



CATALOG

Switches and Controls

Electromechanical & Digital 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⁺



Innovative & Eco-Friendly Products



Excellent Quality & Customer Service



Reliable & On-Time Delivery



Vertical Integration

WORLDWIDE NUMBERS:



2800⁺
EMPLOYEES



150⁺
ENGINEERS



70⁺
DISTRIBUTORS



50⁺
REP FIRMS

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

Please visit 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

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

Software	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)
Switch Layout	3 or 6 individual Rockers	One lever switch with options for 1 or 2 extra pushbuttons	4 to 12 Pushbuttons	Up to 3 switches
Operating Voltage	12 or 24 V	12 or 24V	8-32 V	9-32 VDC (Controller Module) 5-32 VDC (Hardwire Switch)
Illumination	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
Sealing	IP68 Front Panel; IP68 Back Panel when connected	IP54	IP6k9k Front Panel; IP68 Back Panel when connected	IP52 when connected
Termination	Deutsch DT-Series Connector	TE connectors and terminals (see datasheet)	Deutsch DT-Series Connector	TE connectors and terminals (see datasheet)
Legends	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

Software	SAE J1939 CAN 2.0b Protocol	n/a	SAE J1939 CAN 2.0b Protocol
Switch Layout	5 Pushbuttons, (1) 4-directional Joystick and 1 Rotary knob	(1) 4-directional Joystick, 1 Rotary and Pushbutton Encoder	n/a
Operating Voltage	8-32 V	3.3 or 5.0 V	6.5-32 V
Illumination	CAN Controlled dimmable LEDs	n/a	n/a
Sealing	IP67 for above panel switch components	IP67 or above panel components	IP69k
Termination	Deutsch DT-Series connector	SAMTEC SQT, SMM & MMS-Series Connectors	Molex MX-150 Connector
Legends	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; up to 15A 125VAC 10A 250VAC 20A 18VDC	IP68 including connector; up to 10A 24VDC	IP66/68; up to 20/15A 12/24VDC 15A 125VAC 10A 250VAC
Actuator	Rocker, Paddle, Locking Rocker, Window Lift	Bezel-Less Rocker, Paddle & Locking Rocker	Rocker, Paddle, Locking Rocker
Mounting Hole Specifications	.867" x 1.734" [22mm x 44mm] 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
Termination	.187 tab .250 tabs	.110 tabs	.250 tabs solder lug wire leads
Illumination	incandescent, LED	LED	incandescent, LED, 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 10A 28VDC	up to 15A 125VAC 10A 250VAC 26A 250VAC Resistive
Actuator	bezel-less rocker	rocker, paddle
Mounting Hole Specifications	.787" x 1.575" snap-in, keyed	.830" x 1.450" [21.08mm x 36.83mm] snap-in mount screw mount
Termination	.110 Tabs	.187 tab solder lug .250 tabs screw terms 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
Poles	1, 2	1	1, 2
Ratings	up to 20A 125VAC 15A 250VAC	up to 12A 125VAC 10A 250VAC	up to 20A 125VAC 10A 250VAC
Actuator	rocker, paddle	rocker	rocker, lever, paddle, plunger, toggle (bat)
Mounting Hole Specifications	.480" x 1.072" [12.19mm x 27.23mm] .866" x 1.182" [22mm x 30mm] snap-in mount	.795" [20.2mm] round snap-in mount	.550" x 1.125" [13.97mm x 28.57mm] 1.00" x 1.125" [25.4mm x 28.57mm] snap-in mount
Termination	solder lug .250 tabs wire leads PC terms	.187 tab	.187 tab solder lug .250 tabs wire leads
Illumination	incandescent, neon	incandescent, neon	incandescent, neon
Approvals	UL, CSA, VDE	UL, cUL	UL, CSA

SMALL-SIZED ROCKERS



	651 / 652	622 / 632	611 / 621	610 / 620
Poles	1	1, 2	1, 2	1, 2
Ratings	up to 10A 125VAC 10A 250VAC 1/4 HP 125-250VAC	up to 12A 125VAC 8A 250VAC 1/2 HP 125-250VAC	up to 8A 125VAC 4A 250VAC	up to 8A 125VAC 4A 250VAC
Actuator	rocker, paddle	rocker	rocker, paddle	rocker, paddle
Mounting Hole Specifications	.508" x .756" [12.9mm x 19.2mm] snap-in mount	.508" x .756" [12.9mm x 19.2mm] snap-in mount	.508" x .756" [12.9mm x 19.2mm] snap-in mount	.508" x .756" [12.9mm x 19.2mm] snap-in mount
Termination	.187 tab solder lug wire leads PC terms	.187 tab solder lug	.187 tab solder lug wire leads PC terms	solder lug PC terms
Illumination	n/a	incandescent, LED, neon	n/a	n/a
Sealing	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 20A 125VAC 10A 250VAC 1/2HP 125- 250VAC	up to 20A 125VAC/ DC 10A 250VAC/ DC	up to 6A 125VAC/ DC 3A 250VAC/ DC	up to 20A 125VAC 10A 250VAC	up to 20A 125VAC 20A 277VAC 2 HP 250VAC	up to 15A 125VAC 10A 250VAC 15A 12-28VDC	10A 250VAC 15A 125VAC 16A 12/24VDC
Actuator	toggle (bat)	toggle (bat), toggle (ball)	toggle (bat), toggle (ball)	paddle, toggle (bat)	paddle, toggle (bat)	paddle, toggle (bat)	IP68, bat, paddle
Mounting Hole Specifications	.656" x 1.218" [16.66mm x 30.54mm] snap-in mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount
Termination	.250 tabs screw terms wire leads	screw terms	solder lug .250 tabs screw terms wire leads	solder lug .250 tabs screw terms wire leads	.187 tabs solder lug .250 tabs screw terms wire leads PC terms	.187 tabs solder lug .250 tabs screw terms wire leads PC terms	.250 tabs Screw Terminals with cage 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 20A 125VAC 10A 250VAC	up to 5A 125VAC 2A 250VAC	up to 6A 125VAC 3A 277VAC	up to 15A 125VAC 10A 250VAC	up to 3A 125VAC	AV-Series: up to 10.1A 12VDC AVH-Series: up to 30A 12VDC	.25A 24VDC
Mounting Hole Specifications	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.500" dia [12.7mm] bushing mount	.748" dia [19mm] bushing mount	.830" x 1.450" [21.08mm x 36.83mm] snap-in mount
Termination	.250 tabs screw terms wire leads	solder lug wire leads PC terms	.250 tabs solder lug wire leads	solder lug screw terms wire leads	solder lug wire leads	.110 tabs wire leads	Integrated female connector in switch base. Mates with Delphi Connector 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

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

BATTERY DISCONNECT



BD1-Series



BD-Series

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

COMBINATION



CSW-Series

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

Selector Guide

CONTROL SWITCHES



LW Wiper

LMR Mirror

LD Dimmer

Poles	2	multi	1
Ratings	up to 8A 14VDC 4A 28VDC	up to 1A 14VDC .5A 28VDC	up to 10A 12VDC 5A 24VDC
Actuator	rocker, paddle	joystick	rocker, paddle
Mounting Hole Specifications	.867" x 1.734" [22mm x 44mm] snap-in mount	.867" x 1.734" [22mm x 44mm] snap-in mount	.867" x 1.734" [22mm x 44mm] snap-in mount
Termination	.187 tabs	wire leads with 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 12V/24VDC	9-32VDC
Mounting Hole Specifications	.830" x 1.450" [21.08mm x 36.83mm]	.830" x 1.450" [21.08mm x 36.83mm]
Termination	.250 tabs	.250 tabs
Illumination	LED	LED
Sealing	Curved Doors: IP65 above-panel when doors closed Square Doors: IP64 above-panel when doors closed	IP64 or IP65 above-panel when doors closed

VM-Series

CAN Bus Rocker Switch
Module

PRODUCT WEBPAGE

request sample, watch video



The sealed VM-Series incorporates the Contura® switches actuator style flexibility with CAN Bus technology to create a multiplexed rocker switch 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)



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



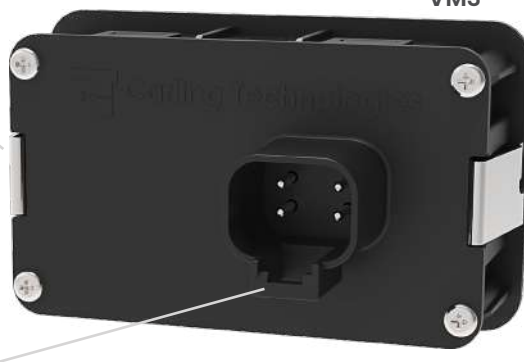
6 PIN CONNECTOR

Mates to the Deutsch DT-Series Connector.

SNAP-IN MOUNTING

For fast, easy assembly.

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

Operating Voltage		12 or 24VDC systems
Maximum Current		VM3: Operation: 90mA; Sleep mode: 8mA VM6: Operation: 130mA; Sleep mode: 8mA
Electrical Endurance		Minimum 250,000 operations (50,000 cycles at -40°C, 150,000 cycles at room temperature, & 50,000 cycles at 85°C)
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 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 $0.5 \pm 0.1V/min$ 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 time 10ms.

Electromagnetic Compatibility (EMC)

ESD	ISO 10605	±15kV air discharges, ±8kV contact discharges
Absorbed-Lined Chamber	ISO 11452-2	100V/m, 80MHz to 2GHz
Bulk Current Injection	ISO 11452-4	100mA, 20MHz to 400MHz
Conducted Transients	ISO 7637-2	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

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

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, $\pm 15\text{mm}$ 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 ² for 11 ms
Bump	IEC 60068-2-27	100 shocks in each direction of the 3 axes (600 total shocks) at 400 m/s ² 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

Switch Functions	2-position maintained, 2-position momentary (top), 2-position momentary (bottom), 3-position maintained, 3-position maintained (top and bottom), 3-position maintained (top), 3-position maintained (bottom)	
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	VM3: ~91 grams [0.2 lb] VM6: ~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

Communication	Supported Protocols and baud rates: 1. SAE J1939 a. Baud Rates i. 125 Kbps ii. 250 Kbps iii. 500 Kbps 2. NMEA2000 a. 250 Kbps 3. CANopen <Add Profile> a. Baud Rates i. 125 Kbps ii. 250 Kbps iii. 500 Kbps	
Bootloader	Allows in-network update of application software when using qualified CAN diagnostic tools.	
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	

Certification

E-Mark	ECE/R10.05	No.: E11*10R05/01*11680*00
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Tech Specs

Software Interface Integration

Click below on integrating the VM-Series into a

J1939 CAN network: www.carlingtech.com/vm-series_j1939-interface.pdf

CANopen network: www.carlingtech.com/vm-series_CANOpen-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

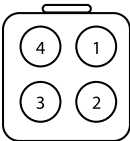


Figure 1:
Connector 1 Pinout

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

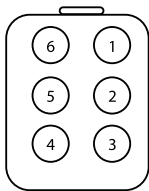


Figure 2:
Connector 2
Pinout

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 (6 position size only)
4 CANopen ¹
5 CANopen with Control Relay (6 position size only) ¹

4. ROCKER STYLE ²

A Contura II
B Contura III
E Contura V
F Contura V – Laser Etched
M Contura XIV
N Contura XIV – Laser Etched
R Indicator/Blank Cap ³
Z No Rockers

 [Configure Complete Part Number >](#)

5. ORIENTATION ^{See orientation diagram page for more details}

Mounting Panel Thickness	
1 Orientation 1	0.06 to 0.11 inches [1.6 to 2.8mm]
2 Orientation 2	
3 Orientation 3	
4 Orientation 4	
5 Orientation 5	0.11 to 0.16 inches [2.8 to 4.0mm]
6 Orientation 6	
7 Orientation 7	
8 Orientation 8	

6. NETWORK TYPE

1 250K Baud Rate
2 500K Baud Rate
4 125K Baud Rate

7. SOURCE ADDRESS ⁴

000 A Unique Number (**0-238**)
000 A Unique Number (**0-127**) ¹

Notes:

- When CANopen is selected, the second listed '000' (Part 1, Box 7) must be selected.
- If any code besides Code Z is chosen, please configure all rockers using Part 3 of the ordering scheme (next page).
- Available with stationary Switch Circuit Code 8 only (Part 2, Box 1).
- 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.
- Available with Rocker Style Code R only (Part 1, Box 4).

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 Stationary ⁵

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

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 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 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			

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

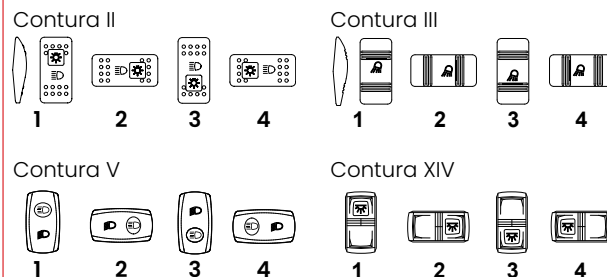
5. ACTUATOR LENS OR BODY LEGENDS

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

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

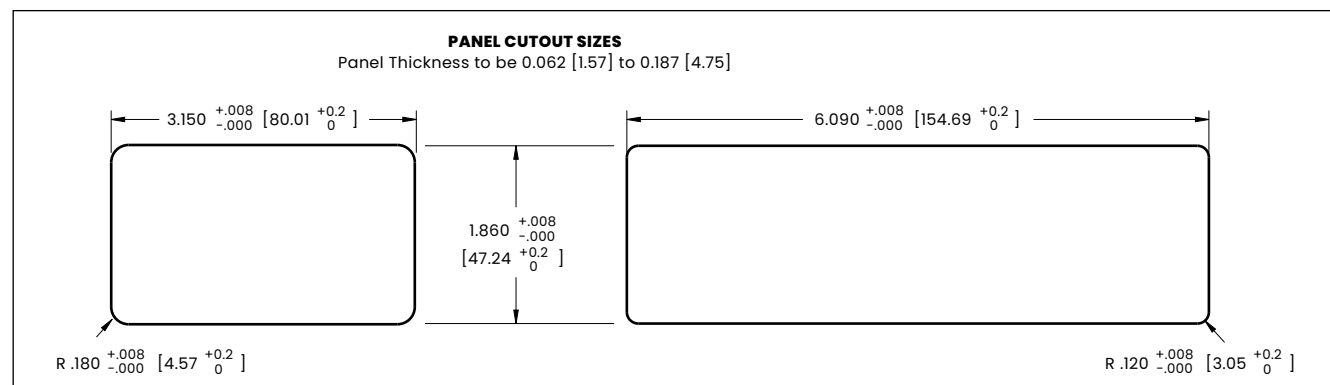
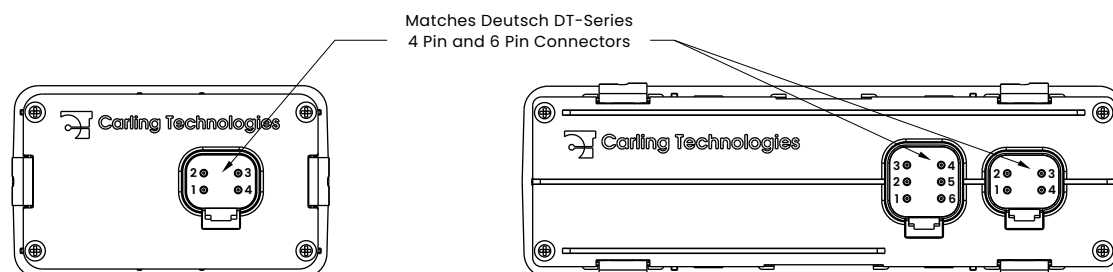
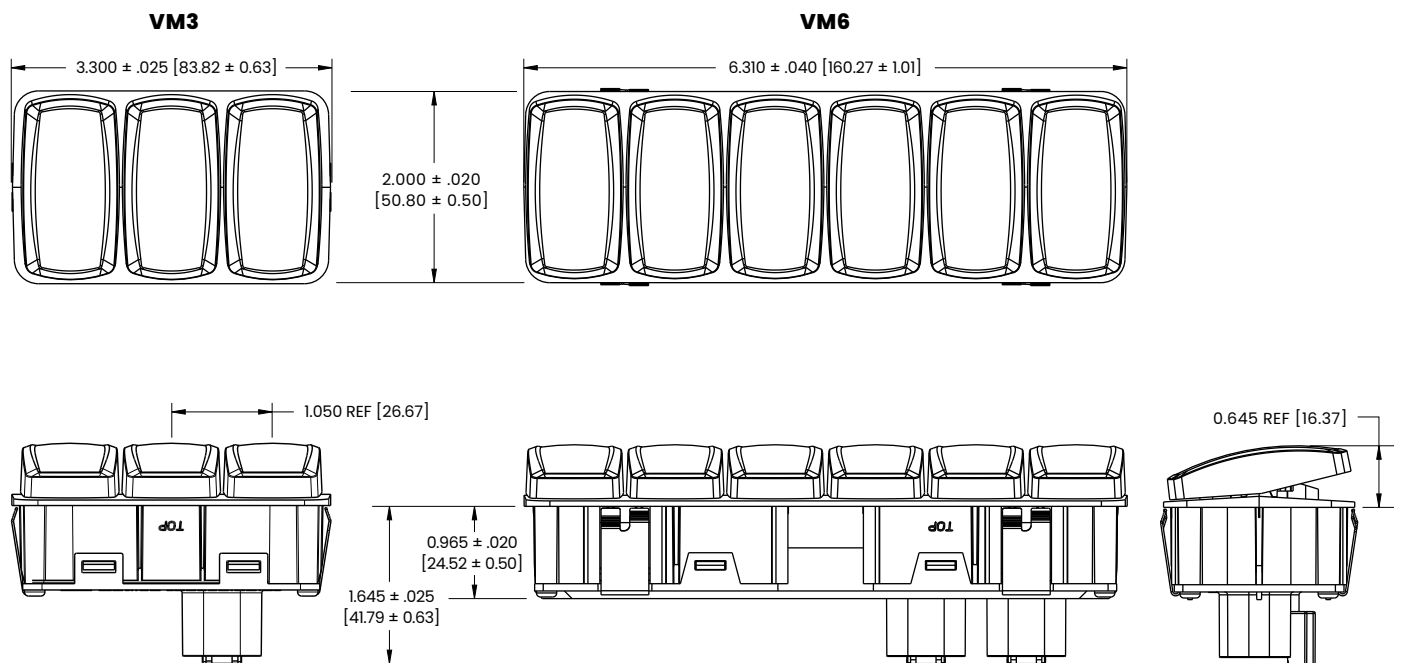


7. ACTUATOR LENS LEGEND

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.

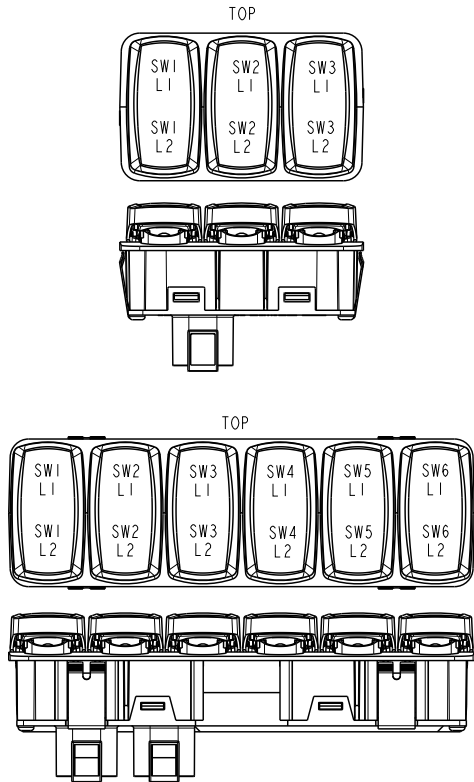
Dimensional Specs

inches [millimeters]

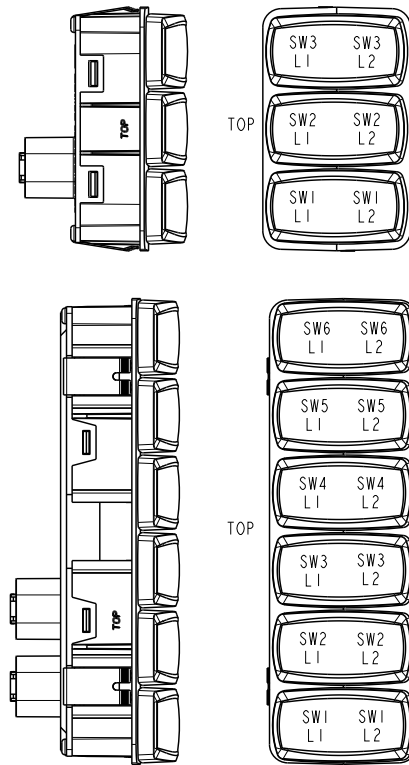


Orientation Diagram

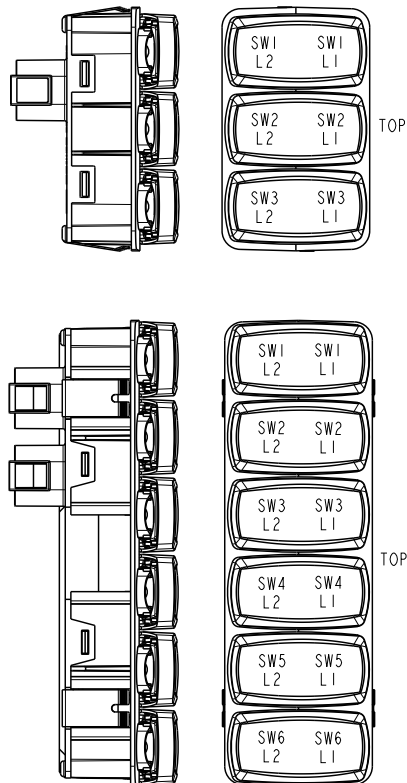
Orientation 1



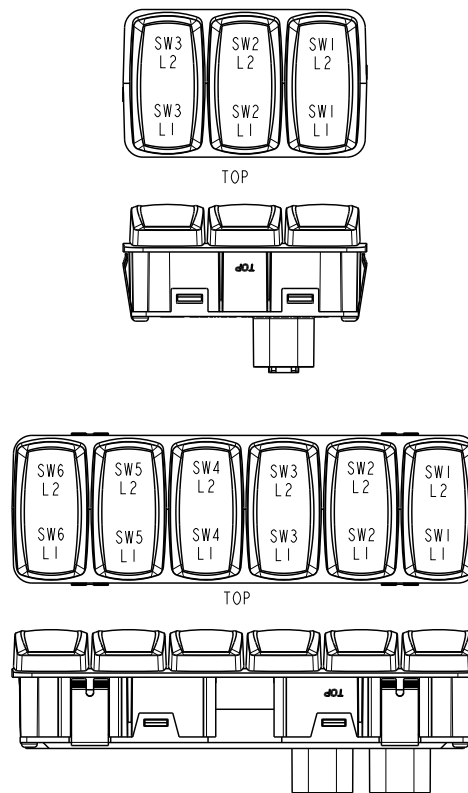
Orientation 2



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
Functional Safety	Not compliant, MCU and hall sensor ISO 26262 ASIL B grade
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 ² , stay for 60s
Vibration	IEC 60068-2-6; Amplitude 1.2mm (10~25Hz), Accelerate 30m/s ² (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 ² *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 TVOC; <50µg C/g Benzene; <5µg/g Methylbenzene; <5µg/g Xylene; <15µg/g Condensable components; <2mg Odour level; (23°C/40°C) ≤3 Odour level; (80°C) ≤3.5

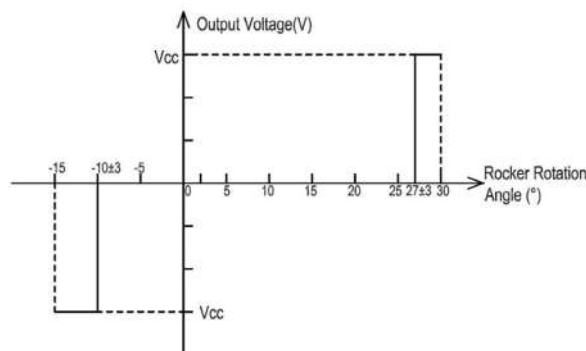
Physical

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 ¹

7. CONNECTOR

2,3,4

	Manufacturer	Manufacturer Pin	Number of Pins
A	TE	174051	12
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

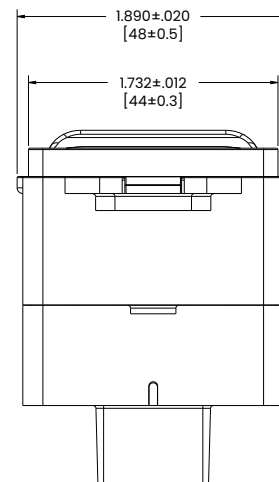
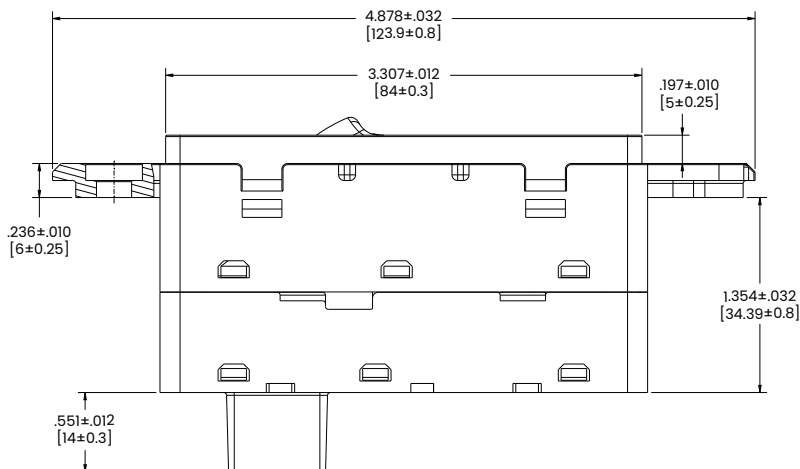
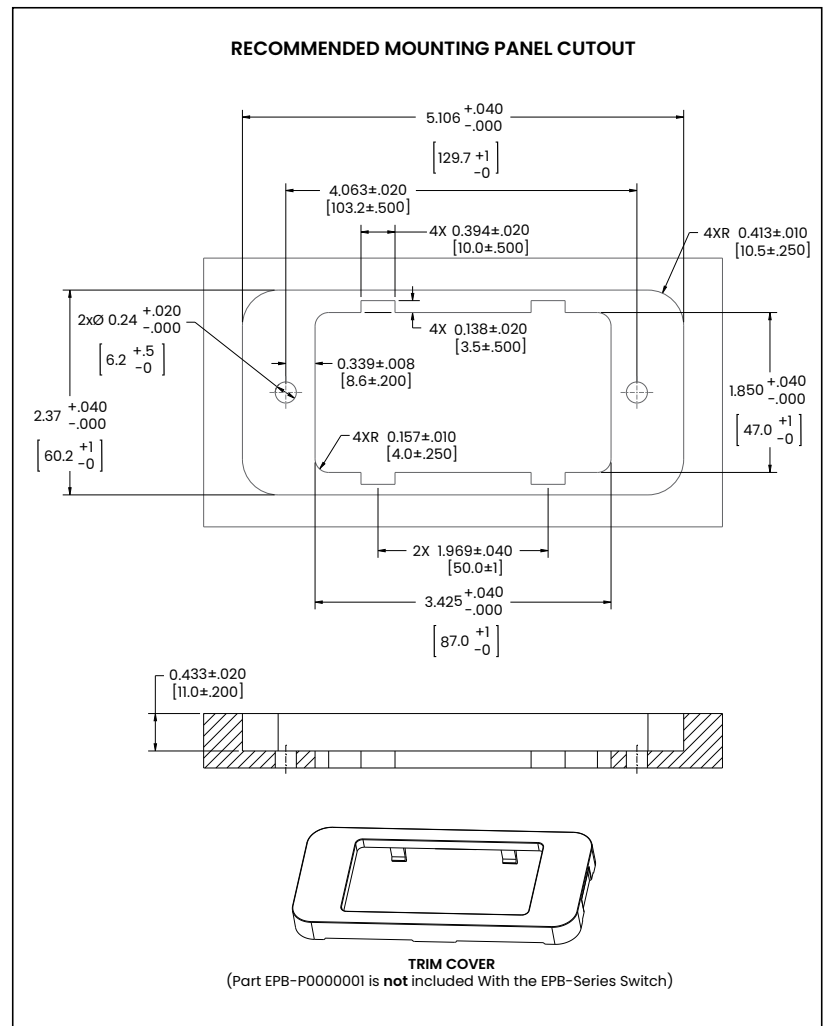
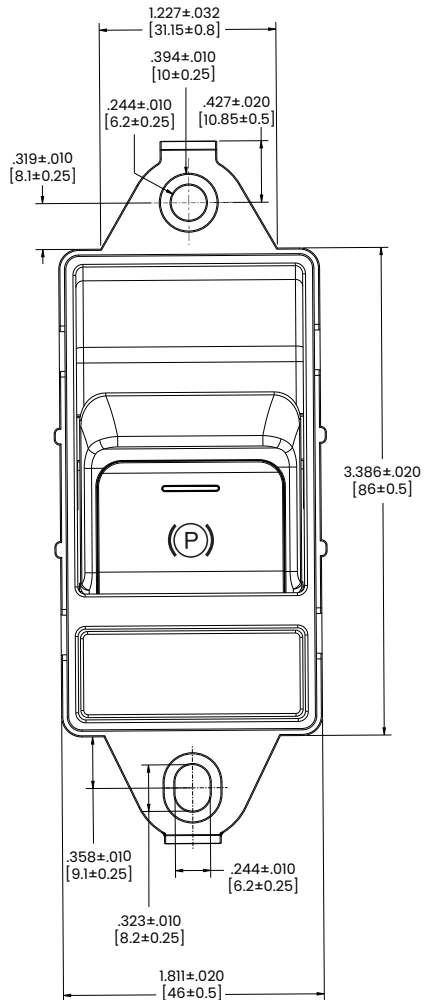


PARKING BREAK WITH AUTO HOLD AND TRAILER BRAKE



Dimensional Specs

inches [millimeters]



Circuit Diagrams & Schematics

Mates with TE/AMP 040 Multi-Lock Series Connector Part Number 174045

QR CODE EPB-10001001 (MFG DATE CODE) (SERIAL NUMBER)

LASER MARKING INFORMATION

PARKING BREAK ONLY

PIN NO.	DESIGNATION
1	APPLY SW_NO
2	APPLY SW_NC
3	APPLY SW
4	RELEASE SW_NC
5	RELEASE SW
6	RELEASE SW_NO
7	GND_BL
8	PWR_BL
9	PWR_IL
10	GND_IL
11	NULL
12	NULL

ELECTRICAL SCHEMATIC

Mates with TE/AMP 040 Multi-Lock Series Connector Part Number 174045

QR CODE EPB-10001002 (MFG DATE CODE) (SERIAL NUMBER)

LASER MARKING INFORMATION

PARKING BREAK WITH AUTO HOLD

PIN NO.	DESIGNATION
1	Apply SW_NO
2	Apply SW_NC
3	Apply SW
4	Release SW_NC
5	Release SW
6	Release SW_NO
7	PWR_IL_AH
8	PWR_BL
9	PWR_IL_BRK
10	GND
11	AH_IN
12	AH_OUT

ELECTRICAL SCHEMATIC

Switch Connector equal to TE/AMP 040 Multi-Lock Series 174053-2 Mating Plug TE 174046-2

QR CODE EPB-10001003 (MFG DATE CODE) (SERIAL NUMBER)

LASER MARKING INFORMATION

PARKING BREAK WITH AUTO HOLD AND TRAILER BRAKE

PIN NO.	DESIGNATION
1	AH SW
2	APPLY SW C
3	APPLY SW_NO
4	APPLY SW_NC
5	RELEASE SW_NC
6	RELEASE SW_NO
7	RELEASE SW C
8	TB SW
9	AH_OUT
10	PWR_IL_AH
11	PWR_BL
12	GND_BL
13	PWR_IL_BRK
14	GND_IL
15	PWR_IL_TB
16	TB_OUT

ELECTRICAL SCHEMATIC

Switch Connector equal to TE/AMP 040 Multi-Lock Series 174051-2 Mating Plug TE 174045-2

QR CODE EPB-00001005 (MFG DATE CODE) (SERIAL NUMBER)

LASER MARKING INFORMATION

PARKING BREAK WITH CAN

PIN NO.	DESIGNATION
1	POWER
2	CAN_H
3	CAN_L
4	GND
5	NULL
6	NULL
7	NULL
8	NULL
9	NULL
10	NULL
11	NULL
12	NULL

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

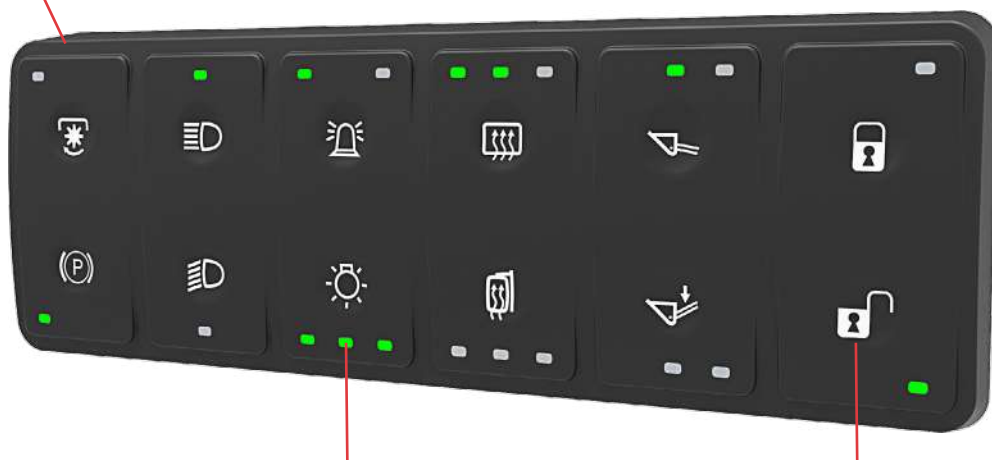
Typical Applications

• 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

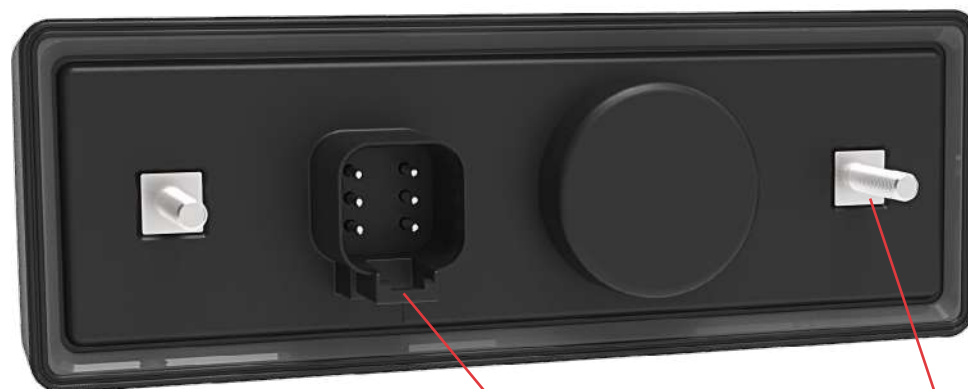
Fully sealed IP6K9K above panel

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 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 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 IEC60068-2-1 Cold Soak IEC60068-2-2 Heat Soak 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

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

3 **RS**

Function Icon Code

Button 2

3 **RA**

Function Icon Code

Button 3

3 **UV**

Function Icon Code

Button 4

3 **UW**

Function Icon Code

Button 5

3 **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

3 **PR**

Function Icon Code

Button 10

3 **PP**

Function Icon Code

Button 11

3 **RH**

Function Icon Code

Button 12

3 **NU**

Function Icon Code

FUNCTION LIGHT CODE

	Landscape	Portrait	Reverse Landscape	Reverse Portrait
1¹ No Function Light				
3 Closed-Open-Closed				
8 Open-Open-Open				

ICON CODE

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

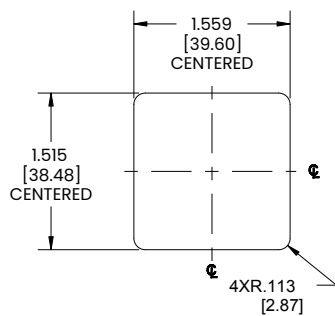
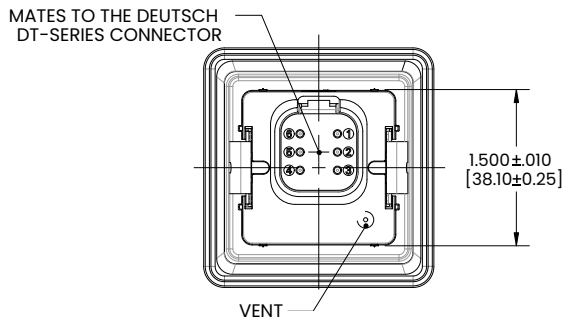
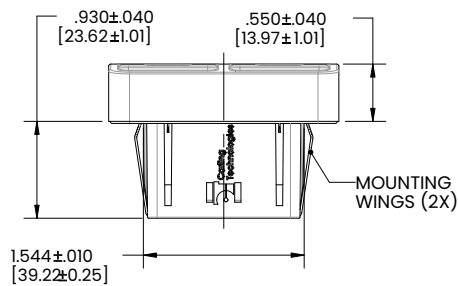
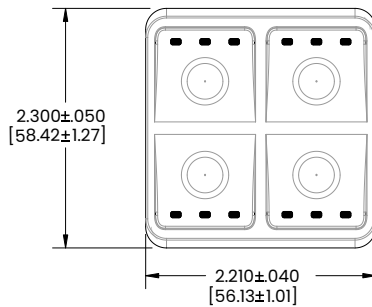
Note:

¹ Non-noted Function Light Codes cannot be used unless certain commercial requirements are met, please contact factory to provide information regarding your business opportunity.

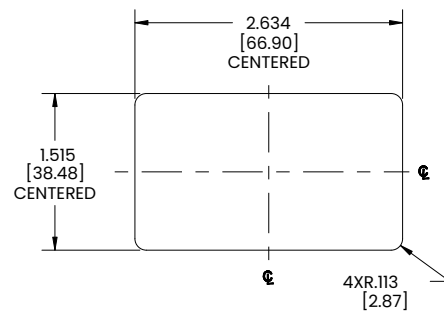
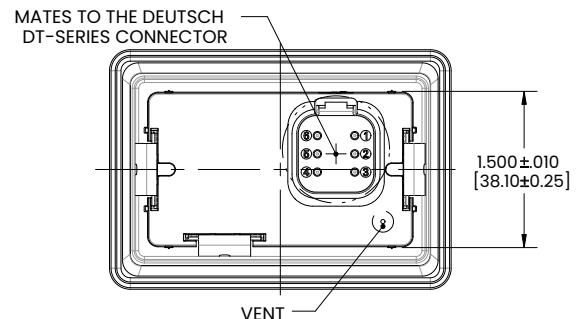
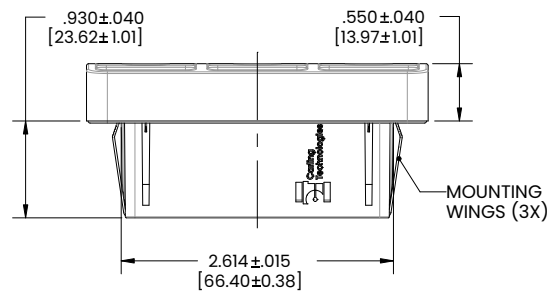
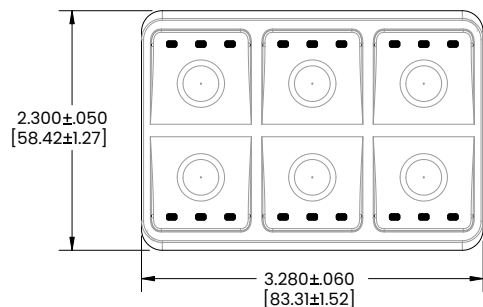
Dimensional Specs

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.



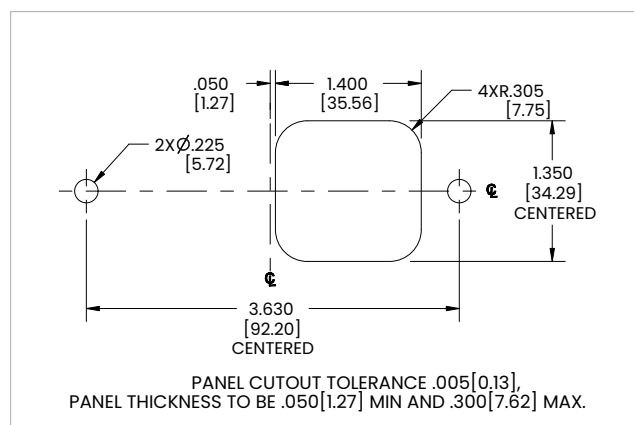
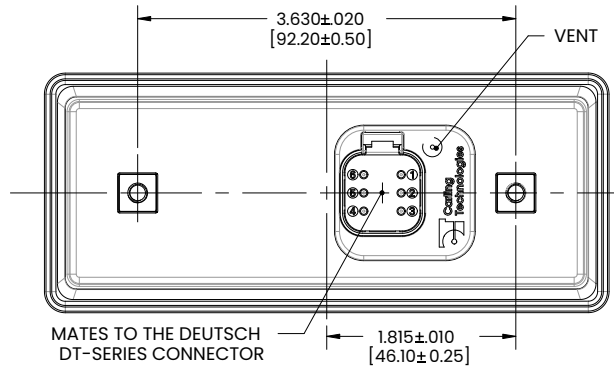
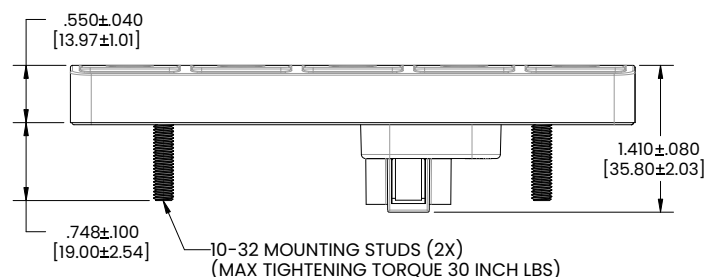
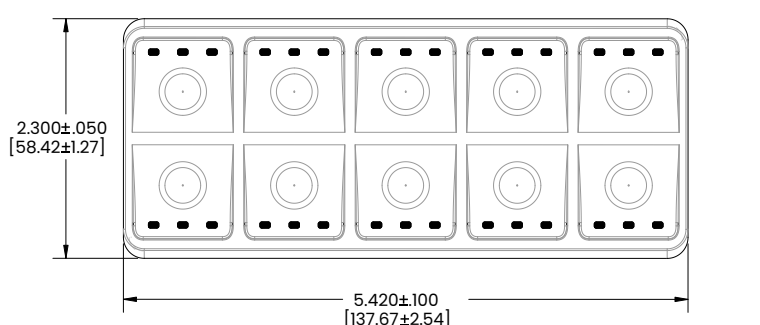
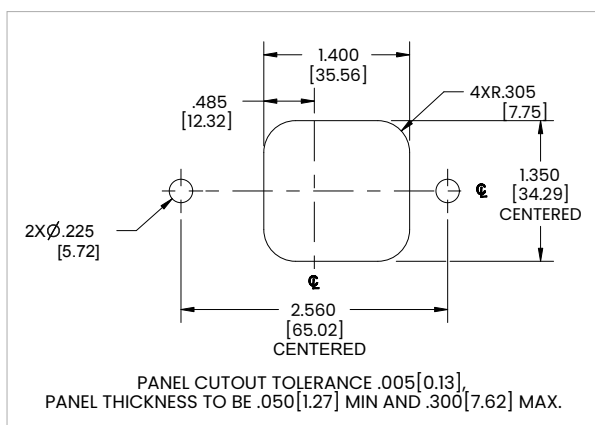
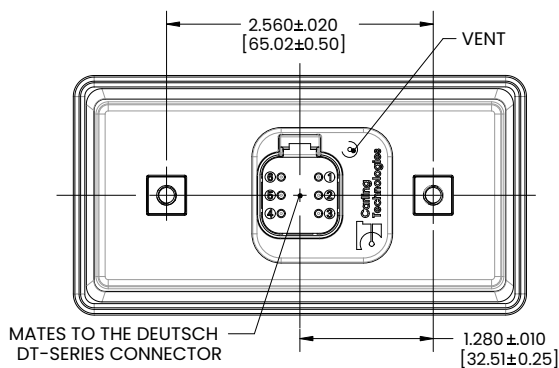
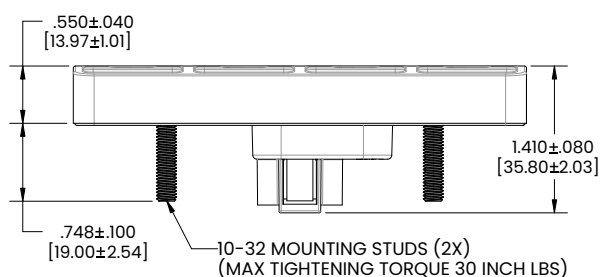
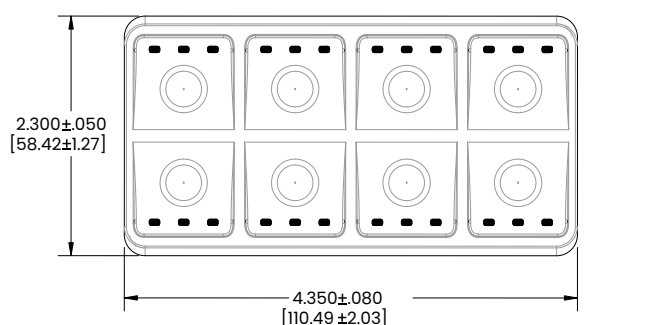
PANEL CUTOUT TOLERANCE .005[0.13],
PANEL THICKNESS TO BE .080[2.03] MIN AND .130[3.30] MAX.

Notes:

1. Do not puncture or plug the vent

inches [millimeters]

2x4 and 2x5 Configurations



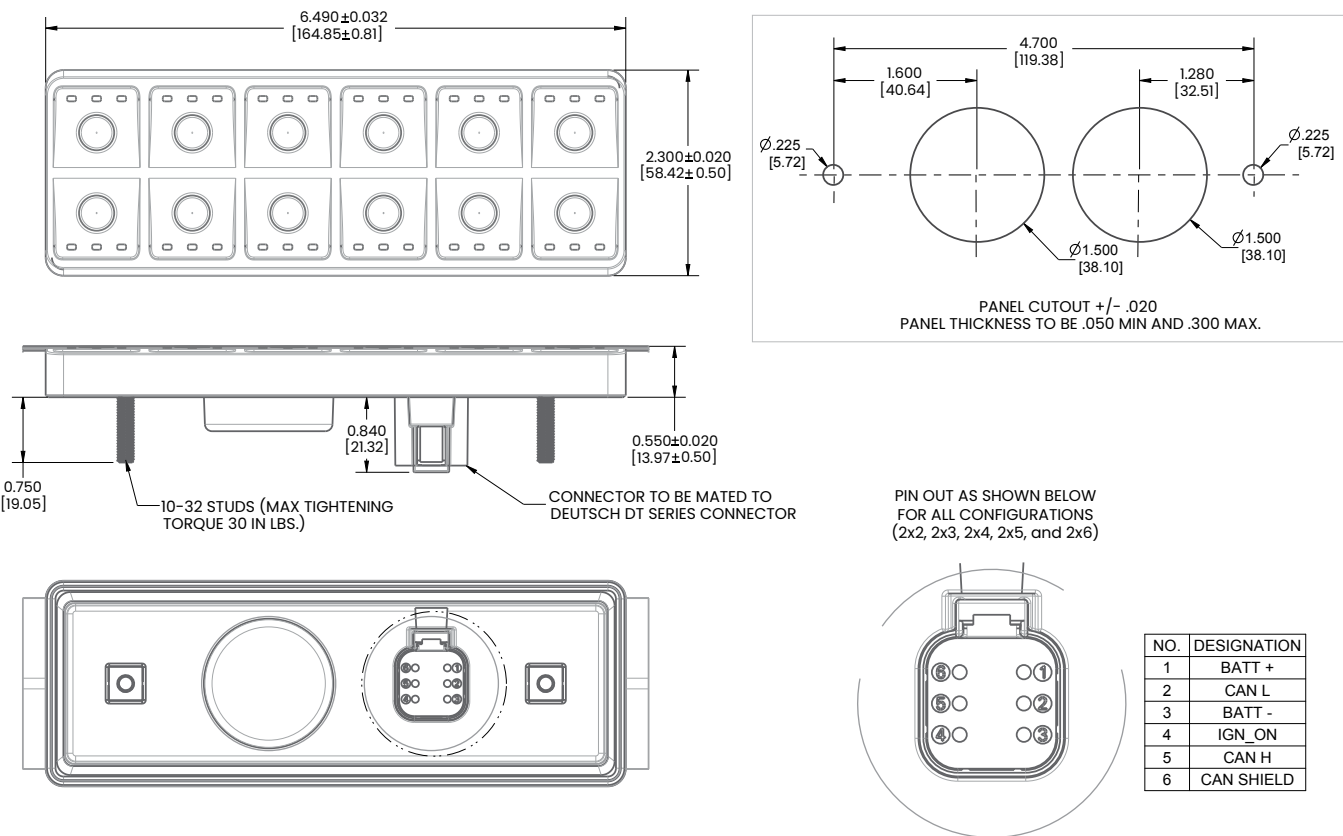
Notes:

1. 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 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 IEC 60068-2-1: Cold Soak IEC 60068-2-2: Heat Soak IEC 60068-2-14: Cycling/Shock
Solar Radiation	IEC 60068-2-5, procedure B, Irradiation: 1120W/m ² , 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 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 (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 ² . Apply 90m/s ² at resonance point for 1h at Z axis and 0.5h at X/Y axis. Sinusoidal Vibration: IEC 60068-2-6, 5Hz~200Hz with amplitude 100m/s ² for 4h at Z axis and 2h at X/Y axis. 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 ² 11 milliseconds. IEC 60068-2-29, Bump 400 m/s ² 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:

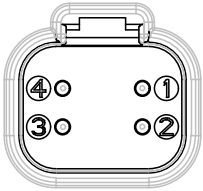
www.carlingtech.com/sites/default/files/documents/ukp-series_interface.pdf

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

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

4. KEYPAD COLOR

1 Black

5. BACKLIGHT

A White

6. FUNCTION LIGHT COLOR

B Amber	D Red
C Green	E Blue

7. NON-ILLUMINATED IMAGE COLOR

A White

8. NETWORK TYPE

J J1939 (250K Baud Rate)
K J1939 (500K Baud Rate)

9. SOURCE ADDRESS ¹

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:

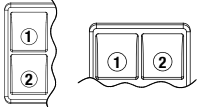
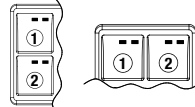
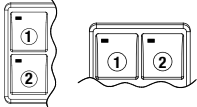
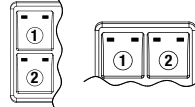
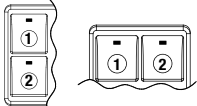
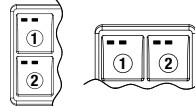
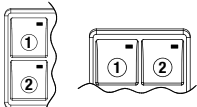
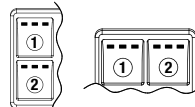
- Default Source Address is 128.
- Source Address to be defined as the Decimal Value in the Ordering Scheme, unit will be programmed with Source Address as a Hexadecimal value when delivered.

[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.)

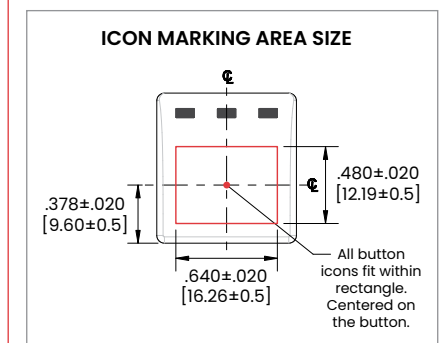
Button 1 2 RS Function Icon Code	Button 2 2 RA Function Icon Code	Button 3 3 UV Function Icon Code	Button 4 3 UW Function Icon Code	Button 5 6 MT Function Icon Code	Button 6 8 UB Function Icon Code
Button 7 8 NN Function Icon Code	Button 8 8 PU Function Icon Code	Button 9 5 PR Function Icon Code	Button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

FUNCTION LIGHT CODE

1 No Function Light 	5 Closed-Open-Open 
2 Open-Closed-Closed 	6 Open-Closed-Open 
3 Closed-Open-Closed 	7 Open-Open-Closed 
4 Closed-Closed-Open 	8 Open-Open-Open 

ICON CODE

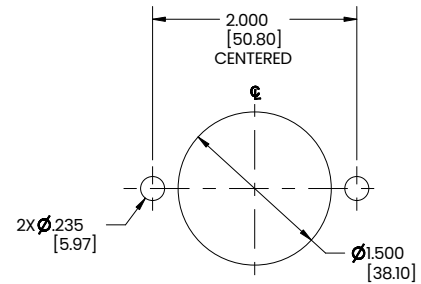
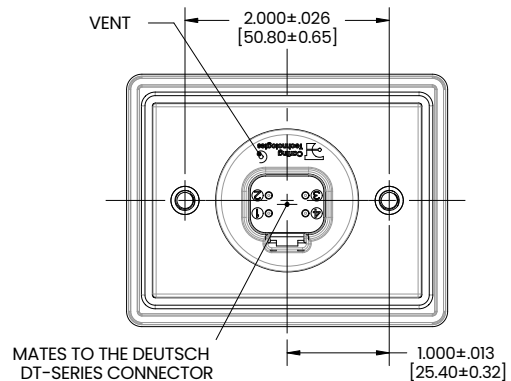
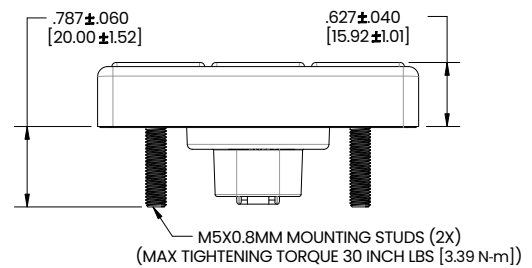
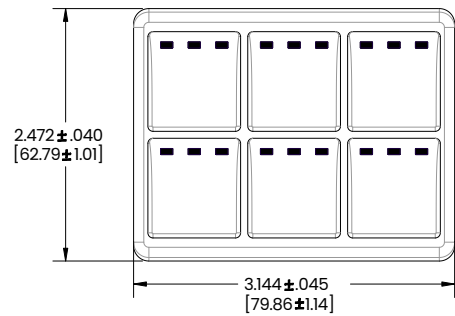
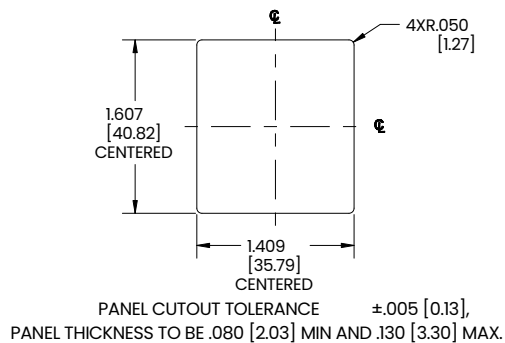
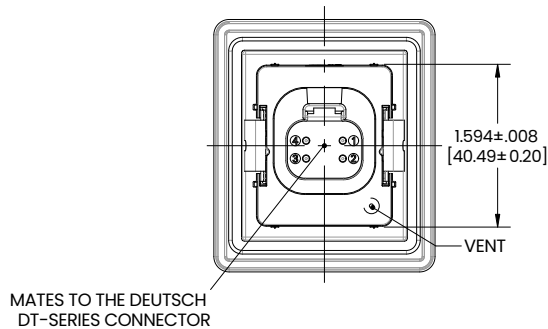
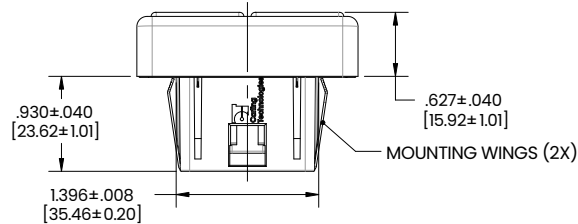
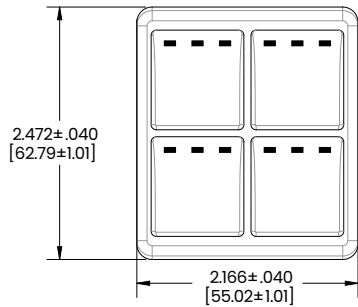
00 For standard icons, see Standard Legends Code page.
For additional icons, please consult factory.



Dimensional Specs

inches [millimeters]

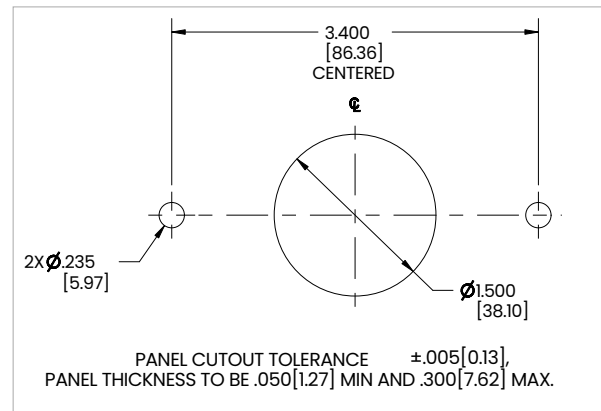
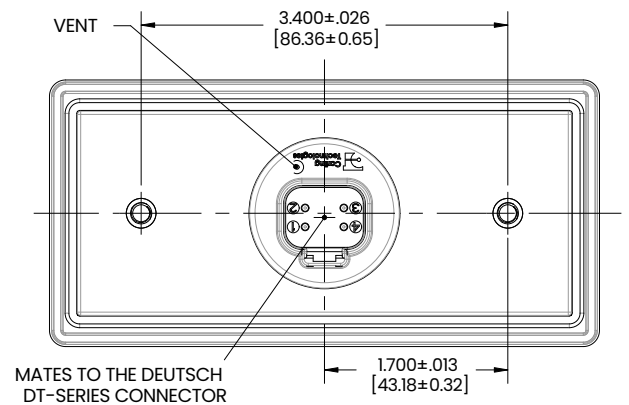
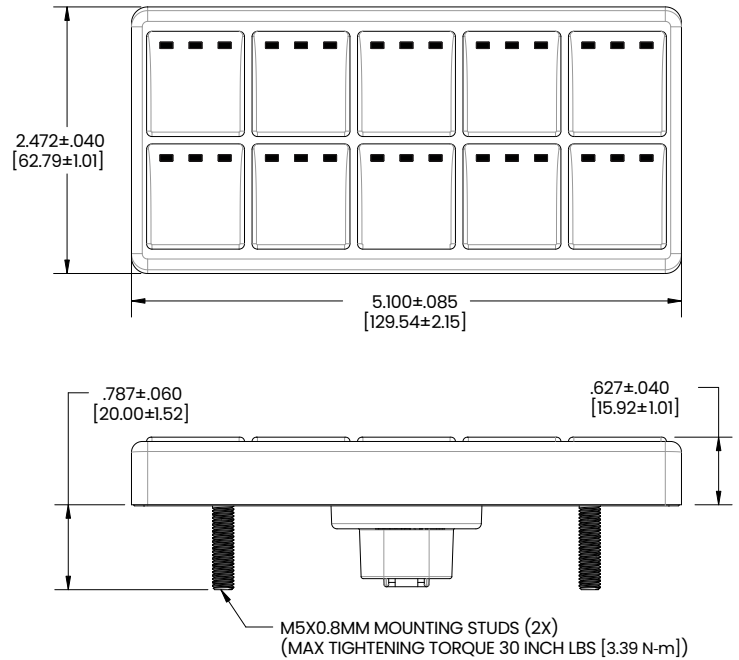
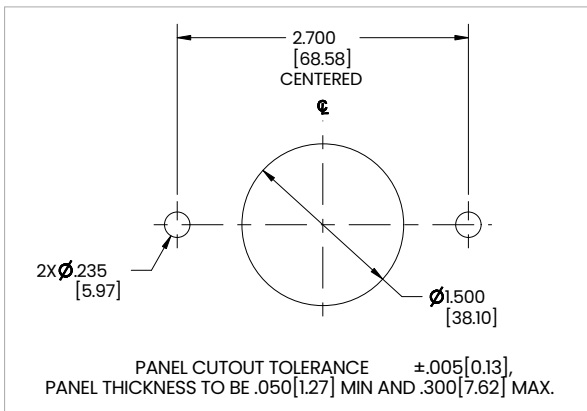
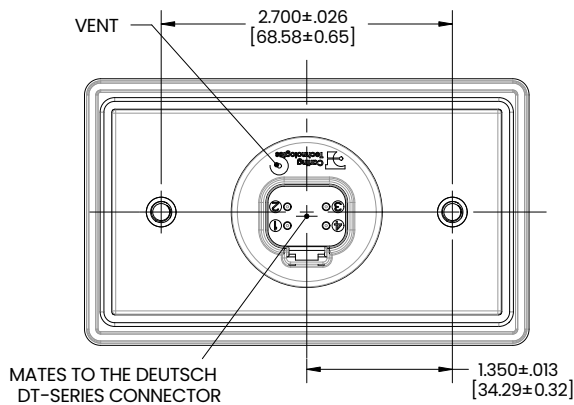
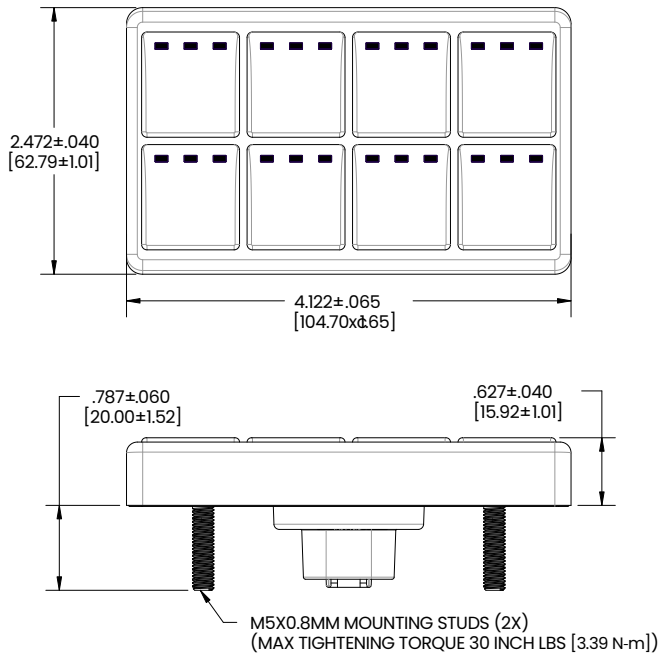
2x2 and 2x3 Configurations



Dimensional Specs

inches [millimeters]

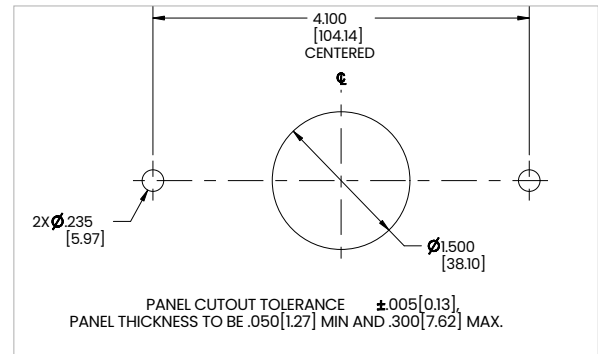
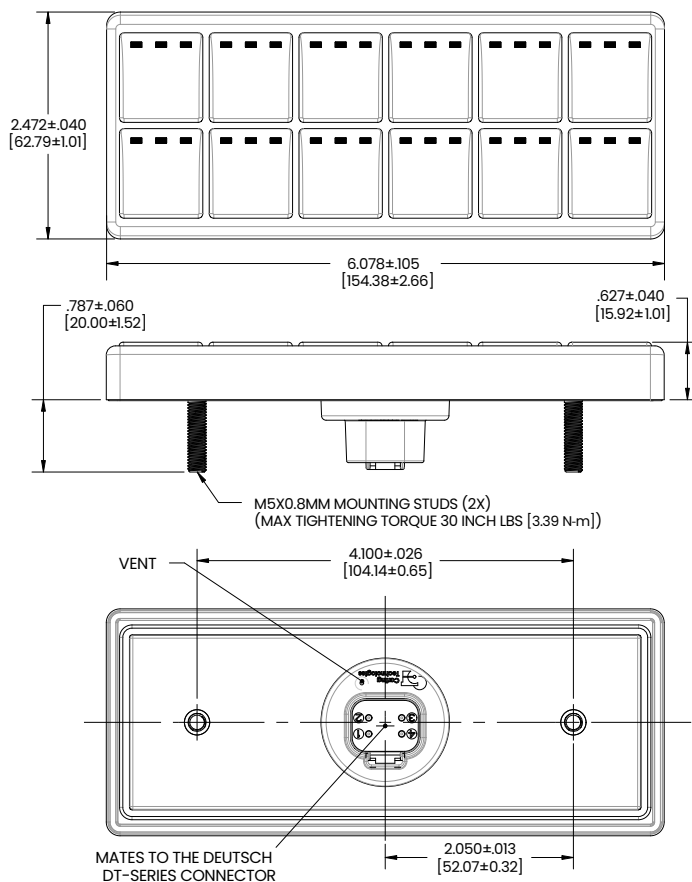
2x4 and 2x5 Configurations



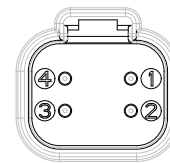
Dimensional Specs

inches [millimeters]

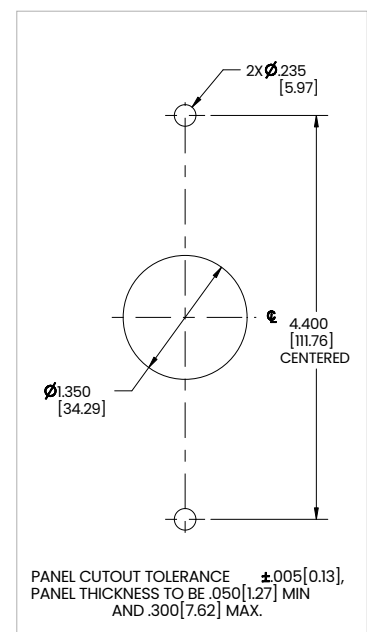
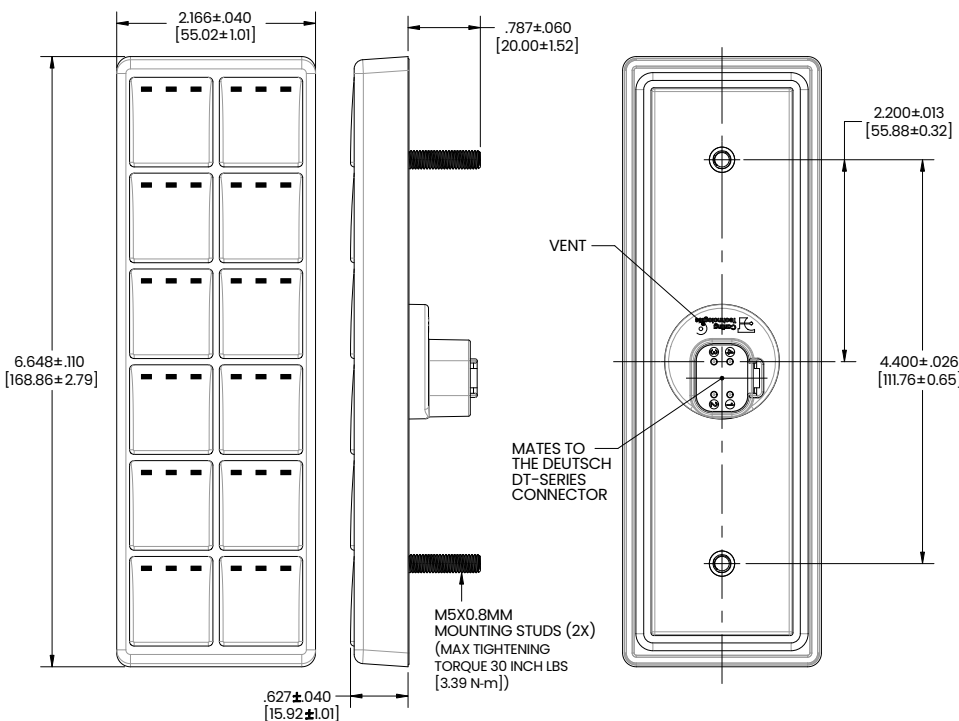
2x6 and 6x2 Configurations



PIN OUT AS SHOWN BELOW



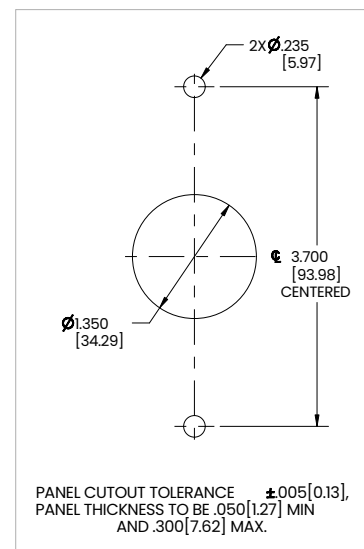
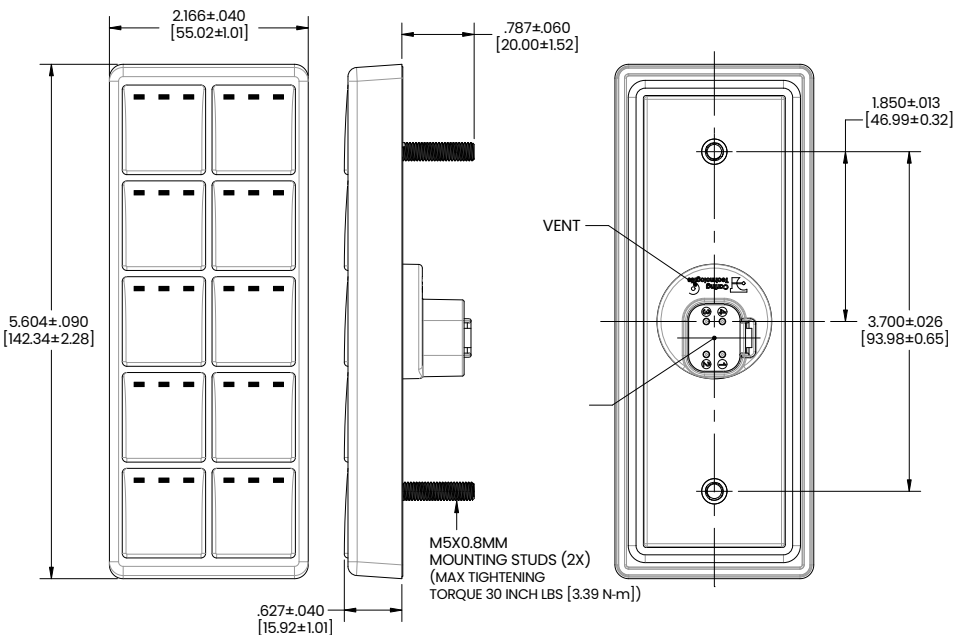
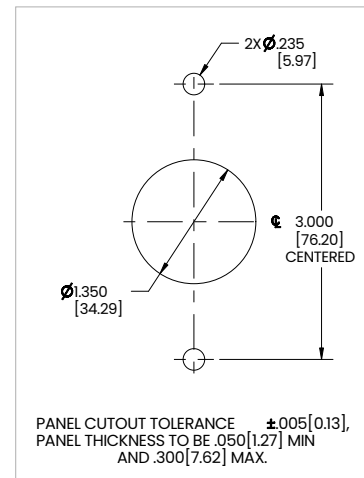
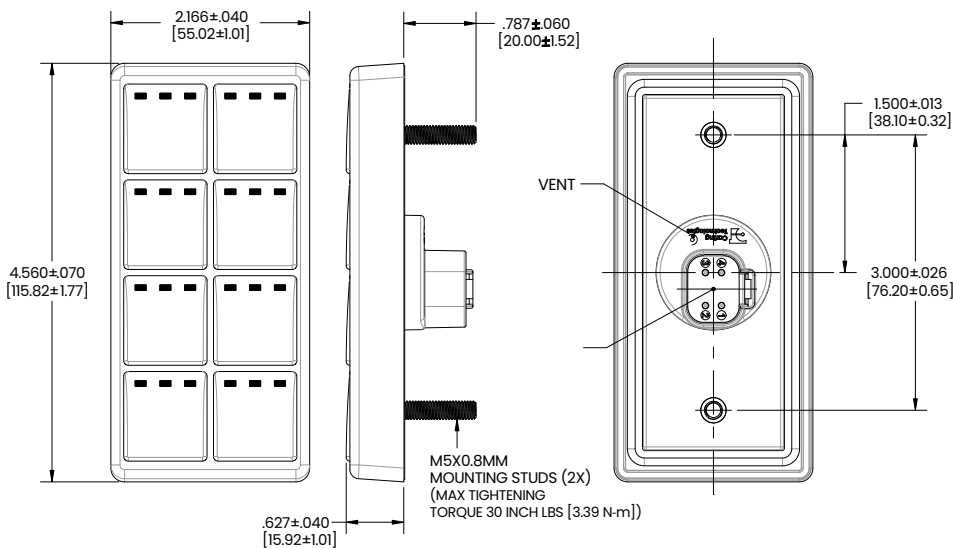
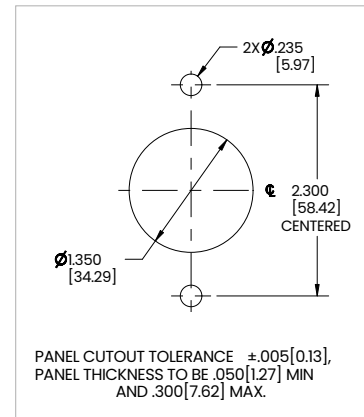
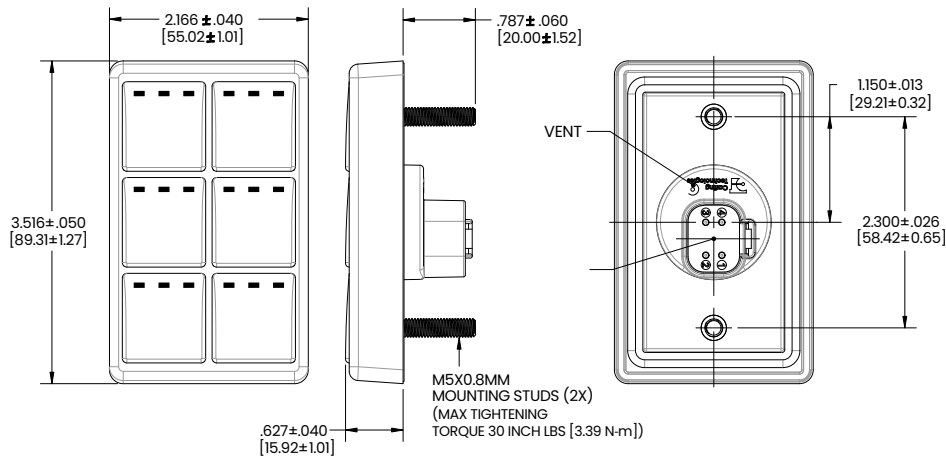
NO.	DESIGNATION
1	POWER
2	GROUND
3	CAN H
4	CAN L



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	Keypad Buttons: Up to 500,000 cycles Knob Push: Up to 500,000 cycles Knob Directional Joystick: Up to 500,000 cycles in each of four directions Knob Rotation: 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

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

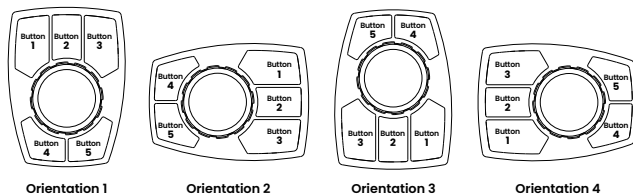
A 5 Buttons

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 ¹

- | | |
|----------------|-----------------|
| 0 None | C Yellow |
| A White | D Blue |
| B Green | E Red |

9. COMMUNICATION PROTOCOL

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

10. SOURCE ADDRESS ²

000 A Unique Number from 000 to 248

11, 12, 13, 14, 15. LEGENDS - BUTTONS 1 TO 5 ^{3, 4}

- 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

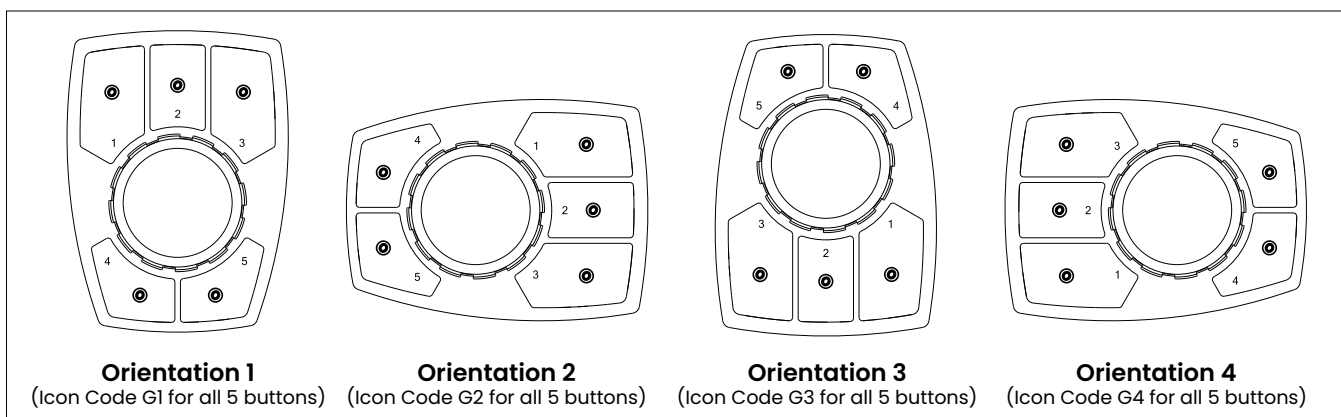
For additional legends, please consult factory

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

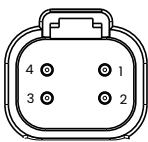
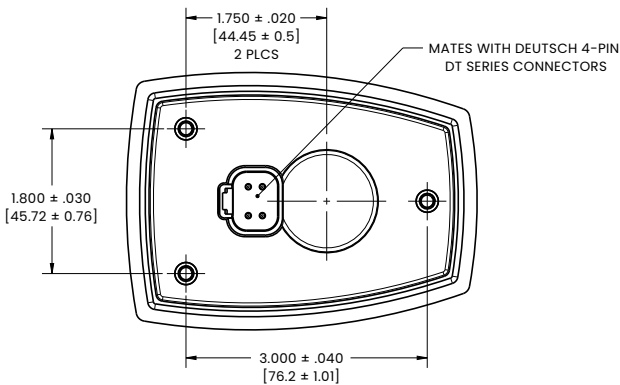
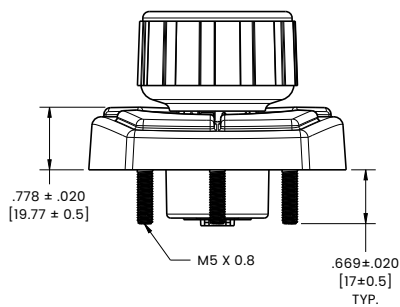
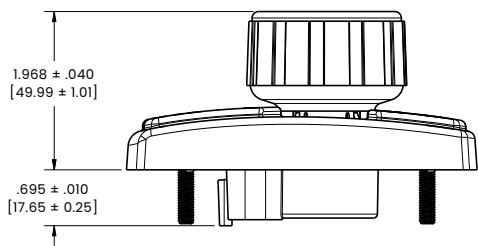
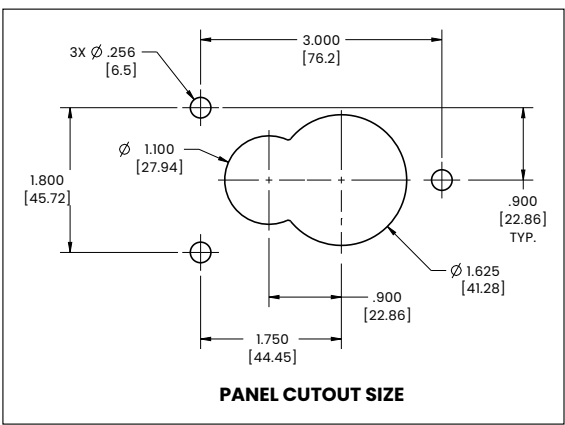
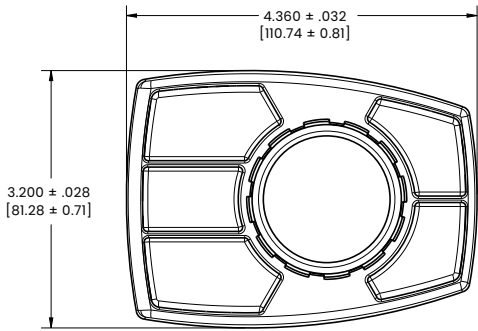
[Configure Complete Part Number >](#)

Legend/Button Orientation



Dimensional Specs

inches [millimeters]



PIN OUT AS SHOWN

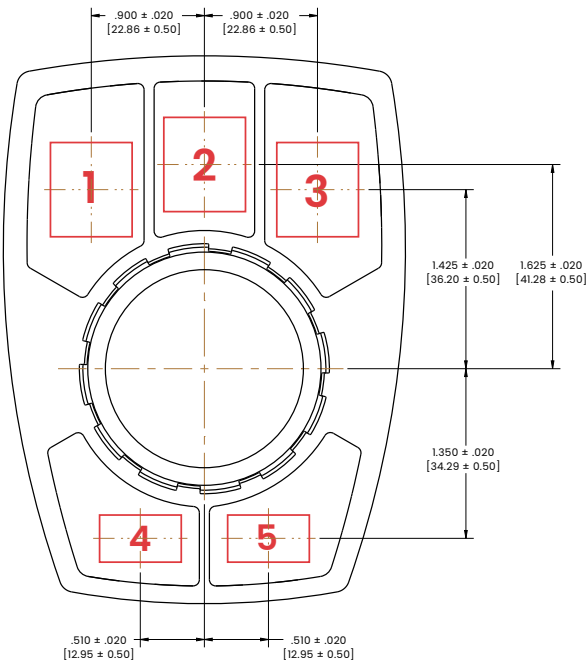
PIN NO.	DESIGNATION
1	POWER
2	GND
3	CAN H
4	CAN L

Legend Marking Area

	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

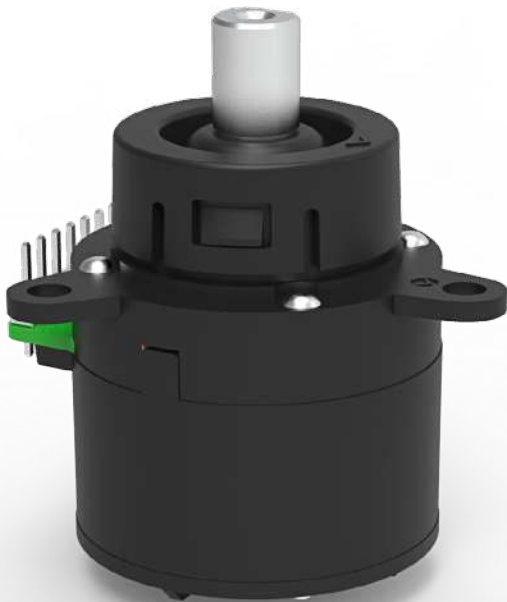


CRS-Series

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	Rotary; 500,000 cycles of one full rotation Push-button; 500,000 cycles Joystick; 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 Housing: Nylon Base: Nylon Bottom Cover: Nylon Seal: Silicone Shaft: Stainless steel Pin Out Terminal: Brass, gold plated Dome Contact: Stainless steel 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

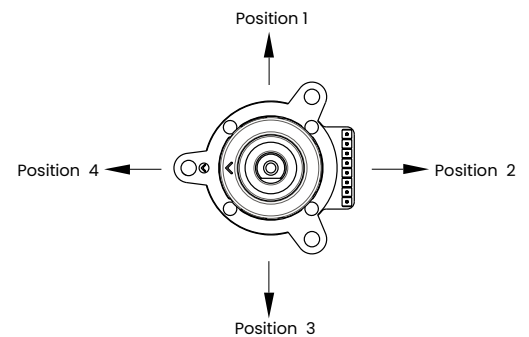
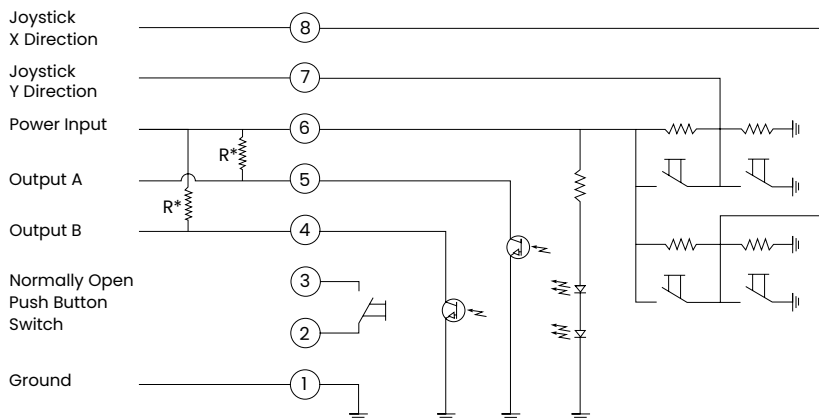
Joystick				
Operating Voltage (VDC)	Maximum Supply Current (MA)	"Neutral" Logic Output (VDC)	"High" Logic Output (VDC)	"Low" Logic Output (VDC)
5.00 ± .25	0.6	2.5 ± 0.5	>4.5	<0.5
3.30 ± .25	0.4	1.65 ± 0.2	>= 3	<0.5

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		●

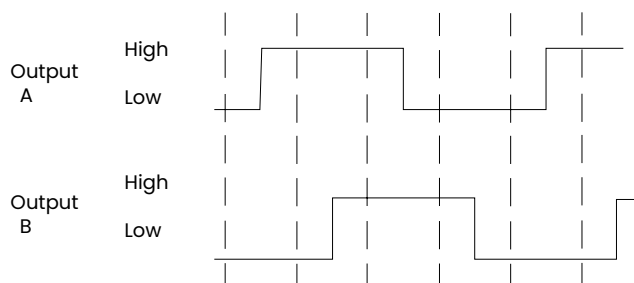
• Indicates logic high; blank indicates logic low.
Code repeats every 4 positions

Circuit Schematic & Joystick Operation



External Pull-up Resistors Required for Operation (2.2K Ω) When Operating Power is 5.0VDC
External Pull-up Resistors Required for Operation (3.0K Ω) 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

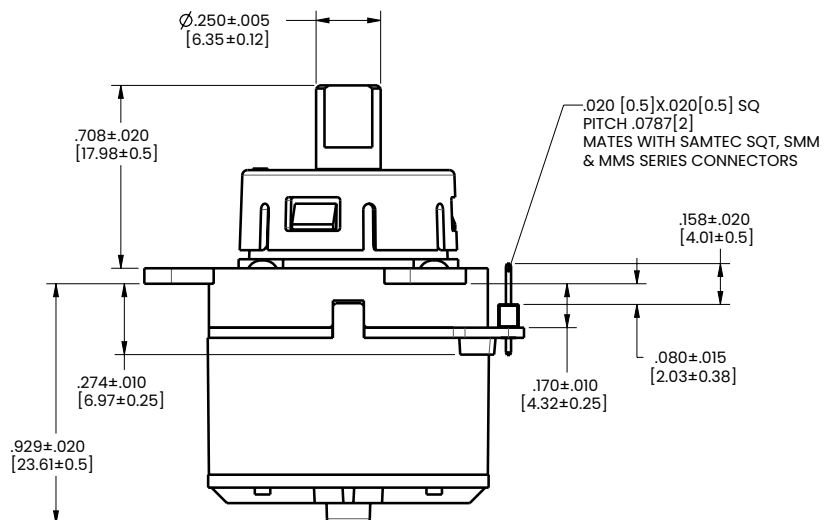
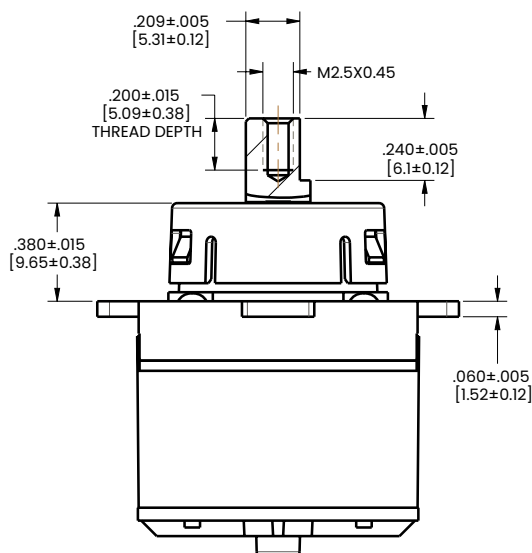
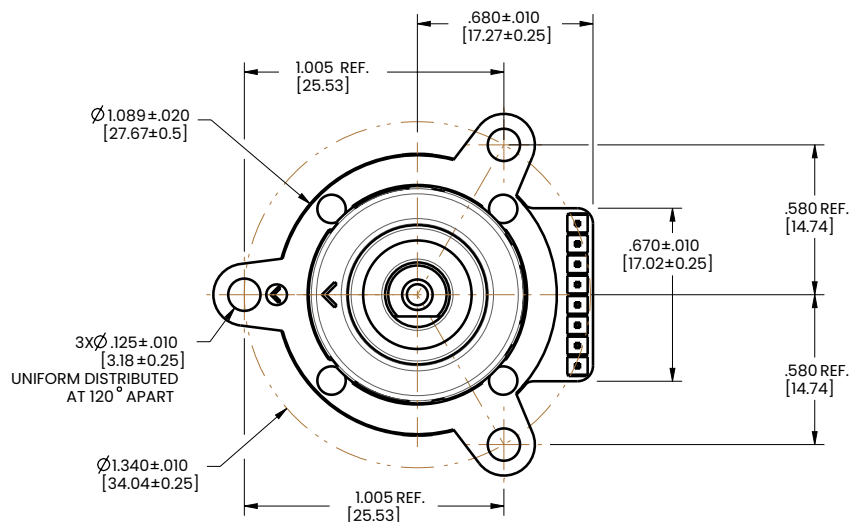
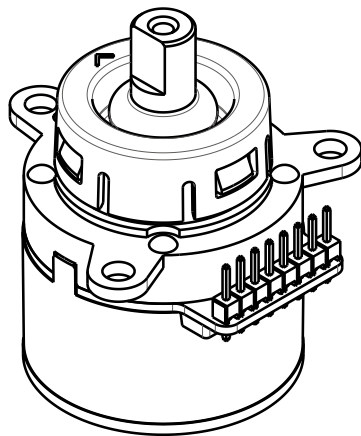
- 1 5.0VDC
- 2 3.3VDC

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

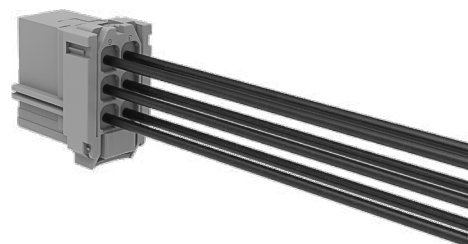
Two LIN connectors: 1 to Controller Module and 1 for Daisy Chaining.



Carling Part Number:
MPU-00000010

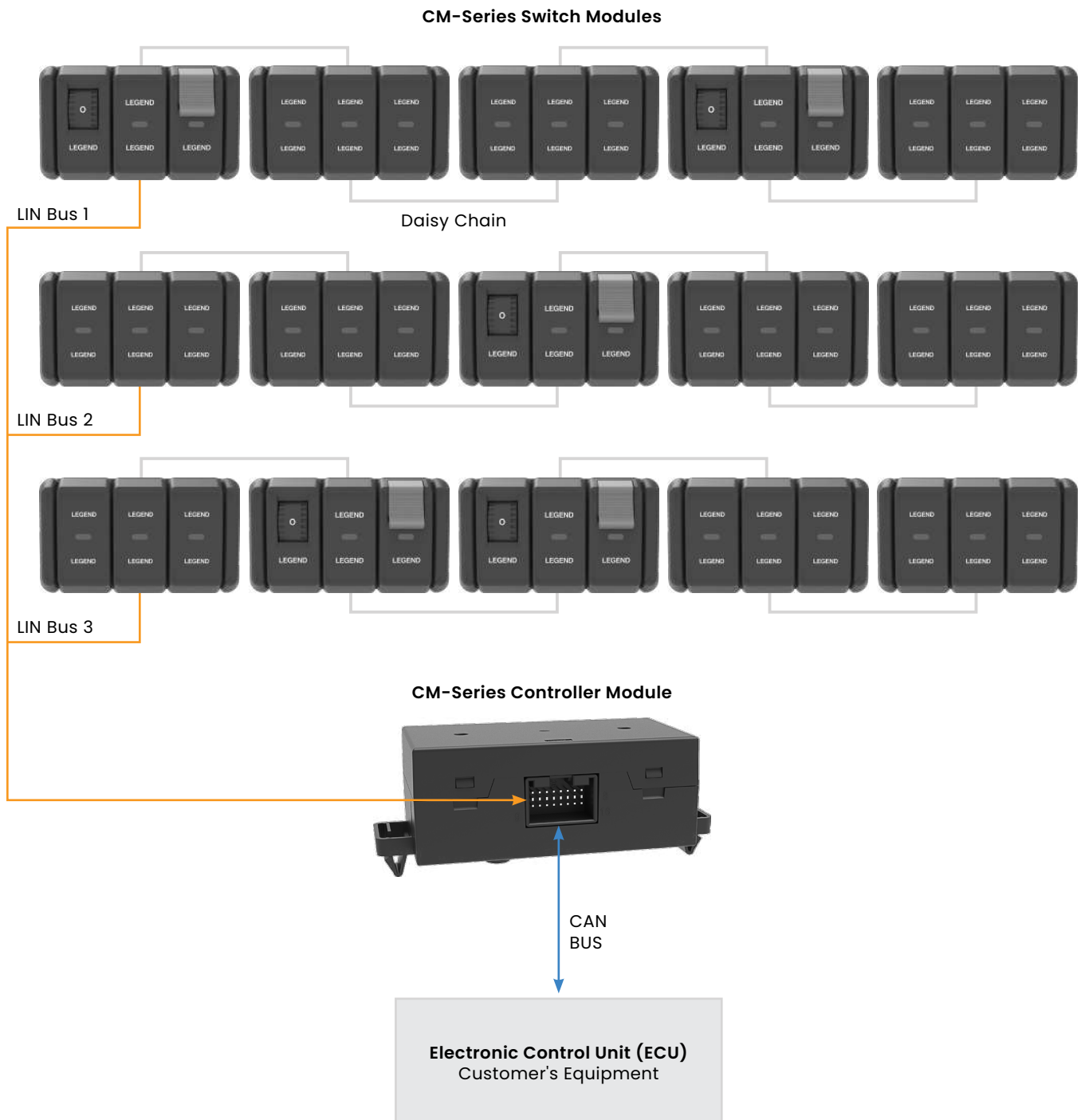
HARDWIRE CONNECTOR

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 HW Switch = 5 to 32VDC
Electrical Rating	HW Switch = 5mA to 10A at 24VDC
Sleep Current	Switch = 90uA per switch Controller module = 550uA
Electrical Endurance	LIN Switch = 80k operations, resistive load 25uA, 24 VDC HW Switch = 80k operations, resistive load 10mA, 24 VDC HW Switch = 80k operations, resistive load 10A, 24VDC HW Switch = 100k operations, inductive load 10A, 24 VDC HW Switch = 100k operations, electronics load 5mA, 24 VDC 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 ISO 7637-2 transient immunity on supply lines pulses 1, 2a, 2b, 3a, 3b, 4 ISO 7637-3 transient immunity on signal leads Frequency emission on power supply and signal leads from 0.15 to 108 MHz.
EMC – Radiated	BCI per ISO 11452-4 at 100mA Broadband radiated emissions per ECE-R10 annex 7 Narrowband radiated emissions per ECE-R10 annex 8

Damp Heat Test	IEC 60069-2-30, 6 cycles, -40°C to +70°C, 90%RH
Composite Temp/Humidity Test	IEC 60068-2-38, -40°C to +70°C, >90%RH
Low Temperature	IEC 60068-2-1 test A, -40°C, 72 Hours non-operational, 24 hours operational
Thermal Shock	IEC 6008-2-14 test Na, -40°C to +70°C, 20 cycles, 2-hour exposure
Sunlight (UV Aging)	ISO 4892-3, 8-hour dry UV at 70°C, 4-hour condensation no UV at 50°C, 25 cycles
Temperature Cycling	IEC 60068-2-14 test Nb, -40°C to +70°C, 10 cycles, 2-hour exposure

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

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	2	3
SP	SP	Pole	DP
LIN	LIN	1 2	HW
Only	& HW	Lin HW	& LIN
16	26	ON	OFF
17	27	ON	OFF
18	28	(ON)	OFF
Special Circuits			
40	50	OFF	2&3
41	51	ON	OFF
42	52	(ON)	OFF
44	54	ON	2&3
48	58	None	OFF
49	59	None	OFF
	76	None	4 & 5
	77	None	4 & 5
	C4	(1&2, 4&5)	OFF

3. ILLUMINATION

Lamp #	Illumination Type	Lamp #	Illumination Type
S	None	E	1
A	1	3	Independent
B	3	1	Independent
C	1	2	Independent
D	2	3	Independent
	3		Independent

4,5. LAMP 1 AND/OR LAMP 2 4,7

No Lamp	0
LED	Red
12VDC	A
	Amber
	C
	Green
	H
	Blue
	2
	White
	6

6. LAMP 3 OR LOCK OPTION 4,7

No Lamp	0
Lock Option	W
LED	Red
12VDC	A
	Amber
	C
	Green
	H
	Blue
	2
	White
	6

7. ACTUATOR STYLE AND COLOR 3

Style	Black	Red
Rocker - Laser Etched	A	D
Locking Rocker - Laser Etched	P	R

8. IMAGE 1 COLOR 1

Z	No Image
2	White
Image Location	1 2 3

9. IMAGE 2 COLOR 1

Z	No Image
1	Clear
Image Location	1 2 3

10. IMAGE 3 COLOR OR LOCK FUNCTION & COLOR 2

Image 3 Color	
Z	No Image
2	White
Image Location	1 2 3
Actuator Lock Function & Color	
Lock in 0 POS	Lock Color
H	Match Actuator
L	Red
M	Orange

11. LEGEND - IMAGE 1

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

12. LEGEND ORIENTATION

0	No legend
1	Orientation 1
2	Orientation 2
3	Orientation 3
4	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
A	Drive
B	Drive
C	Entry
D	Entry

Notes:

- If LIN switch only, rating is 12VDC Max.
If LIN & hardware, hardware 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.
- Non-existing LED combinations cannot be created unless certain commercial requirements are met, factory may contact you to advise of these requirements for setting up new LED combinations or to suggest alternatives.

[Configure Complete Part Number >](#)

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	0					
LED	<u>Red</u>	<u>Amber</u>	<u>Green</u>	<u>Blue</u>	<u>White</u>	
12VDC	C	N	H	A	6	

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

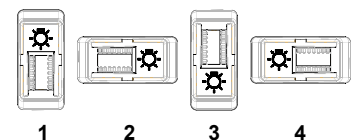
Color	Style
A Black	Painted, Laser-Etched

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
A	Drive	No Wake
C	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

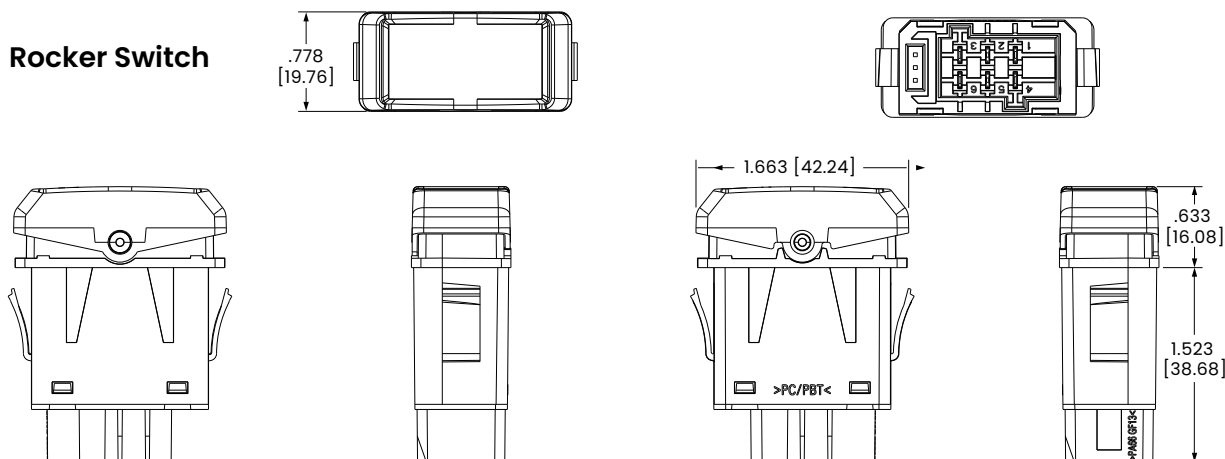
The Controller Module translates the LIN to CAN for communication with the rest of the vehicle's system.



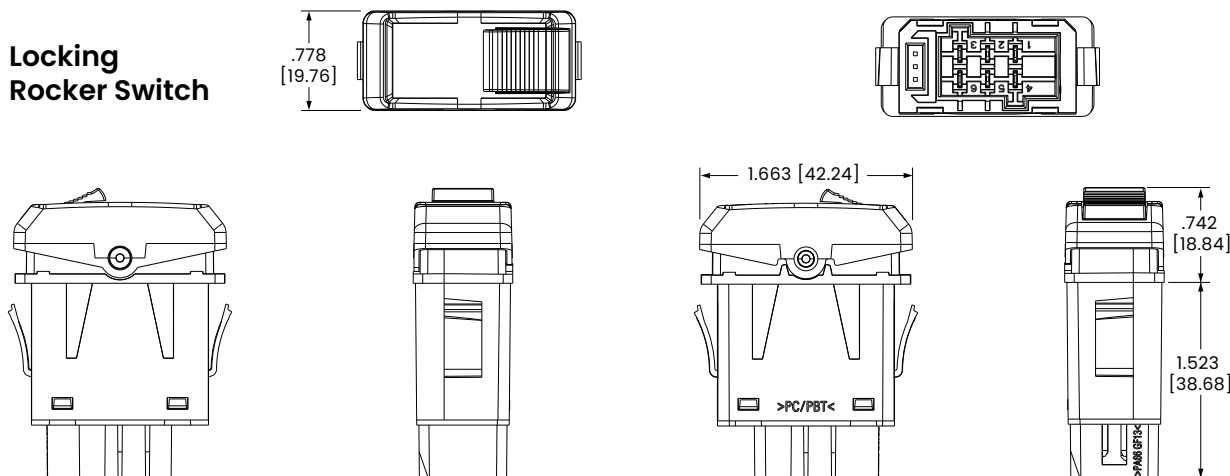
Dimensional Specs

inches [millimeters]

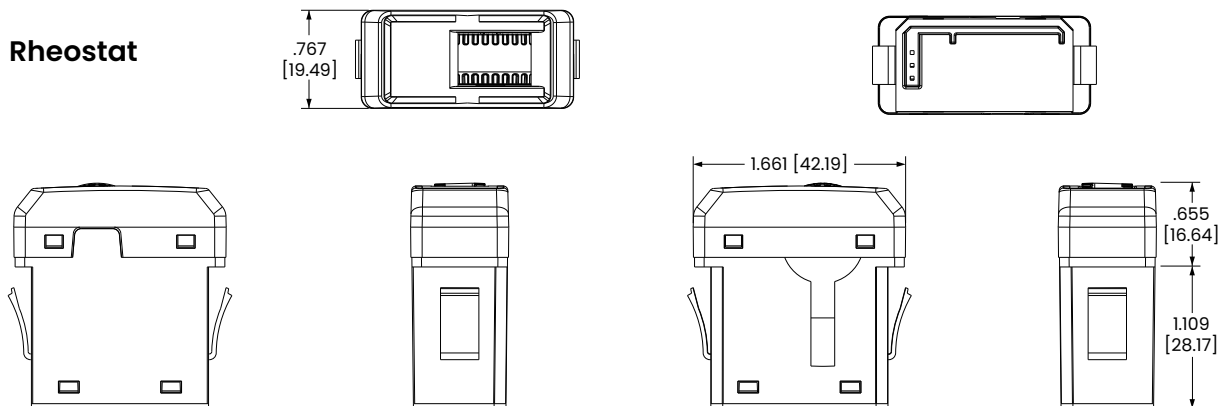
Rocker Switch



Locking Rocker Switch



Rheostat



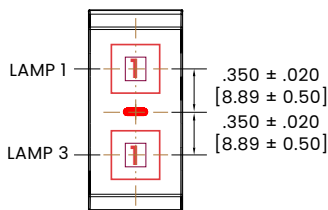
Legend Marking Area

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

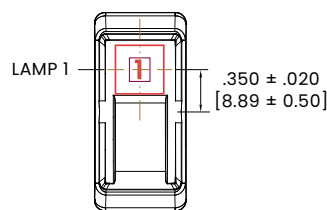


Icon marking area and location
Unless otherwise specified, icon size and location
should follow this drawing and is applicable to all
4 orientations

Rocker Switch



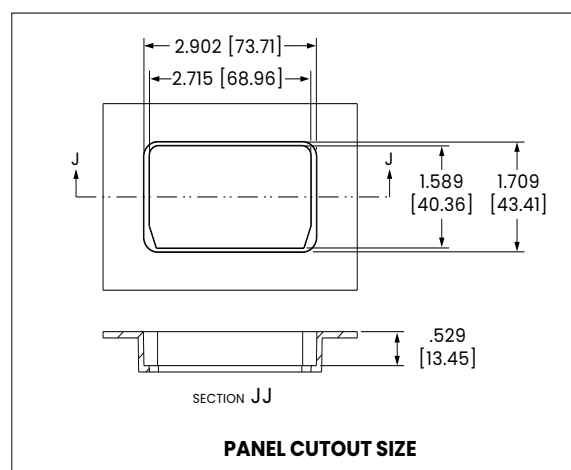
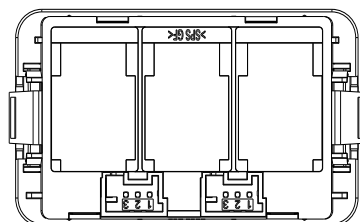
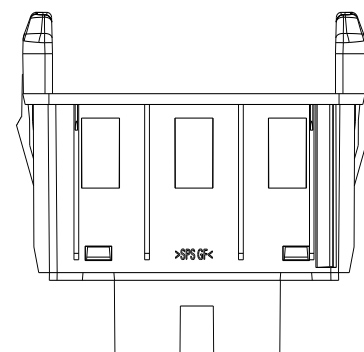
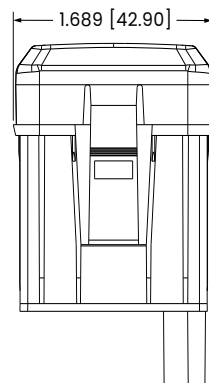
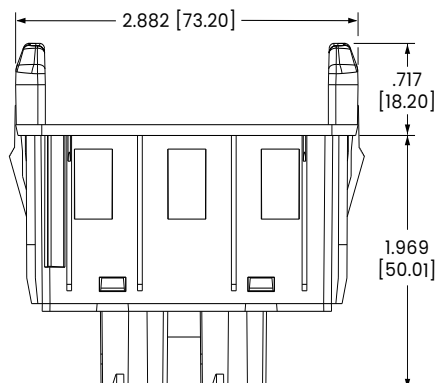
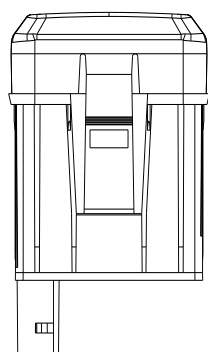
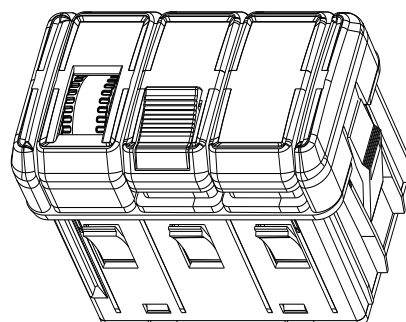
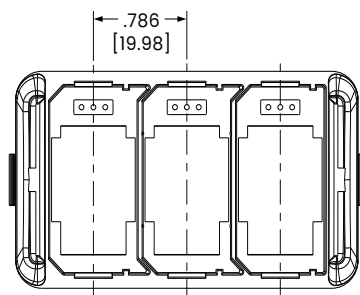
Locking Rocker Switch



Dimensional Specs

inches [millimeters]

Carrier



inches [millimeters]

59.

Circuit Diagrams

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

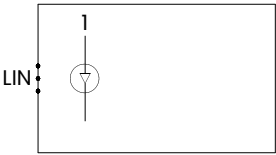
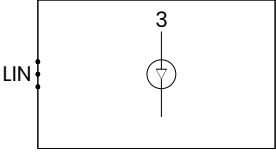
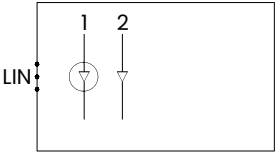
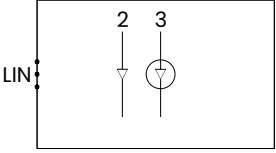
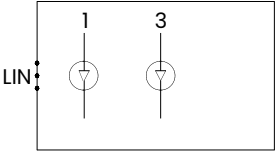
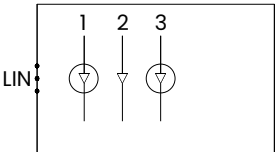
Circuit Code	CIRCUIT DIAGRAM
43	
44	
45	
46	
47	
48	
49	
50	
51	

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 (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

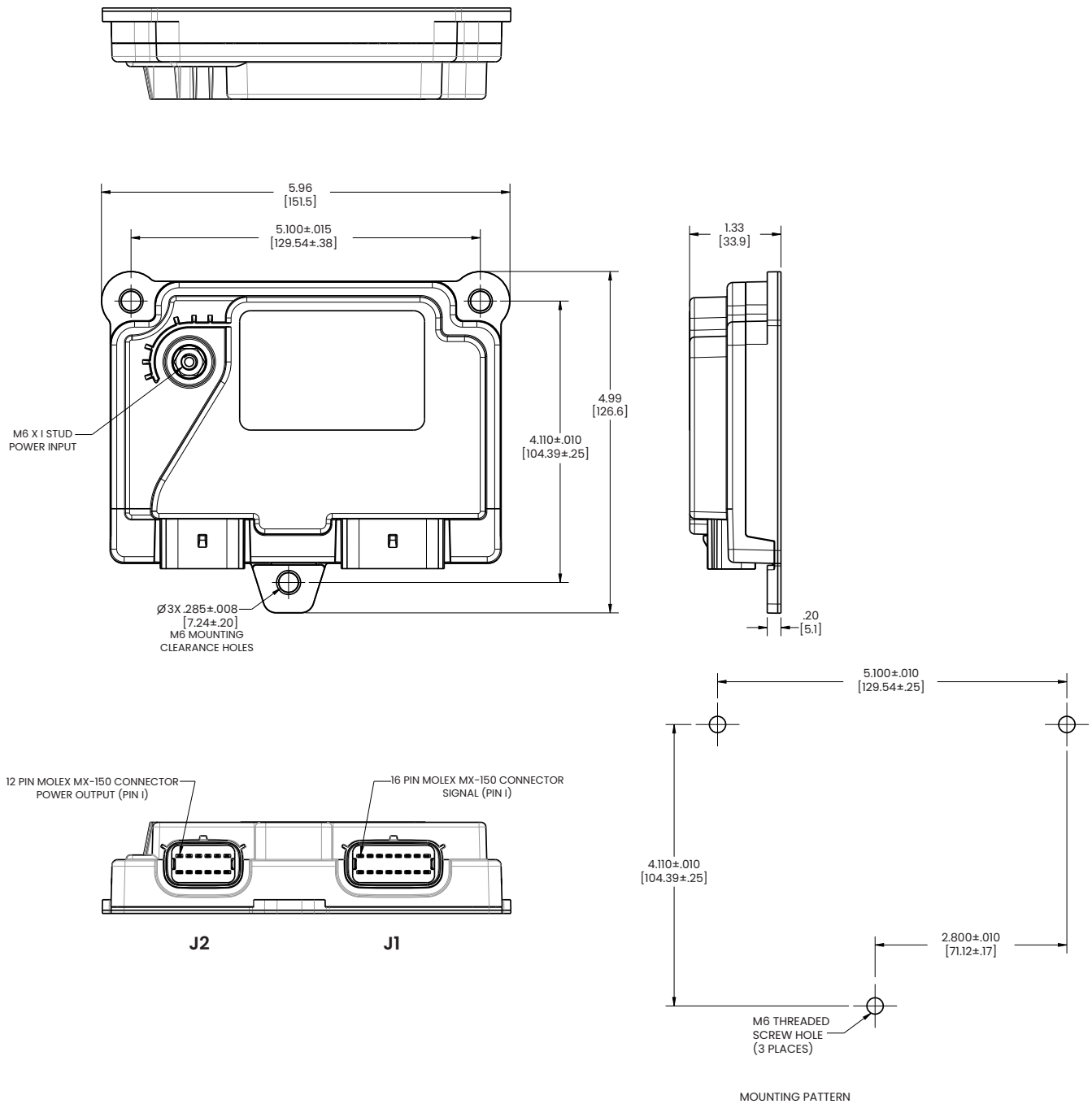
Transient Immunity	ISO 11451-1 & 11452-2
Transient Emissions	ISO 13766, Section 5 Annex D And Annex E
Conducted Transients	ISO 7637-2, Annex A
Electrostatic Discharge (ESD)	ISO 13766 & ISO 10605

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 (Operational)	IEC 60068-2-14, Test Nb
Temp. Shock (Storage)	IEC 60068-2-14, Test Na
Simulated Solar Radiation	IEC 60068-2-5, Procedure B
Altitude (Transport)	IEC 60068-2-13
Altitude (Operational)	IEC 60068-2-13, Test M: 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 (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 Search)	IEC 60068-2-6
Chemical Resistance	IEC 60068-2-74, Test Class B (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.

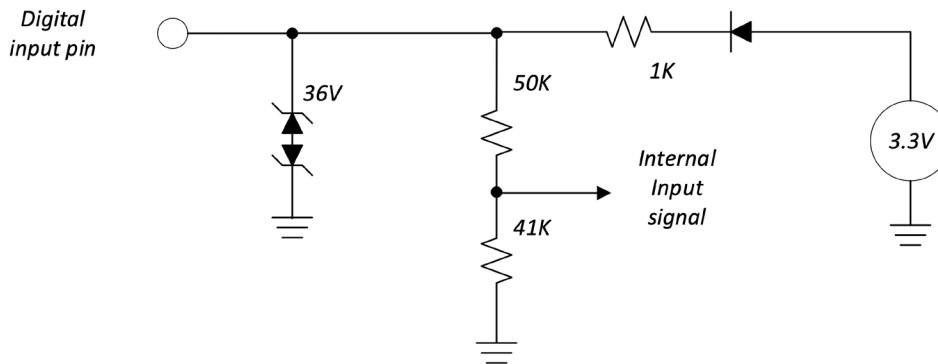
The IND_4_WKE pin is a special case. When the CLTM12-S is in sleep mode this pin serves as a means of waking the CLTM12-S from sleep when a low to high logic transition is detected.

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:

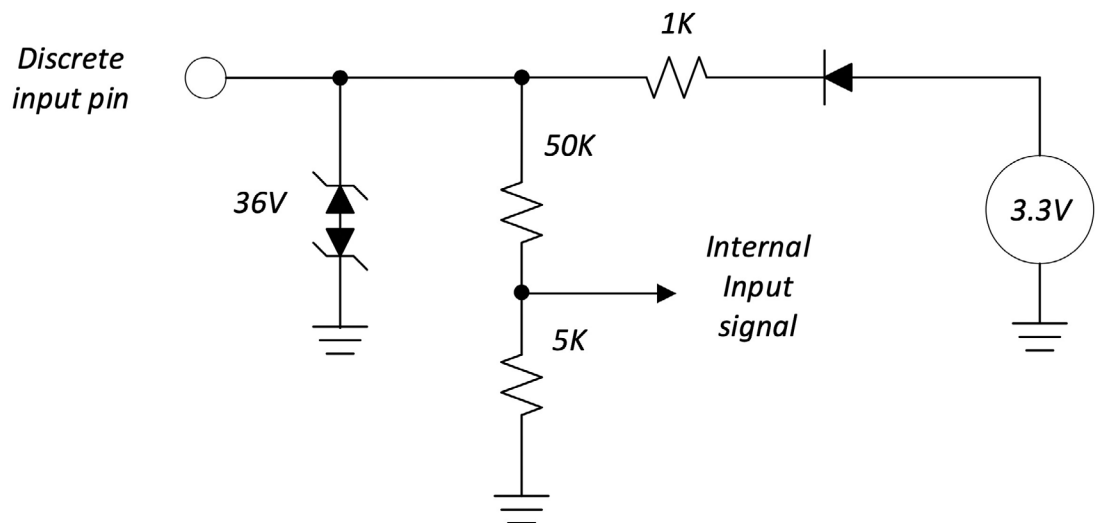
Open = 1.51 to 4.31V

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)

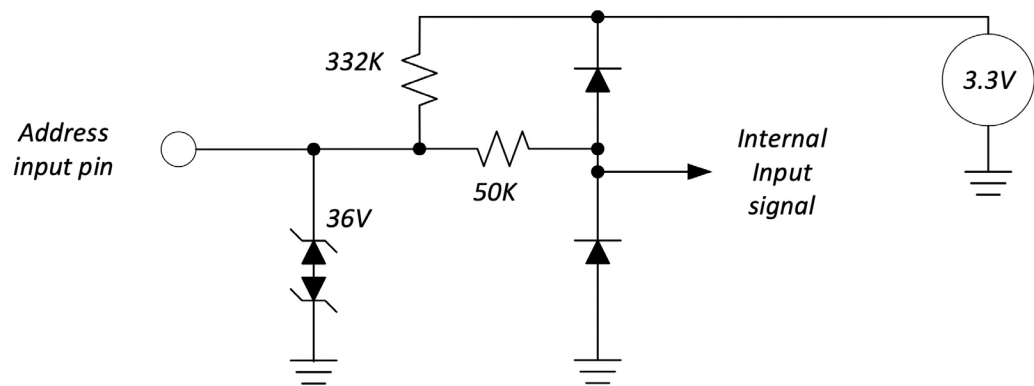
Open circuit voltage = 3.3V
Input resistance > 50K Ohms
Low = below 0.72V
High = above 1.65V

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.

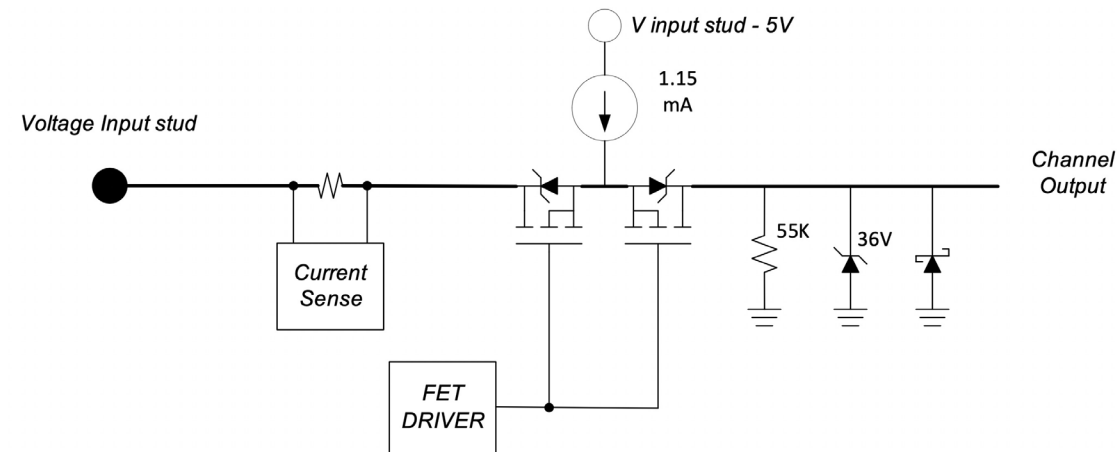
5A	Channels 3 (J2 pin 11), 6 (J2 pin 9), 9 (J2 pin 8) and 12 (J2 pin 10)
10A	Channels 1 (J2 pin 6), 2 (J2 pin 4), 4 (J2 pin 2), 5 (J2 pin 1), 7 (J2 pin 7), 8 (J2 pin 3), 10 (J2 pin 5), 11 (J2 pin 12)

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.

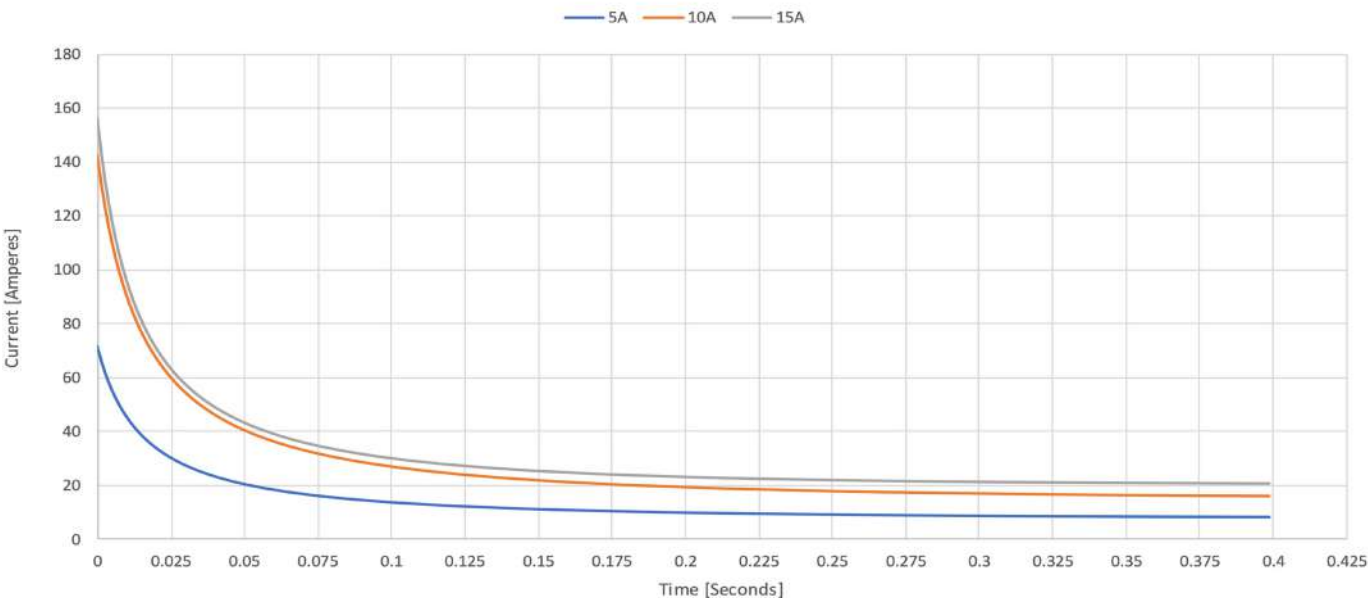
The surge allowance function is also implemented in hardware. Constant over-current levels are allowed for a time that is inversely proportional to the magnitude of overcurrent according to the following curve.

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

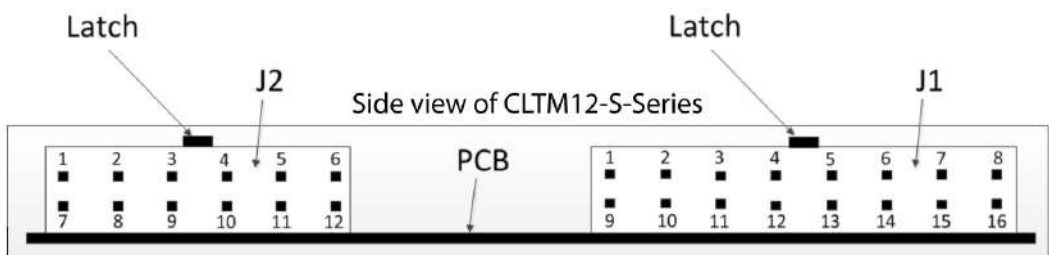
Configuration

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				
Description	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			
PGN	65226 (0x00FECA)			
Default Priority	7			
Source Address	CLT Source Address (0x31, 0x32, 0x33, 0x34)			
DLC	8			
Update Rate	1000 mS			
Direction	CLT → Network			
Start	Bits	Name	SPN	Notes
1.1	2	Protect Lamp	987	0 (00b) = Lamp off 1 (01b) = Lamp ON 2 (10b) = Reserved 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 _{supply} Above Normal (>32 V)		3598	3 ³	Red Stop
V _{supply} Below Normal (< 8 V)		3598	4 ²	
Overtemperature		517248	0	
CLT Command Message Timeout		517249	31 ¹	

¹ FMI 31 = Condition Exists

² FMI 4 = Voltage Below Normal or Shorted to Low Source

³ 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 Conducted Transient Emissions RF Conducted Emissions Conducted Susceptibility: Test pulse #1 Test pulse #2 Test pulse #3a, #3b Load Dump: Test Pulse #5 Power lead Disturbance (Power Dips) AF Conducted Immunity Direct RF Injection (DRFI) Abnormal Vehicle Operating Conditions RF Radiated Emissions Radiated Immunity-Absorber Lined Chamber Electrostatic Discharge: Shipping / handling Electrostatic Discharge: Human Static Discharge
Dielectric Strength	000V @ 60 Hz was applied for each unit for 1 minute
Reverse Polarity	24VDC for 5 minutes

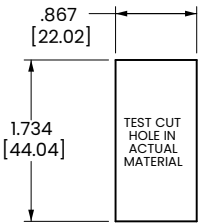
Physical

Function	Incremental for continuous dimming
Operation	Momentary
Lighted	LED's internally dimmed
Base	PBT Polyester V-0 flammability
Rocker	Polycarbonate or Nylon 6/6 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 Individual resonance searches were conducted with vibration applied along each of the three mutually perpendicular axes. 24-50 Hz 0.40DA 50-2000 Hz ± 10 G's peak Random Vibration The random vibration endurance test conditions were sequentially conducted in each of the three mutually perpendicular axes, 1hr/ axis Freq. (Hz) PSD (G ² /Hz) 9.36 grms 24 Hz 0.06 60 Hz 0.50 100 Hz 0.025 1000 Hz 0.025 2000 Hz 0.025 During the test, all units were operated at a load current of 2A with 12.5VDC.
Salt Spray	Per Mil-Std 202F, Method 101D, Test Condition A. Duration 96 hrs.
Dust	Per Mil-Std 810C, Method 510.2. Air velocity 300 ± 200 Feet/Min., Test Duration 16 Hr.
Moisture Resistance	Per Mil-Std 202F, Method 106E. Test Criteria-pre and post test 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

1	4A, 12 volts	A	2A, 24 volts
2	7A, 12 volts	C	5A, 24 volts
3	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	S		
	Red	Amber	Green
12V LED	C	N	H
24V LED	D	P	J

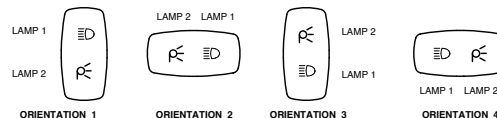
1	Black	2	White	3	Gray
---	-------	---	-------	---	------

	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

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

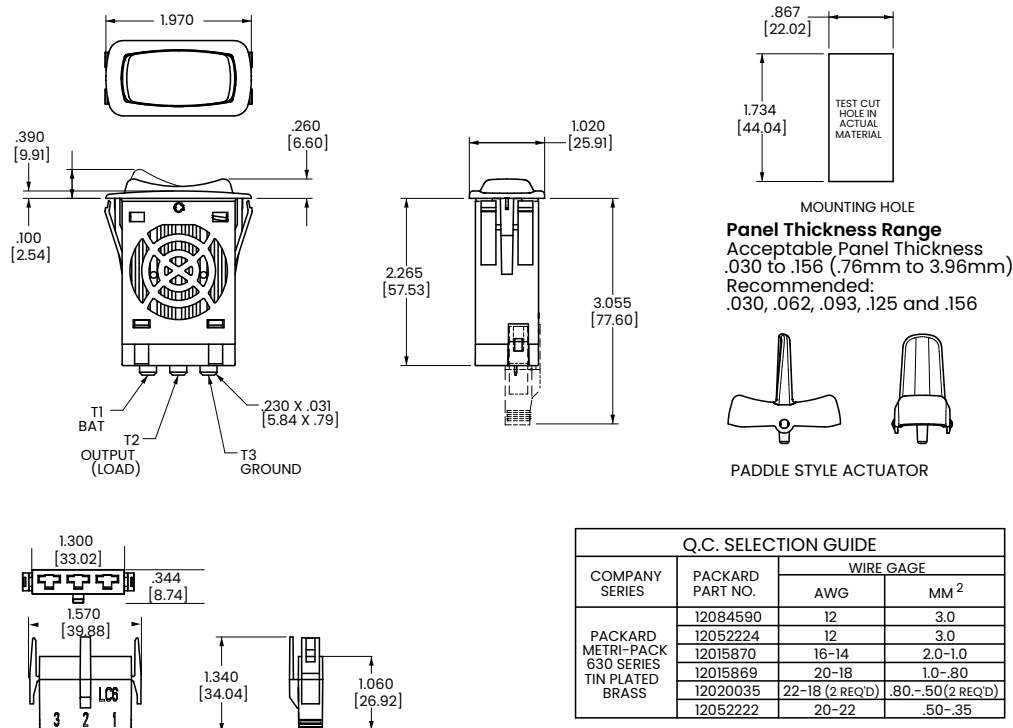


00 No legend FC Dim FE Bright
For legend options, visit us at carlingtech.com

Notes:
1 Custom colors are available. Consult factory.

 Configure Complete Part Number >

inches [millimeters]

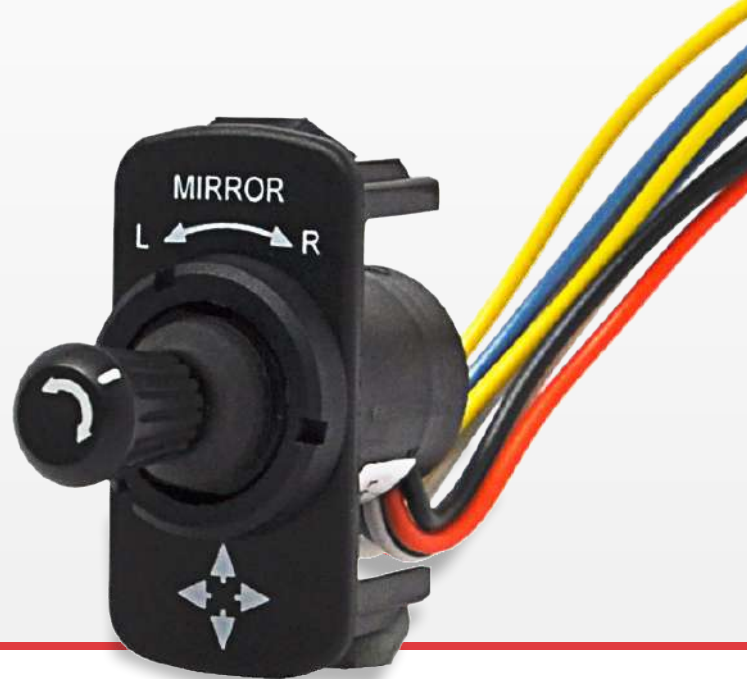


LMR-Series

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	.5-1	14-28
Pole	Amps	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 ¹

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

Mechanism

Sliding contacts in conjunction with a circuit board

Notes:

¹ 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)

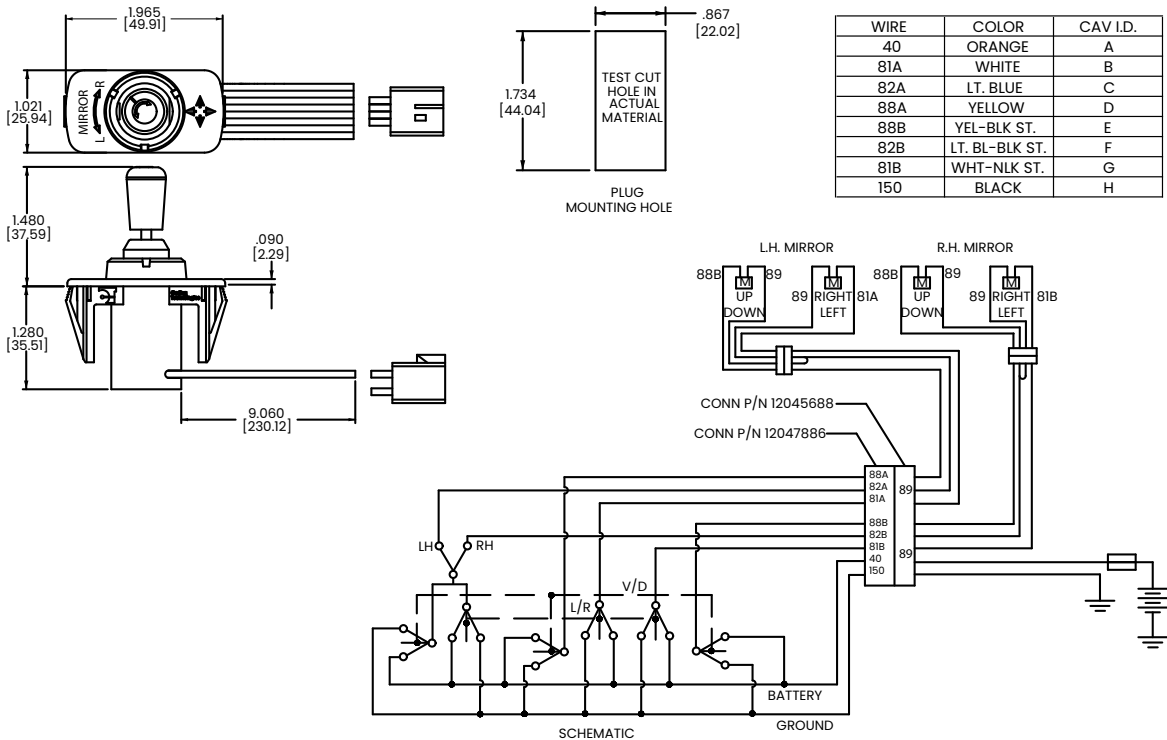
Notes:

¹ 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 8 amps, 14VDC 4 amps, 28VDC 2 relays 1 amps, 14VDC 1 amps, 28VDC
Terminals	.187 (7.4mm) Quick Connect terminations standard.
Protection	Reverse polarity protection Over voltage protection Cold cranking protection according to SAE J1455, Sections. 4.11.1.1 and 4.11.1.2.1 Transient voltage protection which includes load dump and inductive switching according to SAE J1455, sec. 4.11.2.2 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.) Meets all other EMI/EMC requirements for class C trucks.

Mechanical

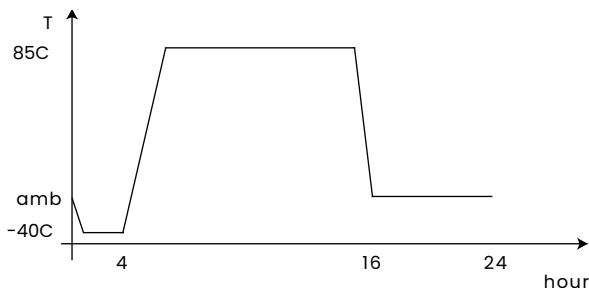
Mechanical	Sinusoidal Vibration: 10-55-10 Hz, 0.06" DA, one minute-cycle, three hours/axis Random Vibration: Three hours/axis, three mutually perpendicular axes with a test level 4G's.								
	<table> <tr> <th>Frequency</th><th>Amplitude</th></tr> <tr> <td>5Hz</td><td>0.16 G²/Hz</td></tr> <tr> <td>100Hz</td><td>0.16 G²/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. Shock: MIL-STD-202G Method 213B, Test Condition K, 30G's, 11 ms.</p>	Frequency	Amplitude	5Hz	0.16 G ² /Hz	100Hz	0.16 G ² /Hz	500Hz	-3dB/octave roll-off
Frequency	Amplitude								
5Hz	0.16 G ² /Hz								
100Hz	0.16 G ² /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

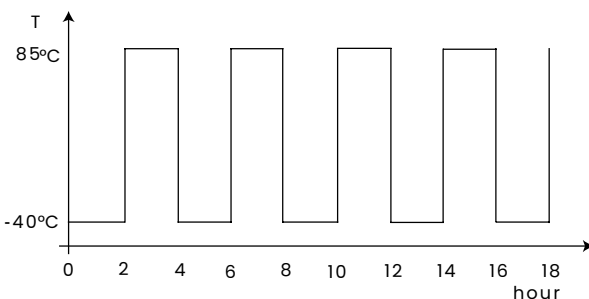
Illumination	LED, rated 100,000 hours 1/2 life
Cover	Acetate
Washer Actuator	Silicone
Toggle Actuator	Nylon 6/6 glass filled
Bracket	Nylon 6/6
Connector	Nylon 6/6 rated 85°C polarized
Washer Function	Momentary
Toggle Function	Maintained Intermittent
Operation	Momentary
Weight	44 grams

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)
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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 ³ 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)

Z No Lamp	2 Red LED
1 Green LED	3 Amber LED

6. LAMP #2 (ABOVE WIPE)

Z No Lamp	2 Red LED
1 Green LED	3 Amber LED

7. BRACKET COLOR

1 Black

8. ROCKER / PADDLE COLOR

1 Black

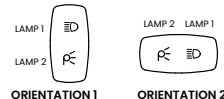
9. LEGEND #1

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

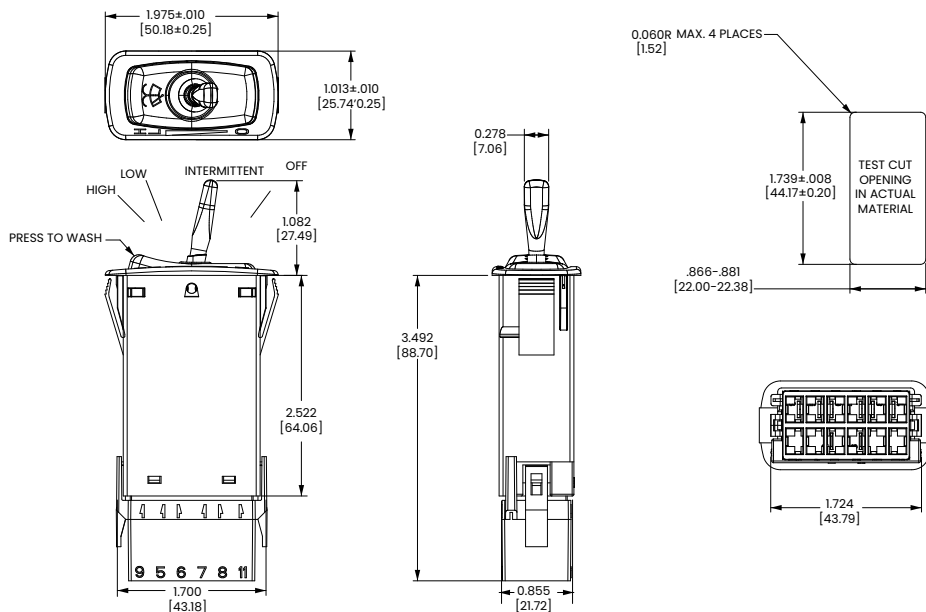
For standard legends, see "Standard Legend Codes" page
For additional legends, please consult factory

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)



Littelfuse®



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A Littelfuse® Brand

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 Field Strength for 200 MHz to 1 GHz: 60 V/m Field Strength for 1 to 2.7 GHz: 50 V/m Bulk Cable Injection ISO 11452-2, 1 to 400 MHz Field Strength: 80 mA
Emissions	FCC Part 15, Class B 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 Square Doors: IP64, for above-panel components of actual switch only
Operating Temperature	-40° to +60°C at 3.15A -40° to +70°C at 2.4A -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 Doors: Polyester Light Pipe: Polycarbonate Torsion Springs Pins: Stainless Steel Door Seal: Silicone PCBA Gasket/Panel Gasket: Closed Cell Neoprene Terminals: Silver plated Copper 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

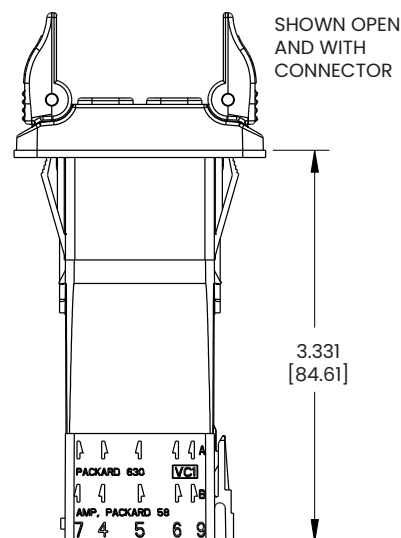
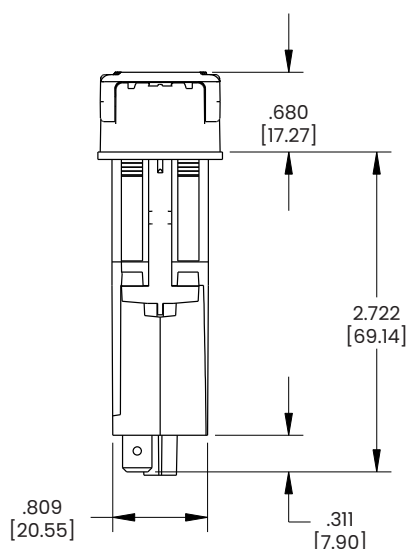
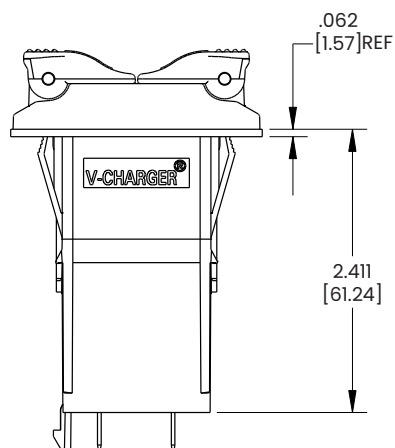
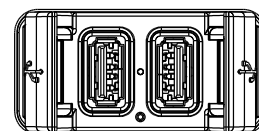
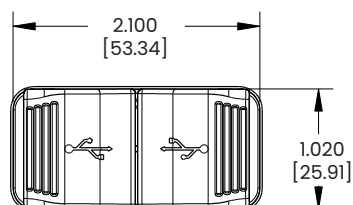
1 Yes

[Configure Complete Part Number >](#)

Dimensional Specs

inches [millimeters]

Curved Door Style Option



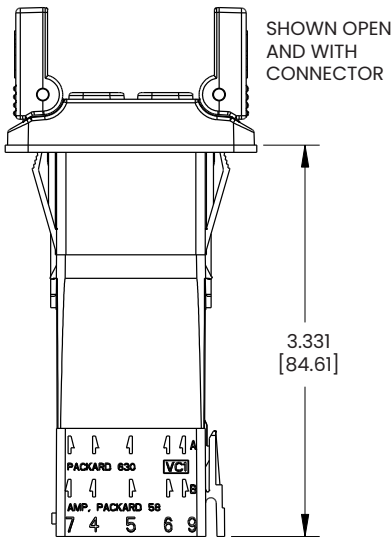
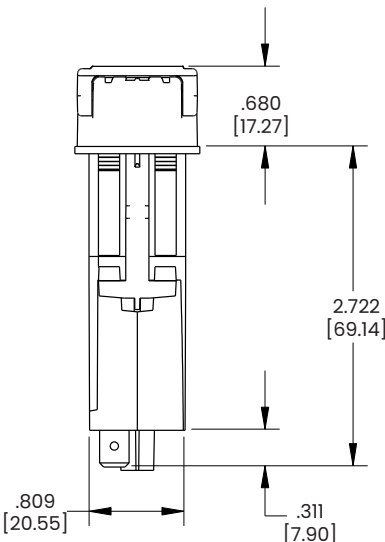
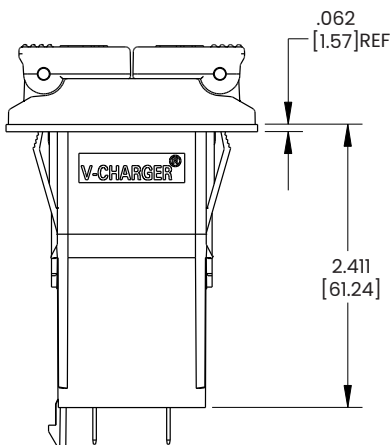
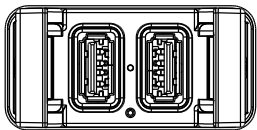
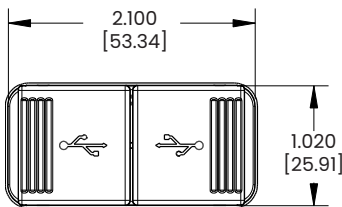
Notes:
1 Charger to install into 1.450" X 0.830" panel opening

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



Littelfuse®



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A Littelfuse® Brand

CV-Charger

Single-Port and Dual-Port 2.0 and 3.1 USB Chargers

PRODUCT WEBPAGE

Request sample, Configure part



The single-port and dual-port 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 spring-loaded access doors that automatically close to safeguard its electronics, assuring prolonged safe and reliable operation. The center LED indicates charging is in progress.

4.5A

Fast Charging

9-32V

Operating Voltage

IP64 or IP65

Sealing Protection

Typical Applications

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

Tech Specs

Physical

USB Type	2.0 for type A (4 pins) 3.1 for type C (16 pins)
Number of USB Ports	1 or 2
Life Cycles	5,000 cycles for USB port 30,000 cycles for door
Mounting Method	Snap
Panel Opening	.83" x 1.45"; 21.08mm x 36.83mm
Panel Thickness	0.76mm to 3.96mm
Connectors	Carling VC2, VC1 housing Two pin connectors
Mating Terminal	Tyco/AMP .25 QC faston series for VC2 housing, Delphi GT 630 series for VC1
Weight	Single-Port: 33 grams [.072 lbs] Dual-Port: 44.45 grams [.097 lbs]
Size	L 47.73 x W 25.9 x H 64.2 mm

Electrical

Operating Voltage	9-32V DC
Max. Output Power	22.5W for SCP protocol for each port, 18W for other protocol for each USB port
Max. Output Current	4.5A
Charging Protocol	BC1.2, Apple, Samsung, Qualcomm QC2.0/QC3.0, MTK PE1.1/2.0, Huawei FCP/SCP, Samsung AFC PD3.0 only for port C
LED Indicator	Green LED brightens when charging is in progress.
Reverse Polarity	ISO 16750-2: 2012 4.7; Apply power supply with -28 V DC for 60s
ESD	ISO 10605: 2008; ±15kV air discharges, ±8kV contact discharges
Electrical Endurance	5000 cycles USB plug push in pull out with charging
Over Voltage	ISO 16750-2: 2012 4.3; Power up with 36V DC 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 500V DC for 60s, resistance value >10MΩ
Radiated Immunity-ALSE	ISO 11452-2: 2004; Absorbed-lined chamber enclosure field strength 30V/m, frequency 400MHz~2000MHz
Bulk Current Injection	ISO 11452-4: 2011; Level 60mA, frequency from 0.5MHz to 400MHz, Probe position 150mm/450mm/750mm
Conducted Transients	ISO 7637-2: 2004; All test pulse in Annex A Table A1 and A2, 2a/3a/3b/4

Environmental

Sealing Protection (when doors closed)	IEC 60529: 2013; IP64 or IP65 (Optional), 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/s2 (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/s2 (50~500Hz). Apply 100 m/s2 at resonance point for 1h
Vibration, Sinusoidal	IEC 60068-2-6: 2007; Sweep 10Hz~500Hz with amplitude 0.75mm (10~58.1Hz), 100m/s2 (58.1~200Hz) for 4h at Z axis and 2h at X/Y axis
Mechanical Shock	IEC 60068-2-27: 2008; Acceleration: 500m/s2, dwell 11ms. 3 pulse per axial, Total 18 times
Mechanical Bump	IEC 60068-2-27: 2009; Acceleration: 400m/s2, 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

Agency Certifications

CE Mark	2014/30/EU EN 50498:2010
---------	-----------------------------

Ordering Scheme

Sample Part Number **CHG - A 2 A - 001**

Selection 1 2 3 4 5 6

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)
- 3 Dual-Port: Port A (2.0 USB) + Port C (3.1 USB)
- 4 Dual-Port: Port A (2.0 USB) + Port A (2.0 USB)
- 5 Dual-Port: Port C (3.1 USB) + Port C (3.1 USB)

4. INDICATOR LIGHT COLOR

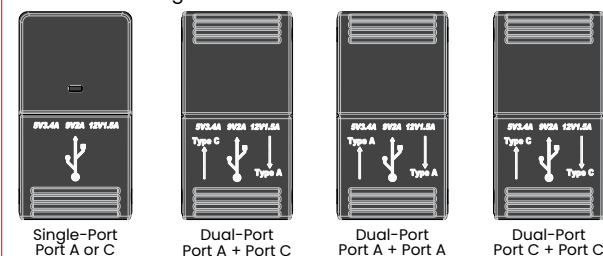
A Green

5. SEALING

	Sealing	Gasket
BLANK	IP64	No
1	IP65	No
2	IP64	Yes
3	IP65	Yes

6. LEGEND

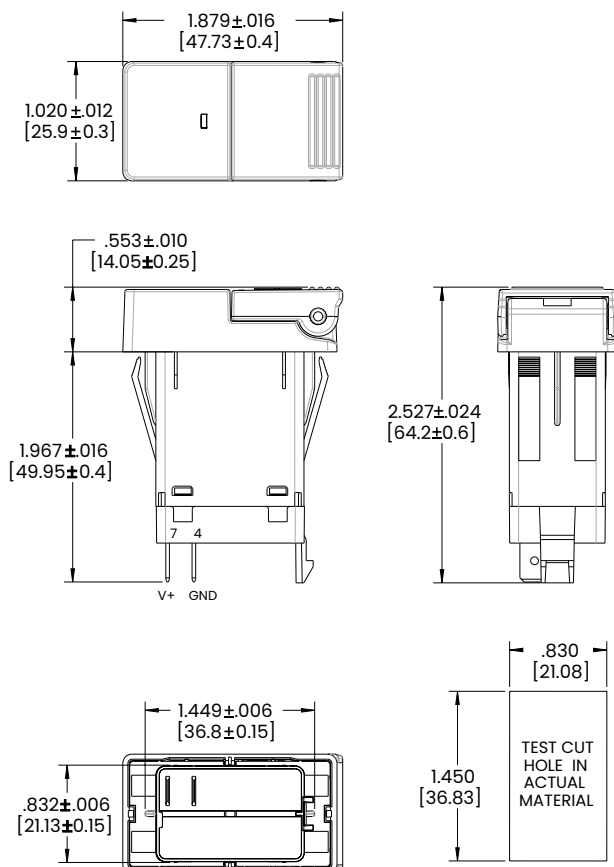
- 000** No Legend
- 001** Standard Legend



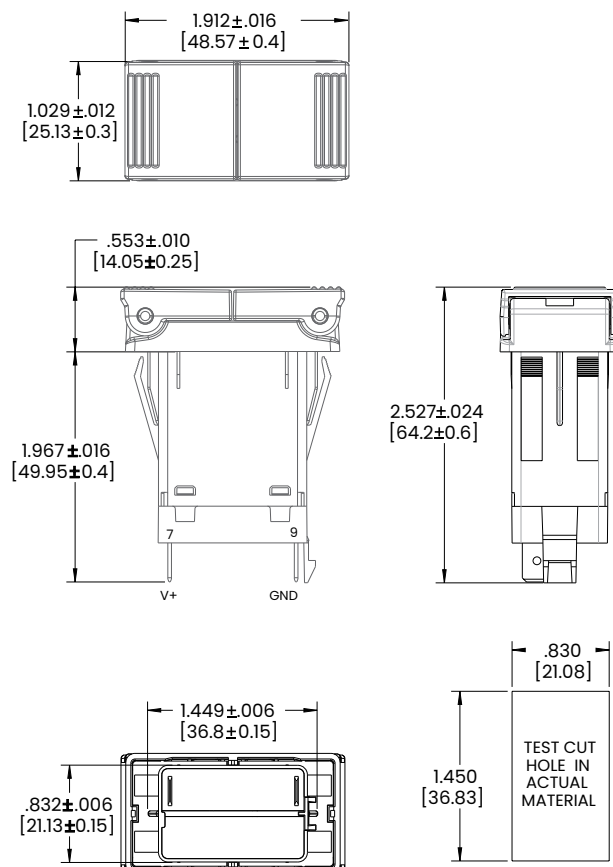
Dimensional Specs

inches [millimeters]

Single Port



Dual Port





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 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 3/16" (4.76mm) Quick Connect terminations standard.

Physical

Lighted	Incandescent - rated 10,000 hours LED - rated 100,000 hours 1/2 life (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. Front snap-in.
Connector	Nylon 66 rated at 85°C. Polarized.
Bracket	Nylon Zytel

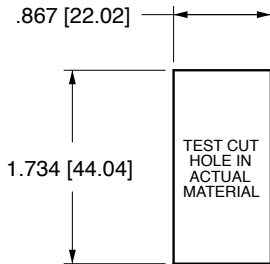
Actuator Travel (Angular Displacement)

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% NCl 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

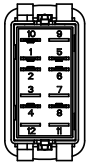
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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	-	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

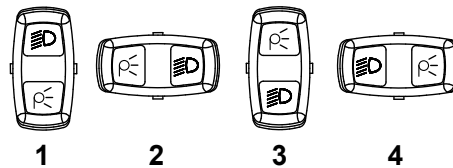
13. LEGEND ORIENTATION

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.

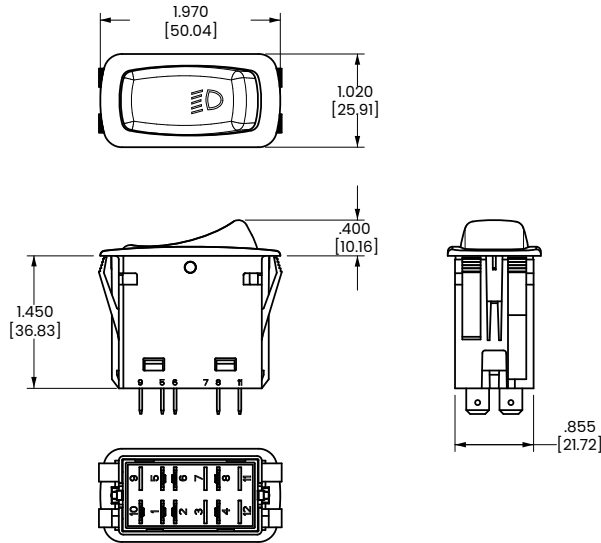
[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

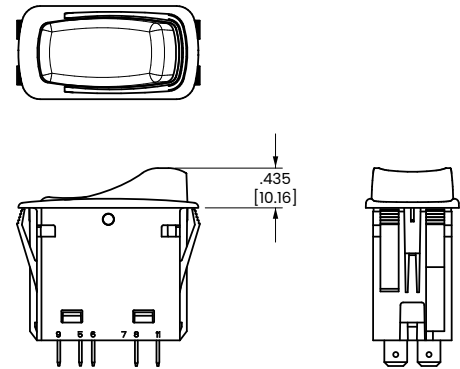
Dimensional Specs

inches [millimeters]

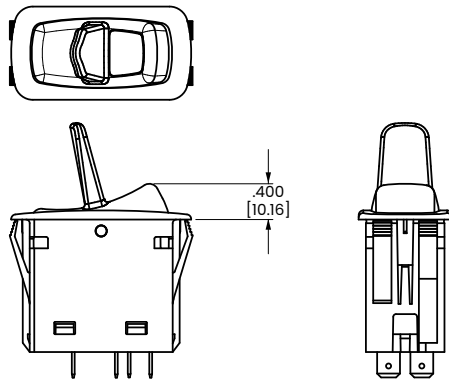
LASER ETCHED ACTUATOR



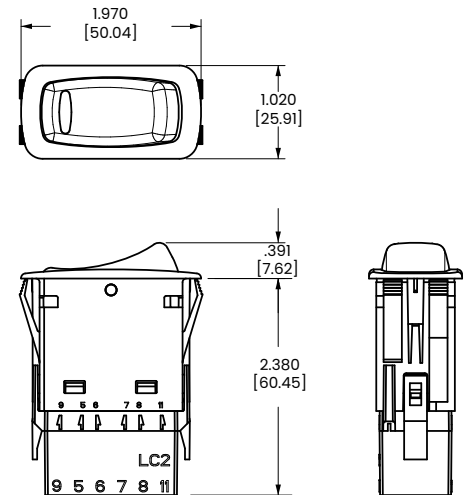
ROCKER GUARD



LARGE LENS AND PADDLE ACTUATOR

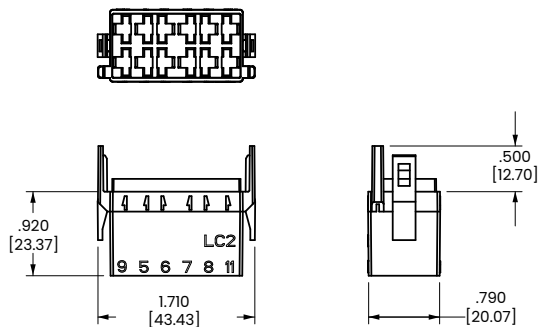


BARS LENS AND CONNECTOR



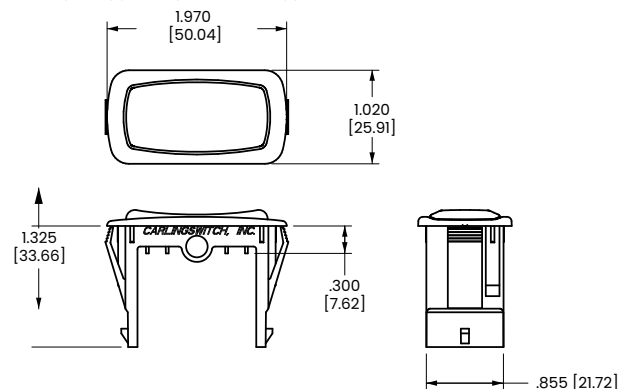
ACCESSORY

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
- Armoured Vehicles
- Mining Machinery
- Any Application Requiring Sealing Protection

Design Features

INTERCHANGEABLE ACTUATORS

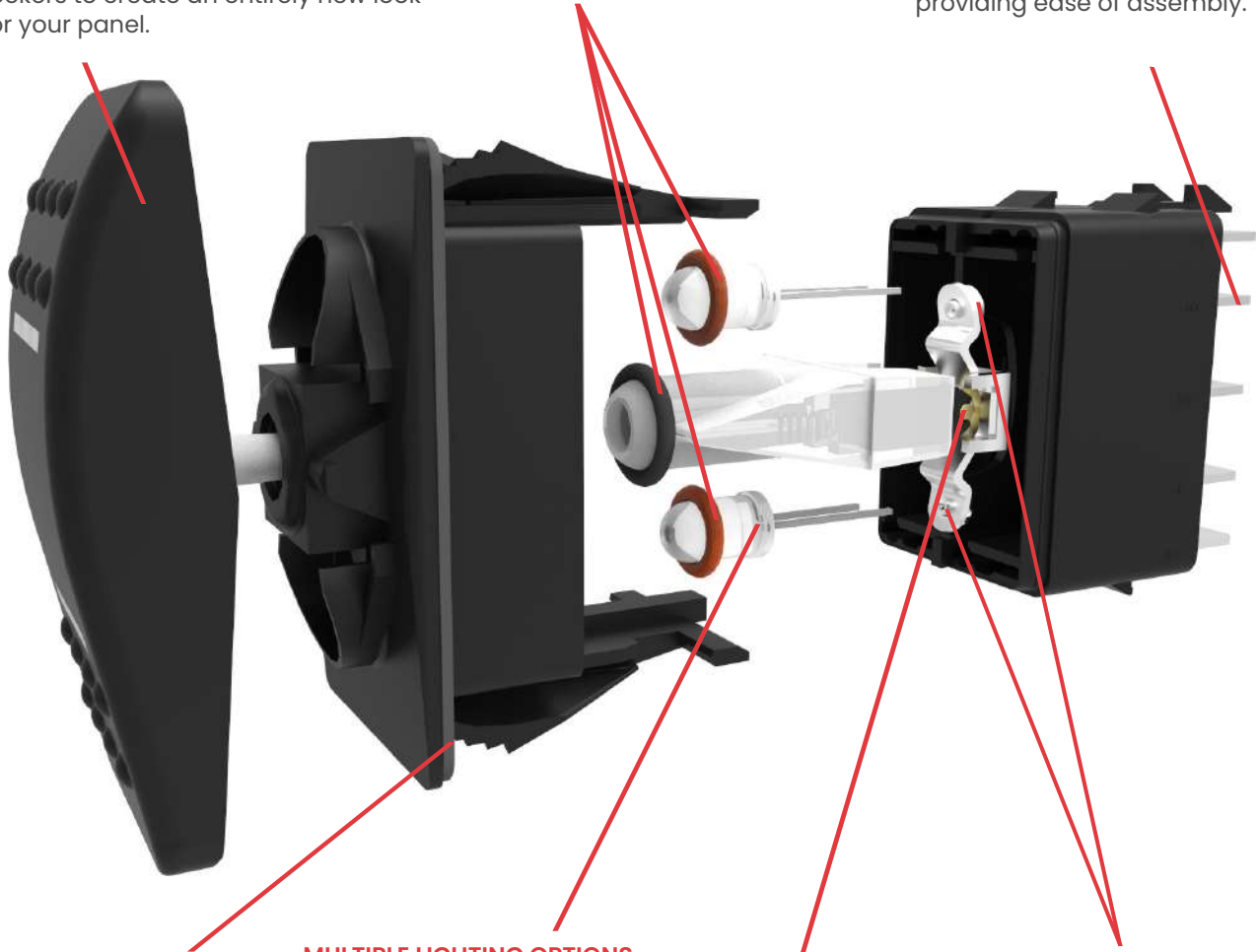
Panel redesign is a snap with our wide range of rocker styles. Achieve maximum design variety with minimum inventory. Simply swap rockers to create an entirely new look for your panel.

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 $+85^{\circ}\text{C}$ 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 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 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 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 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 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 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.



Illuminated Indicators & Accessories

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

Tech Specs

Electrical

Contact Rating	4VA @ 24VDC (MAX) resistive 15 amps, 125VAC 10 amps, 250VAC 1/2 HP 125-250VAC 20 amps, 4-14VDC 15 amps, 15-28VDC 10A, 14VT 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 1/4" (6.3mm) Quick Connect terminations standard. Solder lug, Wire Lead

Physical

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

Actuator Travel (Angular Displacement)

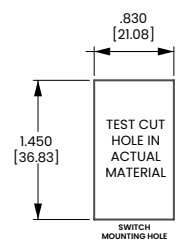
2 position	18°
3 positions	9° from center

Environmental

Sealing	IP66/68, for above-panel components of actual switch only.
Corrosion	Mixed Flowing Gas (MFG) Class III 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 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 0.40 DA 50-2000 Hz ±10 G's peak Horizontal Axis 3-5 G's max. Random 24 Hz 0.06 PSD-Gsq/Hz 60 Hz 0.50 100 Hz 0.50 200 Hz 0.025 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.
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
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
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 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

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	Lamps	Illumination Type	Lamp wired to Terminals
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 (-)
U	2	INDEPENDENT	8 (+) 7 (-)
	2	INDEPENDENT	10 (+) 9 (-)
SINGLE POLE SWITCHES ONLY			
J	1	DOWN	3 (+) 8 (-)
K	2	INDEPENDENT	6 (+) 7 (-)
	1	INDEPENDENT	8 (+) 7 (-)
	2	INDEPENDENT	6 (+) 7 (-)
DOUBLE POLE SWITCHES ONLY			
L	1	DOWN	3 (+) 6 (-)
M	1	UP	3 (+) 6 (-)
N	1	DOWN	3 (+) 6 (-)
P	2	DOWN	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
Neon 1 125VAC 2 250VAC
Incandescent 4 3V 6 12V 8 24V







LED*	Red	Amber	superbright Green	superbright Red
2VDC	A	L	F	R
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
One Seal	B
	C

9. ACTUATOR

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

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

10. LENS 1

0 - No Actuator	Z - No Lens	White	Amber	Green	Red	Blue
1	6	8	G	M	T	
2	7	C	H	N	U	
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	Red
Hard Surface	B	R
	C	S

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

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.

Notes:

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

1 Custom colors are available. Consult factory.

2 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.

3 Additional ratings available. See V-Series Switch Accessories page.

4 Contura II available with two square lenses. Consult factory for details.

Configure Complete Part Number >

Browse Standard Parts >

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.
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	ON	NONE	OFF
4 D	ON	NONE	ON	ON
6 J	ON	OFF	ON	ON
7 K	ON	OFF	(ON)	(ON)
8 L	(ON)	OFF	(ON)	(ON)
9 N	OFF	NONE	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	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)

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	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 (-)
	2	DOWN	1 (+) 4 (-)
P	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
Neon 1 125VAC 2 250VAC
Incandescent 4 3V 6 12V 8 24V

LED*

	Red	Amber	superbright Green	superbright Red
2VDC	A	L	F	R
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

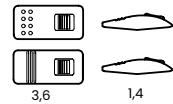
No Seal	Black
One Seal	B
	C

9. HARD SURFACE ACTUATOR

1

Contura II	Black	Red
	A	G
Contura III	C	E

Actuator orientation above terminals:



10. LENS

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

Green or blue lenses are not recommended with Neon lamps.

11. ACTUATOR LOCK FUNCTION AND COLOR

1

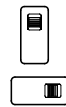
Lock Color	Up	Down	Up & Down	Center ³
Match Actuator	A	H	R	1
Black	B	J	S	2
White	C	K	T	3
Red	D	L	V	4
Safety Orange	E	M	W	5

12. ACTUATOR LENS OR BODY LEGENDS

2

00 - No Legend

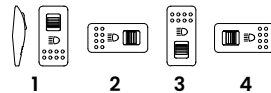
21	22	23	24
OFF	ON	O	I
25	26	27	28
O	O	O	I
F	N		



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

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.
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:

SP	DP	1	2	3
1	A	2 & 3, 5 & 6	Connected	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, 5 & 6	2 & 3	OFF
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)

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	F	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	Lamps	illumination Type	Lamp wired to Terminals
A	NONE	-	-
B	1	INDEPENDENT	8 (+) 7 (-)
C	1	DOWN	3 (+) 7 (-)
D	2	UP	3 (+) 7 (-)
E	1	DOWN	3 (+) 7 (-)
F	2	DOWN	1 (+) 7 (-)
G	1	UP	1 (+) 7 (-)
H	2	UP	3 (+) 7 (-)
I	1	INDEPENDENT	8 (+) 7 (-)
J	2	UP	3 (+) 6 (-)
K	1	INDEPENDENT	8 (+) 7 (-)
L	2	UP	3 (+) 7 (-)
M	1	INDEPENDENT	8 (+) 7 (-)
N	2	UP	3 (+) 7 (-)
P	1	INDEPENDENT	8 (+) 7 (-)
U	2	UP	10 (+) 9 (-)
SINGLE POLE SWITCHES ONLY			
J	1	DOWN	3 (+) 8 (-)
K	2	INDEPENDENT	6 (+) 7 (-)
L	1	INDEPENDENT	8 (+) 7 (-)
M	2	UP	6 (+) 7 (-)
N	1	INDEPENDENT	8 (+) 7 (-)
P	2	UP	1 (+) 4 (-)
U	1	DOWN	1 (+) 4 (-)
U	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 6 12V 8 24V
LED*	superbright superbright
	Green Red
2VDC	A L F R
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
One Seal	B C

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	8	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	Red	S
Nickel	D	Pewter	E		

12. ACTUATOR LENS OR BODY LEGENDS 2

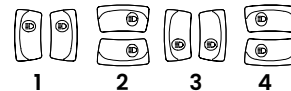
11	ON	12	OFF	13	I	14	O
	OFF		ON		O		I
15	O O	16	O O	17	O I	18	I O
	F N		N F				
	F		F				



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

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.

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

SPECIAL CIRCUITS	2 & 3	2 & 3, 5 & 4	5 & 4
H*	2 & 3	2 & 3	OFF
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)

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	Lamps	Illumination Type	Lamp wired to Terminals
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 (-)
	1	UP	1 (+) 7 (-)
	2	UP	3 (+) 7 (-)
F	1	INDEPENDENT	8 (+) 7 (-)
	2	UP	3 (+) 6 (-)
G	1	INDEPENDENT	8 (+) 7 (-)
	2	UP	3 (+) 7 (-)
H	2	INDEPENDENT	8 (+) 7 (-)
U	1	INDEPENDENT	8 (+) 7 (-)
	2	INDEPENDENT	10 (+) 9 (-)
SINGLE POLE SWITCHES ONLY			
J	1	DOWN	3 (+) 8 (-)
	2	INDEPENDENT	6 (+) 7 (-)
K	1	INDEPENDENT	8 (+) 7 (-)
	2	INDEPENDENT	6 (+) 7 (-)
DOUBLE POLE SWITCHES ONLY			
L	1	DOWN	3 (+) 6 (-)
M	1	UP	3 (+) 6 (-)
N	1	DOWN	3 (+) 6 (-)
	2	DOWN	1 (+) 4 (-)
P	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 6 12V 8 24V

LED*

	Red	Amber	superbright Green	superbright Red
2VDC	A	L	F	R
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
One Seal	B
	C

9. ACTUATOR

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

10. LENS

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

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, 3, 5

No Actuator	0	Black	H	Red	S
Nickel	D	Pewter	E		

12. ACTUATOR LENS OR BODY LEGENDS

2, 6

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

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

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 IV & V Locking

Sample
Part Number

V 1 D A S W O B - J 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 3

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 -- 7Terminals 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	2 & 3, 5 & 6	Connected Terminals	1 & 2, 4 & 5
DP			
1	ON	NONE	OFF
4	ON	NONE	ON
6	ON	OFF	ON
7	ON	OFF	(ON)
8	(ON)	OFF	(ON)
9	OFF	NONE	ON

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)

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	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 (-)

6. LOCK

Lock above terminals 1 & 4 end of switch.
W low profile lock Y 6 high 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. 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.
- Located at T3-6 end of switch.
- Contura V style only.

7. LAMP

Lamp above terminals 3 & 6 end of switch

No lamp	0
Neon	1 125VAC 2 250VAC
Incandescent	4 3V 6 12V 8 24V

LED*	Red	Amber	Green	superbright	superbright
2VDC	A	L	F	R	R
12VDC	C	N	H	T	T
24VDC	D	P	J	V	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
One Seal	B
	C

9. HARD SURFACE ACTUATOR

CONTURA IV:

Orientation	Black	Red
Left	J	L
Right	N	R

Actuator orientation over terminals: 3,6 1,4

CONTURA V:

Black	Red
U	W

Actuator orientation over terminals: 3,6 1,4

10. LENS 5

Z - No Lens

Clear	White	Amber	Green	Red	Blue
A	B	C	D	E	F
G	H	J	K	L	M

bar lens
oval lens

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 3
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
Gray	F	G	N	6

12. ACTUATOR LENS OR BODY LEGENDS 2

00 - No Legend

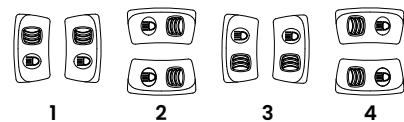
21	22	23	24
OFF	ON	O	I
25	26	27	28
O	O	O	I
F	N		



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

13. LEGENDS ORIENTATION

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



[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Ordering Scheme

Contura X, XI & XII

Sample
Part Number

V 1 D A B 6 0 1-6 P Z 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	2 & 3, 5 & 6	Connected Terminals	1 & 2, 4 & 5
A	(ON)	NONE	OFF
B	(ON)	NONE	OFF
C	(ON)	NONE	OFF
D	(ON)	NONE	OFF
E	(ON)	NONE	OFF
F	(ON)	NONE	OFF
G	(ON)	NONE	OFF
H	(ON)	NONE	OFF
I	(ON)	NONE	OFF
J	(ON)	NONE	OFF
K	(ON)	NONE	OFF
L	(ON)	NONE	OFF
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)

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	Lamps	Illumination Type	Lamp wired to Terminal
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 (+) 6 (-)
L	1	INDEPENDENT	8 (+) 7 (-)
M	2	UP	3 (+) 6 (-)
N	1	INDEPENDENT	8 (+) 7 (-)
O	2	UP	3 (+) 6 (-)
P	1	INDEPENDENT	8 (+) 7 (-)
Q	2	UP	3 (+) 6 (-)
SINGLE POLE SWITCHES ONLY			
J	1	DOWN	3 (+) 8 (-)
K	2	INDEPENDENT	6 (+) 7 (-)
L	1	INDEPENDENT	8 (+) 7 (-)
M	2	INDEPENDENT	6 (+) 7 (-)
DOUBLE POLE SWITCHES ONLY			
L	1	DOWN	3 (+) 6 (-)
M	1	UP	3 (+) 6 (-)
N	1	DOWN	3 (+) 6 (-)
O	2	DOWN	1 (+) 4 (-)
P	1	UP	1 (+) 4 (-)
Q	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 6 12V 8 24V

LED*	Red	Amber	superbright Green	superbright Red
2VDC	A	L	F	R
12VDC	C	N	H	T
24VDC	D	P	J	V

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

8. FLUSH BRACKET COLOR, PANEL SEAL

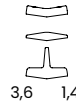
1

X & XI with Flush Bracket	X, XI, XII with Raised Bracket
# of gaskets 0 1 2 0 1	0 1 4
Black B C D	1 4

9. ACTUATOR

No Actuator	0	Black	Red
Contura X	1	4	
Contura XI	6	9	
Contura XII	J	M	

Actuator orientation over terminals:



10. LENS - ABOVE LAMP #1 TERMINALS

1,4

11. LENS - ABOVE LAMP #2 TERMINALS

3,6

0 - No Actuator	Z - No Lens	Clear	White	Amber	Green	Red	Blue	Lens Style
3 8 D	J	P	V	W	Bar			
4 9 E	K	R	S	Y	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 LENS OR BODY LEGENDS

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

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

13. ACTUATOR LENS OR BODY LEGENDS

(3)

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

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

- 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 & gray actuators. Custom colors are available, consult factory.
 - With 2 square lenses, use selection 12 for lens above lamp 1, & selection 14 for lens above lamp 2.
 - Additional ratings available. See V-Series Switch Accessories page.
 - Not available with Contura XI rockers.

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:	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
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	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 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)

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
E	6	Wire Leads no barriers	No
F	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	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 (-)

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.

Configure Complete Part Number >

Browse Standard Parts >

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 6 12V 8 24V

LED*	Red	Amber	superbright Green	superbright Red
2VDC	A	L	F	R
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 Gasket	Black
One Gasket	1

9. HARD SURFACE ACTUATOR

Contura X	Black	Red
	1	3



Actuator orientation over terminals:

3,6 1,4

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	One piece Square
4	9	E	K	R	W	Two piece Square*	(with clear top protective lens)
5	A	F	L	S	Y	Two piece Square*	(with smoke top protective lens)
2	7	C	H	N	U	Two piece Square*	(with white 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

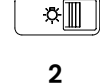
00 - No Legend	22	23	24
21 OFF	ON	O	I
25 O	26 O	27 O	28 I
F	N		



For additional legend options & codes, visit us at 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



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.
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
- 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	UP	3 (+) 7 (-)
H	INDEPENDENT	8 (+) 7 (-)
DOUBLE POLE SWITCHES ONLY		
M	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
	2 250VAC
	6 12V
	8 24V

LED*	Red	Amber	Green	superbright	superbright
2VDC	A	L	F	R	R
12VDC	C	N	H	T	T
24VDC	D	P	J	V	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

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.

11. ACTUATOR LOCK COLOR / FUNCTION

1

Lock Color	UP	LOCK IN POSITION		CENTER
		DOWN	UP & DOWN	
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

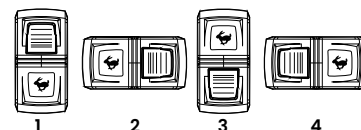
21 OFF 22 ON 23 O 24 I

25 O 26 O 27 O 28 I
F N F



13. LEGEND ORIENTATION

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



Configure Complete Part Number >

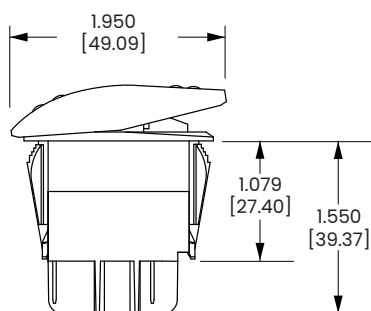
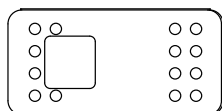
Browse Standard Parts >

Dimensional Specs

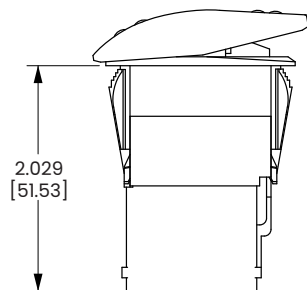
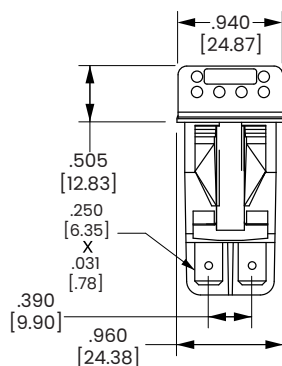
inches [millimeters]

CONTURA II

SHOWN WITH
SQUARE LENS

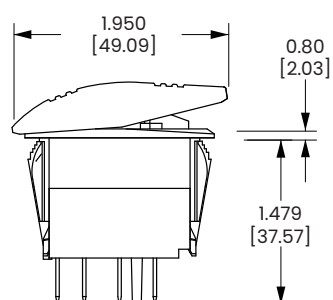
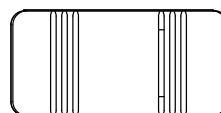


8 TERMINAL BASE
W/BARRIERS

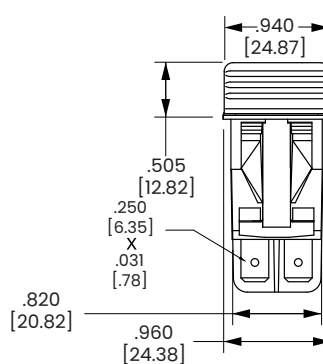


SWITCH SHOWN WITH
VCH CONNECTOR 8
TERMINAL

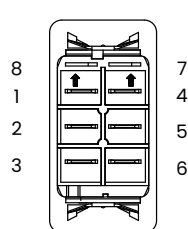
CONTURA III



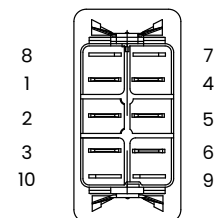
8 TERMINAL BASE
W/O BARRIERS



10 TERMINAL BASE
W/BARRIERS



BOTTOM VIEW
TERMINAL
ARRANGEMENT
8 TERMINAL BASE



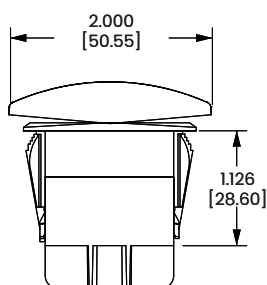
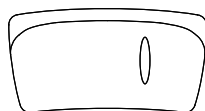
BOTTOM VIEW
TERMINAL
ARRANGEMENT
10 TERMINAL BASE

Dimensional Specs

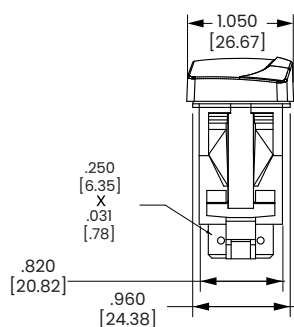
inches [millimeters]

CONTURA IV

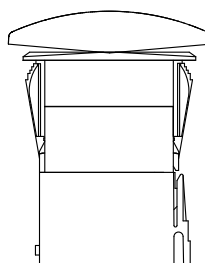
SHOWN WITH
BAR LENS



10 TERMINAL BASE
W/BARRIERS



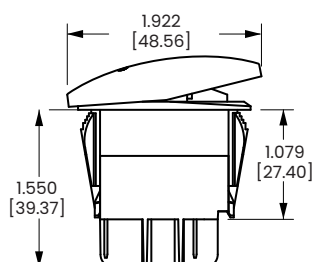
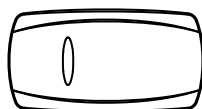
10 TERMINAL BASE
W/O BARRIERS



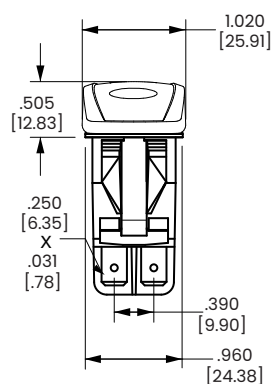
SWITCH SHOWN WITH
VCI CONNECTOR 10
TERMINAL

CONTURA V

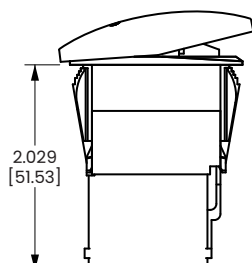
SHOWN WITH
BAR LENS



8 TERMINAL BASE
W/BARRIERS



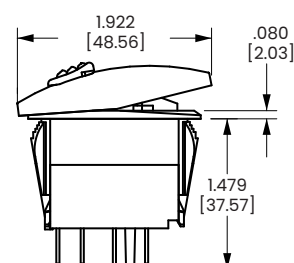
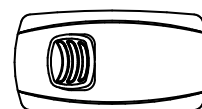
8 TERMINAL BASE
W/BARRIERS



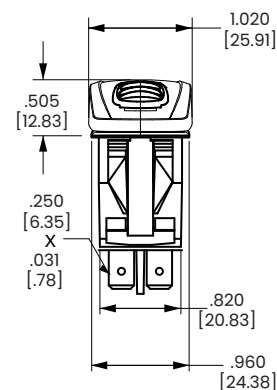
SWITCH SHOWN WITH
VCH CONNECTOR 8
TERMINAL

CONTURA V

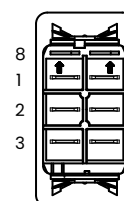
SHOWN WITH
LOW PROFILE LOCK



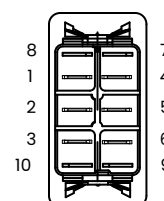
8 TERMINAL BASE
W/O BARRIERS



8 TERMINAL BASE
W/O BARRIERS



BOTTOM VIEW
TERMINAL
ARRANGEMENT
8 TERMINAL BASE



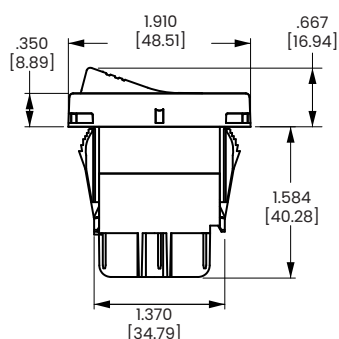
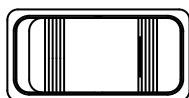
BOTTOM VIEW
TERMINAL
ARRANGEMENT
10 TERMINAL BASE

Dimensional Specs

inches [millimeters]

CONTURA X

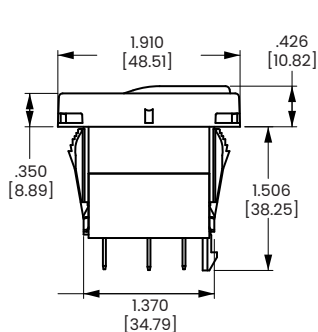
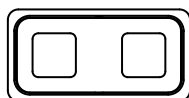
SHOWN WITH RAISED BRACKET



8 TERMINAL BASE
W/BARRIERS

CONTURA XI

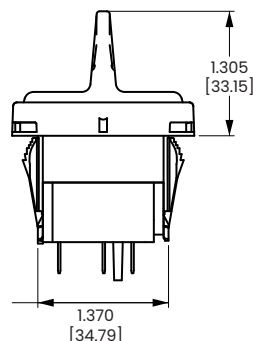
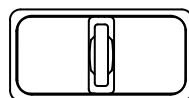
SHOWN WITH RAISED
BRACKET AND TWO SQUARE
LENSES



10 TERMINAL BASE
W/O BARRIERS

CONTURA XII

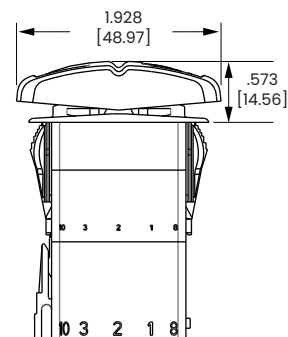
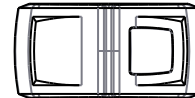
SHOWN WITH PADDLE
ACTUATOR



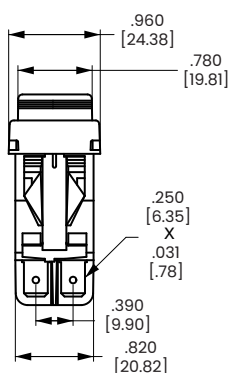
8 TERMINAL BASE
W/O BARRIERS

CONTURA XIV

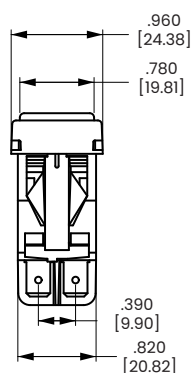
SHOWN WITH LARGE LENS



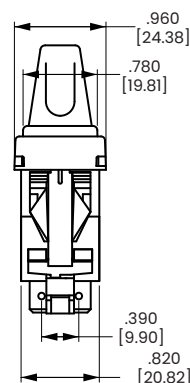
10 TERMINAL BASE
W/O BARRIERS



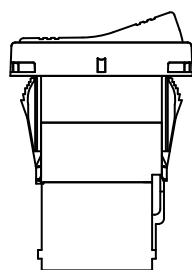
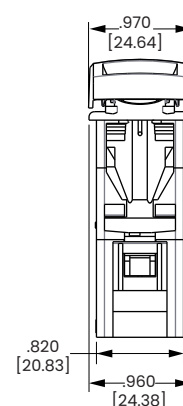
8 TERMINAL BASE
W/BARRIERS



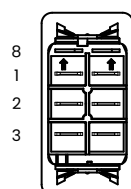
10 TERMINAL BASE
W/O BARRIERS



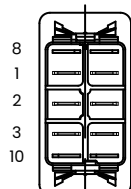
10 TERMINAL BASE
W/O BARRIERS



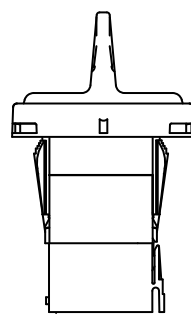
SWITCH SHOWN WITH
VCH CONNECTOR
8 TERMINAL



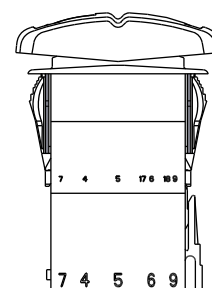
BOTTOM WITH TERMINAL
ARRANGEMENT
8 TERMINAL BASE



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		F		L		SPECIAL #1	
B		G		M		SPECIAL #3	
C		H		N		SPECIAL #4	
D		J		P			
E		K		U			

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, 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 II, III, IV, V 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/ bar lens on bottom (Contura X only)
4	Two square lenses		

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	O
	F N	N F		F

For additional legend options & code, visit us at 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	
	25 O	26 O	27 O	28 I	
	F	N			
	F				

For additional legend options & codes, visit us at 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 lens⁵

3 TRANSLUCENT LENS COLOR

1 Clear 2 White 3 Amber 4 Green⁴ 5 Red 6 Blue⁴

4 LENS OR BODY LEGEND 2

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

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

5 LEGEND ORIENTATION 3

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

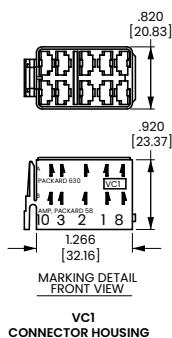
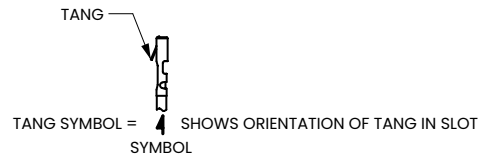
Accessories

Easily integrate Contura products into your system, with Contura Accessories

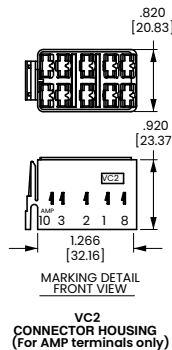
Contura Connectors

Q.C. SELECTION GUIDE					
COMPANY SERIES	PART NO		WIRE RANGE		ORIENTATION
	PLAIN BRASS	TIN PLATED BRASS	AWG	MM ² (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
			(2) 16	(2) 1.3	
	42100-1	42100-2	18-14	.8-2	
	60295-1	60295-2	22-18	.3-.9	

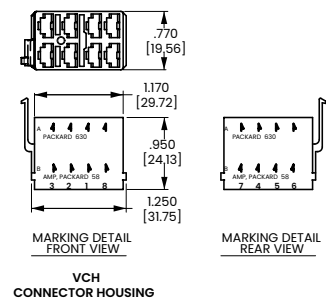
NOTE: Consult Delphi Packard and/or Amp on actual part numbers and availability.
AMP is a registered trademark of AMP Inc. Harrisburg, PA
Delphi Packard is a registered trademark of Delphi-Packard Electrical Systems Warr



VC1
CONNECTOR HOUSING

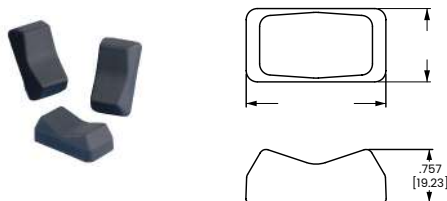


VC2
CONNECTOR HOUSING
(For AMP terminals only)

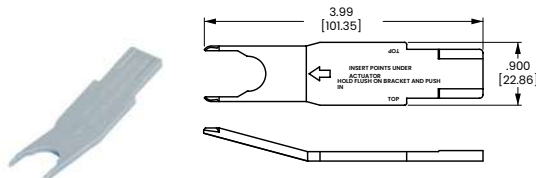


VCH
CONNECTOR HOUSING

Contura X Boot (P/N VB1-01)



Contura II, III, IV and V 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
- 5¹ 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
- L² 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.

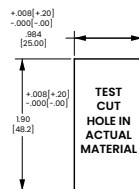
Accessories

Contura Mounting Panels Dimensional Specifications: in. [mm]

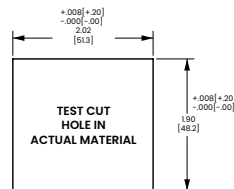
MOUNTING PANEL
For additional units, add 1.03 [26.2] per unit. For more than 2 V-Series Switches, add middle section. Available in panel Thicknesses listed below. Consult factory.

MOUNTING PANEL THICKNESS

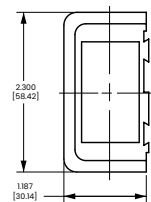
.062	.187
[1.57]	[4.75]
.093	.250
[2.36]	[6.35]
.125	.375
[3.17]	[9.52]



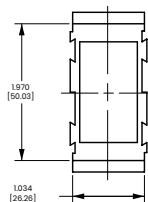
VMS MOUNTING PANEL HOLE



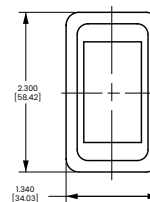
MOUNTING PANEL OPENING (2) UNITS



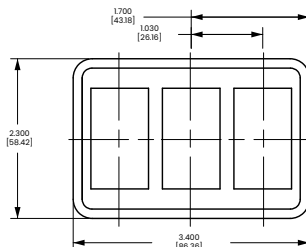
VME MOUNTING PANEL END



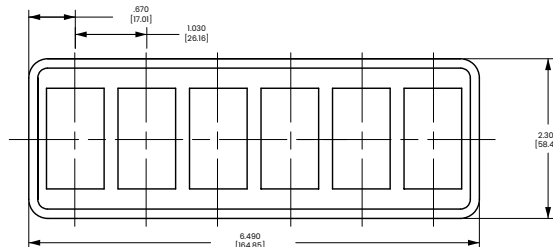
VMM MOUNTING PANEL MIDDLE



VMS MOUNTING PANEL



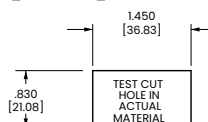
VM3 MOUNTING PANEL



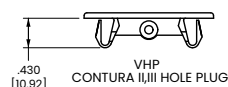
VM6 MOUNTING PANEL



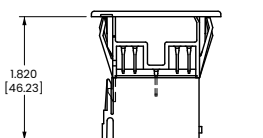
Contura Hole Plug Dimensional Specifications: in. [mm]



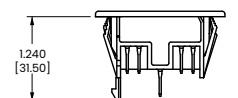
VHP CONTURA II, III HOLE PLUG



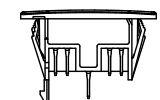
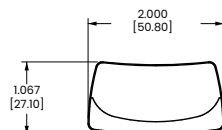
VHP CONTURA II, III HOLE PLUG



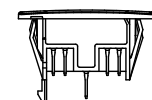
VH1 STANDARD HOLE PLUG (No wing serrations) (With VC1 connector attached)



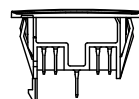
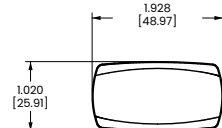
VH2 STANDARD HOLE PLUG (With wing serrations)



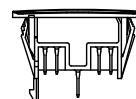
VH3 CONTURA IV HOLE PLUG (No wing serrations)



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	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. 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





Z	No Lens					
Clear	White	Amber	Green	Red	Blue	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 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:

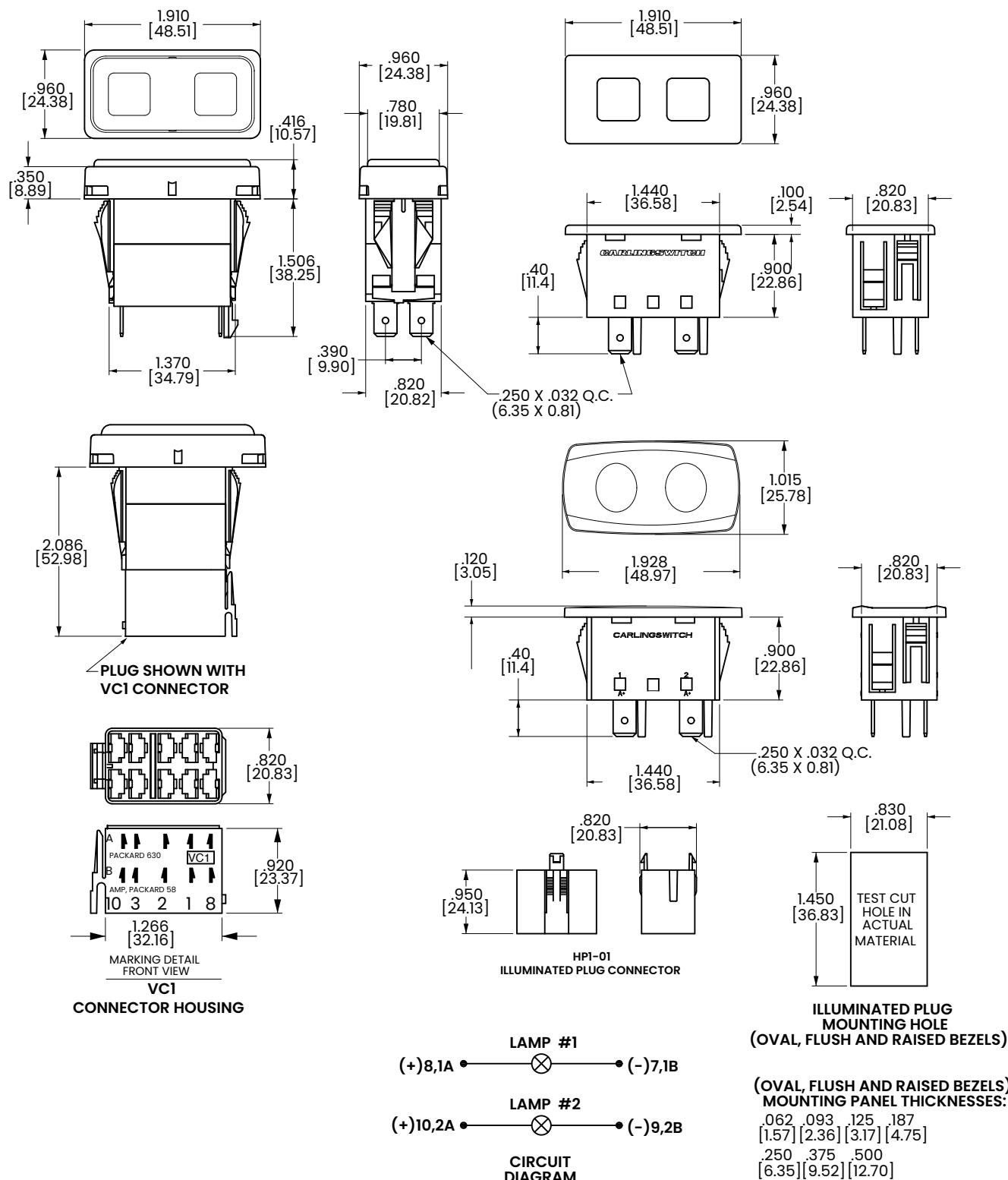
- 1 Field 3 specifies lamp 1 is located over terminals 8 (+) & 7 (-).
- Field 4 specifies lamp 2 is located over terminals 10 (+) & 9 (-).
- 2 Field 6 specifies lens 1 is located over terminals 8 (+) & 7 (-).
- Field 7 specifies lens 2 is located over terminals 10 (+) & 9 (-).
- 3 Field 8 specifies lens 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®



Carling Technologies®

A Littelfuse® Brand

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

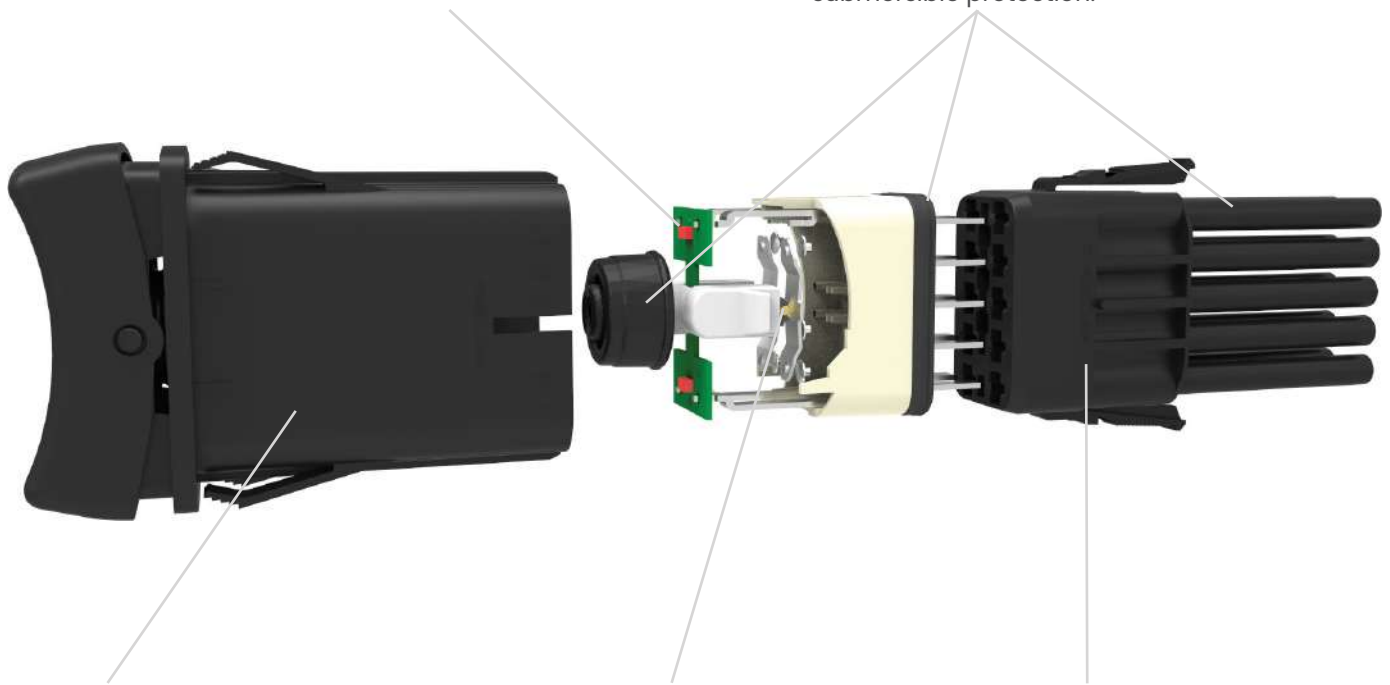
Design Features

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°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 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 (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

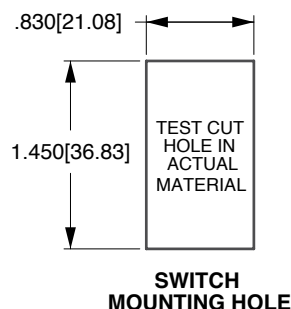
Environmental

Sealing	IP68, for above and below-panel components of actual switch only
Corrosion/ Chemical Splash	Flowing Mixed Gas (FMG) 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 Test Condition A 0.06 DA or 10G's 10-500 Hz.
Vibration 2	Resonance search 24-50 Hz 0.40 DA 50-2000 ±10 G's peak Results Horizontal Axis 3-5 G's max Random 24 Hz 0.06 PSD-Gsq/Hz 60 Hz 0.50 100 Hz 0.50 200 Hz 0.025 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 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 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	Independent	8+ 7-
L	#1	Independent	8+ 7-
M	#2	Independent	8+ 7-
N	#1	Independent	8+ 7-
O	#2	Independent	8+ 7-
P	#1	Independent	8+ 7-
Q	#2	Independent	8+ 7-
R	#1	Independent	8+ 7-
S	#2	Independent	8+ 7-
T	#1	Independent	8+ 7-
U	#2	Independent	8+ 7-
V	#1	Independent	8+ 7-
W	#2	Independent	8+ 7-
X	#1	Independent	8+ 7-
Y	#2	Independent	8+ 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			
6VDC	B			
12VDC	C			
24VDC	D			

* 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

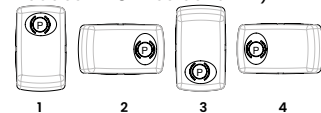
11	ON	12	OFF	13	I	14	O
	OFF		ON		O		I
15	O	16	O	17	O	18	I
	F		N		F		N
21	OFF	22	ON	23	O	24	I
	F		N				
25	O	26	O	27	O	28	I
	F		N				

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 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 ¹

J Black

9. ACTUATOR ¹

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

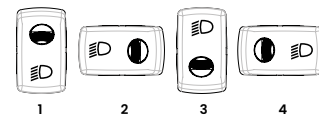
Up	Down	Lock Color
B	J	Black
C	K	White
D	L	Red
E	M	Safety Orange

12. LASER ETCHED, LENS OR BODY LEGEND ¹

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:

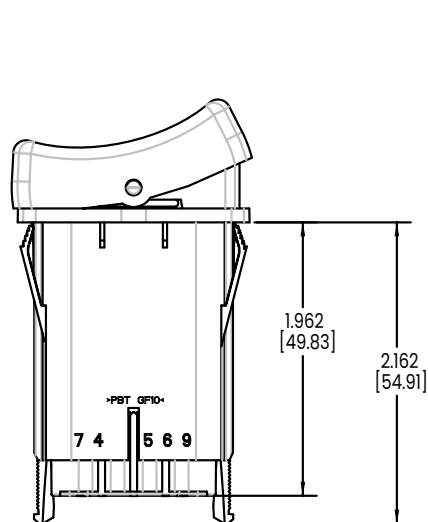
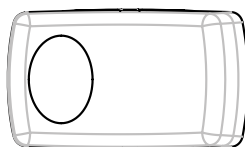
¹ White imprinting is standard on black actuators; Black imprinting is standard on white, red & gray actuators; Custom colors are available, consult factory.

[Configure Complete Part Number >](#)

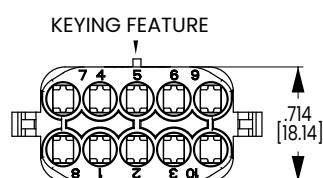
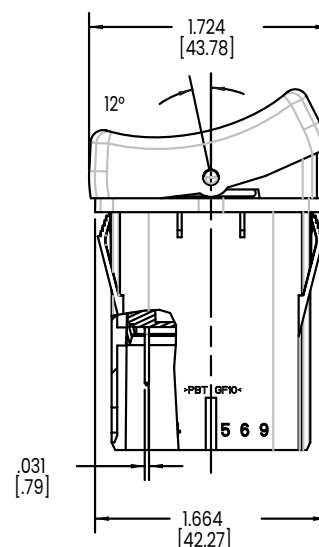
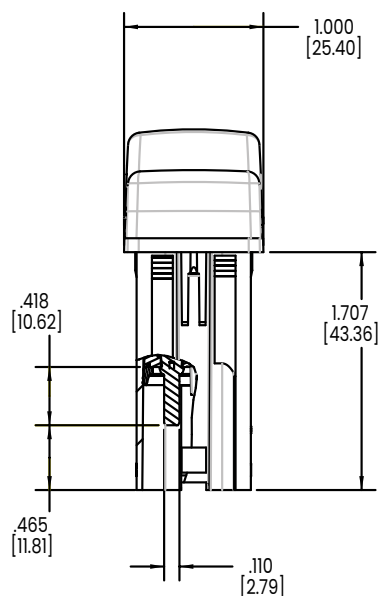
[Browse Standard Parts >](#)

Dimensional Specs

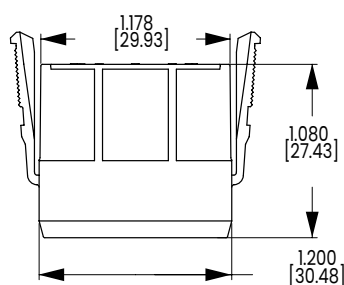
inches [millimeters]



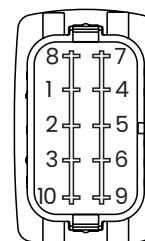
SWITCH SHOWN WITH
CONNECTOR INSTALLED



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	



Littelfuse®



Carling Technologies®

A Littelfuse® Brand

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

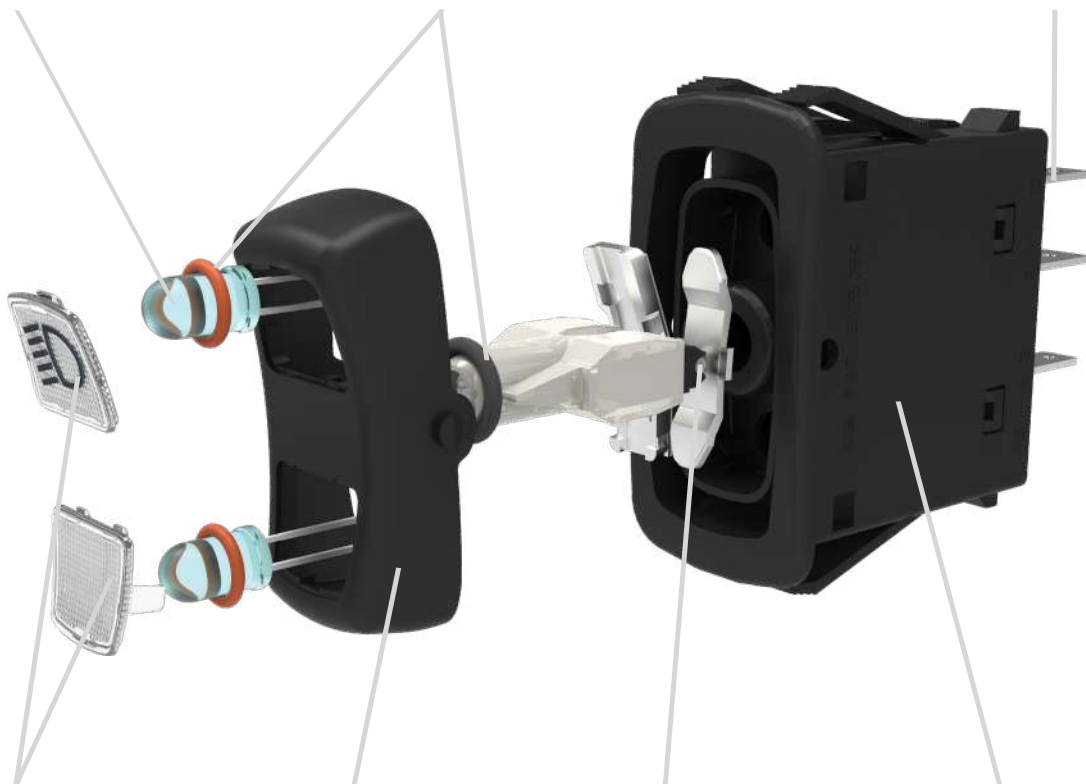
Utilize less current and are not affected by vibration, providing long lasting illumination. Available in 3 standard colors.

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°C to $+85^{\circ}\text{C}$ [-40°F to 185°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 15 amps, 125VAC 10 amps, 250VAC 20 amps, 4-14VDC 15 amps, 15-28VDC
Dielectric Strength	1250 Volts RMS between pole to pole 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, 50,000 cycles momentary circuit and load dependent
Contacts	90/10 silver-nickel, silver tin-oxide, gold
Terminals	Brass or copper/silver plate 3/16" (4.76mm) & 1/4" (6.3mm) Quick Connect terminations standard.

Physical

Lighted	Incandescent - rated 10,000 hours LED - rated 100,000 hours 1/2 life (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.

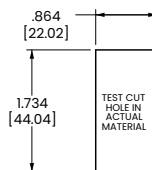
Actuator Travel (Angular Displacement)

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 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 24-50 Hz 0.40 DA 50-2000 ±10 G's peak Results Horizontal Axis 3-5 G's max. Random 24 Hz 0.06 PSD-Gsq/Hz 60 Hz 0.50 100 Hz 0.50 200 Hz 0.025 2000 Hz 0.025 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 (in series)	10+ 9-
K	#1 Dependent	4+ 9-
L	& #2 Dependent	1+ 9-
M	#2 Hazard	6+ 10- 12-
N	#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	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 Etched background color

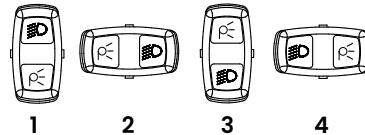
12. LASER ETCHED, LENS OR BODY LEGEND

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 ⁵

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
14	24	ON	NONE
16	26	ON	OFF
17	27	ON	OFF
18	28	(ON)	OFF
CIRCUITS WITH JUMPER TERMINALS			
30 ²	(2,4&5), (1,6&8)	OFF, OFF	(1,2&8), (4,5&6)
31 ²	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 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 ⁴

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 ¹

J Black

9. ACTUATOR STYLE AND COLOR ¹

	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

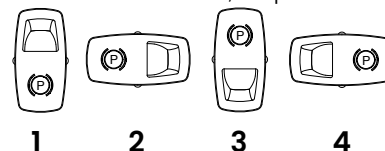
Locking Position	Up	Down	Up & Down	Center ³	Lock Color
A	H	R	1	Match Actuator	
B	J	S	2	Black	
C	K	T	3	White	
D	L	V	4	Red	
E	M	W	5	Safety Orange	

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 ³

() - momentary

Position:	1	2	3
SP DP	2 & 4, 6 & 8	Connected Terminals	1 & 2, 5 & 6
18 28	(ON)	OFF	(ON)
30*	(2,4&5), (1,6&8)	OFF, OFF	(1,2&8), (4,5&6)
70*	(2 & 4), (7 & 8)	2 & 4, 5 & 7	(1 & 2), (5 & 7)

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

3. RATING ³

1 0.4VA 28V DC Resistive
B 15A 24V
D 20A 12V
E 15A 12V

4. TERMINATION ³

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
S None		
B # 2	Independent	12+ 11-
K # 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
	6	N	H	E	12VDC
	8	P	J	K	24VDC

8. BRACKET COLOR / STYLE ¹

W Black Window Lift

9. ACTUATOR COLOR / STYLE ¹

W Black Window Lift

10 & 11. LASER ETCHED BACKGROUND COLOR

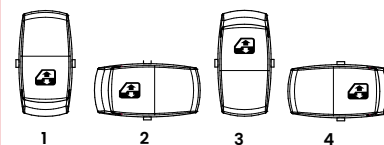
Z Blank
5 Clear
A White

12. LEGEND #1 ²

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



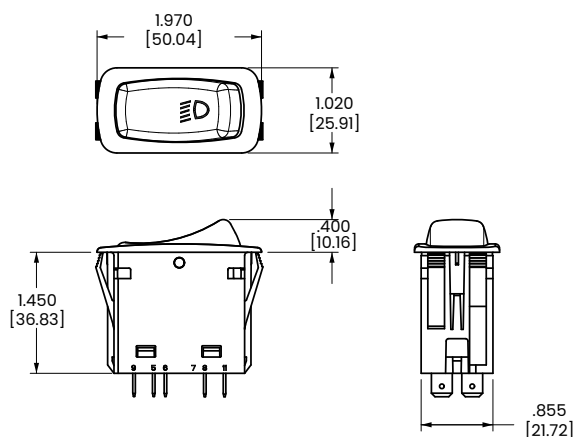
14. LEGEND #2 ⁴

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

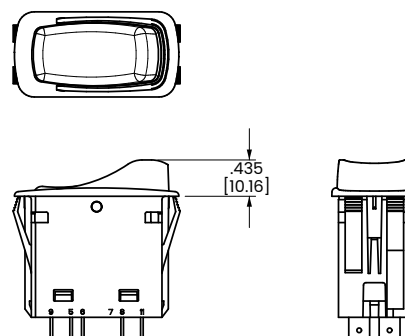
Dimensional Specs

inches [millimeters]

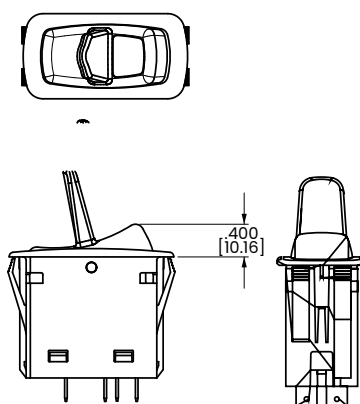
L-SERIES
SHOWN WITH LASER ETCHED
ACTUATOR



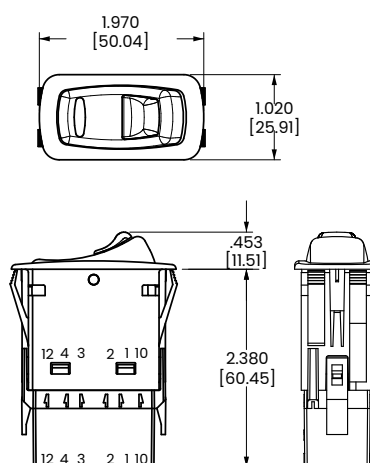
L-SERIES
SHOWN WITH ROCKER GUARD



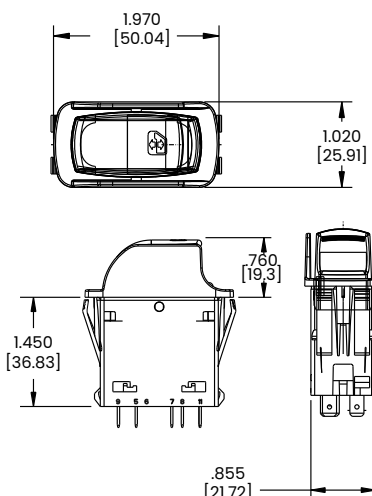
L-SERIES
SHOWN WITH LARGE LENS
AND PADDLE ACTUATOR



L-SERIES
SHOWN WITH BAR LENS, LOCK
AND CONNECTOR



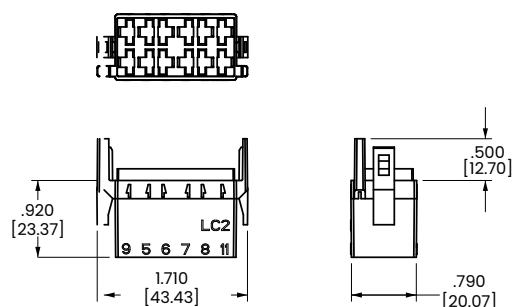
L-SERIES
SHOWN WITH LASER ETCHED
WINDOW LIFT ACTUATOR



Connector

L-SERIES
CONNECTOR

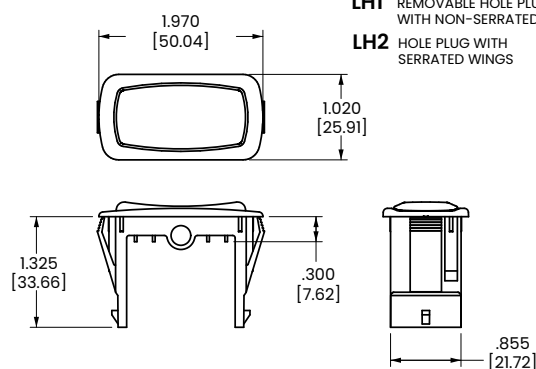
- LC1-01** BLACK .250 TAB CONNECTOR (PACKARD 630 SERIES)
- LC2-01** BLACK .187 TAB CONNECTOR (PACKARD 480 SERIES)
- LC3-01** BLACK .250 TAB CONNECTOR (AMP ONLY)



Hole Plug

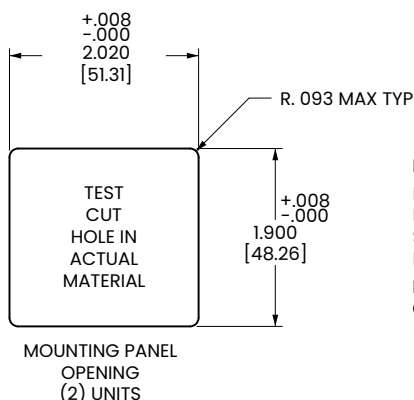
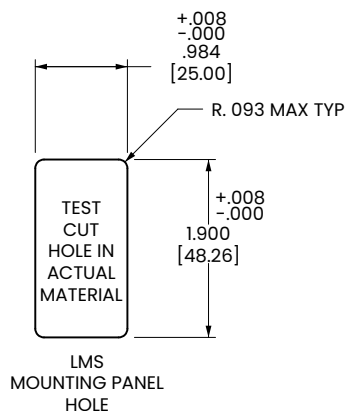
L-SERIES
HOLE PLUG

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



Dimensional Specs

inches [millimeters]



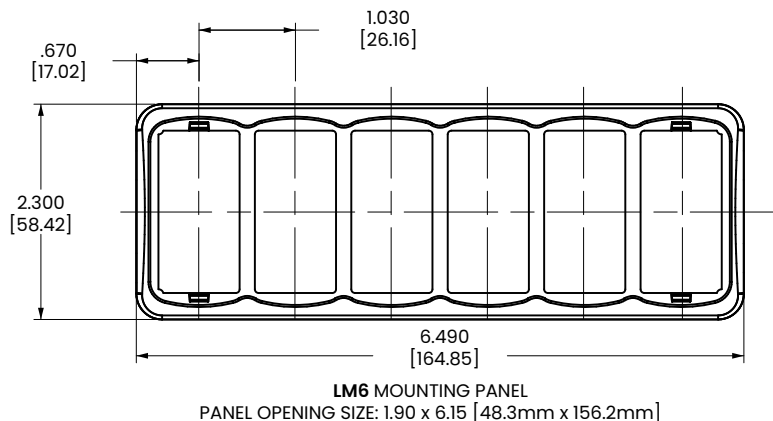
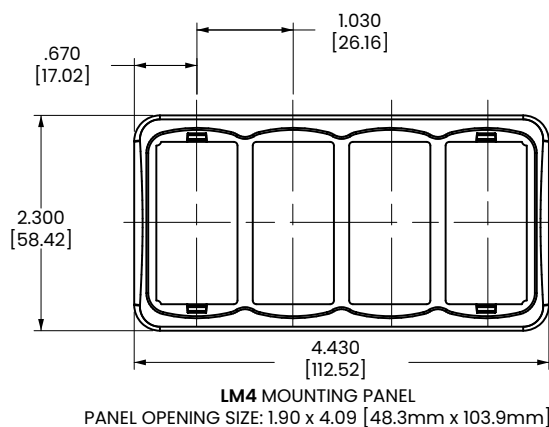
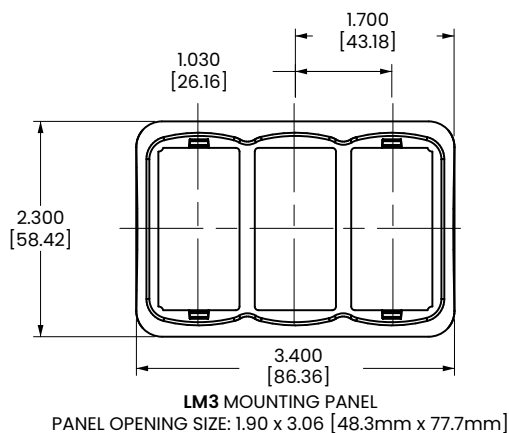
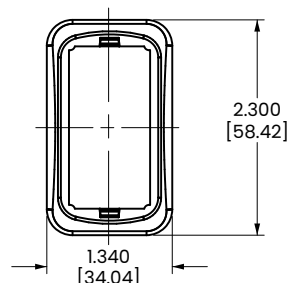
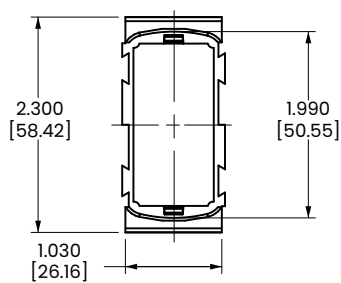
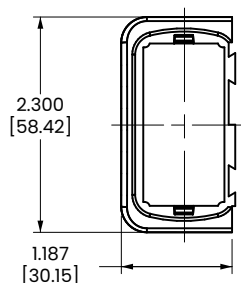
MOUNTING PANEL

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]

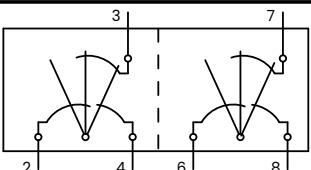
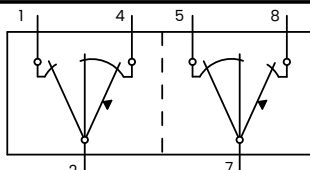
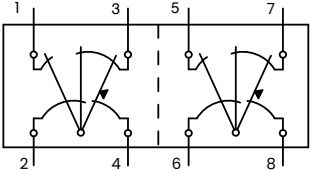
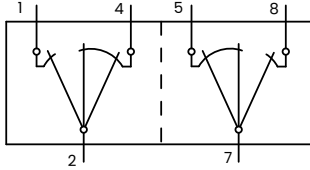
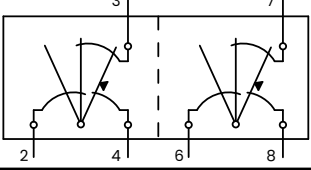
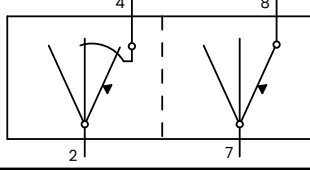
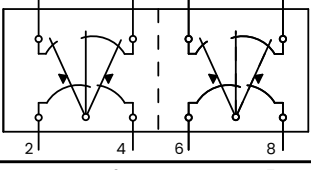
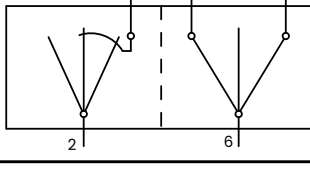
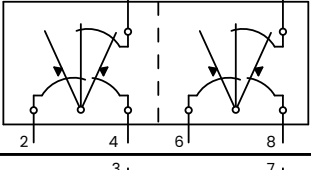
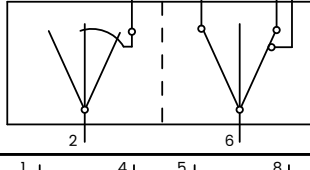
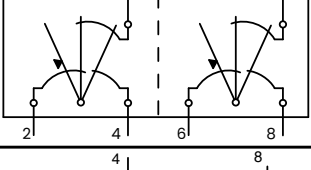
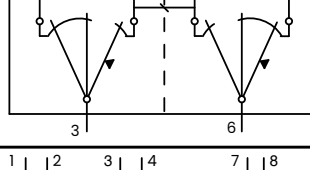
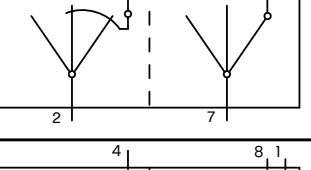
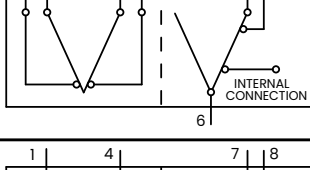
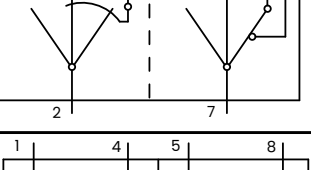
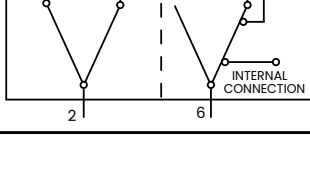
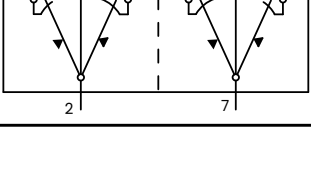


Circuit Diagrams

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
A	
B	
C	
D	
E	
F	
G	
H	

LAMP CIRCUIT CODE	CIRCUIT DIAGRAM
J	
I	
2	
K	

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

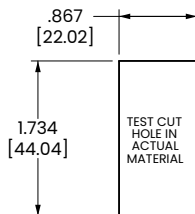
Electrical

Terminals	Brass or copper/silver plate 3/16" (4.76mm) & 1/4" (6.3mm) Quick Connect terminations standard.
Lighted	Incandescent - rated 10,000 hours LED -rated 100,000 hours 1/2 life (LED is internally ballasted for voltages to 24VDC)

Physical

Seals	Insert, base & bracket are sealed
Base	Nylon 66 GF rated to 85°C with a 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 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 of actual switch only.
Corrosion Resistance	Mixed Flowing Gas MFG Class III per ASTM B-827 & B-845, Method H, with 3 years exposure.
Operating Temperature	-40°C to +85°C
Vibration 1	Per Mil-Std 202F, Method 204D 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 24-50 Hz 0.40 DA 50-2000 ±10 G's peak Results Horizontal Axis 3-5 G's max. Random 24 Hz 0.06 PSD-Gsq/H 60 Hz 0.50 100 Hz 0.50 200 Hz 0.025 2000 Hz 0.025 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.

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 ³

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) ²

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 ^{1,2}

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)

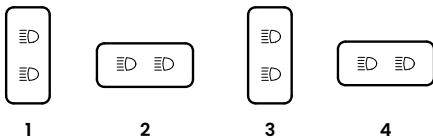
2 Not Painted (used with Insert Colors A-F)
5 Clear Laser Etch Background Color (used with Insert Color 9)
A White Laser Etch Background Color (used with Insert Color 9)

10. LEGEND OVER LAMP ¹

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 ²

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

Notes:

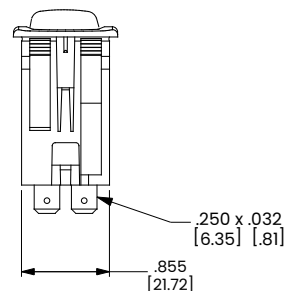
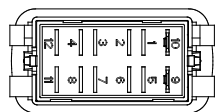
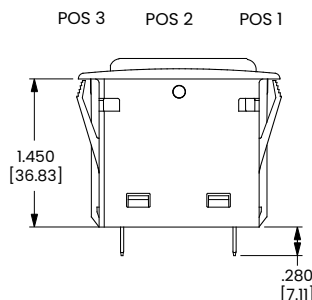
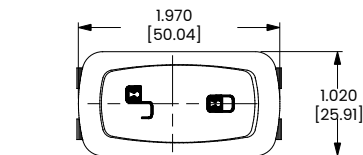
- To order separately, specify LPC and selection 7 code. Ex LPC-9
- For LEDs, insert color must be clear, white or match color of LED.
- For connector, specify part number LC2-01 (.187 tabs), LC3-01 (.250 tabs).

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]





Littelfuse®



Carling Technologies®

A Littelfuse® Brand

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 10 amps, 250 VAC 3/4 HP 125-250 VAC 15 amps, 12-30 VDC
Life	25,000 cycles circuit dependent 50,000 cycles circuit dependent consult factory for applicable circuits.
Contact	Fine silver, silver cad-oxide
Terminals	Brass or copper/silver plate 1/4" (6.3mm) Quick Connect terminations standard. Solder lug - Brass Tin Plated Wire Lead 16 gauge standard 105°C 600VAC Screw Terminals - Brass

Agency Certifications

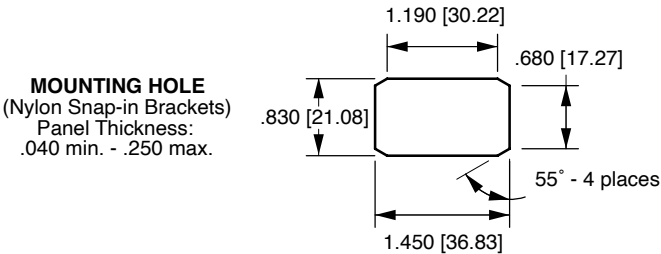
UL, CSA and VDE

Select circuits and constructions with VDE/IEC approvals are available. Consult factory

Physical

Lighted	Incandescent - rated 10,000 hours Neon - rated 25,000 hours
Seals	Bracket - Actuator WBL/MBL optional external gasket panel seal
Operating Temperature	Up to 85° C 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 ²

solder	.250	screw	wire
lug	tab	term.	leads
TIGA50	TIGA51	TIGA54	TIGA55
TIGA5A	TIGA5B	TIGA5E	TIGA5F
TIGA5L	TIGA5M	TIGA5S	TIGA5T
TIGB50	TIGB51	TIGB54	TIGB55
TIGB5A	TIGB5B	TIGB5E	TIGB5F
TIGC50	TIGC51	TIGC54	TIGC55
TIGC5A	TIGC5B	TIGC5E	TIGC5F
TIGC5L	TIGC5M	TIGC5S	TIGC5T

Three Pole

solder	.250	screw	wire
lug	tab	term.	leads
TIHK50	TIHK51	TIHK54	TIHK55
TIHK5A	TIHK5B	TIHK5E	TIHK5F
TIHK5L	TIHK5M	TIHK5S	TIHK5T
TIHL50	TIHL51	TIHL54	TIHL55
TIHL5A	TIHL5B	TIHL5E	TIHL5F
TIHM50	TIHM51	TIHM54	TIHM55
TIHM5A	TIHM5B	TIHM5E	TIHM5F
TIHM5L	TIHM5M	TIHM5S	TIHM5T

VDE APPROVED

10A 250VAC, 15A 125VAC, 12(6)A 250VAC T85

Single Pole in Double Pole base ²

solder	.250	wire
lug	tab	lead
TIGA90	TIGA91	TIGA95
TIGB90	TIGB91	TIGB95
TIGC90	TIGC91	TIGC95

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 ¹²
1C	Angular/Cross Serrations Gloss ¹²
1F	Flatted/Smooth Face Gloss ¹²
1L	Angular/Longline Serrations Gloss ^{1,12}
2L	Long Smooth/Narrow ¹
6M	Curved/Smooth Face Matte ³
6S	Curved/Smooth Face Gloss ³
7S	Rounded Paddle/Smooth Face Gloss ¹
7N	Witch's Hat/Narrow ¹⁴
7P	Witch's Hat/Wide ¹⁴

3. ACTUATOR COLOR

BL	Black
WH	White
RD	Red

4. BRACKET STYLE

A	Screw Mount ⁵
B	Screw Mount ^{5,12}
C	Screw Mount ⁵
H	Screw Mount ⁵
NBL	Nylon Black
WBL	Water shedding Black ⁴
MBL	Marine Style Black ^{4,6}
FN	Metal Snap-In ⁵
FN BLK	Black Metal Snap-In ⁵
FN SS	Stainless Steel Snap-In ⁵
FW	Wide Stainless Steel Snap-In ⁵

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 ¹
1C	Angular/Cross Serrations Gloss ¹
1L	Angular/Longline Serrations Gloss ¹
6M	Curved/Smooth Face Matte ³
6S	Curved/Smooth Face Gloss ³
7S	Rounded Paddle/Smooth Face Gloss ²

5. BRACKET STYLE 11

NBL	Nylon Black
WBL	Water shedding Black ⁵
MBL	Marine Style Black ^{5,8}
FN	Metal Snap-In ^{4,6}
FN BLK	Black Metal Snap-In ^{4,6}
FN SS	Stainless Steel Snap-In ^{4,6}

3. ACTUATOR COLOR 11

BL	Black
WH	White
RD	Red

4. LENS COLOR 13

AM	Amber
LU	Blue ⁷
RC	Red
CL	Clear
GN	Green ⁷
WH	White

6. LAMP VOLTAGE

neon ⁹			
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.

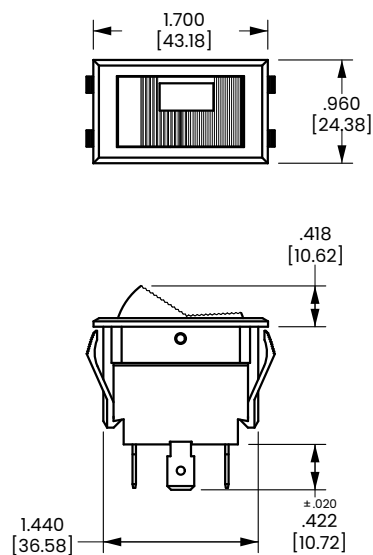
 [Configure Complete Part Number >](#)

 [Browse Standard Parts >](#)

Dimensional Specs

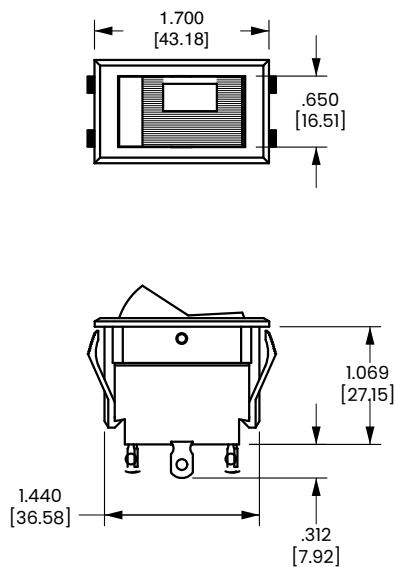
inches [millimeters]

1C
CROSS-LINE W/ONE LENS



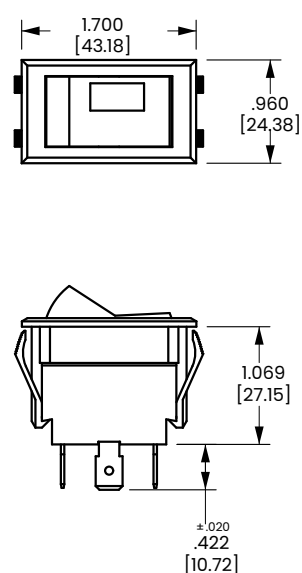
WITH .250 TAB
TERMINALS
AND NBL BRACKET

1L
LONG-LINE W/ONE LENS



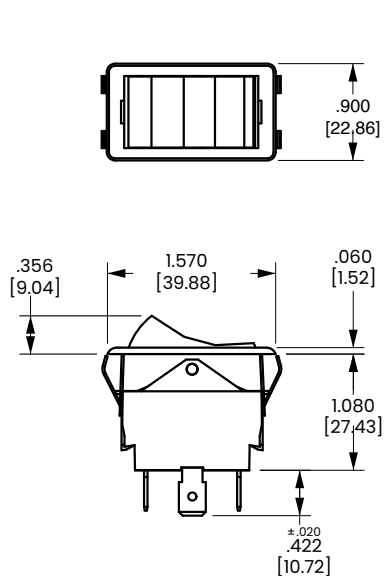
WITH SOLDER LUG
TERMINAL
AND NBL BRACKET

1S
SMOOTH W/ONE LENS



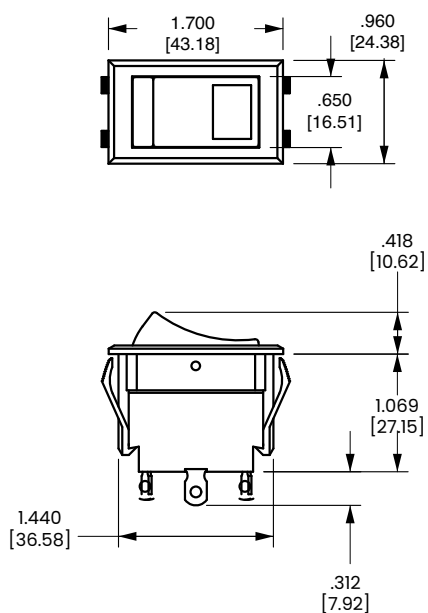
WITH .250 TAB
TERMINALS
AND NBL BRACKET

1F
FLATTED STYLE NO LENS



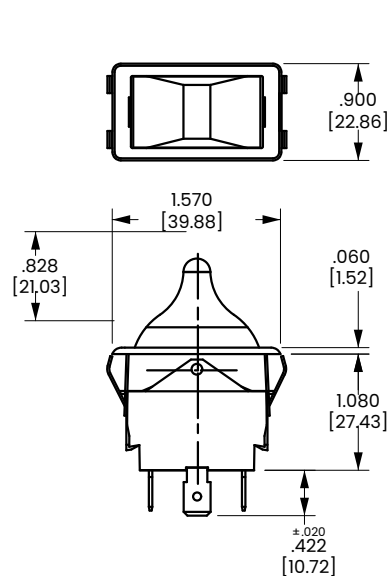
WITH .250 TAB
TERMINALS
AND FN BRACKET

6M, 6S
CURVED W/ONE LENS



WITH SOLDER LUG
TERMINALS
AND NBL BRACKET

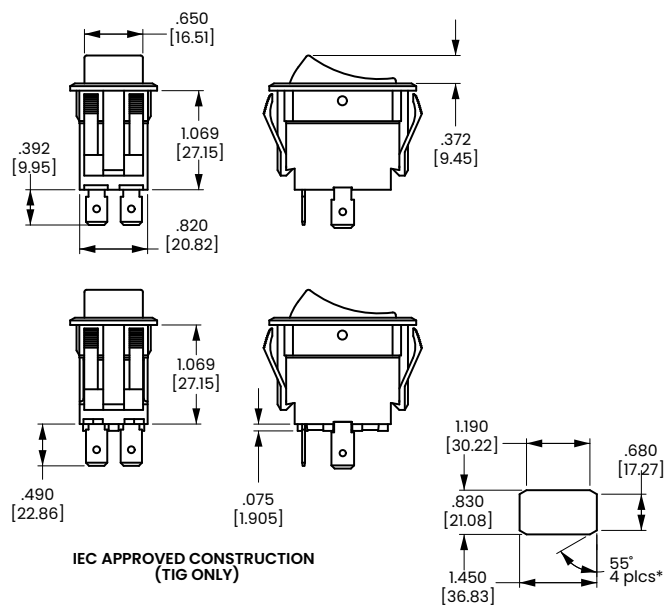
7S
TOGGLE-STYLE W/ONE LENS



WITH .250 TAB
TERMINALS
AND FN BRACKET

Dimensional Specs

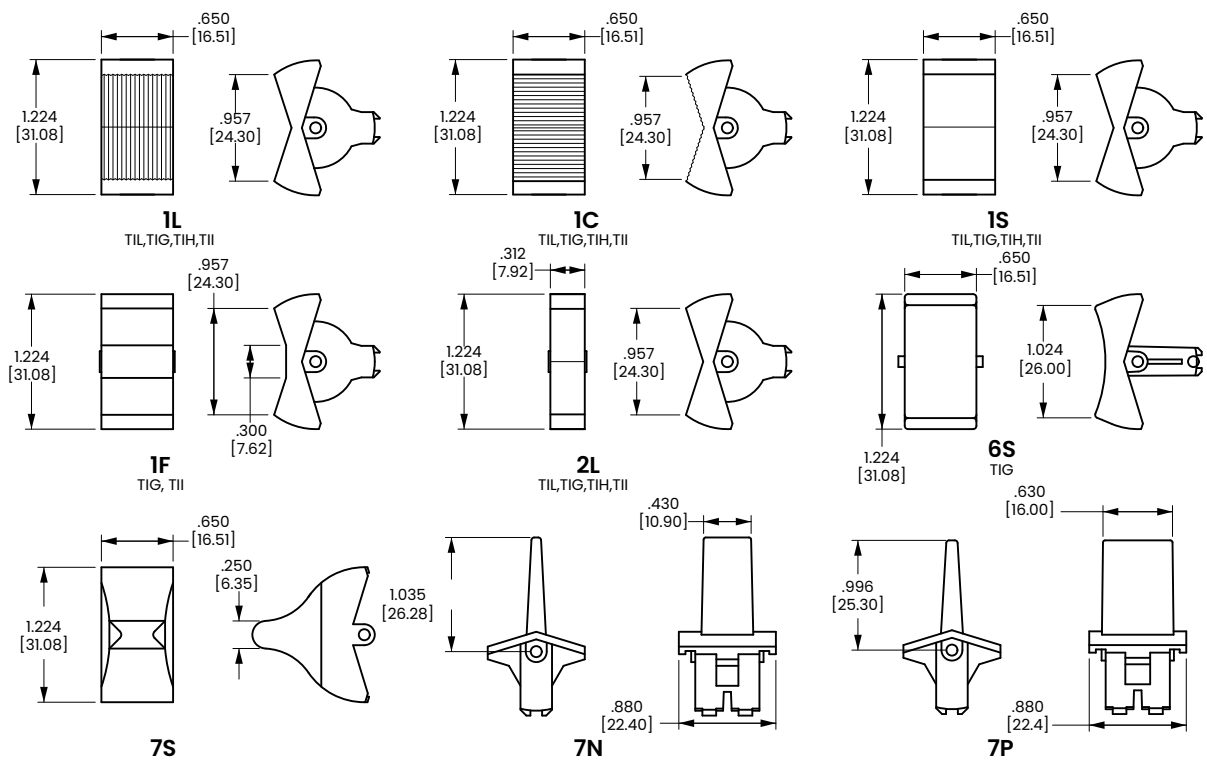
inches [millimeters]



 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)

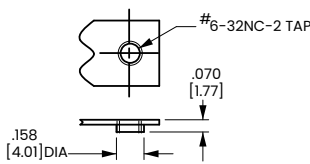
* Angled corners are suggested for optimum fit. Standard rectangular cutout is acceptable.



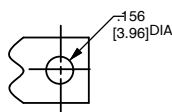
SPECIAL CIRCUITS FOR TIPPETTE ROCKER SWITCHES				
Circuit	Position 1	Position 2	Position 3	
Progressive Two Circuit				
GG	Both Circuits ON	One Circuit ON	OFF	
GG	Both Circuits (ON)	One Circuit ON	OFF	
Single Pole Triple Throw				
GE	ON	ON	ON	
Two Circuit				
GH	Circuit 1 ON	Both Circuits ON	Circuit 2 ON	
GP	Circuit 2 ON	Circuit 1 ON	OFF	
Reversing Double Pole Double Throw				
GO	ON	OFF	ON	
GX	ON	NONE	ON	

Dimensional Specs

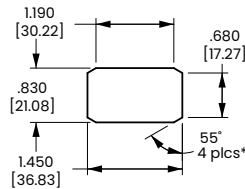
inches [millimeters]



TAPPED HOLE
Standard with
A & B Brackets



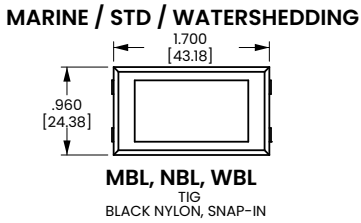
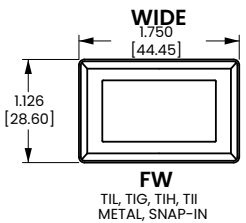
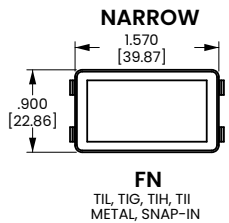
CLEARANCE HOLE
Standard with
C Bracket



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





Littelfuse®



Carling Technologies®

A Littelfuse® Brand

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	

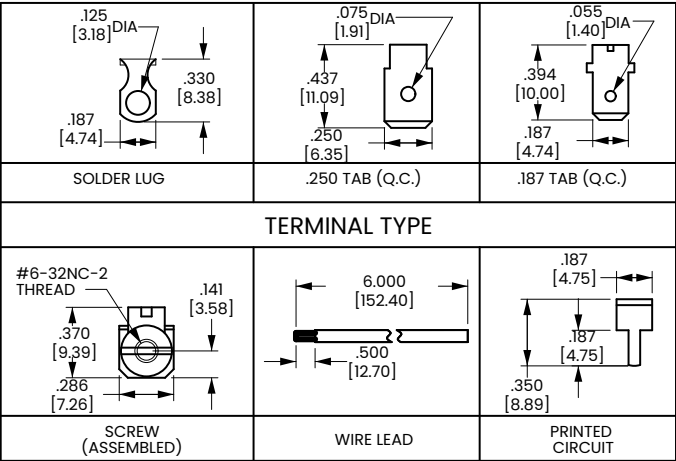
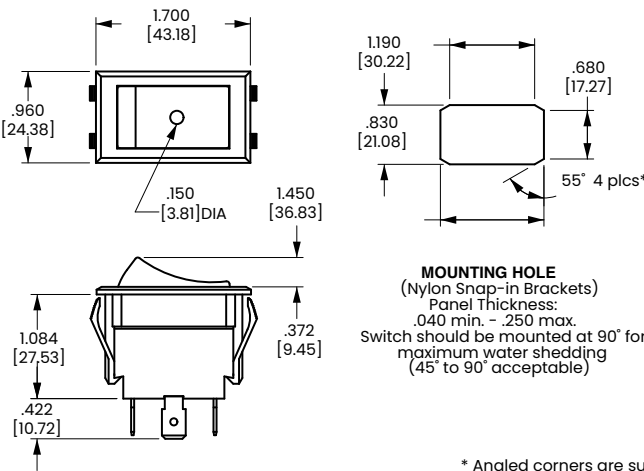
- 1 Independent lamp is standard. Dependent lamp with ON-OFF function (including momentary) is available with Lighting Sequences 10, 20, 30, 40 and 50. (No light in OFF position.)
- 2 Green and blue not recommended with 125 volt or 250 volt neon lamps.
- 3 Additional terminations available. Consult factory.
- 4 Custom colors available. Consult factory.
- () Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]



* 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:	1	2	3
SP	DP	5 & 7, 6 & 8	Connected Terminals 3 & 5, 4 & 6
16	26	ON	OFF
18	28	(ON)	OFF (ON)
SPECIAL CIRCUITS			
31		(6 & 8)	4, 5, 6, 7 OFF
41	51	ON	OFF NONE 1
42	52	(ON)	OFF NONE 1
43	53	(ON)	3 & 5 NONE 1
44	54	ON	3 & 5 NONE 1
45	55	(ON)	OFF ON
46	56	NONE	5 & 7 ON
47	57	NONE	5 & 7 (ON)
	75	(5 & 7, 3 & 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
S	NONE	INDEPENDENT	-
A	1	INDEPENDENT	1 (+) 2 (-)
C	1	INDEPENDENT	1 (+) 2 (-)
	2	INDEPENDENT	9 (+) 2 (-)
D	1	INDEPENDENT	1 (+) 2 (-)
	2	INDEPENDENT	9 (+) 10 (-)
E	1 & 3	INDEPENDENT	1 (+) 2 (-)
		PARALLEL	
F	1	INDEPENDENT	1 (+) 10 (-)
		SNAP	
G	1 & 2	INDEPENDENT	1 (+) 10 (-)
		DEPENDENT	9 (+) 2 (-)
H	1 & 2	INDEPENDENT	1 (+) 2 (-)
		DEPENDENT	9 (+) 10 (-)
J	1, 2 & 3	INDEPENDENT	1 (+) 2 (-)
		DEPENDENT	5 (+) 10 (-)
		INDEPENDENT	1 (+) 2 (-)
K	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	0				
LED	Red	Orange	Yellow	Green	
12VDC	A	C	E	H	
24VDC	B	D	F	J	

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

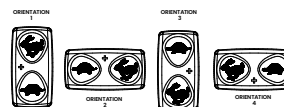
Z No Legend **1** Clear

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:

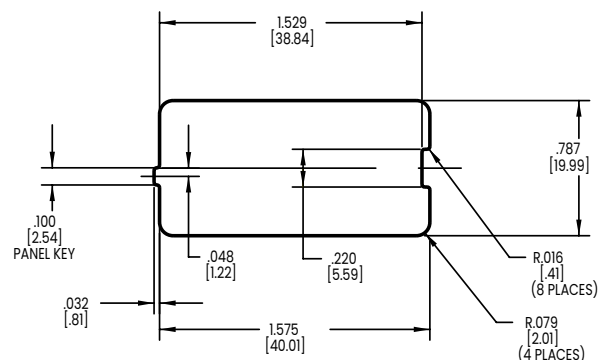
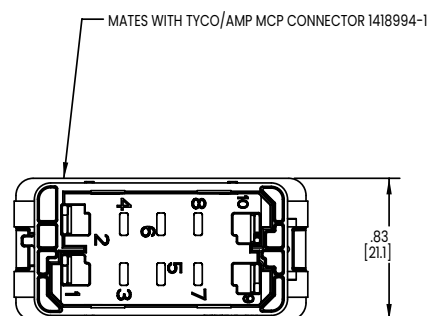
- 1 Indicates 1/2 travel for actuator.
- 2 Snap-Action Contact Mechanism
- 3 Not available with circuit 98.
- 4 Available with circuit 98 only.
- 5 Located over T1-2.
- 6 Legend 2 located in center of rocker, Legend 3 located over T9-10. Legend 2 options are limited due to a very small marking area. Consult factory for specifics.

[Configure Complete Part Number >](#)

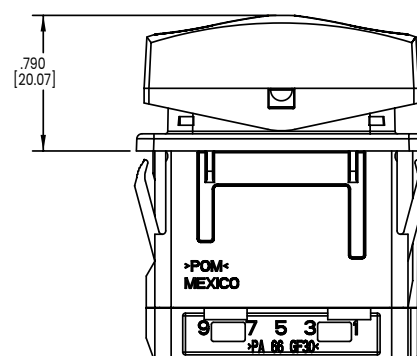
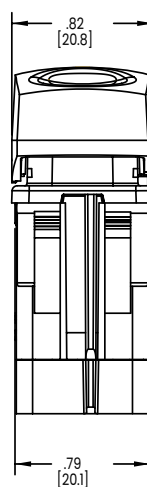
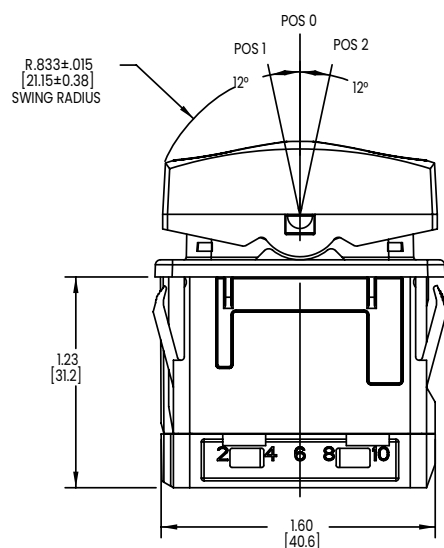
[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]



PANEL THICKNESS: 2.5±0.1mm
PANEL OPENING CLEARANCE: ±5°
SCALE 2.000





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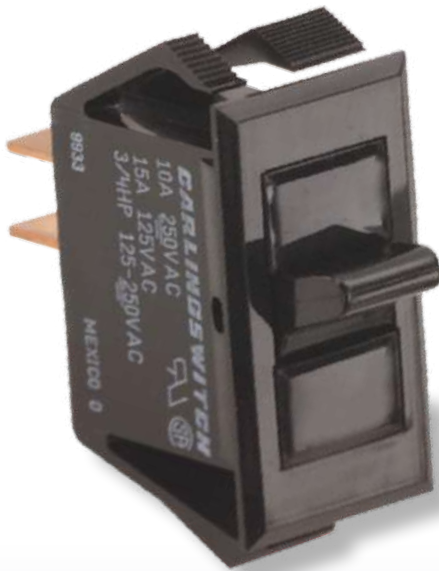
A Littelfuse® Brand

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 >](#)

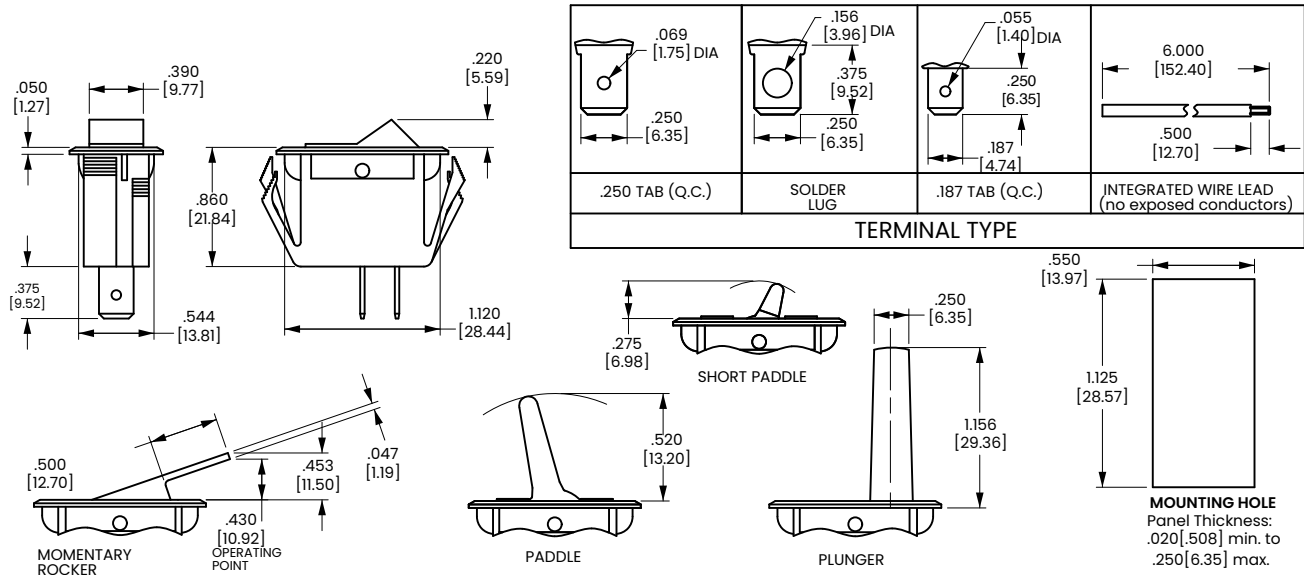
2. ACTUATOR STYLE

T Rocker
P Paddle

PS Short Paddle

Dimensional Specs

inches [millimeters]

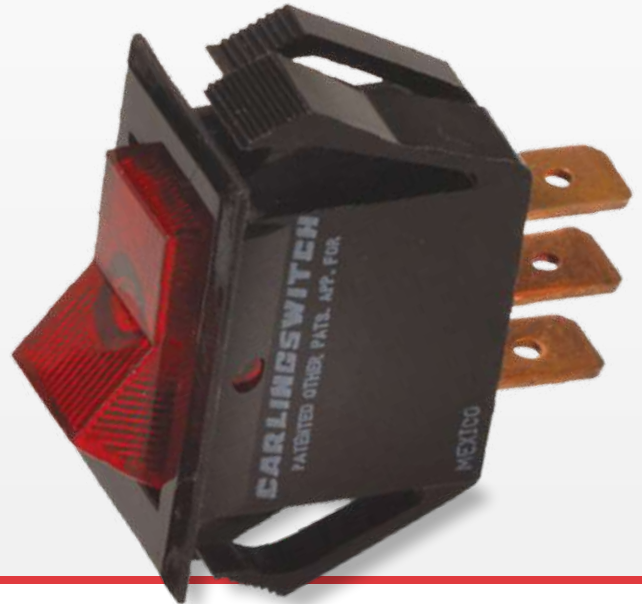


LTA-Series

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:

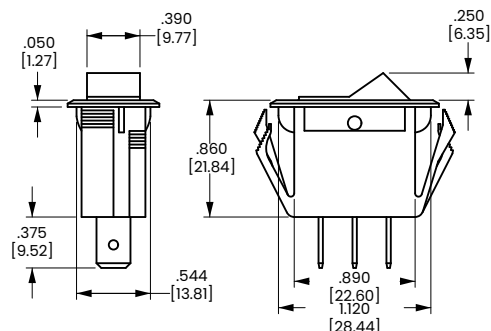
- 1 Additional ratings and colors are available. Consult factory for details.
- 2 Neon lamps not recommended with green or blue rocker/lenses.
- 3 Lens color is specified only if actuator style is P or PS. If style is T (rocker), then leave position 5 blank.
- 4 Available with paddle ("P & PS") style actuators only.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

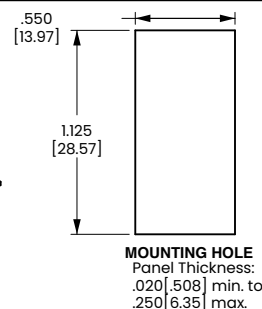
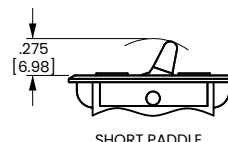
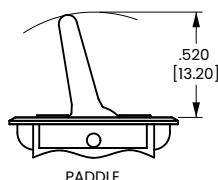
Dimensional Specs

inches [millimeters]



 .069 [1.75] DIA .250 [6.35]	 .156 [3.96] DIA .375 [9.52] .250 [6.35]	 .055 [1.40] DIA .250 [6.35] .187 [4.74]	 6.000 [152.40] .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	O	1	3	5
(On)-None-Off	A	B	D	T
On-None-(Off)	L	M	R	F
On-None-On	O	1	3	5
On-None-(On)	A	B	D	F
On-Off-On	O	1	3	5

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
6V 6 volt	125N 125 volt neon
12V 12 volt	250N 250 volt neon
18V 18 volt	
24V 24 volt	
28V 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.

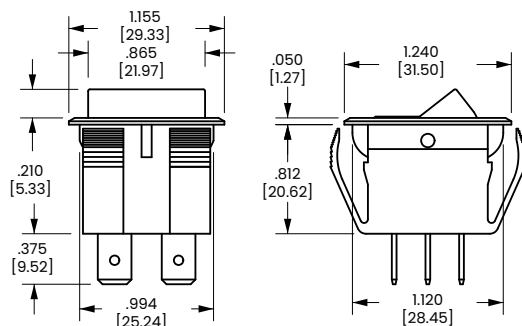
- 1 Custom colors are available. Consult factory.
2 Specify lens color for LTG-Series only.
() Indicates momentary function.

[Configure Complete Part Number >](#)

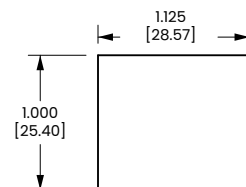
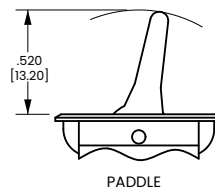
[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]



 .069 [1.75] DIA .250 [6.35]	 .156 [3.96] DIA .375 [9.52] .250 [6.35]	 .055 [1.40] DIA .250 [6.35] .187 [4.74]	 6.000 [152.40] .500 [12.70]
TERMINAL TYPE			

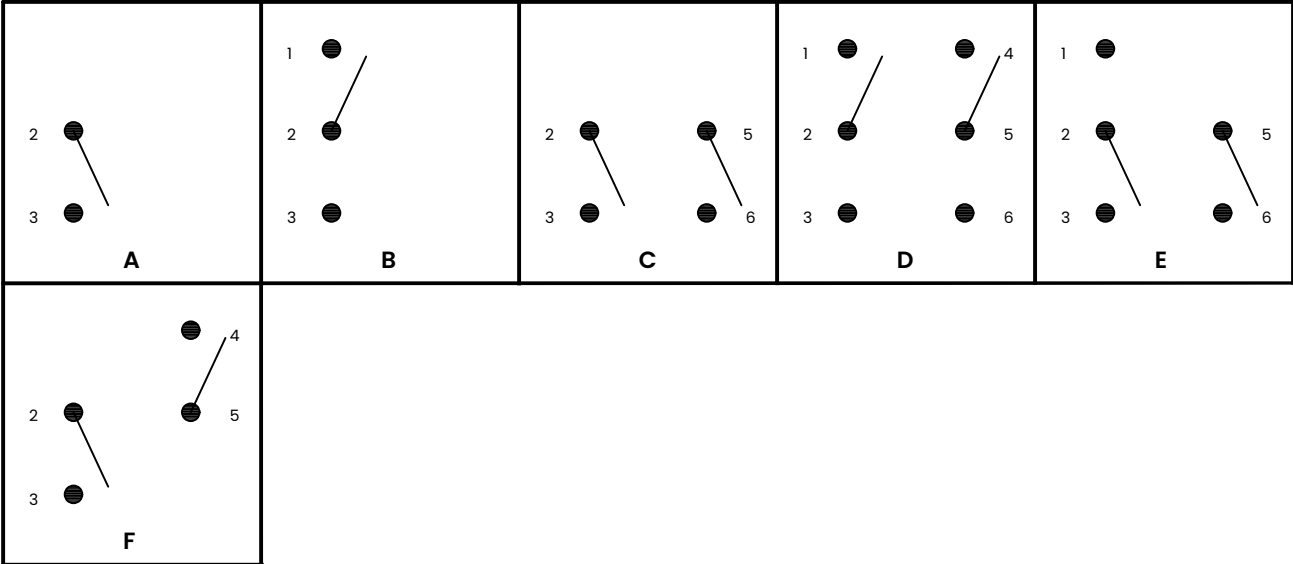


Panel Thickness:
.030 [.762] min. to
.250 [6.35] max.

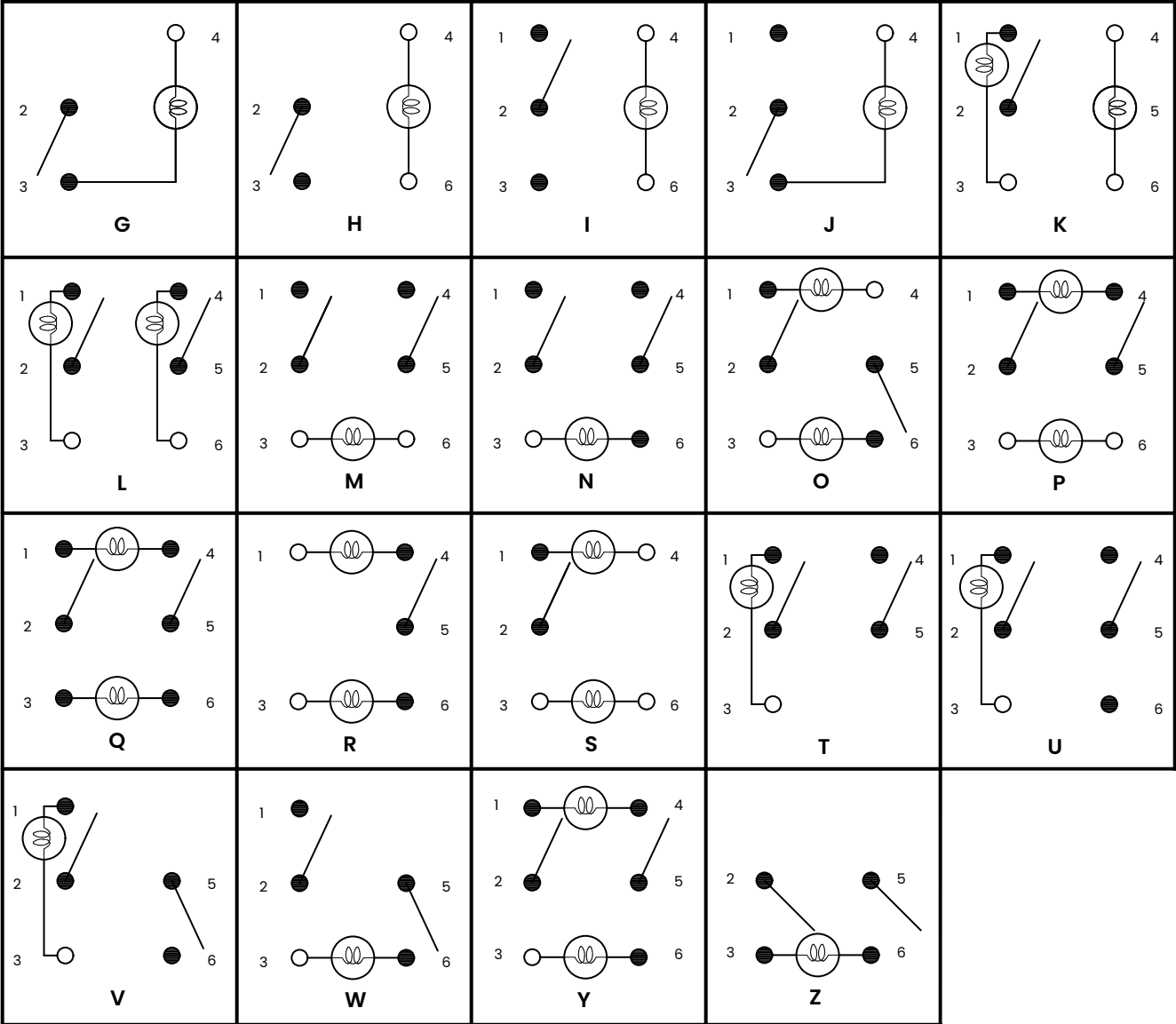
Ordering Scheme Diagram

2. CIRCUIT

TG



LTG

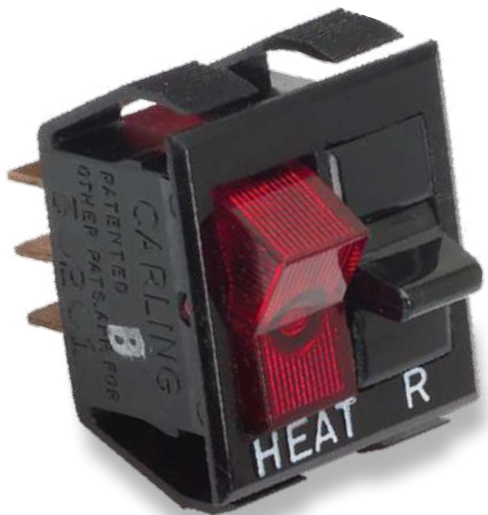
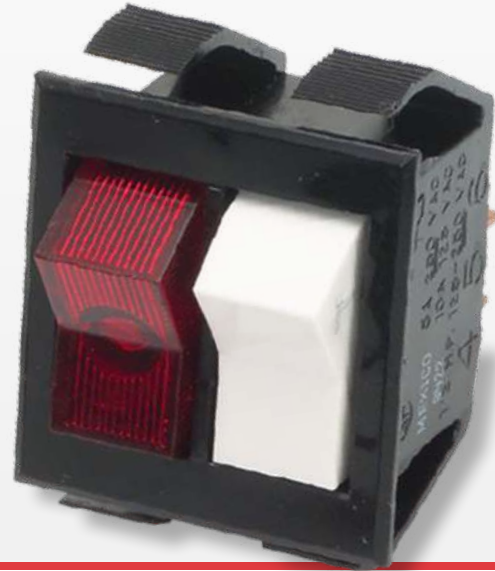


TTG-Series

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

	Base Only				Switch 1				
Sample Part Number	TTG	T -	TA	20	1 -	T	B -	B	/
Selection	1	2	3	4	5	6	7	8	

	Switch 2									
	LTA	20	1		P	B -	B	R	/	125N
	3	4	5		6	7	8	9		10

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 ¹		lighted ²	
B	Black	A	Amber
W	White	C	Clear
		G	Green
		LU	Blue
		R	Red

8. BASE COLOR

B Black **W** White

9. LENS COLOR 3

A	Amber	G	Green	R	Red
C	Clear	LU	Blue	W	White

10. LAMP VOLTAGE

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	

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 LTA with rocker only.

3 Specify lens color for LTA with paddle actuators only.

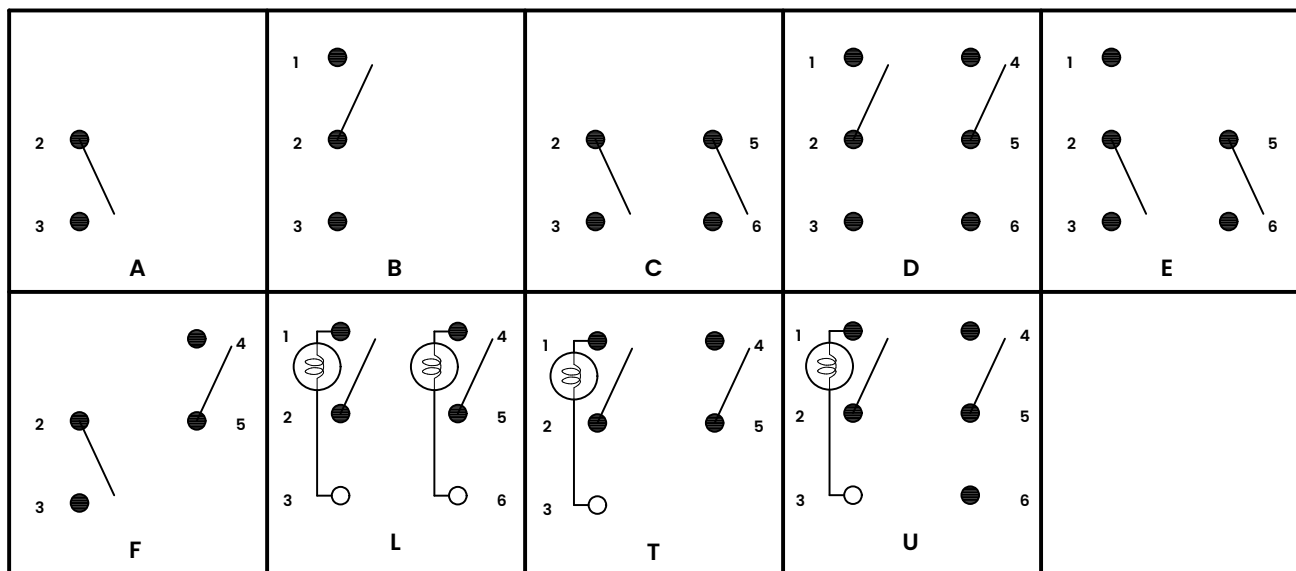
() Indicates momentary function.



 Browse Standard Parts >

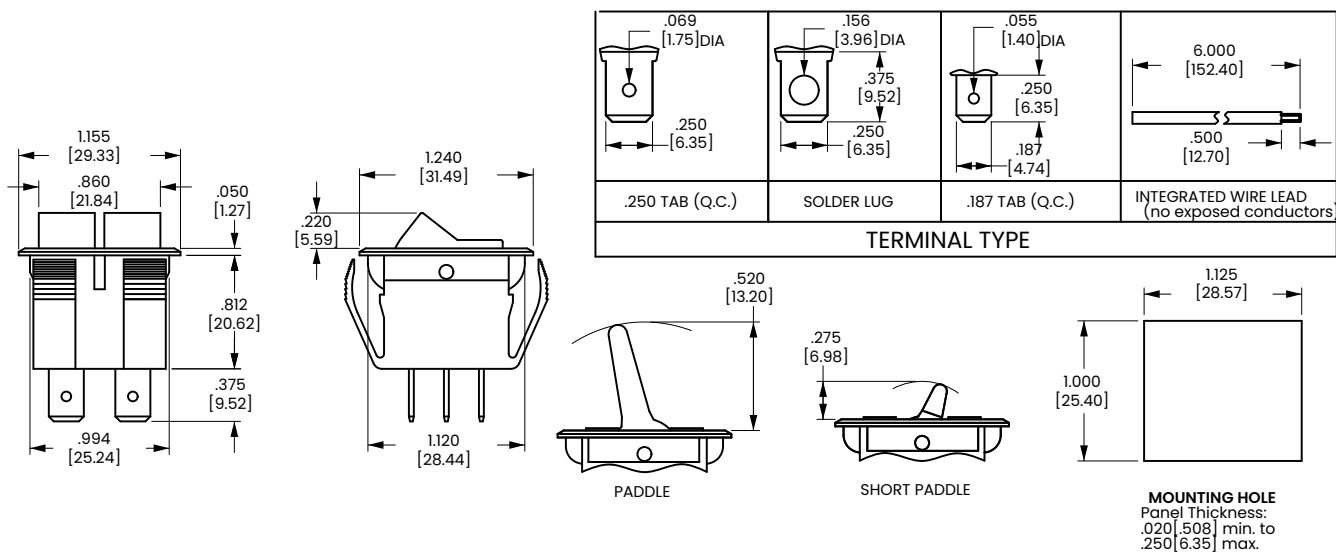
Ordering Scheme Diagram

2. CIRCUIT



Dimensional Specs

inches [millimeters]





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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 2

P Paddle
T Rocker
PS Short Paddle

9. ACTUATOR COLOR

unlighted ²
B Black
W White

lighted
A Amber
C Clear
G Green
LU Blue
R Red

10. BASE COLOR 2

B Black **W** White

11. LENS COLOR 1,3

A Amber **G** Green **R** Red
C Clear **LU** Blue **W** White

12. LAMP VOLTAGE 1

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.

1 Neon Lamps not recommended with green or blue actuators and lenses.

2 Custom colors are available. Consult factory.

3 Specify lens color only if actuator is lighted paddle.

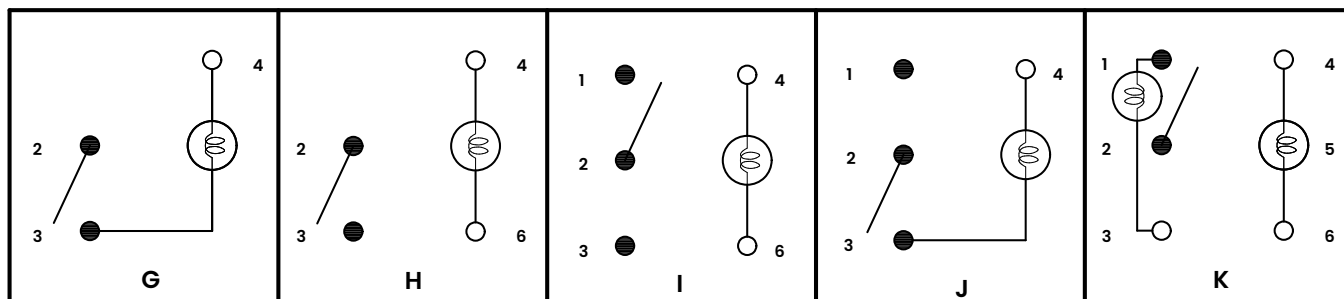
() Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

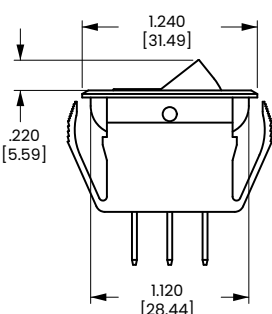
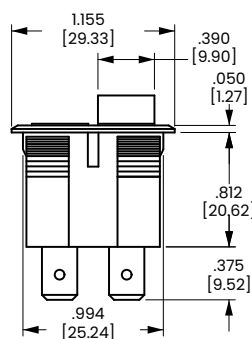
Ordering Scheme Diagram

2. CIRCUIT

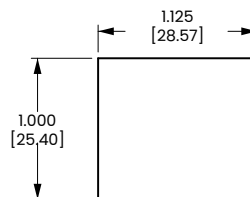
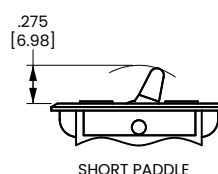
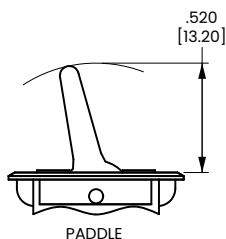


Dimensional Specs

inches [millimeters]



.250 TAB (Q.C.)	SOLDER LUG	.187 TAB (Q.C.)	INTEGRATED WIRE LEAD (no exposed conductors)
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

- 1¹ 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 | C ² 28V Incandescent |
| A 6V Incandescent | J ² 125V Neon |
| B 12V Incandescent | K ² 250V Neon |

8. ROCKER FACE LEGEND

- | | |
|-----------------------|-----------------------|
| N No imprinting | F O (on rocker end) |
| A On-Off (vertical) | G II-O-I (vertical) |
| B On-Off (horizontal) | H II-O-I (horizontal) |
| D I-O (horizontal) | J Off-On (vertical) |
| E I-O (vertical) | K Off-On (horizontal) |

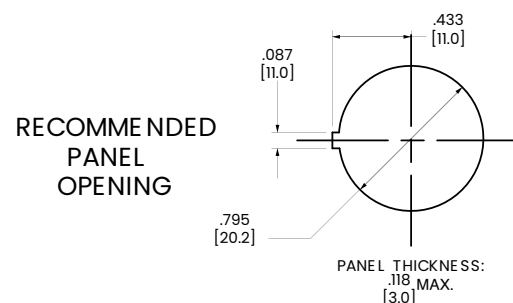
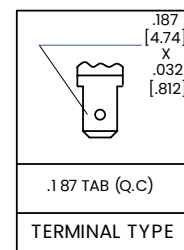
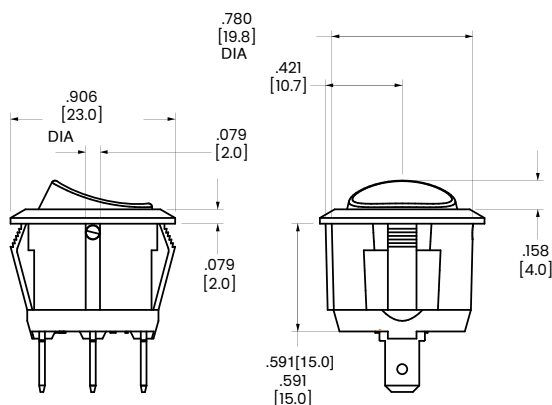
Notes:

- 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]



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
- Appliance

- HVAC
- On-Highway

- Commercial Food
- Lawn & Garden

- Medical Equipment

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

	Solder Lugs	.250 Tabs	Wire Leads
OFF-NONE-ON	RA900	RA901	RA905
ON-NONE-ON	RB900	RB901	RB905
ON-OFF-ON ³	RC910	RC911	RC915
OFF-NONE-(ON) ²	RD220	RD221	RD225

15A 250 VAC; 20A 125 VAC; 3/4 HP 125-250 VAC

	Solder Lugs	.250 Tabs
OFF-NONE-ON	RSCA200	RSCA201
ON-NONE-ON	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

	molded in	hot stamp
NO LEGEND	0	0
Off-On vertical	1	A
Off-On horizontal	2	B
O-I horizontal	8	D
O-I vertical	9	E
dual OFF-ON/O-I	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

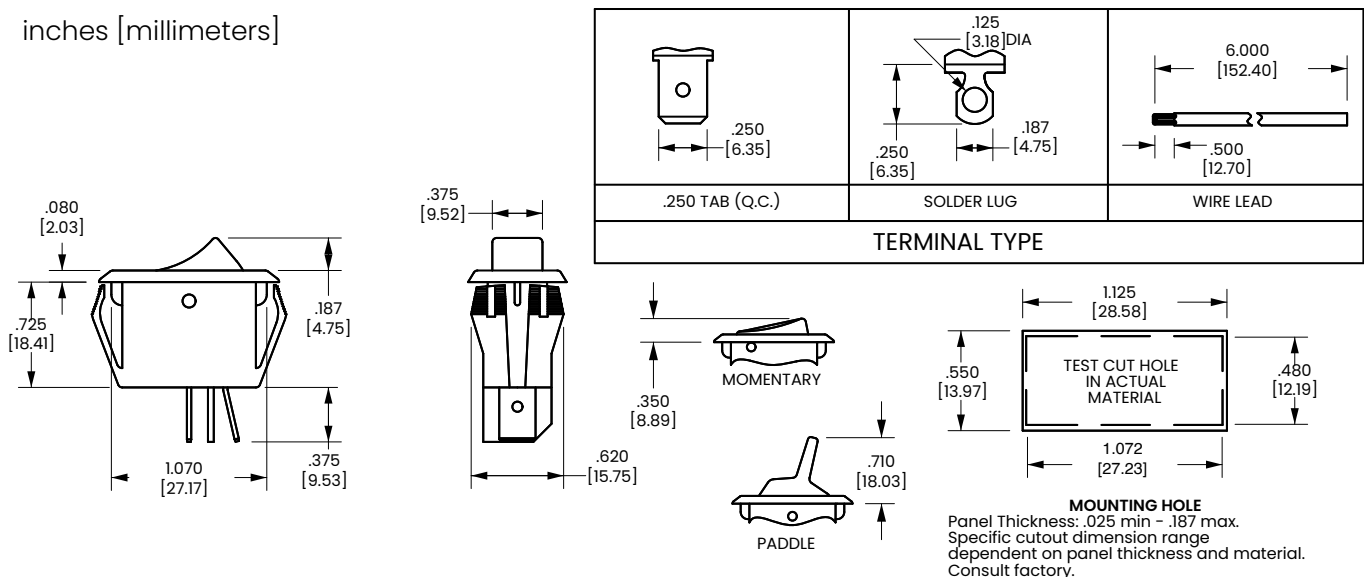
() indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

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

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.

1 Neon lamps not available with blue or green actuators.
2 Consult factory for additional ratings.

3. ACTUATOR COLOR

translucent		clear	
A	Amber	A	Amber
C	White	C	Clear
P	Yellow	G ¹	Green
S	Red	B ¹	Blue
W	Pale Red	R	Red

4. BEZEL COLOR/STYLE

STANDARD		OVAL	
B	Black (matte)	1	Black (gloss)
W	White (matte)	2	White (gloss)

5. LAMP VOLTAGE

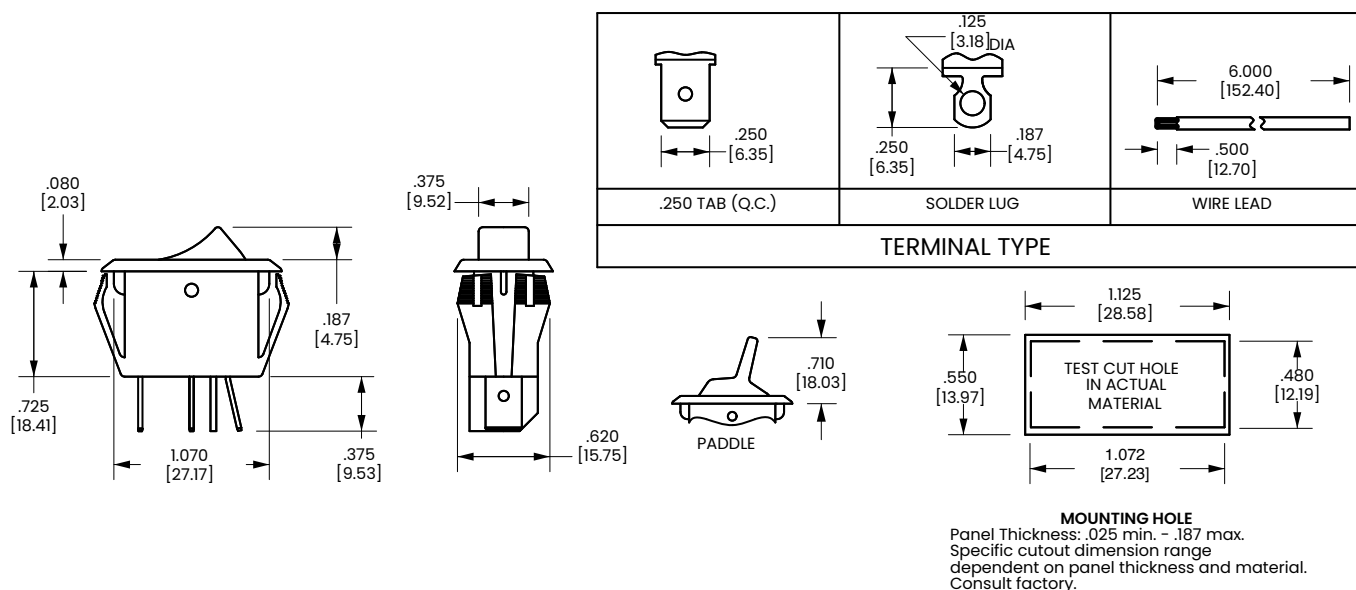
006V	6 volts incandescent
012V	12 volts incandescent
018V	18 volts incandescent
024V	24 volts incandescent
125N ¹	125 volts neon
250N ¹	250 volts neon

[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

	RGSCA900	RGSCA901	RGSCA905
OFF-NONE-ON (Single Pole)	RGSCB900	RGSCB901	RGSCB905
ON-NONE-ON (Single Pole)	RGSCC900	RGSCC901	RGSCC905
OFF-NONE-ON (Double Pole)	RGSCD900	RGSCD901	RGSCD905

European Base (22 x 30 mm cutout)

	RGSEA900	RGSEA901	RGSEA905
OFF-NONE-ON (Single Pole)	RGSEB900	RGSEB901	RGSEB905
ON-NONE-ON (Single Pole)	RGSEC900	RGSEC901	RGSEC905
OFF-NONE-ON (Double Pole)	RGSED900	RGSED901	RGSED905

4. BEZEL COLOR

1

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

2. ACTUATOR STYLE

P Paddle

R Rocker

3. ACTUATOR COLOR

1

B Black

W White

Notes:

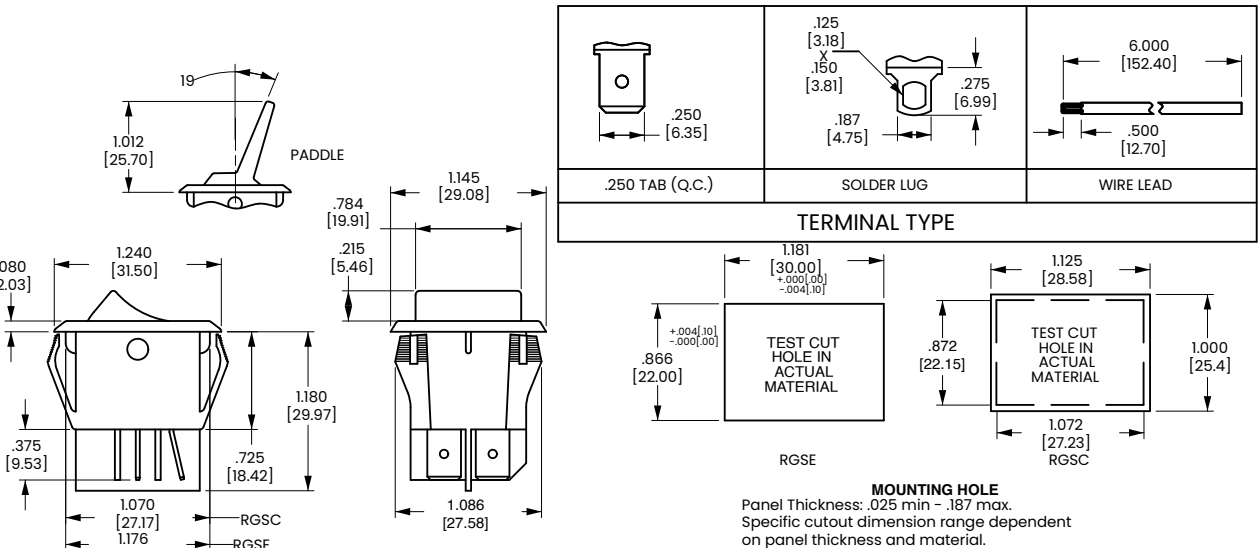
1 Additional ratings, colors and clear style actuators are available. Consult factory.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]





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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
Standard Base			
OFF-NONE-ON	LRGSCK610	LRGSCK611	LRGSCK615
European Base (22 x 30 mm cutout)			
OFF-NONE-ON (Single Pole)	LRGSEK610	LRGSEK611	LRGSEK615
15A 6-24 V³			
Standard Base			
OFF-NONE-ON	LRGSCK510	LRGSCK511	LRGSCK515
European Base (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 ^{3,5}	Blue	R	Red (clear)
C ⁴	White/Clear	S	Red
G ⁵	Green	W	Pale Red
L ³	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:

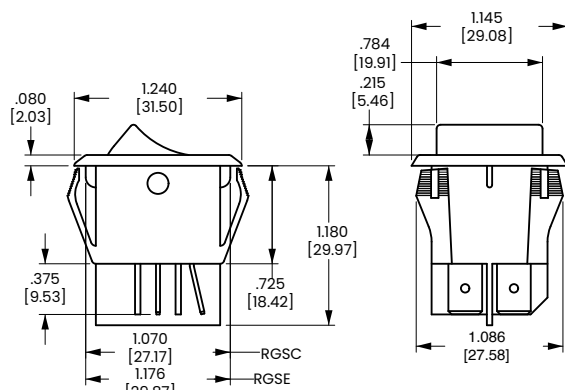
- Additional ratings, colors and clear style actuators are available. Consult factory.
- Incandescent lamps must specify 15A 24V rating only.
- Available with incandescent lamps only.
- Clear color provided where specified with clear style rocker.
- Available with clear style rocker only.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

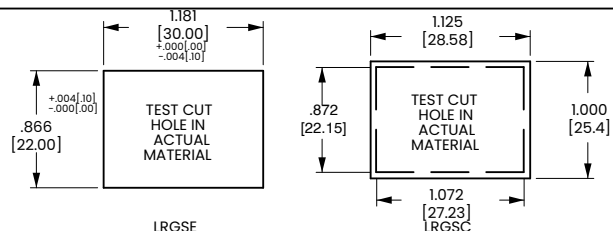
Dimensional Specs

inches [millimeters]



.250 TAB (Q.C.)	SOLDER LUG	WIRE LEAD

TERMINAL TYPE



MOUNTING HOLE

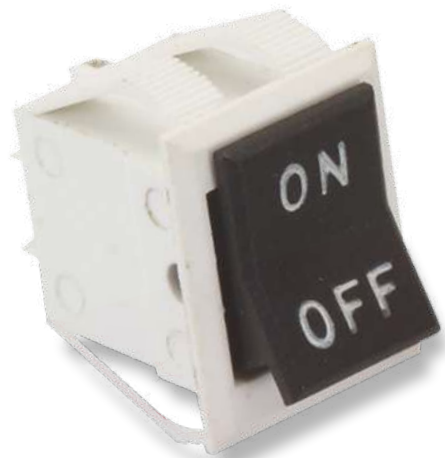
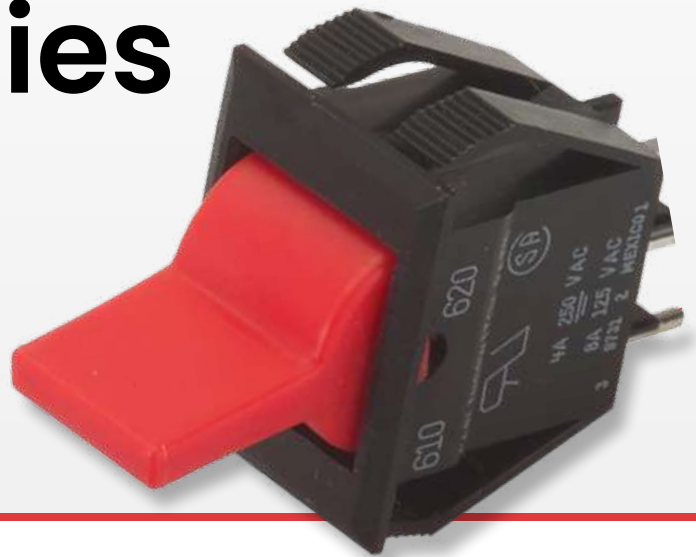
Panel Thickness: .025 min - .187 max.
Specific cutout dimension range dependent on panel thickness and material.

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
Double Pole		
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:

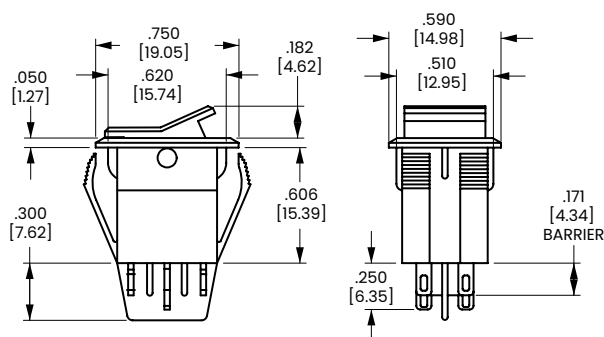
- 1 Base part number specifies black rocker and bezel. To specify paddle actuator, change 2nd digit of part number from 2 to 1 (ex. 61012421) For additional ratings and colors, consult factory.
() indicates momentary function.

[Configure Complete Part Number >](#)

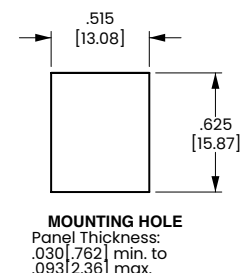
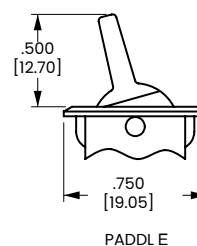
[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]



 PC TERMINAL	 END CENTER .080 [2.03] X .047 [1.19] SLOT .080 SOLDER LUG
TERMINAL TYPE	





Littelfuse®



Carling Technologies®

A Littelfuse® Brand

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 ⁴	.080 Solder Lugs	PC Terms	Wire Leads	PC Front Mount	PC Back Mount	.187 Solder Lugs
Single Pole; 4A 250VAC; 8A 125VAC; 6(4) A 250V ⁴							
ON-NONE-OFF	62116919	-	-	62111914	62111918 ⁶	62111917 ⁶	62111916
ON-NONE-ON	62116929	62116421	62111422	62111924	62111928 ⁶	62111927 ⁶	62111926
ON-OFF-ON ³	-	62111461	62111462	62111263 ⁷	-	-	-
ON-NONE-(ON) ³	-	62111431	62111432	62111233 ⁷	-	-	-
ON-OFF-(ON) ³	-	62111471	62111472	62111273 ⁷	-	-	-
(ON)-OFF-(ON) ³	-	62111481	62111482	62111283 ⁷	-	-	-
Double Pole; 4A 250VAC; 8A 125VAC; 6(4) A 250V ⁴							
ON-NONE-OFF	62115919	-	-	62112914	62112918 ⁶	62112917 ⁶	62112916
ON-NONE-ON	62115929	62112421	62112422	62112924	62112928 ⁶	62112927 ⁶	62112926
ON-OFF-ON ³	-	62112461	62112462	62112263 ⁷	-	-	-
ON-NONE-(ON) ³	-	62112431	62112432	62112233 ⁷	-	-	-
ON-OFF-(ON) ³	-	62112471	62112472	62112273 ⁷	-	-	-
(ON)-OFF-(ON) ³	-	62112481	62112482	62112283 ⁷	-	-	-

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 ⁵	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

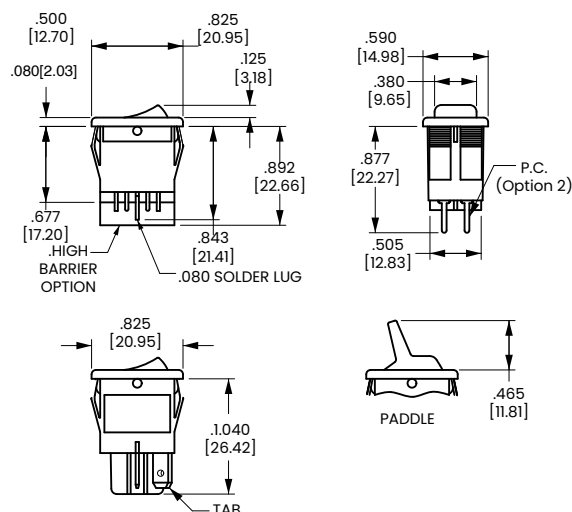
- N n/a
- V visi-red
- W visi-white

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]



<p>.171 [4.34]</p> <p>END</p> <p>CENTER</p> <p>.250 [6.35]</p> <p>.080[2.03] X .047[1.19] SLOT</p>	<p>.062 [1.57] DIA MIN</p> <p>.207 [5.261]</p> <p>.046 [1.17] x .029 [.736]</p> <p>.200 [5.08]</p> <p>.185 [4.70]</p>												
<p>.080 SOLDER LUG (terminal option 1) function 2,3,6,7,8</p> <p>PC TERMINAL FRONT MOUNT & MOUNTING PATTERN (terminal option 2) functions 2,3,6,7,8</p>													
<p>TERMINAL TYPE</p>													
<p>.187 [4.74] x .032 [.812]</p>	<p>.120 [3.05] DIA .315 [8.00]</p>												
<p>6.000 [152.40]</p> <p>.500 [12.70]</p>	<p>WIRE LEAD DIA MIN</p>												
<p>.187 TAB (Q.C) (terminal option 9) Funtion 1,2</p>	<p>.187 SOLDER LUG (terminal option 6) functions 1,2</p>												
<table><tr><th>PANEL THICKNESS</th><th>X</th><th>Y</th></tr><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></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]
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.093[2.36]-.156[3.96]	.508[12.90]	.780[19.81]											
<p>+ .004[.10] - .004[.10]</p> <p>TEST CUT HOLE IN ACTUAL MATERIAL</p>													

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 Blue²
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:

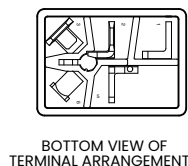
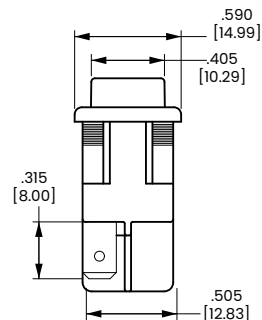
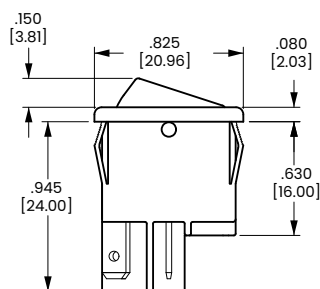
- For all incandescent or LED lamps specify 5 in 5th digit of part number.
Example 632151-1B-CN
- Available with incandescent lamps only.
- Additional colors available. Consult factory for details.

[Configure Complete Part Number >](#)

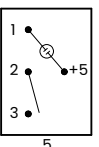
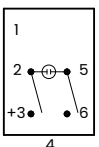
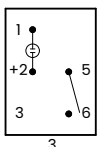
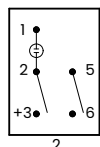
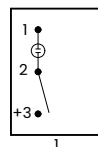
[Browse Standard Parts >](#)

Dimensional Specs

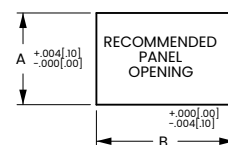
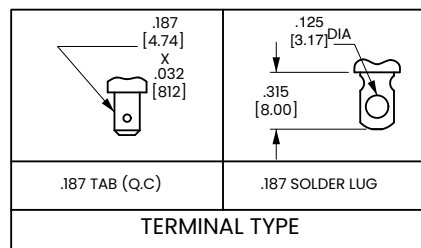
inches [millimeters]



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



Littelfuse®



Carling Technologies®

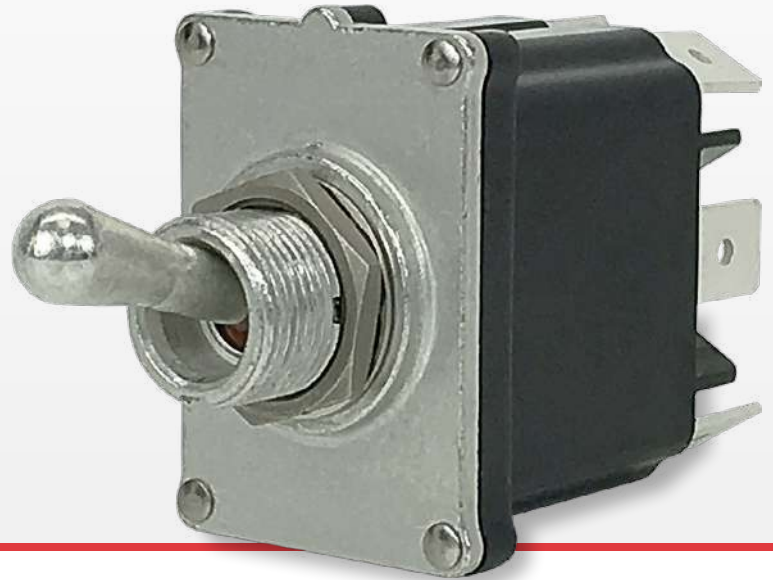
A Littelfuse® Brand

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

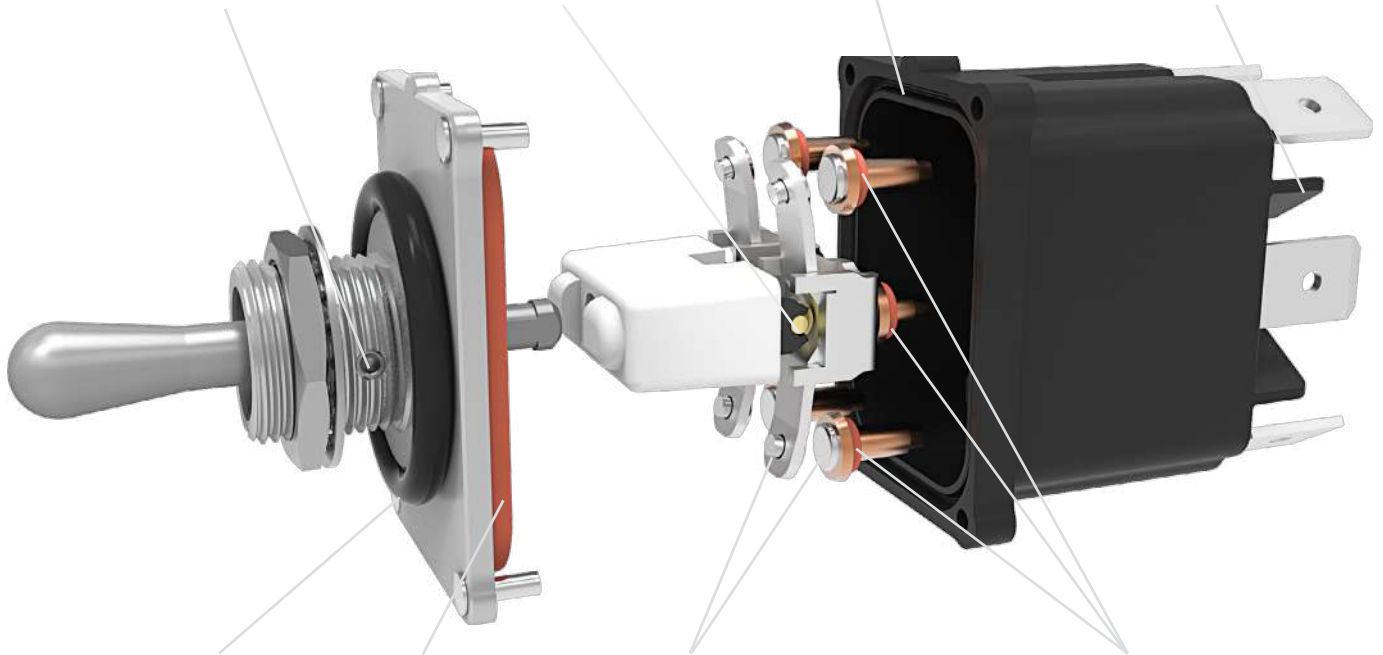
Provides rolling metal on metal actuation for maximum endurance

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 Electrical Endurance and Temperature: UL 61058-1 Momentary circuits: 25,000 operations, minimum. 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. Tab Terminal: ¼" quick-connect Screw Terminal: #6-32 brass screw and cage clamp 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 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. <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
A	ON	NONE	OFF
B	(ON)	NONE	OFF
C	ON	NONE	(OFF)
D	ON	NONE	ON
F ⁶	ON	NONE	(ON)
J	ON	OFF	ON
K	ON	OFF	(ON)
L	(ON)	OFF	(ON)
Special Circuits ⁶			
E ^{2,3}	5 & 6	5 & 3	5 & 1
G ^{2,4}	2 & 3, 5 & 6	2 & 3	OFF
M ^{2,4}	(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
5⁷ 10A 250VAC; 15A 125VAC (UL, cUL Recognized)
E 16A, 12/24VDC

5. TERMINATION

- 1** .250 (6.4mm) TAB (QC)
4 Screw with Cage Clamps
B⁵ .250 (6.4mm) TAB (QC). Jumper T2 to T5.
No terminal at T5
E⁵ Screw with Cage Clamps. Jumper T2 to T5.
No terminal at T5

6. ACTUATOR STYLE

TOGGLE (SEALED METAL)

Without Panel Seal	With Panel Seal (Bulk)	Toggle Color	Toggle Length	Bushing Length
53	58	Dull Nickel	.561	.385
73	78	Dull Nickel	.687	.385

PADDLE (SEALED PLASTIC)

Without Panel Seal	With Panel Seal (Bulk)	Paddle Color	Paddle Length	Bushing Length
B3	B8	Black	.880	.385
W3	W8	White	.880	.385
R3	R8	Red	.880	.385
Y3	Y8	Yellow	.880	.385

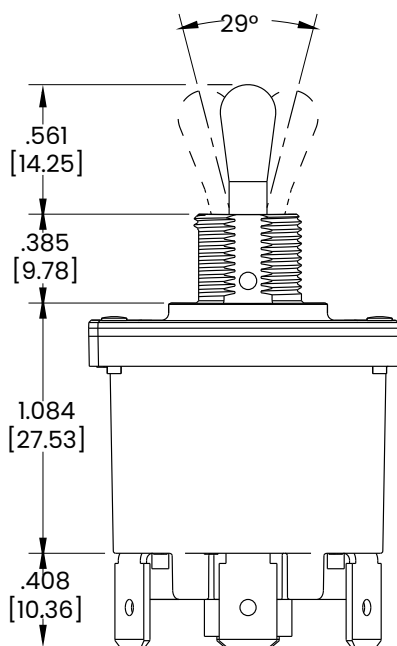
 [Configure Complete Part Number >](#)

 [Browse Standard Parts >](#)

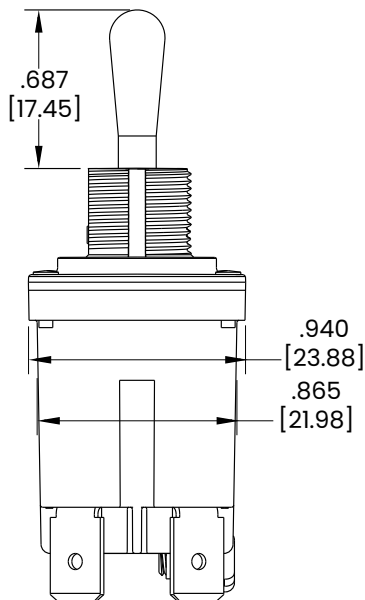
Dimensional Specs

inches [millimeters]

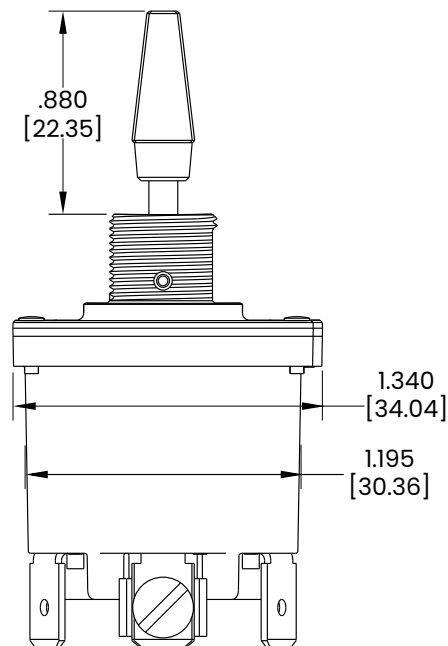
BAT TOGGLE



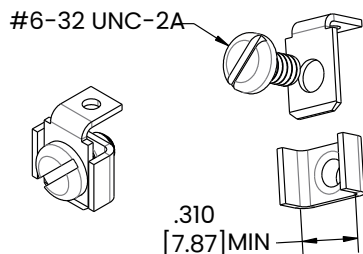
TALL BAT TOGGLE



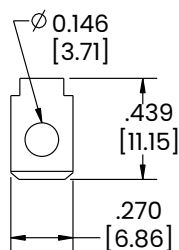
PADDLE TOGGLE



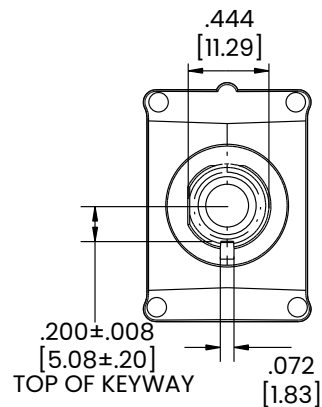
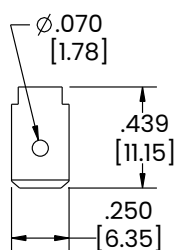
TERMINALS



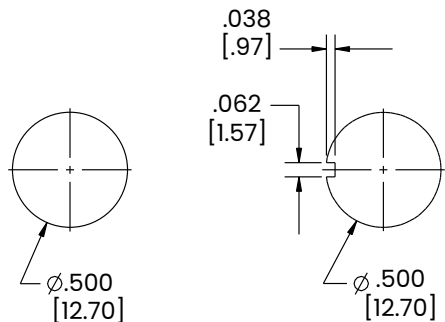
SCREW (AND CAGE) TERMINAL



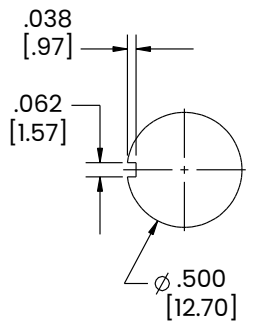
.250 TAB (Q.C.) TERMINAL



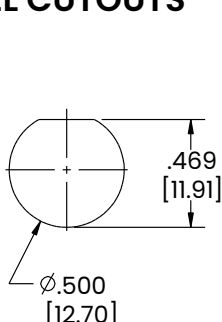
PANEL CUTOUTS



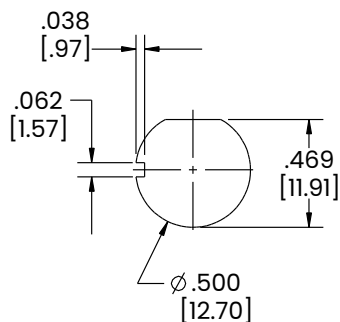
MOUNTING HOLE



WITH KEYWAY



WITH FLAT



WITH KEYWAY, FLAT



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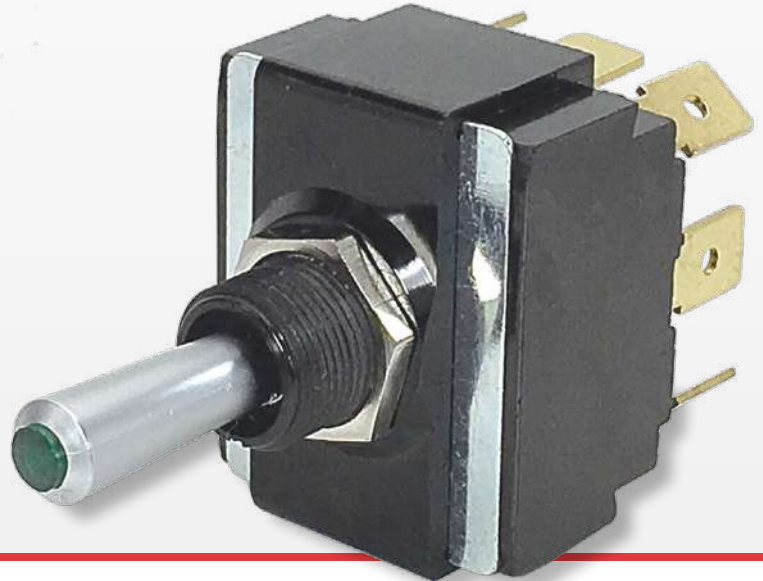
A Littelfuse® Brand

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

Paddle¹

- 1 Clear Paddle
4 Solid Color Paddle

Snapkap Style²

- 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

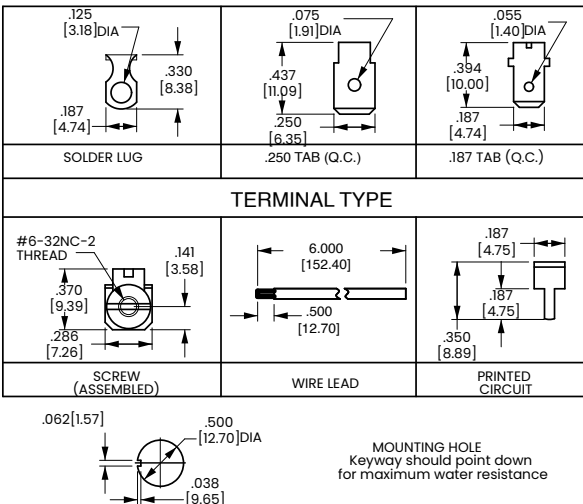
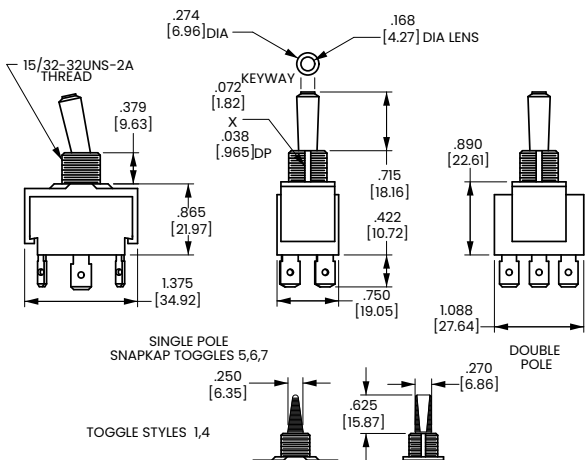
4. LAMP VOLTAGE

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]



MOUNTING HOLE
Keyway should point down
for maximum water resistance



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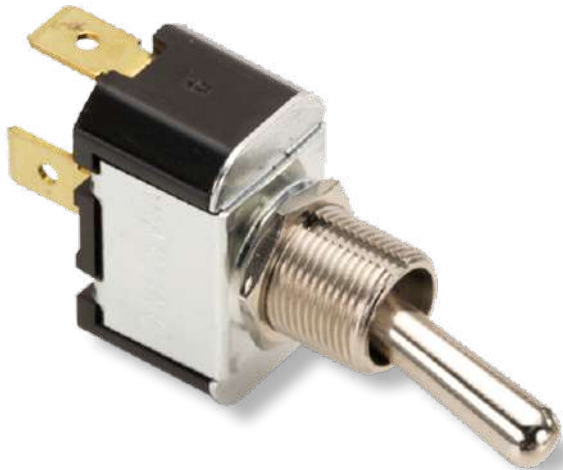
A Littelfuse® Brand

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.

1

Pole

3-20

Amps

125, 250

VAC

12-24

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 ²

	unsealed	sealed	toggle length	bushing length
73		78	0.687	0.465
E3		E8	2.000	0.465

3. TAB TERMINALS

/TABS (blank)	Tab Terminals Leave blank if tab terminals not required.
------------------	---

Notes:

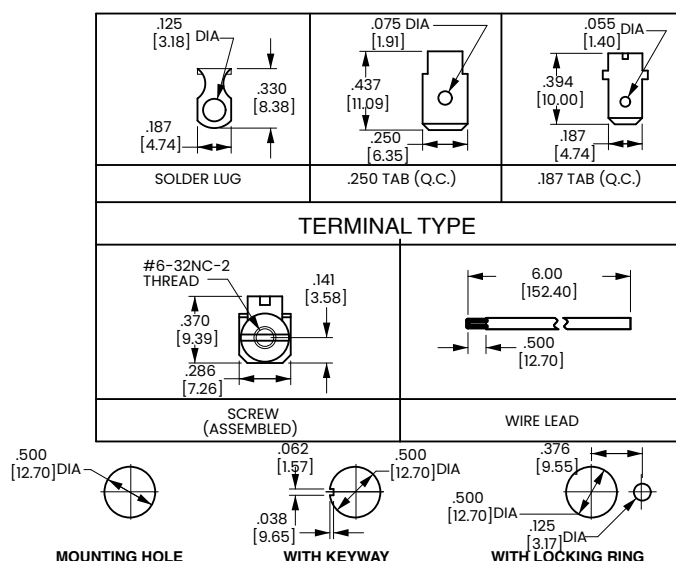
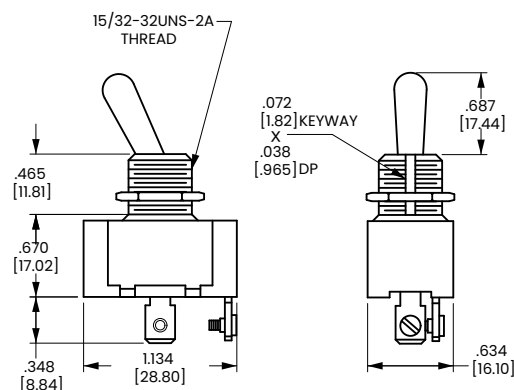
- 1 Consult factory for .187 tab, wire lead and combination screw/tab/solder lug termination callouts.
 - 2 Additional toggle options are available. Consult factory.
- () indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]





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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 3

Single Pole in Double Pole base
10A 250VAC, 15A 125VAC, 3/4 HP 125-250VAC
solder lug .250 tab screw term.

Goldenrod	250 tad	screw term.	
2GA50	2GA51	2GA54	On-None-Off
6GA5A	6GA5B	6GA5E	(On)-None-Off
6GA5L	6GA5M	6GA5S	On-None-(Off)
2GB50	2GB51	2GB54	On-None-On
6GB5A	6GB5B	6GB5E	On-None-(On)
2GC50	2GC51	2GC54	On-Off-On
6GC5A	6GC5B	6GC5E	On-Off-(On)
6GC5L	6GC5M	6GC5S	(On)-(Off)-(On)

Double Pole

solder lug	.250 tab	screw term.
2GK50	2GK51	2GK54
6GK5A	6GK5B	6GK5E
6GK5L	6GK5M	6GK5S
2GL50	2GL51	2GL54
6GL5A	6GL5B	6GL5E
2GM50	2GM51	2GM54
6GM5A	6GM5B	6GM5E
6GM5L	6GM5M	6GM5S

10A 250VAC, 15A 125VAC, 12 (6)A 250VAC T85/55 ENEC/VDE Approved¹

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, IHP 120-240 VAC available.
Consult factory for specifics.

2. ACTUATOR STYLE

	unsealed	sealed	toggle length	bushing length
Bat	73	78	0.687	0.465
Paddle ⁵	NBL3	NBL8	0.687	0.465
Bat ²	D-3B-B	-	0.687	0.379
Paddle ²	-	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.

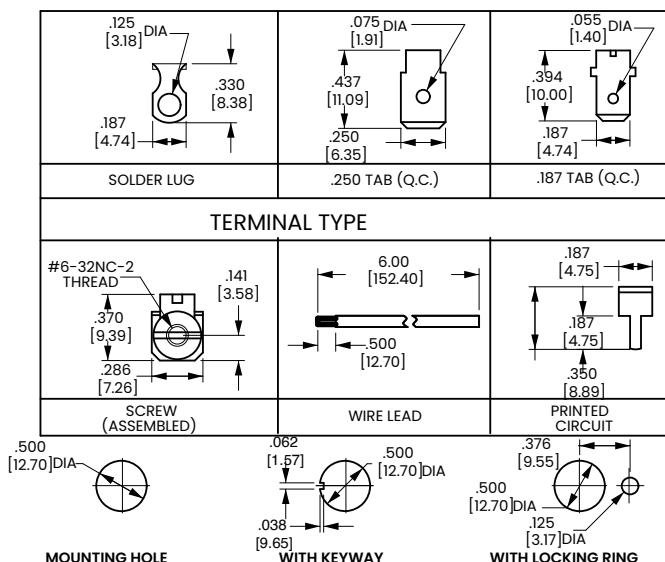
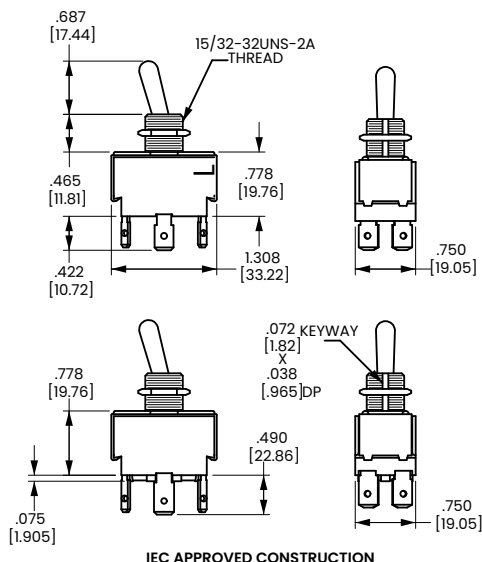
5. Nylon toggle with black ebanol plated bushing.

() Indicates momentary function.

 Configure Complete Part Number >[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]

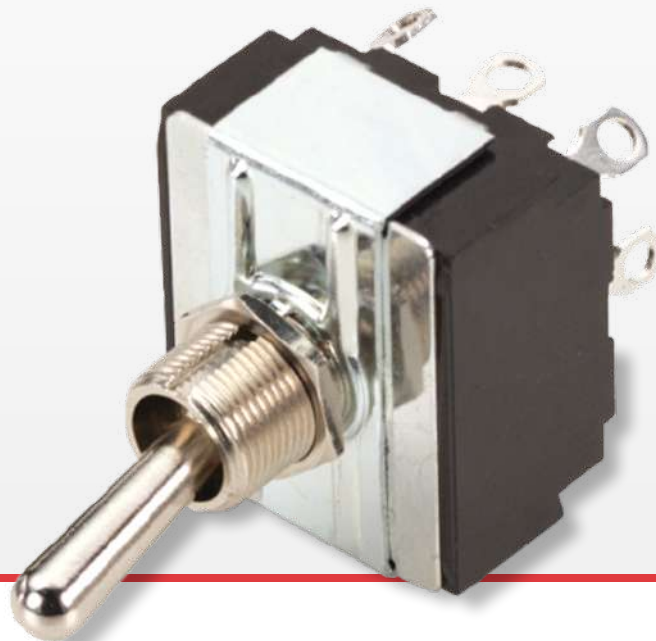


H/I-Series

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

25	10A 250 VAC 15A 125 VAC 3/4HP 250 VAC 1, 2 or 3-Phase	A25	6A 600VAC, 10A 250 VAC, 15A 125 VAC, 3/4HP 250 VAC, 1, 2, 3-Phase,
26	3A 250 VAC 6A 125 VAC 1/4HP 125-250 VAC 1, 2 or 3-Phase	A27	1 HP 480-600VAC; 3 Phase 6A 600 VAC, 12A 250 VAC, 17A 125 VAC,
27	12A 250 VAC 17A 125 VAC 1-1/2HP 250 VAC 1, 2, 3-Phase		2 HP 480-600 VAC; 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

8

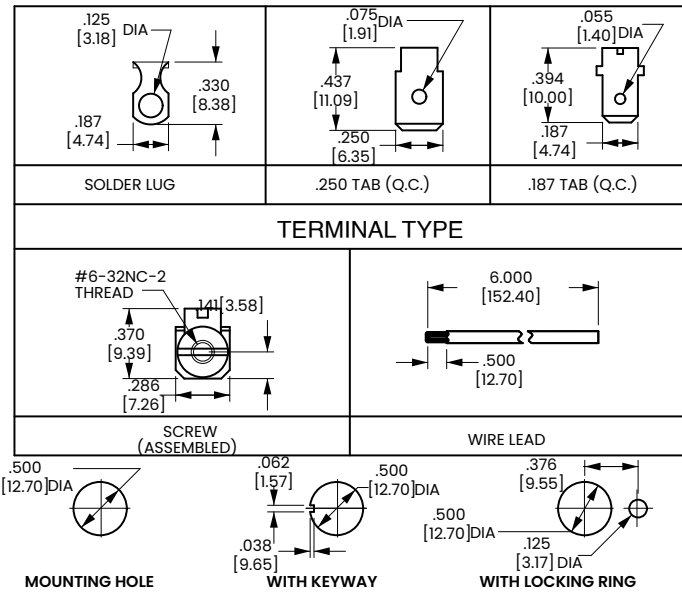
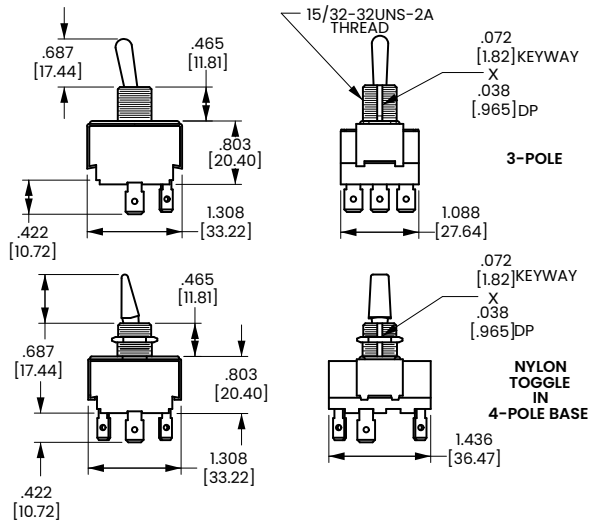
Bat Style Toggle	Toggle with Neoprene Seal	Toggle Length	Bushing Length
73	78	.687	.465
NBL3	NBL8	.687	.465
NWH3	NWD8	.687	.465
NRD3	NRD8	.687	.465

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]

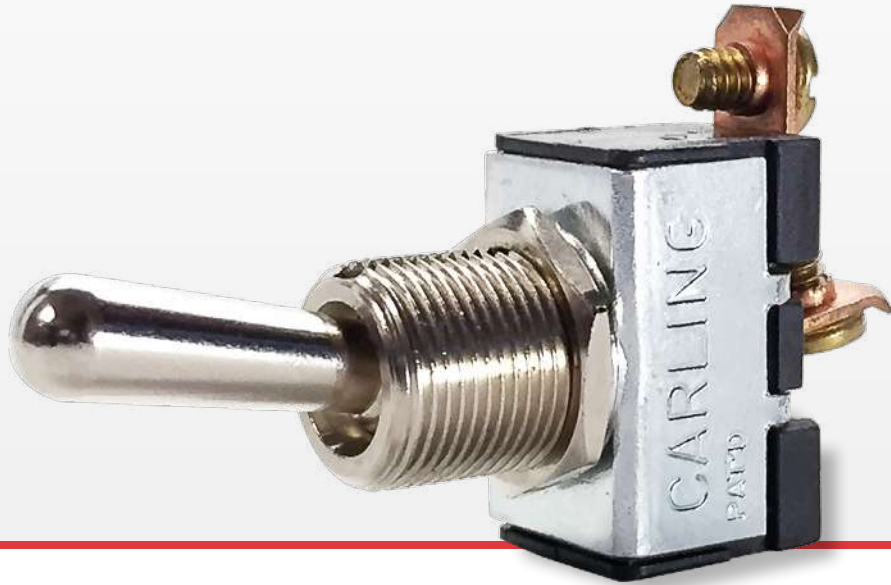


C-Series

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.

1	10-20	125, 250
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				
On-None-Off	CA200	CA201	CA204	CA205
On-None-On	CB200	CB201	CB204	CB205

Additional toggle styles available. Consult factory.

2. KNOB COLOR

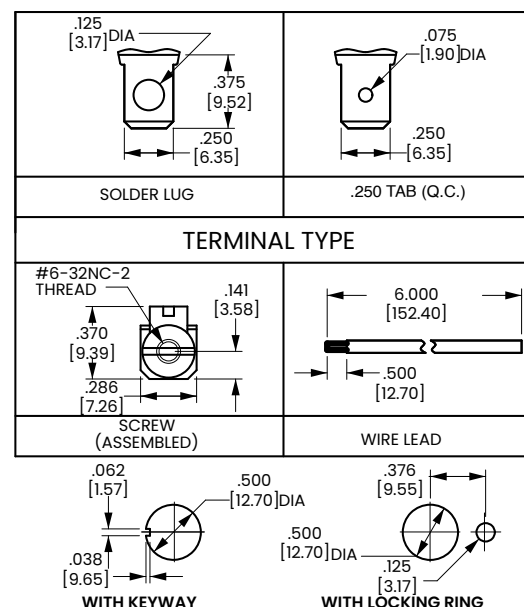
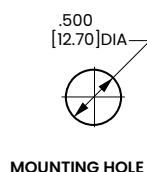
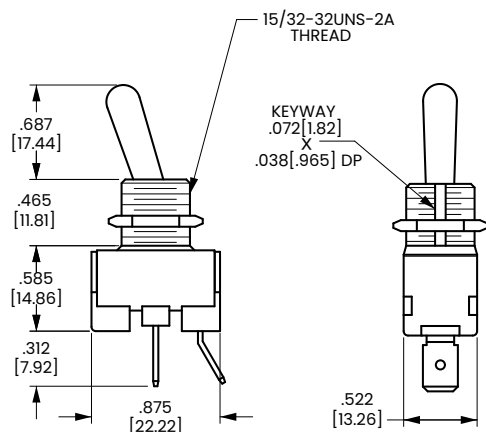
BAT	unsealed	sealed	toggle length	bushing length
73		78	0.687	0.465

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]





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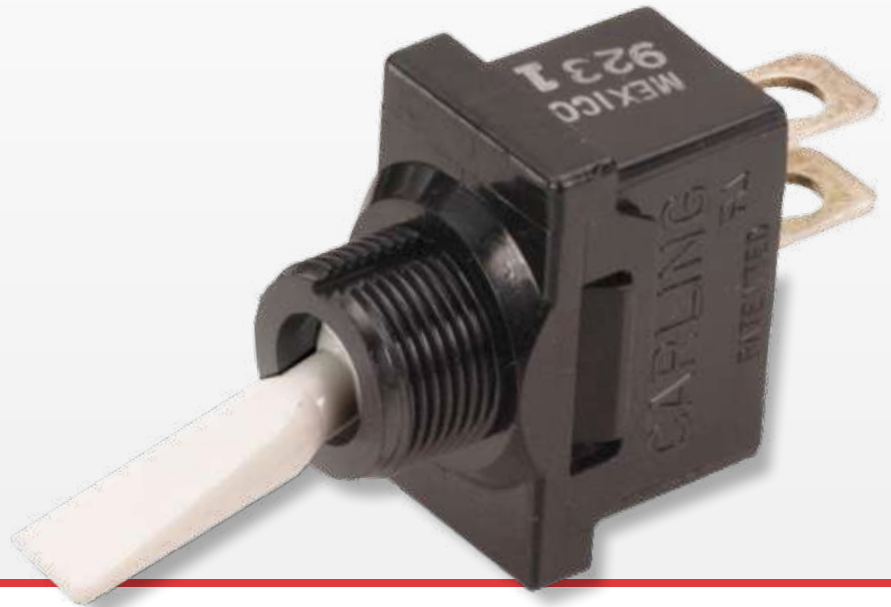
A Littelfuse® Brand

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 ²

B Black W White

4. BUSHING COLOR ²

B Black W White

Notes:

1 DA945 available with wire leads and ON-OFF circuit only.

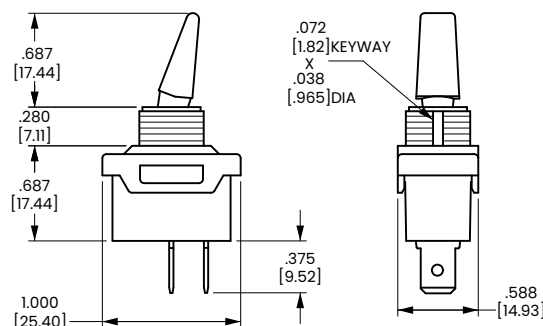
2 Additional colors available. Please consult factory.

[Configure Complete Part Number >](#)

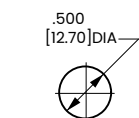
[Browse Standard Parts >](#)

Dimensional Specs

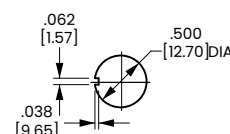
inches [millimeters]



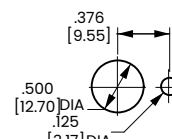
 .156 [3.96] DIA .375 [9.52] .250 [6.35]	 .069 [1.75] DIA .250 [6.35]	 6.000 [152.4] .500 [12.70]
SOLDER LUG	.250 TAB (Q.C.)	INTEGRATED WIRE LEAD (no exposed conductors)
TERMINAL TYPE		



MOUNTING HOLE



WITH KEYWAY



WITH LOCKING RING

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 (end)	Solder Lug (bottom)	Screw Terminals	Wire Leads
Single Pole				
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	2BK62	-	-	2BK65
On-None-On	2BL62	-	-	2BL65

1A 250V, 3A 125V, AC/DC

Single Pole				
On-None-On	112	-	-	112-A
On-None-(On)	112-M	-	-	112-M-A
Double Pole				
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

Single Pole				
On-None-On	2BB62	-	-	2BB65

5A 250V, 10A 125V, 1/4HP, 125V

Single Pole				
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.

2 160H and 110-Series are available with .250 tab terminals. Add suffix /TABS to end of part number. ex. 110-73/TABS

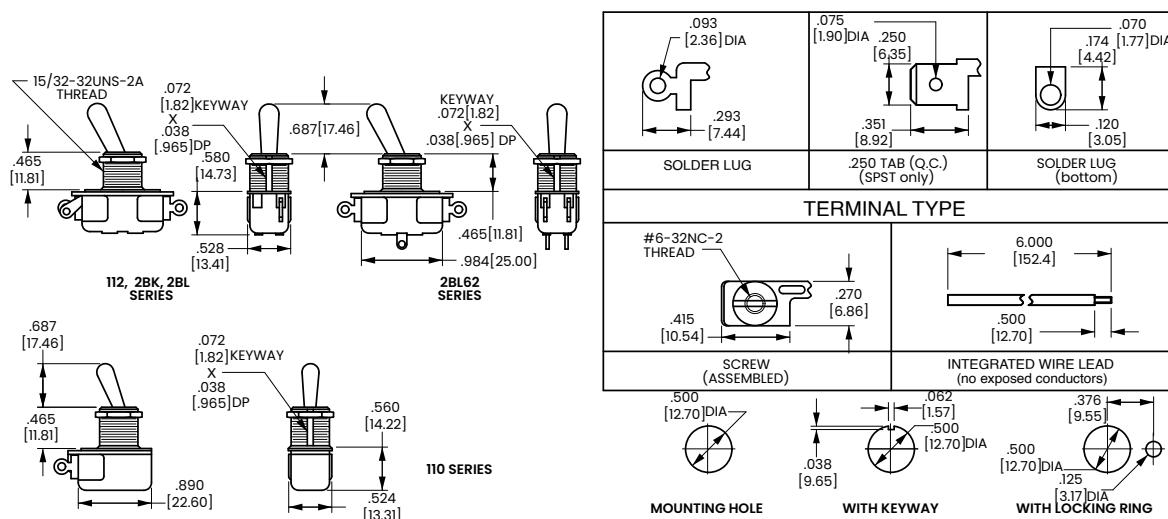
() Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]



*Manufacturer reserves the right to change product specification without prior notice.

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	toggle length	bushing length
73	0.687	0.465
BALL STYLE TOGGLE		
unsealed	toggle length	bushing length
32	0.500	0.343

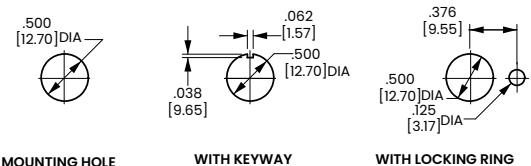
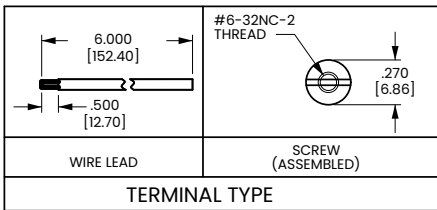
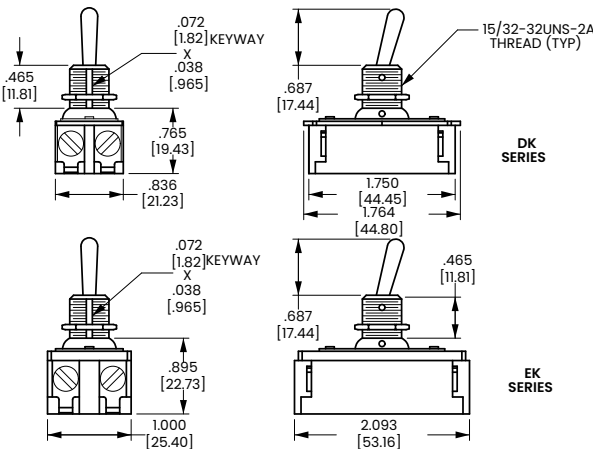
Notes:
1 Additional toggle lengths available. Consult factory for details.

[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 ¹

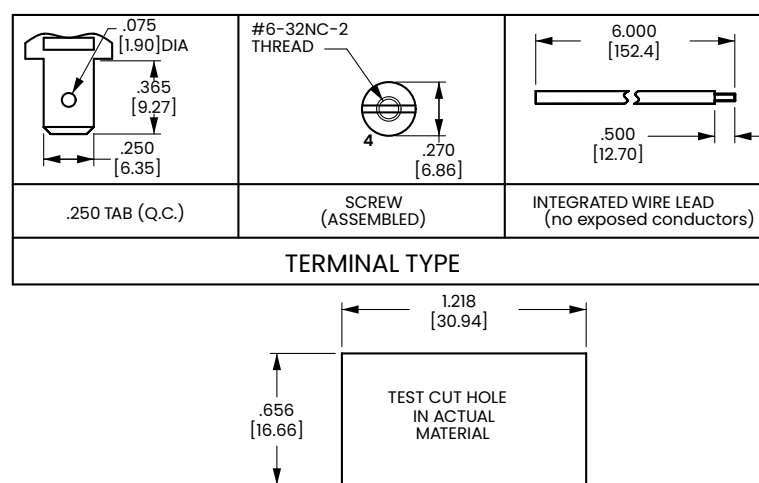
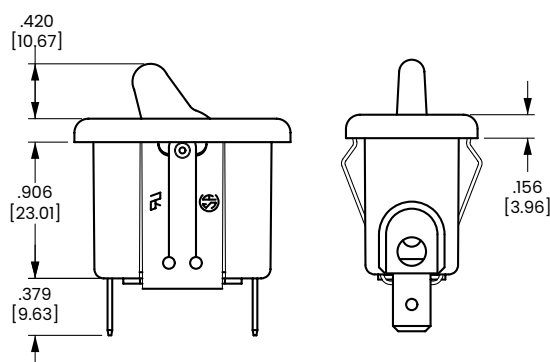
On-Off

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]



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

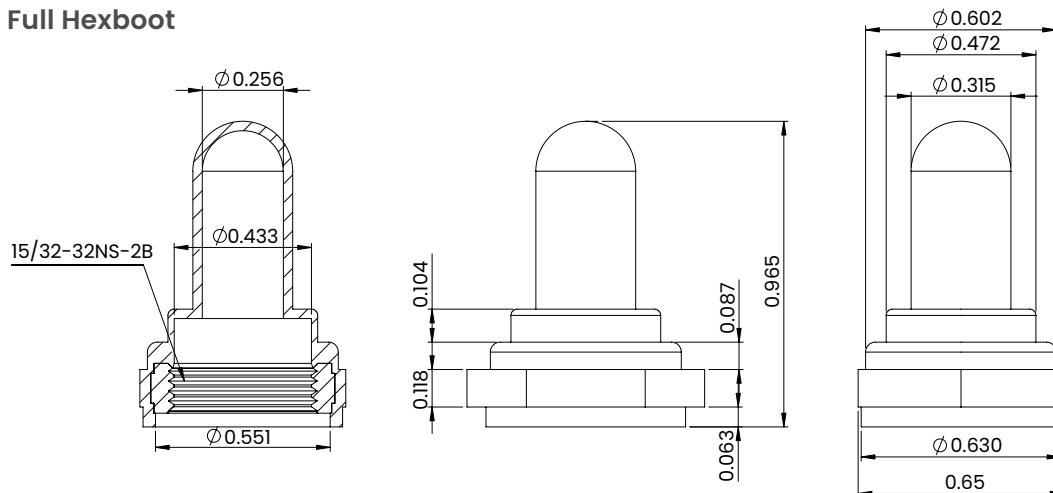


Part #: 999-37245-001

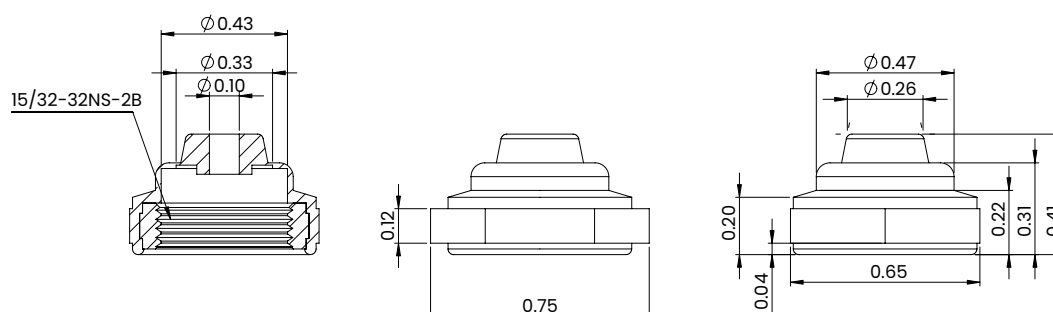
Dimensional Specs

inches [millimeters]

Full Hexboot



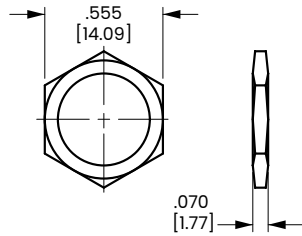
Half Hexboot



*Manufacturer reserves the right to change product specification without prior notice.

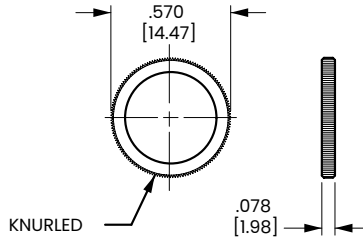
Bushing Accessories

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.



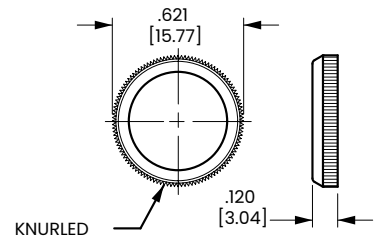
STANDARD HEXNUT

.562 in. [14.27 mm] X .076 in. [1.93 mm]
NICKEL: 380-08602
BLACK: 380-08606



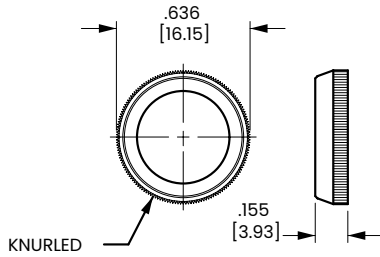
STANDARD FACENUT

.570 in. [14.47 mm] X .078 in. [1.98 mm]
NICKEL: 380-08693
BLACK: 380-08694



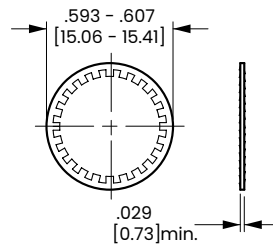
PLASTIC FACENUT

(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



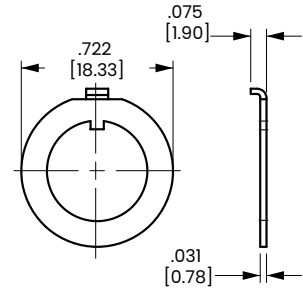
DRESS FACENUT

.636 in. [16.15 mm] X .155 in. [3.93 mm]
NICKEL: 380-08810
BLACK: 380-08811



LOCKWASHER

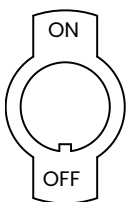
NICKEL-PLATED: 728-15907



LOCKING RING

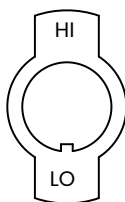
ZINC: 728-15946
BLACK: 728-15947

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.



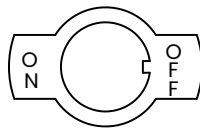
YO1

272-06747



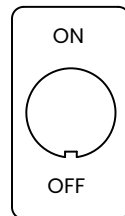
YO2

272-06764



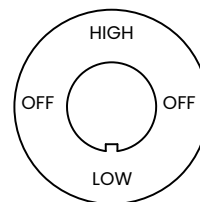
Y51

272-06842



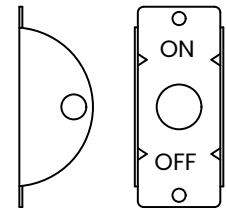
Y101

272-06935



Y311

272-07258



Y500

272-07293

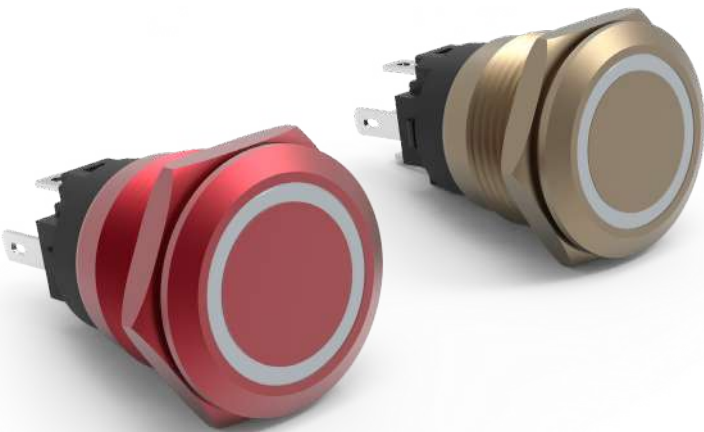
ALL PLATES SHOWN FIT 15/32" (.465 [11.81]) BUSHINGS

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; 5A @ 36VDC 3A @ 48VDC
LED Voltage/Current	6 VDC @ 15mA; 12 VDC @ 15mA; 24 VDC @ 10mA; 36 VDC @ 10mA; 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; 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; 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.

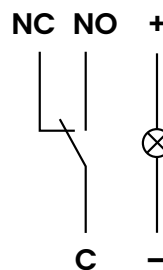
Physical

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 Amber¹ E Blue

9. ILLUMINATION STYLE

N None R Ring

10. AGENCY APPROVAL

00 No Legend

01 On/Off



02 Stand By



03 Light



04 Bell



05 Door Open



06 Information



07 Horn



Notes:

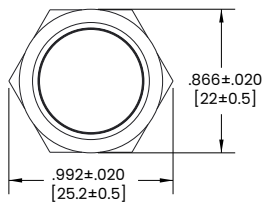
1. Only available with rating 2

[Configure Complete Part Number >](#)

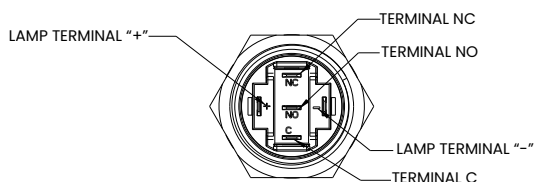
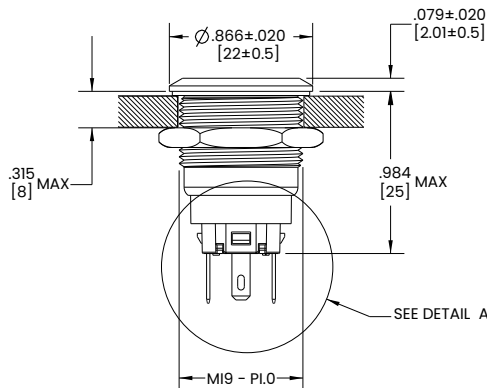
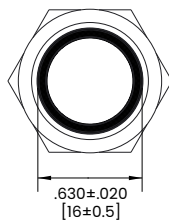
Dimensional Specs

inches [millimeters]

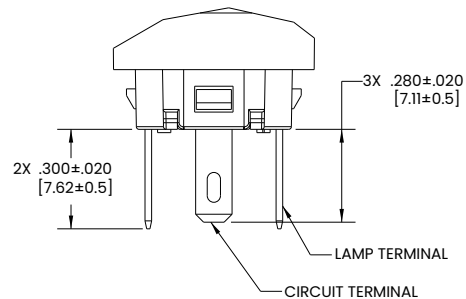
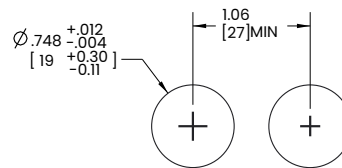
NON-ILLUMINATED WITH NUT



RING-ILLUMINATED WITH NUT



MOUNTING CUT-OUTS (RECOMMENDED SWITCH SPACING)



DETAIL A SCALE 3.000

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 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 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 Second press: Load 1 ON, Load 2 OFF, Blue Ring Illuminated 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 Second press: Load 1 ON, Load 2 OFF, Red Ring Illuminated 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

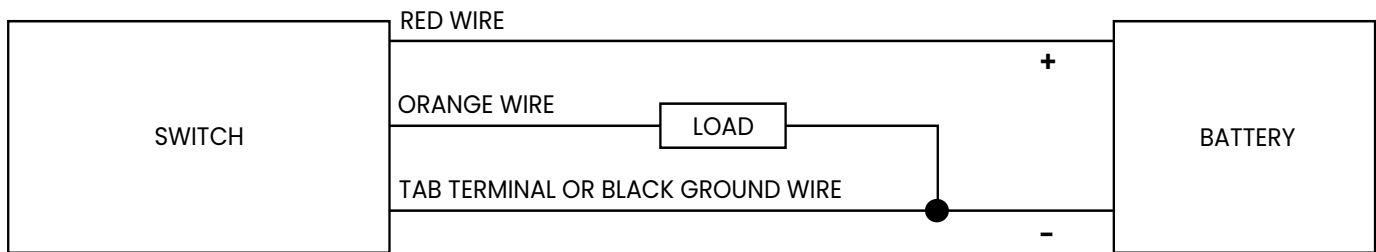
AVH-Series

Physical

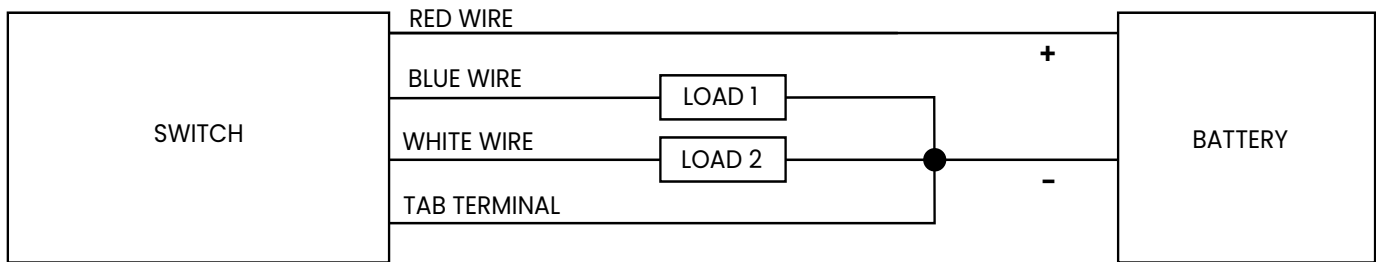
Operation	Pushbutton, Momentary (Circuits A, C & D), Pushbutton Maintained (Circuit B)
Illumination	Dependent LED
Seals	Gasket, bezel silicone, potted housing
Mounting	M19-PI.0 Nut, Tightening torque: 2~3Nm
Housing	Aluminum 6061 T6, Anodized per MIL-STD-8625, Type II, Class 2; Black
Actuator	Stainless steel 316 or Aluminum Anodized
Lens	Polycarbonate, PC
Bushing	Stainless steel 316 or Aluminum Anodized
Actuation Force	7N max
Weight	45~50g

Wiring Diagrams

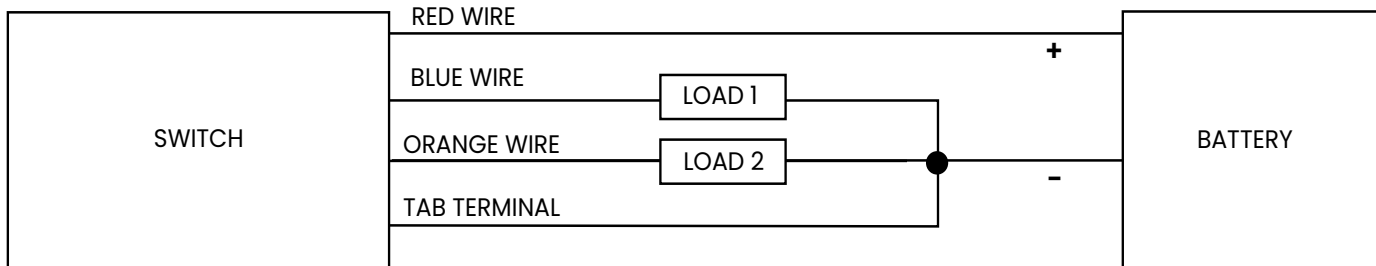
Single Output (Circuit A & B)



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:

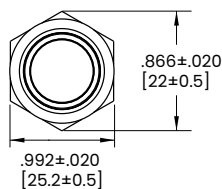
- 1 Circuit codes (A & B) require rating codes (1 or 2) only
- 2 Circuit codes (C & D) require rating code (3)
- 3 Rating will determine the wire gauge used.
- 4 Illumination Style code (N) requires: Pos 1 LED Color (N); Pos 2 LED Color code (N); Illumination type code (N)
- 5 Circuit code (C & D) requires 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]

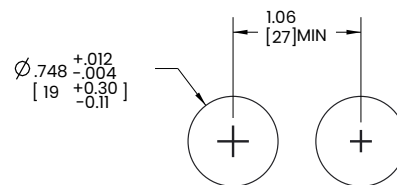
NON-ILLUMINATED WITH NUT



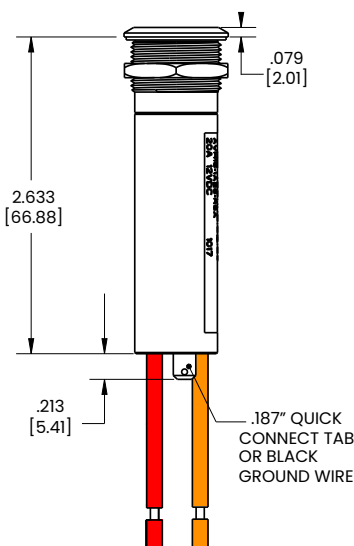
RING-ILLUMINATED WITH NUT



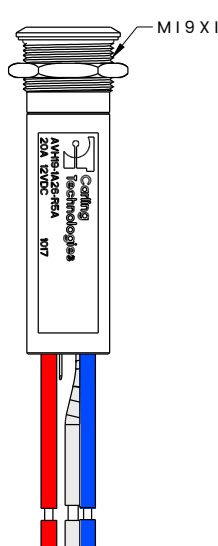
MOUNTING CUT-OUTS (RECOMMENDED SWITCH SPACING)



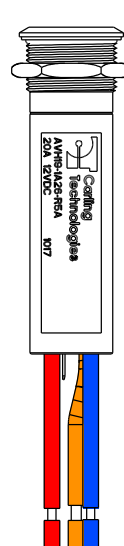
CIRCUIT A, B



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) 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 Acceptable Panel Thickness Range: .098 to .118 (2.50mm to 3.00mm) 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 .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

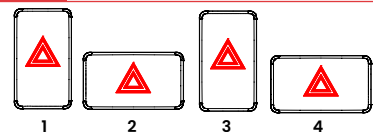
Z No Lens
R Red (Laser Etched)

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



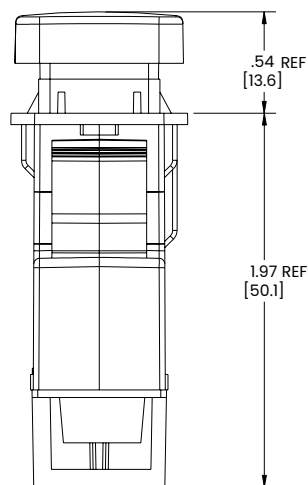
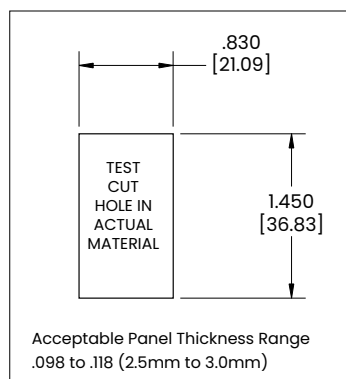
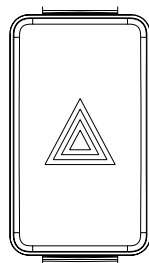
Notes:

1. "Tolerances For Image Size (Transfer or Laser) are +/- .020" Applicable on Field #7, Unless Otherwise Specified by customer".

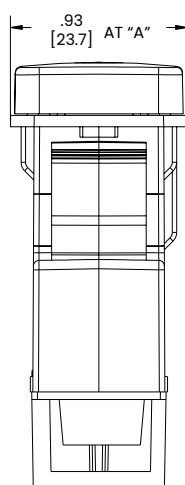
[Configure Complete Part Number >](#)

Dimensional Specs

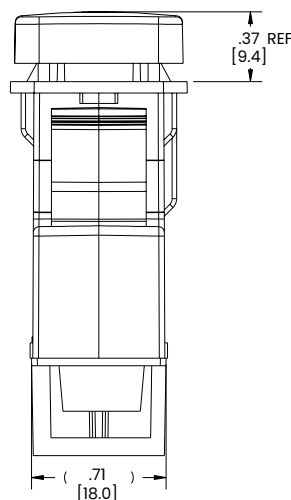
inches [millimeters]



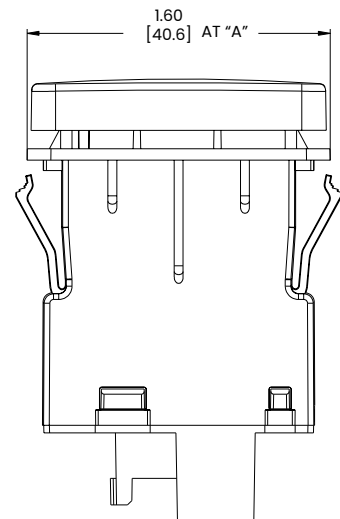
POS 1: "OFF"



POS 2: "Max Overtravel"

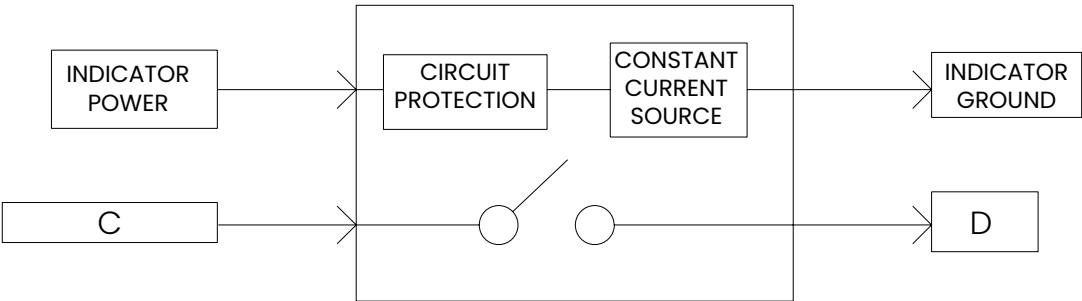


POS 3: "ON"

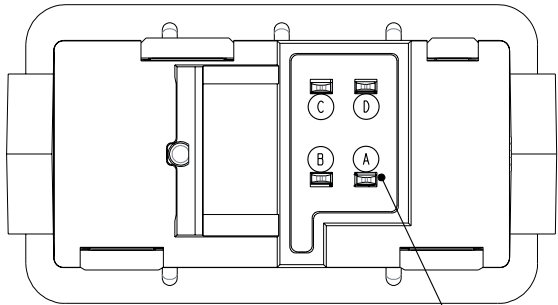
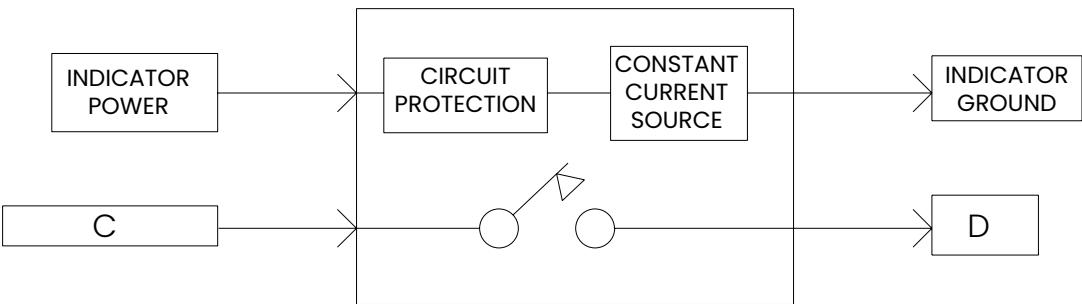


Circuit Diagram

“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

3A 125VAC
Off-(On)
Off-(On) with overtravel ¹
On-(Off)

1A 125VAC

On-On
On-On with overtravel ¹
1 On-1 Off (2 circuit)
1 On-1 Off with overtravel ¹ (2 circuit)

Solder Lug

16-3P Off
16-3P Off-Ov
16-3P On

Wire Leads

16-3AP Off
16-3AP Off-Ov
16-3AP On

116-P
116-P-OV
516-P
516-P-OV

116-AP
116-AP-OV
516-AP
516-AP-OV

3. ACTUATOR STYLE ²

CBL Black plastic color cap

CRD Red plastic color cap

Notes:

¹ Overtravel only available with #4 bushing.

² When selection 3 is left blank, a standard nickel plated plunger is supplied.
() Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

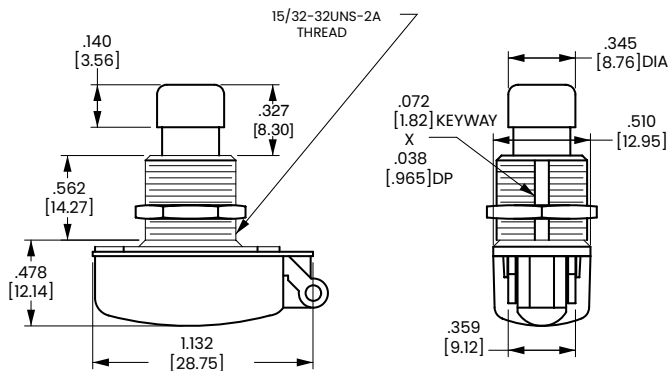
2. BUSHING STYLE

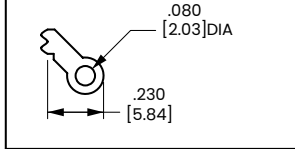
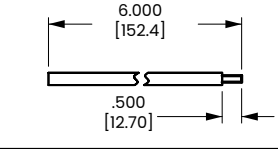
2 .312 length

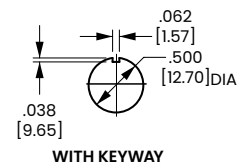
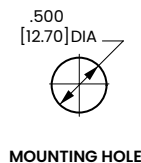
4 .562 length

Dimensional Specs

inches [millimeters]



 SOLDER LUG	 INTEGRATED WIRE LEAD (no exposed conductors)
TERMINAL TYPE	



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

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
3A 250VAC, 6A 125 VAC, 3/4A 125V	P26A	P26B	P26F
Off - (On)	P26L	-	P26T
On - (Off)			
3A 277VAC, 6A 125 VAC ¹	P267A	P267B	P267F
Off - (On)	P267L	-	P267T
On - (Off)			

2. BUSHING STYLE

	length	diameter
1A	.406	.375
1B	.406	.468
1C	.465	.375
1D ³	.465	.468

3. BUTTON STYLE / COLOR

BL	Black Nylon	RND MTL ²	Round Metal
RD	Red Nylon	CON MTL ²	Concave Metal

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 buttons

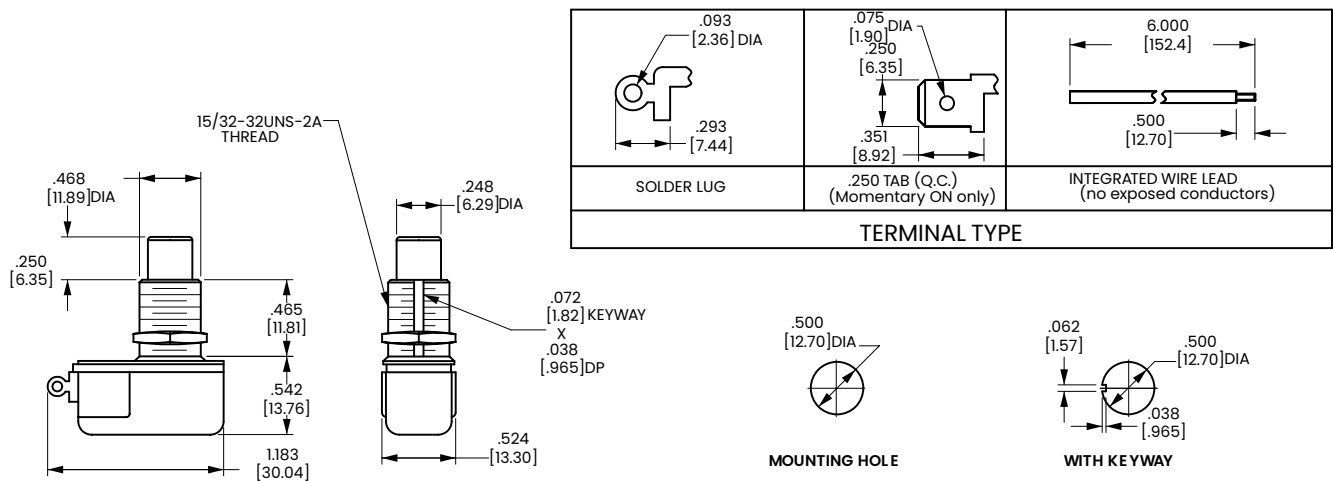
() Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]





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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

Single Pole 3A 250VAC, 6A 125 VAC, 3/4A 125V Off - (On) On - (Off)	Solder Lug P27A P27L	.250 Tab P27B -	Wire Leads P27F P27T
---	---	--	---

2. BUTTON STYLE / COLOR

BL Black	WH White
RD Red	

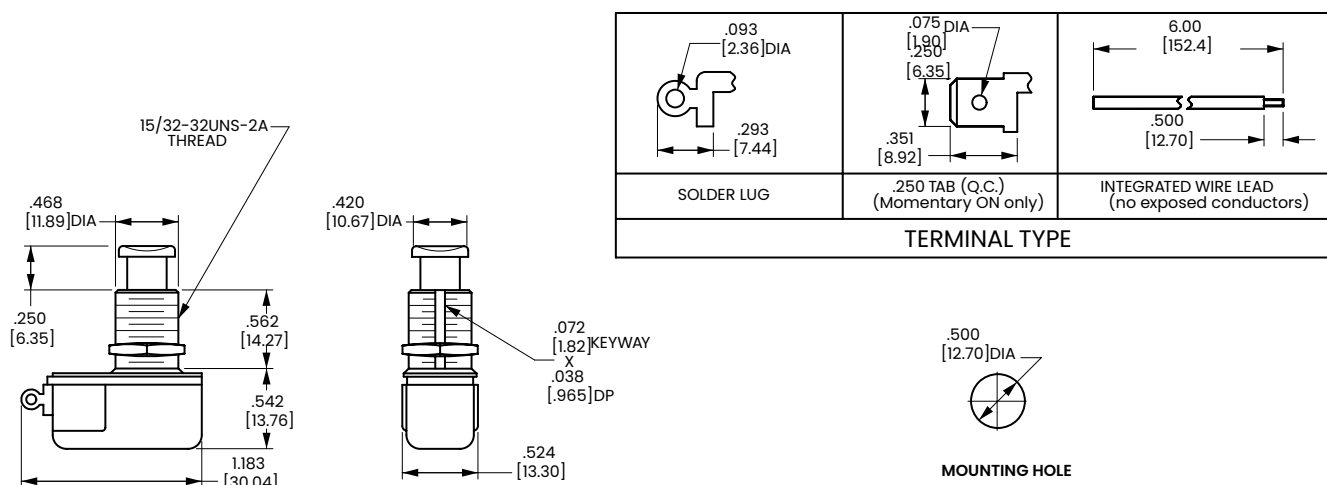
Notes:
() Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]



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 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) ¹	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) 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				Two Pole			Three Pole		
solder lug	PC term.	wire leads.		solder lug	PC term.	wire leads	solder lug	PC term.	wire leads
64111210	64111212	64111215	ON-OFF	64112210	64112212	64112215	64113210	64113212	64113215
64111220	64111222	64111225	ON-ON	64112220	64112222	64112225	64113220	64113222	64113225

Notes:

1 For 1 and 2 pole only. 3 Pole switches use brass Pin

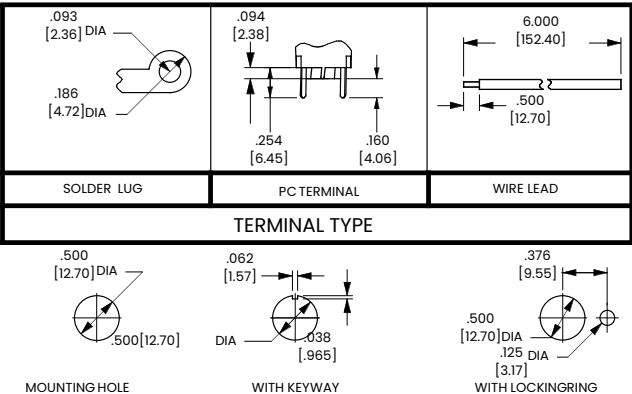
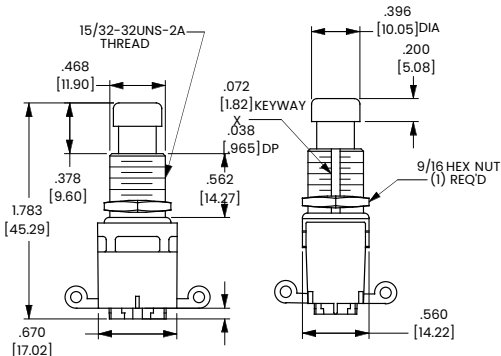
[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

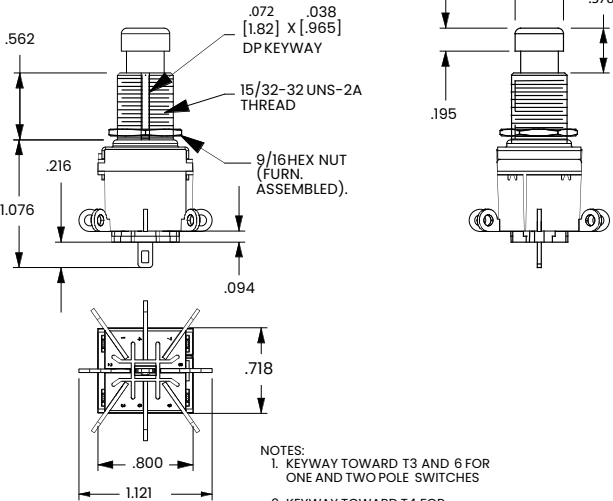
Dimensional Specs

inches [millimeters]

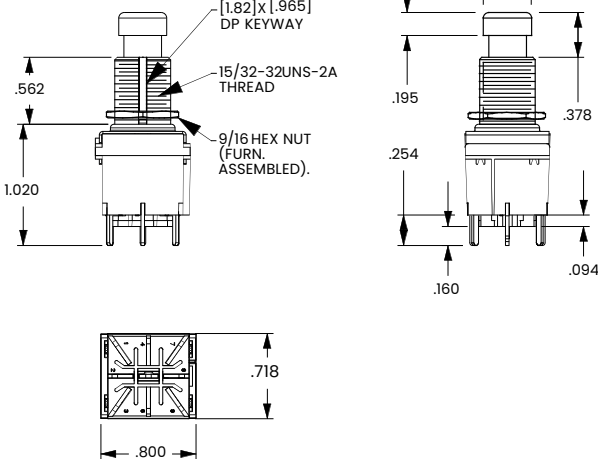
1 OR 2 POLE SHOWN WITH SOLDER LUG



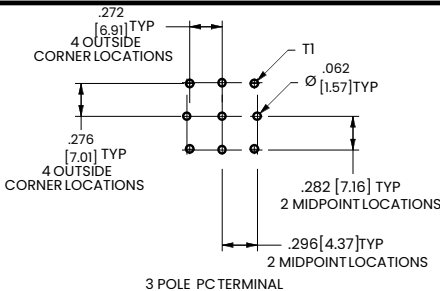
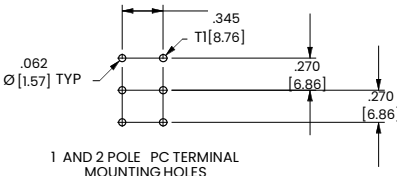
3 POLE SHOWN WITH SOLDER LUG



3 POLE SHOWN WITH PC TERMINAL



NOTES:
1. KEYWAY TOWARD T3 AND 6 FOR ONE AND TWO POLE SWITCHES
2. KEYWAY TOWARD T4 FOR THREE POLE SWITCHES.



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
Single Pole				
3A 250V, 6A 125V				
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
5A 250V, 10A 125V, 1/4 HP 125V				
OFF-ON	160H-P	160H-BP	160H-SP	160H-AP
1A 250V, 3A 125V				
ON-ON	112-P	-	-	112-PA
ON-(ON)	112-PM	-	-	112-PAM
Double Pole				
1A 250V, 3A 125V				
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:

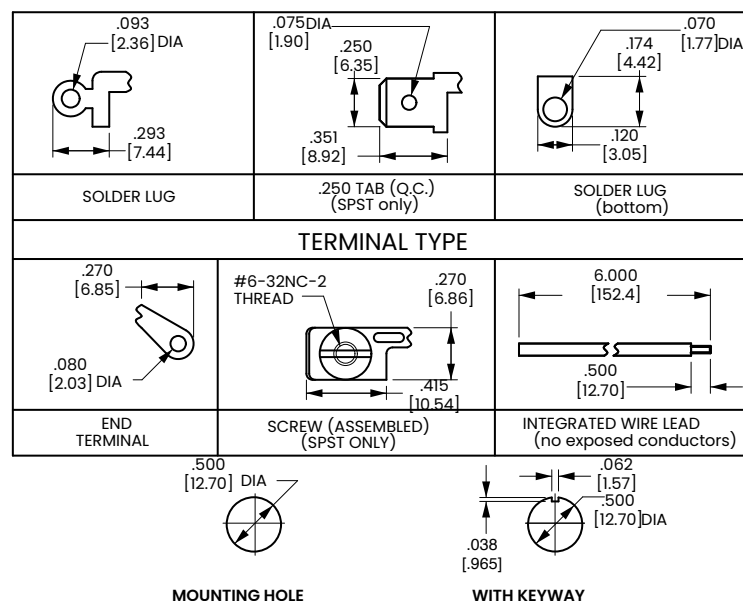
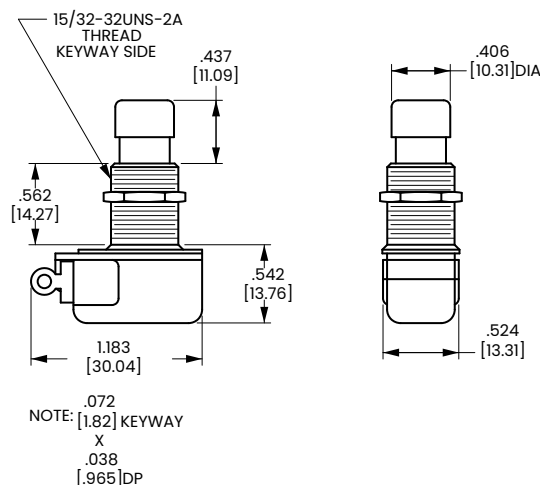
() Indicates momentary function.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]

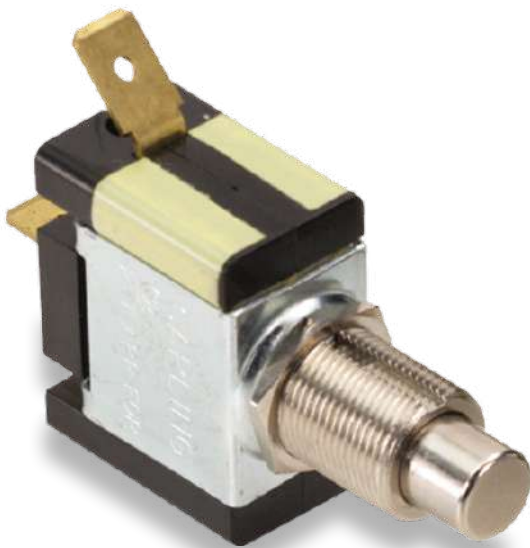


P-Series

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.

1	10-20	125-250
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

10A 250VAC, 15A 125VAC, 3/4 HP 120-240 VAC¹

On-Off

On-On

10A 250VAC, 20A 125VAC, 1 1/2 HP 120-240 VAC¹

On-Off

On-On

10A 250VAC, 15A 125VAC, 10(6)α 250 VACu, T85²

On-Off

.250 Tab

PA341

PB341

PA301

PB301

PA951

Screw Terms.

PA344

PB344

PA304

PB304

PA954

Wire Leads

PA345

PB345

PA305

PB305

PA955

Notes:

1 Additional ratings available. Consult factory.

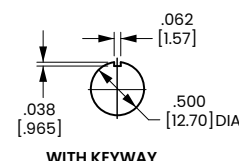
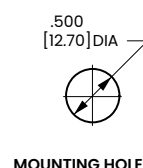
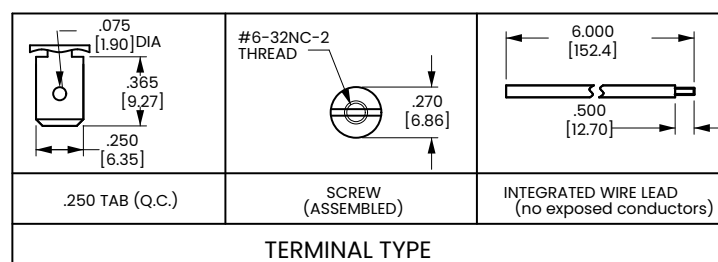
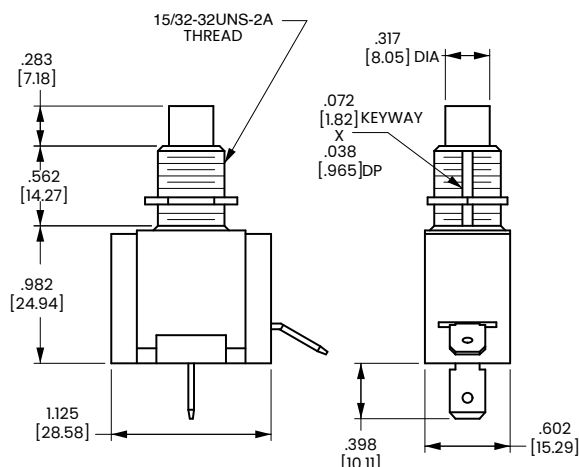
2 UL, CSA & TUV approved.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]



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

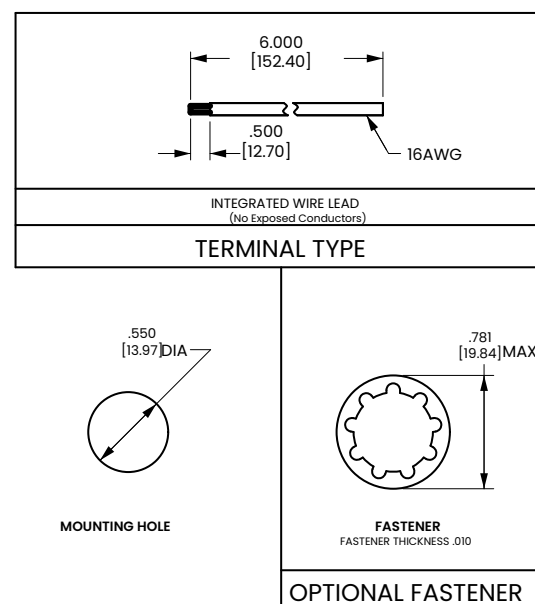
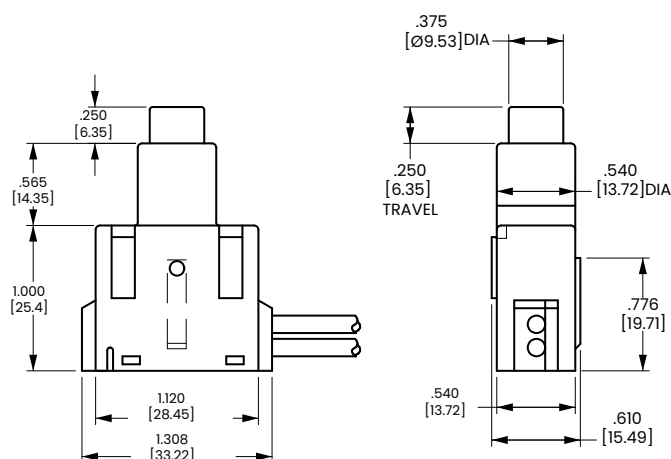
Notes:
() Indicates momentary function.

[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

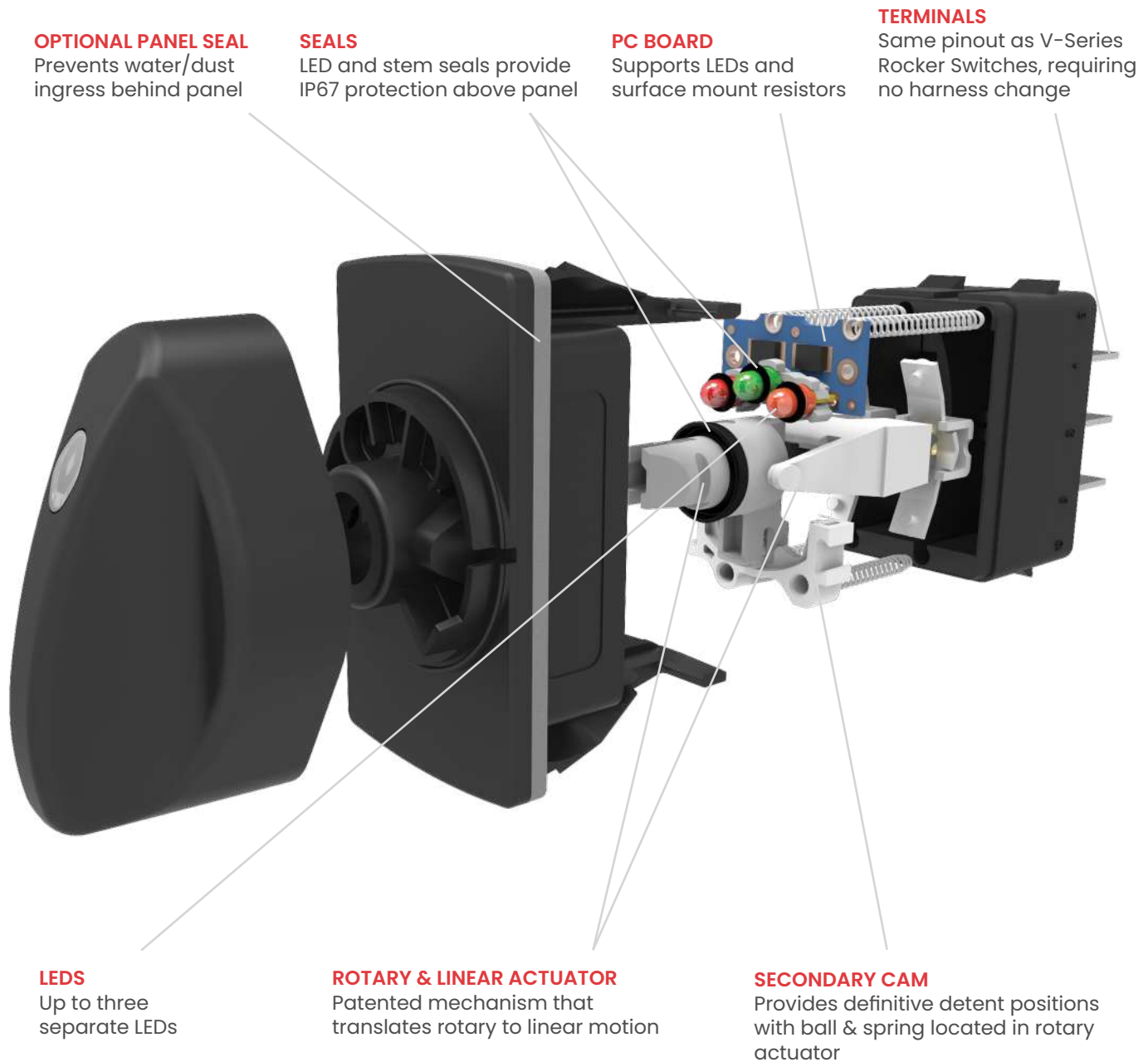
IP67 Sealing

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 25,000 Cycles Two Position Momentary and All Three position
Terminals	0.250" (6.3mm) Quick Connect

Physical

Function Circuits	Double Pole Single Throw, DPST Double Pole Double Throw, DPDT
Operation	Two and Three Position Maintained and Momentary
Knob Rotation	Two Position 60 Degrees Three Position 30 Degrees from Center
Illumination	LED; Red, Green, Amber, Yellow, White, Blue
Seals	LED O-ring(s) – Silicone, Bezel gasket – Neoprene, Knob seal – NBR
Flammability	Exceeds FVMSS 302 Requirements, Exterior Components, UL 94 V-2 or Better Interior Components, UL 94 HB or Better
Base	Polyester, PBT
Bracket	Nylon 66, PA
Knob	Polybutylene Terephthalate, PBT 6.5%GF
Lens	Polycarbonate, PC
Connector	Nylon 66, PA
Mounting	Front Panel Snap In, 1.450" (36.83mm) X 0.830" (21.08mm) Panel Thickness, 0.030" – 0.187" (0.76 – 4.75mm)

Environmental

Sealing	IP67, for above-panel components of actual switch only.
Dust	Mil STD 810, Method 510.2 Air Velocity 300 Ft/Min Duration 16Hr
Corrosion	IEC 68-2-60 Mixed Flowing Gas (MFG) 14 Days
Chemical Splash	Gasoline, Diesel, Motor Oil, Brake Fluid, Ammonia, Armour All
Salt Spray	Mil STD 202G, Method 101, Test Condition A 96 Hr
Vibration Random	Mil STD 202G, Method 214 test Condition C 10G's RMS
Vibration Sinusoidal	Mil STD 202G, Method 204D, Test Condition A 0.06DA or 10G's 10- 500Hz
Shock	MIL-STD 202G, Method 213B Test Condition K, 30G's
Handling Shock	1 Meter Drop onto Hard Surface
Thermal Shock	MIL-STD 202G, Method 107G Test Condition A -55 C to 85 C
Moisture Resistance	MIL-STD 202G, Method 106F 10, 25 C to 65 C Cycles 95% RH
Thermal Cycling	25 Cycles -40 C to 85 C
Ignition Protection	ISO 8846 with EC Directive 94/25/ EC for Marine Products
UV Protection	300 hr Xenon Arc, 1.4W/m2 wavelength 420 nm
ESD	Human Static Discharge, +/- 15KV applied during normal operation Shipping/Handling, frequency range 200-2000 MHz applied voltage is +8KV to +15KV and -8KV to -15KV 3 discharge cycles

Mechanical

Knob Impact	50 Gram weight dropped from a 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 **D** 20A 12V
B 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 4, 5	K 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
S	NONE		
A	#1	Independent	8+ 7-
B	#1	Dependent	3+ 7-
C	#1	Independent	8+ 7-
D	& #3	Independent	10+ 7-
E	#1	Dependent	3+ 7-
F	& #3	Dependent	1+ 7-
G	#1	Independent	8+ 7-
H	#2	Independent	9+ 7-
J	#1	Independent	10+ 7-
K	#2	Independent	3+ 7-
L	#1	Dependent	1+ 7-
M	#2	Dependent	3+ 7-
N	#2	Independent	8+ 7-
P	#3	Independent	10+ 7-
R	#2	Dependent	1+ 7-
T	#3	Dependent	10+ 7-
	#3	Independent	8+ 7-
	#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	0				
LED	Red	Amber	Green	Blue	White
12VDC	C	N	H	E	6
24VDC	D	P	J	K	8

9. BRACKET COLOR & PANEL SEAL

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

10. ACTUATOR STYLE

K Rotary Knob (Standard)

ACTUATOR ORIENTATION
ABOVE TERMINALS



11. LENS COLOR

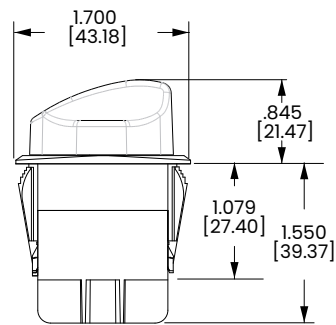
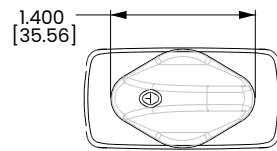
No Lens	Z				
Clear	White	Amber	Green	Red	Blue
4	9	E	K	R	W

12. KNOB COLOR

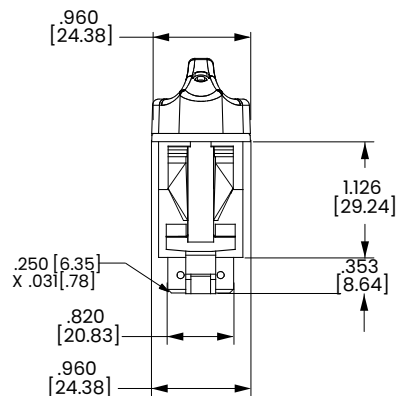
Black	Gray	Red	White
C	H	S	Y

Dimensional Specs

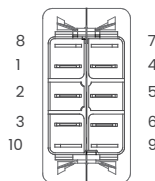
inches [millimeters]



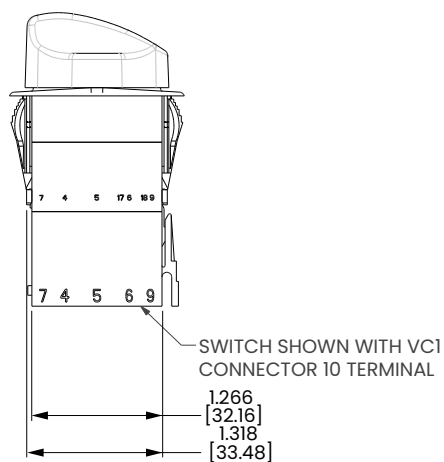
**10 TERMINAL BASE
W/BARRIERS**



**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 (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 Base – Nylon Top cover – PC Wheel – Nylon Terminal – Brass, Silver Plated
Weight	≈23.8g
Mating Connection	VC2 : AMP 250 series fastin-faston 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 ² *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 ² 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
1	12V	2.8V	5V	7.3V	9.5V
2	24V	5.5V	10V	14.5V	19V
3	12V	5V	7.3V	9.5V	-
4	24V	10V	14.5V	19V	-

Shunt Resistor (Only for 3 Detents)

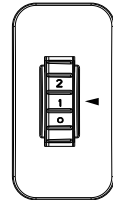
	System Voltage	Detent 0	Detent 1	Detent 2
A	12V or 24V	1.5K OHMS	4.2K OHMS	9.8K OHMS

4. BACK LIGHT COLOR

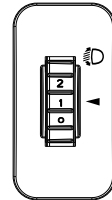
Z None
A White

5. CAP AND WHEEL LEGEND

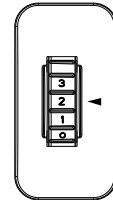
100 Standard legend



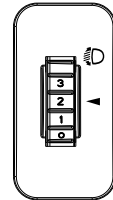
3 POSITION
WITHOUT BACKLIGHT



3 POSITIONS
WITH BACKLIGHT



4 POSITIONS
WITHOUT BACKLIGHT



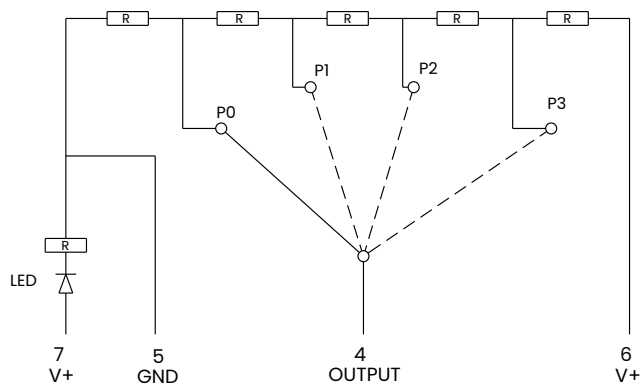
4 POSITIONS
WITH BACKLIGHT

For additional legends, please consult factory.

[Configure Complete Part Number >](#)

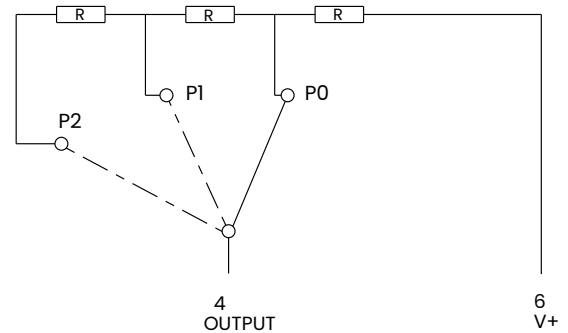
Circuit Diagram

VOLTAGE DIVIDER OUTPUT



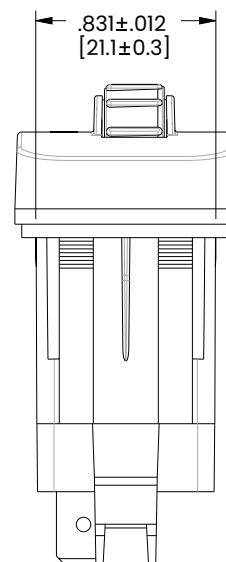
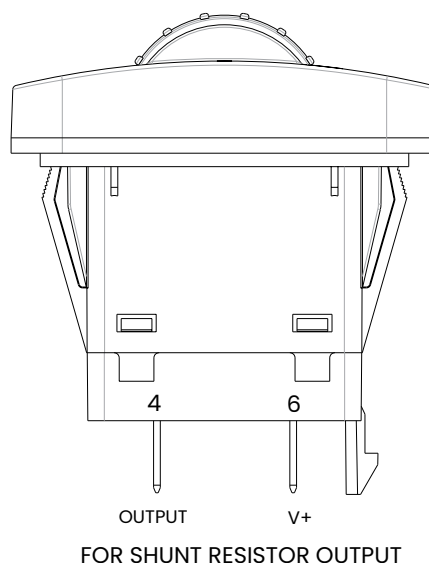
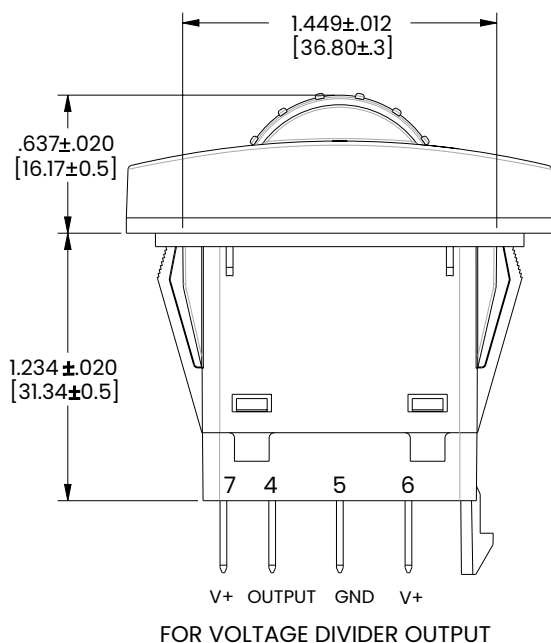
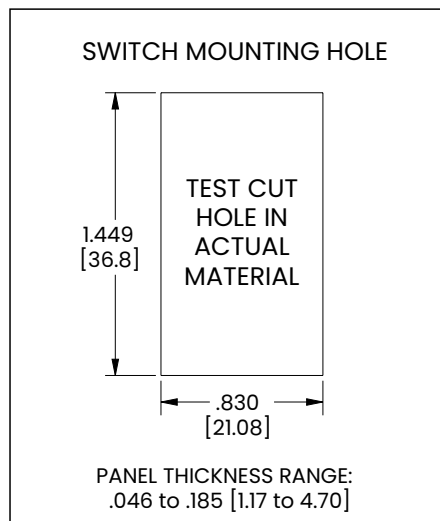
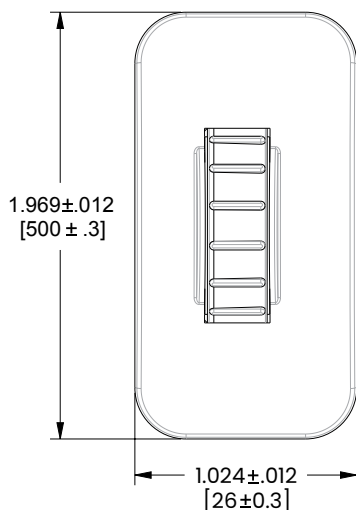
4 DETENTS AS SHOWN, NO P3 FOR 3 DETENTS

SHUNT RESISTOR OUTPUT



Dimensional Specs

inches [millimeters]



MATING CONNECTOR:
 VC2: AMP 250 series fastin-faston
 VC1: Packard 630 and AMP 250 series fastin-faston



Littelfuse®



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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.

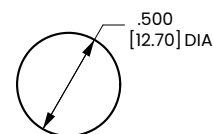
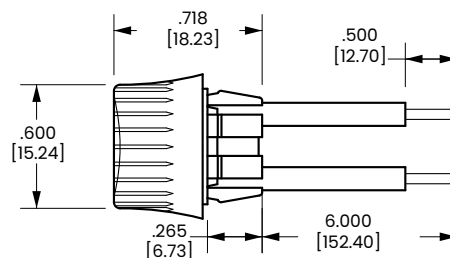
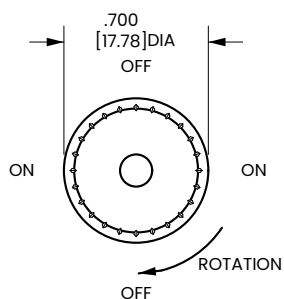
Note:
Standard Wire Leads are 6" long, stripped 1/2" black. If different length required, please specify at the end of the part number. ex. R135-A-BL/20". Panel Cut-Out Recommendations: For sheet metal panels, switch must enter panel in same direction as the punch. Burr on bottom. Test cut hole in actual material.

[Configure Complete Part Number >](#)

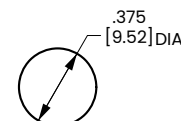
[Browse Standard Parts >](#)

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]



Littelfuse®



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A Littelfuse® Brand

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 ¹

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:

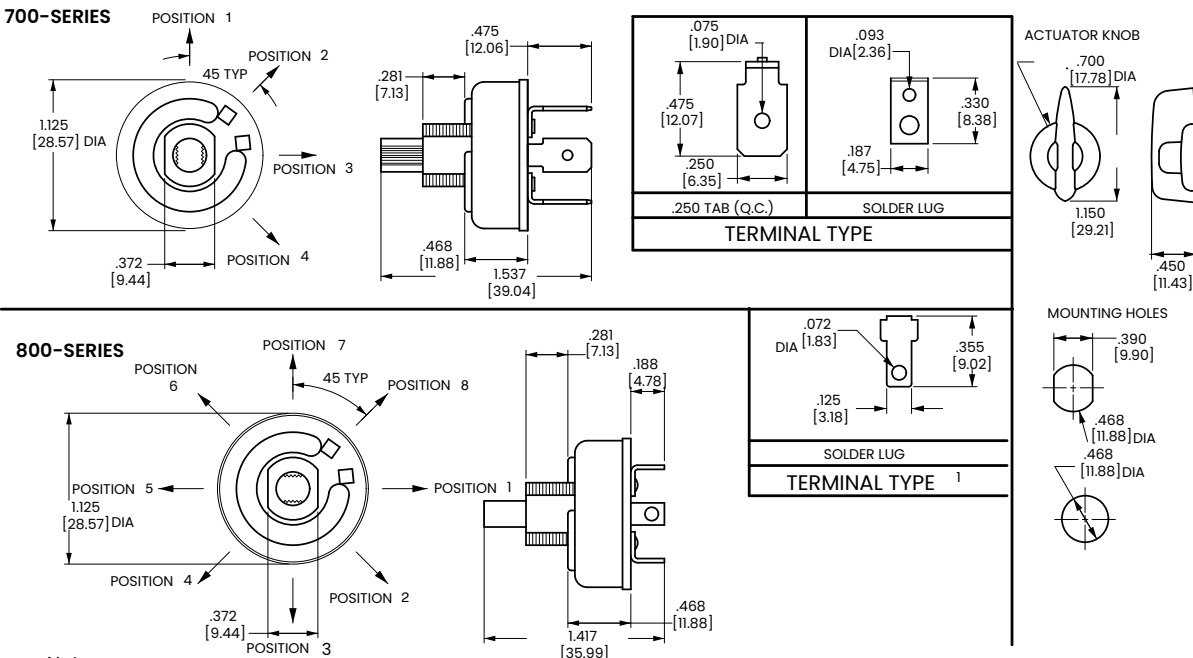
¹ 700-2 and 700-2A feature 8 detent positions.
800-Series terminal is a combination solder lug and quick connect.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

Dimensional Specs

inches [millimeters]



Notes:

1. Terminal is combination solder lug and quick connect.

*Manufacturer reserves the right to change product specification without prior notice.



Littelfuse®



Carling Technologies®
A Littelfuse® Brand

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

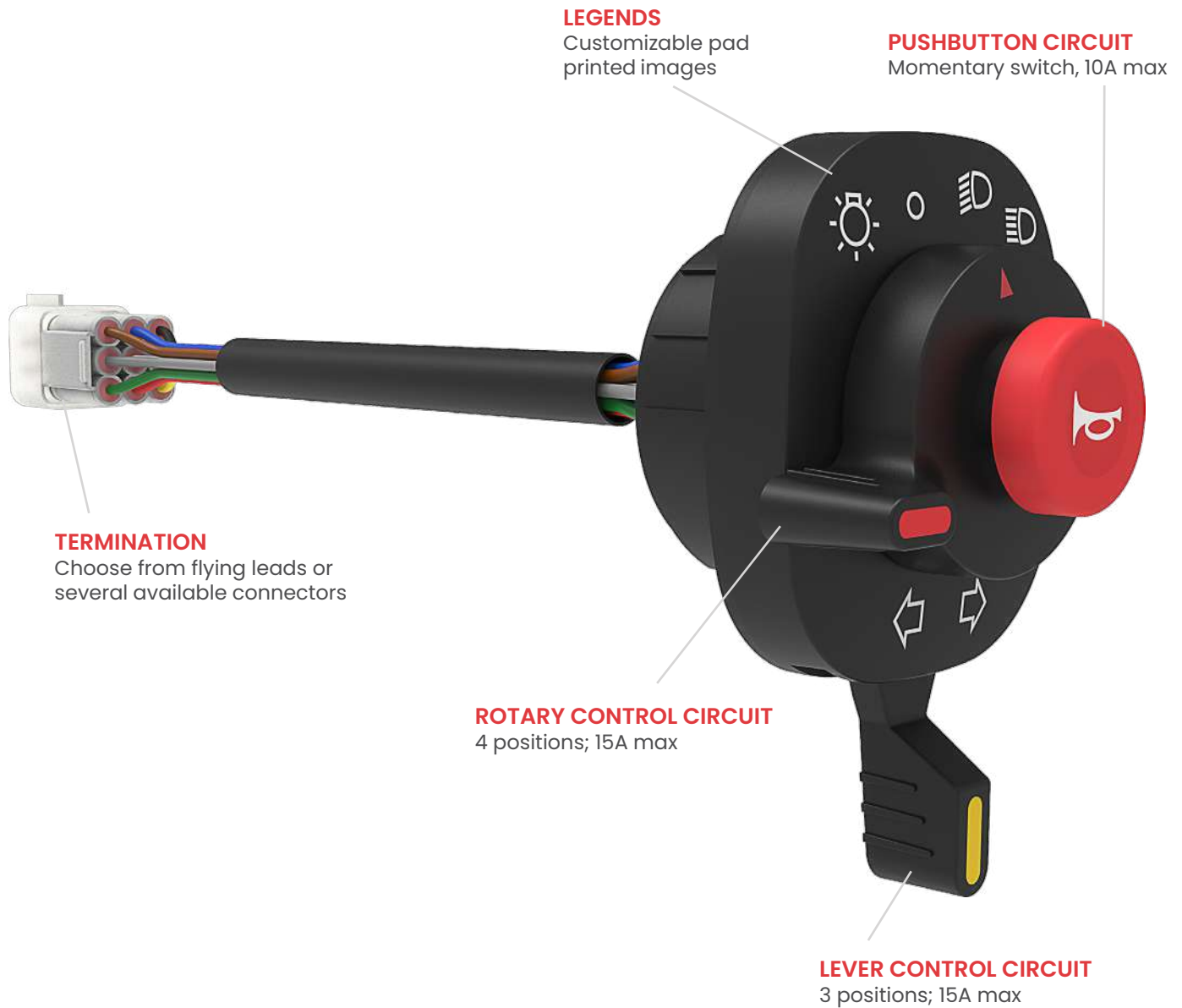
IP67 Sealing

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 Lever: 15A 12V 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><tr><th>Connector Part Number</th><th>Mating Connector Part Number</th></tr><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></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: Momentary (ON)-OFF Single Pole: 17.3+/-3.5 N Maintained ON-OFF: 14.5+/-1.5 N Rotary Control: 0.42+/-0.20 N.m Lever Control: 0.13+/-0.06 N.m														
Weight	Approx. 0.2 lbs [91g]														
Depth behind panel	1.10" [28.5 mm] (to bottom of header)														

Environmental

Operating Temp.	-40 °C to +85 °C.
Vibration	Random test IEC 60068-2-64: 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
- 2¹ Maintained ON-OFF

3. ROTARY CONTROL CIRCUIT

- A 4 Positions
- B 3 Positions (Position 2 OFF)
- C 2 Positions
- D² 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 Manufacturer*	Manufacturer Part Number	Number of Terminals	Sealed
0	None	N/A	N/A	N/A
1	Boer Electrical	DJ7101-6.3-21	10	No
2 ³	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]
- 3⁴ 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



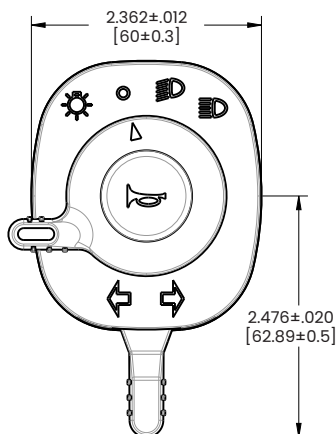
012



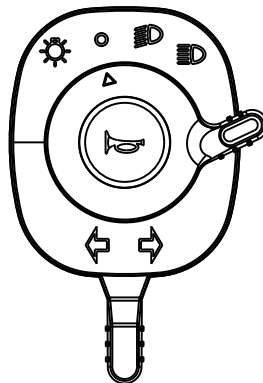
Dimensional Specs

inches [millimeters]

ROTARY KNOB OPTION 1:
LEFT ROTARY KNOB



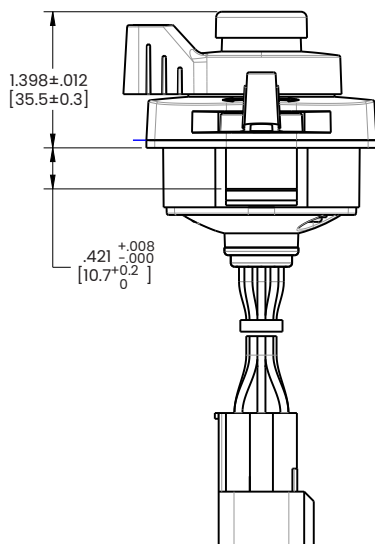
ROTARY KNOB OPTION 2:
RIGHT ROTARY KNOB



LEGEND SHOWN HERE IS ONLY AN EXAMPLE
LEGEND MAY VARY BASED ON REQUEST

THE WIRE COLOR

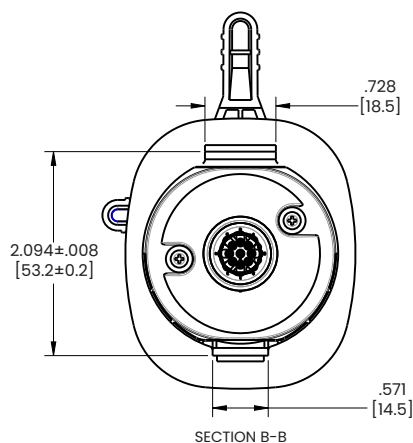
WIRE NO.	WIRE COLOR	WIRE NO.	WIRE COLOR
1	PURPLE	6	RED
2	GREEN	7	GRAY
3	BLACK	8	BROWN
4	YELLOW	9	BLUE
5	WHITE		



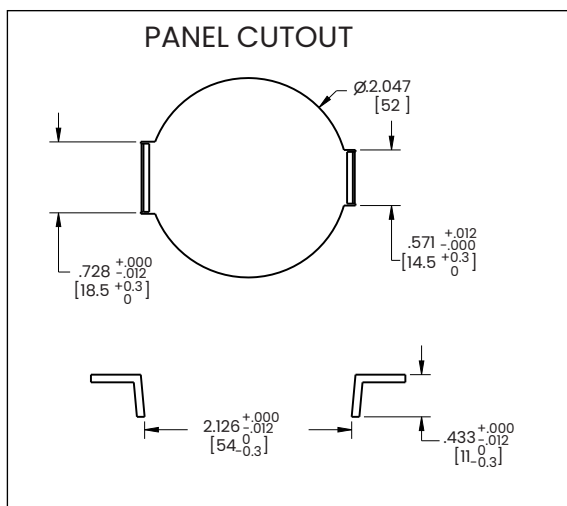
SWITCH WIRING DIAGRAM

SWITCH POSITION	TERMINAL
	9 — 1
	9 — 1 3
	9 — 5 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



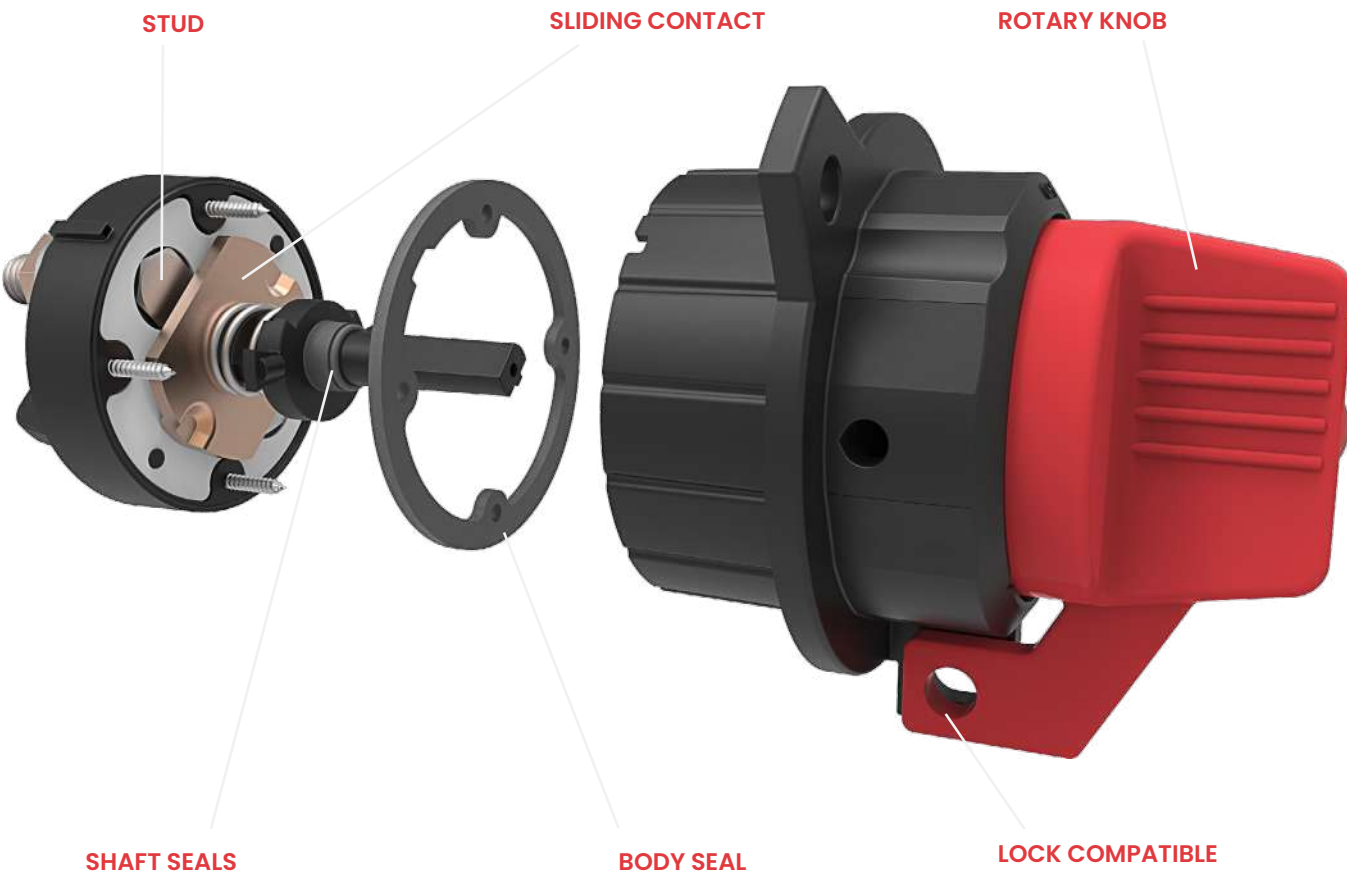
The BD-Series battery disconnect switch is designed to minimize battery drain, ensure maintenance personnel safety, and when used in conjunction with a padlock, provides vehicle theft protection.

1	100-300	12-24	IP67 Sealing
Pole	Amps	VDC	Above-Panel

Typical Applications

- On/Off-Highway Equipment
- Military
- Marine

Design Features



Tech Specs

Electrical

Application Voltage	DC Rated voltage: 12VDC / 24VDC Range of operating voltage: 12VDC: min 9VDC, max 16VDC; 24VDC: min 18VDC, max 32VDC
Current Ratings	12VDC/24VDC: rated 100A, max 300A (M10 Studs); 12VDC/24VDC: rated 300A (M14 Studs)
Intermittent Current	24VDC/1500A, 3 seconds on, 60 seconds off, 10 cycles: voltage drop should not exceed 400mV between main terminals. 28V/1500A/30 seconds: voltage drop should not exceed 400mV 28V/2000A/5 seconds followed by 28V/750A/30 seconds followed by 28V/250A/24 hours: voltage drop should not exceed 100mV
Dielectric Strength	50HZ, 550VAC for 1 minute between electrically / isolated terminals in main circuit; between terminals of main circuit, knob and enclosure.
Insulation Resistance	Minimum of 100 Megohms 1 min @ 500VDC
Temperature Rise	Terminal should not exceed 60°C above ambient.
Endurance	For M10 Studs: 2 seconds ON and 2 seconds OFF per operation, load with rated current & voltage. 12V test @14V±0.1V; 24V test @28V±0.2V. 50,000 cycles: 100A current; 20,000 cycles: 200A current; 3,000 cycles: 250A current 2 seconds ON and 6 seconds OFF per operation, load with rated current & voltage. 12V test @14V±0.1V; 24V test @28V±0.2V 3,000 cycles: 300A current For M14 Studs: 2 seconds ON and 6 seconds OFF per operation, load with rated current & voltage. 12V test @14V±0.1V; 24V test @28V±0.2V 3,000 cycles: 300A current

Mechanical

Handling Shock	Fully functional after 3 drops from 1000 mm height. Surface damage may occur.
----------------	---

Environmental

Operating Temp.	-40 °C to +85 °C.
Moisture Resistance	IEC 60068-2-38 or G/T 2423.34, Test Z/AD: Composite temperature/humidity cycle test, ten 24-hour cycles @ -10°C to +65°C, ≤80-96% RH.
Thermal Cycling	IEC 60068-2-14 or GB/T 2423.22, Test Nb, 25 Cycles -40°C to +85°C
Thermal Shock	IEC 60068-2-14 or GB/T 2423.22, Test Na (5 cycles @ -55°C to +25°C to +85°C to +25°C)
Thermal Resistance	IEC 60068-2-1 or GB/T 2423.1 Cold: Test A, operate 8 hours @ -40°C IEC 60068-2-2 or GB/T 2423.2 Heat: Test B, operate 8 hours @ +85°C
Vibration	IEC 60068-2-34 or GB/T 2423.11,10- 500 Hz, Random vibration test for 8 hours in each of the 3 mutually perpendicular axes. 25Gs @ Z axes, 12.5Gs @ X/Y axes. powered.
Salt Spray	IEC 60068-2-11 or GB/T 2423.17, 48 hours
Fire and Smoke	IEC 60695-11-10 or GB/T 2408, HB
Dust / Waterproof	IP67, for above and below-panel components of actual switch only
Chemical Splash	Gasoline, Diesel, Motor Oil, Brake Fluid, Ammonia, Armor All
UV Protection	ASTM G155-05a, cycle 11,300 hr Xenon Arc, 1.4W / (m2 Nm), wavelength 420 Nm

Physical

Number of Poles	1 pole
Wiring Terminals	Line / Load terminal: M10 brass nuts Torque value: M10 (6-8 Nm); M14 (10-14 Nm)
Mounting	M8 Iron nut, torque value: (10-15 Nm)
Torque Operation	1.0-3.0 Nm
Body Color	Black
Actuator Color	Handle color optional, with white color "Arrow" legends.
Weight	(M10 Studs): 340±10 g / set; (M14 Studs): 385±10 g / set
Material	Base (PBT glass filled), Bracket & Knob (nylon glass filled), Studs (Copper + Tin plating), 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:

¹ Only available with code B from box 2.

[Configure Complete Part Number >](#)

[Browse Standard Parts >](#)

3. TERMINATION

10 M10 Stud
14¹ M14 Stud

4. KNOB COLOR

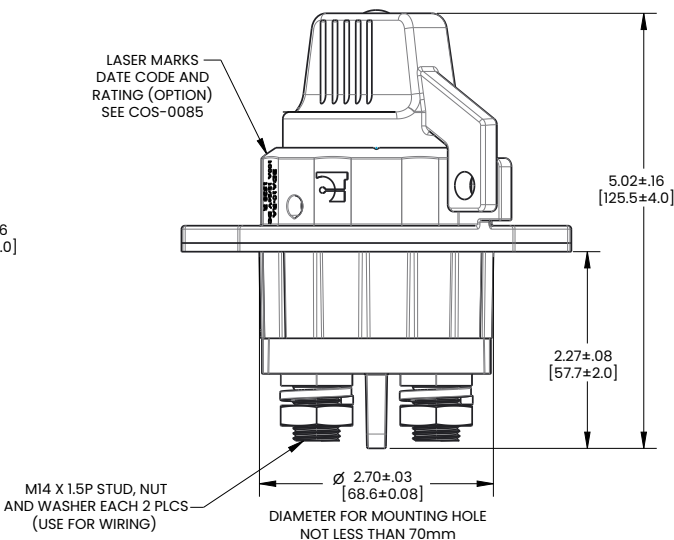
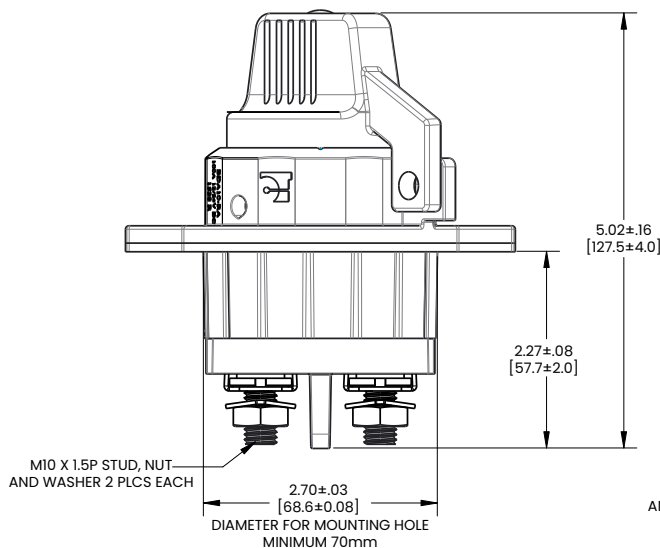
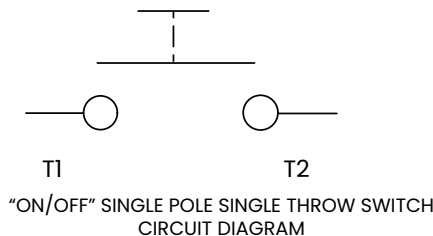
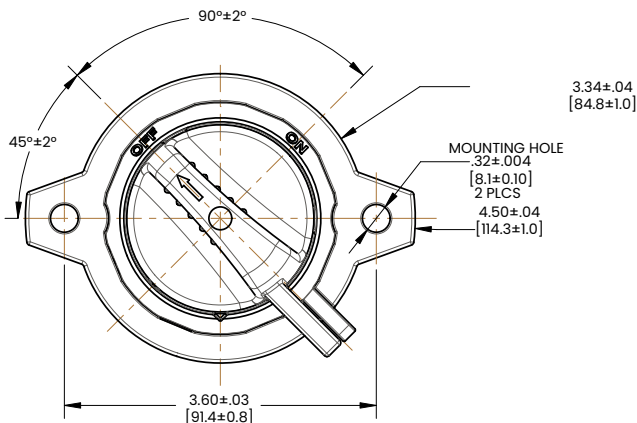
R Red
Y Yellow
B Black

5. LEGEND

A Arrow Legend, White Color

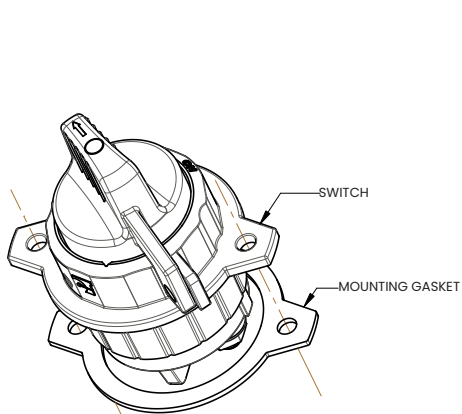
Dimensional Specs

inches [millimeters]

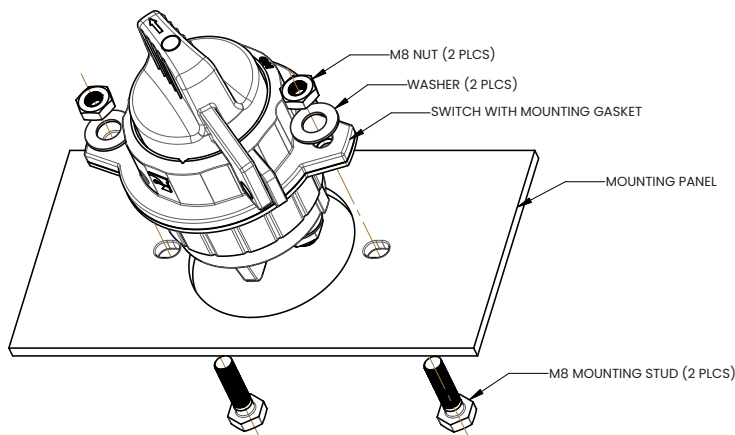


Mounting Method 1

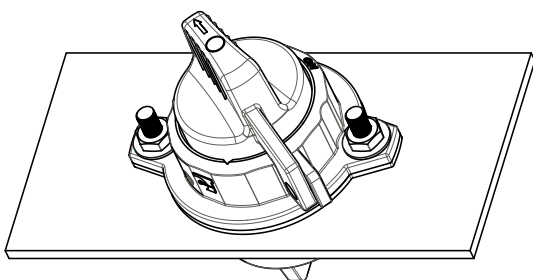
inches [millimeters]



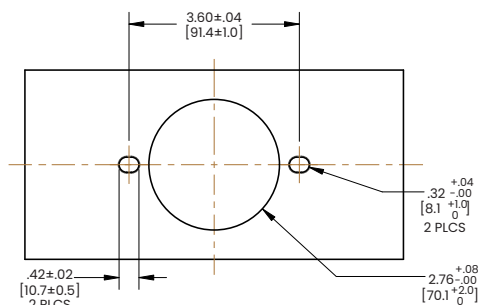
MOUNTING STEP 1: ATTACH MOUNTING GASKET WITH THE SWITCH ORIENTATION AS SHOWN



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])



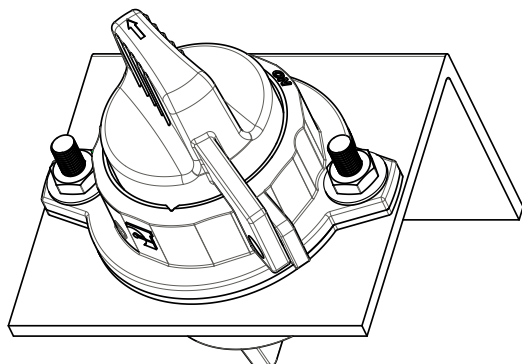
MOUNTING PANEL

Notes:

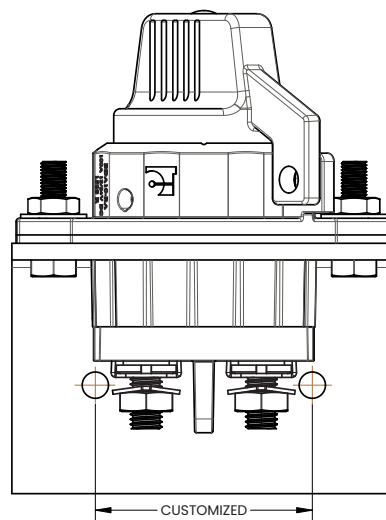
1 Switch can be mounted horizontally or vertically.

Mounting Method 2

inches [millimeters]



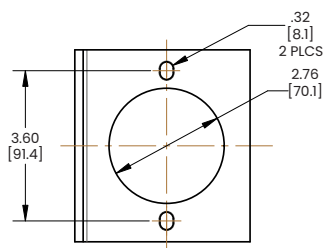
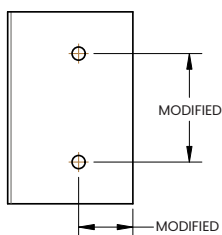
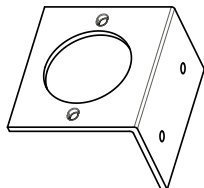
MOUNTING STEP 1: INSTALL SWITCH WITH MOUNTING BRACKET ORIENTATION AS SHOWN



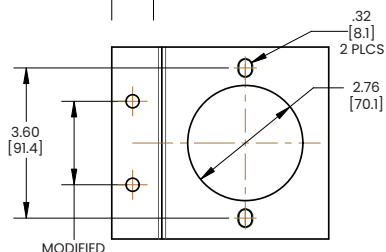
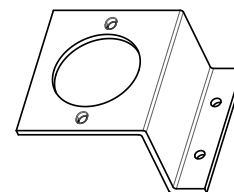
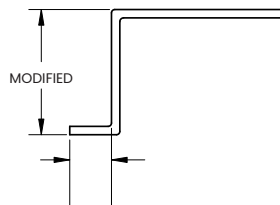
MOUNTING BRACKET CAN BE MODIFIED AS BELOW

MOUNTING STEP 2: ORIENT AS SHOWN AND INSTALL THE SWITCH IN CUSTOMER PANEL.

"L" SHAPED MOUNTING BRACKET



"Z" SHAPED MOUNTING BRACKET

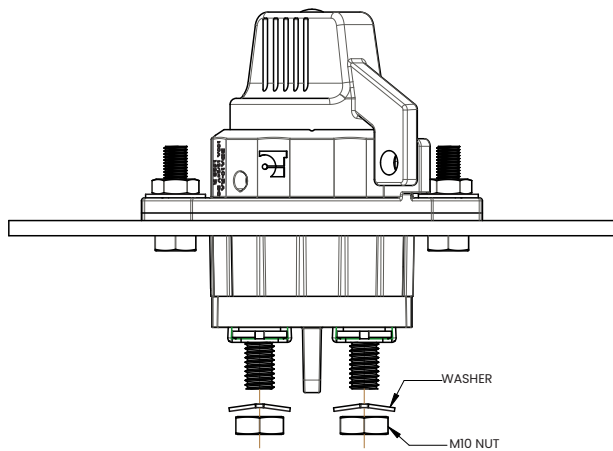


Notes:

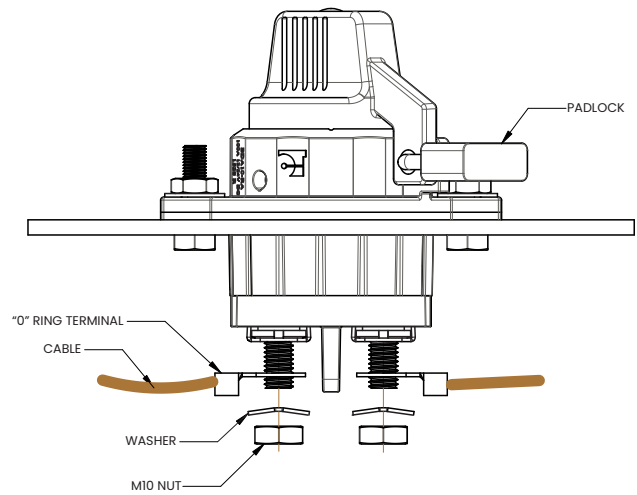
- 1 Switch can be mounted horizontally or vertically.

Wiring

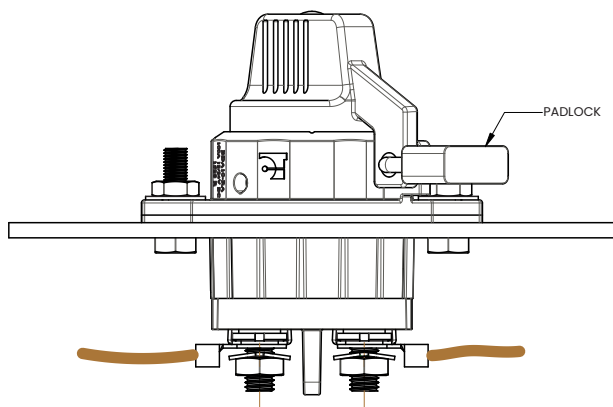
inches [millimeters]



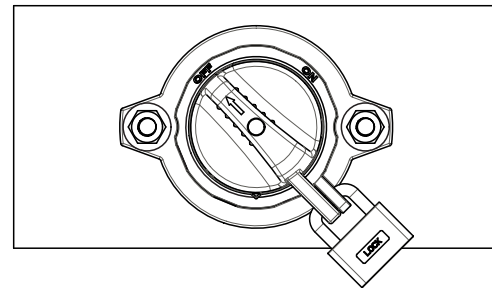
WIRING 1: DISCONNECT WASHERS AND NUTS



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 Rated voltage: 12VDC / 24VDC Range of operating voltage: 12VDC: min 9VDC, max 16VDC; 24VDC: min 18VDC, max 32VDC
Current Ratings	250A@ 12VDC/24VDC
Contact Voltage Drop	Voltage drop≤100mV after 300 sec. ON at 200% rated current prior to endurance test; Voltage drop≤500mV after 5 msec. ON at 1600A max. current prior to endurance test.
Dielectric Strength	50HZ, 1200VAC for 1 minute between electrically / isolated terminals in main circuit; between terminals of main circuit, knob and enclosure.
Insulation Resistance	Minimum of 100 Megohms 1 min @ 500VDC.
Temperature Rise	Terminal should not exceed 90°C above ambient at rated current after endurance test.
Endurance	2 seconds ON and 3 seconds OFF per operation, load with rated current & voltage. 12V test @14V; 24V test @28V. Total 20,000 cycles: 250A current ratings, including 4,000 cycles respectively at -40 °C±2 and +85 °C±2; 12,000 cycles at 23 °C±2.
Overload	500A: 300 seconds ON; 1600A: 30 seconds ON.

Mechanical

Handling Shock	Fully functional after 3 drops from 1000 mm height. Surface damage may occur.
----------------	---

Agency Approvals

UL 558/583

Environmental

Operating Temp.	-40 °C to +85 °C.
Moisture Resistance	IEC 60068-2-38 or G/T 2423.34, Test Z/AD: Composite temperature/humidity cycle test, ten 24-hour cycles @ -10°C to +65°C, ≤80-96% RH.
Thermal Cycling	IEC 60068-2-14 or GB/T 2423.22, Test Nb, 25 Cycles -40°C to +85°C.
Thermal Shock	GB/T 28046.4-2011, 5.3.2, Test Na (100 cycles@ -40°C to +25°C to+85°C to +25°C).
Thermal Resistance	ISO 16750-4 or GB/T 28046.4 Cold: Test A, work 24 hours @ -40°C ISO 16750-4 or GB/T 28046.4 Heat: Test B, work 48 hours @ +85°C.
Vibration	IEC 60068-2-34 or GB/ T 2423.11,10- 500 Hz, Random vibration test for 8 hours in each of the 3 mutually perpendicular axes. 25Gs @ Z axes, 12.5Gs @ X/Y axes, powered.
Salt Spray	IEC 60695-11-10 or GB/T 2408, HB (horizontal burning) and V0 (vertical burning).
Sealing	IP67, for above and below-panel components of actual switch only
Chemical Splash	Gasoline, Diesel, Motor Oil, Brake Fluid, Ammonia, Mixture of previous five chemicals.
UV Protection	ASTM G155-05a, cycle 11, 300 hr Xenon Arc, 1.4W / (m2 Nm), wavelength 420 Nm.

Physical

Number of Poles	1 pole
Wiring Terminals	Line / Load terminal: brass nuts Torque value: M10 (10-15 Nm).
Mounting	M6/M7 bolt and nut, 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 nylon), Studs (Tin plated brass), Nuts (Brass) 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 ¹
- B** Non-Removable

4. TERMINATION

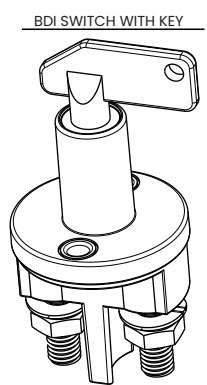
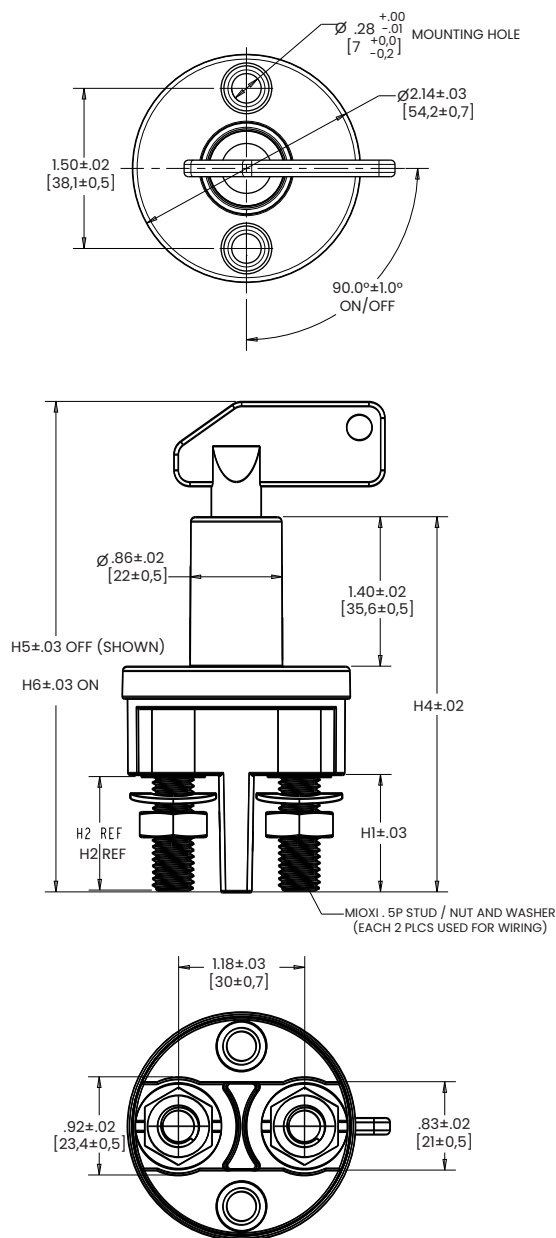
- 1 M10 Stud 19 mm length
- 2 M10 Stud 27 mm length
- 3 M8 Stud 19 mm length ²

5. ACCESSORY ³

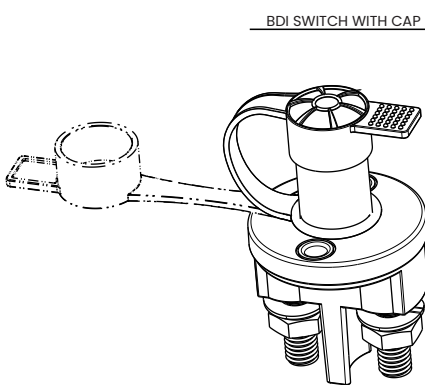
- BLANK** Without Cap
- /CAP** With Cap

Dimensional Specs

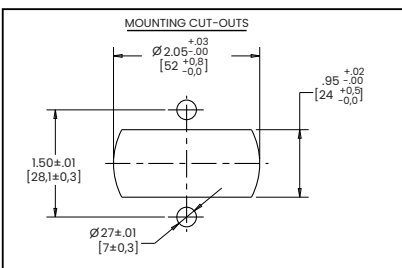
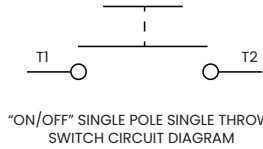
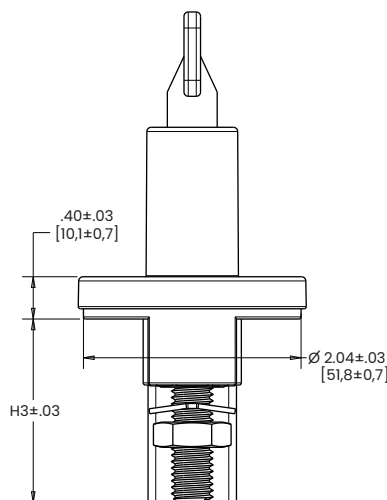
inches [millimeters]



BD1 SWITCH WITH KEY



BD1 SWITCH WITH CAP



Part Number	BD1-XX2	BD1-XX1
H1	1.10 [27.9±0.6]	0.80 [20.3±0.63]
H2	1.06 [27] [19]	0.75 [19]
H3	1.72 [43.6±0.7]	1.42 [36.0±0.5]
H4	3.51 [89.3±0.5]	3.21 [81.6±0.5]
OFF: H5	OFF 4.59 [116.7±0.7]	OFF 4.29 [109.1±0.7]
ON: H6	ON 4.45 [113.1±0.7]	ON 4.15 [105.4±0.7]

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 (4) A 250V ~ T85 μ	resistive load amperage motor load amperage amperage voltage AC max. operating temp. in centigrade micro-gap (<3mm) 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 Incandescent LED	25,000 hours 25,000+ hours 100,000 hours
Lamp Characteristics	Neon (120-240V) Incandescent 6V 12-14V 18V 24-28V	.002A Current Draw .20A Current Draw .08A Current Draw .04A Current Draw .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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