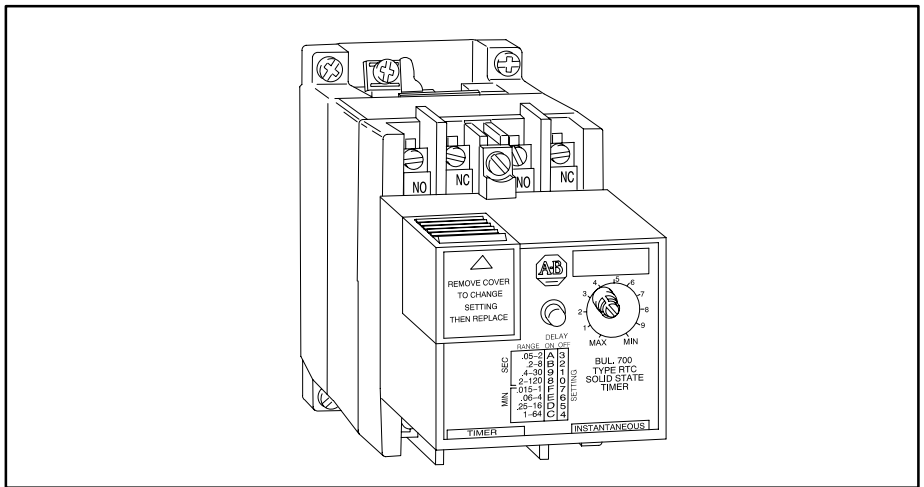




# Bulletin 700 Type RTC and RTCR Solid-state Timing Relays

## Instruction Sheet



**Important:** Save these instructions for future reference.

## Description

Bulletin 700 Type RTC relays are designed for industrial environments. They offer the reliability and accuracy of solid-state timing along with the contact isolation of conventional electromechanical relays. The contacts are hermetically sealed in glass for reliability.

Type RTC relays are available with up to two timed contacts and two instantaneous contacts in any N.O. – N.C. combination. A sixteen position rotary switch is used to set the mode to on-delay or off-delay, and there are eight timing ranges in each mode. The timing period is set by means of a self-contained potentiometer in the Type RTC relays. Relays with provisions for an external timing adjustment potentiometer are identified as Type RTCR.

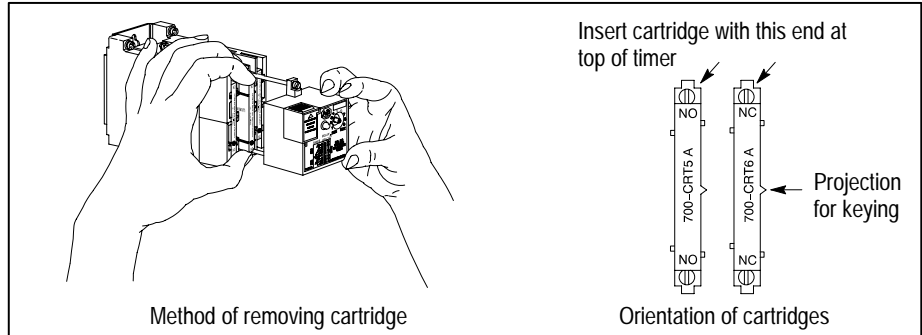
The N.O. and N.C. contacts are designed to be changed or added in the field. A relay can be easily modified to have any combination of N.O. and N.C. contacts, limited to two timed and two instantaneous contacts maximum.

## UL Listed

Bulletin 700 Type RTC relays are listed by Underwriters' Laboratories, Inc. for use in Class I, Division 2, Groups A, B, C, and D hazardous locations as defined by the National Electric Code.

## Adding or Changing Contact Cartridges

Figure 1  
 Removing and Orientation of Cartridges



Timers are supplied with two slots for timed contacts and two slots for instantaneous contacts. “Dummy” cartridges are placed in any unused cartridge slots to guard against entrance of foreign material.

Contact Cartridges		
Type	Color	Catalog Number
Normally Open	Gray	700-CRT5
Normally Closed	Orange	700-CRT6
Dummy	Black	700-CR9

The N.O. cartridges, N.C. cartridges, and dummy cartridges are removable and interchangeable using the same cartridges for both timed and instantaneous slots. Use the following procedure:



**ATTENTION:**

The glass envelopes in the N.O. and N.C. cartridges can be damaged if dropped or mishandled. Damaged cartridges must be replaced.

1. Disconnect all power from timer or timer panel.
2. Loosen the two front housing screws (see Figure 1) until the housing slides back along the screws for approximately one inch. The screws are captive and will restrain the front housing to protect the circuit cable that connects to the timer base.
3. Remove the N.O. or N.C. contact or the dummy cartridge by lifting it out of the slot. A screwdriver is required to pry out the dummy cartridge.



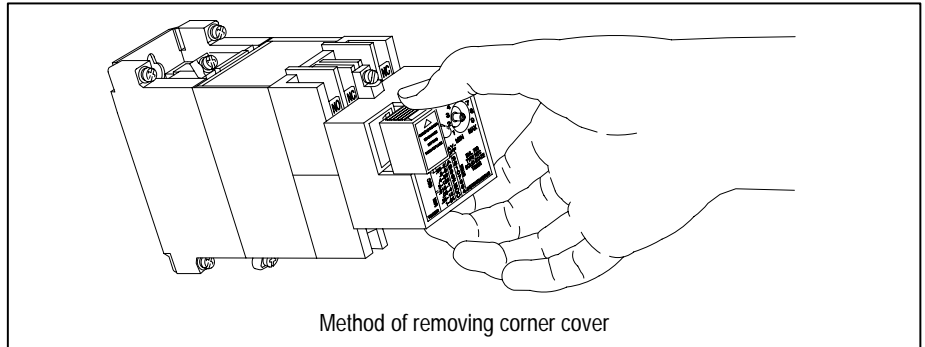
**ATTENTION:**

Be careful not to damage circuit table.

4. Insert the desired cartridge. The cartridges are keyed and must be inserted with correct orientation (See Figure 1).
5. Slide front housing back down carefully to avoid cable damage. Tighten screws.

## Setting the Mode and Timing Range

Figure 2  
 Removing Corner Cover



### ATTENTION:

Unpredictable contact operation can occur if the mode setting is changed with power applied to any terminal.

1. Remove the corner cover by pressing down on the top of the cover with your thumb and slide forward (See Figure 2).
2. Set the desired position on the sixteen position rotary switch using a small screwdriver.
3. Replace corner cover by sliding it back into its original position.

## Operation

Table 1 outlines timer operation in both the on-delay and off-delay modes. The red LED indicator on the front housing of the timer gives visual indication of timing, timed out, and reset or stable timer conditions.

Table 1  
 Timer Operation

Operating Mode	Power (Terminals L1-L2)	Voltage (Applied to Initiate Terminal P)	Timer Status	Red LED Indicator	Contact Cartridge Status			
					Instantaneous		Timed	
					N.O.	N.C.	N.O.	N.C.
On-delay	On	No	Reset	Off	Open	Closed	Open	Closed
		Yes	Timing	Flashing	Closed	Open	Open	Closed
		Yes	Timed Out	On	Closed	Open	Closed	Open
	Off	No	Stable	Off	Open	Closed	Open	Closed
		Yes	Stable	Off	Closed	Open	Open	Closed
Off-delay	On	Yes	Reset	On	Closed	Open	Closed	Open
		No	Timing	Flashing	Open	Closed	Closed	Open
		No	Timed Out	Off	Open	Closed	Open	Closed
	Off	No	Stable	Off	Open	Closed	Open	Closed
		Yes	Stable	Off	Closed	Open	Open	Closed

**Note:** When the timer is energized or times out in the on-delay mode, an N.O. contact may close before an N.C. contact opens; this can occur because of inherent operating characteristics. Similarly, when the timer is deenergized or times out in the off-delay mode, an N.C. contact may close before an N.O. opens. Assured contact overlap or non-overlap cannot be provided in the same device.

## Terminals

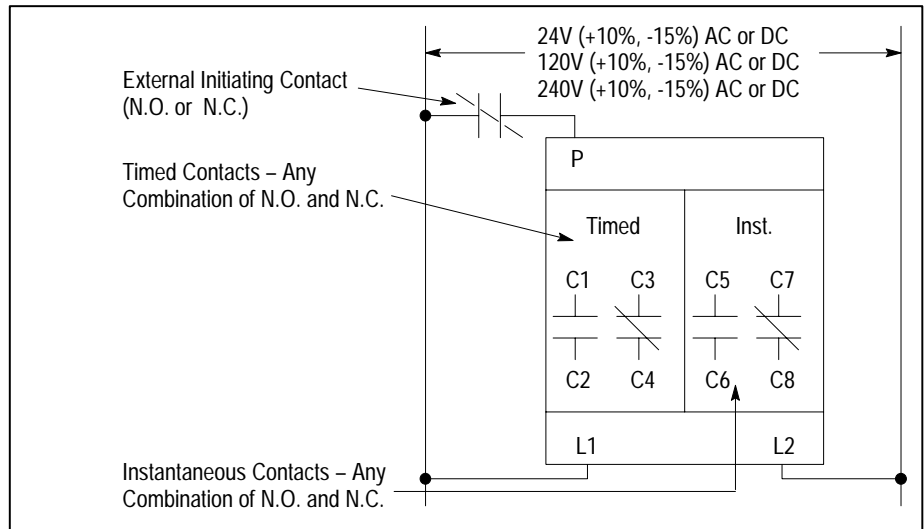
Terminal clamps are designed for solid or stranded copper wire (strip ends to 7.9mm [5/16"]). Use 7 – 8 lb.-in. of torque to tighten the terminal clamps. Wire size: (1) #18 AWG (.75mm<sup>2</sup>) minimum to (2) #12 AWG (14.0mm<sup>2</sup>) maximum.

## Wiring

Make connections as shown in Figure 3. Power is applied continuously to terminals L1 and L2. Voltage applied and removed at initiating terminal P will operate the instantaneous contacts and initiate timing as indicated in Table 1.

Use insulated copper wire rated at 75°C (167°F) or higher.

**Figure 3**  
**Timer Power and Initiate Circuit Connections**



## Connecting Remote Potentiometer

Type RTCR Timing Relays are designed for use with an external potentiometer (400K ohms maximum resistance). Recommended potentiometers and required connecting cables are listed below.

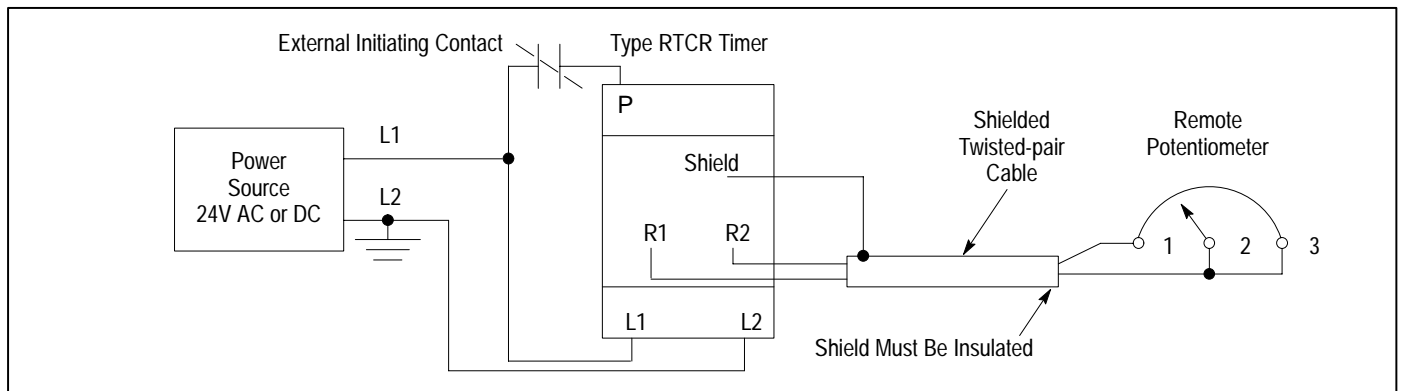
Potentiometer Construction	Catalog Number
Bulletin 800T NEMA Type 13 Oiltight	800T-U90
Bulletin 800MR Small NEMA Type 13 Oiltight - Round	800MR-N37❶
Bulletin 800MS Small NEMA Type 13 Oiltight - Square	800MS-N37❶

❶ 1 operator only - suitable for 400K ohm potentiometer.

**Connection Cable** – Use shielded twisted pair cable, maximum of 50 feet. Recommended cable (or equivalent): UL Style 2517, having two #18 stranded conductors with aluminum mylar foil shield and #20 drain wire rated 105°C (221°F), FR-1, 300V.

In the connection drawing (Figure 4 on page 5), note that the shield is connected to the terminal marked “Shield” at one end and is insulated and not connected at the other end. The L2 terminal should be grounded at the power source.

**Figure 4**  
**Remote Potentiometer Connections**



## Manual Actuator

Timer can be equipped with a manual actuator (Cat. No. 700-N7) which is used to energize the initiate circuit (Terminal P) manually using a separate voltage source, 24V and 120V AC/DC only. It can be easily installed in the field.

## Specifications

### Voltage and Power Requirements

AC Voltage 50/60 Hz +10%, -15%	Total Power Required	Initiate Terminal P Power	Coil Code
24V AC	8VA	4VA	U24
110-120V AC	9VA	4VA	U1
220-240V AC	11VA	5VA	U2
DC Voltage +10%, -15%	Total Power Required	Initiate Terminal P Power	Coil Code
24V DC	10W	5W	U24
120V DC	11W	5W	U1
240V DC	12W	5W	U2

**Repeat Accuracy:**  $\pm 1\%$  or  $\pm 50$  milliseconds at constant voltage and temperature.

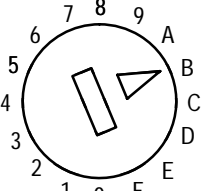
**Maximum Available Leakage Currents:** 240V – 2.4mA RMS, 120V – 2.4mA RMS, 24V – 10mA RMS.

**Reset Time:** 25 milliseconds required.

**Operating Mode:** On-Delay and Off-Delay. For instructions, refer to “Setting the Mode and Timing Range” on Page 3.

### Timing Ranges and Switch Positions – Types RTC and RTCR

## Specifications (continued)

	On-Delay				Off-Delay			
	Timing Range (Seconds)	Switch Position	Timing Range (Minutes)	Switch Position	Timing Range (Seconds)	Switch Position	Timing Range (Minutes)	Switch Position
	2.0 - 120	8	1 - 64	C	2.0 - 120	0	1 - 64	4
	0.4 - 30	9	0.25 - 16	D	0.4 - 30	1	0.25 - 16	5
	0.2 - 8	A	0.06 - 4	E	0.2 - 8	2	0.06 - 4	6
0.05 - 2	B	0.015 - 1	F	0.05 - 2	3	0.015 - 1	7	

**Temperature Range:**  $-20^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$  to  $+140^{\circ}\text{F}$ )

For altitudes above 2000 meters (1.24 miles):  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$  to  $+122^{\circ}\text{F}$ ). For CONTINUOUS DUTY and units placed close or next to each other (3 in a row), use  $-20^{\circ}\text{C}$  to  $45^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$  to  $+113^{\circ}\text{F}$ ) or circulate air around units.

### Contact Ratings - NEMA B600, P300

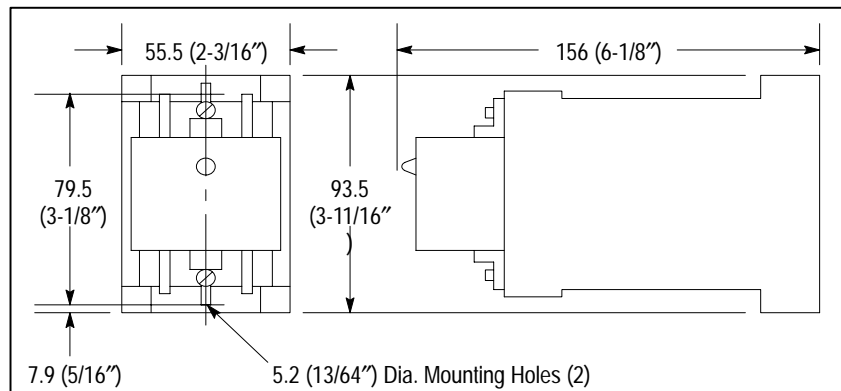
AC, 60/50 Hz - NEMA B600					DC - NEMA P300		
Maximum Volts	Amperes		Voltamperes		Maximum Volts	Amperes	Voltamperes
	Make	Break	Make	Break			
120	30	3.00	3600	360	125 250	1.1 0.55	138
240	15	1.50					
480	7.5	0.75					
600	6	0.60					
Continuous Current Rating 5 Amps					Continuous Current Rating 5 Amps		

## Dimensions

These timing relays can be mounted directly on a panel or installed on Bulletin 700 Type MP mounting strips. Dimensions are shown below.

### Mounting Dimensions

Dimensions in millimeters (inches). Dimensions are approximate and are not intended to be used for manufacturing purposes.



### Enclosure Dimensions

124mm (4.88") x 195mm (7.69") x 178mm (7") deep (Cat. No. 700-N31)