



## CATALOG

# Switches and Controls

Electromechanical & Electronic Switching



# FOUNDED IN 1920



Since its founding, Carling Technologies has continually forged a tradition of leadership in quality and product innovation.

There are few products that Carling Technologies hasn't turned "ON" and fewer industries that haven't turned to Carling for solutions.

With ISO and TS registered manufacturing facilities and technical sales offices worldwide, Carling ranks among the world's largest manufacturers of circuit breakers, switches, power distribution units, digital switching systems and electronic controls.



## SWITCHES & CONTROLS

- Electronic
- Rocker
- Toggle
- Pushbutton
- Rotary
- Combination
- Battery
- Disconnect

## CIRCUIT PROTECTION

- Hydraulic-Magnetic
- Thermal
- GFCI / ELCI
- Fuse Links & Holders

## CUSTOM SOLUTIONS

- PDU's
- Keypads
- Control Modules

## MULTIPLEXED POWER SYSTEMS

- HMI Devices & I/O Modules
- Programmable Displays
- Data Communication Interfaces
- Electrical Systems Monitoring

## STRATEGIC MARKETS SERVED:



On/Off Highway



Marine



Telecom/Datacom



Renewable Energy

## HEADQUARTERS/MANUFACTURING FACILITIES:



## OTHER SERVED INDUSTRIES:



Medical



Industrial Control



Audio / Visual



Commercial Food



HVAC



Floor Care



Generators



Small Appliances



Security Systems



Test & Measurement

## COMPETITIVE ADVANTAGES<sup>+</sup>



Innovative &  
Eco-Friendly Products



Excellent Quality &  
Customer Service



Reliable &  
On-Time Delivery



Vertical  
Integration

## WORLDWIDE NUMBERS:



2800<sup>+</sup>  
EMPLOYEES



150<sup>+</sup>  
ENGINEERS



70<sup>+</sup>  
DISTRIBUTORS



50<sup>+</sup>  
REP FIRMS

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**Available Online** are tools such as a [configurit](#), [product selector](#) and [stock check](#).

Please visit [www.carlingtech.com](http://www.carlingtech.com) for the latest information on all our products.

**Application Solution Engineers** are readily available to assist you in selecting the appropriate product for your application. For further assistance, please email us at [team2@carlingtech.com](mailto:team2@carlingtech.com)

**Custom Design Solutions** can be tailor-made for most any application using our extensive engineering resources.

**Other Products** such as miniature switches, hydraulic-magnetic, thermal and ground fault circuit breakers are also available.

# Selector Guide

## DIGITAL SWITCHING



**VM-Series**



**EPB-Series**



**CKP-Series**



**CM-Series**

|                          |                                                  |                                                                   |                                                    |                                                                    |
|--------------------------|--------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------------|
| <b>Software</b>          | SAE J1939 CAN 2.0b Protocol                      | SAE J1939 CAN 2.0b Protocol or Electromechanical Only Option      | SAE J1939 CAN 2.0b Protocol                        | SAE J1939 CAN 2.0b Protocol (Controller Module) LIN Bus (Switches) |
| <b>Switch Layout</b>     | 3 or 6 individual Rockers                        | One lever switch with options for 1 or 2 extra pushbuttons        | 4 to 12 Pushbuttons                                | Up to 3 switches                                                   |
| <b>Operating Voltage</b> | 12 or 24 V                                       | 12 or 24V                                                         | 8-32 V                                             | 9-32 VDC (Controller Module) 5-32 VDC (Hardwire Switch)            |
| <b>Illumination</b>      | Dependent or Independent LED's                   | 1, 2 or 3 dependent white LEDs                                    | 1, 2, or 3 LED's per load                          | 0, 1, 2, or 3 Independent LED's                                    |
| <b>Sealing</b>           | IP68 Front Panel; IP68 Back Panel when connected | IP54                                                              | IP6k9k Front Panel; IP68 Back Panel when connected | IP52 when connected                                                |
| <b>Termination</b>       | Deutsch DT-Series Connector                      | TE connectors and terminals (see datasheet)                       | Deutsch DT-Series Connector                        | TE connectors and terminals (see datasheet)                        |
| <b>Legends</b>           | Custom or standard laser etched backlighting     | Parking Brake Symbol with options for Auto Hold and Trailer Brake | Custom or standard laser etched backlighting       | Custom or standard laser etched backlighting                       |



**CKJ-Series**



**CRS-Series**



**CLTM12-S-Series**

|                          |                                                             |                                                             |                             |
|--------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-----------------------------|
| <b>Software</b>          | SAE J1939 CAN 2.0b Protocol                                 | n/a                                                         | SAE J1939 CAN 2.0b Protocol |
| <b>Switch Layout</b>     | 5 Pushbuttons, (1) 4-directional Joystick and 1 Rotary knob | (1) 4-directional Joystick, 1 Rotary and Pushbutton Encoder | n/a                         |
| <b>Operating Voltage</b> | 8-32 V                                                      | 3.3 or 5.0 V                                                | 6.5-32 V                    |
| <b>Illumination</b>      | CAN Controlled dimmable LEDs                                | n/a                                                         | n/a                         |
| <b>Sealing</b>           | IP67 for above panel switch components                      | IP67 or above panel components                              | IP69k                       |
| <b>Termination</b>       | Deutsch DT-Series connector                                 | SAMTEC SQT, SMM & MMS-Series Connectors                     | Molex MX-150 Connector      |
| <b>Legends</b>           | Custom or standard laser etched backlighting                | n/a                                                         | n/a                         |



# Selector Guide

## SEALED ROCKERS



**L-Series**



**W-Series**



**V-Series**

| Poles                           | 1, 2                                                 | 1, 2                                                   | 1, 2                                                             |
|---------------------------------|------------------------------------------------------|--------------------------------------------------------|------------------------------------------------------------------|
| Ratings                         | IP67;<br>up to 15A 125VAC<br>10A 250VAC<br>20A 18VDC | IP68 including<br>connector;<br>up to 10A 24VDC        | IP66/68;<br>up to 20/15A<br>12/24VDC<br>15A 125VAC<br>10A 250VAC |
| Actuator                        | Rocker, Paddle,<br>Locking Rocker,<br>Window Lift    | Bezel-Less Rocker,<br>Paddle & Locking<br>Rocker       | Rocker, Paddle,<br>Locking Rocker                                |
| Mounting Hole<br>Specifications | .867" x 1.734"<br>[22mm x 44mm]<br>snap-in mount     | .830" x 1.450"<br>[21.08mm x 36.83mm]<br>snap-in mount | .830" x 1.450"<br>[21.08mm x<br>36.83mm]<br>snap-in mount        |
| Termination                     | .187 tab<br>.250 tabs                                | .110 tabs                                              | .250 tabs<br>solder lug<br>wire leads                            |
| Illumination                    | incandescent, LED                                    | LED                                                    | incandescent, LED,<br>neon                                       |
| Approvals                       | n/a                                                  | n/a                                                    | UL, CSA                                                          |

## FULL-SIZE ROCKERS



**S-Series**



**TIG / LTIG / TIH / LTIH / TIL / LTIL / TII / LS**

| Poles                           | 1, 2                             | 1, 2, 3, 4                                                            |
|---------------------------------|----------------------------------|-----------------------------------------------------------------------|
| Ratings                         | up to<br>10A 28VDC               | up to<br>15A 125VAC<br>10A 250VAC<br>26A 250VAC Resistive             |
| Actuator                        | bezel-less rocker                | rocker, paddle                                                        |
| Mounting Hole<br>Specifications | .787" x 1.575" snap-in,<br>keyed | .830" x 1.450"<br>[21.08mm x 36.83mm]<br>snap-in mount<br>screw mount |
| Termination                     | .110 Tabs                        | .187 tab<br>solder lug<br>.250 tabs<br>screw terms<br>wire leads      |
| Illumination                    | LED                              | incandescent, neon                                                    |
| Approvals                       | n/a                              | UL, CSA, VDE                                                          |

# Selector Guide

## MID-SIZED ROCKERS



|                                     | R / LRA / RSC / RG / LRG                                                                  | RR / LRR                                 | T / LTA / TG / LTG / TLG / TTG                                                                 |
|-------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------|
| <b>Poles</b>                        | 1, 2                                                                                      | 1                                        | 1, 2                                                                                           |
| <b>Ratings</b>                      | up to<br>20A 125VAC<br>15A 250VAC                                                         | up to<br>12A 125VAC<br>10A 250VAC        | up to<br>20A 125VAC<br>10A 250VAC                                                              |
| <b>Actuator</b>                     | rocker, paddle                                                                            | rocker                                   | rocker, lever, paddle, plunger, toggle (bat)                                                   |
| <b>Mounting Hole Specifications</b> | .480" x 1.072"<br>[12.19mm x 27.23mm]<br>.866" x 1.182"<br>[22mm x 30mm]<br>snap-in mount | .795"<br>[20.2mm]<br>round snap-in mount | .550" x 1.125"<br>[13.97mm x 28.57mm]<br>1.00" x 1.125"<br>[25.4mm x 28.57mm]<br>snap-in mount |
| <b>Termination</b>                  | solder lug<br>.250 tabs<br>wire leads<br>PC terms                                         | .187 tab                                 | .187 tab<br>solder lug<br>.250 tabs<br>wire leads                                              |
| <b>Illumination</b>                 | incandescent, neon                                                                        | incandescent, neon                       | incandescent, neon                                                                             |
| <b>Approvals</b>                    | UL, CSA, VDE                                                                              | UL, cUL                                  | UL, CSA                                                                                        |

## SMALL-SIZED ROCKERS



|                                     | 651 / 652                                              | 622 / 632                                             | 611 / 621                                           | 610 / 620                                           |
|-------------------------------------|--------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|
| <b>Poles</b>                        | 1                                                      | 1, 2                                                  | 1, 2                                                | 1, 2                                                |
| <b>Ratings</b>                      | up to<br>10A 125VAC<br>10A 250VAC<br>1/4 HP 125-250VAC | up to<br>12A 125VAC<br>8A 250VAC<br>1/2 HP 125-250VAC | up to<br>8A 125VAC<br>4A 250VAC                     | up to<br>8A 125VAC<br>4A 250VAC                     |
| <b>Actuator</b>                     | rocker, paddle                                         | rocker                                                | rocker, paddle                                      | rocker, paddle                                      |
| <b>Mounting Hole Specifications</b> | .508" x .756"<br>[12.9mm x 19.2mm]<br>snap-in mount    | .508" x .756"<br>[12.9mm x 19.2mm]<br>snap-in mount   | .508" x .756"<br>[12.9mm x 19.2mm]<br>snap-in mount | .508" x .756"<br>[12.9mm x 19.2mm]<br>snap-in mount |
| <b>Termination</b>                  | .187 tab<br>solder lug<br>wire leads<br>PC terms       | .187 tab<br>solder lug                                | .187 tab<br>solder lug<br>wire leads<br>PC terms    | solder lug<br>PC terms                              |
| <b>Illumination</b>                 | n/a                                                    | incandescent, LED,<br>neon                            | n/a                                                 | n/a                                                 |
| <b>Sealing</b>                      | UL, CSA                                                | UL, CSA                                               | UL, CSA, VDE                                        | UL, CSA                                             |

# Selector Guide

## TOGGLES



**MAAOA / 215**

**DK / EK**

**110-Series**

**C / D**

**F / G / H / I**

**LT-Series**

**ST-Series**

| Poles                        | 1                                                            | 1, 2                                            | 1, 2                                                 | 1                                                    | 1, 2, 3, 4                                                                    | 1, 2                                                                          | 1, 2                                                |
|------------------------------|--------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------|
| Ratings                      | up to<br>20A 125VAC<br>10A 250VAC<br>1/2HP 125-<br>250VAC    | up to<br>20A 125VAC/<br>DC<br>10A 250VAC/<br>DC | up to<br>6A 125VAC/<br>DC<br>3A 250VAC/<br>DC        | up to<br>20A 125VAC<br>10A 250VAC                    | up to<br>20A 125VAC<br>20A 277VAC<br>2 HP 250VAC                              | up to<br>15A 125VAC<br>10A 250VAC<br>15A 12-28VDC                             | 10A 250VAC<br>15A 125VAC<br>16A 12/24VDC            |
| Actuator                     | toggle (bat)                                                 | toggle (bat),<br>toggle (ball)                  | toggle (bat),<br>toggle (ball)                       | paddle,<br>toggle (bat)                              | paddle, toggle<br>(bat)                                                       | paddle, toggle (bat)                                                          | IP68, bat, paddle                                   |
| Mounting Hole Specifications | .656" x 1.218"<br>[16.66mm x<br>30.54mm]<br>snap-in<br>mount | .500" dia<br>[12.7mm]<br>bushing<br>mount       | .500" dia<br>[12.7mm]<br>bushing<br>mount            | .500" dia<br>[12.7mm]<br>bushing<br>mount            | .500" dia<br>[12.7mm]<br>bushing mount                                        | .500" dia<br>[12.7mm]<br>bushing mount                                        | .500" dia<br>[12.7mm]<br>bushing mount              |
| Termination                  | .250 tabs<br>screw terms<br>wire leads                       | screw terms                                     | solder lug<br>.250 tabs<br>screw terms<br>wire leads | solder lug<br>.250 tabs<br>screw terms<br>wire leads | .187 tabs<br>solder lug<br>.250 tabs<br>screw terms<br>wire leads<br>PC terms | .187 tabs<br>solder lug<br>.250 tabs<br>screw terms<br>wire leads<br>PC terms | .250 tabs<br>Screw Terminals<br>with cage<br>clamps |
| Illumination                 | n/a                                                          | n/a                                             | n/a                                                  | n/a                                                  | n/a                                                                           | incandescent, neon                                                            | n/a                                                 |
| Approvals                    | UL, CSA                                                      | UL, CSA                                         | UL, CSA                                              | UL, CSA                                              | UL, CSA, VDE                                                                  | n/a                                                                           | UL60079-15, cUL                                     |

## PUSHBUTTONS



**P / PP**

**641 / 110**

**P26 / P27**

**170 / 172**

**16-3P**

**AV / AVH**

**GP-Series**

| Poles                        | 1                                         | 1, 2, 3                                   | 1                                         | 1                                         | 1                                         | 1                                                                 | 1                                                                                                |
|------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Ratings                      | up to<br>20A 125VAC<br>10A 250VAC         | up to<br>5A 125VAC<br>2A 250VAC           | up to<br>6A 125VAC<br>3A 277VAC           | up to<br>15A 125VAC<br>10A 250VAC         | up to<br>3A 125VAC                        | AV-Series: up to<br>10.1A 12VDC<br>AVH-Series: up to<br>30A 12VDC | .25A 24VDC                                                                                       |
| Mounting Hole Specifications | .500" dia<br>[12.7mm]<br>bushing<br>mount | .500" dia<br>[12.7mm]<br>bushing<br>mount | .500" dia<br>[12.7mm]<br>bushing<br>mount | .500" dia<br>[12.7mm]<br>bushing<br>mount | .500" dia<br>[12.7mm]<br>bushing<br>mount | .748" dia<br>[19mm]<br>bushing mount                              | .830" x 1.450"<br>[21.08mm x<br>36.83mm]<br>snap-in mount                                        |
| Termination                  | .250 tabs<br>screw terms<br>wire leads    | solder lug<br>wire leads<br>PC terms      | .250 tabs<br>solder lug<br>wire leads     | solder lug<br>screw terms<br>wire leads   | solder lug<br>wire leads                  | .110 tabs<br>wire leads                                           | Integrated female<br>connector in switch<br>base. Mates with<br>Delphi Connector<br>P/N 12064760 |
| Illumination                 | n/a                                       | n/a                                       | n/a                                       | n/a                                       | n/a                                       | LED                                                               | LED                                                                                              |
| Approvals                    | UL, CSA, TUV                              | UL, CSA                                   | UL, CSA                                   | UL, CSA                                   | UL, CSA                                   | UL1500                                                            | N/A                                                                                              |

# Selector Guide

## ROTARY



**700 / 800-Series**



**R135-Series**



**V-Rotary**



**CVR-Series**

|                                     |                                      |                                                                      |                                                  |                                                  |
|-------------------------------------|--------------------------------------|----------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| <b>Poles</b>                        | 1                                    | 1                                                                    | 2                                                | 1                                                |
| <b>Ratings</b>                      | up to<br>3A 250VAC<br>6A 125VAC      | 1.5A 250VAC<br>3A 125VAC<br>5A 12VDC                                 | up to<br>15A 24VDC<br>20A 12VDC                  | 12/24VDC                                         |
| <b>Sealing / Actuator</b>           | asymmetrical                         | round                                                                | IP67, ergonomic knob                             | Thumbwheel                                       |
| <b>Mounting Hole Specifications</b> | .500" dia [12.7mm] bushing mount     | .375" dia [9.52mm] bushing mount<br>.500" dia [12.7mm] snap-in mount | .830" x 1.450" [21.08mm x 36.83mm] snap-in mount | .830" x 1.450" [21.08mm x 36.83mm] snap-in mount |
| <b>Termination</b>                  | .125 tabs<br>solder lug<br>.250 tabs | wire leads                                                           | solder lug<br>.250 tabs<br>wire leads            | 250 tabs                                         |
| <b>Illumination</b>                 | n/a                                  | n/a                                                                  | incandescent, LED                                | LED                                              |
| <b>Approvals</b>                    | UL, CSA                              | UL, CSA                                                              | pending                                          | n/a                                              |

## BATTERY DISCONNECT



**BD1-Series**



**BD-Series**

|                                     |                                               |                             |
|-------------------------------------|-----------------------------------------------|-----------------------------|
| <b>Poles</b>                        | 1                                             | 1                           |
| <b>Ratings</b>                      | 250 Amps<br>12VDC/24VDC                       | 100-300 Amps<br>12VDC/24VDC |
| <b>Actuator</b>                     | ergonomic knob;<br>removable option available | ergonomic knob              |
| <b>Mounting Hole Specifications</b> | M6/M7 Bolt and Nut                            | M8 Bolt and Nut             |
| <b>Termination</b>                  | M10 Stud;<br>19 and 27mm length               | M10 Stud<br>M14 Stud        |

## COMBINATION



**CSW-Series**

|                                     |                            |
|-------------------------------------|----------------------------|
| <b>Poles</b>                        | Multi                      |
| <b>Ratings</b>                      | 10-15A 12VDC               |
| <b>Actuator</b>                     | Pushbutton, Rotary & Lever |
| <b>Mounting Hole Specifications</b> | Round, Snap in Style       |
| <b>Termination</b>                  | Wire Leads or Connector    |

# Selector Guide

## CONTROL SWITCHES



**LW Wiper**

**LMR Mirror**

**LD Dimmer**

| Poles                        | 2                                                | multi                                            | 1                                                |
|------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Ratings                      | up to<br>8A 14VDC<br>4A 28VDC                    | up to<br>1A 14VDC<br>.5A 28VDC                   | up to<br>10A 12VDC<br>5A 24VDC                   |
| Actuator                     | rocker, paddle                                   | joystick                                         | rocker, paddle                                   |
| Mounting Hole Specifications | .867" x 1.734"<br>[22mm x 44mm]<br>snap-in mount | .867" x 1.734"<br>[22mm x 44mm]<br>snap-in mount | .867" x 1.734"<br>[22mm x 44mm]<br>snap-in mount |
| Termination                  | .187 tabs                                        | wire leads with<br>connector                     | .250 tabs                                        |
| Illumination                 | LED                                              | n/a                                              | LED                                              |
| Sealing                      | n/a                                              | n/a                                              | IP67 above-panel                                 |

## CHARGING DEVICES



**V-Charger**

**CV-Charger**

| Poles                        | 1                                                                                                    | 1                                     |
|------------------------------|------------------------------------------------------------------------------------------------------|---------------------------------------|
| Ratings                      | up to IP65<br>12V/24VDC                                                                              | 9-32VDC                               |
| Mounting Hole Specifications | .830" x 1.450"<br>[21.08mm x 36.83mm]                                                                | .830" x 1.450"<br>[21.08mm x 36.83mm] |
| Termination                  | .250 tabs                                                                                            | .250 tabs                             |
| Illumination                 | LED                                                                                                  | LED                                   |
| Sealing                      | Curved Doors: IP65 above-panel when doors closed<br>Square Doors: IP64 above-panel when doors closed | IP64 above-panel when doors closed    |



# VM-Series

J1939 multiplexed  
operator control module

**PRODUCT WEBPAGE**

*request sample, watch video*



The sealed VM-Series incorporates the Contura® switches actuator style flexibility with SAEJ1939 CAN Bus technology to create a multiplexed operator control module. Additionally, the VM-Series increases product reliability, while reducing the complexity of wire harnesses and improving assembly efficiencies.

**12/24**  
VDC

**250,000**  
Operations

**IP68 Sealing**  
Above and below panel

## Typical Applications

- Commercial Vehicles
- Construction Equipment
- Agricultural Equipment
- Work Trucks

# Design Features

## IP68 SEALING PROTECTION

Fully sealed above panel and below panel (when connected)



Front View

### ROCKERS

Variety of removable V-Series Contura® actuator styles

### CUSTOMIZABLE ICONS

Choose from our extensive library of legends, or customize your own.

Back View

VM6



### SNAP-IN MOUNTING

For fast, easy assembly.

### 6 PIN CONNECTOR

Mates to the Deutsch DT-Series Connector.

VM3



### 4 PIN CONNECTOR

Mates to the Deutsch DT-Series Connector. Can be used to Daisy-chain multiple VM-Series.

## Related Products



**CLTM12-S-Series >**  
Load Controller



**CKJ-Series >**  
Jog Switch



**CKP-Series >**  
Customizable Keypad

# Tech Specs

## Electrical

|                                              |             | VM3                                                                                                                                             | VM6                                 |
|----------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Operating Voltage                            |             | 12 or 24VDC systems                                                                                                                             |                                     |
| Maximum Current                              |             | Operation: 250mA<br>Sleep mode: 6mA                                                                                                             | Operation: 300mA<br>Sleep mode: 3mA |
| Electrical Endurance                         |             | Minimum 250,000 operations (50,000 cycles at -40°C, 150,000 cycles at room temperature, and 50,000 cycles at 85°C) with Contura V+ rocker style |                                     |
| Over Voltage                                 | ISO 16750-2 | Apply voltage 36VDC for 60 min at 65°C                                                                                                          |                                     |
| Short Circuit Protection                     | ISO 16750-2 | All signal inputs and outputs short to ground for 60s                                                                                           |                                     |
| Reverse Polarity Protection                  | ISO 16750-2 | 12 VDC systems: -24VDC for 5 minutes<br>24 VDC systems: -36VDC for 5 minutes                                                                    |                                     |
| Starting Profile                             | ISO 16750-2 | Class A                                                                                                                                         |                                     |
| Withstand Voltage                            | ISO 16750-2 | 500Vrms (50 Hz to 60 Hz) with a duration of 60s                                                                                                 |                                     |
| Insulation Resistance                        | ISO 16750-2 | Minimum 10 Mohms at 500 VDC with a duration of 60s                                                                                              |                                     |
| Superimposed Alternating Voltage             | ISO 16750-2 | Severity 2, Upp of 4V for Un=12V and Un=24V                                                                                                     |                                     |
| Slow Decrease and Increase of Supply Voltage | ISO 16750-2 | Power supply from 8V to 0V, 0V to 8V, rate of 0.5 ± 0.1) V/min linear                                                                           |                                     |
| Momentary Drop in Supply Voltage             | ISO 16750-2 | Voltage drop from 8V to 4.5V for 12V system, 16V to 9V for 24V system. Dwell 10ms.                                                              |                                     |

## Electromagnetic Compatibility (EMC)

|                        |             | VM3                                                                                      | VM6                                                                                    |
|------------------------|-------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| ESD                    | ISO 10605   | ±15kV air discharges, ±8kV contact discharges                                            |                                                                                        |
| Absorbed-Lined Chamber | ISO 11452-2 | 100V/m, 80MHz to 2GHz                                                                    | 100V/m, 20MHz to 2GHz                                                                  |
| Bulk Current Injection | ISO 11452-4 | 100mA, 20MHz to 400MHz                                                                   |                                                                                        |
| Conducted Transients   | ISO 7637-2  | Applied level IV according to ISO 7637, Annex A, and ISO 16750-2, sections 4.6.3 & 4.6.4 | All test pulses according to ISO 7637, Annex table A2 for 24V systems, level 3 minimum |
| Transient Emissions    | ISO 13766   | Annex D and E, 30MHz to 1GHz                                                             |                                                                                        |

## Environmental

|                       |                | VM3                                                                                                               | VM6 |
|-----------------------|----------------|-------------------------------------------------------------------------------------------------------------------|-----|
| Operating Temperature |                | -40 °C to + 85°C                                                                                                  |     |
| Storage Temperature   |                | -40°C to + 85°C                                                                                                   |     |
| Thermal, Hot Soak     | IEC 60068-2-2  | Test Bb, 85°C for 96 hours                                                                                        |     |
| Thermal, Cold Soak    | IEC 60068-2-1  | Test Ad, -40°C for 96 hours                                                                                       |     |
| Thermal Shock         | IEC 60068-2-14 | Test Na, -40°C to 85°C, 1 hour per cycle (30 minutes at -40°C, 30 minutes at 85°C) 10 cycles                      |     |
| Thermal Cycling       | IEC 60068-2-14 | Test Nb, -40°C to 85°C, 2 cycles of 8 hours each                                                                  |     |
| Sealing Protection    | IEC 60529      | IP68, for above and below panel components of actual switch only (when connected), 1.2m deep water for 60 ± 2 min |     |
| Solar Radiation       | IEC 60068-2-5  | Procedure B, 40°C for 10 days                                                                                     |     |
| Humidity, Soak        | IEC 60068-2-78 | Test Cab, 30°C at 93% RH for 10 days                                                                              |     |
| Humidity, Cyclic      | IEC 60068-2-30 | Test Db, Method 1, 55°C to 25°C at >90% R.H., 6 cycles of 24 hours each                                           |     |
| Salt Spray            | IEC 60068-52   | Test Kb, severity level 4                                                                                         |     |
| Chemical Resistance   | ISO 16750-5    | Method II for engine oil, hydraulic oil, diesel fuel, grease, and urea at max temperature                         |     |

# Tech Specs

## Mechanical

|                      |                | VM3                                                                                                          | VM6 |
|----------------------|----------------|--------------------------------------------------------------------------------------------------------------|-----|
| Vibration, Random    | IEC 60068-2-64 | Test Fh, method 1, random excitation at 10, 150, 220 and 350 Hz breakpoint frequencies, 5 hours in each axis |     |
| Vibration, Resonance | IEC 60068-2-6  | Sinusoidal from 10-2000 Hz, 5 minutes at resonant points                                                     |     |
| Vibration, General   | IEC 60068-2-6  | Swept sine wave from 5 to 500 Hz, $\pm 15$ mm amplitude, 5g, 20 cycles in each plane                         |     |
| Shock                | IEC 60068-2-27 | 3 shocks in each direction of the 3 axes (18 total shocks) at 500 m/s <sup>2</sup> for 11 ms                 |     |
| Bump                 | IEC 60068-2-27 | 100 shocks in each direction of the 3 axes (600 total shocks) at 400 m/s <sup>2</sup> for 6 ms               |     |
| Drop Test            | IEC 60068-2-31 | Test Ec, free fall procedure 1, drop in each direction of the 3 axes (6 total drops) from 500mm              |     |

## Physical

|                    |  | VM3                                                                                                                                                                                                         | VM6                 |
|--------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Switch Functions   |  | 2 Position Maintained<br>2 Position Momentary Top<br>2 Position Momentary Bottom<br>3 Position Momentary Bottom<br>3 Position Maintained<br>3 Position Momentary Top and Bottom<br>3 Position Momentary Top |                     |
| Illumination       |  | Single color LED (Red, Green, Amber, Blue, White) (See Table A)                                                                                                                                             |                     |
| Soft Lock          |  | Yes                                                                                                                                                                                                         |                     |
| Mounting           |  | Front panel, removable from a side                                                                                                                                                                          |                     |
| Depth Behind Panel |  | Depth behind panel 41mm [1.6 in]                                                                                                                                                                            |                     |
| Weight             |  | ~91 grams [0.2 lb]                                                                                                                                                                                          | ~227 grams [0.5 lb] |
| Materials          |  | Housing – Acetal, UV stabilized; Back cover – Acetal, UV stabilized; Rocker – Polycarbonate / Nylon; Mounting clips – Stainless Steel                                                                       |                     |
| RoHS               |  | Yes                                                                                                                                                                                                         |                     |
| REACH              |  | Yes                                                                                                                                                                                                         |                     |
| Connector          |  | Deutsch DT-Series 4 and 6 pin (6 pin for VM6 only)                                                                                                                                                          |                     |

## Software

|               |  | VM3                                                                                      | VM6 |
|---------------|--|------------------------------------------------------------------------------------------|-----|
| Communication |  | Master: CAN 2.0b (SAE J1939)                                                             |     |
| Programming   |  | During manufacture or via CAN                                                            |     |
| Sleep Mode    |  | Any switch can be configured to wake the unit, which also activates the switch function. |     |
| Dimming       |  | LED dimming controlled by ECU through CAN bus                                            |     |

# Tech Specs

## Software Interface Integration

Click below on integrating the VM-Series into J1939 CAN network:

[www.carlingtech.com/sites/default/files/documents/vm-series\\_interface.pdf](http://www.carlingtech.com/sites/default/files/documents/vm-series_interface.pdf)

## Tables

**Table A:** Illumination Table (for each switch position)

| Location   | Type      | Color                            | Option                         |
|------------|-----------|----------------------------------|--------------------------------|
| Top LED    | Backlight | Red, Green, Amber, Blue or White | Continuous Flashing            |
|            | Function  | Red, Green, Amber, Blue or White | ON with Switch, ON with Device |
| Bottom LED | Backlight | Red, Green, Amber, Blue or White | Continuous Flashing            |
|            | Function  | Red, Green, Amber, Blue or White | ON with Switch, ON with Device |

**Table B:** Connector 1 Pinout for VM3

|          | Pin    | 1   | 2   | 3     | 4     |
|----------|--------|-----|-----|-------|-------|
| Option 1 | Signal | VCC | GND | CAN_H | CAN_L |

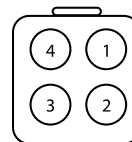


Figure 1:  
Connector 1 Pinout

**Table C:** Connector 1 Pinout for VM6

|          | Pin    | 1     | 2     | 3     | 4     |
|----------|--------|-------|-------|-------|-------|
| Option 1 | Signal | VCC   | GND   | CAN_H | CAN_L |
| Option 2 | Signal | Out 1 | Out 2 | Out 3 | Out 4 |

Note: Out 1 to Out 4 is to control loads with max output current 0.5A @ 24VDC

**Table D:** Connector 1 Pinout for VM6

|          | Pin    | 1     | 2     | 3  | 4  | 5   | 6   |
|----------|--------|-------|-------|----|----|-----|-----|
| Option 1 | Signal | CAN_L | CAN_H | NC | NC | GND | VCC |

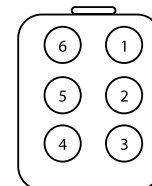


Figure 2:  
Connector 2  
Pinout

**Table E:** Operation Current Values

Size Voltage Sleep Current Value (mA) 100% Brightness Operating Current Value (mA) 10% Brightness Operating Current Value (mA)

| Size | Voltage | Sleep Current Value (mA) | 100% Brightness Operating Current Value (mA) | 10% Brightness Operating Current Value (mA) |
|------|---------|--------------------------|----------------------------------------------|---------------------------------------------|
| VM3  | 12      | ~7.15                    | ~78.72                                       | ~63.55                                      |
|      | 24      | ~6.75                    | ~42.38                                       | ~34.61                                      |
| VM6  | 12      | ~22.74                   | ~155.67                                      | ~111.61                                     |
|      | 24      | ~14.05                   | ~78.74                                       | ~57.94                                      |

# Ordering Scheme

## Part 1: Module and Rocker Style

Sample Part No. **VM 6 - 1 F 1 - 1 000**

Selection 1 2 3 4 5 6 7

### 1. SERIES

**VM** V-Series Module System

### 2. SIZE

**3** 3 Position  
**6** 6 Position

### 3. COMMUNICATION PROTOCOL

**1** J1939  
**3** J1939 with Control Relay (available with 6 position size only)

### 4. ROCKER STYLE

**A** Contura II  
**B** Contura III  
**E** Contura V  
**F** Contura V - Laser Etched  
**H** Contura VII  
**M** Contura XIV  
**N** Contura XIV - Laser Etched  
**Z** No Rockers  
**R** Indicator/Blank Cap

### 5. ORIENTATION

See orientation diagram page for more details

|          |               | Mounting Panel Thickness              |
|----------|---------------|---------------------------------------|
| <b>1</b> | Orientation 1 | 0.06 to 0.11 inches<br>[1.6 to 2.8mm] |
| <b>2</b> | Orientation 2 |                                       |
| <b>3</b> | Orientation 3 |                                       |
| <b>4</b> | Orientation 4 |                                       |
| <b>5</b> | Orientation 5 | 0.11 to 0.16 inches<br>[2.8 to 4.0mm] |
| <b>6</b> | Orientation 6 |                                       |
| <b>7</b> | Orientation 7 |                                       |
| <b>8</b> | Orientation 8 |                                       |

### 6. NETWORK TYPE

**1** 250K Baud Rate  
**2** 500K Baud Rate

### 7. SOURCE ADDRESS

The Source Address is a unique number (**000-238**) assigned to each node on a CAN network, and is determined based on the specific CAN architecture of each customer application.

 [Configure Complete Part Number >](#)

## Part 2: Module Circuit and Lamps

Switch 1 to 3 VM3 and VM6 **1 B 2 A - 2 A 1 0 - 6 0 0 0 -**

Selection 1 2 3 4 1 2 3 4 1 2 3 4

Switch 4 to 6 VM6 Only **1 B 2 A - 2 A 1 0 - 6 0 0 0**

Selection 1 2 3 4 1 2 3 4 1 2 3 4

### 1. SWITCH CIRCUIT

**1** 2 Position Maintained  
**2** 2 Position Momentary Top  
**3** 2 Position Momentary Bottom  
**4** 3 Position Momentary Bottom  
**5** 3 Position Maintained  
**6** 3 Position Momentary Top and Bottom  
**7** 3 Position Momentary Top  
**8**<sup>2</sup> Stationary

### 2. LAMP CIRCUIT

**A** L1 Backlight  
**B** L1, L2 Backlight  
**C** L2 Backlight  
**D** L1 Backlight, L2 Function Light  
**E** L1, L2 Function Light  
**F** L1 Function Light, L2 Backlight  
**G** L1 Function Light  
**H** L2 Function Light  
**0** No Lamp

### 3. LAMP 1

**1** LED 1, Red  
**2** LED 1, Green  
**3** LED 1, Blue  
**4** LED 1, Amber  
**5** LED 1, White  
**0** No LED

### 4. LAMP 2

**A** LED 2, Red  
**B** LED 2, Green  
**C** LED 2, Blue  
**D** LED 2, Amber  
**G** LED 2, White  
**0** No LED

#### Notes:

- 1 Available with stationary switch circuit 8 only, (see part 2 of ordering scheme).  
2 Available with rocker style r only, (see part 1 of ordering scheme).



# Ordering Scheme

## Part 3: Rockers

All Rocker options must match box 4 from part 1. For additional Contura® styles and options, consult factory.

### Contura II, III, V, VII and XIV Rockers

Sample Part No. **VV A Z C 00 - 0 00**

Selection 1 2 3 4 5 6 7

#### 1. SERIES

**VV** V-Series Rocker

#### 2. ACTUATOR STYLE

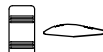
##### Contura II

**A** Thick end on top



##### Contura III

**C** Thick end on top



##### Contura V

**G** Contura V  
**P** Laser-Etched



##### Contura VII

**Z** Contura VII



##### Contura XIV

**FA** Contura XIV  
**FB** Laser-Etched



#### 3. LENS

| Z - No Lens |       |       |       |     |      | Lens Style Location   |     |   |     |
|-------------|-------|-------|-------|-----|------|-----------------------|-----|---|-----|
| Clear       | White | Amber | Green | Red | Blue | II                    | III | V | XIV |
| 1           | 6     | B     | G     | M   | T    |                       |     |   |     |
| 2           | 7     | C     | H     | N   | U    |                       |     |   |     |
| 3           | 8     | D     | J     | P   | V    |                       |     |   |     |
| 4           | 9     | E     | K     | R   | W    |                       | N/A |   |     |
| 5           | A     | F     | L     | S   | Y    |                       | N/A |   |     |
| 5           | A     | N/A   | N/A   | N/A | N/A  | XIV laser-etched only |     |   |     |

##### Only Contura VII

| Z - No Lens |       |       |     |      | Lens Style Location |  |
|-------------|-------|-------|-----|------|---------------------|--|
| White       | Amber | Green | Red | Blue |                     |  |
| 6           | B     | G     | M   | T    |                     |  |
| 7           | C     | H     | N   | U    |                     |  |
| 8           | D     | J     | P   | V    |                     |  |
| 9           | E     | K     | R   | W    |                     |  |
| A           | F     | L     | S   | Y    |                     |  |
| 1           | 2     | 3     | 4   | 5    |                     |  |

Lens color for LEDs must be clear, white, or match color of LED.

#### 4. ACTUATOR COLOR AND TEXTURE

##### Contura II & III

**B** Black **G** Gray **R** Red **W** White (Soft Surface)  
**C** Black **H** Gray **S** Red **Y** White (Hard Surface)

##### Contura V

**C** Black **H** Gray **S** Red **Y** White  
**Laser-Etched only** **D** Nickel **E** Pewter

##### Contura VII

**C** Black **H** Gray **S** Red **Y** White

##### Contura XIV

**C** Black **S** Red **Y** White

#### 5. ACTUATOR LENS OR BODY LEGENDS

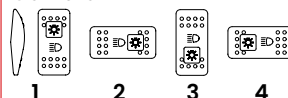
|        |        |        |        |  |
|--------|--------|--------|--------|--|
| 11 ON  | 12 OFF | 13 I   | 14 O   |  |
| OFF    | ON     | O      | I      |  |
| 15 O O | 16 O O | 17 O I | 18 I O |  |
| F N    | N F    | F      |        |  |

See standard legends codes page. Consult factory for additional icons.

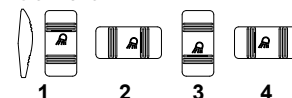
#### 6. LEGEND ORIENTATION

- 0 No legend (used with codes 11-18 in box 5)
- 1 Orientation 1
- 2 Orientation 2
- 3 Orientation 3
- 4 Orientation 4

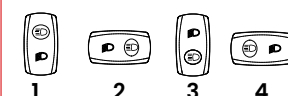
##### Contura II



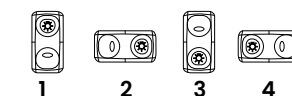
##### Contura III



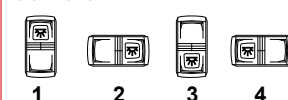
##### Contura V



##### Contura VII



##### Contura XIV



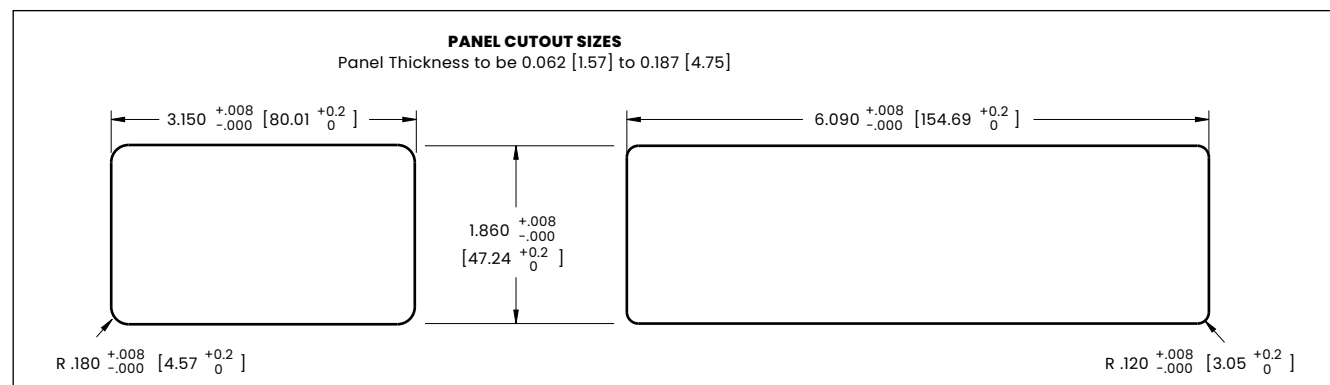
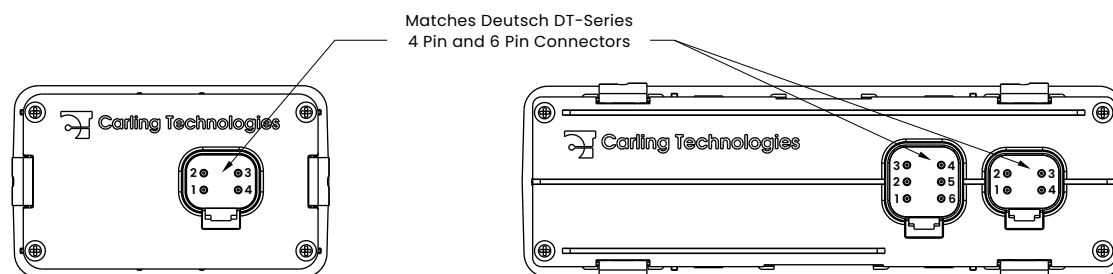
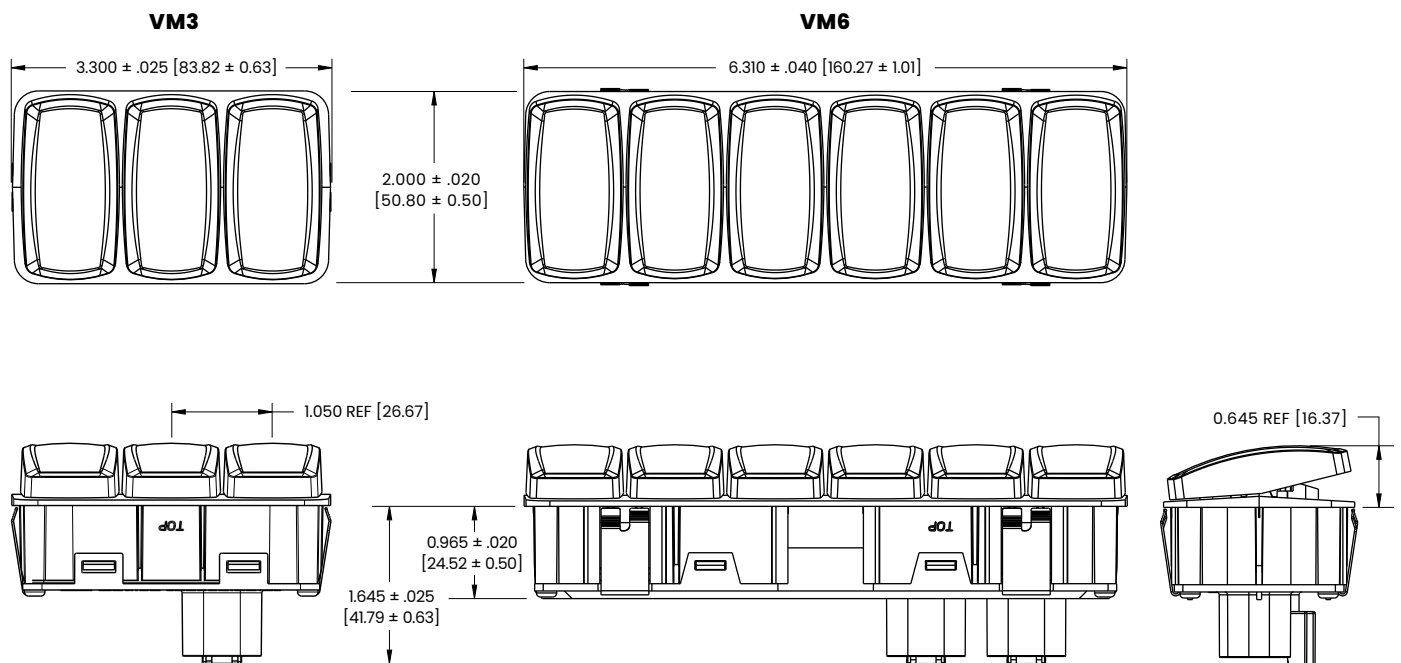
#### 7. ACTUATOR LENS LEGEND

**00** No legend this location  
(used with codes 11-18 in box 5) Box 7 required when rocker requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in box 5; body legend specified in box 7.

See standard legends codes page. Consult factory for additional icons.

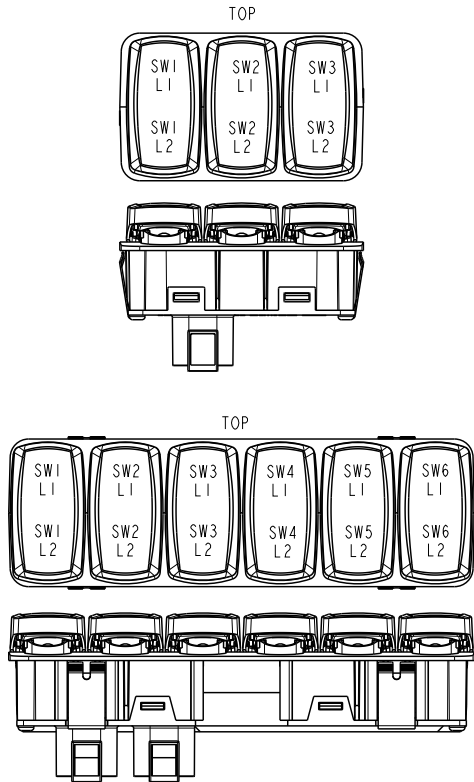
# Dimensional Specs

inches [millimeters]

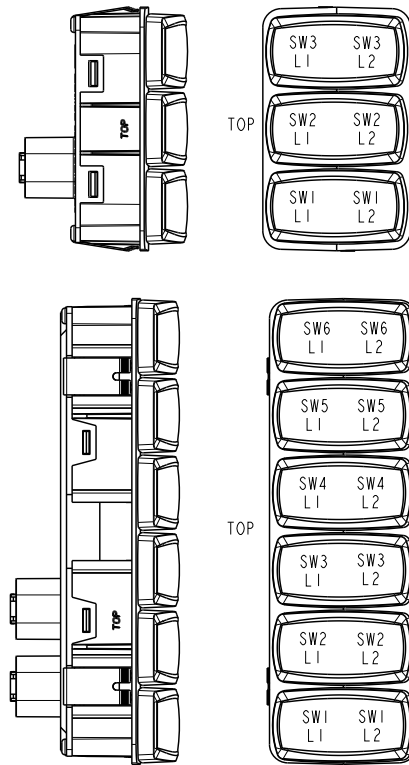


# Orientation Diagram

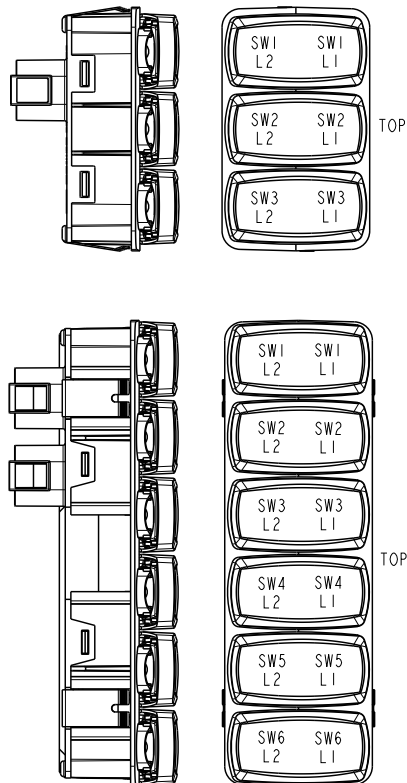
## Orientation 1



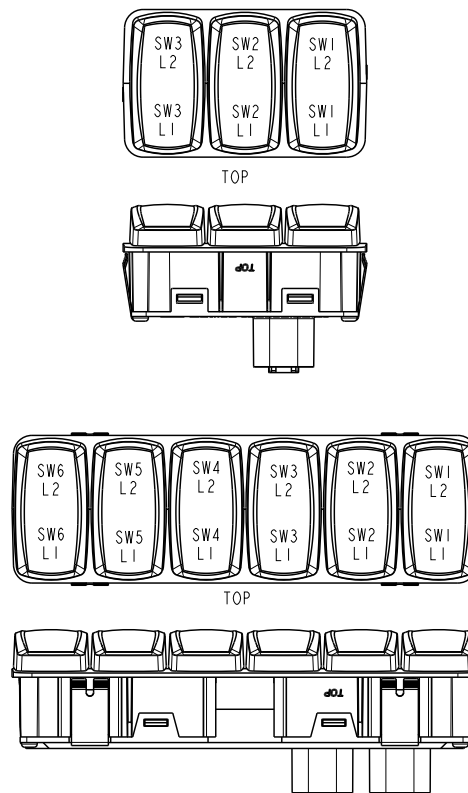
## Orientation 2



## Orientation 3



## Orientation 4



# EPB-Series

Electronic Parking Brake Switch

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



The EPB-Series is a configurable electronic parking brake switch for 12/24 VDC systems. Featuring IP54-rated sealing of above-panel components and an electrical endurance rating of 1,000,000 cycles, the EPB-Series switch is ideal for commercial vehicles. The durable EPB switch can be configured with parking brake only, parking brake with auto hold, or parking brake with auto hold and trailer brake functions. In addition, there are multiple options for configuring the switch for hardwired signals or SAE J1939-compliant CAN protocol.

**12/24**  
VDC

**1,000,000**  
Operations

**IP54 Sealing**  
for above-panel components

## Typical Applications

- Work Trucks
- Commercial Vehicles
- Construction Equipment
- Agricultural Equipment

# Tech Specs

## Electrical

|                                                          |                                                                                                                                   |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Operating Voltage                                        | Designed for 12/24 VDC systems                                                                                                    |
| Electrical Endurance                                     | Operating 1,000,000 cycles, Rate 15~20cycles/minute, with 28V 100mA, 20% at 85°C, 20% at -40°C, 60% at 25°C. Force deviation <30% |
| Over Voltage                                             | ISO 16750-2; 36V DC for 60 minutes at 65°C                                                                                        |
| Reverse Polarity Protection                              | ISO 16750-2; Apply -28VDC for 60s                                                                                                 |
| Withstand Voltage                                        | ISO 16750-2; 550Vrms with a duration of 60s                                                                                       |
| Abnormal Supply Voltage                                  | ISO 16750-2; DC9V, 16V, 18V, 32V                                                                                                  |
| Safety Requirement                                       | ISO 26262; ASIL B grade MCU and hall sensor                                                                                       |
| Initial voltage drop of contacts (hardwire version only) | < 1mV at 100mA                                                                                                                    |

## Mechanical

|                            |                                                                                                                                 |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Structural Characteristics | Put 98N force on the outside surface, contact area more than 1cm <sup>2</sup> , stay for 60s                                    |
| Vibration                  | IEC 60068-2-6; Amplitude 1.2mm (10~25Hz), Accelerate 30m/s <sup>2</sup> (25~500Hz), Sweep 1oct/min, each axis 8 hours           |
| Drop Test                  | IEC 60068-2-31; Free fall test in each direction of the 3 axis (6 surfaces) from 1000mm, each specimen 3 times (total 18 drops) |

## Electromagnetic (CAN version only)

|                                   |                                                                                                                                                                                                  |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ESD                               | ISO 10605; +/-15kV air discharge, +/-8kV contact discharge                                                                                                                                       |
| Radiation Immunity-ALSE           | ISO 11452-2; Absorbed-lined chamber 75V/m, Frequency 80MHz to 3GHz, Class A                                                                                                                      |
| Bulk Current Injection            | ISO 11452-4; 75mA, 1MHz to 400MHz, Class A                                                                                                                                                       |
| Transient Conduction -Supply Line | ISO 7637-2:2004; All test pulse in Annex A Table A2, pulse 1/2b-Class C, pulse 2a/3a/3b/4/5a-Class A                                                                                             |
| Transient Conduction -Signal Line | ISO 7637-3:2007; Test method CCC and ICC. Annex B, level III, Class A                                                                                                                            |
| Portable Transmitters             | ISO 11452-9:2012; Frequency 360MHz~5.925GHz. Test sample surface and wiring harness, Class A                                                                                                     |
| Immunity to Magnetic Fields       | ISO 11452-8:2015; Frequency 15 to 150,000 Hz. Internal field: Annex A2.2, level III. External field: Annex A2.3, level III, Class A                                                              |
| Conducted Emission                | CISPR 25:2016; Voltage method: Section 6.3.4, Frequency band 0.15MHz~108MHz, Test severity level III Current probe method: Section 6.4.3, Frequency band 0.15MHz~245MHz, test severity level III |
| Radiated Emission                 | CISPR 25:2016; ALSE method: Section 6.5.4, Frequency band 0.15MHz~2500MHz, test severity level III                                                                                               |

## Environmental

|                          |                                                                                                                                                                                                     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temperature    | -40°C to +85°C                                                                                                                                                                                      |
| Storage Temperature      | -40°C to +85°C                                                                                                                                                                                      |
| Thermal, Hot Soak        | IEC 60068-2-2; Test Bb, 95°C for 2 hours, down to 65°C with rate 1°C/min, then stay for 1 hour                                                                                                      |
| Thermal, Cold Soak       | IEC 60068-2-1; Test Ab, - 50°C for 2 hours, up to -40°C with rate 1°C/min, then stay for 1 hour                                                                                                     |
| Thermal Shock            | IEC 60068-2-14; Test Na, - 40°C to +85°C 5 cycles for 10 hours                                                                                                                                      |
| Solar Radiation          | ISO 4892-3; 200 hours, test method B Cycle 5, 0.76W/m <sup>2</sup> *nm at 340nm, BP temp. 50±3°C                                                                                                    |
| Ingress Protection       | IEC 60529; IP54, for above-panel components of actual switch                                                                                                                                        |
| Salt Spray               | IEC 60068-2-11; Test Ka, test continuously for 96 hours with 5% NaCl solution                                                                                                                       |
| Chemical resistance      | ISO 16750-5; Engine oil, Diesel fuel, Glass cleaner, Medicinal alcohol, Brake Fluid. Load 10N, brushing with cotton cloth 100 cycles, rate 30 cycles/min                                            |
| Environmental Protection | Formaldehyde; <10mg/kg<br>TVOC; <50µg C/g<br>Benzene; <5µg/g<br>Methylbenzene; <5µg/g<br>Xylene; <15µg/g<br>Condensable components; <2mg<br>Odour level; (23°C/40°C) ≤3<br>Odour level; (80°C) ≤3.5 |

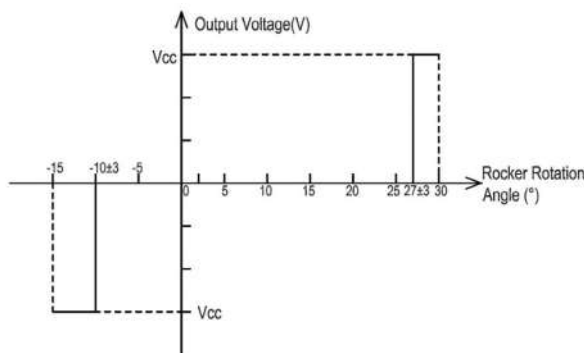
## Physical

|                 |                                                                     |
|-----------------|---------------------------------------------------------------------|
| Limit Switch    | Micro switch, two channels                                          |
| Illumination    | LED backlit icon, dimmable illumination, controlled by CAN messages |
| Operating Force | 8N±3N                                                               |
| Weight          | 102 grams                                                           |

## (CAN version only)

|                  |                           |
|------------------|---------------------------|
| Angle Sensor     | Hall sensor, two channels |
| Angle Resolution | 0.15°                     |
| CAN Protocol     | SAE J1939 compliant       |
| Baud Rate        | 250-500Kbps               |

Schematic diagram of output voltage Vs Rocker Rotation Angle:



GPS-0023 Rev A, GPS-0024 Rev A  
\*Manufacturer reserves the right to change product specification without prior notice.

# Ordering Scheme

Sample Part No. **EPB - 1 A 1 A 156 A**

Selection 1 2 3 4 5 6 7

## 1. SERIES

**EPB** Electronic Parking Brake Switch

## 2. SIGNAL TYPE

- 1** CAN Version, J1939, 250k Baud Rate
- 2** CAN Version, J1939, 500k Baud Rate
- 3** Hardwire Version, Rated Voltage 12VDC
- 4** Hardwire Version, Rated Voltage 24VDC

## 3. SWITCH FUNCTION

See diagram below

- A** Electronic Parking Brake
- B** Electronic Parking Brake Auto Hold
- C** Electronic Parking Brake Auto Hold + Trailer Brake

## 4. INDICATOR COLOR

- 1** Orange

[Configure Complete Part Number >](#)

## 5. BACKLIGHT COLOR

- A** White

## 6. SOURCE ADDRESS

- 000** Hardwire Version
- 156** CAN Version - Default Source Address <sup>1</sup>

## 7. CONNECTOR

2,3,4

|          | Manufacturer | Manufacturer Pin | Number of Pins |
|----------|--------------|------------------|----------------|
| <b>A</b> | TE           | 174051           | 12             |
| <b>B</b> | TE           | 174053           | 16             |

Notes:

1. Unique numbers from 001 to 248 in decimal
2. Mating 12-pin plug TE 174045, mating 16-pin plug TE 174046
3. Hardwire version: 12-pin available with switch function codes A, B; 16-pin available with switch function code B, C
4. CAN version: available ONLY with 12-pin

# Switch Function

PARKING BREAK ONLY



PARKING BREAK WITH AUTO HOLD

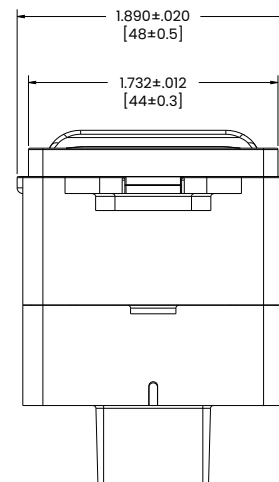
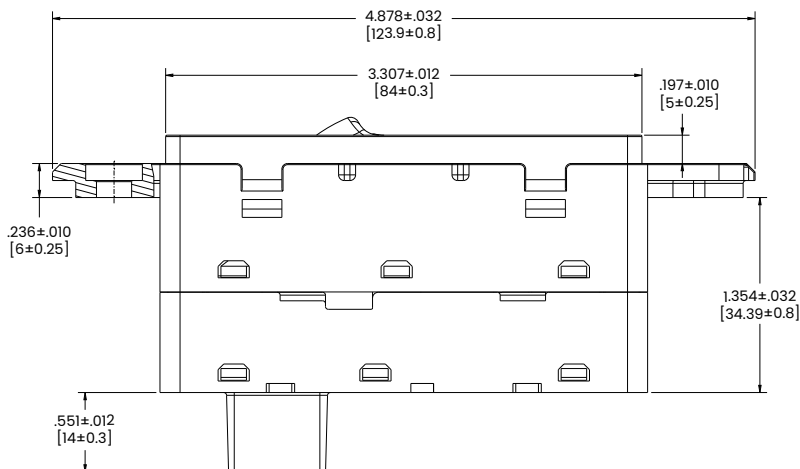
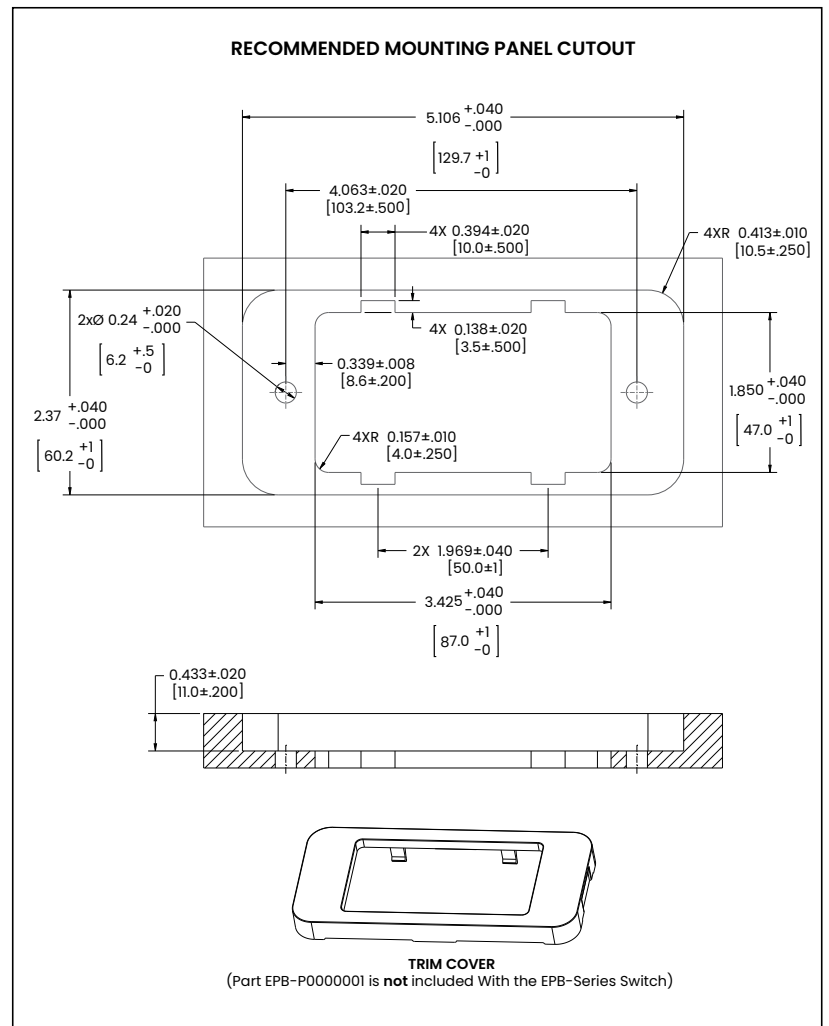
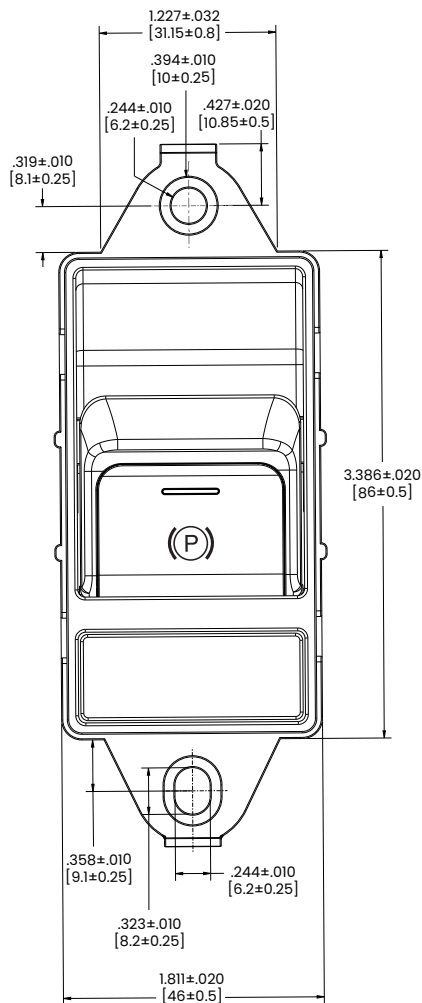


PARKING BREAK WITH AUTO HOLD AND TRAILER BRAKE



# Dimensional Specs

inches [millimeters]





# CKP-Series

J1939 Customizable Keypads

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



Compliant with SAE J1939 CAN standards, the CKP-Series is a customizable membrane keypad featuring laser etched legends and up to three dimmable LED function lights per button, which also offer diagnostic feedback by blinking if there is a fault. With above and below panel sealing protection, the CKP-Series can be installed inside or outside the cab.

**12/24 VDC**    **1,000,000 Operations**    **IP6K9K Sealing**  
 for above panel components

## Typical Applications

• Commercial Vehicles    • Construction    • Mining    • Agricultural    • Military

# Design Features

## LOW PROFILE DESIGN

0.57 inch [14.48 mm] thickness (see dimensional specs for more detail)



Front View

## SEALING PROTECTION

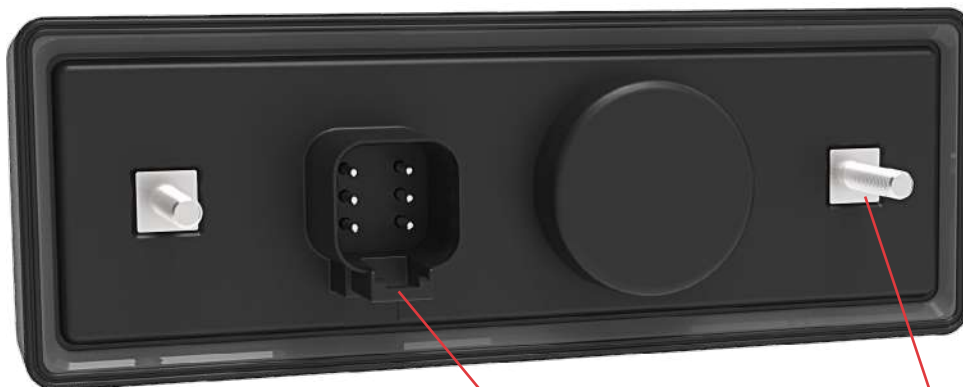
Fully sealed IP6K9K above panel

## LED FUNCTION LIGHTS

One, two, or three LED Function Lights per button. Colors include Amber, Green, Red or Blue

## CUSTOMIZABLE ICONS

Choose from our standard library of icons or use custom icons



Back View

## SEALING PROTECTION

Fully sealed IP6K8 below panel when connected

## CONNECTOR

Mates to the Deutsch DT-Series Connector

## MOUNTING STUDS OR WINGS

10-32 Mounting Studs (2x4, 2x5, 2x6)  
Mounting Wings (2x2, 2x3)

# Related Products



**CLTM12-S-Series >**  
Load Controller



**CKJ-Series >**  
Jog Switch



**VM-Series >**  
Operator Control Module

# Tech Specs

## General

|                     |                                                                                                                              |
|---------------------|------------------------------------------------------------------------------------------------------------------------------|
| Illumination        | LED backlit icons and function lights. Up to 3 function lights per button. Dimmable illumination, controlled by CAN messages |
| Connection / Wiring | Deutsch DT-Series connector (See Dimensional Specs)                                                                          |

## Electrical

|                        |                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Voltage      | Designed for 12/24 Volt systems<br>Minimum 8 VDC Maximum 32VDC                                                                                                                                                                                                                                                                                                     |
| Sleep Mode             | Low current sleep mode draws less than 1.5 mA throughout the supply voltage range, and wakes on keypress or CAN message                                                                                                                                                                                                                                            |
| Supply Voltage Ratings | The keypad passes SAE J1455 section 4.13.1 for power up, operating voltage, over voltage, reverse polarity, and short circuit                                                                                                                                                                                                                                      |
| EMC                    | Transient immunity: ISO 11452-2, 100 V/m, 20 MHz to 2,000 MHz, Class A per ISO 11451-1 Conducted Transient immunity: ISO 7637-2:2004, Annex A Table A2 (for 24V systems), Class A<br>ESD immunity: ISO 10605:2001, Test level IV (8 kV direct discharge, 15 kV air discharge) Transient Emission: ISO 13766, Broadband: Annex D, Narrow band: Annex E, 30-1000 MHz |

## Mechanical

|                    |                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Overall Dimensions | See Dimensional Specs                                                                                                                                     |
| Panel Cutout       | See Dimensional Specs                                                                                                                                     |
| Endurance          | Each button functions for at least 1,000,000 total actuations (100,000 actuations at -40°C, 100,000 actuations at +85°C, and 800,000 actuations at +25°C) |

## Software

|              |                                                 |
|--------------|-------------------------------------------------|
| CAN Protocol | CAN 2.0b type interface as defined by SAE J1939 |
|--------------|-------------------------------------------------|

## Environmental

|                                |                                                                                                                                                                                                                                                   |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Thermal                        | -40°C to +85°C<br>IEC60068-2-1 Cold Soak<br>IEC60068-2-2 Heat Soak<br>IEC60068-2-14 Cycling/Shock                                                                                                                                                 |
| Solar Radiation                | IEC 60068-2-5, procedure B, 10 cycles, Total irradiation per cycle = 22.4 kWh/m²                                                                                                                                                                  |
| Low Pressure                   | IEC 60068-2-13                                                                                                                                                                                                                                    |
| Humidity                       | Soak: IEC 60068-2-78, 93% RH (±3%), 10 day cycle IEC 60068-2-30, test Db: Damp Heat cycle (12 hr. cycles for each variant) 6 cycles total                                                                                                         |
| Ingress Protection             | ISO 20653, IP6K9K, for above panel components of actual switch only. IP6K8, for below panel components of actual switch only. (when connected)                                                                                                    |
| Shock and Bump                 | IEC 60068-2-27, Shock 500 m/s² 11 milliseconds, Bump 400 m/s² 6 milliseconds 600 cycles                                                                                                                                                           |
| Drop Test                      | IEC 60068-2-31, Free fall, Procedure 1, 1000 mm height, drop on all 3 axes in both directions                                                                                                                                                     |
| Vibration                      | IEC 60068-2-6, Swept sine wave section 8.2, 5 - 500 Hz 20 cycles 5g acceleration. IEC 60068-2-6, Vibration sinusoidal, section 8.1, 10 - 2000 Hz, 5g acceleration. IEC 60068-2-64, Method 1, random excitation, 10 - 350 Hz, 5 hours in each axis |
| Chemical Resistance            | IEC 60068-2-74, Class B, Engine Oil, Diesel, Hydraulic Oil, Ethylene Glycol, Urea Nitrogen, Liquid Lime, NPK Fertilizer, Ammonia, Calcium Chloride, Brake fluid                                                                                   |
| Corrosion Resistance           | IEC 60068-2-52, Test Kb, Severity level 4                                                                                                                                                                                                         |
| Weathering/Cracking Resistance | ASTM D1171-99, method A, 72 hours                                                                                                                                                                                                                 |
| Abrasion/Wear Resistance       | ASTM F2357; 40 cycles with .25" paper at 175g force                                                                                                                                                                                               |

## Physical

|                 |                                                                    |
|-----------------|--------------------------------------------------------------------|
| Operating Force | 10 ± 3 N [2.25 ± .67 lbs]                                          |
| Mounting        | Clips or studs (See Dimensional Specs), Vertically or horizontally |
| RoHS            | Compliant                                                          |
| REACH           | Compliant                                                          |
| Connector       | Deutsch DT-Series 6 pin                                            |

Tech Specs continued on next page

# Tech Specs

## Software Interface Integration

Click below on integrating the CKP-Series into J1939 CAN network:

[www.carlingtech.com/sites/default/files/documents/ckp-series\\_interface.pdf](http://www.carlingtech.com/sites/default/files/documents/ckp-series_interface.pdf)

## Tables

**Table A:** Standard Illumination

| Type      | Red | Green | Amber | Blue | White |
|-----------|-----|-------|-------|------|-------|
| Backlight | --- | ---   | ---   | ---  | Yes   |
| Function  | Yes | Yes   | Yes   | Yes  | ---   |

**Table B:** Operation Current Values

|                    | 2x2 | 2x3 | 2x4 | 2x5 | 2x6 |
|--------------------|-----|-----|-----|-----|-----|
| 12V, 10% Luminance | --- | --- | --- | --- | --- |
| Sleep (mA) Max     | .9  | .9  | .9  | .9  | .9  |
| Operate (mA) Max   | 16  | 19  | 29  | 30  | 40  |
| 24V, 10% Luminance | --- | --- | --- | --- | --- |
| Sleep (mA) Max     | .7  | .7  | .7  | .7  | 1   |
| Operate (mA) Max   | 9   | 10  | 15  | 16  | 35  |

# Ordering Scheme

## Part 1: Keypad

Sample Part No. **CKP 1 - 1 A 1 - A B - A - J 000 /**

Selection 1 2 3 4 5 6 7 8 9 10

### 1. SERIES

**CKP** CKP-Series Keypad

### 2. KEYPAD STYLING

**1** Standard

### 3. BUTTON LAYOUT

- 1** Two by Six
- 2** Two by Five
- 3** Two by Four
- 4** Two by Three (1.6~2.8mm Panel Thickness)
- 5** Two by Two (1.6~2.8mm Panel Thickness)
- 6** Two by Three (2.8~4.0mm Panel Thickness)
- 7** Two by Two (2.8~4.0mm Panel Thickness)

### 4. KEYPAD ORIENTATION

- A** Landscape
- B** Portrait
- C** Reverse Landscape
- D** Reverse Portrait

See Orientation Diagrams page

[Configure Complete Part Number >](#)

### 5. KEYPAD COLOR

**1** Black

### 6. BACKLIGHT

**A** White

### 7. FUNCTION LIGHT COLOR

- B** Amber
- C** Green
- D** Red
- E** Blue

### 8. NON-ILLUMINATED IMAGE COLOR

**A** White

### 9. NETWORK TYPE

- J** J1939 (250K BAUD Rate)
- K** J1939 (500K BAUD Rate)

### 10. SOURCE ADDRESS

The Source Address is a unique number (**000-248**) assigned to each node on a CAN network, and is determined based on the specific CAN architecture of each customer application.

## Part 2: Icon Artwork (Select 12 buttons for 2x6, 10 buttons for 2x5, 8 buttons for 2x4, 6 buttons for 2x3, and 4 buttons for 2x2.)

Button 1

**2** **RS**

Function Icon Code

Button 2

**2** **RA**

Function Icon Code

Button 3

**3** **UV**

Function Icon Code

Button 4

**3** **UW**

Function Icon Code

Button 5

**6** **MT**

Function Icon Code

Button 6

**8** **UB**

Function Icon Code

Button 7

**8** **NN**

Function Icon Code

Button 8

**8** **PU**

Function Icon Code

Button 9

**5** **PR**

Function Icon Code

Button 10

**5** **PP**

Function Icon Code

Button 11

**4** **RH**

Function Icon Code

Button 12

**4** **NU**

Function Icon Code

### FUNCTION LIGHT CODE

|                             | Landscape | Portrait | Reverse Landscape | Reverse Portrait |                           | Landscape | Portrait | Reverse Landscape | Reverse Portrait |
|-----------------------------|-----------|----------|-------------------|------------------|---------------------------|-----------|----------|-------------------|------------------|
| <b>1</b> No Function Light  |           |          |                   |                  | <b>5</b> Closed-Open-Open |           |          |                   |                  |
| <b>2</b> Open-Closed-Closed |           |          |                   |                  | <b>6</b> Open-Closed-Open |           |          |                   |                  |
| <b>3</b> Closed-Open-Closed |           |          |                   |                  | <b>7</b> Open-Open-Closed |           |          |                   |                  |
| <b>4</b> Closed-Closed-Open |           |          |                   |                  | <b>8</b> Open-Open-Open   |           |          |                   |                  |

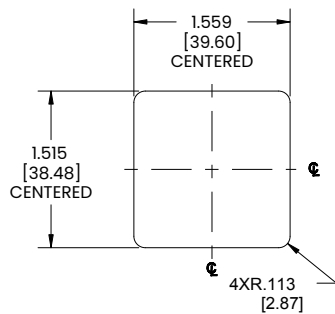
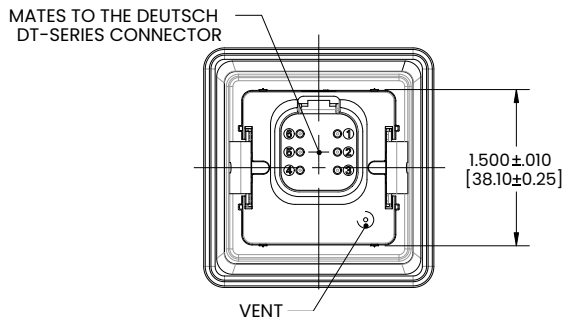
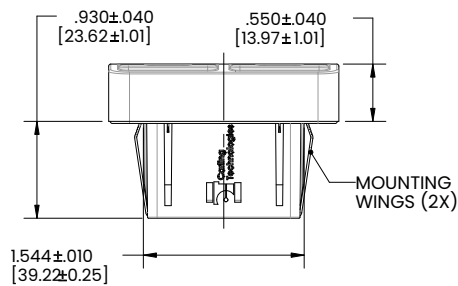
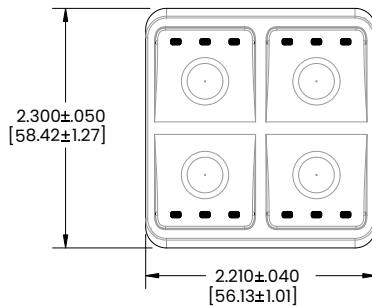
### ICON CODE

**00** For standard icons, see Standard Legends Code page. For additional icons, please consult factory.

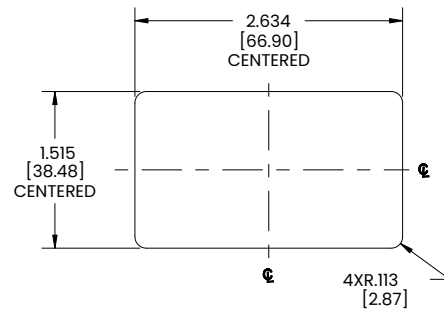
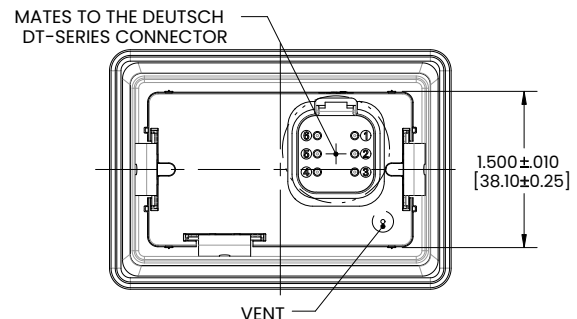
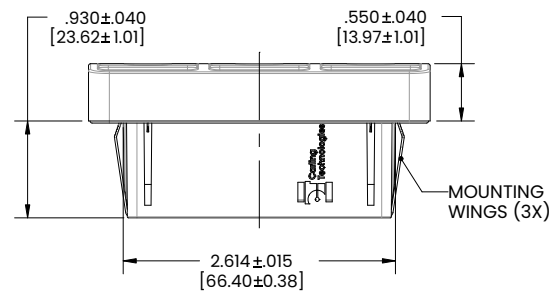
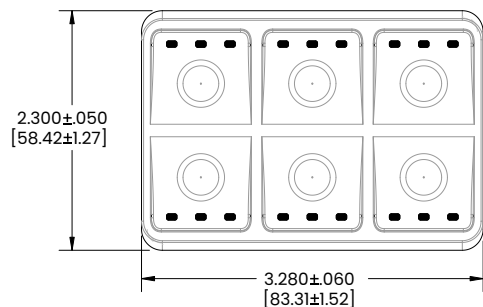
# Dimensional Specs

inches [millimeters]

## 2x2 and 2x3 Configurations



PANEL CUTOUT TOLERANCE .005[0.13],  
PANEL THICKNESS TO BE .080[2.03] MIN AND .130[3.30] MAX.



PANEL CUTOUT TOLERANCE .005[0.13],  
PANEL THICKNESS TO BE .080[2.03] MIN AND .130[3.30] MAX.

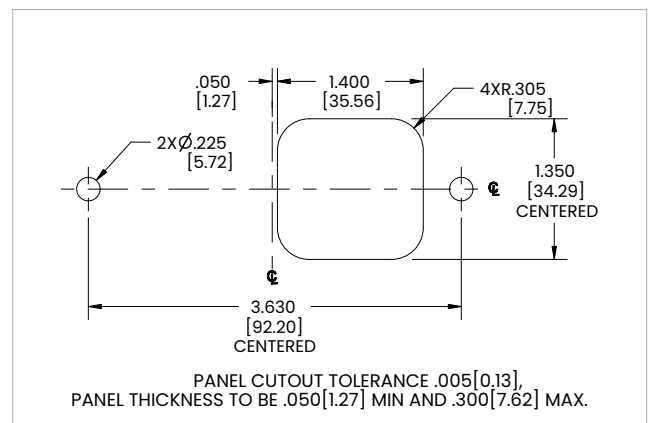
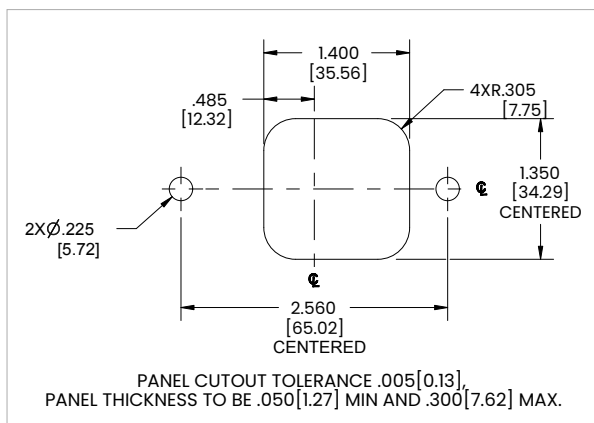
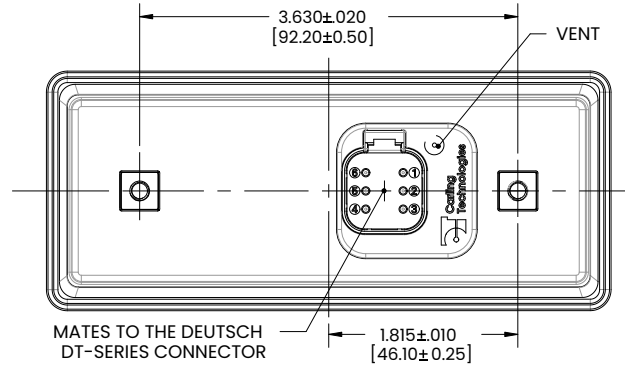
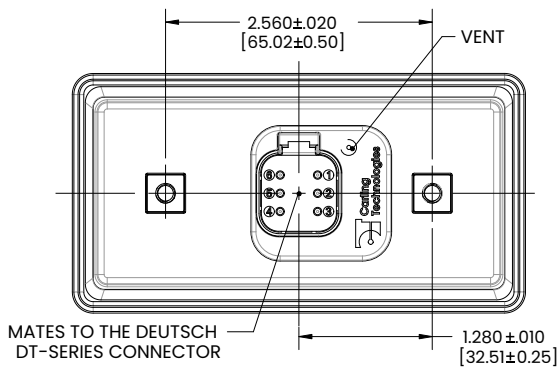
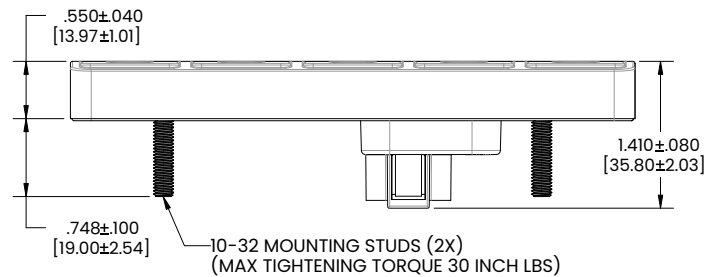
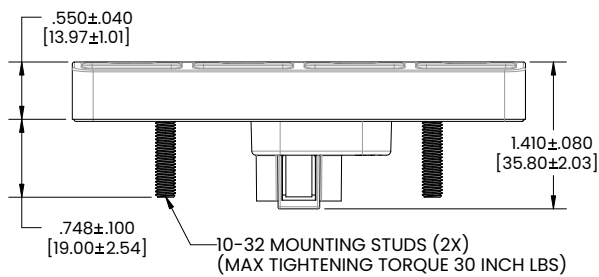
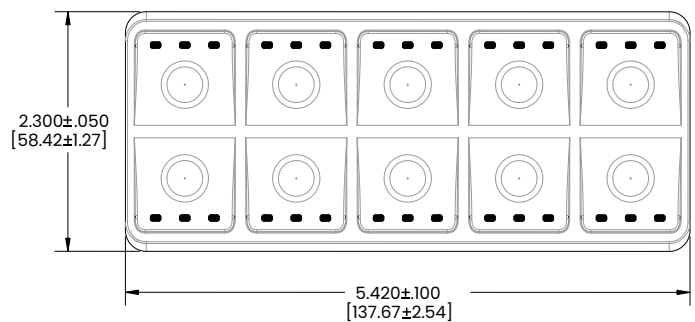
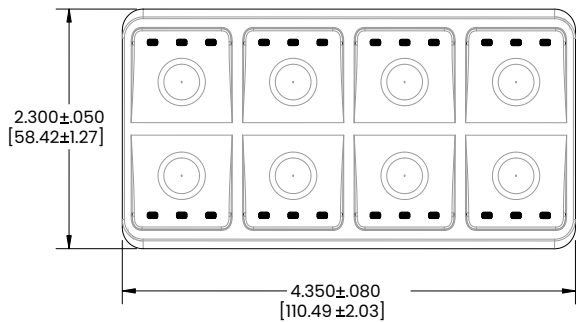
Notes:

1. Do not puncture or plug the vent

# Dimensional Specs

inches [millimeters]

## 2x4 and 2x5 Configurations



Notes:

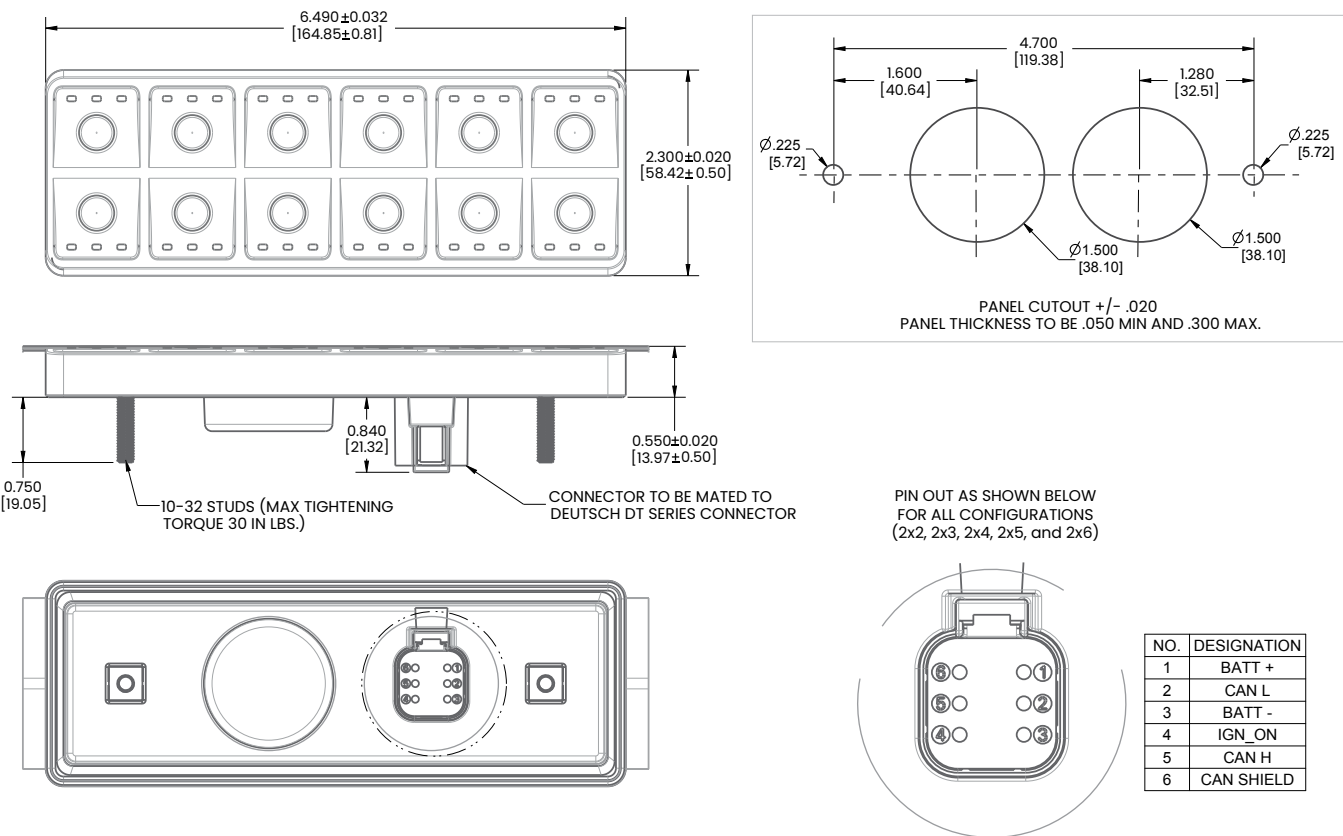
- Do not puncture or plug the vent



# Dimensional Specs

inches [millimeters]

## 2x6 Configuration



# Orientation Diagrams

Icon Artwork Button Number Layout

A: Landscape



B: Portrait



D: Reverse Portrait



C: Reverse Landscape



# UKP-Series

J1939 Universal Keypads

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



The UKP-Series is a universal, customizable membrane keypad that is compliant with SAE J1939 CAN standards. With above and below sealing protection, the UKP-series can be installed inside or outside the cab. Each button features laser etched legends, up to three dimmable LED function lights, and tactile/audible feedback when pressed.

**12/24 VDC**    **1,000,000 Operations**    **IP67 Sealing**  
 for above panel components

## Typical Applications

• Truck    • Bus    • Construction    • Mining    • Agricultural

# Design Features

## LOW PROFILE DESIGN

0.62 inch [15.92 mm] thickness (see dimensional specs for more detail)



Front View

## SEALING PROTECTION

IP67 above panel and below panel (when connected)

## LED FUNCTION LIGHTS

One, two, or three LED Function Lights per button. Colors include Amber, Green, Red or Blue

## CUSTOMIZABLE ICONS

Choose from our standard library of icons or use custom icons



Back View

## CONNECTOR

Mates to the Deutsch DT-Series Connector

## MOUNTING STUDS OR WINGS

M5 x 0.8mm Mounting Studs (2x3, 2x4, 2x5, 2x6)  
Mounting Wings (2x2)

# Related Products



**CLTM12-S-Series >**  
Load Controller



**CKJ-Series >**  
Jog Switch



**VM-Series >**  
Operator Control Module

# Tech Specs

## General

|                         |                                                                                                                              |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------|
| CAN Protocol            | CAN 2.0b type interface as defined by SAE J1939                                                                              |
| Illumination            | LED backlit icons and function lights. Up to 3 function lights per button. Dimmable illumination, controlled by CAN messages |
| Connection/Wiring       | Deutsch DT-Series 4 Pin connector                                                                                            |
| Operating Force         | 7 ± 3 N                                                                                                                      |
| Mounting                | Clips or studs (See Dimensional Specs), Vertically or horizontally                                                           |
| Panel Cutout/Dimensions | See Dimensional Specs                                                                                                        |

## Electrical

|                                              |                                                                                                                                                      |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Voltage                            | Designed for 12/24 Volt systems<br>Minimum 8VDC Maximum 32VDC                                                                                        |
| Sleep Mode                                   | Defined as the state after a pre-defined time of non-activity to reduce current draw on the system, and wakes on keypress or CAN message             |
| ESD                                          | ISO 10605, ±15kV air discharge (x2), ±8kV contact discharge (x2)                                                                                     |
| Radiated Immunity-ALSE                       | ISO 11452-2, Absorbed-lined chamber enclosure field strength 100V/m, frequency from 80MHz to 2GHz, Class A                                           |
| Bulk Current Injection                       | ISO 11452-4, Level 100mA, frequency from 1MHz to 400MHz, linear step, Class A                                                                        |
| Conducted Transients                         | ISO 7637-2, All test pulses in Annex A Table A1 and A2, 2a/3a/3b/5a/5b-Class A                                                                       |
| Radiation Emission                           | ISO 13766-1, Broadband and Narrowband for ESA, range 30-1000MHz                                                                                      |
| Over Voltage                                 | ISO 16750-2, Power up with 36VDC for 60 min at 65 °C.                                                                                                |
| Short Circuit Protection                     | ISO 16750-2, All output terminal short to ground for 60s.                                                                                            |
| Reverse Polarity Protection                  | ISO 16750-2, 28V for 60s                                                                                                                             |
| Starting Profile                             | ISO 16750-2, Level IV $U_{s6}=6V$ (12V) class B. Level I $U_{s6}=10V$ (24V) class A                                                                  |
| Withstand Voltage                            | ISO 16750-2, Apply 500VAC 60Hz for 60s                                                                                                               |
| Insulation Resistance                        | ISO 16750-2, 500VDC for 60s, > 100MΩ                                                                                                                 |
| Superimposed Alternating Voltage             | ISO 16750-2, UPP of 4 V for 120s, total 5 cycles                                                                                                     |
| Slow Decrease and Increase of Supply Voltage | ISO 16750-2, Increase the supply voltage from 0V to $U_{smin}$ , then decrease it from $U_{smin}$ to 0V, applying a change rate of 0.5 V/min linear. |
| Momentary Drop in Supply Voltage             | ISO 16750-2, Voltage drop from 8V to 4.5V, duration ≤ 100 ms.                                                                                        |
| EU Commission Directive                      | 2004/104/EC Compliant (E-Marked)                                                                                                                     |

## Environmental

|                        |                                                                                                                                                                                  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temperature  | -40°C to +85°C                                                                                                                                                                   |
| Storage Temperature    | -40°C to +85°C                                                                                                                                                                   |
| Thermal                | -40°C to +85°C<br>IEC 60068-2-1: Cold Soak<br>IEC 60068-2-2: Heat Soak<br>IEC 60068-2-14: Cycling/Shock                                                                          |
| Solar Radiation        | IEC 60068-2-5, procedure B, Irradiation: 1120W/m <sup>2</sup> , Total Period: 15 day. Light: 20h, 70°C BST, 30%RH, 40°C CHT. Dark: 4h, 25°C BST, 93%RH, 25°C CHT                 |
| Low Pressure           | IEC 60068-2-13                                                                                                                                                                   |
| Humidity               | Soak: IEC 60068-2-78, Soak at 40°C at 93% RH for 10 days<br>Cyclic: IEC 60068-2-30, Method 1, Temp range from 25°C to 55°C, cycling change with 93±3% RH, 10 cycles for 240 hrs. |
| Ingress Protection     | ISO 20653, IP67, for above panel components of actual switch only.                                                                                                               |
| Salt Spray             | IEC 60068-2-52, Salt mist for 2h at 35°C, dry for 4h at 35°C RH≤30%, and humid for 2h at 50°C RH≥95%. Repeat 12 cycles, total 96h.                                               |
| Chemical Loads         | ISO 16750-5, brushing engine oil, hydraulic oil, diesel fuel, Grease, Urea at 85°C for 22hrs. Dipping battery fluid for 22hrs and alcohol for 10min at 25°C.                     |
| Resistance for Rubbing | RCA Abrasion, 400 sweeps, 175g                                                                                                                                                   |

## Mechanical

|                |                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Endurance      | 1,000,000 cycles per key<br>(20% at -40°C, 20% at +85°C, 60% at +25°C)                                                                                                                                                                                                                                                                                                                                     |
| Vibration      | Resonance Vibration: IEC 60068-2-6, 20Hz~500Hz per axis with amplitude of 19.6m/s <sup>2</sup> . Apply 90m/s <sup>2</sup> at resonance point for 1h at Z axis and 0.5h at X/Y axis.<br><br>Sinusoidal Vibration: IEC 60068-2-6, 5Hz~200Hz with amplitude 100m/s <sup>2</sup> for 4h at Z axis and 2h at X/Y axis.<br><br>Random vibration: IEC 60068-2-64, 10-2000Hz. Acceleration 5.825Grms, 8h per axial |
| Shock and Bump | IEC 60068-2-27, Shock 500 m/s <sup>2</sup> 11 milliseconds. IEC 60068-2-29, Bump 400 m/s <sup>2</sup> 6 milliseconds 600 cycles                                                                                                                                                                                                                                                                            |
| Drop Test      | IEC 60068-2-31, Free fall, Procedure 1, 1000 mm height, drop on all 3 axes in both directions                                                                                                                                                                                                                                                                                                              |

# Tech Specs

## Software Interface Integration

Click below to integrate the UKP-Series into J1939 CAN network:

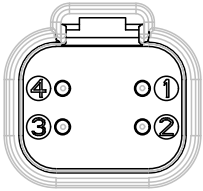
[www.carlingtech.com/sites/default/files/documents/ukp-series\\_interface.pdf](http://www.carlingtech.com/sites/default/files/documents/ukp-series_interface.pdf)

## Tables

**Table A:** Standard Illumination

| Type      | Red | Green | Amber | Blue | White |
|-----------|-----|-------|-------|------|-------|
| Backlight | --- | ---   | ---   | ---  | Yes   |
| Function  | Yes | Yes   | Yes   | Yes  | ---   |

**Connection:** 4 pin Deutsch DT Connector. Power with 8V to 32V vehicle type input



| No. | Desination |
|-----|------------|
| 1   | Power      |
| 2   | Ground     |
| 3   | CAN H      |
| 4   | CAN L      |

**Table B:** Operation Current Values

| Size | Voltage | Sleep Current Value (mA) |
|------|---------|--------------------------|
| 2x2  | 12      | ~4.63                    |
|      | 24      | ~3.18                    |
| 2x3  | 12      | ~6.67                    |
|      | 24      | ~4.27                    |
| 2x4  | 12      | ~9.11                    |
|      | 24      | ~5.55                    |
| 2x5  | 12      | ~8.84                    |
|      | 24      | ~5.40                    |
| 2x6  | 12      | ~11.54                   |
|      | 24      | ~6.95                    |

# Ordering Scheme

## Part 1: Keypad

Sample Part No. **UKP 1 - 5 1 - A B - A - J 128 /**

Selection 1 2 3 4 5 6 7 8 9

### 1. SERIES

**UKP** UKP-Series Keypad

### 2. KEYPAD STYLING

**1** Standard

### 3. BUTTON LAYOUT

|                                                    |                                                    |
|----------------------------------------------------|----------------------------------------------------|
| <b>1</b> Two by Two<br>(1.6-2.8mm Panel Thickness) | <b>6</b> Three by Two                              |
| <b>2</b> Two by Three                              | <b>7</b> Four by Two                               |
| <b>3</b> Two by Four                               | <b>8</b> Five by Two                               |
| <b>4</b> Two by Five                               | <b>9</b> Six by Two                                |
| <b>5</b> Two by Six                                | <b>A</b> Two by Two<br>(2.8-4.0mm Panel Thickness) |

### 4. KEYPAD COLOR

**1** Black

### 5. BACKLIGHT

**A** White

### 6. FUNCTION LIGHT COLOR

|                |               |
|----------------|---------------|
| <b>B</b> Amber | <b>D</b> Red  |
| <b>C</b> Green | <b>E</b> Blue |

### 7. NON-ILLUMINATED IMAGE COLOR

**A** White

### 8. NETWORK TYPE

|                                 |
|---------------------------------|
| <b>J</b> J1939 (250K Baud Rate) |
| <b>K</b> J1939 (500K Baud Rate) |

### 9. SOURCE ADDRESS <sup>1</sup>

The Source Address is a unique number (**000-248**) assigned to each node on a CAN network, and is determined based upon the specific CAN architecture of each customer application.

Notes:

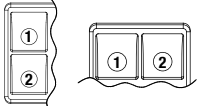
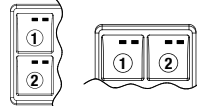
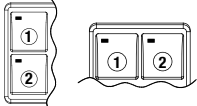
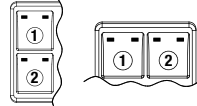
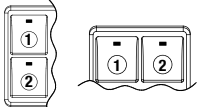
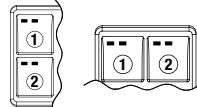
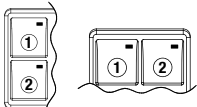
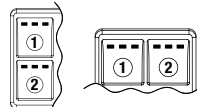
- <sup>1</sup> Default Source Address is 128.
- <sup>2</sup> Source Address to be defined as the Decimal Value in the Ordering Scheme, unit will be programmed with Source Address as a Hexadecimal value when delivered.

[Configure Complete Part Number >](#)

## Part 2: Icon Artwork (Select 12 buttons for 2x6, 10 buttons for 2x5, 8 buttons for 2x4, 6 buttons for 2x3, and 4 buttons for 2x2.)

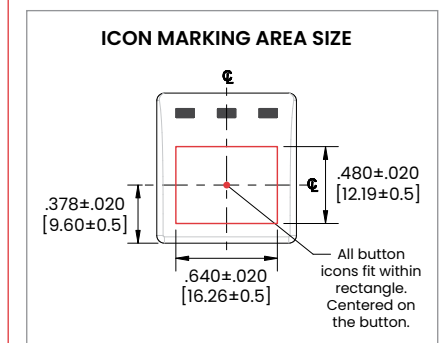
|                                                      |                                                      |                                                      |                                                       |                                                       |                                                       |
|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|
| <b>Button 1</b><br><b>2 RS</b><br>Function Icon Code | <b>Button 2</b><br><b>2 RA</b><br>Function Icon Code | <b>Button 3</b><br><b>3 UV</b><br>Function Icon Code | <b>Button 4</b><br><b>3 UW</b><br>Function Icon Code  | <b>Button 5</b><br><b>6 MT</b><br>Function Icon Code  | <b>Button 6</b><br><b>8 UB</b><br>Function Icon Code  |
| <b>Button 7</b><br><b>8 NN</b><br>Function Icon Code | <b>Button 8</b><br><b>8 PU</b><br>Function Icon Code | <b>Button 9</b><br><b>5 PR</b><br>Function Icon Code | <b>Button 10</b><br><b>5 PP</b><br>Function Icon Code | <b>Button 11</b><br><b>4 RH</b><br>Function Icon Code | <b>Button 12</b><br><b>4 NU</b><br>Function Icon Code |

### FUNCTION LIGHT CODE

|                                                                                                                    |                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>1</b> No Function Light<br>  | <b>5</b> Closed-Open-Open<br> |
| <b>2</b> Open-Closed-Closed<br> | <b>6</b> Open-Closed-Open<br> |
| <b>3</b> Closed-Open-Closed<br> | <b>7</b> Open-Open-Closed<br> |
| <b>4</b> Closed-Closed-Open<br> | <b>8</b> Open-Open-Open<br>   |

### ICON CODE

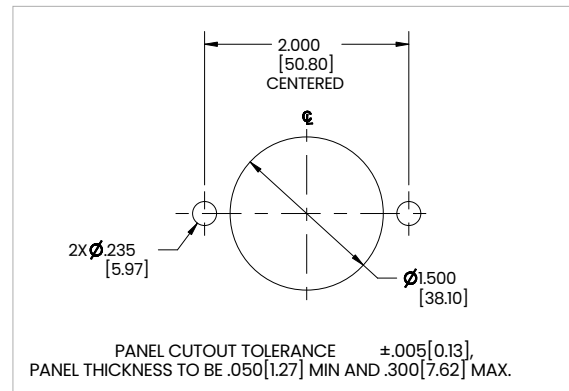
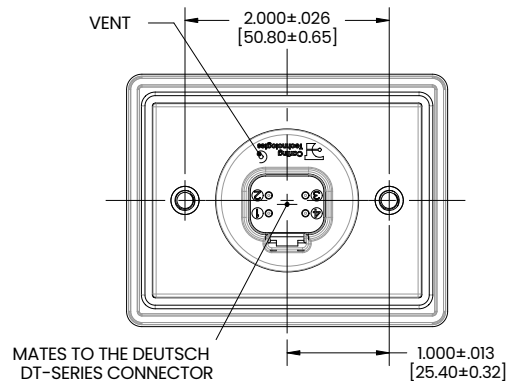
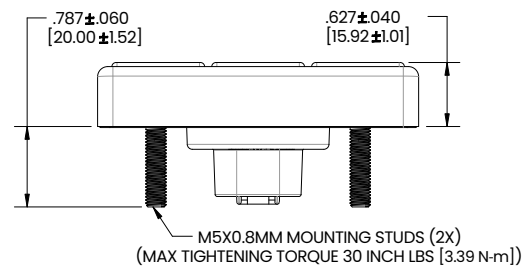
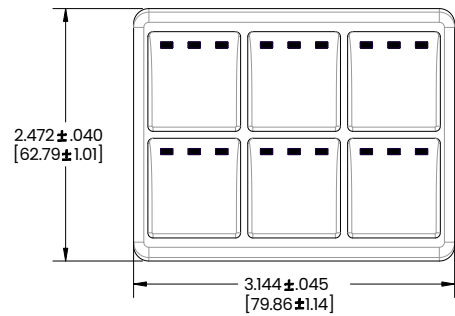
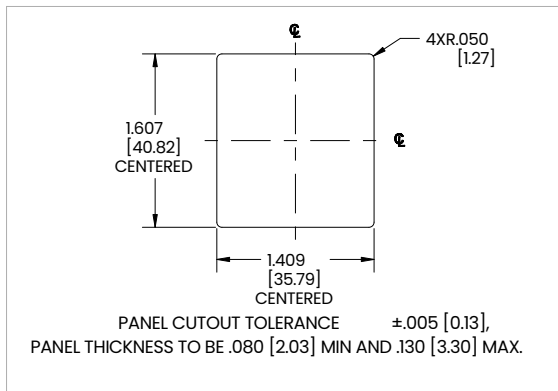
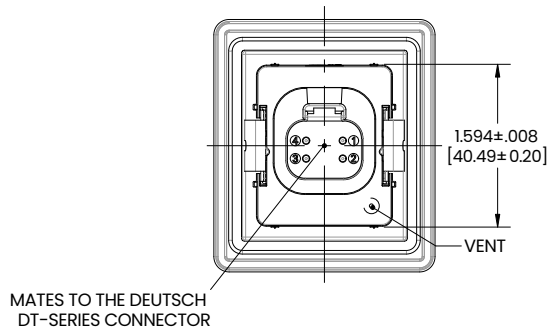
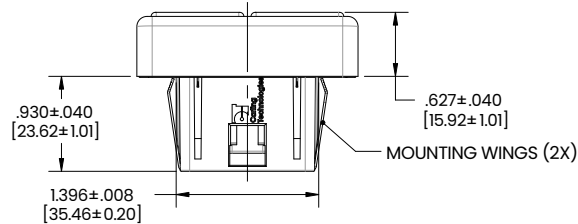
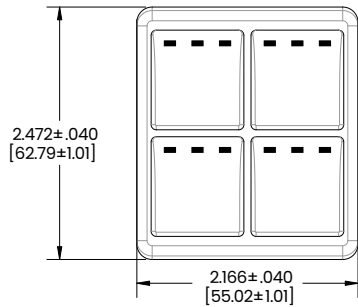
**00** For standard icons, see Standard Legends Code page.  
For additional icons, please consult factory.



# Dimensional Specs

inches [millimeters]

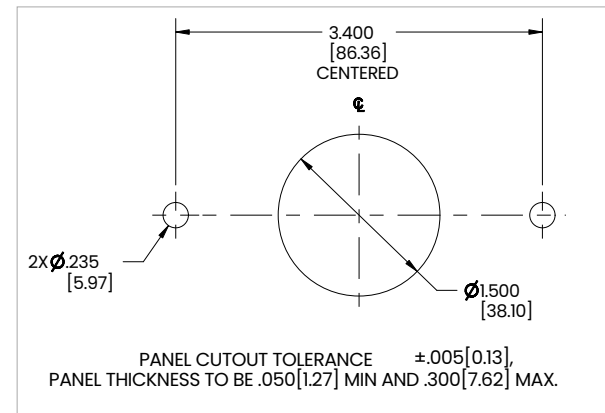
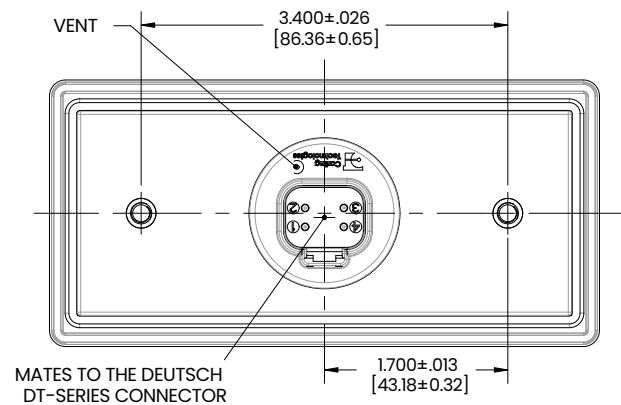
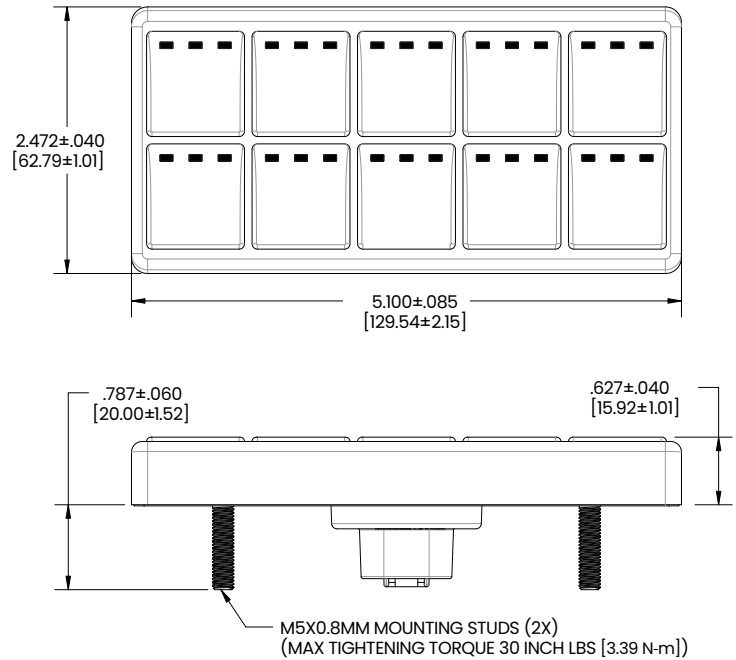
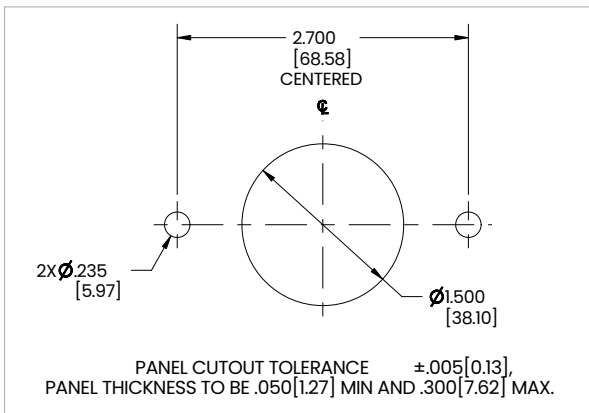
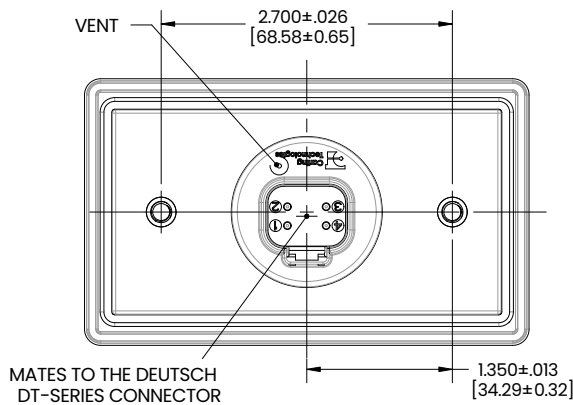
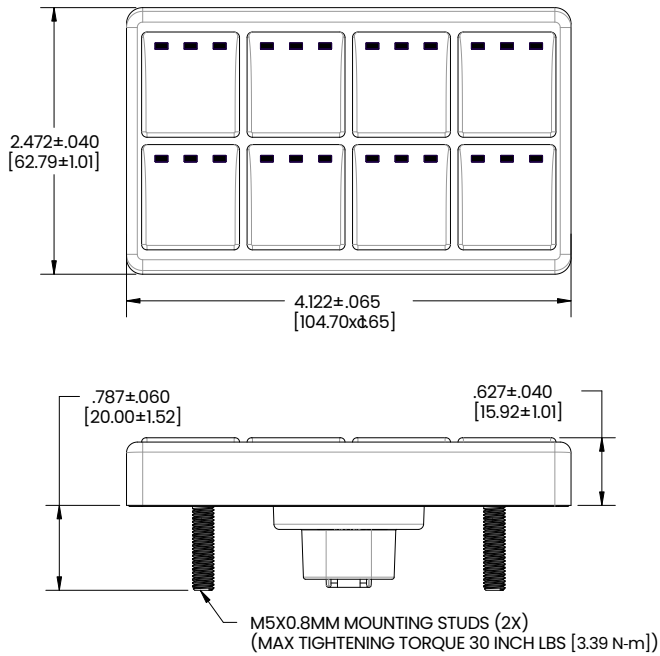
## 2x2 and 2x3 Configurations



# Dimensional Specs

inches [millimeters]

## 2x4 and 2x5 Configurations

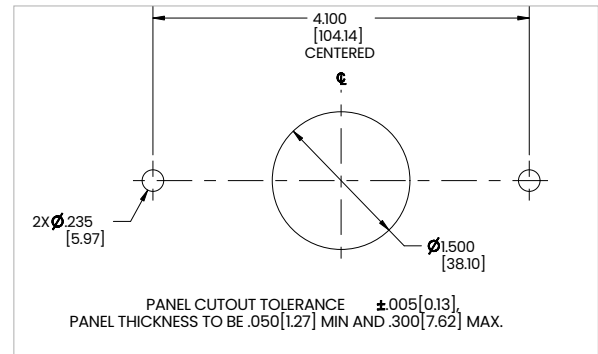
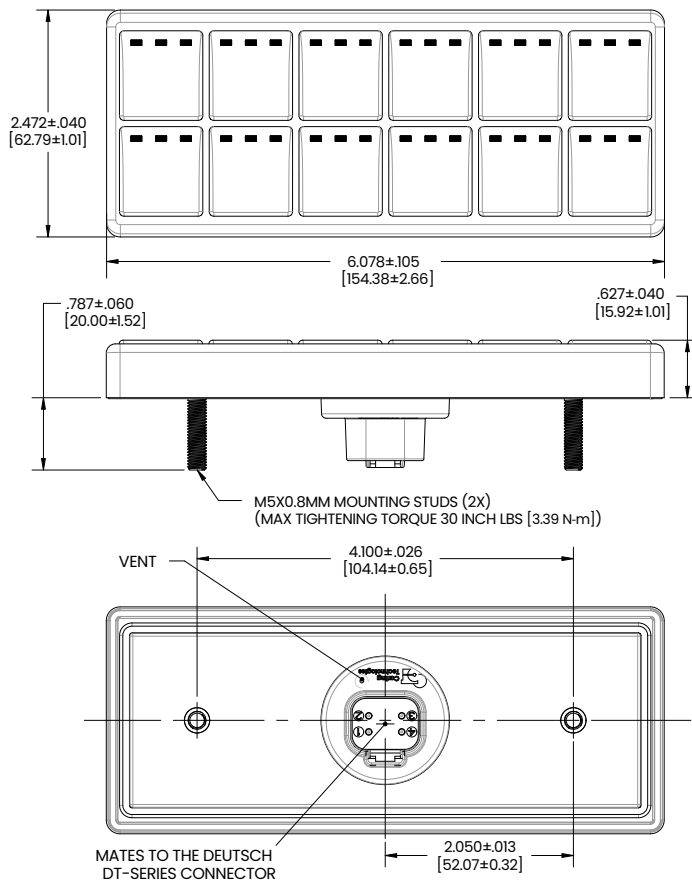




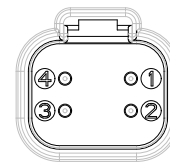
# Dimensional Specs

inches [millimeters]

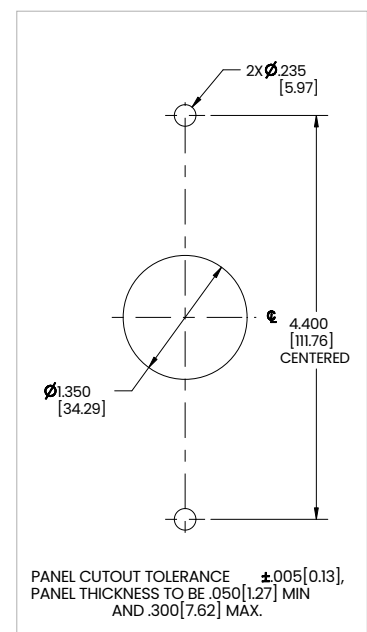
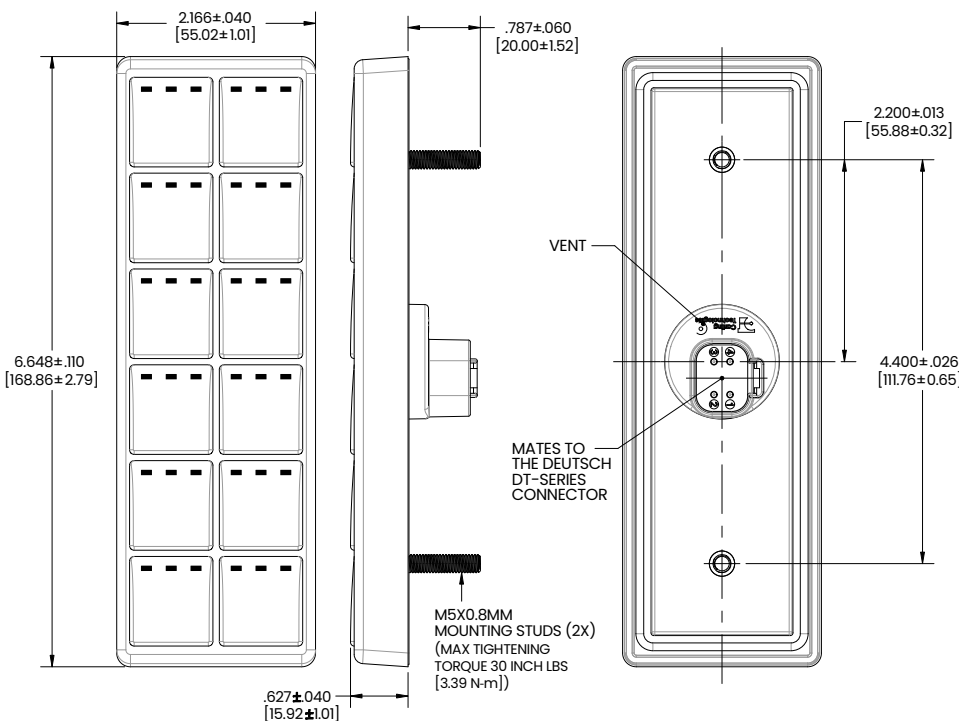
## 2x6 and 6x2 Configurations



PIN OUT AS SHOWN BELOW



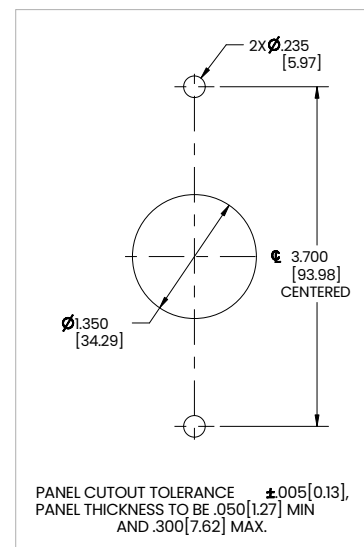
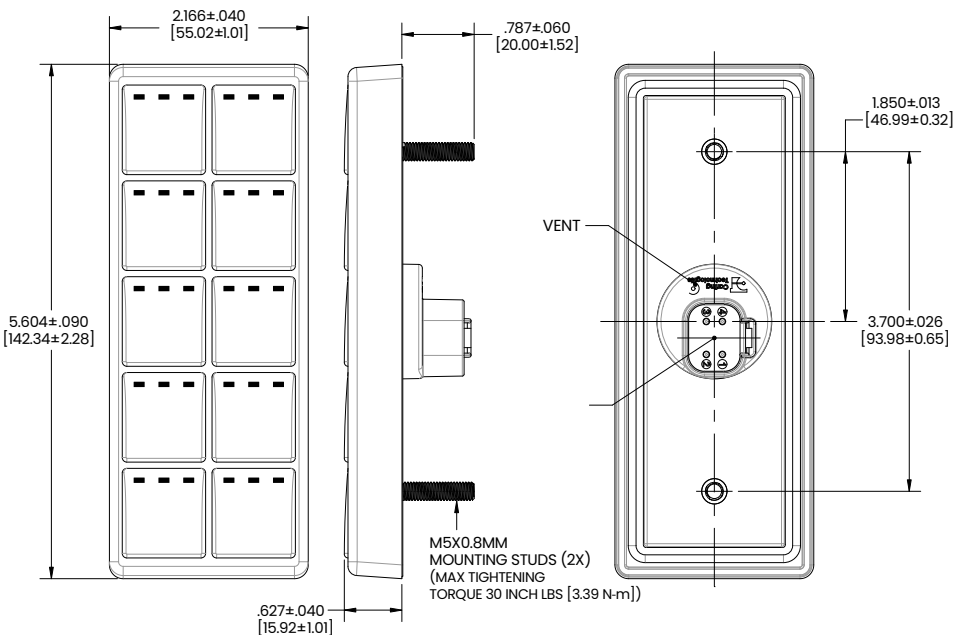
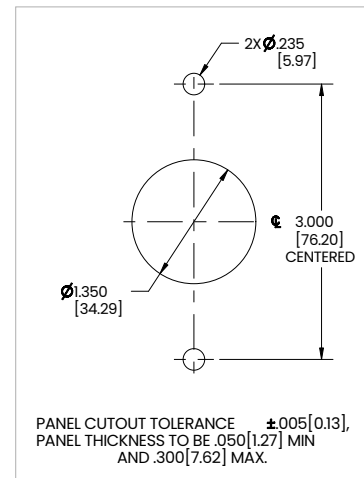
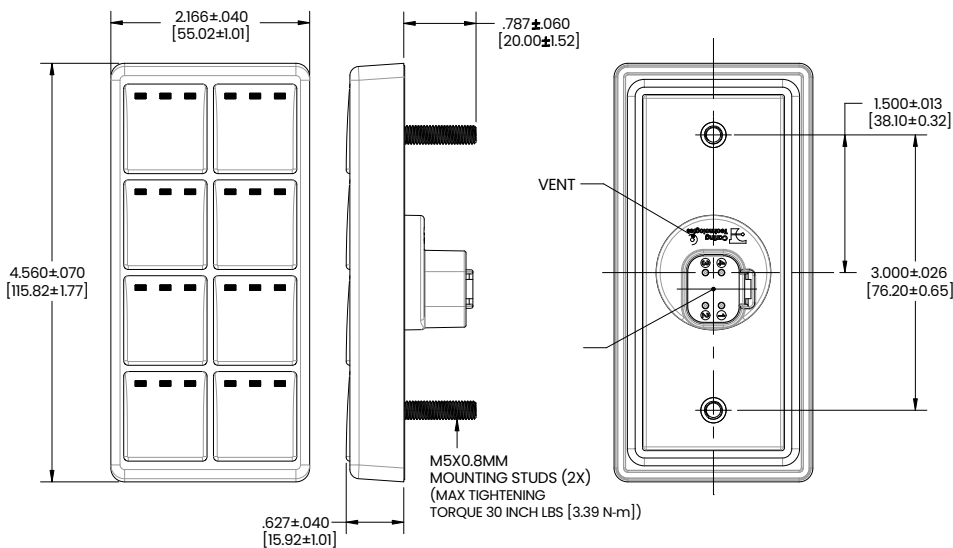
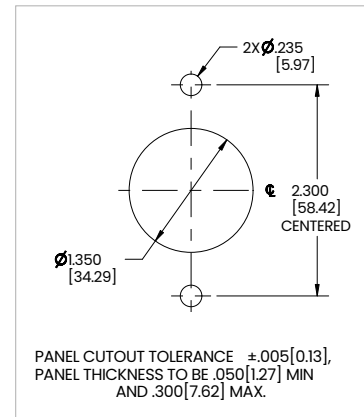
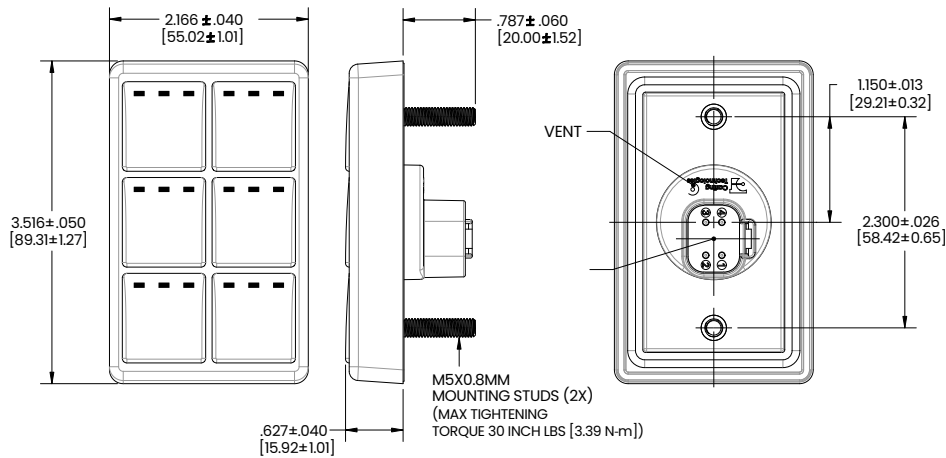
| NO. | DESIGNATION |
|-----|-------------|
| 1   | POWER       |
| 2   | GROUND      |
| 3   | CAN H       |
| 4   | CAN L       |



# Dimensional Specs

inches [millimeters]

## 3x2, 4x2 and 5x2 Configurations





**Littelfuse®**



**Carling Technologies®**

A Littelfuse® Brand

# CKJ-Series

A CAN J1939, sealed, jog switch feature a rotary and push knob.

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



The CKJ-Series jog switch features a joystick rotary encoder\* with push-to-select button and 5 customizable function buttons with dimmable lighting. This CAN J1939 compatible display controller is sealed to IP67 standards and can be configured in a variety of orientations providing simple installation and connectivity.

*\* Rotary switch only (CRS-Series) is available separately*

**12/24**  
VDC

**500,000**  
Cycles

**IP67 Sealing**  
for above-panel components

## Typical Applications

- Commercial Vehicles
- Construction Equipment
- Agricultural Equipment
- Work Trucks

# Design Features

## **BUTTONS**

Five customizable functions for quick access



## **KNOB ( Joystick, Rotary & Push )**

Easy menu scrolling, push-button selection and joystick navigation

*Rotary switch only (CRS-Series) is available separately*



## **CONNECTOR**

Deutsch 4 Pin DT-Series

# Related Products



**CLTM12-S-Series >**  
Load Controller



**CKP-Series >**  
Customizable Keypad



**VM-Series >**  
Operator Control Module

# Tech Specs

## Electrical

|                                              |                                                                                                                                                                                                                                             |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Voltage                            | Designed for 12/24 VDC systems (8 minimum, 32 VDC maximum)                                                                                                                                                                                  |
| Electrical Endurance                         | <b>Keypad Buttons:</b> Up to 500,000 cycles<br><b>Knob Push:</b> Up to 500,000 cycles<br><b>Knob Directional Joystick:</b> Up to 500,000 cycles in each of four directions<br><b>Knob Rotation:</b> Up to 500,000 cycles, one cycle is 360° |
| Over Voltage                                 | ISO 16750-2; 36 VDC for 60 minutes                                                                                                                                                                                                          |
| Short Circuit Protection                     | ISO 16750-2; All outputs to ground for 60s                                                                                                                                                                                                  |
| Reverse Polarity Protection                  | ISO 16750-2; 28 VDC for 60s                                                                                                                                                                                                                 |
| Starting Profile                             | ISO 16750-2; Class A                                                                                                                                                                                                                        |
| Withstand Voltage                            | ISO 16750-2; 500 Vrms with a duration of 60s                                                                                                                                                                                                |
| Insulation Resistance                        | ISO 16750-2; 500 VDC with a duration of 60s                                                                                                                                                                                                 |
| Superimposed Alternating Voltage             | ISO 16750-2; 4.4 Superimposed alternating voltage: UPP, of 4 VDC                                                                                                                                                                            |
| Slow Decrease and Increase of Supply Voltage | ISO 16750-2; Increase the supply voltage from 0 VDC to 8 VDC, then decrease it from 8 VDC to 0 VDC, applying a change rate of 0.5 VDC/min linear                                                                                            |
| Momentary Drop in Supply Voltage             | Test pulse applied in accordance with ISO 16750-2                                                                                                                                                                                           |

## Electromagnetic Compatibility

|                        |                                                                                                                                       |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| ESD                    | ISO 10605; +/- 15kV air discharges, +/-8kV contact discharges                                                                         |
| Absorbed-Lined Chamber | ISO 11452-2; Absorbed-lined chamber 100V/m, 80MHz to 2 GHz Class A                                                                    |
| Bulk Current Injection | ISO 11452-4; 100mA, 20MHz to 400MHz Class A                                                                                           |
| Conducted Transients   | ISO 7637-2:2004; All test pulse in Annex A table A1 for 12V system and Table A2 for 24V system, Level 4, pulse 2a/3a/3b/4/5a -Class A |
| Transient Emission     | ISO 13766; 64dB to 54dB, 30MHz-75MHz (linearly decreases); 54dB to 65dB, 75MHz-400MHz (linearly increases); 65dB, 400MHz - 1000MHz    |

## Physical

|                  |                                                                                                                     |
|------------------|---------------------------------------------------------------------------------------------------------------------|
| Switch functions | 5 keypad button, knob push, 4 directions knob joystick (optional), continuous rotary knob (20 detents per rotation) |
| Illumination     | LED backlit icon, dimmable illumination, controlled by CAN messages                                                 |
| Mounting         | M5 back screw mounting                                                                                              |
| Mounting Torque  | 2.26-2.82 nm [20~25 in-lbs]                                                                                         |
| Weight           | 196 grams [.43 lbs]                                                                                                 |

## Environmental

|                                              |                                                                                                                                          |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Sealing                                      | IP67, for above-panel components of actual switch only                                                                                   |
| Operating Temperature                        | -40°C to +85°C                                                                                                                           |
| Storage Temperature                          | -40°C to +85°C                                                                                                                           |
| Thermal, Hot Soak                            | IEC 60068-2-2; Test Bb, +85°C for 96 hours                                                                                               |
| Thermal, Cold Soak                           | IEC 60068-2-1; Test Ab, -40°C for 96 hours                                                                                               |
| Thermal Shock                                | IEC 60068-2-14; Test Na -40°C to +85°C, 10 cycles for 10 hours                                                                           |
| Solar Radiation                              | IEC 60068-2-5; Procedure B, 24h per cycle, 20h irradiation and 4h darkness, total irradiation of 22.4kWh/m2 per diurnal cycle. 15 cycles |
| Humidity, Soak                               | IEC 60068-2-78; Test Cab, 30°C at 93% RH for 10 days                                                                                     |
| Humidity, Cyclic                             | IEC 60068-2-30; Test Db Method 1, 55 to 25 at 90% RH 6 cycles of 24 hours each                                                           |
| Salt Spray                                   | IEC 60068-52; Test Kb, severity level 4                                                                                                  |
| Chemical resistance (Resistance to Solvents) | ISO 16750-5; Method II (Brushing) for Engine oil, hydraulic oil, diesel fuel, grease and urea at room temperature for 24 hours           |
| Thermal Cycling                              | IEC 60068-2-14; Test Nb, -40°C to +85°C, dwell: 3 hours; transfer rate:(3±0.6°C)/min, 2 cycles                                           |

## Mechanical

|                       |                                                                                                                                                                                      |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vibration, Random     | MIL-STD-202G; Method 214A Test condition A, 5.35Grms, from 50Hz to 2000Hz, each plane 8 h, total 24h                                                                                 |
| Vibration, Sinusoidal | IEC 60068-2-6; Sweep sine wave form 10 to 60.1Hz with 0.35mm amplitude, 60.1Hz to 2000Hz with 50m/s2, each plane 20 cycles (5h) total 60 cycles (15h)                                |
| Vibration, Resonance  | IEC 60068-2-6; Sinusoidal from 10 to 2000Hz, 5 minutes at resonant point                                                                                                             |
| Shock and Bump        | IEC 60068-2-27; 3 shocks in each direction of the 3 axis (18 total shocks) at 500 m/s2 for 11 ms. 100 shocks in each direction of the 3 axis (600 total shocks) at 400 m/s2 for 6 ms |
| Drop test             | IEC 60068-2-31; Test Ec Free Fall - Procedure 1 drop in each direction of the 3 axis (6 total drops) from 1000mm                                                                     |

## Communication Programming

Click below for instructions on integrating the CKJ-Series:  
[www.carlingtech.com/sites/default/files/documents/ckj-series\\_communication.pdf](http://www.carlingtech.com/sites/default/files/documents/ckj-series_communication.pdf)

# Ordering Scheme

Sample Part No. **CKJ - 1 A 1 - 1 1 1 - C - J 129 / 00 - 00 - 00 - 00 - 00**

Selection 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

## 1. SERIES

**CKJ** Customizable Jog Switch

## 2. KNOB INPUT TYPE AND FUNCTION

- 1 Directional, Rotary and Push
- 2 Rotary and Push
- 3 Rotary Only

## 3. BUTTON LAYOUT

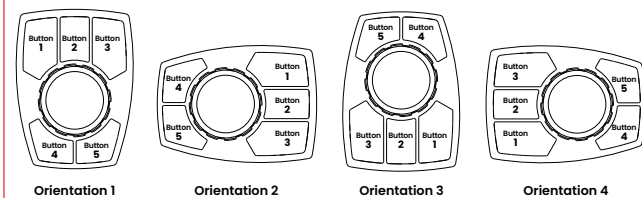
**A** 5 Buttons

## 4. KNOB COLOR AND STYLE

**1** Standard

## 5. ORIENTATION

- 1 Orientation 1
- 2 Orientation 2
- 3 Orientation 3
- 4 Orientation 4



## 6. KEYPAD COLOR

**1** Black

## 7. CONNECTOR

**1** Deutsch 4 Pin DT-Series

## 8. ILLUMINATION <sup>1</sup>

- |                |                 |
|----------------|-----------------|
| <b>0</b> None  | <b>C</b> Yellow |
| <b>A</b> White | <b>D</b> Blue   |
| <b>B</b> Green | <b>E</b> Red    |

## 9. COMMUNICATION PROTOCOL

- J** J1939, 250K Baud Rate
- L** J1939, 500K Baud Rate

## 10. SOURCE ADDRESS <sup>2</sup>

**000** A Unique Number from 000 to 248

## 11, 12, 13, 14, 15. LEGENDS - BUTTONS 1 TO 5 <sup>3, 4</sup>

- 00** No legend
- G1** Numeric icons for orientation 1
- G2** Numeric icons for orientation 2
- G3** Numeric icons for orientation 3
- G4** Numeric icons for orientation 4

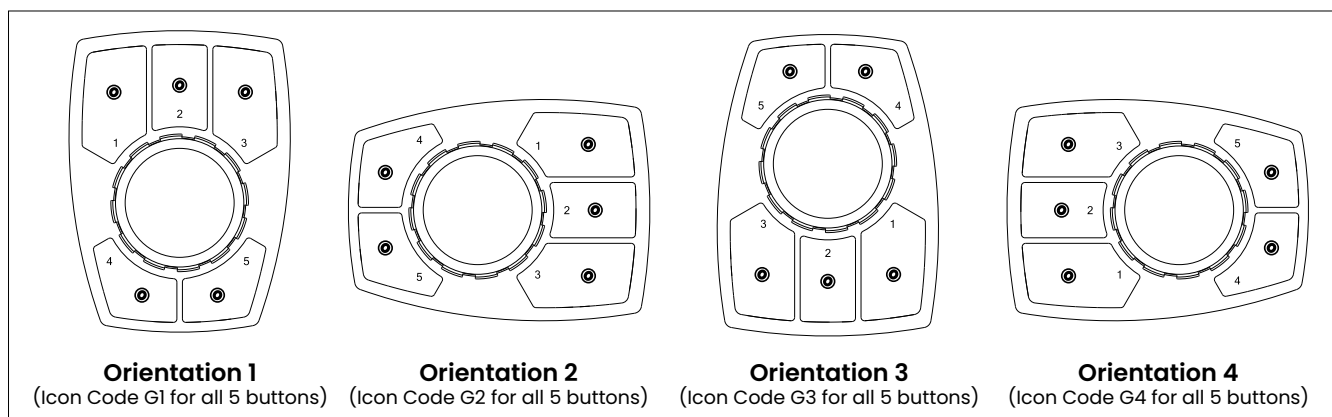
For additional legends, please consult factory

Notes:

1. Standard backlight color is white.
2. Default source address is 129.
3. Icon code G1 indicates a set of icons on all 5 buttons. Use icon code G1 for each button. For example, CKJ-1A1-111-A-1100/G1-G1-G1-G1-G1. Same case for icon codes G2, G3, and G4.
4. Orientation must match option chosen in box 5

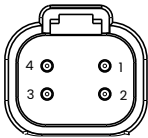
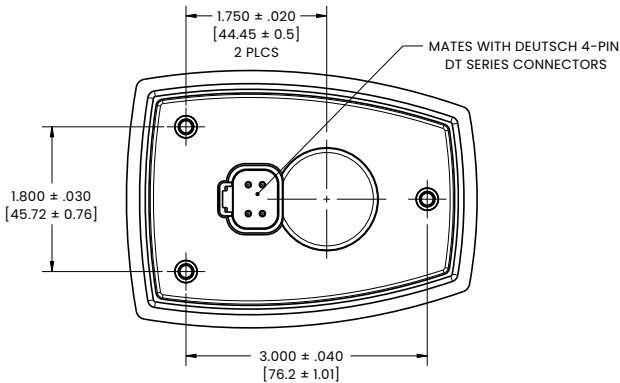
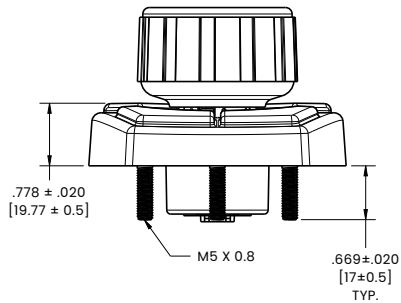
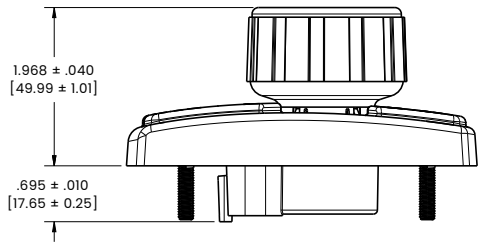
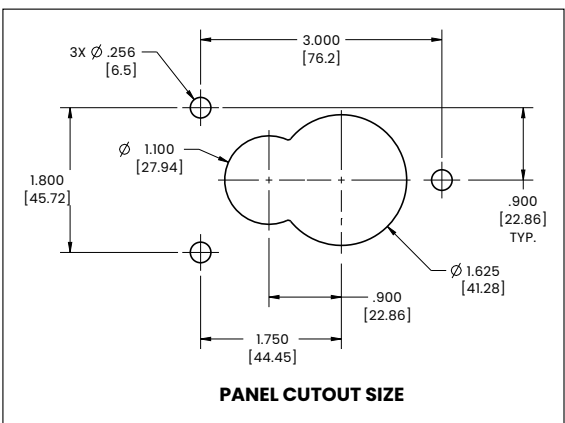
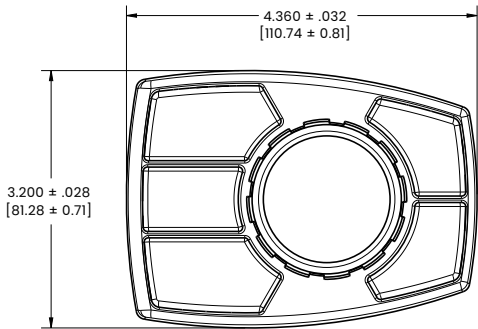
[Configure Complete Part Number >](#)

## Legend/Button Orientation



# Dimensional Specs

inches [millimeters]



PIN OUT AS SHOWN

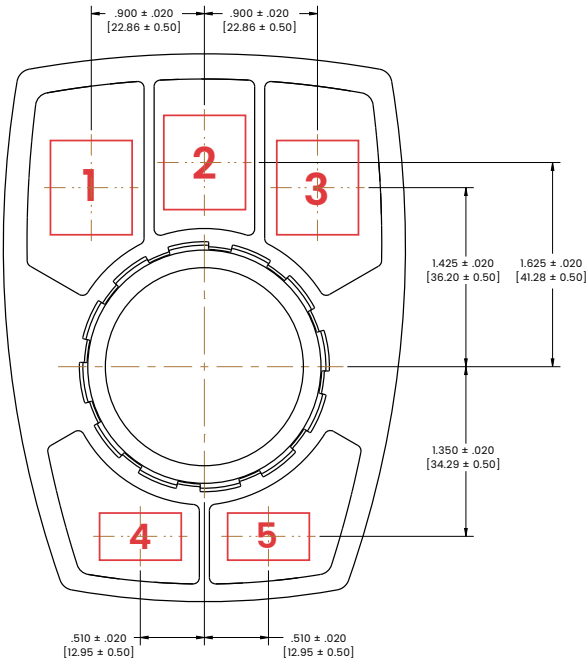
| PIN NO. | DESIGNATION |
|---------|-------------|
| 1       | POWER       |
| 2       | GND         |
| 3       | CAN H       |
| 4       | CAN L       |

## Legend Marking Area

| MARKING AREA |              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|--------------|
|              | 1            | 2            | 3            | 4            | 5            |
| X            | .650 [16.51] | .650 [16.51] | .650 [16.51] | .650 [16.51] | .650 [16.51] |
| Y            | .750 [19.05] | .750 [19.05] | .750 [19.05] | .380 [9.65]  | .380 [9.65]  |



Icon marking area and location  
Unless otherwise specified, icon size and location should follow this drawing and is applicable to all 4 orientations



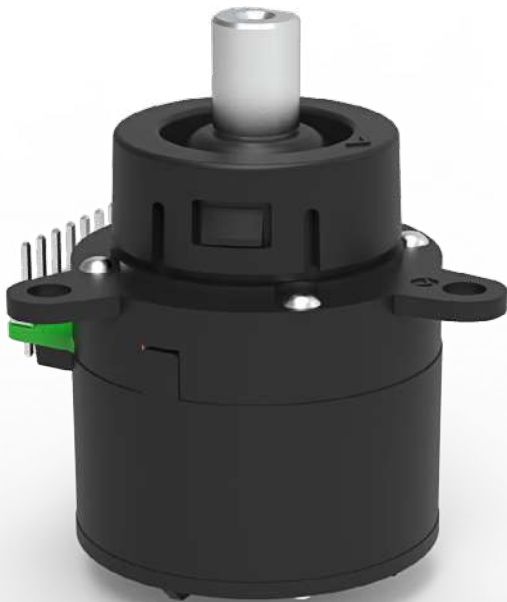


# CRS-Series

Rotary Encoder Switch

**PRODUCT WEBPAGE**

*request sample, configure part*



## Rotary Encoder Switch Designed for Commercial Vehicles

The CRS-Series rotary encoder switch features an IP67 rating for above-panel components and mechanical and electrical endurance ratings of 500,000 cycles, making it ideal for work trucks, farm equipment, and construction vehicles. Available with an operating voltage rating of 3.3 V DC or 5.0 V DC, this rotary encoder switch is available for 4-way directional, rotary, and push-button input, rotary and push-button input, or rotary-only input.

*\* For a complete CAN solution, please see our CKJ-Series*

**3.3 or 5.0 VDC**   **500,000 Cycles**   **IP67 Sealing**  
for above-panel components

## Typical Applications

• Truck   • Bus   • Construction   • Mining   • Agricultural



# Tech Specs

## Electrical

### Rotary

|                      |                                                                                                                         |
|----------------------|-------------------------------------------------------------------------------------------------------------------------|
| Supply current       | 20 mA maximum                                                                                                           |
| Output               | Open collector photo transistor. External pull-up resistors are required. See circuit schematic for external resistors. |
| Output code          | 2-bit quadrature, channel A leads channel B by 90° electrically during clockwise rotation of the shaft.                 |
| Minimum sink current | 2.0 mA                                                                                                                  |

### Pushbutton

|                      |                                                                                                                                               |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Contact resistance   | Less than 0.2 ohm                                                                                                                             |
| Electrical endurance | <b>Rotary;</b> 500,000 cycles of one full rotation<br><b>Push-button;</b> 500,000 cycles<br><b>Joystick;</b> 500,000 cycles in each direction |

### Joystick

|             |       |
|-------------|-------|
| Output code | 2-bit |
|-------------|-------|

## Environmental

|                                         |                                                                                                  |
|-----------------------------------------|--------------------------------------------------------------------------------------------------|
| Operating temperature                   | -40°C to + 85°C                                                                                  |
| Storage Temperature                     | -40°C to + 85°C                                                                                  |
| Thermal, Hot Soak                       | IEC 60068-2-2; Test Bb, + 85°C for 96 hours                                                      |
| Thermal, Cold Soak                      | IEC 60068-2-1; Test Ab, - 40°C for 96 hours                                                      |
| Thermal Shock                           | IEC 60068-2-14; Test Na, - 55°C to +100°C, 10 cycles for 10 hours                                |
| Sealing Protection                      | ISO 20653; IP67 above panel                                                                      |
| Humidity, soak (Damp heat)              | IEC 60068-2-78; Test Cab, 96 hours at 93% humidity and 40°C                                      |
| Salt Spray                              | IEC 60068-2-11; Test Ka, 5% NaCl, spray for 48 hours                                             |
| Thermal Cycling (Change of Temperature) | IEC 60068-2-14; Test Nb, -40°C to 85°C, dwell: 3 hours; transfer rate: (3 ± 0.6°C)/min, 2 cycles |

## Mechanical

### Rotary

|                           |                                                                                                          |
|---------------------------|----------------------------------------------------------------------------------------------------------|
| Lifecycle                 | 500,000 rotational cycles of operation (one cycle is a rotation through all positions and a full return) |
| Average rotational torque | .038 ± .014 N-m [5.4 ± 2 oz-in] initially, rotation torque within 50% of initial value throughout life.  |

### Pushbutton

|                 |                                   |
|-----------------|-----------------------------------|
| Lifecycle       | 500,000 actuations                |
| Actuation force | 16 ± 3 N [3.6 ± .67 lbs]          |
| Shaft travel    | 0.8 ± 0.3 mm [.031 ± .012 inches] |

### Joystick

|                       |                                                                                                                                                                                    |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lifecycle             | 500,000 actuations in each direction                                                                                                                                               |
| Actuation torque      | 0.18 ± 0.06 N-m [25.5 ± 8.5 oz-in]                                                                                                                                                 |
| Angle of throw        | 4° ± 2° in each direction                                                                                                                                                          |
| Vibration, Sinusoidal | MIL-STD 202G; Method 204, Condition B, sinus vibration harmonic motion with 1.5mm from 10Hz to 60Hz and 15g (peak) from 60Hz to 2000Hz. Each axis 4 hours total 12 hours.          |
| Shock                 | MIL-STD 202G; Method 213B, Condition C, 100G for 6ms, three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen (18 shocks) |
| Drop test             | IEC 60068-2-31; Test Ee, FreeFall -Procedure 1 drop in each direction of the 3 axes {6 total drops) from 1m                                                                        |

## Physical

|                  |                                                                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pin out terminal | Pin header, pin size .020 X .020 SQ, pitch .079 inch                                                                                                                                                      |
| Mounting         | 3x mounting holes                                                                                                                                                                                         |
| Mounting torque  | 1.2 - 1.4 N-m [10.62 - 12.39 inch-lbs]                                                                                                                                                                    |
| Weight           | 25 grams [.055 lbs]                                                                                                                                                                                       |
| Materials        | Seal Holder: Nylon<br>Housing: Nylon<br>Base: Nylon<br>Bottom Cover: Nylon<br>Seal: Silicone<br>Shaft: Stainless steel<br>Pin Out Terminal: Brass, gold plated<br>Dome Contact: Stainless steel<br>PCB:FR |

# Tech Specs

## Tables

| Rotary                  |                           |                          |                                |
|-------------------------|---------------------------|--------------------------|--------------------------------|
| Operating Voltage (VDC) | "High" Logic Output (VDC) | "Low" Logic Output (VDC) | Maximum Power Consumption (MW) |
| 5.00 ± .25              | >3.5                      | < 1.0                    | 100                            |
| 3.30 ± .25              | > 2.6                     | <.8                      | 66                             |

| Pushbutton              |                     |
|-------------------------|---------------------|
| Operating Voltage (VDC) | Current Rating (MA) |
| 5.00 ± .25              | 16                  |
| 3.30 ± .25              | 12                  |

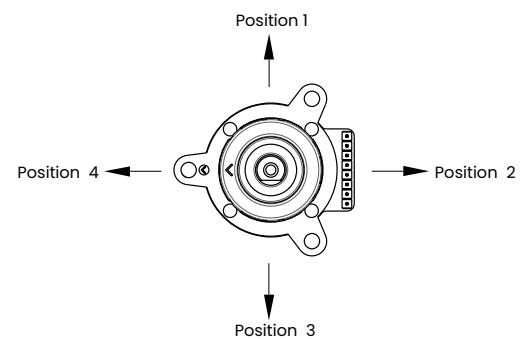
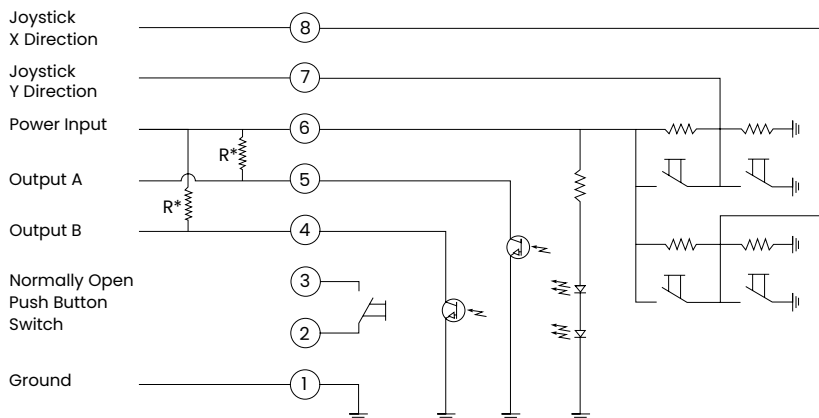
| Joystick                |                             |                              |                           |                          |
|-------------------------|-----------------------------|------------------------------|---------------------------|--------------------------|
| Operating Voltage (VDC) | Maximum Supply Current (MA) | "Neutral" Logic Output (VDC) | "High" Logic Output (VDC) | "Low" Logic Output (VDC) |
| 5.00 ± .25              | 0.6                         | 2.5 ± 0.5                    | >4.5                      | <0.5                     |
| 3.30 ± .25              | 0.4                         | 1.65 ± 0.2                   | >= 3                      | <0.5                     |

| Joystick Truth Table |          |          |
|----------------------|----------|----------|
| Position             | X Output | Y Output |
| 1                    | Neutral  | High     |
| 2                    | High     | Neutral  |
| 3                    | Neutral  | Low      |
| 4                    | Low      | Neutral  |
| Center               | Neutral  | Neutral  |

| Rotary Switch Truth Table |          |          |
|---------------------------|----------|----------|
| Clockwise Rotation        |          |          |
| Position                  | Output A | Output B |
| 1                         | ●        |          |
| 2                         | ●        |          |
| 3                         |          | ●        |
| 4                         |          | ●        |

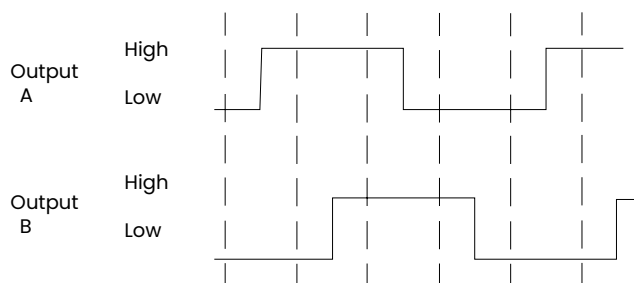
• Indicates logic high; blank indicates logic low.  
Code repeats every 4 positions

## Circuit Schematic & Joystick Operation



External Pull-up Resistors Required for Operation (2.2K $\Omega$ ) When Operating Power is 5.0VDC  
External Pull-up Resistors Required for Operation (3.0K $\Omega$ ) When Operating Power is 3.3VDC

## Rotary Switch Waveform



# Ordering Scheme

Sample Part No. **CRS - 1 - 2 - 1**

Selection 1 2 3 4

## 1. SERIES

**CRS** Carling Rotary Encoder Switch

## 2. SWITCH INPUT TYPE/FUNCTION

- 1 Directional, Rotary and Push
- 2 Rotary and Push
- 3 Rotary Only

## 3. RATED VOLTAGE OF ROTARY OPERATION

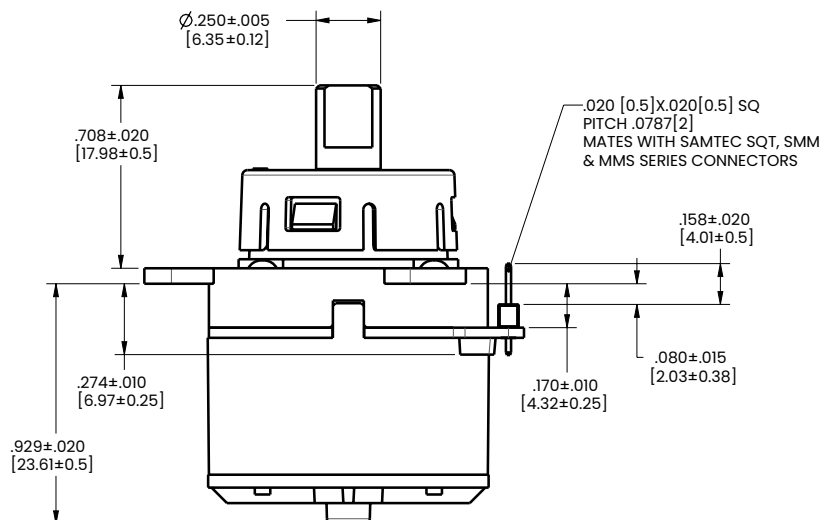
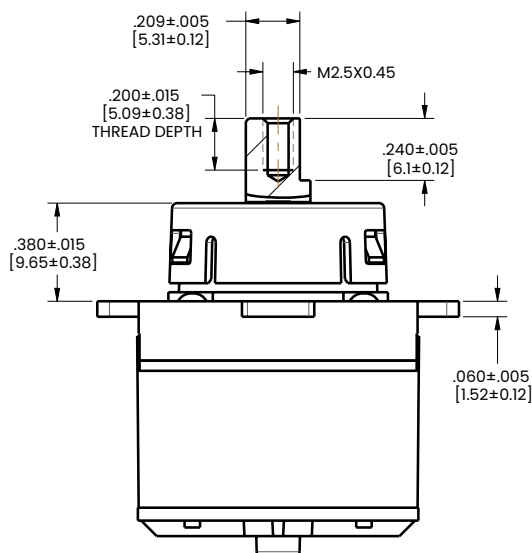
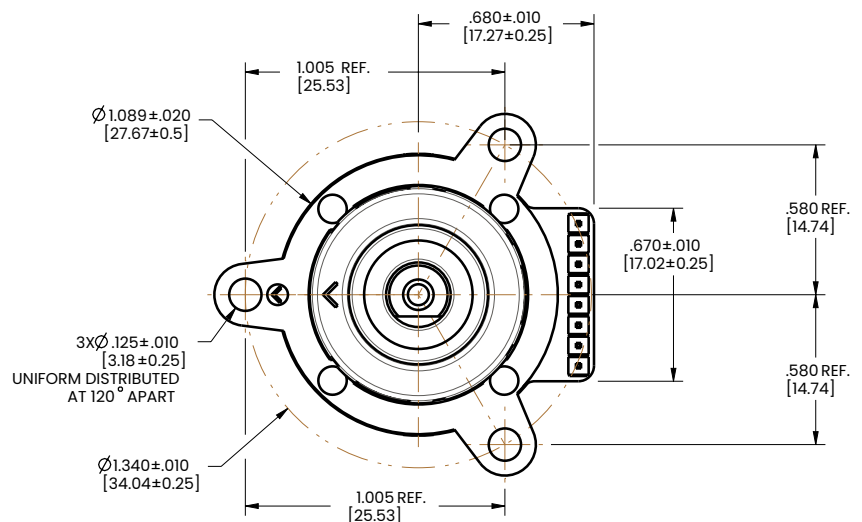
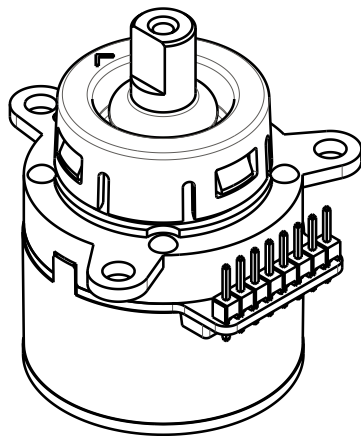
- 1 5.0VDC
- 2 3.3VDC

## 4. TERMINATION

- 1 Pin Header

# Dimensional Specs

inches [millimeters]

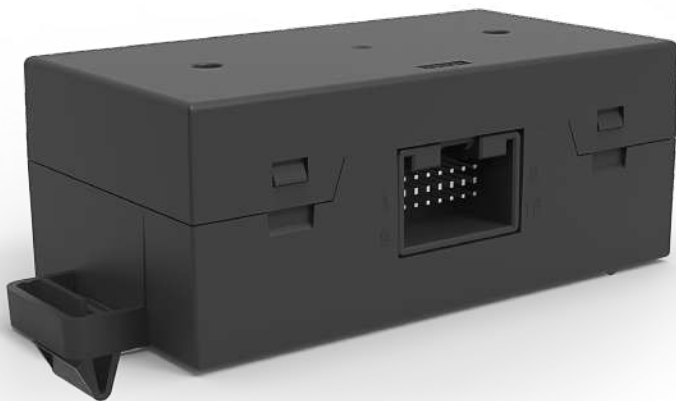


# CM-Series

Multiplexed CAN/LIN Switching System

**PRODUCT WEBPAGE**

*request sample, watch video*



The CM-Series system features a LIN Switch Module and a CAN/LIN Controller Module. The switch module includes a carrier that accommodates up to three uniquely identifiable switches and rheostats. The carrier also features two LIN connectors, one that connects to the controller module and one that allows for daisy-chaining to other switch modules. Additionally, the carrier can accommodate a two-pole hardwired switch. The controller module acts as the CAN interface to the system ECU and the LIN switches, and it accommodates up to 3 LIN buses for a total of 45 switch functions in one system.

**12/24**  
VDC

**100,000**  
Operations

**up to 45**  
Switch Functions Controlled

## Typical Applications

- Commercial Vehicles
- Construction Equipment
- Agricultural Equipment
- Work Trucks

# Design Features

## CARRIER

Versatile, 3-compartment Carrier provides easy installation and access.

## SWITCH OPTIONS

Uniquely identifiable standard, locking, and rheostat laser etched switches.

## ILLUMINATION

Up to 2 backlit icons and 1 center function light.



Above Panel

## CONTROLLER MODULE

Accommodates up to 45 switch functions. LIN connection to switches and CAN connection to ECU.



Carling Part Number:  
MPU-00000011

## Behind Panel

## CONNECTIONS

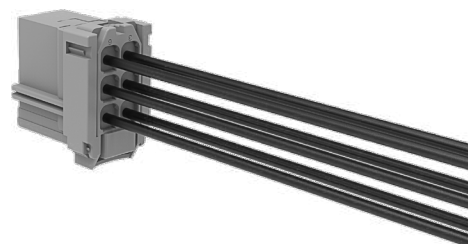
Two LIN connectors: 1 to Controller Module and 1 for Daisy Chaining.



Carling Part Number:  
MPU-00000010

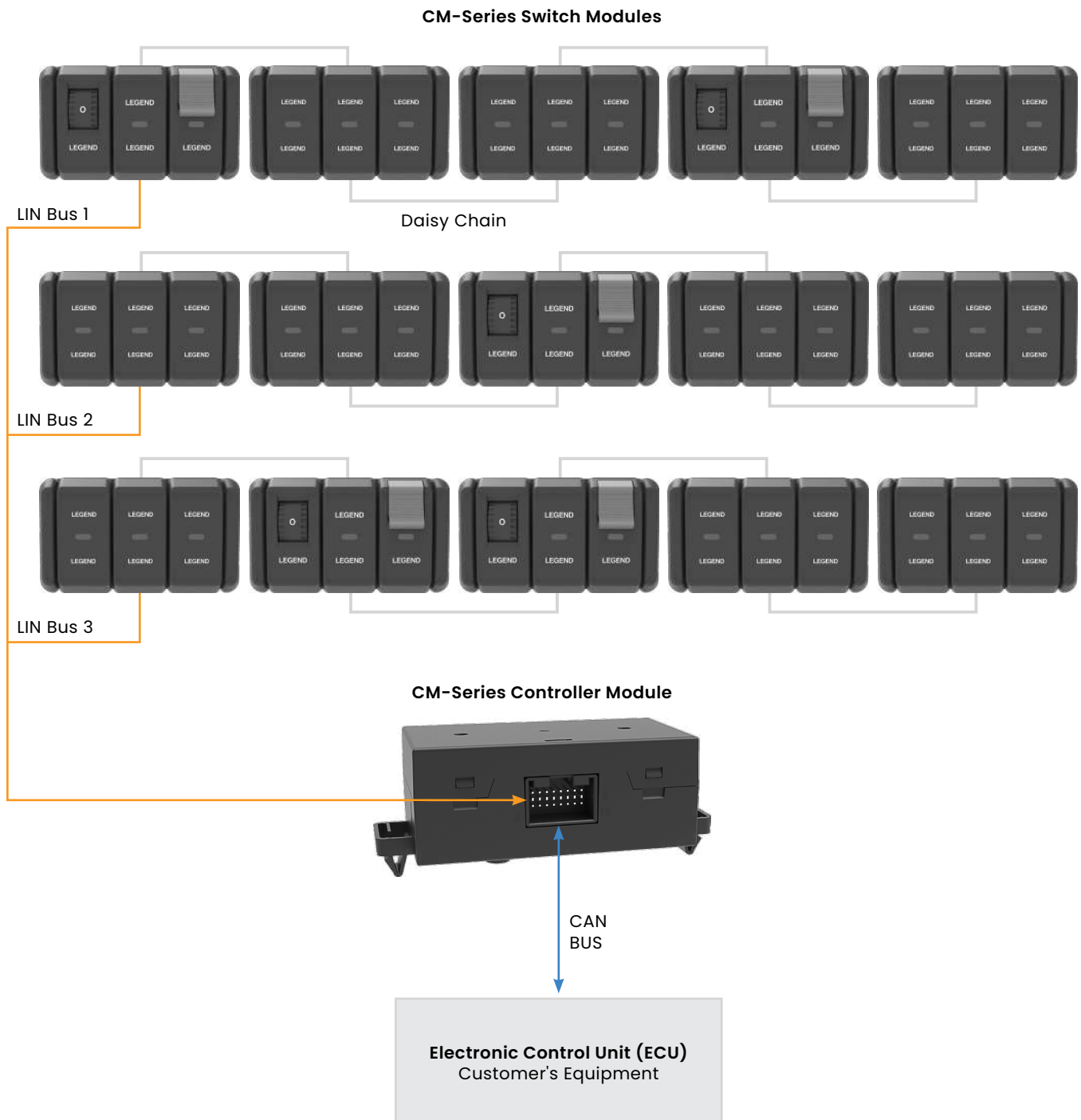
## HARDWIRE CONNECTOR

Option to hardwire loads. Status feedback through LIN connection



TE Part Number:  
8-968970-2

# System Diagram



# Tech Specs

## Physical

|                             |                                                                                                                                                                                                                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Function                    | Switch is LIN only, or LIN with hardware (HW). Rheostat is LIN only. Carrier to hold up to 3 switches, rheostats and/or hole plugs. Nodes/carriers must be used with Carling controller module.                                                                                                 |
| Switch Circuits             | 2-position maintained, 2-position momentary, 3-position maintained, 3-position momentary, 3-position maintained-momentary, 3-position momentary-maintained, locking                                                                                                                             |
| Illumination                | Switch can have up to 2 backlit laser marked icons. Switch can have 1 center function bar/light. Rheostat has 1 backlit laser marked icon. 5 color choices for backlight and function lights – red, orange/amber, green, blue, white. Backlight and function light illumination control via LIN |
| Mounting                    | See dimensional specs for carrier and controller module mounting requirements. Switch and rheostat must be installed in carriers. No fasteners required. Assembly/disassembly of carrier and controller from front side of panel                                                                |
| Connector Interface         | Controller module = MQS (Tyco p/n 966870-1). Harness connector is Tyco p/n 1534101-1 and 1534097-1. Carrier module = MQS (Tyco p/n 953698-1). Harness connector is Tyco p/n 953697-1. Switch hardware = MQS (Tyco p/n 8-968970-2).                                                              |
| Actuation Force             | Switch rocker actuation force = 4 to 10 Newtons. Switch lock actuation force = 4 to 6 Newtons.                                                                                                                                                                                                  |
| Angular Movement            | Switch rocker rotation = 12° from center. Rheostat wheel rotation = 190°, with detent at 67.6°.                                                                                                                                                                                                 |
| LIN Bus                     | 3 LIN buses max, 15 nodes per bus. 5 rheostat limit per system                                                                                                                                                                                                                                  |
| CAN Interface to Controller | Per CAN SAE J1939/71                                                                                                                                                                                                                                                                            |
| CAN Baud Rate               | 250 kbps                                                                                                                                                                                                                                                                                        |

## Environmental

|                       |                                                                                                                                           |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temperature | -40°C to +70°C                                                                                                                            |
| Vibration             | ISO 16750-3, Test VIII, 32 hours per plane                                                                                                |
| Mechanical Shock/Drop | ISO 16750-3, free fall 1-meter drop 3 times                                                                                               |
| Accelerated Aging     | IEC 60068-2-2 test Bb, 336 hours at 95°C                                                                                                  |
| Chemical Resistance   | IEC 60068-2-74 condition A – gasoline, diesel, denatured alcohol, mineral oil, motor oil, brake fluid, ethylene glycol, Armor All, Windex |
| Ingress Protection    | IP52 rated                                                                                                                                |
| High Temperature Test | IEC 60068-2-2 test B, 70°C for 24 hours                                                                                                   |

## Electrical

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Voltage    | Controller module = 9 to 32VDC<br>HW Switch = 5 to 32VDC                                                                                                                                                                                                                                                                                                                                                                                 |
| Electrical Rating    | HW Switch = 5mA to 10A at 24VDC                                                                                                                                                                                                                                                                                                                                                                                                          |
| Sleep Current        | Switch = 90uA per switch<br>Controller module = 550uA                                                                                                                                                                                                                                                                                                                                                                                    |
| Electrical Endurance | LIN Switch = 80k operations, resistive load 25uA, 24 VDC<br>HW Switch = 80k operations, resistive load 10mA, 24 VDC<br>HW Switch = 80k operations, resistive load 10A, 24VDC<br>HW Switch = 100k operations, inductive load 10A, 24 VDC<br>HW Switch = 100k operations, electronics load 5mA, 24 VDC<br>Rheostat = 10k cycles                                                                                                            |
| Reverse Voltage Test | -16 VDC for 4 hours                                                                                                                                                                                                                                                                                                                                                                                                                      |
| ESD                  | 8kV direct, 15kV through air                                                                                                                                                                                                                                                                                                                                                                                                             |
| EMC – Conducted      | ISO 7637-2 pulse 1, 2A, 2B, 3A, 3B, starting profile, load dump A, load dump B, super imposed alternating voltage, slow increase/decrease of supply voltage, momentary drop in supply voltage, reset behavior at voltage drop<br>ISO 7637-2 transient immunity on supply lines pulses 1, 2a, 2b, 3a, 3b, 4<br>ISO 7637-3 transient immunity on signal leads<br>Frequency emission on power supply and signal leads from 0.15 to 108 MHz. |
| EMC – Radiated       | BCI per ISO 11452-4 at 100mA<br>Broadband radiated emissions per ECE-R10 annex 7<br>Narrowband radiated emissions per ECE-R10 annex 8                                                                                                                                                                                                                                                                                                    |

Tech Specs continued on next page

# Tech Specs

## Software Interface Integration

Click below for instructions on integrating the CM-Series:

[www.carlingtech.com/sites/default/files/documents/cm-series\\_interface.pdf](http://www.carlingtech.com/sites/default/files/documents/cm-series_interface.pdf)

## Tables

**Table A: Controller** Connection Pin Definition

| Pin Number | Pin Definition     |
|------------|--------------------|
| Pin 1      | LIN 3 Ground       |
| Pin 2      | LIN 3 Power (+12V) |
| Pin 3      | LIN 3 Bus          |
| Pin 4      | LIN 2 Power (+12V) |
| Pin 5      | LIN 2 Bus          |
| Pin 6      | LIN 1 Power (+12V) |
| Pin 7      | LIN 1 Bus          |
| Pin 8      | VBat Input         |

| Pin Number | Pin Definition        |
|------------|-----------------------|
| Pin 9      | LIN 1 Ground          |
| Pin 10     | LIN 2 Ground          |
| Pin 11     | CAN Term Connect A    |
| Pin 12     | CAN Term Connect B    |
| Pin 13     | CAN L                 |
| Pin 14     | CAN H                 |
| Pin 15     | CAN Shield            |
| Pin 16     | VBat (Vehicle Ground) |

**Table B: Carrier** Connection Pin Definition

| Pin Number | Pin Definition   |
|------------|------------------|
| Pin 1      | LIN Ground       |
| Pin 2      | LIN Bus          |
| Pin 3      | LIN Power (+12V) |



# Ordering Scheme

## Standard Switch

Sample Part No. **CM 18 C H C 0 - A 2 1 Z 53 - 1 LV 00 00 A**

Selection 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

### 1. SERIES

**CM** Standard Switch

### 2. CIRCUIT

Terminal connections as viewed from bottom of switch  
Single pole uses 1, 2, and 3. Double pole uses 1, 2, 3 and 4, 5, 6  
( ) = momentary. SP = Single Pole. DP = Double Pole.

| Position:        |           | 1          | 0         | 2          |
|------------------|-----------|------------|-----------|------------|
| SP               | SP        | 1&2        | Connected | 2&3        |
| LIN              | LIN       | 4&5        | Terminals | 5&6        |
| Only             | & HW      | Lin        | HW        | & LIN      |
| <b>16</b>        | <b>26</b> | ON         | OFF       | ON         |
| <b>17</b>        | <b>27</b> | ON         | OFF       | (ON)       |
| <b>18</b>        | <b>28</b> | (ON)       | OFF       | (ON)       |
| Special Circuits |           |            |           |            |
| <b>40</b>        | <b>50</b> | OFF        | 2&3       | None       |
| <b>41</b>        | <b>51</b> | ON         | OFF       | None       |
| <b>42</b>        | <b>52</b> | (ON)       | OFF       | None       |
| <b>43</b>        | <b>53</b> | (ON)       | 2&3       | None       |
| <b>44</b>        | <b>54</b> | ON         | 2&3       | None       |
| <b>45</b>        | <b>55</b> | (ON)       | OFF       | ON         |
| <b>46</b>        | <b>56</b> | None       | 1&2       | ON         |
| <b>47</b>        | <b>57</b> | None       | 1&2       | (ON)       |
| <b>48</b>        | <b>58</b> | None       | OFF       | 2 & 3      |
| <b>49</b>        | <b>59</b> | None       | OFF       | (ON)       |
|                  | <b>71</b> | 1&2, 4&5   | 5&6       | None       |
|                  | <b>72</b> | (4&5)      | OFF       | None       |
|                  | <b>76</b> | None       | 4 & 5     | 2&3, 5&6   |
|                  | <b>77</b> | None       | 4 & 5     | (2&3, 5&6) |
|                  | <b>78</b> | (1&2, 4&5) | OFF       | (2&3, 5&6) |
|                  | <b>C4</b> | (1&2, 4&5) | OFF       | (2&3, 5&6) |

### 3. ILLUMINATION

| Lamp #   | ILLUMINATION Type | Lamp #   | ILLUMINATION Type |
|----------|-------------------|----------|-------------------|
| <b>S</b> | None              | <b>E</b> | 1                 |
| <b>A</b> | 1                 | <b>F</b> | 3                 |
| <b>B</b> | 3                 | <b>F</b> | 1                 |
| <b>C</b> | 1                 | <b>F</b> | 2                 |
| <b>D</b> | 2                 | <b>F</b> | 3                 |
|          | 3                 |          | Independent       |

### 4.5. LAMP 1 AND/OR LAMP 2 <sup>4</sup>

|         |                                                               |
|---------|---------------------------------------------------------------|
| No Lamp | <b>0</b>                                                      |
| LED     | <u>Red</u> <u>Amber</u> <u>Green</u> <u>Blue</u> <u>White</u> |
| 12VDC   | <b>A C H 2 6</b>                                              |

### 6. LAMP 3 OR LOCK OPTION <sup>4</sup>

|             |                                                               |
|-------------|---------------------------------------------------------------|
| No Lamp     | <b>0</b>                                                      |
| Lock Option | <b>W</b>                                                      |
| LED         | <u>Red</u> <u>Amber</u> <u>Green</u> <u>Blue</u> <u>White</u> |
| 12VDC       | <b>A C H 2 6</b>                                              |

### 7. ACTUATOR STYLE AND COLOR <sup>3</sup>

|                               |          |          |
|-------------------------------|----------|----------|
| Style                         | Black    | Red      |
| Rocker - Laser Etched         | <b>A</b> | <b>D</b> |
| Locking Rocker - Laser Etched | <b>P</b> | <b>R</b> |

### 8. IMAGE 1 COLOR <sup>1</sup>

|          |          |                |
|----------|----------|----------------|
| <b>Z</b> | No Image | Image Location |
| <b>2</b> | White    | 1 2 3          |

### 9. IMAGE 2 COLOR <sup>1</sup>

|          |          |                |
|----------|----------|----------------|
| <b>Z</b> | No Image | Image Location |
| <b>1</b> | Clear    | 1 2 3          |

### 10. IMAGE 3 COLOR OR LOCK FUNCTION & COLOR <sup>2</sup>

|                                |          |                |
|--------------------------------|----------|----------------|
| Image 3 Color                  |          | Image Location |
| <b>Z</b>                       | No Image | 1 2 3          |
| <b>2</b>                       | White    |                |
| Actuator Lock Function & Color |          |                |
| Lock in 0 POS                  |          | Lock Color     |
| <b>H</b>                       |          | Match Actuator |
| <b>J</b>                       |          | Black          |
| <b>K</b>                       |          | White          |
| <b>L</b>                       |          | Red            |
| <b>M</b>                       |          | Orange         |
| <b>G</b>                       |          | Gray           |

### 11. LEGEND - IMAGE 1

**00** No legend  
For standard legends, see "Standard Legend Codes" page. For additional legends, please consult factory

### 12. LEGEND ORIENTATION

|          |               |
|----------|---------------|
| <b>0</b> | No legend     |
| <b>1</b> | Orientation 1 |
| <b>2</b> | Orientation 2 |
| <b>3</b> | Orientation 3 |
| <b>4</b> | Orientation 4 |

### 13. LEGEND - IMAGE 2

**00** No legend  
**LV** Function Light - Orientation 1 and 3  
**LY** Function Light - Orientation 2 and 4

### 14. LEGEND - IMAGE 3

**00** No legend  
For standard legends, see "Standard Legend Codes" page. For additional legends, please consult factory

### 15. SOURCE ADDRESS

The Source Address is a unique two digit code (**01-5F**) assigned to each switch on the CAN network, and is determined based on the specific CAN architecture of each customer application.

### 16. ILLUMINATION DECISION

| ILLUMINATION Group | Wake/No Wake |
|--------------------|--------------|
| <b>A</b>           | Drive        |
| <b>B</b>           | Drive        |
| <b>C</b>           | Entry        |
| <b>D</b>           | Entry        |

Notes:

- If LIN switch only, rating is 12VDC Max.
- If LIN & hardwire, hardwire portion of switch rating is 5mA-10A 24VDC.
- Use (0) in lock callout location when creating laser etched locking rocker description.
- Bracket color is black.
- LED voltage to be supplied by the network at 12V.
- Switches **must be** mounted in Carrier & interfaced with Controller Module.
- Hole plug also available. Part number 390-41022-001.

# Ordering Scheme

## Rheostat Switch

Sample Part No. CMR B C A N W - A D A 4L 1 - 81 A

Selection 1 2 3 4 5 6 7 8 9 10 11 12 13

### 1. SERIES

**CMR** Rheostat with LIN Termination

### 2. POTENTIOMETER ROTATION

**B** 190 Degree Rotation

### 3. RESISTANCE RANGE

**C** LIN Signal Controlled

### 4. RATING

**A** 12V

### 5. BACKLIGHTING LED

|         |            |              |              |             |              |  |
|---------|------------|--------------|--------------|-------------|--------------|--|
| No Lamp | <b>0</b>   |              |              |             |              |  |
| LED     | <u>Red</u> | <u>Amber</u> | <u>Green</u> | <u>Blue</u> | <u>White</u> |  |
| 12VDC   | <b>C</b>   | <b>N</b>     | <b>H</b>     | <b>A</b>    | <b>6</b>     |  |

### 6. BRACKET COLOR

**W** White

### 7. THUMB WHEEL COLOR

**A** Black

### 8. THUMB WHEEL DETENTS

**D** 1 Detent Position at 67.6 Degrees

### 9. COVER COLOR AND STYLE

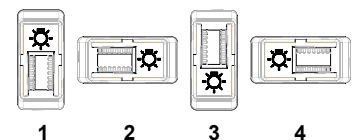
| Color          | Style                 |
|----------------|-----------------------|
| <b>A</b> Black | Painted, Laser-Etched |

### 10. LEGEND

**00** No legend  
For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

### 11. LEGEND ORIENTATION

**0** No legend  
**1** Orientation 1  
**2** Orientation 2  
**3** Orientation 3  
**4** Orientation 4



### 12. SOURCE ADDRESS

The Source Address is a unique two digit code (**81-85**) assigned to each rheostat on the CAN network, and is determined based on the specific CAN architecture of each customer application.

### 13. ILLUMINATION DECISION

|          | Illumination Group | Wake/No Wake |
|----------|--------------------|--------------|
| <b>A</b> | Drive              | No Wake      |
| <b>C</b> | Entry              | No Wake      |

#### Notes:

- Rheostats **must be** mounted in Carrier & interfaced with Controller Module.
- Thumb wheel marking available. Consult factory.

## Additional Part Numbers

### Hole Plug

390-41022-001

Hole Plugs are inserts that can be mounted in Carriers populated with less than 3 switches, to occupy the vacant space.



### Carrier

MPU - 00000010

Switches, Rheostats and Hole Plugs must be mounted in a Carrier. Each Carrier has three slots.



### Controller Module

MPU - 00000011

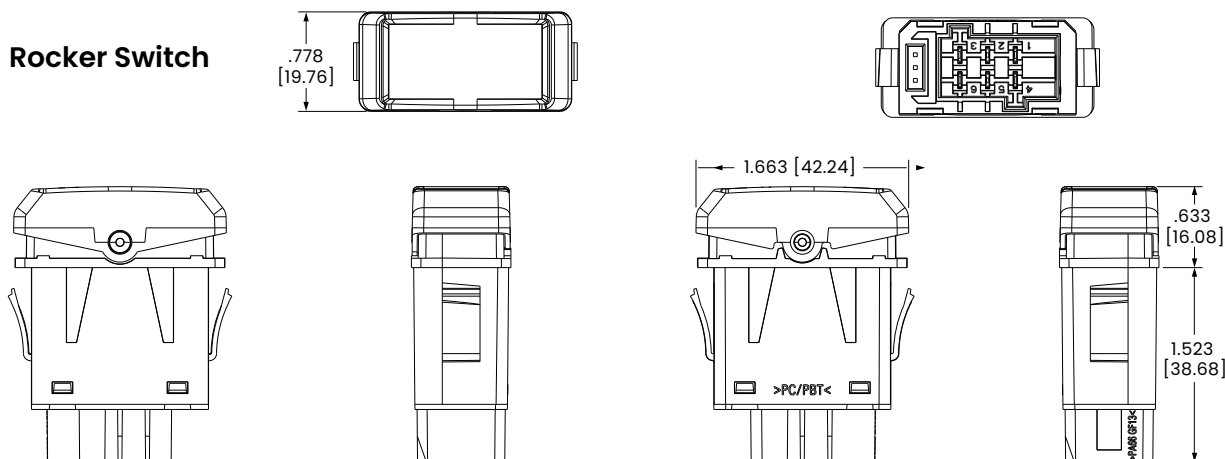
The Controller Module translates the LIN to CAN for communication with the rest of the vehicle's system.



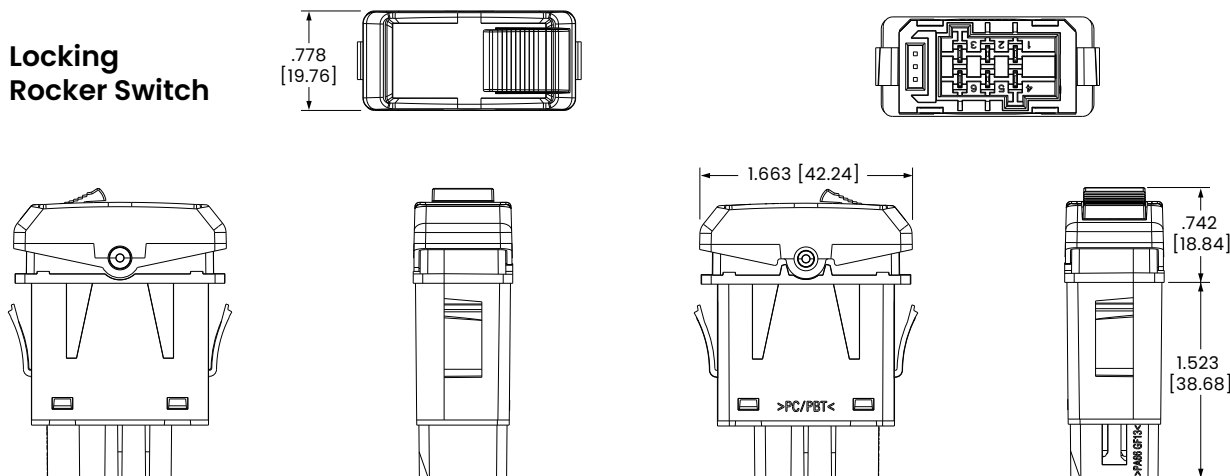
# Dimensional Specs

inches [millimeters]

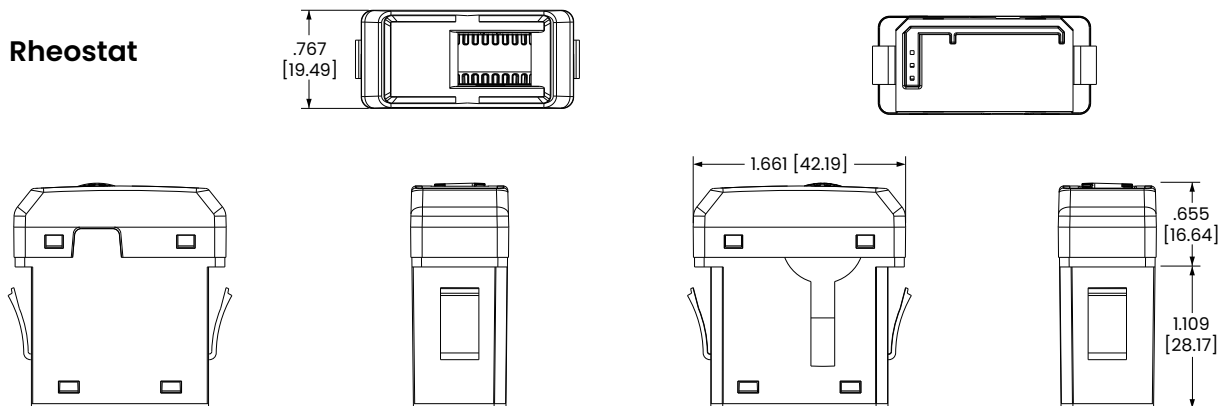
## Rocker Switch



## Locking Rocker Switch



## Rheostat



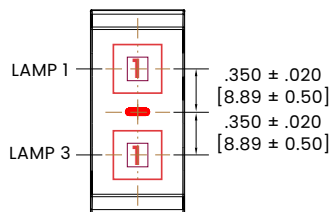
## Legend Marking Area

|   | MARKING AREA |
|---|--------------|
| X | .375 [9.53]  |
| Y | .375 [9.53]  |

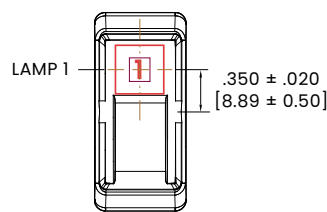


Icon marking area and location  
Unless otherwise specified, icon size and location  
should follow this drawing and is applicable to all  
4 orientations

### Rocker Switch



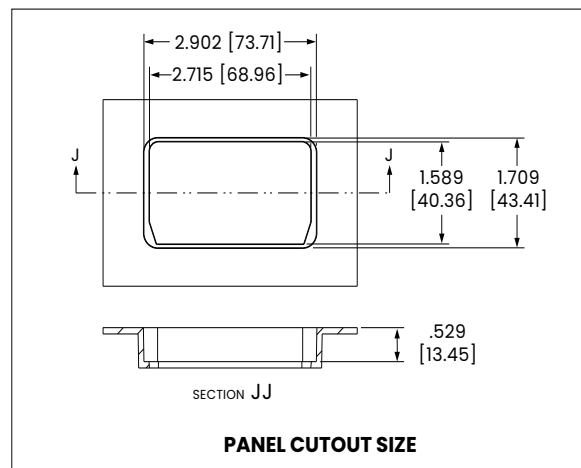
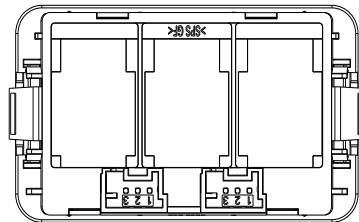
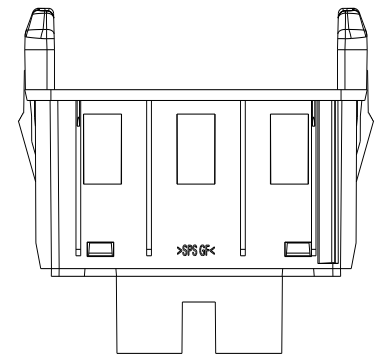
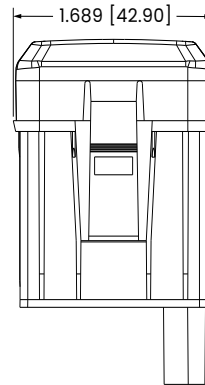
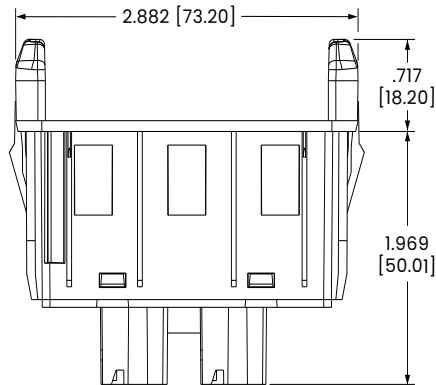
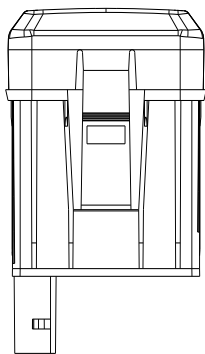
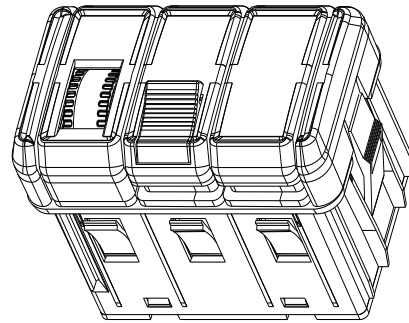
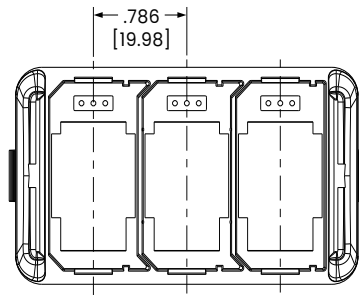
### Locking Rocker Switch



# Dimensional Specs

inches [millimeters]

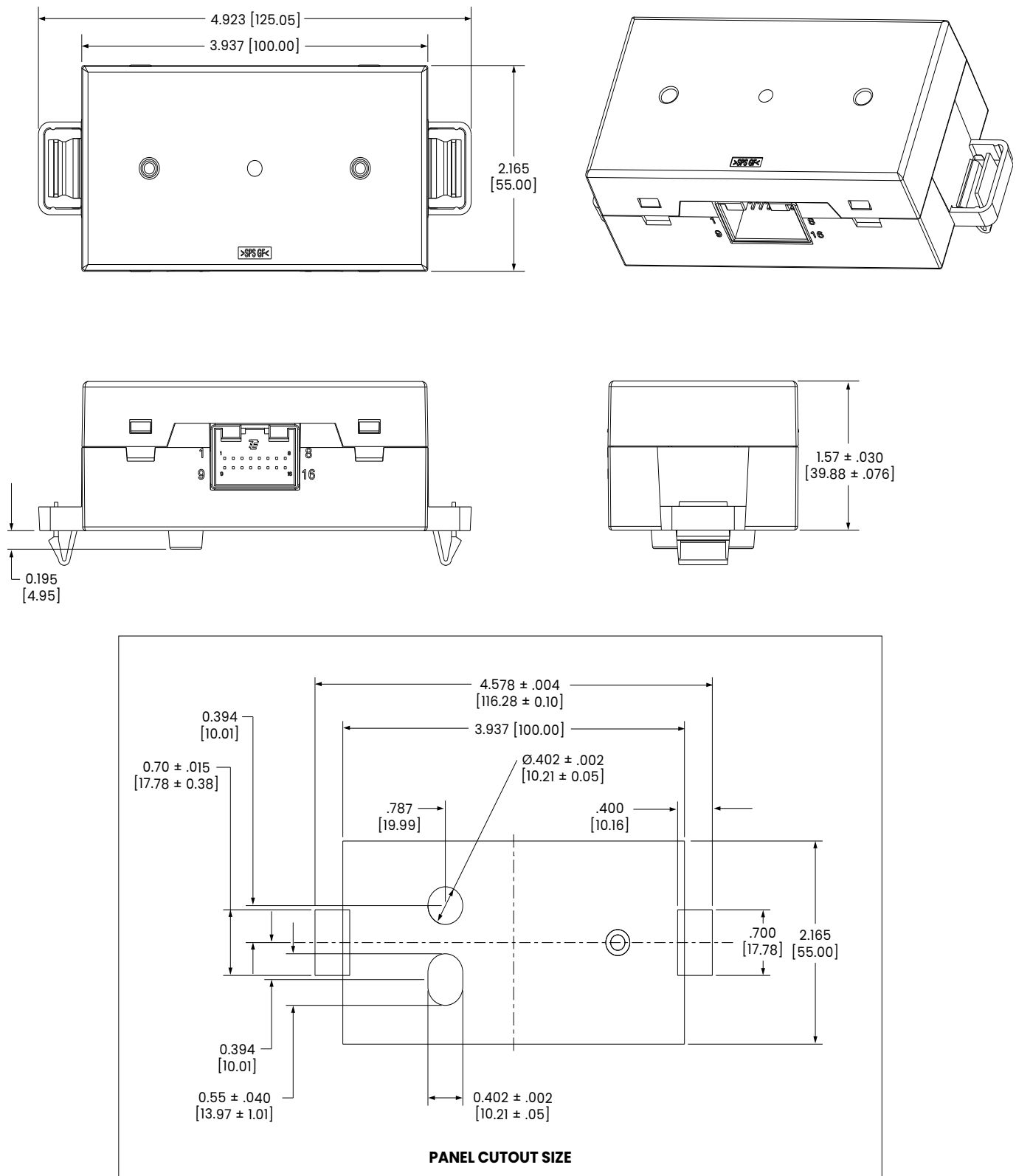
## Carrier



# Dimensional Specs

inches [millimeters]

## Controller Module



# Circuit Diagrams

| Circuit Code | CIRCUIT DIAGRAM |
|--------------|-----------------|
| 16           |                 |
| 17           |                 |
| 18           |                 |
| 26           |                 |
| 27           |                 |
| 28           |                 |
| 40           |                 |
| 41           |                 |
| 42           |                 |

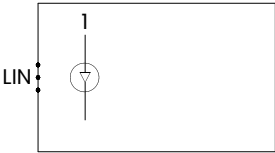
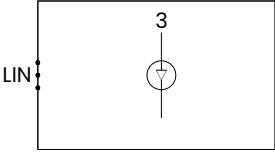
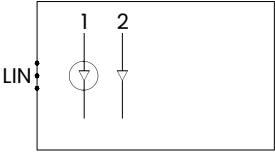
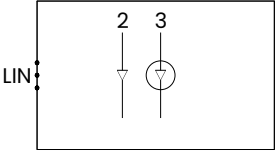
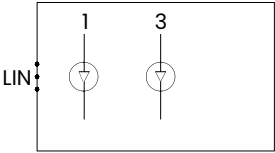
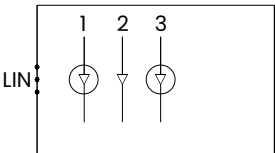
| Circuit Code | CIRCUIT DIAGRAM |
|--------------|-----------------|
| 43           |                 |
| 44           |                 |
| 45           |                 |
| 46           |                 |
| 47           |                 |
| 48           |                 |
| 49           |                 |
| 50           |                 |
| 51           |                 |

# Circuit Diagrams

| Circuit Code | CIRCUIT DIAGRAM |
|--------------|-----------------|
| 52           |                 |
| 53           |                 |
| 54           |                 |
| 55           |                 |
| 56           |                 |
| 57           |                 |
| 58           |                 |

| Circuit Code | CIRCUIT DIAGRAM |
|--------------|-----------------|
| 59           |                 |
| 71           |                 |
| 72           |                 |
| 76           |                 |
| 77           |                 |
| 78           |                 |
| C4           |                 |

# Illumination Diagrams

| Illumination Code | ILLUMINATION DIAGRAM                                                                |
|-------------------|-------------------------------------------------------------------------------------|
| A                 |    |
| B                 |    |
| C                 |    |
| D                 |    |
| E                 |  |
| F                 |  |



# CLTM12-Series

Solid State Load Controller

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



The CLTM12-S is a compact, solid state load controller with 12 high-side outputs, 4 digital inputs, 3 discrete inputs, 2 address lines, and a CAN baud rate select line. It provides fast, low-loss, solid state on/off switching along with short circuit protection for each output, as well as load status and power diagnostics. Relative to electromechanical relays, the CLTM12 electronic control module increases thermal efficiency by providing lower power dissipation and higher power-to-weight densities.

**6.5–32 VDC** **IP69K Sealing**  
 When Connected

## Typical Applications

- On/Off-Highway
- Directional and Hazard Signals
- Site and Work Lights
- Headlamps and Sidelights
- Beacon and Alarm Systems
- Cab Illumination

# Tech Specs

## Mechanical

|                                      |                                    |
|--------------------------------------|------------------------------------|
| Dimensions (L x W x H)               | 5.7" x 4.2" x 1.33"                |
| Weight (max)                         | 1.25 lbs. (0.567 kg)               |
| Torque Value<br>(voltage input stud) | 20 – 25 in.-lbs. [2.26 – 2.82 N-m] |
| J2 Mating connector                  | Molex P/N 334721201                |
| J1 Mating connector                  | Molex P/N 0334721601               |

## Electrical

|                      |                                                                                            |
|----------------------|--------------------------------------------------------------------------------------------|
| Voltage Input        | 6.5 to 32VDC                                                                               |
| Max Current Capacity | 75 Amps                                                                                    |
| Serial Communication | CAN J1939                                                                                  |
| 8 High Side Outputs  | 10 Amps each                                                                               |
| 4 High Side Outputs  | 5 Amps each                                                                                |
| 2 Address Lines      | Active Low                                                                                 |
| Baud Rate Select     | Connector J1 Pin 3: 250 Kbit/s open; connector J1 Pin 3 to connector J1 Pin 15: 500 Kbit/s |
| 4 Digital Inputs     | Active High & Open                                                                         |
| 3 Discrete Inputs    | Active High & Open                                                                         |
| Sleep Mode Current   | <3mA                                                                                       |
| Operating Voltage    | SAE J1455, Section 4.13.1                                                                  |
| Over Voltage         | SAE J1455, Section 4.13.1                                                                  |
| Reverse Polarity     | SAE J1455, Section 4.13.1                                                                  |
| Short Circuit        | SAE J1455, Section 4.13.1                                                                  |
| Power Up             | SAE J1455, Section 4.13.1                                                                  |

## Electromagnetic

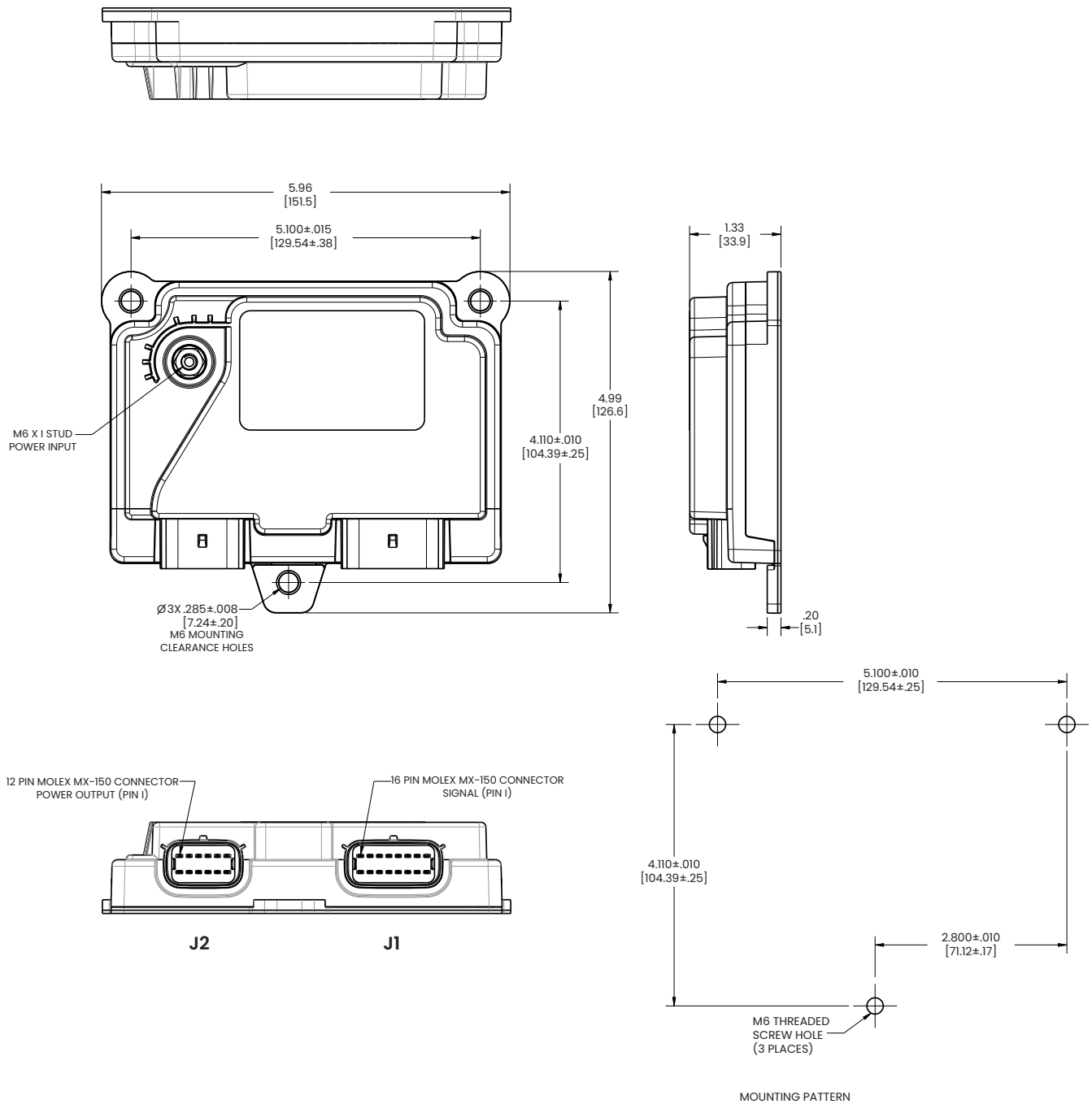
|                               |                                          |
|-------------------------------|------------------------------------------|
| Transient Immunity            | ISO 11451-1 & 11452-2                    |
| Transient Emissions           | ISO 13766, Section 5 Annex D And Annex E |
| Conducted Transients          | ISO 7637-2, Annex A                      |
| Electrostatic Discharge (ESD) | ISO 13766 & ISO 10605                    |

## Environmental

|                                 |                                                                                                                                                             |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temp.                 | -40° to +85°C                                                                                                                                               |
| Storage Temperature             | -40° to +85°C                                                                                                                                               |
| High Temperature                | IEC 60068-2-2, Test Bb                                                                                                                                      |
| Low Temperature                 | IEC 60068-2-1, Test Ad                                                                                                                                      |
| Temp. Cycling<br>(Operational)  | IEC 60068-2-14, Test Nb                                                                                                                                     |
| Temp. Shock (Storage)           | IEC 60068-2-14, Test Na                                                                                                                                     |
| Simulated Solar<br>Radiation    | IEC 60068-2-5, Procedure B                                                                                                                                  |
| Altitude (Transport)            | IEC 60068-2-13                                                                                                                                              |
| Altitude (Operational)          | IEC 60068-2-13, Test M:<br>Low air pressure                                                                                                                 |
| Humidity (Soak)                 | IEC 60068-2-78                                                                                                                                              |
| Humidity (Cyclic)               | IEC 60068-2-30                                                                                                                                              |
| Sealing Protection              | IP69k in accordance with DIN 40050-9 and IEC 60529 sections 13.4, 13.6, & 14                                                                                |
| Mechanical Shock<br>(Drop Test) | IEC 60068-2-32, Test Ed: Free Fall, Procedure 1.                                                                                                            |
| Mechanical (Shock)              | 60068-2-27                                                                                                                                                  |
| Mechanical (Bump)               | 60068-2-29                                                                                                                                                  |
| Vibration (Sine)                | IEC 60068-2-6                                                                                                                                               |
| Vibration (Random)              | IEC 60068-2-64, Method 1                                                                                                                                    |
| Vibration (Resonant<br>Search)  | IEC 60068-2-6                                                                                                                                               |
| Chemical Resistance             | IEC 60068-2-74, Test Class B<br>(Engine oil, Diesel, Hydraulic Oil, Ethylene Glycol, Urea Nitrogen, Liquid lime, NPX fertilizer, Ammonia, Calcium chloride) |
| Salt Spray                      | IEC 60068-2-52, Test Kb                                                                                                                                     |
| Ozone                           | ASTM D1171-99, Method 1                                                                                                                                     |

# Dimensional Specs

inches [millimeters]



# Configuration

## Digital inputs

The digital inputs (IND\_1, IND\_2, IND\_3, IND\_4\_WKE) sense the presence of two voltage level states: “Active High”, and “Open” are compatible with standard 5v logic devices (E.g. when the input is at +5v it will be read as a logic ‘1’ or “High”. When the input is at 0v or GND it will be read as logic ‘0’) The unused digital inputs can be left disconnected.

- Absolute limits -2.3 to 36V
- Input resistance: 1K Ohm
- Input pin voltage open circuit: 2.75V

## Thresholds

Open = 1.58 to 4.28V

High = 4.78V to 6.63V

These thresholds apply when the CLTM12-S is not in sleep mode.

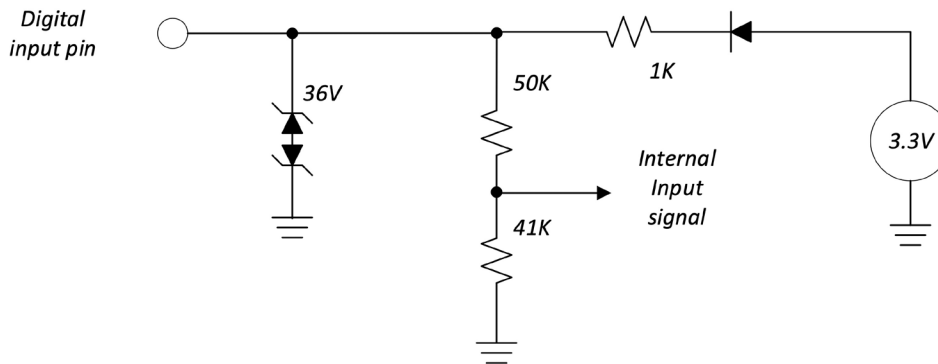
The IND\_4\_WKE pin is a special case. When the CLTM12-S is in sleep mode this pin serves as a means of waking the CLTM12-S from sleep when a low to high logic transition is detected.

The logic levels associated with this function are:

Logic high for levels no less than 3.70 V

In the sleep state the open circuit voltage on this pin is between 3.0 and 3.3V, so it must be pulled high to cross the threshold and wake the CLTM12-S.

## Digital Input Impedance Model



## Discrete inputs

The discrete inputs (INA\_1, INA\_2, INA\_3) are similar to the digital inputs in that they respond to two voltage level states “Active High”, and “Open” (E.g. when the input is at V-Battery it will be read as a logic ‘1’ or “High”. When the input is at 0v or GND it will be read as logic ‘0’) The unused discrete inputs can be left disconnected which results in an “open” state.

Absolute limits: -2.3 to 36V

Input resistance: 1K Ohm

Input voltage, open circuit: 2.75V

Thresholds:

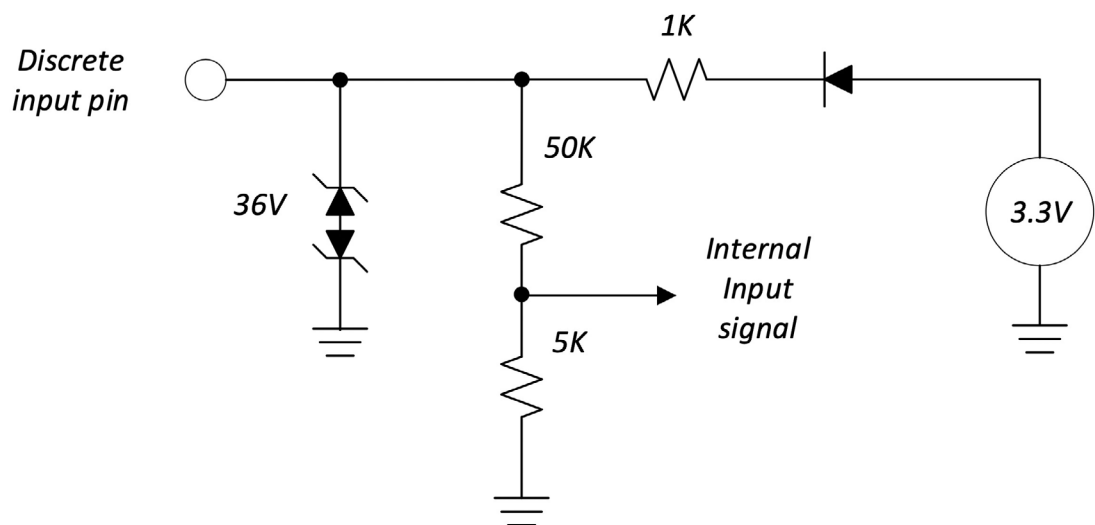
Open = 1.51 to 4.31V

High = 4.82V to 32.0V

These thresholds apply when the CLTM12-S is not in sleep mode.

# Configuration

## Discrete Input Impedance Model



## Address and Baud Rate select inputs

The address lines (ADD\_1, ADD\_2 and baud rate select) are active Low inputs that the software uses to identify the application based on the configuration of the wiring harness. These pins recognize two states Low and High.

| Address 1 | Address 2 | J1939 Source Address |
|-----------|-----------|----------------------|
| Open      | Open      | 49 (0x31)            |
| Ground    | Open      | 50 (0x32)            |
| Open      | Ground    | 51 (0x33)            |

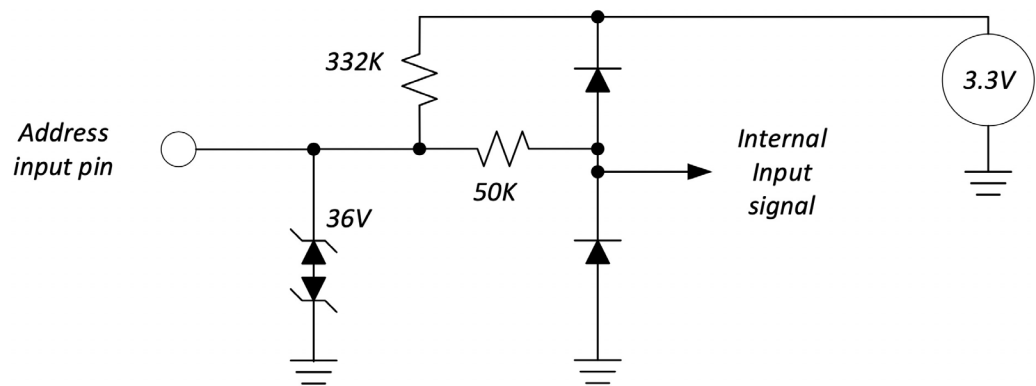
Open circuit voltage = 3.3V  
Input resistance > 50K Ohms  
Low = below 0.72V  
High = above 1.65V

## Baud Rate Select input

No connect (J1-3) for 250 Kbits/second select.  
Connect (J1-3 to J1-15) for 500 Kbits/second select.  
If the CLTM12-S-Series is configured for 500k Baud operation, several CAN errors will be visible on the bus at power-up. This is because the bootloader software is hard-configured for 250k Baud operation and will generate CAN errors as the software transitions from the bootloader to the application.

# Configuration

## Address & Baud Rate select Input Impedance Model



## Output Channels

The 12 High side output channels are switched with MOSFETs connected in a back-to-back arrangement so that back-feeding is not possible when the channel is turned off.

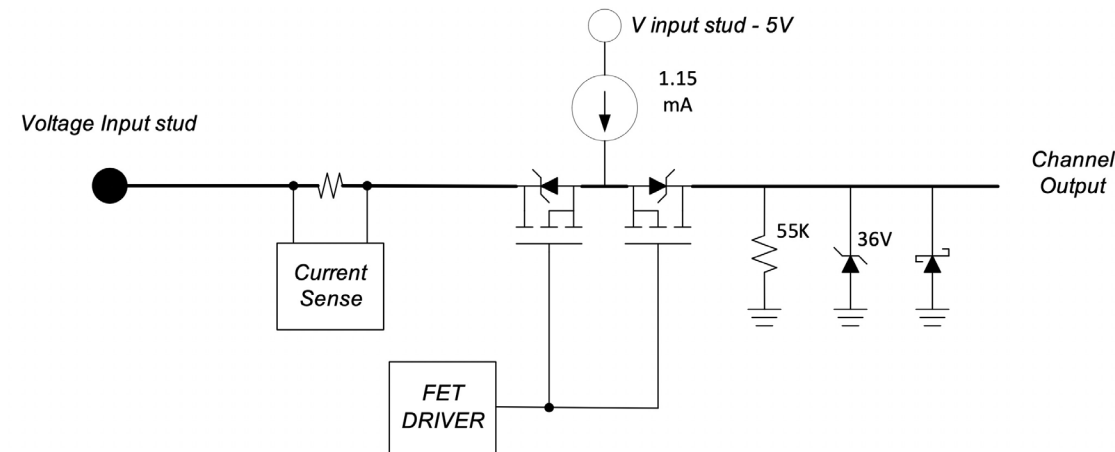
|     |                                                                                                                                            |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------|
| 5A  | Channels 3 ( J2 pin 11 ), 6 ( J2 pin 9 ), 9 ( J2 pin 8 ) and 12 ( J2 pin 10 )                                                              |
| 10A | Channels 1 ( J2 pin 6 ), 2 ( J2 pin 4 ), 4 ( J2 pin 2 ), 5 ( J2 pin 1 ), 7 ( J2 pin 7 ), 8 ( J2 pin 3 ), 10 ( J2 pin 5 ), 11 ( J2 pin 12 ) |

The total current supplied by the CLTM12-S is limited to 75A.

All channels employ the following:

- Load Presence Detection
- Latched shutdown overcurrent detection with reset.
- Overcurrent surge allowance that prevents overcurrent latch tripping when starting high surge loads such as incandescent lamps.

## Output Channel Schematic



# Configuration

## Output Channel Schematic (continued)

When a channel is off, a current source supplies 1.15 mA to the load so that the channel output voltage can be used to determine its status. The real-time monitoring functions for the faults: "Open circuit" and "ON when commanded OFF" are implemented by comparing channel voltage to input voltage. "Open circuit" is asserted when the channel is OFF and the difference between the Input voltage and the Channel voltage is between 1.5V and 6.0 volts. If the difference between the Input and Channel voltages is between 0 and 1.5V when the channel is OFF, the "ON when commanded OFF" fault is asserted.

The OFF when commanded ON fault is asserted when a channel is ON and the channel voltage is 1.5V or less.

When an overcurrent condition is detected the hardware will latch the channel off and prevent it from being turned back on for the remainder of the continuously powered interval. The channel will be available again after a power cycle.

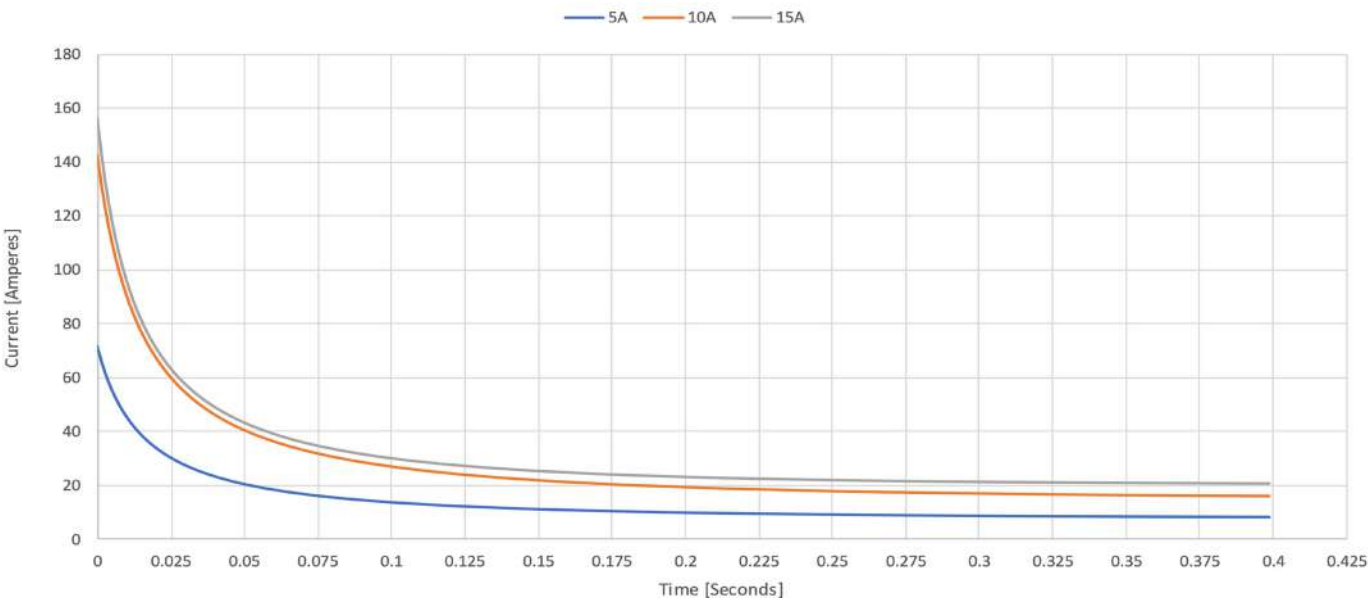
The surge allowance function is also implemented in hardware. Constant over-current levels are allowed for a time that is inversely proportional to the magnitude of overcurrent according to the following curve.

Most real loads have current draws that vary continuously with time for an interval of time. An incandescent lamp filament is an example where the instantaneous start current is a high peak that exponentially decays to the steady state level within a short time (100mS).

The surge allowance function does have a hard-peak limit that is not time dependent. The channel shuts down immediately when this limit is exceeded. The hard peak is greater than nine times (9x) the continuous current limit.

|                          |      |      |
|--------------------------|------|------|
| Channel current rating   | 5A   | 10A  |
| Peak Current Limit       | 70A  | 140A |
| Continuous Current Limit | 7.5A | 15A  |

Channel Current in Amperes vs. time to Overcurrent Shutdown in Seconds



# Configuration

## CAN Interface

| CLTM12-S Command Message (Received) |                       |                        |
|-------------------------------------|-----------------------|------------------------|
| PGN                                 | 65374 (0xFF5E)        |                        |
| Priority                            | 6                     |                        |
| Periodicity                         | 1000 mS, or on change |                        |
| Start                               | Description           | Available States       |
| 1.1                                 | Output 01 Cmd         | 00b = OP commanded OFF |
| 1.3                                 | Output 02 Cmd         | 01b = OP commanded ON  |
| 1.5                                 | Output 03 Cmd         | 10b = Unused           |
| 1.7                                 | Output 04 Cmd         | 11b = N/A              |
| 2.1                                 | Output 05 Cmd         |                        |
| 2.3                                 | Output 06 Cmd         |                        |
| 2.5                                 | Output 07 Cmd         |                        |
| 2.7                                 | Output 08 Cmd         |                        |
| 3.1                                 | Output 09 Cmd         |                        |
| 3.3                                 | Output 10 Cmd         |                        |
| 3.5                                 | Output 11 Cmd         |                        |
| 3.7                                 | Output 12 Cmd         |                        |
| 4.1                                 | Operating Mode        | 00 = Sleep, 01 = Run   |
| 4.3                                 | Reserved              | 11111b                 |
| 5.1                                 | Slave Source Address  | 0x31, 0x32, 0x33       |

| CLTM12-S Output State Message (Transmitted) |                       |                             |
|---------------------------------------------|-----------------------|-----------------------------|
| PGN                                         | 65375 (0xFF5F)        |                             |
| Priority                                    | 6                     |                             |
| Periodicity                                 | 1000 mS, or on change |                             |
| Start                                       | Description           | Available States            |
| 1.1                                         | Output 01 State       | 0000b = Output OFF          |
| 1.5                                         | Output 02 State       | 0001b = Output ON           |
| 2.1                                         | Output 03 State       | 0010b = ON when OFF fault   |
| 2.5                                         | Output 04 State       | 0011b = OFF when ON fault   |
| 3.1                                         | Output 05 State       | 0100b = Short Circuit fault |
| 3.5                                         | Output 06 State       | 0101b = Open Circuit fault  |
| 4.1                                         | Output 07 State       |                             |
| 4.5                                         | Output 08 State       |                             |
| 5.1                                         | Output 09 State       |                             |
| 5.5                                         | Output 10 State       |                             |
| 6.1                                         | Output 11 State       |                             |
| 6.5                                         | Output 12 State       |                             |
| 7.1                                         | Reserved              | 0xFF                        |
| 8.1                                         | Reserved              | 0xFF                        |



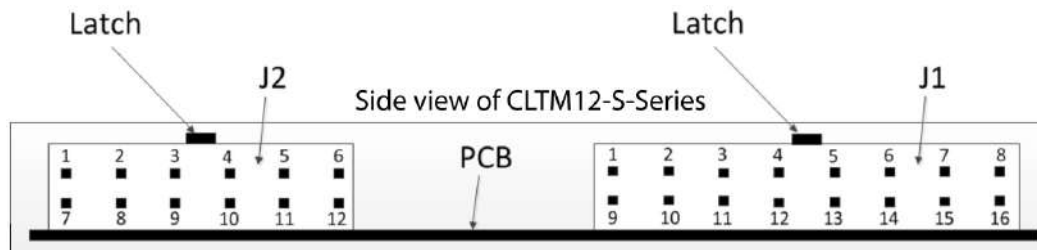
# Configuration

## CAN Interface (continued)

| CLTM12-S Input State Message (Transmitted) |                      |                  |
|--------------------------------------------|----------------------|------------------|
| PGN                                        | 65422 (0xFF8E)       |                  |
| Priority                                   | 6                    |                  |
| Periodicity                                | 100 mS, or on change |                  |
| Start                                      | Description          | Available States |
| 1.1                                        | Input 01 State       | 00b = Input OFF  |
| 1.3                                        | Input 02 State       | 01b = Input ON   |
| 1.5                                        | Input 03 State       | 10b = Error      |
| 1.7                                        | Input 04 State       | 11b = N/A        |
| 2.1                                        | Input 05 State       |                  |
| 2.3                                        | Input 06 State       |                  |
| 2.5                                        | Input 07 State       |                  |
| 2.7                                        | Reserved             | 11b              |

| Addr-1 | Addr-2         | J1939 Source Address |
|--------|----------------|----------------------|
| Open   | Input 01 State | 00b = Input OFF      |
| Gnd    | Input 02 State | 01b = Input ON       |
| Open   | Reserved       | 11b                  |

## Connector interface



| J2 Connector Pin No. | Description | Output Rating in AMPS |
|----------------------|-------------|-----------------------|
| 1                    | Output 5    | 10                    |
| 2                    | Output 4    | 10                    |
| 3                    | Output 8    | 10                    |
| 4                    | Output 2    | 10                    |
| 5                    | Output 10   | 10                    |
| 6                    | Output 1    | 10                    |
| 7                    | Output 7    | 10                    |
| 8                    | Output 9    | 5                     |
| 9                    | Output 6    | 5                     |
| 10                   | Output 12   | 5                     |
| 11                   | Output 3    | 5                     |
| 12                   | Output 11   | 10                    |

| J1 Connector Pin No. | Description                                                  |
|----------------------|--------------------------------------------------------------|
| 1                    | CAN High                                                     |
| 2                    | System Ground                                                |
| 3                    | Baud Rate Select                                             |
| 4                    | Address #1 (active low)                                      |
| 5                    | Digital Input #3 (active high / open)                        |
| 6                    | Digital Input #1 (active high / open)                        |
| 7                    | Discrete Input #3 (active high / open)                       |
| 8                    | Discrete Input #1 (active high / open)                       |
| 9                    | CAN Low                                                      |
| 10                   | CAN Shield                                                   |
| 11                   | No connect                                                   |
| 12                   | Address #2 (active low)                                      |
| 13                   | Digital Input #4 (active high) / Ignition Wake (active high) |
| 14                   | Digital Input #2 (active high / open)                        |
| 15                   | Pull-Down to Ground (for configuration address daisy-chain)  |
| 16                   | Discrete Input #2 (active high / open)                       |

# J1939 Diagnostic Reporting

| Active Diagnostic Trouble Codes          |                                                                                                                                                                                                                                           |                                  |                 |                                                                                          |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------|------------------------------------------------------------------------------------------|
| <b>Description</b>                       | This message is broadcast from the CLT and contains details of any problems within the unit. If more than one problem exists it will be transmitted using the multi-packet protocol. SPN 1215, through 1706 are repeated for each problem |                                  |                 |                                                                                          |
| <b>PGN</b>                               | 65226 (0x00FECA)                                                                                                                                                                                                                          |                                  |                 |                                                                                          |
| <b>Default Priority</b>                  | 7                                                                                                                                                                                                                                         |                                  |                 |                                                                                          |
| <b>Source Address</b>                    | CLT Source Address (0x31, 0x32, 0x33, 0x34)                                                                                                                                                                                               |                                  |                 |                                                                                          |
| <b>DLC</b>                               | 8                                                                                                                                                                                                                                         |                                  |                 |                                                                                          |
| <b>Update Rate</b>                       | 1000 mS                                                                                                                                                                                                                                   |                                  |                 |                                                                                          |
| <b>Direction</b>                         | CLT → Network                                                                                                                                                                                                                             |                                  |                 |                                                                                          |
| Start                                    | Bits                                                                                                                                                                                                                                      | Name                             | SPN             | Notes                                                                                    |
| 1.1                                      | 2                                                                                                                                                                                                                                         | Protect Lamp                     | 987             | 0 (00b) = Lamp off<br>1 (01b) = Lamp ON<br>2 (10b) = Reserved<br>3 (11b) = Not Available |
| 1.3                                      |                                                                                                                                                                                                                                           | Amber Warning Lamp               | 624             |                                                                                          |
| 1.5                                      |                                                                                                                                                                                                                                           | Red Stop Lamp                    | 623             |                                                                                          |
| 1.7                                      |                                                                                                                                                                                                                                           | Malfunction Indicator Lamp       | 1213            |                                                                                          |
| 2.1                                      |                                                                                                                                                                                                                                           | Flash Protect Lamp               | 3041            |                                                                                          |
| 2.3                                      |                                                                                                                                                                                                                                           | Flash Amber Warning Lamp         | 3040            |                                                                                          |
| 2.5                                      |                                                                                                                                                                                                                                           | Flash Red Stop Lamp              | 3039            |                                                                                          |
| 2.7                                      |                                                                                                                                                                                                                                           | Flash Malfunction Indicator Lamp | 3038            |                                                                                          |
| 3-4, 5.6                                 | 19                                                                                                                                                                                                                                        | Suspect Parameter Number (SPN)   | 1214            |                                                                                          |
| 5.1                                      | 5                                                                                                                                                                                                                                         | Failure Mode Identifier (FMI)    | 3883            |                                                                                          |
| 6.1                                      | 7                                                                                                                                                                                                                                         | Occurrence count                 | 1216            |                                                                                          |
| 6.8                                      | 2                                                                                                                                                                                                                                         | SPN Conversion Method            | 1706            |                                                                                          |
| Bits                                     |                                                                                                                                                                                                                                           | SPN                              | FMI             | Lamp                                                                                     |
| V <sub>supply</sub> Above Normal (>32 V) |                                                                                                                                                                                                                                           | 3598                             | 3 <sup>3</sup>  | Red Stop                                                                                 |
| V <sub>supply</sub> Below Normal (< 8 V) |                                                                                                                                                                                                                                           | 3598                             | 4 <sup>2</sup>  |                                                                                          |
| Overtemperature                          |                                                                                                                                                                                                                                           | 517248                           | 0               |                                                                                          |
| CLT Command Message Timeout              |                                                                                                                                                                                                                                           | 517249                           | 31 <sup>1</sup> |                                                                                          |

<sup>1</sup> FMI 31 = Condition Exists

<sup>2</sup> FMI 4 = Voltage Below Normal or Shorted to Low Source

<sup>3</sup> FMI 3 = Voltage Above Normal or Shorted to High Source



**Littelfuse®**



**Carling Technologies®**

A Littelfuse® Brand

# LD-Series

Electronic Dimmer Controls

**PRODUCT WEBPAGE**

*request sample, configure part*



The LD-Series represents a dynamic breakthrough in dashboard technology, with its programmable circuitry, superior design, and unparalleled performance that affords seamless integration into most any dash panel. A variety of options, along with superior performance, functionality, and aesthetics assure compliance with the most stringent customer requirements.

**1**

Pole

**2-10**

Amps

**12-24**

VDC

## Typical Applications

- On/Off-Highway Equipment
- Agricultural Equipment
- Construction Equipment

# Tech Specs

## Electrical

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Contact Rating      | 9-16VDC, 2-10Amp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Terminals           | 6.3mm (0.250" TAB)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Contacts            | solid-state load switching                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Output              | PWM 200 Hz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| EMI/EMC             | SAE J1113 and SAE J1455<br>Conducted Transient Emissions<br>RF Conducted Emissions<br>Conducted Susceptibility:<br>Test pulse #1<br>Test pulse #2<br>Test pulse #3a, #3b<br>Load Dump: Test Pulse #5<br>Power lead Disturbance<br>(Power Dips)<br>AF Conducted Immunity<br>Direct RF Injection (DRFI)<br>Abnormal Vehicle Operating<br>Conditions<br>RF Radiated Emissions<br>Radiated Immunity-Absorber<br>Lined Chamber<br>Electrostatic Discharge:<br>Shipping / handling Electrostatic<br>Discharge: Human Static<br>Discharge |
| Dielectric Strength | 000V @ 60 Hz was applied for<br>each unit for 1 minute                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Reverse Polarity    | 24VDC for 5 minutes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

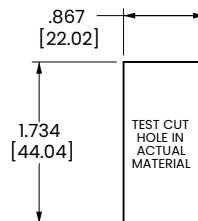
## Physical

|                 |                                            |
|-----------------|--------------------------------------------|
| Function        | Incremental for continuous<br>dimming      |
| Operation       | Momentary                                  |
| Lighted         | LED's internally dimmed                    |
| Base            | PBT Polyester V-0 flammability             |
| Rocker          | Polycarbonate or Nylon 6/6<br>Glass filled |
| Bracket         | PBT Polyester V-0 flammability             |
| Connector       | Nylon 6/6 toughened                        |
| Actuation Force | 300 gm ± 50 gm                             |
| Weight          | 52 grams                                   |

## Environmental

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temp.     | -40°C to + 85°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Vibration           | Resonance Search<br>Individual resonance<br>searches were conducted<br>with vibration applied along<br>each of the three mutually<br>perpendicular axes.<br>24-50 Hz 0.40DA<br>50-2000 Hz ± 10 G's peak<br>Random Vibration<br>The random vibration endurance<br>test conditions were sequentially<br>conducted in each of the three<br>mutually perpendicular axes, 1hr/<br>axis<br>Freq. (Hz) PSD (G <sup>2</sup> /Hz) 9.36 grms<br>24 Hz 0.06<br>60 Hz 0.50<br>100 Hz 0.025<br>1000 Hz 0.025<br>2000 Hz 0.025<br>During the test, all units were<br>operated at a load current of 2A<br>with 12.5VDC. |
| Salt Spray          | Per Mil-Std 202F, Method 101D, Test<br>Condition A. Duration 96 hrs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Dust                | Per Mil-Std 810C, Method 510.2. Air<br>velocity 300 ± 200 Feet/Min., Test<br>Duration 16 Hr.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Moisture Resistance | Per Mil-Std 202F, Method 106E.<br>Test Criteria-pre and post test<br>operation of switch.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Mounting Specifications



MOUNTING HOLE

**Panel Thickness Range**  
Acceptable Panel Thickness  
.030 to .156 (.76mm to 3.96mm)  
Recommended:  
.030, .062, .093, .125 and .156

|                    |    |   |   |   |   |   |   |   |   |   |    |    |   |    |    |
|--------------------|----|---|---|---|---|---|---|---|---|---|----|----|---|----|----|
| Sample Part Number | LD | 3 | 5 | 1 | C | C | 1 | - | 3 | A | A  | FE | - | 1  | FC |
| Selection          | 1  | 2 | 3 | 4 | 5 | 6 | 7 |   | 8 | 9 | 10 | 11 |   | 12 | 13 |

## Selection

LD 3 5 1 C C 1 - 3 A A FE - 1 FC

1 2 3 4 5 6 7 8 9 10 11 12 13

**LD** Electronic Dimmer Control

|          |               |          |              |
|----------|---------------|----------|--------------|
| <b>1</b> | 4A, 12 volts  | <b>A</b> | 2A, 24 volts |
| <b>2</b> | 7A, 12 volts  | <b>C</b> | 5A, 24 volts |
| <b>3</b> | 10A, 12 volts |          |              |

**1** 30 - 100% 8 positions      **A** 0 - 100% 11 positions  
**5** 10 - 100% 10 positions

1 .230 TABS (5.84 mm)

|         |          |          |          |
|---------|----------|----------|----------|
| No lamp | <b>S</b> |          |          |
|         | Red      | Amber    | Green    |
| 12V LED | <b>C</b> | <b>N</b> | <b>H</b> |
| 24V LED | <b>D</b> | <b>P</b> | <b>J</b> |

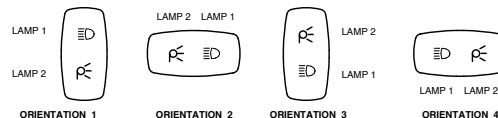
|   |       |   |       |   |      |
|---|-------|---|-------|---|------|
| 1 | Black | 2 | White | 3 | Gray |
|---|-------|---|-------|---|------|

|        |              |       |       |      |     |
|--------|--------------|-------|-------|------|-----|
|        | Laser Etched | Black | White | Gray | Red |
| Rocker | 3            | A     | B     | C    | D   |
| Paddle | 4            | J     | K     | M    | N   |

| Z     | No Lens |       |       |     |      |  |                   |
|-------|---------|-------|-------|-----|------|--|-------------------|
| Clear | White   | Amber | Green | Red | Blue |  | Lens Style        |
| 1     | -       | B     | G     | M   | T    |  | Large Transparent |
| -     | 7       | C     | H     | N   | U    |  | Large Translucent |
| 3     | -       | D     | J     | P   | V    |  | Bar Transparent   |
| -     | 9       | E     | K     | R   | W    |  | Bar Translucent   |
| 5     | A       | -     | -     | -   | -    |  | Laser Etch        |

00 No legend      FC Dim      FE Bright  
For legend options, visit us at [carlingtech.com](http://carlingtech.com)

- 0 No legend
- 1 vertical (lamp 1 on top)
- 2 horizontal (lamp 1 on right)
- 3 vertical (lamp 1 on bottom)

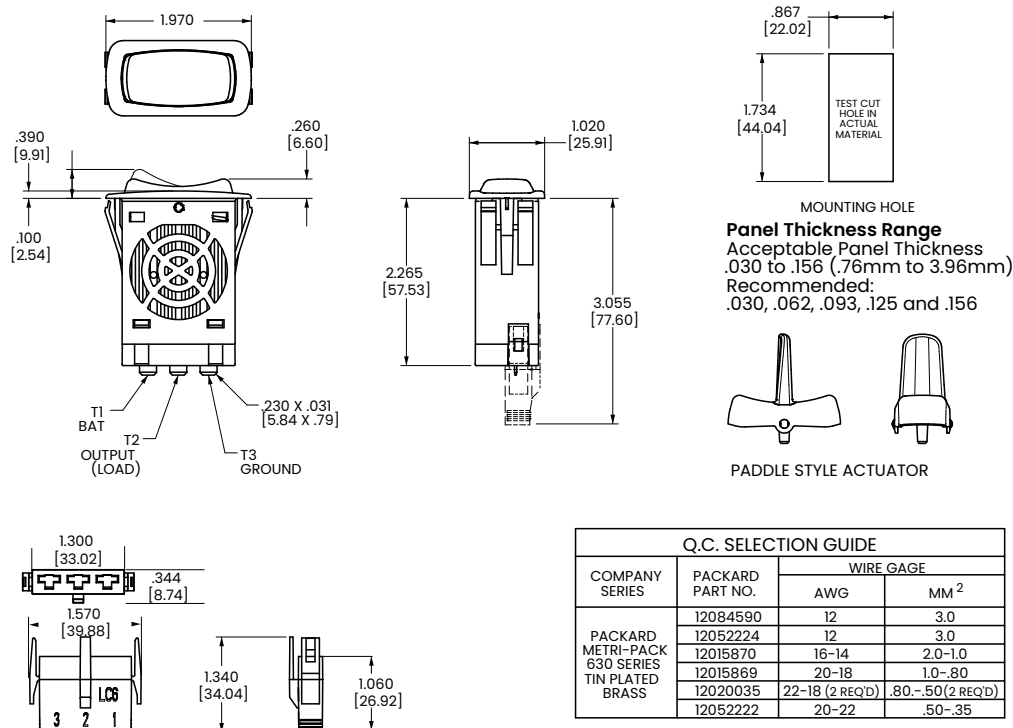


00 No legend      FC Dim      FE Bright  
For legend options, visit us at [carlingtech.com](http://carlingtech.com)

Notes:  
1 Custom colors are available. Consult factory.

 **Configure Complete Part Number >**

## inches [millimeters]



# LMR-Series

Mirror Rotate Controls

**PRODUCT WEBPAGE**

*request sample, configure part*



The LMR-Series provides the means to control one or two mirrors and up to four separate motors from one easy to operate joy stick control. When used in conjunction with our dimmer control and wiper/washer control, Carling Technologies provides a solution to most any dashboard control need within the Transportation market.

**Multi**  
Pole

**.5-1**  
Amps

**14-28**  
VDC

## Typical Applications

- On/Off-Highway Equipment
- Agricultural Equipment
- Construction Equipment

# Tech Specs

## Actuator

4 axis joy stick style

## Electrical

1A 14V; .5A 28V

## Sealing

Internal boot and potted wire leads protect critical component from dust and moisture

## Termination <sup>1</sup>

9" wire leads with Delphi-Packard connector #12047886 3

## Mechanism

Sliding contacts in conjunction with a circuit board

Notes:  
<sup>1</sup> Compatible with Delphi-Packard #12045688. Delphi-Packard is a registered trademark of Delphi-Packard Electrical Systems, Warren, Ohio.

# Ordering Scheme

Sample  
Part Number **LMR - 01 - 1**

Selection                      1                      2                      3

### 1. SERIES

**LMR** 2 position (left, right), 4 axis (N,S,E,W) with wire leads

### 2. ACTUATOR /BRACKET COLOR

**01** Black

### 3. LEGEND

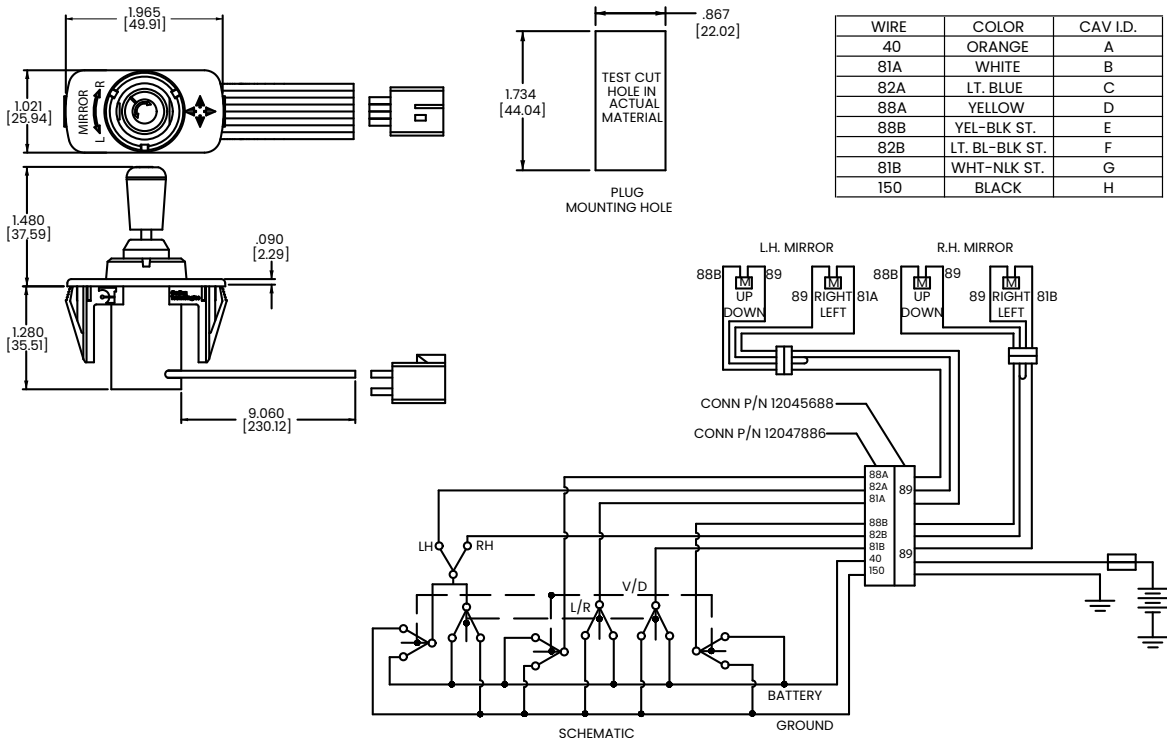
**2** no legend  
**1** 2 arrows symbol (left, right)  
**2** 4 arrows symbol (front, back and left, right)

Notes:  
<sup>1</sup> All legends are imprinted in white. All product supplied with Mirror L & R legend on top of bracket and detent and directional legend on actuator.

[Configure Complete Part Number >](#)

# Dimensional Specs

inches [millimeters]



# LW-Series

Wiper / Washer Controls

**PRODUCT WEBPAGE**

*request sample, configure part*



The LW-Series Electronic Wiper Washer Control combines two switches into one self-contained unit allowing effortless control of both wash and wipe functions from a singular location. A variety of features and options including, Continuous low and high speed wiper positions, Six intermittent delay intervals ranging from 3-18 seconds, Push-to-wash button and an LED Night-light indicator combine to provide the flexibility to meet most any Cab design.

**2**

Poles

**1-8**

Amps

**14-28**

VDC

## Typical Applications

- On/Off-Highway Equipment
- Agricultural Equipment
- Construction Equipment



# Tech Specs

## Electrical

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Contact Rating | 1 relay<br>8 amps, 14VDC<br>4 amps, 28VDC<br>2 relays<br>1 amps, 14VDC<br>1 amps, 28VDC                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Terminals      | .187 (7.4mm) Quick Connect terminations standard.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Protection     | Reverse polarity protection<br>Over voltage protection<br>Cold cranking protection according to SAE J1455, Sections. 4.11.1.1 and 4.11.1.2.1<br>Transient voltage protection which includes load dump and inductive switching according to SAE J1455, sec. 4.11.2.2<br>Electrostatic discharge protection according to SAE J1455 Sec. 4.11.2.2.5.1 (Discharge a 150 pf capacitor that has been charged to a potential of 15kV through 150 Ohm resistor.)<br>Meets all other EMI/EMC requirements for class C trucks. |

## Mechanical

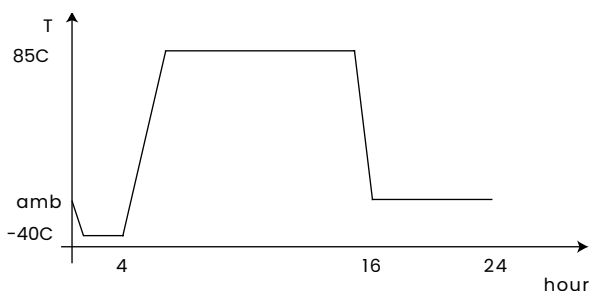
| Mechanical | Sinusoidal Vibration: 10-55-10 Hz, 0.06" DA, one minute-cycle, three hours/axis<br>Random Vibration: Three hours/axis, three mutually perpendicular axes with a test level 4G's.                                                                                                                                                                                                   |           |           |     |                         |       |                         |       |                      |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----|-------------------------|-------|-------------------------|-------|----------------------|
|            | <table> <tr> <th>Frequency</th><th>Amplitude</th></tr> <tr> <td>5Hz</td><td>0.16 G<sup>2</sup>/Hz</td></tr> <tr> <td>100Hz</td><td>0.16 G<sup>2</sup>/Hz</td></tr> <tr> <td>500Hz</td><td>-3dB/octave roll-off</td></tr> </table> <p>Tests were conducted according to SAE J1455, Sec 5.7 and Sec. 4.9.4.<br/>Shock: MIL-STD-202G Method 213B, Test Condition K, 30G's, 11 ms.</p> | Frequency | Amplitude | 5Hz | 0.16 G <sup>2</sup> /Hz | 100Hz | 0.16 G <sup>2</sup> /Hz | 500Hz | -3dB/octave roll-off |
| Frequency  | Amplitude                                                                                                                                                                                                                                                                                                                                                                          |           |           |     |                         |       |                         |       |                      |
| 5Hz        | 0.16 G <sup>2</sup> /Hz                                                                                                                                                                                                                                                                                                                                                            |           |           |     |                         |       |                         |       |                      |
| 100Hz      | 0.16 G <sup>2</sup> /Hz                                                                                                                                                                                                                                                                                                                                                            |           |           |     |                         |       |                         |       |                      |
| 500Hz      | -3dB/octave roll-off                                                                                                                                                                                                                                                                                                                                                               |           |           |     |                         |       |                         |       |                      |
| Endurance  | According to SAE J2349, March 97 for windshield washer switch for Trucks, Buses and Multipurpose Vehicles (20,000 cycle minimum).                                                                                                                                                                                                                                                  |           |           |     |                         |       |                         |       |                      |

## Physical

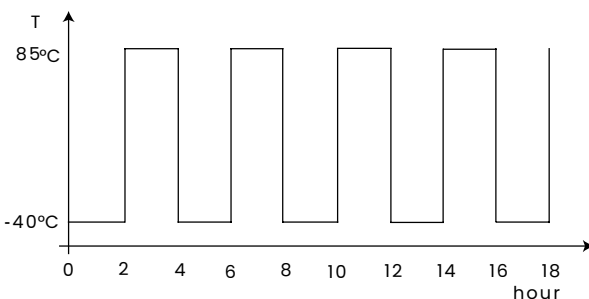
|                 |                                   |
|-----------------|-----------------------------------|
| Illumination    | LED, rated 100,000 hours 1/2 life |
| Cover           | Acetate                           |
| Washer Actuator | Silicone                          |
| Toggle Actuator | Nylon 6/6 glass filled            |
| Bracket         | Nylon 6/6                         |
| Connector       | Nylon 6/6 rated 85°C polarized    |
| Washer Function | Momentary                         |
| Toggle Function | Maintained Intermittent           |
| Operation       | Momentary                         |
| Weight          | 44 grams                          |

## Environmental

|                   |                                                         |
|-------------------|---------------------------------------------------------|
| Operating Temp.   | -25°C to +85°C                                          |
| Temperature Cycle | According to SAE J1455, Sec. 4.1.3.1 (See Figure below) |



|               |                                                         |
|---------------|---------------------------------------------------------|
| Thermal Shock | According to SAE J1455, Sec. 4.1.3.2 (See Figure below) |
|---------------|---------------------------------------------------------|



|                  |                                                                                                                      |
|------------------|----------------------------------------------------------------------------------------------------------------------|
| Humidity         | According to SAE J1455, Sec. 4.2.3 (30 cycles for 8 hrs. with maximum temperature of 85°C and 95% relative humidity. |
| Dust Bombardment | According to SAE J1455, Sec. 4.7.3 (with dust concentration of 0.88gm/m <sup>3</sup> for 24 hours.)                  |
| Salt Spray       | MIL-STD-202G, Method 101D for 96 hours.                                                                              |

# Ordering Scheme

Sample Part Number **LW 1 A 1 1 Z - 1 1 00 1 00**

Selection 1 2 3 4 5 6 7 8 9 10 11

## 1. SERIES

**LW** Wiper/Washer Control with six intermittent positions: low, high, wash/wipe

## 2. RATING

|                       |                       |
|-----------------------|-----------------------|
| 1 8A, 14VDC (1 relay) | 4 1A, 14VDC (1 relay) |
| 2 4A, 28VDC (1 relay) | 5 1A, 14VDC (2 relay) |
| 3 1A, 14VDC (1 relay) | 6 1A, 28VDC (2 relay) |

## 3. INTERMITTENT TIMING

**A** 2-15 seconds

## 4. WIPER/WASHER TIMING

**1** 3 seconds

## 5. LAMP #1 (ABOVE WASH)

|                    |                    |
|--------------------|--------------------|
| <b>Z</b> No Lamp   | <b>2</b> Red LED   |
| <b>1</b> Green LED | <b>3</b> Amber LED |

## 6. LAMP #2 (ABOVE WIPE)

|                    |                    |
|--------------------|--------------------|
| <b>Z</b> No Lamp   | <b>2</b> Red LED   |
| <b>1</b> Green LED | <b>3</b> Amber LED |

## 7. BRACKET COLOR

**1** Black

## 8. ROCKER / PADDLE COLOR

**1** Black

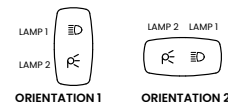
## 9. LEGEND #1

**00** No legend

For standard legends, see "Standard Legend Codes" page  
For additional legends, please consult factory

## 10. LEGEND ORIENTATION

**0** No legend  
**1** Vertical (lamp 1 on top)  
**2** Horizontal (lamp 1 on right)



## 11. LEGEND #2

**00** No legend

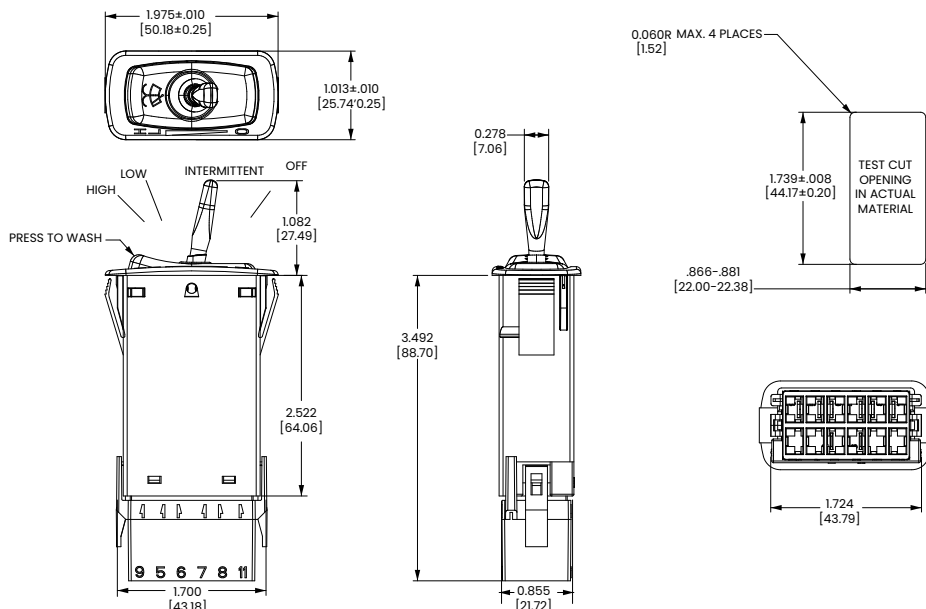
For standard legends, see "Standard Legend Codes" page  
For additional legends, please consult factory

Notes:

1 Relay coil current is 1A max. Relay must have an arc suppression in parallel with the coil. Ref P/N LC2-01 for black wiper/washer connector housing.

# Dimensional Specs

inches [millimeters]



## Principles of operation:

From the OFF position, moving the toggle one step up puts the function into the intermittent slower mode (18 sec.). Moving the toggle another step up reduces the delay time by 3 sec for each of the next six steps. The seventh step up puts the motor into a continuous low-speed mode and the last step up puts the motor into the high-speed mode. Reversing the previous steps puts the motor finally into the stop/parking mode. During the OFF position, intermittent and low-speed modes, pressing the wash button activates the wash function. Wipe function starts after a two second delay from the onset of the washing and continues for three continuous wipes after the wash button is released. For convenience, the wash function is not active during the high-speed mode.

The Wiper Control is designed to interface with single or dual relay systems for intermittent delay and the park function. The high speed is driven directly via a power transistor internal to the module. The coil of the relay is pulled down to ground during the intermittent, low-speed and high-speed modes respectively. (Contact Carling Technologies for wiring diagrams)

# V-Charger

Dual Port USB 2.0 Chargers

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



The USB V-Charger is designed to charge tablets, e-readers, mobile and gaming devices, digital cameras, as well as other compatible electronic devices. The V-Charger delivers fast charging times even in extreme temperatures from -40°C to +80°C. This innovative product safeguards its electronics with integrated over-current and thermal overload protection, as well as optional load dump circuitry, assuring prolonged safe and reliable operation. The center LED indicates charging is in progress.

**1**

Pole

**3.15**

Amps

**12-24**

VDC

**IP65 Sealing**

Above-Panel

## Typical Applications

- On/Off-Highway Equipment
- Lawn & Garden Equipment
- Military
- Golf Carts
- Marine

# Design Features

## DUAL USB 2.0 PORTS

Total current of 3.15 amps, facilitating faster charges

## SPRING LOADED DOORS

Stylish, curved or square double doors automatically close to cover and seal each port when not in use

## LED

Green LED brightens to indicate charging is in progress



## SEALING PROTECTION

Silicone rubber seal perfectly mates with door indent to provide sealing protection up to IP65 for above-panel components

## PANEL SEAL

Prevents water ingress beneath panel to protect critical connections

## MOUNTING

Fits industry standard panel opening size of 1.450" x .830"

# Tech Specs

## Electrical

|                             |                                                                                                                                                                                                      |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| USB Type                    | 2.0                                                                                                                                                                                                  |
| Number of USB Ports         | 2                                                                                                                                                                                                    |
| Operating Voltage           | 12V/24V DC power systems (9 to 29 VDC)                                                                                                                                                               |
| Output Voltage              | 5.0 VDC                                                                                                                                                                                              |
| Max Output Current          | 3.15A DC Total                                                                                                                                                                                       |
| Current Draw (No Load)      | 12V: 1.5 mA, 24V: 3.5 mA                                                                                                                                                                             |
| Compatibility               | Charges mobile devices including iPad, iPhone, iPod, HTC, Galaxy, Blackberry, MP3 Players, Digital Cameras and PDA's                                                                                 |
| LED Indicator               | Green LED brightens when charging is in progress.                                                                                                                                                    |
| Receptacle Insertion Life   | 10,000 operating cycles per port minimum                                                                                                                                                             |
| Terminals                   | Copper/silver plating 1/4" (6.3 mm) Quick Connect terminations                                                                                                                                       |
| Reverse Polarity            | Operational with correct polarity after reverse polarity exposure                                                                                                                                    |
| Output Protection           | Short Circuit and Overload                                                                                                                                                                           |
| Thermal Overload Protection | Operation will cease if internal temperature reaches 125°C. Charging will resume after sufficient heat loss                                                                                          |
| ESD                         | 15kV air, 8kV touch per ISO10605 for Operational; Packaging and Handling Tests                                                                                                                       |
| Load Dump Protection        | ISO 7637-2 detailed data available. Consult factory for details.                                                                                                                                     |
| Radiated Immunity           | ISO 11452-2, 200 MHz to 2.7 GHz<br>Field Strength for 200 MHz to 1 GHz: 60 V/m<br>Field Strength for 1 to 2.7 GHz: 50 V/m<br>Bulk Cable Injection ISO 11452-2, 1 to 400 MHz<br>Field Strength: 80 mA |
| Emissions                   | FCC Part 15, Class B<br>Radiated, Conducted and Far Field Emissions data available. Consult factory for details.                                                                                     |

## Mechanical

|           |                                           |
|-----------|-------------------------------------------|
| Endurance | 10,000 open/close cycles minimum per door |
|-----------|-------------------------------------------|

## Environmental

|                             |                                                                                                                                              |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Sealing (when doors closed) | Curved Doors: IP65, for above-panel components of actual switch only<br>Square Doors: IP64, for above-panel components of actual switch only |
| Operating Temperature       | -40° to +60°C at 3.15A<br>-40° to +70°C at 2.4A<br>-40° to +80°C at 2.1A                                                                     |
| Vibration                   | MIL-STD 202G, Method 204D, Test Condition A. 0.06DA or 10G, 10-500 Hz                                                                        |
| Shock                       | MIL-STD 202G, Method 213B, Test Condition K @ 30-G. No loss of circuit during test.                                                          |
| Chemical Exposure           | Brush method with USB doors closed: diesel, gasoline, brake fluid, Windex, Armor All                                                         |
| Thermal Shock               | MIL-STD 202G, Method 107G, Test Condition A, -40° to 85°C. Test Criteria: Remains functional without damage.                                 |
| Moisture Resistance         | MIL-STD 202G, Method 106G. Test Criteria: Remains functional without damage                                                                  |
| Thermal Cycling             | 25 Cycles -40° to 85°C, 2 hours for each temperature every cycle                                                                             |
| Salt Spray                  | MIL-STD 202G, Method 101E, Test Condition A                                                                                                  |
| Blowing Dust                | MIL-STD 810G Method 510.5, Air Velocity: 1750 ± 250 ft/min, Test Duration: 12 hours                                                          |

## Physical

|                              |                                                                                                                                                                                                                                                                     |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Materials                    | Housing: Polycarbonate/PBT<br>Doors: Polyester<br>Light Pipe: Polycarbonate<br>Torsion Springs Pins: Stainless Steel<br>Door Seal: Silicone<br>PCBA Gasket/Panel Gasket: Closed Cell Neoprene<br>Terminals: Silver plated Copper<br>Electronics: Two PCB Assemblies |
| Panel Opening                | 1.450" x .830"                                                                                                                                                                                                                                                      |
| Panel Thickness              | .030 - .156 inches                                                                                                                                                                                                                                                  |
| Panel Mounting Method        | Front Panel Insertion                                                                                                                                                                                                                                               |
| Installation Insertion Force | 12-28 lbs typical (dependent on panel design)                                                                                                                                                                                                                       |
| Panel Retention Force        | Greater than 35 lbs (dependent on panel design)                                                                                                                                                                                                                     |
| Depth Behind Panel           | See Dimensional Specs                                                                                                                                                                                                                                               |
| Connectors                   | VC1, VC2                                                                                                                                                                                                                                                            |
| Weight                       | Approximately 45g (1.6 oz)                                                                                                                                                                                                                                          |
| Styling Options              | Curved or square USB port doors                                                                                                                                                                                                                                     |
| Port Protection              | Twin, self-closing doors                                                                                                                                                                                                                                            |

# Ordering Scheme

Sample Part Number V - USB - 24 - G 1 1 - 1 B B 1

Selection 1 2 3 4 5 6 7 8 9 10

## 1. SERIES

V

## 2. PRODUCT TYPE

USB Charger

## 3. SOURCE VOLTAGE

24 24 / 12 Volts DC

## 4. LED INDICATOR (VOLTAGE MATCHES SOURCE)

G Green 0 Stealth (no LED)

## 5. CIRCUIT PROTECTION

- 1 Reverse Polarity, Thermal Overload & Overcurrent
- 2 Load Dump, Reverse Polarity, Thermal Overload & Overcurrent

## 6. TERMINATION

1 .250 Tab

## 7. DOOR STYLE

1 Curved 2 Square

## 8. DOOR COLOR

B Black

## 9. FRAME COLOR

B Black

## 10. PANEL SEAL

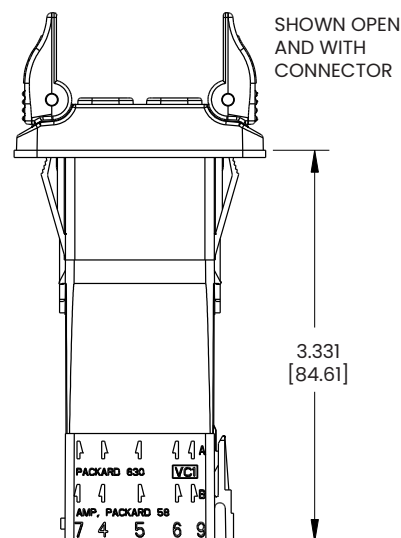
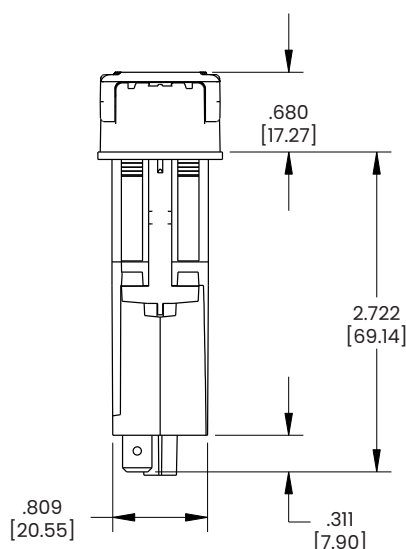
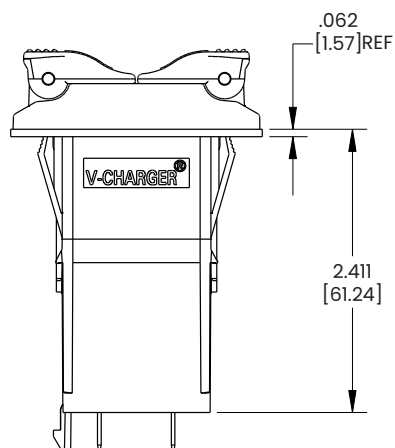
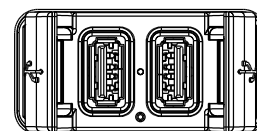
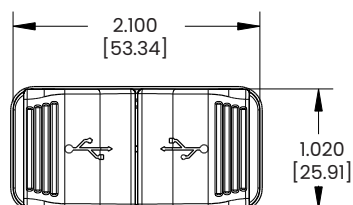
1 Yes

[Configure Complete Part Number >](#)

# Dimensional Specs

inches [millimeters]

## Curved Door Style Option



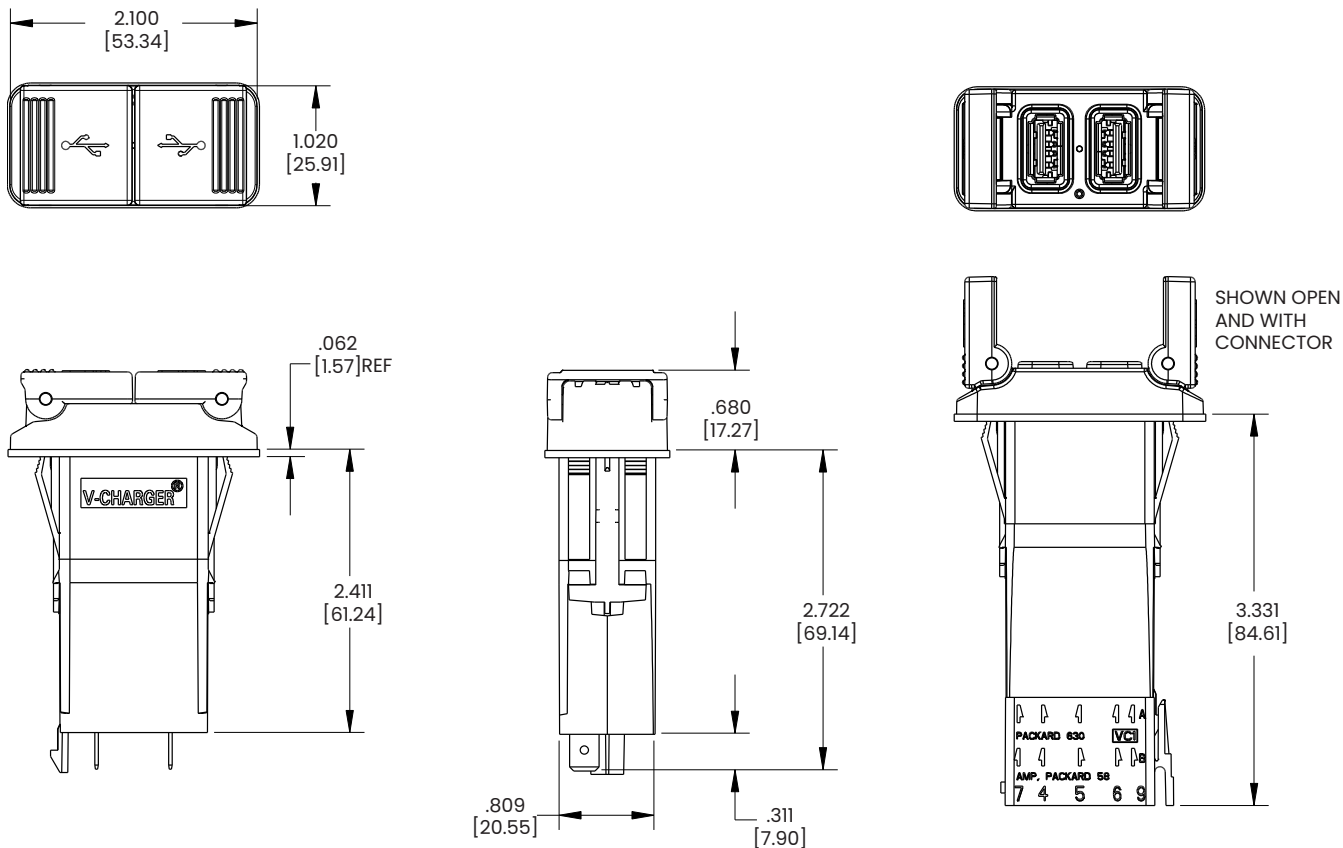
Notes:  
1 Charger to install into 1.450" X 0.830" panel opening

COS-0136 Rev: B, CLA-0075 Rev: C  
\*Manufacturer reserves the right to change product specification without prior notice.

# Dimensional Specs

inches [millimeters]

## Square Door Style Option



Notes:  
1 Charger to install into 1.450" X 0.830" panel opening

# CV-Charger

Single-Port 2.0 and 3.1 USB Charger

**PRODUCT WEBPAGE**

*Request sample, Configure part*



The USB CV-Charger is designed to charge electronic devices compatible with 2.0 or 3.1 USB types. The CV-Charger delivers fast charging times even in extreme temperatures from -40 °C to +85 °C. This innovative product features a spring-loaded access door that automatically closes to safeguard its electronics, assuring prolonged safe and reliable operation. The center LED indicates charging is in progress.

**3.6A**

Fast Charging

**9-32V**

Operating Voltage

**IP64 Sealing**

For Above-Panel Components

## Typical Applications

- On/Off-Highway Equipment
- Lawn & Garden Equipment
- Military
- Golf Carts
- Marine



# Tech Specs

## Electrical

|                       |                                                                                                            |
|-----------------------|------------------------------------------------------------------------------------------------------------|
| USB type              | 2.0 for type A(4 pins) and 3.1 for type C(16 pins)                                                         |
| Number of USB Ports   | 1                                                                                                          |
| Operating Voltage     | 9-32VDC                                                                                                    |
| Max. Output Power     | 18W for single port A, 18W for single port C                                                               |
| Max. Output Current   | 3.6A                                                                                                       |
| Charging Protocol     | BC1.2, Apple, Samsung, Qualcomm QC2.0/QC3.0, MTK PE1.1/2.0, Huawei FCP/SCP, Samsung AFC for single port A. |
| LED Indicator         | Green LED brightens when charging is in progress.                                                          |
| Reverse polarity      | ISO 16750-2: 2012 4.7; Apply power supply with -28 VDC for 60s                                             |
| ESD                   | ISO 10605: 2008; ±15kV air discharges, ±8kV contact discharges                                             |
| Electrical Endurance  | 5000cycles USB plug push in pull out with charging                                                         |
| Over voltage          | ISO 16750-2: 2012 4.3; Power up with 36VDC for 60 min at 65 °C                                             |
| Withstand Voltage     | ISO 16750-2: 2012 4.11; Apply 500VRMS with a duration of 60s                                               |
| Insulation Resistance | ISO 16750-2: 2012 4.12; Measure with 500VDC for 60s, resistance value >10MΩ                                |

## Physical

|                 |                                                                             |
|-----------------|-----------------------------------------------------------------------------|
| Mounting Method | Snap                                                                        |
| Panel Opening   | 36.83 x 21.08mm                                                             |
| Panel Thickness | 0.76mm to 3.96mm                                                            |
| Connectors      | Carling VC2, VC1 housing<br>Two pin connectors                              |
| Mating terminal | Tyco/AMP .25 QC faston series for VC2 housing, Delphi GT 630 series for VC1 |
| Weight          | 196 grams [.43 lbs]                                                         |
| Size            | L47.73 X W25.9 X H64.2mm                                                    |

## Mechanical

|             |                                                     |
|-------------|-----------------------------------------------------|
| Life Cycles | 5000 cycles for USB port;<br>30,000 cycles for door |
|-------------|-----------------------------------------------------|

## Agency Certifications

|                  |                             |
|------------------|-----------------------------|
| CE certification | 2014/30/EU<br>EN 50498:2010 |
|------------------|-----------------------------|

## Environmental

|                                              |                                                                                                                                                                         |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sealing Protection (when doors closed)       | IEC 60529: 2013;<br>IP64, for above-panel components of the actual switch only                                                                                          |
| Operating temperature                        | - 40 °C to + 85 °C                                                                                                                                                      |
| Storage Temperature                          | ISO 16750-4: 2010; - 50 °C to + 95 °C                                                                                                                                   |
| Thermal, Hot Soak                            | IEC 60068-2-2: 2007; Test Bb, +85 °C for 24 hours                                                                                                                       |
| Thermal, Cold Soak                           | IEC 60068-2-1: 2007; Test Ab, -40 °C for 24 hours                                                                                                                       |
| Thermal Shock                                | IEC 60068-2-14: 2009; Test Na -40 °C to +85 °C, soak for 1hrs at each extreme and transfer within 3min, repeat 10 cycles                                                |
| Thermal Cycling                              | IEC 60068-2-14: 2009; Test Nb, -40 °C to 85 °C, dwell for 2h at each extremes with transfer rate 3 °C/min, 2 cycles                                                     |
| Humidity, soak                               | IEC 60068-2-78: 2012; Test Cab, +40 °C at 93±3% RH for 4 days                                                                                                           |
| Damp Heat Cyclic                             | IEC 60068-2-30: 2005; Test Db Method 1, 25 °C to 55 °C cycling change with 93± 3% RH for 6 cycles, totally 144h                                                         |
| Salt Spray                                   | IEC 60068-2-11:1981; Salt mist with 35°C, totally 48h                                                                                                                   |
| Chemical resistance (Resistance to Solvents) | ISO 16750-5: 2010; Brushing engine oil, hydraulic oil, diesel fuel, urea at 85°C for 22hrs. Dipping battery fluid for 22hrs and alcohol for 10min at 25°C               |
| Vibration, Random                            | IEC 60068-2-64: 2008; Range:10~2000Hz, Acceleration 57.088m/s <sup>2</sup> (RMS), Duration 8h per axial                                                                 |
| Vibration, Resonance                         | IEC 60068-2-6: 2007; Sweep 10Hz~500Hz per axis with amplitude 0.5mm (10~50Hz) and 19.6m/s <sup>2</sup> (50~500Hz). Apply 100 m/s <sup>2</sup> at resonance point for 1h |
| Vibration, Sinusoidal                        | IEC 60068-2-6: 2007; Sweep 10Hz~500Hz with amplitude 0.75mm (10~58.1Hz), 100m/s <sup>2</sup> (58.1~200Hz) for 4h at Z axis and 2h at X/Y axis                           |
| Mechanical Shock                             | IEC 60068-2-27: 2008; Acceleration: 500m/s <sup>2</sup> , dwell 11ms. 3 pulse per axial, Total 18 times                                                                 |
| Mechanical Bump                              | IEC 60068-2-27: 2009; Acceleration: 400m/s <sup>2</sup> , dwell 6ms. 100 pulse per axial, total 600 times                                                               |
| Drop test                                    | IEC 60068-2-31: 2008; Test Ec Free Fall -Procedure 1 drop in each direction of the 3 axis (6 total drops) from 1000mm                                                   |

# Ordering Scheme

Sample Part Number CHG - A 2 A - 001

Selection                    1                    2                    3                    4                    5

1. SERIES

CHG CV-Charger

2. POWER

A 18W

3. PORT TYPE

1 Single Port A (2.0 USB)      2 Single Port C (3.1 USB)

4. INDICATOR LIGHT COLOR

A Green

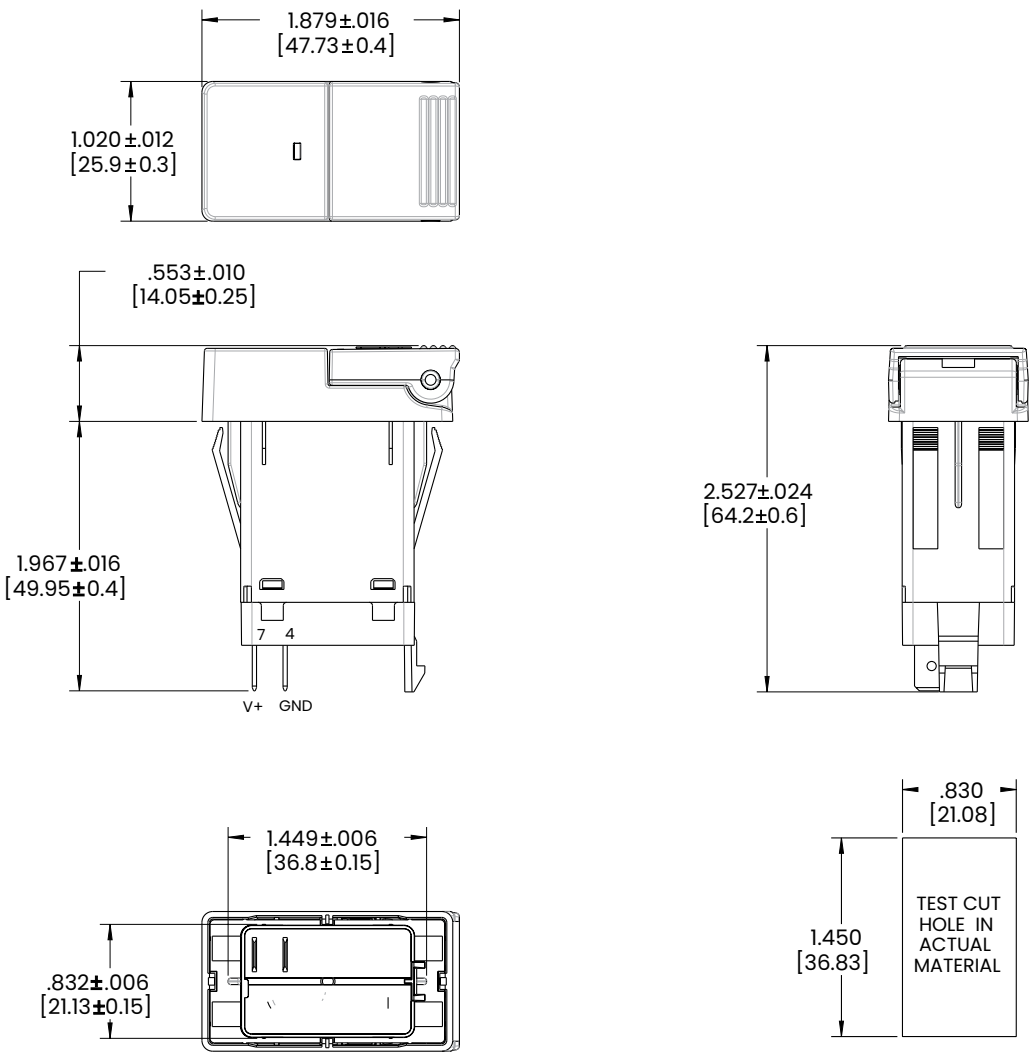
5. LEGEND

000 No Legend  
001 Legend 1



# Dimensional Specs

inches [millimeters]





**Littelfuse®**



**Carling Technologies®**

A Littelfuse® Brand

# N-Series

Addressable Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The N-Series produces up to 144 individual switch IDs by using a resistive ladder circuit. Different switch IDs are achieved by changing the resistor values tied to individual loads, which can then be assigned to the specific functions that the switch is controlling.

**1**

Pole

**.4**

Amps

**28**

VDC Max

**IP67 Sealing**

Above-Panel

## Typical Applications

• On/Off-Highway    • Construction    • Agriculture    • Marine

# Tech Specs

## Electrical

|                       |                                                                                                  |
|-----------------------|--------------------------------------------------------------------------------------------------|
| Contact Rating        | .4VA @ 28VDC (MAX)                                                                               |
| Dielectric Strength   | 1250 Volts RMS between pole to pole<br>3750 Volts RMS between live parts and accessible surfaces |
| Insulation Resistance | 50 Megaohms                                                                                      |
| Contact Bounce        | 20 milliseconds max.                                                                             |
| Contact               | gold plated                                                                                      |
| Terminals             | Brass or copper/silver plate<br>3/16" (4.76mm)<br>Quick Connect terminations standard.           |

## Physical

|                     |                                                                                                                                |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Lighted             | Incandescent - rated 10,000 hours<br>LED - rated 100,000 hours 1/2 life<br>(LED is internally ballasted for voltages to 24VDC) |
| Seals               | Rocker, base & bracket are sealed                                                                                              |
| Base                | Nylon 66 GF rated to 85°C with a flammability rating of 94V0.                                                                  |
| Rocker and Paddle   | Nylon 66 Reinforced, rated to 105°C                                                                                            |
| Laser Etched Rocker | Polycarbonate rated at 100°C.                                                                                                  |
| Lens                | Polycarbonate rated at 100°C.<br>Front snap-in.                                                                                |
| Connector           | Nylon 66 rated at 85°C. Polarized.                                                                                             |
| Bracket             | Nylon Zytel                                                                                                                    |

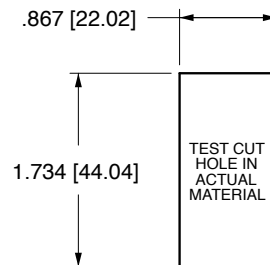
## Actuator Travel (Angular Displacement)

|            |                 |
|------------|-----------------|
| 2 position | 26°             |
| 3 position | 13° from center |

## Environmental

|                 |                                                                                                                                                                                                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environmental   | IP67, for above-panel components of actual switch only.                                                                                                                                                          |
| Operating Temp. | -40°C to +85°C                                                                                                                                                                                                   |
| Vibration       | Per SAE J1399 "electronic Tachometer Specification" for Class II truck and bus applications. Test Criteria: No change in resistance and no evidence of physical damage.                                          |
| Salt Spray      | Exposure to 95% water, 5% NCI fog solution at 95 degrees F according to ASTM B 117-90 "Standard Method of Salt Spray (fog) Testing". Test Criteria: No visual evidence of corrosion or external physical damage. |
| Humidity        | Samples were exposed to selected temperature profile, while maintaining 90% +- 5% relative humidity for 30 cycles. Test Criteria: No evidence of external physical deterioration.                                |

## Mounting Specifications



MOUNTING HOLE

### Panel Thickness Range

Acceptable Panel Thickness  
.030 to .156 (.76mm to 3.96mm)  
Recommended:  
.030, .062, .093, .125 and .156

# Ordering Scheme

Sample  
Part Number

N 4 1 2 1 A N H 1 - 1 1 2 46 - 1 EK

Selection

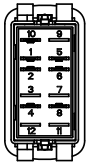
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

## 1. SERIES

N

## 2. CIRCUIT 2

### Terminal Orientation



( ) - momentary

| Position: | 1     | 2                   | 3     |
|-----------|-------|---------------------|-------|
| STANDARD  | 2 & 4 | Connected Terminals | 1 & 2 |
| 4         | ON    | NONE                | ON    |
| 5         | (ON)  | NONE                | ON    |
| 6         | ON    | ON                  | ON    |
| 7         | (ON)  | ON                  | ON    |
| 8         | (ON)  | ON                  | (ON)  |

## 3. R1 RESISTIVE IDENTIFICATION

|   |      |   |       |
|---|------|---|-------|
| 1 | 1020 | 7 | 3570  |
| 2 | 1300 | 8 | 4320  |
| 3 | 1620 | A | 5230  |
| 4 | 2000 | B | 6340  |
| 5 | 2430 | C | 7870  |
| 6 | 2940 | D | 10000 |

## 4. R2 RESISTIVE IDENTIFICATION

|   |      |   |       |
|---|------|---|-------|
| 1 | 1020 | 7 | 3570  |
| 2 | 1300 | 8 | 4320  |
| 3 | 1620 | A | 5230  |
| 4 | 2000 | B | 6340  |
| 5 | 2430 | C | 7870  |
| 6 | 2940 | D | 10000 |

## 5. RESISTOR CONSTANTS (INDICATES SWITCH STATE)

|   | R3   | R4    | R5   |
|---|------|-------|------|
| 1 | 1300 | 10000 | 5230 |
| 2 | 825  | 6650  | 3830 |

## 6. ILLUMINATION

Lamp #1: above terminals 9 & 10 end of switch.; Lamp #2 above terminals 11 & 12 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only.

|   | Lamps   | Illumination Type | Lamp wired to Terminals |
|---|---------|-------------------|-------------------------|
| S | None    |                   |                         |
| A | # 1     | Standard          | 10+ 12-                 |
|   | # 2     | Standard          | 11+ 9-                  |
| B | # 1 & 2 | Special Parallel  | 11+ 9-                  |
| C | # 1 & 2 | Special Parallel  | 10+ 9-                  |
| 1 | # 1     | Independent       | 10+ 9-                  |
| 2 | # 2     | Independent       | 12+ 11-                 |
| 3 | # 1     | Independent       | 10+ 9-                  |
|   | # 2     | Independent       | 12+ 9-                  |
| 4 | # 1     | Independent       | 10+ 9-                  |
|   | # 2     | Independent       | 12+ 11-                 |

## 7,8. LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 7: above terminals 10 & 9; Selection 8: above terminals 12 & 11

No lamp 0  
LED\* Red Amber Green  
12VDC C N H

\* Consult factory for "daylight bright", blue/green and white LED options. Typical current draw for LED is 20ma.

## 9. BRACKET COLOR 1

|                       | Black | White | Gray | Red |
|-----------------------|-------|-------|------|-----|
| Standard Bracket      | 6     | 7     | 8    | 9   |
| Rockerguard at Lamp 1 | L     | B     | C    | D   |
| Rockerguard at Lamp 2 | E     | F     | G    | H   |

## 10. ACTUATOR STYLE AND COLOR

|        | Black | White | Gray | Red | Laser Etched |
|--------|-------|-------|------|-----|--------------|
| Rocker | A     | B     | C    | D   | 1            |
| Paddle | J     | N     | K    | M   |              |

## 11. & 12. LENS STYLE AND COLOR

Lens color for LEDs must be clear, white, or match color of LED.

| 0 – No Actuator |       |       | Z – No Lens |     |      |                             |
|-----------------|-------|-------|-------------|-----|------|-----------------------------|
| Clear           | White | Amber | Green       | Red | Blue |                             |
| 1               | -     | B     | G           | M   | T    | Large Transparent           |
| -               | 7     | C     | H           | N   | U    | Large Translucent           |
| 3               | -     | D     | J           | P   | V    | Bar Transparent             |
| -               | 9     | E     | K           | R   | W    | Bar Translucent             |
| 5               | A     | -     | -           | -   | -    | Laser Etch background color |

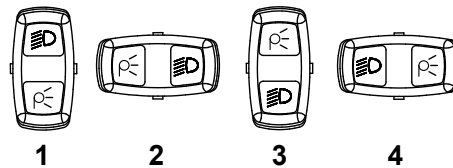
## 13. LEGEND ORIENTATION

00 No legend

For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

## 14. LEGEND ORIENTATION

- 0 No legend (used with codes 11-18 in selection 12)
- 1 Orientation 1 - vertical, lamp 1 on top
- 2 Orientation 2 - horizontal, lamp 1 on right
- 3 Orientation 3 - vertical, lamp 1 on bottom
- 4 Orientation 4 - vertical, lamp 1 on left



## 15. ACTUATOR LENS LEGEND

00 No legend

For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

Notes:

- 1 Custom colors are available. Consult factory.
- 2 Switch supplied with .187 tab terminals.

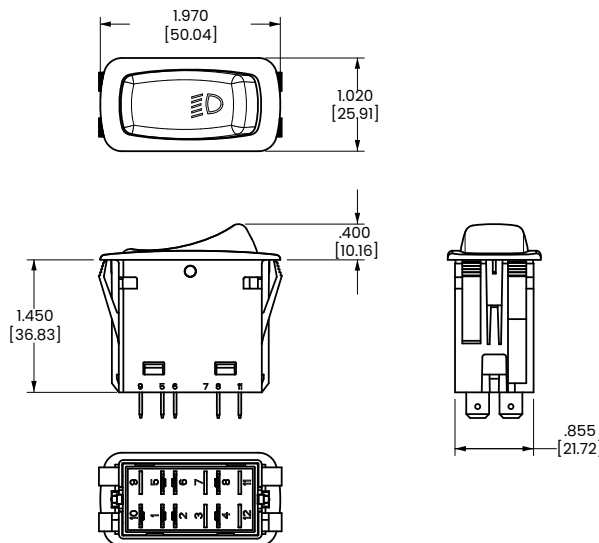
[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

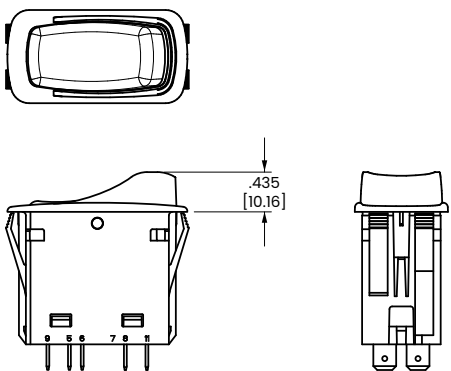
# Dimensional Specs

inches [millimeters]

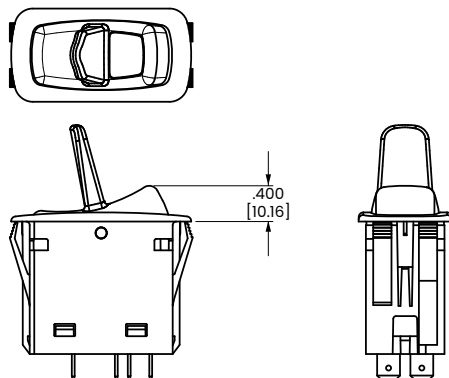
## LASER ETCHED ACTUATOR



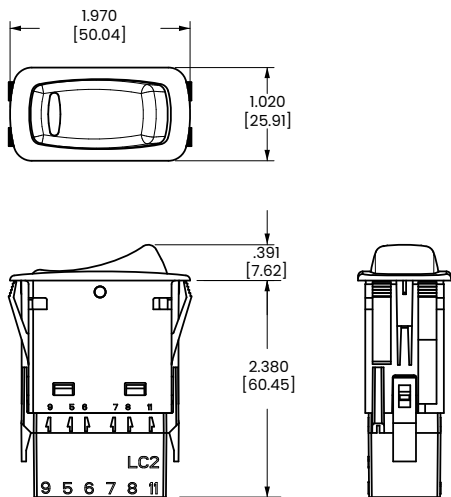
## ROCKER GUARD



## LARGE LENS AND PADDLE ACTUATOR

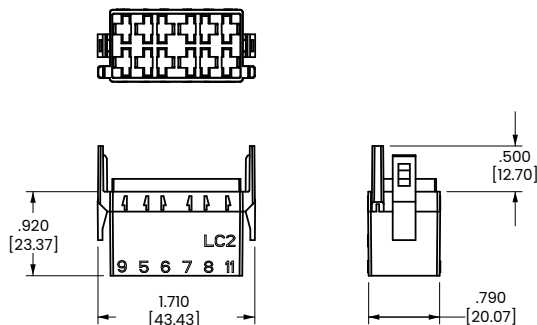


## BARS LENS AND CONNECTOR



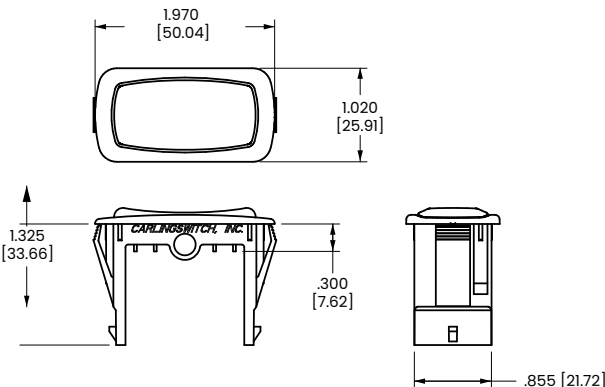
## ACCESSORY

LC2-01 BLACK .187 TAB CONNECTOR (PACKARD 480-SERIES)



## ACCESSORY

LH1 REMOVABLE HOLE PLUG WITH NON-SERRATED WINGS  
LH2 HOLE PLUG WITH SERRATED WINGS



# Diagrams

## Circuit Diagrams:

| CIRCUIT CODE | SCHEMATIC                               |
|--------------|-----------------------------------------|
| 4            | <p>INTERNAL CIRCUIT BOARD (TYPICAL)</p> |
| 5            |                                         |
| 6            |                                         |
| 7            |                                         |
| 8            |                                         |

## Lamp Circuit Diagrams:

| ILLUM. CODE | SCHEMATIC |
|-------------|-----------|
| A           |           |
| B           |           |
| C           |           |
| 1           |           |
| 2           |           |
| 3           |           |
| 4           |           |



**Littelfuse®**



**Carling Technologies®**

A Littelfuse® Brand

# V-Series

Sealed Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



## Contura® IP66/68 Snap-In Mounted Switches

These switches are a staple in the marine and transportation industries and have passed a range of environmental, corrosion, temperature, vibration, shock and sealing tests including MIL Std 202F, MIL Std 510.1, UL 1500, ISO 8846, IEC 60529 and BS 5490 among others, making them one of the most rugged and reliable switches ever manufactured.

**1-2**  
Poles

**.4-20**  
Amps

**125-250**  
VAC

**12-24**  
VDC

## Typical Applications

- On/Off-Highway
- Marine
- Armored Vehicles
- Industrial Automation
- Commercial Food
- Medical Equipment
- Any Application Requiring Sealing Protection



# Design Features

## INTERCHANGEABLE ACTUATORS

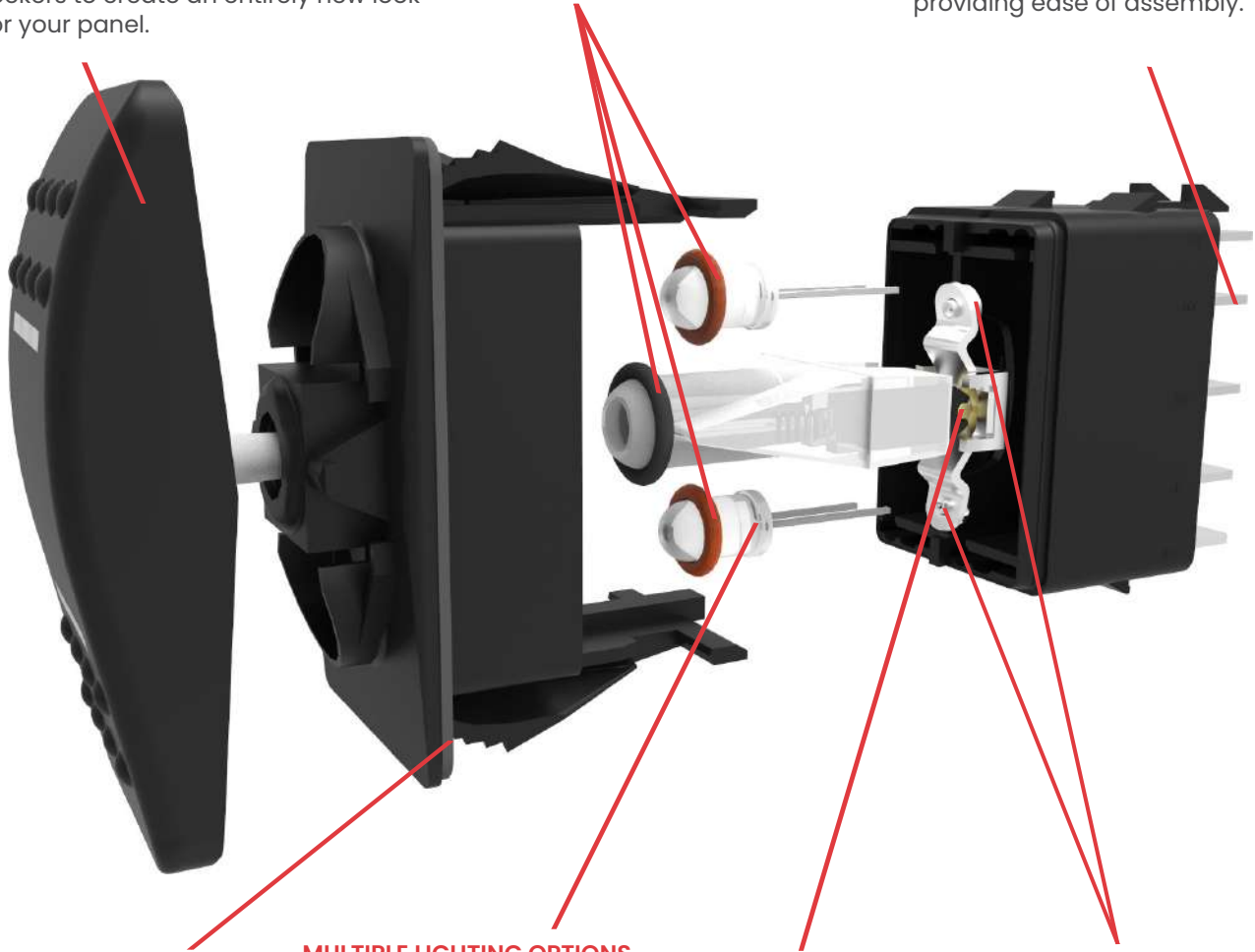
Panel redesign is a snap with our wide range of rocker styles. Achieve maximum design variety with minimum inventory. Simply swap rockers to create an entirely new look for your panel.

## DUAL SEAL PROTECTION

Seals out water, dust, debris, and sealed to IP66/68 for above-panel components

## CLEAN CONNECTIONS

Options for both eight and ten terminal base styles with AMP & Packard compatible connectors affords myriad circuit options while providing ease of assembly.



## OPTIONAL PANEL SEAL

Helps prevent water/dust ingress behind panel.

## MULTIPLE LIGHTING OPTIONS

In addition to Incandescent lamps, our LED illumination is offered in a wide array of light intensities, colors, as well as dual level, tri-color, and flashing options.

## BRASS ROLLER PIN

Robust mechanism eliminates the need for lubricants. Enables switch to withstand -40°C to +85°C temperatures.

## SILVER PLATED BUTT CONTACT MECHANISM

Providing 50k to 100k electrical cycles, circuit and load dependent

# Actuator Options & Accessories

## Contura II & III



The Contura II & III actuators are constructed of thermoplastic polycarbonate and are offered with a hard nylon overlay or a "soft-touch" elastomer overlay. These models incorporate aesthetic designs on the top and bottom of the rocker featuring two rows of raised "bumps" on the Contura II and three "indented" lines on the Contura III.

## Contura X



The raised bracket/bezel on the Contura X helps prevent debris from being trapped under the actuator. This curved rocker style is available with a variety of lenses and legends.

## Contura IV



The Contura IV's "Shape to create a Shape" actuator works with the curves, contours & advanced styling of the latest panel designs, flowing with these advanced curves & radii. This actuator style fits on the Contura flush bracket/bezel.

## Contura XI



The raised bracket/bezel on the Contura XI helps prevent debris from being trapped under the actuator. This convex style rocker is available with a wide variety of lenses and legends.

## Contura V



The symmetrically curved Contura V actuator provides the perfect complement to the Contura IV's "Shape to create a Shape" design concept. With its flush style mounting bracket, Contura V can be mounted in between two Contura IV's, by itself, or in groups.

## Contura XII



The Contura XII version features a paddle style actuator with the raised bracket/bezel of Contura X and XI. The contoured handle design provides intuitive recognition and ease of operation and is available with all Contura X and XI lens and legend offerings.

## Contura VI (WAVE)



The Contura VI WAVE sealed rocker switches, when used in a row, create an uniquely appealing "wave" design on your panel. A variety of colors and finishes are available for both rocker and wave insert. Contura VI features bar and oval lenses.

## Contura XIV



The Contura XIV represents a sleek new crossover rocker design which should appeal to Trucks, Buses and Heavy Vehicles as well as the Marine Industry. Intuitive feel is provided by recessed ridges along with a Center Groove which effectively defines the boundary between top and bottom switch functions.

## Contura VII



Contura VII featuring gently curved corners and edges assuring compatibility with most any panel design. Intuitive feel is maximized by the use of 2 embossed circular pads located at opposite ends of the rocker. Any combination of Bar or Oval style lenses can be located in the pads providing a truly unique look, exclusive to Contura VII.

## Illuminated Indicators & Accessories



Alert operator of systems functions or malfunctions, are offered with removable/replaceable lamps in Contura II, II, V or X styles. Accessories include connectors, mounting panels, hole plugs, panel seals, and actuator removal tools. Refer to accessories page for full details

# General Specifications

## Electrical

|                            |                                                                                                                                                              |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Contact Rating             | 4VA @ 24VDC (MAX) resistive<br>15 amps, 125VAC<br>10 amps, 250VAC<br>1/2 HP 125-250VAC<br>20 amps, 4-14VDC<br>15 amps, 15-28VDC<br>10A, 14VT<br>6A, 125VAC L |
| Dielectric Strength        | 1500 Volts RMS                                                                                                                                               |
| Insulation Resistance      | 50 Megohms                                                                                                                                                   |
| Initial Contact Resistance | 10 milliohms max. @ 4VDC                                                                                                                                     |
| Life                       | Up to 100,000 cycles, circuit and load dependent                                                                                                             |
| Contacts                   | Silver alloy, silver tin-oxide, fine silver                                                                                                                  |
| Terminals                  | Brass or copper/silver plate<br>1/4" (6.3mm) Quick Connect terminations standard. Solder lug, Wire Lead                                                      |

## Physical

|                                          |                                                                                                                                                                                                                                                           |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lighted                                  | Incandescent - rated 10,000 hours<br>Neon - rated 25,000 hours<br>LED - rated 100,000 hours 1/2 life (LED is internally ballasted for voltages to 24VDC)                                                                                                  |
| Seals                                    | Internal<br>Optional external gasket panel seal                                                                                                                                                                                                           |
| Base                                     | Polyester blend rated to 125°C with a UL flammability rating of 94V0.                                                                                                                                                                                     |
| Contura II, III, IV, V, VI, VII Actuator | <b>Hard Surface:</b> Basic actuator structure molded of thermoplastic polycarbonate with a hard Nylon 66 thermoplastic surface overlay.<br><b>Soft Surface:</b> Basic actuator structure molded of thermoplastic polycarbonate with an elastomer overlay. |
| Contura X, XI, XII Actuator, VP          | Nylon 66 Reinforced rated to 105°C                                                                                                                                                                                                                        |
| Lens                                     | Polycarbonate rated at 100°C                                                                                                                                                                                                                              |
| Contura XIV                              | Polycarbonate lens/sub-rocker with ABS shell                                                                                                                                                                                                              |

## Actuator Travel (Angular Displacement)

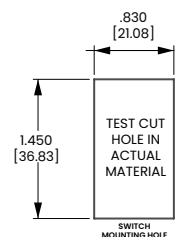
|             |                |
|-------------|----------------|
| 2 position  | 18°            |
| 3 positions | 9° from center |

## Environmental

|                     |                                                                                                                                                                                                                                           |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sealing             | IP66/68, for above-panel components of actual switch only.                                                                                                                                                                                |
| Corrosion           | Mixed Flowing Gas (MFG) Class III<br>3 year accelerated exposure per ASTM B-827, B-845 Silver and gold contacts                                                                                                                           |
| Operating Temp      | -40°C to +85°C                                                                                                                                                                                                                            |
| Vibration 1         | Per Mil-Std 202F, Method 204D<br>Test Condition A 0.06 DA or 10G's 10-500 Hz. Tested with VCH connector. Test criteria - No loss of circuit during test, pre and post test contact resistance.                                            |
| Vibration 2         | Resonance search 24-50 Hz<br>0.40 DA50-2000 Hz ±10 G's peak<br>Horizontal Axis 3-5 G's max.<br>Random 24 Hz 0.06 PSD-Gsq/Hz<br>60 Hz 0.50 100 Hz 0.50 200 Hz 0.025<br>2000 Hz 0.025 No loss of circuit during test; <10μ seconds chatter. |
| Shock               | Per Mil-Std 202F, Method 213B, Test Condition K @ 30G's. Tested with VCH connector. Test criteria - No loss of circuit during test, pre and post test contact resistance.                                                                 |
| Salt Spray          | Per Mil-Std 202F, Method 101D, Test Condition A, 96 Hrs. Sealed version only.                                                                                                                                                             |
| Dust                | Mil STD 810, Method 510.2 Air Velocity 300 Ft/Min Duration 16Hr                                                                                                                                                                           |
| Thermal Shock       | Per Mil-Std 202F, Method 107F, Test Cond. A, -55°C to +85°C. Test criteria - pre and post test contact resistance                                                                                                                         |
| Moisture Resistance | Per Mil-Std 202F, Method 106F, Test Criteria - pre and post test contact resistance                                                                                                                                                       |
| Ignition Protection | All Contura switches with sealed construction meet the requirements of UL1500/ISO8846 for ignition protection, in addition to conformance with EC directive 94/25/EC for marine products.                                                 |

## Mounting Specifications

Panel Thickness Range  
Gaskets Acceptable Panel Thickness  
0 .030 to .250 (.76 to 6.35mm)  
1 .030 to .109 & .147 to .157 (.76 to 2.77mm & 3.73 to 3.98mm)  
Recommended: No gasket with panel thickness of .032, .062, .093, .125, .187 or .250



# Ordering Scheme

Contura II & III

Sample  
Part Number

V 1 D A B T 0 B - A R B 00 - 0 00

Selection

1

2

3

4

5

6

7

8

9

10

11

12

13

14

## 1. SERIES

V V-Series

## 2. CIRCUIT

Terminal Connections as viewed ( ) - momentary from bottom of switch: SP - single pole: terminals 1, 2 & 3.  
8 terminal 10 terminal DP - double pole: terminals 1, 2, 3, 4, 5 & 6.  
8 - - 7 8 - - 7 Terminals 7, 8, 9 & 10 for lamp circuit only.  
1 - - 4 1 - - 4  
2 - - 5 2 - - 5  
3 - - 6 3 - - 6  
10 - - 9

### Position:

| SP DP | 1            | 2         | 3                      |
|-------|--------------|-----------|------------------------|
| 1 A   | 2 & 3, 5 & 6 | Connected | Terminals 1 & 2, 4 & 5 |
| 2 B   | (ON)         | NONE      | OFF                    |
| 3 C   | ON           | NONE      | OFF                    |
| 4 D   | ON           | NONE      | (OFF)                  |
| 5 F   | ON           | NONE      | ON                     |
| 6 J   | ON           | NONE      | (ON)                   |
| 7 K   | ON           | OFF       | ON                     |
| 8 L   | (ON)         | OFF       | (ON)                   |

### SPECIAL CIRCUITS

|    | 2 & 3          | 2 & 3, 5 & 4 | 5 & 4 |
|----|----------------|--------------|-------|
| H* | 2 & 3          | 2 & 3        | OFF   |
| G* | 2 & 3, 5 & 6   | 2 & 3        | 1 & 2 |
| S* | 2 & 3, 5 & 6   | 2 & 3        | OFF   |
| M* | (2 & 3, 5 & 6) | 2 & 3        | 2 & 1 |
| R* | (2 & 3, 5 & 6) | 2 & 3        | 5 & 1 |
| E* | 5 & 6          | 5 & 3        |       |

Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

## 3. RATING 3

|   |                                              |
|---|----------------------------------------------|
| 1 | .4VA @ 28VDC Resistive                       |
| B | 15A 24V                                      |
| C | 20A 18V                                      |
| D | 20A 12V                                      |
| E | 20A 14V, 10A 14VT (circuit 1, 4, A & D only) |
| F | 10A 14V, 6A 14VT (circuit G only)            |
| M | .4VA/20A 12V                                 |
| N | .4VA/15A 24V                                 |

## 4. TERMINATION / BASE STYLE

| 8 term | 10 Term | Termination                 | Jumper      |
|--------|---------|-----------------------------|-------------|
| 1      | 2       | .250 TAB (QC) no barriers   | No          |
| A      | B       | .250 TAB (QC) with barriers | No          |
| J      | K       | .250 TAB (QC) no barriers   | Yes T2 to 5 |
| 3      | 5       | Solder Lug no barriers      | No          |
| C      | D       | Solder Lug                  | No          |
| 5      | 6       | Wire Leads no barriers      | No          |
| E      | F       | Wire Leads                  | No          |

Note: Codes J & K for circuits H, G & M. Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION

Lamp #1: above terminals 1 & 4 end of switch; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only.

| Sealed                    | Unsealed | Lamps | illumination Type | Lamp wired to Terminals |
|---------------------------|----------|-------|-------------------|-------------------------|
| S                         | 0        | NONE  | -                 | -                       |
| A                         | 1        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
| B                         | 2        | 1     | DOWN              | 3 (+) 7 (-)             |
| C                         | 3        | 2     | UP                | 3 (+) 7 (-)             |
| D                         | 4        | 1     | DOWN              | 3 (+) 7 (-)             |
| E                         | 5        | 2     | DOWN              | 1 (+) 7 (-)             |
| F                         | 6        | 1     | UP                | 3 (+) 7 (-)             |
| G                         | 7        | 2     | INDEPENDENT       | 8 (+) 7 (-)             |
| H                         | 8        | 1     | UP                | 3 (+) 7 (-)             |
| U                         | 9        | 2     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           | Y        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           | Z        | 2     | INDEPENDENT       | 10 (+) 9 (-)            |
| SINGLE POLE SWITCHES ONLY |          |       |                   |                         |
| J                         | 8        | 1     | DOWN              | 3 (+) 8 (-)             |
| K                         | W        | 2     | INDEPENDENT       | 6 (+) 7 (-)             |
|                           |          | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | INDEPENDENT       | 6 (+) 7 (-)             |
| DOUBLE POLE SWITCHES ONLY |          |       |                   |                         |
| L                         | 9        | 1     | DOWN              | 3 (+) 6 (-)             |
| M                         | R        | 1     | UP                | 3 (+) 6 (-)             |
| N                         | T        | 1     | DOWN              | 3 (+) 6 (-)             |
| P                         | V        | 2     | UP                | 1 (+) 4 (-)             |
|                           |          | 1     | UP                | 1 (+) 4 (-)             |
|                           |          | 2     | UP                | 3 (+) 6 (-)             |

## 6,7. LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6

|              |     |          |          |             |             |       |
|--------------|-----|----------|----------|-------------|-------------|-------|
| No lamp      | 0   | 1 125VAC | 2 250VAC | 6 12V       | 7 18V       | 8 24V |
| Neon         | 1   | 3V       | 5 6V     | superbright | superbright |       |
| Incandescent | 4   |          |          | Green       | Red         |       |
| LED*         |     |          |          | F           | R           |       |
| 2VDC         | Red | Amber    | Green    |             |             |       |
| 6VDC         | A   | L        | F        |             |             |       |
| 12VDC        | B   | M        | G        |             |             |       |
| 24VDC        | C   | N        | H        |             |             |       |
|              | D   | P        | J        |             |             |       |

\* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

## 8. FLUSH BRACKET COLOR, PANEL SEAL 1

|          |       |       |      |
|----------|-------|-------|------|
| No Seal  | Black | White | Gray |
| One Seal | B     | W     | G    |
|          | C     | Y     | H    |

## 9. ACTUATOR

|      |             |  |  |
|------|-------------|--|--|
| 0    | No Actuator |  |  |
| A, B | Contura II  |  |  |
| C, D | Contura III |  |  |

Actuator thick end over terminals: 3, 6 1, 4

## 10. LENS 1

|                 |             |       |       |
|-----------------|-------------|-------|-------|
| 0 - No Actuator | Z - No Lens |       |       |
| Clear           | White       | Amber | Green |
| 1               | 6           | B     | G     |
| 2               | 7           | C     | H     |
| 3               | 8           | D     | J     |
|                 |             |       | P     |
|                 |             |       | V     |

Square lens options only available for Contura II.

4 9 E K R W  
5 A F L S Y  
Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

## 11. ACTUATOR COLOR AND TEXTURE 1

|                 |       |      |     |       |
|-----------------|-------|------|-----|-------|
| 0 - No Actuator |       |      |     |       |
| Soft Surface    | Black | Gray | Red | White |
| Hard Surface    | B     | G    | R   | W     |
|                 | C     | H    | S   | Y     |

## 12. ACTUATOR LENS OR BODY LEGENDS 2

|    |     |    |     |    |     |    |     |
|----|-----|----|-----|----|-----|----|-----|
| 11 | ON  | 12 | OFF | 13 | I   | 14 | O   |
|    | OFF |    | ON  |    | O   |    | I   |
| 15 | O O | 16 | O O | 17 | O I | 18 | I O |
|    | F N |    | N F |    |     |    |     |
|    | F   |    | F   |    |     |    |     |

For additional legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com)

## 13. LEGENDS ORIENTATION

|   |                                                   |
|---|---------------------------------------------------|
| 0 | No legend (used with codes 11-18 in selection 12) |
| 1 | Orientation 1                                     |
| 2 | Orientation 2                                     |
| 3 | Orientation 3                                     |
| 4 | Orientation 4                                     |

## 14. ACTUATOR LENS LEGENDS

00 No legend this location / no actuator  
(used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14.  
For legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com).

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- Custom colors are available. Consult factory.
- Body legends not available on Soft surface actuators; White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- Additional ratings available. See V-Series Switch Accessories page.
- Contura II available with two square lenses. Consult factory for details.

# Ordering Scheme

Contura II & III locking

Sample  
Part Number

V 1 D A S W O B - A Z E 00 - 0

Selection

1 2 3 4 5 6 7 8 9 10 11 12 13

## 1. SERIES

V V-Series

## 2. CIRCUIT

Terminal Connections as viewed ( ) - momentary from bottom of switch: SP - single pole: terminals 1, 2 & 3.  
8 terminal 10 terminal DP - double pole: terminals 1, 2, 3, 4, 5 & 6.  
Terminals 7, 8, 9 & 10 for lamp circuit only.

|         |          |
|---------|----------|
| 8 - - 7 | 8 - - 7  |
| 1 - - 4 | 1 - - 4  |
| 2 - - 5 | 2 - - 5  |
| 3 - - 6 | 3 - - 6  |
|         | 10 - - 9 |

| Position: | 1            | 2                   | 3            |
|-----------|--------------|---------------------|--------------|
| SP DP     | 2 & 3, 5 & 6 | Connected Terminals | 1 & 2, 4 & 5 |
| 1 A       | ON           | NONE                | OFF          |
| 4 D       | ON           | NONE                | ON           |
| 6 J       | ON           | OFF                 | ON           |
| 7 K       | ON           | OFF                 | (ON)         |
| 8 L       | (ON)         | OFF                 | (ON)         |
| 9 N       | OFF          | NONE                | ON           |

| SPECIAL CIRCUITS | 2 & 3          | 2 & 3, 5 & 4 | 5 & 4 |
|------------------|----------------|--------------|-------|
| H*               | 2 & 3, 5 & 6   | 2 & 3        | OFF   |
| G*               | 2 & 3, 5 & 6   | 2 & 3        | 1 & 2 |
| S*               | (2 & 3, 5 & 6) | 2 & 3        | OFF   |
| M*               | (2 & 3, 5 & 6) | 2 & 3        | 2 & 1 |
| R*               | 5 & 6          | 5 & 3        | 5 & 1 |
| E*               |                |              |       |

\*Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

## 3. RATING

4

|   |                                              |
|---|----------------------------------------------|
| 1 | .4VA @ 28VDC Resistive                       |
| B | 15A 24V                                      |
| C | 20A 18V                                      |
| D | 20A 12V                                      |
| E | 20A 14V, 10A 14VT (circuit 1, 4, A & D only) |
| F | 10A 14V, 6A 14VT (circuit G only)            |
| M | .4VA/20A 12V                                 |
| N | .4VA/15A 24V                                 |

## 4. TERMINATION / BASE STYLE

| 8 term | 10 Term | Termination                 | Jumper      |
|--------|---------|-----------------------------|-------------|
| 1      | 2       | .250 TAB (QC) no barriers   | No          |
| A      | B       | .250 TAB (QC) with barriers | No          |
| J      | K       | .250 TAB (QC) no barriers   | Yes T2 to 5 |
| 3      | 4       | Solder Lug no barriers      | No          |
| C      | D       | Solder Lug                  | No          |
| 5      | 6       | Wire Leads no barriers      | No          |
| E      | F       | Wire Leads                  | No          |

Note: Codes J & K for circuits H, G & M. Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION & SWITCH SEALING

| 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only | Sealed | Unsealed | Lamps       | Illumination Type | Lamp wired to Terminals |
|------------------------------------------------------------------------------------|--------|----------|-------------|-------------------|-------------------------|
| S                                                                                  | 0      | NONE     | -           | -                 | -                       |
| C                                                                                  | 3      | 2        | UP          | 3 (+) 7 (-)       |                         |
| H                                                                                  | Z      | 2        | INDEPENDENT | 8 (+) 7 (-)       |                         |
| DOUBLE POLE SWITCHES ONLY                                                          |        |          |             |                   |                         |
| M                                                                                  | R      | 1        | UP          | 3 (+) 6 (-)       |                         |
|                                                                                    |        | 2        | DOWN        | 1 (+) 4 (-)       |                         |
| P                                                                                  | V      | 1        | UP          | 1 (+) 4 (-)       |                         |
|                                                                                    |        | 2        | UP          | 3 (+) 6 (-)       |                         |

## 6. LOCK

Lock above terminals 1 & 4 end of switch  
W lock

## 7. LAMP

Lamp above terminals 3 & 6 end of switch

|              |      |          |          |             |             |       |
|--------------|------|----------|----------|-------------|-------------|-------|
| No lamp      | 0    | 1 125VAC | 2 250VAC | 6 12V       | 7 18V       | 8 24V |
| Neon         | 1    | 125VAC   | 250VAC   | superbright | superbright |       |
| Incandescent | 4 3V | 5 6V     |          | LED*        |             |       |
| Red          | A    | Amber    | Green    | Red         |             |       |
| L            | M    | F        | R        |             |             |       |
| B            | N    | G        | S        |             |             |       |
| C            | P    | H        | T        |             |             |       |
| D            |      | J        | V        |             |             |       |

\* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

## 8. FLUSH BRACKET COLOR, PANEL SEAL

1

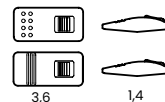
|          |       |       |      |
|----------|-------|-------|------|
| No Seal  | Black | White | Gray |
| One Seal | B     | W     | G    |
|          | C     | Y     | H    |

## 9. HARD SURFACE ACTUATOR

1

|             |       |      |     |       |
|-------------|-------|------|-----|-------|
| Contura II  | Black | Gray | Red | White |
|             | A     | B    | G   | H     |
| Contura III | C     | D    | E   | F     |

Actuator orientation above terminals:



## 10. LENS

|             |       |       |       |     |      |
|-------------|-------|-------|-------|-----|------|
| Z - No Lens |       |       |       |     |      |
| Clear       | White | Amber | Green | Red | Blue |
| 3           | 8     | D     | J     | P   | V    |



Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

## 11. ACTUATOR LOCK FUNCTION AND COLOR

1

| Lock Color     | Up | Down | Up & Down | Center <sup>3</sup> |
|----------------|----|------|-----------|---------------------|
| Match Actuator | A  | H    | R         | 1                   |
| Black          | B  | J    | S         | 2                   |
| White          | C  | K    | T         | 3                   |
| Red            | D  | L    | V         | 4                   |
| Safety Orange  | E  | M    | W         | 5                   |

## 12. ACTUATOR LENS OR BODY LEGENDS

2

00 - No Legend

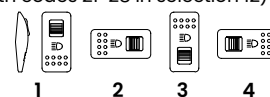
|     |    |    |    |
|-----|----|----|----|
| 21  | 22 | 23 | 24 |
| OFF | ON | O  | I  |
| 25  | 26 | 27 | 28 |
| O   | O  | O  | I  |
| F   | N  |    |    |



For additional legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com)

## 13. LEGEND ORIENTATION

|   |                                                   |
|---|---------------------------------------------------|
| 0 | No legend (used with codes 21-28 in selection 12) |
| 1 | Orientation 1                                     |
| 2 | Orientation 2                                     |
| 3 | Orientation 3                                     |
| 4 | Orientation 4                                     |



Notes: Consult factory to verify horsepower rating for your particular circuit choice.

- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- Only available with 3 position circuits. Center OFF and special circuits only available with center position lock function.
- Additional ratings available. See V-Series Switch Accessories page.

Configure Complete Part Number >

Browse Standard Parts >



# Ordering Scheme

Contura IV

Sample  
Part Number

V 1 D A B T 0 B - E P C 00 - 0 00

Selection

1

2

3

4

5

6

7

8

9

10

11

12

13

14

## 1. SERIES

V V-Series

## 2. CIRCUIT

Terminal Connections as viewed ( ) - momentary from bottom of switch: SP - single pole: terminals 1, 2 & 3.  
8 terminal 10 terminal DP - double pole: terminals 1, 2, 3, 4, 5 & 6.  
1 - - 4 8 - - 7 Terminals 7, 8, 9 & 10 for lamp circuit only.  
2 - - 5 2 - - 5  
3 - - 6 3 - - 6  
10 - - 9

| Position:        | 1              | 2                   | 3            |
|------------------|----------------|---------------------|--------------|
| SP DP            | 2 & 3, 5 & 6   | Connected Terminals | 1 & 2, 4 & 5 |
| 1 A              | ON             | NONE                | OFF          |
| 2 B              | (ON)           | NONE                | OFF          |
| 3 C              | (ON)           | NONE                | (OFF)        |
| 4 D              | ON             | NONE                | ON           |
| 5 F              | ON             | NONE                | (ON)         |
| 6 J              | ON             | OFF                 | ON           |
| 7 K              | (ON)           | OFF                 | (ON)         |
| 8 L              | (ON)           | OFF                 | (ON)         |
| SPECIAL CIRCUITS |                |                     |              |
| H*               | 2 & 3          | 2 & 3, 5 & 4        | 5 & 4        |
| G*               | 2 & 3, 5 & 6   | 2 & 3               | OFF          |
| S*               | 2 & 3, 5 & 6   | 2 & 3               | 1 & 2        |
| M*               | (2 & 3, 5 & 6) | 2 & 3               | OFF          |
| R*               | (2 & 3, 5 & 6) | 2 & 3               | 2 & 1        |
| E*               | 5 & 6          | 5 & 3               | 5 & 1        |

\*Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

## 3. RATING

4

|   |                                              |
|---|----------------------------------------------|
| 1 | .4VA @ 28VDC Resistive                       |
| B | 15A 24V                                      |
| C | 20A 18V                                      |
| D | 20A 12V                                      |
| E | 20A 14V, 10A 14VT (circuit 1, 4, A & D only) |
| F | 10A 14V, 6A 14VT (circuit G only)            |
| M | .4VA/20A 12V                                 |
| N | .4VA/15A 24V                                 |

## 4. TERMINATION / BASE STYLE

| 8 term | 10 Term | Termination                | Jumper      |
|--------|---------|----------------------------|-------------|
| 1      | 2       | 250 TAB (QC) no barriers   | No          |
| A      | B       | 250 TAB (QC) with barriers | No          |
| J      | K       | 250 TAB (QC) no barriers   | Yes T2 to 5 |
| 3      | 4       | Solder Lug no barriers     | No          |
| C      | D       | Solder Lug                 | No          |
| 5      | 6       | Wire Leads no barriers     | No          |
| E      | F       | Wire Leads                 | No          |

Note: Codes J & K for circuits H, G & M. Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

| Sealed                    | Unsealed | Lamps | Illumination Type | Lamp wired to Terminals |
|---------------------------|----------|-------|-------------------|-------------------------|
| S                         | 0        | NONE  | -                 | -                       |
| A                         | 1        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
| B                         | 2        | 1     | DOWN              | 3 (+) 7 (-)             |
| C                         | 3        | 2     | UP                | 3 (+) 7 (-)             |
| D                         | 4        | 1     | DOWN              | 3 (+) 7 (-)             |
|                           |          | 2     | DOWN              | 1 (+) 7 (-)             |
| E                         | 5        | 1     | UP                | 1 (+) 7 (-)             |
|                           |          | 2     | UP                | 3 (+) 7 (-)             |
| F                         | 6        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | UP                | 3 (+) 6 (-)             |
| G                         | 7        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | UP                | 3 (+) 7 (-)             |
| H                         | Z        | 2     | INDEPENDENT       | 8 (+) 7 (-)             |
| U                         | Y        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | INDEPENDENT       | 10 (+) 9 (-)            |
| SINGLE POLE SWITCHES ONLY |          |       |                   |                         |
| J                         | 8        | 1     | DOWN              | 3 (+) 8 (-)             |
|                           |          | 2     | INDEPENDENT       | 6 (+) 7 (-)             |
| K                         | W        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | INDEPENDENT       | 6 (+) 7 (-)             |
| DOUBLE POLE SWITCHES ONLY |          |       |                   |                         |
| L                         | 9        | 1     | DOWN              | 3 (+) 6 (-)             |
| M                         | R        | 1     | UP                | 3 (+) 6 (-)             |
| N                         | T        | 1     | DOWN              | 3 (+) 6 (-)             |
|                           |          | 2     | DOWN              | 1 (+) 4 (-)             |
| P                         | V        | 1     | UP                | 1 (+) 4 (-)             |
|                           |          | 2     | UP                | 3 (+) 6 (-)             |

## 6,7. LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6  
No lamp 0  
Neon 1 125VAC 2 250VAC  
Incandescent 4 3V 5 6V 6 12V 7 18V 8 24V  
LED\*  
2VDC Red A Amber L Green F  
6VDC B M superbright Red S  
12VDC C N superbright R  
24VDC D P J T V  
\* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

## 8. FLUSH BRACKET COLOR, PANEL SEAL

1

|          |       |       |      |
|----------|-------|-------|------|
| No Seal  | Black | White | Gray |
| One Seal | B     | W     | G    |
|          | C     | Y     | H    |

## 9. ACTUATOR

E Contura IV, left orientation  
T Contura IV, left orientation, laser etched  
F Contura IV, right orientation  
R Contura IV, right orientation, laser etched  
Actuator orientation over terminals:



## 10. LENS

| 0 - No Actuator |       | Z - No Lens |       |     |      |
|-----------------|-------|-------------|-------|-----|------|
| Clear           | White | Amber       | Green | Red | Blue |
| 1               | 6     | B           | G     | M   | T    |
| 2               | 7     | C           | H     | N   | U    |
| 3               | 8     | D           | J     | P   | V    |
| 4               | 9     | E           | K     | R   | W    |
| 5               | A     | F           | L     | S   | Y    |



Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

## 11. ACTUATOR COLOR

1, 5, 6

|             |   |        |   |        |   |     |   |
|-------------|---|--------|---|--------|---|-----|---|
| No Actuator | 0 | Black  | C | Gray   | H | Red | S |
| White       | Y | Nickel | D | Pewter | E |     |   |

## 12. ACTUATOR LENS OR BODY LEGENDS

2

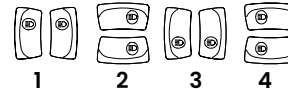
|    |     |    |     |    |     |    |     |
|----|-----|----|-----|----|-----|----|-----|
| 11 | ON  | 12 | OFF | 13 | I   | 14 | O   |
|    | OFF |    | ON  |    | O   |    | I   |
| 15 | O O | 16 | O O | 17 | O I | 18 | I O |
|    | F N |    | N F |    |     |    |     |
|    | F   |    | F   |    |     |    |     |



For additional legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com)

## 13. LEGENDS ORIENTATION

|   |                                                   |
|---|---------------------------------------------------|
| 0 | No legend (used with codes 11-18 in selection 12) |
| 1 | Orientation 1                                     |
| 2 | Orientation 2                                     |
| 3 | Orientation 3                                     |
| 4 | Orientation 4                                     |



## 13. ACTUATOR LENS LEGENDS

00 No legend this location / no actuator  
(used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14.  
For legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com).

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- Gloss brow is on left side of E actuator and right side of F actuator.
- Additional ratings available. See V-Series Switch Accessories page.
- Laser etched rocker only available with lens code Z & actuator colors black, nickel or pewter.
- Pewter and nickel colors only available with laser etched actuator.

Configure Complete Part Number >

Browse Standard Parts >

# Ordering Scheme

Contura V

Sample  
Part Number

V 1 D A B T O B - G P C 00 - 0 00

Selection

1

2

3

4

5

6

7

8

9

10

11

12

13

14

## 1. SERIES

V V-Series

## 2. CIRCUIT

Terminal Connections as viewed ( ) - momentary from bottom of switch: SP - single pole: terminals 1, 2 & 3.  
8 terminal 10 terminal DP - double pole: terminals 1, 2, 3, 4, 5 & 6.  
8 -- 7 8 -- 7  
1 - 4 1 - 4  
2 - 5 2 - 5  
3 - 6 3 - 6  
10 - 9

| Position:        | 1              | 2                   | 3            |
|------------------|----------------|---------------------|--------------|
| SP DP            | 2 & 3, 5 & 6   | Connected Terminals | 1 & 2, 4 & 5 |
| 1 A              | ON             | NONE                | OFF          |
| 2 B              | (ON)           | NONE                | OFF          |
| 3 C              | ON             | NONE                | (OFF)        |
| 4 D              | ON             | NONE                | ON           |
| 5 F              | ON             | NONE                | (ON)         |
| 6 J              | ON             | OFF                 | ON           |
| 7 K              | (ON)           | OFF                 | (ON)         |
| 8 L              | (ON)           | OFF                 | (ON)         |
| SPECIAL CIRCUITS |                |                     |              |
| H*               | 2 & 3          | 2 & 3, 5 & 4        | 5 & 4        |
| G*               | 2 & 3, 5 & 6   | 2 & 3               | OFF          |
| S*               | 2 & 3, 5 & 6   | 2 & 3               | 1 & 2        |
| M*               | (2 & 3, 5 & 6) | 2 & 3               | OFF          |
| R*               | (2 & 3, 5 & 6) | 2 & 3               | 2 & 1        |
| E*               | 5 & 6          | 5 & 3               | 5 & 1        |

\*Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

## 3. RATING

|   |                                              |
|---|----------------------------------------------|
| 1 | .4VA @ 28VDC Resistive                       |
| B | 15A 24V                                      |
| C | 20A 18V                                      |
| D | 20A 12V                                      |
| E | 20A 14V, 10A 14VT (circuit 1, 4, A & D only) |
| F | 10A 14V, 6A 14VT (circuit G only)            |
| M | .4VA/20A 12V                                 |
| N | .4VA/15A 24V                                 |

## 4. TERMINATION / BASE STYLE

| 8 term | 10 Term | Termination                 | Jumper      |
|--------|---------|-----------------------------|-------------|
| 1      | 2       | .250 TAB (QC) no barriers   | No          |
| A      | B       | .250 TAB (QC) with barriers | No          |
| J      | K       | .250 TAB (QC) no barriers   | Yes T2 to 5 |
| 3      | 4       | Solder Lug no barriers      | No          |
| C      | D       | Solder Lug                  | No          |
| 5      | 6       | Wire Leads no barriers      | No          |
| E      | F       | Wire Leads                  | No          |

Note: Codes J & K for circuits H, G & M. Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

| Sealed                    | Unsealed | Lamps | Illumination Type | Lamp wired to Terminals |
|---------------------------|----------|-------|-------------------|-------------------------|
| S                         | 0        | NONE  | -                 | -                       |
| A                         | 1        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
| B                         | 2        | 1     | DOWN              | 3 (+) 7 (-)             |
| C                         | 3        | 2     | UP                | 3 (+) 7 (-)             |
| D                         | 4        | 1     | DOWN              | 3 (+) 7 (-)             |
| E                         | 5        | 2     | DOWN              | 1 (+) 7 (-)             |
| F                         | 6        | 1     | UP                | 1 (+) 7 (-)             |
| G                         | 7        | 2     | UP                | 3 (+) 7 (-)             |
| H                         | Z        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
| U                         | Y        | 2     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | INDEPENDENT       | 10 (+) 9 (-)            |
| SINGLE POLE SWITCHES ONLY |          |       |                   |                         |
| J                         | 8        | 1     | DOWN              | 3 (+) 8 (-)             |
| K                         | W        | 2     | INDEPENDENT       | 6 (+) 7 (-)             |
|                           |          | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | INDEPENDENT       | 6 (+) 7 (-)             |
| DOUBLE POLE SWITCHES ONLY |          |       |                   |                         |
| L                         | 9        | 1     | DOWN              | 3 (+) 6 (-)             |
| M                         | R        | 1     | UP                | 3 (+) 6 (-)             |
| N                         | T        | 1     | DOWN              | 3 (+) 6 (-)             |
|                           |          | 2     | DOWN              | 1 (+) 4 (-)             |
| P                         | V        | 1     | UP                | 1 (+) 4 (-)             |
|                           |          | 2     | UP                | 3 (+) 6 (-)             |

## 6,7. LAMP

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6  
No lamp 0  
Neon 1 125VAC 2 250VAC  
Incandescent 4 3V 5 6V  
LED\* 6 12V 7 18V 8 24V  
superbright superbright  
Red Red  
2VDC A B L F G R  
6VDC B C M N H S  
12VDC C D P J T  
24VDC D  
\* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

## 8. FLUSH BRACKET COLOR, PANEL SEAL

|          |         |         |        |
|----------|---------|---------|--------|
| No Seal  | Black B | White W | Gray G |
| One Seal | C       | Y       | H      |

## 9. ACTUATOR

|   |                         |
|---|-------------------------|
| 0 | No Actuator             |
| G | Contura V               |
| P | Contura V, laser etched |

## 10. LENS

| 0 - No Actuator | White | Amber | Green | Red | Blue | style & location: #1 / #2 |
|-----------------|-------|-------|-------|-----|------|---------------------------|
| 1               | 6     | B     | G     | M   | T    |                           |
| 2               | 7     | C     | H     | N   | U    |                           |
| 3               | 8     | D     | J     | P   | V    |                           |
| 4               | 9     | E     | K     | R   | W    |                           |
| 5               | A     | F     | L     | S   | Y    |                           |

Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

## 11. ACTUATOR COLOR

|             |   |        |   |        |   |     |   |
|-------------|---|--------|---|--------|---|-----|---|
| No Actuator | 0 | Black  | C | Gray   | H | Red | S |
| White       | Y | Nickel | D | Pewter | E |     |   |

## 12. ACTUATOR LENS OR BODY LEGENDS

|    |     |    |     |    |     |    |     |
|----|-----|----|-----|----|-----|----|-----|
| 11 | ON  | 12 | OFF | 13 | I   | 14 | O   |
|    | OFF |    | ON  |    | O   |    | I   |
| 15 | O O | 16 | O O | 17 | O I | 18 | I O |
|    | F N |    | N F |    |     |    |     |
|    | F   |    | F   |    |     |    |     |

For additional legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com)

## 12. LEGENDS ORIENTATION

|   |                                                   |
|---|---------------------------------------------------|
| 0 | No legend (used with codes 11-18 in selection 12) |
| 1 | Orientation 1                                     |
| 2 | Orientation 2                                     |
| 3 | Orientation 3                                     |
| 4 | Orientation 4                                     |

## 13. ACTUATOR LENS LEGEND

00 No legend this location / no actuator  
(used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14.  
For legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com)

Notes:

- Consult factory to verify horsepower rating for your particular circuit choice.
- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- Laser Etched rocker only available with lens code Z & actuator colors black, nickel or pewter.
- Additional ratings available. See V-Series Switch Accessories page.
- Nickel and Pewter colors only available with laser etched actuator.
- Consult factory for laser etched lens callout.

Configure Complete Part Number >

Browse Standard Parts >





# Ordering Scheme

Contura VI Wave

Sample  
Part Number

V I D B G N T B - H A 7 C B - A C 1 0 0

Selection 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

## 1. SERIES

V V-Series

## 2. CIRCUIT

Terminal Connections as viewed ( ) - momentary from bottom of switch: SP - single pole: terminals 1, 2 & 3.  
8 terminal 10 terminal DP - double pole: terminals 1, 2, 3, 4, 5 & 6.  
8--7 8--7  
1--4 1--4  
2--5 2--5  
3--6 3--6  
10--9

| Position: | 1            | 2                   | 3            |
|-----------|--------------|---------------------|--------------|
| SP        | 2 & 3, 5 & 6 | Connected Terminals | 1 & 2, 4 & 5 |
| 1         | A            | ON                  | OFF          |
| 2         | B            | (ON)                | OFF          |
| 3         | C            | (ON)                | (OFF)        |
| 4         | D            | ON                  | (ON)         |
| 5         | F            | ON                  | (ON)         |
| 6         | J            | ON                  | (ON)         |
| 7         | K            | (ON)                | (ON)         |
| 8         | L            | (ON)                | (ON)         |

| SPECIAL CIRCUITS | 2 & 3          | 2 & 3, 5 & 4 | 5 & 4 |
|------------------|----------------|--------------|-------|
| H*               | 2 & 3          | 2 & 3        | OFF   |
| G*               | 2 & 3, 5 & 6   | 2 & 3        | 1 & 2 |
| S*               | 2 & 3, 5 & 6   | 2 & 3        | OFF   |
| M*               | (2 & 3, 5 & 6) | 2 & 3        | 2 & 1 |
| R*               | (2 & 3, 5 & 6) | 2 & 3        | 5 & 1 |
| E*               | 5 & 6          | 5 & 3        | 5 & 1 |

\*Jumper between terminals 2 & 5 for circuits H,G,M,R & S are specified in section 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

## 3. RATING 3

|   |                                              |
|---|----------------------------------------------|
| 1 | .4VA @ 28VDC Resistive                       |
| B | 15A 24V                                      |
| C | 20A 18V                                      |
| D | 20A 12V                                      |
| E | 20A 14V, 10A 14VT (circuit 1, 4, A & D only) |
| F | 10A 14V, 6A 14VT (circuit G only)            |
| M | .4VA/20A 12V                                 |
| N | .4VA/15A 24V                                 |

## 4. TERMINATION / BASE STYLE

| 8 term | 10 Term | Termination                 | Jumper      |
|--------|---------|-----------------------------|-------------|
| 1      | 2       | .250 TAB (QC) no barriers   | No          |
| A      | B       | .250 TAB (QC) with barriers | No          |
| J      | K       | .250 TAB (QC) no barriers   | Yes T2 to 5 |
| 3      | 4       | Solder Lug no barriers      | No          |
| C      | D       | Solder Lug                  | No          |
| 5      | 6       | Wire Leads no barriers      | No          |
| E      | F       | Wire Leads                  | No          |

Note: Codes J & K for circuits H, G & M. Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

| Sealed                    | Unsealed | Lamps | illumination Type | Lamp wired to Terminals |
|---------------------------|----------|-------|-------------------|-------------------------|
| S                         | 0        | NONE  | -                 | -                       |
| A                         | 1        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
| B                         | 2        | 1     | DOWN              | 3 (+) 7 (-)             |
| C                         | 3        | 2     | UP                | 3 (+) 7 (-)             |
| D                         | 4        | 1     | DOWN              | 3 (+) 7 (-)             |
|                           |          | 2     | DOWN              | 1 (+) 7 (-)             |
| E                         | 5        | 1     | UP                | 1 (+) 7 (-)             |
|                           |          | 2     | UP                | 3 (+) 7 (-)             |
| F                         | 6        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | UP                | 3 (+) 6 (-)             |
| G                         | 7        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | UP                | 3 (+) 7 (-)             |
| H                         | Z        | 2     | INDEPENDENT       | 8 (+) 7 (-)             |
| U                         | Y        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | INDEPENDENT       | 10 (+) 9 (-)            |
| SINGLE POLE SWITCHES ONLY |          |       |                   |                         |
| J                         | 8        | 1     | DOWN              | 3 (+) 8 (-)             |
|                           |          | 2     | INDEPENDENT       | 6 (+) 7 (-)             |
| K                         | W        | 1     | INDEPENDENT       | 8 (+) 7 (-)             |
|                           |          | 2     | INDEPENDENT       | 6 (+) 7 (-)             |
| DOUBLE POLE SWITCHES ONLY |          |       |                   |                         |
| L                         | 9        | 1     | DOWN              | 3 (+) 6 (-)             |
| M                         | R        | 1     | UP                | 3 (+) 6 (-)             |
| N                         | T        | 1     | DOWN              | 3 (+) 6 (-)             |
|                           |          | 2     | DOWN              | 1 (+) 4 (-)             |
| P                         | V        | 1     | UP                | 1 (+) 4 (-)             |

## 6,7. LAMP

Lamp above terminals 3 & 6 end of switch

|              |   |          |          |             |             |       |
|--------------|---|----------|----------|-------------|-------------|-------|
| No lamp      | 0 | 1 125VAC | 2 250VAC | 6 12V       | 7 18V       | 8 24V |
| Neon         | 1 | 4 3V     | 5 6V     | superbright | superbright |       |
| Incandescent | 4 |          |          | Green       | Red         |       |
| LED*         |   | Red      | Amber    |             |             |       |
|              |   | A        | L        | F           | R           |       |
|              |   | B        | M        | G           | S           |       |
|              |   | C        | N        | H           | T           |       |
|              |   | D        | P        | J           | V           |       |

\* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

## 8. FLUSH BRACKET COLOR, PANEL SEAL 1

|          |       |       |      |
|----------|-------|-------|------|
|          | Black | White | Gray |
| No Seal  | B     | W     | G    |
| One Seal | C     | Y     | H    |

## 9. ACTUATOR

0 No Actuator H High Insert L Low Insert



## 10,11. LENS

|                 |             |       |       |      |
|-----------------|-------------|-------|-------|------|
| 0 - No Actuator | Z - No Lens |       |       |      |
| Clear           | White       | Amber | Green | Red  |
| -               | 7           | C     | H     | N    |
| 3               | -           | D     | J     | P    |
| 4               | -           | E     | K     | R    |
| -               | A           | F     | L     | S    |
|                 |             |       |       | Blue |
|                 |             |       |       | U    |
|                 |             |       |       | V    |
|                 |             |       |       | W    |
|                 |             |       |       | Y    |

Bar Lens Translucent  
Bar Lens Transparent  
Oval Lens Transparent  
Oval Lens Translucent

Green or blue lenses are not recommended with Neon lamps.

## 12. ACTUATOR COLOR

C Black H Gray S Red Y White

## 13. INSERT COLOR

|   |                      |   |                     |
|---|----------------------|---|---------------------|
| B | Black                | S | Satin Chrome Plated |
| C | Bright Chrome Plated | T | Satin Nickel Plated |
| D | Satin Chrome Painted | W | White               |
| N | Bright Nickel Plated |   |                     |

## 14. ACTUATOR LENS OR BODY LEGEND 2

00 - No Legend this location/No actuator

|    |     |    |     |    |     |    |     |
|----|-----|----|-----|----|-----|----|-----|
| 11 | ON  | 12 | OFF | 13 | I   | 14 | O   |
|    | OFF |    | ON  |    | O   |    | I   |
| 15 | O O | 16 | O O | 17 | O I | 18 | I O |
|    | F N |    | N F |    |     |    |     |
|    | F   |    | F   |    |     |    |     |

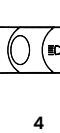
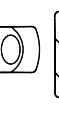
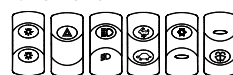


For additional legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com)

## 15. ACTUATOR ORIENTATION

0 No legend (used with codes 11-18 in selection 12)

1 Orientation 1  
2 Orientation 2  
3 Orientation 3  
4 Orientation 4



## 16. ACTUATOR LENS LEGEND

00 No legend this location / no actuator

(used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14.

For legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com).

Notes: Consult factory to verify horsepower rating for your particular circuit choice.

- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators. Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- Additional ratings available. See V-Series Switch Accessories page.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Ordering Scheme

Contura VII

Sample  
Part Number

V 1 D A B T O B - Z R C 00 - 0 00

Selection

1

2

3

4

5

6

7

8

9

10

11

12

13

14

## 1. SERIES

V V-Series

## 2. CIRCUIT

Terminal Connections as viewed ( ) - momentary from bottom of switch: SP - single pole: terminals 1, 2 & 3.  
8 terminal 10 terminal DP - double pole: terminals 1, 2, 3, 4, 5 & 6.  
8 - 7 8 - 7 Terminals 7, 8, 9 & 10 for lamp circuit only.  
1 - 4 1 - 4  
2 - 5 2 - 5  
3 - 6 3 - 6  
10 - 9

| Position:        | 1              | 2                   | 3            |
|------------------|----------------|---------------------|--------------|
| SP DP            | 2 & 3, 5 & 6   | Connected Terminals | 1 & 2, 4 & 5 |
| 1 A              | ON             | NONE                | OFF          |
| 2 B              | (ON)           | NONE                | OFF          |
| 3 C              | ON             | NONE                | (OFF)        |
| 4 D              | ON             | NONE                | ON           |
| 5 F              | ON             | NONE                | (ON)         |
| 6 J              | ON             | OFF                 | ON           |
| 7 K              | ON             | OFF                 | (ON)         |
| 8 L              | (ON)           | OFF                 | (ON)         |
| SPECIAL CIRCUITS |                |                     |              |
| H*               | 2 & 3          | 2 & 3, 5 & 4        | 5 & 4        |
| G*               | 2 & 3, 5 & 6   | 2 & 3               | OFF          |
| S*               | 2 & 3, 5 & 6   | 2 & 3               | 1 & 2        |
| M*               | (2 & 3, 5 & 6) | 2 & 3               | OFF          |
| R*               | (2 & 3, 5 & 6) | 2 & 3               | 2 & 1        |
| E*               | 5 & 6          | 5 & 3               | 5 & 1        |

\*Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

## 3. RATING 4

|   |                                              |
|---|----------------------------------------------|
| 1 | .4VA @ 28VDC Resistive                       |
| B | 15A 24V                                      |
| C | 20A 18V                                      |
| D | 20A 12V                                      |
| E | 20A 14V, 10A 14VT (circuit 1, 4, A & D only) |
| F | 10A 14V, 6A 14VT (circuit G only)            |
| M | .4VA/20A 12V                                 |
| N | .4VA/15A 24V                                 |

## 4. TERMINATION / BASE STYLE

| 8 term | 10 Term | Termination                 | Jumper      |
|--------|---------|-----------------------------|-------------|
| 1      | 2       | .250 TAB (QC) no barriers   | No          |
| A      | B       | .250 TAB (QC) with barriers | No          |
| J      | K       | .250 TAB (QC) no barriers   | Yes T2 to 5 |
| 3      | 4       | Solder Lug no barriers      | No          |
| C      | D       | Solder Lug                  | No          |
| 5      | 6       | Wire Leads no barriers      | No          |
| E      | F       | Wire Leads                  | No          |

Note: Codes J & K for circuits H, G & M. Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

| Sealed                    | Unsealed | Lamps | Termination | illumination Type | Lamp wired to Terminals |
|---------------------------|----------|-------|-------------|-------------------|-------------------------|
| 0                         | 0        | NONE  | -           | -                 | -                       |
| A                         | 1        | 1     | INDEPENDENT | 8 (+) 7 (-)       |                         |
| B                         | 2        | 1     | DOWN        | 3 (+) 7 (-)       |                         |
| C                         | 3        | 2     | UP          | 3 (+) 7 (-)       |                         |
| D                         | 4        | 1     | DOWN        | 3 (+) 7 (-)       |                         |
|                           |          | 2     | DOWN        | 1 (+) 7 (-)       |                         |
| E                         | 5        | 1     | UP          | 1 (+) 7 (-)       |                         |
|                           |          | 2     | UP          | 3 (+) 7 (-)       |                         |
| F                         | 6        | 1     | INDEPENDENT | 8 (+) 7 (-)       |                         |
|                           |          | 2     | UP          | 3 (+) 6 (-)       |                         |
| G                         | 7        | 1     | INDEPENDENT | 8 (+) 7 (-)       |                         |
|                           |          | 2     | UP          | 3 (+) 7 (-)       |                         |
| H                         | Z        | 2     | INDEPENDENT | 8 (+) 7 (-)       |                         |
| U                         | Y        | 1     | INDEPENDENT | 8 (+) 7 (-)       |                         |
|                           |          | 2     | INDEPENDENT | 10 (+) 9 (-)      |                         |
| SINGLE POLE SWITCHES ONLY |          |       |             |                   |                         |
| J                         | 8        | 1     | DOWN        | 3 (+) 8 (-)       |                         |
|                           |          | 2     | INDEPENDENT | 6 (+) 7 (-)       |                         |
| K                         | W        | 1     | INDEPENDENT | 8 (+) 7 (-)       |                         |
|                           |          | 2     | INDEPENDENT | 6 (+) 7 (-)       |                         |
| DOUBLE POLE SWITCHES ONLY |          |       |             |                   |                         |
| L                         | 9        | 1     | DOWN        | 3 (+) 6 (-)       |                         |
| M                         | R        | 1     | UP          | 3 (+) 6 (-)       |                         |
| N                         | T        | 1     | DOWN        | 3 (+) 6 (-)       |                         |
|                           |          | 2     | DOWN        | 1 (+) 4 (-)       |                         |
| P                         | V        | 1     | UP          | 1 (+) 4 (-)       |                         |
|                           |          | 2     | UP          | 3 (+) 6 (-)       |                         |

## 6,7. LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6  
No lamp 0  
Neon 1 125VAC 2 250VAC  
Incandescent 4 3V 5 6V 6 12V 7 18V 8 24V  
LED\* Red Amber Green Red  
2VDC A L F R  
6VDC B M G S  
12VDC C N H T  
24VDC D P J V  
\* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

## 8. FLUSH BRACKET COLOR, PANEL SEAL 1

|          |       |       |      |
|----------|-------|-------|------|
| No Seal  | Black | White | Gray |
| One Seal | B     | W     | G    |
|          | C     | Y     | H    |

## 9. ACTUATOR

0 No Actuator  
Z Contura VII

Actuator orientation over terminals:



3,6 1,4

## 10. LENS

Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

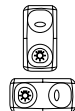
| 0 - No Actuator | Z - No Lens | White | Amber | Green | Red | Blue | Lens style & location |
|-----------------|-------------|-------|-------|-------|-----|------|-----------------------|
| 6               | B           | G     | M     | T     |     |      |                       |
| 7               | C           | H     | N     | U     |     |      |                       |
| 8               | D           | J     | P     | V     |     |      |                       |
| 9               | E           | K     | R     | W     |     |      |                       |
| A               | F           | L     | S     | Y     |     |      |                       |
| 1               | 2           | 3     | 4     | 5     |     |      |                       |

## 11. ACTUATOR COLOR / THUMB PRINT COLOR 1

|   |                   |   |             |
|---|-------------------|---|-------------|
| O | N/A - No Actuator | C | Black/Black |
| H | Grey/Black        | S | Red/Black   |
| Y | White/Black       |   |             |

## 12. ACTUATOR LENS OR BODY LEGENDS 2

|        |        |        |        |
|--------|--------|--------|--------|
| 11 ON  | 12 OFF | 13 I   | 14 O   |
| OFF    | ON     | O      | I      |
| 15 O O | 16 O O | 17 O I | 18 I O |
| F N    | N F    | F      |        |



For additional legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com)

## 13. ACTUATOR LENS OR BODY LEGENDS

0 No legend (used with codes 11-18 in selection 12)

|                 |  |
|-----------------|--|
| 1 Orientation 1 |  |
| 2 Orientation 2 |  |
| 3 Orientation 3 |  |
| 4 Orientation 4 |  |

## 16. ACTUATOR LENS LEGEND

00 No legend this location / no actuator.  
(used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14.  
For legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com).

Notes:

Consult factory to verify horsepower rating for your particular circuit choice.

- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators. Black imprinting is standard on white, red and gray actuators. Custom colors are available, consult factory.
- Additional ratings available. See V-Series Switch Accessories page.
- Legends available for lighted oval lens version only

Configure Complete Part Number >

Browse Standard Parts >



# Ordering Scheme

Contura X locking

Sample  
Part Number

V 1 D A S W 0 1 - 1 P B 00 - 0

Selection

1

2

3

4

5

6

7

8

9

10

11

12

13

## 1. SERIES

V V-Series

## 2. CIRCUIT

Terminal Connections as viewed ( ) - momentary from bottom of switch: SP - single pole: terminals 1, 2 & 3.  
8 terminal 10 terminal DP - double pole: terminals 1, 2, 3, 4, 5 & 6.  
8 - 7 8 - 7 Terminals 7, 8, 9 & 10 for lamp circuit only.  
1 - 4 1 - 4  
2 - 5 2 - 5  
3 - 6 3 - 6  
10 - 9

### Position:

| SP | DP | 2 & 3, 5 & 6 | Connected Terminals | 1 & 2, 4 & 5 |
|----|----|--------------|---------------------|--------------|
| 1  | A  | ON           | NONE                | OFF          |
| 4  | D  | ON           | NONE                | ON           |
| 6  | J  | ON           | OFF                 | ON           |
| 9  | N  | OFF          | NONE                | ON           |

### SPECIAL CIRCUITS

|    | 2 & 3        | 2 & 3, 5 & 4 | 5 & 4 |
|----|--------------|--------------|-------|
| H* | 2 & 3        | 2 & 3        | OFF   |
| G* | 2 & 3, 5 & 6 | 2 & 3        | 1 & 2 |
| S* | 2 & 3, 5 & 6 | 5 & 3        | 5 & 1 |
| E* | 5 & 6        |              |       |

\*Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

## 3. RATING 4

|   |                                              |
|---|----------------------------------------------|
| 1 | .4VA @ 28VDC Resistive                       |
| B | 15A 24V                                      |
| C | 20A 18V                                      |
| D | 20A 12V                                      |
| E | 20A 14V, 10A 14VT (circuit 1, 4, A & D only) |
| F | 10A 14V, 6A 14VT (circuit G only)            |
| M | .4VA/20A 12V                                 |
| N | .4VA/15A 24V                                 |

## 4. TERMINATION / BASE STYLE

| 8 term | 10 Term | Termination                 | Jumper      |
|--------|---------|-----------------------------|-------------|
| 1      | 2       | .250 TAB (QC) no barriers   | No          |
| A      | B       | .250 TAB (QC) with barriers | No          |
| J      | K       | .250 TAB (QC) no barriers   | Yes T2 to 5 |
| 3      | 4       | Solder Lug no barriers      | No          |
| C      | D       | Solder Lug                  | No          |
| 5      | 6       | Wire Leads no barriers      | No          |
| E      | F       | Wire Leads                  | No          |

Note: Codes J & K for circuits H, G & M. Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

| Sealed                    | Unsealed | Lamps | Illumination Type | Lamp wired to Terminals |
|---------------------------|----------|-------|-------------------|-------------------------|
| S                         | 0        | NONE  | -                 | -                       |
| C                         | 3        | 2     | UP                | 3 (+) 7 (-)             |
| H                         | Z        | 2     | INDEPENDENT       | 8 (+) 7 (-)             |
| DOUBLE POLE SWITCHES ONLY |          |       |                   |                         |
| M                         | R        | 1     | UP                | 3 (+) 6 (-)             |

## 6. LOCKS

Lock above terminals 1 & 4 end of switch.  
W Lock

Notes: Consult factory to verify horsepower rating for your particular circuit choice.

- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators; Custom colors are available, consult factory.
- Located over T1-4 end of switch.
- Additional ratings available. See V-Series Switch Accessories page.
- Located over T3-6 end of switch.

## 6,7. LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6

|              |          |          |                   |                   |                   |
|--------------|----------|----------|-------------------|-------------------|-------------------|
| No lamp      | 0        |          |                   |                   |                   |
| Neon         | 1 125VAC | 2 250VAC |                   |                   |                   |
| Incandescent | 4 3V     | 5 6V     | 6 12V superbright | 7 18V superbright | 8 24V superbright |
| LED*         |          |          |                   |                   |                   |

|       | Red | Amber | Green | Red |
|-------|-----|-------|-------|-----|
| 2VDC  | A   | L     | F     | R   |
| 6VDC  | B   | M     | G     | S   |
| 12VDC | C   | N     | H     | T   |
| 24VDC | D   | P     | J     | V   |

\* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

## 8. FLUSH BRACKET COLOR, PANEL SEAL 1

|            | Black | White | Gray |
|------------|-------|-------|------|
| No Gasket  | 1     | 2     | 3    |
| One Gasket | 4     | 5     | 6    |

## 9. HARD SURFACE ACTUATOR

| Contura X | Black | Gray | Red | White |
|-----------|-------|------|-----|-------|
|           | 1     | 2    | 3   | 4     |

Actuator orientation over terminals:



## 10. LENS - ABOVE LAMP #2 TERMINALS 5

| Z - No Lens | Clear | White | Amber | Green | Red | Blue | Lens Style                                         |
|-------------|-------|-------|-------|-------|-----|------|----------------------------------------------------|
| 3           | 8     | D     | J     | P     | V   |      | Bar                                                |
| 4           | 9     | E     | K     | R     | W   |      | One piece Square                                   |
| 5           | A     | F     | L     | S     | Y   |      | Two piece Square* (with clear top protective lens) |
| 2           | 7     | C     | H     | N     | U   |      | Two piece Square* (with smoke top protective lens) |
| 1           | 6     | B     | G     | M     | T   |      | Two piece Square* (with white top protective lens) |

\* All bottom lenses are molded of opaque material. Consult factory for other lens colors. Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

## 12. ACTUATOR LOCK FUNCTION 3

| Lock Color     | Up | Down | Up & Down |
|----------------|----|------|-----------|
| Match Actuator | A  | H    | R         |
| Black          | B  | J    | S         |
| White          | C  | K    | T         |
| Red            | D  | L    | V         |
| Gray           | E  | M    | W         |
| Safety Orange  | F  | N    | Y         |

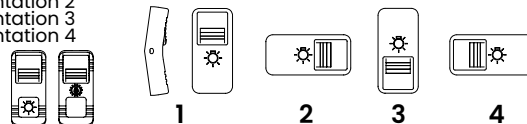
## 13. ACTUATOR LENS OR BODY LEGENDS 2

|                |        |      |      |  |
|----------------|--------|------|------|--|
| 00 - No Legend |        |      |      |  |
| 21 OFF         | 22 ON  | 23 O | 24 I |  |
| 25 O F         | 26 O N | 27 O | 28 I |  |

For additional legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com)

## 14. LEGEND ORIENTATION 3

|   |                                                   |
|---|---------------------------------------------------|
| 0 | No legend (used with codes 11-18 in selection 12) |
| 1 | Orientation 1                                     |
| 2 | Orientation 2                                     |
| 3 | Orientation 3                                     |
| 4 | Orientation 4                                     |



Configure Complete Part Number >

Browse Standard Parts >

# Ordering Scheme

Contura XIV

Sample  
Part Number

V 1 D B B C 0 B-FA P C AB- 1 00

Selection

1

2

3

4

5

6

7

8

9

10

11

12

13

14

## 1. SERIES

V V-Series

## 2. CIRCUIT

Terminal Connections as viewed ( ) - momentary from bottom of switch: SP - single pole: terminals 1, 2 & 3.  
8 terminal 10 terminal DP - double pole: terminals 1, 2, 3, 4, 5 & 6.  
8 -- 7 8 -- 7  
1 -- 4 1 -- 4  
2 -- 5 2 -- 5  
3 -- 6 3 -- 6  
10 -- 9

| Position: | 1            | 2                   | 3            |
|-----------|--------------|---------------------|--------------|
| SP        | 2 & 3, 5 & 6 | Connected Terminals | 1 & 2, 4 & 5 |
| 1 A       | ON           | NONE                | OFF          |
| 2 B       | (ON)         | NONE                | OFF          |
| 3 C       | ON           | NONE                | (OFF)        |
| 4 D       | ON           | NONE                | ON           |
| 5 F       | ON           | NONE                | (ON)         |
| 6 J       | ON           | OFF                 | (ON)         |
| 7 K       | ON           | OFF                 | (ON)         |
| 8 L       | (ON)         | OFF                 | (ON)         |

### SPECIAL CIRCUITS

|    | 2 & 3          | 2 & 3, 5 & 4 | 5 & 4 |
|----|----------------|--------------|-------|
| H* | 2 & 3          | 2 & 3        | OFF   |
| G* | 2 & 3, 5 & 6   | 2 & 3        | OFF   |
| M* | (2 & 3, 5 & 6) | 2 & 3        | OFF   |
| R* | (2 & 3, 5 & 6) | 2 & 3        | 2 & 1 |
| E* | 5 & 6          | 5 & 3        | 5 & 1 |
| S* | 2 & 3, 5 & 6   | 2 & 3        | 1 & 2 |

\*Jumper between terminals 2 & 5 for circuits H, G, M, R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

## 3. RATING

3

|   |                                              |
|---|----------------------------------------------|
| 1 | 4VA @ 28VDC Resistive                        |
| B | 15A 24V                                      |
| C | 20A 18V                                      |
| D | 20A 12V                                      |
| E | 20A 14V, 10A 14VT (circuit 1, 4, A & D only) |
| F | 10A 14V, 6A 14VT (circuit G only)            |

## 4. TERMINATION / BASE STYLE

| 8 Term | 10 Term | Termination                | Jumper      |
|--------|---------|----------------------------|-------------|
| 1      | 2       | 250 TAB (QC) no barriers   | No          |
| A      | B       | 250 TAB (QC) with barriers | No          |
| J      | K       | 250 TAB (QC) no barriers   | Yes T2 to 5 |
| 3      | 4       | Solder Lug no barriers     | No          |
| C      | D       | Solder Lug                 | No          |
| 5      | 6       | Wire Leads no barriers     | No          |
| E      | F       | Wire Leads                 | No          |

Note: Codes J & K for circuits H, G & M. Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

| Lamps | 1    | 2           | 3            | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|-------|------|-------------|--------------|---|---|---|---|---|---|----|----|----|----|----|
| S     | NONE |             |              |   |   |   |   |   |   |    |    |    |    |    |
| A     | 1    | INDEPENDENT | 8 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| B     | 1    | DOWN        | 3 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| C     | 2    | UP          | 3 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| D     | 1    | DOWN        | 3 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| E     | 2    | DOWN        | 1 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| F     | 1    | UP          | 1 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| G     | 2    | UP          | 3 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| H     | 1    | INDEPENDENT | 8 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| I     | 2    | UP          | 3 (+) 6 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| J     | 1    | INDEPENDENT | 8 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| K     | 2    | UP          | 3 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| L     | 1    | DOWN        | 3 (+) 6 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| M     | 2    | UP          | 3 (+) 6 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| N     | 1    | DOWN        | 1 (+) 4 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| P     | 2    | UP          | 1 (+) 4 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| U     | 1    | UP          | 3 (+) 6 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| V     | 2    | UP          | 8 (+) 7 (-)  |   |   |   |   |   |   |    |    |    |    |    |
| W     | 1    | INDEPENDENT | 10 (+) 9 (-) |   |   |   |   |   |   |    |    |    |    |    |
| X     | 2    | INDEPENDENT |              |   |   |   |   |   |   |    |    |    |    |    |

## 6 & 7. LAMP

|              |      |          |          |             |             |             |
|--------------|------|----------|----------|-------------|-------------|-------------|
| No lamp      | 0    | 1 125VAC | 2 250VAC | 6 12V       | 7 18V       | 8 24V       |
| Neon         | 1    | 125VAC   | 250VAC   | superbright | superbright | superbright |
| Incandescent | 4 3V | 5 6V     |          |             |             |             |
| LED*         |      |          |          |             |             |             |
| 2VDC         | Red  | Amber    | Green    |             |             |             |
| 6VDC         | A    | L        | F        |             |             |             |
| 12VDC        | B    | M        | G        |             |             |             |
| 24VDC        | C    | N        | H        |             |             |             |
|              | D    | P        | J        |             |             |             |

\* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

## 8. BRACKET COLOR & PANEL SEAL

|       |           |          |          |
|-------|-----------|----------|----------|
| Color | No Gasket | 1 Gasket | 2 Gasket |
| Black | B         | C        | D        |
| Gray  | G         | H        | J        |
| White | W         | Y        | Z        |

## 9. ACTUATOR STYLE

|    |                                    |
|----|------------------------------------|
| 0  | No Actuator - Furnished separately |
| FA | Contura XIV                        |
| FB | Contura XIV - Laser Etched         |



## 10. LENS COLOR / STYLE

| 0 - No Actuator |       |       | Z - No Lens |     |      |                                                                                                           |
|-----------------|-------|-------|-------------|-----|------|-----------------------------------------------------------------------------------------------------------|
| Clear           | White | Amber | Green       | Red | Blue |                                                                                                           |
| 1               | 6     | B     | G           | M   | T    |                        |
| 2               | 7     | B     | H           | N   | U    |                        |
| 3               | 8     | D     | J           | P   | V    |                        |
| 4               | 9     | E     | K           | R   | W    |                        |
| 5               | A     | F     | L           | S   | Y    |                        |
| 5               | A     | N/A   | N/A         | N/A | N/A  |  Laser-Etched Actuator |

Only Lens color for LEDs must be clear, white, or match color of LED.  
Green or blue lenses are not recommended with Neon lamps.

Only Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

## 11. ACTUATOR COLOR

1

|   |                   |
|---|-------------------|
| O | N/A - No Actuator |
| C | Black             |
| S | Red               |
| Y | White             |

## 12. ACTUATOR LENS OR BODY LEGEND

2

| 00 - No Legend this location / No actuator | 11  | 12  | 13 | 14 | 15 | 16 | 17 | 18 |
|--------------------------------------------|-----|-----|----|----|----|----|----|----|
|                                            | ON  | OFF | I  | O  | O  | O  | O  | O  |
|                                            | OFF | ON  | O  | I  | F  | N  | F  | F  |



## 12. ACTUATOR LENS OR BODY LEGEND

|   |               |  |  |  |  |
|---|---------------|--|--|--|--|
| 0 | No legend     |  |  |  |  |
| 1 | Orientation 1 |  |  |  |  |
| 2 | Orientation 2 |  |  |  |  |
| 3 | Orientation 3 |  |  |  |  |
| 4 | Orientation 4 |  |  |  |  |



## 12. ACTUATOR LENS OR BODY LEGEND

00 No legend this location / no actuator (used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens and one body legend, lens legend must be specified in selection 12; body legend specified in selection 14. For legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com).

Notes: Consult factory to verify horsepower rating for your particular circuit choice.

- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators.
- Additional ratings available. See V-Series Switch Accessories page.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)



# Ordering Scheme

Contura XIV Locking

Sample  
Part Number

V 1 D A B W 0 B-FC Z B 00-0

Selection 1 2 3 4 5 6 7 8 9 10 11 12 13

## 1. SERIES

V V-Series

## 2. CIRCUIT

Terminal Connections as viewed ( ) - momentary from bottom of switch: SP - single pole: terminals 1, 2 & 3.  
8 terminal 10 terminal DP - double pole: terminals 1, 2, 3, 4, 5 & 6.  
8 -- 7 8 -- 7  
1 -- 4 1 -- 4  
2 -- 5 2 -- 5  
3 -- 6 3 -- 6  
10 -- 9

Terminals 7, 8, 9 & 10 for lamp circuit only.

| Position: | 1            | 2                   | 3            |
|-----------|--------------|---------------------|--------------|
| SP DP     | 2 & 3, 5 & 6 | Connected Terminals | 1 & 2, 4 & 5 |
| 1 A       | ON           | NONE                | OFF          |
| - B       | (ON)         | NONE                | OFF          |
| 4 D       | ON           | NONE                | ON           |
| 6 J       | ON           | OFF                 | ON           |
| 7 K       | ON           | OFF                 | (ON)         |
| 8 L       | (ON)         | OFF                 | (ON)         |
| 9 N       | OFF          | NONE                | ON           |

### SPECIAL CIRCUITS

|    |                |              |       |
|----|----------------|--------------|-------|
| H* | 2 & 3          | 2 & 3, 5 & 4 | 5 & 4 |
| G* | 2 & 3, 5 & 6   | 2 & 3        | OFF   |
| M* | (2 & 3, 5 & 6) | 2 & 3        | OFF   |
| R* | (2 & 3, 5 & 6) | 2 & 3        | 2 & 1 |
| E* | 5 & 6          | 5 & 3        | 5 & 1 |
| S* | 2 & 3, 5 & 6   | 2 & 3        | 1 & 2 |

\*Jumper between terminals 2 & 5 for circuits H,G,M,R & S are specified in selection 4. External jumper between terminals 2 & 4 for circuit E are provided by customer. Circuit E may be used for SP OFF-ON-ON circuit.

## 3. RATING

3

|   |                                              |
|---|----------------------------------------------|
| 1 | .4VA @ 28VDC Resistive                       |
| B | 15A 24V                                      |
| C | 20A 18V                                      |
| D | 20A 12V                                      |
| E | 20A 14V, 10A 14VT (circuit 1, 4, A & D only) |
| F | 10A 14V, 6A 14VT (circuit G only)            |

## 4. TERMINATION / BASE STYLE

| 8 Term | 10 Term | Termination                 | Jumper      |
|--------|---------|-----------------------------|-------------|
| 1      | 2       | .250 TAB (QC) no barriers   | No          |
| A      | B       | .250 TAB (QC) with barriers | No          |
| J      | K       | .250 TAB (QC) no barriers   | Yes T2 to 5 |

Note: Codes J & K for circuits H, G & M. Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION & SWITCH SEALING

Lamp #1: above terminals 1 & 4 end of switch.; Lamp #2 above terminals 3 & 6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

| Lamps                     | illumination Type | Lamp wired to Terminals |
|---------------------------|-------------------|-------------------------|
| S                         | NONE              | -                       |
| C                         | 2 UP              | 3 (+) 7 (-)             |
| H                         | 2 INDEPENDENT     | 8 (+) 7 (-)             |
| DOUBLE POLE SWITCHES ONLY |                   |                         |
| M                         | 1 UP              | 3 (+) 6 (-)             |

## 5. LOCK OPTION

W Low Profile Lock

Notes: Consult factory to verify horsepower rating for your particular circuit choice.

- Custom colors are available. Consult factory.
- White imprinting is standard on black actuators; Black imprinting is standard on white, red and gray actuators.
- Additional ratings available. See V-Series Switch Accessories page.

## 7. LAMP

|              |             |
|--------------|-------------|
| No lamp      | 0           |
| Neon         | 1 125VAC    |
| Incandescent | 4 3V        |
| LED*         | 2 250VAC    |
|              | 5 6V        |
|              | 6 12V       |
|              | 7 18V       |
|              | 8 24V       |
|              | superbright |
|              | superbright |
| 2VDC         | Red         |
| 6VDC         | Amber       |
| 12VDC        | Green       |
| 24VDC        | Red         |
|              | A           |
|              | L           |
|              | F           |
|              | R           |
|              | B           |
|              | M           |
|              | G           |
|              | S           |
|              | C           |
|              | N           |
|              | H           |
|              | T           |
|              | D           |
|              | P           |
|              | J           |
|              | V           |

\* Consult factory for "daylight bright" LED options. Typical current draw for LED is 20ma.

## 8. BRACKET COLOR & PANEL SEAL

| Color | No Gasket | 1 Gasket | 2 Gasket |
|-------|-----------|----------|----------|
| Black | B         | C        | D        |
| Gray  | G         | H        | J        |
| White | W         | Y        | Z        |

## 9. ACTUATOR COLOR / STYLE

|    |                         |
|----|-------------------------|
| FC | Black - Standard Rocker |
| FD | Black - Laser Etched    |
| FS | Red - Standard Rocker   |
| FT | Red - Laser Etched      |



## 10. LENS COLOR / STYLE

| Z - No Lens |       |       |       |     |      |                                                                                                       |
|-------------|-------|-------|-------|-----|------|-------------------------------------------------------------------------------------------------------|
| Clear       | White | Amber | Green | Red | Blue |                                                                                                       |
| 1           | 6     | B     | G     | M   | T    |                    |
| 3           | 8     | D     | J     | P   | V    |                    |
| 5           | A     | N/A   | N/A   | N/A | N/A  |  Laser-Etched Only |

Lens color for LEDs must be clear, white, or match color of LED.  
Green or blue lenses are not recommended with Neon lamps.



Lens color for LEDs must be clear, white, or match color of LED. Green or blue lenses are not recommended with Neon lamps.

## 11. ACTUATOR LOCK COLOR / FUNCTION

1

| Lock Color     | LOCK IN POSITION |      |           |        |
|----------------|------------------|------|-----------|--------|
|                | UP               | DOWN | UP & DOWN | CENTER |
| Match Actuator | A                | H    | R         | 1      |
| Black          | B                | J    | S         | 2      |
| White          | C                | K    | T         | 3      |
| Red            | D                | L    | V         | 4      |
| Orange         | E                | M    | W         | 5      |
| Gray           | F                | G    | N         | 6      |

## 12. ACTUATOR LENS OR BODY LEGENDS

2

00 - No Legend

21 OFF 22 ON 23 O 24 I

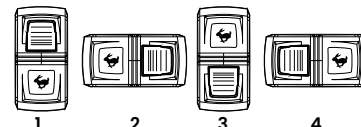
25 O 26 O 27 O 28 I

F F N F



## 13. LEGEND ORIENTATION

|   |               |
|---|---------------|
| 0 | No legend     |
| 1 | Orientation 1 |
| 2 | Orientation 2 |
| 3 | Orientation 3 |
| 4 | Orientation 4 |



[Configure Complete Part Number >](#)

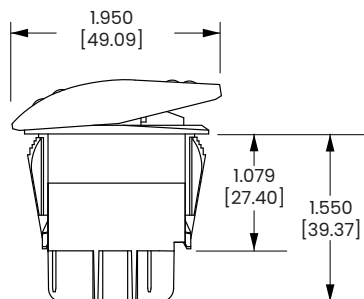
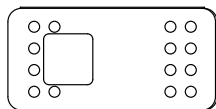
[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]

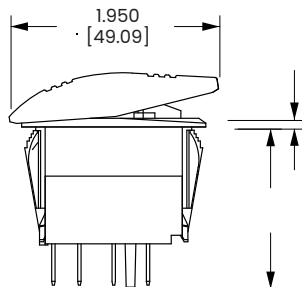
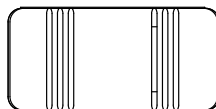
## CONTURA II

SHOWN WITH  
SQUARE LENS



8 TERMINAL BASE  
W/BARRIERS

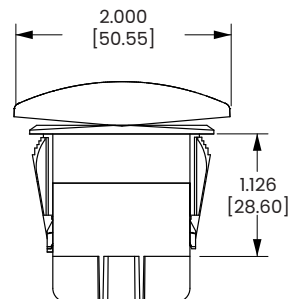
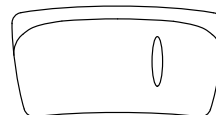
## CONTURA III



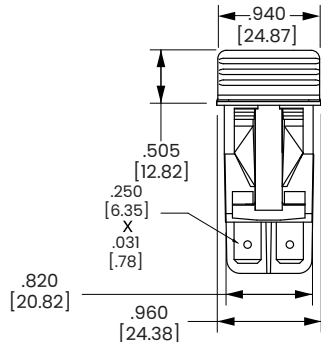
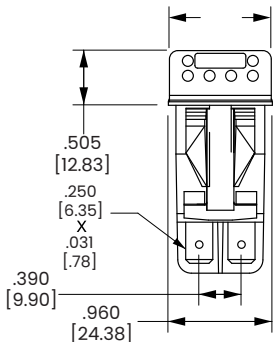
8 TERMINAL BASE  
W/O BARRIERS

## CONTURA IV

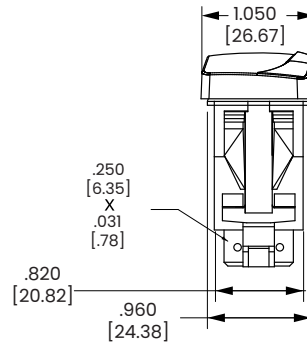
SHOWN WITH  
BAR LENS



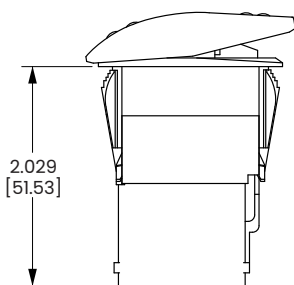
10 TERMINAL BASE  
W/BARRIERS



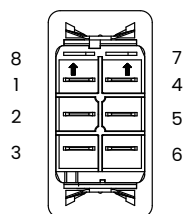
10 TERMINAL BASE  
W/BARRIERS



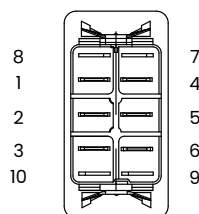
10 TERMINAL BASE  
W/O BARRIERS



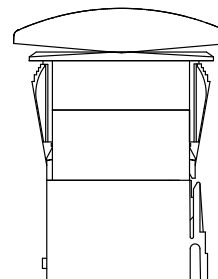
SWITCH SHOWN WITH  
VCH CONNECTOR 8  
TERMINAL



BOTTOM VIEW  
TERMINAL  
ARRANGEMENT  
8 TERMINAL BASE



BOTTOM VIEW  
TERMINAL  
ARRANGEMENT  
10 TERMINAL BASE



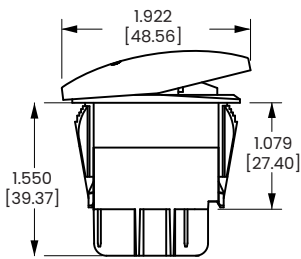
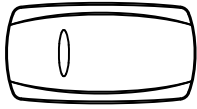
SWITCH SHOWN WITH  
VC1 CONNECTOR 10  
TERMINAL

# Dimensional Specs

inches [millimeters]

## CONTURA V

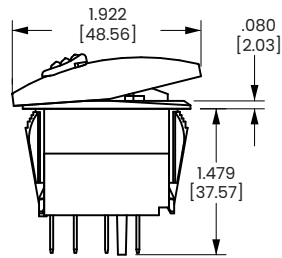
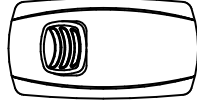
SHOWN WITH  
BAR LENS



8 TERMINAL BASE  
W/BARRIERS

## CONTURA V

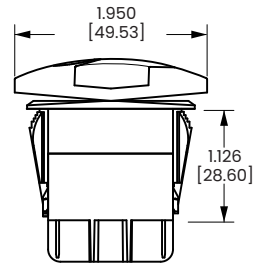
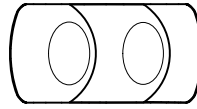
SHOWN WITH  
LOW PROFILE LOCK



8 TERMINAL BASE  
W/O BARRIERS

## CONTURA VI

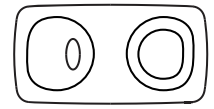
SHOWN WITH OVAL  
LENS



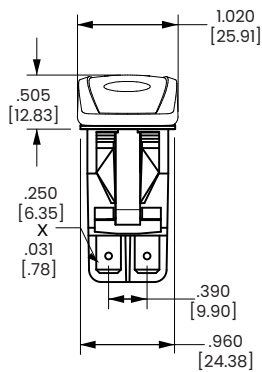
10 TERMINAL BASE  
W/BARRIER AND  
LAMP TERMINAL

## CONTURA VII

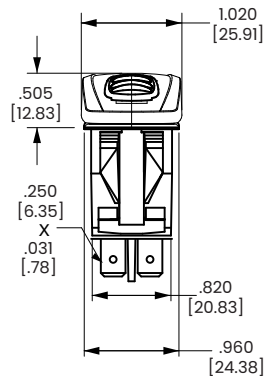
SHOWN WITH LARGE LENS  
AND BAR LENS



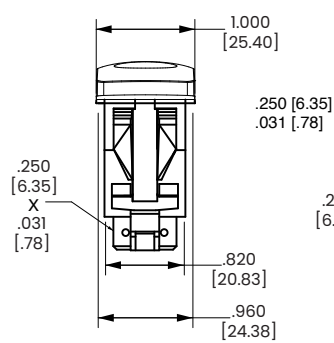
10 TERMINAL BASE  
W/O BARRIERS



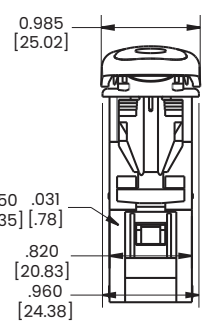
8 TERMINAL BASE  
W/BARRIERS



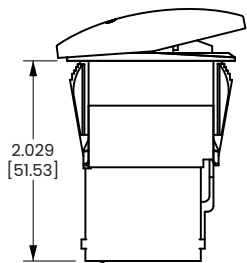
8 TERMINAL BASE  
W/O BARRIERS



10 TERMINAL BASE  
W/O BARRIERS

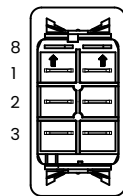


10 TERMINAL BASE  
W/O BARRIERS

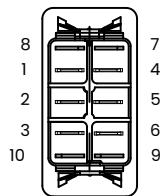


2.029  
[51.53]

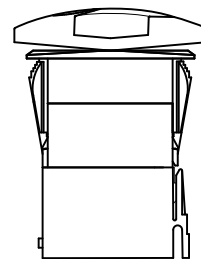
SWITCH SHOWN WITH  
VCH CONNECTOR 8  
TERMINAL



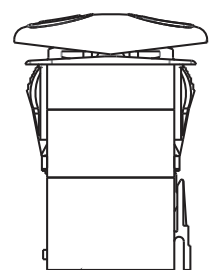
BOTTOM VIEW  
TERMINAL  
ARRANGEMENT  
8 TERMINAL BASE



BOTTOM VIEW  
TERMINAL  
ARRANGEMENT  
10 TERMINAL BASE



SWITCH SHOWN WITH  
VC1 CONNECTOR 10  
TERMINAL



SWITCH SHOWN  
WITH VC1  
CONNECTOR 10  
TERMINAL

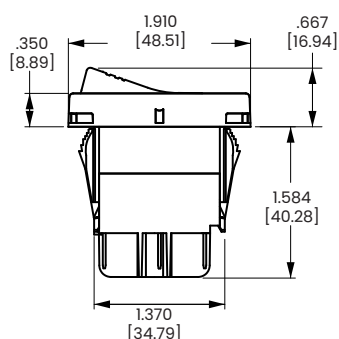
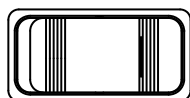


# Dimensional Specs

inches [millimeters]

## CONTURA X

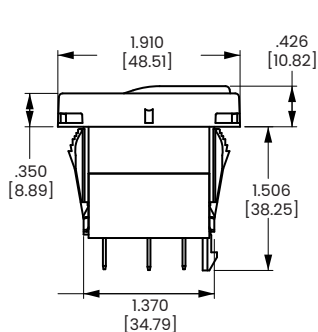
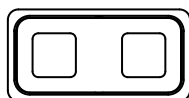
SHOWN WITH RAISED BRACKET



8 TERMINAL BASE  
W/BARRIERS

## CONTURA XI

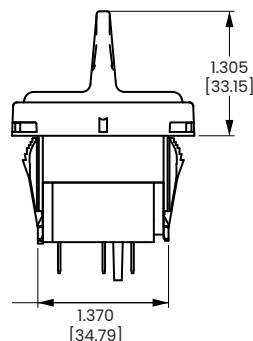
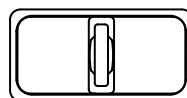
SHOWN WITH RAISED  
BRACKET AND TWO SQUARE  
LENSES



10 TERMINAL BASE  
W/O BARRIERS

## CONTURA XII

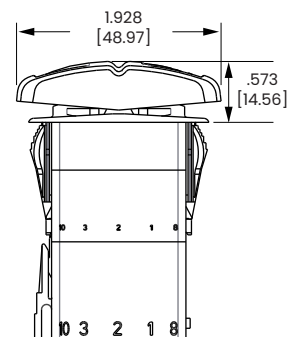
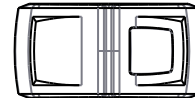
SHOWN WITH PADDLE  
ACTUATOR



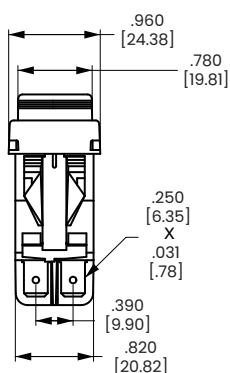
8 TERMINAL BASE  
W/O BARRIERS

## CONTURA XIV

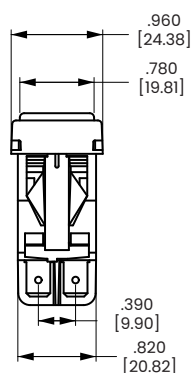
SHOWN WITH LARGE LENS



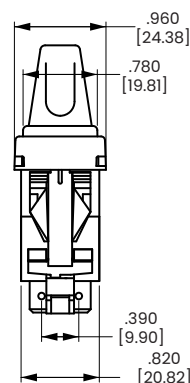
10 TERMINAL BASE  
W/O BARRIERS



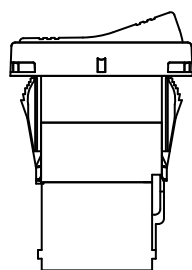
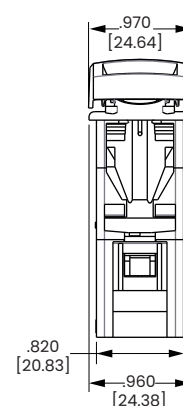
8 TERMINAL BASE  
W/BARRIERS



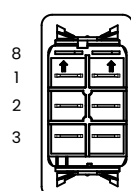
10 TERMINAL BASE  
W/O BARRIERS



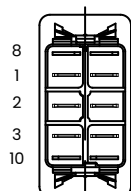
10 TERMINAL BASE  
W/O BARRIERS



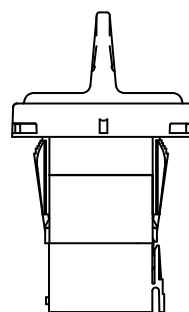
SWITCH SHOWN WITH  
VCH CONNECTOR  
8 TERMINAL



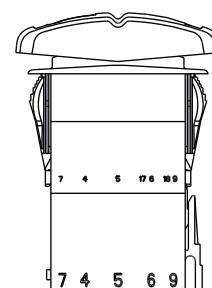
BOTTOM WITH TERMINAL  
ARRANGEMENT  
8 TERMINAL BASE



BOTTOM WITH TERMINAL  
ARRANGEMENT  
10 TERMINAL BASE



SWITCHES SHOWN WITH  
VC1 CONNECTOR  
10 TERMINAL



# Circuit Diagrams:

| CIRCUIT CODE | CIRCUIT DIAGRAM |
|--------------|-----------------|
| 1            |                 |
| 2            |                 |
| 3            |                 |
| 4            |                 |
| 5            |                 |
| 6            |                 |
| 7            |                 |
| 8            |                 |

| CIRCUIT CODE | CIRCUIT DIAGRAM |
|--------------|-----------------|
| A            |                 |
| B            |                 |
| C            |                 |
| D            |                 |
| E            |                 |
| F            |                 |
| G            |                 |
| H            |                 |

| CIRCUIT CODE | CIRCUIT DIAGRAM |
|--------------|-----------------|
| J            |                 |
| K            |                 |
| L            |                 |
| M            |                 |
| R            |                 |
| S            |                 |

| SYMBOL LEGEND |                                                 |
|---------------|-------------------------------------------------|
| SYM.          | DEFINITION                                      |
| ○             | DESIGNATES TERMINALS AND CONTACTS               |
| —○—           | DESIGNATES MAINTAINED CIRCUITS                  |
| - - -         | DESIGNATES OTHER POSITION                       |
| ○—○           | DESIGNATES MOMENTARY CIRCUITS                   |
| —○—○—         | DESIGNATES TWO POSITION CONNECTION              |
| —○—           | DESIGNATES EXTERNAL JUMPER PROVIDED BY CUSTOMER |

# Lamp Circuit Diagrams:

| LAMP CIRCUIT CODE | CIRCUIT DIAGRAM | LAMP CIRCUIT CODE | CIRCUIT DIAGRAM | LAMP CIRCUIT CODE | CIRCUIT DIAGRAM | LAMP CIRCUIT CODE | CIRCUIT DIAGRAM |
|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|
| A / 1             |                 | F / 6             |                 | L / 9             |                 | SPECIAL #1        |                 |
| B / 2             |                 | G / 7             |                 | M / R             |                 | SPECIAL #3        |                 |
| C / 3             |                 | H / Z             |                 | N / T             |                 | SPECIAL #4        |                 |
| D / 4             |                 | J / 8             |                 | P / V             |                 |                   |                 |
| E / 5             |                 | K / W             |                 | U / Y             |                 |                   |                 |

## J-Series Hazard Warning Circuit Diagrams:

| CIRCUIT CODE | CIRCUIT DIAGRAM | CIRCUIT CODE | CIRCUIT DIAGRAM |
|--------------|-----------------|--------------|-----------------|
| J1           |                 | J5           |                 |
| J2           |                 | JA           |                 |
| J3           |                 | JJ           |                 |
| J4           |                 | JK           |                 |

NOTE:  
J circuits are available for all  
non-locking V-Series styles.  
Consult factory for partnumber details.

| SYMBOL LEGEND |                                   |
|---------------|-----------------------------------|
| SYM.          | DEFINITION                        |
| ○             | DESIGNATES TERMINALS AND CONTACTS |
| ○             | DESIGNATES LAMP LOCATION          |

# Stand-Alone Components

**Reduce inventory levels and cost by stocking actuators and base switches separately.**

**Contura II, III, IV, V, VI, VII, X, XI, XII, XIV Base switches separately:** specify V with code selections 2-8 in the ordering schemes.

**Contura II, III, IV, V Actuator only:** VV with code A or C for selection 9, & with selections 10-14 in the ordering schemes.

**Contura VI Actuator with lenses and inserts only:** VT with code selections 9-16

**Contura II, III, IV, V, VII Actuator only:** VV with code A, C, E, G, P or Z for selection 9 & with selections 10-14 in the ordering schemes.

**Contura X, XI, XII, XIV actuators with lenses separately:** VV with code selections 9-14 in the ordering schemes.

Panel Seal: VPS

## Contura X & XI actuators without lenses separately

VVR 6 1 00 1

1 2 3 4 5

### 1. CONTURA X & XI ACTUATOR SEPARATELY

VVR

### 2. ACTUATOR STYLE & COLOR

|            | Black | Gray | White | Red |
|------------|-------|------|-------|-----|
| Contura X  | 1     | 2    | 3     | 4   |
| Contura XI | 6     | 7    | 8     | 9   |

### 3. LENS OPENING FOR 1

|   |                 |   |                                                               |
|---|-----------------|---|---------------------------------------------------------------|
| 1 | One bar lens    |   |                                                               |
| 2 | Two bar lenses  |   |                                                               |
| 3 | One square lens | 5 | square lens on top/<br>bar lens on bottom<br>(Contura X only) |
| 4 | Two square lens |   |                                                               |

### 4. ACTUATOR LENS OR BODY LEGEND

00 - No Legend this location

|    |     |    |     |    |   |    |   |
|----|-----|----|-----|----|---|----|---|
| 11 | ON  | 12 | OFF | 13 | I | 14 | O |
|    |     |    |     |    |   |    |   |
|    | OFF |    | ON  |    | O |    | I |
| 15 | O   | 16 | O   | 17 | O | 18 | I |
|    | F   |    | N   |    | F |    |   |

For additional legend options & code, visit us at [www.carlingtech.com](http://www.carlingtech.com)

### 5. LEGEND ORIENTATION 1

|   |               |  |  |  |  |
|---|---------------|--|--|--|--|
| 0 | No legend     |  |  |  |  |
| 1 | Orientation 1 |  |  |  |  |
| 2 | Orientation 2 |  |  |  |  |
| 3 | Orientation 3 |  |  |  |  |
| 4 | Orientation 4 |  |  |  |  |

## Contura X, XI & XII top piece of 2-piece lens separately

VVT 1

1 2

### 1 TOP OF LENS SEPARATELY

VVT

### 2 COLOR

1 Clear 2 Smoke 3 White

## Contura X, XI & XII actuator lens assembly:



1 piece lens/bar lens are positioned the same as bottom lens for assembly, minus the top lens. Lenses snap in from bottom.

Notes:

- 1 If actuator lens opening for 2 bar or 2 square lenses, legend orientation 0, 1, or 2 must be chosen.
- 2 Center of actuator marking not available for Contura XII.
- 3 Legend is not available for bar style lens.
- 4 Not recommended with neon lamps.
- 5 Must also order top piece of 2 piece square lens separately.

## Contura XII actuators without lenses separately

VVP J 1 Z 21 1 00

1 2 3 4 5 6 7

### 1 CONTURA XII ACTUATOR SEPARATELY

VVP

### 2. ACTUATOR STYLE & COLOR

J Black K Gray N White M Red

### 3,4 LENS OPENING FOR 1

Z No lens 1 Bar lens 2 Square lens

### 5, 7 LENS OR BODY LEGEND 2

|    |             |    |     |    |    |    |   |    |   |
|----|-------------|----|-----|----|----|----|---|----|---|
| 00 | - No Legend | 21 | OFF | 22 | ON | 23 | O | 24 | I |
|    |             |    |     |    |    |    |   |    |   |
|    |             |    |     |    |    |    |   |    |   |
|    |             |    |     |    |    |    |   |    |   |
|    |             |    |     |    |    |    |   |    |   |

For additional legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com)

### 6 LEGEND ORIENTATION 3

|   |               |  |  |
|---|---------------|--|--|
| 0 | No legend     |  |  |
| 1 | Orientation 1 |  |  |
| 2 | Orientation 2 |  |  |

## Contura X, XI & XII actuator lens assembly separately

VVL 2 1 00 0

1 2 3 4 5

### 1 CONTURA X, XI & XII LENS SEPARATELY

VVL

### 2 LENS STYLE 3

1 Bar lens  
2 One Piece Square lens  
3 Bottom of Two-Piece Square lens<sup>5</sup>

### 3 TRANSLUCENT LENS COLOR

1 Clear 2 White 3 Amber 4 Green<sup>4</sup> 5 Red 6 Blue<sup>4</sup>

### 4 LENS OR BODY LEGEND 2

|    |             |    |     |    |    |    |   |    |   |
|----|-------------|----|-----|----|----|----|---|----|---|
| 00 | - No Legend | 21 | OFF | 22 | ON | 23 | O | 24 | I |
|    |             |    |     |    |    |    |   |    |   |
|    |             |    |     |    |    |    |   |    |   |
|    |             |    |     |    |    |    |   |    |   |
|    |             |    |     |    |    |    |   |    |   |

For additional legend options & codes, visit us at [www.carlingtech.com](http://www.carlingtech.com)

### 5 LEGEND ORIENTATION 3

|   |               |  |  |  |  |
|---|---------------|--|--|--|--|
| 0 | No legend     |  |  |  |  |
| 1 | Orientation 1 |  |  |  |  |
| 2 | Orientation 2 |  |  |  |  |
| 3 | Orientation 3 |  |  |  |  |
| 4 | Orientation 4 |  |  |  |  |

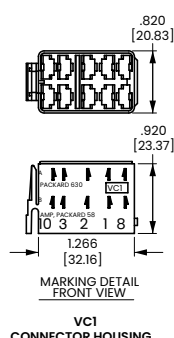
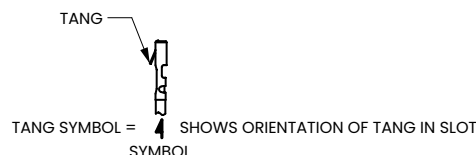
# Accessories

Easily integrate Contura products into your system, with Contura Accessories

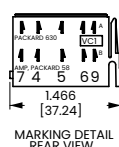
## Contura Connectors

| Q.C. SELECTION GUIDE          |             |                  |            |                       |             |
|-------------------------------|-------------|------------------|------------|-----------------------|-------------|
| COMPANY SERIES                | PART NO     |                  | WIRE RANGE |                       | ORIENTATION |
|                               | PLAIN BRASS | TIN PLATED BRASS | AWG        | MM <sup>2</sup> (REF) |             |
| PACKARD 58 SERIES             | 02965580    |                  | 12         | 3.0                   | B           |
|                               | 02965471    | 12010601         | (2)16-14   | (2)1.0-2.0            |             |
|                               | 02965470    |                  | 16-14      | 1.0-2.0               |             |
|                               | 02965469    | 06288318         | 20-18      | .5-.8                 |             |
| PACKARD METRI-PACK 630 SERIES |             | 12084590         | 105.0      |                       | A           |
|                               |             | 12052224         | 123.0      |                       |             |
|                               |             | 12015870         | 16-14      | 1.0-2.0               |             |
|                               |             | 12020035         | (2)22-18   | (2).5-.8              |             |
|                               | 12015832    | 12015869         | 20-18      | .5-.8                 |             |
|                               |             | 12052222         | 20-22      | .35-.5                |             |
| AMP 250 SERIES FASTIN-FASTON  | 60253-1     | 60253-2          | 16-12      | 1.3-3                 | B           |
|                               | 42100-1     | 42100-2          | 18-14      | .8-2                  |             |
|                               | 60295-1     | 60295-2          | 22-18      | .3-.9                 |             |
|                               |             |                  |            |                       |             |

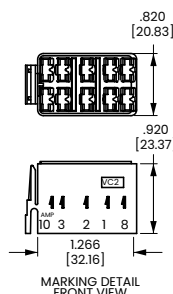
**NOTE:** Consult Delphi Packard and/or Amp on actual part numbers and availability.  
AMP is a registered trademark of AMP Inc. Harrisburg, PA  
Delphi Packard is a registered trademark of Delphi-Packard Electrical Systems Warr



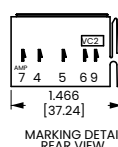
VC1  
CONNECTOR HOUSING



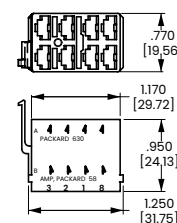
MARKING DETAIL  
REAR VIEW



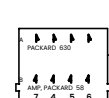
VC2  
CONNECTOR HOUSING  
(For AMP terminals only)



MARKING DETAIL  
REAR VIEW

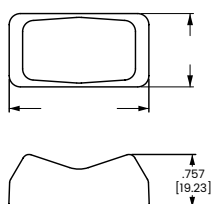


VCH  
CONNECTOR HOUSING

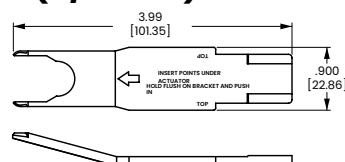


MARKING DETAIL  
REAR VIEW

## Contura X Boot (P/N VB1-01)



## Contura II, III, IV, V, VI & VII Actuator Removal Tool (P/N VRT)



## Additional V-Series Ratings

- 1 .4VA @ 28VDC Resistive
- 4 10A 250VAC 1/2 HP, 15A 125 VAC 1/2 HP, No Agency Listings
- 5<sup>1</sup> 10A 250VAC 1/2 HP, 15A 125 VAC 1/2 HP, UL Recognized, CSA Certified
- B 15A 24V
- C 20A 18V
- D 20A 12V
- E 20A 14V, 10A 14VT (circuits 1, 4, A, & D only)
- F 10A 14V, 6A, 14VT (circuit G only)
- G 20A 6V
- H 20A 3V
- L<sup>2</sup> 15A 125 VAC, 10A 250VAC, 1/2 HP 125-250 VAC; 6A 125 VAC L
- M .4VA/20A 12V (combi-contact)  
(combination gold/silver contacts for borderline dry circuit applications)
- N .4VA/15A 24V (combi-contact)  
(combination gold/silver contacts for borderline dry circuit applications)

### NOTES

Consult factory to determine availability for individual circuits and their HP rating.

1. Not available with Contura 7 or 14 rocker styles.
2. Rating L available with circuits 1, 4, A & D only.

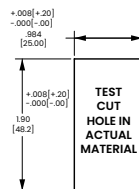
# Accessories

## Contura Mounting Panels Dimensional Specifications: in. [mm]

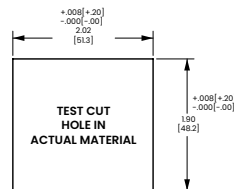
**MOUNTING PANEL**  
For additional units, add 1.03 [26.2] per unit. For more than 2 V-Series Switches, add middle section. Available in panel Thicknesses listed below. Consult factory.

### MOUNTING PANEL THICKNESS

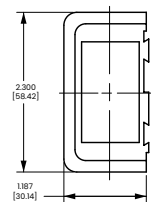
|        |        |
|--------|--------|
| .062   | .187   |
| [1.57] | [4.75] |
| .093   | .250   |
| [2.36] | [6.35] |
| .125   | .375   |
| [3.17] | [9.52] |



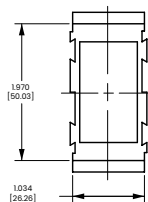
**VMS MOUNTING PANEL HOLE**



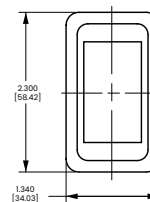
**MOUNTING PANEL OPENING (2) UNITS**



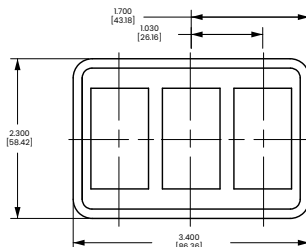
**VME MOUNTING PANEL END**



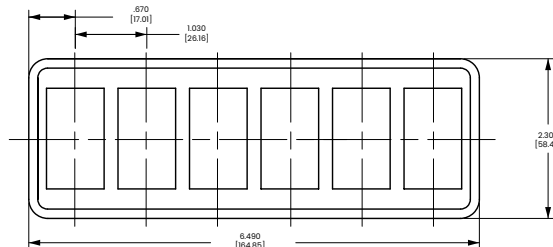
**VMM MOUNTING PANEL MIDDLE**



**VMS MOUNTING PANEL**



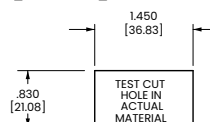
**VM3 MOUNTING PANEL**



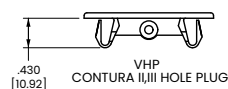
**VM6 MOUNTING PANEL**



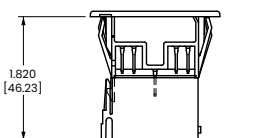
## Contura Hole Plug Dimensional Specifications: in. [mm]



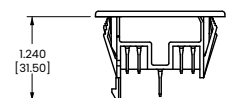
**VHP CONTURA II, III HOLE PLUG**



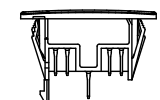
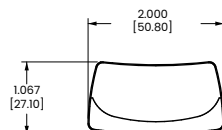
**VHP CONTURA II, III HOLE PLUG**



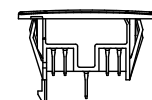
**VH1 STANDARD HOLE PLUG (No wing serrations) (With VC1 connector attached)**



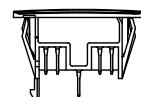
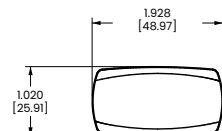
**VH2 STANDARD HOLE PLUG (With wing serrations)**



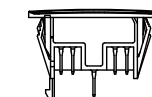
**VH3 CONTURA IV HOLE PLUG (No wing serrations)**



**VH4 CONTURA IV HOLE PLUG (With wing serrations)**



**VH5 CONTURA V HOLE PLUG (No wing serrations)**



**VH6 CONTURA V HOLE PLUG (With wing serrations)**



**DETAIL VIEW VH1, VH3 & VH5 HOLE PLUGS (No wing serrations for ease of removal)**



**DETAIL VIEW VH2, VH4 & VH6 HOLE PLUGS (With wing serrations)**



# VP-Series

Illuminated Indicators

**PRODUCT WEBPAGE**

*request sample, configure part*



The VP-Series illuminated plug offers an additional design option for the modular and flexible V-Series Contura® system. It is offered with removable and replaceable lamps, Contura styling, and LED illumination with your choice of one or two lenses.

**1-2**  
LED's

**125-250**  
VAC

**12-24**  
VDC

## Typical Applications

- On/Off-Highway

# Ordering Scheme

Flush Housing

Sample Part Number **VP 1 6 6 - B 1 1 6 6 - 00 0 00**

Selection 1 2 3 4 5 6 7 8 9 10 11 12

## 1. SERIES

**VP** Illuminated plug for V and J Mounting Hole  
**H2** Housing only  
**H3** Lamp module only

## 2. TERMINATION

**1** .250 TAB (QC)

## 3, 4. LAMP 4

|              |                 |                 |              |              |              |  |
|--------------|-----------------|-----------------|--------------|--------------|--------------|--|
| No lamp      | <b>0</b>        |                 |              |              |              |  |
| Neon         | <b>1</b> 125VAC | <b>2</b> 250VAC |              |              |              |  |
| Incandescent | <b>4</b> 3V     | <b>5</b> 6V     | <b>6</b> 12V | <b>7</b> 18V | <b>8</b> 24V |  |
| LED*         | Amber           | Green           | Red          |              |              |  |
| 2VDC         | <b>L</b>        | <b>F</b>        | <b>R</b>     |              |              |  |
| 6VDC         | <b>M</b>        | <b>G</b>        | <b>S</b>     |              |              |  |
| 12VDC        | <b>N</b>        | <b>H</b>        | <b>T</b>     |              |              |  |
| 24VDC        | <b>P</b>        | <b>J</b>        | <b>V</b>     |              |              |  |

\*Typical current draw for LED is 20ma.

## 5. FLUSH HOUSING COLOR / STYLE

**B** Black / Rectangular  
**W** White / Rectangular  
**R** Red / Rectangular  
**G** Gray / Rectangular  
**1** Black / Oval (Contura V)

## 6, 7. LENS STYLE 5

**Z** No Lens  
**1** Transparent Diamond Square  
**2** Translucent Square 9  
**3** Laser Etched 10  
**4** Transparent Oval  
**5** Translucent Oval  
**6** Laser Etched Oval 10

## 8, 9. LENS COLOR 6,11

|              |              |              |              |            |             |                                         |
|--------------|--------------|--------------|--------------|------------|-------------|-----------------------------------------|
| <b>Z</b>     | No Lens      |              |              |            |             |                                         |
| <b>Clear</b> | <b>White</b> | <b>Amber</b> | <b>Green</b> | <b>Red</b> | <b>Blue</b> | <b>One piece lens</b>                   |
| <b>4</b>     | <b>9</b>     | <b>E</b>     | <b>K</b>     | <b>R</b>   | <b>W</b>    | <b>Two piece lens*</b>                  |
| <b>5</b>     | <b>A</b>     | <b>F</b>     | <b>L</b>     | <b>S</b>   | <b>Y</b>    | <b>(with clear top protective lens)</b> |
| <b>2</b>     | <b>7</b>     | <b>C</b>     | <b>H</b>     | <b>N</b>   | <b>U</b>    | <b>(with smoke top protective lens)</b> |
| <b>1</b>     | <b>6</b>     | <b>B</b>     | <b>G</b>     | <b>M</b>   | <b>T</b>    | <b>(with white top protective lens)</b> |

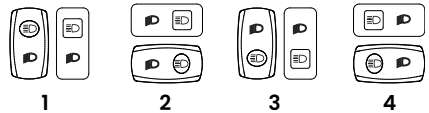
\*All bottom lenses are molded of opaque material.  
 Consult factory for other lens colors.

## 10. LENS LEGEND OVER LAMP 1 7

**00** No legend  
 For standard legends, see "Standard Legend Codes" page.  
 For additional legends, please consult factory

## 11. LEGEND ORIENTATION

**0** No legend  
**1** Orientation 1  
**2** Orientation 2  
**3** Orientation 3  
**4** Orientation 4



## 12. LENS LEGEND OVER LAMP 2 7

**00** No legend  
 For standard legends, see "Standard Legend Codes" page.  
 For additional legends, please consult factory

### Notes:

- To order housing only, specify H2 followed by fields 5-11.
- To order lamp module only, specify H3 followed by fields 2-3.
- To order connector housing specify HPI-01 (black).
- Field 3 specifies lamp 1 is located over terminals 1A & 1B.  
Field 4 specifies lamp 2 is located over terminals 2A & 2B.
- Field 6 specifies lens 1 is located over terminals 1A & 1B.  
Field 7 specifies lens 2 is located over terminals 2A & 2B.
- Field 8 specifies lens 1 is located over terminals 1A & 1B.  
Field 9 specifies lens 2 is located over terminals 2A & 2B.
- Field 10 specifies legend is over lens 1.  
Field 12 specifies legend is over lens 2.
- If only one lens is chosen, it will be located over terminals 1A & 1B.
- Translucent lens is available with two piece lens option only.
- Laser etched option is available with one piece lens.
- Oval lens option is available as one piece lens.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)



# Ordering Scheme

Raised Bracket

Sample Part Number **VP 1 6 6 - 6 1 1 6 6 - 00 0 00**

Selection 1 2 3 4 5 6 7 8 9 10 11 12

## 1. SERIES

**VP** Illuminated plug for V and J Mounting Hole

## 2. TERMINATION

- 1 .250 TAB (QC)
- 2 Solder Lug

## 3, 4. LAMP 1

|              |          |          |       |       |       |
|--------------|----------|----------|-------|-------|-------|
| No lamp      | 0        |          |       |       |       |
| Neon         | 1 125VAC | 2 250VAC |       |       |       |
| Incandescent | 4 3V     | 5 6V     | 6 12V | 7 18V | 8 24V |
| LED*         | Amber    | Green    | Red   |       |       |
| 2VDC         | L        | F        | R     |       |       |
| 6VDC         | M        | G        | S     |       |       |
| 12VDC        | N        | H        | T     |       |       |
| 24VDC        | P        | J        | V     |       |       |

\*Typical current draw for LED is 20ma.

## 5. RAISED BRACKET / INSERT COLOR

- 5 White / White
- 6 Black / Black
- 7 White / Black
- 8 Black / White

## 6, 7. LENS STYLE 2

- Z No Lens
- 1 Transparent Diamond Square
- 2 Translucent Square 6
- 3 Laser Etched 7

## 8, 9. LENS COLOR 3

|       |         |       |       |     |      |                                  |
|-------|---------|-------|-------|-----|------|----------------------------------|
| Z     | No Lens |       |       |     |      |                                  |
| Clear | White   | Amber | Green | Red | Blue | Lens Style                       |
| 4     | 9       | E     | K     | R   | W    | One piece lens                   |
| 5     | A       | F     | L     | S   | Y    | Two piece lens*                  |
|       |         |       |       |     |      | (with clear top protective lens) |
| 2     | 7       | C     | H     | N   | U    | Two piece lens*                  |
|       |         |       |       |     |      | (with smoke top protective lens) |
| 1     | 6       | B     | G     | M   | T    | Two piece lens*                  |
|       |         |       |       |     |      | (with white top protective lens) |

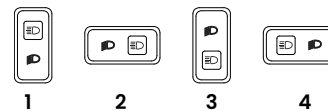
\*All bottom lenses are molded of opaque material.  
Consult factory for other lens colors.

## 10 LENS LEGEND OVER LAMP 1 4

00 No legend  
For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

## 11 LENS ORIENTATION

- 0 No legend
- 1 Orientation 1
- 2 Orientation 2
- 3 Orientation 3
- 4 Orientation 4



## 12 LENS LEGEND OVER LAMP 2 4

00 No legend  
For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

### Notes:

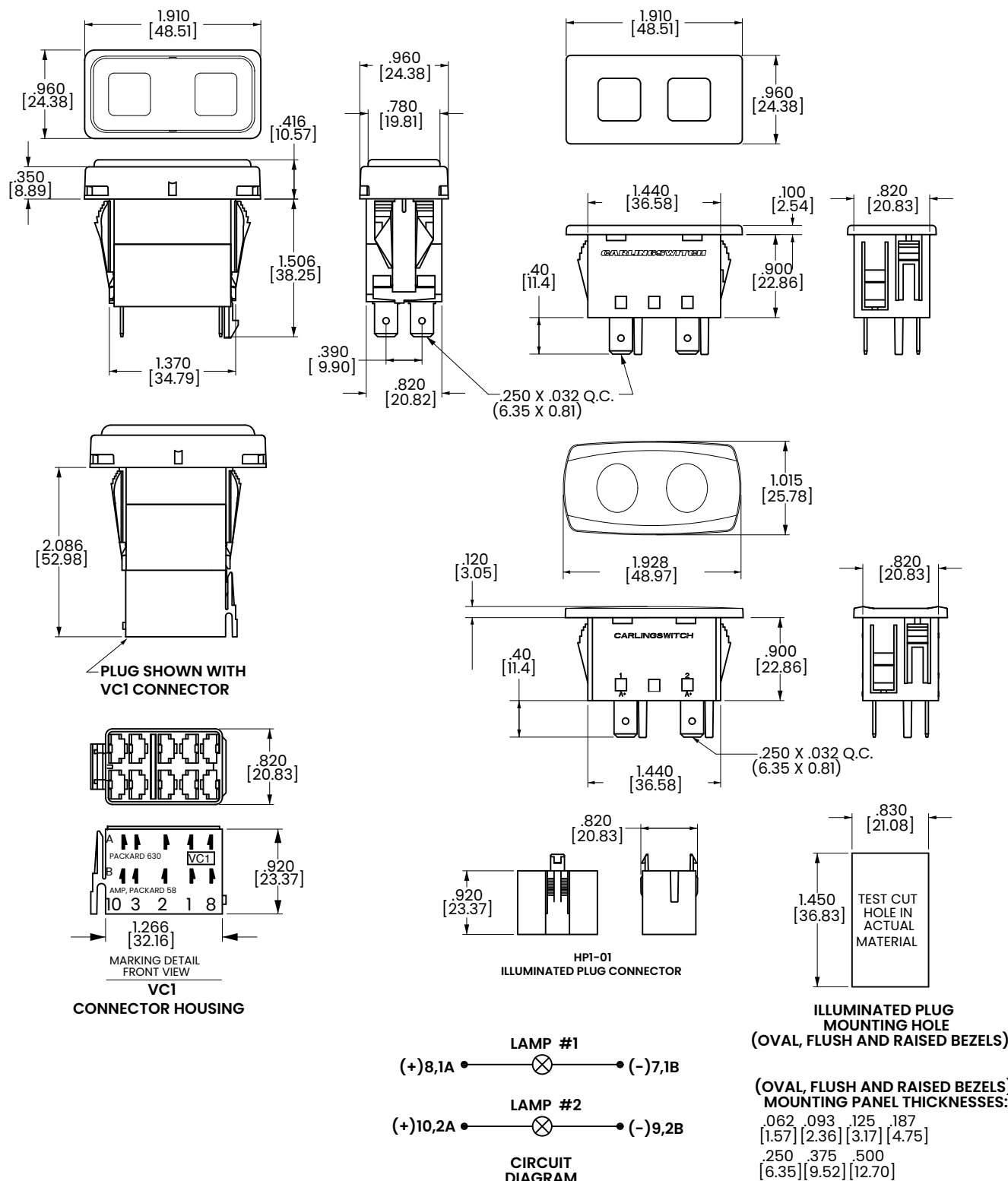
- 1 Field 3 specifies lamp 1 is located over terminals 8 (+) & 7 (-).
- Field 4 specifies lamp 2 is located over terminals 10 (+) & 9 (-).
- 2 Field 6 specifies lens 1 is located over terminals 8 (+) & 7 (-).
- Field 7 specifies lens 2 is located over terminals 10 (+) & 9 (-).
- 3 Field 8 specifies lens 1 is located over terminals 8 (+) & 7 (-).
- Field 9 specifies lens 2 is located over terminals 10 (+) & 9 (-).
- 4 Field 10 specifies legend is over lens 1.
- Field 12 specifies legend is over lens 2.
- 5 If only one lens is chosen, it will be located over terminals 8 (+) & 7 (-).
- 6 Translucent lens is available with two piece lens option only.
- 7 Laser etched option is available with one piece lens.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



Notes:  
Oval and flush bezel styles use terminals 1A, 1B, 2A, 2B. Raised bezel style uses terminals 7, 8, 9, 10.



**Littelfuse®**



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# W-Series

Sealed Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The W-Series features complete IP68 protection, even below the panel, where the critical connection is made from your wiring harness. When used in conjunction with the integrated connector, the totally submersible W-Series provides a seal for up to ten individual wires, assuring compatibility with even the most complex circuitry.

**1-2**

Poles

**.4-10**

Amps

**12-24**

VDC

**IP68 Sealing**

Above/Below-Panel

## Typical Applications

- Marine
- On/Off-Highway

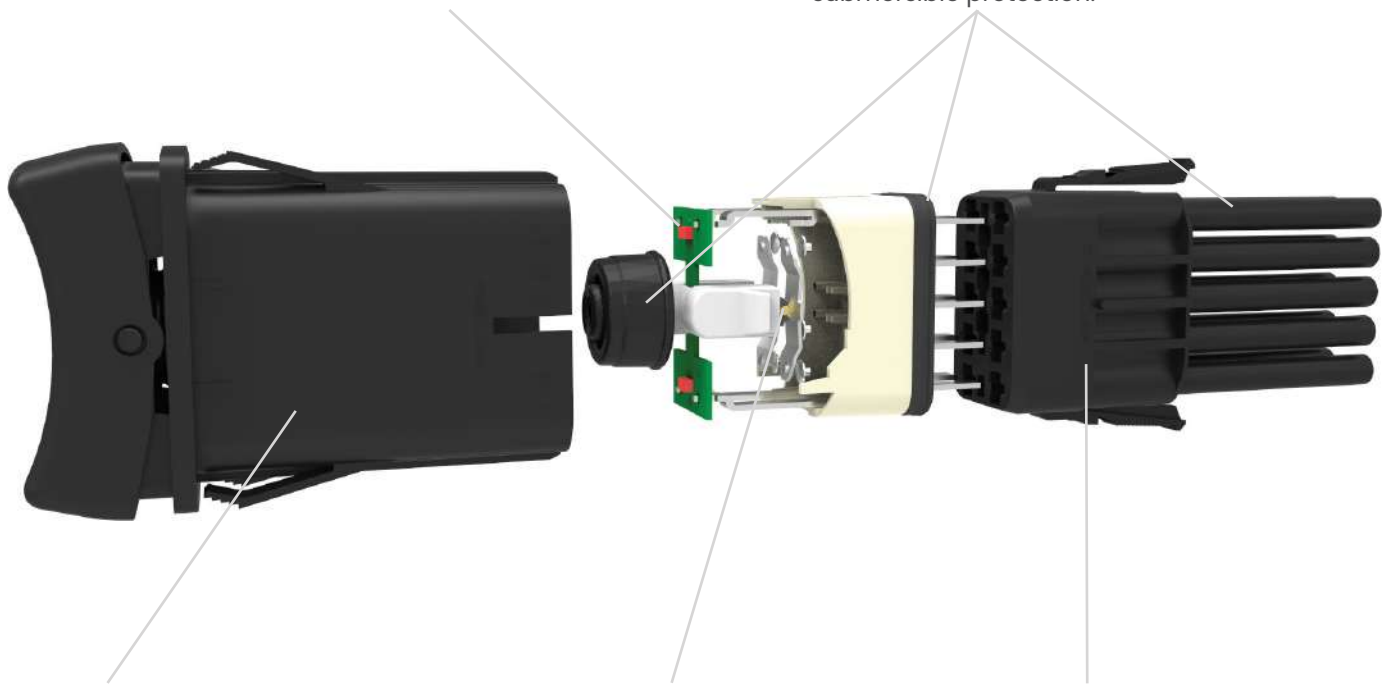
# Design Features

## ILLUMINATION

Choice of highly reliable SMT LED or incandescent lighting with 21 dependent or independent circuit options.

## TRI-SEAL DESIGN

Sealing at actuator, an insert molded neoprene base seal, along with wire lead seals, assures water tight, fully submersible protection.



## BODY

One piece polyester 94V0 seamless body acts as an umbrella to protect critical internal components.

## ROLLER PIN

Proven reliable mechanism is lubricant free and allows for 100k electrical and 250k mechanical cycles, and withstands extreme temperatures from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ .

## INTEGRATED CONNECTOR

Accommodates Tyco/Amp .110 junior power timer contacts with twin locking tabs to provide a safe, secure, sealed connection.

# Tech Specs

## Electrical

|                            |                                                  |
|----------------------------|--------------------------------------------------|
| Contact Rating             | .4VA @ 24VDC<br>10 amps, 3-24VDC                 |
| Dielectric Strength        | 1500 Volts RMS                                   |
| Insulation Resistance      | 50 Megohms                                       |
| Initial Contact Resistance | 10 milliohms max. @ 4VDC                         |
| Life                       | Up to 100,000 cycles, circuit and load dependent |
| Contacts                   | Silver tin-oxide, 88/12                          |
| Terminals                  | Copper with silver or gold plating               |
| Quick                      | Connect terminations.                            |
| Voltage                    | 3-24 VDC                                         |
| Overcurrent                | 15A for 50 cycles                                |

## Physical

|           |                                                                                                                    |
|-----------|--------------------------------------------------------------------------------------------------------------------|
| Lighted   | LED - rated 100,000 hours 1/2 life<br>(LED is internally ballasted for voltages to 24 VDC)                         |
| Seals     | Neoprene                                                                                                           |
| Base      | Polyester blend rated to 125C with a UL flammability rating of 94V0.                                               |
| Actuator  | Basic actuator structure molded of thermoplastic polycarbonate with a hard Nylon 66 thermoplastic surface overlay. |
| Lens      | Polycarbonate rated at 100°C                                                                                       |
| Function  | 2 & 3 Position Rocker Style                                                                                        |
| Operation | Maintained & Momentary                                                                                             |
| Base      | PA 6/6 30GF (glass filled)                                                                                         |
| Actuator  | PA 6/6 13GF                                                                                                        |
| Bracket   | PBT 10GF                                                                                                           |
| Connector | PBT 10GF, polarized                                                                                                |

## Actuator Travel (Angular Displacement)

24° full throw

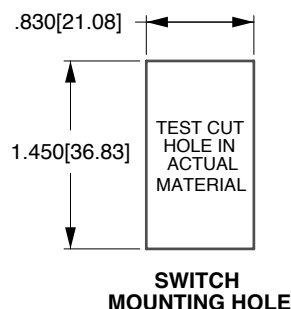
## Environmental

|                               |                                                                                                                                                                                                      |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sealing                       | IP68, for above and below-panel components of actual switch only                                                                                                                                     |
| Corrosion/ Chemical Splash    | Flowing Mixed Gas (FMG)<br>Class III 3 year accelerated exposure per ASTM B-827, B-84                                                                                                                |
| Operating Temperature         | -40°C to +85°C, 22 cycles, 300 hours                                                                                                                                                                 |
| Vibration 1                   | Per Mil-Std 202F, Method 204D<br>Test Condition A 0.06 DA or 10G's 10-500 Hz.                                                                                                                        |
| Vibration 2                   | Resonance search<br>24-50 Hz 0.40 DA<br>50-2000 ±10 G's peak<br>Results Horizontal Axis 3-5 G's max<br>Random<br>24 Hz 0.06 PSD-Gsq/Hz<br>60 Hz 0.50<br>100 Hz 0.50<br>200 Hz 0.025<br>2000 Hz 0.025 |
| Handling/Drop                 | One meter onto concrete floor                                                                                                                                                                        |
| Salt Spray                    | Per Mil-Std 202F, Method 101D, Test Condition A, 48 Hrs.                                                                                                                                             |
| Dust                          | IP6X                                                                                                                                                                                                 |
| Thermal Shock                 | Per Mil-Std 202F, Method 107F, Test Condition A, -55°C to 85°C<br>Test criteria - pre and post test contact resistance                                                                               |
| Moisture Resistance/ Humidity | Per Mil-Std 202F, Method 106F, Test Criteria - pre and post test contact resistance                                                                                                                  |

## Mounting Specifications

Panel Thickness Range .032 to .125

For optimum panel fit, the following panel thicknesses are suggested: .032, .062, .093, .125



# Ordering Scheme Rocker

Sample  
Part Number

W 11 D 2 B C 0 1 - A 7 Z 00 - 0 00

Selection

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

14.

## 1. SERIES

W

## 2. CIRCUIT

( ) - momentary For terminal arrangement, see dimensional specs

| Position: | 1  | 2                | 3                   |
|-----------|----|------------------|---------------------|
| SP        | DP | 2 & 3, 5 & 6     | Connected Terminals |
| 11        | 21 | ON               | NONE                |
| 12        | 22 | (ON)             | NONE                |
| 13        | 23 | ON               | NONE                |
| 14        | 24 | ON               | NONE                |
| 15        | 25 | ON               | NONE                |
| 16        | 26 | ON               | OFF                 |
| 17        | 27 | ON               | OFF                 |
| 18        | 28 | (ON)             | OFF                 |
| -         | 47 | 2 & 3 & 4, 5 & 6 | 2 & 3, 4 & 5        |
| -         | 49 | 2 & 3, 5 & 6     | 2 & 3, 4 & 5        |

## 3. RATING

3

B 10A 24V D 10A 12V G 10A 6V H 10A 3V

## 4. TERMINATION / BASE STYLE

2 .110 TAB (QC)

## 5. ILLUMINATION

Lamp #1: above terminals 1&4 end of switch; Lamp #2 above terminals 3&6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

|   | Lamps   | Actuator Lens Position<br>Illumination Type | Lamp Wired to Terminals |
|---|---------|---------------------------------------------|-------------------------|
| O | NONE    |                                             |                         |
| A | #1      | Independent                                 | 8+ 7-                   |
| B | #1      | Down                                        | 3+ 7-                   |
| C | #2      | Up                                          | 3+ 7-                   |
| D | #1      | Down                                        | 3+ 7-                   |
| E | #2      | Down                                        | 1+ 7-                   |
| F | #1      | Up                                          | 1+ 7-                   |
| G | #2      | Up                                          | 3+ 7-                   |
| H | #1      | Independent                                 | 8+ 7-                   |
| I | #2      | Up                                          | 3+ 7-                   |
| J | #1      | Independent                                 | 8+ 7-                   |
| K | #2      | Up                                          | 3+ 7-                   |
| L | #1      | Independent                                 | 8+ 7-                   |
| M | #2      | Up                                          | 3+ 7-                   |
| N | #1      | Down                                        | 3+ 6-                   |
| O | #2      | Down                                        | 1+ 4-                   |
| P | #1      | Up                                          | 1+ 4-                   |
| Q | #2      | Up                                          | 3+ 6-                   |
| R | #1      | Down                                        | 3+ 7-                   |
| S | #2      | Up                                          | 6+ 7-                   |
| T | #1      | Down                                        | 6+ 7-                   |
| U | #2      | Independent                                 | 8+ 7-                   |
| V | #1      | Independent                                 | 10+ 9-                  |
| W | #2      | Independent                                 | 10+ 9-                  |
| X | #1      | Independent                                 | 8+ 7-                   |
| Y | #2      | Independent                                 | 10+ 7-                  |
| Z | #1 & #2 | Independent in Series                       | 8+ 7-                   |
|   | #1 & #2 | Independent in Parallel                     | 8+ 7-                   |

## 6,7. LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 6: above terminals 1 & 4; Selection 7: above terminals 3 & 6

|          |   |       |       |       |
|----------|---|-------|-------|-------|
| No lamp  | 0 |       |       |       |
| LED* Red | A | Amber | Green | White |
| 2VDC     | L |       | L     | F     |
| 6VDC     | B |       | M     | G     |
| 12VDC    | C |       | N     | H     |
| 24VDC    | D |       | P     | J     |

\* Consult factory for "daylight bright", blue/green and white LED options.  
Typical current draw for LED is 20ma.

## 8. BRACKET COLOR

1 Black

## 9. ACTUATOR

3 Black with Laser Etched A Black

## 10. LENS COLOR / STYLE - ABOVE LAMP #1 TERMINALS 1 & 4 11. LENS COLOR / STYLE - ABOVE LAMP #2 TERMINALS 3 & 6

|             |       |       |       |     |      |                   |
|-------------|-------|-------|-------|-----|------|-------------------|
| Z - No Lens |       |       |       |     |      |                   |
| Clear       | White | Amber | Green | Red | Blue |                   |
| 1           | -     | B     | G     | M   | T    | Large Transparent |
| 2           | -     | C     | H     | N   | U    | Large Translucent |
| 3           | -     | D     | J     | P   | V    | Bar Transparent   |
| 4           | -     | E     | K     | R   | W    | Bar Translucent   |
| 5           | A     | -     | -     | -   | -    | Laser-Etched      |

Lens color for LEDs must be clear, white, or match color of LED.

## 12. ACTUATOR LENS OR BODY LEGENDS

00 - No Legend this location/No actuator

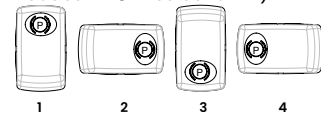
|    |     |    |     |    |   |    |   |
|----|-----|----|-----|----|---|----|---|
| 11 | ON  | 12 | OFF | 13 | I | 14 | O |
|    | OFF |    | ON  |    | O |    | I |
| 15 | O   | 16 | O   | 17 | O | 18 | I |
|    | F   |    | N   |    | F |    | N |
| 21 | OFF | 22 | ON  | 23 | O | 24 | I |
| 25 | O   | 26 | O   | 27 | O | 28 | I |
|    | F   |    | N   |    | F |    | N |

For additional legend options & codes, visit us at carlingtech.com

## 13. LEGENDS ORIENTATION

0 No legend (used with codes 11-18 in selection 12)

- 1 Orientation 1
- 2 Orientation 2
- 3 Orientation 3
- 4 Orientation 4



## 14. ACTUATOR LENS LEGENDS

00 No legend (used with codes 11-18 in selection 12) Selection 14 required when switch requires two legends. If the two legends consist of one lens & one body legend, lens legend must be specified in selection 12; body legend specified in selection 14. For standard legends, see "Standard Legend Codes" page. For additional legends, please consult factory

Notes:

- 1 Custom colors are available. Consult factory.
- 2 White imprinting is standard on black actuators; Black imprinting is standard on white, red & gray actuators; Custom colors are available, consult factory.
- 3 .4VA @ 24VDC rating is available, consult factory for circuit compatibility.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Ordering Scheme Locking Rocker

Sample  
Part Number

W 11 D 2 0 W 0 J - P 7 B 00 - 0

Selection 1 2 3 4 5 6 7 8 9 10 11 12 13

## 1. SERIES

W

## 2. CIRCUIT

( ) - momentary  
For terminal arrangement, see dimensional specifications

| Position: |    | 1            | 2                   | 3            |
|-----------|----|--------------|---------------------|--------------|
| SP        | DP | 2 & 3, 5 & 6 | Connected Terminals | 1 & 2, 4 & 5 |
| 11        | 21 | ON           | NONE                | OFF          |
| 14        | 24 | ON           | NONE                | ON           |

## 3. RATING

B 10A 24V  
D 10A 12V  
G 10A 6V  
H 10A 3V

## 4. TERMINATION / BASE STYLE

2 .110 TAB (QC)

## 5. ILLUMINATION

Lamp #1: above terminals 1&4 end of switch.; Lamp #2 above terminals 3&6 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only

|   | Lamps | Actuator Lens Position<br>Illumination Type | Lamp Wired to Terminals |    |
|---|-------|---------------------------------------------|-------------------------|----|
| O | NONE  |                                             |                         |    |
| C | # 2   | Up                                          | 3+                      | 7- |
| H | # 2   | Independent                                 | 8+                      | 7- |

## 6. LOCK

W Lock Option

## 7. LAMP #2

|         |     |       |       |       |
|---------|-----|-------|-------|-------|
| No lamp | 0   |       |       |       |
| LED*    | Red | Amber | Green | White |
| 2VDC    | A   | L     | F     | 4     |
| 6VDC    | B   | M     | G     | 5     |
| 12VDC   | C   | N     | H     | 6     |
| 24VDC   | D   | P     | J     | 8     |

\* Consult factory for "daylight bright", blue/green and white LED options. Typical current draw for LED is 20ma.

## 8. BRACKET COLOR <sup>1</sup>

J Black

## 9. ACTUATOR <sup>1</sup>

P Black  
R Red

## 10. LENS

| Z - No Lens | Clear | White | Amber | Green | Red | Blue |                   |
|-------------|-------|-------|-------|-------|-----|------|-------------------|
| 1           | -     | B     | G     | M     | T   |      | Large Transparent |
| -           | 7     | C     | H     | N     | U   |      | Large Translucent |
| 3           | -     | D     | J     | P     | V   |      | Bar Transparent   |
| -           | 9     | E     | K     | R     | W   |      | Bar Translucent   |

Lens color for LEDs must be clear, white, or match color of LED.

## 11. LOCK FUNCTION

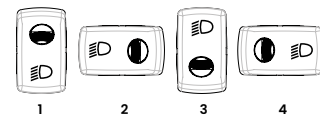
| Up | Down | Lock Color    |
|----|------|---------------|
| B  | J    | Black         |
| C  | K    | White         |
| D  | L    | Red           |
| E  | M    | Safety Orange |

## 12. LASER ETCHED, LENS OR BODY LEGEND <sup>1</sup>

00 No legend  
For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

## 13. LEGENDS ORIENTATION

- 0 No legend
- 1 Orientation 1
- 2 Orientation 2
- 3 Orientation 3
- 4 Orientation 4



Notes:

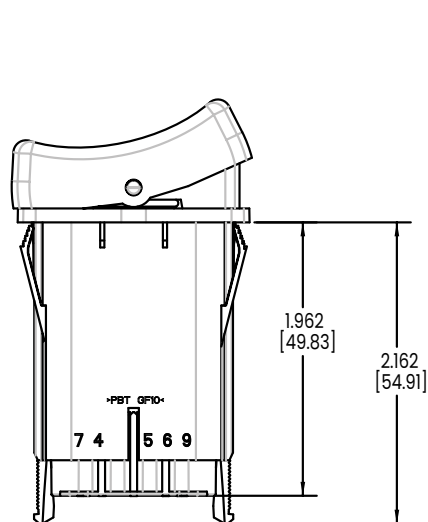
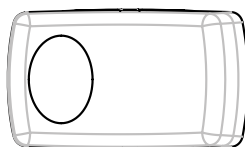
<sup>1</sup> White imprinting is standard on black actuators; Black imprinting is standard on white, red & gray actuators; Custom colors are available, consult factory.

[Configure Complete Part Number >](#)

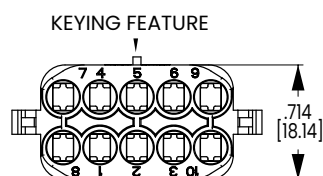
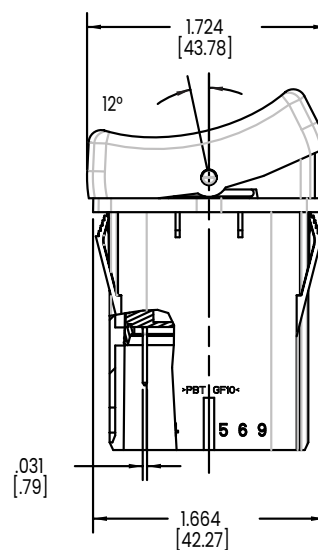
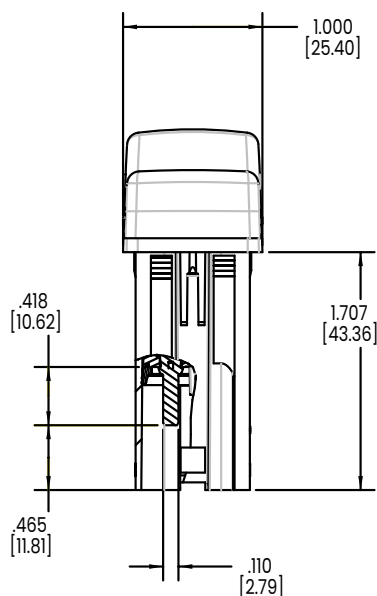
[Browse Standard Parts >](#)

# Dimensional Specs

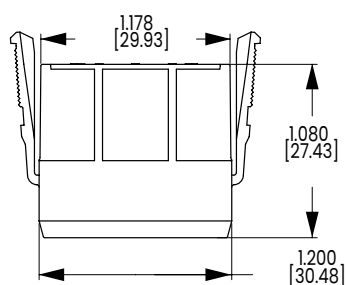
inches [millimeters]



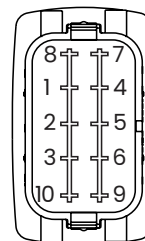
SWITCH SHOWN WITH  
CONNECTOR INSTALLED



WCH CONNECTOR  
(190-31214-001)



TERMINAL ARRANGMENT



Notes:  
WCH connector is intended for use with Tyco/Amp .110 Junior Power Timer, female contacts, and wire seals.  
For 14-16 awg wire, specify Tyco/Amp P/N 927766-3  
For 16-20 awg wire, specify Tyco/Amp P/N 927770-3  
Tyco/Amp cable seal P/N 828904-1 (20-18 awg wire) or P/N 828905-1 (16-14 awg wire) is required for each individual wire lead, and Tyco/Amp cable plug, P/N 828922-1, is required to seal each unused connector opening.  
Consult Tyco/Amp for the cable seal recommended for your specific wire gauge and thickness.



# Circuit Diagrams

| CIRCUIT CODE | CIRCUIT DIAGRAM | CIRCUIT CODE | CIRCUIT DIAGRAM |
|--------------|-----------------|--------------|-----------------|
| 11           |                 | 23           |                 |
| 12           |                 | 24           |                 |
| 13           |                 | 25           |                 |
| 14           |                 | 26           |                 |
| 15           |                 | 27           |                 |
| 16           |                 | 28           |                 |
| 17           |                 | 47           |                 |
| 18           |                 | 49           |                 |
| 21           |                 |              |                 |
| 22           |                 |              |                 |

# Lamp Circuit Diagrams

| LAMP CIRCUIT CODE | CIRCUIT DIAGRAM |
|-------------------|-----------------|
| A                 |                 |
| B                 |                 |
| C                 |                 |
| D                 |                 |
| E                 |                 |
| F                 |                 |
| G                 |                 |
| H                 |                 |

| LAMP CIRCUIT CODE | CIRCUIT DIAGRAM |
|-------------------|-----------------|
| J                 |                 |
| K                 |                 |
| L                 |                 |
| M                 |                 |
| N                 |                 |
| P                 |                 |
| R                 |                 |
| S                 |                 |

| LAMP CIRCUIT CODE | CIRCUIT DIAGRAM |
|-------------------|-----------------|
| U                 |                 |
| V                 |                 |
| W                 |                 |
| Y                 |                 |
| Z                 |                 |



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# L-Series

Sealed Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



The L-Series snap-in rocker switches offer countless unique options including choices for ratings, colors, illuminations and laser etched legends. These single or double pole switches feature a broad choice of actuator styles, colors, and lenses.

**1-2**

Poles

**.4-20**

Amps

**125-250**

VAC

**12-24**

VDC

## Typical Applications

- Construction
- Agriculture
- On-Highway

# Design Features

## LED LIGHTING

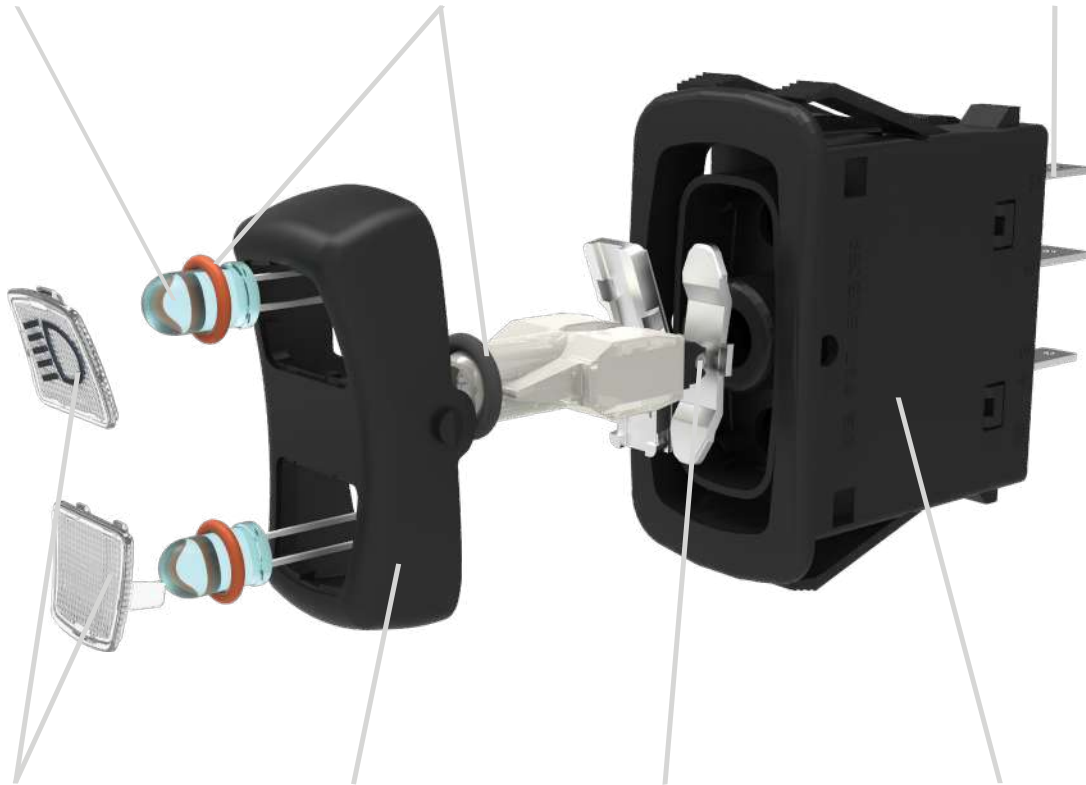
Utilize less current and are not affected by vibration, providing long lasting illumination. Available in 3 standard colors.

## SEAL PROTECTION

Locks out elements such as water, dust & debris. Sealed to IP67 for Above-Panel Components

## TERMINALS

Available with 2 industry standard termination options: .250 or .187 tabs with up to 12 terminal options.



## LENS & LEGENDS

Lens available in 2 sizes and 6 standard colors in either translucent or transparent materials. Numerous symbols and text available for imprinting or laser etching.

## ACTUATOR

Available in rocker or paddle styles. Several standard color options also available.

## ROLLER PIN

Eliminates need for lubricants, increasing the temperature range of the switch from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  [ $-40^{\circ}\text{F}$  to  $185^{\circ}\text{F}$ ].

## BASE

Fits into industry standard mounting hole of 1.734 x .867 in [44.0mm x 22.0mm].

# Tech Specs

## Electrical

|                            |                                                                                                            |
|----------------------------|------------------------------------------------------------------------------------------------------------|
| Contact Rating             | 4VA @ 24VDC (MAX) resistive<br>15 amps, 125VAC<br>10 amps, 250VAC<br>20 amps, 4-14VDC<br>15 amps, 15-28VDC |
| Dielectric Strength        | 1250 Volts RMS between pole to pole<br>3750 Volts RMS between live parts and accessible surfaces           |
| Insulation Resistance      | 50 Megohms                                                                                                 |
| Initial Contact Resistance | 10 milliohms max. @ 4 VDC                                                                                  |
| Life                       | Up to 100,000 cycles maintained,<br>50,000 cycles momentary circuit and load dependent                     |
| Contacts                   | 90/10 silver-nickel, silver tin-oxide, gold                                                                |
| Terminals                  | Brass or copper/silver plate<br>3/16" (4.76mm) & 1/4" (6.3mm)<br>Quick Connect terminations standard.      |

## Physical

|           |                                                                                                                                 |
|-----------|---------------------------------------------------------------------------------------------------------------------------------|
| Lighted   | Incandescent - rated 10,000 hours<br>LED - rated 100,000 hours 1/2 life<br>(LED is internally ballasted for voltages to 24 VDC) |
| Seals     | Rocker, base & bracket are sealed.                                                                                              |
| Base      | Nylon 66 GF rated to 85°C with a flammability rating of 94V0.                                                                   |
| Actuator  | Basic actuator structure molded of thermoplastic polycarbonate with a hard Nylon 66 thermoplastic surface overlay.              |
| Locks     | Acetal                                                                                                                          |
| Lens      | Polycarbonate rated at 100°C                                                                                                    |
| Function  | 2 & 3 Position Rocker Style                                                                                                     |
| Bracket   | Nylon Zytel                                                                                                                     |
| Connector | Nylon 66 rated at 85°C. Polarized.                                                                                              |

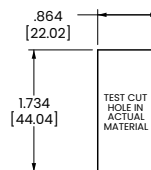
## Actuator Travel (Angular Displacement)

|            |                 |
|------------|-----------------|
| 2 Position | 26°             |
| 3 Position | 13° from center |

## Environmental

|                     |                                                                                                                                                                                                                                                        |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sealing             | IP67, for above-panel components of actual switch only                                                                                                                                                                                                 |
| Corrosion           | Mixed Flowing Gas MFG Class III per ASTM B-827 & B-845, Method H, with 3 years exposure.                                                                                                                                                               |
| Operating Temp      | -40°C to + 85°C                                                                                                                                                                                                                                        |
| Vibration 1         | Per Mil-Std 202F, Method 204D<br>Test Condition A 0.06 DA or 10G's 10-500 Hz. Tested with VCH connector. Test criteria - No loss of circuit during test and pre and post test contact resistance.                                                      |
| Vibration 2         | Resonance search<br>24-50 Hz 0.40 DA<br>50-2000 ±10 G's peak<br>Results Horizontal Axis 3-5 G's max.<br>Random<br>24 Hz 0.06 PSD-Gsq/Hz<br>60 Hz 0.50<br>100 Hz 0.50<br>200 Hz 0.025<br>2000 Hz 0.025<br>No loss of circuit during test; <10µ chatter. |
| Shock               | Per Mil-Std 202F, Method 213B, Test Condition K @ 30G's. Tested with VCH connector. Test criteria - No loss of circuit during test, pre, and post test contact resistance.                                                                             |
| Salt Spray          | Per Mil-Std 202F, Method 101D, Test Condition A, 48 Hrs.                                                                                                                                                                                               |
| Thermal Shock       | Per Mil-Std 202F, Method 107F, Test Condition A, -55°C to 85°C. Test criteria - pre and post test contact resistance.                                                                                                                                  |
| Moisture Resistance | Per Mil-Std 202F, Method 106F, Test Criteria - pre and post test contact resistance.                                                                                                                                                                   |

## Mounting Specifications



MOUNTING HOLE

### Panel Thickness Range

Acceptable Panel Thickness  
.030 to .156 (.76mm to 3.96mm)  
Recommended: .030, .062, .093, .125 and .156

For Window Lift variant only -  
Recommended Panel Thickness  
.118 (3.00mm)

# Ordering Scheme Rocker

Sample  
Part Number

L 11 E 3 C H N 1-3 A A 45-1 48

Selection

1 2 3 4 5 6 7 8 9 10 11 12 13 14

## 1. SERIES

L

## 2. CIRCUIT

Terminal Orientation



( ) - momentary  
SP - single pole - uses terminals 1, 2 & 4.  
DP - double pole uses terminals 5, 6 & 8.  
Terminals 9, 10 & 11 for lamp circuit only.

| Position:                      | 1                | 2            | 3                   |
|--------------------------------|------------------|--------------|---------------------|
| SP                             | DP               | 2 & 4, 6 & 8 | Connected Terminals |
| 11                             | 21               | ON           | NONE                |
| 12                             | 22               | (ON)         | NONE                |
| 13                             | 23               | ON           | NONE                |
| 14                             | 24               | ON           | NONE                |
| 15                             | 25               | ON           | NONE                |
| 16                             | 26               | ON           | OFF                 |
| 17                             | 27               | ON           | OFF                 |
| 18                             | 28               | (ON)         | OFF                 |
| CIRCUITS WITH JUMPER TERMINALS |                  |              |                     |
| 30*                            | (2,4&5), (1,6&8) | OFF, OFF     | (1,2&8), (4,5&6)    |
| 31*                            | 1, 2 & 5         | 2, 3 & 7     | 2, 4 & 8            |
| PROGRESSIVE CIRCUITS           |                  |              |                     |
| 51                             | 3 & 4            | 2, 3         | 1 & 2               |
| 52                             | 3 & 4            | 2, 3         | OFF                 |
| 53                             | (3 & 4)          | 2, 3         | 1 & 2               |
| 54                             | (3 & 4)          | 2, 3         | (OFF)               |
| 55                             | (3 & 4)          | 2, 3         | (1 & 2)             |
| 56                             | (3 & 4)          | 2, 3         | (OFF)               |
| 57                             | 3 & 4            | 2, 3         | (OFF)               |
| 58*                            | 2 & 4            | 2, 3         | 1 & 2               |
| 61                             | 3 & 4, 7 & 8     | 2 & 3, 6 & 7 | 1 & 2, 5 & 6        |
| 62                             | 3 & 4, 7 & 8     | 2 & 3, 6 & 7 | OFF, OFF            |
| 63                             | (3 & 4), (7 & 8) | 2 & 3, 6 & 7 | 1 & 2, 5 & 6        |
| 64                             | (3 & 4), (7 & 8) | 2 & 3, 6 & 7 | OFF, OFF            |
| 65                             | (3 & 4), (7 & 8) | 2 & 3, 6 & 7 | (1 & 2), (5 & 6)    |
| 66                             | (3 & 4), (7 & 8) | 2 & 3, 6 & 7 | (OFF, OFF)          |
| 67                             | 3 & 4, 7 & 8     | 2 & 3, 6 & 7 | (OFF, OFF)          |
| 68                             | 2 & 4, 7 & 8     | 2 & 4, OFF   | OFF, OFF            |
| 69*                            | 2 & 4, 1, 7 & 8  | 2 & 4, OFF   | OFF, OFF            |
| 70                             | (2 & 4), (7 & 8) | 2 & 4, 5 & 7 | (1 & 2), (5 & 7)    |
| 71                             | (2 & 4), (7 & 8) | 2 & 4, 5 & 7 | 1 & 2, 5 & 7        |
| 72                             | 2 & 4, 7 & 8     | 2 & 4, 5 & 7 | 1 & 2, 5 & 7        |
| 73                             | (2 & 4), (7 & 8) | 2 & 4, OFF   | OFF, OFF            |
| 80                             | 2 & 4, 6 & 8     | 2 & 4, OFF   | OFF, 5 & 6          |
| HAZARD WARNING CIRCUITS        |                  |              |                     |
| A2                             | 6, 7 & 8, 3 & 4  | NONE         | OFF, 1 & 2          |
| A3                             | 6, 7 & 8, 2 & 4  | NONE         | OFF, 1 & 2          |

\* Available with ratings 1, B, & E only.

## 3. RATING

2

|   |                        |   |         |
|---|------------------------|---|---------|
| 1 | .4VA @ 28VDC Resistive | E | 15A 12V |
| B | 15A 24V                | G | 20A 6V  |
| C | 20A 18V                | H | 20A 3V  |
| D | 20A 12V                |   |         |

## 4. TERMINATION

2,3

- 1 .250 (6.4mm) TAB (QC)  
3 .187 (4.7mm) TAB (QC)

Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION

Lamp #1: above terminals 9 & 10 end of switch; Lamp #2 above terminals 11 & 12 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only.

| Lamps | illumination Type   | Lamp Wired to Terminals |
|-------|---------------------|-------------------------|
| S     | None                |                         |
| A     | #1 Independent      | 10+ 9-                  |
| B     | #2 Independent      | 12+ 11-                 |
| C     | #1 Independent      | 10+ 9-                  |
| D     | & #2 Independent    | 12+ 9-                  |
| E     | #1 Dependent        | 4+ 9-                   |
| F     | #1 Independent      | 10+ 9-                  |
| G     | & #2 Dependent      | 8+ 9-                   |
| H     | #1 Dependent        | 4+ 9-                   |
| I     | & #2 Independent    | 10+ 9-                  |
| J     | #1 Both Independent | 10+ 9-                  |
| K     | (in series)         |                         |
| L     | #1 Dependent        | 4+ 9-                   |
| M     | & #2 Dependent      | 1+ 9-                   |
| N     | #2 Hazard           | 6+ 10- 12-              |
| O     | #1 Hazard           | 6+ 10- 12-              |

## 6,7. LAMP (SAME CODING FOR BOTH SELECTIONS)

Selection 6: above terminals 10 & 9; Selection 7: above terminals 12 & 11

|              |      |       |       |       |       |
|--------------|------|-------|-------|-------|-------|
| No lamp      | 0    | 5 6V  | 6 12V | 7 18V | 8 24V |
| Incandescent | 4 3V |       |       |       |       |
| LED*         | Red  | Amber | Green |       |       |
| 2VDC         | A    | L     | F     |       |       |
| 6VDC         | B    | M     | G     |       |       |
| 12VDC        | C    | N     | H     |       |       |
| 24VDC        | D    | P     | J     |       |       |

\* Consult factory for "daylight bright", blue/green and white LED options.  
Typical current draw for LED is 20ma.

## 8. BRACKET COLOR

1

|                       |       |       |      |     |
|-----------------------|-------|-------|------|-----|
|                       | Black | White | Gray | Red |
| Standard Bracket      | 1     | 2     | 3    | 4   |
| Rockerguard at Lamp 1 | A     | B     | C    | D   |
| Rockerguard at Lamp 2 | E     | F     | G    | H   |

## 9. ACTUATOR STYLE AND COLOR

1

|        |       |       |      |     |              |
|--------|-------|-------|------|-----|--------------|
|        | Black | White | Gray | Red | Laser Etched |
| Rocker | A     | B     | C    | D   | 3            |
| Paddle | J     | N     | K    | M   | 4            |

## 10 & 11. LENS STYLE AND COLOR

Lens color for LEDs must be clear, white, or match color of LED.

0 - No Actuator Z - No Lens

|       |       |       |       |     |      |
|-------|-------|-------|-------|-----|------|
| Clear | White | Amber | Green | Red | Blue |
| 1     | -     | B     | G     | M   | T    |
| -     | 7     | C     | H     | N   | U    |
| 3     | -     | D     | J     | P   | V    |
| -     | 9     | E     | K     | R   | W    |
| 5     | A     | -     | -     | -   | -    |

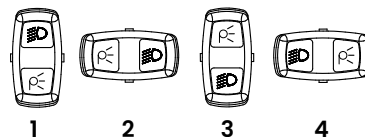
## 12. LASER ETCHED, LENS OR BODY LEGEND

00 No legend

For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

## 13. LEGEND ORIENTATION

- 0 No legend (used with codes 11-18 in selection 12)  
1 Orientation 1 - vertical, lamp 1 on top  
2 Orientation 2 - horizontal, lamp 1 on right  
3 Orientation 3 - vertical, lamp 1 on bottom  
4 Orientation 4 - vertical, lamp 1 on left



## 14. ACTUATOR LENS LEGEND

00 No legend

For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

Notes: Consult factory to verify horsepower rating for your particular circuit choice.

- 1 Custom colors are available. Consult factory.  
2 Circuits 30, 31, 58, 69 are not available with rating codes 4, C, D, G or H.  
3 Termination 3 only available with rating codes 1, B, and E.  
4 Not available with circuits 11-18, 51-57 and 69.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Ordering Scheme Locking Rocker

Sample  
Part Number

L 11 D 1 S W C J - P M H 00 - 0

Selection

1 2 3 4 5 6 7 8 9 10 11 12 13

## 1. SERIES

L

## 2. CIRCUIT <sup>5</sup>

Terminal Orientation



( ) - momentary  
SP - single pole - uses terminals 1, 2 & 4.  
DP - double pole uses terminals 5, 6 & 8.  
Terminals 9, 10 & 11 for lamp circuit only.

| Position:                      | 1                | 2                   | 3                |
|--------------------------------|------------------|---------------------|------------------|
| SP                             | DP 2 & 4, 6 & 8  | Connected Terminals | 1 & 2, 5 & 6     |
| 11                             | 21 ON            | NONE                | OFF              |
| 14                             | 24 ON            | NONE                | ON               |
| 16                             | 26 ON            | OFF                 | ON               |
| 17                             | 27 ON            | OFF                 | (ON)             |
| 18                             | 28 (ON)          | OFF                 | (ON)             |
| CIRCUITS WITH JUMPER TERMINALS |                  |                     |                  |
| 30 <sup>2</sup>                | (2,4&5), (1,6&8) | OFF, OFF            | (1,2&8), (4,5&6) |
| 31 <sup>2</sup>                | 1, 2 & 5         | 2, 3 & 7            | 2, 4 & 8         |
| PROGRESSIVE CIRCUITS           |                  |                     |                  |
| 51                             | 3 & 4            | 2, 3                | 1 & 2            |
| 52                             | 3 & 4            | 2, 3                | OFF              |
| 53                             | (3 & 4)          | 2, 3                | 1 & 2            |
| 54                             | (3 & 4)          | 2, 3                | (OFF)            |
| 55                             | (3 & 4)          | 2, 3                | (1 & 2)          |
| 56                             | (3 & 4)          | 2, 3                | (OFF)            |
| 57                             | 3 & 4            | 2, 3                | (OFF)            |
| 58                             | 2 & 4            | 2, 3                | 1 & 2            |
| 61                             | 3 & 4, 7 & 8     | 2 & 3, 6 & 7        | 1 & 2, 5 & 6     |
| 62                             | 3 & 4, 7 & 8     | 2 & 3, 6 & 7        | OFF, OFF         |
| 63                             | (3 & 4), (7 & 8) | 2 & 3, 6 & 7        | 1 & 2, 5 & 6     |
| 64                             | (3 & 4), (7 & 8) | 2 & 3, 6 & 7        | OFF, OFF         |
| 65                             | (3 & 4), (7 & 8) | 2 & 3, 6 & 7        | (1 & 2), (5 & 6) |
| 66                             | (3 & 4), (7 & 8) | 2 & 3, 6 & 7        | (OFF, OFF)       |
| 67                             | 3 & 4, 7 & 8     | 2 & 3, 6 & 7        | (OFF, OFF)       |
| 68                             | 2 & 4, 7 & 8     | 2 & 4, OFF          | OFF, OFF         |
| 69                             | 2 & 4, 1, 7 & 8  | 2 & 4, OFF          | OFF, OFF         |
| 70                             | (2 & 4), (7 & 8) | 2 & 4, 5 & 7        | (1 & 2), (5 & 7) |
| 71                             | (2 & 4), (7 & 8) | 2 & 4, 5 & 7        | 1 & 2, 5 & 7     |
| 72                             | 2 & 4, 7 & 8     | 2 & 4, 5 & 7        | 1 & 2, 5 & 7     |
| 73                             | (2 & 4), (7 & 8) | 2 & 4, OFF          | OFF, OFF         |
| 80                             | 2 & 4, 6 & 8     | 2 & 4, OFF          | OFF, 5 & 6       |

## 3. RATING <sup>2</sup>

|   |                        |   |         |
|---|------------------------|---|---------|
| 1 | .4VA @ 28VDC Resistive | E | 15A 12V |
| B | 15A 24V                | G | 20A 6V  |
| C | 20A 18V                | H | 20A 3V  |
| D | 20A 12V                |   |         |

## 4. TERMINATION <sup>4</sup>

1 .250 (6.4mm) TAB (QC)  
3 .187 (4.7mm) TAB (QC)  
Do not use silicone based lubricants to reduce terminal insertion forces during connector assembly, as it is detrimental to function and performance.

## 5. ILLUMINATION

Lamp #1: above terminals 9 & 10 end of switch; Lamp #2 above terminals 11 & 12 end of switch. Positive (+) and negative (-) symbols apply to LED lamps only.  
Lamps Illumination Type Lamp Wired to Terminals  
S None  
B # 2 Independent 12+ 11-

## 6. LOCK

W Lock above terminals 10 & 9.

## 7. LAMP

|              |      |       |       |       |       |
|--------------|------|-------|-------|-------|-------|
| No lamp      | 0    |       |       |       |       |
| Incandescent | 4 3V | 5 6V  | 6 12V | 7 18V | 8 24V |
| LED*         | Red  | Amber | Green |       |       |
| 2VDC         | A    | L     | F     |       |       |
| 6VDC         | B    | M     | G     |       |       |
| 12VDC        | C    | N     | H     |       |       |
| 24VDC        | D    | P     | J     |       |       |

\* Consult factory for "daylight bright", blue/green and white LED options.  
Typical current draw for LED is 20ma.

## 8. BRACKET COLOR <sup>1</sup>

J Black

## 9. ACTUATOR STYLE AND COLOR <sup>1</sup>

|                |       |     |
|----------------|-------|-----|
|                | Black | Red |
| Locking Rocker | P     | R   |

## 10 & 11. LENS STYLE AND COLOR

Lens color for LEDs must be clear, white, or match color of LED.

|                 |             |       |       |     |      |
|-----------------|-------------|-------|-------|-----|------|
| 0 - No Actuator | Z - No Lens |       |       |     |      |
| Clear           | White       | Amber | Green | Red | Blue |
| 1               | -           | B     | G     | M   | T    |
| 2               | 7           | C     | H     | N   | U    |
| 3               | -           | D     | J     | P   | V    |
| -               | 9           | E     | K     | R   | W    |

Large Transparent  
Large Translucent  
Bar Transparent  
Bar Translucent

## 11. LOCK FUNCTION AND COLOR

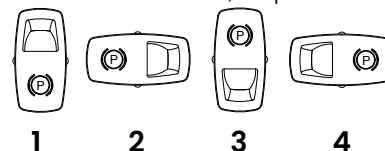
| Locking Position |      | Up & Down | Center <sup>3</sup> | Lock Color     |
|------------------|------|-----------|---------------------|----------------|
| Up               | Down |           |                     |                |
| A                | H    | R         | 1                   | Match Actuator |
| B                | J    | S         | 2                   | Black          |
| C                | K    | T         | 3                   | White          |
| D                | L    | V         | 4                   | Red            |
| E                | M    | W         | 5                   | Safety Orange  |

## 12. LASER ETCHED, LENS OR BODY LEGEND

00 No legend  
For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

## 13. LEGEND ORIENTATION

- No legend (used with codes 11-18 in selection 12)
- Orientation 1 - vertical, lamp 1 on top
- Orientation 2 - horizontal, lamp 1 on right
- Orientation 3 - vertical, lamp 1 on bottom
- Orientation 4 - vertical, lamp 1 on left



Notes: Consult factory to verify horsepower rating for your particular circuit choice.  
1 Custom colors are available. Consult factory.  
2 Additional lamp circuits available. Consult factory.  
3 Available only with 3 position circuits.  
4 Termination 3 only available with ratings 1, B and E.  
5 Circuits 30, 31, 58 and 69, are not available with rating codes 4, C, D, G or H.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Ordering Scheme Window Lift

Sample  
Part Number

**L 70 D 1 K 0 C W - W Z A RY - 3 00**

Selection

1

2

3

4

5

6

7

8

9

10

11

12

13

14

## 1. SERIES

L

## 2. CIRCUIT <sup>3</sup>

( ) - momentary

**Position:**

|           |            |                             |                            |                             |
|-----------|------------|-----------------------------|----------------------------|-----------------------------|
| <b>SP</b> | <b>DP</b>  | <b>2 &amp; 4, 6 &amp; 8</b> | <b>Connected Terminals</b> | <b>1 &amp; 2, 5 &amp; 6</b> |
| <b>18</b> | <b>28</b>  | (ON)                        | OFF                        | (ON)                        |
|           | <b>30*</b> | (2,4&5), (1,6&8)            | OFF, OFF                   | (1,2&8), (4,5&6)            |
|           | <b>70*</b> | (2 & 4), (7 & 8)            | 2 & 4, 5 & 7               | (1 & 2), (5 & 7)            |

\* Available with ratings 1, B, & E only.

## 3. RATING <sup>3</sup>

**1** 0.4VA 28V DC Resistive  
**B** 15A 24V  
**D** 20A 12V  
**E** 15A 12V

## 4. TERMINATION <sup>3</sup>

**1** .250 (6.4mm) TAB (QC)  
**3** .187 (4.7mm) TAB (QC)

## 5. ILLUMINATION

Positive (+) and negative (-) symbols apply to LED lamps only.

| Lamps         | Illumination Type | Lamp Wired to Terminals |
|---------------|-------------------|-------------------------|
| <b>S</b> None |                   |                         |
| <b>B</b> # 2  | Independent       | 12+ 11-                 |
| <b>K</b> # 2  | Independent       | 10+ 9-                  |

Notes:

- Custom colors are available. Consult factory.
- Legend 1 over lamp 2 location.
- Circuit 30 & any combination of terminations code 1 or 3 can not be used with rating code D. Termination code 3 can only be used with rating codes 1, B & E.
- Legend 2 over lamp 1 location.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

## 6 & 7. LAMP #2

Lamp #1: Not available on window lift switch, Use Code "0" for Selection 6  
 Selection 7: Above Terminals 11 & 12

No lamp **0**  
 LED\* 

|          |          |          |          |              |
|----------|----------|----------|----------|--------------|
| White    | Amber    | Green    | Blue     | Volts        |
| <b>6</b> | <b>N</b> | <b>H</b> | <b>E</b> | <b>12VDC</b> |
| <b>8</b> | <b>P</b> | <b>J</b> | <b>K</b> | <b>24VDC</b> |

## 8. BRACKET COLOR / STYLE <sup>1</sup>

**W** Black Window Lift

## 9. ACTUATOR COLOR / STYLE <sup>1</sup>

**W** Black Window Lift

## 10 & 11. LASER ETCHED BACKGROUND COLOR

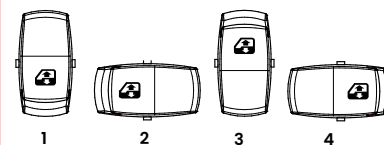
**Z** Blank  
**5** Clear  
**A** White

## 12. LEGEND #1 <sup>2</sup>

**00** No legend  
 For standard legends, see "Standard Legend Codes" page.  
 For additional legends, please consult factory

## 13. LEGEND ORIENTATION

**0** No legend  
**1** Orientation 1  
**2** Orientation 2  
**3** Orientation 3  
**4** Orientation 4



## 14. LEGEND #2 <sup>4</sup>

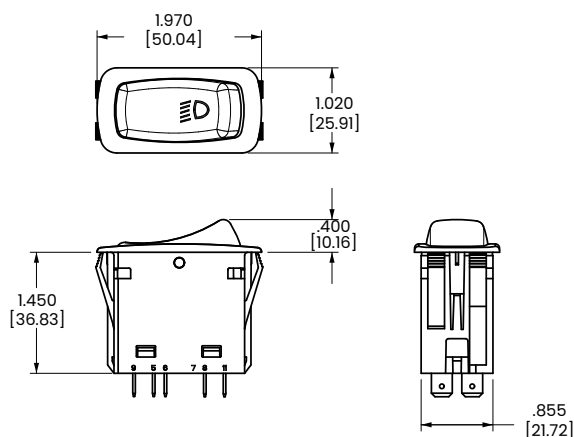
**00** No legend  
 For standard legends, see "Standard Legend Codes" page.  
 For additional legends, please consult factory



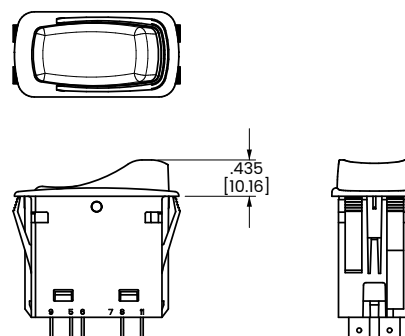
# Dimensional Specs

inches [millimeters]

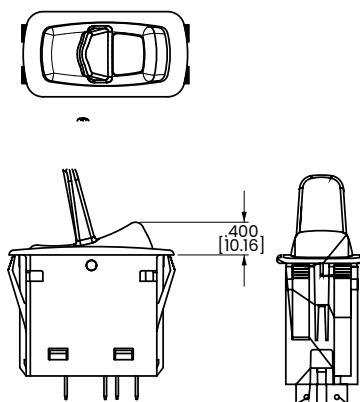
**L-SERIES**  
SHOWN WITH LASER ETCHED  
ACTUATOR



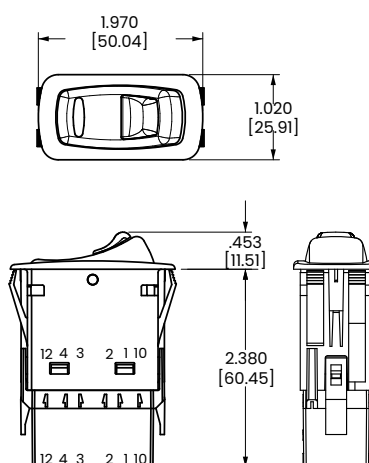
**L-SERIES**  
SHOWN WITH ROCKER GUARD



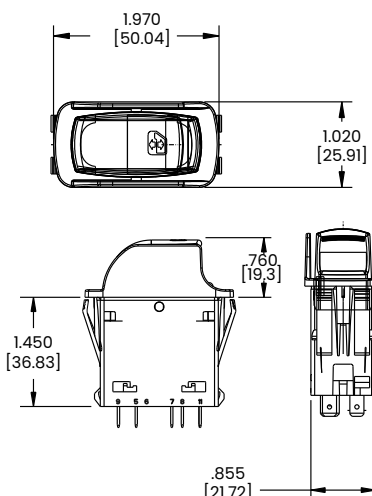
**L-SERIES**  
SHOWN WITH LARGE LENS  
AND PADDLE ACTUATOR



**L-SERIES**  
SHOWN WITH BAR LENS, LOCK  
AND CONNECTOR



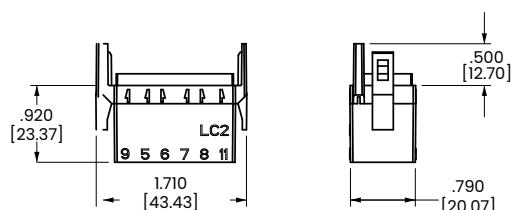
**L-SERIES**  
SHOWN WITH LASER ETCHED  
WINDOW LIFT ACTUATOR



## Connector

### L-SERIES CONNECTOR

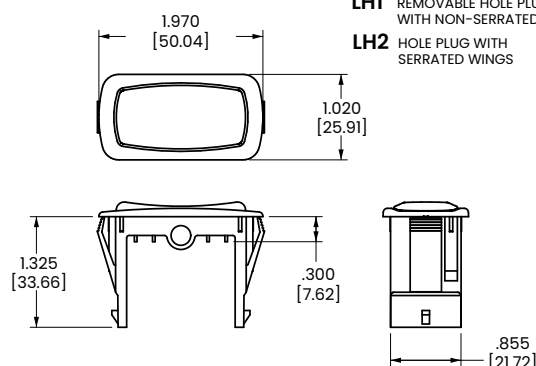
- LC1-01** BLACK .250 TAB CONNECTOR (PACKARD 630 SERIES)
- LC2-01** BLACK .187 TAB CONNECTOR (PACKARD 480 SERIES)
- LC3-01** BLACK .250 TAB CONNECTOR (AMP ONLY)



## Hole Plug

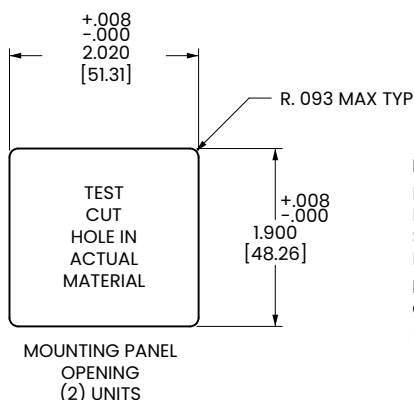
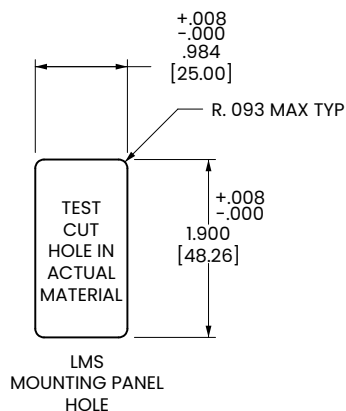
### L-SERIES HOLE PLUG

- LH1** REMOVABLE HOLE PLUG  
WITH NON-SERRATED WINGS
- LH2** HOLE PLUG WITH  
SERRATED WINGS



# Dimensional Specs

inches [millimeters]



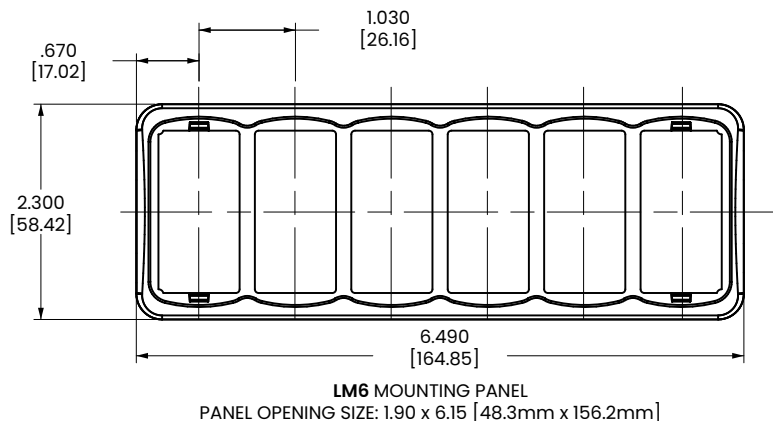
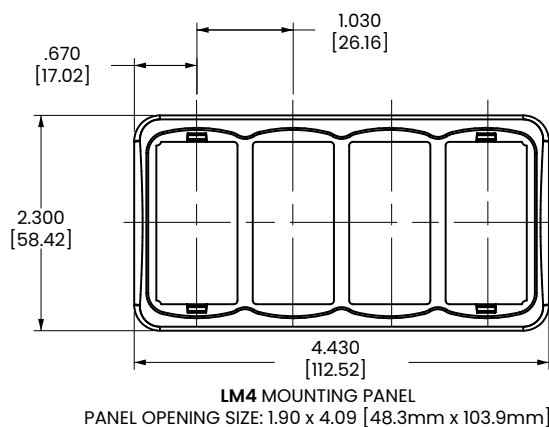
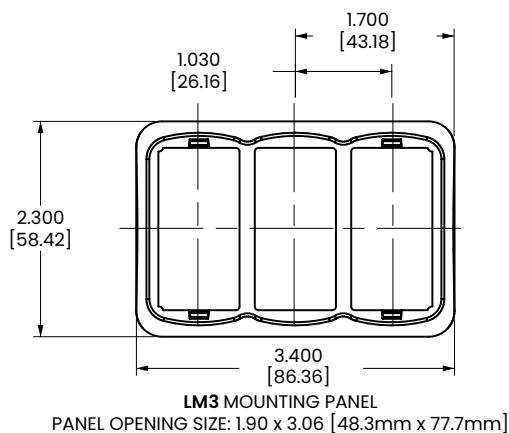
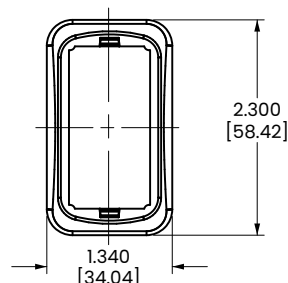
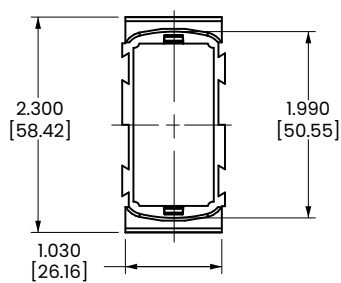
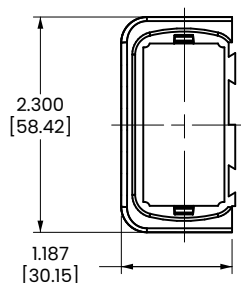
## MOUNTING PANEL

FOR ADDITIONAL UNITS< ADD 1.03 [26.2] PER UNIT.  
FOR MORE THAN 2 L-SERIES SWITCHES, ADD MIDDLE  
SECTION. AVAILABLE IN PANEL THICKNESSES LISTED  
BELOW> CONSULT FACTORY

DIMENSIONS: **LME** 2.02 [51.3mm] PLUS NUMBER OF  
CENTER BEZELS (**LMM**) X 1.034 [26.26mm]

## MOUNTING PANEL THICKNESS

.062 .093 .125 .156  
[1.57] [2.36] [3.17] [3.96]

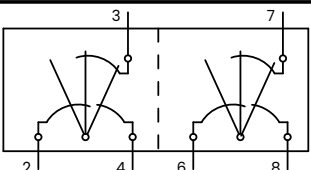
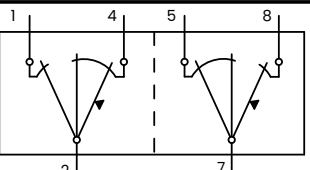
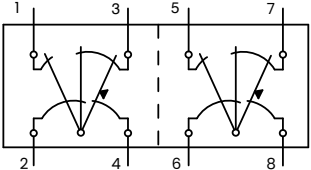
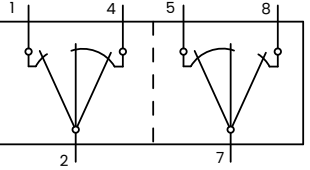
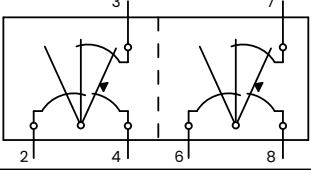
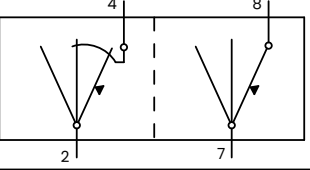
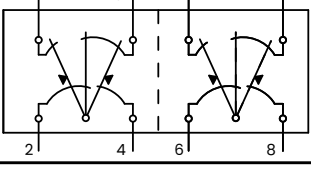
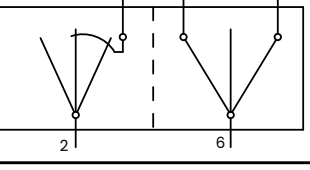
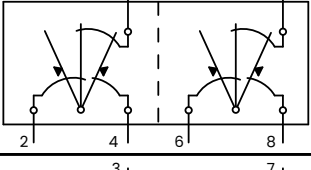
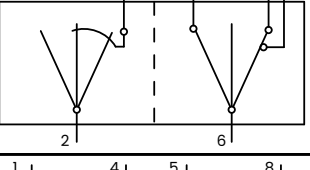
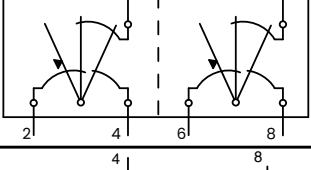
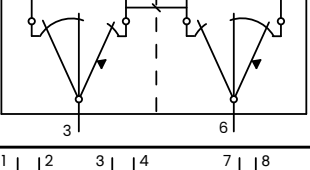
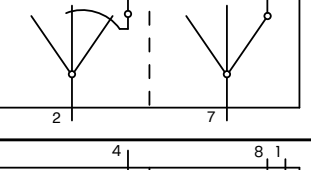
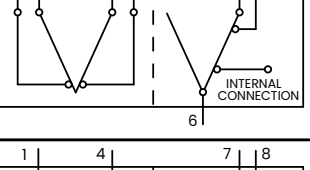
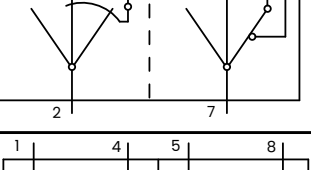
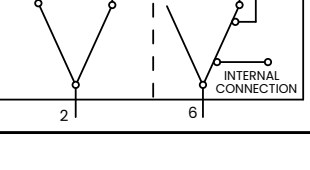
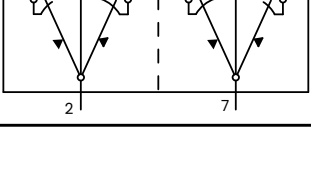


# Circuit Diagrams

| CIRCUIT CODE | CIRCUIT DIAGRAM | CIRCUIT CODE | CIRCUIT DIAGRAM | CIRCUIT CODE | CIRCUIT DIAGRAM |
|--------------|-----------------|--------------|-----------------|--------------|-----------------|
| 11           |                 | 22           |                 | 51           |                 |
| 12           |                 | 23           |                 | 52           |                 |
| 13           |                 | 24           |                 | 53           |                 |
| 14           |                 | 25           |                 | 54           |                 |
| 15           |                 | 26           |                 | 55           |                 |
| 16           |                 | 27           |                 | 56           |                 |
| 17           |                 | 28           |                 | 57           |                 |
| 18           |                 | 30           |                 | 58           |                 |
| 21           |                 | 31           |                 | 61           |                 |

Circuit Diagrams continued on next page

# Circuit Diagrams

| CIRCUIT CODE | CIRCUIT DIAGRAM                                                                     | CIRCUIT CODE | CIRCUIT DIAGRAM                                                                     |
|--------------|-------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------|
| 62           |    | 71           |    |
| 63           |    | 72           |    |
| 64           |    | 73           |    |
| 65           |   | 80           |   |
| 66           |  | 81           |  |
| 67           |  | 82           |  |
| 68           |  | A2           |  |
| 69           |  | A3           |  |
| 70           |  |              |                                                                                     |

# Lamp Circuit Diagrams

| LAMP CIRCUIT CODE | CIRCUIT DIAGRAM |
|-------------------|-----------------|
| <b>A</b>          |                 |
| <b>B</b>          |                 |
| <b>C</b>          |                 |
| <b>D</b>          |                 |
| <b>E</b>          |                 |
| <b>F</b>          |                 |
| <b>G</b>          |                 |
| <b>H</b>          |                 |

| LAMP CIRCUIT CODE | CIRCUIT DIAGRAM |
|-------------------|-----------------|
| <b>J</b>          |                 |
| <b>I</b>          |                 |
| <b>2</b>          |                 |
| <b>K</b>          |                 |

| LEGEND |                                       |
|--------|---------------------------------------|
| SYMBOL | DEFINITION                            |
|        | TERMINAL LOCATION                     |
|        | LAMP LOCATION                         |
|        | MAINTAINED CIRCUIT                    |
|        | MOMENTARY CIRCUIT                     |
|        | INTERNAL CONNECTION (JUMPER TERMINAL) |
|        | 2 POSITION CONNECTION                 |
|        | 2 POSITION                            |
|        | 3 POSITION                            |



**Littelfuse®**



**Carling Technologies®**

A Littelfuse® Brand

# LP-Series

Illuminated Indicators

**PRODUCT WEBPAGE**

*request sample, configure part*



The LP-Series Illuminated Indicators are the perfect complement to the aesthetics, reliability, and performance of the L-Series sealed rocker switches. As a critical safety feature, the illumination alerts the operator of essential system functions or malfunctions, such as: oil pressure, high temperature, transmission or other fluid levels, parking brake, or general system confirmations.

**1-2**

LED's

**12-24**

VDC

**IP67 Sealing**

Above-Panel

## Typical Applications

- Construction
- Agriculture
- On/Off-Highway

# Tech Specs

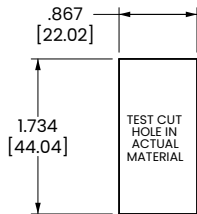
## Electrical

|           |                                                                                                                                  |
|-----------|----------------------------------------------------------------------------------------------------------------------------------|
| Terminals | Brass or copper/silver plate<br>3/16" (4.76mm) & 1/4" (6.3mm)<br>Quick Connect terminations<br>standard.                         |
| Lighted   | Incandescent - rated 10,000 hours<br>LED -rated 100,000 hours 1/2 life<br>(LED is internally ballasted for<br>voltages to 24VDC) |

## Physical

|           |                                                                  |
|-----------|------------------------------------------------------------------|
| Seals     | Insert, base & bracket are sealed                                |
| Base      | Nylon 66 GF rated to 85°C with a<br>flammability rating of 94VO. |
| Insert    | Polycarbonate rated at 100°C.                                    |
| Connector | Nylon 66 rated at 85°C. Polarized                                |
| Markings  | Over 1000 pad printed or laser<br>etched legends available       |
| Bracket   | Nylon 66 GF rated to 85°C                                        |

## Mounting Specifications



MOUNTING HOLE

**Panel Thickness Range**  
Acceptable Panel Thickness  
.030 to .156 (.76mm to 3.96mm)  
Recommended:  
.030, .062, .093, .125 and .156

## Environmental

|                          |                                                                                                                                                                                                                                                       |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environmental            | IP67, for above-panel components<br>of actual switch only.                                                                                                                                                                                            |
| Corrosion<br>Resistance  | Mixed Flowing Gas MFG Class III<br>per ASTM B-827 & B-845, Method<br>H, with 3 years exposure.                                                                                                                                                        |
| Operating<br>Temperature | -40°C to +85°C                                                                                                                                                                                                                                        |
| Vibration 1              | Per Mil-Std 202F, Method 204D Test<br>Condition A 0.06 DA or 10G's 10-<br>500 Hz. Tested with VCH connector.<br>Test criteria - No loss of circuit<br>during test and pre and post test<br>contact resistance.                                        |
| Vibration 2              | Resonance search<br>24-50 Hz 0.40 DA<br>50-2000 ±10 G's peak<br>Results Horizontal Axis 3-5 G's max.<br>Random<br>24 Hz 0.06 PSD-Gsq/H<br>60 Hz 0.50<br>100 Hz 0.50<br>200 Hz 0.025<br>2000 Hz 0.025<br>No loss of circuit during test; <10µ chatter. |
| Shock                    | Per Mil-Std 202F, Method 213B, Test<br>Condition K @ 30G's. Tested with<br>VCH connector. Test criteria -<br>No loss of circuit during test, pre,<br>and post test contact resistance.                                                                |
| Salt Spray               | Per Mil-Std 202F, Method 101D, Test<br>Condition A, 48 Hrs.                                                                                                                                                                                           |
| Thermal Shock            | Per Mil-Std 202F, Method 107F, Test<br>Condition A, -55°C to 85°C. Test<br>criteria - pre and post test contact<br>resistance.                                                                                                                        |
| Moisture<br>Resistance   | Per Mil-Std 202F, Method 106F, Test<br>Criteria - pre and post test contact<br>resistance.                                                                                                                                                            |

# Ordering Scheme

Sample  
Part Number

LP 1 H R R 5 - 9 A A Y2 - 1 DU

## 1. SERIES

LP L-Series Illuminated Plug

## 2. TERMINATION <sup>3</sup>

1 .250 (8.35) x .032 (0.51) Quick Connect  
3 .187 (4.75) x .032 (0.51) Quick Connect

## 3. ILLUMINATION

|   | LAMPS | ILLUMINATION          | LAMP WIRED TO TERMINALS |
|---|-------|-----------------------|-------------------------|
| A | 1     | - 10 (+) 9 (-)        |                         |
| B | 1     | - 10 (+) 9 (-)        |                         |
|   | 2     | - 12 (+) 11 (-)       |                         |
| C | 1     | - 10 (+) 9 (-)        |                         |
|   | 2     | - 12 (+) 9 (-)        |                         |
| E | 1 & 2 | Parallel 10 (+) 9 (-) |                         |
| H | 1 & 2 | Series 10 (+) 9 (-)   |                         |

Lamp 1 Located Above Terminals 9 & 10 End Of Bracket.  
Lamp 2 Located Above Terminals 11 & 12 End Of Bracket.  
Positive (+) And Negative (-) Symbols Apply To Led Lamps Only.

## 4,5. LAMP. (SAME CODING FOR BOTH SELECTIONS) <sup>2</sup>

Selection 4: specifies lamp 1 located above terminals 10 (+) & 9 (-).  
Selection 5: specifies lamp 2 located above terminals 12 (+) & 11 (-).  
No lamp 0 (position 5 only)  
Incandescent 4 3V 5 6V 6 12V 7 18V 8 24V  
LED Amber Green Red  
2VDC L F R  
6VDC M G S  
12VDC N H T  
24VDC P J V

## 6. BRACKET COLOR

5 Black

## 7. INSERT COLOR <sup>1,2</sup>

9 Painted Black - Laser Etch D Amber (Translucent)  
A Clear (Transparent) E Green (Translucent)  
B White (Translucent) F Blue (Translucent)  
C Red (Translucent)

## 8, 9. STYLE (SAME CODING FOR BOTH SELECTIONS)

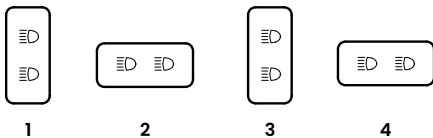
2 Not Painted (used with Insert Colors A-F)  
5 Clear Laser Etch Background Color (used with Insert Color 9)  
A White Laser Etch Background Color (used with Insert Color 9)

## 10. LEGEND OVER LAMP <sup>1</sup>

00 No legend  
For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

## 11. LEGEND ORIENTATION

0 No legend  
1 Orientation 1  
2 Orientation 2  
3 Orientation 3  
4 Orientation 4



## 12. LEGEND OVER LAMP <sup>2</sup>

00 No legend  
For standard legends, see "Standard Legend Codes" page.  
For additional legends, please consult factory

Notes:

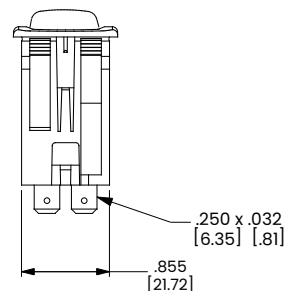
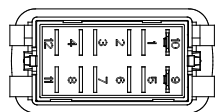
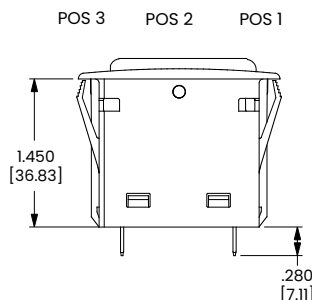
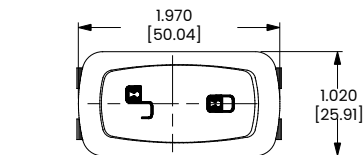
- To order separately, specify LPC and selection 7 code. Ex LPC-9
- For LEDs, insert color must be clear, white or match color of LED.
- For connector, specify part number LC2-01 (.187 tabs), LC3-01 (.250 tabs).

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]







**Littelfuse®**



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# Tippette®

Full Sized Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The Tippette Series is a traditionally styled rocker switch, available in sealed or unsealed versions. These switches are appropriate for use in general purpose applications which may or may not require a modicum of environmental protection.

**1-4**  
Poles

**10-20**  
Amps

**125-250**  
VAC Max

**12-30**  
VDC Max

## Typical Applications

- General Purpose Applications
- Commercial Food
- Recreational Vehicles

# Tech Specs

## Electrical

|                |                                                                                                                                                                                           |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Contact Rating | 15 amps, 125 VAC<br>10 amps, 250 VAC<br>3/4 HP 125-250 VAC<br>15 amps, 12-30 VDC                                                                                                          |
| Life           | 25,000 cycles circuit dependent<br>50,000 cycles circuit dependent<br>consult factory for applicable circuits.                                                                            |
| Contact        | Fine silver, silver cad-oxide                                                                                                                                                             |
| Terminals      | Brass or copper/silver plate<br>1/4" (6.3mm) Quick Connect terminations standard.<br>Solder lug - Brass Tin Plated<br>Wire Lead 16 gauge standard 105°C 600VAC<br>Screw Terminals - Brass |

## Agency Certifications

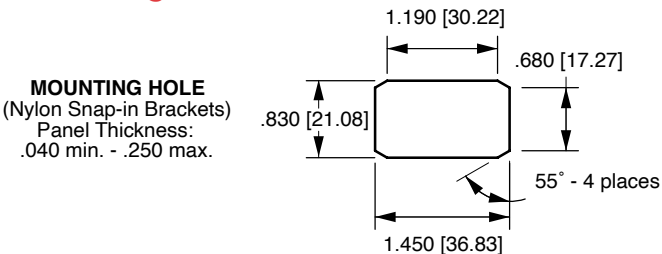
UL, CSA and VDE

Select circuits and constructions with VDE/IEC approvals are available. Consult factory

## Physical

|                       |                                                                   |
|-----------------------|-------------------------------------------------------------------|
| Lighted               | Incandescent - rated 10,000 hours<br>Neon - rated 25,000 hours    |
| Seals                 | Bracket - Actuator WBL/MBL<br>optional external gasket panel seal |
| Operating Temperature | Up to 85° C<br>Consult Factory for Specific Applications          |

## Mounting



\*Angled corners are suggested for optimum fit.  
Standard rectangular cutout is acceptable.

# Ordering Scheme

Sample Part Number **TIGA51 - 6M - BL - MBL**

Selection 1 2 3 4

## 1. SERIES

10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC, 15A 6-28VDC

Single Pole in Double Pole base <sup>2</sup>

|        |        |        |                      |
|--------|--------|--------|----------------------|
| solder | .250   | screw  | wire                 |
| lug    | tab    | term.  | leads                |
| TIGA50 | TIGA51 | TIGA54 | TIGA55 On-None-Off   |
| TIGA5A | TIGA5B | TIGA5E | TIGA5F (On)-None-Off |
| TIGA5L | TIGA5M | TIGA5S | TIGA5T On-None-(Off) |
| TIGB50 | TIGB51 | TIGB54 | TIGB55 On-None-On    |
| TIGB5A | TIGB5B | TIGB5E | TIGB5F On-None-(On)  |
| TIGC50 | TIGC51 | TIGC54 | TIGC55 On-Off-On     |
| TIGC5A | TIGC5B | TIGC5E | TIGC5F On-Off-(On)   |
| TIGC5L | TIGC5M | TIGC5S | TIGC5T (On)-Off-(On) |

Three Pole

|        |        |        |                      |
|--------|--------|--------|----------------------|
| solder | .250   | screw  | wire                 |
| lug    | tab    | term.  | leads                |
| TIHK50 | TIHK51 | TIHK54 | TIHK55 On-None-Off   |
| TIHK5A | TIHK5B | TIHK5E | TIHK5F (On)-None-Off |
| TIHK5L | TIHK5M | TIHK5S | TIHK5T On-None-(Off) |
| TIHL50 | TIHL51 | TIHL54 | TIHL55 On-None-On    |
| TIHL5A | TIHL5B | TIHL5E | TIHL5F On-None-(On)  |
| TIHM50 | TIHM51 | TIHM54 | TIHM55 On-Off-On     |
| TIHM5A | TIHM5B | TIHM5E | TIHM5F On-Off-(On)   |
| TIHM5L | TIHM5M | TIHM5S | TIHM5T (On)-Off-(On) |

VDE APPROVED

10A 250VAC, 15A 125VAC, 12(6)A 250VAC T85

Single Pole in Double Pole base <sup>2</sup>

|        |        |                    |
|--------|--------|--------------------|
| solder | .250   | wire               |
| lug    | tab    | lead               |
| TIGA90 | TIGA91 | TIGA95 On-None-Off |
| TIGB90 | TIGB91 | TIGB95 On-None-On  |
| TIGC90 | TIGC91 | TIGC95 On-Off-On   |

Double Pole

|        |        |        |        |
|--------|--------|--------|--------|
| solder | .250   | screw  | wire   |
| lug    | tab    | term.  | leads  |
| TIGK50 | TIGK51 | TIGK54 | TIGK55 |
| TIGK5A | TIGK5B | TIGK5E | TIGK5F |
| TIGK5L | TIGK5M | TIGK5S | TIGK5T |
| TIGL50 | TIGL51 | TIGL54 | TIGL55 |
| TIGL5A | TIGL5B | TIGL5E | TIGL5F |
| TIGM50 | TIGM51 | TIGM54 | TIGM55 |
| TIGM5A | TIGM5B | TIGM5E | TIGM5F |
| TIGM5L | TIGM5M | TIGM5S | TIGM5T |

Four Pole

|        |        |        |        |
|--------|--------|--------|--------|
| solder | .250   | screw  | wire   |
| lug    | tab    | term.  | leads  |
| TIHK50 | TIHK51 | TIHK54 | TIHK55 |
| TIHK5A | TIHK5B | TIHK5E | TIHK5F |
| TIHK5L | TIHK5M | TIHK5S | TIHK5T |
| TIIL50 | TIIL51 | TIIL54 | TIIL55 |
| TIIL5A | TIIL5B | TIIL5E | TIIL5F |
| TIIM50 | TIIM51 | TIIM54 | TIIM55 |
| TIIM5A | TIIM5B | TIIM5E | TIIM5F |
| TIIM5L | TIIM5M | TIIM5S | TIIM5T |

Double Pole

|        |        |        |
|--------|--------|--------|
| solder | .250   | wire   |
| lug    | tab    | lead   |
| TIGK90 | TIGK91 | TIGK95 |
| TIGL90 | TIGL91 | TIGL95 |
| TIGM90 | TIGM91 | TIGM95 |

Additional ratings up to 20A 125-277VAC, 1 1/2HP 125 VAC, 2HP 250VAC are available. Consult factory for specifics.

## 2. ACTUATOR STYLE

|    |                                                   |
|----|---------------------------------------------------|
| 1S | Angular/Smooth Face Gloss <sup>12</sup>           |
| 1C | Angular/Cross Serrations Gloss <sup>12</sup>      |
| 1F | Flatted/Smooth Face Gloss <sup>12</sup>           |
| 1L | Angular/Longline Serrations Gloss <sup>1,12</sup> |
| 2L | Long Smooth/Narrow <sup>1</sup>                   |
| 6M | Curved/Smooth Face Matte <sup>3</sup>             |
| 6S | Curved/Smooth Face Gloss <sup>3</sup>             |
| 7S | Rounded Paddle/Smooth Face Gloss <sup>1</sup>     |
| 7N | Witch's Hat/Narrow <sup>14</sup>                  |
| 7P | Witch's Hat/Wide <sup>14</sup>                    |

## 3. ACTUATOR COLOR

|    |       |
|----|-------|
| BL | Black |
| WH | White |
| RD | Red   |

## 4. BRACKET STYLE

|        |                                           |
|--------|-------------------------------------------|
| A      | Screw Mount <sup>5</sup>                  |
| B      | Screw Mount <sup>5,12</sup>               |
| C      | Screw Mount <sup>5</sup>                  |
| H      | Screw Mount <sup>5</sup>                  |
| NBL    | Nylon Black                               |
| WBL    | Water shedding Black <sup>4</sup>         |
| MBL    | Marine Style Black <sup>4,6</sup>         |
| FN     | Metal Snap-In <sup>5</sup>                |
| FN BLK | Black Metal Snap-In <sup>5</sup>          |
| FN SS  | Stainless Steel Snap-In <sup>5</sup>      |
| FW     | Wide Stainless Steel Snap-In <sup>5</sup> |

Notes:

- 1 FN, & FW brackets only.
- 2 For single pole switch in a single pole base, specify TIL with single pole circuitry/rating/termination.
- 3 NBL, WBL, & MBL brackets only. With 6M actuator, brackets also will be matte finish.
- 4 6M & 6S actuators only
- 5 Not available with 6M & 6S actuators.
- 6 Consists of WBL bracket, neoprene seal, and dummy rivets at open holes. Consult factory for agency approval status.
- 7 All ratings are appropriate for usage in low voltage applications.
- 8 For additional special circuits, see catalog.
- 9 Custom colors are available, consult factory.
- 10 .187 tab and PC terminations are also available. Consult factory for catalog number callout.
- 11 ( ) momentary
- 12 Not available with WBL or MBL style brackets.
- 13 Available with bracket A, C or H only.
- 14 Not available with MBL, WBL or H brackets. Can be supplied as a double rocker to control separate poles of a TIG,TIH or TII switch. Consult factory for details.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Ordering Scheme

Sample Part Number LTILA51 - 6M - BL - RC - MBL - 12V

Selection 1 2 3 4 5 6

## 1. SERIES

10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC, 15A 15-28VDC

illuminated Single Pole in Double Pole base

| solder lug | .250 tab | screw term. | wire leads |               |
|------------|----------|-------------|------------|---------------|
| LTILA50    | LTILA51  | LTILA54     | LTILA55    | On-None-Off   |
| LTILA5A    | LTILA5B  | LTILA5E     | LTILA5F    | (On)-None-Off |
| LTILA5L    | LTILA5M  | LTILA5S     | LTILA5T    | On-None-(Off) |
| LTILB50    | LTILB51  | LTILB54     | LTILB55    | On-None-On    |
| LTILB5A    | LTILB5B  | LTILB5E     | LTILB5F    | On-None-(On)  |
| LTILC50    | LTILC51  | LTILC54     | LTILC55    | On-Off-On     |
| LTILC5A    | LTILC5B  | LTILC5E     | LTILC5F    | On-Off-(On)   |
| LTILC5L    | LTILC5M  | LTILC5S     | LTILC5T    | (On)-Off-(On) |

illuminated Double Pole

| solder lug | .250 tab | screw term | wire leads |  |
|------------|----------|------------|------------|--|
| LTIGK50    | LTIGK51  | LTIGK54    | LTIGK55    |  |
| LTIGK5A    | LTIGK5B  | LTIGK5E    | LTIGK5F    |  |
| LTIGK5L    | LTIGK5M  | LTIGK5S    | LTIGK5T    |  |
| LTIGL50    | LTIGL51  | LTIGL54    | LTIGL55    |  |
| LTIGL5A    | LTIGL5B  | LTIGL5E    | LTIGL5F    |  |
| LTIGM50    | LTIGM51  | LTIGM54    | LTIGM55    |  |
| LTIGM5A    | LTIGM5B  | LTIGM5E    | LTIGM5F    |  |
| LTIGM5L    | LTIGM5M  | LTIGM5S    | LTIGM5T    |  |

Additional ratings up to 12A 250VAC, 17A 125 VAC, 3/4 HP 125 VAC, 1HP 250VAC are available. Consult factory for specifics. Three pole switch is also available: Substitute H for fourth digit of part number. ex. LTIHK51

## 2. ACTUATOR STYLE 4

|    |                                                |
|----|------------------------------------------------|
| 1S | Angular/Smooth Face Gloss <sup>1</sup>         |
| 1C | Angular/Cross Serrations Gloss <sup>1</sup>    |
| 1L | Angular/Longline Serrations Gloss <sup>1</sup> |
| 6M | Curved/Smooth Face Matte <sup>3</sup>          |
| 6S | Curved/Smooth Face Gloss <sup>3</sup>          |
| 7S | Rounded Paddle/Smooth Face Gloss <sup>2</sup>  |

## 5. BRACKET STYLE 11

|        |                                        |
|--------|----------------------------------------|
| NBL    | Nylon Black                            |
| WBL    | Water shedding Black <sup>5</sup>      |
| MBL    | Marine Style Black <sup>5,8</sup>      |
| FN     | Metal Snap-In <sup>4,6</sup>           |
| FN BLK | Black Metal Snap-In <sup>4,6</sup>     |
| FN SS  | Stainless Steel Snap-In <sup>4,6</sup> |

## 3. ACTUATOR COLOR 11

|    |       |
|----|-------|
| BL | Black |
| WH | White |
| RD | Red   |

## 4. LENS COLOR 13

|    |                    |
|----|--------------------|
| AM | Amber              |
| LU | Blue <sup>7</sup>  |
| RC | Red                |
| CL | Clear              |
| GN | Green <sup>7</sup> |
| WH | White              |

## 6. LAMP VOLTAGE

|                   |          |      |          |             |
|-------------------|----------|------|----------|-------------|
| neon <sup>9</sup> |          |      |          |             |
| 125N              | 125 volt | 250N | 250 volt |             |
| incandescent      |          |      |          |             |
| 6V                | 6 volt   | 12V  | 12 volt  | 18V 18 volt |
| 24V               | 24 volt  | 28V  | 28 volt  |             |

### Notes:

- 1 NBL, FN, & FW brackets only. Double pole circuits provided with 3 pole base.
- 2 LTIL-Series with NBL, FN, & FW brackets only.
- 3 NBL, WBL, & MBL brackets only. With 6M actuator, bracket will also be matte finish.
- 4 1S, 1C, 1L & 7S with NBL bracket only available with LTIL-Series.
- 5 6M, 6S actuators only.
- 6 Not available with 6M and 6S actuators.
- 7 Not recommended with neon lamps.
- 8 Consists of WBL bracket, neoprene seal, dummy rivets at open holes. Consult factory for agency approval status.
- 9 Not recommended with blue or green lenses.
- 10 All ratings are appropriate for usage in low voltage applications.
- 11 Custom colors and additional bracket styles are available, consult factory.
- 12 ( ) - momentary
- 13 All double throw circuits supplied with two lenses. To specify two different lens colors, specify second color, after first color. (ex. LTIGM51-6S-BL-RC/GN-WBL-12V)
- 14 .187 tab and PC terminations are also available. Consult factory for catalog number callout.

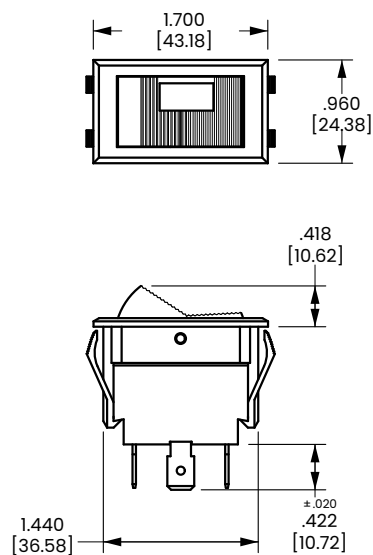
 [Configure Complete Part Number >](#)

 [Browse Standard Parts >](#)

# Dimensional Specs

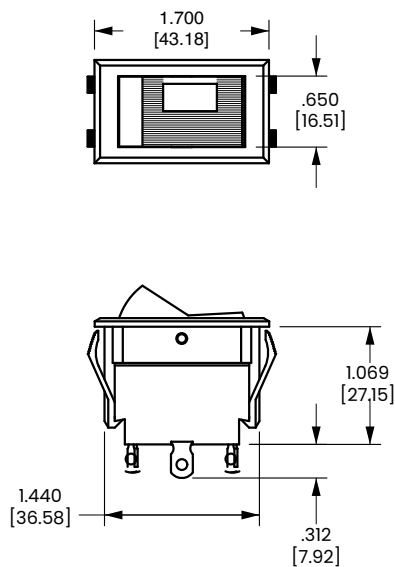
inches [millimeters]

**1C**  
CROSS-LINE W/ONE LENS



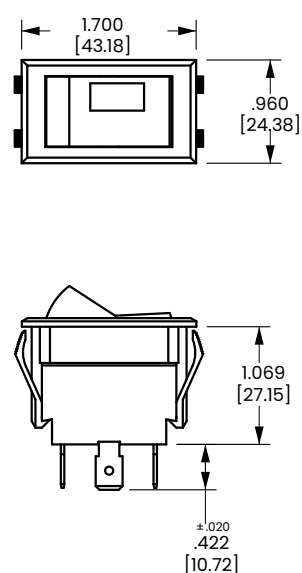
WITH .250 TAB  
TERMINALS  
AND NBL BRACKET

**1L**  
LONG-LINE W/ONE LENS



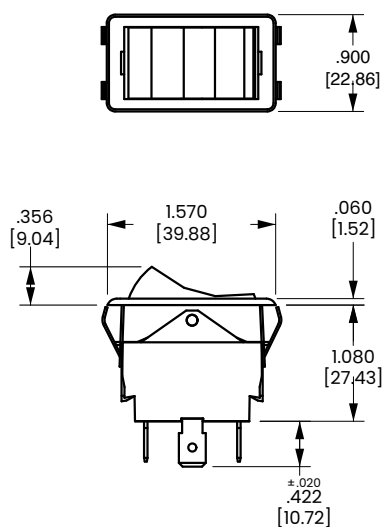
WITH SOLDER LUG  
TERMINAL  
AND NBL BRACKET

**1S**  
SMOOTH W/ONE LENS



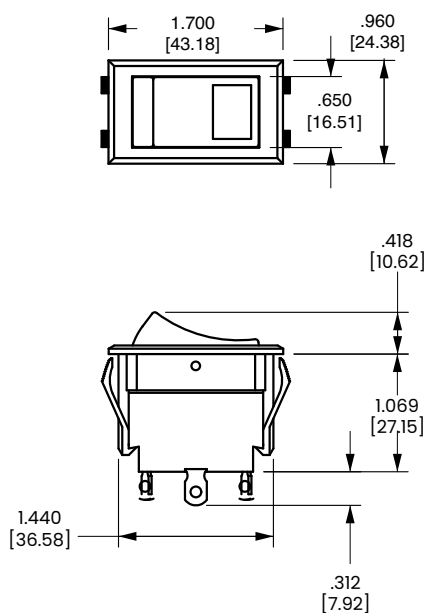
WITH .250 TAB  
TERMINALS  
AND NBL BRACKET

**1F**  
FLATTED STYLE NO LENS



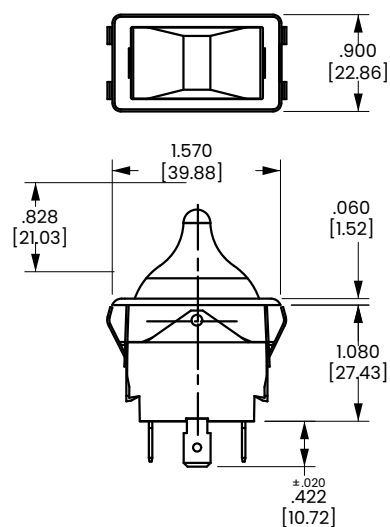
WITH .250 TAB  
TERMINALS  
AND FN BRACKET

**6M, 6S**  
CURVED W/ONE LENS



WITH SOLDER LUG  
TERMINALS  
AND NBL BRACKET

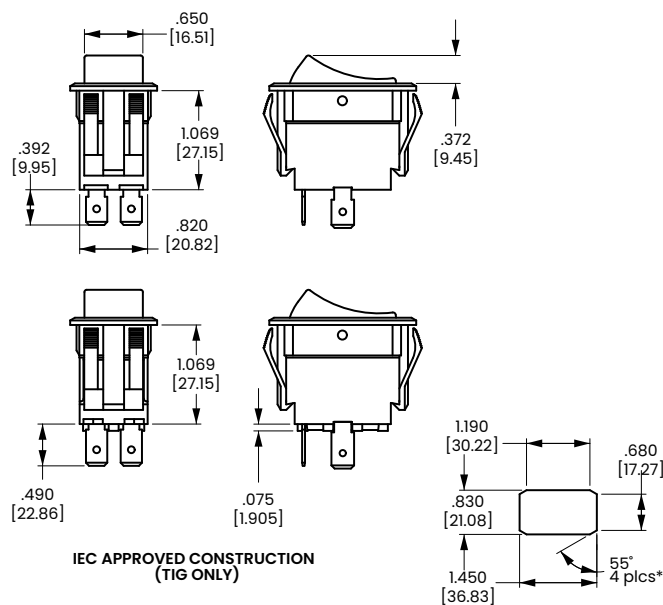
**7S**  
TOGGLE-STYLE W/ONE LENS



WITH .250 TAB  
TERMINALS  
AND FN BRACKET

# Dimensional Specs

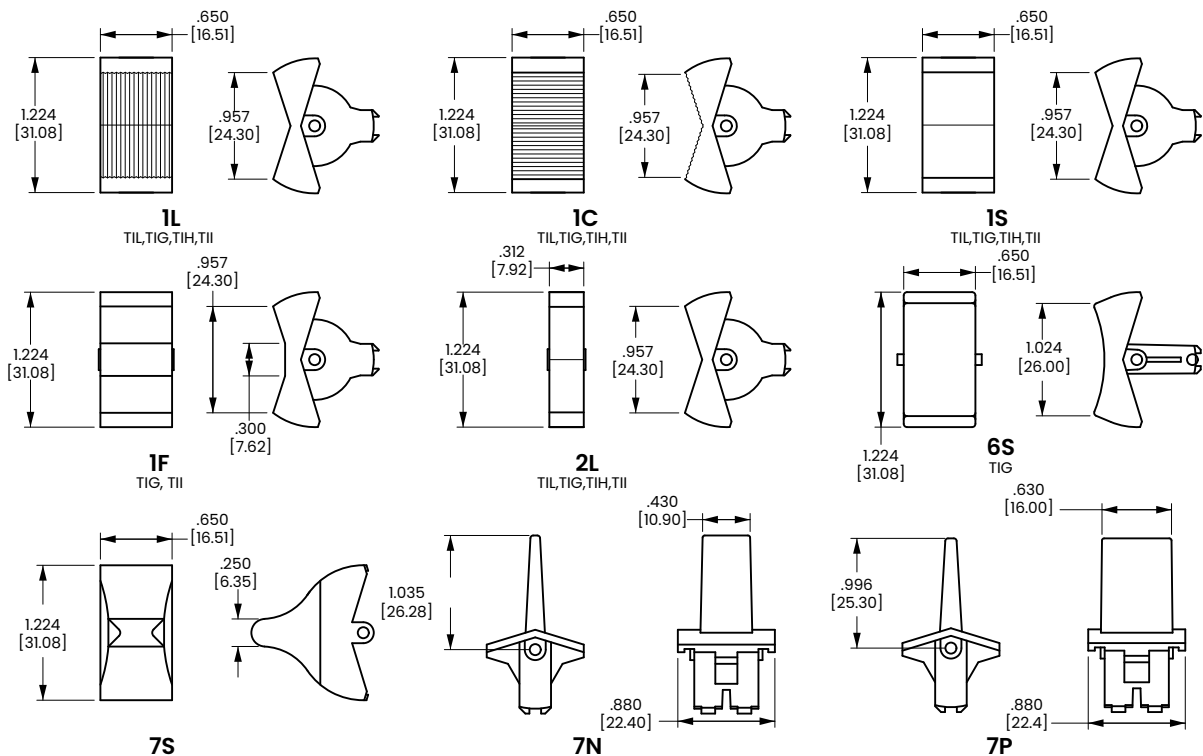
inches [millimeters]



|                   |                 |                 |
|-------------------|-----------------|-----------------|
|                   |                 |                 |
| SOLDER LUG        | .250 TAB (Q.C.) | .187 TAB (Q.C.) |
| TERMINAL TYPE     |                 |                 |
|                   |                 |                 |
| SCREW (ASSEMBLED) | WIRE LEAD       | PRINTED CIRCUIT |

**MOUNTING HOLE**  
(Nylon Snap-in Brackets)  
Panel Thickness:  
.030 min. - .250 max.  
Switch should be mounted at 90°  
for maximum water shedding  
(45° to 90° acceptable)

\* Angled corners are  
suggested for optimum fit.  
Standard rectangular  
cutout is acceptable.



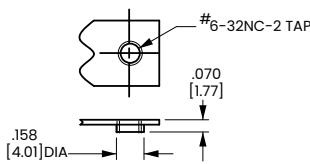
## SPECIAL CIRCUITS FOR TIPPETTE ROCKER SWITCHES

| Circuit                            | Position 1         | Position 2       | Position 3   |
|------------------------------------|--------------------|------------------|--------------|
| Progressive Two Circuit            |                    |                  |              |
| GG                                 | Both Circuits ON   | One Circuit ON   | OFF          |
| GG                                 | Both Circuits (ON) | One Circuit ON   | OFF          |
| Single Pole Triple Throw           |                    |                  |              |
| GE                                 | ON                 | ON               | ON           |
| Two Circuit                        |                    |                  |              |
| GH                                 | Circuit 1 ON       | Both Circuits ON | Circuit 2 ON |
| GP                                 | Circuit 2 ON       | Circuit 1 ON     | OFF          |
| Reversing Double Pole Double Throw |                    |                  |              |
| GO                                 | ON                 | OFF              | ON           |
| GX                                 | ON                 | NONE             | ON           |

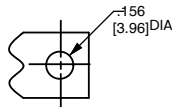
( ) Indicates momentary function.

# Dimensional Specs

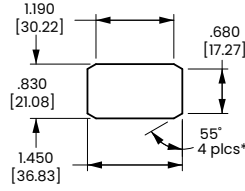
inches [millimeters]



**TAPPED HOLE**  
Standard with  
A & B Brackets



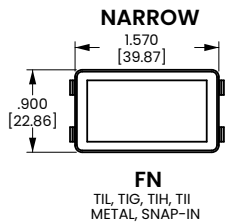
**CLEARANCE HOLE**  
Standard with  
C Bracket



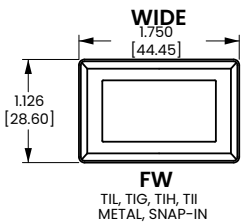
**MOUNTING HOLE**  
(Nylon Snap-in Brackets)  
Panel Thickness:  
.030 min. - .250 max.

\* Angled corners are suggested for optimum fit. Standard rectangular cutout is acceptable.

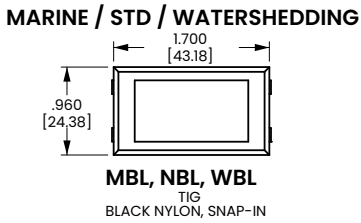
| TIL | TIG | TII | TIH |
|-----|-----|-----|-----|
|     |     |     |     |
|     |     |     |     |
|     |     |     |     |
|     |     |     |     |



**FN**  
TIL, TIG, TIH, TII  
METAL, SNAP-IN



**FW**  
TIL, TIG, TIH, TII  
METAL, SNAP-IN



**MBL, NBL, WBL**  
TIG  
BLACK NYLON, SNAP-IN



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# LS-Series

Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The LS-Series Softspot illuminated rocker switches feature a three-color high brightness light sequence, from a single lamp. These switches are designed with a standard nylon snap-in bracket and “Drip-Dry” construction that protects the front panel from dust and moisture.

**1**

Pole

**10-15**

Amps

**125-250**

VAC Max

**12-28**

VDC Max

## Typical Applications

• On/Off-Highway • Marine



# Tech Specs

## Dielectric Strength

1000V - live to dead metal parts

## Electrical Life

50,000 cycles - maintained  
25,000 cycles - momentary

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

LS1522 - 13 - BL - BL - 012

Selection

1

2

3

4

5

### 1. SERIES

| 10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC, 15A 12-28VDC | Solder Lug | .250 Tab QC | Screw Terms | Wire Leads |
|---------------------------------------------------------|------------|-------------|-------------|------------|
| Single Pole                                             |            |             |             |            |
| On-None-Off                                             | LS1510     | LS1511      | LS1514      | LS1515     |
| On-None-(Off)                                           | LS1520     | LS1521      | LS1524      | LS1525     |
| (On)-None-Off                                           | LS1530     | LS1531      | LS1534      | LS1535     |
| On-None-On                                              | LS1540     | LS1541      | LS1544      | LS1545     |
| On-None-(On)                                            | LS1550     | LS1551      | LS1554      | LS1555     |
| On-Off-On                                               | LS1560     | LS1561      | LS1564      | LS1565     |
| On--Off-(On)                                            | LS1570     | LS1571      | LS1574      | LS1575     |
| (On)-Off-(On)                                           | LS1580     | LS1581      | LS1584      | LS1585     |

### 2. LIGHTING SEQUENCE

| position 1 | position 2 | position 3 | 31 green | clear | red   |
|------------|------------|------------|----------|-------|-------|
| 01 red     | red        | red        | 32 green | clear | amber |
| 02 amber   | amber      | amber      | 33 green | clear | green |
| 03 green   | green      | green      | 34 green | clear | blue  |
| 10 red     | ---        | none       | 35 green | clear | clear |
| 11 red     | clear      | red        | 40 blue  | ---   | none  |
| 12 red     | clear      | amber      | 41 blue  | clear | red   |
| 13 red     | clear      | green      | 42 blue  | clear | amber |
| 14 red     | clear      | blue       | 43 blue  | clear | green |
| 15 red     | clear      | clear      | 44 blue  | clear | blue  |
| 20 amber   | ---        | none       | 45 blue  | clear | clear |
| 21 amber   | clear      | red        | 50 clear | ---   | none  |
| 22 amber   | clear      | amber      | 51 clear | clear | red   |
| 23 amber   | clear      | green      | 52 clear | clear | amber |
| 24 amber   | clear      | blue       | 53 clear | clear | green |
| 25 amber   | clear      | clear      | 54 clear | clear | blue  |
| 30 green   | ---        | none       | 55 clear | clear | clear |

### 3. ACTUATOR COLOR

BL Black WH White

### 4. BASE COLOR

BL Black WH White

### 5. LAMP VOLTAGE 2

| incandescent | neon               |
|--------------|--------------------|
| 6V 6 volt    | 125N 125 volt neon |
| 12V 12 volt  | 250N 250 volt neon |
| 18V 18 volt  |                    |
| 24V 24 volt  |                    |
| 28V 28 volt  |                    |

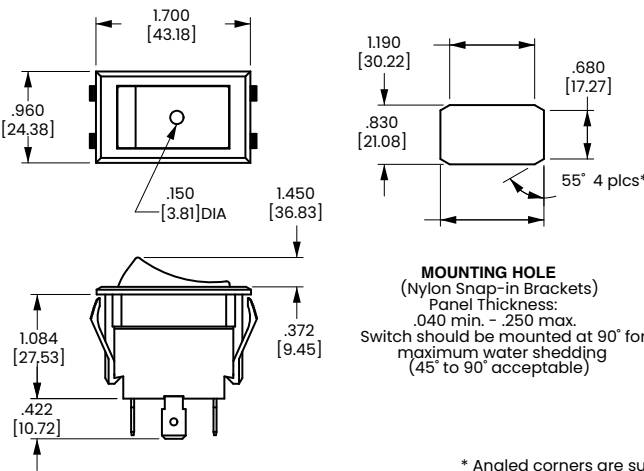
- 1 Independent lamp is standard. Dependent lamp with ON-OFF function (including momentary) is available with Lighting Sequences 10, 20, 30, 40 and 50. (No light in OFF position.)
- 2 Green and blue not recommended with 125 volt or 250 volt neon lamps.
- 3 Additional terminations available. Consult factory.
- 4 Custom colors available. Consult factory.
- ( ) Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



|                   |                 |                 |
|-------------------|-----------------|-----------------|
|                   |                 |                 |
| SOLDER LUG        | .250 TAB (Q.C.) | .187 TAB (Q.C.) |
| TERMINAL TYPE     |                 |                 |
|                   |                 |                 |
| SCREW (ASSEMBLED) | WIRE LEAD       | PRINTED CIRCUIT |

\* Angled corners are suggested for optimum fit.  
Standard rectangular cutout is acceptable.

# S-Series

Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



S-Series rocker switches are designed for use in the enclosed cabs of today's trucks, with special focus afforded to the vehicle operator. With features including abbreviated travel ½ throw actuation, ergonomic rockers, illumination in up to three detent switch positions, and a non-teasable snap action circuit, these switches provide the driver with easily recognizable and simple to operate controls.

**1-2**  
Poles

**.4-10**  
Amps

**12-28**  
VDC Max

## Typical Applications

• On/Off-Highway    • Marine

# Tech Specs

## Electrical

|                       |                                                                                                             |
|-----------------------|-------------------------------------------------------------------------------------------------------------|
| Contact Rating        | 10A @ 28VDC                                                                                                 |
| Dielectric Strength   | 1500 Volts RMS between pole to pole                                                                         |
| Insulation Resistance | 50 Megaohms                                                                                                 |
| Contact Resistance    | 10 milliohms max. @ 4VDC                                                                                    |
| Contact Bounce        | <20 milliseconds                                                                                            |
| Life                  | 100,000 cycles maintained circuit, 50,000 cycles momentary circuit at rated voltage and current gold plated |
| Circuitry             | SP, DP 2 & 3 position, 1/2 or full throw                                                                    |
| Terminals             | .110 Tabs, Silver Plated Brass                                                                              |

## Physical

|         |                                                                                         |
|---------|-----------------------------------------------------------------------------------------|
| Lighted | LED - rated 100,000 hours 1/2 life (LED is internally ballasted for voltages to 24VDC.) |
| Bracket | Acetal                                                                                  |
| Base    | Nylon 66 GF                                                                             |
| Rocker  | Polycarbonate                                                                           |
| Weight  | 25 gms max.                                                                             |

## Connector

Amp/Tyco MCP 2.8 receptacle housing P/N 1418994-1 mates with Amp/Tyco MCP 2.8 flat type receptacle. Based on wire size, choose P/N below:

|            |                  |
|------------|------------------|
| 1-968880-1 | 20-24 awg wire   |
| 1-968849-1 | 17-20 awg wire   |
| 1-968851-1 | 13.5-17 awg wire |

## Actuator Travel (Angular Displacement)

|                         |                 |
|-------------------------|-----------------|
| 2 position (1/2 throw)  | 12°             |
| 3 position (full throw) | 12° from center |

## Environmental

|                        |                                                                                                                                    |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temp.        | -40°C to +85°C                                                                                                                     |
| Vibration              | Per IEC 68-2.6 test Fc and 68-2.47 Test Criteria - no noise or contact chatter below 10ms.                                         |
| Cold Test              | Per IEC 68-2-1 -40°C for 72 hours Test Criteria - pre & post test contact resistance.                                              |
| Dry Heat Test Criteria | Per IEC 68-2-2 + 85°C for 72 hours Test Criteria - no loss of circuit during test, pre & post test contact resistance.             |
| Handling Shock         | Drop from height of 1 meter, 3 times, 4 sides. Test criteria - No loss of circuit during test, pre & post test contact resistance. |
| Thermal Shock          | Per IEC 68-2-14, -40°C to +85°C. Test criteria - pre & post test contact resistance.                                               |

## Mounting Specifications

|               |                                                             |
|---------------|-------------------------------------------------------------|
| Snap in Mount | 40mm x 20mm keyed hole (see dimensional specs for details.) |
|---------------|-------------------------------------------------------------|

# Ordering Scheme

Sample Part Number **S 18 A A R F 0 4 - M Z Z Z 00 - 1 00 00**

Selection 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

## 1. SERIES

**S**

## 2. CIRCUIT

Terminal Connections as viewed ( ) - momentary from bottom of switch:

1 - - 2 SP - single pole uses terminals 3, 5 & 7.  
3 - - 4 DP - double pole uses terminals 3, 5, 7 & 4, 6, 8.  
5 - - 6  
7 - - 8  
9 - - 10

**Position:**

| SP | DP | 1            | 2                   | 3            |
|----|----|--------------|---------------------|--------------|
| 16 | 26 | 5 & 7, 6 & 8 | Connected Terminals | 3 & 5, 4 & 6 |
| 18 | 28 | ON           | OFF                 | ON           |
|    |    | (ON)         | OFF                 | (ON)         |

### SPECIAL CIRCUITS

|      | 1              | 2            | 3              |
|------|----------------|--------------|----------------|
| 31   | (6 & 8)        | 4, 5, 6, 7   | OFF            |
| 41   | ON             | OFF          | NONE 1         |
| 42   | (ON)           | OFF          | NONE 1         |
| 43   | (ON)           | 3 & 5        | NONE 1         |
| 44   | ON             | 3 & 5        | NONE 1         |
| 45   | (ON)           | OFF          | ON             |
| 46   | NONE           | 5 & 7        | ON             |
| 47   | NONE           | 5 & 7        | (ON)           |
| 75   | (5 & 7, 3 & 6) | 5 & 7, 4 & 6 | (3 & 5, 4 & 6) |
| 98 2 | (5 & 7, 2 & 6) | 5 & 7, 4 & 6 | (5 & 9, 4 & 6) |

## 3. RATING

**1** 0.4VA 28VDC Resistive  
**A** 3 10.5mA 1.5A 28VDC,  
5A 28V 50A Inrush Lamp Load  
**B** 4 3.5A 28VDC, 18A Inrush  
**C** 3 10mA 10A 28VDC  
**D** 3 20mA 10A 14VDC

## 4. ILLUMINATION

|          | Lamps    | Illumination Type         | Lamp wired to Terminals |
|----------|----------|---------------------------|-------------------------|
| <b>S</b> | NONE     | INDEPENDENT               | -                       |
| <b>A</b> | 1        | INDEPENDENT               | 1 (+) 2 (-)             |
| <b>C</b> | 1        | INDEPENDENT               | 1 (+) 2 (-)             |
|          | 2        | INDEPENDENT               | 9 (+) 2 (-)             |
| <b>D</b> | 1        | INDEPENDENT               | 1 (+) 2 (-)             |
|          | 2        | INDEPENDENT               | 9 (+) 10 (-)            |
| <b>E</b> | 1 & 3    | INDEPENDENT               | 1 (+) 2 (-)             |
|          |          | PARALLEL                  |                         |
| <b>F</b> | 1        | INDEPENDENT               | 1 (+) 10 (-)            |
|          |          | SNAP                      |                         |
| <b>G</b> | 1 & 2    | INDEPENDENT               | 1 (+) 10 (-)            |
|          |          | DEPENDENT                 | 9 (+) 2 (-)             |
| <b>H</b> | 1 & 2    | INDEPENDENT               | 1 (+) 2 (-)             |
|          |          | DEPENDENT                 | 9 (+) 10 (-)            |
| <b>J</b> | 1, 2 & 3 | INDEPENDENT               | 1 (+) 2 (-)             |
|          |          | DEPENDENT                 | 5 (+) 10 (-)            |
|          |          | INDEPENDENT               | 1 (+) 2 (-)             |
| <b>K</b> | 1 & 2    | INDEPENDENT               | 1 (+) 2 (-)             |
|          |          | INDEPENDENT               | 9 (+) 10 (-)            |
|          |          | 3.3K RESISTOR IN PARALLEL |                         |

## 5,6,7. LAMP (SAME CODING FOR ALL 3 SELECTIONS)

Selection 5: specifies lamp 1 located above terminals 1 (+) & 2 (-).  
Selection 6: specifies lamp 2 located in center of rocker.  
Selection 7: specifies lamp 3 located above terminals 9 (+) & 10 (-).

| No lamp LED | 0        | Red      | Orange   | Yellow   | Green |
|-------------|----------|----------|----------|----------|-------|
| 12VDC       | <b>A</b> | <b>C</b> | <b>E</b> | <b>H</b> |       |
| 24VDC       | <b>B</b> | <b>D</b> | <b>F</b> | <b>J</b> |       |

## 8. BRACKET COLOR

**1** Black **4** Dark Carbon

## 9. ACTUATOR

Standard Rocker, Laser Etched  
Black Titan Gray Dark Carbon  
**M** **N** **R**

## 10, 11, 12. LEGEND COLOR

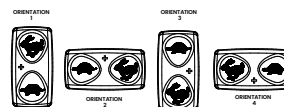
**Z** No Legend **1** Clear

## 13. LEGEND 1

**00** No legend

## 14. LEGEND ORIENTATION

**0** No legend  
**1** Orientation 1  
**2** Orientation 2  
**3** Orientation 3  
**4** Orientation 4



## 15,16. LEGEND 2,3

**00** No legend

### Notes:

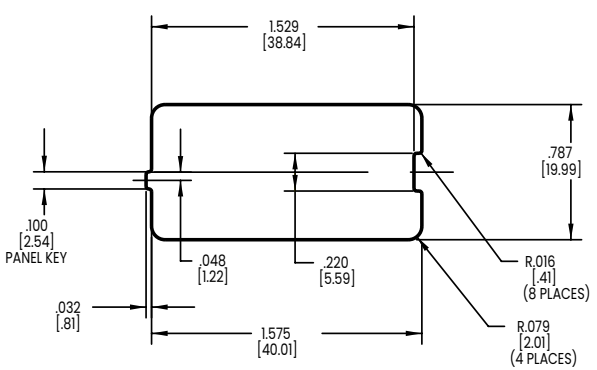
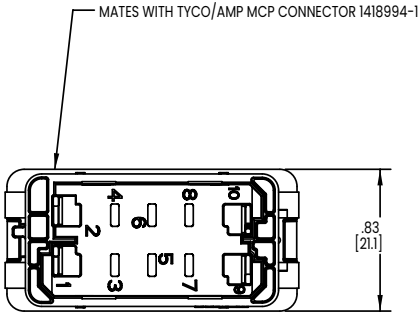
- 1 Indicates 1/2 travel for actuator.
- 2 Snap-Action Contact Mechanism
- 3 Not available with circuit 98.
- 4 Available with circuit 98 only.
- 5 Located over T1-2.
- 6 Legend 2 located in center of rocker, Legend 3 located over T9-10. Legend 2 options are limited due to a very small marking area. Consult factory for specifics.

[Configure Complete Part Number >](#)

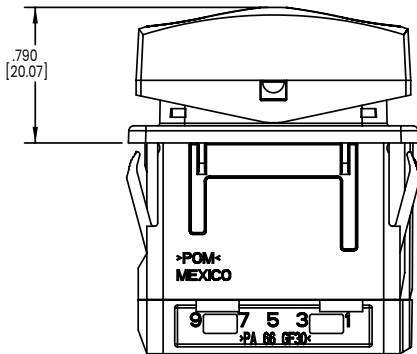
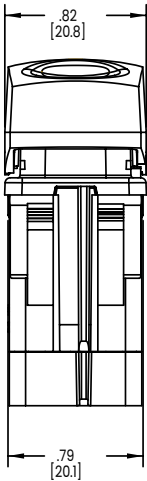
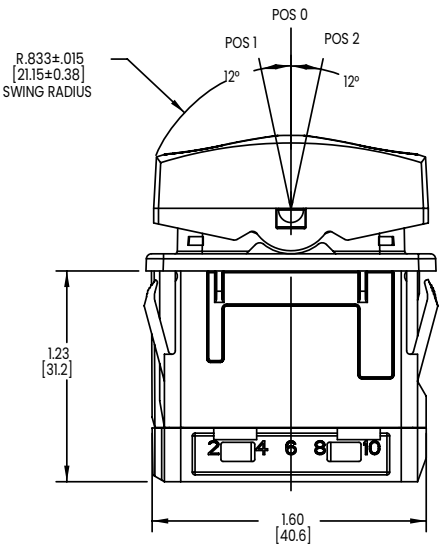
[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



PANEL THICKNESS: 2.5±0.1mm  
PANEL OPENING CLEARANCE: ±5°  
SCALE 2.000





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**Carling Technologies®**

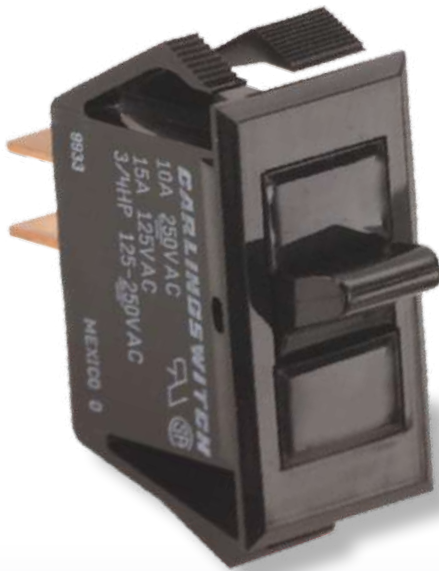
A Littelfuse® Brand

# T-Series

Single Pole Rocker & Paddle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The predecessor to the Corvette series whose versatility has allowed it to stand the test of time. Traditional styling coupled with self cleaning contacts, integrated wire leads, a multitude of circuits, ratings, and actuator choices has made the TA/LTA-Series appeal to a wide range of markets.

**1**

Pole

**5-20**

Amps

**125-250**

VAC

**6-28**

VDC

## Typical Applications

- Appliances
- On-Highway
- Medical Equipment
- HVAC
- Food Service

# Tech Specs

## Dielectric Strength

UL/CUL: 1000V-live to dead metal parts & opposite polarity

## Electrical Life

50,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample Part Number **TA201 - T B - B**

Selection 1 2 3 4

### 1. SERIES

10A 250 VAC, 15A 125 VAC, 3/4 HP 125-250 VAC  
Standard Base Solder Lugs .250 Tabs Wire Leads

ON-NONE-OFF **TA200** **TA201** **TA205**

ON-NONE-ON **TB200** **TB201** **TB205**

ON-OFF-ON **TC200** **TC201** **TC205**

5A 250 VAC, 10A 125 VAC, 1/2 HP 125-250 VAC

(ON)-NONE-OFF **TA10A** **TA10B** **TA10F**

ON-NONE-(OFF) **TA10L** **TA10M** **TA10T**

ON-NONE-(ON) **TB10A** **TB10B** **TB10F**

#### T-SERIES WITH PLUNGER ACTUATOR 1,2

10A 250 VAC, 16A 125 VAC, 1/2 HP 125-250 VAC

OFF-NONE-(ON) - **TA25B-PLB-B** **TA25F-PLB-B**

#### T SERIES WITH MOMENTARY ROCKER ACTUATOR

10A 250 VAC, 15A 125 VAC, 20A 125-250 VAC "H", 3/4 HP 125-250 VAC

(ON)-NONE-OFF - **TA22B-TLB-B** -

ON-NONE-(OFF) - **TA22M-TLB-B** -

### 3. ACTUATOR COLOR 5

**B** Black **W** White

### 4. BEZEL COLOR 5

**B** Black **W** White

#### Notes:

Imprinting is available. Consult factory.

1 Optional plunger support option is available for applications requiring extensive lateral travel, consult factory for details.

2 Maintained circuit not available with TA22 and TA25 Series.

3 .187 tab terminals also available. Consult factory for catalog number callout.

4 Additional ratings are available. Consult factory.

5 Additional colors are available. Consult factory.

( ) Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

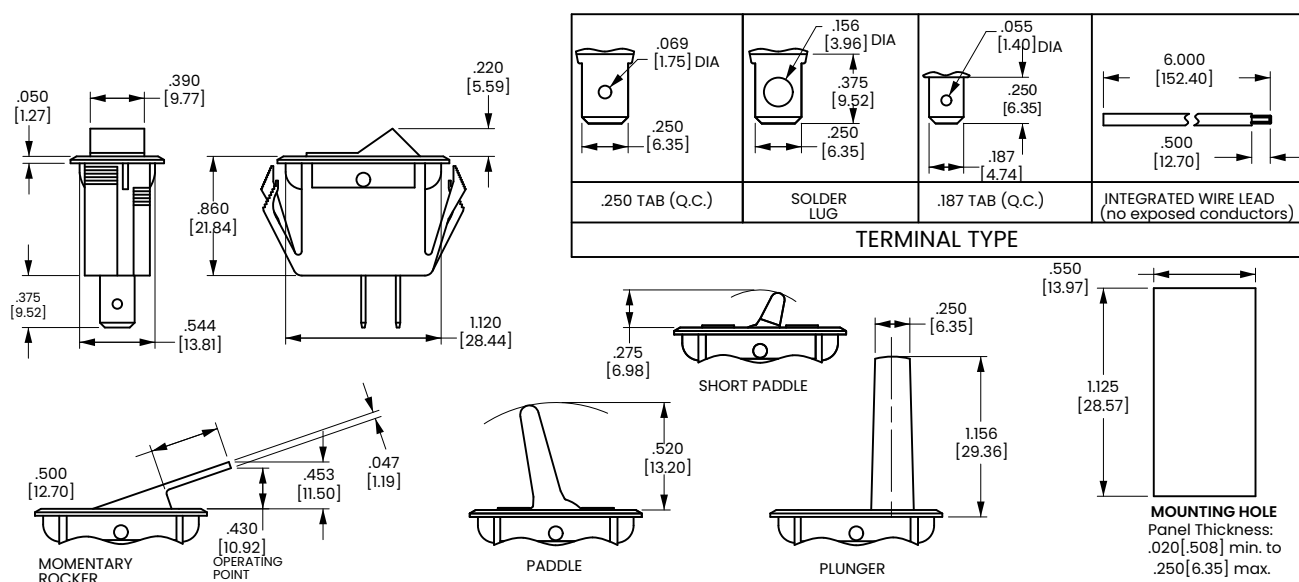
### 2. ACTUATOR STYLE

**T** Rocker  
**P** Paddle

**PS** Short Paddle

# Dimensional Specs

inches [millimeters]

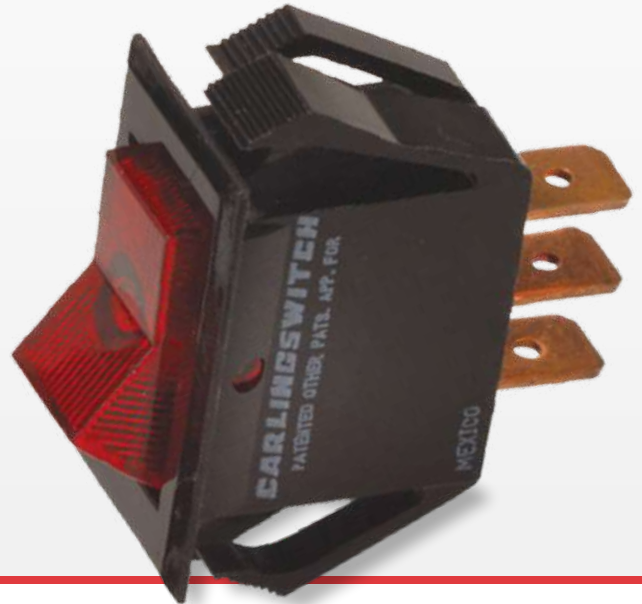


# LTA-Series

Single Pole Lighted Rocker & Paddle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The illuminated predecessor to the Corvette series whose versatility has allowed it to stand the test of time. Traditional styling coupled with self cleaning contacts, integrated wire leads, and various actuator choices has made the LTA-Series appeal to a wide range of markets.

**1**  
Pole

**10-15**  
Amps

**125-250**  
VAC

**6-24**  
VDC

## Typical Applications

- Appliances
- Transportation
- Medical
- HVAC
- Commercial Food



# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts  
750V - across open contacts

## Electrical Life

100,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

LTA201 - P R - B - A / 125N

Selection

1

2

3

4

5

6

### 1. SERIES

10A 250VAC; 15A 125VAC; 3/4 HP 125-250VAC

OFF-NONE-ON Solder Lugs LTA200 .250 Tabs LTA201 .187 Tabs LTA203 Wire Leads LTA205

### 2. ACTUATOR STYLE

3

T Rocker PS Short Paddle  
P Paddle

### 3. ACTUATOR COLOR

1

A Amber B Black 4  
C Clear W White 4  
R Red  
G Green 2

### 4. BEZEL COLOR

1

B Black W White

### 5. LENS COLOR

2,3

Blank No Lens -G Green  
-A Amber -R Red  
-C Clear -LU Blue

### 6. LAMP VOLTAGE

2

006V 6V incandescent 024V 24V incandescent  
012V 12V incandescent 125N 125V neon  
018V 18V incandescent 250N 250V neon

Notes:

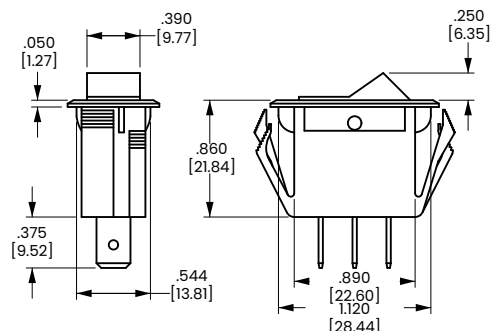
- 1 Additional ratings and colors are available. Consult factory for details.
- 2 Neon lamps not recommended with green or blue rocker/lenses.
- 3 Lens color is specified only if actuator style is P or PS. If style is T (rocker), then leave position 5 blank.
- 4 Available with paddle ("P & PS") style actuators only.

[Configure Complete Part Number >](#)

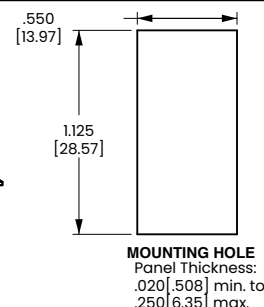
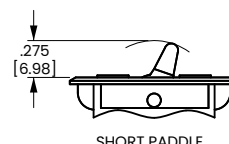
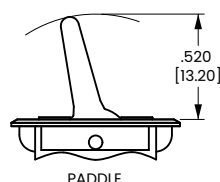
[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



|                                    |                                                   |                                                   |                                              |
|------------------------------------|---------------------------------------------------|---------------------------------------------------|----------------------------------------------|
| <br>.069 [1.75] DIA<br>.250 [6.35] | <br>.156 [3.96] DIA<br>.375 [9.52]<br>.250 [6.35] | <br>.055 [1.40] DIA<br>.250 [6.35]<br>.187 [4.74] | <br>6.000 [152.40]<br>.500 [12.70]           |
| .250 TAB (Q.C.)                    | SOLDER LUG                                        | .187 TAB (Q.C.)                                   | INTEGRATED WIRE LEAD (no exposed conductors) |
| TERMINAL TYPE                      |                                                   |                                                   |                                              |



# TG/LTG-Series

Single Pole Rocker & Paddle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The TG-Series Mid-Sized Tippet rocker switches are single or double pole and feature an all nylon construction. These switches are designed with snap-in mounting for fast, low cost assembly. The illuminated version (LTG) is available with either a paddle or rocker actuator. These AC rated switches are also suitable for low-voltage DC applications assuring compatibility for a wide range of markets.

**1-2**  
Poles

**5-15**  
Amps

**125-250**  
VAC

**6-28**  
VDC

## Typical Applications

- Appliances
- On-Highway
- Medical Equipment
- HVAC
- Commercial Food

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

## Electrical Life

50,000 cycles - maintained  
25,000 cycles - momentary

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample Part Number **LTG G O 50 1 - T B - B - R / 125**

Selection 1 2 3 4 5 6 7 8 9 10

### 1. SERIES

**TG** Double Pole, Non-Lighted  
**LTG** Double Pole with Indicator Lights

### 2. CIRCUIT

 see next page for diagram

TG available with circuits A, B, C, D, E, F  
LTG available with circuits G, H, I, J, M, N, P, Q, R, T, U, V, Y, Z.

### 3. CENTER POSITION

**C** Center OFF, Three position **O** No Center OFF, Two position

### 4. RATING

**40** 5A 250VAC, 10A 125VAC, 1/2HP 125-250VAC  
**41** 5A 250VAC, 10A 125VAC  
**50** 10A 250VAC, 15A 125VAC, 3/4HP 125-250VAC  
**51** 10A 250VAC, 15A 125VAC

### 5. TERMINATION / FUNCTION

|               | Solder Lug | .250 Tab QC | .187 Tab QC | Wire Leads |
|---------------|------------|-------------|-------------|------------|
| On-None-Off   | <b>O</b>   | <b>1</b>    | <b>3</b>    | <b>5</b>   |
| (On)-None-Off | <b>A</b>   | <b>B</b>    | <b>D</b>    | <b>T</b>   |
| On-None-(Off) | <b>L</b>   | <b>M</b>    | <b>R</b>    | <b>F</b>   |
| On-None-On    | <b>O</b>   | <b>1</b>    | <b>3</b>    | <b>5</b>   |
| On-None-(On)  | <b>A</b>   | <b>B</b>    | <b>D</b>    | <b>F</b>   |
| On-Off-On     | <b>O</b>   | <b>1</b>    | <b>3</b>    | <b>5</b>   |

### 6. ACTUATOR STYLE

**P** Paddle  
**T** Rocker

### 7. ACTUATOR COLOR

 2

**B** Black **W** White

### 8. BASE COLOR

 2

**B** Black **W** White

### 9. LENS COLOR

 3

**A** Amber **C** Clear **R** Red

### 10. LAMP VOLTAGE

| incandescent       | neon                      |
|--------------------|---------------------------|
| <b>6V</b> 6 volt   | <b>125N</b> 125 volt neon |
| <b>12V</b> 12 volt | <b>250N</b> 250 volt neon |
| <b>18V</b> 18 volt |                           |
| <b>24V</b> 24 volt |                           |
| <b>28V</b> 28 volt |                           |

#### Notes:

Imprinting is available. Consult factory.  
Panel Cut-Out Recommendations: For sheet metal panels, switch must enter panel in same direction as the punch. (Burr on bottom.) Test cut hole in actual material.

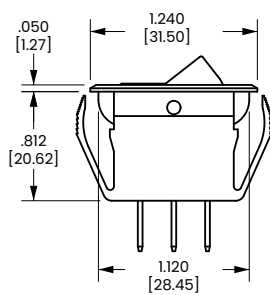
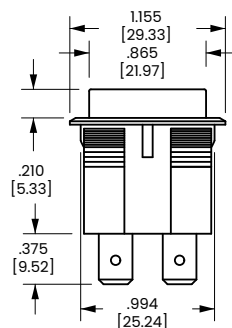
- 1 Custom colors are available. Consult factory.  
2 Specify lens color for LTG-Series only.  
( ) Indicates momentary function.

[Configure Complete Part Number >](#)

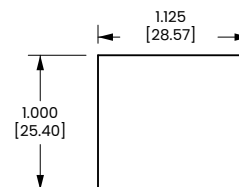
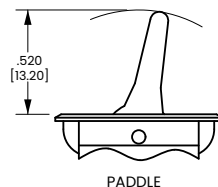
[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



|               |  |  |  |
|---------------|--|--|--|
|               |  |  |  |
| TERMINAL TYPE |  |  |  |

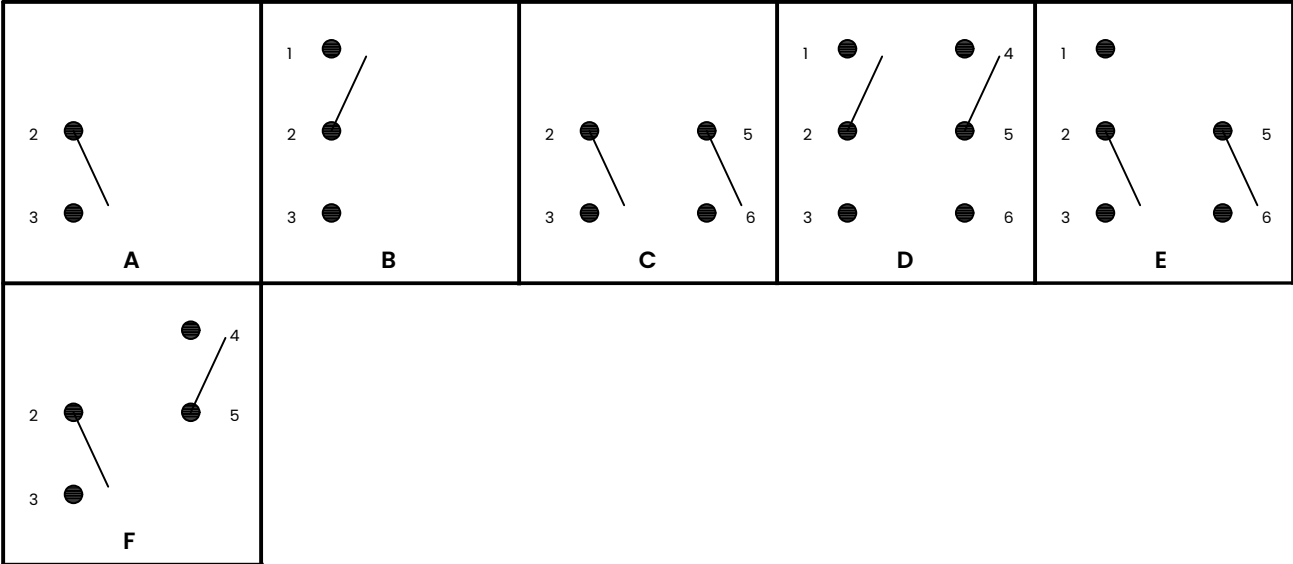


**MOUNTING HOLE**  
Panel Thickness:  
.030 [.762] min. to  
.250 [6.35] max.

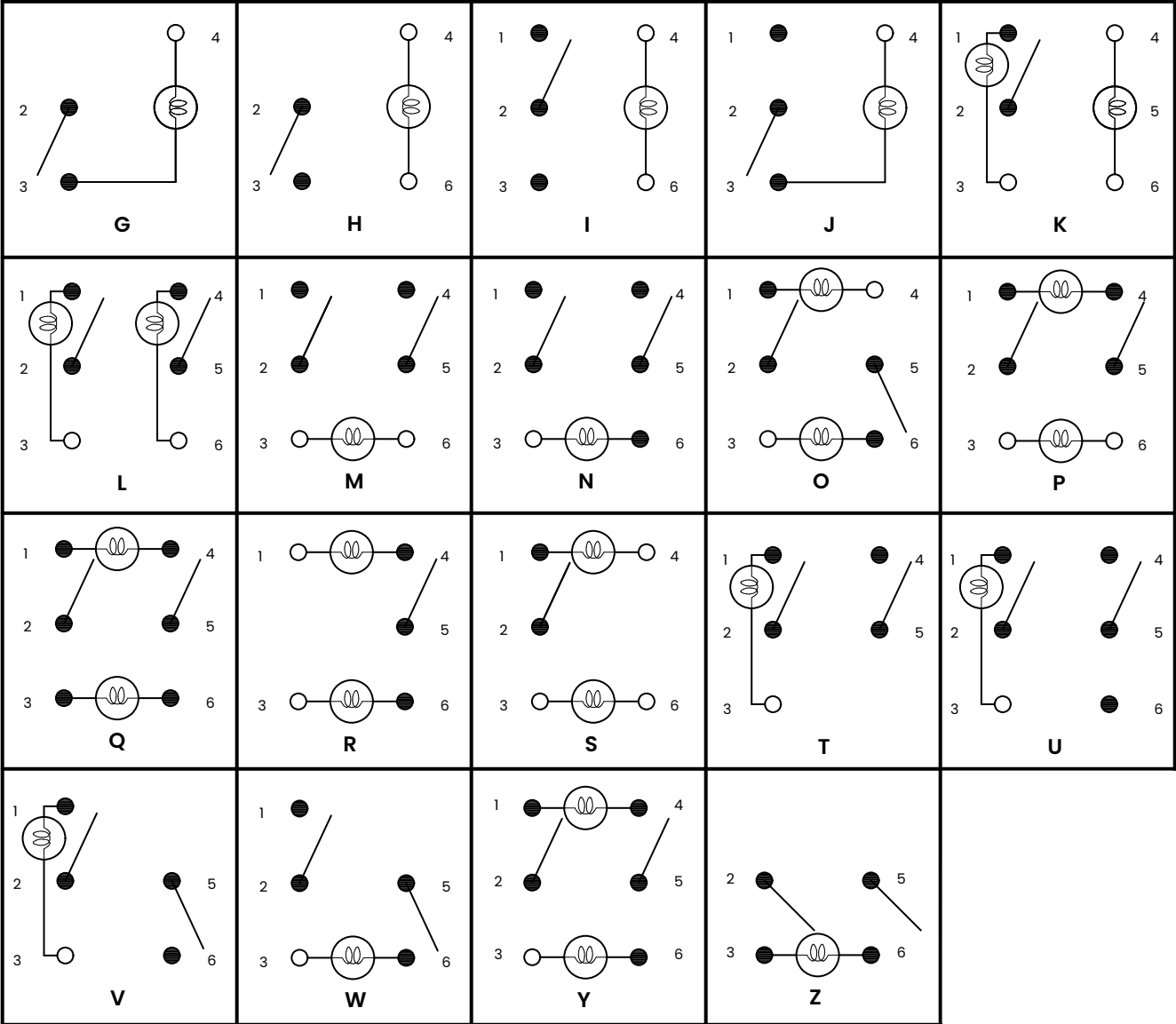
# Ordering Scheme Diagram

## 2. CIRCUIT

TG



LTG

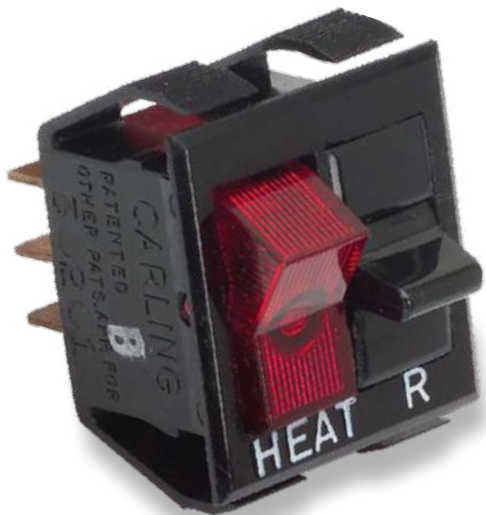


# TTG-Series

Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The TTG-Series Mid-Sized Tippette snap-in rocker switches consist of two single pole illuminated or non-illuminated switches in a common base. Each pole can have the same or different switch function. These switches are AC rated up to 15 amps and are also suitable for low-voltage DC applications, in a wide range of markets.

**2**  
Poles

**5-15**  
Amps

**125-250**  
VAC

**6-28**  
VDC

## Typical Applications

- Appliances
- Transportation
- Medical
- HVAC
- Commercial Food

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

## Electrical Life

50,000 cycles - maintained  
25,000 cycles - momentary

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample Part Number: **TTG T - TA 20 1 - T B - B / LTA 20 1 P B - B R / 125N**

Selection: 1 2 3 4 5 6 7 8 3 4 5 6 7 8 9 10

Base Only: TTG T - TA 20 1 - T B - B /  
Switch 1: LTA 20 1 P B - B R / 125N  
Switch 2: 125N

### 1. SERIES

**TTG** Two Single Pole switches in one base

### 2. CIRCUIT

See next page for diagram

Available with circuits A, B, C, D, E, F, L, T, U

### 3. BASIC SWITCH NUMBER

**TA** On-None-Off **TC** On-Off-On  
**TB** On-None-On **LTA** On-None-Off, Lighted

### 4. RATING

**10** 5A 250VAC, 10A 125VAC, 1/2HP 125-250VAC  
**20** 10A 250VAC, 15A 125VAC, 3/4HP 125-250VAC  
**21** 10A 250VAC, 15A 125VAC

### 5. TERMINATION / FUNCTION

|               | Solder Lug | .250 Tab QC | .187 Tab QC | Wire Leads |
|---------------|------------|-------------|-------------|------------|
| On-None-Off   | 0          | 1           | 3           | 5          |
| (On)-None-Off | A          | B           | D           | F          |
| On-None-(Off) | L          | M           | R           | T          |
| On-None-On    | 0          | 1           | 3           | 5          |
| On-None-(On)  | A          | B           | D           | F          |
| On-Off-On     | 0          | 1           | 3           | 5          |

### 6. ACTUATOR STYLE

**P** Paddle  
**T** Rocker  
**PS** Short Paddle

### 7. ACTUATOR COLOR

**unlighted**<sup>1</sup>  
**B** Black  
**W** White

**lighted**<sup>2</sup>  
**A** Amber  
**C** Clear  
**G** Green  
**LU** Blue  
**R** Red

### 8. BASE COLOR

**B** Black **W** White

### 9. LENS COLOR

**A** Amber **G** Green **R** Red  
**C** Clear **LU** Blue **W** White

### 10. LAMP VOLTAGE

**incandescent**  
**6V** 6 volt  
**12V** 12 volt  
**18V** 18 volt  
**24V** 24 volt  
**28V** 28 volt

**neon**  
**125N** 125 volt neon  
**250N** 250 volt neon

Notes: Imprinting is available. Consult factory. Panel Cut-Out Recommendations: For sheet metal panels, switch must enter panel in same direction as the punch. (Burr on bottom.) Test cut hole in actual material.

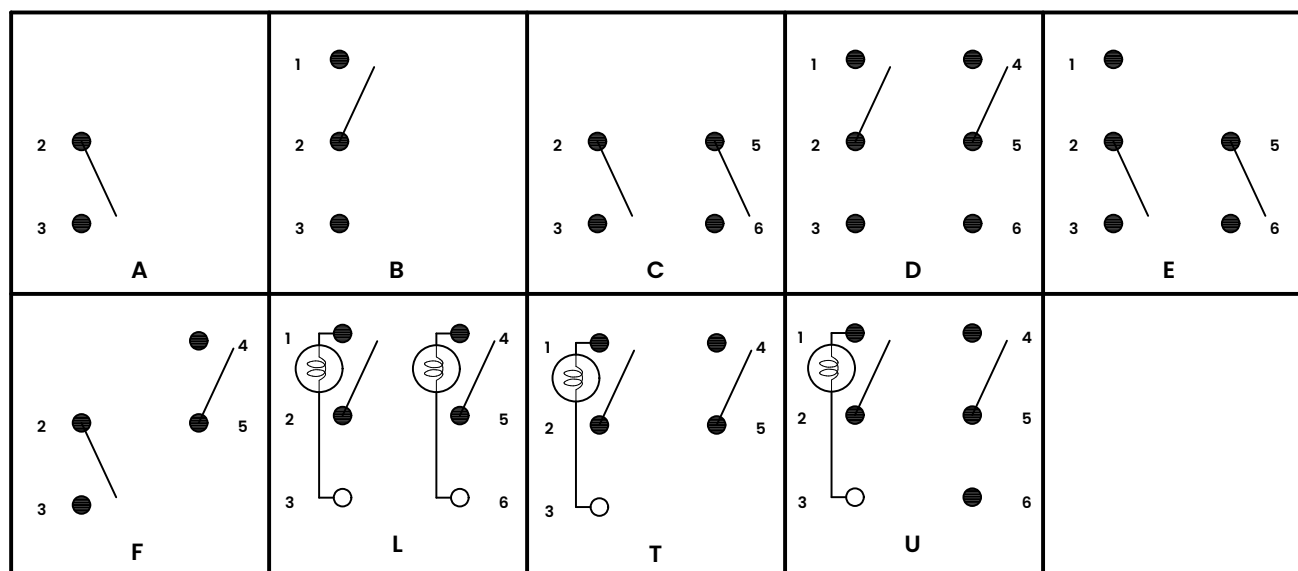
- <sup>1</sup> Custom colors are available. Consult factory.  
<sup>2</sup> Specify lens color for LTA with rocker only.  
<sup>3</sup> Specify lens color for LTA with paddle actuators only.  
( ) Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

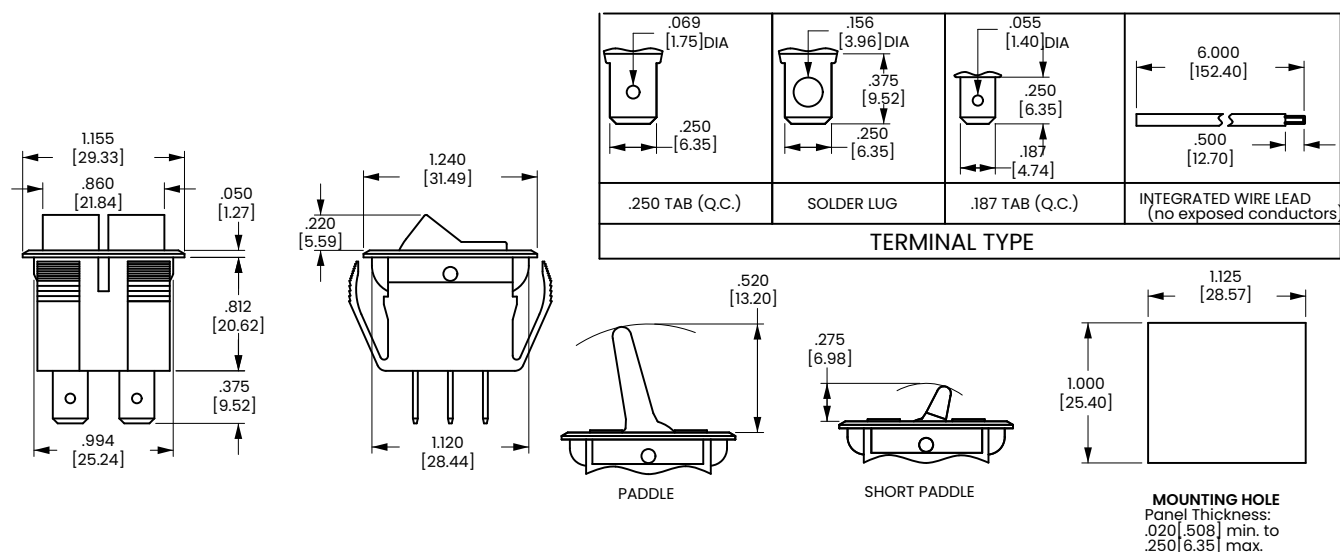
# Ordering Scheme Diagram

## 2. CIRCUIT



# Dimensional Specs

inches [millimeters]





**Littelfuse®**



**Carling Technologies®**

A Littelfuse® Brand

# TLG-Series

Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The TLG-Series Mid-Sized Tippette snap-in rocker switches are single pole, rocker or paddle actuated with an adjacent indicator light. These single-actuator-switches are AC rated to 15 amps and are also suitable for low voltage DC applications.

**1**

Pole

**5-15**

Amps

**125-250**

VAC

**6-28**

VDC

## Typical Applications

- Appliances
- Transportation
- Medical
- HVAC
- Commercial Food



# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

## Electrical Life

50,000 cycles - maintained  
25,000 cycles - momentary

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample Part Number **TLG G - D R - TA 20 1 - T B - B W / 125N**

Selection 1 2 3 4 5 6 7 8 9 10 11 12

### 1. SERIES

**TLG** Single Pole with adjacent Indicator Light

### 2. CIRCUIT

see next page for diagram

Available with circuits G, H, I, J, K

### 3. LENS DESIGN

**D** Diamond **L** Long Line

### 4. LENS COLOR

**A** Amber **G** Green **W** White  
**C** Clear **R** Red

### 5. BASIC SWITCH NUMBER

**TA** On-None-Off **TC** On-Off-On  
**TB** On-None-On **LTA** On-None-Off, Lighted

### 6. RATING

**10** 5A 250VAC, 10A 125VAC, 1/2HP 125-250VAC  
**20** 10A 250VAC, 15A 125VAC, 3/4HP 125-250VAC  
**21** 10A 250VAC, 15A 125VAC

### 7. TERMINATION / FUNCTION

|               | Solder Lug | .250 Tab QC | .187 Tab QC | Wire Leads |
|---------------|------------|-------------|-------------|------------|
| On-None-Off   | 0          | 1           | 3           | 5          |
| (On)-None-Off | A          | B           | D           | F          |
| On-None-(Off) | L          | M           | R           | T          |
| On-None-On    | 0          | 1           | 3           | 5          |
| On-None-(On)  | A          | B           | D           | F          |
| On-Off-On     | 0          | 1           | 3           | 5          |

### 8. ACTUATOR STYLE

**P** Paddle  
**T** Rocker  
**PS** Short Paddle

### 9. ACTUATOR COLOR

**unlighted**<sup>2</sup>  
**B** Black  
**W** White

**lighted**  
**A** Amber  
**C** Clear  
**G** Green  
**LU** Blue  
**R** Red

### 10. BASE COLOR

**B** Black **W** White

### 11. LENS COLOR

**A** Amber **G** Green **R** Red  
**C** Clear **LU** Blue **W** White

### 12. LAMP VOLTAGE

**incandescent**  
**6V** 6 volt  
**12V** 12 volt  
**18V** 18 volt  
**24V** 24 volt  
**28V** 28 volt

**neon**  
**125N** 125 volt neon  
**250N** 250 volt neon

Notes: Imprinting is available. Consult factory.  
Panel Cut-Out Recommendations: For sheet metal panels, switch must enter panel in same direction as the punch. (Burr on bottom.) Test cut hole in actual material.

<sup>1</sup> Neon Lamps not recommended with green or blue actuators and lenses.

<sup>2</sup> Custom colors are available. Consult factory.

<sup>3</sup> Specify lens color only if actuator is lighted paddle.

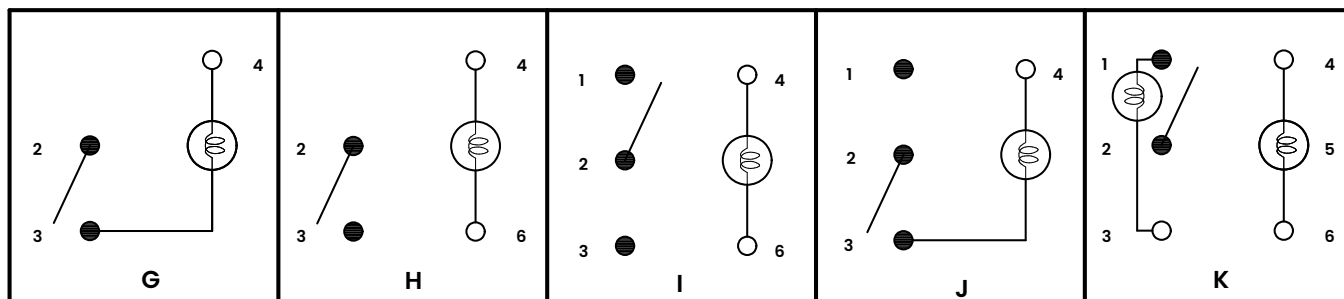
( ) Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

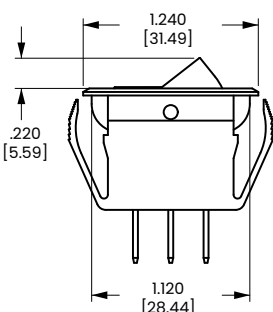
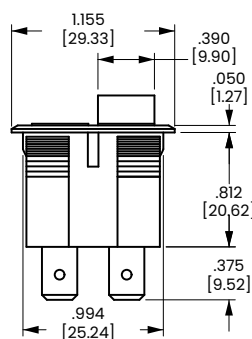
# Ordering Scheme Diagram

## 2. CIRCUIT

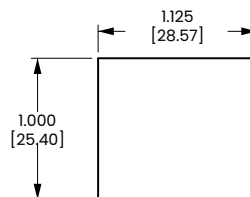
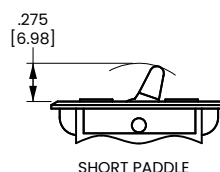
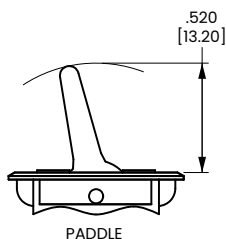


# Dimensional Specs

inches [millimeters]



|                                        |                                                        |                                                        |                                        |
|----------------------------------------|--------------------------------------------------------|--------------------------------------------------------|----------------------------------------|
| <p>.069 [1.75] DIA<br/>.250 [6.35]</p> | <p>.156 [1.75] DIA<br/>.375 [9.52]<br/>.250 [6.35]</p> | <p>.055 [1.75] DIA<br/>.250 [6.35]<br/>.187 [4.74]</p> | <p>6.000 [152.40]<br/>.500 [12.70]</p> |
| TERMINAL TYPE                          |                                                        |                                                        |                                        |



**MOUNTING HOLE**  
Panel Thickness:  
.020 [508] min. to  
.250 [6.35] max.

# RR/LRR-Series

Rounded Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The RR and LRR-Series round rocker switches feature a uniquely sculpted rocker design with electrical ratings of up to 12A 125VAC, 10A 250VAC and fit an industry standard cutout, making installation a snap. The lighted LRR-Series can be wired to accommodate dependent or independent, illumination, neon or incandescent lamps with red, green, amber or white translucent rockers. Standard or custom actuator legends are available.

**1**  
Pole

**6-12**  
Amps

**125-250**  
VAC

**6-28**  
VDC

## Typical Applications

- Appliances
- Office Automation
- Audio Visual
- Vacuum Cleaners
- Commercial Food
- Test & Measurement

# Tech Specs

## Dielectric Strength

UL/CUL: 1000V-live to dead metal parts & opposite polarity

## Electrical Life

50,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample Part Number **RR 1 1 2 - B B - N N**

Selection 1 2 3 4 5 6 7 8

### 1. SERIES

**RR** Rocker

**LRR** Lighted Rocker

### 2. CIRCUIT

- 1 On-None-Off
- 2 (On)-None-Off
- 3 On-None-(Off)
- 4 On-None-On
- 5 On-None-(On)
- 6 On-Off-On

### 3. RATING

- 1<sup>1</sup> 10A, 125-250VAC; 12A 125 VAC  
1/4 HP 125-250 VAC
- 3 6A, 28 VDC
- 4 12A, 12 VDC
- 5 12A, 6 VDC

### 4. TERMINATION

- 2 .187 Tab

### 5. ACTUATOR COLOR

**RR-Series (Non-Illuminated) Solid Color**

- B** Black
- W** White
- R** Red

**LRR-Series (Illuminated) Transparent Color**

- 1 Amber
- 2 Red
- 3 Blue
- 4 Green
- 5 Clear

### 6. BASE COLOR

- B** Black
- W** White
- R** Red

### 7. LAMP VOLTAGE

- N** None
- A** 6V Incandescent
- B** 12V Incandescent
- C** 28V Incandescent
- J**<sup>2</sup> 125V Neon
- K**<sup>2</sup> 250V Neon

### 8. ROCKER FACE LEGEND

- N** No imprinting
- A** On-Off (vertical)
- B** On-Off (horizontal)
- D** I-O (horizontal)
- E** I-O (vertical)
- F** O (on rocker end)
- G** II-O-I (vertical)
- H** II-O-I (horizontal)
- J** Off-On (vertical)
- K** Off-On (horizontal)

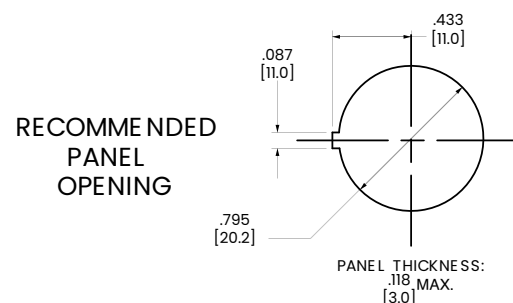
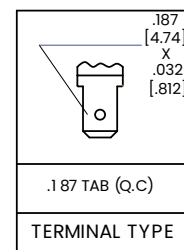
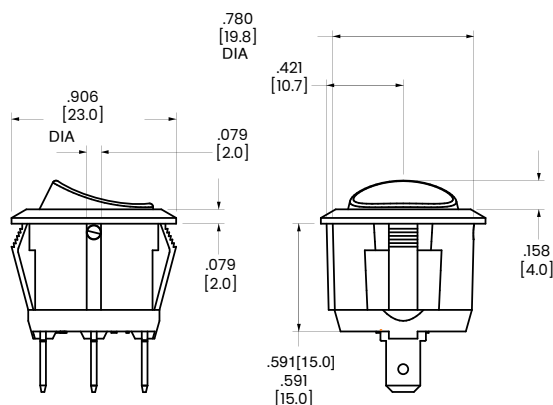
Notes:

- 1 Rating Code "I" has UL and cUL approval.
- 2 Neon Lamps (125 or 250 Volts) not recommended with green or blue actuators.

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]





**Littelfuse®**



**Carling Technologies®**

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# R/RSC-Series

Single Pole Lighted Rocker & Paddle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



Since its introduction, the Corvette switch has become the barometer for versatility and performance in the switch market. Self cleaning contacts, international approvals, along with a wide variety of circuits, ratings, and actuator options make the Corvette the switch of choice for many markets.

**1**

Pole

**10-20**

Amps

**125-250**

VAC

**6-24**

VDC

## Typical Applications

- Office Lighting
- HVAC
- Commercial Food
- Medical Equipment
- Appliance
- On-Highway
- Lawn & Garden

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts  
VDE: 4000V - live to dead metal parts;  
750V - across open contacts

## Electrical Life

100,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

RA901 - V B - B - 9 - V

Selection

1

2

3

4

5

6

### 1. SERIES

10A 250 VAC; 16A 125 VAC; 3/4 HP 125-250 VAC; 10(4) A 250 VACu  
T85

|                            |             |           |            |
|----------------------------|-------------|-----------|------------|
| OFF-NONE-ON                | Solder Lugs | .250 Tabs | Wire Leads |
| ON-NONE-ON                 | RA900       | RA901     | RA905      |
| ON-OFF-ON <sup>3</sup>     | RB900       | RB901     | RB905      |
| OFF-NONE-(ON) <sup>2</sup> | RC910       | RC911     | RC915      |
|                            | RD220       | RD221     | RD225      |

15A 250 VAC; 20A 125 VAC; 3/4 HP 125-250 VAC

|             |             |           |
|-------------|-------------|-----------|
| OFF-NONE-ON | Solder Lugs | .250 Tabs |
| ON-NONE-ON  | RSCA200     | RSCA201   |
|             | RSCB200     | RSCB201   |

### 2. ACTUATOR STYLE

|   |                  |   |                       |
|---|------------------|---|-----------------------|
| M | Momentary Rocker | R | Rocker                |
| P | Paddle           | V | Visi-rocker (2 color) |

### 3. ACTUATOR COLOR

|   |               |   |               |
|---|---------------|---|---------------|
| 1 | Black (gloss) | B | Black (matte) |
| 2 | White (gloss) | W | White (matte) |

### 4. BEZEL COLOR

|          |               |      |               |
|----------|---------------|------|---------------|
| STANDARD |               | OVAL |               |
| B        | Black (matte) | 1    | Black (gloss) |
| W        | White (matte) | 2    | White (gloss) |

### 5. ROCKER LEGEND

|                   |           |           |
|-------------------|-----------|-----------|
| NO LEGEND         | molded in | hot stamp |
| Off-On vertical   | 0         | 0         |
| Off-On horizontal | 1         | A         |
| O-I horizontal    | 2         | B         |
| O-I vertical      | 8         | D         |
| dual OFF-ON/O-I   | 9         | E         |
|                   | n/a       | H         |

### 6. VISI-ROCKER END / LEGEND COLOR

|   |       |   |          |
|---|-------|---|----------|
| N | N/A   | V | Visi-red |
| B | Black | W | White    |

Notes: PC Terminals also available, consult factory for details.

1 For additional ratings, consult factory.

2 Rating is 8A 250 VAC, 12A 125 VAC, 1/2 HP 125-250 VAC, and must specify M actuator style.

3 Not rated at 3/4 HP 125-250 VAC

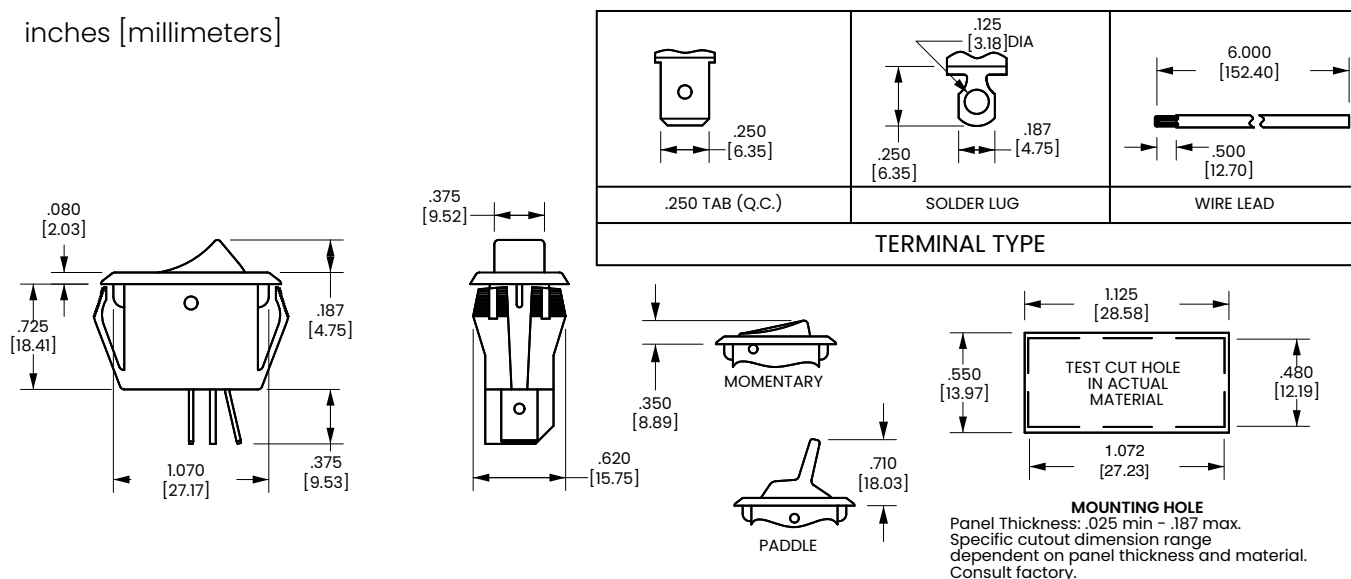
( ) indicates momentary function.

[Configure Complete Part Number >](#)

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# Dimensional Specs

inches [millimeters]



# LRA-Series

Single Pole Lighted Rocker & Paddle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



Since its introduction, the Corvette switch has become the barometer for versatility and performance in the miniature switch market. This lighted version features the very same self cleaning contacts, international approvals, along with a wide variety of circuits, ratings, and actuator options that make the Corvette the switch of choice for various applications.

**1**  
Pole

**10-16**  
Amps

**125-250**  
VAC

**6-30**  
VDC

## Typical Applications

- HVAC
- Transportation
- Lawn & Garden
- Lighting
- Commercial Food
- Power Strip

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V-live to dead metal parts  
VDE: 4000V - live to dead metal parts;  
750V - across open contacts

## Electrical Life

100,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number **LRA911 - R S - B / 250N**

Selection 1 2 3 4 5

### 1. SERIES

125 neon lamp (use 125N in Selection 5 Lamp Voltage)  
**10A 250VAC; 16A 125VAC; 10(4)A 125VACu**  
OFF-NONE-ON Solder Lugs .250 Tabs Wire Leads  
**LRA210 LRA211 LRA215**

250 neon lamp (select 250N in selection 5 Lamp Voltage)  
**15A 250 VAC; 10A 250VAC; 16A 125VAC; 10(4)A 250 T85**  
OFF-NONE-ON Solder Lugs .250 Tabs  
**LRA910 LRA911 LRA915**

Incandescent lamp (select 006V-024V in selection 5 Lamp Voltage)  
**10A 30V**  
OFF-NONE-ON Solder Lugs .250 Tabs Wire Leads  
**LRA510 LRA511 LRA515**

### 3. ACTUATOR COLOR

#### translucent

A Amber  
C White  
P Yellow  
S Red  
W Pale Red

#### clear

A Amber  
C Clear  
G<sup>1</sup> Green  
B<sup>1</sup> Blue  
R Red

### 4. BEZEL COLOR/STYLE

#### STANDARD

B Black (matte)  
W White (matte)



#### OVAL

1 Black (gloss)  
2 White (gloss)



### 2. ACTUATOR STYLE

P Paddle C Rocker Clear  
R Rocker translucent

Notes: LED illumination, PC terminals, independent lamps, and additional color options are available. Consult factory.

<sup>1</sup> Neon lamps not available with blue or green actuators.  
<sup>2</sup> Consult factory for additional ratings.

### 5. LAMP VOLTAGE

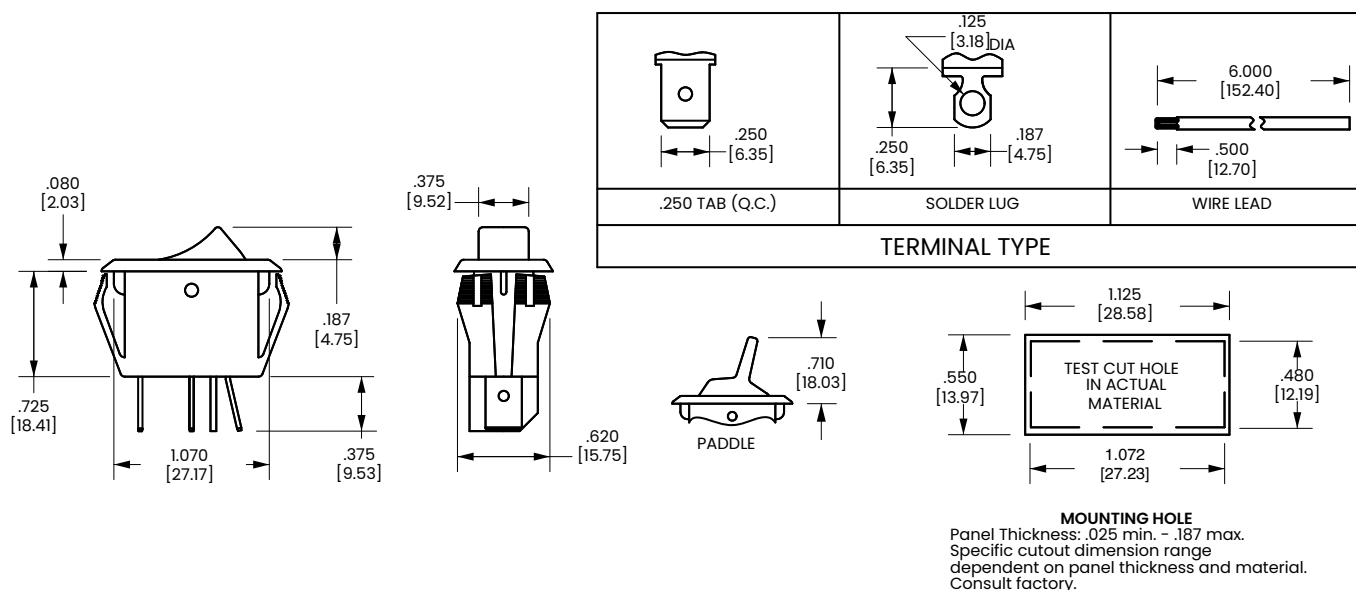
006V 6 volts incandescent  
012V 12 volts incandescent  
018V 18 volts incandescent  
024V 24 volts incandescent  
125N<sup>1</sup> 125 volts neon  
250N<sup>1</sup> 250 volts neon

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]





# RG-Series

Single/Double Pole Lighted Rocker & Paddle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The double pole version of the R-Series incorporates the same sleek lines as the original Corvette, in a double pole envelope. Features include silver-plated butt-action contacts which afford ratings to 20A/125, 15A 250VAC and withstand peak inrush currents up to 100 amps. Paddle or rocker actuators and a choice of solder lug, .250 Tab and wire lead terminations enable this switch to adapt to high current applications.

**1-2**

Poles

**10-20**

Amps

**125-250**

VAC

**6-24**

VDC

## Typical Applications

- Power Supply
- Appliances
- Exercise Equipment
- Music Equipment

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts  
& opposite polarity  
VDE: 4000V - live to dead metal parts;  
1250V - opposite polarity & across open  
contacts

## Electrical Life

50,000 cycles

## Operating Temperature

-40°F to 185°F (-40°C to 85°C)

# Ordering Scheme

Sample  
Part Number **RGSCA901 - R - B - B - A**

Selection 1 2 3 4 5

### 1. SERIES

**15A 250 VAC, 20A 125 VAC, 3/4 HP 125-250 VAC, 14(6)A 250 VAC**  
Solder Lugs .250 Tabs Wire Leads

#### Standard Base

|                           |                 |                 |                 |
|---------------------------|-----------------|-----------------|-----------------|
| OFF-NONE-ON (Single Pole) | <b>RGSCA900</b> | <b>RGSCA901</b> | <b>RGSCA905</b> |
| ON-NONE-ON (Single Pole)  | <b>RGSCB900</b> | <b>RGSCB901</b> | <b>RGSCB905</b> |
| OFF-NONE-ON (Double Pole) | <b>RGSCC900</b> | <b>RGSCC901</b> | <b>RGSCC905</b> |
| ON-NONE-ON (Double Pole)  | <b>RGSCD900</b> | <b>RGSCD901</b> | <b>RGSCD905</b> |

#### European Base (22 x 30 mm cutout)

|                           |                 |                 |                 |
|---------------------------|-----------------|-----------------|-----------------|
| OFF-NONE-ON (Single Pole) | <b>RGSEA900</b> | <b>RGSEA901</b> | <b>RGSEA905</b> |
| ON-NONE-ON (Single Pole)  | <b>RGSEB900</b> | <b>RGSEB901</b> | <b>RGSEB905</b> |
| OFF-NONE-ON (Double Pole) | <b>RGSEC900</b> | <b>RGSEC901</b> | <b>RGSEC905</b> |
| ON-NONE-ON (Double Pole)  | <b>RGSED900</b> | <b>RGSED901</b> | <b>RGSED905</b> |

### 4. BEZEL COLOR 1

**B** Black **W** White

### 5. ROCKER LEGEND

|                             | hot stamp |
|-----------------------------|-----------|
| NO LEGEND                   | O         |
| OFF-ON vertical             | A         |
| OFF-ON horizontal           | B         |
| O-I horizontal              | D         |
| O-I vertical                | E         |
| Dual OFF-ON, O-I vertical   | H         |
| Dual OFF-ON, O-I horizontal | J         |

### 2. ACTUATOR STYLE

**P** Paddle **R** Rocker

### 3. ACTUATOR COLOR 1

**B** Black **W** White

#### Notes:

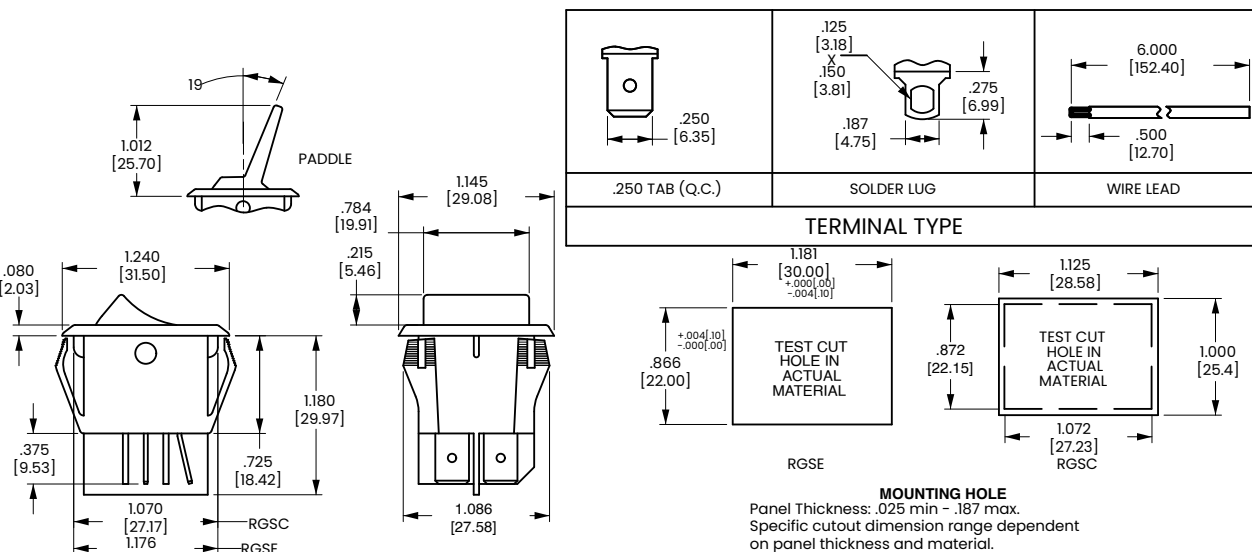
1 Additional ratings, colors and clear style actuators are available. Consult factory.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



# LRG-Series

Illuminated Double Pole Rocker & Paddle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The double pole lighted version of the R-Series incorporates the same sleek lines as the original Corvette, in a double pole envelope. This illuminated version features silver-plated butt-action contacts with ratings to 20A/125, 15A 250VAC and withstand peak inrush currents up to 100 amps. Clear or translucent style rocker actuators and a choice of solder lug, .250 Tab and wire lead terminations enable this switch to adapt to high current applications.

**2**  
Poles

**15-20**  
Amps

**125-250**  
VAC

**6-24**  
VDC

## Typical Applications

- Power Supply
- Appliances
- Exercise Equipment
- Music Equipment

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts  
& opposite polarity

## Electrical Life

100,000 cycles

## Operating Temperature

-40°F to 185°F (-40°C to 85°C)

# Ordering Scheme

Sample  
Part Number

LRGSCK611 - R S - B - B / 250N

Selection

1

2

3

4

5

6

### 1. SERIES

15A 250 VAC, 20A 125 VAC, 3/4 HP 125-250 VAC

|                                          |             |           |            |
|------------------------------------------|-------------|-----------|------------|
|                                          | Solder Lugs | .250 Tabs | Wire Leads |
| <b>Standard Base</b>                     |             |           |            |
| OFF-NONE-ON                              | LRGSCK610   | LRGSCK611 | LRGSCK615  |
| <b>European Base</b> (22 x 30 mm cutout) |             |           |            |
| OFF-NONE-ON (Single Pole)                | LRGSEK610   | LRGSEK611 | LRGSEK615  |
| <b>15A 6-24 V<sup>3</sup></b>            |             |           |            |
| <b>Standard Base</b>                     |             |           |            |
| OFF-NONE-ON                              | LRGSCK510   | LRGSCK511 | LRGSCK515  |
| <b>European Base</b> (22 x 30 mm cutout) |             |           |            |
| OFF-NONE-ON (Single Pole)                | LRGSEK510   | LRGSEK511 | LRGSEK515  |

### 2. ACTUATOR STYLE

R Rocker translucent C Rocker Clear

### 3. ACTUATOR COLOR

|                  |             |   |             |
|------------------|-------------|---|-------------|
| A                | Amber       | P | Yellow      |
| B <sup>3,5</sup> | Blue        | R | Red (clear) |
| C <sup>4</sup>   | White/Clear | S | Red         |
| G <sup>5</sup>   | Green       | W | Pale Red    |
| L <sup>3</sup>   | Lime Green  |   |             |

### 4. BEZEL COLOR

B Black W White

### 5. ROCKER LEGEND

|                             |           |
|-----------------------------|-----------|
| NO LEGEND                   | hot stamp |
| OFF-ON vertical             | O         |
| OFF-ON horizontal           | A         |
| O-I horizontal              | B         |
| O-I vertical                | D         |
| Dual OFF-ON, O-I vertical   | E         |
| Dual OFF-ON, O-I horizontal | H         |
|                             | J         |

### 6. LAMP VOLTAGE

|      |                  |      |                  |
|------|------------------|------|------------------|
| 006V | 6V incandescent  | 024V | 24V incandescent |
| 012V | 12V incandescent | 125N | 125V neon        |
| 018V | 18V incandescent | 250N | 250V neon        |

Notes:

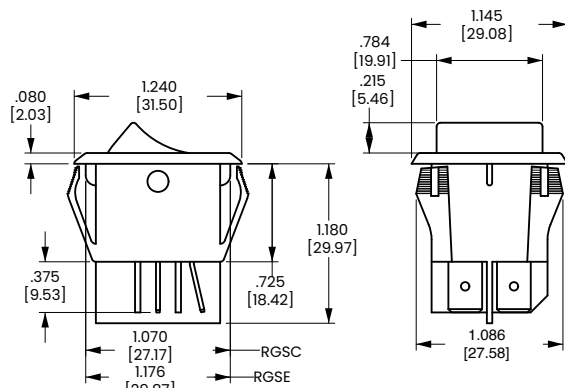
- 1 Additional ratings, colors and clear style actuators are available. Consult factory.
- 2 Incandescent lamps must specify 15A 24V rating only.
- 3 Available with incandescent lamps only.
- 4 Clear color provided where specified with clear style rocker.
- 5 Available with clear style rocker only.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



|                 |            |           |
|-----------------|------------|-----------|
|                 |            |           |
| .250 TAB (Q.C.) | SOLDER LUG | WIRE LEAD |

### TERMINAL TYPE

|       |       |
|-------|-------|
|       |       |
| LRGSE | LRGSC |

### MOUNTING HOLE

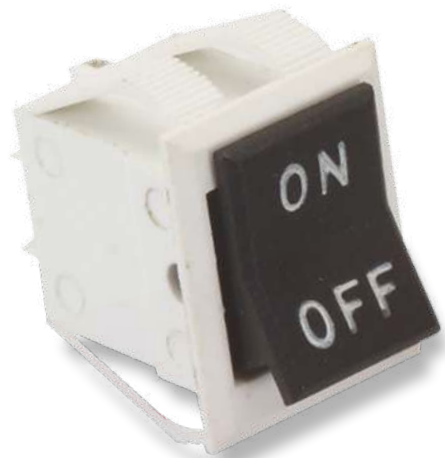
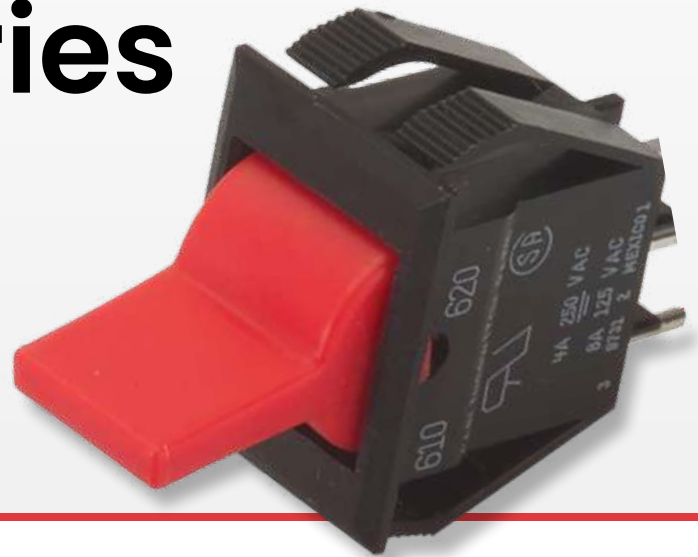
Panel Thickness: .025 min - .187 max.  
Specific cutout dimension range dependent  
on panel thickness and material.

# 610/620-Series

Small-Sized Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The 610/620-Series switches are double insulated and available in single or double pole configurations. These snap-in mounted switches are offered with either a paddle or rocker actuator and with ratings up to 8 amps.

**1-2**  
Poles

**.4-8**  
Amps

**125-250**  
VAC

**12-24**  
VDC

## Typical Applications

- Handheld Appliances
- Audio-Visual
- Power Supplies
- Computers

# Tech Specs

## Dielectric Strength

UL/CSA:  
1000V - live to dead metal parts &  
opposite polarity

## Electrical Life

50,000 cycles- single pole  
50,000 cycles- double pole

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number 62012421 - 0 - 0

Selection 1 2 3

### 1. SERIES

**4A 250VAC; 8A 125VAC**  
**Single Pole**

|                    |             |          |
|--------------------|-------------|----------|
|                    | Solder Lugs | PC Term  |
| On-none-On         | 62011421    | 62011422 |
| On-none-(On)       | 62011431    | 62011432 |
| On-off-On          | 62011461    | 62011462 |
| On-off-(On)        | 62011471    | 62011472 |
| (On)-off-(On)      | 62011481    | 62011482 |
| <b>Double Pole</b> |             |          |
| On-none-On         | 62012421    | 62012422 |
| On-none-(On)       | 62012431    | 62012432 |
| On-off-On          | 62012461    | 62012462 |
| On-off-(On)        | 62012471    | 62012472 |
| (On)-off-(On)      | 62012481    | 62012482 |

### 2. TERMINAL SEALING

0 None  
E Epoxy sealed terminals

### 3. LEGEND

|                   |           |
|-------------------|-----------|
| NO LEGEND         | hot stamp |
| On-OFF vertical   | 0         |
| On-OFF horizontal | A         |
| I-O horizontal    | B         |
| I-O vertical      | D         |
|                   | G         |

#### Notes:

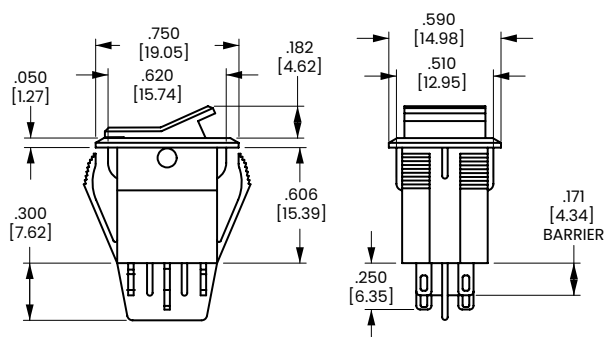
- 1 Base part number specifies black rocker and bezel. To specify paddle actuator, change 2nd digit of part number from 2 to 1 (ex. 61012421) For additional ratings and colors, consult factory.
- ( ) indicates momentary function.

[Configure Complete Part Number >](#)

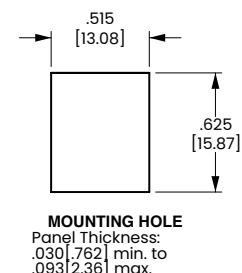
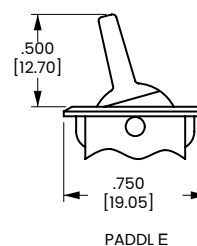
[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



|                 |                                                                   |
|-----------------|-------------------------------------------------------------------|
| <br>PC TERMINAL | <br>END CENTER<br>.080[2.03] X .047[1.19] SLOT<br>.080 SOLDER LUG |
| TERMINAL TYPE   |                                                                   |





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# 611/621-Series

Small-Sized Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The 611/621-Series small-size, sleek styling, actuator and termination choices make this switch a cost effective solution to most any switching need. International approvals, single or double pole circuitry, and ratings to 11A 125VAC further the broad appeal of this product family.

**1-2**

Poles

**.4-11**

Amps

**125-250**

VAC

**12-24**

VDC

## Typical Applications

- Appliances
- Audio-Visual
- Power Supplies
- Medical Equipment



# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts  
& opposite polarity  
VDE: 4000V - live to dead metal parts; 1250V  
opposite polarity & across open contacts

## Electrical Life

50,000 cycles- single pole  
50,000 cycles- double pole

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number 62116919 - 0 - 9 - V

Selection 1 2 3 4

### 1. SERIES

|                                                                   | .187 Tabs <sup>4</sup> | .080 Solder Lugs | PC Terms | Wire Leads            | PC Front Mount        | PC Back Mount         | .187 Solder Lugs |
|-------------------------------------------------------------------|------------------------|------------------|----------|-----------------------|-----------------------|-----------------------|------------------|
| <b>Single Pole; 4A 250VAC; 8A 125VAC; 6(4) A 250V<sup>4</sup></b> |                        |                  |          |                       |                       |                       |                  |
| ON-NONE-OFF                                                       | 62116919               | -                | -        | 62111914              | 62111918 <sup>6</sup> | 62111917 <sup>6</sup> | 62111916         |
| ON-NONE-ON                                                        | 62116929               | 62116421         | 62111422 | 62111924              | 62111928 <sup>6</sup> | 62111927 <sup>6</sup> | 62111926         |
| ON-OFF-ON <sup>3</sup>                                            | -                      | 62111461         | 62111462 | 62111263 <sup>7</sup> | -                     | -                     | -                |
| ON-NONE-(ON) <sup>3</sup>                                         | -                      | 62111431         | 62111432 | 62111233 <sup>7</sup> | -                     | -                     | -                |
| ON-OFF-(ON) <sup>3</sup>                                          | -                      | 62111471         | 62111472 | 62111273 <sup>7</sup> | -                     | -                     | -                |
| (ON)-OFF-(ON) <sup>3</sup>                                        | -                      | 62111481         | 62111482 | 62111283 <sup>7</sup> | -                     | -                     | -                |
| <b>Double Pole; 4A 250VAC; 8A 125VAC; 6(4) A 250V<sup>4</sup></b> |                        |                  |          |                       |                       |                       |                  |
| ON-NONE-OFF                                                       | 62115919               | -                | -        | 62112914              | 62112918 <sup>6</sup> | 62112917 <sup>6</sup> | 62112916         |
| ON-NONE-ON                                                        | 62115929               | 62112421         | 62112422 | 62112924              | 62112928 <sup>6</sup> | 62112927 <sup>6</sup> | 62112926         |
| ON-OFF-ON <sup>3</sup>                                            | -                      | 62112461         | 62112462 | 62112263 <sup>7</sup> | -                     | -                     | -                |
| ON-NONE-(ON) <sup>3</sup>                                         | -                      | 62112431         | 62112432 | 62112233 <sup>7</sup> | -                     | -                     | -                |
| ON-OFF-(ON) <sup>3</sup>                                          | -                      | 62112471         | 62112472 | 62112273 <sup>7</sup> | -                     | -                     | -                |
| (ON)-OFF-(ON) <sup>3</sup>                                        | -                      | 62112481         | 62112482 | 62112283 <sup>7</sup> | -                     | -                     | -                |

### 2. TERMINAL SEALING

- 0 None
- E Epoxy sealed terminals

#### Notes:

- Base part number specifies black rocker with black bezel. To specify paddle actuator change 2nd digit from 2 to 1. ex: 61115919 = black paddle with black bezel.
- For additional ratings & colors, consult factory.
- Dry circuit rating is available, consult factory.
- Not available with 6(4) A 250 V rating or VDE approval.
- 6(4) A 250V VDE approved rating available with On-none-Off and On-none-On circuits only.
- Available with visi-rocker option only.
- Consult factory for PC footprint.
- Rated 2A 250VAC, 5A 125 VAC resistive.
- ( ) Indicates momentary function.

### 3. ROCKER LEGEND

|                    | molded in <sup>5</sup> | hot stamp        |
|--------------------|------------------------|------------------|
| NO LEGEND          | 0                      | 0                |
| Off-On vertical    | n/a                    | A                |
| Off-On horizontal  | n/a                    | B                |
| I-O horizontal     | 8                      | D                |
| I-O vertical       | 9                      | E                |
| O on rocker radius | n/a                    | F (Indicates ON) |

### 4. VISI-ROCKER END COLOR

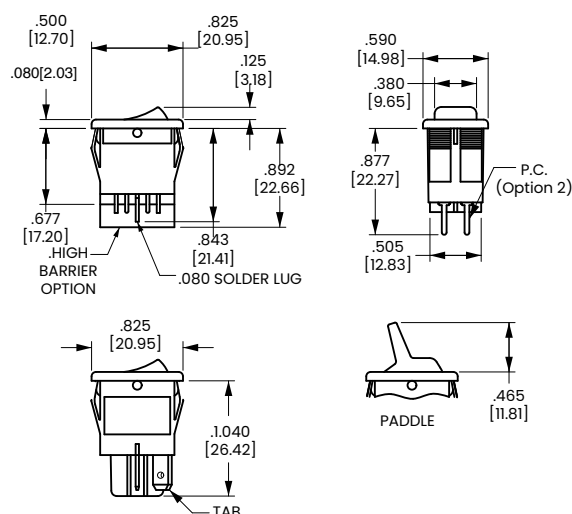
- N n/a
- V visi-red
- W visi-white

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



| <p>.171<br/>[4.34]</p> <p>END</p> <p>.250<br/>[6.35]</p> <p>CENTER</p> <p>.080[2.03] X .047[1.19] SLOT</p>                                                                                                                                                                                                                                      | <p>.062<br/>[1.57]</p> <p>DIA MIN</p> <p>.207<br/>[5.261]</p> <p>.046<br/>[1.17]</p> <p>X</p> <p>.029<br/>[.736]</p> <p>.200<br/>[5.08]</p> <p>.185<br/>[4.70]</p> |                              |   |   |                       |             |             |                       |             |             |                       |             |             |                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---|---|-----------------------|-------------|-------------|-----------------------|-------------|-------------|-----------------------|-------------|-------------|--------------------------------------------------------------------------------------------------|
| <p>.080 SOLDER LUG<br/>(terminal option 1) function 2,3,6,7,8</p> <p>PC TERMINAL FRONT MOUNT &amp; MOUNTING PATTERN<br/>(terminal option 2) functions 2,3,6,7,8</p>                                                                                                                                                                             |                                                                                                                                                                    |                              |   |   |                       |             |             |                       |             |             |                       |             |             |                                                                                                  |
| <p>TERMINAL TYPE</p>                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                    |                              |   |   |                       |             |             |                       |             |             |                       |             |             |                                                                                                  |
| <p>.187<br/>[4.74]</p> <p>X</p> <p>.032<br/>[.812]</p> <p>.120<br/>[3.05]</p> <p>DIA</p> <p>.315<br/>[8.00]</p>                                                                                                                                                                                                                                 | <p>6.000<br/>[152.40]</p> <p>.500<br/>[12.70]</p>                                                                                                                  |                              |   |   |                       |             |             |                       |             |             |                       |             |             |                                                                                                  |
| <p>.187 TAB (Q.C)<br/>(terminal option 9)<br/>Funtion 1,2</p>                                                                                                                                                                                                                                                                                   | <p>.187 SOLDER LUG<br/>(terminal option 6)<br/>functions 1,2</p>                                                                                                   | <p>WIRE LEAD<br/>DIA MIN</p> |   |   |                       |             |             |                       |             |             |                       |             |             |                                                                                                  |
| <table><thead><tr><th>PANEL THICKNESS</th><th>X</th><th>Y</th></tr></thead><tbody><tr><td>.030[.762]-.060[1.52]</td><td>.508[12.90]</td><td>.756[19.20]</td></tr><tr><td>.060[1.52]-.093[2.36]</td><td>.508[12.90]</td><td>.764[19.40]</td></tr><tr><td>.093[2.36]-.156[3.96]</td><td>.508[12.90]</td><td>.780[19.81]</td></tr></tbody></table> |                                                                                                                                                                    | PANEL THICKNESS              | X | Y | .030[.762]-.060[1.52] | .508[12.90] | .756[19.20] | .060[1.52]-.093[2.36] | .508[12.90] | .764[19.40] | .093[2.36]-.156[3.96] | .508[12.90] | .780[19.81] | <p>.0004[.01]</p> <p>Y</p> <p>.0004[.01]</p> <p>TEST CUT<br/>HOLE IN<br/>ACTUAL<br/>MATERIAL</p> |
| PANEL THICKNESS                                                                                                                                                                                                                                                                                                                                 | X                                                                                                                                                                  | Y                            |   |   |                       |             |             |                       |             |             |                       |             |             |                                                                                                  |
| .030[.762]-.060[1.52]                                                                                                                                                                                                                                                                                                                           | .508[12.90]                                                                                                                                                        | .756[19.20]                  |   |   |                       |             |             |                       |             |             |                       |             |             |                                                                                                  |
| .060[1.52]-.093[2.36]                                                                                                                                                                                                                                                                                                                           | .508[12.90]                                                                                                                                                        | .764[19.40]                  |   |   |                       |             |             |                       |             |             |                       |             |             |                                                                                                  |
| .093[2.36]-.156[3.96]                                                                                                                                                                                                                                                                                                                           | .508[12.90]                                                                                                                                                        | .780[19.81]                  |   |   |                       |             |             |                       |             |             |                       |             |             |                                                                                                  |



# 622/632-Series

Small-Sized Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



A high powered offering packed into a small-sized envelope, the 622/632-Series is a staple of numerous markets. With its silver-alloy butt contacts, the 622/632 will handle inrush spikes up to 100 amps and steady state current to 12A 125VAC. The lighted 632-Series features a multitude of illumination circuit options available with LED, incandescent and neon style lamps.

**1-2**  
Poles

**8-12**  
Amps

**125-250**  
VAC

**6-24**  
VDC

## Typical Applications

- Appliances
- Commercial Food
- Transportation
- General Purpose

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts  
& opposite polarity

## Electrical Life

50,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

632121 - 1 B - K N

Selection

1

2

3

4

5

### 1. SERIES

8A 250VAC; 12A 125VAC; 1/2 HP 125-250VAC  
622-SERIES NON-ILLUMINATED ROCKER

ON-none-OFF (Single Pole)  
ON-none-OFF (Double Pole)

632-SERIES ILLUMINATED ROCKER

ON-none-OFF (Single Pole, dependent lamp) schematic 1  
ON-none-OFF (Single Pole, independent lamp) schematic 3  
ON-none-OFF (Single Pole, independent lamp unballasted) schematic 5  
ON-none-OFF (Double Pole, dependent lamp with 5 terms.) schematic 2  
ON-none-OFF (Double Pole, dependent lamp with 4 terms.) schematic 4

| Solder Lugs | .187 Tabs |
|-------------|-----------|
| 622121      | 622122    |
| 622221      | 622222    |
| 632121      | 632122    |
| 632321      | 632322    |
| 632521      | 632522    |
| 632221      | 632222    |
| 632421      | 632422    |

### 2. ACTUATOR COLOR

622 (non illuminated)

B Black  
W White

632 (illuminated)

1 Clear Amber  
2 Clear Red  
3 Clear Blue<sup>2</sup>  
4 Clear Green  
5 Clear

### 4. LAMP VOLTAGE / STYLE

N 622 (non illuminated)  
1 unballasted LED  
2 6V LED  
3 12V LED  
4 24V LED

A 6V incandescent  
C 12V incandescent  
E 18V incandescent  
H 24V incandescent  
J 125V neon  
K 250V neon

### 3. BASE COLOR

B Black

W White

### 5. ROCKER LEGEND

N NO Legend  
A OFF-ON vertical  
B OFF-ON horizontal  
D I-O horizontal  
E I-O vertical  
F O on rocker radius

Notes:

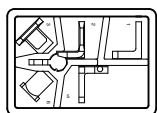
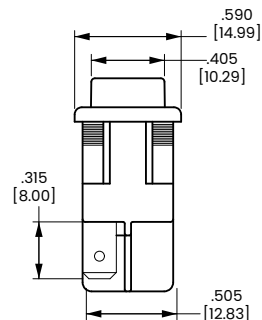
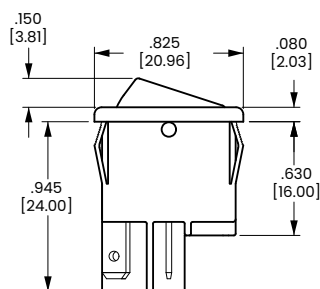
- For all incandescent or LED lamps specify 5 in 5th digit of part number.  
Example 632151-1B-CN
- Available with incandescent lamps only.
- Additional colors available. Consult factory for details.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

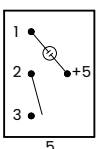
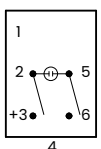
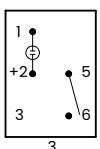
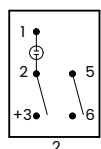
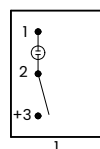
# Dimensional Specs

inches [millimeters]

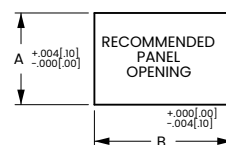
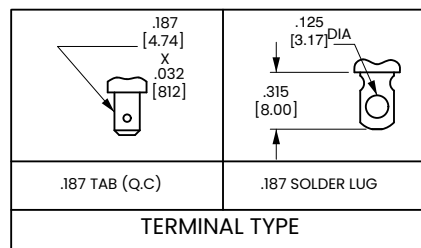


BOTTOM VIEW OF  
TERMINAL ARRANGEMENT

632 SCHEMATIC



UNBALLASTED



| PANEL THICKNESS       | A           | B           |
|-----------------------|-------------|-------------|
| .030[.76]-.050[1.27]  | .508[12.90] | .756[19.20] |
| .050[1.27]-.078[1.98] | .508[12.90] | .764[19.40] |
| .078[1.98]-.125[3.17] | .508[12.90] | .780[19.81] |



**Littelfuse®**



**Carling Technologies®**

A Littelfuse® Brand

# 651/652-Series

Small-Sized Rocker Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



This switch is ideal for applications with back panel size constraints. It fits in a standard rectangular cutout and is designed to provide ease of insertion along with superior panel retention qualities. A high profile rocker and butt-action contacts provide the user with a crisp positive-type feel. A variety of ratings, circuitry and termination choices will appeal to many market segments.

**1**

Pole

**6-12**

Amps

**125-250**

VAC

**6-24**

VDC

## Typical Applications

- Handheld Appliances
- Audio-Visual
- Power Supplies
- Medical Equipment

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V-live to dead metal parts

## Electrical Life

100,000 cycles- maintained  
50,000 cycles- momentary  
50,000 cycles- T-rating

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample Part Number **651 122 - B B - A N**

Selection 1 2 3 4 5 6

### 1. SERIES

**651** Matte Finish

**652** Gloss Finish

### 2. CIRCUITRY / RATING / TERMINATION

|                                             | .187<br>Solder Lugs     | .187<br>Tabs | PC<br>Terms | PC<br>Rt.  | Wire<br>Angle |
|---------------------------------------------|-------------------------|--------------|-------------|------------|---------------|
| 10A 250VAC, 10A 125VAC, 1/4 HP, 125-250 VAC |                         |              |             |            |               |
| Leads                                       |                         |              |             |            |               |
| ON-NONE-OFF                                 | <b>121</b>              | <b>122</b>   | <b>123</b>  | <b>124</b> | <b>125</b>    |
| (ON)-NONE-OFF                               | <b>261</b> <sup>1</sup> | <b>262</b>   | <b>263</b>  | <b>264</b> | <b>265</b>    |
| ON-NONE-(OFF)                               | <b>361</b> <sup>1</sup> | <b>362</b>   | <b>363</b>  | <b>364</b> | <b>365</b>    |
| ON-NONE-ON                                  | <b>421</b>              | <b>422</b>   | <b>423</b>  | <b>424</b> | <b>425</b>    |
| ON-NONE-(ON)                                | <b>561</b> <sup>1</sup> | <b>562</b>   | <b>563</b>  | <b>564</b> | <b>565</b>    |
| ON-OFF-ON                                   | <b>681</b> <sup>2</sup> | <b>682</b>   | <b>683</b>  | <b>684</b> | <b>686</b>    |
| ON-OFF-(ON)                                 | <b>781</b> <sup>2</sup> | <b>782</b>   | <b>783</b>  | <b>784</b> | <b>785</b>    |
| (ON)-OFF-(ON)                               | <b>881</b> <sup>2</sup> | <b>882</b>   | <b>883</b>  | <b>884</b> | <b>885</b>    |

### 3. ACTUATOR COLOR

**B** Black

**W** White

### 4. BASE COLOR

**B** Black

**W** White

### 5. ROCKER LEGEND

|                   | molded in <sup>4</sup> | hot stamp |
|-------------------|------------------------|-----------|
| NO LEGEND         | <b>0</b>               | <b>0</b>  |
| Off-On vertical   | <b>1</b>               | <b>A</b>  |
| Off-On horizontal | <b>-</b>               | <b>B</b>  |
| I-O horizontal    | <b>8</b>               | <b>D</b>  |
| I-O vertical      | <b>9</b>               | <b>E</b>  |
| O on rocker end   | <b>-</b>               | <b>F</b>  |
| II-O-I vertical   | <b>-</b>               | <b>G</b>  |
| II-O-I horizontal | <b>-</b>               | <b>H</b>  |

### 6. VISI-ROCKER END / LEGEND COLOR

**N** N/A  
**B** Black  
**V** Visi-red  
**W** White

#### Notes:

Additional ratings (including 14V T) & color options are available; Consult factory.

<sup>1</sup> Rated 12A 125VAC, 6A 250 VAC, 1/4HP 125-250VAC.

<sup>2</sup> Rated 8A 125-250VAC, 1/4HP 125-250VAC.

<sup>3</sup> Additional colors available. Consult factory for details.

<sup>4</sup> Available with Visi-Rocker option only.

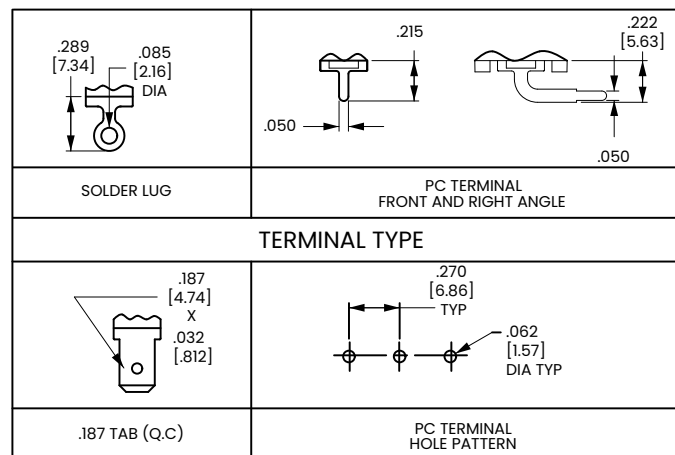
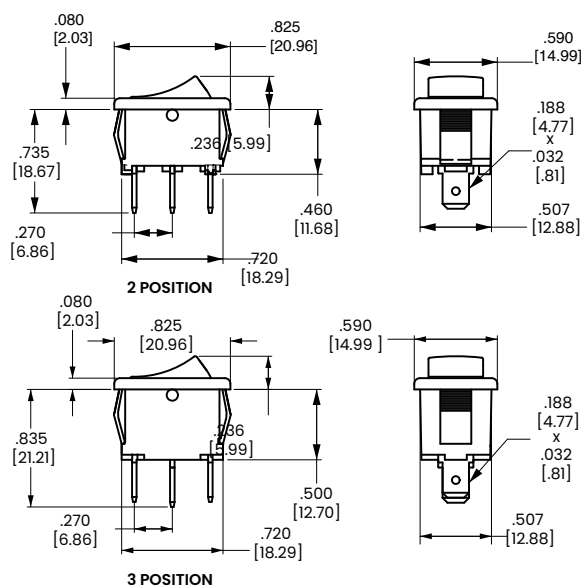
( ) Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



RECOMMENDED  
PANEL  
OPENING

| PANEL THICKNESS       | A           | B           |
|-----------------------|-------------|-------------|
| .030[.76]-.050[1.27]  | .508[12.90] | .756[19.20] |
| .050[1.27]-.078[1.98] | .508[12.90] | .764[19.40] |
| .078[1.98]-.125[3.17] | .508[12.90] | .780[19.81] |

|                                           |   |
|-------------------------------------------|---|
| TEST CUT<br>HOLE IN<br>ACTUAL<br>MATERIAL | B |
|-------------------------------------------|---|



**Littelfuse®**



**Carling Technologies®**

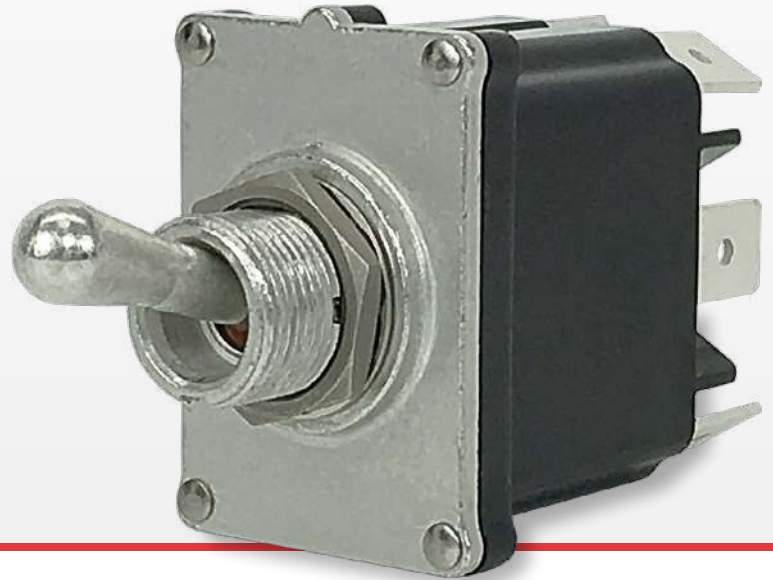
A Littelfuse® Brand

# ST-Series

Sealed Toggle Switches

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



Designed to conform to MIL-DTL-3950G requirements for environmentally sealed toggle switches, and compliant to UL 60079-15 standard for use in explosive gas atmospheres. The ST-Series is fully sealed to IP68, including below the panel and features innovative design and performance principles sure to withstand the most demanding applications.

**1-2**

Poles

**10-16**

Amps

**125, 250**

VAC

**12-24**

VDC

## Typical Applications

- Off-Highway
- Commercial Food
- Marine
- Armored Vehicles
- Military
- Applications requiring stringent sealing

# Design Features

## **PINNED ACTUATOR / BUSHING**

Keeps toggle or paddle firmly in place and prevents rotation

## **BRASS ROLLER PIN**

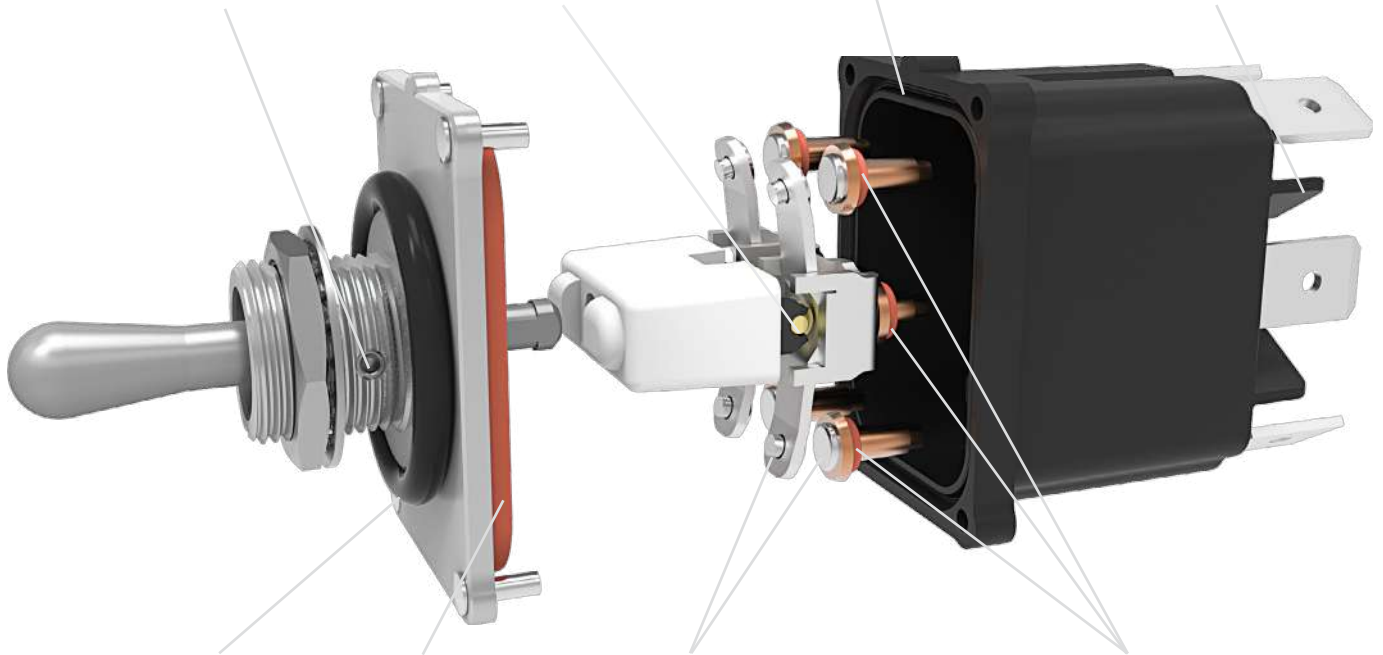
Provides rolling metal on metal actuation for maximum endurance

## **BASE SEAL CHANNEL**

Perfectly fits the toggle assembly seal decreasing the dependence on clamping forces and rivets

## **TERMINAL BARRIERS**

Comply with UL-61058-1 electrical spacing requirements



## **OPTIONAL O-RING**

Assures additional under panel sealing protection

## **BUSHING/TOGGLE SEAL**

Composed of dynamic silicone material that bonds to the metal toggle, pin, and bushing

## **RIVETS**

High purity copper composite and silver alloy materials handle various electrical loads and maintain low contact resistance

## **TERMINAL SEALS**

Assure a secure seal at extreme temperatures. Eliminates potential for separated joints associated with insert molded constructions

# Tech Specs

## Electrical

|                            |                                                                                                                                                                                                                   |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Contact Rating             | 10A 250VAC, 15A 125VAC, 16A 12/24VDC                                                                                                                                                                              |
| Dielectric Strength        | MIL-STD-202G, Method 301 (1500 Volts RMS)                                                                                                                                                                         |
| Insulation Resistance      | MIL-STD-202G, Method 302 (50 MegOhms, 500 VDC)                                                                                                                                                                    |
| Initial Contact Resistance | MIL-STD-202G, Method 307 (10 milliOhms max.)                                                                                                                                                                      |
| Insulation Resistance      | Overload: MIL-DTL-3950G, Section 4.8.11.1<br>Electrical Endurance and Temperature: UL 61058-1<br>Momentary circuits: 25,000 operations, minimum.<br>Maintained circuits: 50,000 operations, minimum.              |
| Initial Contact Resistance | UL-1500 Ignition-Protection Test for Marine Products                                                                                                                                                              |
| Ignition Protection        | Up to 100,000 cycles, circuit and load dependent                                                                                                                                                                  |
| Explosion Protection       | UL 60079-15 Electrical Apparatus for Explosive Gas Atmospheres                                                                                                                                                    |
| Contacts                   | Silver / Nickel Alloy                                                                                                                                                                                             |
| Terminals                  | Brass or Copper / silver plated.<br>Tab Terminal: ¼" quick-connect<br>Screw Terminal: #6-32 brass screw and cage clamp<br>MIL-STD-202G, Method 211 Test Condition A, and B: 25 lb. pull test, two terminal bends. |

## Agency Approvals

UL and cUL  
Reference: UL 61058-1 and CAN/CSA-C22.2 No. 61058-1-09, Switches for Appliances - Part 1: General Requirements. Certificate number 20181012-E7560.  
UL 1500 Ignition-Protection.  
UL 60079-15 Electrical Apparatus for Explosive Gas Atmospheres.

## Environmental

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |          |               |          |      |                 |              |                  |              |             |      |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------|----------|------|-----------------|--------------|------------------|--------------|-------------|------|
| Temperature                   | Operating: -40°C to +85°C<br>Storage: -65°C to +85°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |               |          |      |                 |              |                  |              |             |      |
| Vibration                     | MIL-STD-202G: Method 204D, Test Condition A (10 G peak, Harmonic, 10Hz to 500Hz sweeps, 9 hours total).                                                                                                                                                                                                                                                                                                                                                                                                                                               |          |               |          |      |                 |              |                  |              |             |      |
| Shock                         | MIL-STD-202G: Method 213B, Test Condition K (30 G, half sine)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |               |          |      |                 |              |                  |              |             |      |
| Sealing                       | IP68, for above and below-panel components of actual switch only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |               |          |      |                 |              |                  |              |             |      |
| Salt Atmosphere               | MIL-STD-202G, Method 101, Test Condition A (96 hrs)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |               |          |      |                 |              |                  |              |             |      |
| Thermal Shock                 | MIL-STD-202G, Method 107, Test Condition A (five cycles in air: -55°C, +25°C, +125°C, +25°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                          |          |               |          |      |                 |              |                  |              |             |      |
| Moisture Resistance, Humidity | MIL-STD-202G, Method 106 (ten 24-hour stepped cycles)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |               |          |      |                 |              |                  |              |             |      |
| Chemical Resistance           | No permanent loss of function, obvious loss of sealing, distortion, softening, embrittlement, discoloration or corrosion after being brushed for 10 minutes, wetting all exposed surfaces. Relevant chemical compatibility documentation may be used in place of testing.<br><table> <tr> <td>Chemical</td><td>Concentration</td></tr> <tr> <td>Gasoline</td><td>100%</td></tr> <tr> <td>Ethylene Glycol</td><td>50% in water</td></tr> <tr> <td>Ethanol/Methanol</td><td>10% in water</td></tr> <tr> <td>Diesel Fuel</td><td>100%</td></tr> </table> | Chemical | Concentration | Gasoline | 100% | Ethylene Glycol | 50% in water | Ethanol/Methanol | 10% in water | Diesel Fuel | 100% |
| Chemical                      | Concentration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |               |          |      |                 |              |                  |              |             |      |
| Gasoline                      | 100%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |               |          |      |                 |              |                  |              |             |      |
| Ethylene Glycol               | 50% in water                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |          |               |          |      |                 |              |                  |              |             |      |
| Ethanol/Methanol              | 10% in water                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |          |               |          |      |                 |              |                  |              |             |      |
| Diesel Fuel                   | 100%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |               |          |      |                 |              |                  |              |             |      |

## Physical

|                               |                                                                                                                     |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Function, Operation, Circuits | Single Pole/ Double Pole with Circuits Single Throw/ Double Throw, Two/Three position, Maintain/ Momentary circuits |
| Toggle                        | Tin plated brass bat or tall bat                                                                                    |
| Paddle                        | Acetal, UV stabilized yellow, red, white and black.                                                                 |
| Mechanism Actuator            | Polyester PBT, UL94-V0 and fungus resistant per MIL-STD- 810G, Section 508.6                                        |
| Internal Seals                | Silicone per A-A-59588-1A.                                                                                          |
| Mounting, Hardware            | 15/32"-32 UNS-2A threaded bushing with a keyway. A single nut and lock washer are supplied unassembled.             |
| Bushing/Top Plate             | Zinc/aluminum die cast, with tin plating.                                                                           |
| Base                          | Polyester PBT, UL94-V0 and fungus resistant per MIL-STD- 810G, Section 508.6                                        |
| Actuation Force               | Initial Actuation Forces ± 0.3 lb (for 2-Pole circuits, short bat)                                                  |
| Angular Movement              | 14.5 degrees, each side of center                                                                                   |



# Ordering Scheme

Sample  
Part Number

**ST A 2 E 1 - 53**

Selection      1            2            3            4            5            6

## 1. SERIES

**ST** Sealed Toggle

## 2. CIRCUIT

|                               | 2 & 3, 5 & 6 Connected Terminals |       | 1 & 2, 4 & 5 |
|-------------------------------|----------------------------------|-------|--------------|
| Position:                     | 1                                | 2     | 3            |
| <b>A</b>                      | ON                               | NONE  | OFF          |
| <b>B</b>                      | (ON)                             | NONE  | OFF          |
| <b>C</b>                      | ON                               | NONE  | (OFF)        |
| <b>D</b>                      | ON                               | NONE  | ON           |
| <b>F</b> <sup>6</sup>         | ON                               | NONE  | (ON)         |
| <b>J</b>                      | ON                               | OFF   | ON           |
| <b>K</b>                      | ON                               | OFF   | (ON)         |
| <b>L</b>                      | (ON)                             | OFF   | (ON)         |
| Special Circuits <sup>6</sup> |                                  |       |              |
| <b>E</b> <sup>2,3</sup>       | 5 & 6                            | 5 & 3 | 5 & 1        |
| <b>G</b> <sup>2,4</sup>       | 2 & 3, 5 & 6                     | 2 & 3 | OFF          |
| <b>M</b> <sup>2,4</sup>       | (2 & 3, 5 & 6)                   | 2 & 3 | OFF          |

## 3. POLES

- 1** Single pole using terminals 1, 2 & 3  
**2** Double pole using terminals 1, 2, 3, 4, 5 & 6

### Notes:

- 1 Standard hardware is (1) inner tooth lock washer and (1) hex nut bulk.  
2 Available only with 2 pole option in selection box # 3.  
3 External customer supplied jumper required between terminals 2 & 4 to get SP ON-ON-ON circuit.  
4 Available with termination B and E only.  
5 Available with special circuit G and M only.  
6 Not available with rating 5.  
7 Available with termination 1 and 4 only.

## 4. RATING

- 4** 10A 250VAC; 15A 125VAC  
**5**<sup>7</sup> 10A 250VAC; 15A 125VAC (UL, cUL Recognized)  
**E** 16A, 12/24VDC

## 5. TERMINATION

- 1** .250 (6.4mm) TAB (QC)  
**4** Screw with Cage Clamps  
**B**<sup>5</sup> .250 (6.4mm) TAB (QC). Jumper T2 to T5.  
No terminal at T5  
**E**<sup>5</sup> Screw with Cage Clamps. Jumper T2 to T5.  
No terminal at T5

## 6. ACTUATOR STYLE

### TOGGLE (SEALED METAL)

| Without<br>Panel Seal | With Panel<br>Seal (Bulk) | Toggle<br>Color | Toggle<br>Length | Bushing<br>Length |
|-----------------------|---------------------------|-----------------|------------------|-------------------|
| <b>53</b>             | <b>58</b>                 | Dull Nickel     | .561             | .385              |
| <b>73</b>             | <b>78</b>                 | Dull Nickel     | .687             | .385              |

### PADDLE (SEALED PLASTIC)

| Without<br>Panel Seal | With Panel<br>Seal (Bulk) | Paddle<br>Color | Paddle<br>Length | Bushing<br>Length |
|-----------------------|---------------------------|-----------------|------------------|-------------------|
| <b>B3</b>             | <b>B8</b>                 | Black           | .880             | .385              |
| <b>W3</b>             | <b>W8</b>                 | White           | .880             | .385              |
| <b>R3</b>             | <b>R8</b>                 | Red             | .880             | .385              |
| <b>Y3</b>             | <b>Y8</b>                 | Yellow          | .880             | .385              |

 [Configure Complete Part Number >](#)

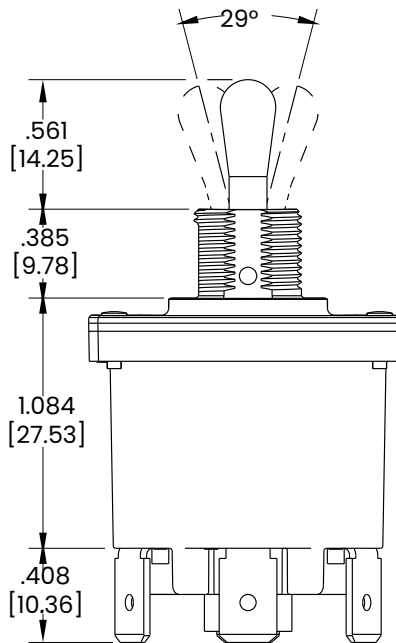
 [Browse Standard Parts >](#)



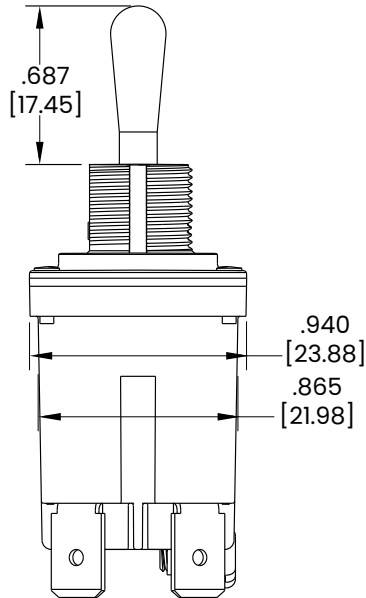
# Dimensional Specs

inches [millimeters]

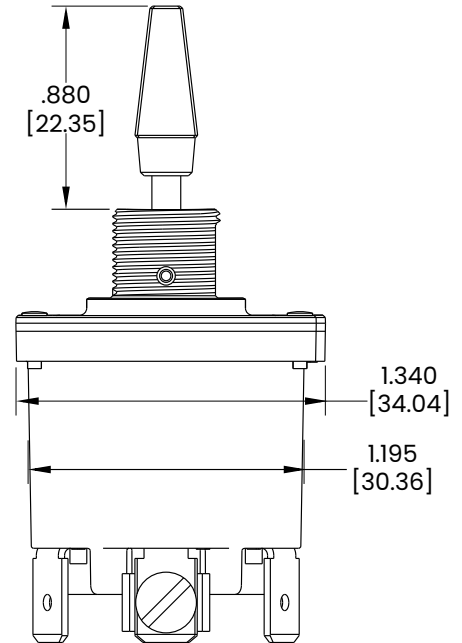
## BAT TOGGLE



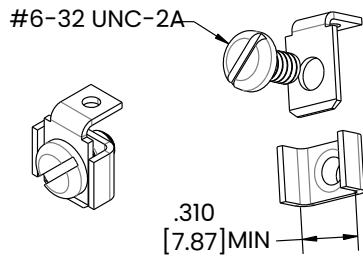
## TALL BAT TOGGLE



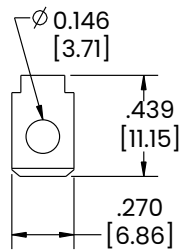
## PADDLE TOGGLE



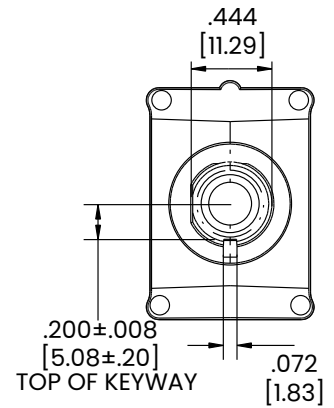
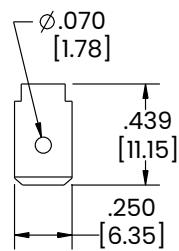
## TERMINALS



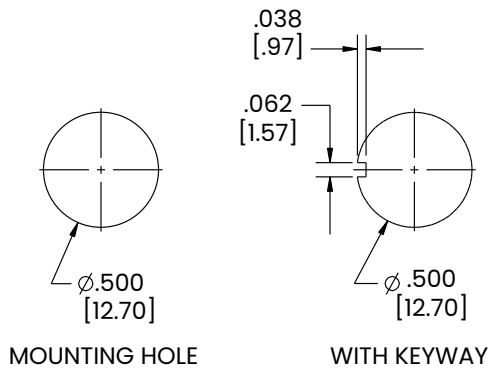
SCREW (AND CAGE) TERMINAL



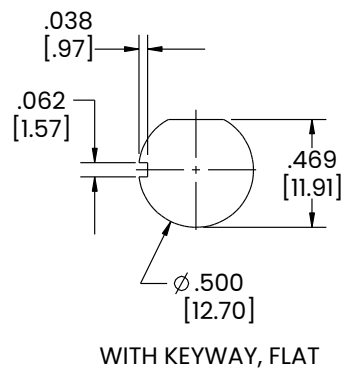
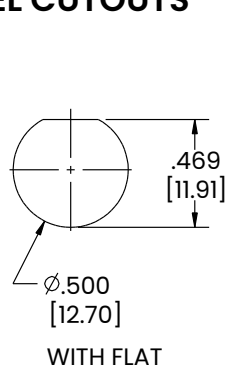
.250 TAB (Q.C.) TERMINAL



## PANEL CUTOUTS



WITH KEYWAY





**Littelfuse®**



**Carling Technologies®**

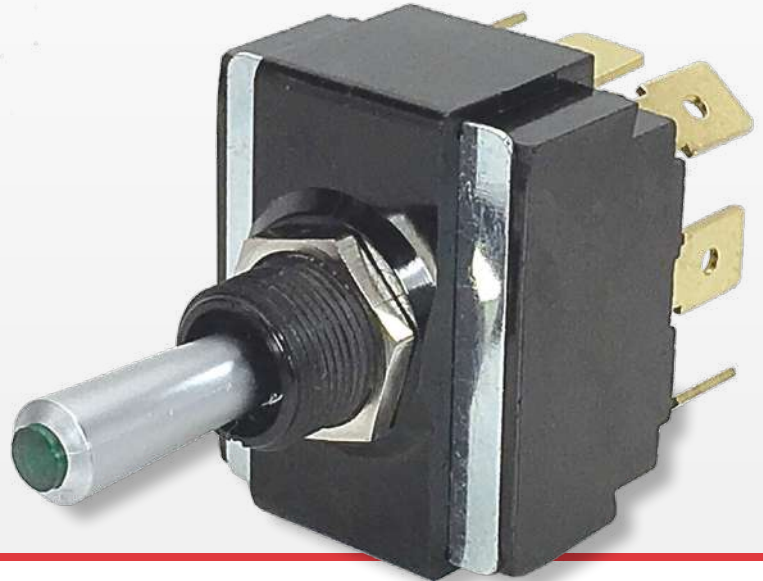
A Littelfuse® Brand

# LT-Series

Toggle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The LT-Series illuminated toggle switches feature up to a three-color lighting sequence from a single lamp. These lighted toggles contain neoprene bushing seals for dust and moisture protection. A variety of circuits and terminations are available.

**1-2**  
Poles

**10-15**  
Amps

**125,250**  
VAC

**12-28**  
VDC

## Typical Applications

- Marine
- Transportation

# Tech Specs

## Dielectric Strength

1000V - live to dead metal parts

## Electrical Life

50,000 cycles - maintained  
25,000 cycles - momentary

## Operating Temperature

32°F to 185°F (0° to 85°C)

# Ordering Scheme

Sample  
Part Number

LT-1561 - 1 30 - 012

Selection

1

2

3

4

### 1. SERIES

10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC, 15A 12-28VDC

| Single Pole   | Solder Lug | .250 Tab QC | Screw Terms | Wire Leads |
|---------------|------------|-------------|-------------|------------|
| On-None-Off   | LT-1510    | LT-1511     | LT-1514     | LT-1515    |
| On-None-(Off) | LT-1520    | LT-1521     | LT-1524     | LT-1525    |
| (On)-None-Off | LT-1530    | LT-1531     | LT-1534     | LT-1535    |
| On-None-On    | LT-1540    | LT-1541     | LT-1544     | LT-1545    |
| On-None-(On)  | LT-1550    | LT-1551     | LT-1554     | LT-1555    |
| On-Off-On     | LT-1560    | LT-1561     | LT-1564     | LT-1565    |
| On-Off-(On)   | LT-1570    | LT-1571     | LT-1574     | LT-1575    |
| (On)-Off-(On) | LT-1580    | LT-1581     | LT-1584     | LT-1585    |
| Double Pole   | Solder Lug | .250 Tab QC | Screw Terms | Wire Leads |
| On-None-Off   | LT-2510    | LT-2511     | LT-2514     | LT-2515    |
| On-None-(Off) | LT-2520    | LT-2521     | LT-2524     | LT-2525    |
| (On)-None-Off | LT-2530    | LT-2531     | LT-2534     | LT-2535    |
| On-None-On    | LT-2540    | LT-2541     | LT-2544     | LT-2545    |
| On-None-(On)  | LT-2550    | LT-2551     | LT-2554     | LT-2555    |
| On-Off-On     | LT-2560    | LT-2561     | LT-2564     | LT-2565    |
| On-Off-(On)   | LT-2570    | LT-2571     | LT-2574     | LT-2575    |
| (On)-Off-(On) | LT-2580    | LT-2581     | LT-2584     | LT-2585    |

### 2. ACTUATOR STYLE

#### Paddle<sup>1</sup>

- 1 Clear Paddle  
4 Solid Color Paddle

#### Snapkap Style<sup>2</sup>

- 5 Bright Chrome  
6 Satin Chrome  
7 Black Molded

#### Notes:

- 1 Solid color paddle available with lighting sequence 01, 02, 10 or 20.  
2 SnapKap Toggle Lenses are available separately. Consult factory.  
3 Independent lamp is standard. Dependent lamp with ON-OFF function (including momentary) is available with Lighting Sequences 10, 20, 30, 40 and 50. (No light in OFF position.)  
4 Green and blue not recommended with 125 volt or 250 volt neon lamps.  
5 Additional terminations available. Consult factory for details.  
6 Ignition protected (UL 1500) construction is available, consult factory for details.  
( ) Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

### 3. LIGHTING SEQUENCE

3,4

|    | position 1 | position 2 | position 3 |
|----|------------|------------|------------|
| 01 | red        | red        | red        |
| 02 | amber      | amber      | amber      |
| 03 | green      | green      | green      |
| 10 | red        | ---        | none       |
| 11 | red        | clear      | red        |
| 12 | red        | clear      | amber      |
| 13 | red        | clear      | green      |
| 14 | red        | clear      | blue       |
| 15 | red        | clear      | clear      |
| 20 | amber      | ---        | none       |
| 21 | amber      | clear      | red        |
| 22 | amber      | clear      | amber      |
| 23 | amber      | clear      | green      |
| 24 | amber      | clear      | blue       |
| 25 | amber      | clear      | clear      |
| 30 | green      | ---        | none       |
| 31 | green      | clear      | red        |
| 32 | green      | clear      | amber      |
| 33 | green      | clear      | green      |
| 34 | green      | clear      | blue       |
| 35 | green      | clear      | clear      |
| 40 | blue       | ---        | none       |
| 41 | blue       | clear      | red        |
| 42 | blue       | clear      | amber      |
| 43 | blue       | clear      | green      |
| 44 | blue       | clear      | blue       |
| 45 | blue       | clear      | clear      |
| 50 | clear      | ---        | none       |
| 51 | clear      | clear      | red        |
| 52 | clear      | clear      | amber      |
| 53 | clear      | clear      | green      |
| 54 | clear      | clear      | blue       |
| 55 | clear      | clear      | clear      |

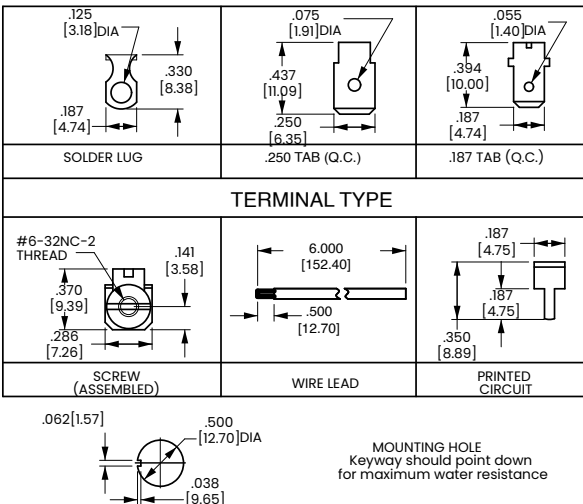
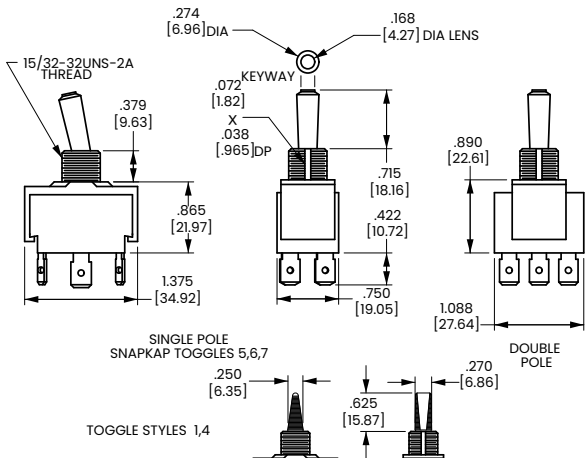
### 4. LAMP VOLTAGE

4

| incandescent |               |      |               |     |         |
|--------------|---------------|------|---------------|-----|---------|
| 006          | 6 volt        | 012  | 12 volt       | 018 | 18 volt |
| 024          | 24 volt       |      |               |     |         |
| neon         |               |      |               |     |         |
| 125N         | 125 volt neon | 250N | 250 volt neon |     |         |

# Dimensional Specs

inches [millimeters]

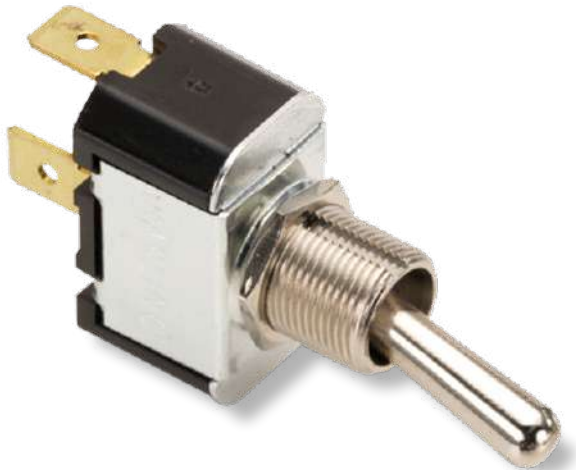


# F-Series

Single Pole Toggle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



General purpose workhorses with options tailored to meet most any need. Ratings to 20A 277VAC, various actuator, bushing, termination, and circuit choices allow this versatile switch to easily integrate into a variety of different applications. The F-Series is appropriate for usage in low voltage DC applications.

|          |             |                 |              |
|----------|-------------|-----------------|--------------|
| <b>1</b> | <b>3-20</b> | <b>125, 250</b> | <b>12-24</b> |
| Pole     | Amps        | VAC             | VDC          |

## Typical Applications

- Marine
- Generators
- Industrial
- Office Automation
- Medical Equipment

# Tech Specs

## Dielectric Strength

1000V - live to dead metal parts

## Electrical Life

50,000 cycles - maintained  
25,000 cycles - momentary

## Operating Temperature

0°F to 150°F (-17.8°C to +65.6°C)

# Ordering Scheme

Sample  
Part Number **2FA54 - 73 /TABS**

Selection 1 2 3

### 1. SERIES

**10A 250VAC; 15A 125VAC; 3/4 HP 125-250VAC**

|               | Solder Lug | .250 Tab Q.C.  | Screw Terminals |
|---------------|------------|----------------|-----------------|
| On-None-Off   | 2FA53      | 2FA53-.../TABS | 2FA54           |
| (On)-None-Off | 6FA53      | 6FA53-.../TABS | 6FA54           |
| On-None-(Off) | 6FA57      | 6FA57-.../TABS | 6FA58           |
| On-None-On    | 2FB53      | 2FB53-.../TABS | 2FB54           |
| On-None-(On)  | 6FB53      | 6FB53-.../TABS | 6FB54           |
| On-Off-On     | 2FC53      | 2FC53-.../TABS | 2FC54           |
| On-Off-(On)   | 6FC57      | 6FC57-.../TABS | 6FC58           |
| (On)-Off-(On) | 6FC53      | 6FC53-.../TABS | 6FC54           |

Additional ratings up to 20A 125VAC, 12A 250VAC, 1HP 120-240 VAC available. Consult factory for specifics.

### 2. ACTUATOR STYLE

**BAT STYLE TOGGLE** <sup>2</sup>

| unsealed | sealed | toggle length | bushing length |
|----------|--------|---------------|----------------|
| 73       | 78     | 0.687         | 0.465          |
| E3       | E8     | 2.000         | 0.465          |

### 3. TAB TERMINALS

|                  |                                                             |
|------------------|-------------------------------------------------------------|
| /TABS<br>(blank) | Tab Terminals<br>Leave blank if tab terminals not required. |
|------------------|-------------------------------------------------------------|

Notes:

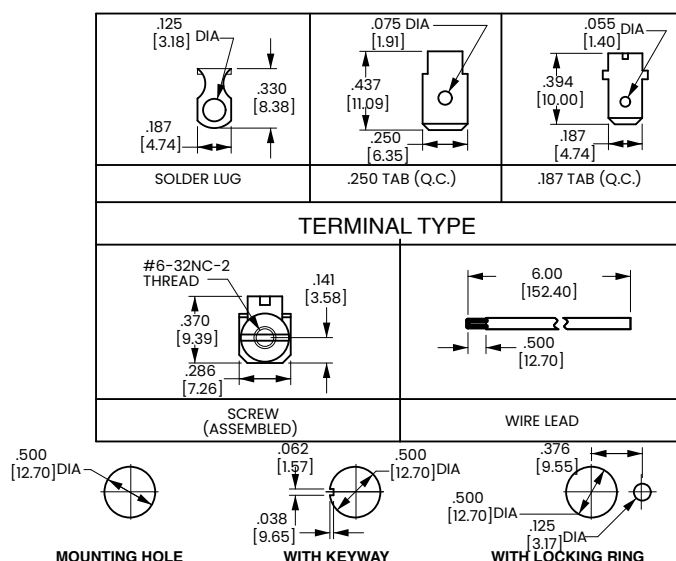
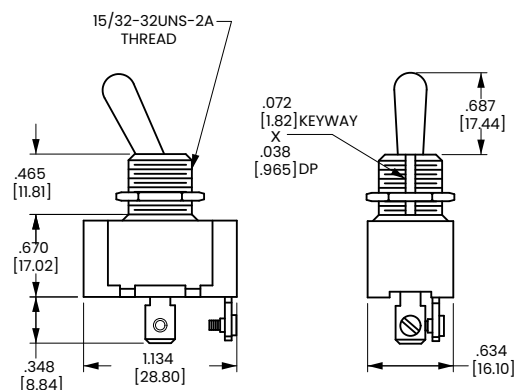
- 1 Consult factory for .187 tab, wire lead and combination screw/tab/solder lug termination callouts.
  - 2 Additional toggle options are available. Consult factory.
- ( ) indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



# G-Series

Toggle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



General purpose workhorses with options tailored to meet most any need. Ratings to 20A 277VAC, international approvals, various actuator, bushing, termination, and circuit choices allow this toggle switch to easily integrate into a variety of different applications. The G-Series is appropriate for usage in low voltage DC applications.

**1-2**  
Poles

**3-20**  
Amps

**125, 250**  
VAC

**12-24**  
VDC

## Typical Applications

- Marine
- Food Service
- Generator
- Industrial Control
- Office Automation

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts  
& opposite polarity  
VDE: 4000V - live to dead metal parts;  
1250V - opposite polarity & across open  
contacts

## Electrical Life

50,000 cycles - maintained  
25,000 cycles - momentary

## Operating Temperature

32°F to 185°F (0° to 85°C)

# Ordering Scheme

Sample  
Part Number **2GM51 - 73**

Selection 1 2

### 1. SERIES <sup>3</sup>

| Single Pole in Double Pole base           |       |       | Double Pole                     |       |       |
|-------------------------------------------|-------|-------|---------------------------------|-------|-------|
| 10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC |       |       | solder lug .250 tab screw term. |       |       |
| 2GA50                                     | 2GA51 | 2GA54 | On-None-Off                     | 2GK50 | 2GK51 |
| 6GA5A                                     | 6GA5B | 6GA5E | (On)-None-Off                   | 6GK5A | 6GK5B |
| 6GA5L                                     | 6GA5M | 6GA5S | On-None-(Off)                   | 6GK5L | 6GK5M |
| 2GB50                                     | 2GB51 | 2GB54 | On-None-On                      | 2GL50 | 2GL51 |
| 6GB5A                                     | 6GB5B | 6GB5E | On-None-(On)                    | 6GL5A | 6GL5B |
| 2GC50                                     | 2GC51 | 2GC54 | On-Off-On                       | 2GM50 | 2GM51 |
| 6GC5A                                     | 6GC5B | 6GC5E | On-Off-(On)                     | 6GM5A | 6GM5B |
| 6GC5L                                     | 6GC5M | 6GC5S | (On)-Off-(On)                   | 6GM5L | 6GM5M |

10A 250VAC, 15A 125VAC, 12 (6)A 250VAC T85/55 ENEC/VDE Approved<sup>1</sup>

2GA90 2GA91 - On-None-Off 2GK90 2GK91  
2GB90 2GB91 - On-None-On 2GL90 2GL91  
2GC90 2GC91 - On-Off-On 2GM90 2GM91

Additional ratings up to 20A 125VAC, 12A 250VAC, 1HP 120-240 VAC available.  
Consult factory for specifics.

### 2. ACTUATOR STYLE <sup>4</sup>

|                     | unsealed | sealed | toggle length | bushing length |
|---------------------|----------|--------|---------------|----------------|
| Bat                 | 73       | 78     | 0.687         | 0.465          |
| Paddle <sup>5</sup> | NBL3     | NBL8   | 0.687         | 0.465          |
| Bat <sup>2</sup>    | D-3B-B   | -      | 0.687         | 0.379          |
| Paddle <sup>2</sup> | -        | D-4B-B | 0.687         | 0.379          |

Notes:

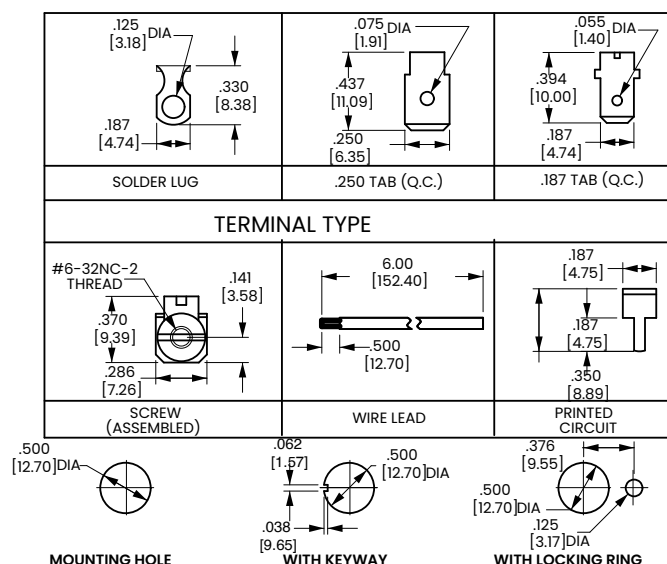
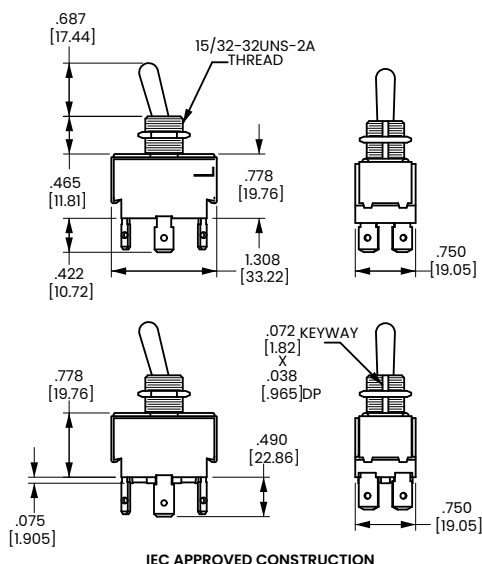
- 1 Not available with 73 or NBL3 style toggles, T55 with 78 and NBL8 style toggles.
- 2 All nylon bushing and toggle.
- 3 Consult factory for .187 tab, wire lead and combination screw/tab/solder lug termination callouts.
- 4 Additional actuator options available. Consult factory.
- 5 Nylon toggle with black ebanol plated bushing.
- ( ) Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]





# H/I-Series

Toggle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



General purpose workhorses with options tailored to meet most any need. Ratings to 17A 125VAC, various actuator, bushing, termination, and circuit choices allow this toggle to easily integrate into a variety of different applications. The H/I-Series is appropriate for usage in low voltage DC applications.

**3-4**  
Poles

**3-17**  
Amps

**125, 250, 600**  
VAC

**12-24**  
VDC

## Typical Applications

- Marine
- Food Service
- Generator
- Industrial Control
- Office Automation



# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead  
metal parts

## Electrical Life

50,000 cycles - maintained  
25,000 cycles - momentary

## Operating Temperature

32°F to 185°F (0° to 85°C)

# Ordering Scheme

Sample Part Number **H K 25 1 - 73**

Selection 1 2 3 4 5

### 1. SERIES

H

### 2. CIRCUIT 5, 9, 10, 11, 12

#### Three Pole

**K** ON-NONE-OFF  
**L** ON-NONE-ON  
**M** ON-OFF-ON  
**O** ON-OFF-ON

#### Three Pole (In Four Pole Base)

**K** ON-NONE-OFF  
**L** ON-NONE-ON  
**M** ON-OFF-ON

### 3. RATING

|           |                                                                  |            |                                                                                                      |
|-----------|------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------|
| <b>25</b> | 10A 250 VAC<br>15A 125 VAC<br>3/4HP 250 VAC<br>1, 2 or 3-Phase   | <b>A25</b> | 6A 600VAC,<br>10A 250 VAC,<br>15A 125 VAC,<br>3/4HP 250 VAC,<br>1, 2, 3-Phase,                       |
| <b>26</b> | 3A 250 VAC<br>6A 125 VAC<br>1/4HP 125-250 VAC<br>1, 2 or 3-Phase | <b>A27</b> | 1 HP 480-600VAC; 3 Phase<br>6A 600 VAC,<br>12A 250 VAC,<br>17A 125 VAC,<br>2 HP 480-600 VAC; 3 Phase |
| <b>27</b> | 12A 250 VAC<br>17A 125 VAC<br>1-1/2HP 250 VAC<br>1, 2, 3-Phase   |            |                                                                                                      |

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

### 4. TERMINATION/FUNCTION 1, 4

| Function      | Solder Lug | .250 Tab (QC) | .205 Tab (QC) | .187 Tab (QC) | Screw Term. | Wire Lead | PC Term. | Combi Term |
|---------------|------------|---------------|---------------|---------------|-------------|-----------|----------|------------|
| ON-NONE-OFF   | 0          | 1             | 2             | 3             | 4           | 5         | 6        | 7          |
| (ON)-NONE-OFF | A          | B             | C             | D             | E           | F         | G        | H          |
| ON-NONE-(OFF) | L          | M             | Q             | R             | S           | T         | U        | Y          |
| ON-NONE-ON    | 0          | 1             | 2             | 3             | 4           | 5         | 6        | 7          |
| ON-NONE-(ON)  | A          | B             | C             | D             | E           | F         | G        | H          |
| ON-OFF-ON     | 0          | 1             | 2             | 3             | 4           | 5         | 6        | 7          |
| ON-OFF-(ON)   | A          | B             | C             | D             | E           | F         | G        | H          |
| (ON)-OFF-(ON) | L          | M             | Q             | R             | S           | T         | U        | Y          |

### 5. TOGGLE STYLE 8

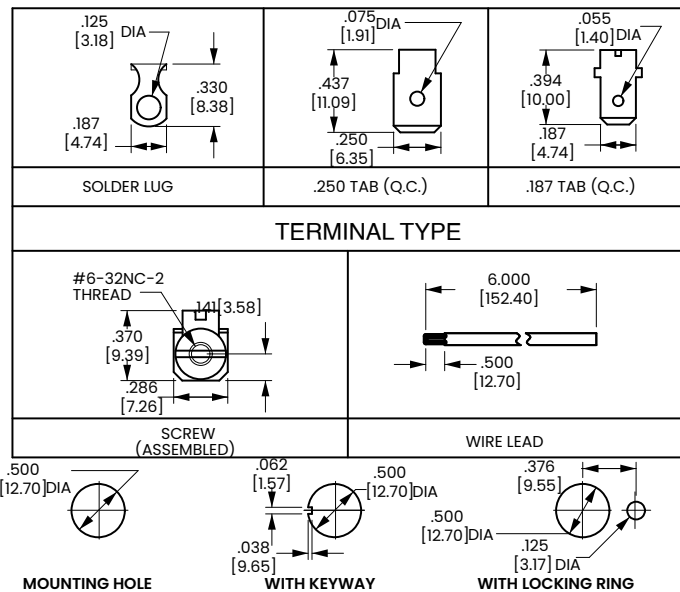
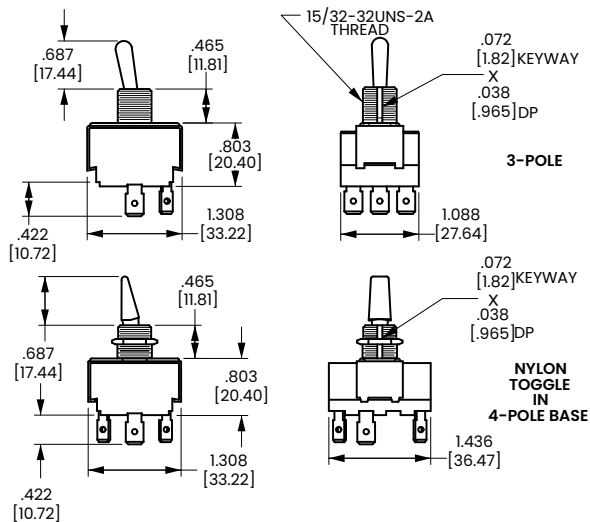
| Bat Style Toggle | Toggle with Neoprene Seal | Toggle Length | Bushing Length |
|------------------|---------------------------|---------------|----------------|
| <b>73</b>        | <b>78</b>                 | .687          | .465           |
| <b>NBL3</b>      | <b>NBL8</b>               | .687          | .465           |
| <b>NWH3</b>      | <b>NWD8</b>               | .687          | .465           |
| <b>NRD3</b>      | <b>NRD8</b>               | .687          | .465           |

#### Notes:

- Standard wire lead length is 6". For other wire lead lengths, Use wire lead termination/function code and add "/" and the wire lead length required at the end of the part number.. Example: HK255-73/10"
- Hardware/Packaging Options may be added to the base part number by adding a "/" with the option at the end of the part number.  
Example: HL251-73 / HDW ASSM  
Available options include:  
2 Hex  
No Hardware  
HDW ASSM  
HDW bulk  
Poly  
2 Hex nuts (1 assembled on switch, 1 Supplied in bulk)  
No Hardware included  
With Hardware assembled  
With Hardware bulk  
With Polybag
- The nbl3 and nbl8 toggle uses a black oxide plated metal bushing. Nwh and nrd toggles use nickel plated metal bushings. Nbl, nwh, and nrd toggles use a four pole base with pole 3 empty.
- () indicates momentary function.
- Maintained or Momentary action of the switch is determined by the combination of the circuit and termination/function designation of the description.  
Example: HK25B-73 is a (ON)-OFF circuit with .250 TAB Terminals.
- Combi-terminals are only available with ratings 25 & 27 with screws and saddle Clamps Supplied in bulk.
- Screw terminals are supplied with screws assembled to terminals.
- Nylon toggles are not available with momentary circuits.
- The "o" circuit is a reversing circuit with jumpers from terminal 1 to 6, 3 to 4, and terminal 7 to 9. Terminals are located at 1, 2, 3, 4, 5, 6, 7, 8, and 9.
- The "o" circuit is not available with pc or combi terminals.
- A special "o" circuit is a reversing circuit called out with a "j" following the termination/function digit in the description. Jumpers are from terminal 1 to 5, 3 to 5, 4 to 9 and 6 to 7. Terminals are located at 2, 3, 6, and 9 with a double terminal at 8.
- Special "O" circuit only available with .250 Tab terminals. Example: H0251J-73
- When the switch circuit is not ul or csa approved, the rating code in the item master file will be 000, no matter what the rating code call out is in the switch description.

# Dimensional Specs

inches [millimeters]

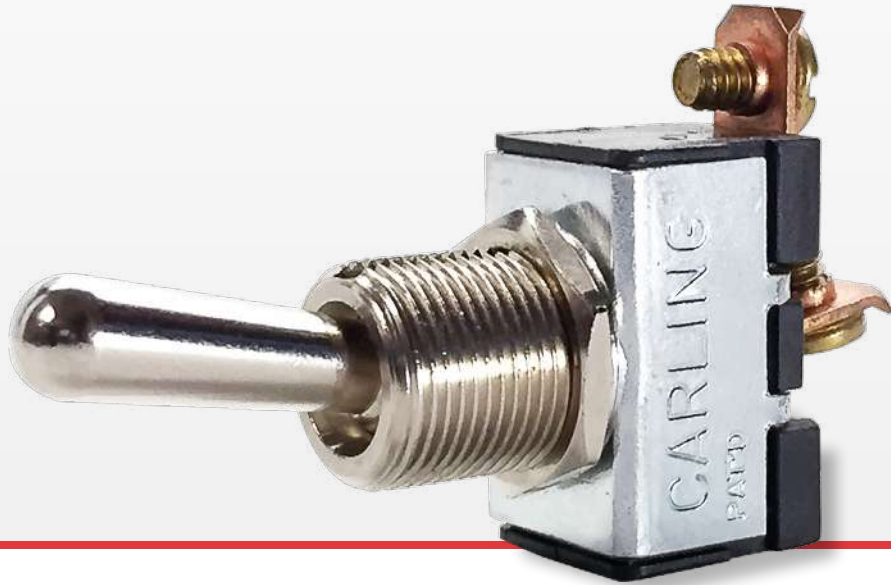


# C-Series

Single Pole Toggle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The C-Series single pole compact high current toggle switches are ideal for applications with back panel size constraints. These switches feature self-cleaning contacts and ratings up to 20A 125VAC, 10A 250VAC, 1 1/2 HP 125-250VAC. With a rugged metal construction, these switches figure prominently in markets with stringent current carrying requirements.

|          |              |                 |
|----------|--------------|-----------------|
| <b>1</b> | <b>10-20</b> | <b>125, 250</b> |
| Pole     | Amps         | VAC             |

## Typical Applications

• Environmental Controls • Marine • Food Service • Vacuum Cleaners

# Tech Specs

## Dielectric Strength

1000V - live to dead metal parts and opposite polarity.

## Electrical Life

25,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample Part Number **CA201 73**

Selection 1 2

### 1. SERIES

| 10A 250VAC, 20A 125VAC, 11/2 HP 125-250VAC | Solder Lug | .250 Tab | Screw Term. | Wire Leads |
|--------------------------------------------|------------|----------|-------------|------------|
| Single Pole                                | CA200      | CA201    | CA204       | CA205      |
| On-None-Off                                | CB200      | CB201    | CB204       | CB205      |
| On-None-On                                 |            |          |             |            |

Additional toggle styles available. Consult factory.

### 2. KNOB COLOR

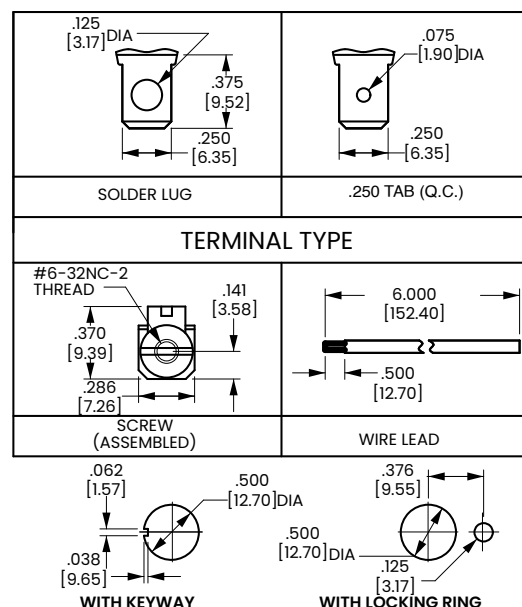
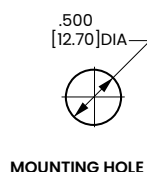
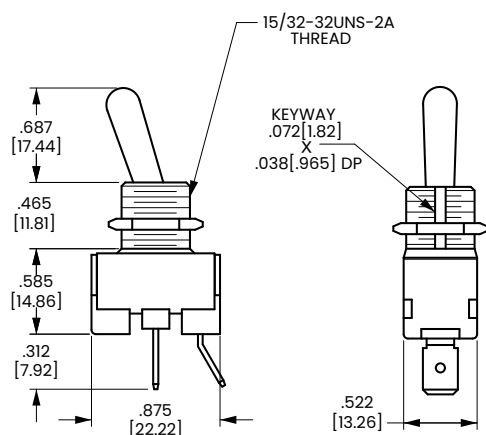
| BAT | unsealed | sealed | toggle length | bushing length |
|-----|----------|--------|---------------|----------------|
| 73  |          | 78     | 0.687         | 0.465          |

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]





**Littelfuse®**



**Carling Technologies®**

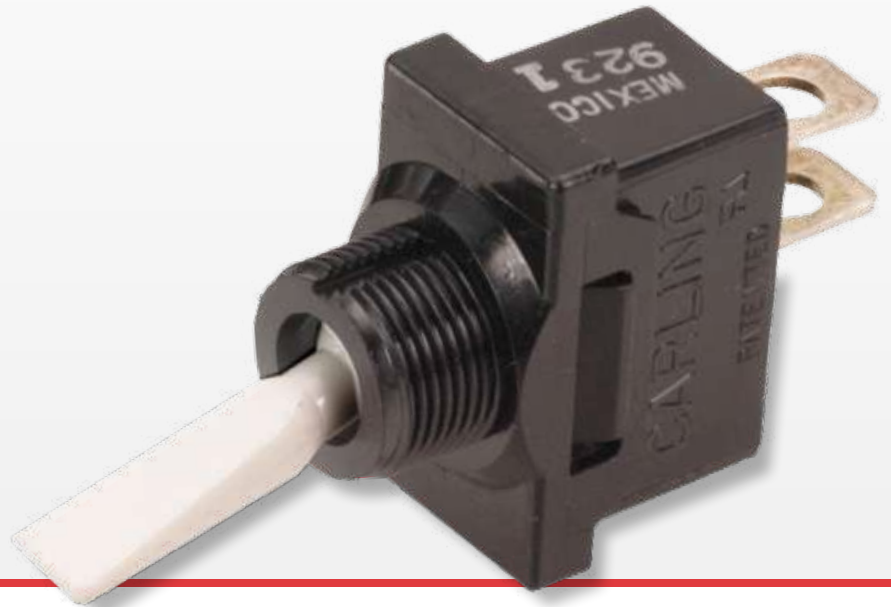
A Littelfuse® Brand

# D-Series

Single Pole Toggle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The D-Series single pole compact high current toggle switches are ideal for applications with back panel size constraints. These switches feature self-cleaning contacts and ratings up to 20A 125VAC, 10A 250VAC, 1 1/2 HP 125-250VAC. With an economical double insulated all nylon construction, these switches figure prominently in markets with stringent current carrying requirements.

**1**

Pole

**5-20**

Amps

**125, 250**

VAC

## Typical Applications

- Environmental Controls
- Marine
- Food Service
- Vacuum Cleaners

# Tech Specs

## Dielectric Strength

1000V - live to dead metal parts and opposite polarity.

## Electrical Life

25,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample Part Number **DA221 - P - B - B**

Selection 1 2 3 4

### 1. SERIES

**10A 250VAC, 20A 125VAC, 1 1/2 HP 125-250VAC**  
Solder Lug .250 Tab Wire Leads  
On-None-Off **DA220 DA221 DA225**  
On-None-On **DB220 DB221 DB225**  
On-Off-On **DC220 DC221 DC225**

### 2. ACTUATOR STYLE

**B** Bat **P** Paddle

### 3. ACTUATOR COLOR <sup>2</sup>

**B** Black **W** White

### 4. BUSHING COLOR <sup>2</sup>

**B** Black **W** White

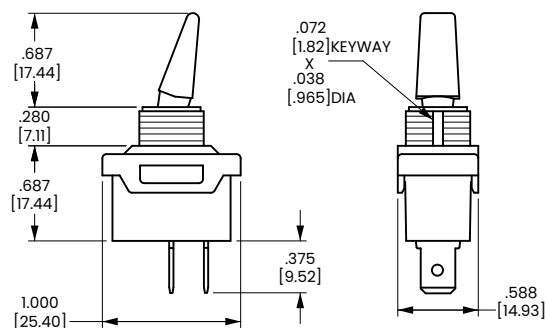
Notes:  
1 DA945 available with wire leads and ON-OFF circuit only.  
2 Additional colors available. Please consult factory.

[Configure Complete Part Number >](#)

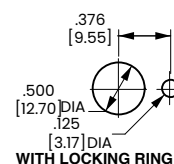
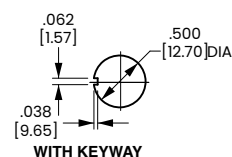
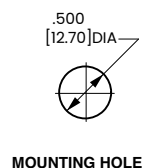
[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



|                |                     |                                                     |
|----------------|---------------------|-----------------------------------------------------|
| <br>SOLDER LUG | <br>.250 TAB (Q.C.) | <br>INTEGRATED WIRE LEAD<br>(no exposed conductors) |
| TERMINAL TYPE  |                     |                                                     |



# 110/216-Series

Heavy Action Toggle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The 110/216-Series is a compactly designed, versatile metal construction toggle switch which is appropriate for a variety of uses. Features include single or double pole options, maintained or momentary construction with termination choices including solder lug end or bottom, wire leads and .250 tab terminals. The quick make/quick break contact mechanism makes the switch suitable for high voltage (125-250 volt) applications.

**1-2**  
Poles

**1-10**  
Amps

**125, 250**  
VAC

**125, 250**  
VDC

## Typical Applications

- Small Appliances
- Floor Maintenance
- Lighting

## Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead  
metal parts & opposite polarity

## Electrical Life

25,000 cycles

## Operating Temperature

0°C to 85°C

# Ordering Scheme

Sample  
Part Number

110-S 73

## Selection

1

2

## 1. SERIES

**3A 250V, 6A 125V, AC/DC**

|                    | Solder Lug<br>(end) | Solder Lug<br>(bottom) | Screw<br>Terminals | Wire<br>Leads |
|--------------------|---------------------|------------------------|--------------------|---------------|
| <b>Single Pole</b> |                     |                        |                    |               |
| On-None-Off        | 110                 | 110-B                  | 110-S              | 111-16        |
| Off-None-(On)      | 110-M-NO            | 110-BM-NO              | 110-SM-NO          | 111-16M-NO    |
| On-None-Off        | 110-M-NC            | 110-BM-NC              | 110-SM-NC          | 111-16M-NC    |

**Double Pole**

|             |              |   |   |              |
|-------------|--------------|---|---|--------------|
| On-None-Off | <b>2BK62</b> | - | - | <b>2BK65</b> |
| On-None-On  | <b>2BL62</b> | - | - | <b>2BL65</b> |

1A 250V, 3A 125V, AC/DC

|                    |          |        |   |            |
|--------------------|----------|--------|---|------------|
| <b>Single Pole</b> |          |        |   |            |
| On-None-On         | 112      | -      | - | 112-A      |
| On-None-(On)       | 112-M    | -      | - | 112-M-A    |
| <b>Double Pole</b> |          |        |   |            |
| On-None-Off        | 216      | -      | - | 216A       |
| Off-None-(On)      | 216-M-NO | -      | - | 216A-M-ANO |
| On-None-(Off)      | 216-M-NC | -      | - | 216A-M-ANC |
| On-None-On         | 316      | 316-B  | - | -          |
| On-None-(On)       | 316-M    | 316-BM | - | -          |

**2 circuit**

|                  |       |        |   |        |
|------------------|-------|--------|---|--------|
| 1 On - 1 Off     | 516   | 516-B  | - | 516-A  |
| 1 (On) - 1 (Off) | 516-M | 516-BM | - | 516-AM |

**6A 120VAC**

|            |       |   |   |       |
|------------|-------|---|---|-------|
| On-None-On | 2BB62 | - | - | 2BB65 |
|------------|-------|---|---|-------|

5A 250V, 10A 125V, 1/4HP, 125V

|             |      |        |        |        |
|-------------|------|--------|--------|--------|
| On-None-Off | 160H | 160H-B | 160H-S | 160H-A |
|-------------|------|--------|--------|--------|

## 2. KNOB COLOR

### BAT STYLE TOGGLE

| unsealed | sealed | toggle length | bushing length |
|----------|--------|---------------|----------------|
| 52       | 57     | 0.375         | 0.343          |
| 63       | 68     | 0.500         | 0.465          |
| 73       | 78     | 0.687         | 0.46555        |

### BALL STYLE TOGGLE

| unsealed | sealed | toggle length | bushing length |
|----------|--------|---------------|----------------|
| 21       | -      | 0.375         | 0.250          |
| 22       | -      | 0.375         | 0.343          |
| 25       | -      | 0.375         | 0.875          |

Notes:

1 Momentary function only available with 73 toggles.

160H and 110-Series are available with .250 tab terminals. Add suffix /TABS to end of part number. ex. 110-73/TABS

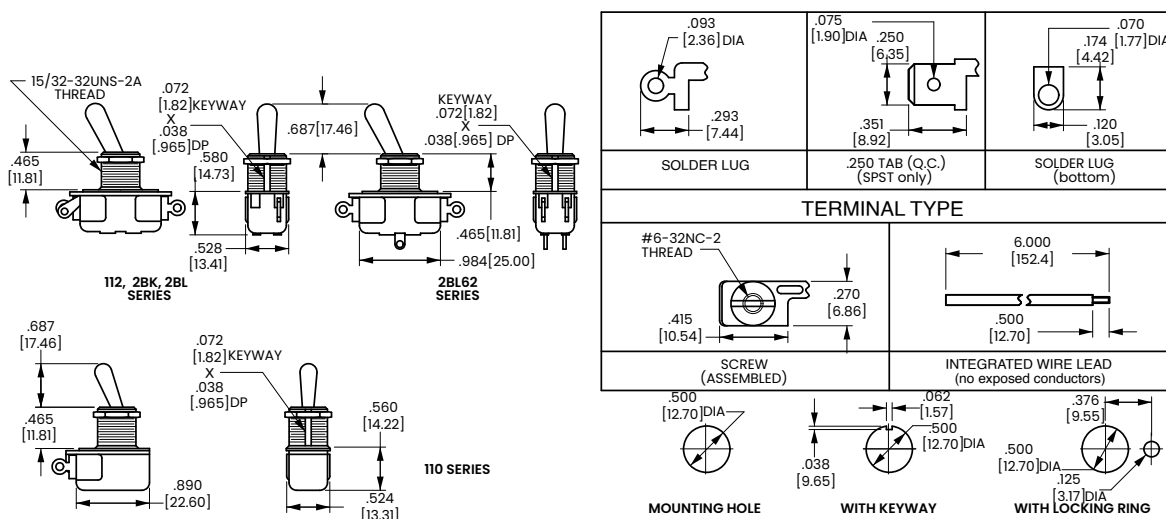
( ) Indicates momentary function.

 **Configure Complete Part Number >**

 **Browse Standard Parts >**

## Dimensional Specs

inches [millimeters]





# DK/EK-Series

Heavy Duty Toggle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The switch that can handle your heavy duty requirements. Single or double pole with wire lead or screw terminations, and ratings to 20A 125V 10A 250V, the ac/dc DK/EK-Series is the most heavy duty toggle switch in the Carling line. Its sturdy metal construction and stiff actuation force will withstand the abuses of virtually any stringent application. The quick make/quick break contact mechanism is ideal for high voltage DC applications.

**1-2**  
Poles

**8-20**  
Amps

**125, 250**  
VAC

**125, 250**  
VDC

## Typical Applications

- Industrial Motor Control
- General Purpose

# Tech Specs

## Dielectric Strength

1000V - live to dead metal parts and opposite polarity.

## Electrical Life

25,000 cycles

## Operating Temperature

0°F to 150°F (-17.8°C to +65.6°C)

# Ordering Scheme

Sample  
Part Number

DK284 - 73

Selection

1

2

### 1. SERIES

8A 250V, 16A 125V, 1 HP 125-250V

Screw Terminals

Wire Leads

Single Pole

On-None-Off

DA284

DA285

Double Pole

On-None-Off

DK284

DK285

10A 250V, 20A 125V, 1 1/2 HP 125-250V

Screw Terminals

Wire Leads

Single Pole

On-None-Off

EA204

EA205

Double Pole

On-None-Off

EK204

EK205

### 2. ACTUATOR STYLE

1

BAT STYLE TOGGLE

unsealed

73

toggle length

0.687

bushing length

0.465

BALL STYLE TOGGLE

unsealed

32

toggle length

0.500

bushing length

0.343

Notes:

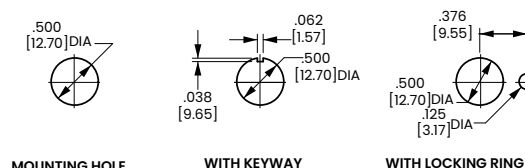
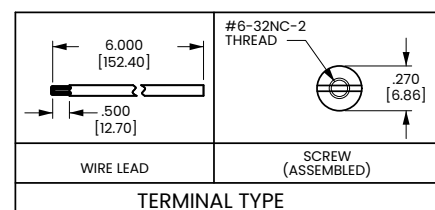
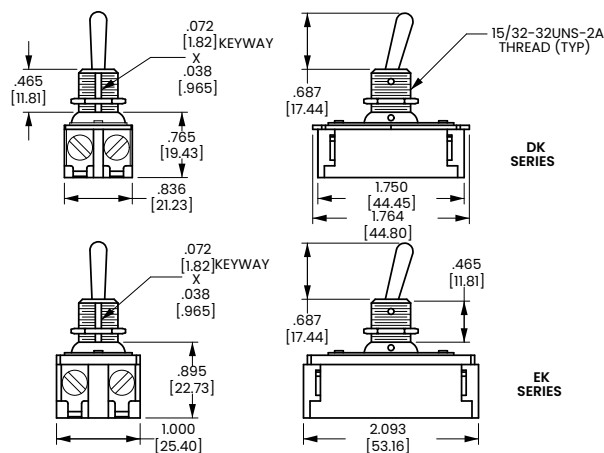
1 Additional toggle lengths available. Consult factory for details.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]





**Littelfuse®**



**Carling Technologies®**

A Littelfuse® Brand

# MAAOA/ 215-Series

Toggle Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The MAAOA/215-Series toggle switches are single pole, AC rated at 20 amps and 125 VAC. These switches are snap-in mounted, with a phenolic toggle and base, and are suitable for high ambient temperature applications.

**1**

Pole

**10-20**

Amps

**125, 250**

VAC

## Typical Applications

- Coffee Makers
- Food Warmers

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead  
metal parts & opposite polarity

## Electrical Life

25,000 cycles

## Operating Temperature

32°F to 185°F (0° to 85°C)

# Ordering Scheme

Sample  
Part Number MAAOA - BL / ON-OFF

Selection                      1                      2                      3

### 1. SERIES

**10A 250 VAC, 20A 125 VAC, 1/2 HP 125-250 VAC**  
.250 Tabs                      Screw Terms.                      Wire Leads

**Single Pole**  
On-None-Off                      **MAAOA**                      **215**                      **215-A**  
(On)-None-Off                      **MM-021**                      -                      -

Notes:  
Standard wire lead length is 6". For other wire lead length, use wire lead termination/  
function code and add "/" and the wire lead length required. Example: 215-A-BL/10"  
1 Imprinting is available. ON-OFF legend is not standard and must be specified  
after color. If not specified, switch will be manufactured with no legend.  
( ) Indicates momentary function.

### 2. BASE & ACTUATOR COLOR

**BL**                      Black  
**WH**                      White

### 3. LEGEND <sup>1</sup>

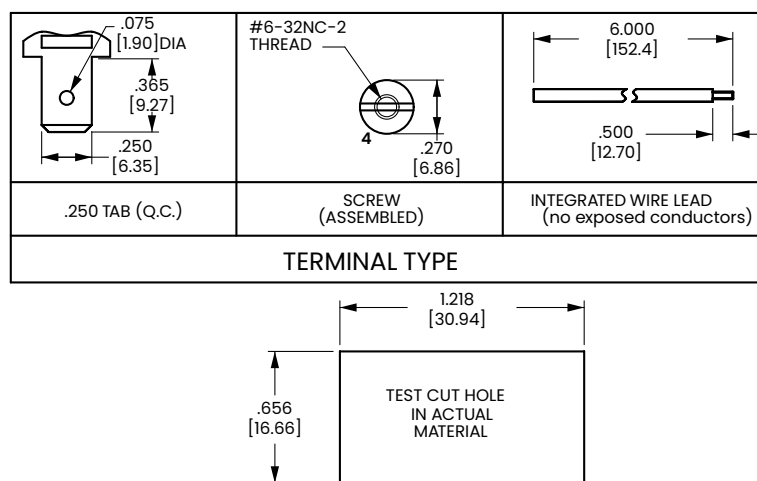
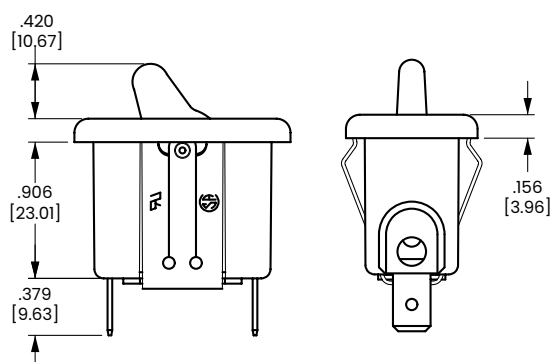
On-Off

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



### TERMINAL TYPE

### MOUNTING HOLE

Panel Thickness: .030 [.762] min - .090 [2.28] max.  
Specific cutout dimension range  
dependent on panel thickness and material.

# Hexboot Accessories

Carling Technologies full or half hexboot is the perfect complement to Carling's line of toggle switches. The boot is compatible with 15/32" threaded bushings and will provide extra protection against the elements in harsh environments.

## Product Highlights:

- Flexible tear-resistant silicone rubber overmolded onto a 15/32" brass hexnut
- Full hexboot completely covers toggle actuator and bushing
- Meets ROHS 2011/65/EU directive
- Inhibits the rotation of switches subjected to low frequency vibration
- Complementary, cost effective addition to Carling's toggle switches
- Suitable for toggle models: F-Series, G-Series, 110-Series, C-Series, D-Series, DK/EK-Series, H/I-Series, LT-Series

### Full Hexboot



Part #: 999-37246-001

### Half Hexboot

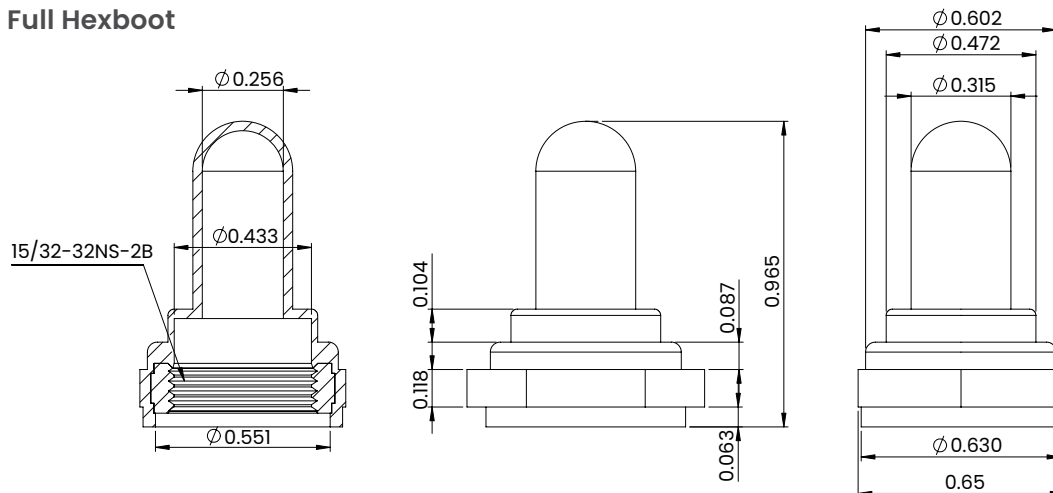


Part #: 999-37245-001

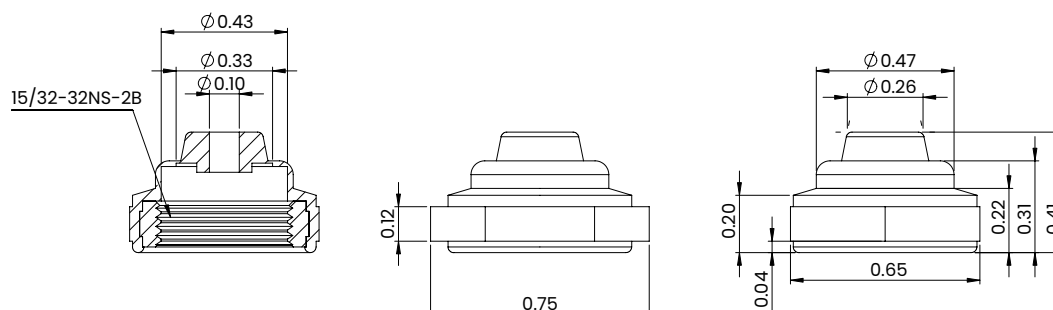
# Dimensional Specs

inches [millimeters]

### Full Hexboot

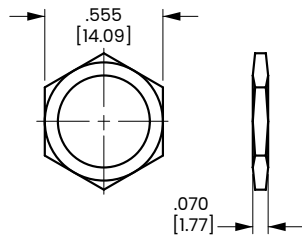


### Half Hexboot



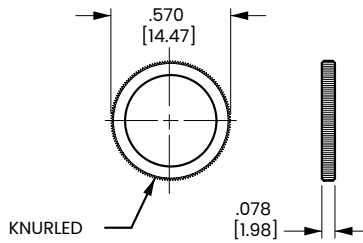
# Bushing Accessories

The hardware options and accessories listed below were specifically designed to be used with toggle and pushbutton switches. The drawings are representative of the actual products. When other hardware options are required, please consult factory.



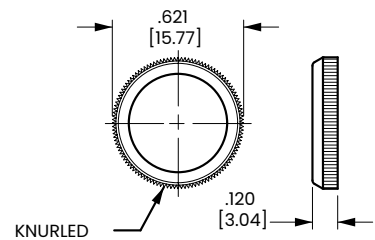
## STANDARD HEXNUT

.562 in. [14.27 mm] X .076 in. [1.93 mm]  
NICKEL: 380-08602  
BLACK: 380-08606



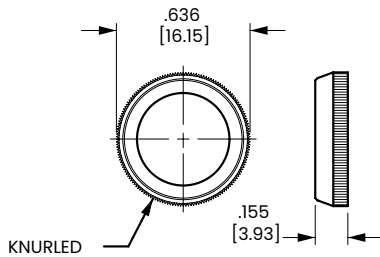
## STANDARD FACENUT

.570 in. [14.47 mm] X .078 in. [1.98 mm]  
NICKEL: 380-08693  
BLACK: 380-08694



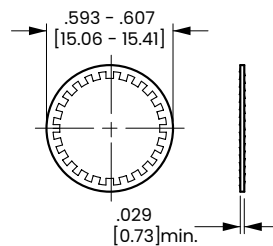
## PLASTIC FACENUT

(Wrench Supplied N/C)  
.625 in. [15.87 mm] X .120 in. [3.04 mm]  
BLACK: 384-17126-001  
RED: 384-17126-002  
WHITE: 384-17126-003



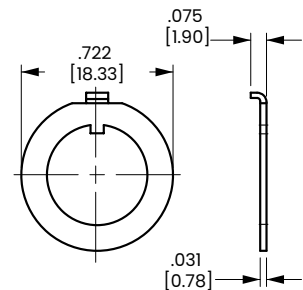
## DRESS FACENUT

.636 in. [16.15 mm] X .155 in. [3.93 mm]  
NICKEL: 380-08810  
BLACK: 380-08811



## LOCKWASHER

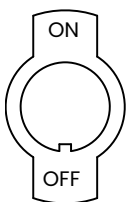
NICKEL-PLATED: 728-15907



## LOCKING RING

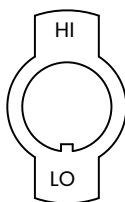
ZINC: 728-15946  
BLACK: 728-15947

All indicator plates are nickel-plated steel. Odd keyway locations, alternate imprints and plating available on special order. Contact factory for minimum quantities and specifications.



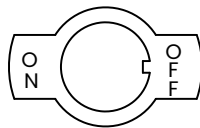
## YO1

272-06747



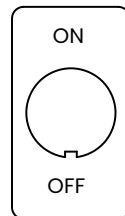
## YO2

272-06764



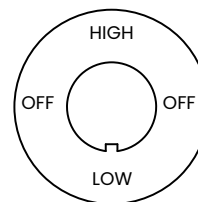
## Y51

272-06842



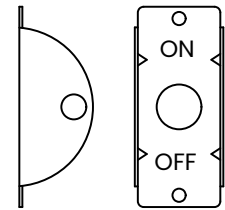
## Y101

272-06935



## Y311

272-07258



## Y500

272-07293

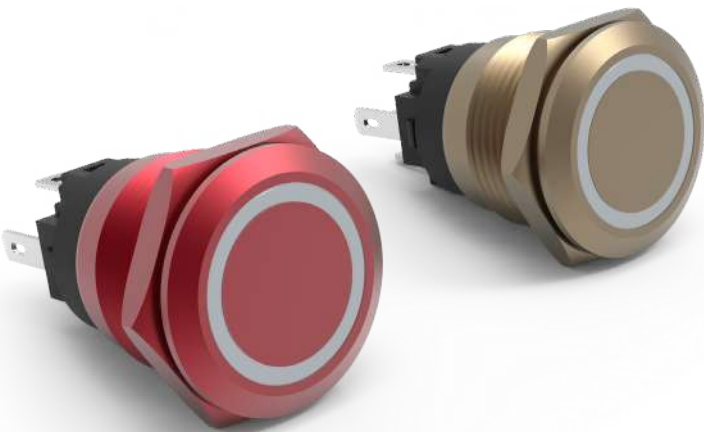
ALL PLATES SHOWN FIT 15/32" (.465 [11.81]) BUSHINGS

# AV/AVH-Series

Sealed Anti-Vandal Pushbutton Switches

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



The AV/AVH-Series sealed switch product line features a sleek design with various LED illumination options. The bushing/button is available in stainless steel, or black, red and gold anodized. These single-pole switches are available with momentary and maintained circuits, with quick connect tab terminals for easy installation and daisy-chaining.

**1**

Pole

**3-30**

Amps

**6-48**

VDC

**IP67 Sealing**

Above-Panel

## Typical Applications

- Marine
- Charging Stations
- Security Panels
- Harsh and/or Outdoor Environments
- EV Infrastructure
- Industrial Automation
- Public Transit Systems



# Tech Specs

## AV-Series

### Electrical

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Contact Rating            | 10.1A @ 6~24VDC;<br>5A @ 36VDC<br>3A @ 48VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| LED Voltage/Current       | 6 VDC @ 15mA;<br>12 VDC @ 15mA;<br>24 VDC @ 10mA;<br>36 VDC @ 10mA;<br>48 VDC @ 5mA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Dielectric Strength       | 1000V RMS 50~60 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Insulation Resistance     | 50 M-ohms min. @500V DC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Initial Contact Endurance | ≤10 mΩ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Life                      | 1 seconds ON and 3 seconds OFF per operation, Resistive load with Rated current & voltage. 10.1A @ 6~24VDC. Total 25K cycles at full load, including 5K at +70°C, 15K at ambient, 5K at -30°C;<br>1 seconds ON and 3 seconds OFF per operation, Resistive load with Rated current & voltage. 5A @ 36VDC. Total 15K cycles at full load, including 3K at +70°C, 9K at ambient, 3K at -30°C;<br>1 seconds ON and 3 seconds OFF per operation, Resistive load with Rated current & voltage. 3A @ 48VDC. Total 15K cycles at full load, including 3K at +70°C, 9K at ambient, 3K at -30°C. |
| Electrical Endurance      | Up to 25K Cycles                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Contacts                  | Silver alloy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Terminals                 | 110" x 0.020 [2.79 x 0.5 mm] plug-in terminal, copper alloy silver plate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

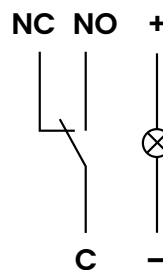
### Physical

|                 |                                                  |
|-----------------|--------------------------------------------------|
| Function        | NO / NC contact (changeover)                     |
| Operation       | Momentary or maintained                          |
| Illumination    | Independent LED (Red, Green, Amber, White, Blue) |
| Seals           | Silicone, Bezel and Button                       |
| Mounting        | M19-P1.0 Nut (SUS316), Tightening torque: 2~3Nm  |
| Base            | Glass filled Nylon                               |
| Actuator        | Stainless Steel 316 or Aluminum Anodized         |
| Lens            | Polycarbonate, PC                                |
| Bushing         | Stainless Steel 316 or Aluminum Anodized         |
| Actuation Force | 7N max                                           |
| Weight          | 18g                                              |

### Environmental

|                           |                                                                                                                                                                                                              |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Storage Temperature       | -40°C to +85°C                                                                                                                                                                                               |
| Operating Temperature     | -30°C to +70°C (may affect endurance)                                                                                                                                                                        |
| Vibration, High Frequency | Mil-Std 202G, Method 204D, Test Condition A 0.06 DA or 10G' s 10-500 Hz. Test criteria- No loss of circuit during test and pre and post test contact resistance.                                             |
| Vibration, Random         | Mil-Std 202G, Method 214A, Test Condition I and B 7.56G' s RMS.8-hours in each of the 3 mutually perpendicular axes. Test criteria- No loss of circuit during test and pre and post test contact resistance. |
| Thermal Shock             | MIL-STD 202G Method 107G, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C)                                                                                                                       |
| Moisture Resistance       | MIL-STD 202G Method 106G, i.e.10~24-hour cycles @ +25°C to +60°C, 80~90% RH.                                                                                                                                 |
| Sealing                   | IP67, for above-panel components of the actual switch; compliant with IEC 60529.                                                                                                                             |
| Ignition Protection       | UL1500, ISO 8846                                                                                                                                                                                             |
| Electro-Static Discharge  | Compliant with EN61000-4-2 Discharge Level: Max. ±8KV; Discharge Level: Max. ±15KV                                                                                                                           |

### Wiring Diagram





# Ordering Scheme

Sample Part Number **AV 1 - 1 A 2 1 1 A - R 00**

Selection 1 2 3 4 5 6 7 8 9 10

## 1. SERIES

**AV** Anti-Vandal Pushbutton Switch

## 2. MOUNTING

**1** M19 Threaded Bushing

## 3. MATERIAL / FINISH

**1** Stainless Steel Bushing / Button  
**2** Black Anodized Bushing / Button  
**3** Red Anodized Bushing / Button  
**4** Gold Anodized Bushing / Button

## 4. CIRCUIT

**A** Momentary Off-(On) **B** Maintained Off-On

## 5. RATING

**2** 10.1A Resistive, 12VDC **3** 10.1A Resistive, 24VDC

## 6. TERMINATION

**1** .110" Quick Connect Tabs - Silver Plated

## 7. LENS / BUTTON

**1** Flush

## 8. LED COLOR

**N** No LED **B** Green **D** White  
**A** Red **C** Amber<sup>1</sup> **E** Blue

## 9. ILLUMINATION STYLE

**N** None **R** Ring

## 10. AGENCY APPROVAL

**00** No Legend **02** Stand By **03** Light **04** Bell  
**01** On/Off **05** Door Open **06** Information **07** Horn

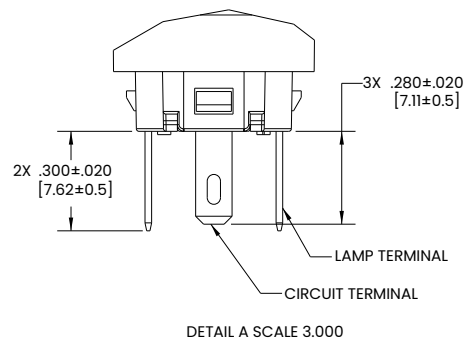
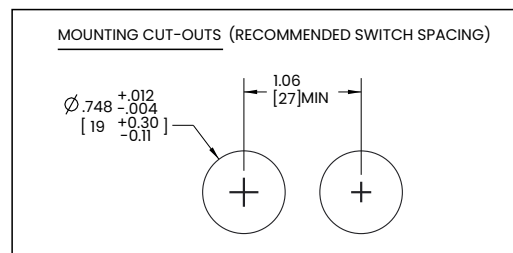
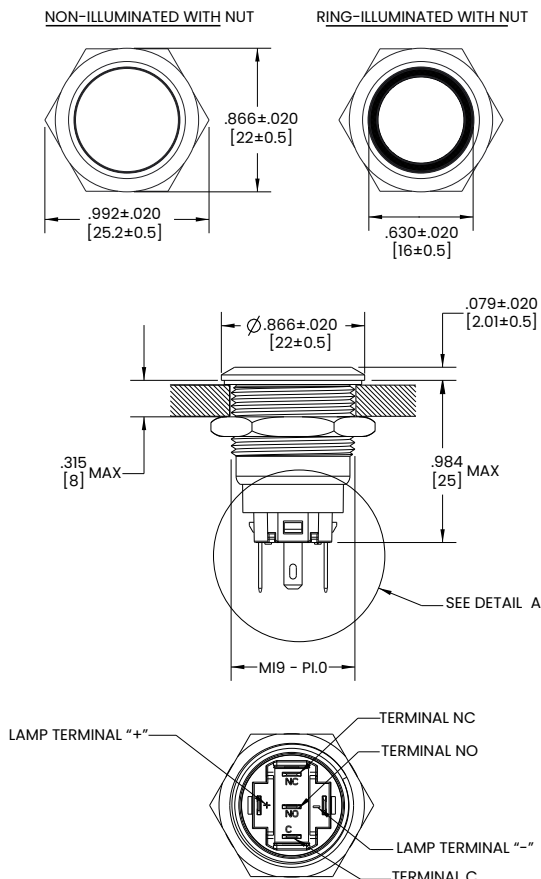
Notes:

1. Only available with rating 2

[Configure Complete Part Number >](#)

# Dimensional Specs

inches [millimeters]



# Tech Specs

## AVH-Series

### Electrical

|                             |                                                             |
|-----------------------------|-------------------------------------------------------------|
| Supply Voltage Range        | 9VDC – 16VDC                                                |
| Reverse Polarity Protection | 16 VDC                                                      |
| Insulation Resistance       | 50 MΩ min. @500VDC                                          |
| Initial Contact Resistance  | ≤10 mΩ                                                      |
| Electrical Endurance        | 50K Total Cycles; 30K at ambient, 10K at -30°C, 10K at 70°C |

### Environmental

|                              |                                                                                                                                                                                                                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Storage Temperature          | -55°C to +85°C                                                                                                                                                                                                                                                                                                |
| Operating Temperature        | -30°C to +70°C                                                                                                                                                                                                                                                                                                |
| Vibration, high frequency    | Mil-Std 202G, Method 204D, Test Condition A 0.06 DA or 10G's 10-500 Hz. Test criteria- No loss of circuit during test and pre and post test contact resistance.                                                                                                                                               |
| Vibration, Random            | Mil-Std 202G, Method 214A, Test Condition I and B 7.56G's RMS. 8-hours in each of the 3 mutually perpendicular axes. Test criteria- No loss of circuit during test and pre and post test contact resistance.                                                                                                  |
| Shock                        | Mil-Std 202G, Method 213B, Test Condition K@ 30g's 11ms normal duration. No resistance value loss pre and post test and no function malfunction. No loss of contact or unintended contact making.                                                                                                             |
| Thermal Shock                | MIL-STD 202G Method 107G, Condition A (Five cycles@ -55°C to +25°C to +85°C to +25°C TR-2131)                                                                                                                                                                                                                 |
| Handling/Drop                | 1 Meter Drop onto Hard Surface. 10 drops at random orientation. Cosmetic damage acceptable. No loss of function.                                                                                                                                                                                              |
| Moisture Resistance/Humidity | MIL-STD 202G Method 106G, i.e., 10-24-hour cycles @ +25°C to +60°C, 80-90% RH.                                                                                                                                                                                                                                |
| Sealing                      | IP67 above panel, According IEC 60529.                                                                                                                                                                                                                                                                        |
| Salt Spray                   | Mil STD 202G Method 101E, Test Condition A. 96 hrs. at a temperature of 95°F±5 °F (35 °C±3 °C), with a NaCl contact of from 4 to 6 percent. The test specimens shall be subjected to the inspections specified upon completion of the salt exposure.                                                          |
| Corrosion/Chemical           | No permanent discoloration, loss of function, distortion, failure of adhesive bonds, obvious loss of sealing, corrosion, softening or embrittlement after being brushed for 10 minutes to completely wet all exposed surfaces. Relevant chemical compatibility documentation may be used in place of testing. |
| Ignition Protection          | UL1500, ISO 8846, SAE J1171 TR-2417                                                                                                                                                                                                                                                                           |

### High-Current Momentary: Circuit A

|                     |                                                                                                            |
|---------------------|------------------------------------------------------------------------------------------------------------|
| Current Rating      | 20A @ 12VDC, 80A surge (300 ms)                                                                            |
| Function            | Off-(On) (momentary)                                                                                       |
| Connections Options | 6" 14 AWG Lead Wires w/0.187" PC Quick-Fit Ground Terminal<br>6" 14 AWG Lead Wires w/6" 20 AWG Ground Wire |

### High-Current Latching: Circuit B

|                     |                                                                                                            |
|---------------------|------------------------------------------------------------------------------------------------------------|
| Current Rating      | 20A @ 12VDC, 80A surge (300 ms)                                                                            |
| Function            | Off-On (maintained)                                                                                        |
| Connections Options | 6" 14 AWG Lead Wires w/0.187" PC Quick-Fit Ground Terminal<br>6" 14 AWG Lead Wires w/6" 20 AWG Ground Wire |

### Nav-Anchor: Circuit C

|                     |                                                                                                                                                   |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Current Rating      | 10A total, 5A each Output; 10A surge each Output (300 ms) TR-2113                                                                                 |
| Function            | V-ANC, first press: Load 1 ON & Load 2 ON, Red Ring Illuminated<br>Second press: Load 1 ON, Load 2 OFF, Blue Ring Illuminated<br>Third Press: OFF |
| Overload Protection | ≥60A, Output does not function. Switch reset by cycling through OFF position (unless overload continues)                                          |
| Connections Options | 6" 16 AWG Lead Wires w/0.187" PC Quick-Fit Ground Terminal                                                                                        |

### Dual-Output: Circuit D

|                     |                                                                                                                                            |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Current Rating      | 10A total, 5A each Output; 10A surge each Output (300 ms) TR-2113                                                                          |
| Function            | First press: OFF<br>Second press: Load 1 ON, Load 2 OFF, Red Ring Illuminated<br>Third Press: Load 1 OFF, Load 2 ON, Blue Ring Illuminated |
| Overload Protection | ≥60A, Output does not function. Switch reset by cycling through OFF position (unless overload continues)                                   |
| Connections Options | 6" 16 AWG Lead Wires w/0.187" PC Quick-Fit Ground Terminal                                                                                 |

Tech Specs continued on next page

# Tech Specs

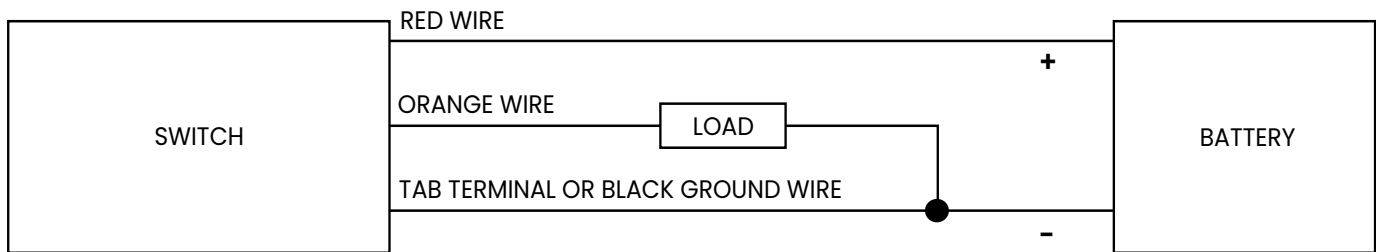
## AVH-Series

### Physical

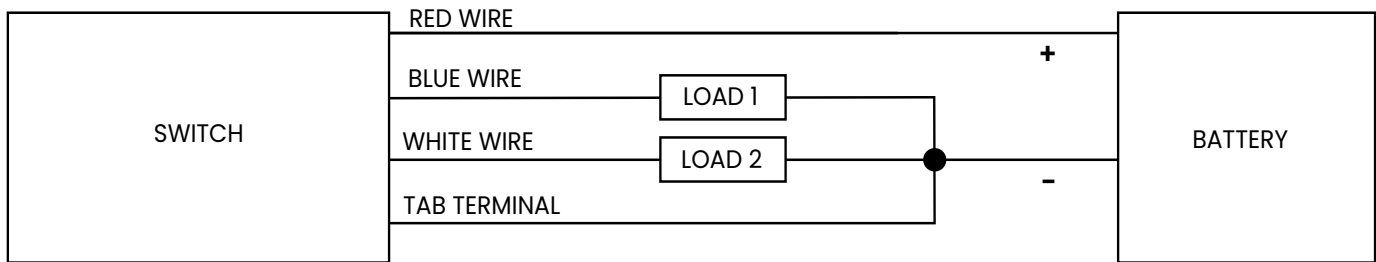
|                 |                                                                                 |
|-----------------|---------------------------------------------------------------------------------|
| Operation       | Pushbutton, Momentary (Circuits A, C & D),<br>Pushbutton Maintained (Circuit B) |
| Illumination    | Dependent LED                                                                   |
| Seals           | Gasket, bezel silicone,<br>potted housing                                       |
| Mounting        | M19-PI.0 Nut, Tightening torque:<br>2~3Nm                                       |
| Housing         | Aluminum 6061 T6, Anodized per<br>MIL-STD-8625, Type II, Class 2; Black         |
| Actuator        | Stainless steel 316<br>or Aluminum Anodized                                     |
| Lens            | Polycarbonate, PC                                                               |
| Bushing         | Stainless steel 316<br>or Aluminum Anodized                                     |
| Actuation Force | 7N max                                                                          |
| Weight          | 45~50g                                                                          |

### Wiring Diagrams

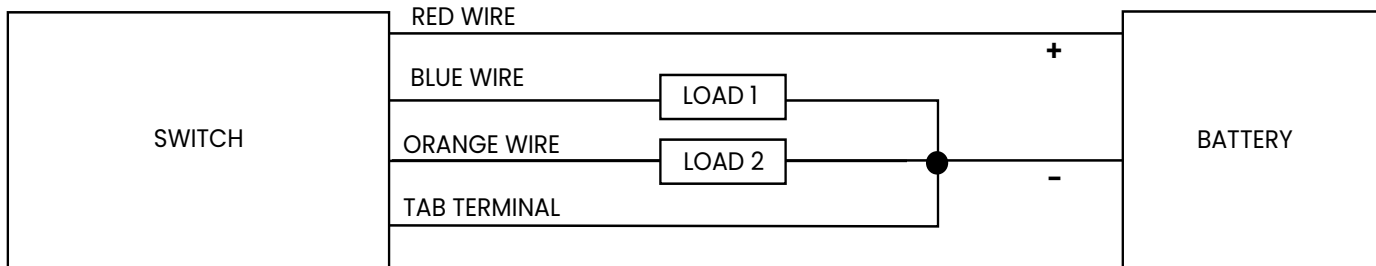
Single Output (Circuit A & B)



Nav-Anchor (Circuit C):



Dual-Output (Circuit D):



# Ordering Scheme

Sample Part Number **AVH 1 - 1 B 2 6 - R E N A**

Selection 1 2 3 4 5 6 7 8 9 10

## 1. SERIES

**AVH** Anti Vandal High Current

## 2. MOUNTING

**1** M19 Threaded Bushing

## 3. MATERIAL / FINISH

**1** Stainless Steel  
**2** Aluminum Anodized - Black  
**3** Aluminum Anodized - Red  
**4** Aluminum Anodized - Golden

## 4. CIRCUIT 1,2

**A** Momentary Off-(On) (None - Output 1)  
**B** Latching Off-On (None - Output 1)  
**C** Momentary Off-(On) - (On) (None - Output 1&2 - Output 1)  
**D** Momentary Off-(On) - (On) (None - Output 1 - Output 2)

## 5. RATING 3

**1** 30A 12VDC (Per Output)  
**2** 20A 12VDC (Per Output)  
**3** 5A 12VDC (Per Output) / 10A 12VDC (Total)

## 6. WIRE LENGTH 9

**2** 6 Inches (152.4mm), Ground, 18 AWG Wire  
**6** 6 inches (152.4 mm) with 0.187" (4.8mm) Ground Tab Terminal

## 7. ILLUMINATION STYLE 4

**N** None **R** Ring

## 8. POSITION 1 LED COLOR 7,8

**N** No LED **B** Green **D** White  
**A** Red **C** Amber **E** Blue

## 9. POSITION 2 LED COLOR 5,6

**N** No LED **E** Blue

## 10. ILLUMINATION TYPE 8

**N** None  
**A** Dependent (LED illuminates when the specified output is "ON")

### Notes:

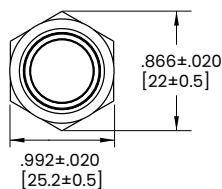
- 1 Circuit codes (A & B) require rating codes (1 or 2) only
- 2 Circuit codes (C & D) require rating code (3)
- 3 Rating will determine the wire gauge used.
- 4 Illumination Style code (N) requires: Pos 1 LED Color (N); Pos 2 LED Color code (N); Illumination type code (N)
- 5 Circuit code (C & D) requires Position 2 LED Color (E)
- 6 Circuit code (B) requires Position 2 LED Color code (N)
- 7 Codes (A,B,C,D,E) not available with Circuit code (B)
- 8 Other lighting options available: Consult Factory
- 9 Wire length code (2) only available with Circuit codes (A & B)

[Configure Complete Part Number >](#)

# Dimensional Specs

inches [millimeters]

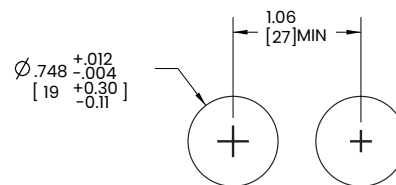
NON-ILLUMINATED WITH NUT



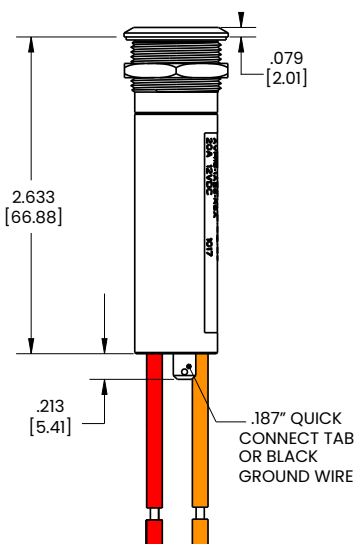
RING-ILLUMINATED WITH NUT



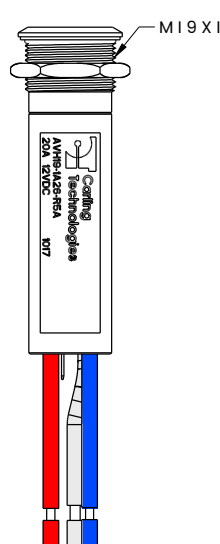
MOUNTING CUT-OUTS (RECOMMENDED SWITCH SPACING)



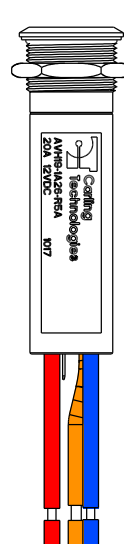
CIRCUIT A, B



CIRCUIT C



CIRCUIT D



CIRCUIT A, B: BATTERY (+): RED WIRE  
 LOAD 1: ORANGE WIRE  
 GROUND: TAB OR BLACK WIRE

CIRCUIT C: BATTERY (+): RED WIRE  
 LOAD 1: BLUE WIRE  
 LOAD 2: WHITE WIRE  
 GROUND: TAB

CIRCUIT D: BATTERY (+): RED WIRE  
 LOAD 1: BLUE WIRE  
 LOAD 2: ORANGE WIRE  
 GROUND: TAB



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# GP-Series

Pushbutton Switch

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



GP-Series pushbutton latch switches are designed for in-cab installation for on- and off-highway vehicles. Featuring an internal PCB rated to 0.25A 24VDC, this 2-position, snap-in panel-mounted switch is available with ON-OFF or Momentary ON-OFF circuitry. Configurable with or without a red LED backlight, the durable polycarbonate switch can be laser-etched in red with one of several standard icons to match your application.

**1**

Pole

**0.25**

Amps

**24**

VDC

**IP54 Sealing**

for Above-Panel Components

## Typical Applications

• Truck • Bus • Construction • Mining • Agriculture

# Tech Specs

## Electrical

|                            |                                                                                            |
|----------------------------|--------------------------------------------------------------------------------------------|
| Contact Rating             | Internal PCB rated to 0.25A @ 24VDC                                                        |
| Initial Contact Resistance | 50.0 miliOhms MAX                                                                          |
| Life                       | 50,000 cycles                                                                              |
| Terminals                  | Staked, Bright Acid Tin over Copper quick connect                                          |
| Reverse Polarity           | Reverse Polarity Test per SAE J1455 REV AUG2012, Section 4.11.3.3                          |
| Inrush                     | Cold Cranking & Jump Starting Capability Tests per SAE J1455 REV AUG2012, Section 4.11.3.3 |

## Mechanical

|           |                    |
|-----------|--------------------|
| Endurance | 438,000 actuations |
|-----------|--------------------|

## Environmental

|                              |                                                                                                                                                           |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environmental                | IP54 for above panel components of the actual switch, representing an index of protection as applied to electrical equipment in accordance with ISO 20653 |
| Operating Temperature        | -40°C to +85°C                                                                                                                                            |
| Vibration                    | SAE J1455 Random Vibration (22 Hours per Axis)<br>SAE J1455 Swept Sine Vibration (5g)                                                                     |
| Shock                        | MIL-STD-202G Method 213b, 30G - 11ms duration                                                                                                             |
| Handling/Drop                | Installation Harness Shock Test per SAE J1455 REV AUG2012, Section 4.11.3.3                                                                               |
| Temperature Cycle            | Thermal Cycle Test per SAE J1455 Rev August 2012 Sec. 4.1.3.1 and Fig 2A                                                                                  |
| Thermal Shock                | Test per SAE J1455 REV AUG2012 Sec 4.1.3.1, -40°C to +85°C                                                                                                |
| Moisture Resistance/Humidity | SAE J1445 REV AUG2012 SEC. 4.2                                                                                                                            |
| Corrosion/Chemical Splash    | SAE J1445 Rev AUG2012 Sec. 4.4; ISO 22241-1 Rec Oct2006                                                                                                   |
| Dust                         | SAE J1455; Section 4.7; ISO 12103                                                                                                                         |

## Physical

|                         |                                                                                                                                            |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Function                | 2 Position; Pushbutton Style                                                                                                               |
| Operation               | ON-OFF, and Momentary ON-OFF                                                                                                               |
| Lighted                 | Right Angle SMD LED - rated to 100,000 hours 1/2 life                                                                                      |
| Seals                   | None                                                                                                                                       |
| Mounting                | Front Panel Push-In<br>Acceptable Panel Thickness Range: .098 to .118 (2.50mm to 3.00mm)<br>See Dimensional Specifications                 |
| Base                    | Nylon PA66 GF rated to UL94 HB                                                                                                             |
| Actuator                | Compound actuator structure molded of thermoplastic polycarbonate rated to UL94 V0 interlocked with a Nylon PA66 actuator rated to UL94 V2 |
| Bracket                 | Acetal (Copolymer)                                                                                                                         |
| Laser Etched Pushbutton | Polycarbonate                                                                                                                              |
| Connector               | Integrated female connector in switch base. Mates with Delphi Connector P/N 12064760, See circuit diagram for Pin Out.                     |
| Actuation Force         | 509-1019 gms (5-10N)                                                                                                                       |
| Movement                | Vertical, max displacement: .256 [6.50] from OFF to maximum overtravel position<br>.170 [4.32] from OFF to ON position                     |
| Weight                  | Approximately 1.2 ounces (34.47 g)                                                                                                         |

# Ordering Scheme

Sample  
Part No.

GP 1 B C B - A R MV 1

Selection

1

2

3

4

5

6

7

8

9

## 1. SERIES

**GP** Pushbutton Latch Switch

## 2. CIRCUIT

**1** ON-OFF  
**2** (ON)-OFF

## 3. RATING

**B** .25A, 24VDC

## 4. BACKLIGHT COLOR

**0** No LED  
**C** Red

## 5. BRACKET COLOR

**B** Black

## 6. CAP COLOR/STYLE

**A** Black (Laser Etched)

## 7. LENS COLOR/STYLE

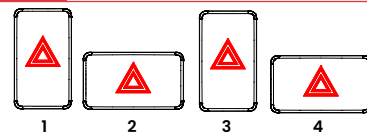
**Z** No Lens  
**R** Red (Laser Etched)

## 8. LEGEND

**00** No legend  
**MV** Hazard Light  
For standard icons, see Standard Legends Code page.  
For additional icons, please consult factory.

## 9. LEGEND ORIENTATION

**0** No Legend  
**1** Orientation 1  
**2** Orientation 2  
**3** Orientation 3  
**4** Orientation 4



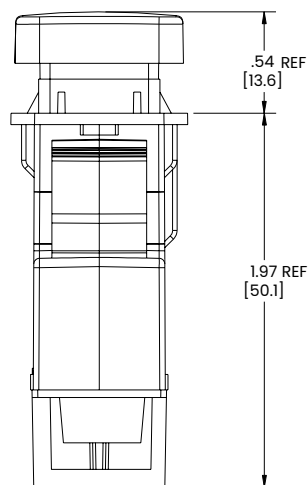
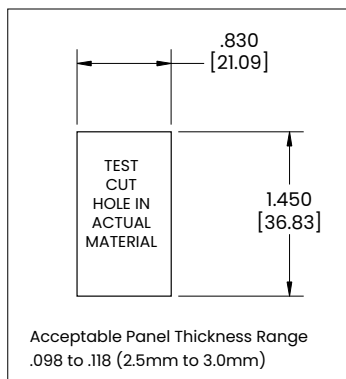
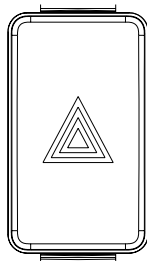
Notes:

1. "Tolerances For Image Size (Transfer or Laser) are +/- .020" Applicable on Field #7, Unless Otherwise Specified by customer".

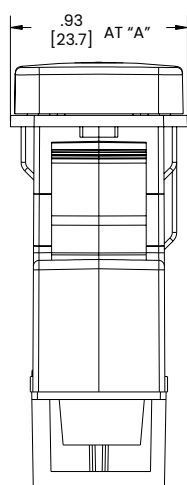
[Configure Complete Part Number >](#)

# Dimensional Specs

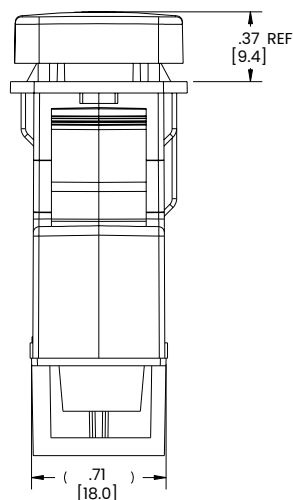
inches [millimeters]



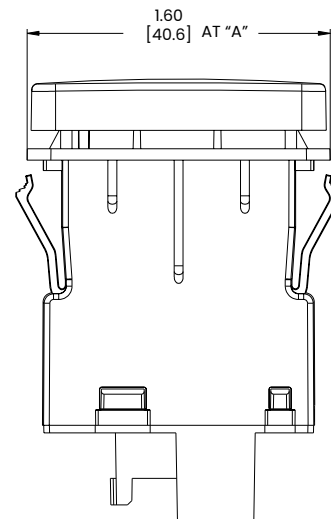
POS 1: "OFF"



POS 2: "Max Overtravel"

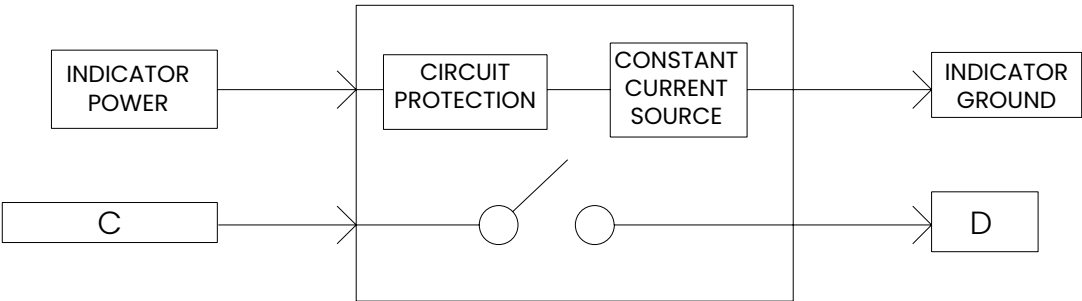


POS 3: "ON"

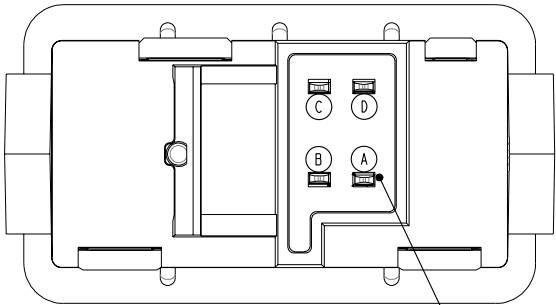
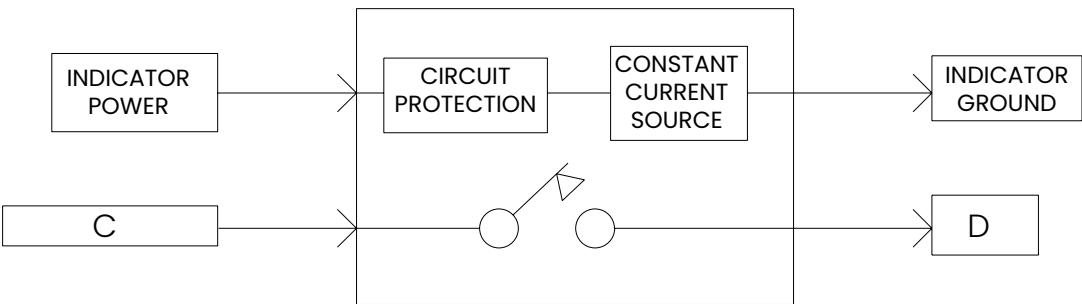


# Circuit Diagram

“ON - OFF” CODE 1



“(ON) - OFF” CODE 1



SEE NOTE 1, TABLE 2

| Table 2  |                  |
|----------|------------------|
| Pin Outs |                  |
| PIN      | Description      |
| A        | Indicator Ground |
| B        | Indicator Power  |
| C        | ---              |
| D        | ---              |

- Notes:
1. Switch Mates with Delphi Connector P/N: 12064760 Terminal Plating: TIN





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# 16-3P-Series

Pushbutton Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The 16-3P-Series pushbutton switches are single pole and AC rated up to 3 amps. These momentary action switches have a slow-make, slow-break contact mechanism and require only light actuation force (4 oz. - 1 lb.). These switches are typically used in general purpose applications requiring finger actuation.

**1**

Pole

**1-3**

Amps

**125**

VAC

## Typical Applications

- Test & Measurement
- Audio-Visual

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead  
metal parts

## Electrical Life

25,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

16-3POFF - 4 - CBL

Selection

1

2

3

### 1. SERIES

#### Single Pole

#### Solder Lug

#### Wire Leads

3A 125VAC  
Off-(On)  
Off-(On) with overtravel <sup>1</sup>  
On-(Off)

16-3P Off  
16-3P Off-Ov  
16-3P On

16-3AP Off  
16-3AP Off-Ov  
16-3AP On

#### 1A 125VAC

On-On  
On-On with overtravel <sup>1</sup>  
1 On-1 Off (2 circuit)  
1 On-1 Off with overtravel <sup>1</sup> (2 circuit)

116-P  
116-P-OV  
516-P  
516-P-OV

116-AP  
116-AP-OV  
516-AP  
516-AP-OV

### 3. ACTUATOR STYLE <sup>2</sup>

**CBL** Black plastic color cap

**CRD** Red plastic color cap

Notes:

<sup>1</sup> Overtravel only available with #4 bushing.

<sup>2</sup> When selection 3 is left blank, a standard nickel plated plunger is supplied.

( ) Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

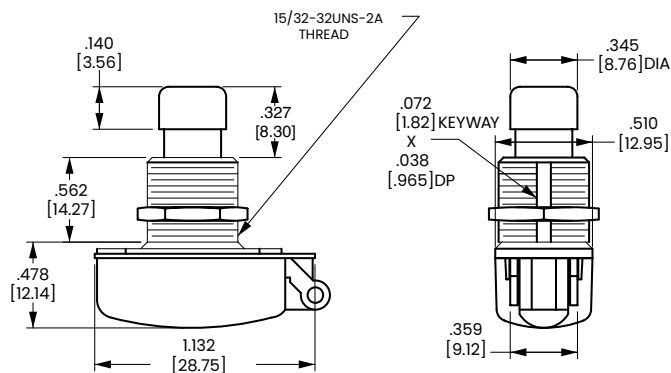
### 2. BUSHING STYLE

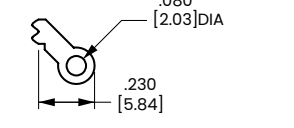
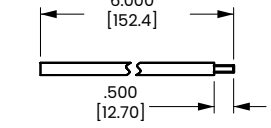
**2** .312 length

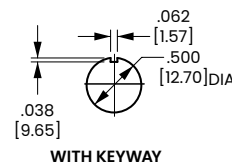
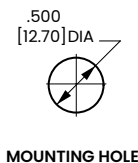
**4** .562 length

# Dimensional Specs

inches [millimeters]



|                                                                                      |                                                                                       |
|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |
| SOLDER LUG                                                                           | INTEGRATED WIRE LEAD<br>(no exposed conductors)                                       |
| TERMINAL TYPE                                                                        |                                                                                       |





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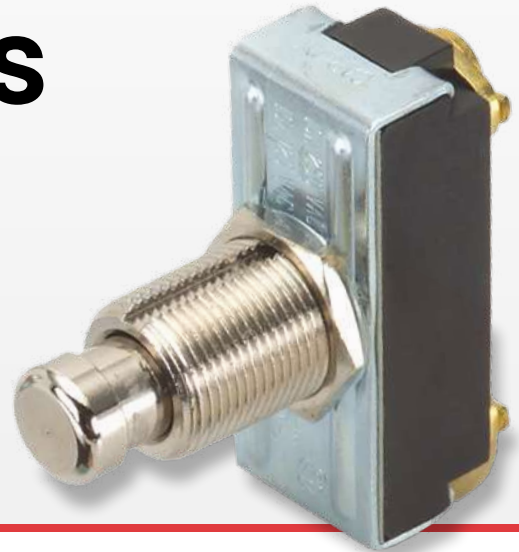
**Carling Technologies®**  
A Littelfuse® Brand

# 170-172-Series

Pushbutton Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The 170/172-Series pushbutton switches are single pole, high amperage switches suitable for shallow back panel applications. These switches are momentary action and require an actuation force of 2.5 lbs. The 170/172-Series switches are equipped with a slow-make, slow-break contact mechanism and are rated at 15 amps at 125VAC.

**1**

Pole

**10-15**

Amps

**125, 250**

VAC

## Typical Applications

- Test & Measurement
- Meters
- Horns

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

## Electrical Life

25,000 cycles - Momentary

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

170 - CBL

Selection

1

2

### 1. SERIES

10A 250VAC; 15A 125VAC

Single Pole

On-(Off)

Off-(On)

Solder Lug

170-B

172-B

Screw Terms.

170

172

Wire Leads

170-A

172-A

### 2. CAP STYLE / COLOR

2

CBL

Black

CGN

Green

CRD

Red

CWH

White

#### Notes:

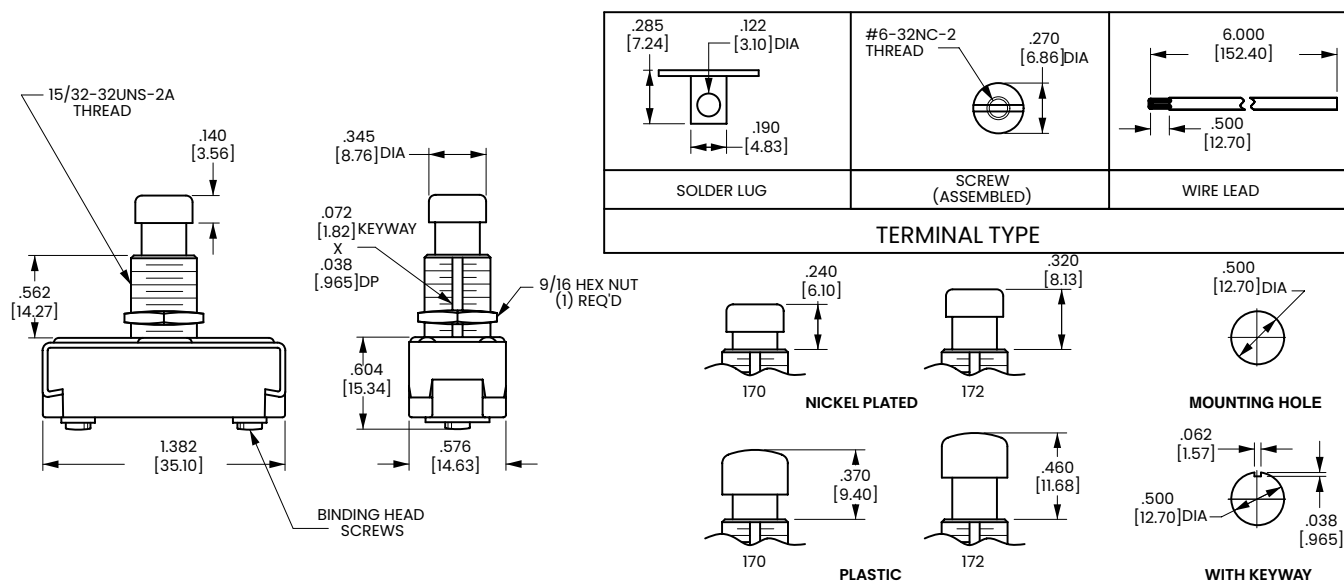
- 1 Standard Wire lead Length is 6 " for other wire lead length, Use Wire length lead Termination/Function code and Add "/" and the wire lead length required.  
Example: 172-A-CBL/10"
- 2 When selection 2 is left blank, a standard nickel plated plunger is supplied.
- 3 ( ) Indicates momentary function.
- 4 Hardware/Packaging options may be added to the base part number by adding A "/" with the option at the end of the part number.  
Example: 170-CBL/HDW ASSM  
Available options include:  
2 Hex  
No Hardware  
HDW ASSM  
HDW bulk  
Poly  
2 Hex nuts (1 assembled on switch, 1 Supplied in bulk)  
No Hardware included  
With Hardware assembled  
With Hardware bulk  
With Polybag

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



# P26-Series

Pushbutton Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The P26-Series pushbutton switches are single pole, AC rated for 6 amps at 125 VAC and suitable for shallow back panel applications. These switches are momentary action with a medium actuation force (13 oz. typical). The P26-Series switch is equipped with a slow-make, slow-break contact mechanism.

**1**  
Pole

**3-6**  
Amps

**125-277**  
VAC

**125**  
VDC

## Typical Applications

- Intercoms
- Security System
- Electronic Signs
- Marine
- Lighting

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

## Electrical Life

25,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample Part Number **P26L - 1D - BL**

Selection 1 2 3

### 1. SERIES

| Single Pole                              | Solder Lug   | .250 Tab     | Wire Leads   |
|------------------------------------------|--------------|--------------|--------------|
| <b>3A 250VAC, 6A 125 VAC, 3/4A 125V</b>  |              |              |              |
| Off - (On)                               | <b>P26A</b>  | <b>P26B</b>  | <b>P26F</b>  |
| On - (Off)                               | <b>P26L</b>  | -            | <b>P26T</b>  |
| <b>3A 277VAC, 6A 125 VAC<sup>1</sup></b> |              |              |              |
| Off - (On)                               | <b>P267A</b> | <b>P267B</b> | <b>P267F</b> |
| On - (Off)                               | <b>P267L</b> | -            | <b>P267T</b> |

Notes:

1 Additional ratings available. Consult factory for details

2 Only available with 1D bushing in .562 length

3 Length is .562 for RND MTL and CON MTL bottoms

( ) Indicates momentary function.

### 2. BUSHING STYLE

|                       | length | diameter |
|-----------------------|--------|----------|
| <b>1A</b>             | .406   | .375     |
| <b>1B</b>             | .406   | .468     |
| <b>1C</b>             | .465   | .375     |
| <b>1D<sup>3</sup></b> | .465   | .468     |

### 3. BUTTON STYLE / COLOR

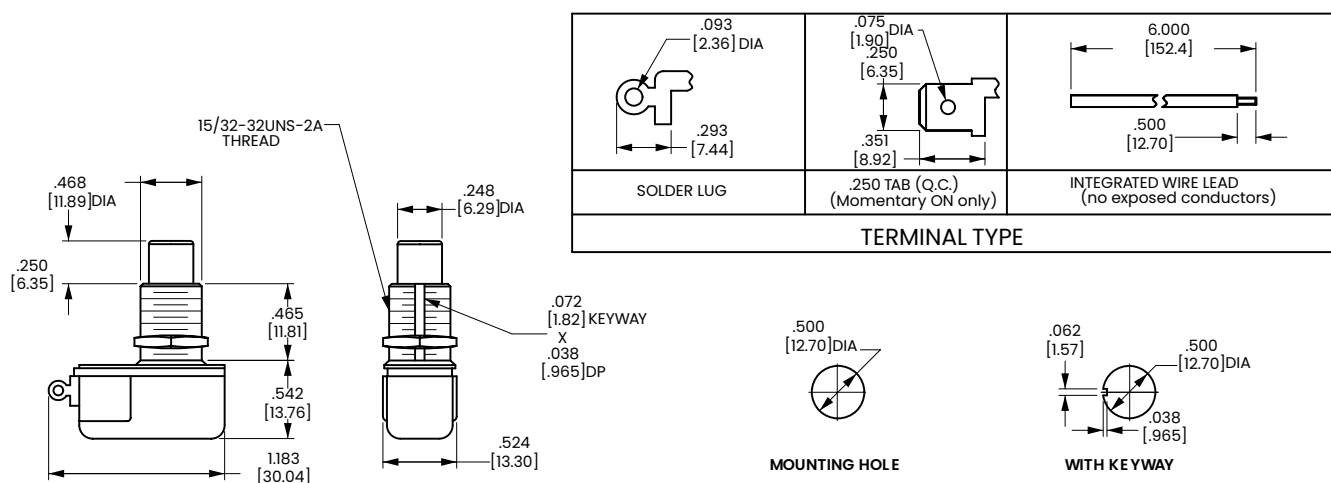
|           |             |                            |               |
|-----------|-------------|----------------------------|---------------|
| <b>BL</b> | Black Nylon | <b>RND MTL<sup>2</sup></b> | Round Metal   |
| <b>RD</b> | Red Nylon   | <b>CON MTL<sup>2</sup></b> | Concave Metal |

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]





**Littelfuse®**



**Carling Technologies®**

A Littelfuse® Brand

# P27-Series

Pushbutton Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The P27-Series pushbutton switches are single pole, AC rated switches suitable for general purpose applications with a shallow back panel. These switches are momentary action with a medium actuation force (26 oz. typical). The P27-Series switch is equipped with a slow-make, slow-break contact mechanism, rated at 6 amps with a nylon concave pushbutton.

**1**

Pole

**3-6**

Amps

**125-250**

VAC

**125**

VDC

## Typical Applications

- Intercoms
- Security System
- Electronic Signs
- Marine

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

## Electrical Life

25,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

P27A - BL

Selection

1

2

### 1. SERIES

|                                                                                           |                                                 |                                            |                                                 |
|-------------------------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------------|-------------------------------------------------|
| <b>Single Pole</b><br><b>3A 250VAC, 6A 125 VAC, 3/4A 125V</b><br>Off - (On)<br>On - (Off) | <b>Solder Lug</b><br><b>P27A</b><br><b>P27L</b> | <b>.250 Tab</b><br><b>P27B</b><br><b>-</b> | <b>Wire Leads</b><br><b>P27F</b><br><b>P27T</b> |
|-------------------------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------------|-------------------------------------------------|

### 2. BUTTON STYLE / COLOR

|           |       |           |       |
|-----------|-------|-----------|-------|
| <b>BL</b> | Black | <b>WH</b> | White |
| <b>RD</b> | Red   |           |       |

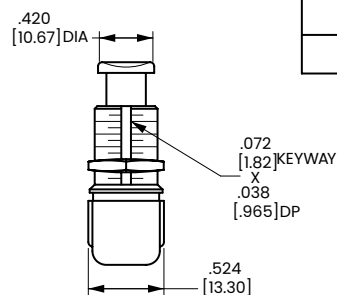
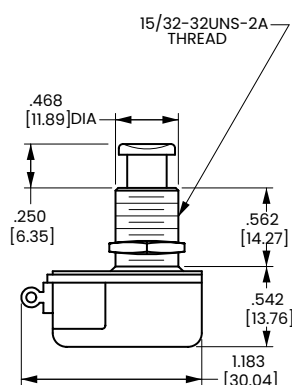
Notes:  
( ) Indicates momentary function.

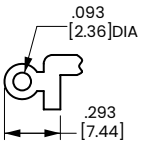
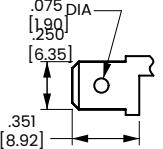
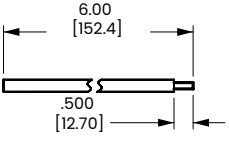
[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



|                                                                                     |                                                                                       |                                                                                       |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |
| SOLDER LUG                                                                          | .250 TAB (Q.C.)<br>(Momentary ON only)                                                | INTEGRATED WIRE LEAD<br>(no exposed conductors)                                       |
| TERMINAL TYPE                                                                       |                                                                                       |                                                                                       |





# 641-Series

Pushbutton Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The 641-Series represents the most compact offerings of the Carling's pushbutton switch line. These switches are UL approved and meet ENEC spacing requirements. Additionally, the new 3-pole switch affords the versatility to control an extra function or indicator light.

**1-3**  
Poles

**2-5**  
Amps

**125, 250**  
VAC

## Typical Applications

- Music Equipment
- Audio-Visual Equipment
- Industrial Automation
- Test & Measurement
- Appliances

# Tech Specs

## Electrical

|                            |                               |
|----------------------------|-------------------------------|
| Rating                     | 5A 125VAC, 2A 250VAC          |
| Dielectric Strength        | 1500V RMS                     |
| Insulation Resistance      | 50 Megohms                    |
| Initial Contact Resistance | 10 Milli Ohm max @ 4Vdc       |
| Electrical Life            | 50,000 Cycles                 |
| Terminals                  | Solder Lug, Wire Leads and PC |

## Environmental

|                       |                                                                      |
|-----------------------|----------------------------------------------------------------------|
| Vibration Sinusoidal  | Mil STD 202G, Method 204D, Test Condition A 0.06DA or 10G's 10-500Hz |
| Shock                 | MIL-STD 2020G, Method 213B Test Condition K, 30G's                   |
| Handling Shock        | 1 Meter Drop onto Hard Surface, all surfaces and planes              |
| Thermal Shock         | MIL-STD 2020G, Method 107G Test Condition A -55 C to 85 C            |
| Moisture Resistance   | MIL-STD 2020G, Method 106F 10 25 C to 65 C Cycles 95% RH             |
| Thermal Cycling       | 25 Cycles -40 C to 85 C                                              |
| Operating Temperature | 32°F to 185°F (0°C to +85°C)                                         |

## Physical

|                             |                                                                |
|-----------------------------|----------------------------------------------------------------|
| Function Circuits           | Three Pole Single Throw, TPST<br>Three Pole Double Throw, TPDT |
| Operation                   | Alternate Action, Push ON, Push OFF                            |
| Button Travel               | 0.19 (4.83mm)                                                  |
| Actuation Force             | 3 to 5 LB, 1360 to 2268 g                                      |
| Base                        | Polyester, PBT Glass Filled                                    |
| Button                      | Brass, Nickel Plated                                           |
| Bushing                     | Brass, Nickel Plated                                           |
| Plunger                     | Brass, Nickel Plated                                           |
| Top Plate                   | Stainless Steel                                                |
| Actuator (Internal)         | Nylon 6/6                                                      |
| Pin (Internal) <sup>1</sup> | Nylon 6/6                                                      |
| Driver                      | Cold Rolled Steel                                              |
| Springs                     | Music Wire                                                     |
| Movable Contact             | Copper                                                         |
| Terminals                   | Brass (tin plated)                                             |
| Mounting                    | ½" Dia. Hole, with and without keyway, or with locking ring    |

## Safety & Regulation

|           |                                                                     |
|-----------|---------------------------------------------------------------------|
| Agency    | UL 61058, EN 61058 (3 Pole Version)<br>UL 1054 (1 & 2 Pole Version) |
| Materials | RoHS, REACH                                                         |

# Ordering Scheme

Sample  
Part Number

64111210

Selection

1

## 1. SERIES

### One Pole

2A 250VAC, 5A 125VAC

solder lug

PC term.

wire leads.

ON-OFF

64111210

64111212

64111215

64111220

64111222

64111225

ON-ON

### Two Pole

solder lug

PC term.

wire leads

64112210

64112212

64112215

64112220

64112222

64112225

### Three Pole

solder lug

PC term.

wire leads

64113210

64113212

64113215

64113220

64113222

64113225

Notes:

1 For 1 and 2 pole only. 3 Pole switches use brass Pin

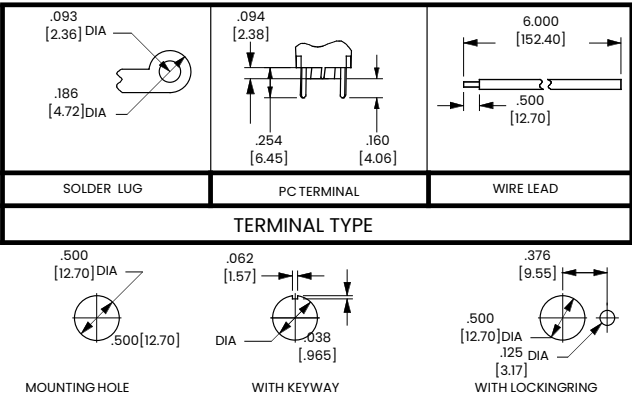
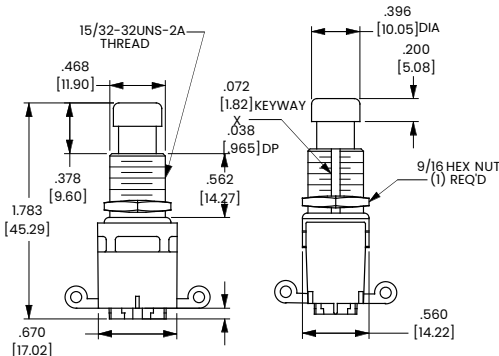
[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

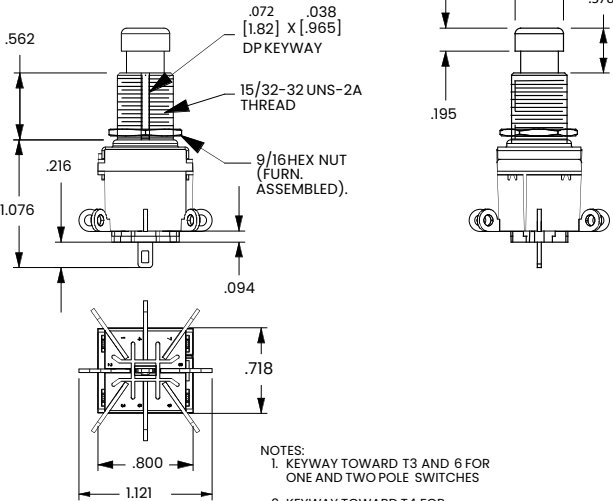
# Dimensional Specs

inches [millimeters]

## 1 OR 2 POLE SHOWN WITH SOLDER LUG

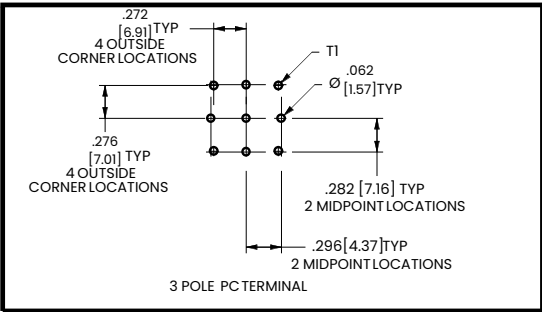
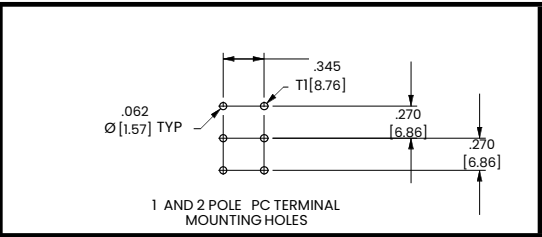
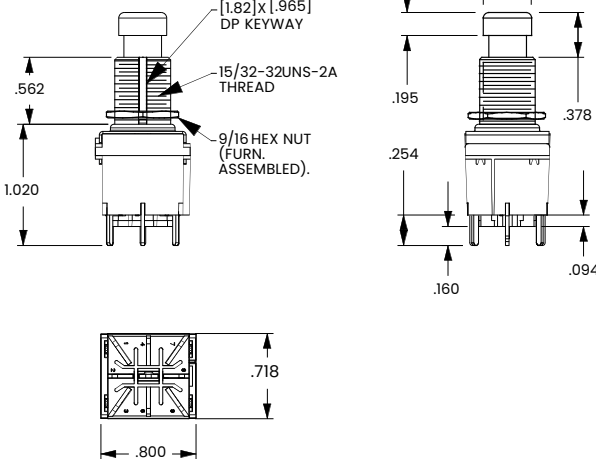


## 3 POLE SHOWN WITH SOLDER LUG



NOTES:  
1. KEYWAY TOWARD T3 AND 6 FOR ONE AND TWO POLE SWITCHES  
2. KEYWAY TOWARD T4 FOR THREE POLE SWITCHES.

## 3 POLE SHOWN WITH PC TERMINAL



# 110-316P-Series

Pushbutton Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The 110/316P-Series provides a compact yet rugged solution to general purpose switch needs. Alternate action, metal construction and stiff (6-8 lb) actuation force have combined to make this switch a pillar in a variety of markets. This versatile switch is available in maintained and momentary circuits with a variety of termination and rating options.

**1-2**  
Poles

**1-6**  
Amps

**125, 250**  
VAC

**125, 250**  
VDC

## Typical Applications

- Music Industry
- Audio-Visual
- Electronic Road Signs

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead  
metal parts & opposite polarity

## Electrical Life

25,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

110-P

Selection

1

## 1. SERIES

|                                       | solder lug (end) | solder lug (bottom) | screw terminals | wire leads  |
|---------------------------------------|------------------|---------------------|-----------------|-------------|
| <b>Single Pole</b>                    |                  |                     |                 |             |
| <b>3A 250V, 6A 125V</b>               |                  |                     |                 |             |
| OFF-ON                                | 110-P            | 110-BP              | 110-SP          | 111-16-P    |
| OFF-(ON)                              | 110-PM-OFF       | 110-PBM-OFF         | 110-SPM-OFF     | 111-PM-OFF  |
| ON-(OFF)                              | 110-PM-ON        | 110-PBM-ON          | 110-SPM-ON      | 111-PM-ON   |
| <b>5A 250V, 10A 125V, 1/4 HP 125V</b> |                  |                     |                 |             |
| OFF-ON                                | 160H-P           | 160H-BP             | 160H-SP         | 160H-AP     |
| <b>1A 250V, 3A 125V</b>               |                  |                     |                 |             |
| ON-ON                                 | 112-P            | -                   | -               | 112-PA      |
| ON-(ON)                               | 112-PM           | -                   | -               | 112-PAM     |
| <b>Double Pole</b>                    |                  |                     |                 |             |
| <b>1A 250V, 3A 125V</b>               |                  |                     |                 |             |
| OFF-ON                                | 216-PP           | -                   | -               | 216-PPA     |
| OFF-(ON)                              | 216-PM-OFF       | -                   | -               | 216-PAM-OFF |
| ON-(OFF)                              | 216-PM-ON        | -                   | -               | 216-PAM-ON  |
| ON-ON                                 | 316-PP           | 316-B-PP            | -               | 316-PPA     |
| ON-(ON)                               | 316-PM           | 316-B-PM            | -               | 316-PAM     |
| 1 ON - 1 OFF (2 circuit)              | 516-PP           | -                   | -               | 516-PPA     |
| 1 (ON) - 1 (OFF) (2 circuit)          | 516-PM           | -                   | -               | 516-PAM     |

Notes:

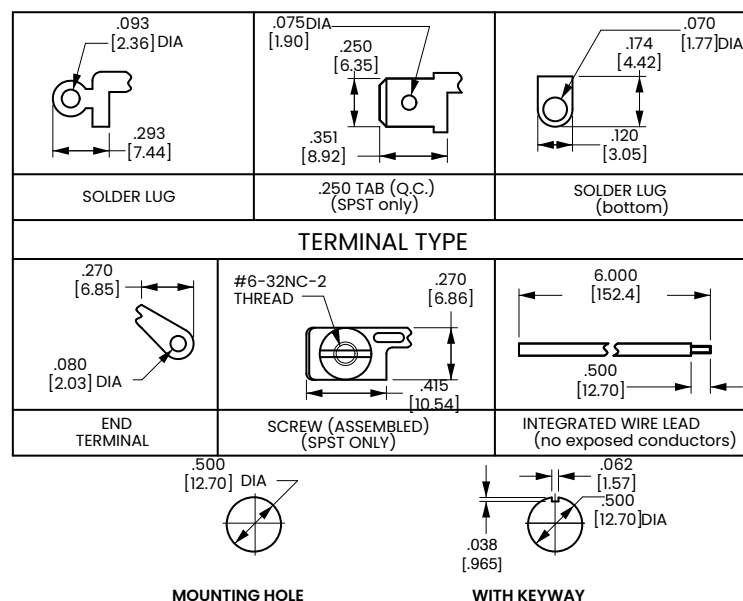
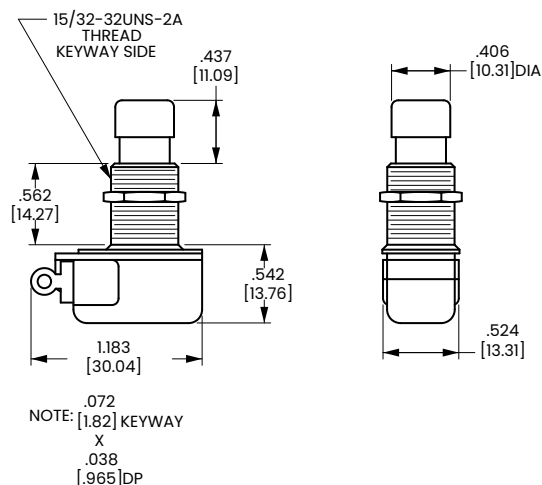
() Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]

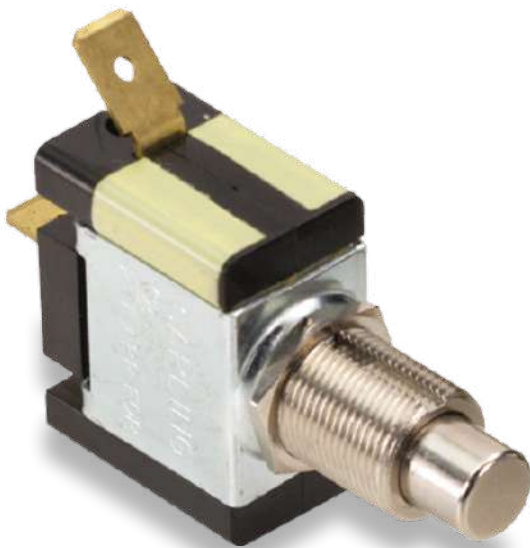


# P-Series

Pushbutton Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



These rugged pushbutton-type switches feature international approvals, ratings to 20A 125VAC and a heavy actuation force (3-5 lbs. typical) which makes this switch ideal for use as a “foot-pedal” switch. The metal bushing and plunger construction enables this alternate action switch to withstand the rigors of most any stringent pushbutton application.

|          |              |                |
|----------|--------------|----------------|
| <b>1</b> | <b>10-20</b> | <b>125-250</b> |
| Pole     | Amps         | VAC            |

## Typical Applications

- Vacuum Cleaners

# Tech Specs

## Dielectric Strength

UL/CSA: 1000 - live to deadmetal parts & opposite polarity  
TUV: 4000V - live to dead metal parts;  
1250V - opposite polarity across open contacts

## Electrical Life

50,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

PA341

Selection

1

### 1. SERIES

|                                                                  | .250 Tab | Screw Terms. | Wire Leads |
|------------------------------------------------------------------|----------|--------------|------------|
| <b>10A 250VAC, 15A 125VAC, 3/4 HP 120-240 VAC</b> <sup>1</sup>   |          |              |            |
| On-Off                                                           | PA341    | PA344        | PA345      |
| On-On                                                            | PB341    | PB344        | PB345      |
| <b>10A 250VAC, 20A 125VAC, 1 1/2 HP 120-240 VAC</b> <sup>1</sup> |          |              |            |
| On-Off                                                           | PA301    | PA304        | PA305      |
| On-On                                                            | PB301    | PB304        | PB305      |
| <b>10A 250VAC, 15A 125VAC, 10(6)α 250 VACu, T85</b> <sup>2</sup> |          |              |            |
| On-Off                                                           | PA951    | PA954        | PA955      |

Notes:

1 Additional ratings available. Consult factory.

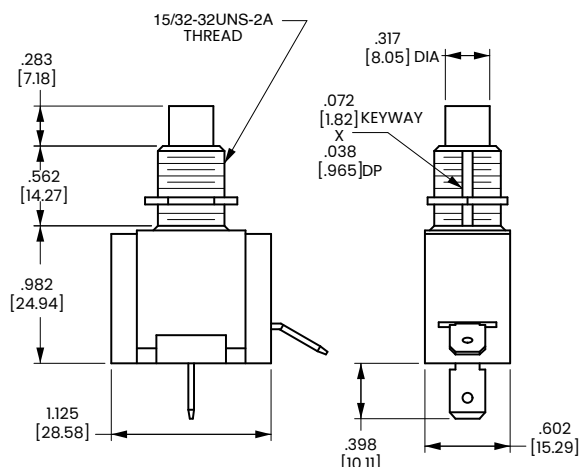
2 UL, CSA & TUV approved.

[Configure Complete Part Number >](#)

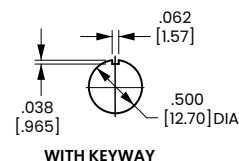
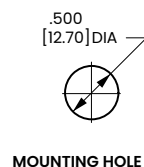
[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



|                                                                          |                                                    |                                                  |
|--------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|
| <p>.075<br/>[1.90] DIA</p> <p>.365<br/>[9.27]</p> <p>.250<br/>[6.35]</p> | <p>#6-32NC-2<br/>THREAD</p> <p>.270<br/>[6.86]</p> | <p>6.000<br/>[152.4]</p> <p>.500<br/>[12.70]</p> |
| .250 TAB (Q.C.)                                                          | SCREW<br>(ASSEMBLED)                               | INTEGRATED WIRE LEAD<br>(no exposed conductors)  |
| TERMINAL TYPE                                                            |                                                    |                                                  |



# PP-Series

Pushbutton Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The PP-Series plastic pushbutton switches are heavy duty, single pole switches with wire leads. They are alternate action, available in single throw construction, with AC ratings up to 15 amps. Both bushing and bracket are made out of nylon. These high current switches are popular within the Appliance market.

**1**  
Pole

**10-15**  
Amps

**125-250**  
VAC

## Typical Applications

- Vacuum Cleaners



# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead  
metal parts & opposite polarity

## Electrical Life

50,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

PPA525-AC

Selection

1

### 1. SERIES

**10A 250VAC, 15A 125VAC, 3/4HP 125-250VAC**  
On-Off  
**10A 250VAC, 15A 125VAC**  
On-Off

Wire Leads  
PPA525-AC  
PAA515-AC

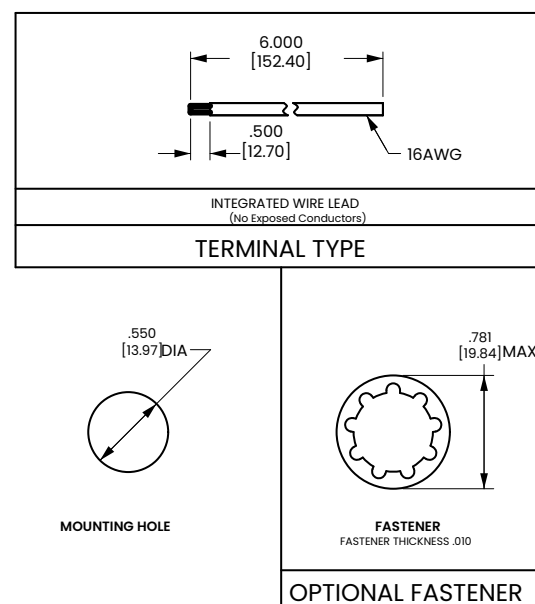
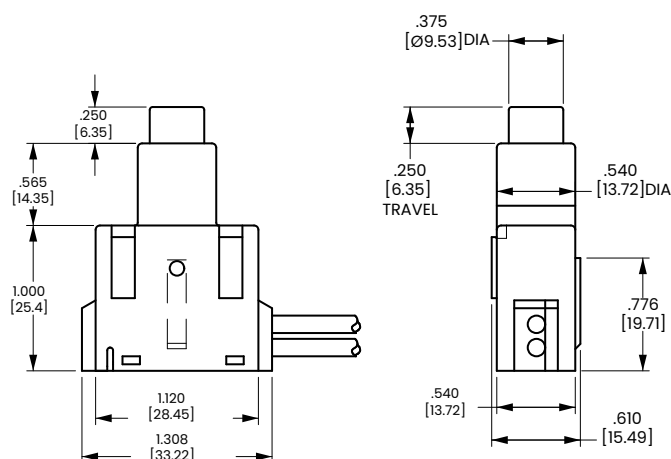
Notes:  
( ) Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]





**Littelfuse®**



**Carling Technologies®**

A Littelfuse® Brand

# V-Series

Contura Rotary Switches

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



The V-Series Contura Rotary Switch was designed for maximum performance and reliability leveraging the features of the widely popular V-Series Contura Rocker Switches. Available in maintained and momentary circuit options, the V-Series Rotary features a sturdy knob construction, up to three separate LEDs, and fits in an industry standard panel opening.

**2**

Poles

**.4-20**

Amps

**12-28**

VDC

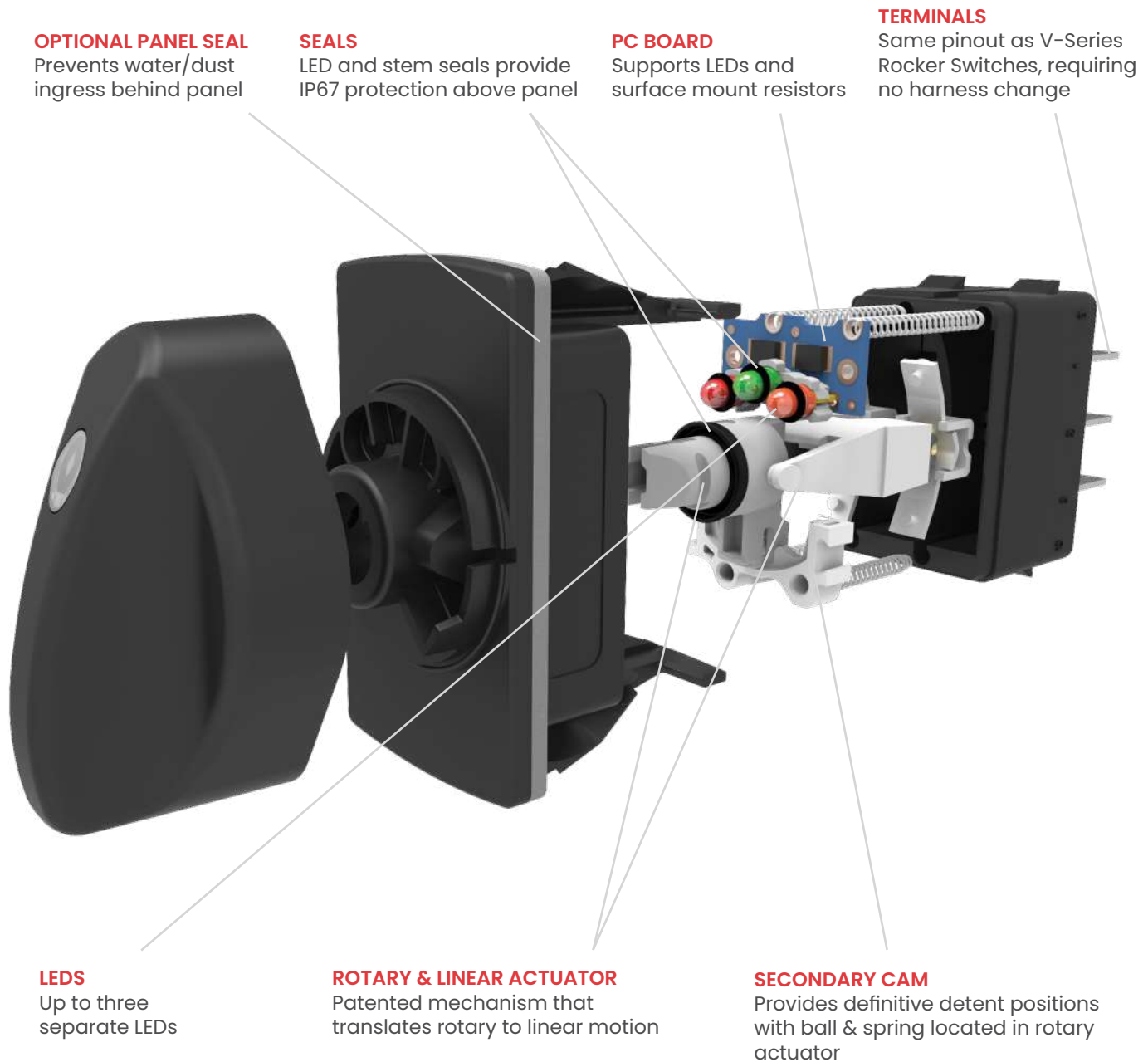
**IP67 Sealing**

Above-Panel

## Typical Applications

- On/Off-Highway
- Marine
- Test & Measurement
- Instrumentation
- Speed Control
- Medical Equipment

# Design Features



# Tech Specs

## Electrical

Rating

| Circuit              | Voltage | Max Current Resistive |
|----------------------|---------|-----------------------|
| 2 Position Maintain  | 12      | 20                    |
| 2 Position Momentary | 12      | 20                    |
| 3 Position All       | 12      | 20                    |
| 2 Position Maintain  | 24      | 15                    |
| 2 Position Momentary | 24      | 15                    |
| 3 Position All       | 24      | 15                    |

|                            |                                                                                              |
|----------------------------|----------------------------------------------------------------------------------------------|
| Dielectric Strength        | 1500 Volts RMS                                                                               |
| Insulation Resistance      | 50 Megohms                                                                                   |
| Initial Contact Resistance | 10 Milli Ohm max @ 4VDC                                                                      |
| Life                       | 50,000 Cycles Two Position<br>25,000 Cycles Two Position<br>Momentary and All Three position |
| Terminals                  | 0.250" (6.3mm) Quick Connect                                                                 |

## Physical

|                   |                                                                                                                              |
|-------------------|------------------------------------------------------------------------------------------------------------------------------|
| Function Circuits | Double Pole Single Throw, DPST<br>Double Pole Double Throw, DPDT                                                             |
| Operation         | Two and Three Position<br>Maintained and Momentary                                                                           |
| Knob Rotation     | Two Position 60 Degrees<br>Three Position 30 Degrees from<br>Center                                                          |
| Illumination      | LED; Red, Green, Amber, Yellow,<br>White, Blue                                                                               |
| Seals             | LED O-ring(s) – Silicone, Bezel<br>gasket – Neoprene, Knob seal –<br>NBR                                                     |
| Flammability      | Exceeds FVMSS 302<br>Requirements, Exterior<br>Components, UL 94 V-2 or Better<br>Interior Components, UL 94 HB or<br>Better |
| Base              | Polyester, PBT                                                                                                               |
| Bracket           | Nylon 66, PA                                                                                                                 |
| Knob              | Polybutylene Terephthalate, PBT<br>6.5%GF                                                                                    |
| Lens              | Polycarbonate, PC                                                                                                            |
| Connector         | Nylon 66, PA                                                                                                                 |
| Mounting          | Front Panel Snap In, 1.450"<br>(36.83mm) X 0.830" (21.08mm)<br>Panel Thickness, 0.030" – 0.187"<br>(0.76 – 4.75mm)           |

## Environmental

|                      |                                                                                                                                                                                                       |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sealing              | IP67, for above-panel components<br>of actual switch only.                                                                                                                                            |
| Dust                 | Mil STD 810, Method 510.2 Air<br>Velocity 300 Ft/Min Duration 16Hr                                                                                                                                    |
| Corrosion            | IEC 68-2-60 Mixed Flowing Gas<br>(MFG) 14 Days                                                                                                                                                        |
| Chemical Splash      | Gasoline, Diesel, Motor Oil, Brake<br>Fluid, Ammonia, Armour All                                                                                                                                      |
| Salt Spray           | Mil STD 202G, Method 101, Test<br>Condition A 96 Hr                                                                                                                                                   |
| Vibration Random     | Mil STD 202G, Method 214 test<br>Condition C 10G's RMS                                                                                                                                                |
| Vibration Sinusoidal | Mil STD 202G, Method 204D, Test<br>Condition A 0.06DA or 10G's 10-<br>500Hz                                                                                                                           |
| Shock                | MIL-STD 202G, Method 213B Test<br>Condition K, 30G's                                                                                                                                                  |
| Handling Shock       | 1 Meter Drop onto Hard Surface                                                                                                                                                                        |
| Thermal Shock        | MIL-STD 202G, Method 107G Test<br>Condition A -55 C to 85 C                                                                                                                                           |
| Moisture Resistance  | MIL-STD 202G, Method 106F 10, 25 C<br>to 65 C Cycles 95% RH                                                                                                                                           |
| Thermal Cycling      | 25 Cycles -40 C to 85 C                                                                                                                                                                               |
| Ignition Protection  | ISO 8846 with EC Directive 94/25/<br>EC for Marine Products                                                                                                                                           |
| UV Protection        | 300 hr Xenon Arc, 1.4W/m2<br>wavelength 420 nm                                                                                                                                                        |
| ESD                  | Human Static Discharge, +/- 15KV<br>applied during normal operation<br>Shipping/Handling, frequency<br>range 200-2000 MHz applied<br>voltage is +8KV to +15KV and -8KV<br>to -15KV 3 discharge cycles |

## Mechanical

|             |                                                                     |
|-------------|---------------------------------------------------------------------|
| Knob Impact | 50 Gram weight dropped from a<br>height of 18 inches on Top & Sides |
|-------------|---------------------------------------------------------------------|

# Ordering Scheme

Sample Part Number **RV 21 D 2 B 6 0 0 B - K R C**

Selection 1 2 3 4 5 6 7 8 9 10 11 12

## 1. SERIES

**RV** Rotary Contura

## 2. CIRCUIT

Terminal Connections as viewed from bottom of switch: ( ) - momentary

8 - 7  
1 - 4  
2 - 5  
3 - 6  
10 - 9

DP - double pole uses 1, 2, 3 and 4, 5, 6.

| Position:        | 1              | 2            | 3                      |
|------------------|----------------|--------------|------------------------|
| DP               | 2 & 3, 5 & 6   | Connected    | Terminals 1 & 2, 4 & 5 |
| 21               | ON             | NONE         | OFF                    |
| 22               | (ON)           | NONE         | OFF                    |
| 23               | ON             | NONE         | (OFF)                  |
| 24               | ON             | NONE         | ON                     |
| 26               | ON             | OFF          | ON                     |
| 28               | (ON)           | OFF          | (ON)                   |
| SPECIAL CIRCUITS |                |              |                        |
| 55               | (ON)           | OFF          | ON                     |
| 61               | 2 & 3, 5 & 6   | 2 & 3, 4 & 5 | 1 & 2, 4 & 5           |
| 62               | 2 & 3, 5 & 6   | 2 & 3        | OFF                    |
| 64               | (2 & 3, 5 & 6) | 2 & 3        | OFF                    |

## 3. RATING

**1** .4VA 28VDC Resistive  
**B** 15A 24V

**D** 20A 12V

## 4. TERMINATION / BASE STYLE

| 8 Term        | 10 Term       | Termination                   | Jumper         |
|---------------|---------------|-------------------------------|----------------|
| <b>1</b>      | <b>2</b>      | .250 TAB (QC) - no barriers   | No             |
| <b>A</b>      | <b>B</b>      | .250 TAB (QC) - with barriers | No             |
| <b>J</b> 4, 5 | <b>K</b> 4, 5 | .250 TAB (QC) - no barriers   | Yes (T2 to T5) |

### Notes:

- Switch circuit uses terminals 1,2,3,4,5 & 6. Terminals 7,8,9 & 10 are for lamp circuit only.
- Jumper between terminals 2 & 5 for Circuits 61, 62, & 64 to be specified in the Termination & Jumper selection.
- Circuit 61 may be used for SP, OFF-ON-ON circuit.
- Base will not have terminal insulating barriers when connector and/or jumpers are used.
- Code J,K are optional for circuits 62 and 64. Customer may provide externally wired jumper to connect terminals 2 and 5.
- Lamp #1 located at top end of switch, above terminal 4.  
Lamp #2 located at top end of switch between terminals 1 & 4.  
Lamp #3 located at top end of switch, above terminal 10.
- Positive (+) and negative (-) symbols apply to L.E.D. lamps only.  
Mounting hole size is 1.450" (36.83mm) by 0.830" (21.08mm). To mount multiple switches in single panel cut-out order optional interlocking mounting panels.
- Lens color for L.E.D.s must be clear, white, or match color of L.E.D.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

## 5. ILLUMINATION

| Sealed   | Lamps | when illuminated | Terminals |
|----------|-------|------------------|-----------|
| <b>S</b> | NONE  |                  |           |
| <b>A</b> | #1    | Independent      | 8+ 7-     |
| <b>B</b> | #1    | Dependent        | 3+ 7-     |
| <b>C</b> | #1    | Independent      | 8+ 7-     |
| <b>D</b> | & #3  | Independent      | 10+ 7-    |
| <b>E</b> | #1    | Dependent        | 3+ 7-     |
| <b>F</b> | & #3  | Dependent        | 1+ 7-     |
| <b>G</b> | #1    | Independent      | 8+ 7-     |
| <b>H</b> | #2    | Independent      | 9+ 7-     |
| <b>J</b> | #1    | Independent      | 10+ 7-    |
| <b>K</b> | #2    | Dependent        | 3+ 7-     |
| <b>L</b> | #1    | Dependent        | 1+ 7-     |
| <b>M</b> | #2    | Dependent        | 3+ 7-     |
| <b>N</b> | #2    | Independent      | 8+ 7-     |
| <b>P</b> | #3    | Independent      | 10+ 7-    |
| <b>R</b> | #2    | Dependent        | 3+ 7-     |
| <b>T</b> | #3    | Dependent        | 1+ 7-     |

## 6, 7, 8. LAMP #1, 2 AND OR LAMP #3

Selection 6: above terminal 7; Selection 8: above terminal 8

|         |          |          |          |          |          |
|---------|----------|----------|----------|----------|----------|
| No lamp | <b>0</b> |          |          |          |          |
| LED     | Red      | Amber    | Green    | Blue     | White    |
| 12VDC   | <b>C</b> | <b>N</b> | <b>H</b> | <b>E</b> | <b>6</b> |
| 24VDC   | <b>D</b> | <b>P</b> | <b>J</b> | <b>K</b> | <b>8</b> |

## 9. BRACKET COLOR & PANEL SEAL

| Color | No Gasket | 1 Gasket | 2 Gasket |
|-------|-----------|----------|----------|
| Black | <b>B</b>  | <b>C</b> | <b>D</b> |
| Gray  | <b>G</b>  | <b>H</b> | <b>J</b> |
| White | <b>W</b>  | <b>Y</b> | <b>Z</b> |

## 10. ACTUATOR STYLE

**K** Rotary Knob (Standard)

ACTUATOR ORIENTATION  
ABOVE TERMINALS



## 11. LENS COLOR

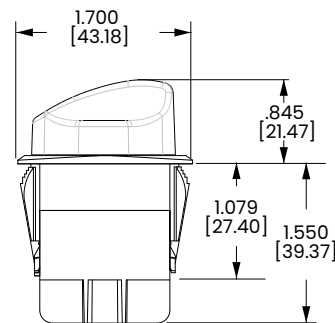
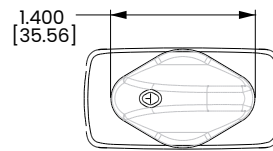
|          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|
| No Lens  | <b>Z</b> |          |          |          |          |
| Clear    | White    | Amber    | Green    | Red      | Blue     |
| <b>4</b> | <b>9</b> | <b>E</b> | <b>K</b> | <b>R</b> | <b>W</b> |

## 12. KNOB COLOR

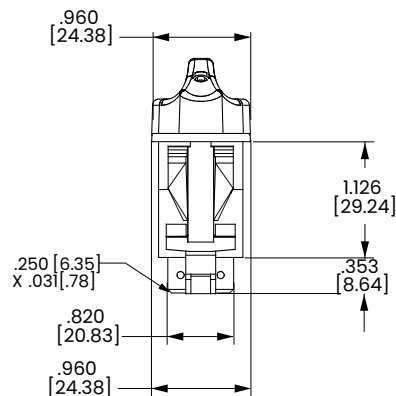
|          |          |          |          |
|----------|----------|----------|----------|
| Black    | Gray     | Red      | White    |
| <b>C</b> | <b>H</b> | <b>S</b> | <b>Y</b> |

# Dimensional Specs

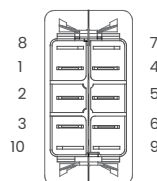
inches [millimeters]



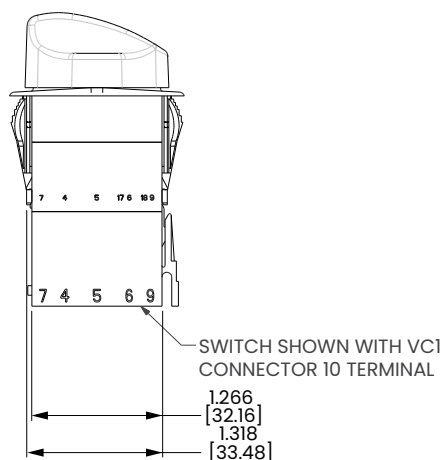
**10 TERMINAL BASE  
W/BARRIERS**



**10 TERMINAL BASE  
W/OBARRIERS**



**BOTTOM VIEW  
TERMINAL ARRANGEMENT  
10 TERMINAL BASE**



# Circuits Diagrams

| CIRCUIT CODE | CIRCUIT DIAGRAM | Knob POSITION |
|--------------|-----------------|---------------|
| 21           |                 | 1 3           |
| 22           |                 | 1 3           |
| 23           |                 | 1 3           |
| 24           |                 | 1 3           |
| 26           |                 | 1 2 3         |
| 28           |                 | 1 2 3         |

| CIRCUIT CODE | CIRCUIT DIAGRAM | Knob POSITION |
|--------------|-----------------|---------------|
| 55           |                 | 1 2 3         |
| 61           |                 | 1 2 3         |
| 62           |                 | 1 2 3         |
| 64           |                 | 1 2 3         |

| LEGEND |                                       |
|--------|---------------------------------------|
| SYMBOL | DEFINITION                            |
|        | TERMINAL LOCATION                     |
|        | MAINTAINED CIRCUIT                    |
|        | MOMENTARY CIRCUIT                     |
|        | INTERNAL CONNECTION (JUMPER TERMINAL) |
|        | 2 POSITION CONNECTION                 |
|        | 2 POSITION CONNECTION                 |
|        | 2 POSITION                            |
|        | 3 POSITION                            |

# Lamp Circuit Diagrams

| LAMP CIRCUIT CODE | CIRCUIT DIAGRAM |
|-------------------|-----------------|
| A                 |                 |
| B                 |                 |
| C                 |                 |
| D                 |                 |
| E                 |                 |
| F                 |                 |
| G                 |                 |
| H                 |                 |
| J                 |                 |
| K                 |                 |

| LAMP CIRCUIT CODE | CIRCUIT DIAGRAM |
|-------------------|-----------------|
| L                 |                 |
| M                 |                 |
| N                 |                 |
| P                 |                 |
| R                 |                 |
| T                 |                 |



# CVR-Series

Rheostat Switch

**PRODUCT WEBPAGE**

*request sample, configure part, product video*



The CVR-Series is a configurable three- or four-position rheostat switch designed for vehicle lighting control. Available for 12VDC and 24VDC systems, the CVR-Series automotive rheostat switch is made with durable thermoplastic materials and silver-plated brass terminals for reliable operation in commercial vehicles, such as work trucks, agricultural equipment, and construction equipment. The front panel-mount dimmer switch is available with or without white backlighting.

**12/24**  
VDC

**3 or 4**  
Detent Positions

**Snap-In**  
Mounting

## Typical Applications

- Commercial Vehicles
- Construction Equipment
- Agricultural Equipment
- Work Trucks

# Tech Specs

## Electrical

|                       |                                                                                                                    |
|-----------------------|--------------------------------------------------------------------------------------------------------------------|
| Operating Voltage     | 12VDC/24VDC systems                                                                                                |
| Dielectric Strength   | 1500V RMS (Terminal to Shell)                                                                                      |
| Insulation Resistance | 50 Megohms                                                                                                         |
| Terminals             | .250" (6.3mm) Quick Connect                                                                                        |
| Electrical Endurance  | Minimum 10,000 Operations<br>(2,000 cycles at -40 °C, 6,000 cycles at ambient temperature, 2,000 cycles at +85 °C) |

## Physical

|                   |                                                                                                    |
|-------------------|----------------------------------------------------------------------------------------------------|
| Switch functions  | 3 or 4 wheel detents of rotation                                                                   |
| Materials         | Housing – PC<br>Base – Nylon<br>Top cover – PC<br>Wheel – Nylon<br>Terminal – Brass, Silver Plated |
| Weight            | ≈23.8g                                                                                             |
| Mating Connection | VC2 : AMP 250 series fastin-faston<br>VC1 : Packard 630 and AMP 250 series fastin-faston           |
| Mounting          | Front panel mount                                                                                  |

## Environmental

|                            |                                                                                                                                              |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temperature      | -40°C to +85°C                                                                                                                               |
| Thermal, Hot Soak          | IEC 60068-2-2 Test Bb, 85°C for 96 hours                                                                                                     |
| Thermal, Cold Soak         | IEC 60068-2-1 Test Ab, -40°C for 96 hours                                                                                                    |
| Thermal, Shock             | MIL-STD-202G Condition A-1, 25 cycle, -55°C to +85°C                                                                                         |
| Humidity, Cyclic           | IEC 60068-2-38 Test Z/AD, -10°C to 65°C, 10 cycle for temperature / humidity composite, 24h per cycle.                                       |
| Thermal, Cycling Each      | IEC 60068-2-14 Test Nb, -40°C to 85°C, 25 cycles of 10 hours                                                                                 |
| Solar Radiation            | ASTM G155-05A 300hr, 1.5W/(m <sup>2</sup> *nm) at 420nm, 300hr,                                                                              |
| Sealing Protection         | IEC 60529; IP53, for above-panel components of the actual switch only                                                                        |
| Shock                      | IEC 60068-2-27, 3 shocks in each direction of the 3 axes (18 total shocks) at 300 m/s <sup>2</sup> for 11 ms                                 |
| Drop                       | EN 60068-2-31 Test Ec Free Fall – Procedure I, drop in each direction of the 3 axes (6 total drops) from 1000 mm                             |
| Vibration, Sinus           | MIL-STD-202G Method 204D, condition A, Sweep from 10Hz to 55Hz with +/-0.06inch, 55Hz to 500Hz with 10g. each axis 12time, total 36 time(9h) |
| Vibration, Random          | MIL-STD-202G Method 214A Condition C, 50Hz to 2000Hz, 0.06PSD, 9.26Grms. each axis 8h, total 24h                                             |
| Chemical Resistance        | ISO 16750-5 Method II for Diesel fuel, Gasoline, Engine oil, Hydraulic fluid, Grease and Urea, interior cleaner .                            |
| Salt Spray                 | IEC 60068-2-11 Test Ka 5%NaCl, 96h.                                                                                                          |
| ESD Contact Discharges     | ISO 10605 Power off mode, +/-15kV air discharges, +/-8kV                                                                                     |
| Symbol Abrasion Resistance | RCA, 175g, 200 cycles.                                                                                                                       |
| Strength                   | withstand a torque 2N*m for 10s                                                                                                              |
| Panel Insertion Force      | 25N to 45N                                                                                                                                   |

# Ordering Scheme

Sample  
Part No.

CVR - B 2 A - 100

Selection

1

2

3

4

5

## 1. SERIES

**CVR** Rheostat Switch

## 2. WHEEL DETENTS

**A** Three  
**B** Four

## 3. OUTPUT

### Voltage Divider

|          | System Voltage | Detent 0 | Detent 1 | Detent 2 | Detent 3 |
|----------|----------------|----------|----------|----------|----------|
| <b>1</b> | 12V            | 2.8V     | 5V       | 7.3V     | 9.5V     |
| <b>2</b> | 24V            | 5.5V     | 10V      | 14.5V    | 19V      |
| <b>3</b> | 12V            | 5V       | 7.3V     | 9.5V     | -        |
| <b>4</b> | 24V            | 10V      | 14.5V    | 19V      | -        |

### Shunt Resistor (Only for 3 Detents)

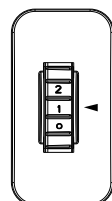
|          | System Voltage | Detent 0     | Detent 1     | Detent 2     |
|----------|----------------|--------------|--------------|--------------|
| <b>A</b> | 12V or 24V     | 1.5K<br>OHMS | 4.2K<br>OHMS | 9.8K<br>OHMS |

## 4. BACK LIGHT COLOR

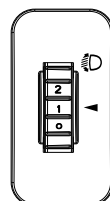
**Z** None  
**A** White

## 5. CAP AND WHEEL LEGEND

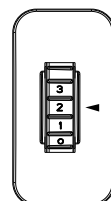
**100** Standard legend



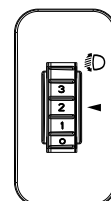
3 POSITION  
WITHOUT BACKLIGHT



3 POSITIONS  
WITH BACKLIGHT



4 POSITIONS  
WITHOUT BACKLIGHT



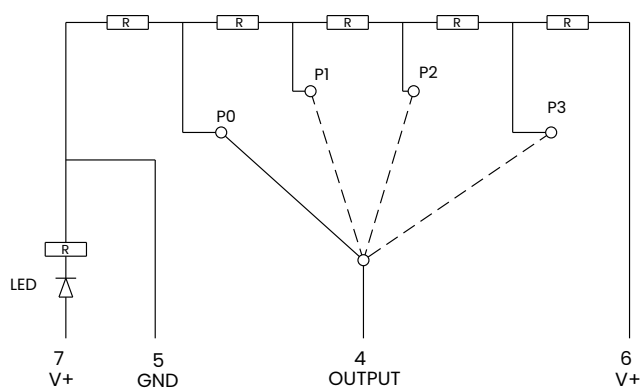
4 POSITIONS  
WITH BACKLIGHT

For additional legends, please consult factory.

[Configure Complete Part Number >](#)

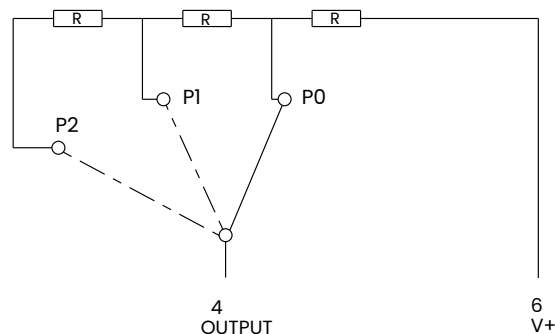
# Circuit Diagram

VOLTAGE DIVIDER OUTPUT



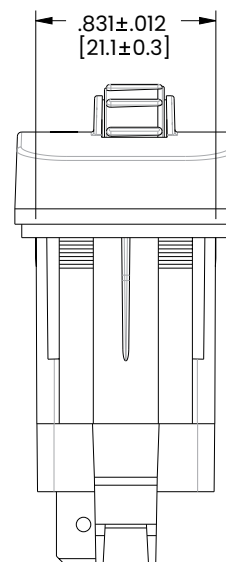
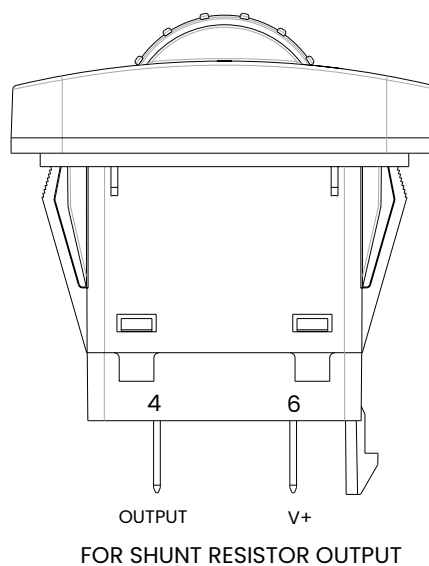
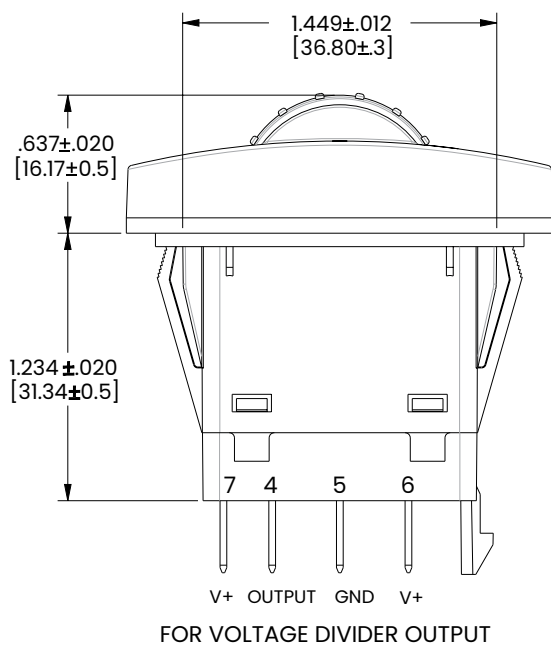
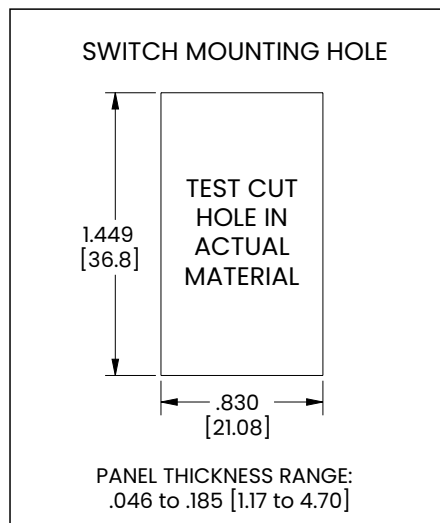
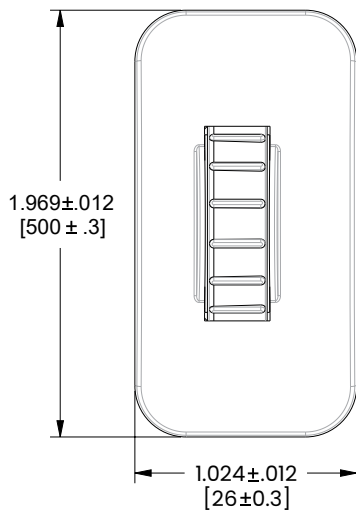
4 DETENTS AS SHOWN, NO P3 FOR 3 DETENTS

SHUNT RESISTOR OUTPUT



# Dimensional Specs

inches [millimeters]



MATING CONNECTOR:  
VC2: AMP 250 series fastin-faston  
VC1: Packard 630 and AMP 250 series fastin-faston



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A Littelfuse® Brand

# R135-Series

Rotary Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The R135 and R135A-Series rotary switches are single pole, single throw "L" rated up to 3A, feature an ON-OFF repeating action, and are available with a nylon actuating knob; nylon snap-in bracket or nickel-plated brass bushing. These switches are typically used to control lighting functions.

**1**

Pole

**1.5-5**

Amps

**125, 250**

VAC

**12**

VDC

## Typical Applications

- Appliances
- HVAC

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V - live to dead metal parts

## Electrical Life

100,000 cycles

## Operating Temperature

32°F to 185°F (0°C to 85°C)

# Ordering Scheme

Sample  
Part Number

R135-A BL

Selection

1

2

### 1. SERIES

**1.5A 250 VAC; 3A 125 VAC L; 5A 12 VDC**  
OFF-ON repeating  
OFF-ON repeating

Wire Leads

**R135**  
**R135-A**

### 2. KNOB COLOR

**BL** Black  
**WH** White

Custom colors available. Consult factory.

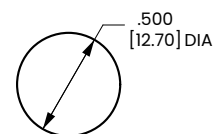
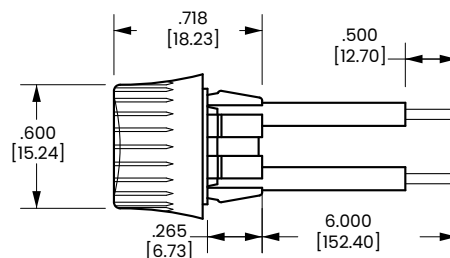
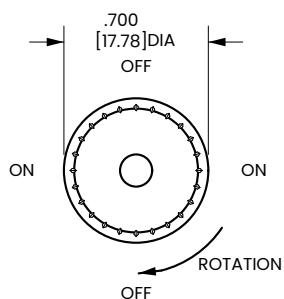
Note:  
Standard Wire Leads are 6" long, stripped 1/2" black. If different length required, please specify at the end of the part number. ex. R135-A-BL/20". Panel Cut-Out Recommendations: For sheet metal panels, switch must enter panel in same direction as the punch. Burr on bottom. Test cut hole in actual material.

[Configure Complete Part Number >](#)

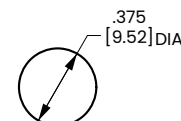
[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



**NYLON BEZEL MOUNTING HOLE**  
Snaps into .500 [12.70] Dia. hole  
Panel Thickness: .020 [508] to .078 [1.98]



**THREADED BUSHING MOUNTING HOLE**  
Fits into .375 [9.52] Dia. hole  
Bushing Length: .312 [7.92]



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# 700/800-Series

Rotary Switches

**PRODUCT WEBPAGE**

*request sample, configure part*



The 700 and 800-Series are single pole multi-position, general purpose rotary switches. These switches feature a nylon actuator in a metal clad construction along with a self-cleaning silver plated contact design. The 700 and 800-Series are typically used in applications requiring multi-position speed controls, such as electric fans.

**1**

Pole

**1-6**

Amps

**125, 250**

VAC

**125**

VDC

## Typical Applications

- Small Appliances
- Industrial Control
- Marine

# Tech Specs

## Dielectric Strength

UL/CSA: 1000V (minimum)

## Insulation Resistance

100 Megohms (minimum)

## Base Material

Steel/Zinc Plate

## Actuator Material

Brass/Nickel Plate

# Ordering Scheme

Sample  
Part Number

700-1A BL

Selection

1

2

### 1. SERIES / POLES / CIRCUITRY / RATING / TERMINATION <sup>1</sup>

2A 250VAC; 4A 125VAC; 1A 125V

| Solder Lugs | .250 Tabs | Positions: | 1   | 2  | 3   | 4                              |
|-------------|-----------|------------|-----|----|-----|--------------------------------|
| -           | 700-A     | 1          | OFF | ON | ON  | ON                             |
| 700-1       | 700-1A    | 2          | OFF | ON | -   | -                              |
| 700-2       | 700-2A    | 3          | OFF | ON | ON  | ON (repeating for 8 positions) |
| 700-3       | 700-3A    | 4          | OFF | ON | ON  | OFF                            |
| 700-4       | 700-4A    | 5          | OFF | ON | ON  | -                              |
| 700-5       | 700-5A    | 6          | OFF | ON | OFF | -                              |
| 700-6       | 700-6A    | 7          | -   | ON | OFF | ON                             |
| 700-7       | 700-7A    | 8          | -   | ON | ON  | -                              |
| 700-8       | 700-8A    | 9          | -   | ON | ON  | ON                             |
| 700-9       | 700-9A    | 10         | OFF | ON | OFF | ON                             |

3A 250VAC; 6A 125VAC

| Switch Positions | OFF Position |
|------------------|--------------|
| 800-2            | 2 positions  |
| 800-3            | 3 positions  |
| 800-4            | 4 positions  |
| 800-5            | 5 positions  |
| 800-6            | 6 positions  |
| 800-7            | 7 positions  |
| 800-8            | 8 positions  |
| 800-A            | 1st position |
| 800-A2           | 2nd position |
| 800-A3           | 3rd position |
| 800-A4           | 4th position |
| 800-A5           | 5th position |
| 800-A6           | 6th position |
| 800-A7           | 7th position |
| 800-A8           | 8th position |

### 2. ACTUATOR COLOR

BL Black

Notes:

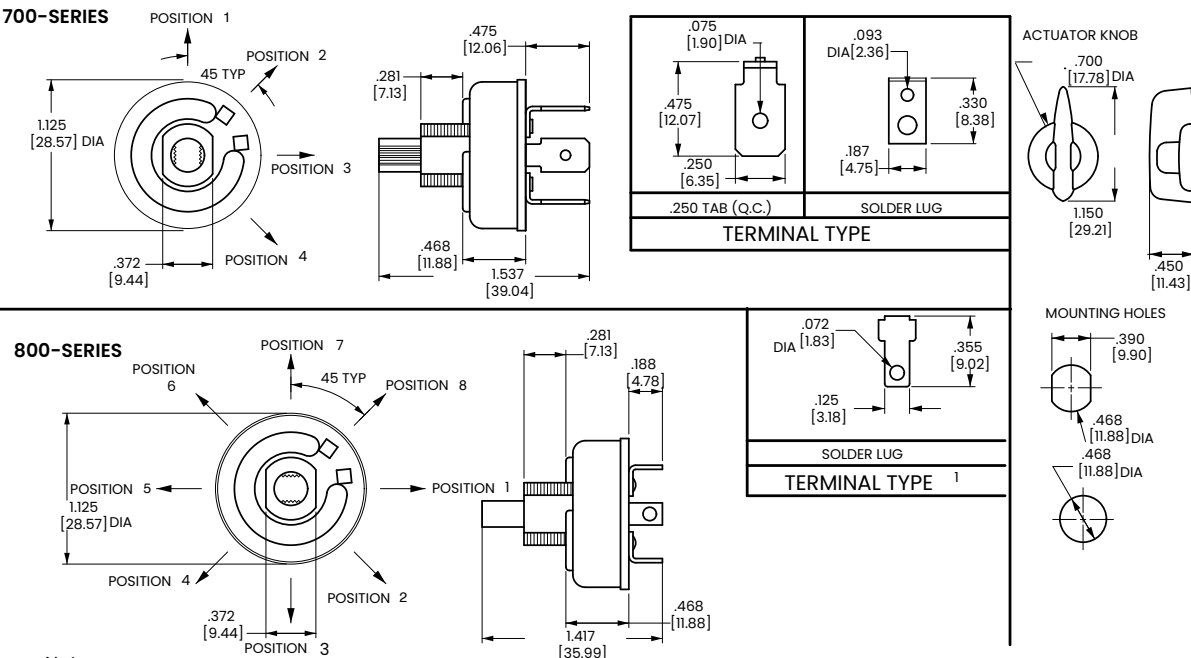
- <sup>1</sup> 700-2 and 700-2A feature 8 detent positions.  
800-Series terminal is a combination solder lug and quick connect.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

# Dimensional Specs

inches [millimeters]



Notes:

1. Terminal is combination solder lug and quick connect.





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# CSW-Series

Combination Switch

**PRODUCT WEBPAGE**

*request sample, configure part*



The CSW-Series is a versatile combination switch featuring a multi-position rotary, a three-position lever, and momentary pushbutton functions. This compact switch offers superior current ratings, IP67 sealing protection, customizable legends and it is compatible with a variety of popular connectors.

**1**

Pole

**10-15**

Amps

**12**

VDC

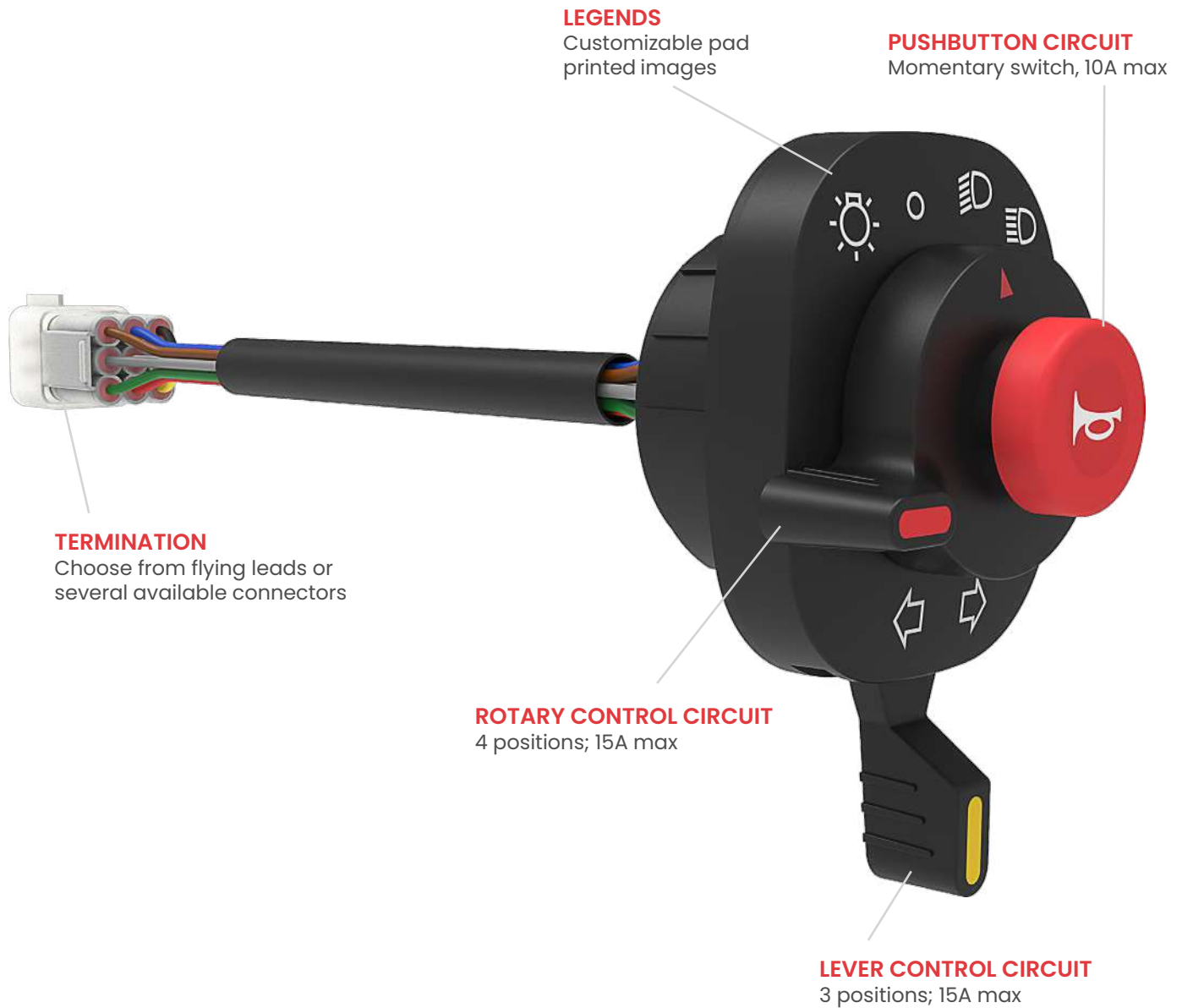
**IP67 Sealing**

Above-Panel

## Typical Applications

- Commercial Vehicles
- Lawn & Garden Equipment
- Recreational Vehicles
- Any Application Requiring Sealing Protection

# Design Features



# Tech Specs

## Electrical

|                        |                                                                                        |
|------------------------|----------------------------------------------------------------------------------------|
| Contact Rating         | Pushbutton: 10A 12V<br>Lever: 15A 12V<br>Rotary: 15A 12V                               |
| Withstand High Voltage | ISO 16750-2 4.11, 500Vrms (50Hz to 60 Hz) with a duration of 60s                       |
| Insulation Resistance  | Minimum 5000MΩ for 1 min @ 500VDC between terminals & housing                          |
| Life                   | 30,000 cycles (6,000 cycles at -40°C, 18,000 cycles at ambient, 6,000 cycles at 85°C). |
| Contact                | AgSnO2                                                                                 |
| Terminals              | Copper Alloy, in connector                                                             |
| Voltage Requirement    | 12 VDC                                                                                 |
| Operating Voltage      | 9 – 16 VDC                                                                             |

## Physical

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Pushbutton switch, rotary control switch, lever control switch                                                                                                      |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|-------------|---------------|----------------|----------------|
| Seals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Silicone                                                                                                                                                            |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| Mounting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Front panel mount, see dimensional specifications page                                                                                                              |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| Base                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | PC+ABS                                                                                                                                                              |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| Actuator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | PC+ABS                                                                                                                                                              |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| Bracket                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Glass-filled Nylon PA6                                                                                                                                              |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| Connector                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Can be customized                                                                                                                                                   |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| <table border="1"> <thead> <tr> <th>Connector Part Number</th><th>Mating Connector Part Number</th></tr> </thead> <tbody> <tr> <td>DJ7101-6.3-21</td><td>DJ7101-6.3-11</td></tr> <tr> <td>DJ7101-2.3-11</td><td>DJ7101-2.3-21</td></tr> <tr> <td>DJ0116-6.3-11</td><td>DJ0116-6.3-21</td></tr> <tr> <td>DJ7091Y-2.3-11</td><td>DJ7091Y-2.3-21</td></tr> <tr> <td>TE:174657-2</td><td>TE: 2822395-1</td></tr> <tr> <td>DJ7091Y-2.3-21</td><td>DJ7091Y-2.3-11</td></tr> </tbody> </table> |                                                                                                                                                                     | Connector Part Number | Mating Connector Part Number | DJ7101-6.3-21 | DJ7101-6.3-11 | DJ7101-2.3-11 | DJ7101-2.3-21 | DJ0116-6.3-11 | DJ0116-6.3-21 | DJ7091Y-2.3-11 | DJ7091Y-2.3-21 | TE:174657-2 | TE: 2822395-1 | DJ7091Y-2.3-21 | DJ7091Y-2.3-11 |
| Connector Part Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Mating Connector Part Number                                                                                                                                        |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| DJ7101-6.3-21                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DJ7101-6.3-11                                                                                                                                                       |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| DJ7101-2.3-11                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DJ7101-2.3-21                                                                                                                                                       |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| DJ0116-6.3-11                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DJ0116-6.3-21                                                                                                                                                       |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| DJ7091Y-2.3-11                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | DJ7091Y-2.3-21                                                                                                                                                      |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| TE:174657-2                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | TE: 2822395-1                                                                                                                                                       |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| DJ7091Y-2.3-21                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | DJ7091Y-2.3-11                                                                                                                                                      |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| Actuation force                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Pushbutton:<br>Momentary (ON)-OFF Single Pole: 17.3+/-3.5 N<br>Maintained ON-OFF: 14.5+/-1.5 N<br>Rotary Control: 0.42+/-0.20 N.m<br>Lever Control: 0.13+/-0.06 N.m |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| Weight                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Approx. 0.2 lbs [91g]                                                                                                                                               |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |
| Depth behind panel                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.10" [28.5 mm]<br>(to bottom of header)                                                                                                                            |                       |                              |               |               |               |               |               |               |                |                |             |               |                |                |

## Environmental

|                           |                                                                                                                                                                                                                                                                                                                                            |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temp.           | -40 °C to +85 °C.                                                                                                                                                                                                                                                                                                                          |
| Vibration                 | Random test IEC 60068-2-64:<br>Random excitation at 10,150, 220 and 350 Hz breakpoint frequencies, 5 hours in each axis, gn=5g.General IEC 60068-2-6: Swept sine wave from 5-500Hz, +/-15mm amplitude, gn=5g, 20 cycles in each plane, 15 min/cycle.Resonance IEC 60068-2-6: Sinusoidal from 10-2000Hz, 5 minutes at resonant point, gn=5g |
| Shock                     | IEC 60068-2-27, 3 shocks in each axis (18 total) with 50g acceleration for 11ms pulse duration.                                                                                                                                                                                                                                            |
| Handling/Drop             | Free drop from 1000mm height, no breakage after 3 drops                                                                                                                                                                                                                                                                                    |
| Thermal Cycle             | IEC 60068-2-14 Test Nb, -40°C to +85°C 2 cycles of 8 hours each                                                                                                                                                                                                                                                                            |
| Salt Spray                | IEC 60068-2-52 Test Kb, severity level 4 (14 days)                                                                                                                                                                                                                                                                                         |
| Thermal Shock             | IEC 60068-2-14 Test Na, -40°C to +85°C 1 hour per cycle (30 minutes at each temperature) for 10 cycles                                                                                                                                                                                                                                     |
| Humidity Cycle            | IEC 60068-2-30 Test Db, 6 cycles                                                                                                                                                                                                                                                                                                           |
| Hot soak                  | IEC 60068-2-2, 85°C for 96 hours                                                                                                                                                                                                                                                                                                           |
| Cold soak                 | IEC 60068-2-1, Test Bb, -40°C for 96 hours                                                                                                                                                                                                                                                                                                 |
| Humidity soak             | IEC 60068-2-78, Test Cab, 30°C & RH 93% for 240 hours                                                                                                                                                                                                                                                                                      |
| Corrosion/Chemical Splash | ISO 16750-5, for engine oil, hydraulic oil, diesel fuel, grease and urea at 85°C & RH 60%                                                                                                                                                                                                                                                  |
| Sealing                   | IP67, for above-panel components of the actual switch                                                                                                                                                                                                                                                                                      |
| UV protection             | ISO 4982-2, 1000hr Xenon Arc, 0.51W/m2*nm at 340nm, per cycle 102mins light / 18mins light and spray, BP temp. 65°C, air temp. 38°C, RH50%                                                                                                                                                                                                 |

# Ordering Scheme

Sample  
Part Number

CSW - 1 A 1 A 1 A 1 - 000

Selection

1

2

3

4

5

6

7

8

9

## 1. SERIES

**CSW** CSW-Series Combination Switch

## 2. PUSHBUTTON CIRCUIT

- 1 Momentary (ON)-OFF Single Pole
- 2<sup>1</sup> Maintained ON-OFF

## 3. ROTARY CONTROL CIRCUIT

- A 4 Positions
- B 3 Positions (Position 2 OFF)
- C 2 Positions
- D<sup>2</sup> 3 Positions (Position 1 OFF)

## 4. LEVER CONTROL CIRCUIT

- 1 ON-OFF-ON Single Pole
- 2 None

## 5. RATINGS

- A Pushbutton: 10A @ 12VDC
- Rotary: 15A @ 12VDC
- Lever: 15A @ 12VDC

## 6. CONNECTORS

|                | Connector<br>Manufacturer* | Manufacturer<br>Part Number | Number<br>of Terminals | Sealed |
|----------------|----------------------------|-----------------------------|------------------------|--------|
| 0              | None                       | N/A                         | N/A                    | N/A    |
| 1              | Boer Electrical            | DJ7101-6.3-21               | 10                     | No     |
| 2 <sup>3</sup> | Yueqing Jinhai             | DJ7101-2.3-11               | 10                     | No     |
|                |                            | DJ70116-6.3-11              | 1                      | No     |
| 3              | Cnly                       | DJ7091Y-2.3-11              | 9                      | Yes    |
| 4              | TE Connectivity            | TE: 174657-2                | 10                     | Yes    |
| 5              | Boer Electrical            | DJ7091Y-2.3-21              | 9                      | Yes    |

\* Note: Or equivalent

## 7. ROTARY ORIENTATION

- A Left
- B Right

## 8. WIRE

- 1 Varies: 6.30 inches [160 mm]
- 2 Varies: 8.26 inches [210 mm]
- 3<sup>4</sup> 9 Wires: 11.40 inches [290 mm]
- 1 Wire: 12.60 inches [320 mm]

## 9. LEGENDS see next page for legend artwork

- 000 No Legend
- 001 Legend 1
- 002 Legend 2
- 003 Legend 3
- 004 Legend 4
- 005 Legend 5
- 006 Legend 6
- 007 Legend 7
- 008 Legend 8
- 009 Legend 9
- 010 Legend 10
- 011 Legend 11
- 012 Legend 12
- XXX Custom Legends

Consult factory for additional legends.

Notes:

- 1 Must use selection B from box 7
- 2 Must use selection 1 from box 4
- 3 Must use selection 3 from box 8
- 4 Must use selection 2 from box 6

 [Configure Complete Part Number >](#)

# Ordering Scheme Legend Artwork

## 9. LEGENDS

001



002



003



004



005



006



007



008



009



010



011



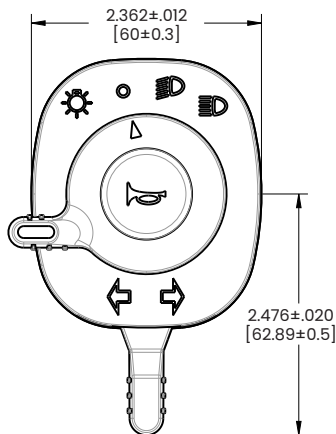
012



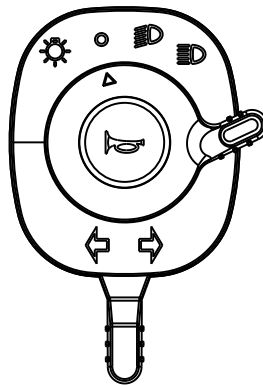
# Dimensional Specs

inches [millimeters]

ROTARY KNOB OPTION 1:  
LEFT ROTARY KNOB



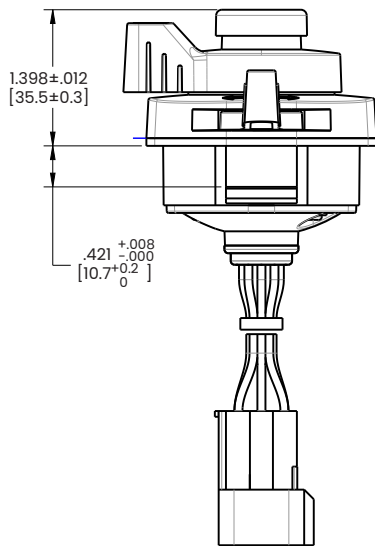
ROTARY KNOB OPTION 2:  
RIGHT ROTARY KNOB



LEGEND SHOWN HERE IS ONLY AN EXAMPLE  
LEGEND MAY VARY BASED ON REQUEST

## THE WIRE COLOR

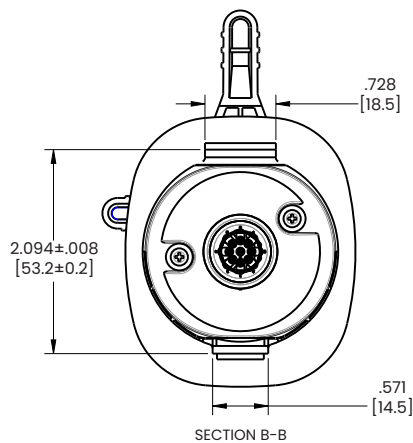
| WIRE NO. | WIRE COLOR | WIRE NO. | WIRE COLOR |
|----------|------------|----------|------------|
| 1        | PURPLE     | 6        | RED        |
| 2        | GREEN      | 7        | GRAY       |
| 3        | BLACK      | 8        | BROWN      |
| 4        | YELLOW     | 9        | BLUE       |
| 5        | WHITE      |          |            |



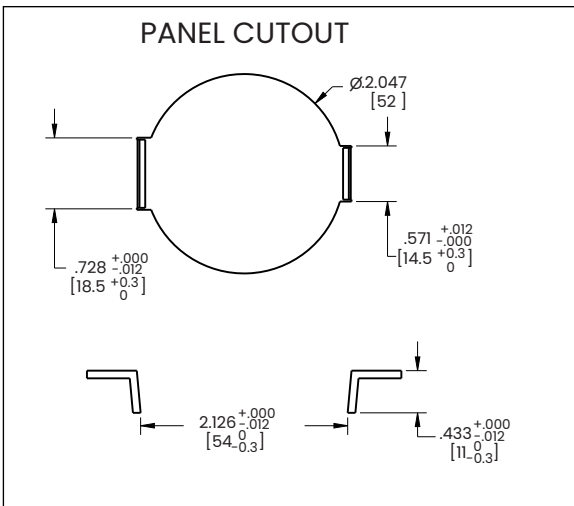
## SWITCH WIRING DIAGRAM

| SWITCH POSITION | TERMINAL   |
|-----------------|------------|
|                 | 9 — 1      |
|                 |            |
|                 | 9 — 1<br>3 |
|                 | 9 — 5<br>1 |

| SWITCH POSITION | TERMINAL |
|-----------------|----------|
|                 | 2 — 7    |
|                 | 2 — 6    |
|                 | 8 — 4    |



## PANEL CUTOUT



# BD-Series

Battery Disconnect Power Switch

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



The BD-Series battery disconnect switch is designed to minimize battery drain, ensure maintenance personnel safety, and when used in conjunction with a padlock, provides vehicle theft protection.

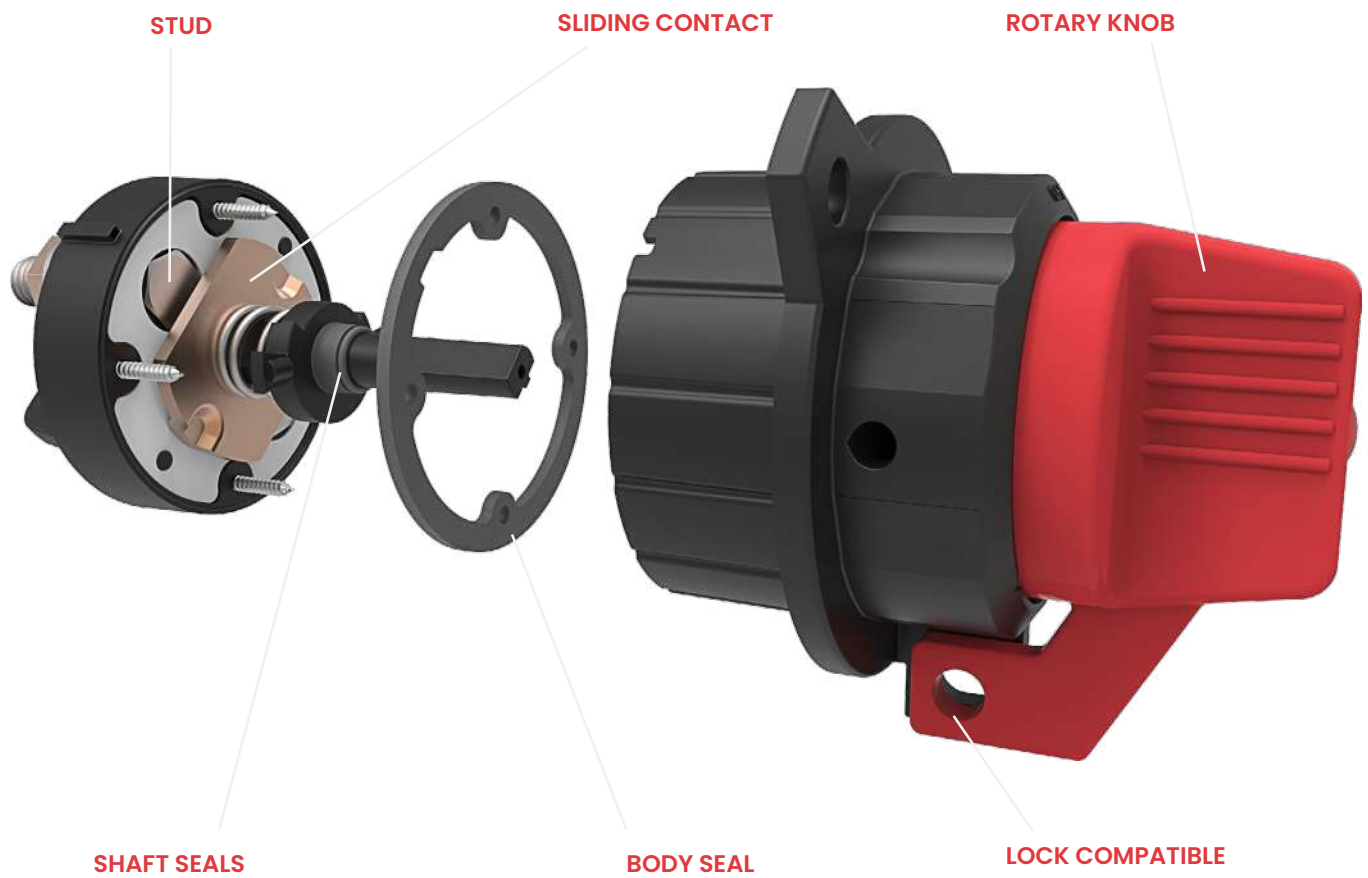
---

|          |                |              |                     |
|----------|----------------|--------------|---------------------|
| <b>1</b> | <b>100-300</b> | <b>12-24</b> | <b>IP67 Sealing</b> |
| Pole     | Amps           | VDC          | Above-Panel         |

## Typical Applications

- On/Off-Highway Equipment
- Military
- Marine

# Design Features





# Tech Specs

## Electrical

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Application Voltage   | DC<br>Rated voltage: 12VDC / 24VDC<br>Range of operating voltage:<br>12VDC: min 9VDC, max 16VDC;<br>24VDC: min 18VDC, max 32VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Current Ratings       | 12VDC/24VDC: rated 100A,<br>max 300A (M10 Studs);<br>12VDC/24VDC: rated 300A<br>(M14 Studs)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Intermittent Current  | 24VDC/1500A, 3 seconds on,<br>60 seconds off, 10 cycles: voltage<br>drop should not exceed 400mV<br>between main terminals.<br>28V/1500A/30 seconds: voltage<br>drop should not exceed 400mV<br>28V/2000A/5 seconds followed<br>by 28V/750A/30 seconds followed<br>by 28V/250A/24 hours: voltage<br>drop should not exceed 100mV                                                                                                                                                                                                                                                                                      |
| Dielectric Strength   | 50HZ, 550VAC for 1 minute<br>between electrically / isolated<br>terminals in main circuit; between<br>terminals of main circuit, knob<br>and enclosure.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Insulation Resistance | Minimum of 100 Megohms 1 min<br>@ 500VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Temperature Rise      | Terminal should not exceed 60°C<br>above ambient.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Endurance             | <b>For M10 Studs:</b><br>2 seconds ON and 2 seconds<br>OFF per operation, load with<br>rated current & voltage. 12V test<br>@14V±0.1V; 24V test @28V±0.2V.<br>50,000 cycles: 100A current;<br>20,000 cycles: 200A current;<br>3,000 cycles: 250A current<br>2 seconds ON and 6 seconds OFF<br>per operation, load with rated<br>current & voltage. 12V test<br>@14V±0.1V; 24V test @28V±0.2V<br>3,000 cycles: 300A current<br><b>For M14 Studs:</b><br>2 seconds ON and 6 seconds OFF<br>per operation, load with rated<br>current & voltage. 12V test<br>@14V±0.1V; 24V test @28V±0.2V<br>3,000 cycles: 300A current |

## Mechanical

|                |                                                                                     |
|----------------|-------------------------------------------------------------------------------------|
| Handling Shock | Fully functional after 3 drops from<br>1000 mm height. Surface damage<br>may occur. |
|----------------|-------------------------------------------------------------------------------------|

## Environmental

|                     |                                                                                                                                                                                   |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temp.     | -40 °C to +85 °C.                                                                                                                                                                 |
| Moisture Resistance | IEC 60068-2-38 or G/T<br>2423.34, Test Z/AD: Composite<br>temperature/humidity<br>cycle test, ten 24-hour cycles @<br>-10°C to +65°C, ≤80-96% RH.                                 |
| Thermal Cycling     | IEC 60068-2-14 or GB/T 2423.22,<br>Test Nb, 25 Cycles -40°C to +85°C                                                                                                              |
| Thermal Shock       | IEC 60068-2-14 or GB/T 2423.22,<br>Test Na (5 cycles @ -55°C to<br>+25°C to +85°C to +25°C)                                                                                       |
| Thermal Resistance  | IEC 60068-2-1 or GB/T 2423.1<br>Cold: Test A, operate 8 hours @<br>-40°C<br>IEC 60068-2-2 or GB/T 2423.2<br>Heat: Test B, operate 8 hours @<br>+85°C                              |
| Vibration           | IEC 60068-2-34 or GB/T 2423.11,10-<br>500 Hz, Random vibration test for<br>8 hours in each of the 3 mutually<br>perpendicular axes. 25Gs @ Z<br>axes, 12.5Gs @ X/Y axes. powered. |
| Salt Spray          | IEC 60068-2-11 or GB/T 2423.17,<br>48 hours                                                                                                                                       |
| Fire and Smoke      | IEC 60695-11-10 or GB/T 2408, HB                                                                                                                                                  |
| Dust / Waterproof   | IP67, for above and below-panel<br>components of actual switch only                                                                                                               |
| Chemical Splash     | Gasoline, Diesel, Motor Oil, Brake<br>Fluid, Ammonia, Armor All                                                                                                                   |
| UV Protection       | ASTM G155-05a, cycle 11,300 hr<br>Xenon Arc, 1.4W / (m <sup>2</sup> Nm),<br>wavelength 420 Nm                                                                                     |

## Physical

|                  |                                                                                                                   |
|------------------|-------------------------------------------------------------------------------------------------------------------|
| Number of Poles  | 1 pole                                                                                                            |
| Wiring Terminals | Line / Load terminal: M10 brass<br>nuts Torque value: M10 (6-8 Nm);<br>M14 (10-14 Nm)                             |
| Mounting         | M8 Iron nut, torque value:<br>(10-15 Nm)                                                                          |
| Torque Operation | 1.0-3.0 Nm                                                                                                        |
| Body Color       | Black                                                                                                             |
| Actuator Color   | Handle color optional, with white<br>color "Arrow" legends.                                                       |
| Weight           | (M10 Studs): 340±10 g / set;<br>(M14 Studs): 385±10 g / set                                                       |
| Material         | Base (PBT glass filled),<br>Bracket & Knob (nylon glass filled),<br>Studs (Copper + Tin plating),<br>Nuts (Brass) |

# Ordering Scheme

Sample  
Part Number BD A 10 - R A

Selection      1            2            3            4            5

## 1. SERIES

**BD** Battery Disconnect Power Switch

## 2. RATING / CYCLES

**A** 100A @ 24VDC: 50,000 Cycles  
200A @ 24VDC: 20,000 Cycles  
250A @ 24VDC: 3,000 Cycles  
**B** 300A @ 24VDC: 3,000 Cycles

Note: Refer to General Specifications for test parameters.

Notes:

<sup>1</sup> Only available with code B from box 2.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

## 3. TERMINATION

**10** M10 Stud  
**14<sup>1</sup>** M14 Stud

## 4. KNOB COLOR

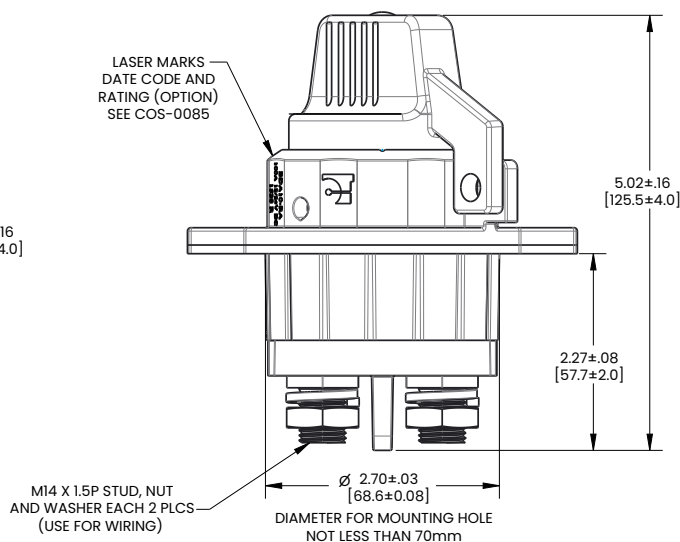
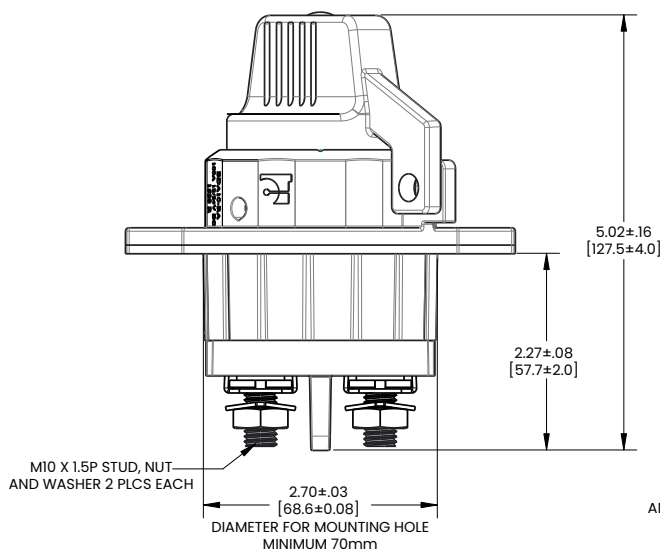
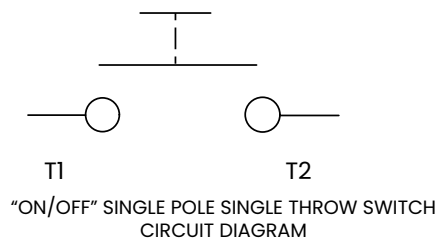
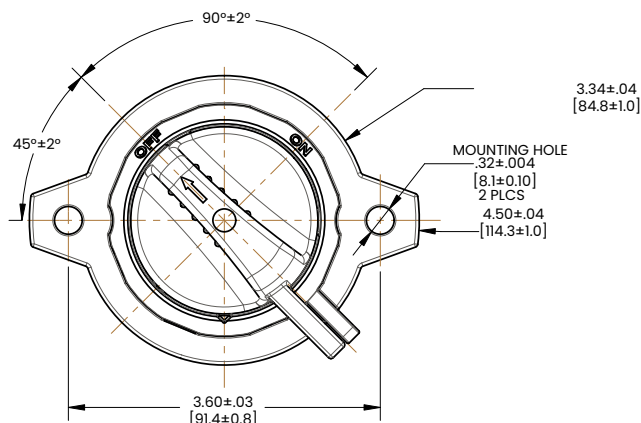
**R** Red  
**Y** Yellow  
**B** Black

## 5. LEGEND

**A** Arrow Legend, White Color

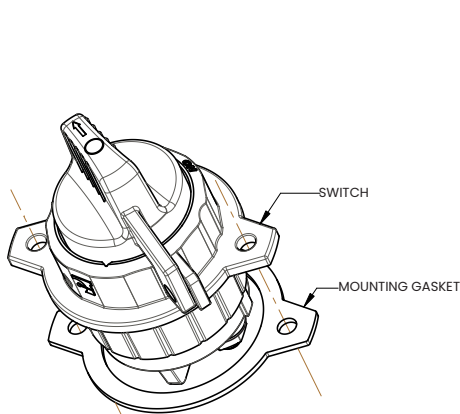
# Dimensional Specs

inches [millimeters]

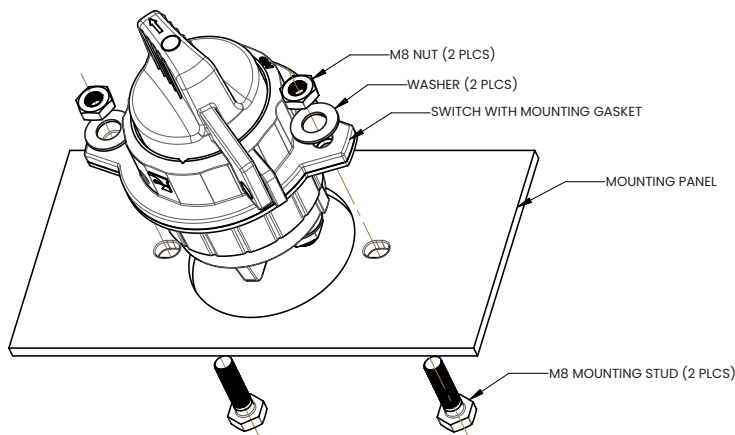


# Mounting Method 1

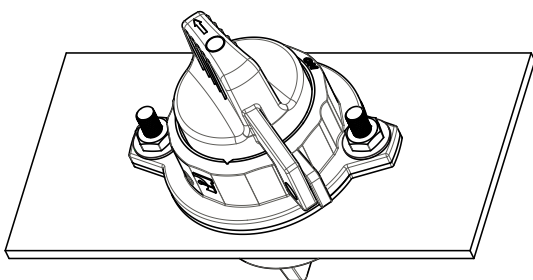
inches [millimeters]



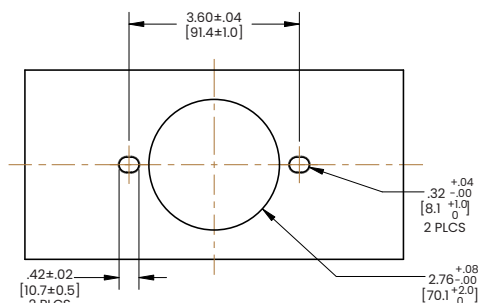
MOUNTING STEP 1: ATTACH MOUNTING GASKET WITH THE SWITCH ORIENTATION AS SHOWN



MOUNTING STEP 2: ORIENT AS SHOWN AND INSTALL THE SWITCH IN MOUNT PANEL HOLE; THEN INSERT STUDS AND WASHERS



MOUNTING STEP 3: TIGHTEN 2PLCS M8 NUTS (REC. TORQUE [10-5Nm])



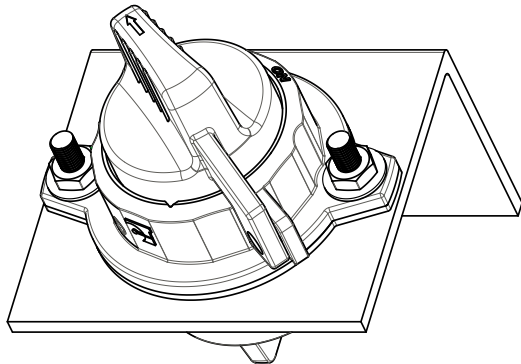
MOUNTING PANEL

Notes:

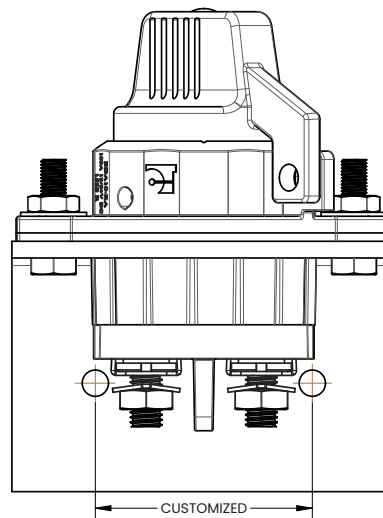
1 Switch can be mounted horizontally or vertically.

# Mounting Method 2

inches [millimeters]



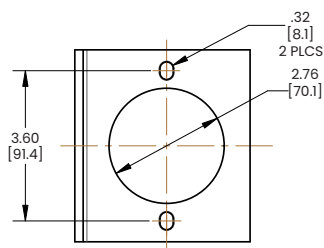
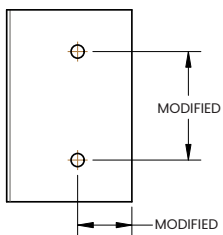
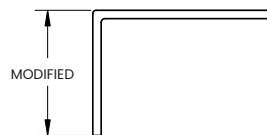
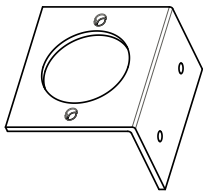
MOUNTING STEP 1: INSTALL SWITCH WITH MOUNTING BRACKET ORIENTATION AS SHOWN



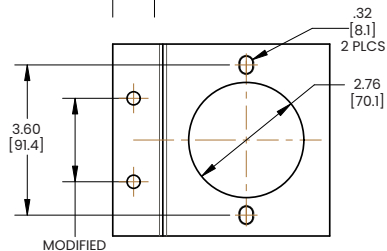
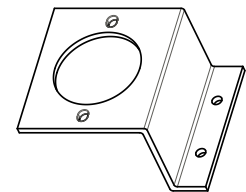
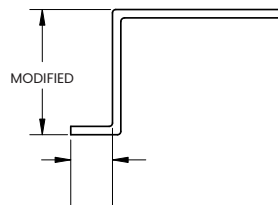
MOUNTING BRACKET CAN BE MODIFIED AS BELOW

MOUNTING STEP 2: ORIENT AS SHOWN AND INSTALL THE SWITCH IN CUSTOMER PANEL.

## "L" SHAPED MOUNTING BRACKET



## "Z" SHAPED MOUNTING BRACKET

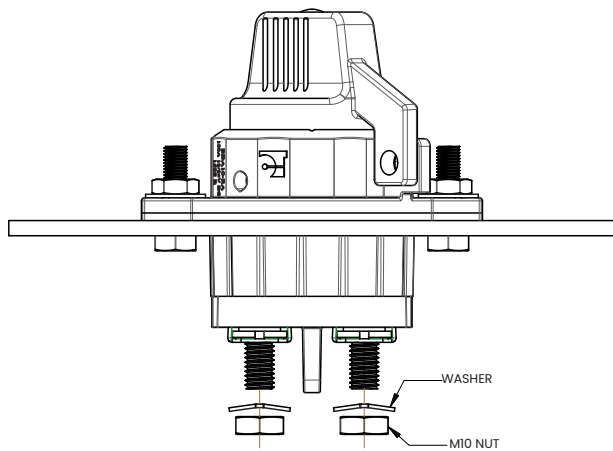


### Notes:

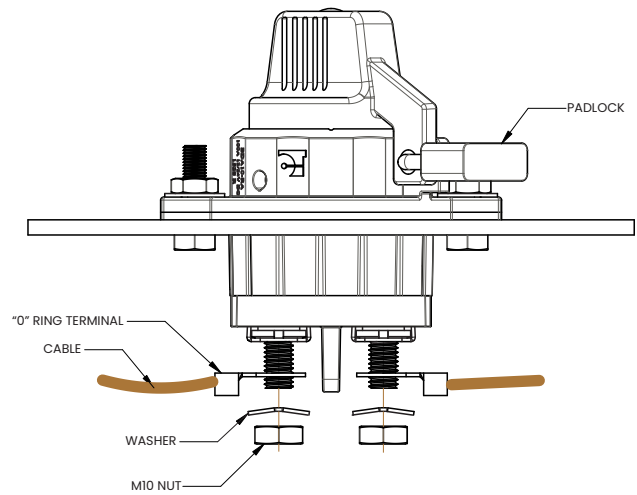
- Switch can be mounted horizontally or vertically.

# Wiring

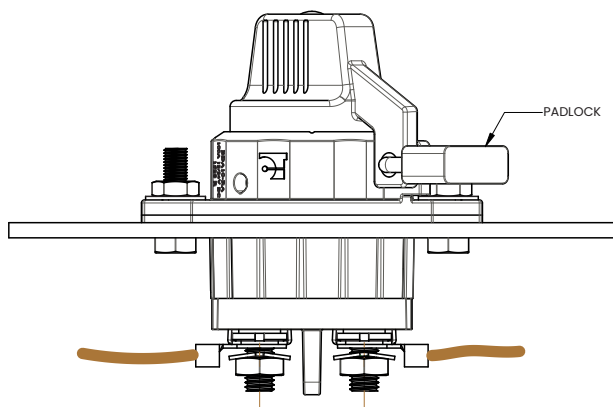
inches [millimeters]



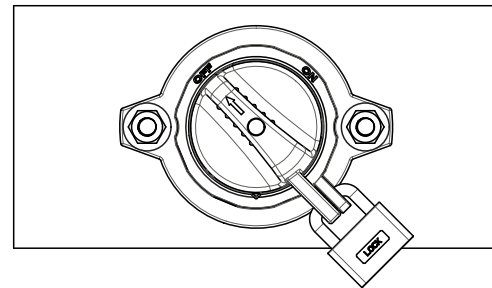
WIRING 1: DISCONNECT WASHERS AND NUTS



WIRING 2: ATTACH 2PLCS M10 "O" RING TERMINALS AS SHOWN, THEN RE-FASTEN WASHERS AND NUTS



WIRING 3: TIGHTEN 2PCS BRASS M10 NUTS (REC. TORQUE [6-8NM])



WHEN USED IN CONJUNCTION WITH A PAD LOCK, SWITCH CAN LOCKED IN THE "OFF" POSITION AS A SAFETY MEASURE

# BD1-Series

Battery Disconnect Power Switch

**PRODUCT WEBPAGE**

*request sample, configure part, watch video*



The BD1-Series battery disconnect switch is designed to minimize battery drain, ensure maintenance personnel safety. Additionally, the optional, removable key adds an extra layer of security to protect against vehicle theft.

**1**  
Pole

**250**  
Amps

**12-24**  
VDC

**IP67 Sealing**  
Above-Panel

## Typical Applications

- On/Off-Highway Equipment
- Military
- Marine

# Design Features

OFF POSITION



ON POSITION



OFF POSITION WITH KEY REMOVED



# Tech Specs

## Electrical

|                       |                                                                                                                                                                                                                                                                           |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Application Voltage   | DC<br>Rated voltage: 12VDC / 24VDC<br>Range of operating voltage:<br>12VDC: min 9VDC, max 16VDC;<br>24VDC: min 18VDC, max 32VDC                                                                                                                                           |
| Current Ratings       | 250A@ 12VDC/24VDC                                                                                                                                                                                                                                                         |
| Contact Voltage Drop  | Voltage drop≤100mV after 300 sec.<br>ON at 200% rated current prior to<br>endurance test; Voltage<br>drop≤500mV after 5 msec. ON<br>at 1600A max. current prior to<br>endurance test.                                                                                     |
| Dielectric Strength   | 50HZ, 1200VAC for 1 minute<br>between electrically / isolated<br>terminals in main circuit; between<br>terminals of main circuit, knob<br>and enclosure.                                                                                                                  |
| Insulation Resistance | Minimum of 100 Megohms 1 min<br>@ 500VDC.                                                                                                                                                                                                                                 |
| Temperature Rise      | Terminal should not exceed 90°C<br>above ambient at rated current<br>after endurance test.                                                                                                                                                                                |
| Endurance             | 2 seconds ON and 3 seconds OFF<br>per operation, load with rated<br>current & voltage. 12V test @14V;<br>24V test @28V.<br>Total 20,000 cycles: 250A current<br>ratings, including 4,000 cycles<br>respectively at -40 °C±2 and<br>+85 °C±2; 12,000 cycles at 23<br>°C±2. |
| Overload              | 500A: 300 seconds ON;<br>1600A: 30 seconds ON.                                                                                                                                                                                                                            |

## Mechanical

|                |                                                                                     |
|----------------|-------------------------------------------------------------------------------------|
| Handling Shock | Fully functional after 3 drops from<br>1000 mm height. Surface damage<br>may occur. |
|----------------|-------------------------------------------------------------------------------------|

## Agency Approvals

UL 558/583

## Environmental

|                     |                                                                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temp.     | -40 °C to +85 °C.                                                                                                                                                                  |
| Moisture Resistance | IEC 60068-2-38 or G/T<br>2423.34, Test Z/AD: Composite<br>temperature/humidity<br>cycle test, ten 24-hour cycles @<br>-10°C to +65°C, ≤80-96% RH.                                  |
| Thermal Cycling     | IEC 60068-2-14 or GB/T 2423.22,<br>Test Nb, 25 Cycles -40°C to +85°C.                                                                                                              |
| Thermal Shock       | GB/T 28046.4-2011, 5.3.2, Test Na<br>(100 cycles@ -40°C to +25°C<br>to+85°C to +25°C).                                                                                             |
| Thermal Resistance  | ISO 16750-4 or GB/T 28046.4 Cold:<br>Test A, work 24 hours @ -40°C<br>ISO 16750-4 or GB/T 28046.4 Heat:<br>Test B, work 48 hours @ +85°C.                                          |
| Vibration           | IEC 60068-2-34 or GB/ T 2423.11,10-<br>500 Hz, Random vibration test for<br>8 hours in each of the 3 mutually<br>perpendicular axes. 25Gs @ Z<br>axes, 12.5Gs @ X/Y axes, powered. |
| Salt Spray          | IEC 60695-11-10 or GB/T 2408,<br>HB (horizontal burning) and V0<br>(vertical burning).                                                                                             |
| Sealing             | IP67, for above and below-panel<br>components of actual switch only                                                                                                                |
| Chemical Splash     | Gasoline, Diesel, Motor Oil, Brake<br>Fluid, Ammonia, Mixture of<br>previous five chemicals.                                                                                       |
| UV Protection       | ASTM G155-05a, cycle 11, 300 hr<br>Xenon Arc, 1.4W / (m2 Nm),<br>wavelength 420 Nm.                                                                                                |

## Physical

|                  |                                                                                                                      |
|------------------|----------------------------------------------------------------------------------------------------------------------|
| Number of Poles  | 1 pole                                                                                                               |
| Wiring Terminals | Line / Load terminal: brass nuts<br>Torque value: M10 (10-15 Nm).                                                    |
| Mounting         | M6/M7 bolt and nut,<br>torque value: 4-5 Nm.                                                                         |
| Torque Operation | 0.5-1.0 Nm.                                                                                                          |
| Body Color       | Black                                                                                                                |
| Actuator Color   | Red                                                                                                                  |
| Weight           | Approximately 165g                                                                                                   |
| Material         | Base & Bracket & Key (glass filled<br>nylon), Studs (Tin plated brass),<br>Nuts (Brass)<br>Locking Washers (SUS304). |



# Ordering Scheme

Sample  
Part Number **BD1 - 1 A 2 /CAP**

Selection      1                      2                      3                      4                      5

## 1. SERIES

**BD1** Battery Disconnect Power Switch (1 Pole)

## 2. RATING / CYCLES

- 1 250A @ 12/24VDC
- 2 250A @ 12/24VDC, UL 558

Notes:  
1 Individual Keys separately available, reference part number 308-39943-001.  
2 Only available with rating code "1".  
3 The Cap accessory is only available for the removable key type.

[Configure Complete Part Number >](#) [Browse Standard Parts >](#)

## 3. KEY STYLE

**A** Removable <sup>1</sup>                      **B** Non-Removable

## 4. TERMINATION

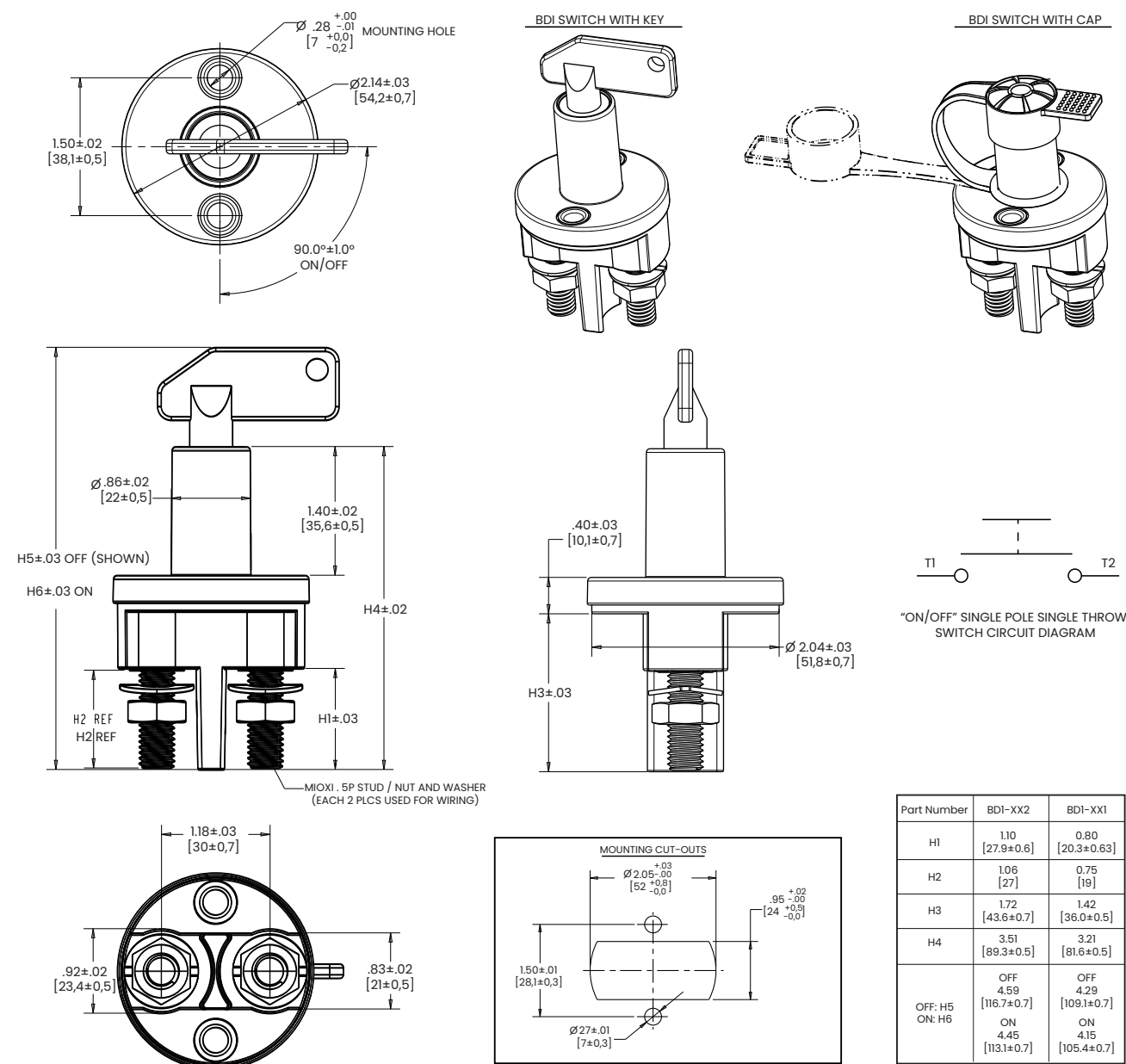
- 1 M10 Stud 19 mm length
- 2 M10 Stud 27 mm length
- 3 M8 Stud 19 mm length <sup>2</sup>

## 5. ACCESSORY <sup>3</sup>

**BLANK** Without Cap                      **/CAP** With Cap

# Dimensional Specs

inches [millimeters]



Notes:  
1 Torque for mounting nut: M6, M7 or M8 (4-5 nm)  
2 Torque for wiring nut: M10 (10-15 nm)  
3 Switch can be mounted vertically or horizontally

# Agency Approvals

## Terminology

Agency data

UL File #E7560  
CSA File # LR9280

|                         |                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                      |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Single Pole (SP)        | A switch device that opens, closes or changes connection of a single conductor in an electrical circuit.                                                                                                                                                                                                          |                                                                                                                                                      |
| Double Pole (DP)        | A switch device that opens, closes or changes connection of two conductors in an electrical circuit.                                                                                                                                                                                                              |                                                                                                                                                      |
| Single Throw (ST)       | A switch that opens, closes or completes a circuit at only one of the extreme positions of its actuator.                                                                                                                                                                                                          |                                                                                                                                                      |
| Double Throw (DT)       | A switch that opens, closes or completes a circuit at both extreme positions of its actuator.                                                                                                                                                                                                                     |                                                                                                                                                      |
| Normally Open (NO)      | A momentary switch where one or more circuits are open when the switch actuator is at rest (the normal position.)                                                                                                                                                                                                 |                                                                                                                                                      |
| Normally Closed (NC)    | A momentary switch where one or more circuits are closed when the switch actuator is at rest (the normal position.)                                                                                                                                                                                               |                                                                                                                                                      |
| Power Rating            | A switches current handling capability measured in amperes, horsepower, lamp loads or combinations thereof, in conjunction with applicable voltage levels.                                                                                                                                                        |                                                                                                                                                      |
| L Rating                | Denotes the ability of a switch to handle the initial high inrush of a Tungsten Filament Lamp on AC voltage only.                                                                                                                                                                                                 |                                                                                                                                                      |
| T Rating                | Denotes the ability of a switch to handle the initial high inrush of a tungsten filament lamp on AC or DC voltage.                                                                                                                                                                                                |                                                                                                                                                      |
| Typical European Rating | 16<br>(4)<br>A<br>250V<br>~<br>T85<br><br>μ                                                                                                                                                                                                                                                                       | resistive load amperage<br>motor load amperage<br>amperage<br>voltage<br>AC<br>max. operating temp. in<br>centigrade<br>micro-gap (<3mm)<br>approved |
| Microgap (μ)            | European marking required for contact separation of less than 3mm. Switches with microgap (μ) approval are not acceptable as the safety disconnect of equipment from the main power source. The equipment requires an additional means for safe disconnection from the main power source such as a cord and plug. |                                                                                                                                                      |
| Bulb Life               | Neon<br>Incandescent<br>LED                                                                                                                                                                                                                                                                                       | 25,000 hours<br>25,000+ hours<br>100,000 hours                                                                                                       |
| Lamp Characteristics    | Neon<br>(120-240V)<br>Incandescent<br>6V<br>12-14V<br>18V<br>24-28V                                                                                                                                                                                                                                               | .002A Current Draw<br><br>.20A Current Draw<br>.08A Current Draw<br>.04A Current Draw<br>.04A Current Draw                                           |

## Agency Approvals

These marks are granted by national certification bodies for use on products which comply with their specifications.

| Agency   | Country        | Mark                                                                                  |
|----------|----------------|---------------------------------------------------------------------------------------|
| UL       | USA            |    |
| UL       | Canada         |    |
| UL       | USA & Canada   |    |
| BEAB     | United Kingdom |    |
| CSA      | Canada         |    |
| VDE      | Germany        |    |
| TUV      | Germany        |    |
| SEMKO    | Sweden         |   |
| NEMKO    | Norway         |  |
| KEMA     | Netherlands    |  |
| DEMKO    | Denmark        |  |
| UTE(USE) | France         |  |
| SEV      | Switzerland    |  |
| OVE      | Austria        |  |
| IMQ      | Italy          |  |
| CCC      | China          |  |
| FIMKO    | Finland        |  |

# Standard Legend Codes

|       |        |      |     |     |     |       |          |      |          |                 |           |      |
|-------|--------|------|-----|-----|-----|-------|----------|------|----------|-----------------|-----------|------|
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| YK    | UA     | UB   | US  | UV  | UW  | UX    | UY       | MP   | MR       | PX              | MS        | MT   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| VU    | MW     | NZ   | NX  | NY  | YM  | VW    | PS       | PW   | PZ       | WG              | WM        | RN   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| RP    | YG     | TX   | VD  | VE  | VF  | VG    | SH       | SM   | SN       | SP              | SR        | SY   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| DIM   | BRIGHT | UH   | UJ  | PD  | PE  | PF    | VC       | VJ   | UF       | UG              | MU        | TN   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| NS    | PB     | SE   | VZ  | YE  | NN  | RW    | PU       | WA   | YN       | UE              | NM        | RJ   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| NR    | YD     | TL   | VR  | SL  | VA  | UC    | VN       | PK   | VY       | UZ              | RH        | NU   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| NV    | RB     | RC   | RK  | RL  | MZ  | RG    | UP       | DOWN | UD       | UR              | WD        | TY   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| PA    | UK     | WR   | UU  | UT  | YR  | PM    | VV       | WB   | TB       | TC              | TD        | TE   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| MY    | PV     | TA   | TZ  | WC  | PT  | PN    | PH       | RA   | TU       | TT              | YL        | SK   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| VS    | UL     | UM   | WK  | TS  | VT  | WL    | VP       | YJ   | PJ       | RY              | UP        | NW   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| NP    | RE     | RF   | PP  | PR  | TV  | PC    | YT       | YU   | PL       | WJ              | MV        | RR   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| TK    | RT     | SZ   | VX  | WF  | WH  | PG    | SJ       | YA   | YB       | RM              | TM        | RD   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| RS    | UN     | TP   | TR  | NT  | MX  | YC    | TW       | TJ   | YF       | TH              | TF        | TG   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| YS    | YH     | SX   | RZ  | YP  | WN  | WP    | WW       | WX   | SA       | SB              | SC        | SD   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| RAISE | LOWER  | HIGH | LOW | FWD | REV | DEPTH | TRIM TAB | ACC  | NAV ANCH | WIND LASS UP/DN | LIVE WELL | REAR |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| ST    | SU     | WU   | WV  | SV  | SW  | VB    | VH       | VK   | VL       | VM              | WE        | SF   |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| PARK  | AUTO   | RU   | RV  | RX  |     |       |          |      |          |                 |           |      |
|       |        |      |     |     |     |       |          |      |          |                 |           |      |
| SG    | SS     |      |     |     |     |       |          |      |          |                 |           |      |

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