Switches and Relays
For the Power Industry

ELECTROSWITCH
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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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
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
- Protective Relay Indicator Modules
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.
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.
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
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 W**
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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<tbody>
<tr>
<td>Series 24</td>
<td>20A</td>
<td>15A</td>
<td>6A</td>
<td>3A</td>
</tr>
<tr>
<td>Series 31</td>
<td>10A</td>
<td>5A</td>
<td>3A</td>
<td>1A</td>
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<td>Series 20</td>
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<td>20A</td>
<td>20A</td>
<td>3A</td>
</tr>
<tr>
<td>Series 101</td>
<td>15A</td>
<td>10A</td>
<td>8A</td>
<td>10A</td>
</tr>
<tr>
<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>
</tr>
</tbody>
</table>
**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 68)

**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

**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 Inlay Phosphor-bronze, Double-Wiping
- Stationary Contacts Silver Plated, 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.

**Matrix Code**
- **No. of Sections**
- **Weight (lbs.)**
- **Torque (lb./in)**
- **Depth Behind Panel**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Handle Type</th>
<th>Shorting</th>
<th>Weight</th>
<th>Torque</th>
<th>Depth</th>
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<tbody>
<tr>
<td>24</td>
<td>B</td>
<td>Blank</td>
<td>1</td>
<td>8</td>
<td>2.41</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>S</td>
<td>2</td>
<td>9</td>
<td>2.78</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>S</td>
<td>3</td>
<td>10</td>
<td>3.33</td>
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<tr>
<td></td>
<td>E</td>
<td>S</td>
<td>4</td>
<td>11</td>
<td>4.28</td>
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<td></td>
<td></td>
<td>S</td>
<td>5</td>
<td>12</td>
<td>4.66</td>
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<td></td>
<td>S</td>
<td>6</td>
<td>13</td>
<td>5.41</td>
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<td>S</td>
<td>8</td>
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<td>6.36</td>
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<td>9</td>
<td>16</td>
<td>7.41</td>
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<tr>
<td></td>
<td></td>
<td>S</td>
<td>10</td>
<td>17</td>
<td>8.03</td>
</tr>
</tbody>
</table>

**STOP SCREWS**
Screws Supplied to Limit Movement of Handle

**NAMEPLATE**
- 3/16” (.476)” HOLE
- CUTOUT 1.90” X 1.90”

**Synchroscope Special Features**
- Removable Oval Handles
- Keyed Arrangements

**Electroswitch** • 180 King Avenue • Weymouth, MA 02188 • TEL: (781) 335-5200 • FAX: (781) 335-4253 • www.electroswitch.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
• Compact Design, also Available as a Retrofit Kit to Upgrade Any Existing Series 24 Application
• 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
• CSA
• CE

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

Consult factory for 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.
**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/30VDC
- Overload Current (50 operations): 60A/125VAC Resistive
- Voltage Breakdown: 2200V rms minimum
- Insulation Resistance: 100 Megohms minimum
- Contacts Resistance: .01ohms maximum

**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 Molded-phenolic Disks

**Approvals**
- UL File No. E18174
- CSA

**Ordering Information**
(For generic switches fill out matrix below. For application specific switches see page 15.)
### Detent 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></td>
</tr>
<tr>
<td>Stop screw positions: 1 &amp; 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handle: Oval</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DOUBLE-THROW NO OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop screw positions: 1 &amp; 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handle: Oval</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DOUBLE-THROW WITH OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop screw positions: 2 &amp; 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handle: Oval</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jumpers** 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).</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

* 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.

### 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>
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</thead>
<tbody>
<tr>
<td>SINGLE-THROW OFF - ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop screw positions: 1 &amp; 7</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Handle: Pistol Grip</td>
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<td></td>
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</tr>
<tr>
<td>DOUBLE-THROW NO OFF</td>
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</tr>
<tr>
<td>Stop screw positions: 1 &amp; 7</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handle: Pistol Grip</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DOUBLE-THROW WITH OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop screw positions: 2 &amp; 7</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Handle: Pistol Grip</td>
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<tr>
<td>Jumpers** 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).</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

* 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.

### 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>
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<td>TWO-THROW</td>
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<td>Stop screw positions: 1 &amp; 7</td>
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<tr>
<td>TRIPLE-THROW</td>
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</tr>
<tr>
<td>Stop screw positions: 1 &amp; 5</td>
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</tr>
<tr>
<td>FOUR-THROW</td>
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<td></td>
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</tr>
<tr>
<td>Stop screw positions: 1 &amp; 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIVE-THROW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop screw positions: 1 &amp; 3</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SIX-THROW</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop screw positions: 1 &amp; 2</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEVEN-THROW</td>
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<td>Stop screw positions: none</td>
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</tr>
</tbody>
</table>

* 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.).

Model numbers are for universal switches that provide all contacting shown. To limit switches to positions shown put limit screws in rear stop plate.
**VOLTMETER - Transfer Switches**

2-wire, single-phase or D.C.
Depth Behind Panel: 2.4”
Handle: Round, Knurled
Engraving and jumpering as shown

3-phase, phase-to-neutral
Depth Behind Panel: 2.9”
Handle: Round, Knurled
Engraving and jumpering as shown

Order #  
Series 24 = 2401C includes NP 10D-2V14  
Series 31 = 3101C includes NP 31D-2V14

Order #  
Series 24 = 2402C includes NP 10C-3V14  
Series 31 = 3102C includes NP 31C-3V14

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

Order #  
Series 24 = 2404C includes NP 10C-4V21  
Series 31 = 3104C includes NP 31C-4V21

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

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

Order #  
Series 24 = 2407C includes NP 10C3A10A  
Series 31 = 3107C includes NP 31C3A10A

Order #  
Series 24 = 2408C includes NP 10C-4A13  
Series 31 = 3108C includes NP 31C-4A13

Order #  
Series 24 = 2409C includes NP 10C3A10A  
Series 31 = 3109C includes NP 31C3A10A

**AMMETER - Transfer Switches**

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

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

Order #  
Series 24 = 2407C includes NP 10C3A10A  
Series 31 = 3107C includes NP 31C3A10A

Order #  
Series 24 = 2408C includes NP 10C-4A13  
Series 31 = 3108C includes NP 31C-4A13

Order #  
Series 24 = 2409C includes NP 10C3A10A  
Series 31 = 3109C includes NP 31C3A10A

**VOLTMETER - Transfer Switches**

3-phase, phase-to-phase
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

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

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

**VOLTMETER - Transfer Switches**

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

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

**AMMETER - Transfer Switches**

6-wire, two 3-phase circuits; phase-to-phase
Depth Behind Panel: 2.9”
Handle: Round, Knurled
Engraving and jumpering as shown

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

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

**AMMETER - Transfer Switches**

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

Order #  
Series 24 = 2407C includes NP 10C3A10A  
Series 31 = 3107C includes NP 31C3A10A

Order #  
Series 24 = 2408C includes NP 10C-4A13  
Series 31 = 3108C includes NP 31C-4A13

Order #  
Series 24 = 2409C includes NP 10C3A10A  
Series 31 = 3109C includes NP 31C3A10A

**AMMETER - Transfer Switches**

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

Order #  
Series 24 = 2407C includes NP 10C3A10A  
Series 31 = 3107C includes NP 31C3A10A

Order #  
Series 24 = 2408C includes NP 10C-4A13  
Series 31 = 3108C includes NP 31C-4A13

Order #  
Series 24 = 2409C includes NP 10C3A10A  
Series 31 = 3109C includes NP 31C3A10A

**AMMETER - Transfer Switches**

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

Order #  
Series 24 = 2407C includes NP 10C3A10A  
Series 31 = 3107C includes NP 31C3A10A

Order #  
Series 24 = 2408C includes NP 10C-4A13  
Series 31 = 3108C includes NP 31C-4A13

Order #  
Series 24 = 2409C includes NP 10C3A10A  
Series 31 = 3109C includes NP 31C3A10A

**AMMETER - Transfer Switches**

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

Order #  
Series 24 = 2407C includes NP 10C3A10A  
Series 31 = 3107C includes NP 31C3A10A

Order #  
Series 24 = 2408C includes NP 10C-4A13  
Series 31 = 3108C includes NP 31C-4A13

Order #  
Series 24 = 2409C includes NP 10C3A10A  
Series 31 = 3109C includes NP 31C3A10A

**AMMETER - Transfer Switches**

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

Order #  
Series 24 = 2407C includes NP 10C3A10A  
Series 31 = 3107C includes NP 31C3A10A

Order #  
Series 24 = 2408C includes NP 10C-4A13  
Series 31 = 3108C includes NP 31C-4A13

Order #  
Series 24 = 2409C includes NP 10C3A10A  
Series 31 = 3109C includes NP 31C3A10A

**AMMETER - Transfer Switches**

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

Order #  
Series 24 = 2407C includes NP 10C3A10A  
Series 31 = 3107C includes NP 31C3A10A

Order #  
Series 24 = 2408C includes NP 10C-4A13  
Series 31 = 3108C includes NP 31C-4A13

Order #  
Series 24 = 2409C includes NP 10C3A10A  
Series 31 = 3109C includes NP 31C3A10A
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

* Denotes make-before-break

WATTMETER – Transfer Switches

3-phase, three current-transformers
Three independent circuits
Depth Behind Panel: 5.4”
Handle: Round, Knurled
Engraving and jumpering as shown

Order #
Series 24 = 2411C includes NP 10A-3A10
Series 31 = 3111C includes NP 31A-3A10
Series 24 = 2412C includes NP 10C-5A16
Series 31 = 3112C includes NP 31C-5A16

* Denotes make-before-break

WATTMETER – Reversing Switch

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

Order #
Series 24 = 2415C includes NP 10C-4A23C
Series 31 = 3115C includes NP 31C-4A23C

* Denotes make-before-break

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

* Denotes make-before-break

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
### POWER-FACTOR Switch

- 3-phase, two current-transformers, one or two current-coils
- Depth Behind Panel: 2.4" inches
- Handle: Round, Knurled
- Engraving and jumpering as shown

**Order #**
- Series 24 = 2422C includes NP 10D-2P14
- Series 31 = 3122C includes NP 31D-2P14

### SYNCHRONIZING Switch

- Machine-to-bus with interlocks
- Depth Behind Panel: 2.9" inches
- Handle: Pistol-Grip, Spring-Return
- Engraving and jumpering as shown

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

### MOTOR CONTROL Switch

- 3-phase, two current-transformers, one or two current-coils
- Depth Behind Panel: 2.4" inches
- Handle: Pistol-Grip, Spring-Return
- Engraving and jumpering as shown

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

### TEMPERATURE METER Transfer Switch

- Transfers two wires to three coils, with "TEST" and "OFF"
- Depth Behind Panel: 2.9" inches
- Handle: Round, Knurled
- Engraving and jumpering as shown

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

### CIRCUIT BREAKER Trip Switch

- Double-pole single-throw contacts
- Depth Behind Panel: 2.4" inches
- Handle: Pistol-Grip, Spring-Return
- Engraving and jumpering as shown

**Order #**
- Series 24 = 2436D includes NP 11D-2S17

### CIRCUIT BREAKER Control Switches

- Depth Behind Panel: 4.3" inches
- Handle: Pistol-Grip, Spring-Return
- Engraving and jumpering as shown

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

---

**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: 4.7"
Handle: Pistol-Grip, Spring-Return
Engraving and jumpering as shown

Order #
Series 24 = 2443D includes NP 18B-2B23

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

Order #
Series 24 = 2444D includes NP 18B-2B23

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

Order #
Series 24 = 2445D includes NP 18B-2B23

Note: Contacts 11-12 & 15-16 connected internally in normal position

Order #
Series 24 = 2446D includes NP 18B-2B23

Order #
Series 24 = 2450D includes NP 19C-3B33

Order #
Series 24 = 2452D includes NP 19C-3B33

Order #
Series 24 = 2457D includes NP 18B-2B23

Order #
Series 24 = 2458D includes NP 19C-3B33

APPLICATION SPECIFIC SWITCHES
SERIES 24 AND SERIES 31 ROTARY SWITCHES

CIRCUIT BREAKER - Control Switches
SPECIAL FEATURES

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

SLIP CONTACTS WILL BE GROUPED AT REAR OF SWITCH
TERMINAL NUMBERS ARE PRELIMINARY PENDING FACTORY REVIEW AND APPROVAL

*denotes make-before-break contact

X-CHART FOR BREAKER CONTROL SWITCH

X-CHART FOR INSTRUMENT & CONTROL SWITCH

SIP CONTACTS W ILL BE GROUPED AT REAR OF SW ITCH
TERM IN A L NUMBERS AR E PRELI M I ERY PEN DI NG FACT ORY REVIEW AN D APPROVAL

- denotes terminal used
SHOW JUMPERS TO BE SUPPLIED
### APPLICATION SPECIFIC SWITCHES
#### SERIES 31 ROTARY SWITCHES

**SERIES 31 DETENT SWITCH WORKSHEET**

<table>
<thead>
<tr>
<th>HANDLE POSITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oval Flush</td>
</tr>
<tr>
<td>Pistol-Grip</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROTARY ACTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintained</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTACTS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonshorting contacts break-before-make</td>
</tr>
<tr>
<td>Shorting contacts make-before-break</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>SPECIAL FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Thickness</td>
</tr>
<tr>
<td>Maximum depth behind panel allowable</td>
</tr>
<tr>
<td>Key operated</td>
</tr>
<tr>
<td>Key removable in_______ position</td>
</tr>
</tbody>
</table>

### SWITCH POSITION TABULATION (FRONT VIEW)

#### HANDLE POSITIONS

#### DECK LAYOUTS

**DIAGRAM**

*TERMINAL NUMBERS ARE PRELIMINARY PENDING FACTORY REVIEW AND APPROVAL

**INDICATE EXTERNAL TERMINAL CONNECTORS REQUIRED**

**SWITCH IS VIEWED FROM HANDLE END**

**TITLE ENGRAVING**

**CONTACTS HANDLE END**

<table>
<thead>
<tr>
<th>POSITION ENGRAVING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position 1</td>
</tr>
</tbody>
</table>

**DECK LAYOUTS**

**POSITION ENGRAVING**

**CONTACTS HANDLE END**

<table>
<thead>
<tr>
<th>DECK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

**SWITCH POSITION TABULATION (FRONT VIEW)**

<table>
<thead>
<tr>
<th>CONTACTS HANDLE END</th>
</tr>
</thead>
<tbody>
<tr>
<td>oval flush</td>
</tr>
<tr>
<td>pistol-grip</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROTARY ACTION:</th>
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<tbody>
<tr>
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**DIAGRAM**

*TERMINAL NUMBERS ARE PRELIMINARY PENDING FACTORY REVIEW AND APPROVAL

**INDICATE EXTERNAL TERMINAL CONNECTORS REQUIRED**

**SWITCH IS VIEWED FROM HANDLE END**

**TITLE ENGRAVING**

**CONTACTS HANDLE END**

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</table>

**DECK LAYOUTS**

**POSITION ENGRAVING**

**CONTACTS HANDLE END**

<table>
<thead>
<tr>
<th>DECK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
</tbody>
</table>
Features

- Space Saving Design - Two Hole Panel Mount on 3" Centers
- Spring Loaded Cam Action Contacts
- Silver Plated Copper Surfaces for Long, Reliable Life
- M4-7 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.

Approvals
- UL File No. E54035
- CSA Certified

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

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

Plug-in Connectors
Burndy Bantamate Trim Trio round connectors are standard. Generally only one connector is needed and the “N” polarization is used. If two connectors are needed, the 2nd connector uses the “W” polarization.

Note: The Series 20M Class 1E utility products comply with the following Nuclear Standards:

ORDERING INFORMATION
Specify Series 20 switch, number, color and voltage of lamps and engraving.
Detent and Momentary Action Rotary Switches

**SINGLE-THROW OFF - ON**

![Diagram](DIAGRAM_1)

<table>
<thead>
<tr>
<th>Indexing</th>
<th>Contacts</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 - 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3 - 4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5 - 6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7 - 8</td>
<td></td>
</tr>
</tbody>
</table>

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

**DOUBLE-THROW No Off**

![Diagram](DIAGRAM_2)

<table>
<thead>
<tr>
<th>Indexing</th>
<th>Contacts</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 - 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3 - 4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5 - 6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7 - 8</td>
<td></td>
</tr>
</tbody>
</table>

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

**DOUBLE-THROW With Off**

![Diagram](DIAGRAM_3)

<table>
<thead>
<tr>
<th>Indexing</th>
<th>Contacts</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 - 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3 - 4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5 - 6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7 - 8</td>
<td></td>
</tr>
</tbody>
</table>

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

### SIX-THROW

**Description**

- **A8** with W/Off
- **A8** without W/Off
- **C8** with No Off

**Contact Diagram**

<table>
<thead>
<tr>
<th>INDEX</th>
<th>CONTACTS</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-1-2</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>2</td>
<td>3-4</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>3</td>
<td>6-7-8</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
</tbody>
</table>

**Ordering Information**

- **20K-26**
  - Handle: Oval Shank
  - Indexing: A8
  - No. Of Poles: 1
  - On / Off: W/Off

### SEVEN-THROW

**Description**

- **A8** with W/Off
- **A8** without W/Off

**Contact Diagram**

<table>
<thead>
<tr>
<th>INDEX</th>
<th>CONTACTS</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-2</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>2</td>
<td>3-4-5</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>3</td>
<td>6-7-8-9</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
</tbody>
</table>

**Ordering Information**

- **20K-27**
  - Handle: Round Shank
  - Indexing: A8
  - No. Of Poles: 1
  - On / Off: W/Off

### EIGHT-THROW

**Description**

- **A1** with W/Off
- **A8** without W/Off
- **C1** with No Off

**Contact Diagram**

<table>
<thead>
<tr>
<th>INDEX</th>
<th>CONTACTS</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-2</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>2</td>
<td>3-4-5</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>3</td>
<td>6-7-8-9</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
</tbody>
</table>

**Ordering Information**

- **20K-28**
  - Handle: Pistol-Grip
  - Indexing: A1
  - No. Of Poles: 1
  - On / Off: W/Off

### NINE-THROW

**Description**

- **A1** with W/Off
- **A1** without W/Off

**Contact Diagram**

<table>
<thead>
<tr>
<th>INDEX</th>
<th>CONTACTS</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-2</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>2</td>
<td>3-4-5</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>3</td>
<td>6-7-8-9</td>
<td>0 1 2 3 4 5 6 7 8</td>
</tr>
</tbody>
</table>

**Ordering Information**

- **20K-29**
  - Handle: Removable
  - Indexing: A1
  - No. Of Poles: 1
  - On / Off: W/Off
# Maintained Action Rotary Switches

## TEN-THROW

<table>
<thead>
<tr>
<th>No.</th>
<th>Contacts</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1 W/ Off</td>
<td>2, 10, 9, 7, 6, 8</td>
</tr>
<tr>
<td>2</td>
<td>A1 No Off</td>
<td>2, 10, 9, 7, 6, 8</td>
</tr>
</tbody>
</table>

### Indexing

- **Handle**: On / Off
- **No. Of Poles**: 1 = 1, 2 = 2
- **Indexing**: A1 = A1, C1 = C1 (see at left)

## ELEVEN-THROW

<table>
<thead>
<tr>
<th>No.</th>
<th>Contacts</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1 W/ Off</td>
<td>2, 10, 9, 7, 6, 8</td>
</tr>
<tr>
<td>2</td>
<td>A1 No Off</td>
<td>2, 10, 9, 7, 6, 8</td>
</tr>
</tbody>
</table>

### Indexing

- **Handle**: On / Off
- **No. Of Poles**: 1 = 1, 2 = 2
- **Indexing**: A1 = A1, C1 = C1 (see at left)

## TWELVE-THROW

<table>
<thead>
<tr>
<th>No.</th>
<th>Contacts</th>
<th>POS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1 W/ Off</td>
<td>2, 10, 9, 7, 6, 8</td>
</tr>
</tbody>
</table>

### Indexing

- **Handle**: On / Off
- **No. Of Poles**: 51 = 1, 52 = 2
- **Indexing**: A1 = A1 (see at left)
VOLT METER - Transfer Switches

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

3-wire, two 3-phase 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
Depth Behind Panel: 2.0"
Handle: Round, Knurled
Engraving and jumpering as shown

VOLT METER - 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, three current-transformers
Depth Behind Panel: 2.6"
Handle: Round, Knurled
Engraving and jumpering as shown

ORDER #
20KC-01 includes NP 53D-2V14
20KC-02 includes NP 53C-3V14
20KC-03 includes NP 53C-4V1SA
20KC-04 includes NP 53C-4V21
20KC-05 includes NP 53E-7V24
20KC-06 includes NP 53E-8V33
20KC-07 includes NP 53C-3A10A
20KC-08 includes NP 53C-4A13
20KC-09 includes NP 53C-3A10A
APPLICATION SPECIFIC SWITCHES
SERIES 20 ROTARY SWITCHES

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 - Voltmeter 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 53C-4A23C
20KC-12 includes NP 53C-4A16

WATTMETER - Transfer Switch
3-phase, three current-transformers, 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-transformers, 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-20 includes NP 53D-2W14

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
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
**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

*Denotes make-before-break

Order #  
20KC-32 includes NP 53D-ST19

---

**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

Order #  
20KD-36 includes NP 53D-1818

---

**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-40 includes NP 55B-2B23

---

**CIRCUIT BREAKER-Control Switches**

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

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

---

**CIRCUIT BREAKER-Control Switches**

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

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

---

**CIRCUIT BREAKER-Control Switches**

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

Order #  
20KD-43 includes NP 55B-2B23

---

**CIRCUIT BREAKER-Control Switches**

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

Order #  
20KD-44 includes NP 55B-2B23

---

**CIRCUIT BREAKER-Control Switches**

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

Order #  
20KD-45 includes NP 55B-2B23

---

*Denotes make-before-break
### 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>20KD-46 includes NP 55B-2B23</th>
</tr>
</thead>
</table>

### CIRCUIT BREAKER-Control Switches

**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>20KD-50 includes NP 55C3B33</th>
</tr>
</thead>
</table>

### CIRCUIT BREAKER-Control Switches

**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>20KD-52 includes NP 55C3B33</th>
</tr>
</thead>
</table>

### CIRCUIT BREAKER-Control Switches

**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>20KD-57 includes NP 55B-2B23</th>
</tr>
</thead>
</table>

### CIRCUIT BREAKER-Control Switches

**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>20KD-58 includes NP 55C3B33</th>
</tr>
</thead>
</table>
# Application Specific Switches
## Series 20 Rotary Switches

### Electroswitch

#### Handles
- Knurled
- Oval
- Pistol Grip
- None
- Removable in Pos

#### Actions
- Standard
- Maintained
- Spring return to Vertical

#### Other Features
- Slip Contacts
- Pull to lock

### Series 20

#### In Instrument & Control Switches
- 20 K (Standard)
- 20 M (Plug-in Module)
- 20 P (Lighted Front of Panel Mount)

#### Switch Number

#### Engraving Code

#### Panel Thickness

#### Depth behind panel

### Special Features

#### Mounting & Light Packages
- 2-hole Panel Mount
- No Light Package
- 4-hole Panel Mount
- 2 Lights
- 4-hole Panel Mount
- 3 Lights

#### Lamp Colors
- 1
- 2
- 3

#### Handle Positions
- 0°
- 90°
- 180°

### X-Chart for Series 20 Switches

#### Title Engraving

<table>
<thead>
<tr>
<th>Use for all except slip contacts</th>
<th>Use for Switches with slip contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSITION ENGRAVING</td>
<td>FOR 20K &amp; 20P ONLY</td>
</tr>
</tbody>
</table>

#### Contacts

<table>
<thead>
<tr>
<th>HANDLE END</th>
<th>POSITIONS</th>
<th>3 from</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 2 3 4 5 6 7 8</td>
<td>1 2 4 4</td>
</tr>
<tr>
<td>2</td>
<td>9 10 11 12</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>13 14 15</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>17 18 19 20</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>21 22</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>23 24</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>25 26</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>27 28</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>29 30</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>31 32</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>33 34</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>35 36</td>
<td></td>
</tr>
</tbody>
</table>

#### Slip Contacts

- Will be grouped at rear of switch.
- A maximum of 4 slip contacts are available.

#### Lamp Wiring (20M)

- Lamps are 24-28 Volts
- DRO PNP (Resistor for 125VDC Supply)
- No DRO (Resistor)

#### Jumper for Series 20K & 20P

<table>
<thead>
<tr>
<th>JUMPER FOR SERIES 20K &amp; 20P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>16</td>
</tr>
<tr>
<td>14</td>
</tr>
</tbody>
</table>

#### Jumper for Series 20M

<table>
<thead>
<tr>
<th>JUMPER FOR SERIES 20M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>16</td>
</tr>
<tr>
<td>14</td>
</tr>
</tbody>
</table>

### Document Control

- Quality Assurance ANSI/ASME
- NQA-1 Qualification ESC-STD-1000
- Drawing Master
- Switch 20K, 20P, 20M

### Made By:

#### Date:

#### Company:

#### DWG N.O.:

#### Sheet of:

---

**Electroswitch** • 180 King Avenue • Weymouth, MA 02188 • TEL: (781) 335-5200 • FAX: (781) 335-4253 • www.electroswitch.com
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
- 7.5A 600VAC, (Circuit 1, 2, 3, 4)
- 10A 125VDC
- 5A 250VDC
- 1A 600VAC, (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.)

<table>
<thead>
<tr>
<th>Series</th>
<th>Number of Poles</th>
<th>Handle Type</th>
<th>No. of Positions</th>
<th>No. of Poles</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>1</td>
<td>A</td>
<td>Blank</td>
<td>2</td>
</tr>
<tr>
<td>101</td>
<td>2</td>
<td>B</td>
<td>Blank</td>
<td>3</td>
</tr>
<tr>
<td>101</td>
<td>3</td>
<td>C</td>
<td>Blank</td>
<td>3</td>
</tr>
<tr>
<td>101</td>
<td>4</td>
<td>D</td>
<td>Blank</td>
<td>3</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.

All Dimensions in inches

Panel Drilling Dimensions
- 2.31 Dia. 4 Holes

Panel Mounting Screw
P/N 92016-103

Four 5/32 Inch Black Mounting Screws Supplied

Dimension X Depth Behind Panel

Typical Terminal Arrangement
- 6.25 x 3-1/4 Inch Crossed Hole End ROUND HEAD PHOSPHOR BRONZE SUPPLIED UNMACHINED TERMINAL SCREW P/N 92016-26

Mounting Screw
P/N 92016-103

Four Holes 10-24 UNC 2B Tap Equally Spaced On 2.31 Dia Circle

First Spacer Blank

Typical Panel Dimensions
- 45˚ 14.51

2.81 Dia

231 Drill (221 Dia) 4 Holes

NOTE: FOR WATERPROOF MOUNTINGS: THE (4) MOUNTING HOLES 5/16 201 DIA. THE CENTER HOLES 5/8 201 DIA. DO NOT CRANK MOUNTING HOLES 1/4 MAX. BREAK PERMISSIBLE

Electroswitch • 180 King Avenue • Weymouth, MA 02188 • TEL: (781) 335-5200 • FAX: (781) 335-4253 • www.electroswitch.com
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
- 7.5A/600VAC, (Circuit 1,2,3,4)
- 10A/125VDC
- 5A/250VDC
- 1A/600 VAC, (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 = 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

<table>
<thead>
<tr>
<th>Model No.</th>
<th>102</th>
<th></th>
<th>To be assigned at factory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit 1</td>
<td>1</td>
<td>01 = 1</td>
<td></td>
</tr>
<tr>
<td>Circuit 2</td>
<td>2</td>
<td>02 = 2</td>
<td></td>
</tr>
<tr>
<td>Circuit 3</td>
<td>3</td>
<td>03 = 3</td>
<td></td>
</tr>
<tr>
<td>Circuit 4</td>
<td>4</td>
<td>04 = 4</td>
<td></td>
</tr>
<tr>
<td>Circuit 5</td>
<td>5</td>
<td>05 = 5</td>
<td></td>
</tr>
<tr>
<td>Circuit 6</td>
<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.

Panel Drilling Dimensions

<table>
<thead>
<tr>
<th>No. of Poles</th>
<th>Circuit 1</th>
<th>Circuit 2, 3, 4</th>
<th>Circuit 5</th>
<th>Circuit 6 &amp; 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.34</td>
<td>1.34</td>
<td>1.59</td>
<td>2.59</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>2.34</td>
<td>2.34</td>
</tr>
<tr>
<td>4</td>
<td>2.09</td>
<td>2.09</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>2.34</td>
<td>2.34</td>
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<td>-</td>
</tr>
<tr>
<td>6</td>
<td>2.59</td>
<td>2.59</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Dimension "X" = 1.188" Min. Panel Thickness = 0.118" Min. J = 0.500" Min.
SERIES 102 AUXILIARY
MODIFIED SNAP-ACTION SWITCHES

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
- 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

Panel Drilling Dimensions
- FRONT VIEW
- DEPTH BEHIND PANEL
- DIA 0.209 (2 PL)
- 1.046
- 2.092
SERIES 101 SWITCHES
SNAP-ACTION INSTRUMENT AND CONTROL SWITCHES

CONTACT DIAGRAMS

CIRCUIT NO. 1
Unlimited Positions 2 Positions 2 Positions
Standard Indexing Standard Indexing Indexing Offset 45°

CIRCUIT NO. 2
Unlimited Positions 3 Positions
Standard Indexing Standard Indexing

CIRCUIT NO. 3
Unlimited Positions 3 Positions
Standard Indexing Standard Indexing

CIRCUIT NO. 4
Unlimited Positions
Standard Indexing

CIRCUIT NO. 5

CIRCUIT NO. 6
Unlimited Positions 2 Positions 2 Positions
Standard Indexing Standard Indexing Indexing Offset 45°

CIRCUIT NO. 7

APPLICATION SPECIFIC SWITCHES

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

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

SHIP-TO-SHORE
Changeover Switch
Order #101602A-2A
Handle: Oval
Jumps 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-VOLTMETER
Transfer Switch
Order #10115C
3-phase, phase-to-phase
3 current transformers
Handle: Round, Knurled
Nameplates and jumpers are supplied
Make-before-break (shorting) contacts

*Denotes make-before-break
### FEATURES:
- Handles
  - Oval Flush
  - Knurled
  - Double Ball
  - Pistol-Grip

### ROTARY ACTION:
- Maintained
- Spring-return

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

### ADDITIONAL REQUIREMENTS
- Number of Positions
- Panel Thickness
- Maximum depth behind panel

### TO SPECIFY A SWITCH NOT SHOWN ELSEWHERE:
- Fill out the Feature Section
- Indicate Handle Position
- (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>Handle Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°</td>
</tr>
</tbody>
</table>

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

Example: Deck #1 Circuit #1

### ELECTRICAL RATINGS MAY BE AFFECTED BY SPRING-RETURN OPERATION

Note: A Single Hole Mount Design is also available. Consult Factory.

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

### ELECTROSWITCH
SNAP-ACTION INSTRUMENT AND CONTROL SWITCHES

SERIES 101
SNAP SWITCH WORKSHEET

**SERIES 101 SWITCHES**

**SNAP-ACTION 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
- 5A/125VDC
- 20A/240VAC
- 1A/250VDC
- 8A/600VAC

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

<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>
</tr>
<tr>
<td>3</td>
<td>6.32</td>
<td>6.81</td>
</tr>
<tr>
<td>4</td>
<td>7.82</td>
<td>8.31</td>
</tr>
<tr>
<td>5</td>
<td>9.32</td>
<td>9.81</td>
</tr>
<tr>
<td>6</td>
<td>10.82</td>
<td>11.31</td>
</tr>
<tr>
<td>7</td>
<td>12.32</td>
<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

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A11-B11</td>
<td></td>
</tr>
<tr>
<td>A12-B12</td>
<td></td>
</tr>
<tr>
<td>A1-B1</td>
<td></td>
</tr>
</tbody>
</table>

Order # 505A701G02

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

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A11-B11</td>
<td></td>
</tr>
<tr>
<td>A12-B12</td>
<td></td>
</tr>
<tr>
<td>A1-B1</td>
<td></td>
</tr>
</tbody>
</table>

Order # 505A701G02

**3-phase-3 CT’s (end of circuit)**
- Handle: Round
- Contacts: Maintained
- Stages: 1, Six Contact Frame
- Mounting: 1/4
- Target: No
- Basic Switch #: 787A876G01

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A5-B5</td>
<td></td>
</tr>
<tr>
<td>A6-B6</td>
<td></td>
</tr>
<tr>
<td>A7-B7</td>
<td></td>
</tr>
</tbody>
</table>

Order # 787A976G01

### VOLTMETER – Switch

**3-phase-3 Wire**
- Handle: Round
- Contacts: Maintained
- Stages: 2, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: No
- Basic Switch #: 505A613G01

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A11-B11</td>
<td></td>
</tr>
<tr>
<td>A12-B12</td>
<td></td>
</tr>
<tr>
<td>A1-B1</td>
<td></td>
</tr>
<tr>
<td>A5-B5</td>
<td></td>
</tr>
<tr>
<td>A6-B6</td>
<td></td>
</tr>
<tr>
<td>A7-B7</td>
<td></td>
</tr>
</tbody>
</table>

Order # 505A713G01

### CIRCUIT BREAKER – Control Switches

**CIRCUIT BREAKER – Control Switch**
- Handle: Pistol-Grip, Oval, or Round
- Contacts: Momentary
- Stages: 1, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: Yes
- Basic Switch #: 505A614G01

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A11-B11</td>
<td></td>
</tr>
<tr>
<td>A12-B12</td>
<td></td>
</tr>
<tr>
<td>A1-B1</td>
<td></td>
</tr>
<tr>
<td>A5-B5</td>
<td></td>
</tr>
<tr>
<td>A6-B6</td>
<td></td>
</tr>
<tr>
<td>A7-B7</td>
<td></td>
</tr>
</tbody>
</table>

Order # 505A714G01

**OFF/ON – Control Switch**
- Handle: Oval, Pistol-Grip, or Round
- Contacts: Momentary
- Stages: 1, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: No
- Basic Switch #: 505A723G01

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A11-B11</td>
<td></td>
</tr>
<tr>
<td>A12-B12</td>
<td></td>
</tr>
<tr>
<td>A1-B1</td>
<td></td>
</tr>
<tr>
<td>A5-B5</td>
<td></td>
</tr>
<tr>
<td>A6-B6</td>
<td></td>
</tr>
<tr>
<td>A7-B7</td>
<td></td>
</tr>
</tbody>
</table>

Order # 505A723G02

### OFF/ON – Instrument Switch

**OFF/ON – Instrument Switch**
- Handle: Oval, Pistol-Grip, or Round
- Contacts: Momentary
- Stages: 1, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: No
- Basic Switch #: 505A706G03

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A11-B11</td>
<td></td>
</tr>
<tr>
<td>A12-B12</td>
<td></td>
</tr>
<tr>
<td>A1-B1</td>
<td></td>
</tr>
<tr>
<td>A5-B5</td>
<td></td>
</tr>
<tr>
<td>A6-B6</td>
<td></td>
</tr>
<tr>
<td>A7-B7</td>
<td></td>
</tr>
</tbody>
</table>

Order # 505A706G03

### Circuit Breaker – Control Switch

**CIRCUIT BREAKER – Control Switch**
- Handle: Pistol-Grip
- Contacts: Maintained
- Stages: 1, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: Yes
- Faceplate: #62F-2C30G

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A11-B11</td>
<td></td>
</tr>
<tr>
<td>A12-B12</td>
<td></td>
</tr>
<tr>
<td>A1-B1</td>
<td></td>
</tr>
<tr>
<td>A5-B5</td>
<td></td>
</tr>
<tr>
<td>A6-B6</td>
<td></td>
</tr>
<tr>
<td>A7-B7</td>
<td></td>
</tr>
</tbody>
</table>

Order # 508A207G02

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

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

**OFF/ON – Control Switch**
- Handle: Oval, Pistol-Grip, or Round
- Contacts: Momentary
- Stages: 1, Six Contact Frame
- Mounting: 1/8 - 1/4
- Target: No
Basic switches do not include handle, nameplate, or external jumpers; these items may be ordered separately. For handles see page 74, nameplates see page 76 and external jumpers see page 77. For complete switch style including handle, nameplate and jumpers, contact the factory.

### Momentary Switches

| Handle: Fixed | Order: #505A623G01 |
| Handle: Removable | Order: #505A624G01 |
| **Target:** No |

| Handle: Fixed | Order: #505A621G01 |
| Handle: Removable | Order: #505A62A7G01 |
| **Target:** No |

| Handle: Fixed | Order: #505A684G01 |
| Handle: Removable | Order: #505A685G01 |
| **Target:** No |

### Maintained Switches

| Handle: Fixed | Order: #505A606G01 |
| Handle: Removable | Order: #505A647G01 |
| **Target:** No |

| Handle: Fixed | Order: #505A608G01 |
| Handle: Removable | Order: #505A672G01 |
| **Target:** No |

| Handle: Fixed | Order: #505A627G01 |
| Handle: Removable | Order: #505A684G01 |
| **Target:** Yes |

| Handle: Fixed | Order: #505A626G01 |
| Handle: Removable | Order: #505A672G01 |
| **Target:** No |

### Payment Specific Switches

| Type W-2 Instrument and Control Switches | Momentary Switches |
| Handle: Fixed | Order: #505A623G01 |
| Handle: Removable | Order: #505A624G01 |
| **Target:** No |

| Handle: Fixed | Order: #505A621G01 |
| Handle: Removable | Order: #505A62A7G01 |
| **Target:** No |

| Handle: Fixed | Order: #505A684G01 |
| Handle: Removable | Order: #505A685G01 |
| **Target:** No |

### Basic Switches

Basic switches do not include handle, nameplate, or external jumpers; these items may be ordered separately. For handles see page 74, nameplates see page 76 and external jumpers see page 77. For complete switch style including handle, nameplate and jumpers, contact the factory.
W-2 INSTRUMENT AND CONTROL SWITCH

SERIES W2
INSTRUMENT AND
CONTROL SWITCH

HANDLE SHAPE
- Oval
- Round Knurled
- Pistol Grip
- Heavy Duty Pistol Grip
- Removable in Position
- None

LATERAL ACTION
- Pull in Position
- Push in Position
- Spring Return
- Maintained
- In
- Out

KEYLOCK
- Number of Locks
  - 1 Top
  - 2 Left
  - 3 Right
  - 2 (Left and Right)
  - 3 (Top, Left, and Right)
- Key(s) Locked and Removable in Position(s)
  - Key Code A52378
  - Random Code
  - Key Interlock (Contact Factory)

ROTARY ACTION
- Maintained
- Spring Return
- to Pos. 12

SPECIAL FEATURES
- Protective Cover
- Slip Contacts
- Auxiliary Switch

SWITCH POSITION TABULATION (FRONT VIEW)

CONNECTORS
(PAGE 76)

HANDLE POSITION

NAMEPLATE

SHOW STANDARD CONTACTS
SHOW SHORTING CONTACTS

CONTACTS PER STAGE
6
12

MAX DEPTH BEHIND PANEL
IN.

NAMEPLATE ENGRAVING (PAGE 76)
MARK AS FollowS

1
7
13
2
8
14
3
9
15
4
10
16
5
11
17
6
12
18

* 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
- 8A/ 125VDC
- 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

**Nameplates**

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
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.
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 interwiring 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.
- A Retrofit Kit is Available to Provide this Enhanced Protection Package to Series 24 Lock-Out Relays Already in the Field.
- This Product is Designed and Manufactured by Electroswitch to Work Flawlessly with the Ultra-reliable, High Speed Series 24 Lock-Out Relay.

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 information on retrofit kits.
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 two contacts/ deck design

<table>
<thead>
<tr>
<th>Contact Circuit</th>
<th>Interrupting Rating (AMPS)</th>
<th>Short Time Rating** (AMPS)</th>
<th>Continuous Rating (AMPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Resistive</td>
<td>Inductive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single Contact</td>
<td>Double Contact</td>
<td>Single Contact</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Double Contact</td>
</tr>
<tr>
<td>125VDC</td>
<td>5</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>250VDC</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>120VAC</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>240VAC</td>
<td>15</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>480VAC</td>
<td>7.5</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>600VAC</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

* AC PF = 0.4; DC L/R = 0.04

Contact ratings for tap switch contact design

<table>
<thead>
<tr>
<th>Contact Circuit</th>
<th>Interrupting Rating (AMPS)</th>
<th>Short Time Rating** (AMPS)</th>
<th>Continuous Rating (AMPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Resistive</td>
<td>Inductive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single Contact</td>
<td>Double Contact</td>
<td>Single Contact</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Double Contact</td>
</tr>
<tr>
<td>125VDC</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>250VDC</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>120VAC</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>240VAC</td>
<td>15</td>
<td>20</td>
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</table>

* AC PF = 0.4; DC L/R = 0.04

Contact Charts

The illustration shows decks one and two of a typical Series 24 LOR and graphically describes the operation of the contacts.

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).

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 models operate in approximately 12–15 mSec and come equipped with the 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. The LOR Monitor Nameplate is not available for the High Speed versions of LOR/ER and LOR/ SR.
OPTIONS

Manual Reset LOR
Closing S1 energizes the linear solenoid LOR 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 LOR 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 80mSec.

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.

OPTIONS
SERIES 24 LOCK-OUT RELAYS

Manual Reset LOR
Closing S1 energizes the linear solenoid LOR 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 LOR 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 80mSec.

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SERIES 24 LOCK-OUT RELAYS

SERIES 24 MANUAL RESET LOR

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

COIL BURDEN DATA

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<th>NO. OF DECKS</th>
<th>MAN. RESET LOR</th>
<th>HI SPEED TRIP LOR/ER</th>
<th>LOR/ER AND INSTANT LOR/SR</th>
<th>TIME DELAY</th>
<th>RESET LOR/SR</th>
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TRIP COIL VOLTAGE DATA

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<th>Nominal Voltage</th>
<th>Threshold Voltage</th>
<th>Operating Range</th>
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<tr>
<td>A</td>
<td>24VDC</td>
<td>6VDC</td>
<td>10 - 40VDC</td>
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<tr>
<td>B</td>
<td>24VDC</td>
<td>9VDC</td>
<td>18 - 50VDC</td>
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<td>C</td>
<td>48VDC</td>
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<td>24 - 70VDC</td>
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<td>16VDC</td>
<td>30 - 140VDC</td>
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<td>90 - 140VDC</td>
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<td>K</td>
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<td>16VDC</td>
<td>100 - 150VDC</td>
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RESET COIL VOLTAGE DATA

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<td>A</td>
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<td>C</td>
<td>48VDC</td>
<td>38.4 to 57.6VDC</td>
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<tr>
<td>D</td>
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<tr>
<td>F</td>
<td>250VDC</td>
<td>200 to 275VDC</td>
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</table>

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

### Manual Reset LOR
- Model: 78
- No. of Decks: 03, 05, 10
- Trip Coil: A, C, D
- Panametrics: 08

### Electric Reset LOR/ER
- Model: 78
- No. of Decks: 03, 05, 10
- Trip Coil: A, C, D
- Panametrics: 08

### Self Reset LOR/ SR
- Model: 78
- No. of Decks: 03, 05, 10
- Trip Coil: A, C, D
- Panametrics: 08

---

### LOR RESPONSE TIMES*
Time to Close Normally Open Contacts

| DC VOLTAGE APPLIED TO COIL | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 |
|---------------------------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| COIL A                    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| COIL B                    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| COIL C                    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| COIL D                    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| COIL E                    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| COIL F                    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| COIL G                    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |
| COIL H                    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |

---

### LOR CURRENT
Voltage Characteristics Of The Trip Coils

- For AC Applications refer to Trip Coil Voltage Data on page 47.
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>
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<th>Voltage</th>
<th>SINGLE CONTACT</th>
<th>TWO CONTACTS IN SERIES</th>
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<tr>
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<td>INDUCTIVE AMPERES</td>
<td>RESISTIVE AMPS</td>
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<td>4.5mH</td>
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<td>240VAC</td>
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<tr>
<td>480VAC</td>
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TYPE WL-2 LOCK-OUT RELAY

<table>
<thead>
<tr>
<th>NOMINAL OPERATING VOLTAGE</th>
<th>AVERAGE COIL CURRENT</th>
<th>INDUCTANCE (H)</th>
<th>RESISTANCE (Ω)</th>
<th>IMPEDANCE (Ω)</th>
<th>MINIMUM PICK UP</th>
<th>OPERATING TIME AVERAGE</th>
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**Six (6) Contact Frame WL-2 Switches**

<table>
<thead>
<tr>
<th>Handle Trip 24-48V Dc</th>
<th>Non-Handle Trip 24-48V Dc</th>
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<td>120V-240V 60Hz</td>
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<td>480V 600Y</td>
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**Six (6) Contact Frame WL-2 Switches**

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<th>Fig.</th>
<th>No. of Stages</th>
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**Wiring Diagram – Figures**

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**Twelve (12) Contact Frame WL-2 Switches**

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</table>

* A pair of contacts are those having adjacent stationary terminals served by the same moving contact. When the interrupted current of a normal closed contact exceeds the rating listed for single contacts, the adjacent “make” contacts should not be used. This column indicates the number of these pairs per switch.

---

480 Volts - Two Coil Cutoff Contacts Wired in Circuit

**Wiring Diagrams - 24 thru 250 Volts**

**Figure A**

Customer Coil Circuit Contact Switches
Six Contact Frame

**Figure B**

Customer Coil Circuit Contact Switches
Twelve Contact Frame

**Figure C**

Customer Coil Circuit Contact Switches
Six Contact Frame

**Figure D**

Customer Coil Circuit Contact Switches
Twelve Contact Frame

* Factory Installed Connectors
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. Electroswitch 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>
<thead>
<tr>
<th>TABLE I: WL SWITCH STYLES (less coils)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Style Numbers Without Coils</strong></td>
</tr>
<tr>
<td><strong>No. of Stages</strong></td>
</tr>
<tr>
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<tr>
<td>3</td>
</tr>
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<td>6</td>
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<td>8</td>
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<tr>
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<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>TABLE II: COIL OPERATING CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coil part numbers must be specified at the time of order. Those marked with an asterisk (*) are considered</strong></td>
</tr>
<tr>
<td><strong>to be standard for the operating voltage indicated. These coils should not be used for 5 ampere series</strong></td>
</tr>
<tr>
<td><strong>trip operation from secondary of current transformers, as the burden is too great. Time is in milliseconds. Time may vary slightly for AC tripping, depending on point of AC cycles at which the coil is energized.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Direct Current</strong></th>
<th><strong>Alternating Current - 60 Cycles</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coil Code</strong></td>
<td><strong>Coil Style Number</strong></td>
</tr>
<tr>
<td>A</td>
<td>701B50G01</td>
</tr>
<tr>
<td>B</td>
<td>701B50G11</td>
</tr>
<tr>
<td>C</td>
<td>701B50G21</td>
</tr>
<tr>
<td>D</td>
<td>701B50G31</td>
</tr>
<tr>
<td>E</td>
<td>701B50G41</td>
</tr>
<tr>
<td>F</td>
<td>701B50G51</td>
</tr>
<tr>
<td>G</td>
<td>701B50G61</td>
</tr>
<tr>
<td>H</td>
<td>701B50G71</td>
</tr>
<tr>
<td>I</td>
<td>701B50G81</td>
</tr>
<tr>
<td>J</td>
<td>701B50G91</td>
</tr>
<tr>
<td>K</td>
<td>701B50G101</td>
</tr>
</tbody>
</table>

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

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 or two N/ C contacts are provided in each deck, and ten decks can be stacked, resulting in a relay with up to twenty contacts.

NOTES:
- The numbers are the same for all decks
- “n” becomes the deck number, e.g., 11 and 12 are CLOSE contacts on deck 1; 51 and 52 are CLOSE contacts on deck 5
- TRIP plus normal after TRIP contacts have the same contact numbers as the normal position contacts
- CLOSE plus normal after CLOSE contacts have the same contact numbers as the CLOSE contacts
- Decks with slip contacts are placed at end of switch/ relay

Optional Lighted Nameplate Available (consult factory)
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.

Coil Voltage Data

<table>
<thead>
<tr>
<th>COIL</th>
<th>COIL CIRCUIT VOLTS</th>
<th>OOIL 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>

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>

CONTACT CIRCUIT VOLTS | INTERRUPTIVE RATING (AMPS) | SHORT TIME RATING* (AMPS) | CONTINUOUS RATING (AMPS) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RESISTIVE</td>
<td>INDUCTIVE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SINGLE</td>
<td>SINGLE</td>
<td>RATING*</td>
</tr>
<tr>
<td>12VDC</td>
<td>-</td>
<td>-</td>
<td>60</td>
</tr>
<tr>
<td>24VDC</td>
<td>-</td>
<td>-</td>
<td>60</td>
</tr>
<tr>
<td>48VDC</td>
<td>-</td>
<td>-</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.

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.

Series 24 CSR ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Series 88 = Series 24 CSR</th>
<th>Switch Contacting (see page 17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 = 2438D</td>
<td>43 = 2443D 50 = 2450D</td>
</tr>
<tr>
<td>40 = 2440D</td>
<td>44 = 2444D 52 = 2452D</td>
</tr>
<tr>
<td>41 = 2441D</td>
<td>45 = 2445D 57 = 2457D</td>
</tr>
<tr>
<td>42 = 2442D</td>
<td>46 = 2446D 58 = 2458D</td>
</tr>
</tbody>
</table>

CSR Circuit
A = 1-3 Sec. Time Delay
B = 1 Sec. Time Delay Seal-in-Relay
C = Up to 15 Sec. Time Delay 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.
### 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
- [ ] Other

**ACTIONS**
- [ ] Maintained in Latched Position
- [ ] Spring Return to Normal Position

**OTHER FEATURES**
- [ ] Slip-contacts
- [ ] Turn-to-latch

**OTHER**

<table>
<thead>
<tr>
<th>Panel Thickness</th>
<th>Depth Behind Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Target 45°**

**Handle Positions**

**X-Chart**

**Use This Form to Specify a Switch Not Shown Elsewhere**

<table>
<thead>
<tr>
<th>HANDLE CODES</th>
<th>USE FOR ALL EXCEPT SLIP CONTACTS</th>
<th>USE FOR SWITCHES WITH SLIP CONTACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>POSITION ENGRAVING</td>
<td></td>
</tr>
</tbody>
</table>

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

*TERMINAL NUMBERS ARE PRELIMINARY PENDING FACTORY REVIEW AND APPROVAL.

**Sup Contacts Will Be Grouped At Rear Of Switch**

**Document Control**
- Quality Assurance - ANSI/ASME NQA-1-1983
- Qualification - ESC STD-1000
- Drawing Master - 246STD-1
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 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.

<table>
<thead>
<tr>
<th>DECK</th>
<th>CONTACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X1-4</td>
</tr>
<tr>
<td></td>
<td>X5-8</td>
</tr>
<tr>
<td>2</td>
<td>X1-10</td>
</tr>
<tr>
<td></td>
<td>X1-17</td>
</tr>
<tr>
<td>3</td>
<td>X1-20</td>
</tr>
<tr>
<td></td>
<td>X1-25</td>
</tr>
<tr>
<td>4</td>
<td>X1-30</td>
</tr>
<tr>
<td></td>
<td>X1-32</td>
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<tr>
<td>5</td>
<td>X1-35</td>
</tr>
<tr>
<td></td>
<td>X1-36</td>
</tr>
</tbody>
</table>

**CONTACTS**

- **POS.**
  - 1
  - 2
  - 3

**CONTACT**

- **DECK**
  - 1: X1-4
  - 2: X5-8
  - 3: X1-10
  - 4: X1-17
  - 5: X1-20

**HANDLE POSITIONS**

- **SPRING RETURN TO POSITION 2**

---

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 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.
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<table>
<thead>
<tr>
<th>DECK</th>
<th>CONTACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X1-4</td>
</tr>
<tr>
<td></td>
<td>X5-8</td>
</tr>
<tr>
<td>2</td>
<td>X1-10</td>
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<tr>
<td></td>
<td>X1-17</td>
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<tr>
<td>3</td>
<td>X1-20</td>
</tr>
<tr>
<td></td>
<td>X1-25</td>
</tr>
<tr>
<td>4</td>
<td>X1-30</td>
</tr>
<tr>
<td></td>
<td>X1-32</td>
</tr>
<tr>
<td>5</td>
<td>X1-35</td>
</tr>
<tr>
<td></td>
<td>X1-36</td>
</tr>
</tbody>
</table>

**CONTACTS**

- **POS.**
  - 1
  - 2
  - 3

**CONTACT**

- **DECK**
  - 1: X1-4
  - 2: X5-8
  - 3: X1-10
  - 4: X1-17
  - 5: X1-20

**HANDLE POSITIONS**

- **SPRING RETURN TO POSITION 2**

---
SELECTOR SWITCH RELAYS

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!

SERIES 24 SSR RELAYS
ORDERING INFORMATION
(Consult Factory)

PANEL MOUNT

<table>
<thead>
<tr>
<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>8.509</td>
<td>13.46</td>
</tr>
</tbody>
</table>

SHELF MOUNT

<table>
<thead>
<tr>
<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>8.509</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, redosing 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 82 is in the eighth deck, in line under terminal 12 and is a N/O contact used together with terminal 84.
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. Shorttime and continuous ratings are based on temperature rise in contact members and supporting parts not exceeding 50˚C above ambient.

Contact Ratings for Series 24 LSR Latching Switch Relay

<table>
<thead>
<tr>
<th>CONTACT CIRCUIT VOLTS</th>
<th>RESISTIVE SINGLE CONTACT</th>
<th>RESISTIVE DOUBLE CONTACT</th>
<th>INDUCTIVE SINGLE CONTACT</th>
<th>INDUCTIVE DOUBLE CONTACT</th>
<th>SHORT TIME RATING* (AMPS)</th>
<th>CONTINUOUS RATING (AMPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>125VDC</td>
<td>5</td>
<td>10</td>
<td>2</td>
<td>4</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>250VDC</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>120VAC</td>
<td>20</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>240VAC</td>
<td>15</td>
<td>20</td>
<td>15</td>
<td>20</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>480VAC</td>
<td>7.5</td>
<td>15</td>
<td>10</td>
<td>10</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>600VAC</td>
<td>7.5</td>
<td>7.5</td>
<td>10</td>
<td>10</td>
<td>60</td>
<td>30</td>
</tr>
</tbody>
</table>

* Short time current is for one minute

Contact Ratings for Series 31 LSR Latching Switch Relay

<table>
<thead>
<tr>
<th>CONTACT CIRCUIT VOLTS</th>
<th>RESISTIVE SINGLE CONTACT</th>
<th>RESISTIVE DOUBLE CONTACT</th>
<th>INDUCTIVE SINGLE CONTACT</th>
<th>INDUCTIVE DOUBLE CONTACT</th>
<th>SHORT TIME RATING* (AMPS)</th>
<th>CONTINUOUS RATING (AMPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120VDC</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>15A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>240VDC</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>15A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>480VDC</td>
<td>1</td>
<td>1</td>
<td>25</td>
<td>15A</td>
<td></td>
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</tr>
<tr>
<td>125VDC</td>
<td>1</td>
<td>1</td>
<td>25</td>
<td>15A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120VAC</td>
<td>10</td>
<td>10</td>
<td>25</td>
<td>15A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>240VAC</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>15A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600VAC</td>
<td>3</td>
<td>1</td>
<td>25</td>
<td>15A</td>
<td></td>
<td></td>
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</table>

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 shown to the right.

Coil Voltage Data

<table>
<thead>
<tr>
<th>COIL</th>
<th>NOM. VOLTAGE</th>
<th>VOLTAGE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>48VDC</td>
<td>36-50VDC</td>
</tr>
<tr>
<td>D</td>
<td>125VDC</td>
<td>100-140VDC</td>
</tr>
<tr>
<td>F</td>
<td>250VDC</td>
<td>200-280VDC</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</td>
<td>COIL CIRCUIT DC OHMS @ 20˚C</td>
<td>BURDEN (AMPS) @ RATED VOLTAGE</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 1 ampere. 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 solenoid 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.
**LATCHING SWITCH RELAYS**

### Series 24 LSR - Panel Mount

- **Dimensions**
  - Number of Decks: 3, 5, 8, 10
  - Depth Behind Panel (IN): 6.7, 7.8, 8.6

### Series 24 LSR - Shelf Mount

- **Dimensions**
  - Number of Decks: 3, 5, 8, 10
  - Depth Behind Panel (IN): 4.7, 5.9, 7.8, 9.1

### Series 31 LSR - Panel Mount

- **Dimensions**
  - Number of Decks: 3, 6, 8, 10
  - Depth Behind Panel (IN): 9.1, 10.4, 12.3

### Series 31 LSR - Shelf Mount

- **Dimensions**
  - Number of Decks: 3, 6, 8
  - Dimension X (IN): 6.9, 8.1, 9.9

### LSR ORDERING 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 = Directed Control/ Panel Mount
  - C = Low Level Control/ Shelf Mount
  - D = Low Level Control/ Panel Mount

110VAC operating voltages available on certain applications. Contact factory for further information.
## LATCHING SWITCH RELAYS

### CONTACT DIAGRAM

<table>
<thead>
<tr>
<th>DECK</th>
<th>CONTACTS</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>110-11-013</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>120-11-014</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>150-11-017</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>160-11-018</td>
<td>X</td>
</tr>
</tbody>
</table>

### NAMEPLATE ENGRAVING (STYLE B)

1. [CONTACT DECK LAYOUT]
2. [CONTROL DECK LAYOUT AND WIRING - LOW-LEVEL CONTROL]
3. [CONTROL DECK LAYOUT AND WIRING - DIRECT CONTROL]

### HANDLE POSITIONS

- 1
- 2

### OPERATING VOLTAGE

- 48VDC (COIL C)
- 125VDC (COIL D)
- 250VDC (COIL F)
- OTHER

### CONTACT DIAGRAM

<table>
<thead>
<tr>
<th>CONTACTS</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOARD</td>
<td>X</td>
</tr>
<tr>
<td>E0-11-010</td>
<td>X</td>
</tr>
<tr>
<td>E0-11-012</td>
<td>X</td>
</tr>
</tbody>
</table>

### COMPANY DWG NO.

- SHEET OF

### SWITCH NUMBER

- Made by:
- Appr by:
- Date:
- Company:
- DWG N0.
- Sheet of

### ENGRAVING CODE

- Style A, C - Shelf Mount (no handle or nameplate)
- Style B, D - Panel Mount (oval handle & nameplate - Series 31)
  (pistol-grip handle & nameplate - Series 24)
TAGGING RELAYS

Personnel Protection Through SCADA Control of NESC “Tag–Out” Function

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

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.


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 Burden:
  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

Series
92 = Series 24
93 = Series 31

No. of Decks
Series 24
23 = 3
25 = 5
28 = 8
30 = 10

Series 31
23 = 3
26 = 6
28 = 8 (2 pos. only)

Voltage/No. of Positions
CE = 48VDC 2 Pos. (DC Only)
CK = 48VDC 2 Pos. (AC Only)
DE = 125VDC 2 Pos. (DC Only)
DK = 125VDC 2 Pos. (AC Only)
CH = 48VDC 3 Pos. (DC Only)
CJ = 48VDC 3 Pos. (AC Only)
DH = 125VDC 3 Pos. (DC Only)
DJ = 125VDC 3 Pos. (AC Only)
## Series 24 - Two Position

### Control Voltages

<table>
<thead>
<tr>
<th>Voltage</th>
<th>48 VDC</th>
<th>125 VAC</th>
<th>120 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>9.9 AMP</td>
<td>6.6 AMP</td>
<td>6.3 AMP</td>
</tr>
<tr>
<td>Response Time</td>
<td>25.60 mSec</td>
<td></td>
<td></td>
</tr>
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</table>

### Series 31 - Two Position

### Control Voltages

<table>
<thead>
<tr>
<th>Voltage</th>
<th>48 VDC</th>
<th>125 VAC</th>
<th>120 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>9.7 AMP</td>
<td>4.1 AMP</td>
<td>3.9 AMP</td>
</tr>
<tr>
<td>Response Time</td>
<td>15.35 mSec</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Low Level Control

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

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 two 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 20A for 1 Second
- User Definable Trip Response Time from 0.001 to 0.100 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

Ordering Information
Model Number Description
686-100 Voltage Sensing Annunciated Target Relay
686-110 Voltage Sensing Annunciated Target Relay

Consult factory for other models.
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 control up to three breaker trip coils (single, dual, or triple coils). By incorporating a CIM into a new or existing system, functions of several individual devices (including two local/remote switches, 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, fail-safe manual switch control.

Three Ways to Control Breaker Operations (Trip/Close)
- From Integral Manual Breaker Control Switch
- Locally Through Protective Relays
- Remotely via Serial or Parallel Interface

Monitors
- Status of Breaker (Open/ 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), remote/local Recloser 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 three different ways:
  1. from a manual Breaker Control Switch mounted on the front panel
  2. from a signal from any local Protective Relay device
  3. from SCADA

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

SCADA Functions:
The CIM units contain 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
- "XSCADA" monitors the status of SCADA (Enabled/Disabled)
Monitors/Indicators:
The CIM provides visual indication of the functions monitored by the unit. These include breaker contact status (open/closed), breaker coil continuity, and operational state of both the Reclose function and the interface to SCADA. The following describes each of the four indicator LEDs located on the front panel of the CIM.

1. **Breaker Open (green) LED:** Indicates the physical state of the breaker (either open or closed). In addition, this LED provides visual indication of which device caused the trip. A steady "ON" LED indicates a trip signal from any protective relay device. A rapid flashing LED indicates a trip signal from SCADA. A slow flashing LED indicates a trip signal from the manual control switch located on the CIM.

3. **Reclose Out (amber) LED:**
   - If the LED is "ON," the reclose relay is disabled (out).
   - If the LED is "OFF," the reclose relay is enabled (in).

4. **SCADA Out (amber) LED:**
   - If the LED is "ON," the SCADA interface is disabled (out).
   - If the LED is "OFF," the SCADA interface is enabled (in).

---

### Specifications

- **Input Voltage:** 38.4 - 140VDC
- **Output Current:**
  - Trip: 20A for 0.5 Sec
  - 0.5A Continuous
  - Close/Reclose: 30A for 1 Sec
  - 1.5A Continuous
- **Control Power Requirements:** 38.4 - 140VDC @ 100 Milliamps
- **Communications:** 9 Pin Mini DIN Connector
- **Operating Temperature range:** -20°C to +55°C
- **RS-485, 1200, 2400, 4800, and 9600 Baud** (consult factory for other baud rates)
- **Parallel Interface:** 38.4 - 140VDC Std, 24VDC Optional
- **Meets IEEE C37.90.1 and C37.90.2**

### Ordering Information

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>642-100</td>
<td>Standard Parallel SCADA CIM - Horizontal Mounting</td>
</tr>
<tr>
<td>642-900</td>
<td>Standard Parallel SCADA CIM - Vertical Mounting</td>
</tr>
<tr>
<td>642-905</td>
<td>Modified Standard Parallel SCADA CIM - Vertical Mounting - SCADA Trip Disables Reclose</td>
</tr>
<tr>
<td>642-107</td>
<td>Modified Standard Parallel SCADA CIM - Horizontal Mounting - Trip Coil LED Shows Steady On When In Close and Flashes When Trip Coil is Bad</td>
</tr>
<tr>
<td>642-108</td>
<td>Modified Standard Parallel SCADA CIM - Horizontal Mounting - Modified Software and Hardware to Control a Circuit Switcher</td>
</tr>
<tr>
<td>672-100</td>
<td>Standard Serial Modbus SCADA CIM - Horizontal Mounting</td>
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<td>Standard Serial Modbus SCADA CIM - Vertical Mounting</td>
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<td>672-106</td>
<td>Standard Serial DNP3.0 SCADA CIM - Horizontal Mounting</td>
</tr>
<tr>
<td>672-906</td>
<td>Standard Serial DNP3.0 SCADA CIM - Vertical Mounting</td>
</tr>
</tbody>
</table>
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 cut-away 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.

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.
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 25-, 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), locating 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.

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 MILM-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 above.

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 movable 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.
**CONSTRUCTION DETAILS**

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

---

**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 pull-out 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**

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handle</td>
<td>Moldarts, General Purpose</td>
</tr>
<tr>
<td>Nameplate</td>
<td>Cycolac, ABS Molded Composition</td>
</tr>
<tr>
<td>Dial Plate</td>
<td>Aluminum Die Cast</td>
</tr>
<tr>
<td>Housing</td>
<td>Aluminum Die Cast</td>
</tr>
<tr>
<td>Stage Frame</td>
<td>Glass Polyester</td>
</tr>
<tr>
<td>Rotor</td>
<td>Glass Polyester</td>
</tr>
<tr>
<td>Stationary Contact</td>
<td>Silicon Bronze, Silver Plated</td>
</tr>
<tr>
<td>Roller Contact</td>
<td>Silicon Bronze, Silver Plated</td>
</tr>
<tr>
<td>Springs</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Locking Spacer Window</td>
<td>Polysulfone</td>
</tr>
<tr>
<td>Starwheel</td>
<td>Nylon</td>
</tr>
<tr>
<td>Pull Cover and Guide</td>
<td>Polycarbonate</td>
</tr>
<tr>
<td>Shaft</td>
<td>Zinc Plated Steel</td>
</tr>
</tbody>
</table>
ELECTROSWITCH – TESTING

All About Testing

Switches are tested in many ways to prove their capabilities and reliability. 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.

If all conditions are met, the switches are considered “certified electrical equipment” by CSA and “recognized components” by UL and the applications are subject to review by these agencies to assure suitability.

UL and CSA Ratings

<table>
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<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>
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</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>
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<td></td>
<td>2.5 · 125VDC</td>
<td>14 HP · 600VAC</td>
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<td>W-2</td>
<td>5A · 125VDC</td>
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</tr>
<tr>
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<td>20A/240VAC</td>
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</tr>
<tr>
<td></td>
<td>1A · 250VDC</td>
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</tr>
<tr>
<td></td>
<td>8A · 600VAC</td>
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</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 - 010A at 150% rating ... over 10A at 125% rating
2. Endurance - 6000 operations (DC resistive; AC at .75 to .80 pf)
3. Temperature rise of contacts 30˚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 (3/32 in. min.) 251-600V (1/8 in. min.)
## Life Expectancy Under Electrical Load - Make & Break Operations

### Alternating Current - 60 Hz

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<tr>
<th>SWITCH SERIES</th>
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<th>250VAC</th>
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### Direct Current

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<tr>
<th>SWITCH SERIES</th>
<th>AMPS.</th>
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<th>125VDC</th>
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<td>RESISTIVE</td>
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</table>
# Electrowhite Accessories Handles

### Series 24

<table>
<thead>
<tr>
<th>Type</th>
<th>Oval Shank</th>
<th>Oval Shank - Removable</th>
<th>Round Knurled</th>
<th>Pistol-Grip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part No.</td>
<td>02000-11</td>
<td>02013-3</td>
<td>02000-10</td>
<td>02000-12</td>
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<tr>
<td>Screw No.</td>
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<td>Notes</td>
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<td>Removable at 0˚ std.</td>
<td>Interchangeable with other Series 24 handles</td>
<td>Interchangeable with other Series 24 handles</td>
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### Series 31

<table>
<thead>
<tr>
<th>Type</th>
<th>Oval Flush</th>
<th>Oval Shank</th>
<th>Round Knurled</th>
<th>Pistol-Grip</th>
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</thead>
<tbody>
<tr>
<td>Mount</td>
<td>Single Hole Mount</td>
<td>4 Hole Mount</td>
<td>4 Hole Mount</td>
<td>4 Hole Mount</td>
</tr>
<tr>
<td>Part No.</td>
<td>03029-1</td>
<td>03029-6-1</td>
<td>03029-4-1</td>
<td>03029-5-1</td>
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<tr>
<td>Screw No.</td>
<td>Included</td>
<td>02016-101</td>
<td>02016-101</td>
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<td>Lockwasher No.</td>
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<td>02015-34</td>
<td>02015-34</td>
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<tr>
<td>Notes</td>
<td>Single Hole</td>
<td>Also used on Series 31 LSR</td>
<td>Interchangeable with Oval Shank Handles</td>
<td>Interchangeable with Oval Shank Handles</td>
</tr>
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### Series 20

<table>
<thead>
<tr>
<th>Type</th>
<th>Oval Shank</th>
<th>Oval Shank - Removable</th>
<th>Round Knurled</th>
<th>Pistol-Grip</th>
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<tbody>
<tr>
<td>Part No.</td>
<td>100-93-38</td>
<td>261-24-11</td>
<td>100-93-68</td>
<td>100-93-2</td>
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<td>Screw No.</td>
<td>02016-226</td>
<td>Included</td>
<td>02016-226</td>
<td>02016-225</td>
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<tr>
<td>Notes</td>
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<td>Removable at 0˚ std.</td>
<td>Interchangeable with other Series 20 handles</td>
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### Series 101

<table>
<thead>
<tr>
<th>Type</th>
<th>Oval Flush</th>
<th>Oval Shank</th>
<th>Pistol-Grip</th>
<th>Round Knurled</th>
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</thead>
<tbody>
<tr>
<td>Part No.</td>
<td>01040-2</td>
<td>01040-6-1</td>
<td>01040-4-1</td>
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<tr>
<td>Notes</td>
<td>Uses lever screw 02016-33</td>
<td>Not interchangeable with Oval Flush Handle</td>
<td>Not interchangeable with Oval Flush Handle</td>
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### Series W-2

<table>
<thead>
<tr>
<th>Type</th>
<th>Oval Shank</th>
<th>Round Notched</th>
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<th>Large Pistol-Grip</th>
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<tbody>
<tr>
<td>Part No.</td>
<td>5018787H01</td>
<td>310C247H01</td>
<td>310C247H02</td>
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<td>504A672601</td>
<td>70001824B</td>
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<tr>
<td>Notes</td>
<td>Interchangeable with other W-2 handles except mini slim and finger tip</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</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.
### ELECTROSWITCH ACCESSORIES

#### NAMEPLATES

<table>
<thead>
<tr>
<th>SERIES 24</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Instrument &amp; Control Switch</td>
<td>Target Nameplate</td>
<td>LOR &amp; LOR/ER</td>
</tr>
<tr>
<td><strong>Code No.</strong></td>
<td>10</td>
<td>18 or 19 (PFL)</td>
<td>17C-2L22</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>2.91&quot; x 2.81&quot;</td>
<td>2.91&quot; x 2.81&quot;</td>
<td>2.91&quot; x 2.81&quot;</td>
</tr>
<tr>
<td><strong>Title Engraving</strong></td>
<td>14 characters max</td>
<td>14 characters max</td>
<td>As Shown</td>
</tr>
<tr>
<td><strong>Position Engraving</strong></td>
<td>5 characters max</td>
<td>5 characters max</td>
<td>As Shown</td>
</tr>
<tr>
<td><strong>Notes</strong></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>

<table>
<thead>
<tr>
<th>SERIES 24</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Lighted Instrument &amp; Control Switch</td>
<td>Lighted Lock-Out-Relay</td>
<td>High Speed LOR/ER</td>
</tr>
<tr>
<td><strong>Code No.</strong></td>
<td>Contact Factory</td>
<td>Contact Factory</td>
<td>Contact Factory</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>2.94&quot; x 2.81&quot;</td>
<td>2.91&quot; x 2.81&quot;</td>
<td>2.91&quot; x 2.81&quot;</td>
</tr>
<tr>
<td><strong>Title Engraving</strong></td>
<td>14 characters max</td>
<td>14 characters max</td>
<td>14 characters max</td>
</tr>
<tr>
<td><strong>Position Engraving</strong></td>
<td>5 characters max</td>
<td>5 characters max</td>
<td>5 characters max</td>
</tr>
<tr>
<td><strong>Notes</strong></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>

<table>
<thead>
<tr>
<th>SERIES 31</th>
<th>SERIES 20</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Single Hole Mount</td>
<td>Four Hole Mount</td>
<td>Tagging Relay</td>
<td>Tagging Relay</td>
</tr>
<tr>
<td><strong>Code No.</strong></td>
<td>39</td>
<td>21</td>
<td>92TR-K</td>
<td>85</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>2.0&quot; Diameter</td>
<td>2.38&quot; x 2.88&quot;</td>
<td>3&quot; x 3.5&quot;</td>
<td>3.5&quot; x 5.66&quot;</td>
</tr>
<tr>
<td><strong>Title Engraving</strong></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>
</tr>
<tr>
<td><strong>Position Engraving</strong></td>
<td>6 characters max</td>
<td>6 characters max</td>
<td>7 per line (2 lines max)</td>
<td>7 per line (2 lines max)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Electroswitch • 180 King Avenue • Weymouth, MA 02188 • TEL: (781) 335-5200 • FAX: (781) 335-4253 • www.electroswitch.com
### SERIES 101
##### TYPE W-2, WL-2 AND W

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>2.38&quot; x 2.88&quot;</td>
<td>02016-26-C3</td>
<td>02015-6</td>
<td>02016-87</td>
<td>For waterproof mount use Code No. 5</td>
</tr>
<tr>
<td>04</td>
<td>2&quot; x 3&quot;</td>
<td>See Below</td>
<td>See Below</td>
<td>See Below</td>
<td>No engraving available at 6° position. Target colors red &amp; green.</td>
</tr>
<tr>
<td>62</td>
<td>2&quot; x 3&quot;</td>
<td>See Below</td>
<td>See Below</td>
<td>See Below</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>2&quot; x 2.375&quot;</td>
<td>See Below</td>
<td>See Below</td>
<td>See Below</td>
<td></td>
</tr>
</tbody>
</table>

**Type W**

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

#### TYPE W-2

- Nameplate Engraving Locations (1-18)
- Engraved Nameplates for W-2 ONLY
- Use This Chart to Specify Engraving. Indicate Engraving Locations by Line Numbers Shown.
- Character Space Allowance is the same for Code 61, 62, and 63 Nameplates.
- Line 12 is Not Available on Code 62 (Target) Nameplates.

### WATERPROOF MOUNT

#### LENS FOR SERIES 20P LAMPS

<table>
<thead>
<tr>
<th>Series Code No.</th>
<th>Panel Thickness</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>1/16&quot;</td>
<td>001022-1</td>
</tr>
<tr>
<td>101</td>
<td>1/8&quot;</td>
<td>001022-2</td>
</tr>
<tr>
<td>101</td>
<td>3/16&quot;</td>
<td>001022-3</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 120VAC</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 250VAC</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>349A556G01</td>
</tr>
<tr>
<td>125VDC 120VAC</td>
<td>349A556G02</td>
</tr>
<tr>
<td>250VDC 240VAC</td>
<td>349A556G02</td>
</tr>
<tr>
<td>120VAC</td>
<td>349A556G10</td>
</tr>
<tr>
<td>250VAC</td>
<td>349A556G10</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.
**ELECTROSWITCH ACCESSORIES**

**JUMPERS**

<table>
<thead>
<tr>
<th>Adjacent Contact (Same Deck)</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></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.

**Examples:**

- Metal jumpers are supplied in packages of 10 or 25.
- Wire jumpers are ordered individually.

<table>
<thead>
<tr>
<th>Conn. Style Number</th>
<th>Dim “A”</th>
<th>Examples:</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 677C19H08</td>
<td>.89&quot;</td>
<td>Conn. #1</td>
</tr>
<tr>
<td>#2 677C19G01</td>
<td>1.59&quot;</td>
<td>Conn. #2</td>
</tr>
<tr>
<td>#3 677C182G01</td>
<td>3.50&quot;</td>
<td>Conn. #6</td>
</tr>
<tr>
<td>#4 677C182G02</td>
<td>4.25&quot;</td>
<td></td>
</tr>
<tr>
<td>#5 677C182G04</td>
<td>5.50&quot;</td>
<td></td>
</tr>
<tr>
<td>#6 677C19G05</td>
<td>1.59&quot;</td>
<td></td>
</tr>
<tr>
<td>#7 677C182G03</td>
<td>5.00&quot;</td>
<td></td>
</tr>
<tr>
<td>#8 677C19G07</td>
<td>1.22&quot;</td>
<td></td>
</tr>
<tr>
<td>#9 677C182G05</td>
<td>6.00&quot;</td>
<td></td>
</tr>
<tr>
<td>#10 677C182G06</td>
<td>7.25&quot;</td>
<td></td>
</tr>
<tr>
<td>#11 677C182G07</td>
<td>9.75&quot;</td>
<td></td>
</tr>
<tr>
<td>#12 677C182G08</td>
<td>10.50&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Typical Wire & Lug Type Connector. Wire & Lugs 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 U/L, CSA, and various Military Agencies, can be maintained with complete control over the manufacture of these products. It is the policy of Electroswitch not to sell any internal spare parts. Any field dis-assembly will automatically void the warranty of the products and Electroswitch will assume no liability for any damage as a result of dis-assembly.
In addition to Switches for Industrial Applications, Electro Switch also provides Switches and Relays for the Power Industry as well as Switches for Military and Electronic Applications. Electro Switch also provides Hydraulic and Electronic Reclosers and Photoelectric Street Lighting Controls.

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