

L-Series Switch

The L-Series rocker switch is an innovative product offering total design flexibility, while at the same time setting new standards for performance and reliability. Its versatile design features include a neatly proportioned size that fits into an industry standard mounting hole of 1.734 x .867 (44.0mm x 22.0mm), countless unique choices for ratings, circuits, colors, illuminations and laser etched legends. These single or double pole switches also feature a broad choice of actuator styles, colors, and lenses with up to twelve terminals offering an extensive range of switch and lamp circuit options, including LED or incandescent illumination. Additionally, an optional plug-in terminal connector enables pre-wiring of wire your harness.

Typical Applications:

- ♦ Construction machinery
- ♦ Agricultural equipment
- ♦ On-highway transportation equipment



Performance Features:

- ♦ IP67 certified sealed front panel components
- ♦ Withstands temperatures from -40°C to +85°C
- ♦ Vibration, shock, thermoshock, moisture and salt spray resistant



Carling Technologies®

Innovative Designs. Powerful Solutions.

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L-Series Switch

DESIGN FEATURES

ELIMINATES NEED FOR RETOOLING

Neatly proportioned, the L-Series fits into an industry standard mounting hole of 1.734 x .867 [44.0mm x 22.0mm].

INTEGRATES EASILY INTO YOUR SYSTEM

Available with two industry standard termination options, .250 TAB or .187 TAB.

ENSURES GREATER SHOCK PROTECTION

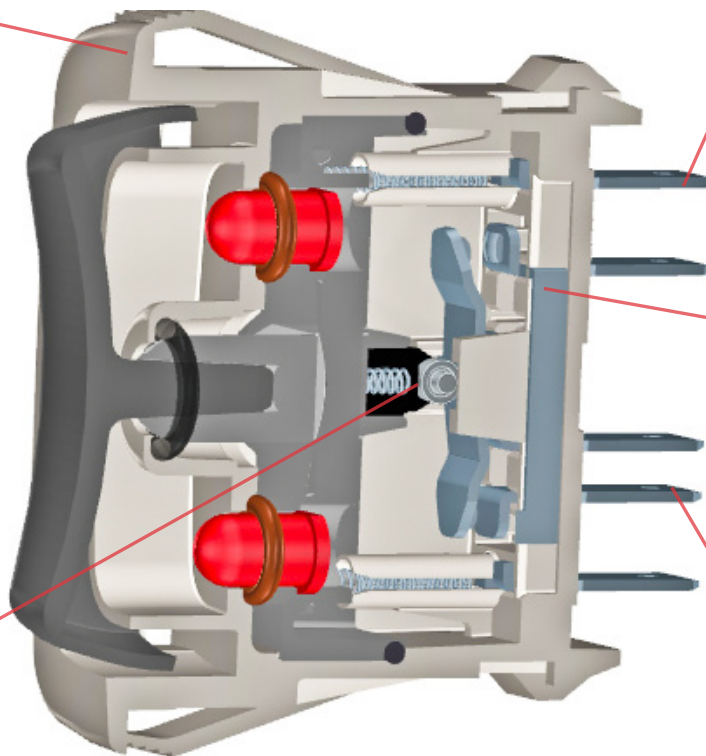
Welded lamp connection and one-piece internal, jumperless terminal withstand extreme shock and vibration.

WITHSTANDS EXTREME TEMPERATURES

Roller pin mechanism eliminates need for lubricants, Withstanding temperatures from -40°C to +85°C.

MAXIMIZES YOUR DESIGN FLEXIBILITY

Twelve terminals offers an extensive range of switch and lamp circuit options, including LED or incandescent illumination.



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 Megaohms
Initial Contact Resistance	10 milliohms max. @ 4VDC
Life	100,000 cycles maintained, 50,000 cycles momentary at rated voltage and current
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.

Mechanical

Endurance	250,000 cycles minimum
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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.
Rocker	Nylon 66 Reinforced, rated to 105°C (modular lens). Locking rocker, standard rocker & paddle. Laser etching with a polycarbonate actuator.
Lock	Acetal
Lens	Polycarbonate rated at 100°C.
Bracket	Nylon Zytel
Connector	Nylon 66 rated at 85°C. Polarized.

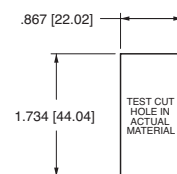
Actuator Travel (Angular Displacement)

2 position	26°
3 positions	13° from center

Environmental

Environmental	IP67 for above panel components of the actual switch, representing an index of protection as applied to electrical equipment in accordance with IEC 529, BS 5490, DIN 400 50 & NFC 20 010.
Corrosion	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/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



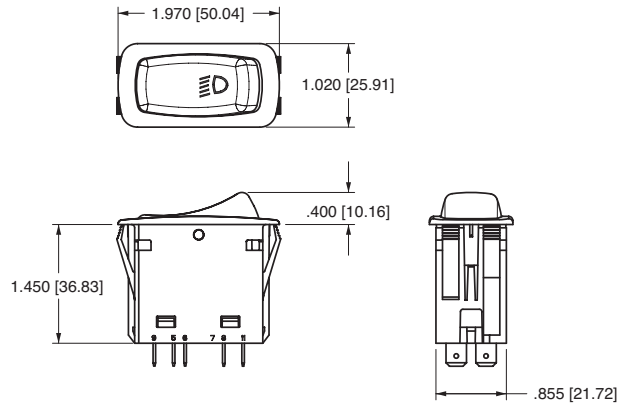
MOUNTING HOLE

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

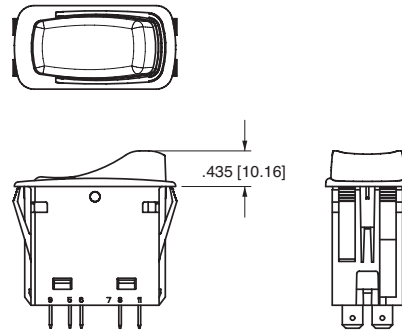
*Manufacturer reserves the right to change product specification without prior notice.

Dimensional Specifications: in. [mm]

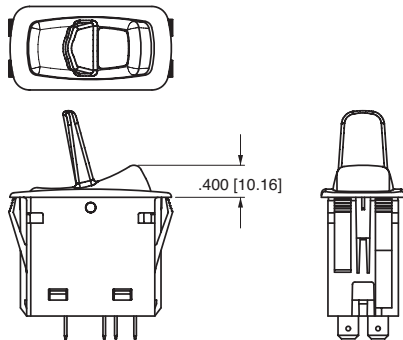
L-SERIES
SHOWN WITH LASER ETCHED
ACTUATOR



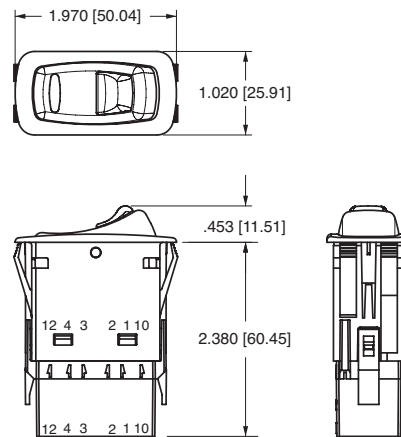
L-SERIES
SHOWN WITH ROCKER GUARD



L-SERIES
SHOWN WITH LARGE LENS
AND PADDLE ACTUATOR

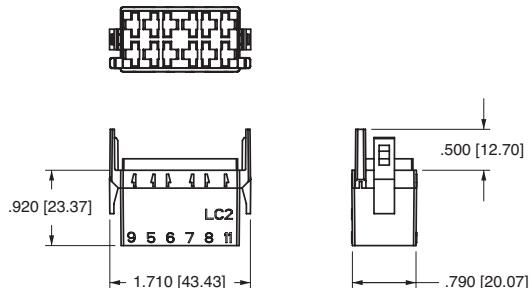


L-SERIES
SHOWN WITH BAR LENS, LOCK
AND CONNECTOR



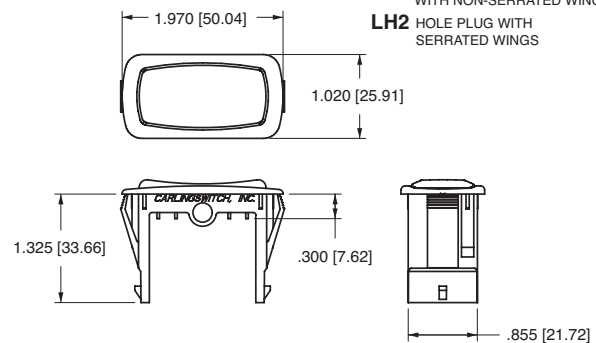
Connector **L-SERIES** CONNECTOR

- 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)

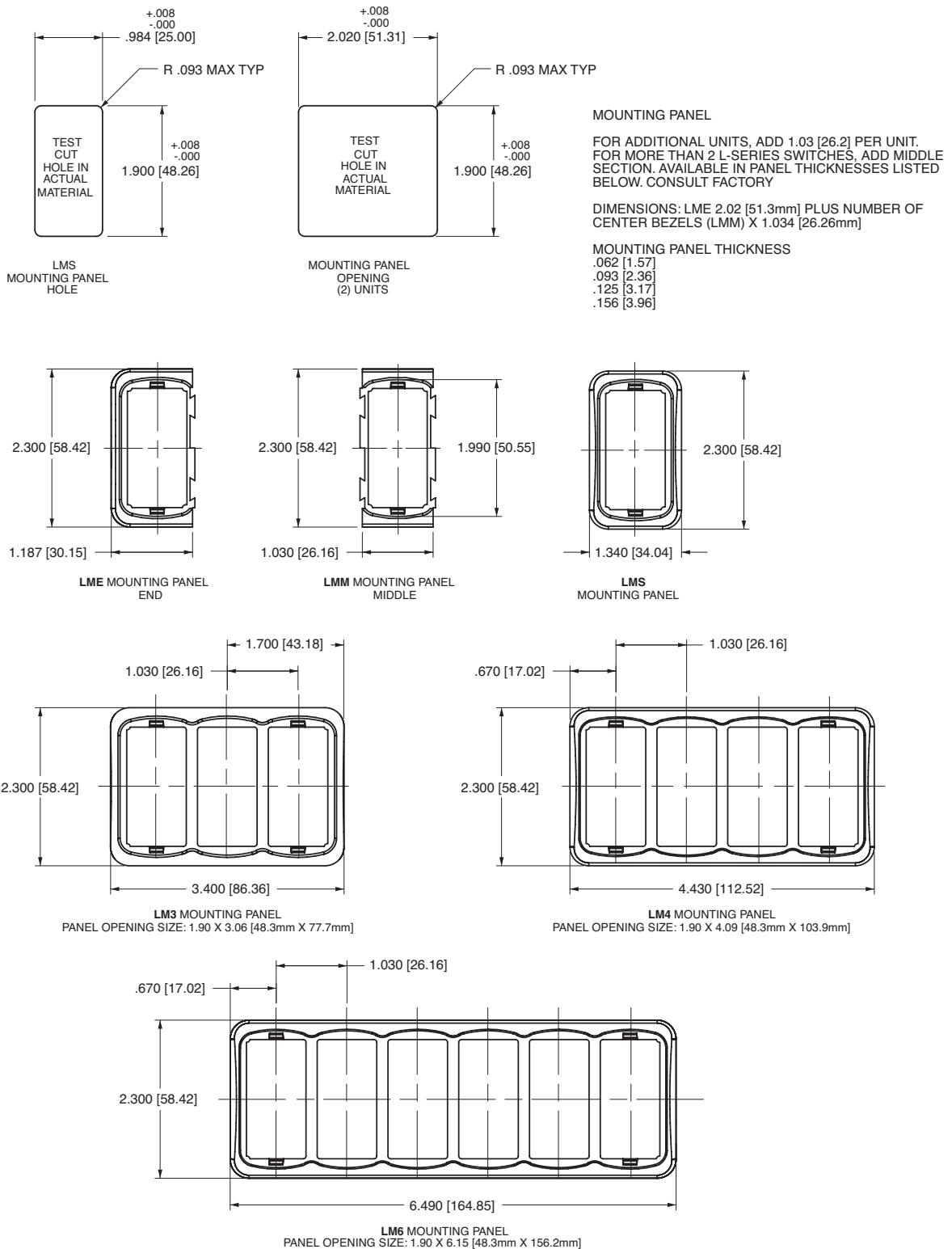


Hole Plug **L-SERIES** HOLE PLUG

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



Dimensional Specifications: in. [mm]



CIRCUIT CODE	SCHEMATIC	CIRCUIT CODE	SCHEMATIC	CIRCUIT CODE	SCHEMATIC
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 CODE	SCHEMATIC	CIRCUIT CODE	SCHEMATIC
62		71	
63		72	
64		73	
65		80	
66		81	
67		82	
68		A2	
69		A3	
70			

ILLUMIN. CODE	SCHEMATIC
A	
B	
C	
D	
E	
F	
G	
H	

ILLUMIN. CODE	SCHEMATIC
J	
1	
2	
K	

LEGEND	
SYMBOL	DEFINITION
	TERMINAL LOCATION
	LAMP LOCATION
	MAINTAINED CIRCUIT
	MOMENTARY CIRCUIT
	INTERNAL CONNECTION (JUMPER TERMINAL)
	2 POSITION CONNECTION
	2 POSITION
	3 POSITION

L	11	E	3	C	H	N	1	—	3	A	A	45	—	1	48
1 Series	2 Circuit	3 Rating	4 Termination	5 Illumination	6 Lamp	7 Lamp	8 Bracket		9 Actuator	10 Lens Style & Color	11 Lens Style & Color	12 Legend		13 Legend Orientation	14 Actuator Lens Legend

1 SERIES L

2 CIRCUIT²

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	2 & 3, 6 & 8	Connected Terminals	1 & 2, 5 & 6
11	ON	NONE	OFF
12	(ON)	NONE	OFF
13	ON	NONE	(OFF)
14	ON	NONE	ON
15	ON	NONE	(ON)
16	ON	OFF	ON
17	ON	OFF	(ON)
18	(ON)	OFF	(ON)
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, 4, & E only.

3 RATING²

1	.4VA @ 28VDC Resistive
4	10A 250VAC 1/2 HP, 15A 125VAC 1/2 HP, No Listings
B	15A 24V
C	20A 18V
D	20A 12V
E	15A 12V
G	20A 6V
H	20A 3V

4 TERMINATION^{2,3,4}

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

Notes:

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

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

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-
	& # 2	Independent	12+	9-
D	# 1	Dependent	4+	9-
E	# 1	Independent	10+	9-
	& # 2	Dependent	4+	9-
F ⁵	# 1	Independent	10+	9-
	& # 2	Dependent	8+	9-
G	# 1	Dependent	4+	9-
	& # 2	Independent	10+	9-
H	# 1	Both Independent	10+	9-
	& # 2	(in series)		
J	# 1	Dependent	4+	9-
	& # 2	Dependent	1+	9-
1	# 2	Hazard	6+	10- 12-
2	# 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				
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 COLOR¹

	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 COLOR¹

	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

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

- Laser Etch background color

12 LASER ETCH, LENS OR BODY LEGEND

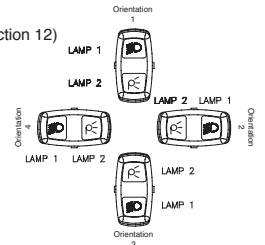
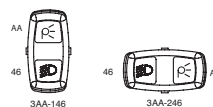
00 No legend this location / no actuator

For legend options & codes, see pages 54-65 of the Carling Transportation catalog.

13 LEGEND ORIENTATION

0 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



14 ACTUATOR LENS LEGEND

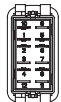
00 No legend this location / no actuator

For legend options & codes, see pages 54-65 of the Carling Transportation catalog.

L	11	D	1	S	W	C	J	—	P	M	H	00	—	0
1 Series	2 Circuit	3 Rating	4 Termination	5 Illumination	6 Lock	7 Lamp	8 Bracket		9 Actuator	10 Lens	11 Lock	12 Legend		13 Legend Orientation

1 SERIES**L****2 CIRCUIT⁶**

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 (Lock location)
SP	2 & 3, 6 & 8	Connected Terminals	1 & 2, 5 & 6
11	21 ON	NONE	OFF
14	24 ON	NONE	ON
16	26 ON	OFF	ON
17	27 ON	OFF	(ON)
18	28 (ON)	OFF	(ON)

CIRCUITS WITH JUMPER TERMINALS

30 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 RATING⁵

1	.4VA @ 28VDC Resistive
4	10A 250VAC 1/2 HP, 15A 125VAC 1/2 HP, No Listings
B	15A 24V
C	20A 18V
D	20A 12V
E	15A 12V
G	20A 6V
H	20A 3V

4 TERMINATION^{4,5}

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

5 ILLUMINATION²

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-

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 1 not available with rating 4.

5 Termination 3 only available with ratings 1, B and E.

6 Circuits 30, 31, 58 and 69, are not available with rating codes 4, C, D, G or H.

6 LOCK**W** Lock above terminals 10 & 9.**7 LAMP**

Above terminals 12 & 11

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 COLOR¹**J** Black**9 ACTUATOR STYLE AND COLOR¹**

	Black	Red
Locking Rocker	P	R

10 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

11 LOCK FUNCTION AND COLOR

Locking Position

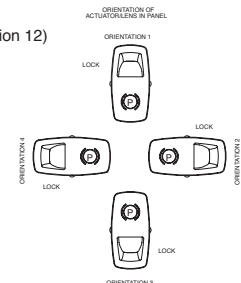
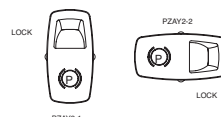
Up	Down	Up & Down	Center ³	Lock Color
A	H	R	1	Match Actuator
B	J	S	2	Black
C	K	T	3	White
D	L	U	4	Red
E	M	V	5	Safety Orange

12 LASER ETCH, LENS OR BODY LEGEND**00** No legend this location / no actuator

For legend options & codes, see pages 54-65 of the Carling Transportation catalog.

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



* Intentionally left blank

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