



# CONTROL SWITCH RELAYS

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.

**Note:** The Series 24 CSR 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, ANSI/IEEE 323, ANSI/IEEE 344, ANSI/ASME NQA -1.

## Series 24 Control Switch Relays

- |              |   |
|--------------|---|
| HIGH QUALITY | <ul style="list-style-type: none"> <li>• Designed and manufactured to the highest standards in the industry</li> <li>• Qualified to UL, CSA, ANSI/IEEE 37.90 and 37.90 .1</li> </ul>  |
| VERSATILITY  | <ul style="list-style-type: none"> <li>• Replaces a manual breaker switch, interposing relays, and associated wiring</li> <li>• Direct retrofit to existing manual breaker control switch</li> <li>• Electric or manual operation</li> <li>• Three circuits to satisfy different industry applications</li> <li>• Multiple voltages: 48VDC, 125VDC, standard, others available</li> <li>• All standard Series 24 circuit breaker control switch contacting (see page 17) available</li> <li>• Available with custom contacting (consult factory)</li> </ul> |
| SAFETY       | <ul style="list-style-type: none"> <li>• Target flag agreement (regardless of manual or electric trip)</li> <li>• Available with SCADA disable for operator safety during service</li> <li>• 1E Nuclear qualified</li> </ul>  |
| AVAILABILITY | <ul style="list-style-type: none"> <li>• 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.</li> </ul>   |
| SERVICE      | <ul style="list-style-type: none"> <li>• 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!</li> </ul>   |

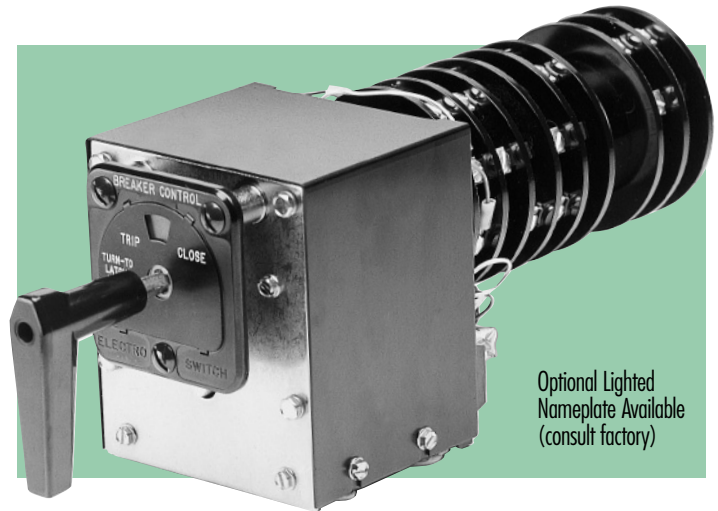
## Basic Circuit Operation

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.

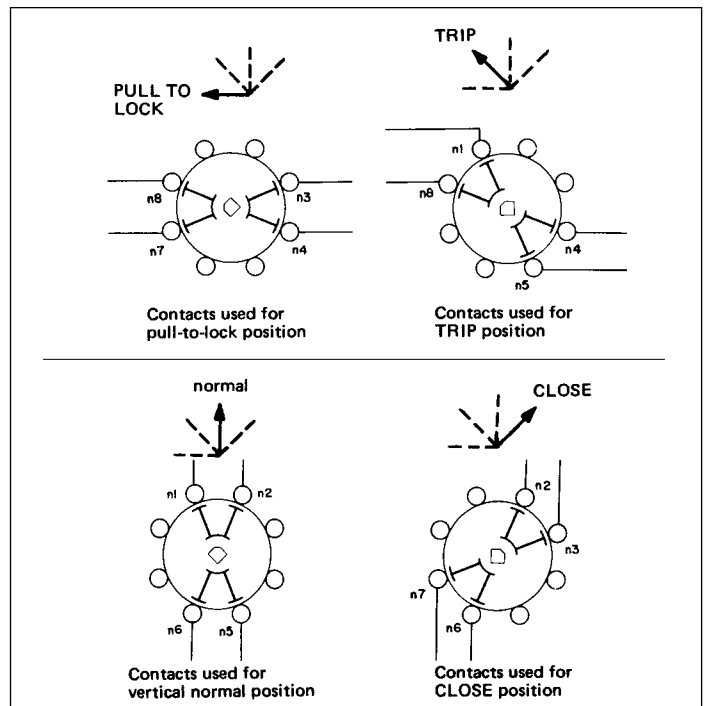


## Contact Deck Arrangement

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





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## Transient Protection

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

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

The CSR is available with Serial Communication Control.

## Coil Voltage Data

COIL	COIL CIRCUIT VOLTS	COIL CIRCUIT DC OHMS @ 25°C	BURDEN (AMPS) AT RATED VOLTAGE
C	48VDC	4.83	9.9
D	125VDC	18.96	6.6

24VDC and 250VDC available — Consult factory.

## Contact Ratings

CONTACT CIRCUIT VOLTS	INTERRUPTIVE RATING (AMPS)		SHORT TIME RATING* (AMPS)	CONTINUOUS RATING (AMPS)
	RESISTIVE	INDUCTIVE		
	SINGLE CONTACT	SINGLE CONTACT		
12VDC	—	—	60	30
24VDC	—	—	60	30
48VDC	—	—	60	30
125VDC	3	3	60	30
250VDC	—	—	—	—
600VDC	—	—	—	—
120VAC	20	20	60	30
240VAC	15	15	60	30
480VAC	10	10	60	30
600VAC	6	6	60	30

\* Short time current is for one minute.

## Coil Burden Data

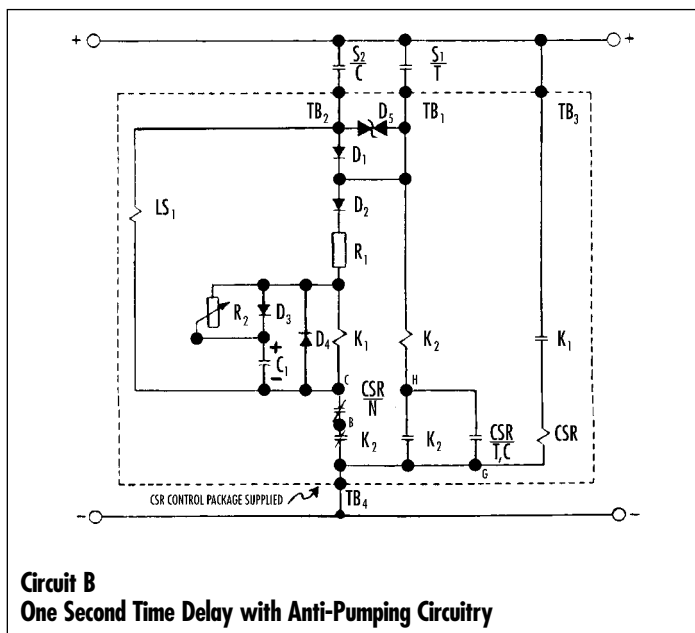
COIL	NOMINAL VOLTAGE	VOLTAGE RANGE
C	48VDC	41-56VDC
D	125VDC	106-140VDC

## OPTIONS

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

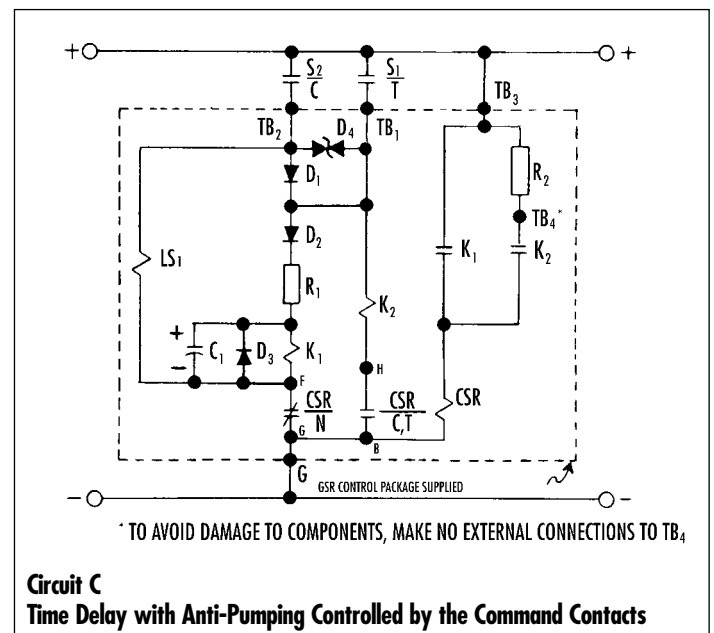
### Circuit B One Second Time Delay With Anti-Pumping Circuitry

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).

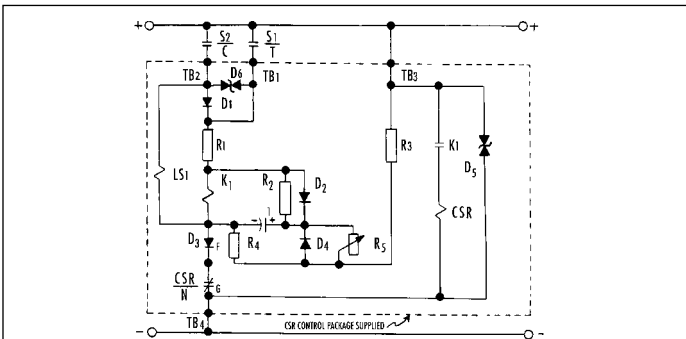




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## Circuit A One To Three Second Time Delay With No Anti-Pumping Circuitry - *Not Recommended Where SCADA Timing Sequence is Greater Than Three Seconds.*

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.

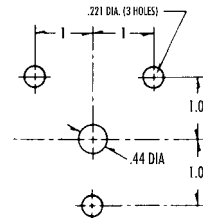
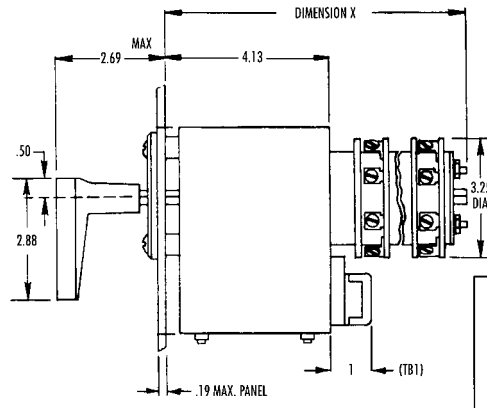
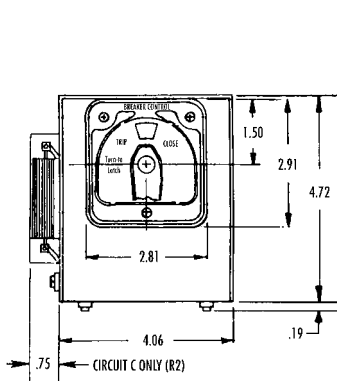
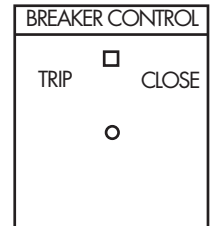


**Circuit A**  
One to Three Second Time Delay with No Anti-Pumping Circuitry

### Contact Chart

DECKS	CONTACTS	POS.			
		TRIP	INAT	MAC	CLOSE
1	12 ○— — —○ 13				✗
	16 ○— — —○ 17				✗
2	21 ○— — —○ 28	✗			
	24 ○— — —○ 25	✗			
3	31 ○— — —○ 32		✗	✗	
	35 ○— — —○ 36		✗	✗	
4	42 ○— — —○ 43			✗	✗
	46 ○— — —○ 47			✗	✗
5	51 ○— — —○ 52	✗			
	55 ○— — —○ 56	✗			

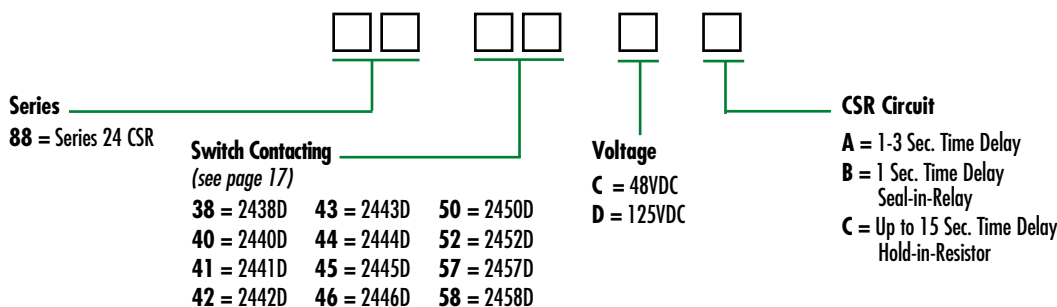
nat = normal after TRIP  
nac = normal after CLOSE



### DEPTH BEHIND PANEL (DIM X)

No of Decks	Standard Config.	With Slip Contacts
1	6.5	7.9
2	7.1	8.6
3	7.9	9.0
4	8.6	9.7
5	9.0	10.5
6	9.7	11.0

## Series 24 CSR ORDERING INFORMATION



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 WITH SCADA DISABLE

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

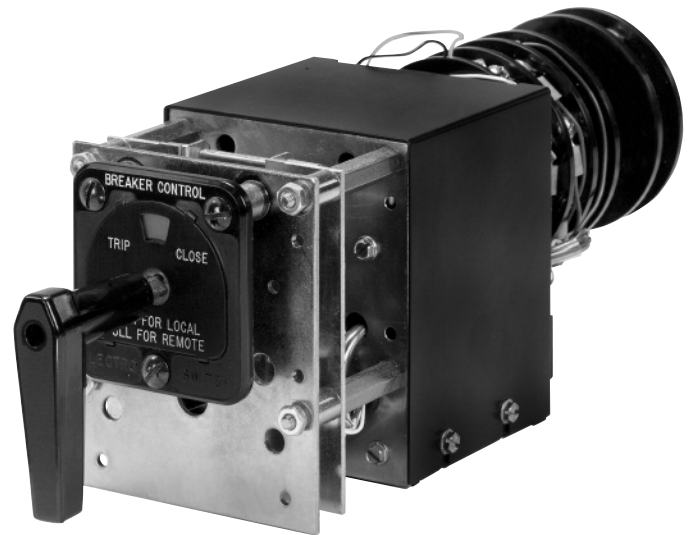
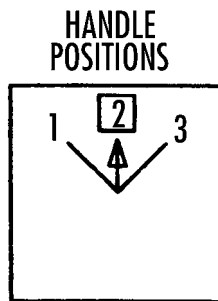
## Series 24 Control Switch Relays with SCADA Disable

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

### OPERATION

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

DECK	CONTACTS	PUSH	PULL	POS.			
				TRIP	N/C	N/O	CLOSE
				1	2 FROM 1	3	3
AUX CONT	X 1 — I — I — I — I — O — X 3	✓					
	X 2 — I — I — I — I — O — X 4		✓				
	X 5 — I — I — I — I — O — X 7	✓					
	X 6 — I — I — I — I — O — X 8		✓				
1	1 2 — I — I — I — I — O — 1 3						✓
	1 6 — I — I — I — I — O — 1 7						✓
2	2 1 — I — I — I — I — O — 2 8			✓			
	2 4 — I — I — I — I — O — 2 5			✓			
3	3 1 — I — I — I — I — O — 3 2				✓	✓	
	3 5 — I — I — I — I — O — 3 6				✓	✓	
4	4 2 — I — I — I — I — O — 4 3					✓	✓
	4 6 — I — I — I — I — O — 4 7					✓	✓
5	5 1 — I — I — I — I — O — 5 2			✓			
	5 5 — I — I — I — I — O — 5 6			✓			



SPRING RETURN TO POSITION 2

