The Best Rotary Switches, Relays, and Electrical Systems Products...

Backed by the industry’s most knowledgeable and responsive engineering and customer service professionals...

Any way you want them...

Delivered when you need them.

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NEVER A DOUBT
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ISO 9001 CERTIFIED
THE ADVANTAGE IS YOURS

When you choose Electroswitch products the advantage is always yours... For over 50 years Electroswitch products have been specified for use in the most demanding, most critical applications in the power industry by virtually every equipment manufacturer and utility in the United States. They know that when you specify Electroswitch products you have chosen the most dependable, most reliable, and most proven products available in the world today. With Electroswitch there is Never a Doubt.
Electroswitch also offers the widest variety of switches and relays available in the power industry today. There are virtually millions of different potential configurations to precisely meet applications.

We offer a choice of manual, remotely operated or SCADA operated products, snap and cam action switches, as well as system products to enhance power industry automation projects.

The Advantage is Always Yours when you work with Electroswitch
THE ADVANTAGE IS YOURS

You Get Everything You Want.

When we say we have a full line of products, we mean exactly that. Our switches and relays are built in three family groups: Detent, Cam Action, and Snap Action. Within the Detent and Cam Action groups we combine manual and remote or SCADA operated designs with standard components in almost limitless configurations to provide literally millions of different models. The objective is not to see how many different switches we can build, but to allow you to choose without compromise or tradeoff the best switch for your particular application.

A FULL LINE OF POWER PRODUCTS

- Instrument and Control Switches
- Miniature Instrument & Control Switches
- Modular Instrument & Control Switches
- Tagging Relays
- Lock-Out Relays
- Control Switch Relays
- Selector Switch Relays
- Latching Switch Relays
- Control Indicator Modules
- Serial Communication Control of Electrically Operated Devices
You Get The Highest Quality Product.

Electroswitch is on the Qualified Supplier List of virtually every electric utility in the United States. Our switches are specified for the most demanding duty in hi-shock military shipboard equipment, nuclear power plants and in all types of industrial, construction, and transportation equipment. Anywhere the ability to perform reliably under the most severe conditions of shock and vibration is essential, you will find Electroswitch products. At Electroswitch high quality is not a claim, but a fact proven through over fifty years of field performance.

We’ll Meet Your Scheduling and Delivery Requirements.

We take great pride in meeting customer delivery requirements – no matter how stringent. In addition to orders by mail, phone, and fax, we also take orders electronically utilizing EDI. Use your MRP system to place orders direct. If your requirements change after placing your order, just give us a call; we can usually adjust our schedule to meet your new requirements.

ISO 9001 CERTIFIED
You Can Get Modifications Tailored To Your Needs.

Just because we have millions of configurations to choose from doesn’t mean we won’t design and build something special for you. Tell us what you need, or explain your application to us. Our application engineers will solve your problem precisely by modifying one of our standard models or creating something entirely new. You don’t have to settle for almost right; we’ll get it exactly right for you.
You Get Total Support.

We recognize our responsibility to you, our customers, and know that it goes far beyond simply delivering switches, relays, and electrical systems.

**Application Assistance**
More than simple assistance. We have a fully trained staff of applications professionals who are anxious to help you solve virtually any switching and relaying problems you may have.

**Engineering**
We have the industry’s most knowledgeable, dedicated, and willing engineering staff waiting to go to work for you. If you need a special switch or relay, give us a call; we’ll solve your switching problems.

**Special Training**
We won’t leave you on your own. If you need any special training or other assistance, we’re more than happy to provide this service.
**THE ADVANTAGE IS YOURS**

Electroswitch...

- Products proven in the most demanding power industry applications
- Products with the highest dependability and reliability
- Proven performance in high shock and vibration environments
- Qualified supplier to virtually every electric utility in the United States
- Widest variety of switches and relays available in the industry
- Custom tailored product modifications to meet specialized applications
- Strongest technical support team in the industry
- Ability to meet the most stringent delivery requirements
- Place orders electronically using EDI, or utilize mail, phone, or fax
**INTRODUCTION**
**INSTRUMENT AND CONTROL SWITCHES**

**Choose the switch that best suits your application**

Electroswitch offers a wide variety of Rotary Instrument and Control Switches designed specifically to satisfy the most stringent requirements of Substation Automation, Power Generation, Transmission, and Distribution systems. In fact, we offer the world’s most complete, tested, and proven line of rotary switches available today.

The following is a quick description of each series. It is designed to help you select the one that is right for you.

### Series 24

The quality standard in the utility industry, the Series 24 features low resistance, double-wiping contacts with self-cleaning silver contacts for years of reliable service. They are available with up to ten decks (20 poles) and allow for between 2 and 8 positions. These switches are rated at 30 amps @ 600 volts.

### Series 24P

**With Lighted Nameplate**

All the same great features you’ve come to expect in our Series 24 Switches now available with built-in, cost-effective, long-life LED indicators. The industry standard — a better value than ever.

### Series 31

The Series 31 features our low resistance, double-wiping contacts in a smaller package. They are available with up to ten decks (20 poles) and allow for between 2 and 8 positions, and can be ordered for either single or 4 hole mounting. Series 31 Switches are rated at 15 amps @ 600 volts.

### Series 20

The Series 20 Cam Switches have a very small footprint and are designed specifically to reduce the space required on a control panel. They can be mounted on 3” centers and are available in a standard configuration, modular plug-in design, or with a lighted front panel. These switches are available with up to 12 decks (24 poles) and between 2 and 12 positions. Series 20 Switches are rated at 24 amps @ 600 volts.

### Series 101

**Single or Four Hole Mount**

Series 101 Switches are a snap-action design that are available for either AC or DC applications. These switches feature low resistance double-wiping contacts. Rated at 20 amps @ 600 volts.

### Series 102

**Auxiliary**

The Series 102 Auxiliary Switch is based on the contact mechanism of the 101 Snap-Action Switch modified to allow lever arm activation. Rated at 20 amps @ 600 volts.

### Type W2

The Type W2 uses a contact roller, spring-actuated design that provides for momentary, maintained, or lateral contacting. These switches can be provided with up to eight decks (48 poles) and between 2 and 12 positions. Type W2 Switches are rated at 20 amps @ 600 volts.

### Type W

Type W Switches are reliable, proven products still used in many time-tested applications. These switches are available with up to 10 poles and between 2 and 12 positions. Type W Switches are rated at 20 amps @ 600 volts.

---

**INTERRUPTING CURRENT RATINGS**

<table>
<thead>
<tr>
<th></th>
<th>120VAC</th>
<th>240VAC</th>
<th>600VAC</th>
<th>125VDC</th>
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<tr>
<td>Series 24</td>
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<td>15A</td>
<td>6A</td>
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<td>Series 31</td>
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<td>Type W</td>
<td>50A</td>
<td>25A</td>
<td>5A</td>
<td>8A</td>
</tr>
<tr>
<td>Type W2</td>
<td>30A</td>
<td>20A</td>
<td>8A</td>
<td>5A</td>
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</tbody>
</table>

---

**TYPE W2 APPLICATIONS**

- **Series 20**: The Series 20 Cam Switches have a very small footprint and are designed specifically to reduce the space required on a control panel. They can be mounted on 3” centers and are available in a standard configuration, modular plug-in design, or with a lighted front panel. These switches are available with up to 12 decks (24 poles) and between 2 and 12 positions. Series 20 Switches are rated at 24 amps @ 600 volts.

---

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Features
- Double-Sided, Double-Wiping, Knife-Type Rotary Contacts
- Silver Contact Surfaces for Long, Reliable Low Contact Resistance Life
- #8-32 Terminal Screws — Easy Installation of #12AWG Wire
- Standard Three Hole Panel Mount

Control Switch Special Features
- Spring Return to Normal (Vertical) Position Multi-Pole Contact Arrangements
- Mechanical Red/Green Target
- Slip Contacts for “Normal After” Applications
- Pull to Lock for Safety Lockout (see page 74)

Instrument Switch Special Features
- Make-Before-Break (Shorting) Contacts
- Common Input Tap Switch Arrangement — Sequentially Connected to Several Lines Using the Same Switching Deck
- Positive Positioning Detent Mechanism
- Pre-Wired Applications

Synchroscope Special Features
- Removable Oval Handles
- Keyed Arrangements

Electrical Specifications

Continuous Ratings
- 30A/600V

Interrupt Ratings
- 20A/120VAC
- 15A/240VAC
- 6A/600VAC
- 3A/125VDC
- 1A/250VDC

Overload Current (50 operations)
- 95A/120VAC
- 65A/240VAC
- 35A/600VAC

Making Ability for Circuit Breaker Coils
- 95A–125VDC

Contacts Resistance
- .01ohms maximum

Mechanical Specifications

Sections
- 1 to 10 — Consult Factory For Additional Sections

Poles
- 1 to 20 — Consult Factory For Additional Poles

Positions
- 8; Adjustable Stops for 2–8 Position Rotation

Contacts
- Break-Before-Make (Non-Shorting);
  Make-Before-Break (Shorting)

Action
- 45˚ Positive Detent or Momentary Indexing

Mounting
- Panel Mount, 3 Hole Mounting, Hardware Supplied

Panel Thickness
- 3/16” Max. Standard — Others Available

Rotor Contacts
- Silver Overlay Phosphor-bronze, Double-Wiping

Stationary Contacts
- Silver Inlay, with Integral Screw Type Terminals

Construction
- Contacts Enclosed in Molded-phenolic Insulators

Approvals
- UL: File No. E18174
- CSA
- Class 1E Nuclear


ORDERING INFORMATION - (For generic switches fill out matrix below. For application specific switches see page 15.)
If you don’t see the switch you need, please consult the factory.

<table>
<thead>
<tr>
<th>Assemblage 2</th>
<th>Assemblage 3</th>
<th>Note 1: Nominal torques, weights, and depth behind panel are listed below. Note 2: Assemblages are shown with handle in 0˚ position (12 o’clock).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handle Type</td>
<td>Shorting</td>
<td></td>
</tr>
<tr>
<td>B = Oval Shank</td>
<td>Blank = No</td>
<td></td>
</tr>
<tr>
<td>C = Round Knurled</td>
<td>S = Yes</td>
<td></td>
</tr>
<tr>
<td>D = Pistol Grip</td>
<td>E = Removable Oval</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Matrix Code</th>
<th>No. of Sections</th>
<th>Weight (lbs.)</th>
<th>Torque (lb./in)</th>
<th>Depth Behind Panel</th>
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<tbody>
<tr>
<td>01</td>
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<td>1.1</td>
<td>8</td>
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<td>02</td>
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<td>2.78</td>
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<td>03</td>
<td>3</td>
<td>1.3</td>
<td>10</td>
<td>3.33</td>
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<td>04</td>
<td>4</td>
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<td>11</td>
<td>4.20</td>
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<tr>
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<td>2.0</td>
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<td>8.03</td>
</tr>
</tbody>
</table>

Matrix Code:
- For each section, subtract the section number from 10 (e.g., section 5: 10 - 5 = 5)

Electroswich • 180 King Avenue • Weymouth, MA 02188 • TEL: (781) 335-5200 • FAX: (781) 335-4253 • www.electroswich.com
Series 24 Lighted Nameplates
The Series 24 family of Manual and Remotely Operated Switches are Now Available with Built-In, Cost-Effective, Long-Life LED Indicators. The Series 24 Switch, the Utility Industry Standard for Quality and Reliability is Now a Better Value Than Ever!

Benefits
- Saves Panel Space
- Reduces Purchase and Installation Cost
- Easy to Use . . . No Special Operator Training
- Provides Local and Remote (SCADA) Annunciation of Breaker Trip Coil Failure

Features
- Can be used on ALL Series 24 Switches
- Is Available with One, Two or Three Replaceable LEDs
- Flexible Circuitry lets LEDs be Wired to Indicate Any Desired Event
- Is Available With or Without a Mechanical Target
- 125VDC Unit Covers IEEE 48V/125V Ranges (38 to 140VDC)
- AC Unit Available
- Saves Panel Space by Fitting up to 3 LEDs into the Standard Series 24 Nameplate Footprint
- Allows Monitoring of Breaker Trip Coil with Local (Center LED) and SCADA Annunciation
- Model Available to Simultaneously Monitor Two Independent Isolated Trip Coils
- Uses Large LEDs that:
  - Are Brighter than the Typical Incandescent Bulb
  - Have an 11 Year Life (Typical)
  - Are Socket Mounted for Design Flexibility and Easy Front of Panel Field Replacement
  - Are More Rugged than Incandescent Bulbs
  - Are Available in Red, Green, Amber, Blue and White
  - Each LED Draws Less than 10mA when Lit

Approvals
- UL File No. E18174

Ordering Information
Part Numbers for the Series 24 Switches with Lighted Target Nameplate are fairly simple. Find the part number of the product you wish to order in the Electroswitch catalog, then simply add a two letter code after the second digit in its part number. The first letter of the code will always be "P" indicating a Lighted Target Nameplate. The second letter will change depending on the options as follows.

A = Single LED, Amber, 48/125VDC
B = Two LEDs, Green/Red, 48/125VDC
C = Three LEDs, Green/Amber/Red, 48/125VDC
D = Three LEDs, Green/Red/Red, 48/125VDC (Dual Trip Coil Monitor)
E = Single LED, Amber, 120VAC
F = Two LEDs, Green/Red, 120VAC
G = Three LEDs, Green/Amber/Red, 120VAC
H = Three LEDs, Green/Red/Red, 120VAC

Consult factory for 24VDC, 250VDC, and special configurations.

Example One:
A Series 24 Breaker Control Switch with circuit number 38 and a pistol grip handle is part number 2438D.
The same Breaker Control Switch with a Lighted Target Nameplate, three LEDs, and 120VAC LED voltage would become part number 24PG38D.

Example Two:
A Series 24 Control Switch Relay with standard circuit number 57, 48VDC relay operating voltage, and control circuit "C" is part number 8857CC.
The same Control Switch Relay with a Lighted Target Nameplate, Three LEDs, and 48/125VDC LED voltage would become part number 88PC57CC.
SERIES 31
INSTRUMENT AND CONTROL SWITCHES

Features
- Double-Sided, Double-Wiping, Knife-Type Rotary Contacts
- Silver Contact Surfaces for Long, Reliable Life
- Terminal Screws — Easy Installation
- Standard Four Hole Mount
  Single Hole Mount Available - Consult Factory

Control Switch Special Features
- Spring Return to Normal (Vertical) Position

Instrument Switch Special Features
- Make-Before-Break (Shorting Contacts)
- Common Input Tap Switch Arrangement — Sequentially Connected to Several Lines Using the Same Switching Deck
- Positive Positioning Detent Mechanism
- Pre-Wired Jumpers

Electrical Specifications

Continuous Ratings
- 15A/600V

Interrupt Ratings
- 10A/120VAC
- 5A/240VAC
- 3A/600VAC
- 3A/30VDC
- 1A/125VDC
- Overload Current (50 operations): 60A/125VAC Resistive
- Voltage Breakdown: 2200V rms minimum
- Insulation Resistance: 100 Megohms minimum
- Contacts Resistance: .01ohms maximum
- Making Ability for Circuit Breaker Coils: 45A–125VDC

Mechanical Specifications

Sections 1 to 10
Poles 1 to 20
Positions 8; Adjustable Stops for 2–8 Position Rotation
Contacts Break-Before-Make (Non-Shorting);
Make-Before-Break (Shorting)
Action 45˚ Positive Detent Indexing
Mounting 4 Hole
Panel Thickness 3/16" Max. Standard
Rotor Contacts Silver Plated Phosphor-bronze, Double Grip
Stationary Contacts Silver Plated Copper, w/Integral Screw Type Terminals
Construction Contacts Enclosed in Moldedphenolic Disks

Approvals
- UL File No. E18174
- CSA
- CE

ORDERING INFORMATION -
(For generic switches fill out matrix below. For application specific switches see page 15.)

<table>
<thead>
<tr>
<th>Assemblage</th>
<th>Mounting Style/Handle</th>
<th>Shorting</th>
<th>No. of Sections</th>
<th>Weight (oz)</th>
<th>Torque (lbs/in)</th>
<th>Depth Behind Panel</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>B = Four Hole/Oval Shank</td>
<td>S = Yes</td>
<td>1</td>
<td>2.00</td>
<td>2.75</td>
<td>4.50</td>
</tr>
<tr>
<td>3</td>
<td>C = Four Hole/Round Knurled</td>
<td>S = Yes</td>
<td>1</td>
<td>2.00</td>
<td>2.75</td>
<td>4.50</td>
</tr>
<tr>
<td>4</td>
<td>D = Four Hole/Pistol Grip</td>
<td>S = Yes</td>
<td>1</td>
<td>2.00</td>
<td>2.75</td>
<td>4.50</td>
</tr>
</tbody>
</table>

Note 1: Nominal torques, weights, and depth behind panel are listed below.
Note 2: Assemblages are shown with handle in 0˚ position (12 o’clock).

Electroswitch
• 180 King Avenue • Weymouth, MA 02188 • TEL: (781) 335-5200 • FAX: (781) 335-4253 • www.electroswitch.com
# Design a Switch to Meet Your Needs

## Series 24 and Series 31 Rotary Switches

### Detent Action Rotary Switches

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<th>Wiring Diagram</th>
<th>Ordering Information</th>
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<td>SINGLE-THROW OFF - ON</td>
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<td>Series</td>
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<tr>
<td>Stop screw positions: 1 &amp; 7</td>
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<td>No. Of Decks</td>
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<td>Handle: Oval</td>
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<td>Shorting</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>$S = Yes$</td>
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</tr>
<tr>
<td>DOUBLE-THROW No Off</td>
<td></td>
<td></td>
<td>Assemble</td>
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<tr>
<td>Stop screw positions: 1 &amp; 7</td>
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<td></td>
<td>2 = 2</td>
<td></td>
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<tr>
<td>Handle: Oval</td>
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<td>05 = 5</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>10 = 10</td>
<td></td>
</tr>
<tr>
<td>DOUBLE-THROW With Off</td>
<td></td>
<td></td>
<td></td>
<td>11-12, 15-16 connected internally in normal position.</td>
</tr>
</tbody>
</table>
| Stop screw positions: 2 & 7 | | | | **
| Handle: Oval | | | |
| | | | |
| Jumper** for these arrangements are sold separately (2 per deck Series 24 P/N 02011-10-C3) 2 per deck Series 31 P/N 03057-1-C3). |
| * Contacts are shown for the first deck. All decks are identical |
| Contact number changes in additional decks (e.g. 11 is deck 1, 21 is deck 2, etc.). |

### Momentary (Spring-Return) Action Rotary Switches

<table>
<thead>
<tr>
<th>Description</th>
<th>Indexing</th>
<th>Contact Diagram</th>
<th>Wiring Diagram</th>
<th>Ordering Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE-THROW OFF - ON</td>
<td></td>
<td></td>
<td></td>
<td>Series</td>
</tr>
<tr>
<td>Stop screw positions: 1 &amp; 7</td>
<td></td>
<td></td>
<td>No. Of Decks</td>
<td></td>
</tr>
<tr>
<td>Handle: Pistol Grip</td>
<td></td>
<td></td>
<td>Shorting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blank = No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$S = Yes$</td>
<td></td>
</tr>
<tr>
<td>DOUBLE-THROW No Off</td>
<td></td>
<td></td>
<td>Assemble</td>
<td></td>
</tr>
<tr>
<td>Stop screw positions: 1 &amp; 7</td>
<td></td>
<td></td>
<td>2 = 2</td>
<td></td>
</tr>
<tr>
<td>Handle: Pistol Grip</td>
<td></td>
<td></td>
<td>05 = 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 = 10</td>
<td></td>
</tr>
<tr>
<td>DOUBLE-THROW With Off</td>
<td></td>
<td></td>
<td></td>
<td>11-12, 15-16 connected internally in normal position.</td>
</tr>
</tbody>
</table>
| Stop screw positions: 2 & 7 | | | | **
| Handle: Pistol Grip | | | |
| | | | |
| Jumper** for these arrangements are sold separately (2 per deck Series 24 P/N 02011-10-C3) 2 per deck Series 31 P/N 03057-1-C3). |
| * Contacts are shown for the first deck. All decks are identical |
| Contact number changes in additional decks (e.g. 11 is deck 1, 21 is deck 2, etc.). |

### Rotary Tap Switches (2–7 Throw Switches With Off, Oval Handle)

<table>
<thead>
<tr>
<th>Description</th>
<th>Indexing</th>
<th>Contact Diagram</th>
<th>Wiring Diagram</th>
<th>Ordering Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWO-THROW</td>
<td></td>
<td></td>
<td></td>
<td>Series</td>
</tr>
<tr>
<td>Stop screw positions: 1 &amp; 7</td>
<td></td>
<td></td>
<td>No. Of Decks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shorting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blank = No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$S = Yes$</td>
<td></td>
</tr>
<tr>
<td>TRIPLE-THROW</td>
<td></td>
<td></td>
<td>Assemble</td>
<td></td>
</tr>
<tr>
<td>Stop screw positions: 1 &amp; 5</td>
<td></td>
<td></td>
<td>3 = 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>05 = 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 = 10</td>
<td></td>
</tr>
<tr>
<td>FOUR-THROW</td>
<td></td>
<td></td>
<td></td>
<td>11-12, 15-16 connected internally in normal position.</td>
</tr>
</tbody>
</table>
| Stop screw positions: 1 & 4 | | | | **
| | | | |
| FIVE-THROW | | | | |
| Stop screw positions: 1 & 3 | | | |
| | | | |
| SIX-THROW | | | | |
| Stop screw positions: 1 & 2 | | | |
| | | | |
| SEVEN-THROW | | | | |
| Stop screw positions: none | | | |
| | | | |
| * Contacts are shown for the first deck. All decks are identical |
| Contact number changes in additional decks (e.g. 11 is deck 1, 21 is deck 2, etc.). |

** 11-12, 15-16 connected internally in normal position.
VOLTMETER–Transfer Switches

2-wire, single-phase or D.C.
Depth Behind Panel: 2.4”
Handle: Round, Knurled
Engraving and jumpering as shown
Order #
Series 24 = 2401C includes NP 10D-2V14
Series 31 = 3101C includes NP 31D-2V14

3-phase, phase-to-phase
and phase-to-neutral
Depth Behind Panel: 2.9”
Handle: Round, Knurled
Engraving and jumpering as shown
Order #
Series 24 = 2404C includes NP 10C-4V21
Series 31 = 3104C includes NP 31C-4V21

3-phase, three current-transformers
Depth Behind Panel: 2.9”
Handle: Round, Knurled
Engraving and jumpering as shown
Order #
Series 24 = 2407C includes NP 10C-3A10A
Series 31 = 3107C includes NP 31C-3A10A

AMMETER–Transfer Switches

3-phase, two current-transformers
Depth Behind Panel: 2.9”
Handle: Round, Knurled
Engraving and jumpering as shown
Order #
Series 24 = 2402C includes NP 10C-3V14
Series 31 = 3102C includes NP 31C-3V14

3-phase, two current-transformers
Depth Behind Panel: 2.9”
Handle: Round, Knurled
Engraving and jumpering as shown
Order #
Series 24 = 2406C includes NP 10C-4A13
Series 31 = 3106C includes NP 31C-4A13

3-phase, three current-transformers
Depth Behind Panel: 2.9”
Handle: Round, Knurled
Engraving and jumpering as shown
Order #
Series 24 = 2409C includes NP 10C-3A10A
Series 31 = 3109C includes NP 31C-3A10A

Order #
Series 24 = 2403C includes NP 10C-4V15A
Series 31 = 3103C includes NP 31C-4V15A

Order #
Series 24 = 2405C includes NP 10E-7V24
Series 31 = 3105C includes NP 31E-7V24

Order #
Series 24 = 2408C includes NP 10C-4V21
Series 31 = 3108C includes NP 31C-4V21

Order #
Series 24 = 2406C includes NP 10E-8V33
Series 31 = 3106C includes NP 31E-8V33

Order #
Series 24 = 2409C includes NP 10C-3A10A
Series 31 = 3109C includes NP 31C-3A10A

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AMMETER – Transfer Switches

3-phase, three current-transformers
Depth Behind Panel: 2.9”
Handle: Round, Knurled
Engraving and jumpering as shown

Order #
Series 24 = 2410C includes NP 10C-4A13
Series 31 = 3110C includes NP 31C-4A13

AMMETER-VOLTMETER – Transfer Switch

3-phase, phase-to-phase three current-transformers
Depth Behind Panel: 4.3”
Handle: Round, Knurled
Engraving and jumpering as shown

For 2411C or 3111C

Order #
Series 24 = 2415C includes NP 10C-5A16
Series 31 = 3115C includes NP 31C-5A16

WATTMETER – Transfer Switches

3-phase, three current-transformers, three current-coils
Depth Behind Panel: 3.6”
Handle: Round, Knurled
Engraving and jumpering as shown

Order #
Series 24 = 2419C includes NP 10D-2W14
Series 31 = 3119C includes NP 31D-2W14

WATTMETER – Reversing Switch

3-phase, two current-transformers, two current-coils, two potential coils
Depth Behind Panel: 3.6”
Handle: Round, Knurled
Engraving and jumpering as shown

Order #
Series 24 = 2420C includes NP 10D-2W14
Series 31 = 3120C includes NP 31D-2W14

Order #
Series 24 = 2421C includes NP 10C-3W16
Series 31 = 3121C includes NP 31C-3W16

* Denotes make-before-break

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APPLICATION SPECIFIC SWITCHES
SERIES 24 AND SERIES 31 ROTARY SWITCHES

POWER-FACTOR-Switch
3-phase, two current-transformers, one or two current-coils
Depth Behind Panel: 2.4”
Handle: Round, Knurled
Engraving and jumpering as shown

SYNCHRONIZING-Switch
Machine-to-bus with interlocks
Depth Behind Panel: 2.9”
Handle: Oval, Removable
Engraving and jumpering as shown

MOTOR CONTROL-Switch, Governor or Rheostat
Split-field motor
Depth Behind Panel: 2.4”
Handle: Pistol-Grip, Spring-Return
Engraving and jumpering as shown

TEMPERATURE METER-Transfer Switch
Transfers two wires to three coils, with “TEST” and “OFF”
Depth Behind Panel: 2.9”
Handle: Round, Knurled
Engraving and jumpering as shown

CIRCUIT BREAKER-Trip Switch
Double-pole single-throw contacts normally open
Depth Behind Panel: 2.4”
Handle: Pistol-Grip, Spring-Return
Engraving and jumpering as shown

CIRCUIT BREAKER-Control Switches
Depth Behind Panel: 2.4”
Handle: Pistol-Grip, Spring-Return
Engraving and jumpering as shown

Order #
Series 24 = 2422C includes NP 100-2P14
Series 31 = 3122C includes NP 31D-2P14

Order #
Series 24 = 2424E includes NP 11D-2S17

Order #
Series 24 = 2436D includes NP 10D-1B18

Order #
Series 24 = 2438D includes NP 18B-2B23

Order #
Series 24 = 2440D includes NP 18B-2B23

Order #
Series 24 = 2441D includes NP 18B-2B23

Order #
Series 24 = 2442D includes NP 18B-2B23

Order #
Series 24 = 2427D includes NP 10B-2M22
Series 31 = 3127D includes NP 31B-2M22

Order #
Series 24 = 2432C includes NP 10D-5T19
Series 31 = 3132C includes NP 31D-5T19

Order #
Series 24 = 2436D includes NP 10D-5T19
Series 31 = 3136D includes NP 31D-5T19

Order #
Series 24 = 2438D includes NP 11D-5T19
Order #
Series 24 = 2440D includes NP 18B-5T19
Order #
Series 24 = 2441D includes NP 18B-5T19
Order #
Series 24 = 2442D includes NP 18B-5T19

Order #
Series 24 = 2436D includes NP 10D-2P14
Order #
Series 24 = 2438D includes NP 18B-2P14
Order #
Series 24 = 2440D includes NP 18B-2P14
Order #
Series 24 = 2441D includes NP 18B-2P14
Order #
Series 24 = 2442D includes NP 18B-2P14

ORDER #
Series 24 = 2422C includes NP 100-2P14
Series 31 = 3122C includes NP 31D-2P14

ORDER #
Series 24 = 2424E includes NP 11D-2S17

ORDER #
Series 24 = 2436D includes NP 10D-1B18

ORDER #
Series 24 = 2438D includes NP 18B-2B23

ORDER #
Series 24 = 2440D includes NP 18B-2B23

ORDER #
Series 24 = 2441D includes NP 18B-2B23

ORDER #
Series 24 = 2442D includes NP 18B-2B23

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## CIRCUIT BREAKER-Control Switches

### Depth Behind Panel: 4.7"
- Handle: Pistol-Grip, Spring-Return
- Engraving and jumpering as shown

### Depth Behind Panel: 4.7"
- Handle: Pistol-Grip, Spring-Return
- Engraving and jumpering as shown

### Depth Behind Panel: 5.4"
- Handle: Pistol-Grip, Spring-Return
- Engraving and jumpering as shown

### Order 
Series 24 = 2444D includes NP 188-2823

### Order 
Series 24 = 2445D includes NP 188-2823

### Order 
Series 24 = 2450D includes NP 19C-3833

### Order 
Series 24 = 2452D includes NP 19C-3833

### Order 
Series 24 = 2457D includes NP 188-2823

### Order 
Series 24 = 2458D includes NP 19C-3833

---

Note: Decks 1 & 3 are make-before-break

Note: Decks 3 & 4 are make-before-break

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- Weymouth, MA 02188
- TEL: (781) 335-5200
- FAX: (781) 335-4253
- www.electroswitch.com
**SPECIAL FEATURES**

- Oval Knurled Pistol-Grip
- Removable in Pos
- Maintained Spring-return to vertical
- Slip-contacts Pull to Lock

**HANDLE POSITIONS**

**X-CHART FOR BREAKER CONTROL SWITCH**

<table>
<thead>
<tr>
<th>TITLE ENGRAVING</th>
<th>POSITION ENGRAVING</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTACTS HANDLE</td>
<td>POSITIONS</td>
</tr>
<tr>
<td>END</td>
<td>1  2  3  4  5  6  7 8</td>
</tr>
</tbody>
</table>

*denotes make-before-break contact

**X-CHART FOR INSTRUMENT & CONTROL SWITCH**

<table>
<thead>
<tr>
<th>TITLE ENGRAVING</th>
<th>POSITION ENGRAVING</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTACTS HANDLE</td>
<td>POSITIONS</td>
</tr>
<tr>
<td>END</td>
<td>1  2  3  4  5  6  7 8</td>
</tr>
</tbody>
</table>

*denotes make-before-break contact

**SLIP CONTACTS WILL BE GROUPED AT REAR OF SWITCH**

**TERMINAL NUMBERS ARE PRELIMINARY PENDING FACTORY REVIEW AND APPROVAL**

**MADE BY:**

**DATE:**

**COMPANY:**

**DWG NO.:**

**APPR BY:**

**DATE:**

**SHEET OF**
# Application Specific Switches

## Series 31 Rotary Switches

### Electroswitch

- **Address:** 180 King Avenue, Weymouth, MA 02188
- **Phone:** (781) 335-5200
- **Fax:** (781) 335-4253
- **Website:** www.electroswitch.com

### Series 31 Detent Switch Worksheet

#### Handles
- Oval Flush
- Oval Shank
- Oval Shank
- Other

#### Rotary Action:
- Maintained
- Spring-return

#### Contacts:
- Nonshorting contacts break-before-make
- Shorting contacts make-before-break

#### Special Features
- Panel Thickness
- Maximum depth behind panel allowable
- Key operated
- Key removable in _______ position

### Switch Position Tabulation (Front View)

#### Handle Positions

#### Deck Layouts

<table>
<thead>
<tr>
<th>TITLE ENGRAVING:</th>
<th>POSITION ENGRAVING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DECK</th>
<th>CONTACTS HANDLE END</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**INDICATE EXTERNAL TERMINAL CONNECTORS REQUIRED**

**SWITCH IS VIEWED FROM HANDLE END**

**TERMINAL NUMBERS ARE PRELIMINARY PENDING FACTORY REVIEW AND APPROVAL**

---

**MADE BY:**

**DATE:**

**COMPANY DWG NO.:**

**SHEET OF:**
Features

- Space Saving Design - Two Hole Panel Mount on 3" Centers
- Spring Loaded Cam Action Contacts
- Silver Plated Copper Surfaces for Long, Reliable Life
- MA-7 Terminal Screws for Easy Installation of #16AWG Wire
- NEMA Class A (105°C) Insulating Materials

Control Switch Special Features

- Mechanical Red/Green Target
- Slip Contacts for Alarm and Indicator Circuits
- Pull to Lock for Safety Lockout
- Spring Return to Normal (Vertical) Position

Instrument Switch Special Features

- Make-Before-Break (Shorting) Contacts
- Positive "Snappy" Positioning Detent Mechanism
- Pre-Wired Jumpers

Synchroscope Special Features

- Keyed Removable Oval Handles

Electrical Specifications

Continuous Ratings
- 24A/600 Volts

Interrupt Ratings
- 3A/125VDC
- 20A/600VAC
- Momentary Current: 420 Amperes 1 Second
- Making Ability (Circuit Breaker Coils): 120A/125VDC
- Dielectric Strength: 2200V rms
- Insulation Resistance: 100 Megohms
- Contact Resistance: 10 Milliohms

Mechanical Specifications

Sections/Poles 1 to 12 / 1 to 24
Positions 2 to 12
Contacts Double Break Silver Plated Copper
Action 45°, 30°, 60° and 90° Positive Detent or Spring Return
Mounting 2 Hole
Panel Thickness 3/16" Max. Standard
Construction Contacts Enclosed in Rigid Thermoset Plastic Housing
Special Drives Key Operated

Approvals

- UL File No. E54035
- CSA Certified

Note: The Series 20 Class 1E utility products comply with the following Nuclear Standards:
ANSI/IEEE C37.90, ANSI/IEEE C37.90.01, ANSI/IEEE C37.98, ANSI/IEEE C37.105,

ORDERING INFORMATION -

For generic switches fill out appropriate matrix pages 24-27. For special applications see page 28. For any other configurations not shown, consult factory.
Features
Series 20P Lighted Switches have all the outstanding features of the Series 20 Switches; however, they also feature the following:

- 1, 2, or 3 Pre-wired Status Indicator Lamps — Red, Green, Amber or Other
- Easy, Inexpensive Front Panel Lamp Replacement
- Push to Test Lamp Holders
- Front Plate Only 2.94” Wide
- Assembly is Mounted from Front of Panel for Easy Wiring
- Can be Mounted with Switch Handle and Nameplate in Place
- Maintenance and Circuit Testing Accomplished from Front of Panel

Electrical Specifications

Continuous Ratings
- 24A/600 Volts

Interrupt Ratings
- 3A/125VDC
- 20A/600VAC
- Momentary Current: 420 Amperes 1 Second
- Making Ability (Circuit Breaker Coils) 120A/125VDC
- Dielectric Strength: 2200V rms
- Insulation Resistance: 100 Megohms
- Contact Resistance: 10 Milliohms

Lamp Voltage
- 24-28VDC
- LEDs Available

Lamp Life
- 10,000 Hours

Note: For ease of installation use #16 AWG Wire (or smaller). Larger wire may cause difficulty removing the switch from the front of the panel.

Mechanical Specifications

Sections/Poles 1 to 12 /1 to 24
Positions 2 to 12
Contacts Double Break Silver Plated Copper
Action 45°, 30°, 60° and 90° Positive Detent or Spring Return
Mounting 4 Hole
Panel Thickness 3/16” Max. Standard
Construction Contacts Enclosed in Rigid Thermoset Plastic Housing
Special Drives Key Operated


ORDERING INFORMATION -
Specify Series 20 switches then: specify number, color, location and control voltage of lamps or LEDs.

Approvals
- UL File No. E54035
- CSA Certified

Note: For ease of installation use #16 AWG Wire (or smaller). Larger wire may cause difficulty removing the switch from the front of the panel.
Features
Series 20 Modular Plug-In Instrument & Control Switches have all the outstanding features of the Series 20 and 20P Switches with the following additions:

- Modular Design — Lighted or Nonlighted
- Plug-in Quick Disconnect Capabilities
- Front of Panel Serviceable Without Service Loops
- Integral Indicating and Annunciator Lights — With or Without Dropping Resistors
- Integrated Markings for Better Control — Engravings for Title, Lamps and Identification Tagging
- Choice of Handles
- Can be Mounted with Switch Handle and Nameplate in Place
- Maintenance and Circuit Testing Accomplished from Front of Panel
- Burndy Bantamate Military Style Connectors
- 3 Lamp Styles — Round Dome, Round-Flat, Dome LEDs

Electrical Specifications
Continuous Ratings
- 20A/240 Volts

Interrupt Ratings
- 20A/120VAC
- 20A/240VAC
- 20A/24VDC
- Momentary Current: 407 Amperes 1 Second
- Overload Current (50 operations): 91A/240VAC
- Dielectric Strength: 1500V rms
- Insulation Resistance: 100 Megohms
- Contact Resistance: 10 Milliohms

Mechanical Specifications
Sections/Poles 1 to 12 /1 to 24
Positions 2 to 12
Contacts Double Break Silver Plated Copper
Action 45°, 30°, 60° and 90° Positive Detent or Spring Return
Mounting Modular
Panel Thickness 2.5” Max. Standard
Construction Contacts Enclosed in Rigid Thermoset Plastic Housing
Special Drives Key Operated

Note: The Series 20M Class 1E utility products comply with the following Nuclear Standards:
ANSI/IEEE C37.90, ANSI/IEEE C37.90.01, ANSI/IEEE C37.98, ANSI/IEEE C37.105,

ORDERING INFORMATION
Specify Series 20 switch, number, color and voltage of lamps and engraving.

Plug-in Connectors
Burndy Bantamate Trim Trio round connectors are standard. Generally only one connector is needed and the “N” polarization is used.
### Detent and Momentary Action Rotary Switches

#### SINGLE-THROW

**OFF - ON**

- **Handle**: B = Oval Shank, C = Round Knurled, D = Pistol-Grip, E = Removable

<table>
<thead>
<tr>
<th>DECKS</th>
<th>CONTACTS</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>02</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>03</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>04</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>05</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>06</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>07</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

For momentary action. Up to six poles, specify S1 indexing.

#### DOUBLE-THROW

**No Off**

- **Handle**: B = Oval Shank, C = Round Knurled, D = Pistol-Grip, E = Removable

<table>
<thead>
<tr>
<th>DECKS</th>
<th>CONTACTS</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>02</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>03</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>04</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>05</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>06</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>07</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

For momentary action. Up to six poles, specify S1 indexing.

**With Off**

- **Handle**: B = Oval Shank, C = Round Knurled, D = Pistol-Grip, E = Removable

<table>
<thead>
<tr>
<th>DECKS</th>
<th>CONTACTS</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>02</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>03</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>04</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>05</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>06</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>07</td>
<td>1</td>
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</table>

For momentary action. Up to six poles, specify S3 indexing.
Maintained Action Rotary Switches

TRIPLE-THROW

20K-23

<table>
<thead>
<tr>
<th>Handle</th>
<th>On / Off</th>
<th>Indexing</th>
</tr>
</thead>
<tbody>
<tr>
<td>B = Oval Shank</td>
<td>0 = W/Off</td>
<td>A4 = A4</td>
</tr>
<tr>
<td>C = Round Knurled</td>
<td>5 = No Off</td>
<td>A8 = A8</td>
</tr>
<tr>
<td>D = Pistol-Grip</td>
<td>No. Of Poles</td>
<td>C8 = C8</td>
</tr>
<tr>
<td>E = Removable</td>
<td>1 = 1</td>
<td>(see at left)</td>
</tr>
<tr>
<td>2 = 2</td>
<td>5 = 5</td>
<td></td>
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<tr>
<td>3 = 3</td>
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<td>4 = 4</td>
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FOUR-THROW

20K-24

<table>
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<tr>
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<th>No. Of Poles</th>
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<tbody>
<tr>
<td>B = Oval Shank</td>
<td>0 = W/Off</td>
<td>1 = 1</td>
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<td>C = Round Knurled</td>
<td>5 = No Off</td>
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<tr>
<td>D = Pistol-Grip</td>
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<tr>
<td>E = Removable</td>
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<td>5 = 5</td>
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FIVE-THROW

20K-25

<table>
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<th>No. Of Poles</th>
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<tbody>
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<td>D = Pistol-Grip</td>
<td>1 = 1</td>
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<tr>
<td>E = Removable</td>
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<td>3 = 3</td>
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<tr>
<td>4 = 4</td>
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</table>
## Design a Switch to Meet Your Needs
### Series 20 Rotary Switches

<table>
<thead>
<tr>
<th>Description</th>
<th>Indexing</th>
<th>Contact Diagram</th>
<th>Ordering Information</th>
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<td><strong>Maintained Action Rotary Switches</strong></td>
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<tr>
<td><strong>SIX-THROW</strong></td>
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<tr>
<td>A8 W/Off</td>
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<td>B = Oval Shank</td>
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<td>C8</td>
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<td>C = Round Knurled</td>
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<td>D = Pistol-Grip</td>
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<td>E = Removable</td>
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<td></td>
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<td>A8 = A8</td>
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<td></td>
<td>CB = C8</td>
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<td>Poles On / Off</td>
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<td>4 = 4</td>
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<td><strong>SEVEN-THROW</strong></td>
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<td></td>
<td>C = Round Knurled</td>
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<td>D = Pistol-Grip</td>
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<td>E = Removable</td>
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<td>A8 = A8</td>
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<td>Poles On / Off</td>
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<td><strong>EIGHT-THROW</strong></td>
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<td>A1</td>
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<td>20K -28</td>
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<td>C = Round Knurled</td>
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<td>D = Pistol-Grip</td>
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<td>E = Removable</td>
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<td>A8 = A8</td>
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<td>C1 = C1</td>
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<td>Handle No. Of</td>
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<td>Poles On / Off</td>
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<td><strong>NINE-THROW</strong></td>
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<tr>
<td>A1 W/Off</td>
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<td>20K -29</td>
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<td>A1 No Off</td>
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<td>B = Oval Shank</td>
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<td></td>
<td></td>
<td>C = Round Knurled</td>
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<tr>
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<td>D = Pistol-Grip</td>
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<td>E = Removable</td>
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<td>A1 = A1</td>
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<td></td>
<td>Handle No. Of</td>
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<td></td>
<td></td>
<td></td>
<td>Poles On / Off</td>
</tr>
<tr>
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<td></td>
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<td>1 = 1</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2 = 2</td>
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</table>
## DESIGN A SWITCH TO MEET YOUR NEEDS
### SERIES 20 ROTARY SWITCHES

### Maintained Action Rotary Switches

#### TEN-THROW

<table>
<thead>
<tr>
<th>Description</th>
<th>Indexing</th>
<th>Contact Diagram</th>
<th>Ordering Information</th>
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</thead>
<tbody>
<tr>
<td>TEN-THROW</td>
<td></td>
<td><img src="image1.png" alt="Contact Diagram" /></td>
<td>20K -40 &lt;br&gt; Handle B = Oval Shank &lt;br&gt;C = Round Knurled &lt;br&gt;D = Pistol-Grip &lt;br&gt;E = Removable &lt;br&gt;No. Of Poles 1 = 1 &lt;br&gt;2 = 2 &lt;br&gt;Indexing A1 = A1 &lt;br&gt;C1 = C1 &lt;br&gt;(see at left)</td>
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</table>

#### ELEVEN-THROW

<table>
<thead>
<tr>
<th>Description</th>
<th>Indexing</th>
<th>Contact Diagram</th>
<th>Ordering Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEVEN-THROW</td>
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<td><img src="image2.png" alt="Contact Diagram" /></td>
<td>20K -41 -A1 &lt;br&gt;Handle B = Oval Shank &lt;br&gt;C = Round Knurled &lt;br&gt;D = Pistol-Grip &lt;br&gt;E = Removable &lt;br&gt;No. Of Poles 1 = 1 &lt;br&gt;2 = 2 &lt;br&gt;Indexing A1 = A1 &lt;br&gt;(see at left)</td>
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</tbody>
</table>

#### TWELVE-THROW

<table>
<thead>
<tr>
<th>Description</th>
<th>Indexing</th>
<th>Contact Diagram</th>
<th>Ordering Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWELVE-THROW</td>
<td></td>
<td><img src="image3.png" alt="Contact Diagram" /></td>
<td>20K -42 -A1 &lt;br&gt;Handle B = Oval Shank &lt;br&gt;C = Round Knurled &lt;br&gt;D = Pistol-Grip &lt;br&gt;E = Removable &lt;br&gt;No. Of Poles 51 = 1 &lt;br&gt;52 = 2 &lt;br&gt;Indexing A1 = A1 &lt;br&gt;(see at left)</td>
</tr>
</tbody>
</table>
**APPLICATION SPECIFIC SWITCHES**
**SERIES 20 ROTARY SWITCHES**

**VOLTMETER - Transfer Switches**

2-wire, single-phase or D.C.
Depth Behind Panel: 1.5”
Handle: Round, Knurled
Engraving and jumpering as shown

4-wire, two-phase or two separate D.C. circuits
Depth Behind Panel: 2.0”
Handle: Round, Knurled
Engraving and jumpering as shown

3-phase, phase-to-neutral
Depth Behind Panel: 2.0”
Handle: Round, Knurled
Engraving and jumpering as shown

3-phase, phase-to-phase and phase-to-neutral
Depth Behind Panel: 2.6”
Handle: Round, Knurled
Engraving and jumpering as shown

6-wire, two 3-phase circuits; phase-to-phase
Depth Behind Panel: 3.1”
Handle: Round, Knurled
Engraving and jumpering as shown

**VOLTMETER - Transfer Switches**

3-phase, phase-to-phase
Depth Behind Panel: 2.0”
Handle: Round, Knurled
Engraving and jumpering as shown

3-phase, phase-to-phase and phase-to-neutral
Depth Behind Panel: 2.6”
Handle: Round, Knurled
Engraving and jumpering as shown

6-wire, two 3-phase circuits; phase-to-phase
Depth Behind Panel: 3.1”
Handle: Round, Knurled
Engraving and jumpering as shown

**AMMETER - Transfer Switches**

3-phase, two current-transformers
Depth Behind Panel: 2.0”
Handle: Round, Knurled
Engraving and jumpering as shown

3-phase, two current-transformers
Depth Behind Panel: 2.6”
Handle: Round, Knurled
Engraving and jumpering as shown

3-phase, three current-transformers
Depth Behind Panel: 2.6”
Handle: Round, Knurled
Engraving and jumpering as shown

Order # 20KC-01 includes NP 53D-2V14
Order # 20KC-02 includes NP 53C-3V14
Order # 20KC-03 includes NP 53C-4V15A
Order # 20KC-04 includes NP 53C-4Y21
Order # 20KC-05 includes NP 53E-7V24
Order # 20KC-06 includes NP 53E-8V33
Order # 20KC-07 includes NP 53C-3A10A
Order # 20KC-08 includes NP 53C-4A13
Order # 20KC-09 includes NP 53C-3A10A
**AMMETER-Transfer Switches**

- **3-phase, three current-transformers**
  - Depth Behind Panel: 2.6"
  - Handle: Round, Knurled
  - Engraving and jumpering as shown

*Denotes make-before-break

Order #
20KC-10 includes NP 53C-4A13

**AMMETER-VOLTMMETER Transfer Switch**

- **3-phase, three current-transformers, three independent circuits**
  - Depth Behind Panel: 4.1"
  - Handle: Round, Knurled
  - Engraving and jumpering as shown

*Denotes make-before-break

Order #
20KC-11 includes NP 53A-3A10
20KC-12 includes NP 53C-5A16

**WATTMETER-Transfer Switch**

- **3-phase, three current-coils**
  - Depth Behind Panel: 3.6"
  - Handle: Round, Knurled
  - Engraving and jumpering as shown

*Denotes make-before-break

Order #
20KC-19 includes NP 53D-2W14

**WATTMETER-Reversing Switch**

- **3-phase, two current-coils, two potential coils**
  - Depth Behind Panel: 3.1"
  - Handle: Round, Knurled
  - Engraving and jumpering as shown

*Denotes make-before-break

Order #
20KC-21 includes NP 53C-3W16

**POWER-FACTOR-Switch**

- **3-phase, two current-transformers, one or two current-coils**
  - Depth Behind Panel: 2.0"
  - Handle: Round, Knurled
  - Engraving and jumpering as shown

*Denotes make-before-break

Order #
20KC-22 includes NP 53D-2P14

**SYNCHRONIZING-Switch**

- **Machine-to-bus with interlocks**
  - Depth Behind Panel: 2.7"
  - Handle: Oval, Removable
  - Engraving and jumpering as shown

*Denotes make-before-break

Order #
20KE-24 includes NP 54D-2S17

**MOTOR CONTROL-Switch, Governor or Rheostat**

- **Split-field motor**
  - Depth Behind Panel: 1.5"
  - Handle: Pistol-Grip
  - Action: Spring Return to Vertical
  - Engraving and jumpering as shown

Order #
20KD-27 includes NP 53B-2M22
**APPLICATION SPECIFIC SWITCHES**

**SERIES 20 ROTARY SWITCHES**

---

**TEMPERATURE METER-Transfer Switch**

Transfers two wires to three coils with “TEST” and “OFF”
Depth Behind Panel: 3.1”
Handle: Round, Knurled
Engraving and jumpering as shown

**CIRCUIT BREAKER-Trip Switch**

Double-pole single-throw contacts normally open
Depth Behind Panel: 1.5”
Handle: Pistol-Grip
Action: Spring-Return
Engraving and jumpering as shown

**CIRCUIT BREAKER-Control Switch**

Depth Behind Panel: 1.5”
Handle: Pistol-Grip
Action: Spring-Return
Engraving and jumpering as shown

---

**CIRCUIT BREAKER-Control Switches**

**Depth Behind Panel: 2.0”**
Handle: Pistol-Grip
Action: Spring-Return
Engraving and jumpering as shown

- Order # 20KD-32 includes NP 53D-1818

**Depth Behind Panel: 2.6”**
Handle: Pistol-Grip
Action: Spring-Return
Engraving and jumpering as shown

- Order # 20KD-40 includes NP 53D-1818

**Depth Behind Panel: 3.2”**
Handle: Pistol-Grip
Action: Spring-Return
Engraving and jumpering as shown

- Order # 20KD-38 includes NP 55B-2B23

**Depth Behind Panel: 3.7”**
Handle: Pistol-Grip
Action: Spring-Return
Engraving and jumpering as shown

- Order # 20KD-41 includes NP 55B-2B23

- Order # 20KD-42 includes NP 55B-2B23

---

**TEMPERATURE METER-Transfer Switch**

- Denotes make-before-break

---

**TEMPERATURE METER-Transfer Switch**

- Denotes make-before-break

---

**CIRCUIT BREAKER-Control Switches**

**Depth Behind Panel: 3.1”**
Handle: Round, Knurled
Engraving and jumpering as shown

**CIRCUIT BREAKER-Control Switches**

**Depth Behind Panel: 3.1”**
Handle: Round, Knurled
Engraving and jumpering as shown

**Depth Behind Panel: 3.2”**
Handle: Round, Knurled
Engraving and jumpering as shown

**Depth Behind Panel: 3.7”**
Handle: Round, Knurled
Engraving and jumpering as shown

---

**Order #**

- 20KD-32 includes NP 53D-1818
- 20KD-38 includes NP 55B-2B23
- 20KD-40 includes NP 55B-2B23
- 20KD-41 includes NP 55B-2B23
- 20KD-42 includes NP 55B-2B23
- 20KD-43 includes NP 55B-2B23
- 20KD-44 includes NP 55B-2B23
- 20KD-45 includes NP 55B-2B23

---

**30 Electroswitch • 180 King Avenue • Weymouth, MA 02188 • TEL: (781) 335-5200 • FAX: (781) 335-4253 • www.electroswitch.com**
CIRCUIT BREAKER-Control Switches

Depth Behind Panel: 3.7"
Handle: Pistol-Grip
Action: Spring-Return
Engraving and jumpering as shown

<table>
<thead>
<tr>
<th>Order #</th>
<th>POS.</th>
<th>DECKS</th>
<th>TRIP</th>
<th>CLOSE</th>
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<tbody>
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<td>8</td>
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<tr>
<td>20KD-46</td>
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<tr>
<td>20KD-46</td>
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<td>6</td>
<td>8</td>
<td>10</td>
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</tbody>
</table>

Order # 20KD-46 includes NP 55B-2823

Depth Behind Panel: 2.5"
Handle: Pistol-Grip
Action: Spring-Return, Pull to lock
Engraving and jumpering as shown

<table>
<thead>
<tr>
<th>Order #</th>
<th>POS.</th>
<th>DECKS</th>
<th>TRIP</th>
<th>CLOSE</th>
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<tbody>
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<td>20KD-50</td>
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</tr>
</tbody>
</table>

Order # 20KD-50 includes NP 55C-3833

Depth Behind Panel: 4.2"
Handle: Pistol-Grip
Action: Spring-Return, Pull to lock
Engraving and jumpering as shown

<table>
<thead>
<tr>
<th>Order #</th>
<th>POS.</th>
<th>DECKS</th>
<th>TRIP</th>
<th>CLOSE</th>
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<tbody>
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<td>20KD-52</td>
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</tbody>
</table>

Order # 20KD-52 includes NP 55C-3833

Universal Circuit
Depth Behind Panel: 4.2"
Handle: Pistol-Grip
Action: Spring-Return
Engraving and jumpering as shown

<table>
<thead>
<tr>
<th>Order #</th>
<th>POS.</th>
<th>DECKS</th>
<th>TRIP</th>
<th>CLOSE</th>
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<td>9</td>
</tr>
<tr>
<td>20KD-57</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

Order # 20KD-57 includes NP 55B-2823

Universal Circuit
Depth Behind Panel: 5.2"
Handle: Pistol-Grip
Action: Spring-Return, Pull to lock
Engraving and jumpering as shown

<table>
<thead>
<tr>
<th>Order #</th>
<th>POS.</th>
<th>DECKS</th>
<th>TRIP</th>
<th>CLOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>20KD-58</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>20KD-58</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>20KD-58</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>20KD-58</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>20KD-58</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>20KD-58</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
</tbody>
</table>

Order # 20KD-58 includes NP 55C-3833
SERIES 20 ROTARY SWITCHES

APPLICATION SPECIFIC SWITCHES

HANDLES
- Knurled
- Oval
- Pistol Grip
- None
- Removable in Pos

ACTIONS
- Panel thickness
- Depth behind panel

SPECIAL FEATURES
- Knurled
- Oval
- Pistol Grip
- None
- Removable in Pos

X-CHART FOR SERIES 20 SWITCHES

<table>
<thead>
<tr>
<th>HANDLE END</th>
<th>POSITIONS</th>
<th>FOR 20K &amp; 20P ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>1234</td>
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</tr>
<tr>
<td>2</td>
<td>1234</td>
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<td>3</td>
<td>1234</td>
<td>1234</td>
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<td>4</td>
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</tr>
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<td>11</td>
<td>1234</td>
<td>1234</td>
</tr>
<tr>
<td>12</td>
<td>1234</td>
<td>1234</td>
</tr>
</tbody>
</table>

SLIP CONTACTS WILL BE GROUPED AT REAR OF SWITCH.
A MAXIMUM OF 4 SLIP CONTACTS ARE AVAILABLE.

JUMPERS FOR SERIES 20K & 20P

LAMP WIRING (20M)

SLIP CONTACTS WILL BE GROUPED AT REAR OF SWITCH.
A MAXIMUM OF 4 SLIP CONTACTS ARE AVAILABLE.
Features
- Double-Wiping Contacts for Low Resistance Even Under Extreme Shock and Vibration
- Fast Switching Speed Independent of Operator Action - Approximately 10 Milliseconds
- Standard Four Hole Mount — Single Hole Mount Available
- NEMA Class A (105°C) Insulating Materials
- Excellent for DC as well as AC Switching
- Making and Breaking of Contacts Performed Inside Enclosed Decks

Electrical Specifications
Continuous Ratings
- 20A/600VAC
Interrupt Ratings
- 15A/120VAC
- 10A/240VAC
- 5A/250VDC
- 1A/600 VAC, (Circuit 6, 7)
- Overload Current (50 operations): 90A/600VAC Restrictive
- Dielectric Breakdown: 2200V rms minimum
- Insulation Resistance: 100 Megohms minimum
- Contacts Resistance: 30 Milliohms max. (10 Milliohms Average Before Life)
- For Higher Rated Snap Action Switches Consult Factory

Mechanical Specifications
Poles Circuit 1 = 12 MAX; Circuit 2, 3 & 4 = 8 MAX; Circuit 6 & 7 = 11 MAX
Positions 2, 3, or 4
Contacts Break-Before-Make (Non-Shorting); Make-Before-Break (Shorting)
Action Positive Snap Action - 90° Indexing
Movement Unlimited Continuous Rotation in Both Directions or Factory Limited to 2 or 3 Positions
Mounting Panel Mount, 4 Tapped Mounting Holes
Panel Thickness 3/16” Standard
Rotor Contacts Phosphor-bronze, Double Grip
Stationary Contacts Copper, Integral with Screw Type Terminals
Construction Contacts Enclosed in Molded-phenolic Disks

Approvals
- UL: File No. E18174
- CSA

ORDERING INFORMATION - (For generic switches fill out matrix below. For application specific switches see page 36.)

Model No. 101

Series (See Page 36) Number of Poles

<table>
<thead>
<tr>
<th>Circuit</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tr>
<td>1 = Circuit 1</td>
<td>01</td>
<td>02</td>
<td>03</td>
<td>04</td>
<td>05</td>
<td>06</td>
<td>07</td>
</tr>
<tr>
<td>2 = Circuit 2</td>
<td>07</td>
<td>08</td>
<td>09</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>3 = Circuit 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 = Circuit 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 = Circuit 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6 = Circuit 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 = Circuit 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

Number of Positions (See Page 36)

<table>
<thead>
<tr>
<th>Circuit</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<td>Blank</td>
</tr>
<tr>
<td>2 = Circuit 2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3 = Circuit 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 = Circuit 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>5 = Circuit 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 = Circuit 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

No.of Positions

<table>
<thead>
<tr>
<th>Circuit</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Circuit 1</td>
<td>A = Oval Flush</td>
<td>A = Oval</td>
<td>A = Oval</td>
<td>A = Oval</td>
<td>A = Oval</td>
<td>A = Oval</td>
<td>A = Oval</td>
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<tr>
<td>2 = Circuit 2</td>
<td>B = Oval</td>
<td>B = Oval</td>
<td>B = Oval</td>
<td>B = Oval</td>
<td>B = Oval</td>
<td>B = Oval</td>
<td>B = Oval</td>
</tr>
<tr>
<td>3 = Circuit 3</td>
<td>C = Round Knurled</td>
<td>C = Round Knurled</td>
<td>C = Round Knurled</td>
<td>C = Round Knurled</td>
<td>C = Round Knurled</td>
<td>C = Round Knurled</td>
<td>C = Round Knurled</td>
</tr>
<tr>
<td>4 = Circuit 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 = Circuit 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 = Circuit 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 = Circuit 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1: Single Hole mount available for direct toggle switch replacement.
Note 2: Higher rated versions available for applications up to 200A/600VAC.
Note 3: For limits on the # of poles available in each circuit, see depth behind panel chart.
Electroswitch
180 King Avenue
Weymouth, MA 02188
TEL: (781) 335-5200
FAX: (781) 335-4253
www.electroswitch.com

ELECTROSWITCH series 101 single hole mount snap-action instrument and control switches

Features
- Double-Wiping Contacts for Low Resistance Even Under Extreme Shock and Vibration
- Fast Switching Speed Independent of Operator Action - Approximately 10 Milliseconds
- Single Hole Mount
- NEMA Class A (105°C) Insulating Materials
- Excellent for DC as well as AC Switching
- Making and Breaking of Contacts Performed Inside Enclosed Decks

Electrical Specifications
Continuous Ratings
- 20A/600VAC

Interrupt Ratings
- 15A/120VAC
- 10A/240VAC
- 10A/125VDC
- 5A/250VDC
- 16A/600 VAC, (Circuit 6, 7)
- Overload Current (50 operations): 90A/600VAC Resistive
- Dielectric Breakdown: 2200V rms minimum
- Insulation Resistance: 180 Megohms minimum
- Contacts Resistance: 30 Milliohms max.

Mechanical Specifications
Poles
Circuit 1 = 6 MAX; Circuit 2, 3 & 4 = 3 MAX;
Circuit 6 & 7 = 6 MAX

Positions
2, 3, or 4

Contacts
Break-Before-Make (Non-Shorting);
Make-Before-Break (Shorting)

Action
Positive Snap Action - 90˚ Indexing

Movement
Unlimited Continuous Rotation in Both Directions or
Factory Limited to 2 or 3 Positions

Mounting
Panel Mount, 4 Tapped Mounting Holes

Panel Thickness
3/16” Standard

Rotor Contacts
Phosphor-bronze, Double Grip

Stationary Contacts
Copper, Integral with Screw Type Terminals

Construction
Contacts Enclosed in Molded-Phenolic Disks

Approvals
- UL: File No. E18174
- CSA: File No. LR20743

ORDERING INFORMATION - Specials

Model No. 102

<table>
<thead>
<tr>
<th>Series</th>
<th>Number of Poles*</th>
<th>To be assigned at factory</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>01 = 1</td>
<td></td>
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<tr>
<td>2</td>
<td>02 = 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>03 = 3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>04 = 4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>05 = 5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>06 = 6</td>
<td></td>
</tr>
</tbody>
</table>

* Circuit 1: 6 Poles Max., Circuits 2, 3, 4: 3 Poles Max., Circuits 6 & 7: 6 Poles Max. Beyond 6 poles consult factory.
Note 1: For limits on the # of poles available in each circuit, see depth behind panel chart.

Typical Terminal Arrangement

Panel Drilling Dimensions

<table>
<thead>
<tr>
<th>No. of Poles</th>
<th>Circuit 1</th>
<th>Circuit 2</th>
<th>Circuit 3</th>
<th>Circuit 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.34</td>
<td>1.34</td>
<td>1.34</td>
<td>1.34</td>
</tr>
<tr>
<td>2</td>
<td>1.59</td>
<td>1.59</td>
<td>2.09</td>
<td>2.09</td>
</tr>
<tr>
<td>3</td>
<td>1.84</td>
<td>1.84</td>
<td>2.59</td>
<td>2.59</td>
</tr>
<tr>
<td>4</td>
<td>2.09</td>
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<td>2.59</td>
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<td>5</td>
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</tr>
<tr>
<td>6</td>
<td>2.59</td>
<td>2.59</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Features
- Double-Wiping Contacts for Low Resistance Even Under Extreme Shock and Vibration
- Two Hole Mount
- NEMA Class A (105°C) Insulating Materials
- Excellent for DC as well as AC Switching
- Making and Breaking of Contacts Performed Inside Enclosed Decks

Electrical Specifications
Continuous Ratings
- 20A/600VAC

Interrupt Ratings
- 15A/120VAC
- 10A/125VDC
- 5A/250VDC
- 10A/125VDC
- 7.5A/600VAC, (Circuit 1,2,3,4)
- 1A/600VAC, (Circuit 6, 7)
- Overload Current (50 operations): 90A/600VAC Resistive
- Dielectric Breakdown: 2200V rms minimum
- Insulation Resistance: 100 Megohms minimum
- Contacts Resistance: 30 Milliohms max.
  (10 Milliohms Average Before Life)

Mechanical Specifications
- Poles: Circuit 1 = 24 MAX
- Contacts: Break-Before-Make (Non-Shorting);
  Make-Before-Break (Shorting)
- Action: 90° Indexing
- Movement: Unlimited Continuous Rotation in Both Directions
- Mounting: Panel Mount, 2 Holes
- Rotor Contacts: Phosphor-bronze, Double Grip
- Stationary Contacts: Copper, Integral with Screw Type Terminals
- Construction: Contacts Enclosed in Molded-phenolic Disks

Approvals
- UL: File No. E18174
- CSA: File No. LR20743

ORDERING INFORMATION
Consult Factory for Complete Details and Ordering Information

TYPICAL CIRCUITS

Circuit 1

Circuit 6

PANEL DRILLING DIMENSIONS

FRONT VIEW

1.046 (2 PL)

1.514

1.514

1.514

2.092

2.092

Front View
CONTACT DIAGRAMS

CIRCUIT NO. 1

Unlimited Positions
Standard Indexing

2 Positions
Standard Indexing

2 Positions
Indexing Offset 45°

CIRCUIT NO. 2

Unlimited Positions
Standard Indexing

3 Positions
Standard Indexing

CIRCUIT NO. 3

Unlimited Positions
Standard Indexing

3 Positions
Standard Indexing

CIRCUIT NO. 4

Unlimited Positions
Standard Indexing

CIRCUIT NO. 6

Unlimited Positions
Standard Indexing

2 Positions
Standard Indexing

CIRCUIT NO. 7

3 Positions
Standard Indexing

APPLICATION SPECIFIC SWITCHES

REVERSING SWITCH
Three Phase
Order #101703A-3
Handle: Oval
Jumpers not supplied
Break-before-make contacts

WYE DELTA
Changeover Switch
Order #101603A-2
For motor speed control
Handle: Oval
Jumpers not supplied
Break-before-make contacts

SHIP-TO-SHORE
Changeover Switch
Order #101602A-2A
Handle: Oval
Jumpers not supplied
Break-before-make contacts

VOLTMETER
Transfer Switch
Order #10104C
3-phase, phase-to-phase
Handle: Round, Knurled
Nameplates and jumpers are supplied
Break-before-make contacts

AMMETER
Transfer Switch
Order #10110C
3-phase, 3 current transformers
Handle: Round, Knurled
Nameplates and jumpers are supplied
Make-before-break contacts

AMMETER- VOLTMEΤER
Transfer Switch
Order #10115C
3-phase, phase-to-phase
3 current transformers
Handle: Round, Knurled
Nameplates and jumpers are supplied
Make-before-break (sharing) contacts

*Denotes make-before-break

Unlimited Positions
Standard Indexing

3 Positions
Standard Indexing

2 Positions
Standard Indexing

2 Positions
Indexing Offset 45°
### FEATURES:

**HANDLES**
- Oval Flush
- Knurled
- Double Ball
- Pistol-Grip

**CONTACTS:**
- Nonshorting break-before-make
- Shorting Contacts make-before-break

### SNAP-ACTION SWITCH WORKSHEET

### ADDITIONAL REQUIREMENTS

Number of Positions
Panel Thickness
Maximum Depth Behind Panel
Waterproof Mount
Nameplate

### TO SPECIFY A SWITCH NOT SHOWN ELSEWHERE:

A. Fill out the Feature Section
B. Indicate Handle Position
C. (1) Complete switch position tabulation with contact closures or
   (2) List deck number and circuit required (example shown)

### SWITCH POSITION TABULATION

<table>
<thead>
<tr>
<th>TITLE ENGRAVING</th>
<th>POSITIONS ENGRAVING</th>
<th>CONTACTS HANDLE END</th>
<th>POSITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4</td>
</tr>
</tbody>
</table>

### HANDLE POSITIONS

<table>
<thead>
<tr>
<th>Deck #</th>
<th>Circuit #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CIRCUITS

Circuits 2, 3 & 4 require 2 decks per pole.
Switch is viewed from handle end.
Terminal numbers are preliminary pending factory review and approval.

Electrical ratings may be affected by spring-return operation.

Series 101 Max. 12 Decks
Series 103 Max. 12 Decks
Series 105 Max. 8 Decks
Series 107 Max. 8 Decks

---

**EXAMPLE:**

Deck # Circuit #
#1 #7

---

**MADE BY:**

**DATE:**

**COMPANY:**

**Dwg No.:**

**APPR BY:**

**DATE:**

**Sheet of:**

---

Electroswitch • 180 King Avenue • Weymouth, MA 02188 • TEL: (781) 335-5200 • FAX: (781) 335-4253 • www.electroswitch.com 37
**TYPE W-2**

**INSTRUMENT AND CONTROL SWITCHES**

### Features
- Lateral Push/Pull Contacts
- Up to 12 Positions
- Compact Size
- Roller-Wipe Spring Actuated Contacting
- Momentary, Maintained and Combination Contacting Designs
- Virtually Unlimited Switching Combinations
- Double Break Contacts per Stage
- Large Number of Contacts per Unit Available
- Slip and Lateral Contacts Available
- Options for Up To Three Key Interlocks

#### Instrument Switch Special Features
- Maintained Contact Type Used for Performing Various Circuit Combinations
- Pull to Lock for Safety Lockout

#### Control Switch Special Features
- Mechanical Red/Green Target
- Spring Return to Normal (Vertical) Position
- Positive Detent Positioning Roller Action Mechanism
- Slip and Lateral Contacts Available

### Electrical Specifications

#### Continuous Ratings
- 20A/600 Volts

#### Interrupt Rating
- 30A/120VAC
- 20A/240VAC
- 5A/125VDC
- 1A/250VDC
- 8A/600VAC

Pull contacts are rated for 10 amps continuous

### Mechanical Specifications

- **Decks**: 1 to 8
- **Poles**: 1 to 48
- **Positions**: 2 to 12
- **Contacts**: Break-Before-Make (Non-Shorting); Make-Before-Break (Shorting)
- **Action**: 30° Positive Indexing
- **Mounting**: Panel Mount
- **Panel Thickness**: 1/4" Max. Standard
- **Rotor Contacts**: Silver Plated Phosphor-bronze
- **Stationary Contacts**: Silver Plated, Bronze with Stud
- **Construction**: Contacts Enclosed in a Glass Polyester Frame

### Approval
- UL E129204
- CSA Certified

### Operation

The Type W-2 Switch is a rotary roller action switch. Rotation of the shaft causes the spring loaded rotor rollers to move from one set of stationary contacts to another. The number of roller contacts can vary from 1 to 6. On standard potential contacts, an insulated wheel is used on both ends of the roller contact that rolls inside the stator frame.

### Contact Terminals

Method of identifying contact terminal: Lettered Bands, Numbered Rows

### Ordering Information

See pages 39 – 41

---

**Depth Behind Panel (in)**

<table>
<thead>
<tr>
<th>No. of Stages</th>
<th>Dim. A</th>
<th>Dim. B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.32</td>
<td>3.81</td>
</tr>
<tr>
<td>2</td>
<td>4.82</td>
<td>5.31</td>
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<tr>
<td>3</td>
<td>6.32</td>
<td>6.81</td>
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<tr>
<td>4</td>
<td>7.82</td>
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<td>5</td>
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<td>9.81</td>
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<td>12.81</td>
</tr>
<tr>
<td>8</td>
<td>13.82</td>
<td>14.31</td>
</tr>
</tbody>
</table>
### AMMETER – Switches

**3-phase-2 CT’s**
- Handle: Round
- Contacts: Maintained
- Stages: 2, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: No
- Basic Switch #: 505A601G01

**3-phase-3 CT’s**
- Handle: Round
- Contacts: Maintained
- Stages: 2, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: No
- Basic Switch #: 505A601G01

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1-B1</td>
<td>1</td>
</tr>
<tr>
<td>A2-B2</td>
<td>2</td>
</tr>
<tr>
<td>A3-B3</td>
<td>3</td>
</tr>
</tbody>
</table>

Order #: 505A701G02

### VOLTMETER – Switch

**3-phase-3 Wire**
- Handle: Round
- Contacts: Maintained
- Stages: 1, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: No

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1-B1</td>
<td>1</td>
</tr>
<tr>
<td>A2-B2</td>
<td>2</td>
</tr>
<tr>
<td>A3-B3</td>
<td>3</td>
</tr>
</tbody>
</table>

Order #: 505A702G04

### CIRCUIT BREAKER – Control Switches

**OFF/ON – Control Switch**
- Handle: Oval, Pistol-Grip, or Round
- Contacts: Maintained
- Stages: 1, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: No

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1-B1</td>
<td>1</td>
</tr>
<tr>
<td>A2-B2</td>
<td>2</td>
</tr>
<tr>
<td>A3-B3</td>
<td>3</td>
</tr>
</tbody>
</table>

Order #: 505A706G01

### CIRCUIT BREAKER – Control Switch

**OFF/ON – Instrument Switch**
- Handle: Oval, Pistol-Grip, or Round
- Contacts: Maintained
- Stages: 1, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: No

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1-B1</td>
<td>1</td>
</tr>
<tr>
<td>A2-B2</td>
<td>2</td>
</tr>
<tr>
<td>A3-B3</td>
<td>3</td>
</tr>
</tbody>
</table>

Order #: 505A706G02

### OFF/ON – Control Switch

- Handle: Oval, Pistol-Grip, or Round
- Contacts: Momentary
- Stages: 1, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: No

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1-B1</td>
<td>1</td>
</tr>
<tr>
<td>A2-B2</td>
<td>2</td>
</tr>
<tr>
<td>A3-B3</td>
<td>3</td>
</tr>
</tbody>
</table>

Order #: 505A723G01

**Order #**
- 505A701G01
- 505A702G04
- 505A706G01
- 505A706G02
- 505A706G03
- 505A706G04
- 505A706G05

**Order #**
- 505A706G01
- 505A706G02
- 505A706G03

Electroswitch • 180 King Avenue • Weymouth, MA 02188 • TEL: (781) 335-5200 • FAX: (781) 335-4253 • www.electroswitch.com
**APPLICATION SPECIFIC SWITCHES**

**TYPE W-2 INSTRUMENT AND CONTROL SWITCHES**

---

## BASIC SWITCHES

Basic switches do not include handle, nameplate, or external jumpers; these items may be ordered separately. For handles see page 80, nameplates see page 81 and external jumpers see page 83. For complete switch style including handle, nameplate and jumpers, contact the factory.

### Momentary Switches
- **Handle:** Fixed  Order #505A623G01
- **Target:** No

### Maintained Switches
- **Handle:** Fixed  Order #505A606G01
- **Target:** No

### Momentary Switches
- **Handle:** Fixed  Order #505A624G01
- **Target:** No

### Maintained Switches
- **Handle:** Fixed  Order #505A621G01
- **Target:** No

### Momentary Switches
- **Handle:** Fixed  Order #505A684G01
- **Target:** No

### Maintained Switches
- **Handle:** Fixed  Order #505A628G01
- **Target:** No

### Momentary Switches
- **Handle:** Fixed  Order #505A627G01
- **Target:** Yes

### Maintained Switches
- **Handle:** Fixed  Order #505A602G01
- **Target:** No

### Momentary Switches
- **Handle:** Fixed  Order #505A626G01
- **Target:** No

### Maintained Switches
- **Handle:** Fixed  Order #505A602G01
- **Target:** No

---

### CONTACT POSITION

- **A1-B1**
- **A2-B2**
- **A3-B3**
- **A4-B4**
- **A5-B5**
- **A6-B6**
- **A7-B7**

---

### Momentary Switches
- **Handle:** Fixed  Order #505A623G01
- **Target:** No

### Maintained Switches
- **Handle:** Fixed  Order #505A606G01
- **Target:** No

---

### Momentary Switches
- **Handle:** Fixed  Order #505A624G01
- **Target:** No

### Maintained Switches
- **Handle:** Fixed  Order #505A621G01
- **Target:** No

---

### Momentary Switches
- **Handle:** Fixed  Order #505A684G01
- **Target:** No

### Maintained Switches
- **Handle:** Fixed  Order #505A628G01
- **Target:** No

---

### Momentary Switches
- **Handle:** Fixed  Order #505A627G01
- **Target:** Yes

### Maintained Switches
- **Handle:** Fixed  Order #505A602G01
- **Target:** No

---

### Momentary Switches
- **Handle:** Fixed  Order #505A626G01
- **Target:** No

---

### Momentary Switches
- **Handle:** Fixed  Order #505A615G01
- **W/Target:** Order #508A118G01

### Maintained Switches
- **Order #505A612G01
- **W/ Removable Handle:** Order #508A119G01

---

**Electroswitch**

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### ELECTROSWITCH

#### SERIES W2
**INSTRUMENT AND CONTROL SWITCH**

<table>
<thead>
<tr>
<th>HANDLE SHAPE</th>
<th>LATERAL ACTION</th>
<th>KEYLOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oval</td>
<td>Pull in Position</td>
<td>Number of Locks 1</td>
</tr>
<tr>
<td>Round Knurled</td>
<td>Push in Position</td>
<td>2 (Left and Right)</td>
</tr>
<tr>
<td>Pistol-Grip</td>
<td>Spring Return In</td>
<td>3 (Top, Left, and Right)</td>
</tr>
<tr>
<td>Heavy Duty</td>
<td>Maintained In</td>
<td>Key(s) Locked and Removable in Position(s)</td>
</tr>
<tr>
<td>Pistol-Grip</td>
<td>Out</td>
<td>Random Code</td>
</tr>
<tr>
<td>Removable in Position</td>
<td></td>
<td>Key Code A52378</td>
</tr>
<tr>
<td>None</td>
<td></td>
<td>Key Interlock (Contact Factory)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>PANEL THICKNESS</th>
<th>SPECIAL FEATURES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slip Contacts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auxiliary Switch</td>
<td></td>
</tr>
</tbody>
</table>

### ROTARY ACTION
- Maintained
- Spring Return
- Slip Contact
- Auxiliary Switch

### HANDLE POSITION
- Nameplate

### SWITCH POSITION TABULATION (FRONT VIEW)

#### SHOW STANDARD CONTACTS
- Contacts Per Stage
  - 6
  - 12
- Max Depth in Panel
  - 13
  - 14
  - 15
  - 16
  - 17
  - 18

#### CONNECTORS

**BETWEEN**
- Term
- Term

**BETWEEN**
- Term
- Term

### NAMEPLATE ENGRAVING (Page 82)

**MARK AS FOLLOWS**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

* Terminal numbers are preliminary pending factory review and approval.*
In 1988, Electroswitch acquired the Type W Switches and Relays from Westinghouse Corporation for the purpose of maintaining a high level of support and assistance to existing customers in the utility industry. Since that time, many changes have been made in switch technology and these models have been replaced. However, Electroswitch continues to offer the Type W Switches for customers needing replacements into existing systems that would require panel rework.

Features

- Rugged Time Tested Design
- Available with Maintained or Momentary Contacts
- Silver Surfaced Contacts for Low Contact Resistance
- Self-Aligning Stationary Contacts
- Contact Wiping Action Ensures Clean, Low-Resistance Contact
- Each Stud Numbered for Terminal Identification
- Protective Side Plated Slide Out for Easy Contact Inspection
- Slip and Lateral Contacts Available
- Supplied With Standard Black Nameplate - Engraving Optional

Control Switch Special Features

- Mechanical Red/Green Target
- Spring Return to Normal (Vertical) Position

Electrical Specifications

Interrupt Ratings

- 50A/120VAC
- 25A/240VAC
- 5A/600VAC

Mechanical Specifications

- Decks 2 to 10
- Poles 2 to 10
- Positions 2 to 12
- Contacts Break-Before-Make (Non-Shorting)
  Make-Before-Break (Shorting)
- Mounting Panel Mount
- Panel Thickness 1/4” Max. with Modern Handle, 2” Max. with Heavy Duty Handle
- Rotor Contacts Silver Plated Brass
- Stationary Contacts Silver Plated Silicone Bronze, Stud Type Terminals

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Type W Switches are supplied with a standard black nameplate that can be engraved to your requirements. Circuit Breaker Control Switches have a cutout in the nameplate for a red and green target indicator to show the last manual operation of the switch. Special engravings should be indicated clearly at the time of order.

Ordering Information – Please consult factory

Nameplates

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Ordering Information – Please consult factory

Nameplates
By definition the Lock-Out Relay plays a pivotal role in the most crucial utility applications. In an emergency, Lock-Out Relay performance can spell the difference between a routine outage and the destruction of expensive equipment. Protect your system and safeguard your personnel with the industry standard for safety and reliability. There’s NEVER A DOUBT with the Electroswitch family of Lock-Out Relays.


### The Series 24 Lock-Out Relays

**HIGH QUALITY**
- Designed and manufactured to the highest standards in the industry
- Qualified to UL, CSA

**VERSATILITY**
- 9 Different trip coils to choose from
- Up to 20 N/O and 20 N/C contacts in one standard LOR
- Available with electric reset capability
- Available with built-in coil monitoring and fault signal detection/indication

**HIGH SPEED**
- Transition times of less than 8mSec (less than 1/2 cycle) are standard

**SAFETY**
- Series 24 - 1E Nuclear Qualified, UL, CSA

**AVAILABILITY**
- Virtually all Series 24 Manual Reset LORs are available from stock for immediate delivery
- The most popular Electric Reset LOR/ERs are also in stock

**SERVICE**
- The Electroswitch team of Customer Service and Applications Professionals stand behind every Electroswitch product. Let us put over 50 years of know-how to work for you!

### Type WL-2 and WL Lock-Out Relays

Since 1988 Electroswitch has been the source for the Type WL-2 and WL Lock-Out Relays. These rugged, dependable devices, designed and originally manufactured by Westinghouse, have stood the test of time in utility and industrial applications worldwide. Now they are available for either new applications or replacement, backed by the industry leading Electroswitch commitment to Quality and Service.
**Electroswitch**  
**180 King Avenue**  
**Weymouth, MA 02188**  
**TEL: (781) 335-5200**  
**FAX: (781) 335-4253**  
**www.electroswitch.com**

---

**Lighted Target Nameplates Save Panel Space and Reduce Costs**

The Electroswitch Series 24 Lock-Out Relay, the Utility Industry Standard for Quality and Reliability, is now available with:

- Integral Coil Monitoring with LED Display and SCADA Feedback.
- LED Indication of Existing Fault Signal.

The Lock-Out Relay fills one of the most critical needs in the utility industry protection scheme. A fast, reliable Lock-Out Relay can mean the difference between a routine fault clearance and a disastrous loss of service, maintenance time and expensive equipment damage.

To assure that this crucial device is functioning and ready to operate, many utilities install pilot lamps on the panel to monitor the integrity of the LOR coil. This can involve expensive inter-wiring and use precious panel space. Because of this, Electroswitch has integrated these monitoring functions and more on a new electronic nameplate for the LOR.

**Features**

- Cost-effective Elimination of Additional Wiring and Lamps Needed to Perform this Function. Just Attach the Pre-wired Leads per the Enclosed Instructions.
- Save Valuable Panel Space. The Entire Package Fits in the Same Space as a Standard Mechanical LOR Nameplate.
- Both LOCAL (LED) and REMOTE (SCADA Signal) Indication is Provided; Reliable Protection for Unmanned Stations.
- Green LED indicates LOR Coil is Intact and Ready to Operate.
- Red LED Warns Against Resetting into an Existing Fault Signal and Possibly Damaging LOR Coils.
- Bright LEDs Visible Through 135˚, > 11 Year Life (Typical).
- LEDs are Field Replaceable From the Front of Panel.
- LEDs are Available in Different Colors (Red, Amber, Green, Blue, and White).
- DC Unit Covers IEEE 24VDC and 48V/125V Ranges (38 to 140VDC).
- The Monitoring Package can be Implemented with Little or no Operator Training.
- This Product is Designed and Manufactured by Electroswitch to Work Flawlessly with the Ultrareliable, High Speed Series 24 Lock-Out Relay.
- Optional Push-to-Test.

**Benefits**

- Provides Local and Remote (SCADA) Annunciation of an LOR Trip Coil Failure.
- Provides Clear Warning Against Closing into a Fault.
- Saves Panel Space.
- Reduces Purchase and Installation Cost.
- Easy to Use...No Special Operator Training.

**How it Works**

When the LOR is in the RESET position, one high visibility LED on the nameplate glows a continuous GREEN, giving local indication that coil continuity is intact and the Lock-Out Relay is ready to respond to a trip signal. Should the coil fail, the LED extinguishes and a built-in solid state contact closes, sending a warning signal to SCADA.

In the TRIP position, the red LED functions as a Trip Signal Monitor. As long as the Trip Signal is present on the LOR coil, the LED glows a continuous RED as a warning against resetting into a fault and possibly damaging the LOR coil. Other LED colors available (Amber, Blue and White).

The new design also retains the proven mechanical orange/black flag to indicate a trip. Contact your local Electroswitch Representative or call us directly for more details on how we can put the Electroswitch tradition of value and innovation to work for you.

**Ordering Information**

Part Numbers for the Series 24 LORs with Lighted Target Nameplate are fairly simple. Find the part number of the product you wish to order in the Electroswitch catalog, then simply add a two letter code after the second digit in its part number. The first letter of the two letter code will always be “P” indicating a Lighted Target Nameplate. The second letter of the code will change depending on the other options as follows.

- **A** = One LED, 48/125VDC
- **B** = Two LEDs, 48/125VDC
- **K** = Two LEDs, 24VDC

Please Specify LED Colors. **Color Options** - Red, Green, Amber, Blue and White.

**Example:**

A Series 24 Manual Reset Lock-Out Relay with one deck and Trip Coil ‘D’ is part number **7801D**. The same Lock-Out Relay with a Lighted Target Nameplate, Two LEDs, and 48/125VDC LED voltage would become part number **78PB01D**.

Consult factory for 24VDC and 250VDC.
FEATURES

**Typical Contact Deck Arrangement**

The blade and terminal configuration enables the use of multiple contacts in the same deck, and simple stacking procedures enable the fabrication of many independent contacts in one relay. Specifically, two N/O contacts and two N/C contacts are provided in each deck, and up to ten decks can be stacked, resulting in a relay with up to forty contacts (twenty N/O and twenty N/C). For good practice, however, it is suggested that polarized voltages should not be used on adjacent contacts. This is because of the remote possibility of flashover during transition between adjacent contacts — especially at the higher DC ratings, or in highly inductive circuits. The illustration shows a single deck. For multideck units the second digit of the terminal number is the same as shown, but the first digit changes to denote the deck number. As an example, terminal 82 is in the eighth deck, directly under terminal 12 and is connected to terminal 88 in the trip position.

**Contact Ratings**

**Contact ratings for LOR**

<table>
<thead>
<tr>
<th>Contact Circuit Volts</th>
<th>Interrupting Rating (AMPS)</th>
<th>Short Time Rating** (AMPS)</th>
<th>Continuous Rating (AMPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>125VDC</td>
<td>5</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>250VDC</td>
<td>3</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>120VAC</td>
<td>20</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>240VAC</td>
<td>15</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>480VAC</td>
<td>7.5</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>600VAC</td>
<td>6</td>
<td>60</td>
<td>30</td>
</tr>
</tbody>
</table>

* AC PF = 0.4; DC L/R = 0.04  ** Short time current is for one minute

The interrupting ratings are based on a 10,000 operation life at rated voltage with no extensive burning of contacts. Short time and continuous ratings are based on temperature rise in contact members and supporting parts not to exceed 50˚ above ambient.


**Trip Speed in Lock-Out Relays**

The manual reset Series 24 LOR has a nominal trip speed of less than 8 milliseconds at rated voltage as tested on 10 deck units. There is very little difference in LORs with fewer decks.

Both the Electric Reset and the Self Reset LORs are available in Standard Trip and High-Speed Trip configurations.

- **Standard Trip** LOR/ER models operate in approximately 12–15 mSec and come equipped with standard LOR target nameplate or the optional LOR Monitor Nameplate.

- **High Speed Trip** LOR/ER models have the same 8 mSec trip speed as the Manual Reset LOR and come equipped with the Memory Target which displays an orange flag until it is manually reset.

- **Lighted Nameplate** with multiple LED indicators is available for all Series 24 LORs.

**Target Used with Lock-out Relays**

All the Lock-out Relays have a mechanical target as part of the nameplate — BLACK for RESET and ORANGE for TRIP. This indicates the condition of the LOR. The target resets when the LOR resets (with the exception of the high-speed trip electric-reset LOR/ER and self-reset LOR/SR where the memory target is manually reset).
OPTIONS

Manual Reset LOR

Closing S1 energizes the linear solenoid which releases the trigger mechanism and causes the LOR to snap to the Trip position. The control deck blades rotate to interrupt current flow to the coil.

Electric Reset LOR

The Electric Reset LOR is tripped by the same method as the Manual Reset LOR. In the Trip position, closing S2 operates relay K1 which closes relay contact K1. The current then flows through solenoid which rotates the LOR/ER back into the reset position, while at the same time terminals A-B open to interrupt the K1 relay. Transition time is 80mS.

Self Reset LOR

The Self Reset LOR is a special Electric Reset LOR which can be both TRIPPED and RESET from a single command contact. In both diagrams below, closing S1 will cause the LOR/SR to snap to the TRIP position. The unit will remain in TRIP as long as S1 remains closed. When S1 is opened, K1 is picked up and the LOR/SR returns to the reset position. The Instant

Reset LOR/SR will reset itself within 80mS of the opening of S1. The Time Delay LOR/SR has factory preset circuitry which causes a time delay of .3 to .6 seconds from the time S1 opens until the LOR/SR contacts reclose.
SERIES 24 LOCK-OUT RELAYS

SERIES 24 MANUAL RESET LOR

SERIES 24 LOR/ER, LOR/SR ELECTRIC RESET & SELF–RESET

DEPTH BEHIND PANEL

<table>
<thead>
<tr>
<th>NO. OF DECKS</th>
<th>MAN. RESET LOR</th>
<th>HI SPEED TRIP LOR/ER</th>
<th>LOR/ER AND INSTANT LOR/SR TIME DELAY</th>
<th>RESET LOR/SR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.63</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>2</td>
<td>4.38</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>3</td>
<td>4.75</td>
<td>8.00</td>
<td>8.00</td>
<td>8.63</td>
</tr>
<tr>
<td>4</td>
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<td>5</td>
<td>6.25</td>
<td>9.75</td>
<td>9.75</td>
<td>10.38</td>
</tr>
<tr>
<td>6</td>
<td>7.50</td>
<td>–</td>
<td>–</td>
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</tr>
<tr>
<td>7</td>
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<td>–</td>
<td>11.63</td>
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<td>8</td>
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<td>11.63</td>
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<tr>
<td>9</td>
<td>9.63</td>
<td>12.90</td>
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</tbody>
</table>

TRIP COIL VOLTAGE DATA

<table>
<thead>
<tr>
<th>Coil</th>
<th>Nominal Voltage</th>
<th>Threshold Voltage</th>
<th>Operating Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>24VDC</td>
<td>9VDC</td>
<td>10 - 40VDC</td>
</tr>
<tr>
<td>B</td>
<td>24VDC</td>
<td>9VDC</td>
<td>10 - 40VDC</td>
</tr>
<tr>
<td>C</td>
<td>48VDC</td>
<td>12VDC</td>
<td>24 - 70VDC</td>
</tr>
<tr>
<td>D</td>
<td>125VDC</td>
<td>16VDC</td>
<td>30 - 140VDC</td>
</tr>
<tr>
<td>E</td>
<td>125VDC</td>
<td>20VAC</td>
<td>45 - 140VDC</td>
</tr>
<tr>
<td>F</td>
<td>250VDC</td>
<td>33VDC</td>
<td>70 - 280VDC</td>
</tr>
<tr>
<td>G</td>
<td>125VDC</td>
<td>70VDC</td>
<td>90 - 140VDC</td>
</tr>
<tr>
<td>H</td>
<td>250VDC</td>
<td>140VDC</td>
<td>180 - 280VDC</td>
</tr>
<tr>
<td>K</td>
<td>125VDC</td>
<td>16VDC</td>
<td>100-150VDC</td>
</tr>
</tbody>
</table>

COIL BURDEN DATA

<table>
<thead>
<tr>
<th>COIL</th>
<th>COIL CIRCUIT VOLTS</th>
<th>TRIP COIL</th>
<th>RESET COIL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COIL CIRCUIT DC OHMS @25°C</td>
<td>BURDEN (AMPS) AT RATED VOLTAGE</td>
<td>COIL CIRCUIT DC OHMS @25°C</td>
</tr>
<tr>
<td>A</td>
<td>24VDC</td>
<td>3.3</td>
<td>7.3</td>
</tr>
<tr>
<td>B</td>
<td>24VDC</td>
<td>7.7</td>
<td>3.1</td>
</tr>
<tr>
<td>C</td>
<td>48VDC</td>
<td>13.0</td>
<td>3.7</td>
</tr>
<tr>
<td>D</td>
<td>125VDC</td>
<td>27.0</td>
<td>4.6</td>
</tr>
<tr>
<td>E</td>
<td>125VDC</td>
<td>50.0</td>
<td>2.5</td>
</tr>
<tr>
<td>F</td>
<td>250VDC</td>
<td>104.0</td>
<td>2.4</td>
</tr>
<tr>
<td>G</td>
<td>125VDC</td>
<td>27.0</td>
<td>4.6</td>
</tr>
<tr>
<td>H</td>
<td>250VDC</td>
<td>104.0</td>
<td>2.4</td>
</tr>
<tr>
<td>K</td>
<td>125VDC</td>
<td>27.0</td>
<td>4.6</td>
</tr>
</tbody>
</table>

RESET COIL VOLTAGE DATA

<table>
<thead>
<tr>
<th>Coil</th>
<th>Nominal Voltage</th>
<th>Normal Voltage Operating Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>24VDC</td>
<td>19.2 to 28VDC</td>
</tr>
<tr>
<td>C</td>
<td>48VDC</td>
<td>36.4 to 57.6VDC</td>
</tr>
<tr>
<td>D</td>
<td>125VDC</td>
<td>100 to 150VDC</td>
</tr>
<tr>
<td>F</td>
<td>250VDC</td>
<td>200 to 275VDC</td>
</tr>
</tbody>
</table>
SERIES 24 LOCK-OUT RELAYS

ORDERING INFORMATION

Selecting a Series 24 Lock-Out Relay:
1. Select type of LOR (Manual Reset, Electric Reset or Self Reset).
2. Fill out appropriate ordering matrix.
3. When selecting Trip and Reset Coils use information from tables below.
4. Contact factory for custom features and nonstandard configurations.

Electric Reset LOR/ER

Model
78 = LOR
Configuration
2 = Std. Trip LOR/ER
3 = Hi-Spd. Trip LOR/ER

Reset Coil
A = 24VDC
C = 48VDC
D = 125VDC
F = 250VDC

Trip Coil
(See Page 47)
A = Coil A
B = Coil B
C = Coil C
D = Coil D
E = Coil E
F = Coil F
G = Coil G
H = Coil H
K = Coil K

No. of Decks
3 = 3
5 = 5
8 = 8
(10 Consult Factory)

Manual Reset LOR

Model
78 = LOR

No. of Decks
03 = 3
05 = 5
10 = 10

Trip Coil
(See Page 47)
A = Coil A
B = Coil B
C = Coil C
D = Coil D
E = Coil E
F = Coil F
G = Coil G
H = Coil H
K = Coil K

Self Reset LOR/SR

Model
78 = LOR
Configuration
4 = Std. Trip, Instant Reset, LOR/SR
5 = Std. Trip, Time Delay Reset, LOR/SR
6 = Hi-Spd. Trip, Instant Reset, LOR/SR
7 = Hi-Spd. Trip, Time Delay Reset, LOR/SR

Reset Coil
D = 125VDC

Trip Coil
D, E, F, G Available for Std. Trip LOR/SR
D, E, F Available for Hi-Spd. Trip LOR/SR

No. of Decks
3 = 3
5 = 5
7 = 7 (time delay units only)
8 = 8 (instant reset units only)

Series 24 Lock-Out Relays
Selecting a Series 24 Lock-Out Relay:
1. Select type of LOR (Manual Reset, Electric Reset or Self Reset).
2. Fill out appropriate ordering matrix.
3. When selecting Trip and Reset Coils use information from tables below.
4. Contact factory for custom features and nonstandard configurations.

LOR RESPONSE TIMES*
Time to Close Normally Open Contacts

LOR RESPONSE TIMES*
Time to Close Normally Open Contacts

LOR CURRENT
Voltage Characteristics Of The Trip Coils

ORDERING INFORMATION

Selecting a Series 24 Lock-Out Relay:
1. Select type of LOR (Manual Reset, Electric Reset or Self Reset).
2. Fill out appropriate ordering matrix.
3. When selecting Trip and Reset Coils use information from tables below.
4. Contact factory for custom features and nonstandard configurations.

Electric Reset LOR/ER

Model
78 = LOR
Configuration
2 = Std. Trip LOR/ER
3 = Hi-Spd. Trip LOR/ER

Reset Coil
A = 24VDC
C = 48VDC
D = 125VDC
F = 250VDC

Trip Coil
(See Page 47)
A = Coil A
B = Coil B
C = Coil C
D = Coil D
E = Coil E
F = Coil F
G = Coil G
H = Coil H
K = Coil K

No. of Decks
3 = 3
5 = 5
8 = 8
(10 Consult Factory)

Manual Reset LOR

Model
78 = LOR

No. of Decks
03 = 3
05 = 5
10 = 10

Trip Coil
(See Page 47)
A = Coil A
B = Coil B
C = Coil C
D = Coil D
E = Coil E
F = Coil F
G = Coil G
H = Coil H
K = Coil K

Self Reset LOR/SR

Model
78 = LOR
Configuration
4 = Std. Trip, Instant Reset, LOR/SR
5 = Std. Trip, Time Delay Reset, LOR/SR
6 = Hi-Spd. Trip, Instant Reset, LOR/SR
7 = Hi-Spd. Trip, Time Delay Reset, LOR/SR

Reset Coil
D = 125VDC

Trip Coil
D, E, F, G Available for Std. Trip LOR/SR
D, E, F Available for Hi-Spd. Trip LOR/SR

No. of Decks
3 = 3
5 = 5
7 = 7 (time delay units only)
8 = 8 (instant reset units only)
Automation That Keeps A Handle On System Protection And Control

The Series 24 Serial (Communication) Lock-Out Relay (SLOR) with Certified DNP 3.00 or Modbus expands the functionality of our field proven Series 24 Electric Reset and Self Reset Lock-Out Relay in a single unit. As an addressable network device, the SLOR provides Remote Trip Capability, Trip Coil Monitoring, Sequence of Events Reporting, System Battery Monitoring and Self-Diagnostic Reporting. Most importantly, the SLOR design maintains the reliable hard-wired protective device trip and manual reset functions.

Cost-Saving Benefits

- Free up RTU Points
- Reduce Point to Point Wiring
- Simplify Testing for Easier Commissioning
- Minimal Training Required
- Simplify Load Shedding Applications
- May Eliminate Separate Devices
  - RTU
  - Discrete Battery Monitors
  - Local/Remote Control Switch
  - Coil Monitoring Lamp
  - Reclosing Relay
- Precise Sequence of Events Log with IRIG-B Input

The simplified SLOR installation provides cost savings associated with wiring (wiring errors), testing, and commissioning.
Serial Lock-Out Relay

Specifications

Electrical
- Continuous Ratings: 30A–600V
- Making Ability for CB Coils: 95A–125VDC
- UL Intermittent Ratings: 20A–120VAC, 15A–240VAC, 6A–600VAC, 3A–125VDC, 1A–250VDC
- Overload Current (50 Ops): 95A–120VAC, 65A–240VAC, 35A–600VAC
- Contact Resistance: .01 Ohms Maximum

Electronic
- Baud Rate: 9600 Std; 1200, 4800, 19200 Selectable
- Transient Protection: Meets IEEE C37.90.1 and IEC 61000-4-4
- Self-Reset Time: Optional, Programmable, 0.1 to 60 Sec.

Mechanical
- Decks: 3, 5, 8 Std. – Consult Factory for Options
- Contacts: 2 N/O and 2 N/C Per Deck
- Action: 45°
- Mounting: Panel Mount, 3 Hole Mounting
- Panel Thickness: 3/16” Max.
- Rotary Contacts: Double-Wiping Silver Overlay Phosphor-bronze
- Stationary Contacts: Silver Inlay in Brass, Silver Plated with Integral Screw Type Terminals
- Construction: Contacts Enclosed in Molded Phenolic Insulators

_required_ordering_information_

For additional trip coil options, consult factory or see LOR-1 Tech Pub on website.

DNP 3.00 Protocol Note: Refer to ES-SLOR-1 Tech Pub on website or consult factory regarding DNP 3.00 implementation for your application.

Modbus Protocol Note: Refer to ES-SLOR-2 for further information.

Required Ordering Information

- Protocol: DNP 3.00 or Modbus
- Handle: Oval Std.
- Voltage: 125VDC Std. or 48 VDC Std.
- Decks: Select 3, 5, or 8
- L1, L2 Replaceable LEDs
- Color Options – (Amber, Red, Green, Blue, White)

For additional trip coil options, consult factory or see LOR-1 Tech Pub on website.

DNP 3.00 Protocol Note: Refer to ES-SLOR-1 Tech Pub on website or consult factory regarding DNP 3.00 implementation for your application.

Modbus Protocol Note: Refer to ES-SLOR-2 for further information.

Required Ordering Information

- Protocol: DNP 3.00 or Modbus
- Handle: Oval Std.
- Voltage: 125VDC Std. or 48 VDC Std.
- Decks: Select 3, 5, or 8
- L1, L2 Replaceable LEDs
- Color Options – (Amber, Red, Green, Blue, White)
The Type WL-2 Lock-Out Relay was designed and manufactured by Westinghouse to provide dependable tripping in a variety of protection schemes. Since acquiring the line in 1988, Electroswitch has supplied hundreds of these rugged, reliable relays for both new applications as well as replacement units for the enormous installed base of WL-2s all over the world.

Features
- Low Current Magnetic Trip Mechanism
- Both Handle Trip and Non-Handle Trip Versions Available
- The Electroswitch Tradition of Quality, Value and Customer Service

How to Order
Contact the factory with the part number for the WL-2 Lock-Out Relay you are replacing or provide us with the following information:
- Number of N/O (Type A) and N/C (Type B) contacts required
- The required control voltage
- Whether the unit is to be Non-Handle Trip (standard) or Handle Trip (optional)

We will promptly respond with an approval drawing of the appropriate WL-2 Lock-Out Relay as well as any further technical information you may require.

Contact Ratings

<table>
<thead>
<tr>
<th>Voltage</th>
<th>SINGLE CONTACT</th>
<th>TWO CONTACTS IN SERIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INDUCTIVE AMPERES</td>
<td>RESISTIVE AMPERS</td>
</tr>
<tr>
<td></td>
<td>4.5mH</td>
<td>12mH</td>
</tr>
<tr>
<td>125VDC</td>
<td>6.3</td>
<td>1.0</td>
</tr>
<tr>
<td>250VDC</td>
<td>1.6</td>
<td>1.0</td>
</tr>
<tr>
<td>500VDC</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>120VAC</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>240VAC</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>480VAC</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

TYPE WL-2 LOCK-OUT RELAY

<table>
<thead>
<tr>
<th>NOMINAL OPERATING VOLTAGE</th>
<th>AVERAGE COIL CURRENT</th>
<th>INDUCTION (H)</th>
<th>RESISTANCE (Ω)</th>
<th>IMPEDANCE (Ω)</th>
<th>MINIMUM PICK UP</th>
<th>OPERATING TIME AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CYCLES</td>
<td>mSEC</td>
<td>19VDC</td>
<td>19VDC</td>
<td>19VDC</td>
<td>19VDC</td>
</tr>
<tr>
<td>24VDC</td>
<td>3.6A</td>
<td>.0029</td>
<td>6.6</td>
<td>19VDC</td>
<td>1.06</td>
<td>17.7</td>
</tr>
<tr>
<td>48VDC</td>
<td>7.3A</td>
<td>.0029</td>
<td>6.6</td>
<td>19VDC</td>
<td>.96</td>
<td>16.0</td>
</tr>
<tr>
<td>125VDC</td>
<td>1.2A</td>
<td>.030</td>
<td>104</td>
<td>19VDC</td>
<td>1.05</td>
<td>17.5</td>
</tr>
<tr>
<td>250VDC</td>
<td>2.0A</td>
<td>.030</td>
<td>104</td>
<td>19VDC</td>
<td>1.01</td>
<td>16.8</td>
</tr>
<tr>
<td>120VAC RECTIFIED</td>
<td>1.4A</td>
<td>.030</td>
<td>85</td>
<td>90VAC</td>
<td>1.58</td>
<td>26.3</td>
</tr>
<tr>
<td>240VAC RECTIFIED</td>
<td>1.4A</td>
<td>.030</td>
<td>85</td>
<td>90VAC</td>
<td>1.08</td>
<td>18.0</td>
</tr>
<tr>
<td>480VAC RECTIFIED</td>
<td>6.0A</td>
<td>.030</td>
<td>80</td>
<td>90VAC</td>
<td>1.54</td>
<td>25.7</td>
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<tr>
<td>240VAC</td>
<td>3.0A</td>
<td>.030</td>
<td>80</td>
<td>90VAC</td>
<td>1.05</td>
<td>17.5</td>
</tr>
</tbody>
</table>
## Electroswitch

### Contacts

<table>
<thead>
<tr>
<th>Switch Style Numbers</th>
<th>Handle Trip</th>
<th>Non-Handle Trip</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24-48V Dc</td>
<td>24-48V Dc</td>
</tr>
<tr>
<td></td>
<td>120V-240V</td>
<td>120V-240V</td>
</tr>
<tr>
<td></td>
<td>60Hz with</td>
<td>60Hz with</td>
</tr>
<tr>
<td></td>
<td>60Hz</td>
<td>60Hz</td>
</tr>
<tr>
<td></td>
<td>125-250V Dc</td>
<td>Rectifier</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rectifier</td>
</tr>
</tbody>
</table>

### Wiring Diagrams

#### Six (6) Contact Frame WL-2 Switches

<table>
<thead>
<tr>
<th>Fig.</th>
<th>No. of Stages</th>
<th>Contacts Available</th>
<th>No. of Paired* Contacts</th>
<th>No. of Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>8</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>10</td>
<td>6</td>
<td>21</td>
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<td>8</td>
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<td>10</td>
<td>7</td>
<td>24</td>
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<td>9</td>
<td>9</td>
<td>12</td>
<td>7</td>
<td>27</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>14</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>16</td>
<td>8</td>
<td>33</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>18</td>
<td>9</td>
<td>36</td>
</tr>
<tr>
<td>13</td>
<td>13</td>
<td>19</td>
<td>10</td>
<td>39</td>
</tr>
<tr>
<td>14</td>
<td>14</td>
<td>22</td>
<td>10</td>
<td>42</td>
</tr>
</tbody>
</table>

### Rectifiers

<table>
<thead>
<tr>
<th>Rectifier</th>
<th>125-250V Dc</th>
<th>Six (6) Contact Frame WL-2 Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Wiring Diagrams

- **Figure A**: 24 thru 250 Volts
- **Figure B**: 480 Volts - Two Coil Cutoff Contacts Wired in Circuit
- **Figure C**: Rectifier
- **Figure D**: Contacts"
TYPE WL LOCK-OUT RELAY

The Type WL Lock-Out Relay product line was also acquired from Westinghouse in 1988. Countless Type WLs are still providing reliable protection in older facilities decades after they were first installed. Electroswitc is pleased to announce that we can provide replacement units for most of the WLs still in service. Please contact us with the WL part number of the switch you are replacing and we will be happy to respond with an approval drawing or a suggested replacement if your WL cannot be duplicated.

### TABLE I: WL SWITCH STYLES (less coils)

<table>
<thead>
<tr>
<th>Style Numbers Without Coils</th>
<th>Rotor Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Stages</td>
<td>Non-Trip by Handle</td>
</tr>
<tr>
<td>2</td>
<td>422D949G60</td>
</tr>
<tr>
<td>3</td>
<td>422D949G60</td>
</tr>
<tr>
<td>4</td>
<td>422D949G60</td>
</tr>
<tr>
<td>5</td>
<td>422D949G60</td>
</tr>
<tr>
<td>6</td>
<td>422D949G60</td>
</tr>
<tr>
<td>7</td>
<td>422D949G60</td>
</tr>
<tr>
<td>8</td>
<td>422D949G60</td>
</tr>
<tr>
<td>9</td>
<td>422D949G60</td>
</tr>
<tr>
<td>10</td>
<td>422D949G60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coil</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>7-8</th>
<th>9-10</th>
<th>11-12</th>
<th>13-14</th>
<th>15-16</th>
<th>17-18</th>
<th>19-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>G</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: On 250 volts dc control circuits this contact must be connected in series with coil contact.

### TABLE II: COIL OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Coil Code</th>
<th>Coil Style Number</th>
<th>Ohms Resistance</th>
<th>Minimum Trip DC Volts</th>
<th>Control Voltage-DC</th>
<th>Ohms Impedance (not tripped)</th>
<th>Minimum Trip AC Volts</th>
<th>Control Voltage-AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>701S000G60</td>
<td>.73</td>
<td>8.7</td>
<td>24</td>
<td>6.2</td>
<td>50</td>
<td>110</td>
</tr>
<tr>
<td>B</td>
<td>701S001G60</td>
<td>2.68</td>
<td>17.1</td>
<td>48</td>
<td>21.0</td>
<td>95</td>
<td>19</td>
</tr>
<tr>
<td>C</td>
<td>701S002G60</td>
<td>4.05</td>
<td>21.4</td>
<td>125</td>
<td>30.0</td>
<td>115</td>
<td>16</td>
</tr>
<tr>
<td>D</td>
<td>701S003G60</td>
<td>6.2</td>
<td>27.0</td>
<td>250</td>
<td>43.0</td>
<td>155</td>
<td>17</td>
</tr>
<tr>
<td>E</td>
<td>701S004G60</td>
<td>8.6</td>
<td>31.0</td>
<td>19</td>
<td>52.0</td>
<td>155</td>
<td>18</td>
</tr>
<tr>
<td>F</td>
<td>701S005G60</td>
<td>12.2</td>
<td>33.0</td>
<td>13</td>
<td>97.0</td>
<td>200</td>
<td>16</td>
</tr>
<tr>
<td>G</td>
<td>701S006G60</td>
<td>18.5</td>
<td>44.0</td>
<td>14</td>
<td>140.5</td>
<td>243</td>
<td>200</td>
</tr>
<tr>
<td>H</td>
<td>701S007G60</td>
<td>28.0</td>
<td>54.0</td>
<td>16</td>
<td>208.0</td>
<td>297</td>
<td>297</td>
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<tr>
<td>I</td>
<td>701S008G60</td>
<td>45.5</td>
<td>70.0</td>
<td>17</td>
<td>300.0</td>
<td>355</td>
<td>220</td>
</tr>
<tr>
<td>J</td>
<td>701S009G60</td>
<td>59.0</td>
<td>84.0</td>
<td></td>
<td>355.0</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>701S010G60</td>
<td>104.0</td>
<td>111.0</td>
<td></td>
<td>400.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Control Voltage-DC: Time in milliseconds*
Electroswitch Control Switch Relays (CSR) combine the function of a control switch with a remote controlled solenoid allowing one device to do both the manual and supervisory control function in the control of power circuit breakers. They eliminate the need to redesign substations for redundant separate relays when manual substations convert to supervisory control. CSRs provide manual or electric control switch operation by supervisory control. The CSR looks, acts, and feels identical to a control switch.


### Series 24 Control Switch Relays

**HIGH QUALITY**
- Designed and manufactured to the highest standards in the industry
- Qualified to UL, CSA, ANSI/IEEE 37.90 and 37.90.1

**VERSATILITY**
- Replaces a manual breaker switch, interposing relays, and associated wiring
- Direct retrofit to existing manual breaker control switch
- Electric or manual operation
- Three circuits to satisfy different industry applications
- Multiple voltages: 48VDC, 125VDC, standard, others available
- All standard Series 24 circuit breaker control switch contacting (see page 17) available
- Available with custom contacting (consult factory)

**SAFETY**
- Target flag agreement (regardless of manual or electric trip)
- Available with SCADA disable for operator safety during service
- 1E Nuclear qualified

**AVAILABILITY**
- Virtually all Universal Circuits in standard voltages of the Series 24 CSRs are available from stock for quick delivery. See pg.14 (Switch Section) for Series 24 Universal Circuits.

**SERVICE**
- The Electroswitch team of Customer Service and Applications Professionals stand behind every Electroswitch product. Let us put over 50 years of know-how to work for you!

### Basic Circuit Operation

The control of the CSR Control Switch Relay for electric operation requires no special wiring. It only requires two contacts (S1 and S2) to command the CSR to either the TRIP or CLOSE position. Low level contacts (rated 1 ampere) may be used since S1 and S2 do not control the rotary drive solenoid directly.

The standard station control bus voltage is used on all three circuits. The device, when shown in the following figures is in the vertical NORMAL position. The CSR coil form shown on the figures represents the rotary solenoid that drives the CSR. Its operation is further described later. LS1 is a linear solenoid within the device that changes the sense of direction of the CSR from left (TRIP) to right (CLOSE). The contacts shown as CSR are contacts within the device. Other components are shown by conventional designations.

### Mechanical Target

When the CSR Switch handle is turned, a mechanical target contained in the nameplate is turned as well (GREEN for TRIP, RED for CLOSE). The target remains latched when the handle returns to normal position and always shows the last active position.
**Transient Protection**

The CSR Control Switch Relay is designed and tested to operate reliably in a normal power industry environment. This includes being subjected to transients on the control bus up to 3.5KV. Since the CSR is normally isolated from the bus, it will experience transients only if they occur in the operating mode. This precludes the possibility of a detrimental, accumulating affect over the life of the unit. As such, no transient protection is needed with circuits B and C. Circuit A with its voltage divider circuit does remain on the bus and therefore contains a bipolar diode, as previously explained, to clip the transients to an acceptable value.

Because of the nature of the operation of the rotary solenoid, the CSR does generate transients that may be of interest to the user. These transients are less than 2KV and generally in the 1.5KV to 1.8KV range. When used in conjunction with unprotected static devices, like solid state relays, a bipolar diode is recommended across the rotary solenoid and the relay contact.

The CSR is available with Serial Communication Control.

**Coil Voltage Data**

<table>
<thead>
<tr>
<th>COIL</th>
<th>COIL CIRCUIT VOLS</th>
<th>COIL CIRCUIT DC OHMS @25°C</th>
<th>BURDEN (AMPS) AT RATED VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>48VDC</td>
<td>4.83</td>
<td>9.9</td>
</tr>
<tr>
<td>D</td>
<td>125VDC</td>
<td>18.96</td>
<td>6.6</td>
</tr>
</tbody>
</table>

24VDC and 250VDC available — Consult factory.

**Contact Ratings**

<table>
<thead>
<tr>
<th>CONTACT CIRCUIT VOLS</th>
<th>INTERRUPTIVE RATING (AMPS)</th>
<th>RESISTIVE</th>
<th>INDUCTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SINGLE CONTACT</td>
<td>SINGLE CONTACT</td>
</tr>
<tr>
<td>12VDC</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>24VDC</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>48VDC</td>
<td>3</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>125VDC</td>
<td>3</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>250VDC</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>600VDC</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>120VAC</td>
<td>20</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>240VAC</td>
<td>15</td>
<td>15</td>
<td>60</td>
</tr>
<tr>
<td>480VAC</td>
<td>10</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td>600VAC</td>
<td>6</td>
<td>6</td>
<td>60</td>
</tr>
</tbody>
</table>

* Short time current is for one minute.

**Coil Burden Data**

<table>
<thead>
<tr>
<th>COIL</th>
<th>NOMINAL VOLTAGE</th>
<th>VOLTAGE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>48VDC</td>
<td>41-56VDC</td>
</tr>
<tr>
<td>D</td>
<td>125VDC</td>
<td>106-140VDC</td>
</tr>
</tbody>
</table>

**OPTIONS**

Three basic circuits are available to satisfy different power industry applications.

**Circuit B**

**One Second Time Delay With Anti-Pumping Circuitry**

Circuit B has a time delay that holds the CSR in the command position for 1 sec. It also has anti-pumping circuitry so that the command contact may be closed indefinitely (greater than 100 msec).

**Circuit C**

**Time Delay And Anti-Pumping Controlled By the Command Contacts**

Circuit C has no built in time delay. It exactly follows (or is a slave to) the operation of the command contact (maximum 15 second time delay).
**Circuit A**

**One To Three Second Time Delay With No Anti-Pumping Circuitry - Not Recommended Where SCADA Timing Sequence is Greater Than Three Seconds.**

Circuit A has a factory adjustable time delay that holds the CSR in the commanded position for 1 to 3 sec. The command contact closure time should be greater than 100 msec and less than the time delay setting (to avoid pumping). This circuit is not recommended for applications where the SCADA timing sequence is greater than three seconds as it will cause pumping.

**Contact Chart**

<table>
<thead>
<tr>
<th>DECKS</th>
<th>CONTACTS</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>TRIP</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>CLOSE</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
<td>TRIP</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>CLOSE</td>
</tr>
<tr>
<td>3</td>
<td>31</td>
<td>TRIP</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>CLOSE</td>
</tr>
<tr>
<td>4</td>
<td>42</td>
<td>TRIP</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>CLOSE</td>
</tr>
<tr>
<td>5</td>
<td>51</td>
<td>TRIP</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td>CLOSE</td>
</tr>
</tbody>
</table>

**Series 24 CSR ORDERING INFORMATION**

Series 88 = Series 24 CSR

<table>
<thead>
<tr>
<th>Switch Contacting (see page 17)</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 = 2438D 43 = 2443D 50 = 2450D</td>
<td>C = 48VDC</td>
</tr>
<tr>
<td>40 = 2440D 44 = 2444D 52 = 2452D</td>
<td>D = 125VDC</td>
</tr>
<tr>
<td>41 = 2441D 45 = 2445D 57 = 2457D</td>
<td></td>
</tr>
<tr>
<td>42 = 2442D 46 = 2446D 58 = 2458D</td>
<td></td>
</tr>
</tbody>
</table>

**CSR Circuit**

A = 1-3 Sec. Time Delay
B = 1 Sec. Time Delay
C = Up to 1.5 Sec. Time Delay

Seal-in-Relay

Hold-in-Resistor

The circuit breaker control switch relays include an engraved nameplate, mechanical target, and pistol-grip handle. Circuits 50, 52 and 58 also have a Turn-To-Latch position. Also included are the control circuits previously explained.

CSR Control Switch Relays have the same flexibility of design as the Series 24 line of Instrument and Control Switches and are available with all the different contact configurations expected from this type of switch. Refer to switch section for details.
Use This Form to Specify a Switch
Not Shown Elsewhere

## CONTROL SWITCH RELAYS

**SERIES 24 CSR**

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Engraving Code</th>
<th>REV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Handles
- [ ] Pistol-Grip
- [ ] Latched Position
- [ ] Slip-contacts
- [ ] Turn-to-latch

### Actions
- [ ] Maintained in Latched Position
- [ ] Spring Return to Normal Position

### Other Features
- Panel Thickness
- Depth Behind Panel
- Operating Voltage
- Control Circuit

### Other

#### Handle Positions

- 45°
- Target

#### Title Engraving

**POSITION ENGRAVING**

<table>
<thead>
<tr>
<th>DECK</th>
<th>CONTACTS/HANDLE END</th>
<th>POSITIONS</th>
<th>3 from</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
<td>1 2 3 4</td>
</tr>
</tbody>
</table>

#### Slip-Contacts

- Slip-contacts will be grouped at rear of switch
- *Terminal numbers are preliminary pending factory review and approval.

**Standard Decks**

- Decks 1-10

**Slip Contact Decks**

- Decks 11-20

**Control Decks**

- Decks 21-30

**Use for all except slip contacts**

**Use for Switches with slip contacts**

---

**Document Control**

- Quality Assurance: ANSI/ASME NQA-1-1983
- Qualification: ESC-STD-1000
- Drawing Master: 246STD-1

---

**Other**

- Slip contacts will be grouped at rear of switch
- SHOW JUMPERS TO BE SUPPLIED
The Control Switch Relay with SCADA Disable (CSR/SD) operates like a standard CSR, allowing both SCADA and manual operation. Pushing in the handle disables remote operation leaving only local/Manual operation possible, allowing testing and service to be performed safely. In addition, the CSR/SD also provides 2 N/O and 2 N/C contacts, push activated, for customer use as SCADA feedback of status indication.

Series 24 Control Switch Relays with SCADA Disable

The CSR/SD maintains all the exceptional quality and functionality of the CSR with the added benefit of a SCADA disable function. Consult factory for control circuit designs and ordering information.

**OPERATION**

- Handle pulls out 3/8” to allow remote operation of the CSR from SCADA, as well as local/manual operation.
- When the CSR handle and shaft is pushed in, the remote operation of the CSR is disabled, and only local/manual operation remains possible.
- The CSR remains in the “Normal” position, vertical at 0 degrees.
- 2 N/O and 2 N/C lateral contacts are provided and will operate via the 3/8” axial movement (push/pull) of the CSR/SD handle shaft.
- Target flag agreement is always true regardless of remote or local mode.
- Electrical connections (15 amp, 600 volt) are provided for the 2 N/C and N/O contacts at the terminal block deck located at the rear of the CSR/SD. These can be used to provide customer status indication.

### CONTACTS

<table>
<thead>
<tr>
<th>DECK</th>
<th>CONTACTS</th>
<th>PUSH</th>
<th>FULL</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUX CONT</td>
<td>X1</td>
<td>1</td>
<td>2 FROM 1 3</td>
</tr>
<tr>
<td></td>
<td>X2</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>X5</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>X6</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2</td>
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<td>0</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>0</td>
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</tr>
<tr>
<td>3</td>
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<td>0</td>
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<tr>
<td>3</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
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<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

**SPRING RETURN TO POSITION 2**
Automation That Keeps A Handle On System Protection And Control

The Series 24 Serial Control Switch Relay (SCSR) with Certified DNP 3.00 or Modbus expands the functionality of the field proven remotely operated Series 24 Breaker Control Switch.

An addressable network device, the SCSR provides Remote Trip Coil Monitoring, Sequence of Events (SOE) Reporting, System Battery Monitoring, and Self-Diagnostic Reporting, while maintaining traditional local control operability.

Features
- Construction and Contacting Based on the Field Proven CSR Device
- Breaker Position via LED, SCADA, Serial Comm & Mechanical Target
- Breaker Trip Coil(s)
- Integrity LED
- Serial Bus XMT/Rec LED
- Local/Remote Mode Control
- with LED Status Indication
- Manual Trip/Close Handle
- Programmable Dwell Time
- Monitor Up to Two Trip Coils

Cost-Saving Benefits
- Free up RTU Points
- Reduce Point to Point Wiring
- Simplify Testing for Easier Commissioning
- Minimize Training
- Eliminate Separate Devices
  - RTU
  - Interposing Relays for Breaker Control
  - Discrete Battery Monitors
  - Breaker Status Lamps
  - Local/Remote Control Switch
- Precise Sequence of Events Log with IRIG-B Input

The SCSR installation provides cost savings associated with wiring (wiring errors), testing, and commissioning.

Other Serial Control Devices From Electroswitch

Series 24 SLOR Serial Lock-Out Relay (page 49)
Series 31 STR Serial Tagging Relay
CIM Serial Control Indicator Module (page 73)
**Specifications**

**Electrical**
- Continuous Ratings: 30A–600V
- UL Interrupt Ratings: 20A–120VAC , 15A–240VAC, 6A–600VAC, 3A–125VDC, 1A–250VDC
- Overload Current (50 Ops): 95A–120VAC, 65A–240VAC, 35A–600VAC
- Making Ability for CB Coils: 95A–125VDC
- Contact Resistance: .01 Ohms Maximum

**Electronic**
- Baud Rate: 9600 Std. 1200, 4800, 19200 Selectable
- Transient Protection: Meets IEEE C37.90.1 and IEC 61000-4-4
- Signal Hold Time: 1 Sec. Standard, 1-3 Seconds Serially Selectable

**Mechanical**
- Sections: 1 to 6
- Poles: 1 to 12
- Break Contacts Available: Break-Before-Make (Non-Shorting); Make-Before-Break (Shorting)
- Standard and Slip Contacts Available
- Action: 45˚ Spring Return to Normal
- Mounting: Panel Mount, 3 Hole Mounting
- Panel Thickness: 3/16” Max. Standard — Others Available
- Rotor Contacts: Silver Inlay Phosphor-bronze, Double-Wiping
- Stationary Contacts: Silver Plated, with Integral Screw Type Terminals
- Construction: Contacts Enclosed in Molded Phenolic Insulators

**Operational and Burden Voltage Data**

<table>
<thead>
<tr>
<th>Coil</th>
<th>Rated Voltage</th>
<th>Voltage Range</th>
<th>Coil Circuit DC Ohms @ 25˚C</th>
<th>Burden (amps) at Rated Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>48VDC</td>
<td>41-56VDC</td>
<td>4.83</td>
<td>9.9</td>
</tr>
<tr>
<td>D</td>
<td>125VDC</td>
<td>106-140VDC</td>
<td>18.96</td>
<td>6.6</td>
</tr>
</tbody>
</table>

**Installation Connections (Rear View)**

**Contact Configuration**

Flexible deck configuration offers multiple decks with two isolated contacts per deck; a total of twelve contacts each designed to handle full rated current.

**Typical Breaker Input Connections**

**Use of Inputs**

Input A controls the L3 (right) LED and sets DNP object 1 point 4. In a typical application, it is used to monitor a 52A contact.

Input B controls the L1 (left) LED and sets DNP object 1 point 3. In a typical application, it is used to monitor a 52B contact.

Input TCM controls the L2 (center) LED and sets DNP object 1 point 5. In a typical application, it is used as a trip coil monitor.

The inputs are polarity sensitive. Reverse polarity causes no damage, but input will not be sensed.

Consult Technical Bulletin ES-SCSR-1 for further information on DNP usage, or ES-SCSR-3 for Modbus.

**Nameplate – Typical Configuration**

L2, LED (Breaker Trip Coil Status)
L1, LED (Breaker Open)
L3, LED (Breaker Closed)

**Mechanical Target Flag**

Shows Last Operation of SCSR

**Remote Status LED**

(local = SCADA Operation Enabled)

**Technical Bulletin**

Consult Technical Bulletin ES-SCSR-1 for further information on DNP usage, or ES-SCSR-3 for Modbus.
Breaker Control Switch Relay with Time Delay Trip and Close for Arc Flash Protection of Personnel

The Time Delay Control Switch Relay (TD-CSR) provides a means of protecting personnel from arc flash during local breaker operation. The time delay feature of the new TD-CSR expands the functionality of the field-proven CSR.

Integrated into the lighted nameplate package, two front panel-mounted push buttons provide the ability to manually initiate a time delayed breaker trip or close operation.

A flashing LED alerts the operator of either a pending trip or close operation, allowing adequate time to evacuate the arc flash area.

The TD-CSR is available with all of the features and options of the standard CSR. The lighted nameplate includes local LED indication, a remote SCADA contact alarm, and a single or dual trip coil monitoring option.

Features
- Local Trip or Close with 10 Second Delay via Push Button
- Flashing LED to Indicate Pending Operation
- Pending Operation Easily Cancelled
- Visible LED and Trip/Close Flag Indication
- Four Second Hold Requirement Prevents Accidental Push Button Operation
- Optional Factory Programmable Delay Time
- Traditional Manual Trip and Close via Pistol Grip

Safety and Cost-Saving Benefits
- Provides Safe On-Site Breaker Operation While Keeping Personnel Outside The “Arc Flash Zone”
- Fits Into Existing Breaker Control Switch Mounting
- No Special Wiring Required
- Includes Features of the Standard CSR
- Intuitive Push Button Operation Simplifies Training Requirements
- Provides a Reliable, Cost-Effective Method for Arc Flash Hazard Protection

Other Arc Flash Control Devices From Electroswitch

3 Position Tagging Relay
(Page 68)

Position 1
Reclose Disabled

Position 2
Reclose Enabled

Position 3
Tagged, Relay Set to Instant Trip, Reclose Disabled — One Shot to Lockout

2 Position Tagging Relay
(Page 68)
**Specifications**

**Electrical**
- Continuous Ratings: 30A–600V
- UL Interrupt Ratings: 20A–120VAC, 15A–240VAC, 6A–600VAC
- Overload Current (50 Ops): 95A–120VAC, 65A–240VAC, 35A–600VAC
- Making Ability for CB Coils: 95A–125VDC
- Contact Resistance: .01 Ohms Maximum

**Electronic**
- Transient Protection: Meets ANSI/IEEE C37.90.1
- Operation Hold Time: 1 Sec. Standard

**Mechanical**
- Contacts
  - Break-Before-Make (Non-Shorting); Make-Before-Break (Shorting);
  - Standard and Slip Contacts Available
- Action
  - 45° Spring Return
- Mounting
  - Panel Mount
- Panel Thickness: 3/16" Max. Standard – Others Available
- Rotor Contacts
  - Silver Overlay Phosphor-bronze, Double-Wiping
- Stationary Contacts
  - Silver Inlay Plated, with Integral Screw Type Terminals
- Construction
  - Contacts Enclosed in Molded Phenolic Insulation

**Operational and Burden Voltage Data**

<table>
<thead>
<tr>
<th>Coil</th>
<th>Rated Voltage</th>
<th>Voltage Range</th>
<th>Coil Circuit DC Ohms @ 25°C (+/- 10%)</th>
<th>Burden (Amps) @ Rated Voltage (+/- 10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>24VDC</td>
<td>21–28VDC</td>
<td>1.2</td>
<td>20.5</td>
</tr>
<tr>
<td>C</td>
<td>48VDC</td>
<td>41–56VDC</td>
<td>4.9</td>
<td>9.9</td>
</tr>
<tr>
<td>D</td>
<td>125VDC</td>
<td>106–140VDC</td>
<td>19</td>
<td>6.6</td>
</tr>
<tr>
<td>D</td>
<td>120VAC</td>
<td>106–140VAC</td>
<td>19</td>
<td>6.6</td>
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<tr>
<td>F</td>
<td>240VAC</td>
<td>216–264VAC</td>
<td>81</td>
<td>3.2</td>
</tr>
<tr>
<td>F</td>
<td>250VDC</td>
<td>212–280VDC</td>
<td>81</td>
<td>3.2</td>
</tr>
</tbody>
</table>

**Use of Inputs**
- Input A controls the L3 (right) LED. In a typical application, it is used to monitor a 52A contact.
- Input B controls the L1 (left) LED. In a typical application, it is used to monitor a 52B contact.
- Input TCM controls the L2 (center) LED. In a typical application, it is used as a trip coil monitor.

The inputs are polarity sensitive. Reverse polarity causes no damage, but will not be sensed.

**Contact Configuration**
- Flexible deck configuration offers multiple decks with two isolated contacts per deck; a total of twelve contacts each designed to handle full rated current.
- NOTE: All features and configurations currently available on the CSR are available on the TD-CSR.

Consult factory for additional information.
The Series 24 Selector Switch Relay (SSR) is an auxiliary relay that combines electrical and manual operation in a single unit for multiposition applications. Basically a unidirectional (CCW) stepping switch, the SSR can be used in any 2 to 8 position application. The SSR is ideally suited for tapswitch applications or any other multiposition application where simple or complicated contacting is used.


**The Series 24 Selector Switch Relay**

**HIGH QUALITY**
- Designed and manufactured to the highest standards in the industry
- Qualified to UL, CSA

**VERSATILITY**
- 2 to 8 unidirectional multiposition
- Up to 10 decks and 20 poles
- Available for electric or manual operation
- 3 switch circuits - One to match your application needs

**SERVICE**
- The Electroswitch team of Customer Service and Applications Professionals stand behind every Electroswitch product. Let us put over 50 years of know-how to work for you!

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>NO. OF DECKS</th>
<th>DIM. A</th>
<th>DIM. X</th>
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</thead>
<tbody>
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<td>4.134</td>
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</tr>
<tr>
<td>5</td>
<td>5.384</td>
<td>10.33</td>
</tr>
<tr>
<td>8</td>
<td>7.259</td>
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</tr>
<tr>
<td>10</td>
<td>8.569</td>
<td>13.46</td>
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</tbody>
</table>

**DIMENSIONS**

<table>
<thead>
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<th>NO. OF DECKS</th>
<th>DIM. A</th>
<th>DIM. X</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4.134</td>
<td>9.08</td>
</tr>
<tr>
<td>5</td>
<td>5.384</td>
<td>10.33</td>
</tr>
<tr>
<td>8</td>
<td>7.259</td>
<td>12.21</td>
</tr>
<tr>
<td>10</td>
<td>8.569</td>
<td>13.46</td>
</tr>
</tbody>
</table>
The electrical power industry has a great variety of requirements for latching type auxiliary relays to provide maintained contacts—both N/C and N/O. Often, manually operated switches are used in conjunction with traditional relays to provide the "maintained" function. However, traditional protective relays have limitations as to the number of contacts available and their ability to withstand seismic vibration. Traditional auxiliary relays used in conjunction with the protective relays also exhibit these limitations.

The LSR Latching Switch Relay was developed to meet these requirements. It is a two-position rotary action Latching Switch Relay that provides control of up to 20 N/O and 20 N/C contacts in a single device. It is a manually or remotely operated unit used for a variety of applications; latching relay, reclosing relay, programming relay, and local/remote switch that is SCADA compatible.

- Series 24 LSR now available with lighted nameplate. See page 12 for Lighted Nameplate information.


**Series 24 and 31 Latching Switch Relays**

**HIGH QUALITY**
- Designed and manufactured to the highest standards in the industry
- Qualified to UL, CSA, ANSI/IEEE

**VERSATILITY**
- 2 Size options - Series 24 and Series 31
- Up to 20 N/O and 20 N/C contacts
- Electric or manual operation
- Control circuits
- Available without handle for remote only operation

**SAFETY**
- 1E Nuclear qualified

**AVAILABILITY**
- Many Series 24/31 LSRs are available from stock for immediate delivery

**SERVICE**
- The Electroswitch team of Customer Service and Applications Professionals stand behind every Electroswitch product. Let us put over 50 years of know-how to work for you!

**Contact Deck Arrangement**

The blade and terminal configuration enables the use of multiple contacts in the same deck, and simple stacking procedures enable the fabrication of many independent contacts in one relay. Specifically, two N/O contacts and two N/C contacts are provided in each deck, and ten decks can be stacked, resulting in a relay with up to forty contacts. This deck arrangement is illustrated in Fig 1.

The contacts operate reliably, using every contact and terminal illustrated. For good practice, however, it is suggested that polarized voltages should not be used on adjacent contacts. This is because of the remote possibility of flashover during transition between adjacent contacts—especially at the higher DC ratings, or in highly inductive circuits.

The illustration of the basic deck LSR layout is for the first deck. For multideck units the second digit of the terminal number is the same as the deck number.

As an example: Terminal 62 is in the eighth deck, in line under terminal 12 and is a N/O contact used together with terminal 84.

**FIG 1.**

**NOW AVAILABLE!**

The New Serial Communication LSR
(DNP 3.0 or Modbus)

For more information, visit: www.electroswitch.com
or call: 781-335-5200
Contact Ratings
The LSR Latching Switch Relay has been tested to many different circuit conditions. The interrupting ratings are based on 10,000 operations of life, using suddenly applied and removed rated voltage, with no extensive burning of contacts. Inductive ratings are based on tests using standard inductance \( L = 0.04 \) for DC and \( \cos \theta = 0.4 \) for AC. The Interrupting Rating column headed “double contacts” means two contacts in series. Short-time and continuous ratings are based on temperature rise in contact members and supporting parts not exceeding 50°C above ambient.

Contact Charts
The contact deck arrangements show construction of the relay and are shown as information for the user. Traditional contact charts are more appropriate, as the relay and are shown as information for the user. The contact deck arrangements show construction of the relay and are shown as information for the user.

Coil Voltage Data

<table>
<thead>
<tr>
<th>COIL</th>
<th>NOMINAL VOLTAGE</th>
<th>VOLTAGE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>48VDC</td>
<td>38-54VDC</td>
</tr>
<tr>
<td>D</td>
<td>125VDC</td>
<td>106-149VDC</td>
</tr>
<tr>
<td>F</td>
<td>250VDC</td>
<td>206-289VDC</td>
</tr>
</tbody>
</table>

Coil Burden Data

<table>
<thead>
<tr>
<th>COIL</th>
<th>SERIES 24</th>
<th>SERIES 31</th>
</tr>
</thead>
<tbody>
<tr>
<td>COIL CIRCUIT VOLS</td>
<td>COIL CIRCUIT DC OHMS</td>
<td>BURDEN (AMPS) @ RATED VOLTAGE</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>C</td>
<td>48VDC</td>
<td>4.83</td>
</tr>
<tr>
<td>D</td>
<td>125VDC</td>
<td>18.96</td>
</tr>
<tr>
<td>F</td>
<td>250VDC</td>
<td>81.14</td>
</tr>
</tbody>
</table>

OPTIONS

Low Level Control
(Recommended For Use with All Microprocessor-Based Devices)

The low level command contacts (S1 and S2) close on an interposing relay coil (k1) and the rotary solenoid coil (LSR) is controlled by the relay contact (K1). S1 and S2 can be LSR contacts rated less than 1ampere. The circuit is interrupted by the internal LSR contacts, so S1 and S2 need to “make” the low level circuit only.

To command the LSR to position 2, S1 is closed momentarily (100 milliseconds minimum). This completes a circuit to the rotary solenoid LSR and the device indexes to position 2 and latches. When this occurs, LSR/1 contact opens, interrupting the LSR solenoid circuit. The LSR resets itself and awaits the next command.

Direct Control Method

The command contacts (S1 and S2) close directly on the full LSR rotary solenoid coil current, so the burden data of this solenoid should be considered in the choice of these control contacts. The internal LSR contacts interrupt the solenoid current however, so S1 and S2 need to “make” the circuit only.
ELECTROSWITCH

LATCHING SWITCH RELAYS

Series 24 LSR–Panel Mount

Series 24 LSR–Shelf Mount

Series 31 LSR–Panel Mount

Series 31 LSR–Shelf Mount

LSR ORDERING INFORMATION

110VAC operating voltages available on certain applications. Contact factory for further information.

Series
92 = Series 24 LSR
93 = Series 31 LSR

Number of Decks
03 = 3
05 = 5 (Series 24 Only)
06 = 6 (Series 31 Only)
08 = 8
10 = 10 (Series 24 Only)

Voltage
C = 48VDC
D = 125VDC
F = 250VDC

Control/Mount
A = Direct Control/Shelf Mount
B = Direct Control/Panel Mount
C = Low Level Control/Shelf Mount
D = Low Level Control/Panel Mount

Electroswitch • 180 King Avenue • Weymouth, MA 02188 • TEL: (781) 335-5200 • FAX: (781) 335-4253 • www.electroswitch.com
LATCHING SWITCH RELAYS

CONTACT DIAGRAM

DECK CONTACTS POSITION
1 2
1 11 10-11-10-13 X
12 10-11-10-14 X
15 10-11-10-17 X
16 10-11-10-18 X

NAMEPLATE ENGRAVING (STYLE B)

HANDLE POSITIONS

CONTACT DECK LAYOUT

CONTROL DECK LAYOUT AND WIRING
LOW-LEVEL CONTROL

CONTROL DECK LAYOUT AND WIRING
DIRECT CONTROL

CONTACTS POSITION
1 2
BO-H-O-H X
EO-I-O-G X

MADE BY: DATE: COMPANY Dwg NO:
APPR BY: DATE: SHEET OF
Personnel Protection Through SCADA Control of NESC “Tag–Out” Function

Electroswitch Tagging Relays allow remote or manual circuit breaker operation for automated power distribution. They feature an eye-catching orange “Warning” hot line tag ensuring personnel safety in compliance with utility requirements.

Designed with multiple contacts housed in a compact unit, they provide an ideal solution to tagging requirements in both new and existing systems. The three position version may be operated to “Closed”, “Open” or “Tagged” position manually, electrically or remotely from SCADA. The two position relay offers the same operations with “Normal” and “Tagged” positions. For custom tags and engraving, contact the factory.

Major applications include expanded SCADA systems beyond substations to distribution feeders; automated reclosure cut-off; and optimal breaker control schemes with improved service reliability.

The design and quality construction of these relays are based on an Electroswitch track record spanning five decades of supplying reliable switches, relays and related control devices to the utility industry.

**Features**
- Available in Two or Three Position Versions
- Remote or Manual Operation
- Bidirectional Operation
- 60mSec Maximum Response Time
- Orange “Warning” Hot Line Tag
- **No. of Decks**
  - Series 31 Two Position — Up to 8
  - Three Position — Up to 6
  - Series 24 — Up to 10
- Contacts: 2 N/O, 2 N/C per Deck

**Applications**
- For Distribution Automation and Safety Tagging
- Expand SCADA Beyond Sub-Stations to Distribution Feeders
- Automate Power Distribution
- Remote Reclosure Cut-Off
- Enhance Breaker Control Schemes
- Improve Service Reliability


**Specifications**
- Available for Both Low Level and Direct Control Applications
- Low Level Control Recommended for All Microprocessor Applications
- Contact Ratings: (Interrupt)
  - Series 31: 10A–120VAC, 1A–125VDC
  - Series 24: 20A–120VAC, 3A–125VDC
- Operating Voltages: 48VDC, 125VDC Standard, Others Available
- Response Time: 60mSec maximum
- Coil Ratings:
  - Series 31 Two Position:
    - 9.7A @ 48V; 4.1A @ 125V
  - Series 31 Three Position:
    - 13.4A @ 48V; 5.3A @ 125V
  - Series 24 Two Position:
    - 9.9A @ 48V; 6.6A @ 125V
- Decks: Two Position:
  - Up to eight (Series 31)
  - Up to 10 (Series 24)
  - Three Position:
    - Up to six

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Series</th>
<th>92 = Series 24</th>
<th>93 = Series 31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage/No. of Positions</td>
<td>CE = 48VDC/2 Pos. (DC Only)</td>
<td>DE = 125VDC/2 Pos. (DC Only)</td>
</tr>
<tr>
<td>No. of Decks</td>
<td>23 = 3</td>
<td>23 = 3</td>
</tr>
<tr>
<td>Series 24</td>
<td>25 = 5</td>
<td>26 = 6</td>
</tr>
<tr>
<td>Series 31</td>
<td>28 = 8 (2 pos. only)</td>
<td></td>
</tr>
<tr>
<td>30 = 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Consult factory for 3 position part numbers or other voltages.
TAGGING RELAYS

SERIES 24 - TWO POSITION

SERIES 31 - TWO POSITION

LOW LEVEL CONTROL

SERIES 24 TWO POSITION CONTROL VOLTAGES

<table>
<thead>
<tr>
<th>CONTROL VOLTAGE</th>
<th>COIL BURDEN</th>
<th>RESPONSE TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 VDC</td>
<td>9.9 AMP</td>
<td>25-60 msec</td>
</tr>
<tr>
<td>125 VAC</td>
<td>6.6 AMP</td>
<td></td>
</tr>
<tr>
<td>120 VAC</td>
<td>6.3 AMP</td>
<td></td>
</tr>
</tbody>
</table>

SERIES 31 TWO POSITION CONTROL VOLTAGES

<table>
<thead>
<tr>
<th>CONTROL VOLTAGE</th>
<th>COIL BURDEN</th>
<th>RESPONSE TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 VDC</td>
<td>9.7 AMP</td>
<td>15-35 msec</td>
</tr>
<tr>
<td>125 VAC</td>
<td>4.1 AMP</td>
<td></td>
</tr>
<tr>
<td>120 VAC</td>
<td>3.9 AMP</td>
<td></td>
</tr>
</tbody>
</table>

Panel Drilling

(4) 6-32 MOUNTING SCREWS SUPPLIED

Additional Customer Decks Same As Deck 1 Except Terminal Numbers.
(Deck 2: 21 to 28, Deck 3: 31 to 38, Etc)
SERIES 31 - THREE POSITION

Control Deck Layout and Wiring 31TR Shown in Position 2

Panel Drilling

Additional Customer Decks Same As Deck 1 Except Terminal Numbers. (Deck 2: 21 to 28, Deck 3: 31 to 38, Etc)
ATR Annunciator Target Relay Improves Trip Indication with a Highly Visible LED, Fast Response Time, Small Panel Footprint, and Standard Three Hole Mounting Configuration

The Electroswitch Series ATR is a solid state Annunciator Target Relay designed for use in a variety of utility applications. It provides a highly visible LED indication of a Trip operation and activates other equipment within the system such as alarms, LORs, and other relay devices.

How it Works

The ATR accepts a 37-140VDC Trip input signal from a variety of devices. When a Trip signal is received, the ATR performs two basic functions. First, it illuminates a bright LED indicating that a Trip signal has indeed been received. Second, it closes two normally open auxiliary contacts rated at 2 Amps @ 125VDC continuous (8A for 1 second). These contacts can be used to activate lock-out relays or other auxiliary devices. An input signal, once received, is latched in memory and is maintained even through power outages until manually reset.

The target LED is highly visible even when viewed from extreme angles. It is designed for long life (>100,000 hours) and available in a variety of colors (amber, red, blue, green, or white) to help identify different functions or circuits.

Because the ATR is a solid state device it features a much shorter response time. It is less sensitive to shock and vibration than electromechanical devices and is also dramatically smaller. A traditional three hole mount configuration making installation simpler than alternative designs.

Theory of Operation

- See www.electroswitch.com

Benefits

- Highly Visible LED Target - Even at Extreme Angles
- Provides Clear Indication of a Trip
- Faster Response Time
- Saves Panel Space
- Traditional Three Hole Mount Configuration
- Reduced Purchase and Installation Cost
- Easy to Use…No Special Operator Training

Make the Electroswitch ATR with Lighted Target Part of Your Trip Detection and Protection Scheme

Features

- Bright LED is Clearly Visible from all Viewing Angles in Front of the Panel
- Long Life LED (> 100,000 Hours), Available in Choice of Colors to Identify Different Functions or Circuits – Amber, Red, Blue, Green, or White – Field Replaceable From the Front
- Save Valuable Panel Space. The Entire Package is less than 3.0” Square about 0.5” High
- Low Power Consumption — 125VDC @ 14 mA (37 to 140VDC operation range)
- 2 Form “A” Auxiliary Contacts Rated 2 Amp @ 125VDC Continuous and 12A for 1 Second
- User Definable Trip Response Time from 0.001 to 1.875 Seconds
- Trip Inputs Validated with High Reliability Digital Algorithm
- Operating Temperature: -20˚C to + 55˚C
- Traditional Three Hole Mounting Arrangement
- UL, CSA and CE Pending
- Time Delay Option Available
- Dual Change of State Available

Ordering Information

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>686-100A</td>
<td>Voltage Sensing Annunciator Target Relay with seal in of auxiliary contacts</td>
</tr>
<tr>
<td>686-110A</td>
<td>Voltage Sensing Annunciator Target Relay without seal in of auxiliary contacts</td>
</tr>
</tbody>
</table>

Consult factory for other models.
Trip Coil Monitor with Local LED and SCADA Alarm 
Provides Continuous Monitoring of the Breaker 
Trip Coil

The Electroswitch Trip Coil Monitor (TCM) is a convenient panel mounted relay that utilizes 
LEDs for visual indication and an added SCADA alarm feature. 
The TCM provides continuous monitoring of the Breaker Trip Coil as well as the breaker’s 52b 
auxiliary contacts. The TCM eliminates nuisance alarms via a built in time delay circuit. This 
provides for a reliable SCADA alarm and local indication when either the trip coil opens or the 
breker doesn’t complete its trip operation.
The TCM panel mounted package also has a self-monitoring feature providing both visual and 
SCADA alarm indication if there is a loss of voltage.

Features
- LED Indication of Open Trip Coils or Breaker Failure to Trip
- Dual Trip Coil Monitoring Option Available
- SCADA Indication of Open Trip Coil, Loss of Voltage or Failure of the Breaker to Trip
- Standard Alarm Time Delay
- Replaceable, Industry Standard LED
- Convenient Easy to Wire Design
- Standard TCM Covers 48 - 125 VDC Applications

Benefits
- Continuous Monitoring of Trip Coil Continuity
- Built in Delay FeatureEliminates Nuisance Alarms
- Solid State Design Prevents False Alarms Due to Magnetic Field Interference
- Minimal Behind Panel Space Required
- Extended Voltage Capability to Minimize Inventory and Reduce Potential Installation Errors
- Eliminates Need for Loss of Voltage Alarm

Specifications
- Operating Voltage Range 37 – 140 VDC
- Scada Output Contact Rating 100mA MAX
- Operating Temperature Range -20C to +55C
- Standard Alarm Time Delay 400 millisecond
- Meets ANSI/IEEE 37.90 and ANSI/IEEE 37.90.1

Ordering Information
- LED Color [Red Standard] Green, Blue, White, Amber Options
- SCADA Contact N/C [Standard] N/O Option Available
- Single Trip Coil Monitoring (Standard) Dual Trip Option Avail.
- Special Engraving if Required [Standard as Shown]
- Consult Factory for Additional Information

Panel Drill Drawing

<table>
<thead>
<tr>
<th>CONNECTIONS</th>
<th>WIRE COLOR</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCM+</td>
<td>RED</td>
<td>RED</td>
</tr>
<tr>
<td>TCM-</td>
<td>ORANGE</td>
<td>ORANGE</td>
</tr>
<tr>
<td>XB+</td>
<td>BLUE</td>
<td>BLUE</td>
</tr>
<tr>
<td>XB-</td>
<td>YELLOW</td>
<td>YELLOW</td>
</tr>
<tr>
<td>SCADA+</td>
<td>BROWN</td>
<td>BROWN</td>
</tr>
<tr>
<td>SCADA-</td>
<td>GREY</td>
<td>GREY</td>
</tr>
</tbody>
</table>

TABLE 1

Typical System Connections
**Features**
- Modbus or DNP 3.0 Communications Protocol with event logging or Parallel SCADA Interface
- Bright LED Status Indicators with 100,000 Hour Operating Life (Red - Green - Amber)
- Compatible with Other Protective Equipment (Electro-Mechanical or Electronic)
- Small Footprint - Less than 13 sq. in. of Panel Space
- Available in Horizontal or Vertical Configuration

**Applications**
The Control Indicator Module (CIM) is designed as a universal substation automation solution by combining multiple control and monitoring functions into a single space-saving, cost-effective unit.

The CIM allows automation while maintaining a manual fail-safe switch. It is designed to monitor and controls up to two breakers and can monitor three trip coils. By incorporating a CIM into a new or existing system, functions of several individual devices (including reclosing and SCADA control, and status monitoring devices) can be combined into one smaller, more compact, cost-effective device.

The CIM provides visual status indication through LEDs located on the front panel, as well as backup, failsafe manual switch control.

**Two Ways to Control Breaker Operations (Trip/Close)**
- From Integral Manual Breaker Control Switch
- Remotely via Serial or Parallel Interface

**Monitor**
- Status of Breaker (Tripped/Closed)
- Continuity of Trip Coil (Open or Intact)
- Trip Source (Manual, Protective Relay or SCADA)
- Remotely Access History of Recent Events (Serial Interface Only)

**Control Reclose Operation (Enable/Disable)**
- Local Manual Switch
- Remotely via SCADA

**Control SCADA Operation (Enable/Disable)**
- Local Manual Switch

**CIM OPERATIONAL DESCRIPTION**
The CIM is a Breaker Control Switch with expanded functionality that provides remote/local breaker control (trip/close), enable/disable Reclose control, and Breaker Trip Coil monitoring. The unit contains a serial or parallel SCADA interface for remote control and monitoring functions.

The CIM will control and monitor three different types of circuit breaker arrangements: a single trip coil, a dual trip coil, and a circuit switcher or ganged single pole breakers with single trip coils. All controls, indicators, and electronics are contained in a compact modular enclosure that can be horizontally or vertically panel mounted.

**Control Functions**: The CIM can trip and close a circuit breaker two different ways:
1. from a manual Breaker Control Switch mounted on the front panel
2. from SCADA

The CIM unit can also control a local automatic Reclose Relay (79) operation three different ways:
1. manual enable or disable switch
2. remote enable or disable from SCADA
3. manual trip disables Reclose

**SCADA Functions**: The CIM units contain either a RS-485 interface with DNP 3.0 or Modbus communications protocol or a simple 8 bit parallel interface. The interface is controlled by the SCADA enable/disable switch on the front panel of the CIM.

**Serial Interface**
Via the Serial Link the user can:
- Trip one or two isolated circuit breakers
- Close the circuit breaker
- Enable and Disable Reclose
- Monitor one, two or three trip coils for integrity
- Read the status of the CIM and circuit breaker
- Recall recent events and the time at which they occurred

**Eight Bit Parallel Interface**
There are three control signals, a single trip signal and two close signals.

**The Trip Signal**: 
- “TR” signals the circuit breaker to immediately trip.

**The Close Signals**: 
- “NC” signals the circuit breaker for a Normal Close with Reclose enabled for the next trip cycle.
- “TC” signals the circuit breaker for a Test Close. The breaker would immediately close. However Reclose would be blocked for the next trip cycle. (A “NC” signal would be required to reenable Reclose after a “TC” or Test Close.)

There are five monitor functions:
- “XA” monitors the “A” contact on the circuit breaker
- “XB” monitors the “B” contact on the circuit breaker
- “XRC” monitors the status of the Reclose function
- “XTM” monitors the status of the trip coil(s)
- “XSCADA” monitors the status of SCADA (Enabled/Disabled)
Electroswitch Detent Switches

Electroswitch Detent Switches are a heavy-duty design that is very versatile and enables standard units to satisfy a great variety of complex switching applications. They are modular in that several subassemblies are stacked together to form a rigid rugged device. Figure 1 shows a cutaway view exposing the basic components.

Overview

The mounting plate (1) connects a detent assembly (2) to one or more contact decks (3) and finally a position limiting stop plate (4). These assemblies are bolted together along with a steel shaft (5) and a handle (6).

The Electrical Design

The Detent Switch contacts operate on the time proven reliable principle of knife switches—double-sided, double-wiping, spring-wiper blades closing on both sides of a terminal. This design is shock-proof and virtually bounce-proof. Figure 2 shows a typical contacting arrangement.

The Detent Assembly

The detent assembly contains a specially designed star wheel and up to four spring-loaded ball bearings providing snappy positive indexing. Spring return switches use a coil spring in place of the star wheel/spring/ball bearing arrangement.

The Pull-to-Lock Mechanism

Control switches generally have positions both 45° left and right of the normal vertical position. The handle spring returns to the normal position. The pull-to-lock mechanism enables an operator to turn the handle beyond the left (normally TRIP) position to the 90° location, pull out the handle and thereby lock the switch into this position. This precludes the possibility of someone inadvertently closing a circuit-breaker when it is desired that it stay in the tripped position.

The Contact Deck Assembly

The electrical parts are contained within sturdy phenolic moldings that provide individual insulated compartments where all switching takes place. An insulating barrier completes the contact deck assembly. The barrier not only separates one contact assembly from another but also provides a tight insulating compartment. With this construction there is no need to add a dust cover.

Positive, reliable, maintenance-free operation results from the double-sided, double-wiping, self-cleaning knife-blade moveable contacts.

Jumpering may be done right on the switch providing a simple and neat arrangement. Silver plated brass strap jumpers are available for adjacent contacts—either between adjacent contacts on the same deck or the same terminal location on adjacent decks. Wire and lug jumpers are also available. Jumpers are already supplied assembled on the typical instrument switches, illustrated in this catalog, simplifying field wiring. All you need to do is connect the instrument leads and the line wires.

The Stop Plate

The steel stop plate assembly includes a steel stop arm that is connected to the shaft and a steel stop plate that contains tapped holes. Stop screws are inserted in the field to limit the positions to the number and location desired. This externally adjustable position limiting feature allows the use of standard switches for many customized applications. The limit screws are supplied assembled for typical instrument switches.
ELECTROSWITCH
Snap Action Switches

Snap Action Switches use a design that enables them to combine a small number of basic parts to satisfy a wide variety of requirements for selector and control switching of power circuits. Standard switches built with this design for 15-, 40-, 60-, and 200-ampere capacities are listed in this catalog. However, the cataloged units merely indicate switching possibilities; we will gladly recommend other combinations, based on our experience, for specific requirements.

The Electrical System

The electrical system of the 101 Series Switch comprises two or more stationary contacts (9) and one or more sets of movable contacts. These are pairs of spring-metal blades (8) that make high-pressure, low-resistance contact on both faces of the stationary contacts while bridging two or more of these contacts. The stationary contacts fit in radial grooves (12) in the rim of molded insulating disks (7), within which the movable contacts are carried on an insulated shaft (11). All “making” and “breaking” of electric circuits takes place within the closed spaces between adjacent disks. Their quick-break action makes these switches particularly suitable for direct-current service. The ends of the stationary contacts extend outside the insulating disks and serve as connecting terminals (10). This one-piece contact/terminal construction minimizes series resistance and heating. Depending on current rating and on-wiring requirements, the terminals may have tapped holes for connecting screws or clearance holes for bolt connection of cable-lugs.

The Mechanical System

The mechanical system of the 101 Series Switch is designed to provide uniform high-speed “make” and “break”, regardless of whether the operating handle (1) is turned rapidly or slowly. Turning the handle through approximately 120° in either direction winds a powerful coil spring (3). When this is fully wound, the indexing plate (4) is momentarily withdrawn from the locking plate (5) by an eccentric cam. The drive-shaft and movable contacts then snap rapidly to the next position. The indexing plate holds them until the spring-drive mechanism is again operated. Transit time is about ten milliseconds.

Assembly

The snap-drive mechanism, mechanism-cover (2), locking plate, mounting bracket (6), insulating disks, and back plate (14) are stacked on side securing rods (13) and bolted firmly together to form a rigid assembly. The handle is keyed to the operating shaft and secured by a screw.

Stationary Contacts

Non-shorting (break-before-make) contacts are standard in all the ratings and circuits shown in this catalog.

Shorting (make-before-break) contacts, required in some special circuits, are available on order.

The “sweep” contact maintains the connection with the rotor through consecutive positions.

Moveable Contacts (Rotors)

The simple, straight-across rotor bridges stationary contacts in the same insulating disk. It provides single-throw switching in Circuit 1 and double-throw switching in Circuit 6.

The right-angle-blade rotor provides a double-throw switching, with an intermediate OFF position, in Circuit 7.

A multi-fingered blade is combined with a single-contact blade to form a composite (double-deck) rotor that interconnects stationary contacts in adjacent disks. Suitable blade arrangements provide double-throw, triple-throw, or four-throw switching.

Insulating Disks (and Circuits)

The insulating disks, molded of phenolic per MIL-M-14, have three functions. They hold the stationary contacts, they form enclosures that contain all making and breaking contacts, and they provide both mechanical and electrical separation of switching sections.
Cam-Action Switches
The design principle allows the combination of a relatively small number of basic parts to satisfy a wide variety of requirements for selector and control switching in power circuits.

The Mechanical Design
The switch features a modular design with switching decks (3) stacked with a detent mechanism deck (6), a mounting plate (12), and a handle (13). A steel shaft (10) couples the handle to the operating parts. Two steel securing rods (11) are used to bolt the whole mechanism rigidly together. The basic parts and assemblies are shown below.

The Detent Assembly
The detent assembly (6) consists of a spring-loaded detent block (7) with a roller coming into contact with a notched detent wheel (8). This detent wheel provides the standard 45˚ detenting as well as optional 30˚, 60˚ or 90˚ detenting. The stop arms (9) are located under the mounting plate. These limit the angular rotation to the desired number and location of positions.

The Contact Assembly
The contact assembly (3) consists of a rigid thermosetting plastic housing, two sets of stationary contacts (5), and two spring-loaded (16) movable contacts (1) held in cam followers (2). Floating on the shaft and held within the contacting chamber are two independent cams (4). The cams are notched to provide the contact “close” angles desired. The contacts are spring-loaded closed and mechanically opened by the cam action to avoid sticking. The terminal screw (15) and pressure clamp (14) will easily accommodate stranded wire with lugs or solid wire, either with or without lugs, compatible with switch size.

Contact Operation
The contacting consists simply of shunting two isolated contacts to make a circuit. Two independent sets of contacts are placed in each deck. The moving portion is spring-loaded to close the contact. A notch on the cam is affixed to the operating shaft allowing the moving contact to spring close, bridging the stationary contacts.

The movable contact (1) is spring-loaded (16) and held by the cam follower (2). It makes a circuit with the two stationary contacts (5) when the cam follower enters the notch in the cam (4).

Identically, the same thing is happening with the contact set on the right. This circuit is held open by the cam and will close when the notch on the second independent cam is rotated around and comes in proximity to its cam follower (the second cam notch is illustrated by the dotted lines — the cam is underneath the other one).

We show the contacts pictorially to agree with typical detailed schematics and wiring plans. This simple system makes the switch contact arrangement, performance and location independent of the switching action required. The switching action is varied and controlled by the shape of the cams—allowing a virtually infinite number of combinations using a few standard parts. This simplicity and flexibility makes it easy for you to design your own switch — using familiar contact language. You eliminate the worry, long deliveries, high costs, etc. normally associated with special switches.

Note: The terminal numbering consists of individual numbers for each terminal for positive identification.
**Design Features General Construction**
The W-2 Switch consists essentially of an operating handle, faceplate, control housing, contact frame assembly and rotor assembly. It can be built up in any number of stages from 1 to 8, where stages are clamped together, and to the control housing by two tie bolts. A steel operating shaft ties the contact rotors together. A metal cover on the rear holds the position stop pins and retains the shaft. For push or pull switches, the metal cover is replaced by a polycarbonate cover which houses the pullout mechanism.

**Switch Positions**
The Type W-2 Switch has a minimum of two and a maximum of twelve rotary positions with a 30° throw between positions. Each rotary position coincides precisely with the nameplate markings. The degree of throw between positions is fixed and cannot be changed. In addition to rotary motion, the W-2 switch can be provided with a lateral movement (push/pull) of the handle and shaft.

**Contact Frames**
Two contact frame sizes are available. The half frame has six sets of contacts; three sets on the top at 11, 12 and 1 o’clock positions and three sets on the bottom at 5, 6 and 7 o’clock positions. The full frame has 12 sets of contacts, each set located at 30° intervals around it. The contact frames are made of glass polyester insulating material.

**Contacts**
Switches are usually referred to as “so many stages long”. For a W-2 Switch, a stage of contacts consists of a contact frame (either 6 or 12 contact sets) and a rotor.

At every position location on the frame, there are two contact terminal studs in line (1 set) per stage. Each of these studs is one piece, made of bronze alloy and silver plated.

**Rotors**
The rotors hold the roller contacts. Each rotor, made of glass polyester insulating material, rotates independently between the stage spacer plates. The rotor assembly is equipped with one to six rollers (as determined by the required circuitry) each of which makes contact with two adjacent stationary terminal studs to complete a circuit and so affording a double series break contact. The silver-plated, bronze alloy roller contacts provide a rolling, wiping action; are self-aligning on assembly; and require no adjustment of contact pressure for the life of the switch. Contact springs do not carry current.

**Switch Dial**
The Type W-2 Switch Dial consists of two parts: a dial plate and a nameplate.

The standard control switch Dial plate is die cast aluminum, with red and green target parts where required, and serves as the base for mounting the nameplate. The nameplate is made of a white Cycolac ABS material on which is engraved in black the desired position marking.

**Type W-2 Switch Materials**

- **Handle**: Moldarta, General Purpose
- **Nameplate**: Cycolac, ABS Molded Composition
- **Dial Plate**: Aluminum Die Cast
- **Housing**: Aluminum Die Cast
- **Stage Frame**: Glass Polyester
- **Rotor**: Glass Polyester
- **Stationary Contact**: Silicon Bronze, Silver Plated
- **Roller Contact**: Silicon Bronze, Silver Plated
- **Springs**: Stainless Steel
- **Locking Spacer Window**: Polysulfone
- **Starwheel**: Nylon
- **Pull Cover and Guide**: Polycarbonate
- **Shaft**: Zinc Plated Steel
All About Testing

Switches are tested in many ways to prove their capabilities and reliably. Electroswitch uses a combination of test methods to provide meaningful data for all applications. These include:

1. Cycle it mechanically until it breaks. This is usually an academic test since switches that do not switch electric power are not needed. An exception is a setup switch whereby the switch sets up a complicated circuit and then a circuit breaker switches the power. All testing is done under electrical load.

2. Test under an application oriented specification—something that simulates actual operating conditions such as environment, overloads, surges, etc. UL1054 on SPECIAL USE SWITCHES and CSA C22.2 on INDUSTRIAL CONTROL EQUIPMENT for use in Ordinary (non-hazardous) Locations are probably the best specifications in widespread use. The Series 21, 24, 25, 28 and 31 are UL recognized and CSA certified to these specifications.

3. Test at different ratings until destruction to determine ultimate life (destruction could be mechanical failure, shorting out, dielectric failure, excessive heat rise, etc.). The test conditions are outlined on the SELECTOR CHART on page 73. The results are summarized below:

Both UL and CSA testing consists of two parts:

1. Product testing to the specifications.
2. Follow-up service by UL and CSA personnel at the factory, including inspection and testing to insure that the quality and reliability is maintained.


UL and CSA Ratings

<table>
<thead>
<tr>
<th>Series</th>
<th>UL Recognized</th>
<th>CSA Certified</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>20A - 120VAC</td>
<td>10A - 125VAC</td>
</tr>
<tr>
<td></td>
<td>15A - 240VAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6A - 600VAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3A - 125VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1A - 250VDC</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>10A - 125VAC</td>
<td>10A - 125VAC</td>
</tr>
<tr>
<td></td>
<td>5A - 250VAC</td>
<td>5A - 250VAC</td>
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<tr>
<td></td>
<td>3A - 600VAC</td>
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<tr>
<td></td>
<td>5A - 30VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1A - 125VDC</td>
<td></td>
</tr>
<tr>
<td>101</td>
<td>15A - 120VDC</td>
<td>15A - 120VDC</td>
</tr>
<tr>
<td></td>
<td>10A - 240VAC</td>
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<tr>
<td></td>
<td>7.5A - 600VAC</td>
<td>5A - 480VAC</td>
</tr>
<tr>
<td></td>
<td>10A - 125VDC</td>
<td>3A - 600VAC</td>
</tr>
<tr>
<td></td>
<td>5A - 250VDC</td>
<td>10A - 125VDC</td>
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<td></td>
<td>.5HP - 120/240VAC</td>
<td>5A - 250VDC</td>
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<td>CKT 1, 2, 3</td>
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<tr>
<td>20</td>
<td>20A - 600VAC</td>
<td>20A - 600VAC</td>
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<tr>
<td></td>
<td>2.5 - 125VDC</td>
<td>14 HP - 600VAC</td>
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<tr>
<td>W-2</td>
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</tr>
<tr>
<td></td>
<td>20A/240VAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1A/250VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8A/600VAC</td>
<td></td>
</tr>
</tbody>
</table>

These recognized or certified ratings are not necessarily the limits of switch capacity. They represent the acceptable tested ratings to comply with individual standards.

Tests include:

1. Overload — 50 cycles of operation.
   UL — 0-10A at 150% rating ... over 10A at 125% rating
   CSA — 150% rating

2. Endurance — 6000 operations (DC resistive; AC at .75 to .80 pf)

3. Temperature rise of contacts 30°C max. at maximum continuous current rating

4. Dielectric Voltage Withstand UL-2200V rms

5. Spacings (between live parts or live parts to ground)
   UL — 0-250V (¾ in. min.) 251-600V (¾ in. min.)
# Life Expectancy Under Electrical Load – Make & Break Operations

**Alternating Current – 60 Hz**

<table>
<thead>
<tr>
<th>SWITCH SERIES</th>
<th>AMPS.</th>
<th>125VAC Resistive</th>
<th>125VAC Inductive</th>
<th>250VAC Resistive</th>
<th>250VAC Inductive</th>
<th>600VAC Resistive</th>
<th>600VAC Inductive</th>
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**Direct Current**

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<tr>
<th>SWITCH SERIES</th>
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<th>24VDC Resistive</th>
<th>24VDC Inductive</th>
<th>125VDC Resistive</th>
<th>125VDC Inductive</th>
<th>250VDC Resistive</th>
<th>250VDC Inductive</th>
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### SERIES 24

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Part No.</th>
<th>Screw No.</th>
<th>Lockwasher No.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVAL SHANK</td>
<td>02000-11</td>
<td>02016-4</td>
<td>02015-4</td>
<td>Interchangeable with other Series 24 handles</td>
</tr>
<tr>
<td>OVAL SHANK–REMOVABLE</td>
<td>02013-3</td>
<td>Included</td>
<td></td>
<td>Removable at O’std. Contact factory for other configurations</td>
</tr>
<tr>
<td>ROUND KNURLED</td>
<td>02000-10</td>
<td>02016-4</td>
<td>02015-4</td>
<td>Interchangeable with other Series 24 handles</td>
</tr>
<tr>
<td>PISTOL-GRIP</td>
<td>02000-12</td>
<td>02016-4</td>
<td>02015-4</td>
<td>Interchangeable with other Series 24 handles</td>
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### SERIES 31

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<tr>
<th>TYPE</th>
<th>Part No.</th>
<th>Screw No.</th>
<th>Lockwasher No.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVAL SHANK</td>
<td>03029-1</td>
<td>02016-101</td>
<td>02015-34</td>
<td>Also used on Series 31 LSR Interchangeable with Oval Shank Handles</td>
</tr>
<tr>
<td>OVAL SHANK–REMOVABLE</td>
<td>03029-6-1</td>
<td>02016-101</td>
<td>02015-34</td>
<td>Removable at O’std Contact factory for other configurations</td>
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<tr>
<td>ROUND KNURLED</td>
<td>03015-34</td>
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<td>Interchangeable with Oval Shank Handles</td>
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<tr>
<td>PISTOL-GRIP</td>
<td>03015-34</td>
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<td>Interchangeable with Oval Shank Handles</td>
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### SERIES 20

<table>
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<tr>
<th>TYPE</th>
<th>Part No.</th>
<th>Screw No.</th>
<th>Lockwasher No.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVAL SHANK</td>
<td>100-93-38</td>
<td>02016-226</td>
<td></td>
<td>Interchangeable with other Series 20 handles</td>
</tr>
<tr>
<td>OVAL SHANK–REMOVABLE</td>
<td>261-24-11</td>
<td>02016-226</td>
<td>02015-1</td>
<td>Removable at O’std Contact factory for other configurations</td>
</tr>
<tr>
<td>ROUND KNURLED</td>
<td>100-93-68</td>
<td>02016-225</td>
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<td>Interchangeable with other Series 20 handles</td>
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<td>PISTOL-GRIP</td>
<td>100-93-2</td>
<td>02016-225</td>
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<td>Interchangeable with other Series 20 handles</td>
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### SERIES 101

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<thead>
<tr>
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<th>Part No.</th>
<th>Screw No.</th>
<th>Lockwasher No.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVAL FLUSH</td>
<td>01040-2</td>
<td>02016-9</td>
<td>02015-1</td>
<td>Uses lever screw 02016-33 Not interchangeable with Oval Flush Handle</td>
</tr>
<tr>
<td>OVAL SHANK</td>
<td>01040-6-1</td>
<td>02016-18</td>
<td></td>
<td>Not interchangeable with Oval Flush Handle</td>
</tr>
<tr>
<td>PISTOL-GRIP</td>
<td>01040-4-1</td>
<td>02016-18</td>
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<td>Not interchangeable with Oval Flush Handle</td>
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<tr>
<td>ROUND KNURLED</td>
<td>01040-5-1</td>
<td>02016-18</td>
<td></td>
<td>Not interchangeable with Oval Flush Handle</td>
</tr>
<tr>
<td>PISTOL-GRIP</td>
<td>01040-5-1</td>
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<td>02015-1</td>
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### SERIES W-2

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<tbody>
<tr>
<td>OVAL SHANK</td>
<td>5018787H01</td>
<td>5044672601</td>
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<tr>
<td>ROUND NOTCHED</td>
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<tr>
<td>PISTOL-GRIP</td>
<td>310G24H02</td>
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<td>LARGE PISTOL-GRIP</td>
<td>677C101G01</td>
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</table>

**TYPICAL W-2 REMOVABLE HANDLE**

Consult factory for part numbers and prices

**NOTE:** Type W Switches are supplied with black molded handles which are an integral part of the stop mechanism for position limiting of the switch. Therefore, it is important to specify the style number of the switch a handle is to be used on.
### SERIES 24

<table>
<thead>
<tr>
<th>Type</th>
<th>Instrument &amp; Control Switch</th>
<th>Target Nameplate</th>
<th>LOR &amp; LOR/ER</th>
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<tbody>
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<td>Code No.</td>
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<td>18 or 19 (PTL)</td>
<td>17C-2L22</td>
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<td>2.91” x 2.81”</td>
<td>2.91” x 2.81”</td>
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<tr>
<td>Title Engraving</td>
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<td>14 characters max</td>
<td>As Shown</td>
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<tr>
<td>Position Engraving</td>
<td>5 characters max</td>
<td>5 characters max</td>
<td>As Shown</td>
</tr>
<tr>
<td>Notes</td>
<td>For removable handle or waterproof mount use Code No. 11</td>
<td>No engraving available at 0° position. Target colors red &amp; green.</td>
<td>Target colors black &amp; orange.</td>
</tr>
</tbody>
</table>

### SERIES 24

<table>
<thead>
<tr>
<th>Type</th>
<th>24P Lighted Instrument &amp; Control Switch</th>
<th>78P Lighted Lock-Out-Relay</th>
<th>High Speed LOR/ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code No.</td>
<td>Contact Factory</td>
<td>Contact Factory</td>
<td>Contact Factory</td>
</tr>
<tr>
<td>Size</td>
<td>2.94” x 2.81”</td>
<td>2.94” x 2.81”</td>
<td>2.94” x 2.81”</td>
</tr>
<tr>
<td>Title Engraving</td>
<td>14 characters max</td>
<td>14 characters max</td>
<td>14 characters max</td>
</tr>
<tr>
<td>Position Engraving</td>
<td>5 characters max</td>
<td>5 characters max</td>
<td>5 characters max</td>
</tr>
<tr>
<td>Notes</td>
<td>Specify number &amp; color of LEDs and control voltage, Available with or without Target.</td>
<td>Specify number &amp; color of LEDs and control voltage, Available with or without Target.</td>
<td>Target colors black &amp; orange.</td>
</tr>
</tbody>
</table>

### SERIES 31

<table>
<thead>
<tr>
<th>Type</th>
<th>Single Hole Mount</th>
<th>Four Hole Mount</th>
<th>Tagging Relay</th>
<th>Tagging Relay</th>
<th>Tagging Relay</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code No.</td>
<td>30</td>
<td>31</td>
<td>92TR.K</td>
<td>85</td>
<td>91</td>
<td>53</td>
</tr>
<tr>
<td>Size</td>
<td>2.0” Diameter</td>
<td>2.38” x 2.88”</td>
<td>3” x 3.5”</td>
<td>3” x 3.5”</td>
<td>5.37” x 5.66”</td>
<td>1.88”</td>
</tr>
<tr>
<td>Title Engraving</td>
<td>10 characters max</td>
<td>12 characters max</td>
<td>10 per line (2 lines max)</td>
<td>10 per line (2 lines max)</td>
<td>30 per line (3 lines max)</td>
<td>14 characters max</td>
</tr>
<tr>
<td>Position Engraving</td>
<td>6 characters max</td>
<td>6 characters max</td>
<td>/ per line (2 lines max)</td>
<td>/ per line (2 lines max)</td>
<td>/ per line (2 lines max)</td>
<td>5 characters max</td>
</tr>
</tbody>
</table>
### SERIES 101
#### TYPE W-2, WL-2 AND W

<table>
<thead>
<tr>
<th>Series</th>
<th>Code No.</th>
<th>Size</th>
<th>Title Engraving</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>04</td>
<td>2.38&quot; x 2.88&quot;</td>
<td>12 characters max</td>
<td>For waterproof mount use Code No. 5</td>
</tr>
<tr>
<td>W.2*</td>
<td>61</td>
<td>2&quot; x 3&quot;</td>
<td>See Below</td>
<td>See Below</td>
</tr>
<tr>
<td>W.2*</td>
<td>62</td>
<td>2&quot; x 3&quot;</td>
<td>See Below</td>
<td>See Below</td>
</tr>
<tr>
<td>W-2 and WL-2*</td>
<td>63</td>
<td>2&quot; x 2.375&quot;</td>
<td>See Below</td>
<td>See Below</td>
</tr>
</tbody>
</table>

**NOTE:** Radial lines etched on nameplates will be blackened in. On engraved nameplates, only the radial lines for engraved positions will be blackened in.

#### TYPE W

<table>
<thead>
<tr>
<th>Engraving Location No.</th>
<th>No. of Letter Spaces Per Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>16</td>
</tr>
</tbody>
</table>

#### TYPE W-2

<table>
<thead>
<tr>
<th>Engraving Location No.</th>
<th>No. of Letter Spaces Per Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>13, 18, 14</td>
<td>26</td>
</tr>
</tbody>
</table>

### WATERPROOF MOUNT

<table>
<thead>
<tr>
<th>Panel Thickness</th>
<th>Part No.</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/16&quot;</td>
<td>001022-1</td>
<td>001022-1</td>
</tr>
<tr>
<td>1/8&quot;</td>
<td>001022-2</td>
<td>001022-2</td>
</tr>
<tr>
<td>3/16&quot;</td>
<td>001022-3</td>
<td>001022-3</td>
</tr>
</tbody>
</table>

WATERPROOF MOUNT Requires Special Shaft; Consult Factory

<table>
<thead>
<tr>
<th>Series 31 Single Hole Mount</th>
<th>Panel Thickness</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3/16&quot; thick</td>
<td>02017-8</td>
</tr>
</tbody>
</table>

### LENSES AND LEDs

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>100-93-5</td>
<td>658-402-1</td>
</tr>
<tr>
<td>Green</td>
<td>100-93-6</td>
<td>658-403-1</td>
</tr>
<tr>
<td>Amber</td>
<td>100-93-7</td>
<td>658-401-1</td>
</tr>
<tr>
<td>White</td>
<td>100-93-31</td>
<td>658-405-1</td>
</tr>
<tr>
<td>Blue</td>
<td>100-93-36</td>
<td>658-404-1</td>
</tr>
<tr>
<td>Bulb</td>
<td>245-8-910</td>
<td></td>
</tr>
</tbody>
</table>

### SERIES 24 TRIP COIL FOR LOR

<table>
<thead>
<tr>
<th>Coil</th>
<th>Nominal Voltage</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>24VDC</td>
<td>002008-12A-3</td>
</tr>
<tr>
<td>B</td>
<td>24VDC</td>
<td>002008-12B-3</td>
</tr>
<tr>
<td>C</td>
<td>48VDC</td>
<td>002008-12C-3</td>
</tr>
<tr>
<td>D</td>
<td>125VDC/120VAC</td>
<td>002008-12D-3</td>
</tr>
<tr>
<td>E</td>
<td>125VDC</td>
<td>002008-12E-3</td>
</tr>
<tr>
<td>F</td>
<td>250VDC/240VAC</td>
<td>002008-12F-3</td>
</tr>
<tr>
<td>K</td>
<td>125VDC</td>
<td>002008-14D-3</td>
</tr>
</tbody>
</table>

### SERIES WL-2 TRIP COIL FOR LOR

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VDC</td>
<td>349A556G01</td>
</tr>
<tr>
<td>48VDC</td>
<td>349A556G02</td>
</tr>
<tr>
<td>125VDC</td>
<td>349A556G02</td>
</tr>
<tr>
<td>250VDC</td>
<td>349A556G10</td>
</tr>
<tr>
<td>120VAC</td>
<td>349A556G10</td>
</tr>
<tr>
<td>250VAC</td>
<td>349A556G10</td>
</tr>
</tbody>
</table>

Type W-2, WL-2 and W

**NOTE:**
- Nameplate Engraving Locations (1-7)
- Engraved Nameplates for W ONLY
- Use This Chart to Specify Engraving. Indicate Engraving Locations by Line Numbers Shown.

Engraving Location No. | No. of Letter Spaces Per Line
------------------------|-----------------------------|
15                     | 6                           |
16                     | 14                          |
13, 18, 14             | 26                          |

**NOTE:**
- Character Space Allowance is the same for Code 61, 62, and 63 Nameplates.
- Line 12 is Not Available on Code 62 (Target) Nameplates.
**ELECTROSWITCH ACCESSORIES**

**JUMPERS**

<table>
<thead>
<tr>
<th></th>
<th>Series 24</th>
<th>Series 31 – Single Hole</th>
<th>Series 31 – Four Hole</th>
<th>Series 20</th>
<th>Series 101</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjacent Contact (Same Deck)</td>
<td>02011-10-C3</td>
<td>03057-1-C3</td>
<td>03057-1-C3</td>
<td>261-23-1-C1</td>
<td>–</td>
</tr>
<tr>
<td>Same Contact (Adjacent Deck)</td>
<td>02011-12-C3</td>
<td>03059-1-C3</td>
<td>03059-1-C3</td>
<td>261-23-2-C1</td>
<td>–</td>
</tr>
<tr>
<td>2” Wire &amp; Lugs</td>
<td>002012-1</td>
<td>00314-1</td>
<td>00314-1</td>
<td>261-26-3</td>
<td>002012-5</td>
</tr>
<tr>
<td>3” Wire &amp; Lugs</td>
<td>002012-2</td>
<td>00314-2</td>
<td>00314-2</td>
<td>261-26-4</td>
<td>002012-6</td>
</tr>
<tr>
<td>5” Wire &amp; Lugs</td>
<td>002012-3</td>
<td>00314-3</td>
<td>00314-3</td>
<td>261-26-5</td>
<td>002012-7</td>
</tr>
</tbody>
</table>

**TYPE W-2 TYPICAL SIX CONTACT STAGE**

**TYPICAL TWELVE CONTACT STAGE**

**TERMINAL CONNECTORS**

The Type W-2 Switch gains additional flexibility with the use of terminal connectors (jumpers) applied to the switch terminals. The chart below shows the connectors required for the most common applications. Order connectors by style No. from the reference list to the right.

### TERMINAL CONNECTORS

<table>
<thead>
<tr>
<th>Comm. No.</th>
<th>Style Number</th>
<th>Dim “A”</th>
<th>Examples:</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>677C519H08</td>
<td>.89”</td>
<td>Conn. #1</td>
</tr>
<tr>
<td>#2</td>
<td>677C519G01</td>
<td>1.59”</td>
<td>Conn. #2</td>
</tr>
<tr>
<td>#3</td>
<td>677C826G01</td>
<td>3.50”</td>
<td>Conn. #6</td>
</tr>
<tr>
<td>#4</td>
<td>677C826G02</td>
<td>4.25”</td>
<td>Conn. #8</td>
</tr>
<tr>
<td>#5</td>
<td>677C826G04</td>
<td>5.50”</td>
<td></td>
</tr>
<tr>
<td>#6</td>
<td>677C519G05</td>
<td>1.59”</td>
<td></td>
</tr>
<tr>
<td>#7</td>
<td>677C826G03</td>
<td>5.00”</td>
<td></td>
</tr>
<tr>
<td>#8</td>
<td>677C519G07</td>
<td>1.22”</td>
<td></td>
</tr>
<tr>
<td>#9</td>
<td>677C826G05</td>
<td>6.00”</td>
<td></td>
</tr>
<tr>
<td>#10</td>
<td>677C826G06</td>
<td>7.25”</td>
<td></td>
</tr>
<tr>
<td>#11</td>
<td>677C826G07</td>
<td>9.75”</td>
<td></td>
</tr>
<tr>
<td>#12</td>
<td>677C826G08</td>
<td>10.50”</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Typical Wire & Lug Type Connector. Wire & Lugs are ordered individually.

Metal jumpers are supplied in packages of 10 or 25.

Wire jumpers are ordered individually.
WARRANTY

All products and components manufactured by Electroswitch are warranted for a period of one year after date of shipment. All products manufactured by Electroswitch require special tools and fixtures to assure reliable operation of these products. Our ratings, both electrical and mechanical, are maintained only through extensive testing after proper assembly. The independent approvals such as UL, CSA, and various Military Agencies, can be maintained only with complete control over the manufacture of these products. It is the policy of Electroswitch not to sell any internal spare parts. Any alteration of the products will automatically void this warranty, and Electroswitch will assume no liability for any resulting damage.
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Backed by the industry’s most knowledgeable and responsive engineering and customer service professionals...

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Delivered when you need them.

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Switches and Relays
For the Power Industry