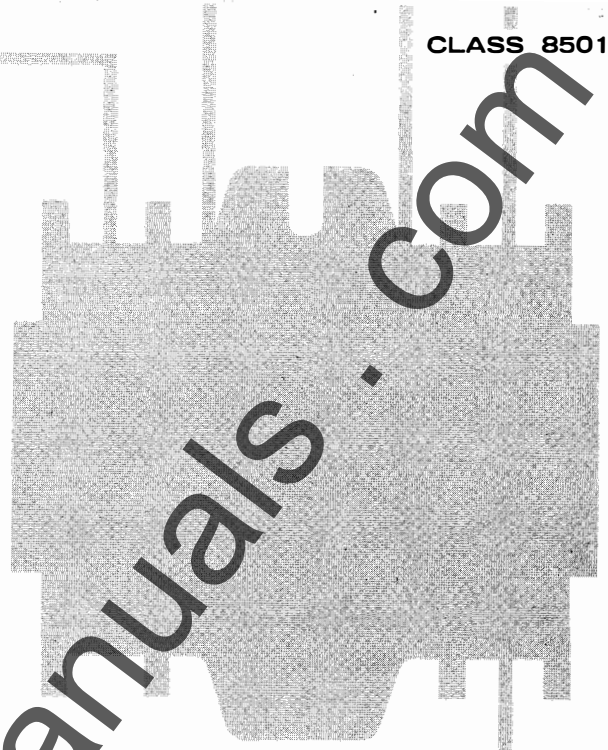
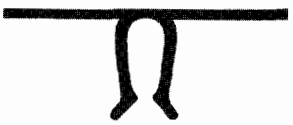
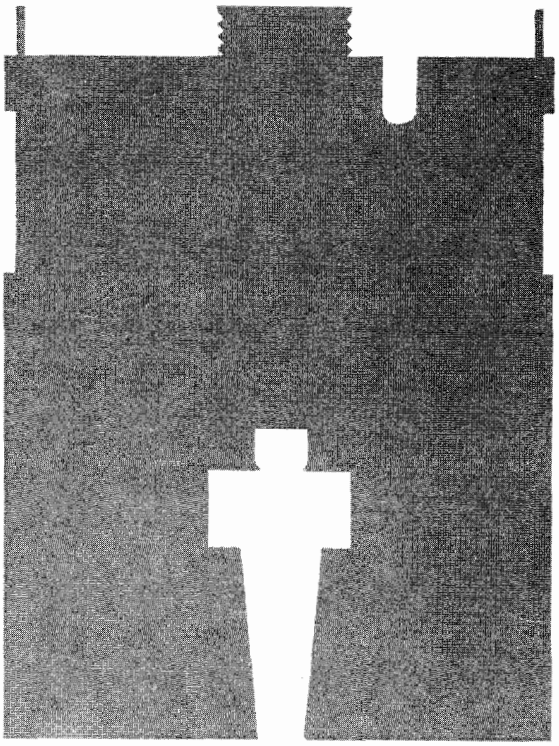
CLASS 8501

Wherever Electricity is Distributed and Controlled





Control Systems Relays



SQUARE D COMPANY

A NEW CONCEPT IN CONTROL SYSTEMS DESIGN

300 VOLT AC AND DC CONTROL SYSTEMS RELAY — CLASS 8501 TYPE G

The age of automation with its complex machines requires increasingly more control components. The relay of a few years ago is inadequate. Today, relays must be smaller, more reliable and easier to mount, wire and maintain.

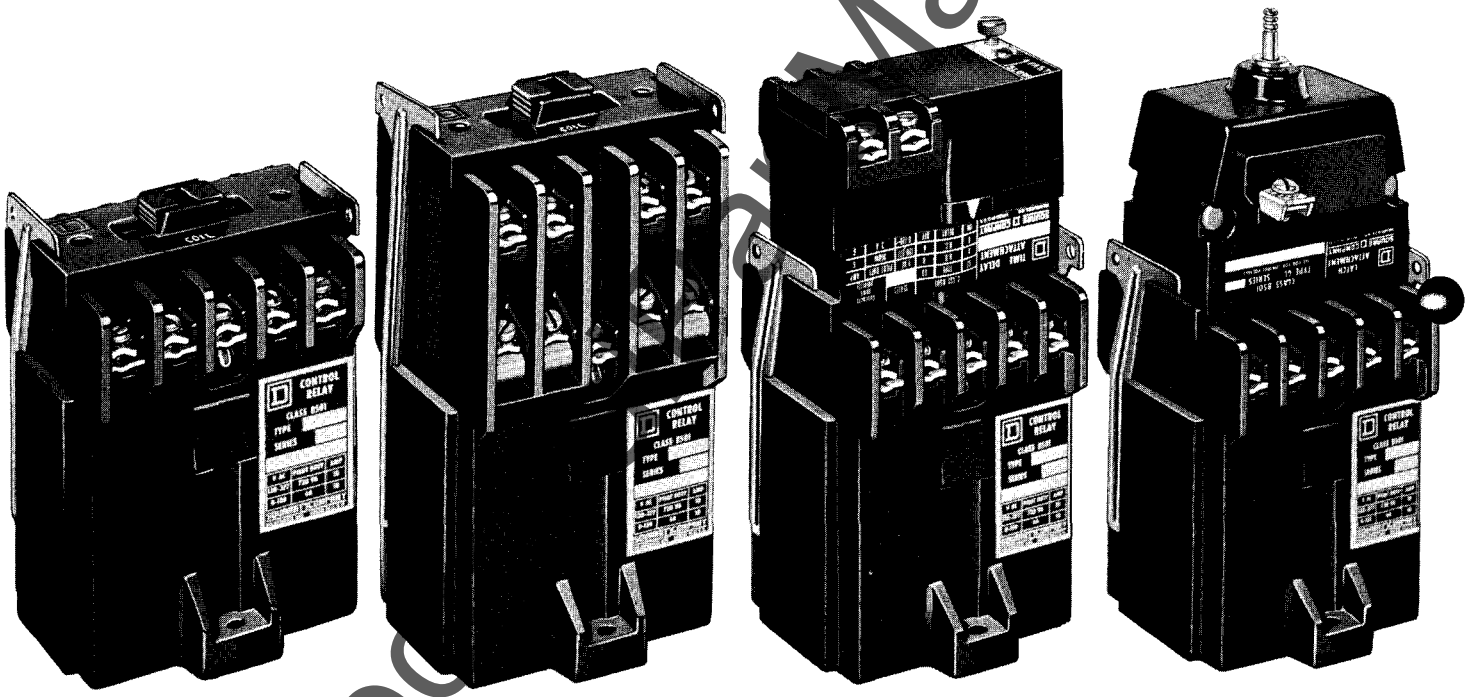
Square D Company, originator of the first machine tool relay, in keeping pace with the advances of automation, now introduces a new two through eight pole, 300 volt ac and dc systems relay. This relay has all of the features you've asked for — and more.

This is not just another control relay. It's a complete system designed to do a complete job — and to do it better!

Among the important features of this relay —

- **Small size**
- **Makes its own duct**
- **Convertible contacts**
- **Modular construction**
- **Timer and mechanically held attachments**
- **Manually operable**
- **Captive pressure wire connectors**
- **AC or DC operation**

Look through the pages of this brochure, and you'll see why no other relay on the market can match these features.

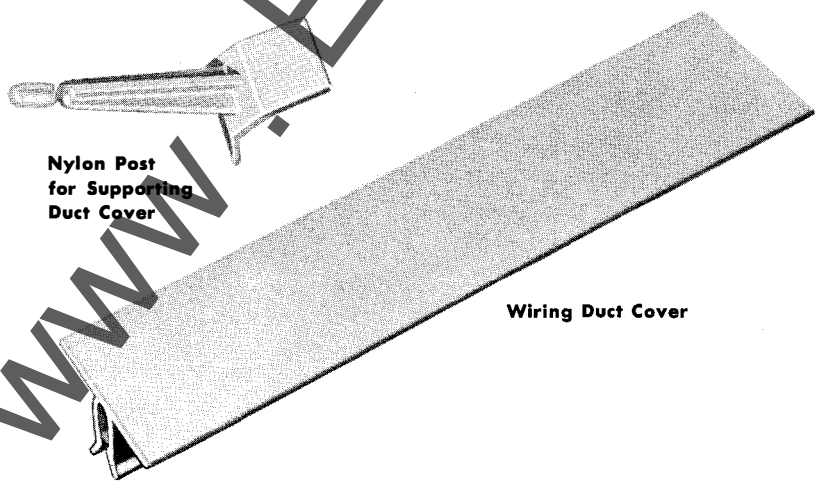


Class 8501 Type G
2, 3 or 4 Pole Relay

Class 8501 Type G
6 or 8 Pole Relay

Class 8501 Type G
Relay with Timer Attachment

Class 8501 Type G
Relay with Mechanically Held Attachment



Nylon Post for Supporting Duct Cover

Wiring Duct Cover

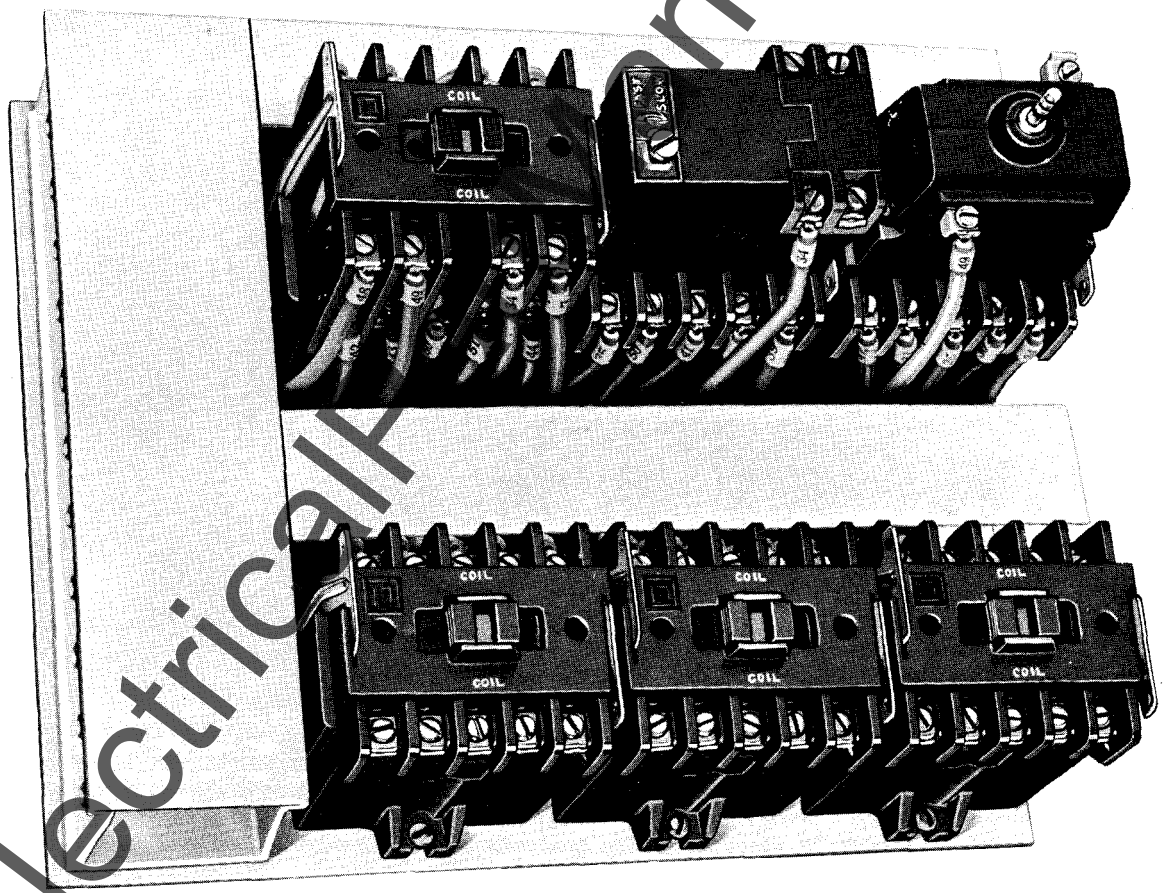
Pictured here are the components for a complete system — the 2 through 8 pole relays, with all contacts instantly convertible, the timer and mechanically held attachments, and the duct posts and duct cover. These components are easy-to-mount, wire and maintain and combine to make a perfect panel with a minimum of panel area.

BIG SAVING OF PANEL SPACE

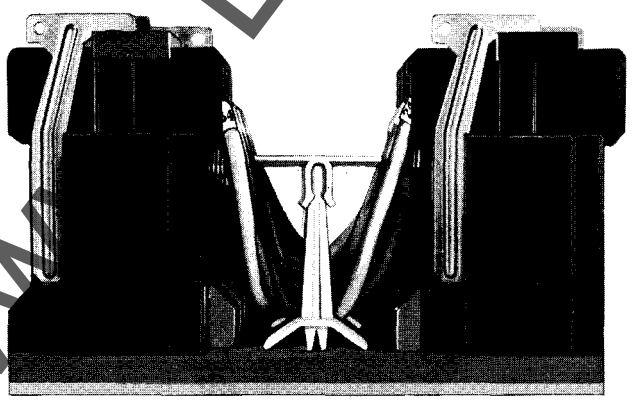
NEW RELAY MAKES ITS OWN DUCT

Panel size has always been a problem. Through the years, control manufacturers have continuously tried to make relays smaller in order to conserve valuable space. But making relays smaller is only part of the answer because on most panels, wiring room and wiring duct occupy over 50% of the panel area. Square D has the *complete* answer in its new control systems relay design.

Square D's new systems relay, in addition to being smaller itself, also saves panel space by reducing the area required for wiring to an absolute minimum. Because of its modular construction, the relays can be butted together to form a perfect wiring duct. Unique and easy-to-install posts and wiring duct cover assure a professional looking job.



The Modular Type G Systems relay makes neat, easy to wire, panels. The wiring duct cover (center) matches the conventional wiring duct used at the left and top of the panel. Every inch of panel space can be utilized to the fullest.

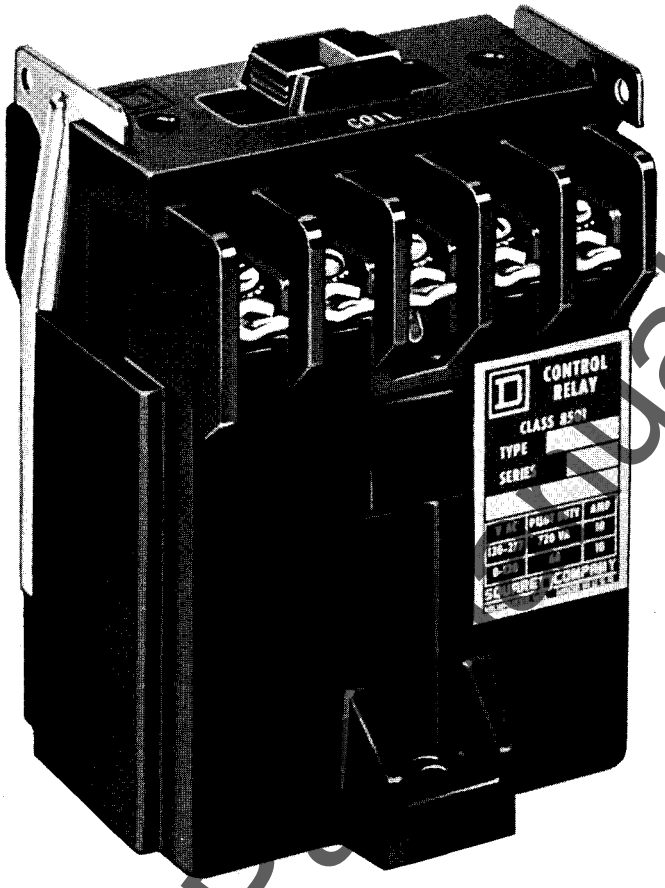


Square D's new duct components are easy to install—save space and money. The molded 2″ or 3″ nylon posts snap easily into a ¼″ hole in the panel. The wiring duct cover, available in white, grey or black and in widths of 1½″, 2″ and 2½″, snaps firmly over the posts, completing the job. *ALL terminals, including the coil terminals, are above the duct.*

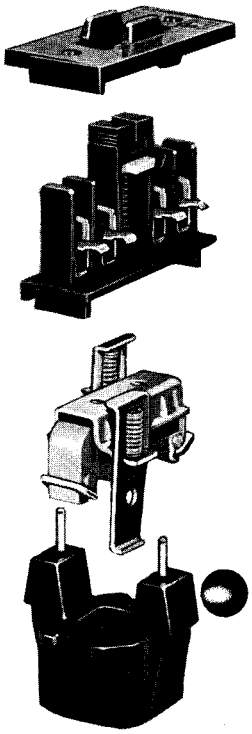
Since the posts and the duct covers are attached to the panel, relay spacing is not critical and the relays can be removed or disassembled without interfering with the duct or wiring.

CONTROL SYSTEMS RELAY...WITH ALL

Keyed to the progress of automation, this new control systems relay will appeal to men who buy machines as well as those who build them. These men know that the Square D nameplate means consistent performance, reliability, long life and simplified maintenance.

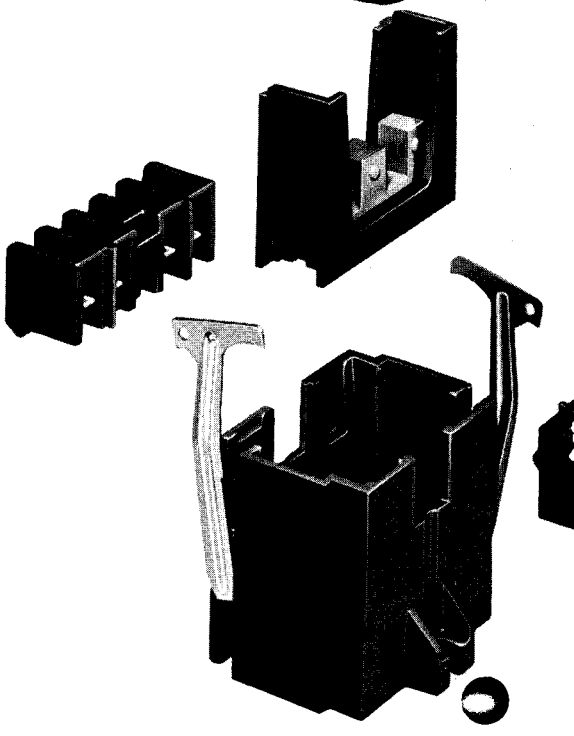


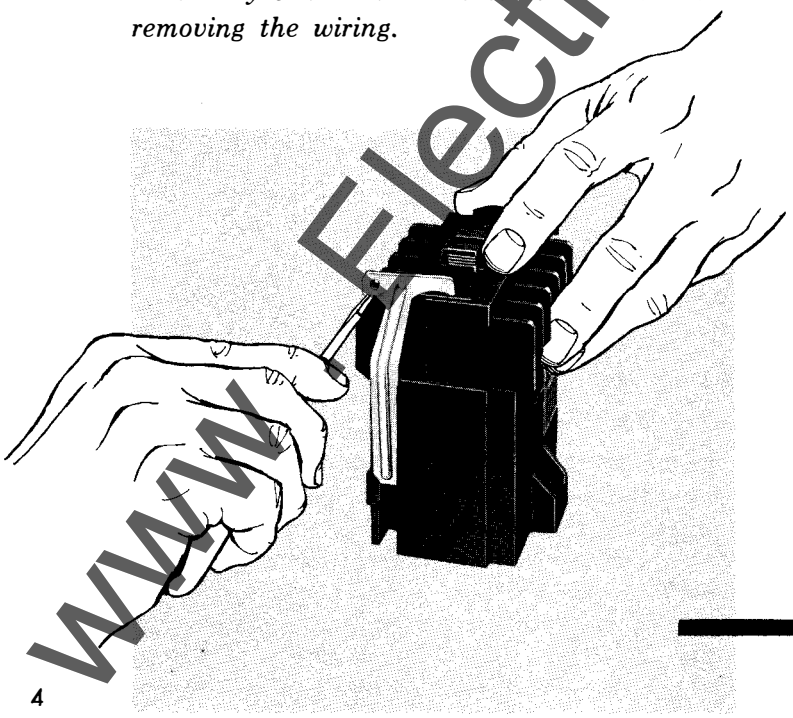
FULL SIZE



DISASSEMBLE IN SECONDS

This relay is designed to disassemble easily and quickly for coil changes, contact conversion or inspection. Just lift the latches and disassemble — the job can be done in seconds. No special tools are required and no screws need be removed. *This relay can even be disassembled without removing the wiring.*

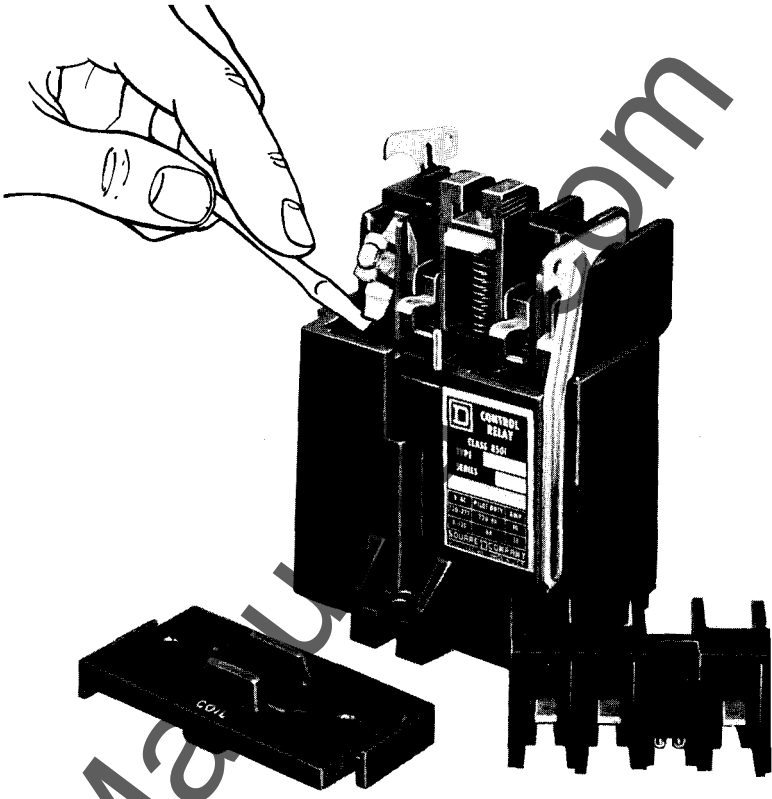


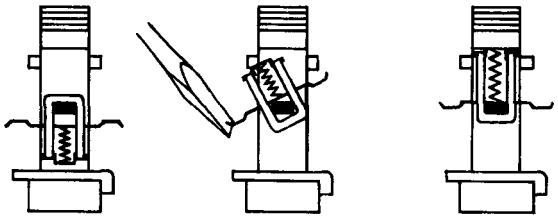


THE FEATURES!

"FINGER-TIP" CONVERTIBILITY

One of the outstanding features of this new systems relay is the ease with which the contacts can be converted from normally open to normally closed, or vice versa. Simply lift the latches, remove the top plate and one stationary contact block, flip the movable contact assembly over with the tip of a screwdriver and reassemble. The job can be done in seconds without removing any screws or adding other parts. Stationary contacts are faced with silver on both sides and need not be touched when making the conversion. All of the contacts are double break and are individually convertible, thus any contact combination can be made.

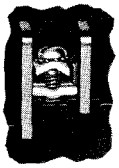


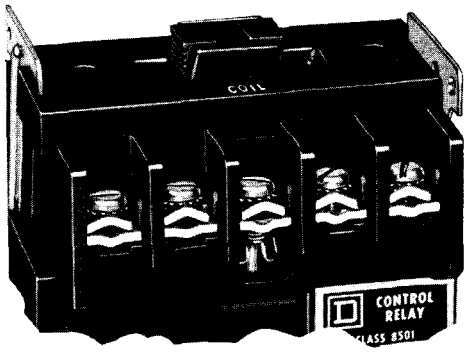


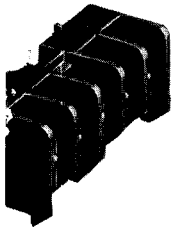
Normally Open Contact | Contact Being Converted | Normally Closed Contact

EASY-TO-WIRE TERMINALS

All terminals, including the coil terminals, are conveniently located near the top of the relay and are in a horizontal line for easy wiring. Terminals are all above the duct cover, thus wires are visible and can be identified and checked out. Pressure wire connectors are standard and will accommodate up to two No. 12, 14, 16 or 18 wires. Pressure wire clamps are of the self lifting (captive) type making insertion of wires quick and easy. Slip-on connectors are also available.

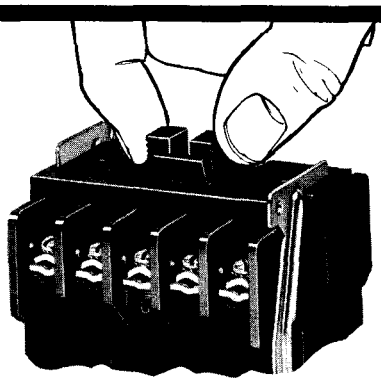






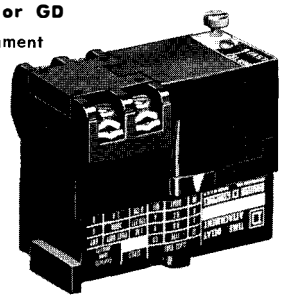
MANUALLY OPERABLE

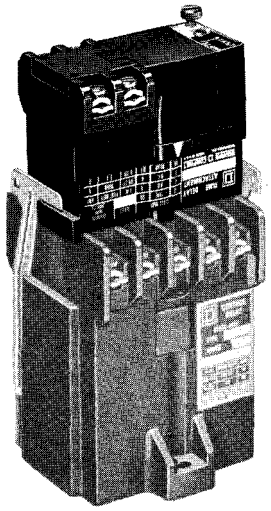
with visual indication of operation.



PNEUMATIC TIMER ATTACHMENT

Class 8501 Type GE or GD
Pneumatic Timer Attachment





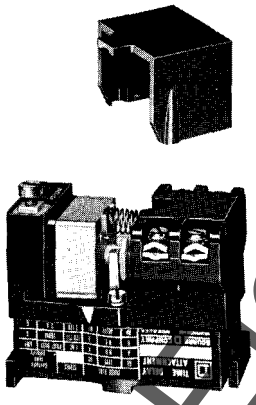
Class 8501 Type GO-40-GE
Pneumatic Timer Attachment
Mounted on 4 Pole Relay

Since timing relays are invariably used on control panels, they must be considered as a part of the relay system. Also, since the modular construction of the control relays permits optimum spacing arrangement, the timing relays must fit this modular scheme.

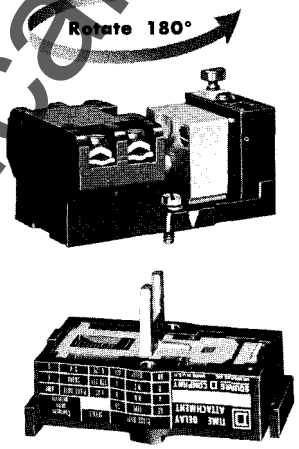
Square D's pneumatic timer attachment fits on top of a standard 2, 3 or 4 pole ac relay or on a dc relay having no instantaneous contacts. It can be added to an existing relay without requiring any additional panel space, drilling or duct.

The pneumatic timer attachment can be installed in seconds — just lift the latches and replace the relay top plate with the timer attachment. If desired, the relay and timer attachment can be purchased completely assembled.

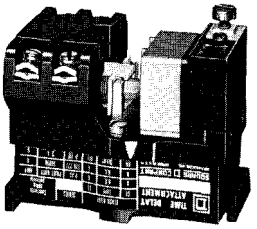
The timer attachment is quickly convertible from time delay on energization (on delay) to time delay after de-energization (off delay). The timer attachment provides single pole, double throw, double break timing contacts. Timing range is 0.2 seconds — 1 minute and repeat accuracy is within ±15% of setting.



Time delay after de-energization (off-delay)



Time being converted



Time delay after energization (on delay)

TIMER CONVERSION

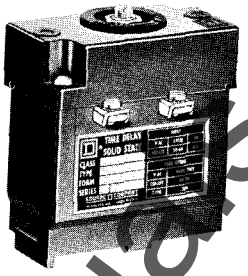
The timer attachment can be easily converted from time delay after de-energization (off delay) to time delay after energization (on delay) or vice versa — lift off the snap-on cover, loosen two self retaining screws, rotate the timing unit 180° and reassemble. Conversion can be made in the field in a matter of seconds. This timer conversion feature adds to the exceptional flexibility of the Type G systems relay.

SOLID STATE TIMER ATTACHMENT

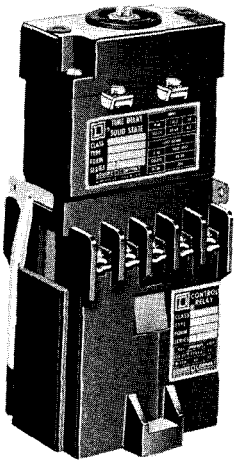
The Class 8501 Type GT Solid State Timer is designed for applications requiring accurate timing and easily adjustable timing periods. It is initiated from a normally open contact and has a single pole single throw output contact.

The Solid State Timer features an adjustable potentiometer for ease in selecting the desired timing period. The timing period is adjustable from .2 seconds to 30 seconds with a repeat accuracy of 6% within a temperature range of 25°C to 60°C and within a voltage range of 102 to 132 volts when the reset time is greater than .1 second. Accuracy of better than ±2% can be obtained with constant temperature, voltage and reset time. The adjusting potentiometer is affixed to the module but may be removed for remote mounting at distances up to 100 feet.

The Class 8501 Type GT Timer consists of encapsulated components to prevent damage from shock, vibration, or atmospheric contaminants. It can be panel mounted, door mounted, or mounted as an attachment on the ac or dc Type G systems relay.



Class 8501 Type GT01
Solid State
Timer Attachment



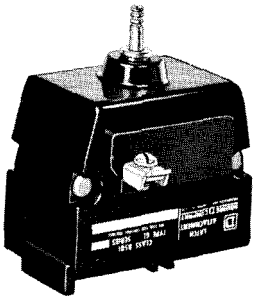
Class 8501 Type GO-40-GT01
Solid State
Timer Attachment
Mounted on
4 Pole Relay

MECHANICALLY HELD ATTACHMENT

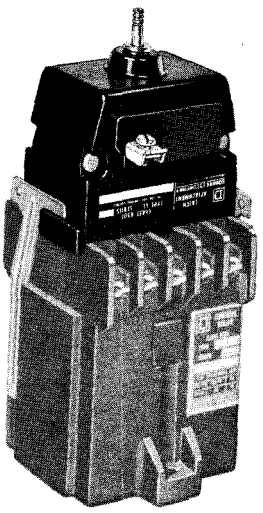
Mechanically held relays are required for many machine functions. Square D's mechanically held attachment fits all relays, 2-8 poles and can be purchased assembled on the relay or separately for field mounting.

The mechanically held attachment can be added to a standard relay quickly and easily — lift the latches, remove the top plate, insert the attachment shaft in the slot on the top of the contact carrier and mount the attachment.

This attachment converts any standard 2 through 8 pole relay to a mechanically held relay. Since it increases the height dimension only, it does not interfere with the modular system of panel layout. Features of the mechanically held attachment include a continuous duty coil and manual operation both for the latch and unlatch functions.



Class 8501 Type GL
Mechanically Held
Attachment



Class 8501 Type GO-40-GL
Mechanically Held
Attachment Mounted
on 4 Pole Relay

DIMENSIONS AND ENGINEERING DATA

AC ELECTRICAL RATINGS‡

Volts	Relay Contacts		Timer Contacts	
	Pilot Duty	Amps.	Pilot Duty	Amps.
0-120	6 Amps.	10	3 Amps.	6
120-277	720 VA	10	360 VA	6

‡The ac continuous ampere rating is based on a 75% power factor. The ac pilot duty rating is based on a 35% power factor.

DC ELECTRICAL RATINGS•

Volts	Relay Contacts		Timer Contacts	
	Pilot Duty •	Amps.	Pilot Duty Amps. • Single Throw	Pilot Duty Amps. • Double Throw
115	125 VA	.5	.5	.2
230	125 VA	.5	.25	.1

•DC pilot duty is based on inductive loads such as coils and solenoids.

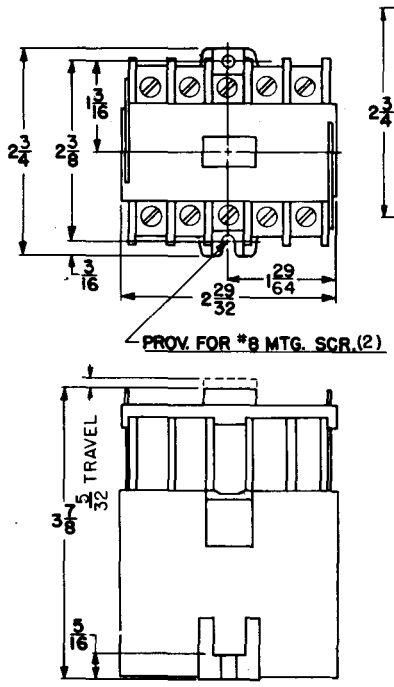
AC COIL DATA

	2, 3 and 4 Pole	6 and 8 Pole
Inrush	65 VA	100 VA
Sealed	9 VA	13 VA

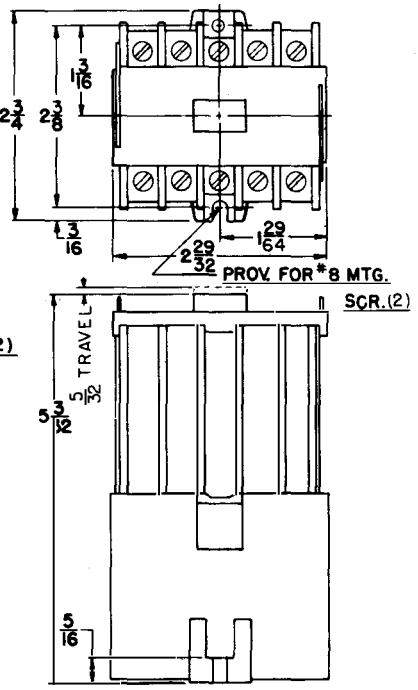
Average Pick-up and Drop-out Time of all basic Relay Pole Arrangements (not with timer or mechanically held attachment)

Average Pick-up Time.....11 Milliseconds

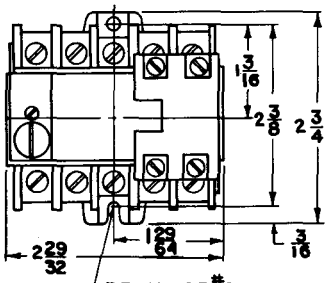
Average Drop-out Time..... 6 Milliseconds

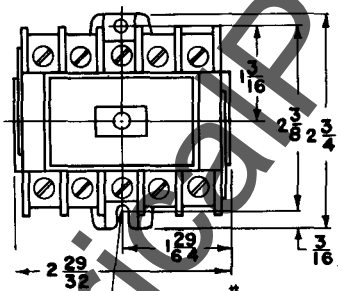


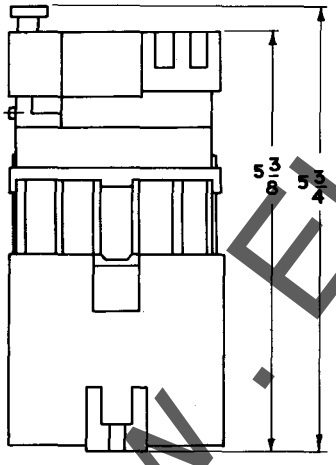
Outline Dimensions for 2, 3 or 4 Pole Relay



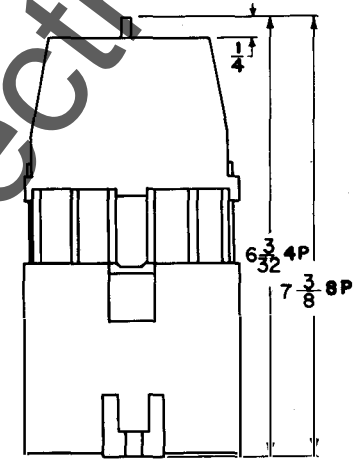
Outline Dimensions for 6 or 8 Pole Relay



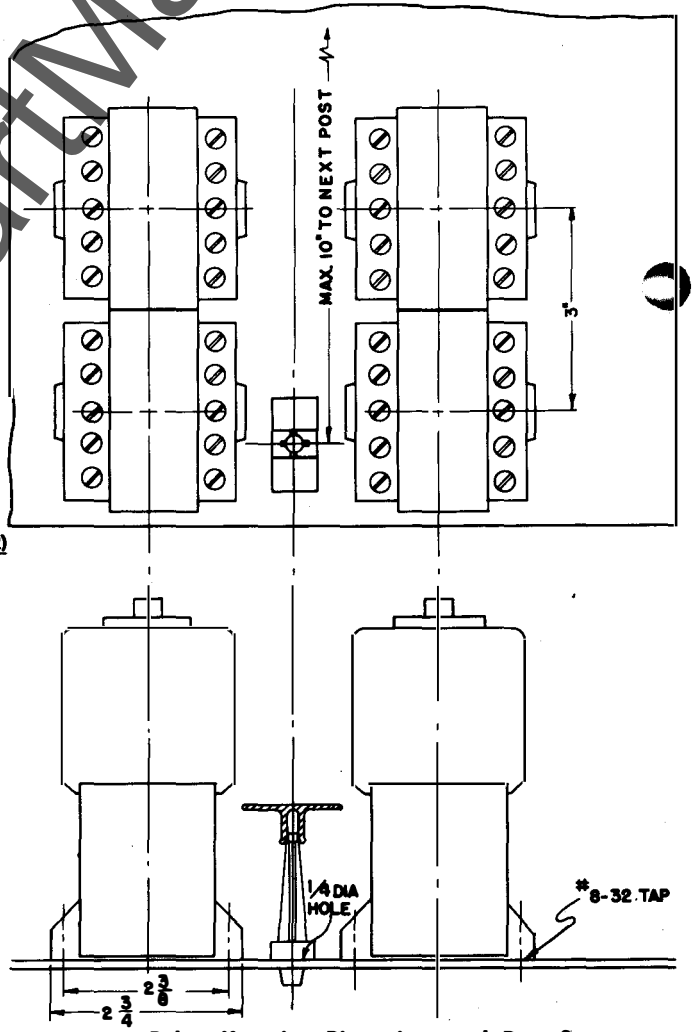




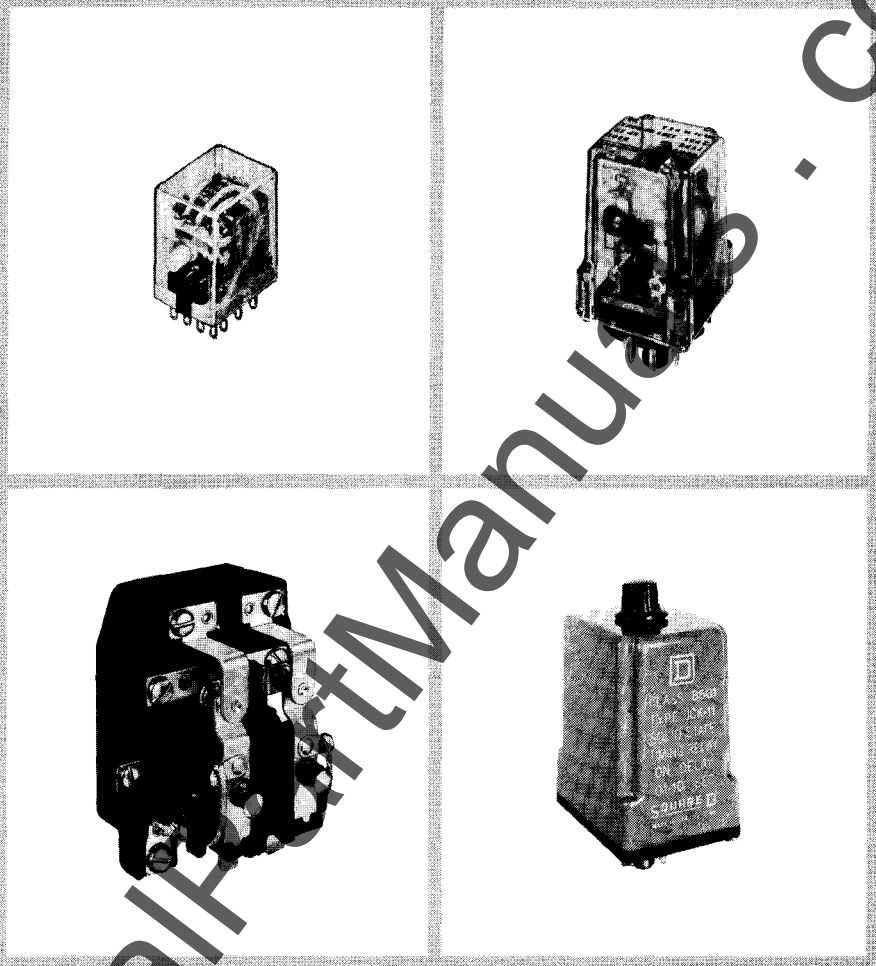
Outline Dimensions for 0, 2, 3 or 4 Pole Relay with Timer Attachment



Outline Dimensions for 2-8 Pole Relay with Mechanically Held Attachment



Relay Mounting Dimensions and Duct System Spacing Between Rows of Relays Dependent on Number of Wires Used.



Relays & Timers
AC & DC General Purpose

CONTENTS

SQUARE D COMPANY

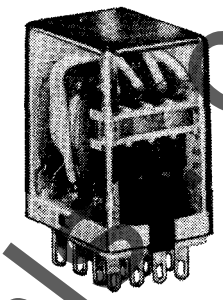
CLASS 8501

GENERAL PURPOSE CONTROL RELAYS

TYPE R

OCTOBER, 1982

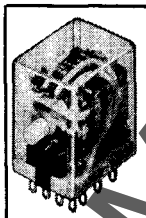
The Type R relay is suited for use both as a logic element and as a power switching output device. Because of the low mass and short stroke motion of the armature it has the extremely long mechanical life required for high speed control systems. Gold flashed fine silver contacts are available to provide high contact reliability. Gold flashed silver cadmium oxide contacts are available for weld resistance on inductive and motor loads.



- LONG LIFE
- HIGH CONTACT RELIABILITY
- HORSEPOWER RATED
- COMPLETE SOCKET LINE
- MANUAL OPERATOR OPTION
- AC OR DC OPERATION

Contacts 4PDT 120 or 240 Volts AC Max. 28 Volts DC Max.	Operation	Terminals Solder or Plug-in Type
Fine Silver — Gold Flashed **3 Amp.** Resistive Best for low level switching.	AC 50/60 Hz.	RS4
Application data below.	DC	RSD4
Silver Cadmium Oxide — Gold Flashed **5 Amp.** Resistive Best for switching inductive loads	AC 50/60 Hz.	RS14
Application data below	DC	RSD14

FACTORY MODIFICATIONS



Form M1

Form	Feature	Function
M1	Manual Operator	Permits manual operating of contacts
P14	Pilot Light	Indicates Power To Coil

APPLICATION DATA

OPERATING DATA

Pick Up Time: 13ms typical.
Drop Out Time: 6ms max.
Ambient Temperature Range: −45°C to +70°C (−49°F to +158°F)

CONTACTS

Configuration: 4PDT (4 Form C)
Material: Fine Silver — Gold Flashed, or Silver Cadmium Oxide — Gold Flashed
Voltage Ratings: 120 or 240VAC max., 28VDC max.

GENERAL

Terminals: Types RS, RSD-Solder/plug-in suitable for sockets listed on page 4-5.

ORDERING INFORMATION REQUIRED — See Page 4-10.

UL/CSA

Type R relays are UL component recognized under File E 42240 Guide NLDX2. The Type R relay, when used with the Type NR-45 socket, is UL Listed under File E 42240 Guide NLDX. Type R relays are CSA approved under File 15734.

DIMENSIONS:

See Page 4-6 for relay dimensions.

COILS

Duty: Continuous rated coils
Standard Voltages: See tables below.
Voltage Range: AC coils: +10%, −15% of nominal
DC coils: +10%, −25% of nominal
Burden: AC coils: 2.5 VA inrush, 1.2 VA sealed
DC coils: 0.9 watts
Frequency: 50/60Hz (AC)

MAXIMUM ELECTRICAL CONTACT RATINGS

Contact Material	AC Amperes						DC Amperes			
	AC Volts	Inductive 35% P.F. Make	Inductive 35% P.F. Break	Inductive 35% P.F. Continuous	Res. 75% P.F. Make Break & Continuous	HP	DC Volts	Inductive Make	Inductive Break	Res. Make Break & Continuous
Silver Cadmium Oxide Gold Flashed	120	15	1.5	5	5	1/10	28	1.5	1.5	5
	240	7.5	.75	5	2.5	1/10	...	...	...	...
Fine Silver — Gold Flashed	120	15	1.5	3	3	....	28	1.5	1.5	3

STANDARD COILS

Volts	Ohms	
	AC 50/60 Hz	DC
6	10.5	40
12	43	160
24	160	650
48	668	2600
110	.....	11000
120	3900	.....
240	12000	.....

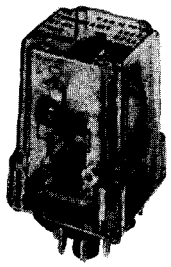
GENERAL PURPOSE CONTROL RELAYS
TYPE K

CLASS 8501

Class 8501 Type K general purpose control relays are designed for multipole switching applications at, or below 240 volts. Class 8501 Type K relays have an industry standard wiring and pin arrangement which allows their use as replacements for many similar relays without wiring or hardware modifications.

- 240 Volt 10 Amp.
- AC or DC Operation
- DPDT or 3 PDT
- Manual Operator Option (Type KU Only)
- Pilot Light Option (Type KU & KP Only)
- UL Component Recognized

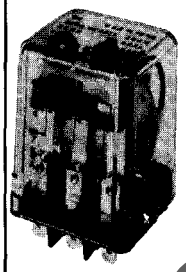
TYPE KP — TUBE TYPE TERMINATION



Type KP
Tube Type

Type KP	Operation	Contacts	Type
10 Amp. Res. 240 Volts Tube Type Socket Mounted Use Type NR Sockets Listed on Page 4-5	AC 50/60 Hz	DPDT	KP-12
		3PDT	KP-13
	DC	DPDT	KPD-12
		3PDT	KPD-13

TYPE KU — SQUARE BASE TERMINATION



Type KU
Square Base

Type KU	Operation	Contacts	Type
10 Amp. Res. 240 Volts Square Base Socket Mounted Use Type NR Sockets Listed on Page 4-5	AC 50/60 Hz	DPDT	KU-12
		3PDT	KU-13
	DC	DPDT	KUD-12
		3PDT	KUD-13

TYPE KF — FLANGE MOUNTED — SQUARE BASE TERMINATION

Type KF
Flange Mounted

Type KF	Operation	Contacts	Type
10 Amp. Res. 240 Volts Flange Mounted Use .187 Slip-on Connectors or Solder Connections	AC 50/60 Hz	DPDT	KF-12
		3PDT	KF-13
	DC	DPDT	KFD-12
		3PDT	KFD-13

FACTORY MODIFICATIONS FOR TYPES KP & KU RELAYS

Form	Feature	Function	Available on Relay Types
P14	Pilot Light	Indicates Power to Coil	KP, KU
M1	Manual Operator	Manual Closing of Contacts	KU

APPLICATION DATA

OPERATING DATA

Pick Up Time: Approximately 15 ms.
Drop Out Time: Approximately 10 ms.
Ambient Temp. Range: AC: 2 pole: −45°C to +55°C
3 pole: −45°C to +45°C
DC: −45°C to +70°C

CONTACTS:

Configuration: 2 or 3 PDT (2 or 3 Form C)
Material: Silver Cadmium Oxide
Ratings: See table below

UL/CSA

Type K relays are UL component recognized under File E42240 Guide NLDX2. Types KF and KU relays are CSA approved under File 1573451M Guide 184-N-13.13 and Type KP relays under File 25490C Guide 184-N-13.1U. The Type K relays with the Type NR Sockets are UL listed under File E42240 Guide NLDX.

DIMENSIONS:

See Page 4-6 for relay dimensions.

ORDERING INFORMATION REQUIRED — See Page 4-10.

COILS

Duty: Continuous
Standard Voltages:

	KP	KU, KF
AC	6,12,24,48,120,240	6,12,24,48,120,240
DC	6,12,24,48,110,125,130	6,12,24,48,110

Operate: AC: 85% of Nominal Voltage at 25°C
DC: 75% of Nominal Voltage at 25°C.

Burden: Type KP: AC: 3 VA inrush, 2 VA sealed
DC: 1.2 watts standard
3 watts maximum
Types KU, KF: AC: 2 pole — 3 VA inrush, 2 VA sealed
3 pole — 5.4 VA inrush, 2.7 VA sealed
DC: 1.2 watts standard
3 watts maximum

TYPE K — MAXIMUM ELECTRICAL CONTACT RATINGS

AC						DC		
Volts	Amperes				HP	Volts	Amperes	
	Inductive 35% PF ▲			Resistive 75% PF			Inductive ▲	
	Make	Break	Continuous	Make, Break & Continuous			Make Break	Continuous
120	30	3	10	10	¼	24-110	60 VA	10 A
240	15	1.5	10*	10*	⅓			

▲Based on inductive loads such as coils and solenoids.
*3 pole devices have 6⅔ Amps max. continuous rating.

COIL RESISTANCE — OHMS

Volts	KP		KU & KF		
	AC 50/60 Hz	DC	AC 50/60 Hz		DC
			2 Pole	3 Pole	
6	6.0	32	6.0	4.2	32.1
12	24	120	24	18	120
24	85	472	85	72	472
48	—	1800	—	—	1800
110	—	10,000	—	—	10,000
120	2250	—	2250	1700	—
240	9110	—	9110	7200	—

*Resistance values for AC coils above are ±15% @ 25°C, and resistance values for DC coils above are ±10% @ 25°C.

CLASS 8501

GENERAL PURPOSE TIMERS

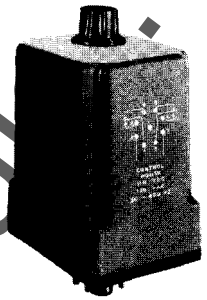
SOLID STATE — TYPE JCK

OCTOBER, 1982

Type JCK timing relays are designed to provide low cost timing in a plug-in housing. A CMOS integrated circuit provides an accurate time delay. The timer is directly interchangeable with many other 8 and 11 pin tube base timers. The Type JCK may be installed using the same mounting sockets as used by the Type KP relay.

- Excellent Repeat Accuracy
- On and Off Delay Versions Available
- Transient Protected
- Dual AC/DC Operation

Timing Mode	Compatible Socket	Timing Range	Type	Timing Mode	Compatible Socket	Timing Range	Type
On delay	Types NR-51, 52 or NR-3	0.1-10 seconds	JCK-11	Off delay	Types NR-61, 62 or NR-4 Listed on Page 4-5	0.1-10 seconds	JCK-21
		0.3-30 seconds	JCK-12			0.3-30 seconds	JCK-22
		0.6-60 seconds	JCK-13			0.6-60 seconds	JCK-23
		1.2-120 seconds	JCK-14			1.2-120 seconds	JCK-24
		1.8-180 seconds	JCK-15			1.8-180 seconds	JCK-25
		3-300 seconds	JCK-16			3-300 seconds	JCK-26
		6-600 seconds	JCK-17			6-600 seconds	JCK-27



Type JCK

APPLICATION DATA

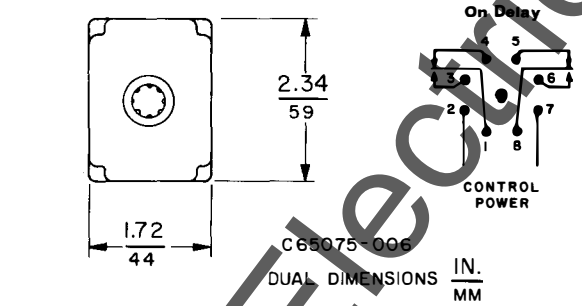
Timing: Knob adjustable with 7 timing ranges of 0.1-10 seconds, 0.3-30 seconds, 0.6-60 seconds, 1.2-120 seconds, 1.8-180 seconds, 3-300 seconds and 6-600 seconds.

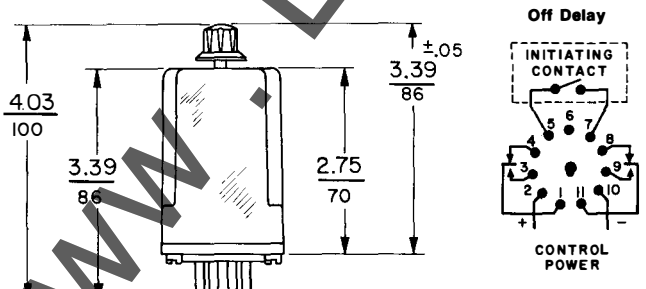
Repeat Accuracy: ± 1% for constant voltage and temperature. ±10% for any variation of voltage and temperature within specifications.

Recycle time: On delay, 100 milliseconds typical and 125 milliseconds maximum. Off delay, 40 milliseconds.

Modes of Operation: On delay, non convertible
Off delay, non-convertible

Operating Voltages: 120VAC/110VDC, 48VAC/DC, 24VAC/DC and 12VAC/DC are available. The timers are dual rated AC/DC. This allows a timer to operate on either an AC or DC voltage. DC on delay versions have no polarity restrictions. For proper operation, the DC off delay version must be wired with the polarity shown in the wiring diagram. Reverse polarity, however, will not damage the timer.





Voltage range: AC operation, + 10%, − 15% of nominal at 50 thru 400 Hz
Dc operation, + 10%, − 20% of nominal.

Burden: On delay — 1 VA during timing, 2 VA after timing
Off delay — 2 VA during timing, 1 VA after timing.

Ambient temperature range:
Operating: − 10°C to + 55° C (14° F to 131° F)
Storage: − 55° C to + 85° C (− 67° F to + 185° F)

Transient protection: 2,000 volts for 100 micro-seconds.

False operation: None.

Dial: Reference scale is marked. At minimum setting the actual time delay may be less than specified and at maximum setting, the time delay may be up to 25% more than specified.

UL: Type JCK timing relays are UL component recognized under File E42259(M) Guide NKCR2.

MAXIMUM ELECTRICAL CONTACT RATINGS

AC Volts	AC Amperes				HP	DC Volts	DC Amperes		
	Inductive 35% P.F.			Res. 75% P.F.			Inductive		Res.
	Make	Break	Continuous	Make Break and Continuous			Make	Break	Make Break and Continuous
120	15	1.5	5	5	1/10	28	1.5	1.5	5
240	7.5	.75	5	2.5	1/10				

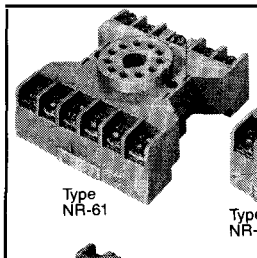
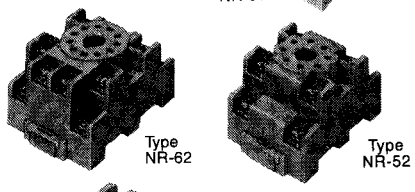
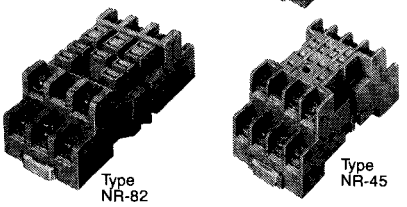
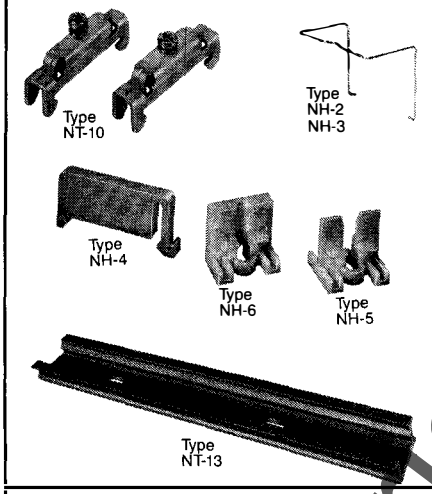
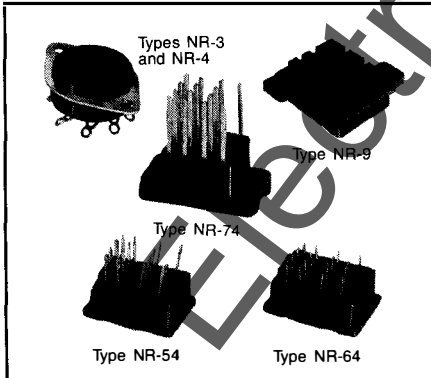
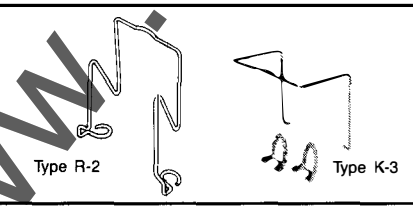
Contact material: Silver Cadmium Oxide

SOCKETS: See table above.

ORDERING INFORMATION REQUIRED

1. Class and type number
2. Input number

SOCKETS

	Relay	Description	Type	Quantity
 Type NR-61 Type NR-51	KP (DPDT) JCK	**SNAPMOUNT DIN RAIL SOCKET (Single Tier)** For use with 8 pin tube base relays. This socket has a single level of terminal connections. Screw terminals are provided with pressure wire clamps that accept 1 or 2 #12-22 wires. This socket can be mounted directly on Type NT-13 DIN Rail Mounting Track.	NR-51	1
	KP (DPDT) JCK	**SNAPMOUNT DIN RAIL SOCKETS (Double Tier)** For use with 8 pin tube base relays. This socket has 2 levels of terminal connections. Screw terminals are provided with pressure wire clamps that accept 1 or 2 #12-22 wires. This socket can be mounted directly on Type NT-13 DIN Rail Mounting Track.	NR-52	1
 Type NR-62 Type NR-52	KP (3PDT) JCK	**SNAPMOUNT DIN RAIL SOCKET (Single Tier)** For use with 11 pin tube base relays. This socket has a single level of terminal connections. Screw terminals are provided with pressure wire clamps that accept 1 or 2 #12-22 wires. This socket can be mounted directly on Class 8501 Type NT-13 DIN Mounting Track.	NR-61	1
	KP (3PDT) JCK	**SNAPMOUNT DIN RAIL SOCKET (Double Tier)** For use with 11 pin tube base relays. This socket has 2 levels of terminal connections. Screw terminals are provided with pressure wire clamps that accept 1 or 2 #12-22 wires. This socket can be mounted directly on Class 8501 Type NT-13 DIN Rail Mounting Track.	NR-62	1
 Type NR-82 Type NR-45	KU	**SNAPMOUNT DIN RAIL SOCKET** For use with 11 pin square base relays. Screw terminals are provided with pressure wire clamps that accept 1 or 2 #12-22 wires. This socket can be mounted directly on Type NT-13 DIN Rail Mounting Track.	NR-82	1
	RS	**SNAPMOUNT DIN RAIL SOCKET** For use with 14 pin square base miniature relays. Screw terminals are provided with pressure wire clamps that accept 1 or 2 #14-22 wires. This socket can be mounted directly on Type NT-13 DIN Rail Mounting Track.	NR-45	1
 Type NT-10 Type NH-2 NH-3 Type NH-4 Type NH-6 Type NH-5 Type NT-13	KP KU	**RELAY RETAINER CLIP** For use with Types NR-51, NR-52, NR-61, NR-62, NR-82, and NR-9 Relay Sockets.	NH-2	Min. Qty. 10*
	RS	**RELAY RETAINER CLIP** For use with Type NR-45 Relay Socket.	NH-3	Min. Qty. 10*
	—	**SOCKET SPACER** For use on DIN Rail Mounting Track when the relay base is wider than the socket base. Use of 1 spacer is recommended between each NR-51 and 2 spacers are recommended between each NR-52 or NR-62 when used with Type JCK Timing Relays. Width of spacer is .197 inches.	NH-4	Min. Qty. 10*
	—	**SOCKET CONNECTOR** For collective panel mounting of the Type NR-82 and Type NR-45 sockets. Connectors fit between sockets.	NH-5	Min. Qty. 10*
	—	**SOCKET END PLUG** For use when panel mounting the Type NR-82 and Type NR-45 either individually or collectively. The End Supporter is used at the outer ends of a socket row.	NH-6	Min. Qty. 10*
	—	**MOUNTING TRACK END CLAMPS** For use with Type NT-13 DIN Mounting Track. Use of end clamps provides security against movement of relay sockets on mounting track.	NT-10	Min. Qty. 10*
	—	**DIN RAIL MOUNTING TRACK** A 40 inch section of DIN rail track for use with Type NR sockets.	NT-13	Min. Qty. 5*
 Types NR-3 and NR-4 Type NR-9 Type NR-74 Type NR-54 Type NR-64	KP (DPDT)	**BACKWIRED SOCKET — SOLDER TERMINALS** For use with 8 pin tube base relays. Mounts in round cutout in chassis. Terminals are pierced to accept 1 or 2 wires.	NR-3	1
	KP (3PDT)	**BACKWIRED SOCKET — SOLDER TERMINALS** Same as above except for use with 11 pin tube base relays.	NR-4	1
	KU	**BACKWIRED SOCKET — SOLDER TERMINALS** For use with 11 pin square base type relays. Mounts in rectangular cutout in chassis.	NR-9	1
	RS	**BACKWIRED SOCKET — SOLDER TERMINALS** For use with 14 pin square base miniature relays — Mounts in rectangular cutout in chassis. A socket mounting clip is provided with each socket. Terminals are pierced to accept one or two wires.	NR-54	Min. Qty. 10*
	RS	**BACKWIRED SOCKET — PRINTED CIRCUIT TERMINALS** For use with 14 pin square base miniature relays. Mounts on printed circuit board.	NR-64	Min. Qty. 10*
	RS	**BACKWIRED SOCKET — WIREWRAP TERMINALS** For use with 14 pin square base miniature relays. Can be wired by hand or by tape controlled automatic machinery. Solid wire from #20 to #26 may be connected using WIREWRAP tools. WIREWRAP is a trademark of Gardner-Denver.	NR-74	Min. Qty. 10*
 Type R-2 Type K-3	KP	**RELAY RETAINER CLIP** For use with Types NR-3 and NR-4 sockets.	K-3	Min. Qty. 10*
	RS	**RELAY RETAINER CLIP** For use with Type NR-74 sockets. Not to be used in conjunction with relays having the Form M1 (manual operator) feature.	R-2	Min. Qty. 50*
	RS	**RELAY RETAINER CLIP** For use with Types NR-54 and NR-64 sockets. Not to be used in conjunction with relays having the Form M1 (manual operator) feature.	R-3	Min. Qty. 25*

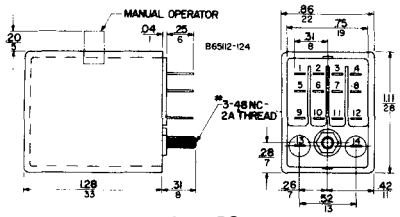
* Must be ordered in multiples of the minimum quantity specified.

ORDERING INFORMATION REQUIRED — Class and type number.

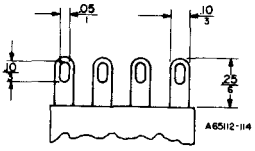
UL/CSA: The Type NR sockets are UL component recognized under file 66924 Guide SWIN2.

GENERAL PURPOSE CONTROL RELAYS

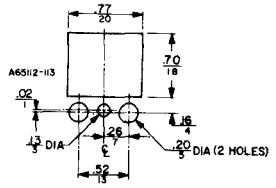
APPROXIMATE DIMENSIONS



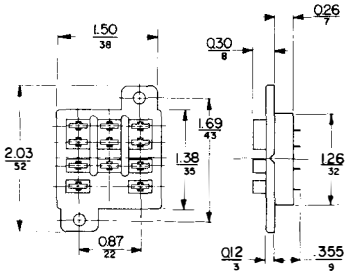
Type RS



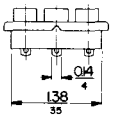
Bottom of 8501 RS

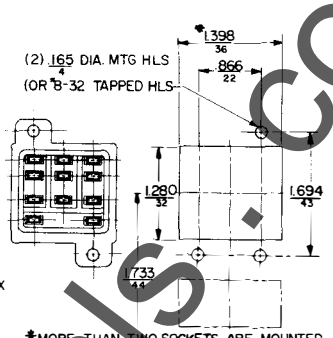


Chassis Cutout RS



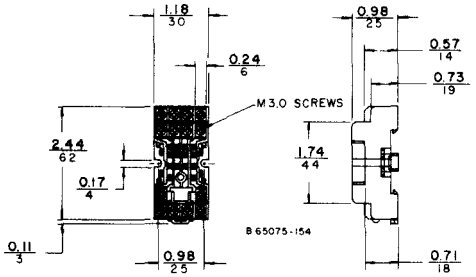
C65075-028



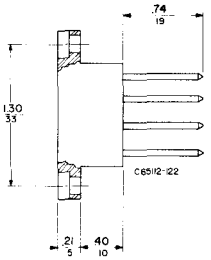


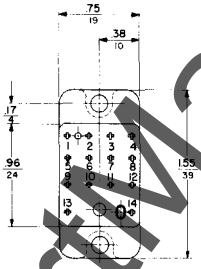
*MORE THAN TWO SOCKETS ARE MOUNTED SIDE BY SIDE.
L = 1.497 (N-1)+1.398
N = NUMBER OF SOCKETS MOUNTED

Type NR-9

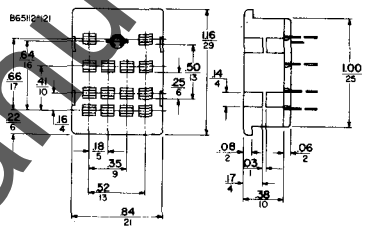


Type NR45

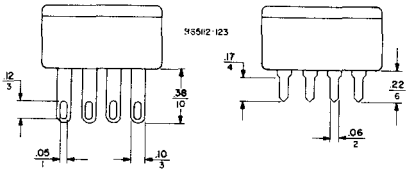




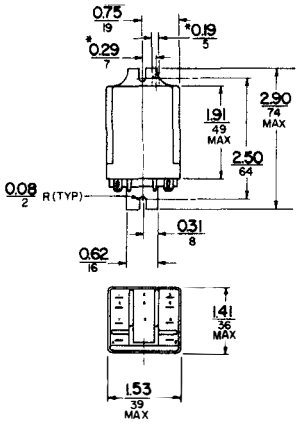
Type NR74



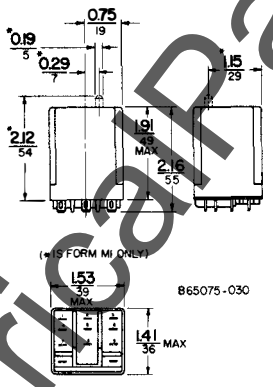
Type NR54 & NR64



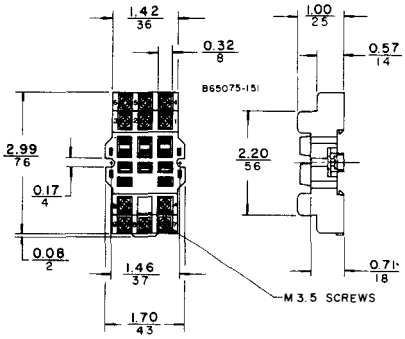
Type NR54 & NR64



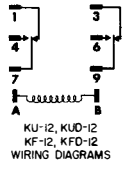
Type KF



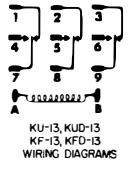
Type KU



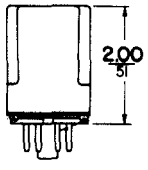
Type NR82

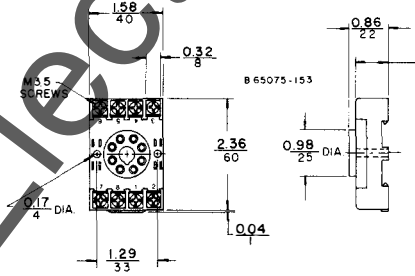


KU-12, KUD-12
KF-12, KFD-12
WIRING DIAGRAMS

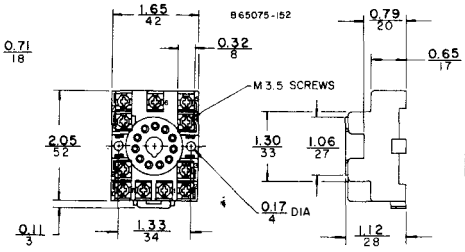


KU-13, KUD-13
KF-13, KFD-13
WIRING DIAGRAMS

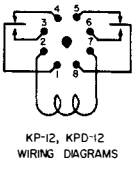




Type NR51

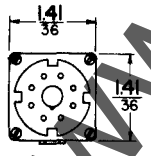


Type NR62

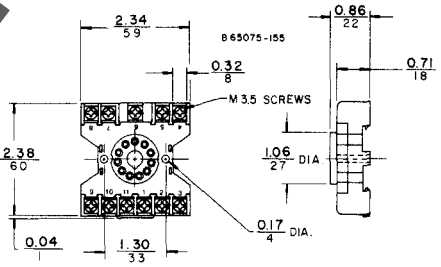


KP-12, KPD-12
WIRING DIAGRAMS

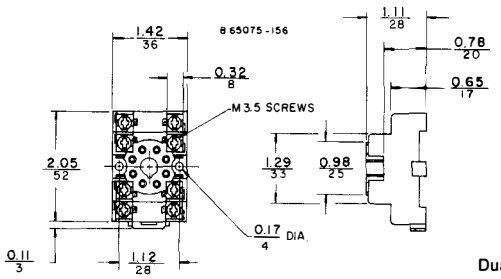
B65075-022



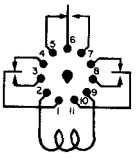
Type KP



Type NR61



Type NR52



KP-13, KPD-13
WIRING DIAGRAMS

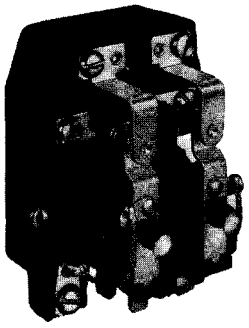
Dual Dimension inch / mm

TYPE C RELAY

CLASS 8501

Class 8501 Type C relays are ideally suited for controlling small single phase motors and other light loads such as electric heaters, pilot lights, or audible signals. Features of this device are:

- Horsepower Rated
- Ampere Rated
- Quiet Operation
- Visible Contacts
- Low Cost
- UL Listed



Type CO-16

Number of Contacts		AC Max. Contact Volts	AC Res. Ampere Rating 75% Power Factor	Inductive AC — VA Rating★ 35% Power Factor	Maximum AC Single Phase Horsepower		AC Operated **Open Type**	DC Operated **Open Type**
Normally Open	Normally Closed				115 Volts	230 Volts	Type	Type
1	0	277	15	690	1	1½	CO-1	CDO-1
2	0	277	10	345	½	½	CO-2	CDO-2
		600	5					
1	1	277	10	345	½	½	CO-3	CDO-3
		600	5					
0	2	277	10	345	½	½	CO-4	CDO-4
		600	5					
0	1	277	15	690	¾	1	CO-5	CDO-5
1	0	277	10	690	½	¾	CO-11	CDO-11
1	1	277	10	690	½	¾	CO-12	CDO-12
1	0	277	10	690	½	¾	CO-13	CDO-13
		600	5					
1	1	277	10	690	½	¾	CO-14	CDO-14
		600	5					
1	1	277	30	720	1	1	CO-15	CDO-15
		600	10					
2	2	240	30	720	1	1	CO-16	CDO-16
		600	10					

★ Maximum current from 0 to 115VAC for 345VA rated devices is 30 amps make and 3 amps break. Maximum current from 0 to 115VAC for 690VA rated devices is 60 amps make and 6 amps break. Maximum current from 0 to 115VAC for 720VA rated devices is 85 amps make and 30 amps break.

APPLICATION DATA

Standard Coil Voltages:

Frequency	Voltage
60 Hz	6, 12, 24, 48, 120, 208, 240, 277, 480
50 Hz	6, 12, 24, 48, 110, 120, 220, 240, 440, 480
DC	6, 12, 24, 48, 110, 120

Coil Burden:

AC —

COIL VA

Hz	Types CO 1-14		Types CO 15-16	
	Inrush	Sealed	Inrush	Sealed
60	14	8.6	14.8	9.8
50	11	6.6	14.8	9.8

DC — Types CO1-14: 3.5 watts nominal
Types CO15-16: 2.0 watts nominal

Input Voltage:

AC — 6 through 480 volts, + 10% – 15% of nominal

DC — 6 through 120 volts, + 10% – 20% of nominal

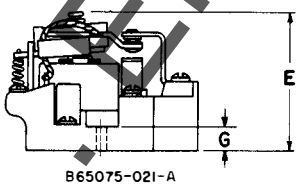
UL/CSA:

Type C control relays are UL listed under File E42240 Guide NLDX and CSA approved under File 25490C Guide 184-N-13.3.

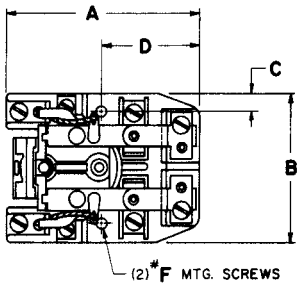
Enclosure —

Type C relay in NEMA 1 sheet steel enclosure — change "O" in the Type designation to "G".

Separately packed NEMA 1 sheet steel enclosure for Types CO & CDO relays — order Class 9991 Type UE-1.



B65075-021-A



Device Class 8501	Dimension						
	A	B	C	D	E	F	G
CO-1 and CO-5 CDO-1 and CDO-5	2.69 68	1.94 49	.19 5	1.19 29	1.81 46	#8 Mtg. Scr.	.25 6
CO-2, 3 and 4 CDO-2, 3 and 4	3.00 76	2.31 59	.69 17	2.13 54	2.22 56	#10 Mtg. Scr.	.25 6
CO-11, 12, 13 and 14 CDO-11, 12, 13 and 14	2.25 57	2.06 52	.22 6	1.59 40	2.38 60	#10 Mtg. Scr.	.25 6
CO-15 CDO-15	2.50 64	2.51 64	.31 8	.81 21	2.29 58	#8 Mtg. Scr.	.38 10
CO-16 CDO-16	3.38 86	2.16 55	.31 8	1.69 43	2.50 64	#8 Mtg. Scr	.38 10

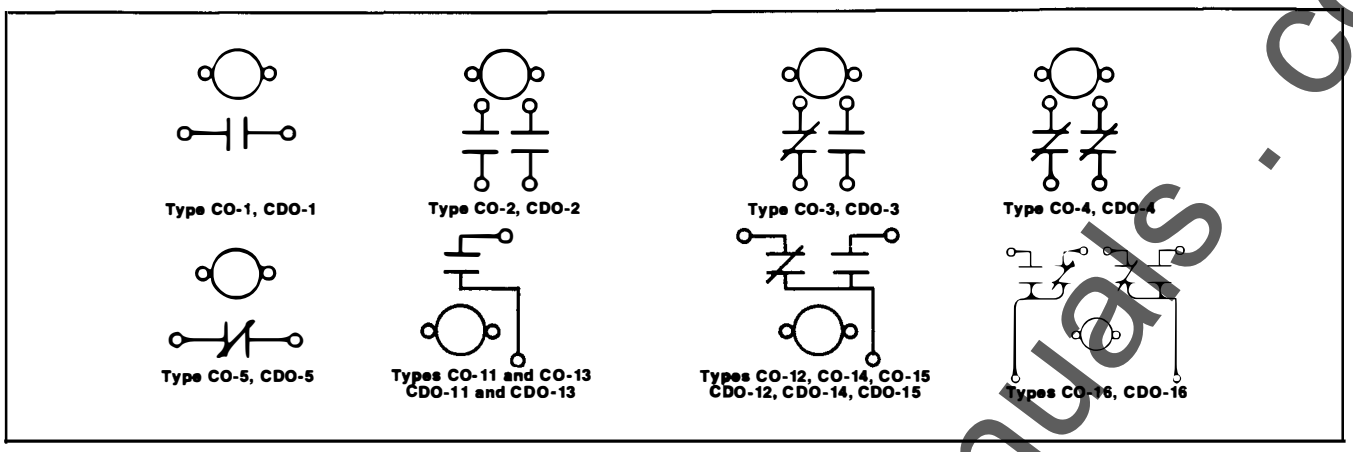
ORDERING INFORMATION REQUIRED

1. Class and type number.
2. Voltage and frequency of operating coil.

CLASS 8501

TYPE C RELAY
CONTACT ARRANGEMENTS

OCTOBER, 1982

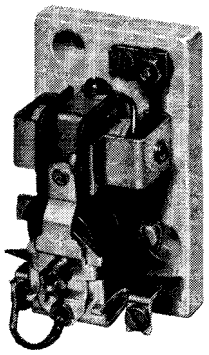


CLASS 7001

GENERAL PURPOSE RELAYS
TYPE J — SINGLE POLE

The Class 7001 Type J relay is ideal for controlling small DC motors, solenoids, and other inductive loads. Its effective blow out coil and arc barriers give it the ability to interrupt high DC currents for a device of such small size.

- BLOW OUT COILS
- HORSEPOWER RATED
- UL LISTED



Type J-30

Number of Contacts	DC Contact Ratings				Open Type
	Volts Max.	Amperes		Horse-power	Type
		Inductive	Resistive		
1 Normally Open	115	15	15	3/4	J-30
	230	5	5	3/4	J-31
	230	....	10	....	J-32

APPLICATION DATA FOR TYPE J

Standard Coil Voltages: For operating voltages higher than 115v, a resistor is wired in series with the Type J coil at the factory. All coils are rated for continuous duty at +10% to −20% of nominal voltage.

UL Listings: Type J-30 with 115v coil and Type J-31 with resistor and coil for operation at 230v are listed under File E42240 Guide NLDX.

Enclosure: Separately packed NEMA Type 1 sheet steel enclosure for Type J: Class 9991 Type UE-6.

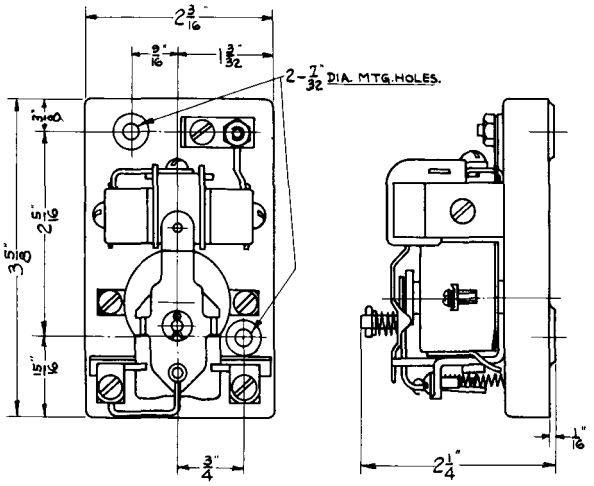
STANDARD COILS

Frequency	Voltage
DC	6, 12, 24, 36, 48, 90, 115, 125, 230◐, 250◐

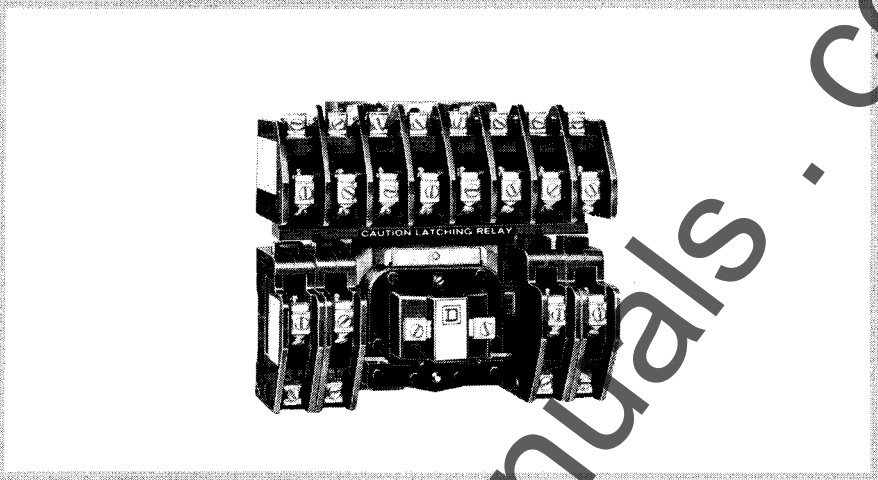
◐ Not available for Type J-30.

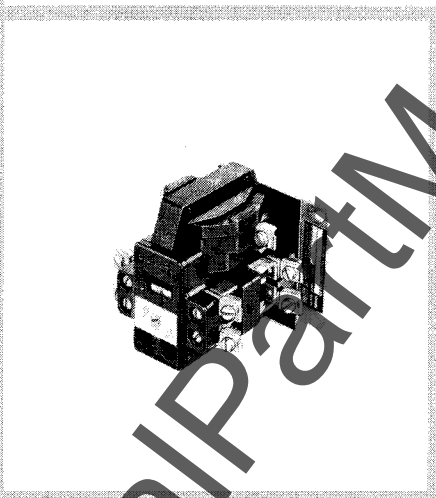
ORDERING INFORMATION REQUIRED

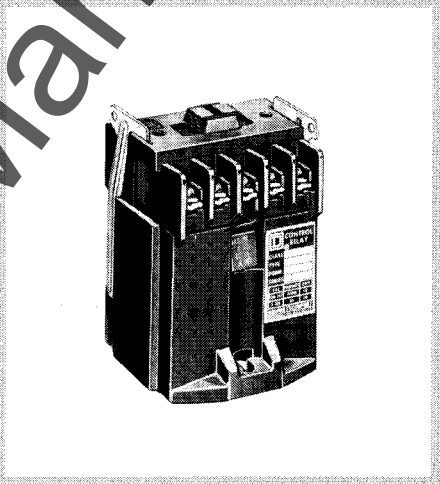
1. Class and type number
2. DC operating voltage of coil



Types J-30, J-31 and **J-32**
Weight — 1 Lb.







Control Relays
AC & DC Industrial
TYPE G, H AND D

CONTENTS

SQUARE D COMPANY

CLASS
8501

AC AND DC CONTROL RELAYS — 300 VOLT

TYPE G

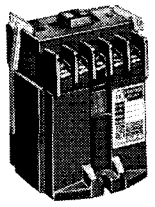
Revised Oct., 1983

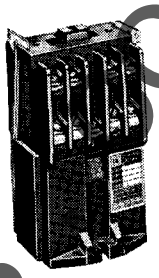
The Type G control relay and its accessories provide a complete system designed to do a complete job — and do it better! Because of this "systems" approach, maximum flexibility is assured during panel design, construction, testing and maintenance.

- 300 volt 10 Amp Rating
- Single coil selection
- Convertible contacts
- Convertible timer
- Uniform mounting dimensions
- AC and DC operated
- Timing attachments
- Latching attachment
- Universal pole attachment
- Captive pressure wire connectors

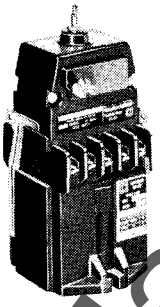
The tables below list relays with all convertible contacts normally open. Relays having a combination of normally open and normally closed convertible contacts can be ordered by description.

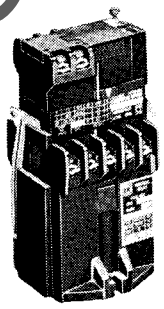
FOR PRICING, REFER TO PAGE 3-13


Type GO-40


Type GO-80


Type GO-40-GU-44


Type GO-40-GL


Type GO-40-GE

AC OPERATED — OPEN TYPE

50-60 HERTZ								300 VOLTS MAX.
Number of Instantaneous Contacts					Standard Relay	‡Mechanically Held Relay	Relay Operated Pneumatic Timer	
	Convertible		Fixed				OFF Delay	ON Delay
Total	Normally Open	Normally Closed	Normally Open	Normally Closed	Type	Type	Type	Type
0	0	0	0	0	GO-00	.....	GO-00-GD	GO-00-GE
2	2	0	0	0	GO-20	GO-20-GL	GO-20-GD	GO-20-GE
3	3	0	0	0	GO-30	GO-30-GL	GO-30-GD	GO-30-GE
4	4	0	0	0	GO-40	GO-40-GL	GO-40-GD	GO-40-GE
6	6	0	0	0	GO-60	GO-60-GL	.....	.....
8	8	0	0	0	GO-80	GO-80-GL	.....	.....
8	0	0	4	4	GO-00-GU-44	.....	.....	.....
10	2	0	4	4	GO-20-GU-44	.....	.....	.....
12	4	0	4	4	GO-40-GU-44	.....	.....	.....

DC OPERATED — OPEN TYPE

6-250 VOLT COILS — Dc					300 VOLTS MAX.	
No. of Convertible Contacts on Relay (Instantaneous Contacts)	No. of Contacts Normally Open	No. of Contacts Normally Closed	Standard Relay	*‡Mechanically Held Relay	Relay Operated Pneumatic Timer	
					OFF Delay	ON Delay
			Type	Type	Type	Type
0	0	0	.....	.....	GDO-00-GD	GDO-00-GE
2	2	0	GDO-20	GDO-20-GDL	GDO-20-GD	GDO-20-GE
3	3	0	GDO-30	GDO-30-GDL	.....	.....
4	4	0	GDO-40	GDO-40-GDL	.....	.....
6	6	0	GDO-60	GDO-60-GDL	.....	.....
8	8	0	GDO-80	GDO-80-GDL	.....	.....

* DC latch attachment has an intermittent rated coil and should be connected through a normally open contact of the relay. Order one more N.O. contact than application requires to accommodate DC latch attachment.

‡ For applications where it is desirable that the latch or unlatch coils do not operate continuously, coil clearing contacts are available. See Page 3-3 — Form Y-14.

REPLACEMENT PARTS

CONTACTS — See Class 9998.

COILS — See Page 3-4 or Class 9998.

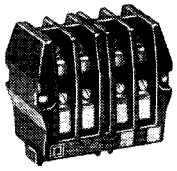
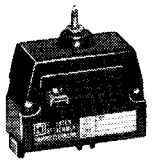
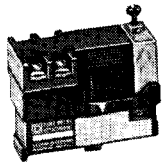
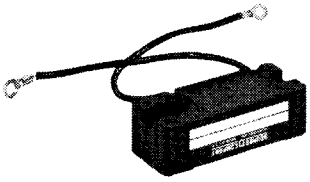
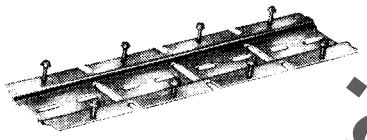
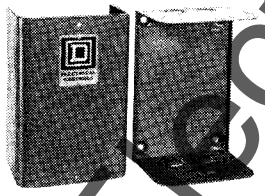
ORDERING INFORMATION REQUIRED

1. Class and type number.
2. Voltage and frequency of operating coil.

Standard Coils	
Frequency	Voltage
60 Hz AC	12, 24, 48, 120, 240, 277
50 Hz AC	12, 24, 48, 110, 220
DC	12, 24, 48, 115, 230/250

AC AND DC CONTROL RELAYS — 300 VOLT
TYPE G

ATTACHMENTS AND ACCESSORIES

Description	Identification
 **Universal Pole Attachment** — converts any 0, 2, 3 or 4 pole ac relay to an 8, 10, 11 or 12 pole relay. It contains four normally open and four normally closed fixed contacts. All contacts are electrically isolated and may be used in circuits of opposite polarity. Contacts have the same heavy duty rating as the standard convertible contacts	Type GU-44
 **Mechanically Held Attachment** — mounts on any 2 through 8 pole relay having all convertible contacts; both ac and dc. The Type GL and GDL latch attachments are identical in size and mounting provisions. The Type GL, ac latch attachment, has a continuous duty rated coil. The Type GDL, dc latch attachment has an intermittent rated coil and should be connected through a normally open contact of the basic relay. AC DC	 Type GL Type GDL
 **Pneumatic Timer Attachment** — may be mounted on a 0, 2, 3 or 4 pole ac relay or factory installed on a 0 or 2 pole dc relay. It has a single pole, double throw, double break timed contact. The timing range is adjustable between 0.2 seconds and one minute with a repeat accuracy of ± 15%. Timing mode is convertible. OFF Delay ON Delay	 Type GD Type GE
 **Transient Suppressor** — consists of an RC circuit and is intended for use with Type G Relays. It is designed to suppress voltage transients generated by the relay coil to approx. 300 volts and is for use on 120 volts or less. Separate Suppressor for field mounting	 Type G-6
 **Mounting Track:** 12″ long for 4 relays 24″ long for 8 relays 36″ long for 12 relays 48″ long for 16 relays	 Type G-4 Type G-8 Type G-12 Type G-16
 **NEMA 1 Enclosure** — Separate enclosure for use with: 2-4 pole relay 6-8 pole or 2 to 4 pole relay with attachments	 Class 9991 Type UE-6 Class 9991 Type UE-7
Coil Clearing Contacts — for mechanically held relays. Disconnects latch and unlatch coils from power after energization. Order and price relay with one more normally open (standard) and normally closed (late opening) contacts than application requires and specify	Form Y-14
Overlapping Contacts — convertible contacts can be supplied with overlap. Description must **state** contacts are to be overlapping and specify how many normally open (early closing) and normally closed (late opening) contacts. Order as pairs	Form Y35 plus description
Dual Contacts ◆ provide two parallel paths per pole for maximum reliability in low energy circuits. Supplied as standard on DC operated relays and Type GU-44	Form Y-89
Manual Test Tool — for manually operating basic relay	31021-054-01

FOR PRICING, REFER TO PAGE 3-13

CLASS 8501

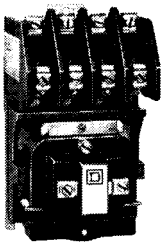
AC AND DC CONTROL RELAYS — 600 VOLT

TYPE H

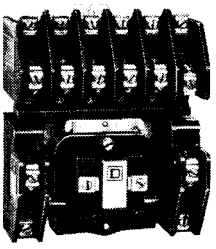
Revised Oct., 1983

The Class 8501, Type H is a heavy duty relay with electrical clearance distances for up to 600 volts. As such, it is particularly well suited for machine tool type applications where long life, high reliability and easy maintenance inspection are important. The ease of contact conversion and coil change provides the flexibility needed to take care of last minute circuit changes. Some of the important features are:

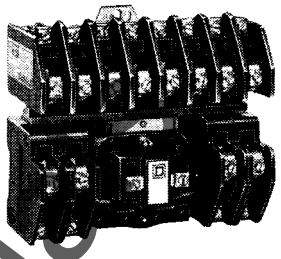
- 600 VOLT 15 AMP RATING
- CONVERTIBLE CONTACTS
- N.O. & N.C. INDICATORS
- VISIBLE CONTACTS
- "ADDER POLES" TO INCREASE STOCK FLEXIBILITY
- AC OR DC
- CONTINUOUS DUTY COILS



Type HO-40



Type HO-80



Type HXO-1200

FOR PRICING, REFER TO PAGE 3-14

15 AMPERE AC OPERATED RELAY					15 AMPERE DC OPERATED RELAY
	CONTROL RELAY		LATCHING RELAY		The dc operated relays are similar to the ac operated relays except for the use of a different coil, an economizing resistor and an economizing contact. The economizing circuit is completely prewired at the factory so that field wiring of the coils is a simple two terminal connection.
Number of Normally Open Convertible Contacts*	Hazardous Locations Class I Groups C & D Class II Groups E, F & G NEMA Type 7 & 9 Type	Open Type Type	Hazardous Locations Class I Groups C & D Class II Groups E, F & G NEMA Type 7 & 9 Type	Open Type Type

Number of Normally Open Convertible Contacts*	CONTROL RELAY Open Type Type
2	HDO-20
3	HDO-30
4	HDO-40
6	HDO-60
7	HDO-70

Number of Normally Open Convertible Contacts*	CONTROL RELAY Hazardous Locations Class I Groups C & D Class II Groups E, F & G NEMA Type 7 & 9 Type	CONTROL RELAY Open Type Type	LATCHING RELAY Hazardous Locations Class I Groups C & D Class II Groups E, F & G NEMA Type 7 & 9 Type	LATCHING RELAY Open Type Type
2	HR-20	HO-20	HLR-20	HLO-20
3	HR-30	HO-30	HLR-30	HLO-30
4	HR-40	HO-40	HLR-40	HLO-40
6	HR-60	HO-60	HLR-60	HLO-60
8	HR-80	HO-80	HLR-80	HLO-80
8	.....	HXO-80▲	.....	HXLO-80
10	.....	HXO-1000	.....	HXLO-1000
12	.....	HXO-1200	.....	HXLO-1200

* The above tables list relays with all normally open convertible contacts. For relays having a combination of normally open and normally closed contacts order by description from page 3-9.

▲ The HXO-80 has an 8-pole contact block and has the capability to accept up to 4 more poles.

AC CONTROL RELAY

The control relay is electromagnetically operated and held. Energization of the magnet coil will cause the normally open contacts to close and the normally closed contacts to open. De-energization of the coil will cause the contacts to switch back to their original state.

DC CONTROL RELAY

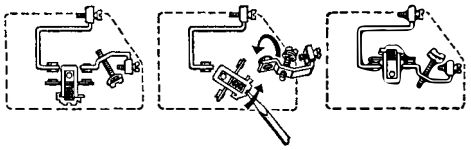
The dc operated relays are similar to the ac operated relays except for the use of a different coil, an economizing resistor and an economizing contact. The economizing circuit is completely prewired at the factory so that field wiring of the coil is a simple two terminal connection.

AC LATCHING RELAY

The latching relay is electromagnetically operated and is held by means of a permanent magnet. Energization of the latching coil will cause the normally open contacts to close and the normally closed contacts to open. The permanent magnet latch will hold all contacts switched, even after power is removed from the latching coil. Energization of a second coil, the unlatching coil, will result in all contacts switching back to their original state. Both coils are continuously rated and require no coil clearing contacts.

CONTACT CONVERSION

1. Remove front stationary contact.
2. Rotate movable contact 180°.
3. Invert and replace front stationary contact.



NEMA 1 ENCLOSURE — See Page 3-7 for separate enclosures for use with all Type H relays listed above. See Page 3-8 for dimensions.

NEMA 4 ENCLOSURE — Separate enclosure for use with all Type H relays listed above, order as Class 9991 Type LW-1.

NEMA 7 & 9 ENCLOSURE WITH RELAY — See AC Relay Table above.

NEMA 12 ENCLOSURE — Separate enclosure for use with all Type H relays listed above, order as Class 9991 Type LA-1.

ORDERING INFORMATION REQUIRED

1. Class and type number.
2. Voltage and frequency of operating coils.

MODIFICATIONS AND ACCESSORIES — See Page 3-7.

RATINGS — See Page 3-8.

APPLICATION DATA — See Pages 3-8 and 3-9.

AVERAGE OPERATING TIMES

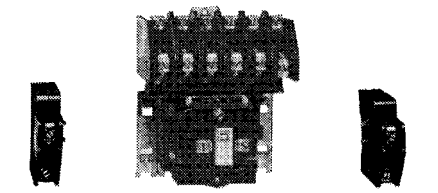
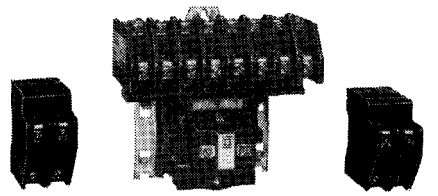
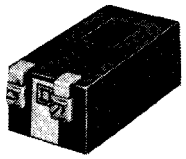
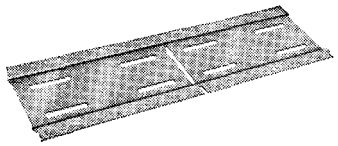
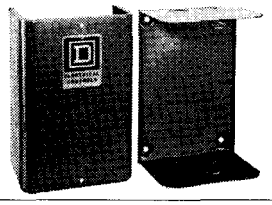
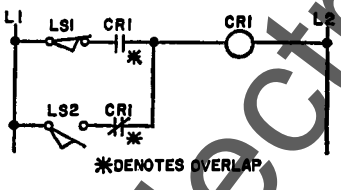
Relay Type	Milliseconds Pick-up	Milliseconds Drop-out
H	14	12
HL	14	18

STANDARD COILS

Frequency	Voltage
60 Hz	24, 48, 120, 240, 277, 480, 600
50 Hz	24, 48, 110, 220, 440, 550
DC	24, 32, 48, 115/125, 230/250

AC AND DC CONTROL RELAYS — 600 VOLT
TYPE H

MODIFICATIONS AND ACCESSORIES

Description	Identification
 Type H1L Type HO-60 Type H1R **Adder Poles** — Used to convert the 6 pole Type H relay into an 8 pole relay and the 8 pole Type HX relay into a 10 pole relay. The 6 pole Type H and 8 pole Type HX relays are provided with mounting brackets so that adder poles can be mounted from the front without additional parts. Convertible contacts are used on the adder poles and on the basic relay. 15 Amp. N.O. Pole for Left Hand Mounting ..... 15 Amp. N.O. Pole for Right Hand Mounting	 Type H1L Type H1R
 Type H3L Type HXO-80 Type H3R **Dual Adder Poles** — Used to convert the 8 pole Type HX into a 12 pole relay. Each dual adder pole consists of two isolated convertible poles permanently fixed together so that a dual adder pole can be fastened to the relay by means of a single captive screws. 15 Amp. 2 N.O. Poles for Left Hand Mounting on Type HX only ..... 15 Amp. 2 N.O. Poles for Right Hand Mounting on Type HX only	 Type H3L Type H3R
 **Transient Suppressed Coil** — Used where transient voltages, generated when opening the coil circuit, interfere with the proper operation of nearby solid state control circuits. The suppression feature is built into the coil and is designed to suppress coil generated transients to approximately 200 per cent of peak line voltage. Separate coil for 2-8 pole relay ..... Available in 6, 12, 24, 48, 120, 208 and 240 volts at 60 hertz. 2-8 pole relay with factory installed coil	 ✻ See Page 3-8 for coil voltage suffix numbers. 31071-406-✻ or Form Y-145
 **Mounting Track** — Used to reduce installation costs when mounting large numbers of Type H relays. Prepunched mounting holes simplify mounting of track to panel. Prepunched relay mounting holes plus self tapping screws provide flexibility in mounting relays with various pole combinations. 18″ long ..... 36″ long ..... 54″ long	 Type H-6 Type H-12 Type H-18
 **NEMA 1 Enclosures** — For Types HO, HDO, HLO, HXO & HXLO use ..	 Class 9991 Type LG-1
 **Overlapping Contacts** — Used for shifting a control signal from a momentary input (LS2) circuit to another circuit without interrupting the signal to the coil. Special movable contacts are supplied so that the normally open pole closes before the normally closed pole opens, when the relay is energized. Overlap also occurs when the relay is de-energized. Order with desired number of normally open and closed contacts and specify by Form number how many pairs must be provided with overlap. One Pair ..... Two Pair	 Form Y159-1 Form Y159-2
Coil Clearing Contacts — for latching relay. Consists of one late opening, normally closed contact and one standard, normally open contact. Disconnects latch and unlatch coils from power after energization. Type number should call for number of usable poles. Ten poles maximum.	Form Y-14
Adaptor Plate — for mounting Type H relay in place of obsolete Class 8501 Types A & BH relays.	HA-1
Replacement Coils and Contact Kits	See Page 3-8 or Class 9998

ORDERING INFORMATION REQUIRED

1. Class and type number.
2. Voltage and frequency of operating coils.
3. Special features as shown above.

FOR PRICING, REFER TO PAGE 3-14

CLASS 8501

AC AND DC CONTROL RELAYS — 600 VOLT

TYPE H

Revised Oct., 1983

APPLICATION DATA
MAXIMUM ELECTRICAL CONTACT RATINGS

Volts	AC RATINGS — NEMA A600						DC RATINGS					
	Inductive 35% Power Factor					Resistive 75% Power Factor	Inductive			Resistive		
	Make		Break		Continuous Amperes	Make, Break and Continuous Amperes	Make Amperes	Break Amperes	Continuous Amperes	Make Amperes	Break Amperes	Continuous Amperes
	Amps.	VA	Amps.	VA								
120	60	7200	6	720	15	15	11	1.1	15	60	6	15
240	30	7200	3	720	15	15	5.5	0.55	15	10	1	15
480	15	7200	1.5	720	15	15	...	...	...	...	...	...
600	12	7200	1.2	720	15	15	2	0.2	15	5	0.5	15

AC MAGNET COILS†

Type Coil	Used On	Coil Prefix	Hertz	SUFFIX NUMBERS (Coil part numbers consist of coil prefix followed by suffix number)														Coil Volt-Amps.	
				6✚ Volts	12✚ Volts	24 Volts	48 Volts	110 Volts	120 Volts	208 Volts	220 Volts	240 Volts	277 Volts	440 Volts	480 Volts	550 Volts	600 Volts	Inrush	Sealed
Pick-up Coil	H, HL	31071-400-	60	05	14	23	32	43	44	50	—	53	55	—	62	—	65	150	30
			50	—	—	24	33	44	45	52	53	54	—	62	63	65	—	140	30
	HX, HXL ◐	31071-408-	60	05	14	23	32	—	44	50	—	53	55	—	62	—	65	180	35
			50	—	—	—	—	44	—	52	53	—	—	62	—	65	—	170	35
*Unlatch Coil Assembly	HL	31071-963-	60	—	—	50	51	—	52	53	—	54	55	—	56	—	57	18	18
			50	—	—	—	—	52	—	—	54	—	—	56	—	57	—	17	17
	HXL	31071-964-	60	—	—	50	51	—	52	53	—	54	55	—	56	—	57	18	18
			50	—	—	—	—	52	—	—	54	—	—	56	—	57	—	17	17
Transient Suppressed Coil	H, HL	31071-406-	60	05	14	23	32	—	44	50	—	53	—	—	—	—	—	150	30

* Includes coil and portion of latching mechanism. Coil only is not replaceable.
✚ 6 and 12 volt coils for HL and HXL are not available.

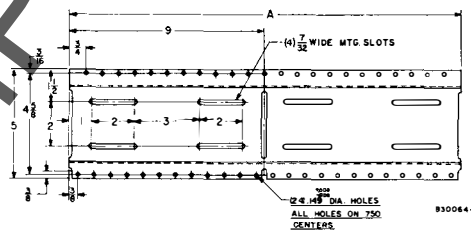
† AC magnet coils are designed to operate on line voltages fluctuating as much as 15% below and 10% above nominal voltage.

◐ All Type H relays with P suffix (see page 3-9) use 31071-400 series coils.

DC APPLICATION DATA

Volts	DC Magnet Coil Number 31071-412-	DC Economizing Resistor Number 31071-209-	Current In Amperes	
			Inrush	Sealed
24	23	55	8.0	0.75
32	26	56	6.8	0.61
48	32	57	6.0	0.36
115/125	44	58	1.9	0.15
230/250	53	59	1.0	0.08

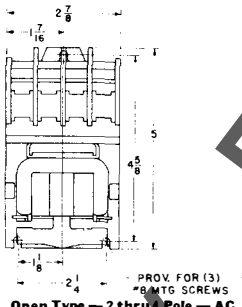
DC magnet coils are designed to operate on line voltages fluctuating as much as 20% below and 10% above nominal voltage.



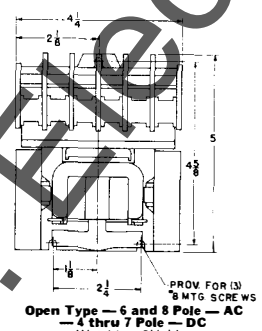
Type H Relay Mounting Track

Type	"A"
H-6	18"
H-12	36"
H-18	54"

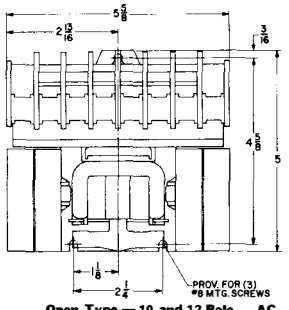
APPROXIMATE DIMENSIONS AND SHIPPING WEIGHTS



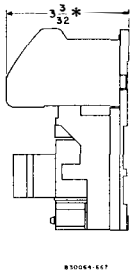
Open Type — 2 thru 4 Pole — AC — 2 and 3 Pole — DC
Weight — 3 Lbs.

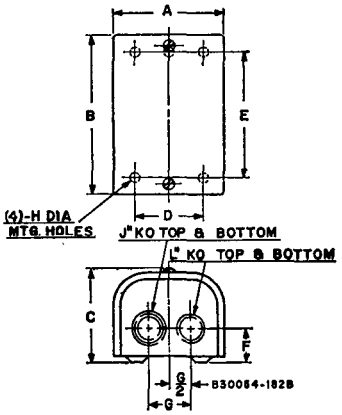


Open Type — 6 and 8 Pole — AC — 4 thru 7 Pole — DC
Weight — 3½ Lbs.



Open Type — 10 and 12 Pole — AC
Weight — 4 Lbs.





Class 9991 LG-1
Weight — 10 Lbs.

*LATCHING RELAY DIMENSIONS are same as above except the depth is 4 inches rather than 3-3/32 inches.

DC RELAY DIMENSIONS are same as above except the depth is 4-11/16 inches rather than 3-3/32.

	A	B	C	D	E	F	G	H	J & L
9991 LG-1	7 1/32	9 25/32	5 29/32	6 1/8	8 3/8	1 5/16	1 7/8	9/32	½, ¾, 1

AC AND DC CONTROL RELAYS — 600 VOLT

TYPE H

CLASS 8501

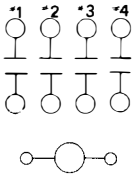
Contact Arrangement for Self-Checking Circuit Application

Self-checking is the term commonly used when N.O. and N.C. contacts of a relay are arranged in a circuit so that a particular function or functions will not occur if the relay contacts fail to open and close at predetermined times in the control sequence.

The following tables list pole arrangements and the location of N.O. and N.C. poles. Relays purchased from the factory will correspond to these tables. For example: a HO-22P will have N.O. poles in positions 1 and 4; positions 2 and 3 will have N.C. poles. These pole configurations are recommended where optimization of self-checking circuitry is desired, such as in certain types of press control systems.

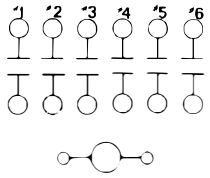
Contact Configurations

0 = Normally Open Contact 1 = Normally Closed Contact



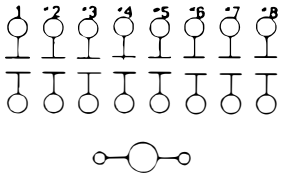
4 Pole Relay

No. of Poles	Type	Contact Number			
		1	2	3	4
4	HO-31P	0	0	1	0
	HO-22P	0	1	1	0



6 Pole Relay

No. of Poles	Type	Contact Number					
		1	2	3	4	5	6
6▲	HO-51P	0	0	1	0	0	0
	HO-42P	0	0	1	1	0	0



8 Pole Relay †

No. of Poles	Type	Contact Number							
		1	2	3	4	5	6	7	8
8▲	HXO-62P	0	0	0	1	1	0	0	0
	HXO-44P	0	1	1	0	0	1	1	0

▲NOTE: Adder poles may not be used in self-checking circuits.

† APPLICATION NOTE

On 8 pole relays, do not use the following combinations in the same self-checking circuit:

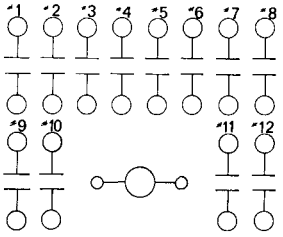
a) N.O. contact #1 with N.C. contact #5, 6 or 7.

b) N.O. contact #8 with N.C. contact #2, 3 or 4.

CONTACT ARRANGEMENTS

The following table lists all pole arrangements and the location of the N.O. and N.C. poles. Relays purchased from the factory will correspond to these tables. For example: an HO-12 will have one N.O. pole in position 1; position 3 will be blank; positions 2 and 4 will have N.C. poles.

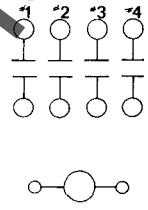
Contact arrangement for Type HL latching relays is the same as below except for the addition of unlatching coil to diagram.



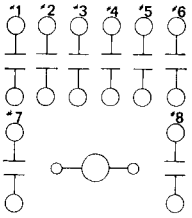
O — Normally Open Contact.

1 — Normally Closed Contact.

No. of Poles	Type	Contact Number			
		1	2	3	4
2	HO-20	O			O
	HO-11	O			1
	HO-02	1			1
3	HO-30	O	O		O
	HO-21	O	O		1
	HO-12	O	1		1
	HO-03	1	1		1
4	HO-40	O	O	O	O
	HO-31	O	O	O	1
	HO-22	O	O	1	1
	HO-13	O	1	1	1
	HO-04	1	1	1	1



No. of Poles	Type	Contact Number							
		1	2	3	4	5	6	7	8
6	HO-60	O	O	O	O	O	O		
	HO-51	O	O	O	O	O	1		
	HO-42	O	O	O	O	1	1		
	HO-33	O	O	O	1	1	1		
	HO-24	O	O	1	1	1	1		
	HO-15	O	1	1	1	1	1		
	HO-06	1	1	1	1	1	1		
8	HO-80	O	O	O	O	O	O	O	O
	HO-71	O	O	O	O	O	O	O	1
	HO-62	O	O	O	O	O	O	1	1
	HO-53	O	O	O	O	O	1	1	1
	HO-44	O	O	O	O	1	1	1	1
	HO-35	O	O	O	1	1	1	1	1
	HO-26	O	O	1	1	1	1	1	1
	HO-17	O	1	1	1	1	1	1	1
	HO-08	1	1	1	1	1	1	1	1



No. of Poles	Type	Contact Number											
		1	2	3	4	5	6	7	8	9	10	11	12
8	HXO-80	O	O	O	O	O	O	O	O				
	HXO-71	O	O	O	O	O	O	O	1				
	HXO-62	O	O	O	O	O	O	1	1				
	HXO-53	O	O	O	O	O	1	1	1				
	HXO-44	O	O	O	O	1	1	1	1				
	HXO-35	O	O	O	1	1	1	1	1				
	HXO-26	O	O	1	1	1	1	1	1				
	HXO-17	O	1	1	1	1	1	1	1				
	HXO-08	1	1	1	1	1	1	1	1				
10	HXO-1000	O	O	O	O	O	O	O	O		O	O	
	HXO-901	O	O	O	O	O	O	O	O		O	1	
	HXO-802	O	O	O	O	O	O	O	O		1	1	
	HXO-703	O	O	O	O	O	O	O	1		1	1	
	HXO-604	O	O	O	O	O	O	1	1		1	1	
	HXO-505	O	O	O	O	O	1	1	1		1	1	
	HXO-406	O	O	O	O	1	1	1	1		1	1	
	HXO-307	O	O	O	1	1	1	1	1		1	1	
	HXO-208	O	O	1	1	1	1	1	1		1	1	
	HXO-109	O	1	1	1	1	1	1	1		1	1	
	HXO-010	1	1	1	1	1	1	1	1		1	1	
12	HXO-1200	O	O	O	O	O	O	O	O	O	O	O	O
	HXO-1101	O	O	O	O	O	O	O	O	O	O	O	1
	HXO-1002	O	O	O	O	O	O	O	O	1	O	O	1
	HXO-903	O	O	O	O	O	O	O	O	1	O	1	1
	HXO-804	O	O	O	O	O	O	O	O	1	1	1	1
	HXO-705	O	O	O	O	O	O	O	1	1	1	1	1
	HXO-606	O	O	O	O	O	O	1	1	1	1	1	1
	HXO-507	O	O	O	O	O	1	1	1	1	1	1	1
	HXO-408	O	O	O	O	1	1	1	1	1	1	1	1
	HXO-309	O	O	O	1	1	1	1	1	1	1	1	1
	HXO-210	O	O	1	1	1	1	1	1	1	1	1	1
	HXO-111	O	1	1	1	1	1	1	1	1	1	1	1
	HXO-012	1	1	1	1	1	1	1	1	1	1	1	1

CLASS 8501 8508

AC AND DC CONTROL RELAYS — 600 VOLT

Revised Oct., 1983

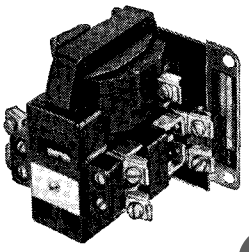
TYPE D

The Type D relay is a fixed contact, heavy duty relay well suited for machine tool type applications where long life and good contact reliability are important. Some of the important features are:

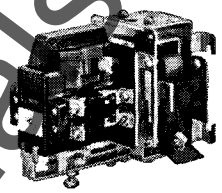
- 600 VOLT, 10 AMP RATING
- SMALL SIZE
- PRESSURE WIRE CONNECTORS ON ALL TERMINALS
- MOLDED COILS
- VISIBLE CONTACTS
- EASY DISASSEMBLY

Description	*Number of Contacts		AC Class 8501	AC – Latching Class 8508
	Normally Open	Normally Closed	Open Type	Open Type
			Type	Type
2 Pole, Single Throw	2	0	DO-20	DO-20
2 Pole, Single Throw	0	2	DO-02	DO-02
2 Pole, Double Throw	2	2	DO-22	DO-22
4 Pole, Single Throw	4	0	DO-40	DO-40
4 Pole, 2 Double Throw, 2 N.O.	4	2	DO-42	DO-42
8 Pole, 4 N.O., 4 N.C.	4	4	DO-44	DO-44
6 Pole, 6 N.O.	6	0	DO-60	DO-60
8 Pole, 6 N.O., 2 N.C.	6	2	DO-62	DO-62
8 Pole, 2 Double Throw, 4 N.O., 2 N.C.	6	4	DO-64	DO-64
8 Pole, 8 N.O.	8	0	DO-80	DO-80
8 Pole, 6 N.O., 2 Double Throw	8	2	DO-82	DO-82

* Double throw contacts must be used on same polarity.



Class 8501
Type DO-22



Class 8508
Type DO-22

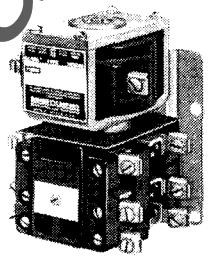
FOR PRICING, REFER TO PAGE 3-14.

CLASS 7001 7008

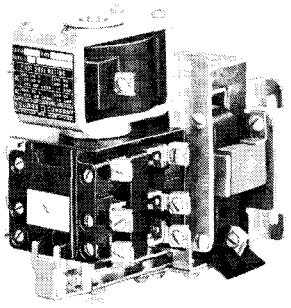
The Class 7008 Type D relay is the mechanically held version of the Class 7001 Type D electrically held relay. The mechanically held device consists of a standard electrically held relay and a Class 7008 Type M-1 attachment.

These mechanically held relays must be wired with a normally open contact of the relay in series with the dropout coil of the attachment. This is necessary to insure momentary energization only on dropout. Because of this wiring arrangement these relays have one less normally open contact available for customer use than is listed in the price table.

Description	Number of Contacts		DC Class 7001	DC – Latching Class 7008
	Normally Open	Normally Closed	Open Type	Open Type
			Type	Type
2 Pole, Single Throw	2	0	DO-20	DO-20
2 Pole, Single Throw	0	2	DO-02	DO-02
2 Pole, Double Throw	2	2	DO-22	DO-22
4 Pole, Single Throw	4	0	DO-40	DO-40
4 Pole, 2 Double Throw, 2 N.O.	4	2	DO-42	DO-42
8 Pole, 4 N.O., 4 N.C.	4	4	DO-44	DO-44
6 Pole, 6 N.O.	6	0	DO-60	DO-60
8 Pole, 6 N.O., 2 N.C.	6	2	DO-62	DO-62
8 Pole, 2 Double Throw, 4 N.O., 2 N.C.	6	4	DO-64	DO-64
8 Pole, 8 N.O.	8	0	DO-80	DO-80
8 Pole, 6 N.O., 2 Double Throw	8	2	DO-82	DO-82



Class 7001
Type DO-42



Class 7008
Type DO-42

TYPE D RELAY OPERATED TIMER

CLASS 8501

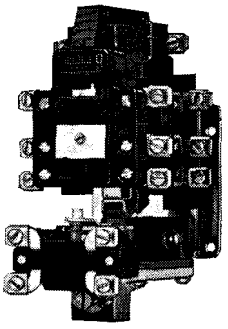
Class 8501 Type D relay operated timer is well suited and economical for applications where a timing relay must operate simultaneously with a control relay.

The advantages of using a Type D relay operated timer are that it requires power to only one coil and uses less panel space than two separate devices. Features of this device are:

- TIMING RANGE — 0.1 SEC. TO 1 MIN.
- REPEAT ACCURACY — ±10%
- TIMED CONTACTS — 1 N.O. & 1 N.C.
- INSTANTANEOUS CONTACTS — UP TO 4 N.O. & 2 N.C.
- CONVERTIBLE TIMING

Description		Number of Instantaneous Contacts*		Number of Timed Contacts*		AC Class 8501 Open Type
		N.O.	N.C.	N.O.	N.C.	Type
Time Delay after De-energization (Off Delay)	2 Pole, Double Throw	2	2	1	1	DDO-22
	4 Pole, 2 Double Throw, 2 N.O.	4	2	1	1	DDO-42
Time Delay after Energization (On Delay)	2 Pole, Double Throw	2	2	1	1	DEO-22
	4 Pole, 2 Double Throw, 2 N.O.	4	2	1	1	DEO-42

* Double throw contacts must be used on same polarity.



Class 8501
Type DEO-42

STANDARD COILS	
Frequency	Voltage
60 Hz	6, 12, 24, 48, 120, 240, 277, 480, 600
50 Hz	6, 12, 24, 48, 110, 220, 440, 550
DC	12, 24, 48, 115, 230/250

ORDERING INFORMATION REQUIRED

1. Class and type number.
2. Voltage and frequency of operating coil.

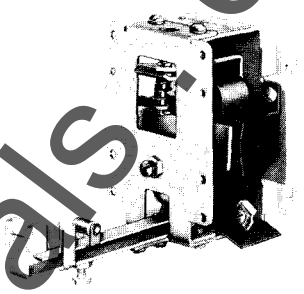
REPLACEMENT CONTACTS — See Class 9998.

AC AND DC CONTROL RELAYS — 600 VOLT
TYPE D

CLASS
8501
8508
7001
7008

LATCHING ATTACHMENT

For Conversion of Class 8501 and 7001, Type DO, Electrically Held Relay to Mechanically Held	Class	Type
Attachment	8508	M-1

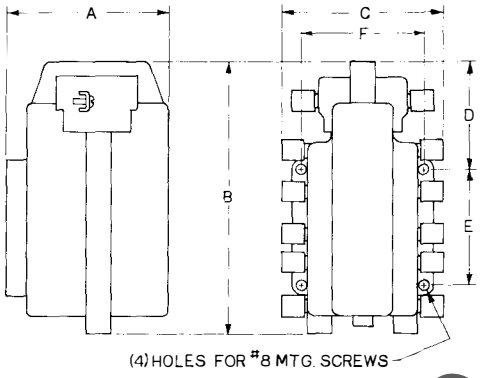


ADAPTOR PLATE — For mounting Type D relays in place of obsolete Class 7001 Types Q & R and Classes 8501 & 8508 Types A & BH relays. Order by Part No. 31071-216-01.

NEMA 1 ENCLOSURE — Separate enclosure for use with Class 7001 and 8501, Type DO relays. Order as Class 9991 Type UE-6, for 2-4 pole relays, and Type UE-3 for 6-8 pole relays. Separate enclosure for use with Class 8501, Type DDO and DEO timers. Order as Class 9991 Type UE-3.

NEMA 4 ENCLOSURE — Separate enclosure for 7001 & 8501 Type D relays, order as 9991 LW-1. For additional enclosure information consult factory.

APPROXIMATE DIMENSIONS AND SHIPPING WEIGHTS



(4) HOLES FOR #8 MT'G SCREWS

Figure 1

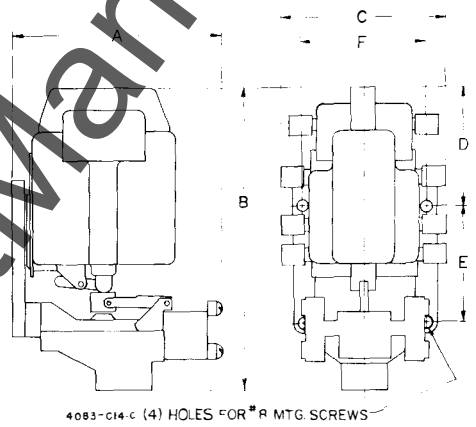
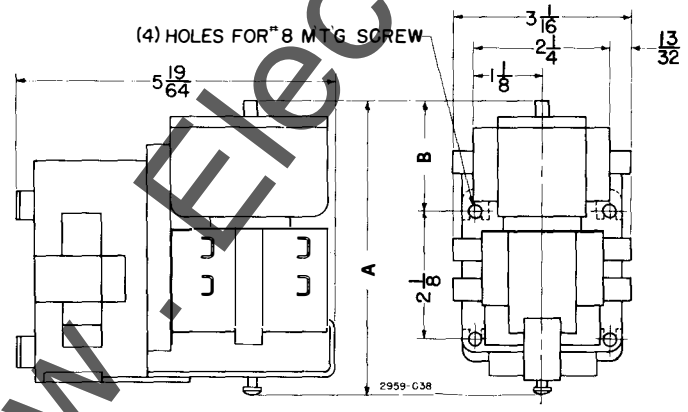


Figure 2

Class	Type	Figure Number	Dimensions — Inches A	B	C	D	E	F	Weight (lbs.)
8501	DO-02, -20, -22	1	3 3/32	3 7/32	3	5/64	2 1/8	2 1/4	1 1/2
	DO-40, -42	1	3 3/32	3 33/64	3	1 13/64	2 1/8	2 1/4	1 1/2
	DO-44, -60, -62, -64, -80, -82	1	3 3/32	5 1/64	3	2 1/64	2 1/8	2 1/4	2
	DDO-22, -42	2	3 17/32	5 9/16	3 1/16	2 13/64	2 1/8	2 1/4	2
	DEO-22, -42	2	3 13/16	5 9/16	3 1/16	2 13/64	2 1/8	2 1/4	2



Class	Type	Dimension A	Dimension B
7008	DO-20, 02, 22	4 15/16	1
	DO-40, 42	5 7/32	2 5/32
	DO-44 to 82	6 5/8	3 5/8

REPLACEMENT PARTS

CONTACTS — See Class 9998.
COILS — See Class 9998.

STANDARD COILS	
Frequency	Voltage
DC	12, 24, 48, 115, 230/250

ORDERING INFORMATION REQUIRED

1. Class and type number.
2. Voltage and frequency of operating coils.

CLASS
8501
8508
7001
7008

AC AND DC CONTROL RELAYS — 600 VOLT

TYPE D

Revised Oct., 1983

APPLICATION DATA

CONTACT RATINGS

Volts	AC Ratings: Inductive 35% Power Factor — Make, Amperes	Make, VA	Break, Amperes	Break, VA	Continuous, Amperes	AC Ratings: Resistive 75% Power Factor — Make, Break and Continuous, Amperes	DC Ratings*: Inductive — Make and Break, Amperes	Inductive — Continuous, Amperes	Resistive — Make and Break, Amperes	Resistive — Continuous, Amperes
120	60	7200	6	720	10	10	1.1	10	6	10
240	30	7200	3	720	10	10	0.55	10	1	10
480	15	7200	1.5	720	10	10	...	...	...	...
600	12	7200	1.2	720	10	10	0.2	10	0.5	10

*DC Ratings do not apply to Type DEO or DDO timed contacts.

AC MAGNET COILS

Type	Poles	Coil Prefix	Hertz	SUFFIX NUMBERS (Coil part numbers consist of coil prefix followed by suffix number) 6● Volts	12● Volts	24● Volts	48● Volts	110-115 Volts	120 Volts	208-220 Volts	240 Volts	277 Volts	440 Volts	480 Volts	550 Volts	600 Volts	Coil Volt-Amperes In-rush	Coil Volt-Amperes Sealed
DO-20 to DO-42	2-4	2959-S1	60	W20A	W23A	W26A	W29A	W32B	W33A	W35B	W36A	W36B	W38A	W39A	W39B	W40A	58	12
			50	W20B	W23B	W26B	W29B	W33A	W33B	...	W36B	...	W39A	W39B	W40A	W40B	52	11
DO-44 to DO-82	6 & 8	2959-S49	60	W18A	W21A	W24A	...	W30B	W31A	W33B	W34A	W34B	W36B	W37A	W37B	W38A	100	25
			50	W19A	W22A	W25A	...	W31A	W32A	...	W35A		W37A	W38A	W38A	W39A	75	22
DEO &DDO	Any	2959-S49	60	W18B	W21B	W24B	...	W31A	W31B	W34A	W34B	W35A	W37A	W37B	W38A	W38B	62	12
			50	W19B	W22B	W25B	...	W31B	W32B	...	W35B	...	W37B	W38B	W38B	...	52	11
Unlatch Coil for 8508	Any	2959-S13	60	...	W20B	W23B	W26B	W30A	W30B	W33A	W33B	W35B	W36A	W36B	W37A	W37B	39	12
			50	...	W21B	W24B	W27B	W30B	W31B	W33B	W34B	W36B	W36B	...	W37B	...	34	10

◐VA values for these coils are 120% of the values shown.

AC magnet coils are designed to operate on line voltages fluctuating as much as 15% below and 10% above nominal voltage.

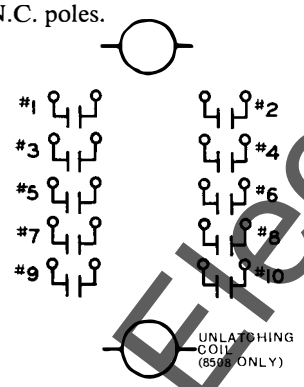
DC MAGNET COILS

Type	Poles	Coil Prefix	SUFFIX NUMBERS (Coil part numbers consist of coil prefix followed by suffix number) 12 Volts	24 Volts	48 Volts	115 Volts	230/250 Volts
DO-20 to DO-82	Any	4491-S1	W24	W27	W30	W34	W37
Resistance (Ohms)			12	48	192	1220	4680

DC magnet coils are designed to operate on line voltages fluctuating as much as 20% below and 10% above nominal voltage.

CONTACT ARRANGEMENTS
7001, 7008, 8501 & 8508 TYPE D RELAYS

The table below lists all pole arrangements and the location of the N.O. and N.C. poles. Relays purchased from the factory will correspond to these tables. For example: a DO-42 will have N.O. poles in positions 1 through 4 and positions 5 and 6 will have N.C. poles.



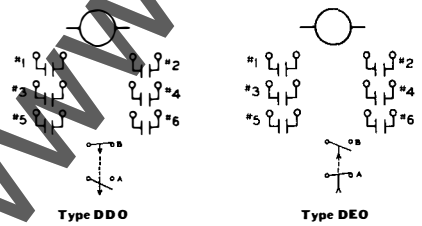
0 — NORMALLY OPEN
1 — NORMALLY CLOSED

Type No.	Contact Number 1	2	3	4	5	6	7	8	9	10
DO-20	O	O								
DO-02			1	1						
DO-22	*O	*O	*1	*1						
DO-40	O	O	O	O						
DO-42	O	O	*O	*O	*1	*1				
DO-44	O	O	O	O			1	1	1	1
DO-60	O	O			O	O			O	O
DO-62	O	O	O	O	O	O			1	1
DO-64	O	O	O	O	*O	*O	*1	*1	1	1
DO-80	O	O	O	O	O	O			O	O
DO-82	O	O	O	O	*O	*O	*1	*1	O	O

*Contacts of Individual Double Throw Poles must be used on the same polarity.

CONTACT ARRANGEMENTS
FOR TYPE D RELAY OPERATED TIMER

The following table lists all pole arrangements and the location of the N.O. and N.C. poles. Relays purchased from the factory will correspond to these tables. For example: a DDO-22 will have N.O. Poles in positions 1 & 2 and N.C. Poles in positions 3 & 4.

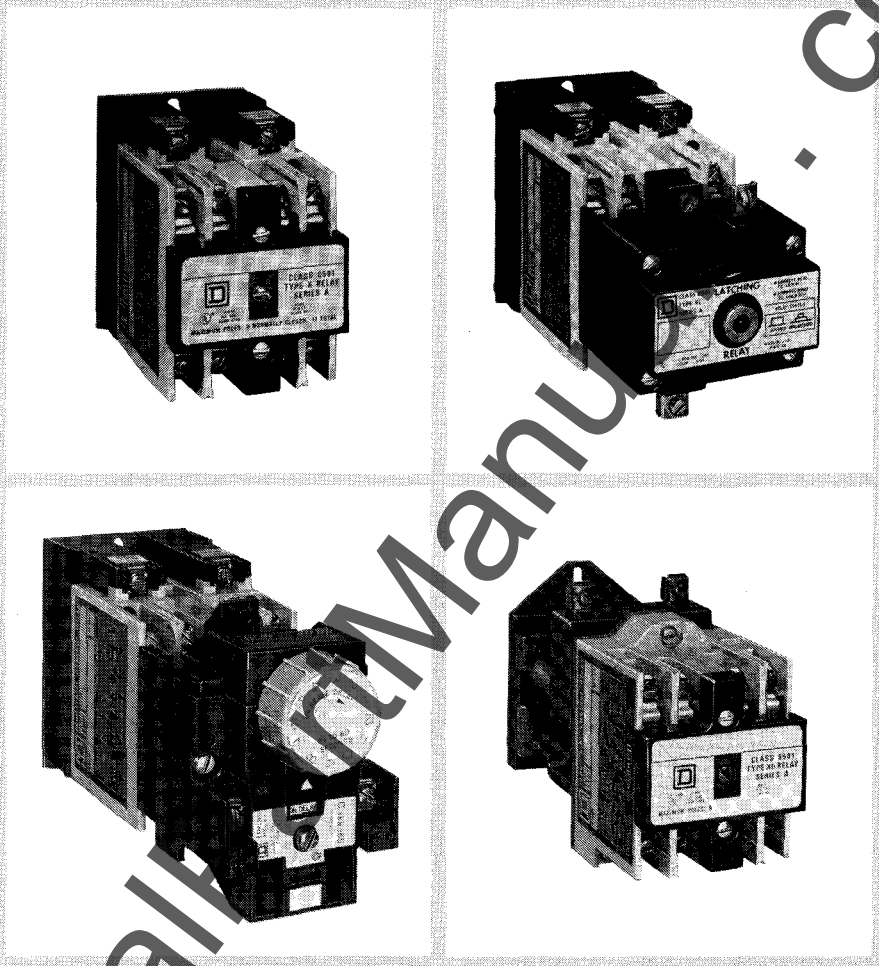


Type DDO — Type DEO

0 — NORMALLY OPEN.
1 — NORMALLY CLOSED.

Type Number	Contact Number 1	2	3	4	5	6
DDO-22 DEO-22	*O	*O	*1	*1		
DDO-42 DEO-42	O	O	*O	*O	*1	*1

*Contacts of Individual Double Throw Poles must be used on the same polarity.



Industrial Control Relays

TYPE X

CONTENTS

SQUARE D COMPANY

CLASS 8501

INDUSTRIAL CONTROL RELAYS — 600 VOLT
TYPE X

APRIL, 1983

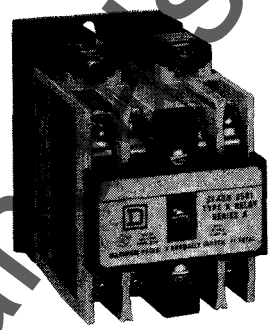
Class 8501 Type X relays combine a rugged, heavy-duty design for improved performance with a modular construction for greater flexibility. They are ideal for those applications where long life, high reliability, and ease of maintenance are important. The Type X family offers a complete line of relays and accessories for all control applications.

- 600 Volt 10 Ampere rating (NEMA A600)
- Mechanical tie between contact cartridges
- Plug-in color-coded contact cartridges
- 1 and 3 minute timing relays
- 8-pole latching relays
- dc-operated relays

CONTROL RELAY

The Type X control relay features a modular design, mechanical tie between all cartridges, and plug-in contact cartridges for easy contact conversion. Wiring on the Type X relay is straight-through. Self-lifting pressure wire connectors will accept up to two #12-18 AWG gauge stranded copper wires. If terminals that will accept ring or spade lugs are required, see page 1-3. The heavy-duty molded coil is easily replaceable.

Number of Normally Open Convertible Contacts	Open Type	
	Type	Price
0 2 3 4	XO-00 XO-20 XO-30 XO-40	**$ 32.** **48.** **56.** **64.**
6 8	XO-60 XO-80	**80.** **96.**
10 12	XO-1000 XO-1200	**112.** **128.**



Type XO-40

NORMALLY CLOSED CONTACTS

Contact conversion is so simple that it is generally more economical to purchase relays with all contacts normally open and convert contacts to normally closed as required. If it is preferred that relays be factory assembled with a combination of normally open and normally closed contacts, order by type number from page 1-6. Also, add **$8.00** list to the price shown in the table above for a relay having the same total number of contacts. For example, a relay with 1 N.O. and 2 N.C. poles would be identified as a Type XO-12 and priced at **$64.00**.

STANDARD COILS

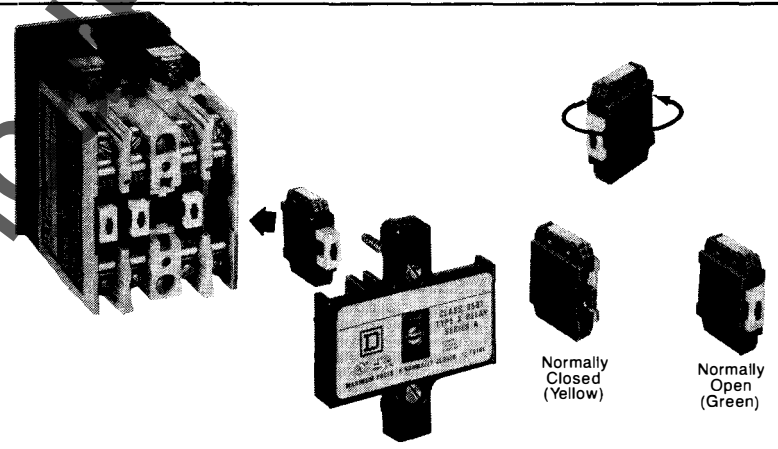
Frequency	Voltage
60 Hz	12, 24, 48, 120, 208, 240, 277, 480, 600
50 Hz	12, 24, 48, 110, 220, 440, 550

ORDERING INFORMATION REQUIRED

1. Class and type number.
2. Voltage and frequency of operating coil.

PLUG-IN CONTACT CARTRIDGES
Contact Conversion Without Removing Terminal Screws or Wires

1. Remove relay cover and captive T-bar actuator.
2. Remove contact cartridge and rotate 180°.
3. Plug contact cartridge back in.
4. Replace T-bar actuator and cover.



MODULAR CONSTRUCTION

A basic relay has room for up to 4 convertible contact cartridges. It can be expanded to 6 or 8 poles by installing an adder deck. A 10 or 12 pole relay can be built by adding a second deck. The same adder deck is used for both the middle and upper decks. This reduces the number of components required in inventory.

COMMON MECHANICAL TIE/ NON-OVERLAPPING CONTACTS

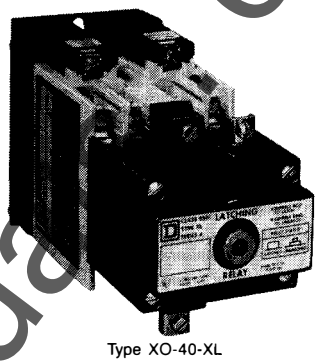
The Type X relay was designed to provide a significant degree of non-overlap between normally open and normally closed contacts during normal operation. In addition, a common mechanical tie between all contact cartridges is provided. Therefore, the Type X relay is suitable for use in self-checking circuits for press control and automatic transfer line applications. Since the T-bar actuator is held captive in the cover plate, there is no chance of losing or forgetting to replace the mechanical tie when converting a contact or adding another deck.

INDUSTRIAL CONTROL RELAYS — 600 VOLT
TYPE X

LATCHING RELAY

- Mechanical Latch
- Manually Operable For Circuit Checkout
- Continuous Duty Coils
- Replaceable Coils

Number of Normally Open Convertible Contacts	Open Type	
	Type	Price
2	XO-20-XL	**$104.**
3	XO-30-XL	**112.**
4	XO-40-XL	**120.**
6	XO-60-XL	**136.**
8	XO-80-XL	**152.**

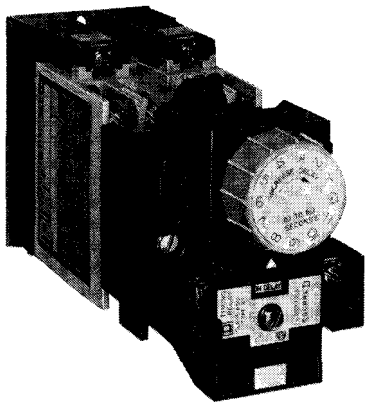


Type XO-40-XL

The latching relay is electromagnetically operated and is held by means of a mechanical latch. Energization of the latching coil will cause the normally open contacts to close and the normally closed contacts to open. The mechanical latch will hold all contacts switched, even after power is removed from the latching coil. Energization of a second coil, the unlatching coil, will result in all contacts switching back to their original state. Both coils are continuously rated — no coil-clearing contacts required — and are replaceable.

TIMING RELAY

- On-Delay and Off-Delay, Convertible
- Two Adjustable Timing Ranges: 0.1-60 seconds and 5-180 seconds
- ± 10% Repeat Accuracy
- 2 Timed and 4 Instantaneous Contacts Maximum, all Convertible



Type XO-40-XTE1

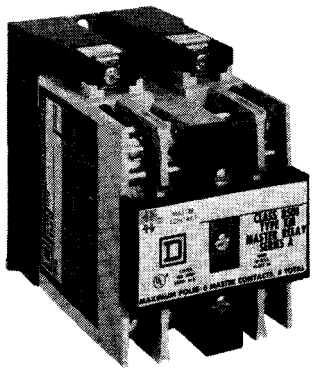
The Type X pneumatic timing relay is available in either ON or OFF delay with 1 N.O. and 1 N.C. convertible timed contacts and up to four convertible instantaneous contacts. Conversion from ON to OFF delay or vice versa is easily done by loosening two screws and rotating the timing head 180°. Two adjustable timing ranges are offered — 0.1 to 60 seconds and 5 to 180 seconds — with a repeat accuracy of ± 10%. A large knob is provided for easy adjustment of the time delay.

Number of Normally Open Instantaneous Convertible Contacts	Number of Timed Convertible Contacts		Open Type				
			Time Delay on Energization		Time Delay on De-energization		
	Normally Open	Normally Closed	0.1-60 sec.	5-180 secs.	0.1-60 secs.	5-180 secs.	
			Type	Type	Type	Type	Price
0	1	1	XO-00-XTE1	XO-00-XTE2	XO-00-XTD1	XO-00-XTD2	**$144.**
2	1	1	XO-20-XTE1	XO-20-XTE2	XO-20-XTD1	XO-20-XTD2	**160.**
4	1	1	XO-40-XTE1	XO-40-XTE2	XO-40-XTD1	XO-40-XTD2	**176.**

MASTER CONTROL RELAY

The Type XMO master control relay offers the same features as the basic control relay except it has a 20 ampere continuous current rating instead of 10 amperes. This device consists of a basic ac control relay with master contact cartridges in place of standard cartridges. It is designed for use in circuits that require a master relay. Standard cartridges may be used in contact cavities not occupied by master contacts in a 2-8 pole ac relay.

Number of Normally Open 20 Ampere Convertible Contacts	Open Type	
	Type	Price
2	XMO-20	**$ 72.**
4	XMO-40	**112.**
6	XMO-60	**152.**



Type XMO-40

RING OR SPADE LUGS — FORM Y12-1

For relays with terminals that will accept ring or spade lugs, add Form Y12-1 to the Class and Type number of the device being ordered. Form Y12-1 is available on all ac relays, dc relays, and attachments. Ring or spade lugs must have an outside diameter of 5/16 inch or less and an inside diameter large enough to accommodate a #6 screw. Lugs should accept #12 – #14 AWG gauge stranded copper wire. UL Listing is maintained only when AMP Plastic-Grip #32958 insulated-barrel ring-tongue lugs or equivalent UL Listed lugs are used.

STANDARD COILS

Frequency	Voltage
60 Hz	12, 24, 48, 120, 208, 240, 277, 480, 600
50 Hz	12, 24, 48, 110, 220, 440, 550

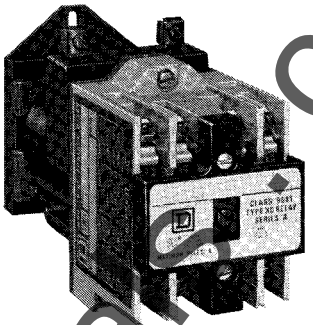
ORDERING INFORMATION REQUIRED

1. Class and type number.
2. Voltage and frequency of operating coil.

DC CONTROL RELAY

The Type X dc-operated control relay is available with up to 8 poles. It features a pure dc power plant — no need for economizing resistors or dual-wound coils — with standard voltages up to 250VDC. In addition, the Type X dc relay offers the same flexibility available with the ac version. The same plug-in convertible contact cartridges are used. Adding contacts is just as easy with the same Type XB adder deck used to convert a 4 pole relay into a 6-8 pole device. And, the mechanical tie between all cartridges is maintained with the dc device.

Number of Normally Open Convertible Contacts	Open Type	
	Type	Price
2 4	XDO-20 XDO-40	**$ 88.** **104.**
6 8	XDO-60 XDO-80	**120.** **136.**



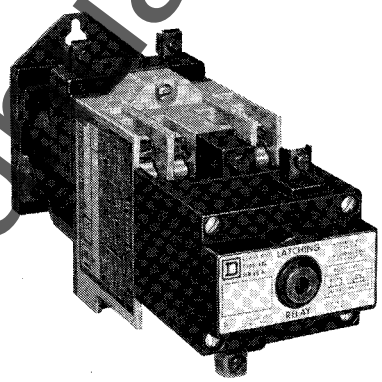
Type XDO-40

DC LATCHING RELAY

The dc-operated latching relay uses the same mechanical latching mechanism as the ac-operated version. **Caution: Unlatch coil is intermittent rated and should be connected through a N.O. contact of the relay if the input signal is maintained. Order one more N.O. contact than application requires to use as coil clearing contact.**

Number of Normally Open Convertible Contacts	Open Type	
	Type*	Price
2 4	XDO-20-XDL XDO-40-XDL	**$152.** **168.**
6 8	XDO-60-XDL XDO-80-XDL	**184.** **200.**

* See **Caution** note at left.



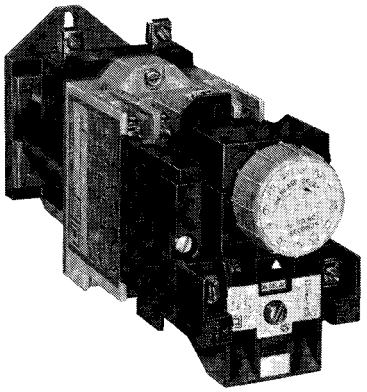
Type XDO-40-XDL

DC TIMING RELAY

The dc-operated timing relay consists of the standard pneumatic timer attachment mounted on a 0-4 pole dc-operated control relay. This provides ON or OFF delay with either a 0.1-60 second or 5-180 second time delay and 2 timed and up to 4 instantaneous contacts.

Number of Normally Open Instantaneous Convertible Contacts	Number of Timed Convertible Contacts		Open Type				
			Time Delay on Energization		Time Delay on De-energization		
			0.1-60 secs.	5-180 secs.	0.1-60 secs.	5-180 secs.	
	Normally Open	Normally Closed	Type	Type	Type	Type	Price
0	1	1	XDO-00-XTE1	XDO-00-XTE2	XDO-00-XTD1	XDO-00-XTD2	**$184.**
2	1	1	XDO-20-XTE1	XDO-20-XTE2	XDO-20-XTD1	XDO-20-XTD2	**200.**
4	1	1	XDO-40-XTE1	XDO-40-XTE2	XDO-40-XTD1	XDO-40-XTD2	**216.**

	Standard Coils
DC	6, 12, 18, 24, 32, 48, 64, 72, 115/125, 230/250



Type XDO-40-XTE1

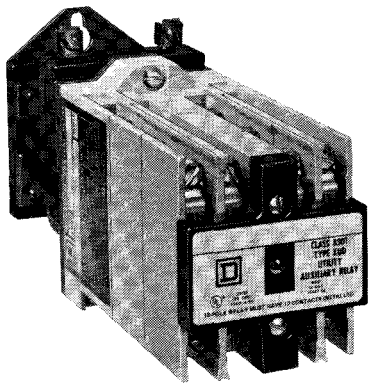
UTILITY AUXILIARY RELAY

For special applications in the electric utility industry, the Type X Utility Auxiliary Relay is available. This special version offers the same features as the standard dc-operated relay plus:

1. 4, 8 and 12 pole versions, with up to 12 poles normally open **or** closed.
2. Nominal 125V dc coil, capable of handling 140V dc continuously and capable of picking up at 105V dc after having been operated at 140V dc continuously. Other voltages with comparable operating characteristics are available on the 4 and 8 pole relays.
3. Enclosed device capable of operating in 145°F ambient.

The Type X Utility Auxiliary Relay is ideal for nuclear and fossil-fueled utility plant applications where reliable performance, a pure dc power plant, and up to 12 usable poles are required.

Number of Convertible Contacts		Open Type	
N.O.	N.C.	Type	Price
4 0	0 4	XUDO-40 XUDO-04	**$130.**
8 0	0 8	XUDO-80 XUDO-08	**170.**
12 0	0 12	XUDO-1200 XUDO-0012	**210.**

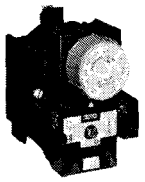
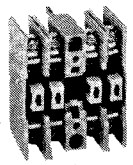
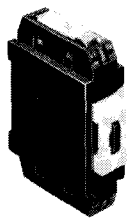
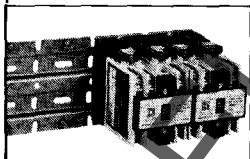
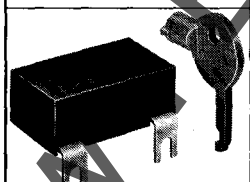
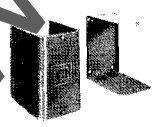


Type XUDO-1200

ORDERING INFORMATION REQUIRED 1. Class and type number. 2. Voltage of operating coil.

INDUSTRIAL CONTROL RELAYS — 600 VOLT
TYPE X

ACCESSORIES

	Description	Identification	Price
	**MECHANICAL LATCH ATTACHMENT**—Mounts on any 2 through 8 pole relay. The Type XL and XDL latch attachments are identical in size and mounting provisions. The Type XL ac latch attachment has a continuous-duty-rated coil which is replaceable. **The Type XDL dc latch attachment has an intermittent-rated coil (replaceable) and should be connected through an N.O. contact of the basic relay if the input signal is maintained.** AC Latch Attachment DC Latch Attachment	 Type XL Type XDL	 **$ 56.00** **64.00**
	**PNEUMATIC TIMER ATTACHMENT** — Mounts on any 0 through 4 pole ac or dc relay. It provides 1 N.O. and 1 N.C. convertible timed contacts, which are the same Type XC-1 cartridges used on the basic relay. Two timing ranges are available, and conversion from ON delay to OFF delay or vice versa is easy. OFF DELAY 0.1-60 seconds 5-180 seconds ON DELAY 0.1-60 seconds 5-180 seconds	 Type XTD1 Type XTD2 Type XTE1 Type XTE2	 **112.00** **112.00** **112.00** **112.00**
	**TIMER LOCKOUT COVER** — Fits over the time delay adjustment knob of any Type XT timing attachment. The Lockout Cover is designed to protect the time setting against accidental adjustment. It mounts directly to the timing attachment with two screws.	Type XJ-1	**2.50**
	**ADDER DECKS** — Adder decks are used to expand the number of poles on a relay. The basic Type X 4 pole relay can be easily converted to an 8 pole or 12 pole relay by installing one or two adder decks. The Class 8501 Type XB-20 comes complete with 2 convertible contact cartridges and will accept 2 additional convertible contact cartridges. The Class 8501 Type XB-40 comes complete with 4 contact cartridges. The same Type XB adder deck is used for both the middle and upper decks. With 2 N.O. contact cartridges With 4 N.O. contact cartridges	 Type XB-20 Type XB-40	 **16.00** **32.00**
	LOGIC REED ADDER DECK — Used for switching low energy circuits. The Logic Reed Adder Deck is supplied with either one or two logic reed cartridges fixed into the center positions of an adder deck. Contact cartridges are neither convertible nor replaceable. Standard cartridges can be inserted in unused cavities of the Logic Reed Adder Deck. See Application Data for electrical ratings.		
	Number of Normally Open Fixed Logic Reed Contact Cartridges / Number of Normally Closed Fixed Logic Reed Contact Cartridges		
	2 / 0	Type XBR-20	**44.00**
	1 / 1	Type XBR-11	**44.00**
	1 / 0	Type XBR-10	**22.00**
	0 / 1	Type XBR-01	**22.00**
	0 / 2	Type XBR-02	**44.00**
	**CONTACT CARTRIDGES** — The Type X relay offers 4 types of contact cartridges. All are color-coded for visual identification of each type.		
	Standard Cartridge — The standard cartridge, used for most applications, has a black case.	Type XC-1	**8.00**
	Overlapping Cartridge — Same NEMA A600 ac rating as standard cartridge and a NEMA P150 dc rating. When it is used in the normally open mode it will close early and when used in the normally closed mode it will open late. If two or more are used together, the normally open contacts will close before the normally closed contacts open as the relay picks up. Overlap also occurs during dropout. Overlapping cartridge has a red case.	Type XC-2	**8.00**
	Master Cartridge — Features the same contact ratings as the Type XC-1 standard cartridge except it has a 20 ampere continuous current rating instead of 10 amperes. It can be used in circuits where a master relay is required. Master cartridge has a blue case. **Maximum of 6 master cartridges may be used on any 7 and 8 pole ac relays. Do not use any master cartridges on 9-12 pole ac or any dc-operated devices.**	Type XC-4	**20.00**
	Logic Reed Cartridge — See Logic Reed Adder Deck above	—	—
	**MOUNTING TRACK** — The mounting track has pre-punched mounting holes to simplify mounting the track on the control panel. The relay mounting screws are factory installed on the track so that the relays can be hung prior to tightening the screws. Type XM track also accepts Class 8501 Type L relays. 9" long for 4 relays 18" long for 8 relays 27" long for 12 relays 36" long for 16 relays 72" long for 32 relays	 Type XM-4 Type XM-8 Type XM-12 Type XM-16 Type XM-32	 **4.00** **6.00** **9.00** **11.00** **23.00**
	**MANUAL TEST TOOL** — Provides a means of manually switching the contacts of a basic relay or timing relay and holding all contacts in their switched state until the tool is removed. This simplifies the checking of control circuits without power on the coil or contacts.	Type XA-1	**1.60**
	TRANSIENT SUPPRESSOR — Consists of an R-C circuit designed to suppress coil generated transients to approximately 200 percent of peak voltage. It is particularly useful when using the Type X relay in conjunction with solid state equipment and is designed for use on coils rated 120V only.	Type XS-1	**12.00**
	**NEMA 1 ENCLOSURE** — Formed from sheet steel to provide strength and rigidity. Two conduit knockouts are located in the top and bottom of the enclosure. The enclosure is furnished with self tapping screws for mounting the relay inside the enclosure. Accommodates 4 and 8 pole ac or dc relays, 12 pole ac relay, 4 pole ac and dc latching relays, and 4 pole timing relays. The 8 pole ac and dc latching relay and 12 pole Utility Auxiliary Relay will not fit.	Class 9991 Type UE-7 (formerly Class 8501)	**28.00**

ORDERING INFORMATION REQUIRED 1. Class and type number.

INDUSTRIAL CONTROL RELAYS — 600 VOLT
TYPE X

APPLICATION DATA

MAXIMUM ELECTRICAL CONTACT RATINGS

Type of Cartridge	AC Ratings								DC Ratings					
		Inductive 35% Power Factor						Resistive 75% Power Factor		Inductive			Resistive	
	Volts	NEMA Rating	Make Amps.	Make VA	Break Amps.	Break VA	Continuous Amperes	Make, Break and Continuous Amperes	Volts	NEMA Rating	Make and Break Amperes 138VA Max.	Continuous Amperes	Make and Break Amperes	Continuous Amperes
Standard	120 240	A600	60 30	7200 7200	6 3	720 720	10 10	10 10	125 250	P300	1.1 0.55	5 5	4 0.8	5 5
Overlappping	480 600		15 12	7200 7200	1.5 1.2	720 720	10 10	10 10	125	P150	1.1	5	4	5
Master*	—	A600	Same as standard cartridge above except substitute 20 ampere for the continuous ampere rating						125 250	P300	1.1 0.55	5 5	4 0.8	5 5
Logic Reed	—	—	150 VAC, 150MA, 8VA Maximum						—	—	30 VDC, 60MA			

* Maximum of six 8501 Type XC-4 Master Cartridges may be used on any 8 pole ac device. Do not use any Master Cartridges on 12 pole ac or any dc-operated relays.

CONTACT ARRANGEMENT

The following table lists all pole arrangements and the location of the N.O. and N.C. poles. Relays purchased from the factory will correspond to these tables. For example: an XO-12 will have one N.O. pole in position 1; positions 2 and 3 will have N.C. poles; position 4 will be a space.

XTD & XTE Timer Attachments All Contacts Convertible

No. of Timed Contacts	Type	Pole Number‡ 13	14
2	XTD XTE	O	1

‡O — Normally Open Contact
1 — Normally Closed Contact
S — Space for Future Contact

2, 3 and 4 Pole Relay All Contacts Convertible

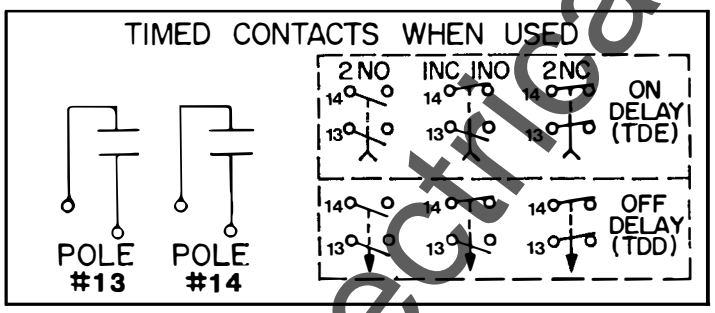
No. of Poles	Type	Pole Number‡ 1	2	3	4
2	XO-20	S	O	O	S
	XO-11	S	O	1	S
	XO-02	S	1	1	S
3	XO-30	O	O	O	S
	XO-21	O	1	O	S
	XO-12	O	1	1	S
	XO-03	1	1	1	S
4	XO-40	O	O	O	O
	XO-31	O	1	O	O
	XO-22	O	1	1	O
	XO-13	O	1	1	1
	XO-04	1	1	1	1

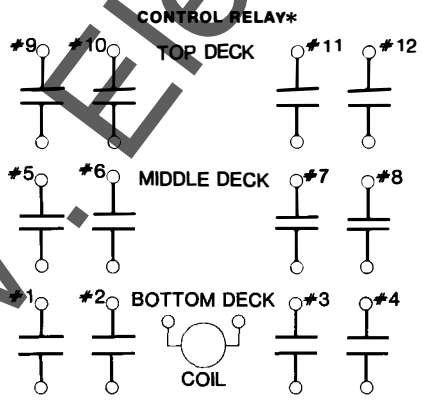
6 and 8 Pole Relay All Contacts Convertible

No. of Poles	Type	Pole Number‡ 5	6	7	8
		1	2	3	4
6	XO-60	S	O	O	S
		O	O	O	O
	XO-51	S	O	O	S
		O	1	O	O
	XO-42	S	O	O	S
		O	1	1	O
	XO-33	S	1	1	S
		O	1	O	O
	XO-24	S	1	1	S
		O	1	1	O
	XO-15	S	1	1	S
		O	1	1	1
	XO-06	S	1	1	S
		1	1	1	1
8	XO-80	O	O	O	O
		O	O	O	O
	XO-71	O	1	O	O
		O	O	O	O
	XO-62	O	1	1	O
		O	O	O	O
	XO-53	O	1	O	O
		O	1	1	O
	XO-44	O	1	1	O
		O	1	1	O
	XO-35	O	1	1	1
		O	1	1	O
	XO-26	O	1	1	O
		1	1	1	1
	XO-17	O	1	1	1
		1	1	1	1
	XO-08	1	1	1	1
		1	1	1	1

10 and 12 Pole Relay All Contacts Convertible

No. of Poles	Type	Pole Number‡ 9	10	11	12
		5	6	7	8
		1	2	3	4
10	XO-1000	S	O	O	S
		O	O	O	O
		O	O	O	O
	XO-0901	S	O	O	S
		O	1	O	O
		O	O	O	O
	XO-0802	S	O	O	S
		O	1	1	O
		O	O	O	O
	XO-0703	S	O	O	S
		O	1	1	O
		O	1	O	O
	XO-0604	S	O	O	S
		O	1	1	O
		O	1	1	O
	XO-0505	S	O	O	S
		O	1	1	1
		O	1	1	O
	XO-0406	S	1	1	S
		O	1	1	O
		O	1	1	O
	XO-0307	S	1	1	S
		O	1	1	1
		O	1	1	O
	XO-0208	S	1	1	S
		O	1	1	O
		1	1	1	1
	Maximum of 8 N.C. Poles				
12	XO-1200	O	O	O	O
		O	O	O	O
		O	O	O	O
	XO-1101	O	1	O	O
		O	O	O	O
		O	O	O	O
	XO-1002	O	1	1	O
		O	O	O	O
		O	O	O	O
	XO-0903	O	1	1	O
		O	1	O	O
		O	O	O	O
	XO-0804	O	1	1	O
		O	1	1	O
		O	O	O	O
	XO-0705	O	1	1	O
		O	1	1	O
		O	1	O	O
	XO-0606	O	1	1	O
		O	1	1	O
		O	1	1	O
	XO-0507	O	1	1	O
		O	1	1	O
		O	1	1	1
	XO-0408	O	1	1	O
		O	1	1	O
		1	1	1	1
	Maximum of 8 N.C. Poles				





* For latch relay use same diagram as above except for the addition of an unlatch coil (8 poles maximum).

INDUSTRIAL CONTROL RELAYS — 600 VOLT
TYPE X

APPLICATION DATA

AC MAGNET COILS

Coil Prefix	Hertz	SUFFIX NUMBERS (Coil part numbers consist of coil prefix followed by suffix number) 12 Volts	24 Volts	48 Volts	110 Volts	120 Volts	208 Volts	220 Volts	240 Volts	277 Volts	440 Volts	480 Volts	550 Volts	600 Volts	Coil Volt-Amps In-Rush	Coil Volt-Amps Sealed	Price
Class 9998 Type X	60	14	23	32	...	44	51	...	53	55	...	62	...	65	148	23	**$21.**
	50	15	24	33	44	...	...	53	...	...	62	...	65	...	143	25	

AC UNLATCH COILS

Coil Prefix	Hertz	SUFFIX NUMBERS (Coil part numbers consist of coil prefix followed by suffix number) 12 Volts	24 Volts	48 Volts	110 Volts	120 Volts	208 Volts	220 Volts	240 Volts	277 Volts	440 Volts	480 Volts	550 Volts	600 Volts	Coil Volt-Amps In-Rush	Coil Volt-Amps Sealed	Price
Class 9998 Type XL	60	14	23	32	...	44	51	...	53	55	...	62	...	65	25	12	**$36.**
	50	15	24	33	44	...	...	53	...	...	62	...	65	...	24	11	

DC MAGNET COILS

Coil Prefix	SUFFIX NUMBERS (Coil part numbers consist of coil prefix followed by suffix number) 6 Volts	12 Volts	18 Volts	24 Volts	32 Volts	48 Volts	64 Volts	72 Volts	90 Volts	115/125 Volts	230/250 Volts	Coil Burden Watts	Price
Class 9998 Type XD	19	28	34	37	40	46	49	52	55	58	67	11	**$51.**

DC UNLATCH COILS

Coil Prefix	SUFFIX NUMBERS (Coil part numbers consist of coil prefix followed by suffix number) 6 Volts	12 Volts	18 Volts	24 Volts	32 Volts	48 Volts	64 Volts	72 Volts	90 Volts	115/125 Volts	230/250 Volts	Coil Burden Watts	Price
Class 9998 Type XDL	19	28	34	37	40	46	49	52	55	58	67	36	**$66.**

UTILITY AUXILIARY RELAY

Coil Prefix	SUFFIX NUMBERS (Coil part numbers consist of coil prefix followed by suffix number) 6 Volts	12 Volts	24 Volts	48 Volts	125 Volts	250 Volts	Coil Burden Watts	Price
Class 9998 Type XUD	19	28	37	46	58	67	10	**$51.**

Heavy duty, molded coils are used. AC coils are designed to operate on line voltage fluctuations as much as 15% below and 10% above normal voltage. DC coils will operate between 80 and 110% of normal voltage.

When ordering replacement magnet coil give Class and Type Number, voltage and frequency of coil being replaced.

AVERAGE OPERATING TIMES

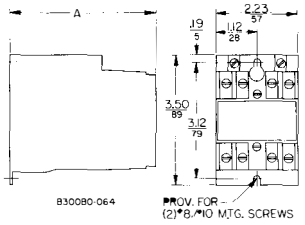
Device	Milli-Seconds Pick-Up	Milli-Seconds Drop-Out
AC Relay	15	16
AC Latching Relay	15	13
DC Relay	37	21
DC Latching Relay	37	45

AMBIENT TEMPERATURE RANGE
−40°C to +71°C (−40°F to +160°F)

INDUSTRIAL CONTROL RELAYS — 600 VOLT
TYPE X

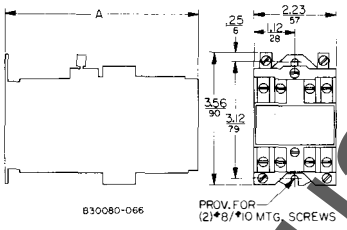
APPROXIMATE DIMENSIONS AND SHIPPING WEIGHTS

AC CONTROL RELAY



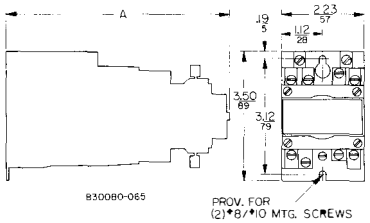
No. of Poles	'A' Dim.	Shipping Weight Lbs.
0-4	**3.95** 100	2.0
6-8	**5.16** 131	2.3
10-12	**6.36** 162	2.7

DC CONTROL RELAY
UTILITY AUXILIARY RELAY



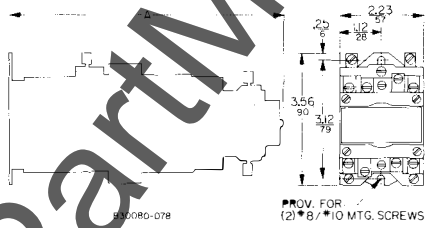
No. of Poles	'A' Dim.	Shipping Weight Lbs.
0-4	**5.17** 131	3.1
6-8	**6.37** 162	3.4
10-12	**7.57** 193	3.8

AC LATCHING RELAY



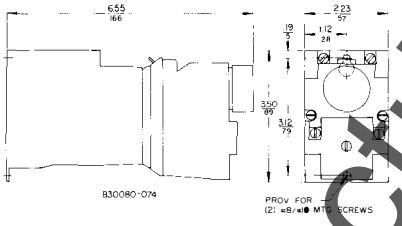
No. of Poles	'A' Dim.	Shipping Weight Lbs.
2-4	**6.09** 155	2.8
6-8	**7.29** 185	3.1

DC LATCHING RELAY



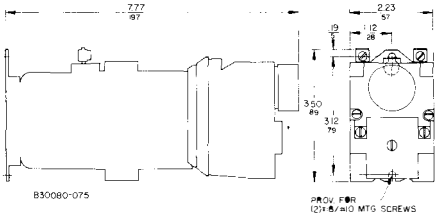
No. of Poles	'A' Dim.	Shipping Weight Lbs.
2-4	**7.31** 186	3.9
6-8	**8.51** 216	4.2

AC TIMING RELAY

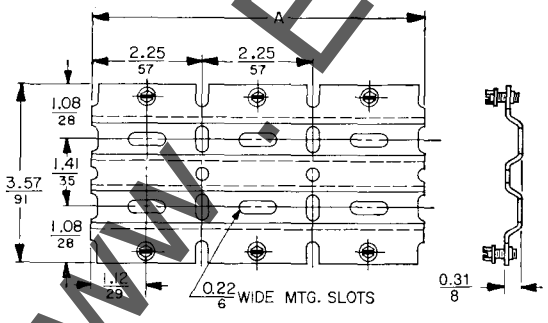


Shipping Weight — 2.6 Lbs.

DC TIMING RELAY

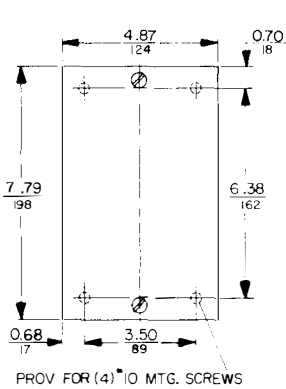


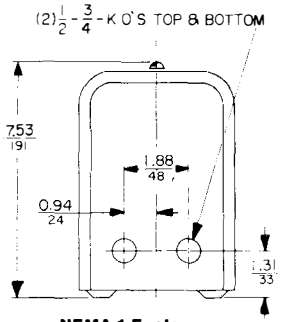
Shipping Weight — 3.7 Lbs.



Type X Relay Mounting Track

No. of Relays	'A' Dim.	Weight In Lbs.
4	**9** 229	0.75
8	**18** 457	1.5
12	**27** 686	2.25
16	**36** 914	3.0
32	**72** 1828	6.0





NEMA 1 Enclosure
Class 9991 Type UE-7

Weight — 4 Lbs.

Dual Dimensions: **INCHES** / Millimeters

AC AND DC CONTROL RELAYS
PRICE LIST
CLASS 8501 TYPE G

CLASS 8501 8503 7001 7008

AC OPERATED — OPEN TYPE

50-60 HERTZ — **300 VOLTS MAX.**

Number of Instantaneous Contacts					Standard Relay		Mechanically Held Relay		Relay Operated Pneumatic Timer		
	Convertible		Fixed						OFF Delay	ON Delay	
Total	Normally Open	Normally Closed	Normally Open	Normally Closed	Type	Price	Type	Price	Type	Type	Price
0	0	0	0	0	GO-00	$ 32.	.....	....	GO-00-GD	GO-00-GE	$144.
2	2	0	0	0	GO-20	48.	GO-20-GL	$104.	GO-20-GD	GO-20-GE	160.
3	3	0	0	0	GO-30	56.	GO-30-GL	112.	GO-30-GD	GO-30-GE	168.
4	4	0	0	0	GO-40	64.	GO-40-GL	120.	GO-40-GD	GO-40-GE	176.
6	6	0	0	0	GO-60	80.	GO-60-GL	136.	.....	.....	...
8	8	0	0	0	GO-80	96.	GO-80-GL	152.	.....	.....	...
8	0	0	4	4	GO-00-GU-44	88.	.....	....	.....	.....	...
10	2	0	4	4	GO-20-GU-44	104.	.....	....	.....	.....	...
12	4	0	4	4	GO-40-GU-44	120.	.....	....	.....	.....	...

DC OPERATED — OPEN TYPE

6-250 VOLT COILS — DC — **300 VOLTS MAX.**

No. of Convertible Contacts on Relay (Instantaneous Contacts)	No. of Contacts Normally Open	No. of Contacts Normally Closed	Standard Relay		Mechanically Held Relay		Relay Operated Pneumatic Timer		
							OFF Delay	ON Delay	
			Type	Price	Type	Price	Type	Type	Price
0	0	0	.....	...	.....	...	GDO-00-GD	GDO-00-GE	$172.
2	2	0	GDO-20	$ 76.	GDO-20-GDL	$140.	GDO-20-GD	GDO-20-GE	188.
3	3	0	GDO-30	84.	GDO-30-GDL	148.	.....	.....	....
4	4	0	GDO-40	100.	GDO-40-GDL	164.	.....	.....	....
6	6	0	GDO-60	124.	GDO-60-GDL	188.	.....	.....	....
8	8	0	GDO-80	148.	GDO-80-GDL	212.	.....	.....	....

The tables above list relays with all convertible contacts normally open. Relays having a combination of normally open and normally closed convertible contacts can be ordered by description. Add **$8.00** per relay.

ATTACHMENTS AND ACCESSORIES

Identification	Price
Class 8501 Type GU-44	$ 56.00
Class 8501 Type GL	56.00
Class 8501 Type GDL	64.00
Class 8501 Type GD	112.00
Class 8501 Type GE	112.00
Class 8501 Type G-6	12.00
Class 8501 Type G-4	4.00
Class 8501 Type G-8	6.00
Class 8501 Type G-12	9.00
Class 8501 Type G-16	11.00
Class 9991 Type UE-6	28.00
Class 9991 Type UE-7	28.00
Form Y-14	Add 9.00
Form Y35 plus description	Add 18.00 Per Pair
Form X-89	N/C
31021-054-01	1.40

AC Operated Relays for Self-Checking Circuit Applications

Class 8501 Type	Price
GO-31P	$72.
GO-22P	72.
GO-51P	88.
GO-42P	88.
GO-62P	104.
GO-44P	104.

Standard Coils	
Frequency	Voltage
60 Hz AC	12, 24, 48, 120, 240, 277
50 Hz AC	12, 24, 48, 110, 220
DC	12, 24, 48, 115, 230/250

ORDERING INFORMATION REQUIRED

1. Class and type number.
2. Voltage and frequency of operating coil.

CLASS
8501
8508
7001
7008

AC AND DC CONTROL RELAYS PRICE LIST

CLASS 8501 TYPE H AND CLASS 8501, 8508, 7001, 7008 TYPE D

Revised Oct., 1983

CLASS 8501 TYPE H

Number of Normally Open Convertible Contacts*	15 AMPERE AC OPERATED RELAY — CONTROL RELAY — Hazardous Locations Class I Groups C & D Class II Groups E, F & G NEMA Type 7 & 9 — Type	Price	15 AMPERE AC OPERATED RELAY — CONTROL RELAY — Open Type — Type	Price	15 AMPERE AC OPERATED RELAY — LATCHING RELAY — Hazardous Locations Class I Groups C & D Class II Groups E, F & G NEMA Type 7 & 9 — Type	Price	15 AMPERE AC OPERATED RELAY — LATCHING RELAY — Open Type — Type	Price	15 AMP DC OPERATED RELAY — CONTROL RELAY — Open Type — Type	Price
2	HR-20	**$338.**	HO-20	**$70.**	HLR-20	**$405.**	HLO-20	**$131.**	HDO-20	**$118.**
3	HR-30	**351.**	HO-30	**83.**	HLR-30	**418.**	HLO-30	**144.**	HDO-30	**135.**
4	HR-40	**362.**	HO-40	**92.**	HLR-40	**429.**	HLO-40	**153.**	HDO-40	**144.**
6	HR-60	**409.**	HO-60	**135.**	HLR-60	**477.**	HLO-60	**196.**	HDO-60	**200.**
8	HR-80	**438.**	HO-80	**161.**	HLR-80	**505.**	HLO-80	**222.**	HDO-70	**226.**
8	.....	....	HXO-80	**196.**	....	....	HXLO-80	**256.**		
10	.....	....	HXO-1000	**222.**	....	....	HXLO-1000	**282.**		
12	.....	....	HXO-1200	**248.**	....	....	HXLO-1200	**308.**		

*The above tables list relays with all normally open convertible contacts. For relays having a combination of normally open and normally closed contacts order by description and add **$13.** to prices shown.

STANDARD COILS

Frequency	Voltage
60 Hz	24, 48, 120, 240, 277, 480, 600
50 Hz	24, 48, 110, 220, 440, 550
DC	24, 32, 48, 115/125, 230/250

ORDERING INFORMATION REQUIRED

1. Class and type number.
2. Voltage and frequency of operating coils.

Type H AC Operated Relays for Self-Checking Circuit Applications

Class 8501 Type	Price
HO-31P	**$100.**
HO-22P	**100.**
HO-51P	**143.**
HO-42P	**143.**
HXO-62P	**204.**
HXO-44P	**204.**

MODIFICATIONS AND ACCESSORIES

Identification	Price
Class 8501 Type H1L Class 8501 Type H1R	**$13.00** **13.00**
Class 8501 Type H3L Class 8501 Type H3R	**26.00** **26.00**
31071-406 or Form Y-145	★ **35.00** Add **8.60**
Class 8501 Type H-6 Class 8501 Type H-12 Class 8501 Type H-18	**7.80** **10.40** **13.00**
Class 9991 Type LG-1	**40.00**
Form Y159-1 Form Y159-2	Add **19.50** Add **19.50**
Form Y-14	**26.00**
Class 8501 HA-1	**6.50**

★ D14A Discount

CLASS 8501, 8508, 7001, 7008 — TYPE D

Description	Number of Contacts — Normally Open	Normally Closed	AC Class 8501 Open Type — Type	Price	AC – Latching Class 8508 Open Type — Type	Price	DC Class 7001 Open Type — Type	Price	DC – Latching Class 7008 Open Type — Type	Price
2 Pole, Single Throw	2	0	DO-20	**$ 57.**	DO-20	**$130.**	DO-20	**$114.**	DO-20	**$187.**
2 Pole, Single Throw	0	2	DO-02	**70.**	DO-02	**143.**	DO-02	**114.**	DO-02	**187.**
2 Pole, Double Throw	2	2	DO-22	**79.**	DO-22	**152.**	DO-22	**141.**	DO-22	**213.**
4 Pole, Single Throw	4	0	DO-40	**75.**	DO-40	**148.**	DO-40	**141.**	DO-40	**213.**
4 Pole, 2 Double Throw, 2 N.O.	4	2	DO-42	**103.**	DO-42	**176.**	DO-42	**167.**	DO-42	**240.**
8 Pole, 4 N.O., 4 N.C.	4	4	DO-44	**103.**	DO-44	**176.**	DO-44	**194.**	DO-44	**266.**
6 Pole, 6 N.O.	6	0	DO-60	**110.**	DO-60	**183.**	DO-60	**167.**	DO-60	**240.**
8 Pole, 6 N.O., 2 N.C.	6	2	DO-62	**145.**	DO-62	**218.**	DO-62	**194.**	DO-62	**266.**
8 Pole, 2 Double Throw, 4 N.O., 2 N.C.	6	4	DO-64	**154.**	DO-64	**227.**	DO-64	**220.**	DO-64	**293.**
8 Pole, 8 N.O.	8	0	DO-80	**132.**	DO-80	**205.**	DO-80	**194.**	DO-80	**266.**
8 Pole, 6 N.O., 2 Double Throw	8	2	DO-82	**180.**	DO-82	**253.**	DO-82	**220.**	DO-82	**293.**

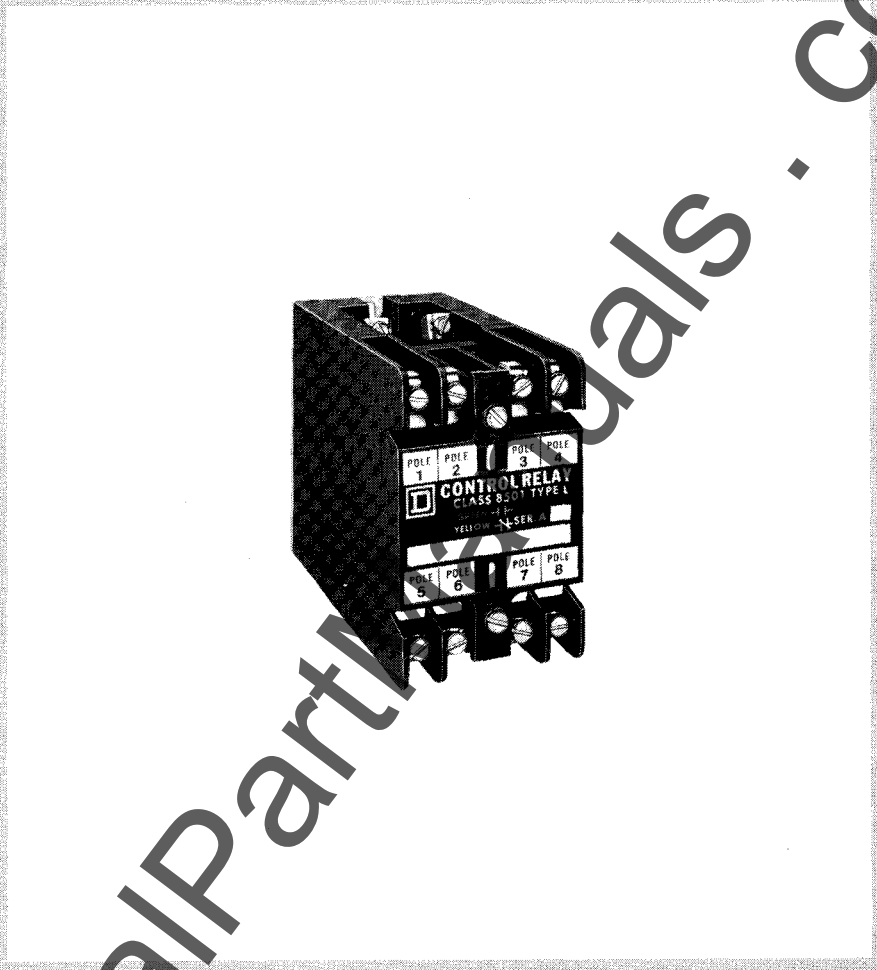
TYPE D RELAY OPERATED TIMER

Description		Number of Instantaneous Contacts — N.O.	N.C.	Number of Timed Contacts — N.O.	N.C.	AC Class 8501 Open Type — Type	Price
Time Delay after De-energization (Off Delay)	2 Pole, Double Throw	2	2	1	1	DDO-22	**$264.**
	4 Pole, 2 Double Throw, 2 N.O. ..	4	2	1	1	DDO-42	**308.**
Time Delay after Energization (On Delay)	2 Pole, Double Throw	2	2	1	1	DEO-22	**264.**
	4 Pole, 2 Double Throw, 2 N.O. ..	4	2	1	1	DEO-42	**308.**

Latching Attachment

Class 8508	
Type	Price
M-1	**$73.**

STANDARD COILS	
Frequency	Voltage
60 Hz	6, 12, 24, 48, 120, 240, 277, 480, 600
50 Hz	6, 12, 24, 48, 110, 220, 440, 550
DC	12, 24, 48, 115, 230/250



Control Relays
AC Industrial
TYPE L

CONTENTS

SQUARE D COMPANY

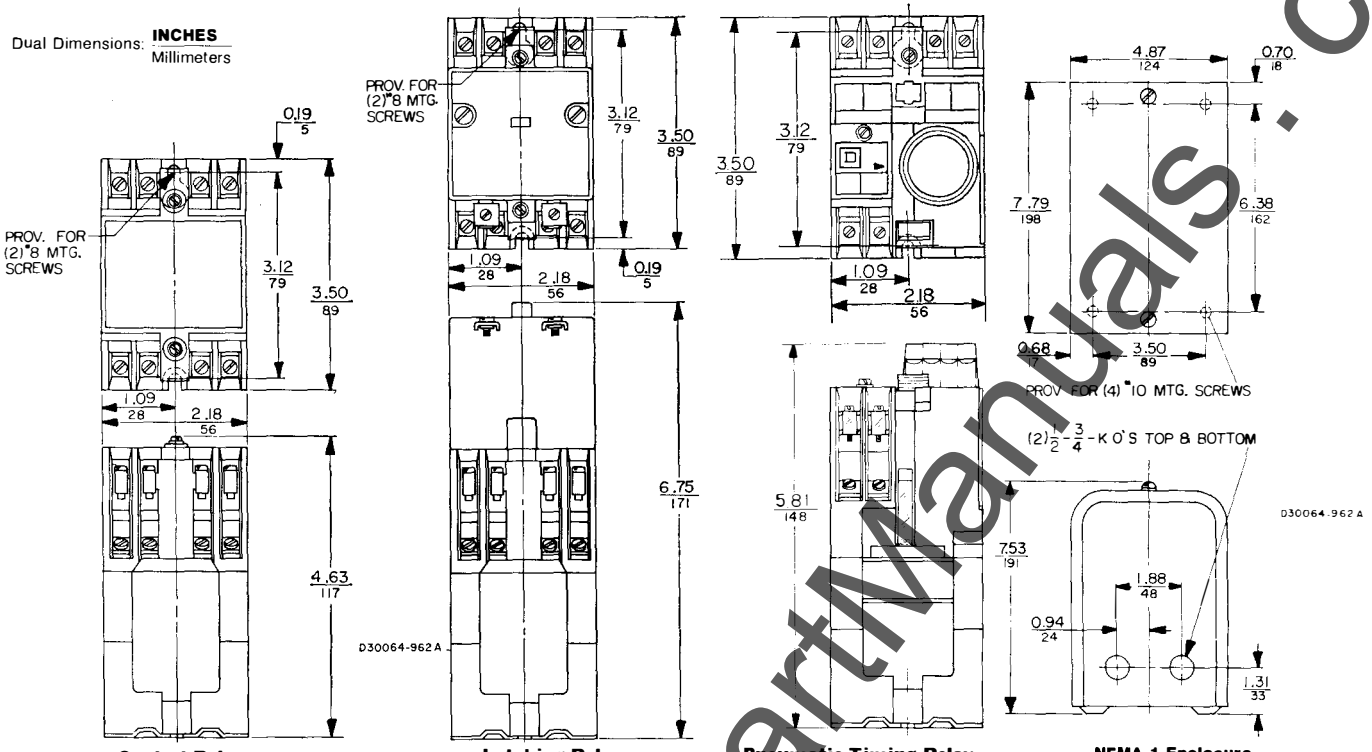
CLASS
8501

AC CONTROL RELAYS — 600 VOLT
TYPE L

Revised Oct., 1983

APPLICATION DATA
APPROXIMATE DIMENSIONS AND SHIPPING WEIGHTS

Dual Dimensions: **INCHES** / Millimeters



Control Relay Type LO 2-8P
Weight — 3 lbs.

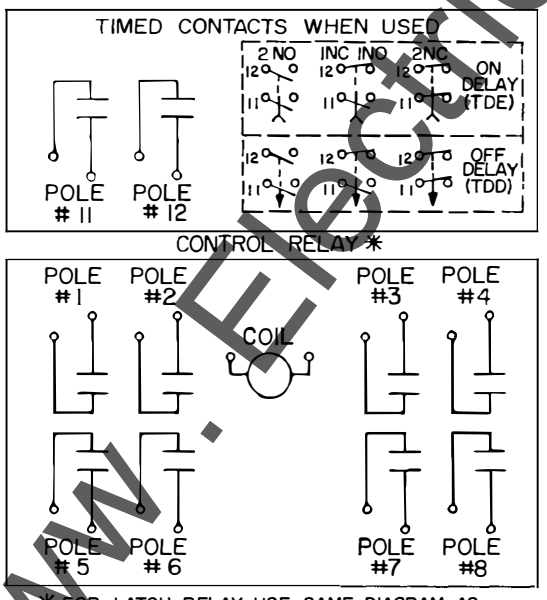
Latching Relay Type LO 2-8P
Weight — 3½ lbs.

Pneumatic Timing Relay Type LO _ _ LT
Weight — 3½ lbs.

NEMA 1 Enclosure Class 9991 Type UE-7
Weight — 4 Lbs.

CONTACT ARRANGEMENT

The following table lists all pole arrangements and the location of the N.O. and N.C. poles. Relays purchased from the factory will correspond to these tables. For example: an LO-12 will have one N.O. pole in position 1; position 2 will be a space; positions 3 and 4 will have N.C. poles.



✳ FOR LATCH RELAY USE SAME DIAGRAM AS ABOVE EXCEPT FOR THE ADDITION OF AN UNLATCH COIL

2, 3 and 4 Pole Relay
All Contacts Convertible

No. of Poles	Type	Pole Number‡ 1	2	3	4
2	LO-20	O	S	S	O
	LO-11	O	S	S	1
	LO-02	1	S	S	1
3	LO-30	O	S	O	O
	LO-21	O	S	O	1
	LO-12	O	S	1	1
	LO-03	1	S	1	1
4	LO-40	O	O	O	O
	LO-31	O	O	O	1
	LO-22	O	O	1	1
	LO-13	O	1	1	1
	LO-04	1	1	1	1

LT Timer Attachment
All Contacts Convertible

No. of Timed Contacts	Type	Pole Number‡ 11	12
2	LT	0	1

‡O — Normally Open Contact
1 — Normally Closed Contact
S — Space for Future Contact

6 and 8 Pole Relay
All Contacts Convertible

No. of Poles	Type	Pole Number‡ 1	2	3	4	5	6	7	8
6	LO-60	O	O	O	O	O	O	O	O
	LO-51	O	S	S	O	O	S	S	O
	LO-42	O	O	O	1	O	O	O	1
	LO-33	O	S	S	O	O	S	S	O
	LO-24	O	1	1	1	O	1	1	1
	LO-15	O	S	S	1	O	S	S	O
	LO-06	1	1	1	1	1	1	1	1
8	LO-80	O	O	O	O	O	S	S	1
	LO-71	O	O	O	1	O	O	O	O
	LO-62	O	O	1	1	O	O	O	1
	LO-53	O	1	1	1	O	O	1	1
	LO-44	1	1	1	1	O	O	O	O
	LO-35	O	O	O	1	1	1	1	1
	LO-26	1	1	1	1	O	O	1	1
	LO-17	O	1	1	1	1	1	1	1
	LO-08	1	1	1	1	1	1	1	1

AC CONTROL RELAYS — 600 VOLT
TYPE L

PRICE SHEET
CLASS 8501 TYPE L RELAYS

AC OPERATED — OPEN TYPE

Number of Normally Open Convertible Contacts† (Instantaneous Contacts)	Control Relay		Latching Relay		Timing Relay	
	Type	Price	Type	Price	Type	Price
0					LO-00-LT	**$158.**
2	LO-20	**$ 53.**	LO-20-LL	**$115.**	LO-20-LT	**176.**
3	LO-30	**62.**	LO-30-LL	**124.**		
4	LO-40	**71.**	LO-40-LL	**133.**	LO-40-LT	**194.**
6	LO-60	**89.**	LO-60-LL	**151.**		
8	LO-80	**107.**	LO-80-LL	**169.**		

† Contact conversion is so simple that it is generally more economical to purchase relays with all contacts normally open and convert contacts to normally closed as required. If it is preferred that relays be factory assembled, with a combination of normally open and normally closed contacts, order by type number from page 2-4. Also, add **$8.00** to the price shown in the table above for a relay having the same total number of contacts. For example, a relay with 1 N.O. and 2 N.C. poles would be identified as a Type LO-12 and priced at **$70.00**.

CLASS 8501 TYPE L ACCESSORIES

Identification	Price
Type LL	**$62.00**
Type LT	**123.00**
Type LB-1	**35.00**
Type LM-1	**9.00**
Type LC-1	**9.00**
Type LC-2	**9.00**
Type LC-3	**21.00**
Type XM-4 Type XM-8 Type XM-12 Type XM-16 Type XM-32	**4.00** **6.00** **9.00** **11.00** **23.00**
Type LA-1	**1.60**
Type LA-2	**12.00**
Class 9991 Type UE-7	**28.00**

ORDERING INFORMATION REQUIRED

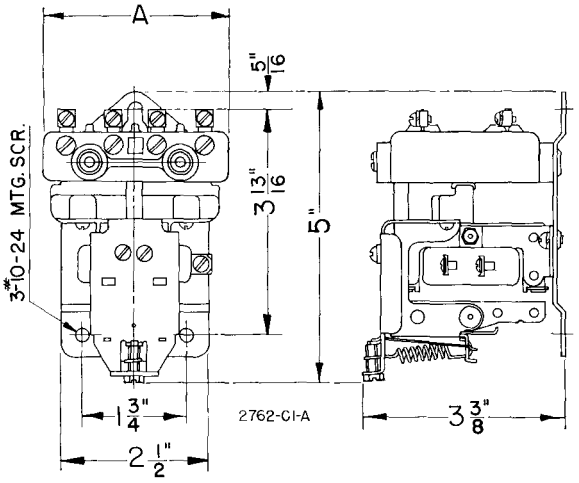
1. Class and type number.
2. Voltage and frequency of operating coil.

STANDARD COILS

Frequency	Voltage
60 Hz	24, 48, 120, 240, 277, 480, 600
50 Hz	24, 48, 110, 220, 440, 550

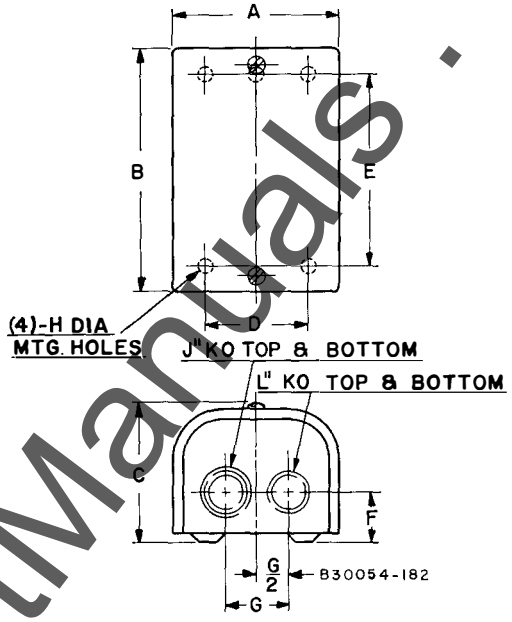
AC MAGNETIC RELAYS

Approximate Dimensions and Shipping Weights

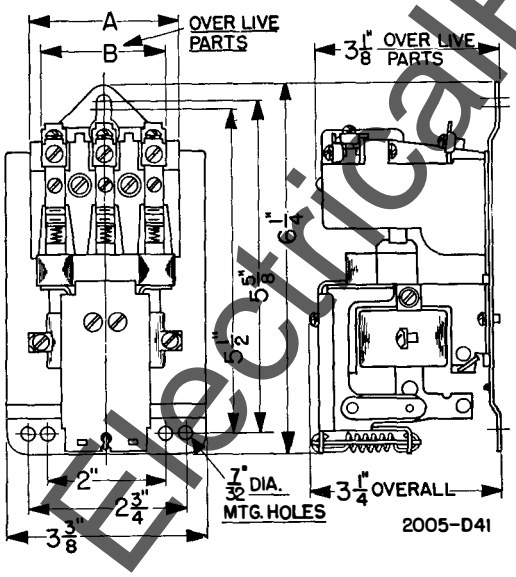


Type AO

Dimensions	OPEN TYPE	
	Type AO	
	2, 3, 4 Pole	6 Pole
A	3 1/4	4 25/32
Weight in Lbs.	2	2 1/4

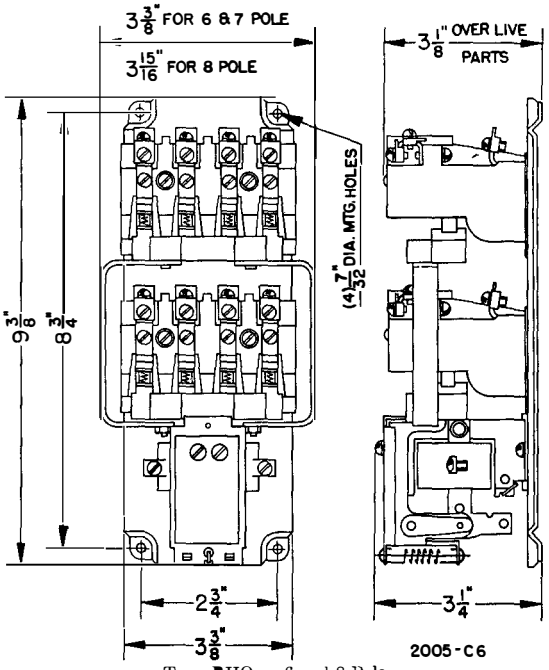


Type	General Purpose Enclosure Dimensions										Wgt. in Lbs.
	A	B	C	D	E	F	G	H	J	L	
AG-(2, 3, 4 and 6 Pole)	6 5/32	8 25/32	4 21/32	4 3/4	7 3/8	1 5/16	1 7/8	9/32	1/2, 3/4, 1	1/2, 3/4, 1	5
BHG-(2, 3 4 and 5 Pole)											6 1/2
BHG-(6 and 8 Pole)	5 5/32	12 25/32	4 15/16	3 3/4	11 3/8	1 5/16	1 7/8	9/32	1/2, 3/4, 1	1/2, 3/4, 1	7 3/4



Type BHO — 2, 3, 4 and 5 Pole

Dimen-sions	OPEN TYPE		
	Type BHO		
	2, 3 Pole	4 Pole	5 Pole
A	2 17/32	3 3/8	4 7/32
B	2 3/32	2 15/16	3 25/32
Weight in Lbs.	3	3	3



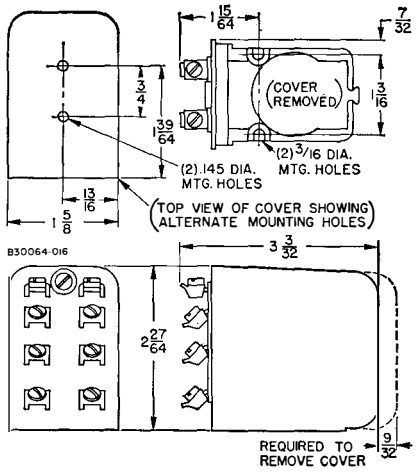
Type BHO — 6 and 8 Pole
Weight — 4½ Lbs.

Dimensions are in inches.

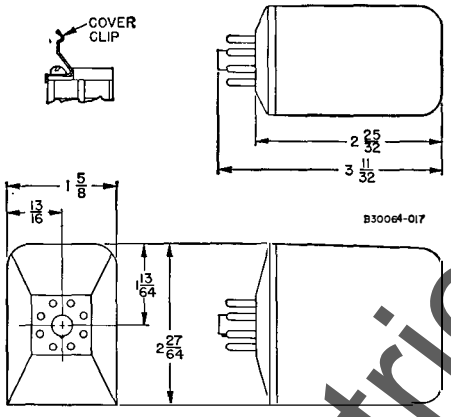
DECEMBER, 1966
Supersedes Dimension Sheet 8501, Page 4, dated April, 1956

AC MAGNETIC RELAYS

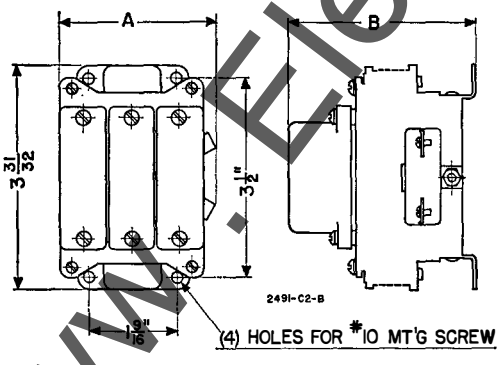
Approximate Dimensions — Not for Construction



Class 8501 Type FO, FBO, FSO, FDO, FBDO and FSDO
Weight — ½ Lb.

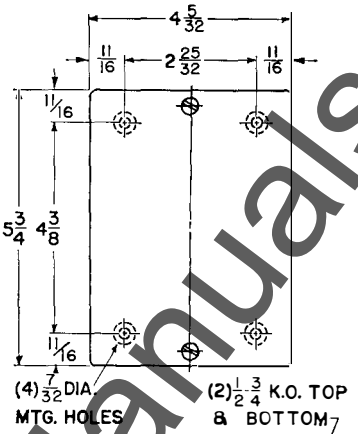


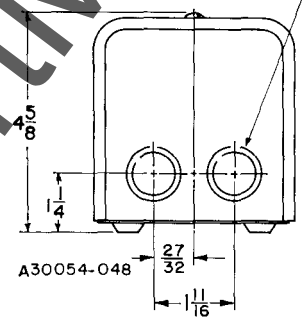
Class 8501 Type FPO and FPDO Relays
Weight — ½ Lb.



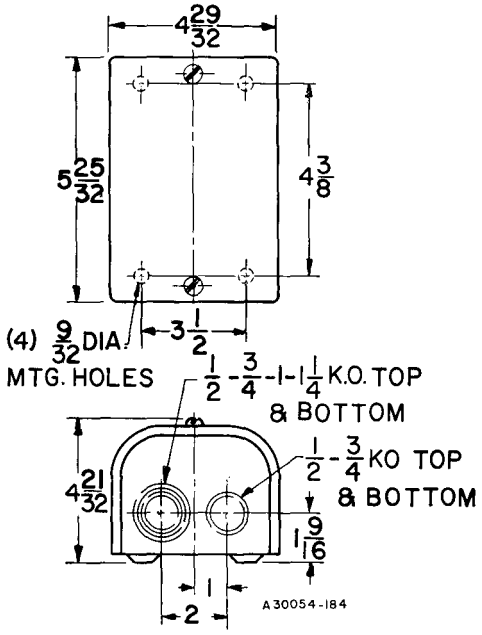
Type	A	B
PO1	2¾	3⅜
PO2		
PO3		
PO4	3⅝	
PO6	2¾	3½
PO8	3⅝	
PO1-S3	2¾	3¾
PO2-S3		
PO3-S3		
PO4-S3	3⅝	

Class 8501, Type PO
Weight — 2 Lbs.





Class 8501, Type FG
Weight — 1 Lb.



Class 8501, Type PG
Weight — 2½ Lbs.

Dimensions are in inches.

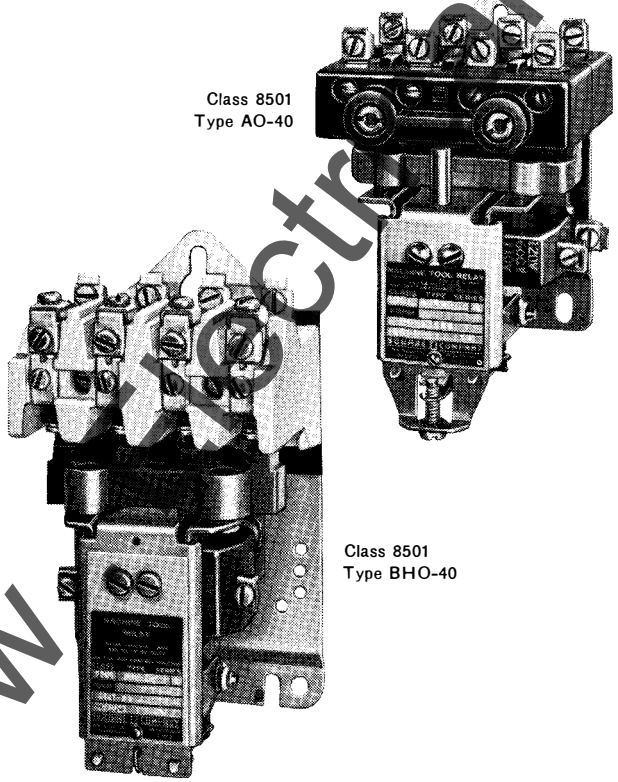
AC MACHINE TOOL RELAYS

600 VOLT — CONVERTIBLE CONTACTS — MULTIPOLE

Type A — 10 Ampere

25-60 Cycles **6-600 Volts**

No. of Poles	Number of Poles Normally Open	Number of Poles Normally Closed	General Purpose Enclosure NEMA Type 1 Type	General Purpose Enclosure NEMA Type 1 Price	Open Type Type	Open Type Price
	2	0	AG-20	$ 18.	AO-20	$ 15.
2	1	1	AG-11	21.	AO-11	18.
Poles	0	2	AG-02	21.	AO-02	18.
	3	0	AG-30	$ 21.	AO-30	$ 18.
3	2	1	AG-21	24.	AO-21	21.
Poles	1	2	AG-12	24.	AO-12	21.
	0	3	AG-03	24.	AO-03	21.
	4	0	AG-40	$ 23.	AO-40	$ 20.
	3	1	AG-31	26.	AO-31	23.
4	2	2	AG-22	26.	AO-22	23.
Poles	1	3	AG-13	26.	AO-13	23.
	0	4	AG-04	26.	AO-04	23.
	6	0	AG-60	$ 33.	AO-60	$ 30.
	5	1	AG-51	36.	AO-51	33.
	4	2	AG-42	36.	AO-42	33.
6	3	3	AG-33	36.	AO-33	33.
Poles	2	4	AG-24	36.	AO-24	33.
	1	5	AG-15	38.	AO-15	35.
	0	6	AG-06	38.	AO-06	35.



Class 8501
Type AO-40

Class 8501
Type BHO-40

Type BH — 15 Ampere

25-60 Cycles **6-600 Volts**

No. of Poles	Number of Poles Normally Open	Number of Poles Normally Closed	General Purpose Enclosure NEMA Type 1 Type	General Purpose Enclosure NEMA Type 1 Price	Open Type Type	Open Type Price
	2	0	BHG-20	$ 24.	BHO-20	$ 21.
2	1	1	BHG-11	27.	BHO-11	24.
Poles	0	2	BHG-02	27.	BHO-02	24.
	3	0	BHG-30	$ 27.	BHO-30	$ 24.
3	2	1	BHG-21	30.	BHO-21	27.
Poles	1	2	BHG-12	30.	BHO-12	27.
	0	3	BHG-03	30.	BHO-03	27.
	4	0	BHG-40	$ 29.	BHO-40	$ 26.
	3	1	BHG-31	32.	BHO-31	29.
4	2	2	BHG-22	32.	BHO-22	29.
Poles	1	3	BHG-13	32.	BHO-13	29.
	0	4	BHG-04	32.	BHO-04	29.
	5	0	BHG-50	$ 38.	BHO-50	$ 35.
	4	1	BHG-41	41.	BHO-41	38.
5	3	2	BHG-32	41.	BHO-32	38.
Poles	2	3	BHG-23	41.	BHO-23	38.
	1	4	BHG-14	41.	BHO-14	38.
	0	5	BHG-05	43.	BHO-05	40.
	6	0	BHG-60	$ 43.	BHO-60	$ 40.
	5	1	BHG-51	46.	BHO-51	43.
	4	2	BHG-42	46.	BHO-42	43.
6	3	3	BHG-33	46.	BHO-33	43.
Poles	2	4	BHG-24	46.	BHO-24	43.
	1	5	BHG-15	48.	BHO-15	45.
	0	6	BHG-06	48.	BHO-06	45.
	8	0	BHG-80	$ 49.	BHO-80	$ 46.
	7	1	BHG-71	52.	BHO-71	49.
	6	2	BHG-62	52.	BHO-62	49.
	5	3	BHG-53	52.	BHO-53	49.
8	4	4	BHG-44	52.	BHO-44	49.
Poles	3	5	BHG-35	54.	BHO-35	51.
	2	6	BHG-26	54.	BHO-26	51.
	1	7	BHG-17	54.	BHO-17	51.
	0	8	BHG-08	54.	BHO-08	51.

ELECTRICAL CONTACT RATINGS

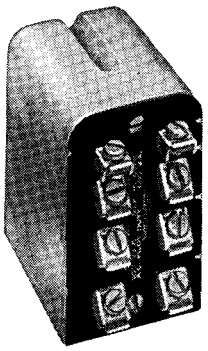
Volts	AC Pilot Duty † Type A★ Make	Type A★ Break	Type BH◐ Make	Type BH◐ Break
0–120	60 Amps.	6 Amps.	60 Amps.	6 Amps.
120–600	7200 VA	720 VA	7200 VA	720 VA

†AC pilot duty rating is based on a 35% power factor.
★AC continuous rating is 10 amperes based on a 75% power factor.
◐AC continuous rating is 15 amperes based on a 75% power factor.

ORDERING INFORMATION REQUIRED

Specify Class and Type number of relay, give the voltage, number of poles, and frequency of the operating coil.

AC AND DC MAGNETIC RELAYS — TYPE F

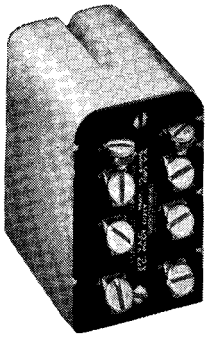


Types FO and FDO
With Pressure
Wire Connectors

AC OPERATION

50, 60 CYCLES **10 AMPERES★** **277 VOLTS MAX.**

Description			Open Type *		General Purpose Enclosure NEMA Type 1	
Number of Poles	Type of Wire Termination	With Pilot Light ▲	Type	Price	Type	Price
2 Pole, Double Throw	Pressure Wire Connectors	No	FO-22	$ 12.00	FG-22	$ 15.00
		Yes	FO-22P	13.50	FG-22P	16.50
	Binder Head Screws	No	FBO-22	12.00	FBG-22	15.00
		Yes	FBO-22P	13.50	FBG-22P	16.50
	Slip-on Connectors	No	FSO-22	12.00	FSG-22	15.00
		Yes	FSO-22P	13.50	FSG-22P	16.50
	Plug-in ‡	No	FPO-22	12.00	FPG-22 †	16.50 †
		Yes	FPO-22P	13.50	FPG-22P †	18.00 †



Types FBO and FBDO
With Binder
Head Screws

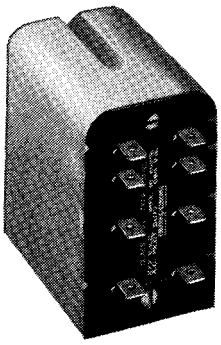
DC OPERATION

MAX. CONTACT RATING — 250 VOLTS DC — 277 VOLTS AC

COIL — 150 VOLTS DC MAX.

Description			Open Type *		General Purpose Enclosure NEMA Type 1	
Number of Poles	Type of Wire Termination	With Pilot Light ▲	Type	Price	Type	Price
2 Pole, Double Throw	Pressure Wire Connectors	No	FDO-22	$ 12.00	FDG-22	$ 15.00
		Yes	FDO-22P	13.50	FDG-22P	16.50
	Binder Head Screws	No	FBDO-22	12.00	FBDG-22	15.00
		Yes	FBDO-22P	13.50	FBDG-22P	16.50
	Slip-on Connectors	No	FSDO-22	12.00	FSDG-22	15.00
		Yes	FSDO-22P	13.50	FSDG-22P	16.50
	Plug-in ‡	No	FPDO-22	12.00	FPDG-22 †	16.50 †
		Yes	FPDO-22P	13.50	FPDG-22P †	18.00 †

*All relays furnished with nylon dust cover.
‡Plug-in relay has a 125 volt maximum voltage rating. Industrial type, front connected receptacle available from Amphenol under their part #146-103-1004.
†Includes receptacle mounted on back of enclosure.
▲Pilot lights available on 115 and 230 volts ac and 115 volts dc only.



Types FSO and FSDO
With Slip-on Connectors

AC ELECTRICAL RATINGS ★

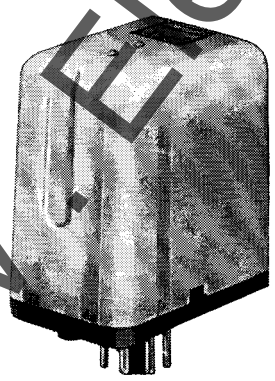
Type Number	Volts	AC Pilot Duty Rating ◆ Make	Break
FO, FBO, FSO, FDO, FBDO or FSDO	0–115	60 Amps.	6.0 Amps.
	115–277	6900 VA.	690 VA.
FPO or FPDO	0–125	60 Amps.	6.0 Amps.

★The ac continuous ampere rating is 10 amperes based on a 75% power factor.
◆The ac pilot duty rating is based on 35% power factor.

DC ELECTRICAL RATINGS

Type Number	Volts	DC Pilot Duty Rating ◐
FO, FBO FSO	0–24	10 Amps.
FDO, FBDO FSDO	25–250	24 VA.
FPO or FPDO	0–24	10 Amps.
	25–120	24 VA.

◐Inductive loads such as coils and solenoids.



Types FPO and FPDO
Plug-in

ORDERING INFORMATION REQUIRED

1—Specify Class and Type number of relay. Give voltage and frequency of operating coil.

2—Select suitable accessories and pilot control devices from Catalog Section 9001, 9007 and 9050.

TYPE F — AC MAGNET COILS

Magnet Coil Part No.			Coil Volt-Amps.	
Cycles	110–115 Volts	208–220 Volts	Inrush V.A.	Sealed V.A.
60	31011-400-56	31011-400-65	11.5	8.5
50	31011-400-59	31011-400-68	10.5	7.8

General Revision

APRIL, 1966
Supersedes Price Sheet 8501,
Page 6, dated February, 1964

AC MAGNETIC RELAYS
TYPE P — MULTIPOLE — TOTALLY ENCLOSED CONTACTS

AC OPERATION ‡

25-60 CYCLES **10 AMPERES★** **277 OR 600 VOLTS MAX.†**

Description	*Number of Contacts		General Purpose Enclosure NEMA Type 1		Open Type With Binder Head Screws		Open Type With Pressure Wire Connectors	
	Normally Open	Normally Closed	Type	Price	Type	Price	Type	Price
One Pole	1	1	PG-1	$ 21.	PO-1	$ 18.	PO1-S3	$ 18.25
Two Pole	2	2	PG-2	24.	PO-2	21.	PO2-S3	21.50
Three Pole	3	3	PG-3	27.	PO-3	24.	PO3-S3	24.75
Four Pole	4	4	PG-4	30.	PO-4	27.	PO4-S3	28.
Six Pole	6	6	PG-6	38.	PO-6	35.	.....	.....
Eight Pole	8	8	PG-8	44.	PO-8	41.	.....	.....

‡For DC operated Type P relays see Class 7001.
*Each pole of the relay consists of an isolated normally open and normally closed circuit. Due to electrical clearance, the normally open and normally closed circuits of any one pole must be used on circuits of the same polarity.
★The AC continuous ampere rating is based on a 75% power factor. The pilot duty rating is given in the tables below.
†One, two, three and four pole relays are rated 600 volts max. and the six and eight pole relays are rated 277 volts max. Coils, however, can be supplied for all Type P relays to 600 volts AC

PILOT DUTY RATING OF TYPES PG AND PO-1 THRU 4

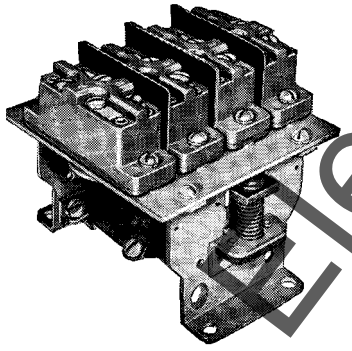
Volts	AC Pilot Duty Amperes		DC Pilot Duty Amperes
	Normal	Inrush	Double Throw
110	15	40	0.5
220	10	20	0.2
440	6	10	.....
600	5	8	0.02

The AC pilot duty rating is based on a 35% power factor.
The DC pilot duty rating is for inductive loads such as coils and solenoids.

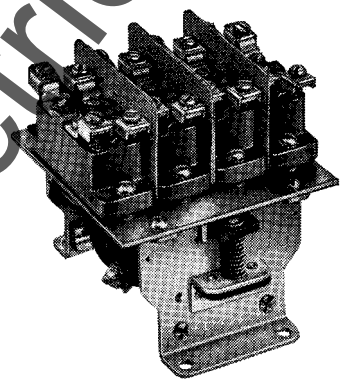
PILOT DUTY RATING OF TYPES PG AND PO-6 AND 8

Volts	AC Pilot Duty Rating		Volts	DC Pilot Duty Amps.	
	Break	Make		Single Throw	Double Throw
0–115	3 Amps.	30 Amps.	115	1.0	0.2
115–277	345 VA.	3450 VA.	230	0.3	0.1

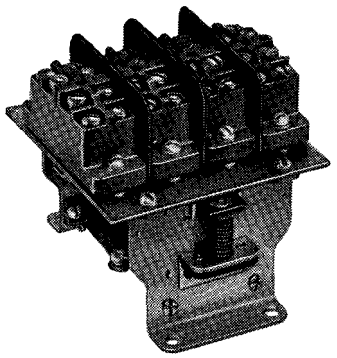
The AC pilot duty rating is based on a 35% power factor.
The DC pilot duty rating is for inductive loads such as coils and solenoids.



Type PO-4
With Binder Head Screws



Type PO4-S3
With Pressure Wire Connectors



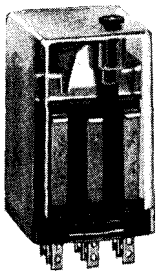
Type PO-8
With Binder Head Screws

ORDERING INFORMATION REQUIRED

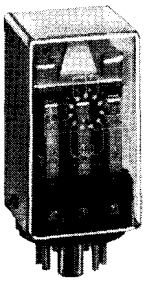
1—Specify Class and Type number of relay. Give voltage and frequency of operating coil.

2—Select suitable accessories and pilot control devices from Catalog Section 9001, 9007 and 9050.

TYPE K GENERAL PURPOSE RELAY



Combination Terminal Type



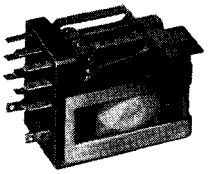
Tube Type

Type K general purpose relays are designed for multi-pole switching applications below 150 volts. Their small size particularly lends their use to the control of industrial or commercial control apparatus. Two basic versions of this relay are available:

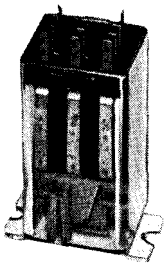
COMBINATION TERMINAL TYPE—Offers the maximum in mounting and wiring versatility.

TUBE TYPE—Features a universal pin and wiring arrangement.

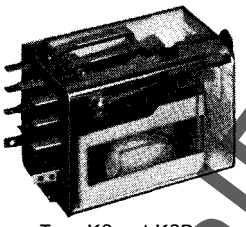
COMBINATION TERMINAL TYPE



Type KR and KRD



Type KT and KTD



Type KS and KSD

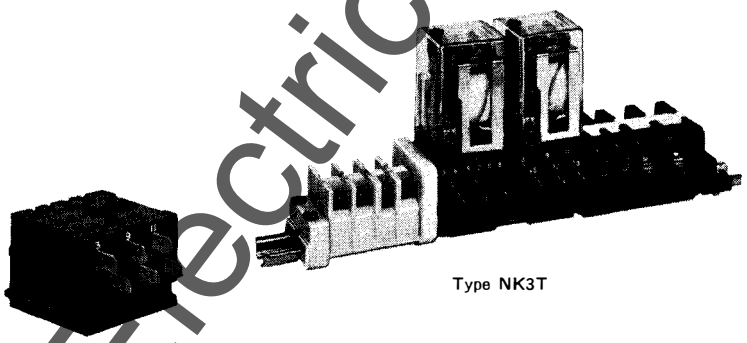
CONTACTS: 10 AMP. RESISTIVE — 150 VOLTS MAX. ●

Coil	Wiring Method	Poles	Direct Panel Mounting, Open Type: Type	Price *	Direct Panel Mounting, Dust Cover Enclosed: Type	Price *	Socket Mounting, Dust Cover Enclosed: Type	Price *
AC (240 V. max.) 50/60 Hz.	Solder or .110 slip-on Connector	2 PDT	KR12	**$5.20**	KT12	**$5.60**	KS12	**$5.60**
		3 PDT	KR13	**5.75**	KT13	**6.30**	KS13	**6.30**
DC (110 V. max. †)	Solder or .110 slip-on connector	2 PDT	KRD12	**5.20**	KTD12	**5.60**	KSD12	**5.60**
		3PDT	KRD13	**5.75**	KTD13	**6.30**	KSD13	**6.30**

†220 volt operation possible by using 5W, 6,800 ohm wire-wound resistor in series with 110 volt coil.

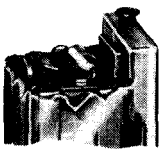
*Prices listed apply to maximum coil voltages of 120 volts ac and 24 volts dc. Above 120 volts ac add **$0.50.** Above 24 volts dc add **$0.65.**

●See page 107 for detailed ratings.



Type NK3T

Type NK-3



Cut-away of Relay with Pilot Light and Manual Operator (Form M1 P14)

SOCKETS — 10 AMPERES

Wiring Method	Mounting Method	Poles	Type	Price
Solder or .187 Slip-on Connector	Front Panel	2	NK32	**$1.75**
		3	NK3	**3.00**
	Track‡	2	NK32T ◐	**1.95**
		3	NK3T ◐	**3.20**

‡Select track and terminal blocks from Class 9080 section.

◐Consists of NK32 or NK3 socket plus snap-on track adapter. Order adapter only as Class 8501 Type NT at **$0.20** each. Standard packaging quantity of 10.

SPECIAL FEATURES

Feature	Function	Form	Additions Price
Pilot Light	Indicates Power to Coil	P14	**$1.20**
Manual Operator	Manual Closing of Contacts	M1	**$0.25**

ORDERING INFORMATION REQUIRED

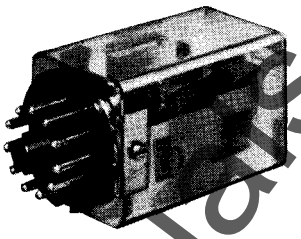
1—Class and type number.

2—Coil voltage and whether ac or dc.

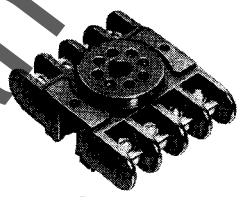
3—If special features are desired, add form designations to Class and type number in alphabetical order e.g. Class 8501 Type KS12 Form M1P14 — 120 volts, 50/60 Hz.

TYPE K GENERAL PURPOSE RELAY
TUBE TYPE

Tube type relays feature an industry standard wiring and pin arrangement. The basic relay is the same as the Type KS (combination terminal) with the exception of pin termination.

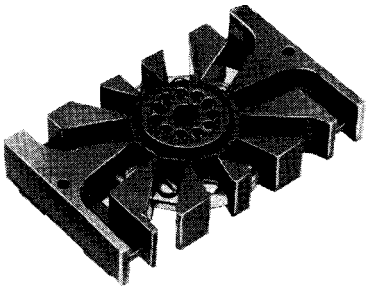


Type KP and KPD



Type NR1

Type NR3 and NR4



Type NR2

CONTACTS: **10 AMP. RESISTIVE —150 VOLTS MAX.●**

Coil	Mounting Method	Termination	Poles	Dust Cover Enclosed Type	Dust Cover Enclosed Price ‡
AC (240 V. max.) 50/60 Hz.	Socket	8 Pin	2 PDT	KP12	$ 8.20
		11 Pin	3 PDT	KP13	10.25
DC (110 V. max.) ▲	Socket	8 Pin	2 PDT	KPD12	8.20
		11 Pin	3 PDT	KPD13	10.25

▲220 volt operation possible by using 5W, 6,800 ohm wire-wound resistor in series with 110 volt coil.

‡Prices listed apply to maximum coil voltages of 120 volts ac and 24 volts dc. Above 120 volts ac add **$0.50.** Above 24 volts dc add **$0.65.**

●See Page 107 for detailed ratings.

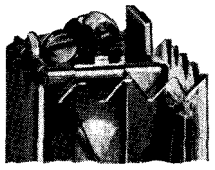
SOCKETS

Termination	Mounting	Amp. Rating	Pins	Poles	Type	Price
Screw	Front or Back Panel	5	8	2 PDT	NR1 ❶	$1.75
		10	11	3 PDT	NR2 ❷	4.05
Solder	Front Panel	3	8	2 PDT	NR3 ❸	.25
		3	11	3 PDT	NR4 ❹	.35

❶Amphenol Type 146-103
❷Amphenol Type 146-817
❸Amphenol Type 77-M1P-8
❹Amphenol Type 77-M1P-11

SPECIAL FEATURE

Feature	Function	Form	Additions Price
Pilot Light	Indicates Power to Coil	P14	$1.20



Cut-away of Relay with Pilot Light (Form P14)

ORDERING INFORMATION REQUIRED

1—Class and type number.

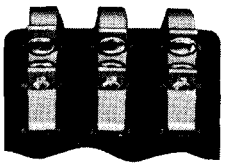
2—Coil voltage and whether ac or dc.

3—If pilot light is desired, add "Form P14" to Class and Type of relay, e.g. Class 8501 Type KP12 Form P14 — 120 Volts, 50/60 Hz.

TYPE K GENERAL PURPOSE RELAY

APPLICATION DATA

The combination terminal and tube type relays differ only in termination. All data below applies to both types unless an exception is noted.



CONTACTS

Silver cadmium-oxide contacts give high interrupting ability and long life.

RATING

AC Volts	AC Amperes: Inductive Pilot Duty — 35% P.F. Make	Break	Continuous	AC Amperes: Resistive 75% P.F. Make, Break & Continuous	DC Volts	DC Amperes: Inductive Pilot Duty▲ Make Break	Continuous
0-120	30	3	10	10	24-120	60 VA	10 Amps.

▲Based on inductive loads such as coils and solenoids.

COILS

Continuous duty coils are wound on a phenolic bobbin using Class A, 105° C polyurethane insulated wire.

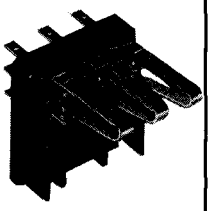
COIL RESISTANCE—OHMS

Volts	AC 50/60 Hz.	DC
6	1.954	19.0
12	7.55	78.5
24	29.9	310
48	118.0	1360
110	.....	6700
120	725	.....
240	3500	.....

Power Requirements
AC — 3 VA Average
DC — 2 Watts Average

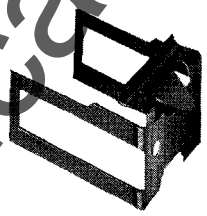
TERMINALS

Elimination of the troublesome pigtail leads between the movable contact blades and relay terminals prevents the possibility of their breakage. Proper alignment and adjustment of contacts is assured by welding the heat treated beryllium copper alloy blades directly to the brass terminals to form an integral switching structure with the base.



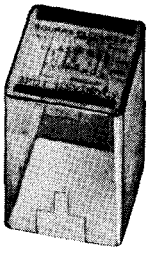
FRAME CLIP

The need for an adjustable tail-spring is eliminated through the use of a stainless steel frame clip which provides proper contact pressure and follow-up for the life of the device.

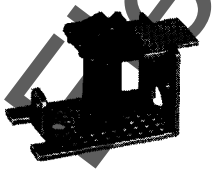


DUST COVER

Enclosed relays are protected by a heat and shock resistant polycarbonate dust cover. It is transparent to afford visual inspection of the contacts under operating conditions. All covers are provided with a marking area to enable easy identification of a specific device within a multi-relay panel.

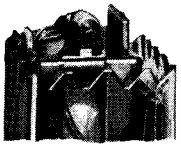


MAGNETIC STRUCTURE

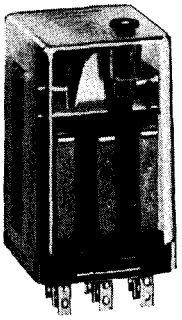


The use of premium materials in the magnetic structure reduces residual magnetism preventing "lock-up" after prolonged use. The armature and frame are manufactured of nickel-plated, hydrogen annealed, ingot iron. The core of AC devices is laminated and knife-staked to the frame to keep iron losses at a minimum.

OPTIONAL FEATURES



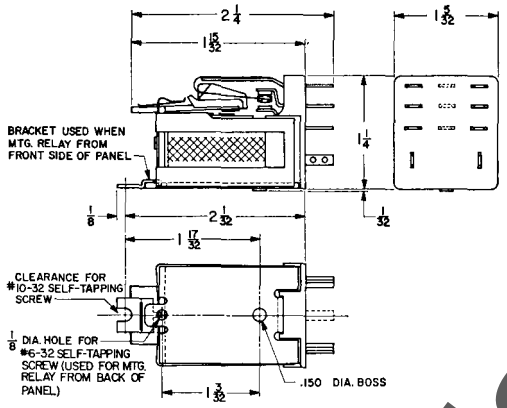
A pilot light can be supplied on any relay except Type KT. The pilot light is wired in parallel with the coil to indicate when power is applied.



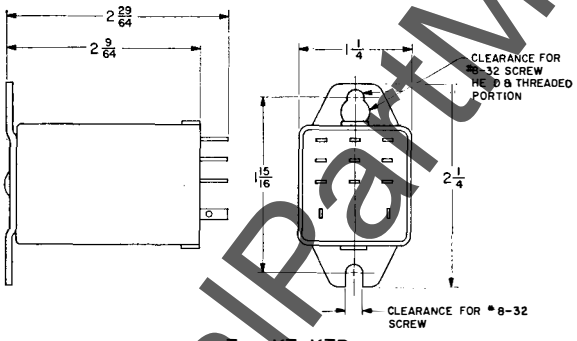
A manual operating button is available on Type KS and KSD combination terminal relays. This feature allows manual closing of the contacts for circuitry checks without power.

TYPE K GENERAL PURPOSE
Dimensions and Wiring Diagrams

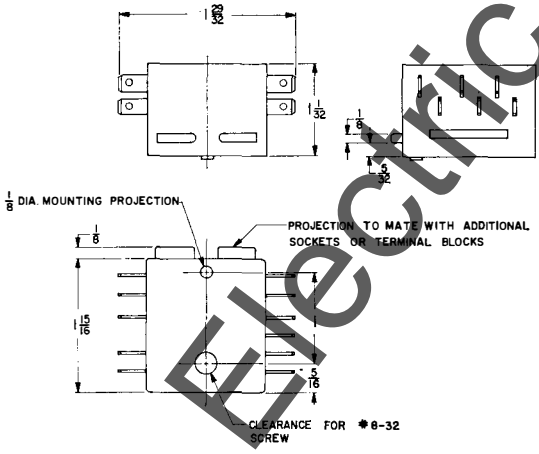
COMBINATION TERMINAL TYPE



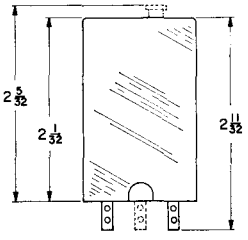
Type KR, KRD

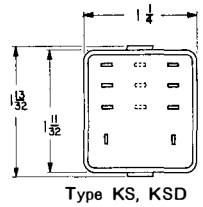


Type KT, KTD

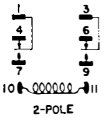


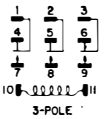
Type NK32 and NK3 — Without Track Adapter



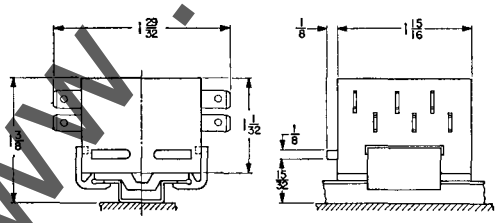


Type KS, KSD





Wiring Diagram
Types KR, KRD, KS, KSD, KT, KTD

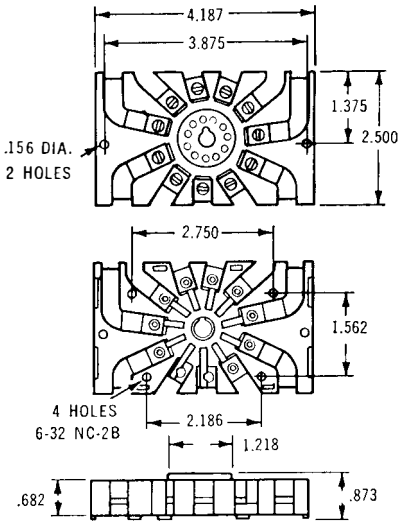


Type NK32T and NK3T — With Track Adapter

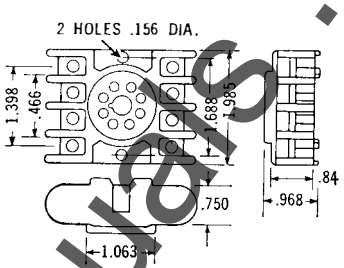
All dimensions are in inches

TYPE K GENERAL PURPOSE RELAY
Dimensions and Wiring Diagrams

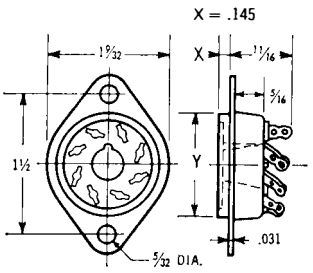
TUBE TYPE



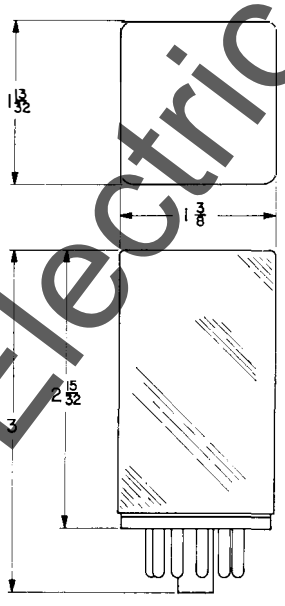
Type NR2



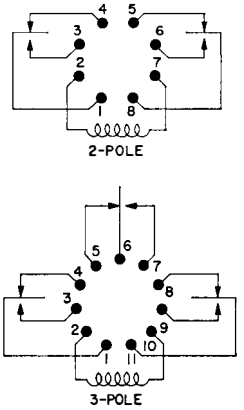
Type NR1



Types NR3 and NR4



Types KP and KPD



Wiring Diagram
Types KP, and KPD

All dimensions are in inches.

CONTACTS are rated at 10 amperes and are available in 2-pole, double throw or 4-pole two double throw, two normally open arrangements. Pressure wire connectors make wiring faster and easier. Timer contacts are single pole, double throw with pilot duty ratings shown on the Price Sheet. Both normally open and normally closed circuits must be used on same polarity. Terminals are provided with pressure wire connectors and are easily accessible from the front.

TIME RANGE is adjustable from 0.2 seconds to one minute and the repeat accuracy is within plus or minus 15% of the average time setting. The pneumatic principle upon which the timing operation is based, inherently provides consistent operation regardless of normal variations in the voltage, ambient temperature and atmospheric pressure.

Type F — The Type F relay is small in size and has the features required by industrial type applications. Possessing exceptionally long life and excellent contact reliability for minimum downtime, the F relay is ideally suited for use in all control systems.

MOUNTING — The relay can be mounted three different ways. First as a plug-in relay, secondly by mounting with two screws thru the relay base and thirdly, the relay can be mounted by fastening the dust cover to the panel. The relay is held in the cover with one screw.

TERMINAL ARRANGEMENTS — When the relay is mounted by its base or by its cover, a terminal board is used for wire termination. Pressure wire connectors, binder head screws or slip-on terminals are available.

The plug-in versions can be either front or panel wired or rear of panel wired depending upon the type of receptacle used.

PILOT LIGHT — An optional pilot light can be factory installed and is wired in parallel with the operating coil to indicate when the coil is energized making troubleshooting quicker and easier.

COILS — Relay coil is of molded construction for long, rugged, maintenance-free life. These coils resist mechanical damage, have a lower moisture absorption rate and a neater appearance.

CONTACTS — The two, double throw poles have three wiring points per pole. Heavy contacts insure long trouble-free life under industrial usage.

Type P — These relays are available with 1 thru 8 poles, utilizing a totally enclosed contact mechanism. Each pole of the relay consists of a Class 9007 precision snap switch.

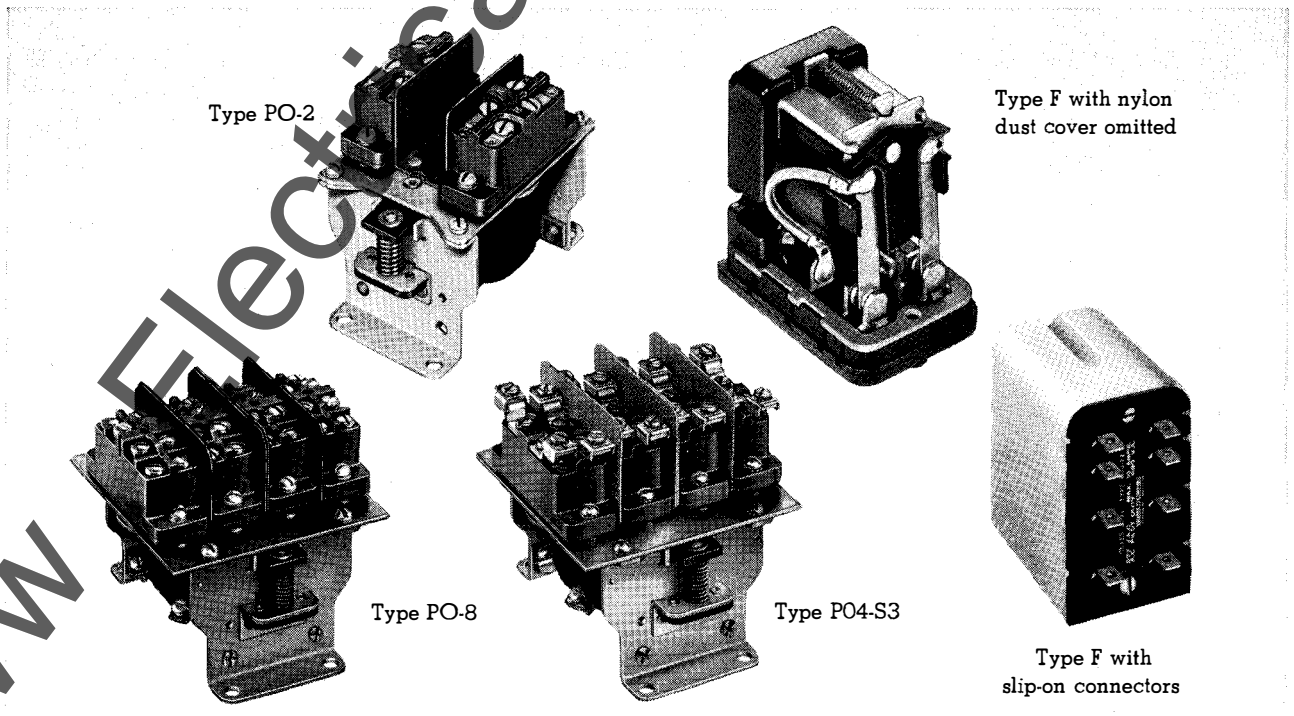
The 1, 2, 3 and 4 pole relays utilize a Class 9007 Type AO-2 snap switch having one normally open and one normally closed electrically isolated circuit per pole. Because of electrical clearances, however, the normally open and normally closed contacts of each pole must be used on circuits of the same polarity. Separate poles, however, can be used on circuits of the opposite polarity. The 1, 2, 3 and 4 pole devices are rated at 600 volt maximum.

The 6 and 8 pole relays use the Class 9007 Type CO-5, 2 pole snap switch. (This snap switch is similar to the Class 9007 Type CO-3, which is listed in the catalog, except for the terminal arrangement). The 6 pole relay uses three 2 pole snap switches and the 8 pole uses four 2 pole snap switches. Each of the 2 poles of the 2 pole snap switch is electrically separate from the other and can be used on opposite polarities. Because of electrical clearances, however, the normally open and normally closed circuit of each pole must be used on circuits of the same polarity. While the relay is rated 277 volts maximum, the electrical clearances are 600 volts. The 277 volt limit is on the circuits of each snap switch. Between snap switches there is 600 volt clearances. Coils are available up to 600 volts.

Contacts are double break, silver-to-silver. Should it be necessary to replace a set of contacts, it is only necessary to remove one of the Class 9007 Type AO-2 or Type CO-5 contact mechanism and replace it with another.

These relays are available with either pressure wire connectors or binder head screws. The relay provided in a general purpose enclosure has binder head screws. All terminals are easily accessible for wiring.

Because of the totally enclosed contact mechanisms, this relay performs well on applications where dust or dirt contamination interferes with proper operation of exposed type of contact construction.



Type PO-2

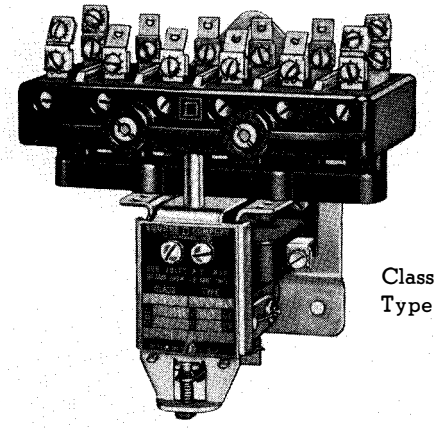
Type F with nylon dust cover omitted

Type PO-8

Type P04-S3

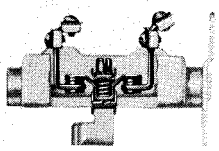
Type F with slip-on connectors

AC MAGNETIC RELAYS — OCTOBER, 1964

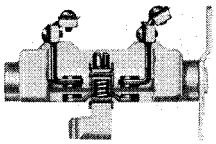


Class 8501
Type AO-60

Convertible Contacts — Type A Relay



Normally Closed



Normally Open

Type A — 10 ampere, 600 volt relay can be furnished as 2, 3, 4, or 6 pole with any combination of normally open and normally closed contacts. Type A relays are assembled in two sizes of contact blocks. The smaller size accommodates 2, 3, and 4 pole combinations, while the larger size is used for 6 pole devices.

Relay parts are assembled on a steel base with all connections made from the front and with current carrying parts insulated to permit direct mounting on a grounded panel.

CONVERTIBLE CONTACTS—An important consideration of flexibility is the ease of converting from normally open to normally closed contacts or vice versa. No additional parts are required. See illustration. Contacts are double break, silver-to-silver.

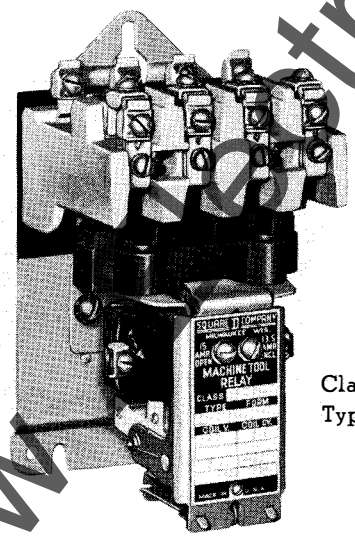
ACCESSIBILITY — By removing the two screws on the front of the magnet assembly, the entire movable contact assembly can be removed for inspection or replacement of coil and contacts. The coil may be taken off by squeezing together the ends of the coil holder clips and sliding the coil off the magnet.

COILS are molded for longer life. Neater appearing than wrapped coils, molded coils are less susceptible to mechanical damage, operate cooler, and are not affected by moisture and oil.

TERMINALS are provided with pressure wire connectors for fast wiring. Each of the two outside poles are provided with two sets of pressure wire connectors for ease in connecting a number of wires to one pole. (See photo to the left.)

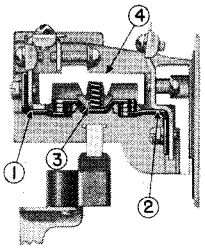
HARDENED PARTS — To insure extremely long mechanical life on these premium quality relays, all steel parts with critical wearing surfaces are hardened.

Type BH — 15 ampere, 600 volt heavy duty relays can be furnished as 2, 3, 4, 5, 6, or 8 pole with any combination of normally open and normally closed contacts. Contactors having five poles or less have one contact block. Contactors having six or eight poles have two contact blocks mounted one above the other on a single steel base, and have movable contacts rigidly coupled together to form a single movable assembly. Basic design features are generally similar to those described above for the 10 ampere, Type A relay.

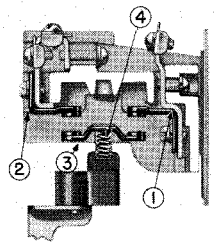


Class 8501
Type BHO-40

Convertible Contacts — Type BH Relay



Normally Closed



Normally Open

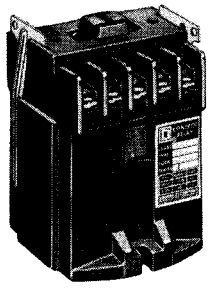
Supersedes Descriptive Sheet 8501
Pages 4 and 5, dated January, 1961

TYPE G — CONTROL RELAY

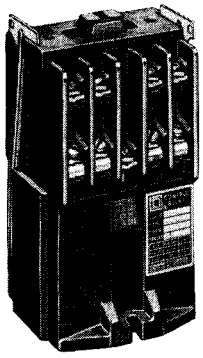
The Type G control relay and its accessories provide a complete system designed to do a complete job — and do it better! This 300 volt, 10 amp. systems relay includes accessories such as a timer attachment and mechanically held attachment. Thus, the relays and accessories provide matched, modular components which can be built into a complete control system. Because of this "systems" approach, maximum flexibility is assured during panel design, construction, testing and maintenance.

FEATURES

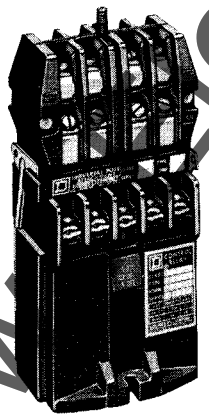
- Single coil selection
- Convertible contacts
- Convertible timer
- Uniform mounting dimensions
- AC and DC operated
- Timing attachment
- Latching attachment
- Universal pole attachment
- Captive pressure wire connectors



Type GO-40



Type GO-80



Type GO-40-GU-44

BASIC CONTROL RELAYS

Number of Contacts					Open Type▲			
	Convertible		Fixed		AC Operated		DC Operated	
Total	Normally Open	Normally Closed	Normally Open	Normally Closed	Type	Price	Type	Price
2	2	0	0	0	GO-20	$12.	GDO-20	$17.
	1	1	0	0	GO-11	14.	GDO-11	19.
	0	2	0	0	GO-02	14.	GDO-02	19.
3	3	0	0	0	GO-30	14.	GDO-30	19.
	2	1	0	0	GO-21	16.	GDO-21	21.
	1	2	0	0	GO-12	16.	GDO-12	21.
	0	3	0	0	GO-03	16.	GDO-03	21.
4	4	0	0	0	GO-40	16.	GDO-40	21.
	3	1	0	0	GO-31	18.	GDO-31	23.
	2	2	0	0	GO-22	18.	GDO-22	23.
	1	3	0	0	GO-13	18.	GDO-13	23.
	0	4	0	0	GO-04	18.	GDO-04	23.
6	6	0	0	0	GO-60	20.	GDO-60	25.
	5	1	0	0	GO-51	22.	GDO-51	27.
	4	2	0	0	GO-42	22.	GDO-42	27.
	3	3	0	0	GO-33	22.	GDO-33	27.
	2	4	0	0	GO-24	22.	GDO-24	27.
	1	5	0	0	GO-15	22.	GDO-15	27.
	0	6	0	0	GO-06	22.	GDO-06	27.
8	8	0	0	0	GO-80	24.	GDO-80	29.
	7	1	0	0	GO-71	26.	GDO-71	31.
	6	2	0	0	GO-62	26.	GDO-62	31.
	5	3	0	0	GO-53	26.	GDO-53	31.
	4	4	0	0	GO-44	26.	GDO-44	31.
	3	5	0	0	GO-35	26.	GDO-35	31.
	2	6	0	0	GO-26	26.	GDO-26	31.
	1	7	0	0	GO-17	26.	GDO-17	31.
	0	8	0	0	GO-08	26.	GDO-08	31.
8	0	0	4	4	GO-00-GU-44	18.	.....	.....
10	2	0	4	4	GO-20-GU-44	22.	.....	.....
	1	1	4	4	GO-11-GU-44	24.	.....	.....
	0	2	4	4	GO-02-GU-44	24.	.....	.....
12	4	0	4	4	GO-40-GU-44	26.	.....	.....
	3	1	4	4	GO-31-GU-44	28.	.....	.....
	2	2	4	4	GO-22-GU-44	28.	.....	.....
	1	3	4	4	GO-13-GU-44	28.	.....	.....
	0	4	4	4	GO-04-GU-44	28.	.....	.....

▲Devices available in NEMA 1 enclosure. Add **$3.00** to open type price and substitute letter "G" for "O" in type number.

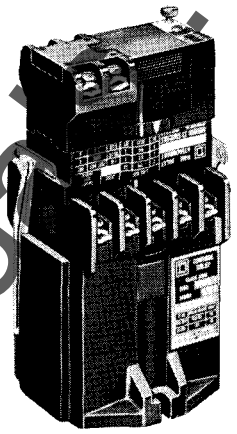
ORDERING INFORMATION REQUIRED

1. Class and type number
2. Voltage and frequency of operating coil

SUPERSEDES:
Class 8501
Price Page 8.01, 8.1, 8.2
April, 1965

TYPE G — CONTROL RELAY

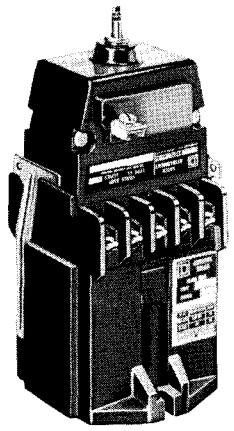
RELAY OPERATED PNEUMATIC TIMER — has a timing range which is adjustable from 0.2 seconds to 1 minute and a repeat accuracy of ± 15%. It has a single pole, double throw timed contact in addition to instantaneous contacts as shown in the table below. The timer is convertible from "on-delay" to "off-delay" or vice versa without any additional parts.



Type GO-40-GD

Number of Contacts				Open Type▲					
				AC Operated			DC Operated		
Instantaneous (Convertible)		Timed (Fixed)		Time Delay After De-energization (Off-Delay)	Time Delay After Energization (On-Delay)	Price	Time Delay After De-energization (Off-Delay)	Time Delay After Energization (On-Delay)	Price
Normally Open	Normally Closed	Normally Open	Normally Closed	Type	Type		Type	Type	
0	0	1	1	GO-00-GD	GO-00-GE	**$36.**	GDO-00-GD	GDO-00-GE	**$41.**
2	0	1	1	GO-20-GD	GO-20-GE	**40.**	GDO-20-GD	GDO-20-GE	**45.**
1	1	1	1	GO-11-GD	GO-11-GE	**42.**	GDO-11-GD	GDO-11-GE	**47.**
0	2	1	1	GO-02-GD	GO-02-GE	**42.**	GDO-02-GD	GDO-02-GE	**47.**
3	0	1	1	GO-30-GD	GO-30-GE	**42.**	.....	.....	....
2	1	1	1	GO-21-GD	GO-21-GE	**44.**	.....	.....	....
1	2	1	1	GO-12-GD	GO-12-GE	**44.**	.....	.....	....
0	3	1	1	GO-03-GD	GO-03-GE	**44.**	.....	.....	....
4	0	1	1	GO-40-GD	GO-40-GE	**44.**	.....	.....	....
3	1	1	1	GO-31-GD	GO-31-GE	**46.**	.....	.....	....
2	2	1	1	GO-22-GD	GO-22-GE	**46.**	.....	.....	....
1	3	1	1	GO-13-GD	GO-13-GE	**46.**	.....	.....	....
0	4	1	1	GO-04-GD	GO-04-GE	**46.**	.....	.....	....

MECHANICALLY HELD RELAY — employs a unique mechanical arrangement for long life and dependability. On ac operated devices both the latching and unlatching coil are continuous rated. On dc operated devices the latching coil is continuous rated while the unlatch coil is intermittent rated and must be wired in series with a normally open relay contact.



Type GO-40-GL

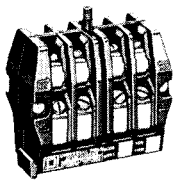
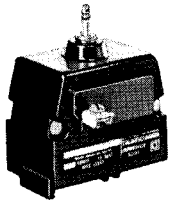
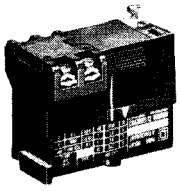
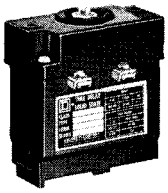
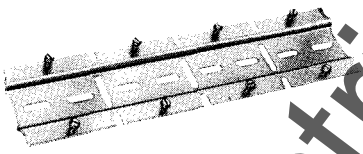
Number of Contacts			Open Type▲			
Total	Convertible		AC Operated		DC Operated	
	Normally Open	Normally Closed	Type	Price	Type	Price
2	2	0	GO-20-GL	**$ 26.**	GDO-20-GDL	**$ 33.**
	1	1	GO-11-GL	**28.**	GDO-11-GDL	**35.**
	0	2	GO-02-GL	**28.**	GDO-02-GDL	**35.**
3	3	0	GO-30-GL	**28.**	GDO-30-GDL	**35.**
	2	1	GO-21-GL	**30.**	GDO-21-GDL	**37.**
	1	2	GO-12-GL	**30.**	GDO-12-GDL	**37.**
	0	3	GO-03-GL	**30.**	GDO-03-GDL	**37.**
4	4	0	GO-40-GL	**30.**	GDO-40-GDL	**37.**
	3	1	GO-31-GL	**32.**	GDO-31-GDL	**39.**
	2	2	GO-22-GL	**32.**	GDO-22-GDL	**39.**
	1	3	GO-13-GL	**32.**	GDO-13-GDL	**39.**
	0	4	GO-04-GL	**32.**	GDO-04-GDL	**39.**
6	6	0	GO-60-GL	**34.**	GDO-60-GDL	**41.**
	5	1	GO-51-GL	**36.**	GDO-51-GDL	**43.**
	4	2	GO-42-GL	**36.**	GDO-42-GDL	**43.**
	3	3	GO-33-GL	**36.**	GDO-33-GDL	**43.**
	2	4	GO-24-GL	**36.**	GDO-24-GDL	**43.**
	1	5	GO-15-GL	**36.**	GDO-15-GDL	**43.**
	0	6	GO-06-GL	**36.**	GDO-06-GDL	**43.**
8	8	0	GO-80-GL	**38.**	GDO-80-GDL	**45.**
	7	1	GO-71-GL	**40.**	GDO-71-GDL	**47.**
	6	2	GO-62-GL	**40.**	GDO-62-GDL	**47.**
	5	3	GO-53-GL	**40.**	GDO-53-GDL	**47.**
	4	4	GO-44-GL	**40.**	GDO-44-GDL	**47.**
	3	5	GO-35-GL	**40.**	GDO-35-GDL	**47.**
	2	6	GO-26-GL	**40.**	GDO-26-GDL	**47.**
	1	7	GO-17-GL	**40.**	GDO-17-GDL	**47.**
	0	8	GO-08-GL	**40.**	GDO-08-GDL	**47.**

▲Devices available in NEMA 1 enclosure except 6 and 8 pole mechanically held relays. Add **$3.00** to open type price

ORDERING INFORMATION REQUIRED

1. Class and type number
2. Voltage and frequency of operating coil

TYPE G — CONTROL RELAYS
ATTACHMENTS AND ACCESSORIES

	Description	Identification	Price
	Universal Pole Attachment — converts any 0, 2, 3 or 4 pole ac relay to an 8, 10, 11 or 12 pole relay. It contains four normally open and four normally closed fixed contacts. All contacts are electrically isolated and may be used in circuits of opposite polarity. Contacts have the same heavy duty rating as the standard convertible contacts.....	Type GU-44	**$10.00**
	Mechanically Held Attachment — mounts on any 2 through 8 pole relay having all convertible contacts; both ac and dc. The Type GL and GDL latch attachments are identical in size and mounting provisions. The Type GL, ac mechanical latch attachment, has a continuous duty rated coil. The Type GDL, dc mechanical latch attachment has an intermittent rated coil and should be connected through a normally open contact of the basic relay. AC.....	Type GL	**14.00**
	DC.....	Type GDL	**16.00**
	Pneumatic Timer Attachment — may be mounted on a 0, 2, 3 or 4 pole ac relay or factory installed on a 0 or 2 pole dc relay. It has a single pole, double throw timed contact. The timing range is adjustable between 0.2 seconds and one minute with a repeat accuracy of ± 15%. Time Delay After De-energization.....	Type GD	**28.00**
	Time Delay After Energization.....	Type GE	**28.00**
	Solid State Timer Attachment — has a normally open single pole output contact which times closed after energization (TDE). The timing period is adjustable, by means of a potentiometer, from 0.2 seconds to 30 seconds with a repeat accuracy of ±2%. It is suitable for use on 120 volts, 50 or 60 hertz and has a burden of 4.5 volt amperes. This timer may be mounted on a Type G relay, door mounted in a knockout or panel mounted on its own baseplate, which is included.....	Type GTO-1	**55.00**
	Mounting Track: 12″ long for 4 relays.....	Type G-4	**0.80**
	24″ long for 8 relays.....	Type G-8	**1.00**
	36″ long for 12 relays.....	Type G-12	**1.40**
	48″ long for 16 relays.....	Type G-16	**1.80**
	Basic 4 pole relay without contacts — For use with the timer attachment or universal pole attachment — AC.....	Type GO-00	**8.00**
	DC.....	Type GDO-00	**13.00**
	Coil clearing contacts — for mechanically held relays. Order and price relay with one more normally open and normally closed contact than application requires and specify.....	Form Y-14	Add **2.25**
	Overlapping contacts — convertible contacts can be supplied with overlap. Specify how many normally open and normally closed contacts must overlap.....	Form — Y35 plus description	Add **4.50** Per Pair
	Dual contacts — provide two parallel paths per pole for maximum reliability in low energy circuits. Supplied as standard on DC operated relays and Type GU-44.....	Form — Y-89	N/C
	Replacement Coils and Contact Kits.....	See Class 9998	.....
	Wiring Duct.....	See Class 9090	.....
	Manual Test Gripper.....	31021-054-01	**0.35**

SUPERSEDES:
Class 8501
Descriptive Page 7, 8, 9, 10
March, 1962

TYPE G — CONTROL RELAY

APPLICATION DATA

ELECTRICAL CONTACT RATINGS

CLASS 8501			AC RATINGS						DC RATINGS			
			Inductive Pilot Duty 35% Power Factor					Resistive 75% Power Factor	Inductive Pilot Duty		Resistive	
			Make		Break							
Type	Device	Volts	Amps.	VA	Amps.	VA	Continuous Amperes	Make, Break and Continuous Amperes	Make and Break Amperes	Continuous Amperes	Make and Break Amperes	Continuous Amperes
GO GDO GU	Relays	120 240	60 30	7200 7200	6 3	720 720	10 10	10 10	1.0 0.5	10 10	5.0 0.5	10 10
GD GE	Pneumatic Timer	120 240	30 15	3600 3600	3 1.5	360 360	10 10	10 10	0.5 0.25	10 10	1.0 0.25	10 10
GTO	Solid State Timer	120	1.5	180	0.4	50	1	1	0.05	1	0.1	1

AC MAGNET COILS

Coil Prefix*	Hertz	SUFFIX NUMBERS 12 Volts	24 Volts	48 Volts	110 Volts	120 Volts	208 Volts	240 Volts	277 Volts	COIL BURDEN VOLT—AMPERES Inrush	Sealed
31021-400-	60	30	39	47	59	60	67	69	70	100	13
	50	32	41	50	60	62	69	71	72	90	13

Type GL latch attachment coils have a 24 VA inrush and 12 VA sealed.
AC magnet coils are designed to operate on line voltages fluctuating as much as 15% below and 10% above nominal voltage.

DC MAGNET COILS

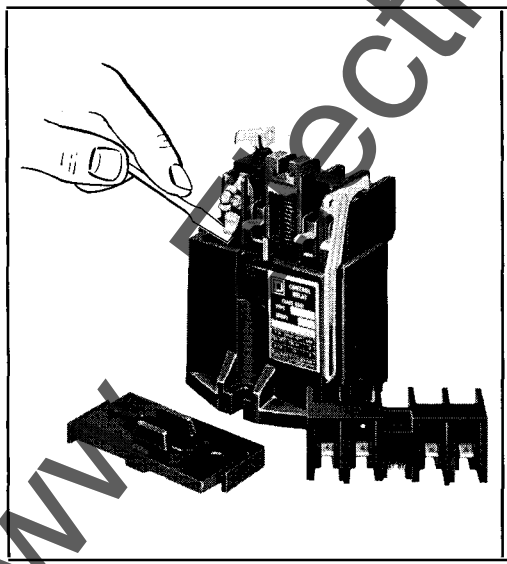
Coil Prefix*	SUFFIX NUMBERS 12 Volts	24 Volts	48 Volts	115 Volts	230 Volts	Coil Burden (Watts)
31030-400-	28	37	46	58	67	8

Type GDL latch attachment coils have a burden of 36 watts.
DC magnet coils are designed to operate on line voltages fluctuating as much as 20% below and 10% above nominal voltage.
*Complete coil numbers consist of prefix followed by suffix, as 31021-400-60.

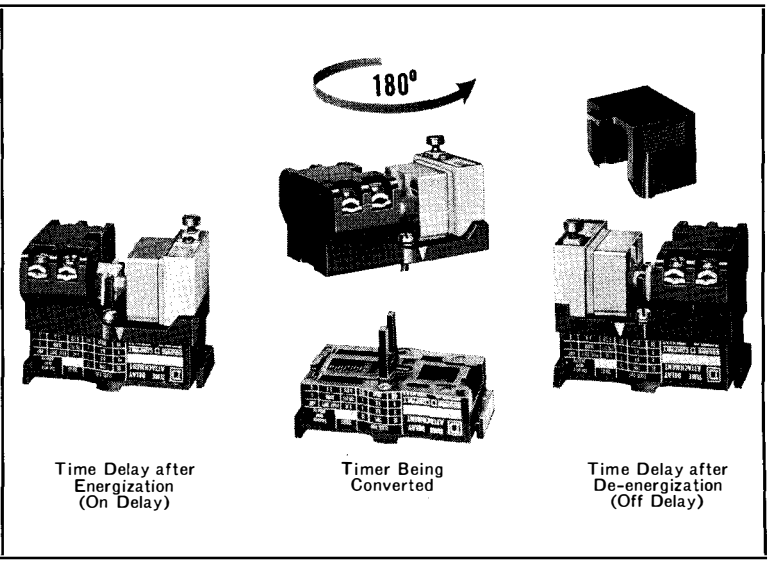
AVERAGE OPERATING TIMES

Device	Milli-Seconds Pick-up	Drop-out
AC Relay	11	6
DC Relay	28	12

CONTACT CONVERSION



TIMER CONVERSION



Time Delay after Energization (On Delay)

Timer Being Converted

Time Delay after De-energization (Off Delay)

TYPE G — CONTROL RELAY

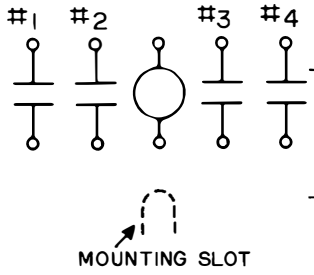
CONTACT ARRANGEMENT

The following table lists all pole arrangements and the location of the N.O. and N.C. poles. Relays purchased from the factory will correspond to these tables. For example: a GO-12 will have one N.O. pole in position 1; position 2 will be blank; positions 3 and 4 will have N.C. pole.

NOTE: In determining pole positions the mounting slot on the relay must be as shown below:

O — NORMALLY OPEN CONTACT **X — NORMALLY CLOSED CONTACT**

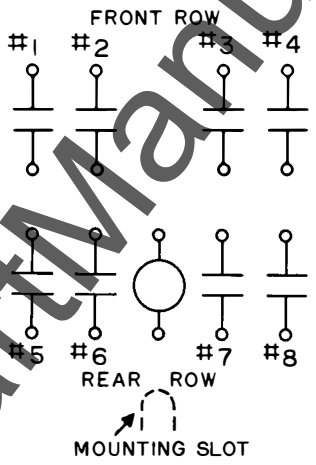
2, 3 and 4 Pole Relay
All Contacts Convertible



No. of Poles	Type	Contact Number 1	2	3	4
2	GO-20	O			O
	GO-11	O			X
	GO-02	X			X
3	GO-30	O		O	O
	GO-21	O		O	X
	GO-12	O		X	X
	GO-03	X		X	X
4	GO-40	O	O	O	O
	GO-31	O	O	O	X
	GO-22	O	O	X	X
	GO-13	O	X	X	X
	GO-04	X	X	X	X

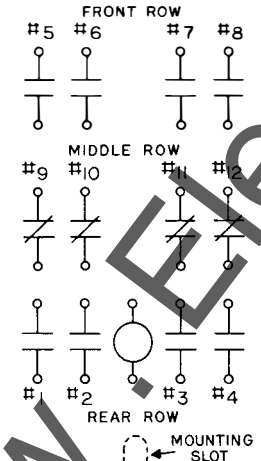
Note: Class 8501 Type GO—GL mechanically held relays have same contact arrangements as above except unlatch coil is added to diagram.

6 and 8 Pole Relay
All Contacts Convertible



No. of Poles	Type	Contact Number 1	2	3	4
		5	6	7	9
6	GO-60	O	O	O	O
		O			O
	GO-51	O	O	O	X
		O			O
	GO-42	O	O	X	X
		O			O
	GO-33	O	X	X	X
		O			O
	GO-24	X	X	X	X
		O			O
	GO-15	O	X	X	X
		X			X
	GO-06	X	X	X	X
		X			X
8	GO-80	O	O	O	O
		O	O	O	O
	GO-71	O	O	O	X
		O	O	O	O
	GO-62	O	O	X	X
		O	O	O	O
	GO-53	O	X	X	X
		O	O	O	O
	GO-44	X	X	X	X
		O	O	O	O
	GO-35	O	O	O	X
		X	X	X	X
	GO-26	O	O	X	X
		X	X	X	X
	GO-17	O	X	X	X
		X	X	X	X
	GO-08	X	X	X	X
		X	X	X	X

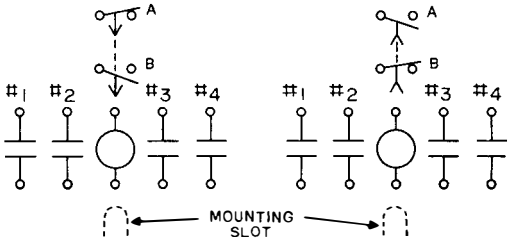
8, 10 and 12 Pole Relay



No. of Poles	Type	Contact Number* 5	6	7	8
		9	10	11	12
			2	3	4
8	GO-00-GU-44	O	O	O	O
		X	X	X	X
10	GO-20-GU-44	O	O	O	O
		X	X	X	X
		O			O
	GO-11-GU-44	O	O	O	O
		X	X	X	X
		O			X
	GO-02-GU-44	O	O	O	O
		X	X	X	X
		X			X
12	GO-40-GU-44	O	O	O	O
		X	X	X	X
		O	O	O	O
	GO-31-GU-44	O	O	O	O
		X	X	X	X
		O	O	O	X
	GO-22-GU-44	O	O	O	O
		X	X	X	X
		O	O	X	X
	GO-13-GU-44	O	O	O	O
		X	X	X	X
		O	X	X	X
	GO-04-GU-44	O	O	O	O
		X	X	X	X
		X	X	X	X

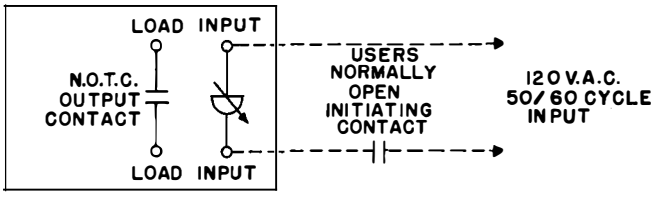
*Poles 1, 2, 3 and 4 Convertible
Poles 5, 6, 7, 8, 9, 10, 11 and 12 non-convertible.

Pneumatic Timing Relay



Instantaneous Contacts Arranged as Shown in Above Table for 2, 3 and 4 Pole Relay.

Solid State Timer Attachment



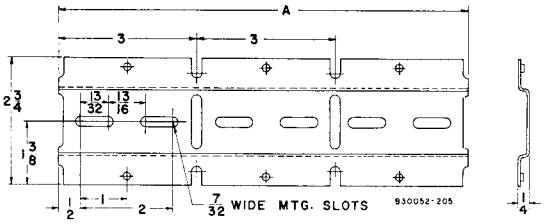
Type GTO-1

All dimensions are in inches.

SUPERSEDES:
Class 8501
Dimension Page 5
December, 1966

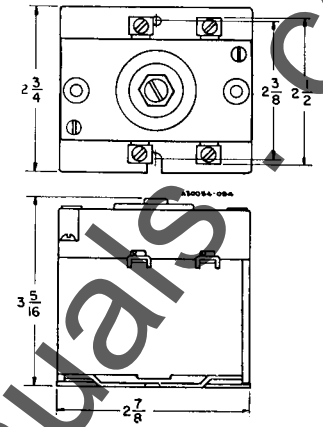
TYPE G — CONTROL RELAY

Approximate Dimensions and Shipping Weights

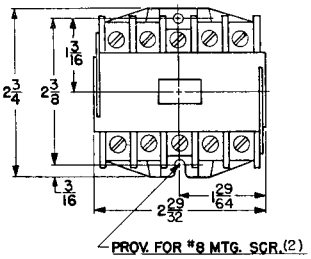


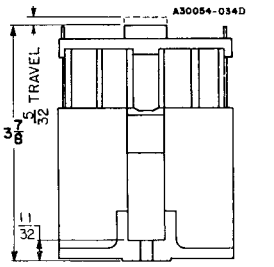
Type G Relay Mounting Track

No. of Relays	A
4	12″
8	24″
12	36″
16	48″

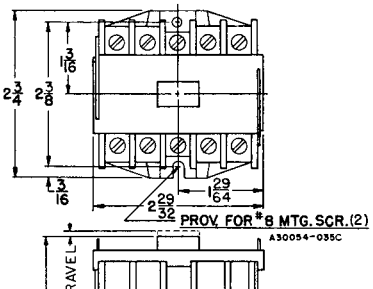


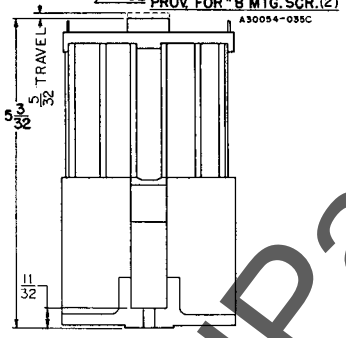
Type GTO-1
Weight — 1 Lb.



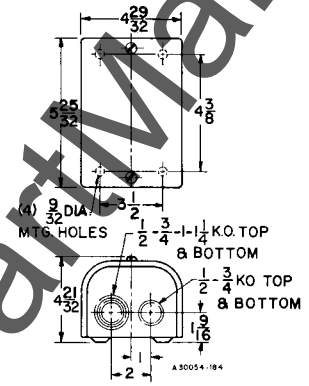


Class 8501 Type G
2, 3 or 4 Pole
Weight — 1½ Lbs.

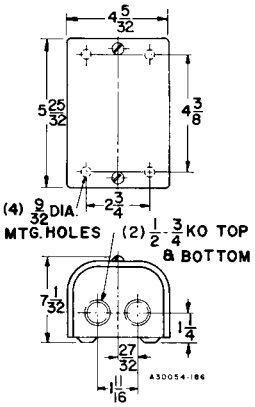




Class 8501 Type G
6 or 8 Pole
Weight — 2 Lbs.

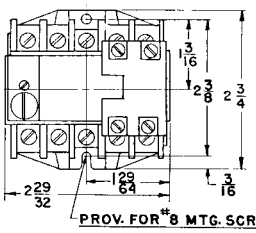


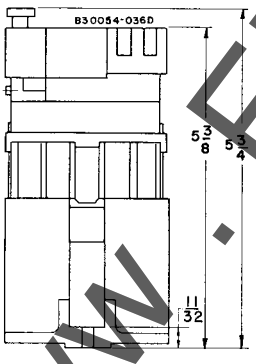
2, 3 and 4 pole relays
Without Attachments
Weight — 2 Lbs.



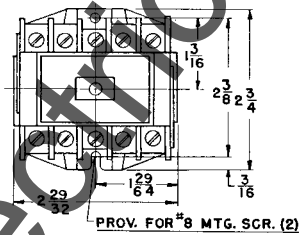
2, 3 and 4 pole relays
with Attachments and
6 and 8 Pole Relays
without Attachment
Weight — 2½ Lbs.

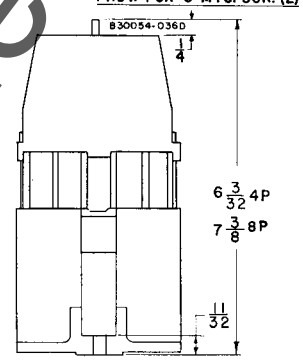
NEMA Type 1
General Purpose Enclosure



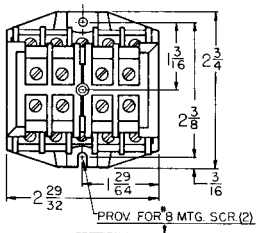


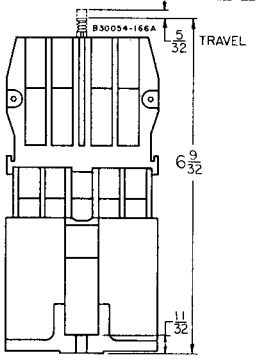
Class 8501 Type G
Pneumatic Timer on 0, 2, 3
or 4 Pole Relay
Weight — 2 Lbs.



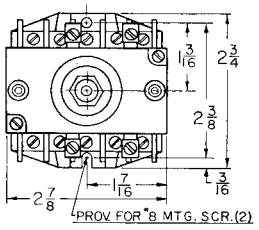


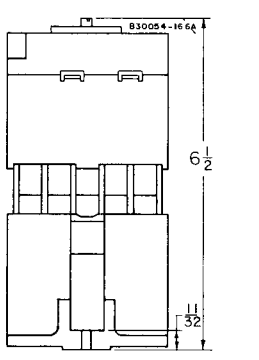
Class 8501 Type G
Mechanically Held Relay
2, 3, 4, 6 or 8 Poles
Weight — 2 Lbs.





Class 8501 Type G
Universal Pole Attachment
on 0, 2, 3 or 4 Pole Relay
Weight — 2 Lbs.

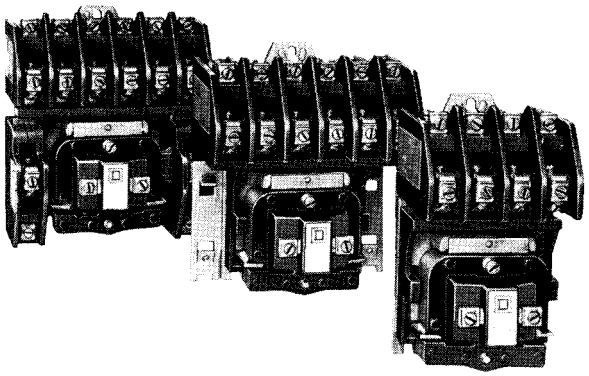




Class 8501 Type G
Solid State Timer on 2, 3
or 4 Pole Relay
Weight — 2 Lbs.

All dimensions are in inches.

AC CONTROL RELAYS — 600 VOLT — TYPE H

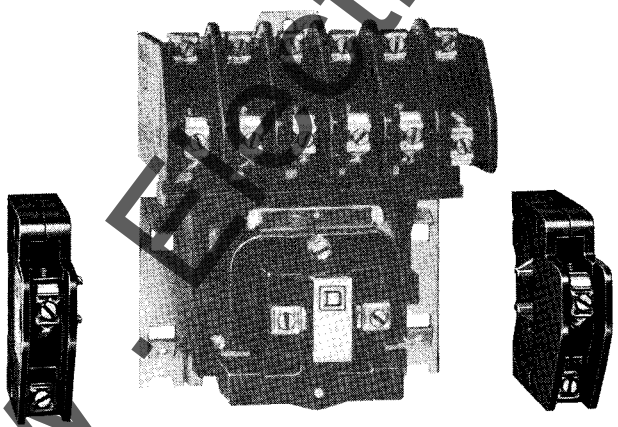


Class 8501 relays are used as auxiliary devices for switching control circuits and for controlling other light loads as electric heaters, pilot lights, or audible signals.

The Type H relay is a full 600 volt NEMA rated device featuring: convertible contacts, N.O. and N.C. contact indication, visible contacts, a heavy duty molded coil and magnet assembly, and "adder poles" to increase stock flexibility.

50-60 CYCLES — **600 VOLTS MAX.**

Number of Contacts			General Purpose Enclosure NEMA Type 1		Water-tight Stainless-Steel Enclosure NEMA Type 4		Hazardous Locations Class I Groups C & D Class II Groups E, F & G NEMA Type 7 & 9		Open Type	
Total	Normally Open	Normally Closed	Type	Price	Type	Price	Type	Price	Type	Price
2	2	0	HG-20	$18.	HW-20	$51.	HR-20	$71.	HO-20	$15.
	1	1	HG-11	21.	HW-11	54.	HR-11	74.	HO-11	18.
	0	2	HG-02	21.	HW-02	54.	HR-02	74.	HO-02	18.
3	3	0	HG-30	21.	HW-30	54.	HR-30	74.	HO-30	18.
	2	1	HG-21	24.	HW-21	57.	HR-21	77.	HO-21	21.
	1	2	HG-12	24.	HW-12	57.	HR-12	77.	HO-12	21.
	0	3	HG-03	24.	HW-03	57.	HR-03	77.	HO-03	21.
4	4	0	HG-40	23.	HW-40	56.	HR-40	76.	HO-40	20.
	3	1	HG-31	26.	HW-31	59.	HR-31	79.	HO-31	23.
	2	2	HG-22	26.	HW-22	59.	HR-22	79.	HO-22	23.
	1	3	HG-13	26.	HW-13	59.	HR-13	79.	HO-13	23.
	0	4	HG-04	26.	HW-04	59.	HR-04	79.	HO-04	23.
6	6	0	HG-60	33.	HW-60	66.	HR-60	86.	HO-60	30.
	5	1	HG-51	36.	HW-51	69.	HR-51	89.	HO-51	33.
	4	2	HG-42	36.	HW-42	69.	HR-42	89.	HO-42	33.
	3	3	HG-33	36.	HW-33	69.	HR-33	89.	HO-33	33.
	2	4	HG-24	36.	HW-24	69.	HR-24	89.	HO-24	33.
	1	5	HG-15	36.	HW-15	69.	HR-15	89.	HO-15	33.
	0	6	HG-06	36.	HW-06	69.	HR-06	89.	HO-06	33.
8	8	0	HG-80	39.	HW-80	72.	HR-80	92.	HO-80	36.
	7	1	HG-71	42.	HW-71	75.	HR-71	95.	HO-71	39.
	6	2	HG-62	42.	HW-62	75.	HR-62	95.	HO-62	39.
	5	3	HG-53	42.	HW-53	75.	HR-53	95.	HO-53	39.
	4	4	HG-44	42.	HW-44	75.	HR-44	95.	HO-44	39.
	3	5	HG-35	42.	HW-35	75.	HR-35	95.	HO-35	39.
	2	6	HG-26	42.	HW-26	75.	HR-26	95.	HO-26	39.
	1	7	HG-17	42.	HW-17	75.	HR-17	95.	HO-17	39.
	0	8	HG-08	42.	HW-08	75.	HR-08	95.	HO-08	39.



Type H1L — Type H1R

Adder Poles

Contact Configuration	Type Number		Price
	Right Hand Mounting	Left Hand Mounting	
1-Normally Open	H1R	H1L	$3.
1-Normally Closed	H2R	H2L	3.

ORDERING INFORMATION REQUIRED

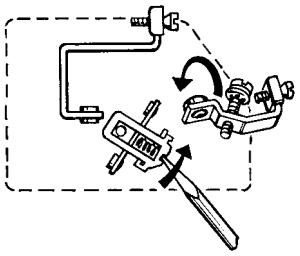
1. Class and type number
2. Voltage and frequency of operating coil

AC CONTROL RELAYS
600 VOLT — TYPE H

APPLICATION DATA

CONVERTIBLE CONTACTS

After removing stationary contact assembly, a simple flip of the movable contact converts a contact from N.O. to N.C. or vice versa.

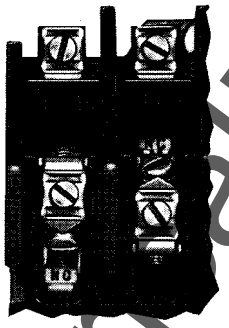


ADDER POLES

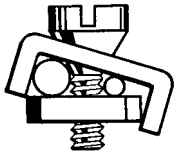
Additional poles are available for field mounting on the basic 6 pole relay to convert it to 8 poles. Identical contacts are used on the adder pole and the basic relay. Contact conversion is also identical.

N.O. & N.C. INDICATION

Each pole is marked N.O. or N.C. to identify the normal position of the contacts plus each contact is visible.



PRESSURE WIRE CONNECTORS



Pressure wire connectors are used on every terminal. Each connector is the self-lifting type and adjusts to accept 2 wires of different sizes. The terminal has been designed to accommodate #18 through #14 solid or stranded wire.

CONTACT RATINGS

Both relay and adder pole contacts are double break. Contact material has been chosen to insure excellent properties of conduction on light loads and interrupting ability on heavy loads.

ELECTRICAL CONTACT RATINGS

Volts	AC RATINGS					
	Inductive Pilot Duty 35% Power Factor					**Resistive** 75% Power Factor
	Make		Break		Continuous Amps.	Make, Break and Continuous Amps.
	Amps.	VA	Amps.	VA		
120	60	7200	6	720	10	10
240	30	7200	3	720	10	10
480	15	7200	1.5	720	10	10
600	12	7200	1.2	720	10	10

AC CONTROL RELAYS
600 VOLT — TYPE H

APPLICATION DATA

MAGNET COILS

Heavy duty, molded coils are used. These coils are designed to operate on line voltage fluctuations as much as 15% below and 10% above nominal voltage.

Coil Prefix*	Hertz	SUFFIX NUMBERS												Coil Volt-Amps.	
		120◐ Volts	240◐ Volts	480◐ Volts	110 Volts	120 Volts	208 Volts	220 Volts	240 Volts	277 Volts	440 Volts	480 Volts	550 Volts	600 Volts	In-rush	Seal-ed
31071-400-	60	14	23	32	Use 120 Volt	44	50	Use 240 Volt	53	55	Use 480 Volt	62	Use 600 Volt	65	180	35
	50	15	24	33	44	45	51	53	54	56	62	63	65	66	170	35

*Complete Part Number of Coil consists of prefix followed by suffix, as 31071-400-44.
◐VA values of these coils are 120% of values shown.

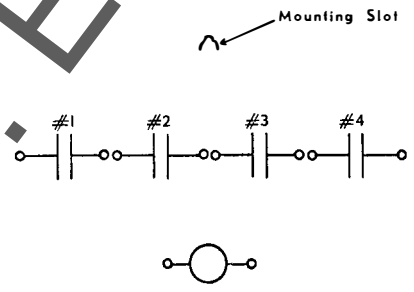
CONTACT KITS — Refer to Class 9998 Section

CONTACT ARRANGEMENTS

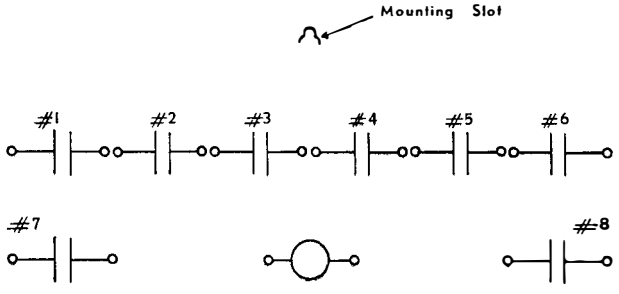
The following table lists all pole arrangements and the location of the N.O. and N.C. poles. Relays purchased from the factory will correspond to these tables. For example: an HO-12 will have one N.O. pole in position 1; position 3 will be blank; positions 2 and 4 will have N.C. poles.

O — Normally Open Contact X — Normally Closed Contact

No. of Poles	Type	Contact Number 1	2	3	4
2	HO-20	O			O
	HO-11	O			X
	HO-02	X			X
3	HO-30	O	O		O
	HO-21	O	O		X
	HO-12	O	X		X
	HO-03	X	X		X
4	HO-40	O	O	O	O
	HO-31	O	O	O	X
	HO-22	O	O	X	X
	HO-13	O	X	X	X
	HO-04	X	X	X	X

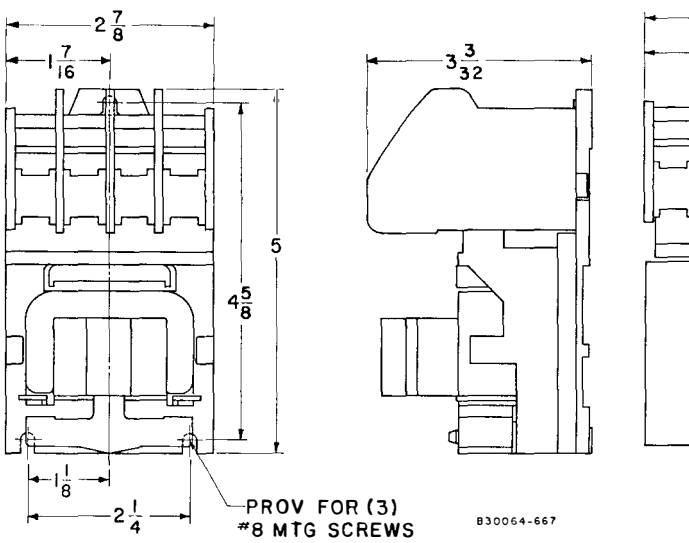


No. of Poles	Type	Contact Number 1	2	3	4	5	6	7	8
6	HO-60	O	O	O	O	O	O		
	HO-51	O	O	O	O	O	X		
	HO-42	O	O	O	O	X	X		
	HO-33	O	O	O	X	X	X		
	HO-24	O	O	X	X	X	X		
	HO-15	O	X	X	X	X	X		
	HO-06	X	X	X	X	X	X		
8	HO-80	O	O	O	O	O	O	O	O
	HO-71	O	O	O	O	O	O	O	X
	HO-62	O	O	O	O	O	O	X	X
	HO-53	O	O	O	O	O	X	X	X
	HO-44	O	O	O	O	X	X	X	X
	HO-35	O	O	O	X	X	X	X	X
	HO-26	O	O	X	X	X	X	X	X
	HO-17	O	X	X	X	X	X	X	X
	HO-08	X	X	X	X	X	X	X	X

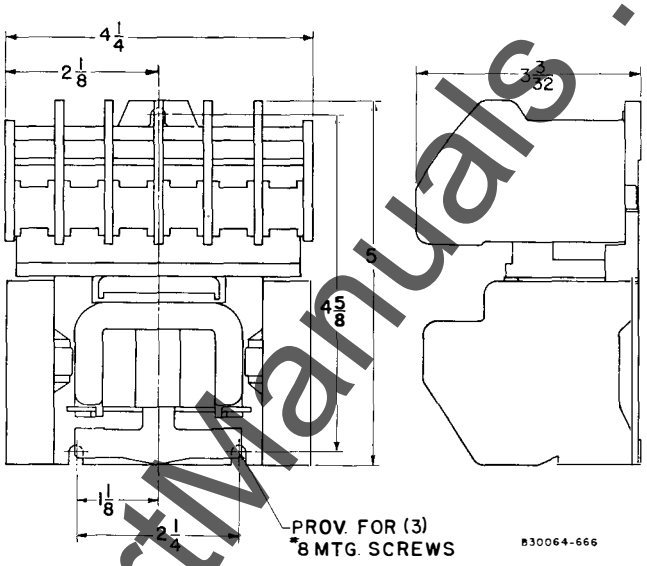


AC CONTROL RELAYS
600 VOLT — TYPE H

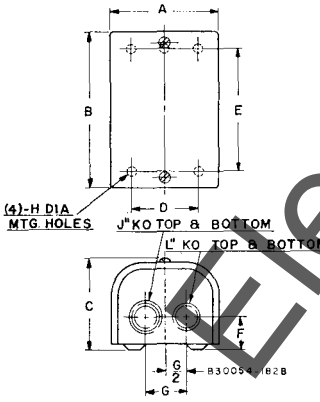
Approximate Dimensions and Shipping Weights



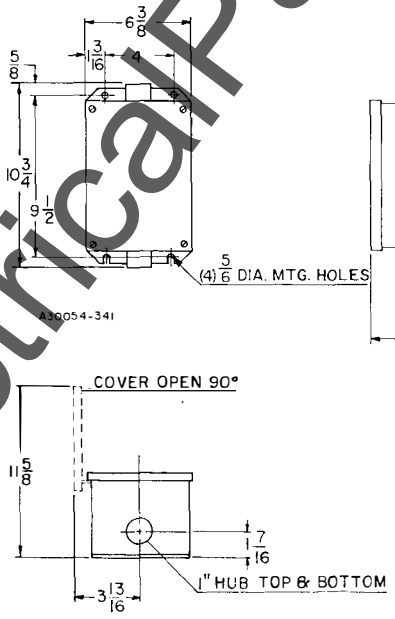
Open Type — 2 thru 4 Pole
Weight — 2 Lbs.



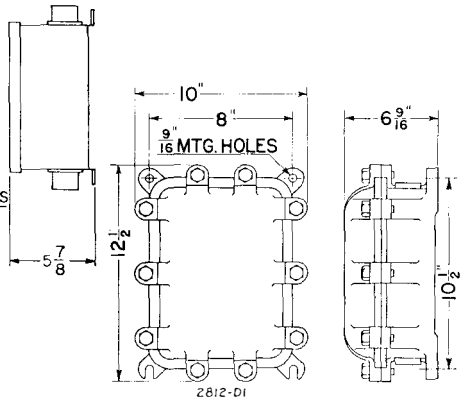
Open Type — 6 and 8 Pole
Weight — 2½ Lbs.



NEMA Type 1
General Purpose Enclosure
Type HG
2 thru 8 Pole
Weight — 5 Lbs.



NEMA Type 4
Water-tight Enclosure
Type HW
2 thru 8 Pole
Weight — 14 Lbs.

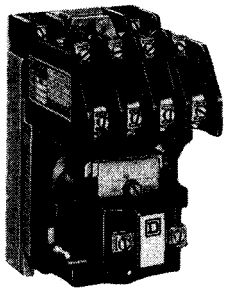


NEMA Types 7 and 9
Hazardous Location Enclosure
Type HR
2 thru 8 Pole
Weight — 44 Lbs.

A	B	C	D	E	F	G	H	J	L
6 5/32	8 25/32	4 21/32	4 3/4	7 3/8	1 5/16	1 7/8	3/32	½, ¾, 1	½, ¾, 1

All dimensions are in inches.

AC LATCHING RELAYS — 600 VOLT — TYPE HL



Type HLO-40

Class 8501 Type HL latching relays offer all of the flexibility and features found in the standard TYPE H relay with no increase in panel area. A 2 coil permanent magnet latching system is used to eliminate the need for coil clearing contacts. Features of this device are:

- CONVERTIBLE CONTACTS
- N.O. & N.C. INDICATORS
- HEAVY DUTY MOLDED COIL AND MAGNET ASSEMBLY
- CONTINUOUS DUTY COILS
- VISIBLE CONTACTS
- "ADDER POLES" TO INCREASE STOCK FLEXIBILITY

50-60 HERTZ — **600 VOLTS MAX.**

Number of Contacts			General Purpose Enclosure NEMA Type 1		Water-tight Stainless-Steel Enclosure NEMA Type 4		Open Type	
Total	Normally Open	Normally Closed	Type	Price	Type	Price	Type	Price
2	2	0	HLG-20	$32.	HLW-20	$65.	HLO-20	$29.
	1	1	HLG-11	35.	HLW-11	68.	HLO-11	32.
	0	2	HLG-02	35.	HLW-02	68.	HLO-02	32.
3	3	0	HLG-30	35.	HLW-30	68.	HLO-30	32.
	2	1	HLG-21	38.	HLW-21	71.	HLO-21	35.
	1	2	HLG-12	38.	HLW-12	71.	HLO-12	35.
	0	3	HLG-03	38.	HLW-03	71.	HLO-03	35.
4	4	0	HLG-40	37.	HLW-40	70.	HLO-40	34.
	3	1	HLG-31	40.	HLW-31	73.	HLO-31	37.
	2	2	HLG-22	40.	HLW-22	73.	HLO-22	37.
	1	3	HLG-13	40.	HLW-13	73.	HLO-13	37.
	0	4	HLG-04	40.	HLW-04	73.	HLO-04	37.
6	6	0	HLG-60	47.	HLW-60	80.	HLO-60	44.
	5	1	HLG-51	50.	HLW-51	83.	HLO-51	47.
	4	2	HLG-42	50.	HLW-42	83.	HLO-42	47.
	3	3	HLG-33	50.	HLW-33	83.	HLO-33	47.
	2	4	HLG-24	50.	HLW-24	83.	HLO-24	47.
	1	5	HLG-15	50.	HLW-15	83.	HLO-15	47.
	0	6	HLG-06	50.	HLW-06	83.	HLO-06	47.
8	8	0	HLG-80	53.	HLW-80	86.	HLO-80	50.
	7	1	HLG-71	56.	HLW-71	89.	HLO-71	53.
	6	2	HLG-62	56.	HLW-62	89.	HLO-62	53.
	5	3	HLG-53	56.	HLW-53	89.	HLO-53	53.
	4	4	HLG-44	56.	HLW-44	89.	HLO-44	53.
	3	5	HLG-35	56.	HLW-35	89.	HLO-35	53.
	2	6	HLG-26	56.	HLW-26	89.	HLO-26	53.
	1	7	HLG-17	56.	HLW-17	89.	HLO-17	53.
	0	8	HLG-08	56.	HLW-08	89.	HLO-08	53.

Type H1R

Additional poles are available for field mounting on the basic 6 pole latch relay to provide up to 8 poles. Contacts are identical to those used on the basic relay and are convertible in the same manner.

Adder Poles

Contact Configuration	Type Number		Price
	Left Hand Mounting	Right Hand Mounting	
1-Normally Open	H1L	H1R	$3.
1-Normally Closed	H2L	H2R	3.

SPECIAL FEATURES

COIL CLEARING CONTACTS — SPECIFY FORM Y14. . . ADD $4.50

ELECTRICAL CONTACT RATINGS

Volts	AC RATINGS					
	Inductive Pilot Duty 35% Power Factor					Resistive 75% Power Factor
	Make		Break		Continuous Amps.	Make, Break and Continuous Amps.
	Amps.	VA	Amps.	VA		
120	60	7200	6	720	10	10
240	30	7200	3	720	10	10
480	15	7200	1.5	720	10	10
600	12	7200	1.2	720	10	10

ORDERING INFORMATION REQUIRED

1 — Class and type number

2 — Voltage and frequency of latch and unlatch coils

AC LATCHING RELAYS — 600 VOLT — TYPE HL

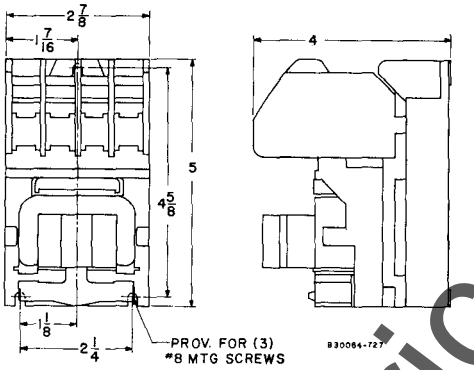
MAGNET COILS

Heavy duty, molded coils are used. These coils are designed to operate on line voltage fluctuations as much as 15% below and 10% above nominal voltage.

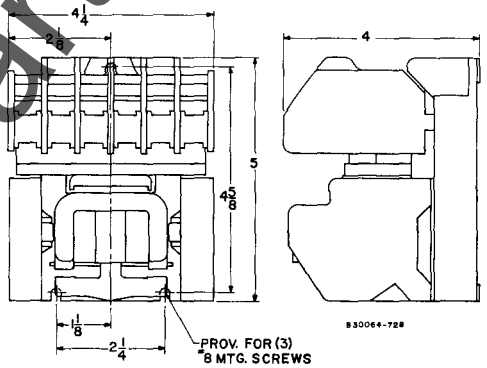
Coil Prefix*	Hertz	SUFFIX NUMBERS												Coil Volt-Amps.	
		12◐ Volts	24◐ Volts	48◐ Volts	110 Volts	120 Volts	208 Volts	220 Volts	240 Volts	277 Volts	440 Volts	480 Volts	550 Volts	600 Volts	In-rush	Sealed
LATCHING COIL																
31071-400-	60	14	23	32	Use 120 Volt	44	50	Use 240 Volt	53	55	Use 480 Volt	62	Use 600 Volt	65	180	35
	50	15	24	33	44	45	51	53	54	56	62	63	65	66	170	35
UNLATCHING COIL																
31071-404-	60	14	23	32	Use 120 Volt	44	50	Use 240 Volt	53	55	Use 480 Volt	62	Use 600 Volt	65	180 VA	
	50	15	24	33	44	45	51	53	54	56	62	63	65	66	170 VA	

*Complete Part Number of Coil consists of prefix followed by suffix, as 31071-400-44.
◐VA values of these coils are 120% of values shown.

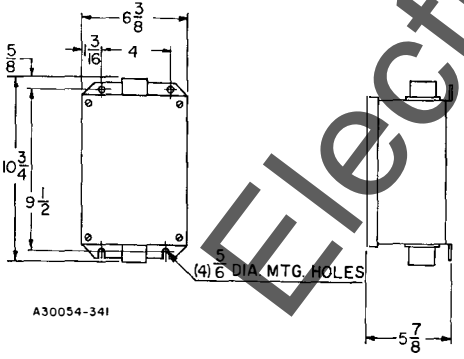
APPROXIMATE DIMENSIONS AND SHIPPING WEIGHTS

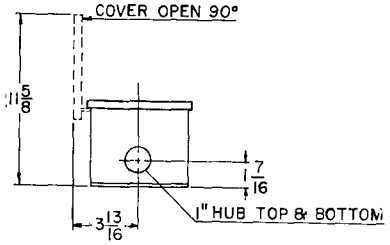


Open Type — 2 thru 4 Pole
Weight — 3 Lbs.

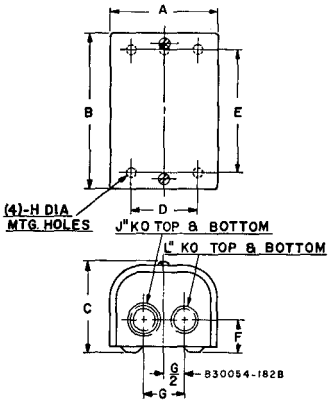


Open Type — 6 and 8 Pole
Weight 3½ Lbs.





NEMA Type 4 Water-tight Enclosure
Type HW 2 thru 8 Pole
Weight — 15 lbs.



NEMA Type 1
General Purpose Enclosure
Type HG
2 thru 8 Pole
Weight — 6 lbs.

A	B	C	D	E	F	G	H	J	L
6	8½	5⅝	4¾	7⅜	1 5/16	1⅞	9/32	½-¾-1	½-¾-1

CONTACT KITS — Refer to Class 9998 Section

CONTACT ARRANGEMENTS — Refer to Class 8501 Page 137

All dimensions are in inches.

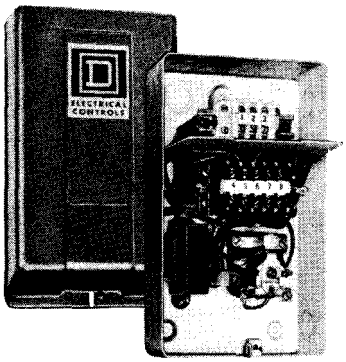
INTRINSICALLY SAFE EQUIPMENT

INTRINSIC SAFETY is an explosion hazard protection technique for electrical control equipment. The principle is quite simple — it is safety by design.
"Intrinsically Safe equipment and wiring is equipment and wiring which is incapable of releasing sufficient electrical or thermal energy under normal or abnormal conditions to cause ignition of a specific hazardous atmospheric mixture in its most easily ignitable concentration. Intrinsically Safe electrical equipment and wiring may be installed in any hazardous location of any Group classification for which it is accepted without requiring explosion-proof housings or other means of protection." From ISA-RP12.2 Specification 1965.

The means of accomplishing intrinsic safety is by the use of energy limiting circuitry located in the non-hazardous area such that the maximum energy which will be released to the hazardous area will be less than that required to ignite a specific hazardous atmosphere within the hazardous area.

All controllers are approved by Underwriter's Laboratories for actuation by Intrinsically Safe (low energy) pilot circuits extending into a hazardous location Class 1 Group A, B, C, or D or Class II Group E, F, or G.

AC RELAY WITH INTRINSICALLY SAFE CIRCUITS

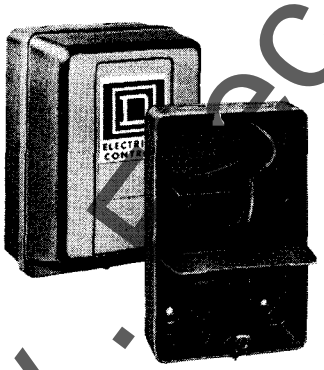


Class 8501, Type TG-33

The Intrinsically Safe ac relay control contains solid state energy limiting components encapsulated in an epoxy resin module. The module, along with a general purpose output relay, is mounted in a NEMA 1 enclosure complete with a barrier which provides an exclusive wiring area for the Intrinsically Safe circuits. When applying this device, the control is mounted in a non-hazardous area and actuated by general purpose pilot devices located in the hazardous area.

50-60 CYCLES	CLASS 8501		UL LISTED
Description of Output Relay	Control Supply Voltage	General Purpose Enclosure **NEMA Type 1** (For Mounting Outside Hazardous Area) Type	Price
Single Pole, Double Throw	120	TG-31	**$ 90.**
Single Pole, Double Throw	240/480, 550	TG-33	**105.**

SOLID STATE PILOT RELAY



Class 8501, Type TG-32

The Intrinsically Safe rated solid state pilot relay is intended for industrial control applications where circuit reliability, switching life or environmental requirements are extremely critical. It can be used to operate relays in existing systems or initiate properly rated output devices directly. The solid state contact is analogous to the electromechanical relay's moving contact performing the same function with more reliability and longer operating life.

50-60 CYCLES	CLASS 8501		UL LISTED
Description of Output	Control Supply Voltage	General Purpose Enclosure **NEMA Type 1** (For Mounting Outside Hazardous Area) Type	Price
Normally Open Equivalent Contact	120	TG-32	**$60.**

ORDERING INFORMATION REQUIRED 1—Class and type number. 2—Control supply voltage.

INTRINSICALLY SAFE EQUIPMENT

APPLICATION DATA

The National Electrical Code in 1956 recognized the validity of the intrinsic safety principle in Article 500-1: "Equipment and associated wiring approved as Intrinsically Safe may be installed in any hazardous location for which it is approved, and the provisions of Articles 500-157 need not apply to such installation. Intrinsically safe equipment and wiring are incapable of releasing sufficient electrical energy under normal or abnormal conditions to cause ignition of a specific hazardous atmospheric mixture. Abnormal conditions will include accidental damage to any part of the equipment or wiring, insulation or other failure of electrical components, application of over-voltage, adjustment and maintenance operations, and other similar conditions."

The controller is intended to be mounted in a non-hazardous area and actuated by an Intrinsically Safe (low energy circuit extending into a hazardous area, Class I, Group A, B, C or D, or Class II, Group E, F, or G.

DESIGN AND OPERATION

Electrical and mechanical design as well as physical arrangement were all important considerations in the control design.

Electrical Design:

The ac power line voltage is stepped down to a low voltage by a transformer. Primary to secondary faults are protected against by interposing a grounded shield between the primary and secondary windings. The low secondary voltage is rectified and filtered to provide a dc voltage of approximately 12 volts. In addition, a zener diode is connected in the circuit to limit the voltage level to the circuit within the hazardous area in the event of application of an excess ac supply voltage. An important feature of the control is the light coupling between the signal circuits in the hazardous area and the power circuits in the non-hazardous area which is provided by a photocell-incandescent lamp which physically and electrically separates the power circuits from the signal circuits.

Physical Design:

All components are conservatively rated and protected from physical damage or short circuit by epoxy encapsulation, which protects the circuit components so that the energy released from the circuitry will be through the desired circuit impedance. The resulting package is a solid unit which will resist mechanical shock and is inert to most industrial atmospheres. Since the control circuitry uses solid state components in the energy limiting module, wear and routine mechanical adjustments are minimized. Power and signal wiring areas are defined by a grounded metal barrier which will have an interference fit with the cover in the event the power circuit and signal circuit wires are improperly passed around the barrier. In the installation of these devices the conductors of the intrinsically safe circuit must be sealed in rigid conduit at a point where the wiring enters the hazardous area.

ELECTRICAL OPERATING CHARACTERISTICS

ELECTRICAL CONTACT RATINGS

Device	Volts	AC AMPERES				Maximum Single Phase Horsepower	
		Inductive Pilot Duty 35% Power Factor			Resistive 75% Power Factor		
		Make	Break	Continuous	Make, Break and Continuous	115 V.	230 V.
TG-31, TG-33	120	60	6	10	10	½	¾
	240	30	3	10	10		
	480	15	1.5	10	5		
	600	12	1.2	10	5		
TG-32	0–120	Normally Open Equivalent Contact Rating					
		Continuous			In Rush		
		10 VA			65 VA		

UNDERWRITERS LABORATORIES LISTING

These devices are listed in Underwriter's Laboratories Hazardous Location Equipment list for industrial control equipment related to hazardous locations in the categories of motor controllers.

1. Magnetic Devices (TG-31 and TG-33) UL Guide No. 184N13.13.
2. Auxiliary Devices (TG-32) UL Guide No. 184N13.1.

INTRINSICALLY SAFE EQUIPMENT

Pilot Circuit Data and Sensitivity:

Maximum open circuit voltage between terminals 1 and 3.....12 VDC

Maximum current in pilot circuit connected to terminals 2 and 3.....56 milliamperes

Sensitivity: (Pilot Circuit Total)

Pick-up resistance.....0-10 ohms

Drop-out resistance.....1000 ohms or greater

Maximum allowable separation between pilot control device and Intrinsically Safe Relay

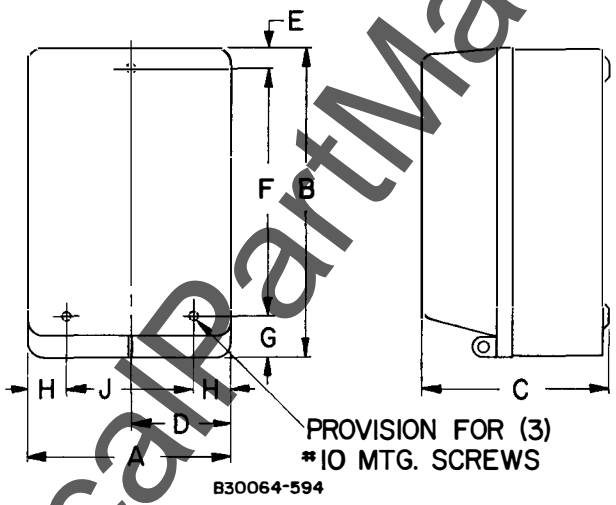
Minimum Gage Wire in Pilot Circuit	Allowable Separation
No. 14 Awg	3750 feet
No. 16 Awg	2500 feet

Ambient Temperature Range:—10° C to +60° C

INSTALLATION

Approximate Dimensions and Shipping Weights

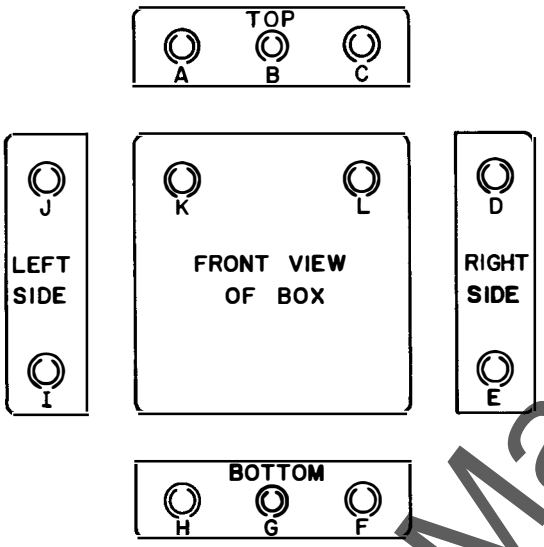
Figure 1



Class	NEMA Type 1 — Figure 1									Weight (Lbs.)
	A	B	C	D	E	F	G	H	J	
TG-31	6	10	5	3	7/8	8 1/2	1	15/16	4 1/8	7
TG-32	4 13/16	7 1/4	4 1/4	2 13/32	. . .	5 13/16	29/32	29/32	3	3 1/2
TG-33	6	10	5	3	7/8	8 1/2	1	15/16	4 1/8	7

INTRINSICALLY SAFE EQUIPMENT

Figure 2



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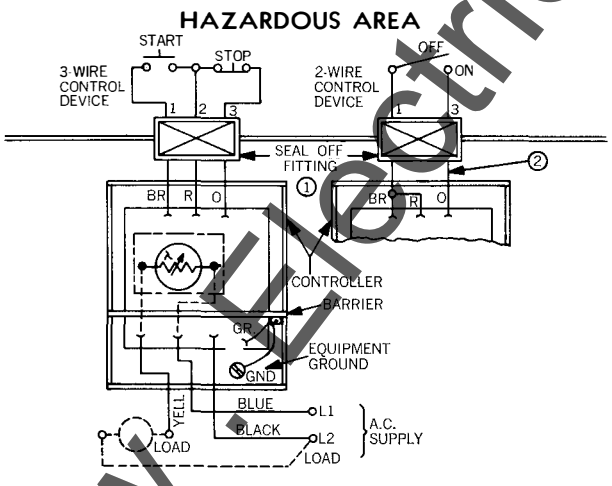
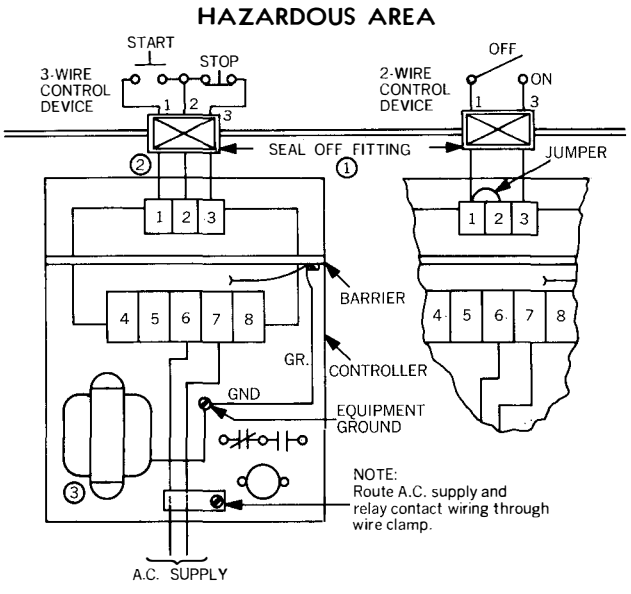
Type	Conduit Size Accepted by Lettered Knockouts — Figure 2											
	A	B	C	D	E	F	G	H	I	J	K	L
TG-31	¾-1	½-¾	¾-1	½-¾	½-¾	¾-1	½-¾	¾-1	½-¾	½-¾	½-¾	½-¾
TG-32	½-¾	. . .	½-¾	½-¾	. . .	½-¾	. . .	½-¾	. . .	½-¾	. . .	. . .
TG-33	¾-1	½-¾	¾-1	½-¾	½-¾	¾-1	½-¾	¾-1	½-¾	½-¾	½-¾	½-¾

Wiring Diagrams



Class 8501, Type TG-32



Class 8501, Types TG-31, & TG-33

Note 1: The conductors of the intrinsically safe circuit must be sealed in rigid conduit, at the point where the wiring enters the hazardous area.

Note 2: Control wiring must be kept isolated from all other panel and power wiring.

Note 3: When transformer is not provided connect 120 V. A.C. supply lines to terminals 4 & 5.

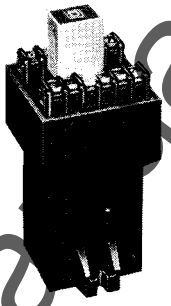
TYPE T — SOLID STATE RELAYS

The Type T Series of specialized control equipment is intended for those applications in which exceptional life and reliability are paramount or where it is necessary to initiate control action from low level signals.

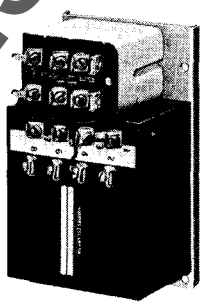
TRANSISTORIZED RELAYS

The Type T solid state transistorized relays are devices with input sensitivity which enable them to operate from substantially lower currents than standard electromechanical relays. They are particularly well suited to applications where the initiating contacts have low current carrying capabilities or where it is desired to detect the opening or closing of high resistance contacts.

Typical applications include contact making devices such as drop wires, feeler gauges, slow make and break contacts and contact making instruments. The unusual flexibility and sensitivity of these relays also permit them to be used in conjunction with photo-conductive cells providing an output in response to changes in light. In addition, the relay design allows it to be used as an output amplifier in NORPAK solid state control systems.



Class 8501
Type TO-21



Class 8501
Type TO-20

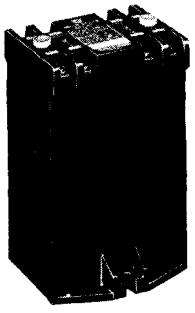
50-60 HERTZ **CLASS 8501**

Description of Output Relay	Control Supply Voltage	Open Type		General Purpose **NEMA Type 1** Enclosure		Dust-tight **NEMA Type 12** Enclosure	
		Type	Price	Type	Price	Type	Price
10 Amp. DPDT Relay	120 or 240	TO-20	**$62.**	TG-20	**$69.**	TA-20	**$86.**
3 Amp. DPDT Relay	120	TO-21	**42.**	TG-21	**49.**	....	....

SOLID STATE RELAYS

The all solid state construction of this relay plus full encapsulation enables it to be used in specialized control applications where electromechanical relays are not suitable. These include problem environmental conditions, such as severe shock and vibration, temperature variations, presence of dust, dirt, lint, moisture or corrosive vapors or fumes. Unaffected by gravity, it is also indifferent to mounting position. In addition, this relay offers all the advantages that solid state construction implies; no moving parts to wear out or fall out of adjustment and long operating life, which all adds up to the ultimate in reliability. There is no contact bounce or arcing and since the load is always turned off at current zero the problem of rf intereference is minimized.

Each device contains two single pole relays with both inputs ("coils") and outputs ("contacts") isolated from each other, making them true relays in the functional sense.



Class 8501
Type TSO-20

120 VOLTS **CLASS 8501** **50-60 HERTZ**

Description of Output	Open Type		General Purpose Encl. **NEMA Type 1**
	Type	Price	
2 N.O. "Contacts"	TSO-20	**$48.**	*
1 N.O. "Contact" 1 N.C. "Contact"	TSO-11	**53.**	*
2 N.C. "Contacts"	TSO-02	**58.**	*

*For a NEMA 1 enclosed device order open type device and Class 8501 Type UE-4 enclosure.

ORDERING INFORMATION REQUIRED 1—Class and type number 2—Control supply voltage

SUPERSEDES:
Class 8501
Page 172
May, 1969

SOLID STATE RELAYS

APPLICATION DATA

TRANSISTORIZED RELAYS

Both these relays are well suited for applications requiring initiation from low levels of current or where the detection of the opening and closing of high resistance contacts is desired. The Type TO-20 relay is energized by a decrease in the resistance in the initiation devices; e.g., closing contacts, illumination of a photo-conductive cell, etc. The Type TO-21 has the added feature of being able to be energized also by increasing resistance; e.g., opening contacts, darkening of a photo-conductive cell, etc. Both relays can be energized using an external DC voltage source or from a standard NOR element in a Square D NORPAK System. The table gives data for applying the relays in these various operating modes. Note the values of resistance of the initiating device for pickup and dropout. In the case of contacts, the pickup resistance (closed contact) will normally be zero; however, in some cases the resistance will be higher. The open contact resistance can be as high as infinity, but in many cases leakage paths can substantially reduce this resistance. Therefore, the pickup and dropout resistances should be considered even when the contact initiating devices are used. The table data can also be used to determine the compatibility of a particular photo-conductive cell pilot input device. Determine the ambient or dark resistance of the cell and its resistance when exposed to the initiating light source.

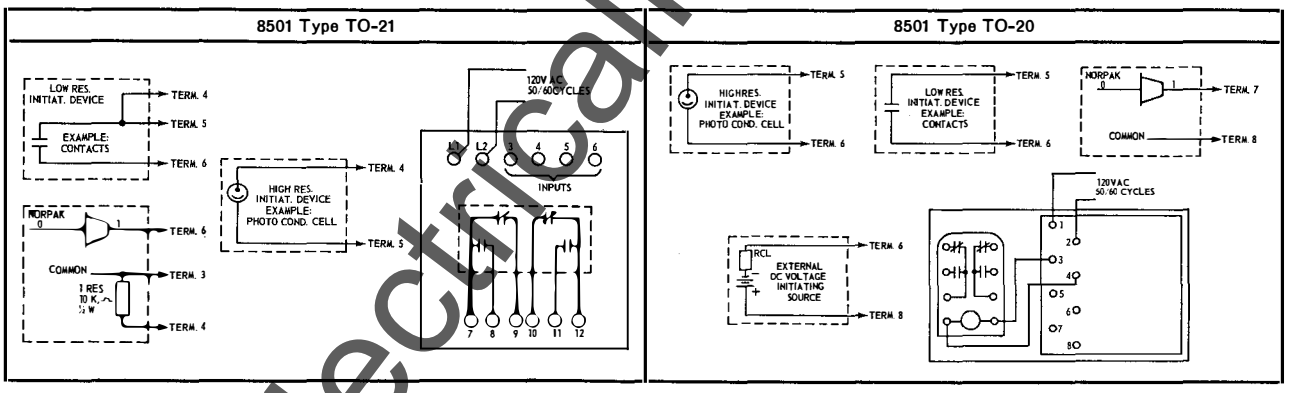
When the base current drive is supplied from an external voltage source, it may be necessary to add a current limiting resistor to hold the current to within the limits of 0.7 ma and 15 ma. Resistor values shown will accomplish this for the specific source voltage.

SOLID STATE RELAYS

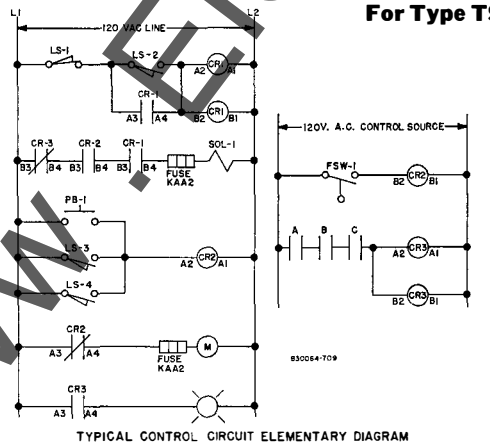
The solid state relay performs the same function as its electromechanical counterpart and can be directly substituted for them in critical control applications. The Type TSO has the identical space and mounting requirements as the Square D Type G control relay.

It is designed to withstand an inrush current at closure of ten times the steady state value which is sufficient capability to meet most requirements. Protection from false actuation and damage due to transients is built into the solid state relay. A suppression network limits line transients to peak voltages below the blocking level of the solid state switch. In addition, an R-C network across the triac reduces commutating dv/dt to a negligible value and assures the ability of the triac to turn off. Combined with complete isolation of the "coil" input and the switching functions, insensitivity to extreme environmental conditions and extra long life, makes it an excellent choice for standard relay applications.

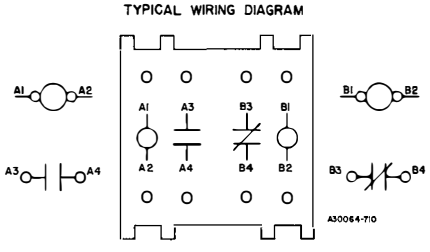
CONNECTIONS OF INITIATING DEVICES



TYPICAL CONTROL CIRCUIT ELEMENTARY DIAGRAM AND TYPICAL WIRING DIAGRAM
For Type TSO Solid State Relays



TYPICAL CONTROL CIRCUIT ELEMENTARY DIAGRAM



TYPE TSO-II

SUPERSEDES:
Class 8501
Price Page 10
Descriptive Pages 19 and 20
December, 1965

TYPE T — SOLID STATE RELAYS

APPLICATION DATA

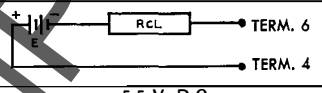
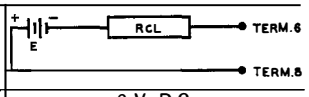
TRANSISTOR RELAYS

DEVICE		TYPE TO-21 — 3 AMP RELAY	TYPE TO-20 — 10 AMP RELAY	
RATINGS				
Input Burden		120 V. (+10% −15%) 50/60 Hz.	120 V. (+10% −15%) 50/60 Hz.	
Operating Temperature Range		0-60° C.	0-60° C.	
Warmup		None Required	None Required	
Reponse Time	Pick Up	12 Milliseconds	12 Milliseconds	
	Drop Out	25 Milliseconds	25 Milliseconds	
Contact Ratings		120 Volts	120 Volts	240 Volts
AC Amps. (Inductive Pilot Duty 35% Power Factor)	Make	15	60	30
	Break	1.5	6	3
	Continuous	3	10	10
AC Amps (Resistive 75% Power Factor) (Make, Break, Continuous)		3	10	10
DC Amps. (Inductive Pilot Duty) (Make, Break, Continuous)		0-30 Volts	0-24 Volts	25-250 Volts
		1.5	10	24 V.A.

OPERATING DATA — USING INITIATING CONTACTS OR A CHANGING RESISTANCE

Terminal Connection	Pick Up on High Resistance	Pick Up on Low Resistance	
	Initiating Device between Terminals 5-6 Short Terminals 4-5	4-5	5-6
Open Circuit Voltage	12 V. D.C. (Term 5-6)	12 V. D.C. (Term. 5-6)	20 V. D.C. (Term. 5-6)
Pick Up Resistance Range	500 Ohms or Greater	0-15,000 Ohms	0-30,000 Ohms
Drop Out Resistance Range	0-200 Ohms	45,000 Ohms or Greater	100,000 Ohms or Greater
Minimum Initiating Current	0.5 Ma.	0.5 Ma.	0.7
Maximum Current (with Zero Resistance)			15 Ma.

OPERATING DATA — USING AN EXTERNAL D.C. VOLTAGE SOURCE

Terminal Connection		
Minimum P.U. Voltage	5.5 V. D.C.	2 V. D.C.
Pick Up Current Range	1.5 - 7.5 Ma.	0.7 - 15 Ma.
Drop Out Current Range	0 - 1.0 Ma.	0- 0.2 Ma.
Select Current Limiting Resistor (RCL) for voltage source E, from the resistance range shown. 1 watt minimum rating. — 3 V. D.C.	....	0 - 1,500 Ohms
6 V. D.C.	0 - 330 Ohms	0 - 6,000 Ohms
12 V. D.C.	0 - 4,700 Ohms	300 - 15,000 Ohms
24 V. D.C.	0 - 13,000 Ohms	1,000 - 30,000 Ohms
48 V. D.C.	2,700 - 33,000 Ohms	3,000 - 70,000 Ohms
72 V. D.C.	6,200 - 47,000 Ohms	4,500 - 100,000 Ohms
96 V. D.C.	20,000 - 68,000 Ohms	6,000 - 140,000 Ohms
120 V. D.C.	43,000 - 82,000 Ohms	8,000 - 180,000 Ohms

OPERATING DATA — USING NORPAK

Connections			
	Com	Terminal 3	Terminal 8
	NOR 9-10	Terminal 6	Terminal 7
	External Resistor	10,000 Ohms ½ Watt-Term. 3-4	None Required
Logic Input Load		1½ Units	1 Unit
Logic Power Load		Not Required	Not Required

SOLID STATE RELAYS

DEVICE	TYPE TSO-20, TSO-11, TSO-02

INPUT "COIL" DATA

Control Voltage Source 120 V. (+10% —15%) 50/60 Hz.		
Burden	Inrush	9.5 V.A. Max.
	Sealed	4.5 V.A. Max

OUTPUT "CONTACT" DATA

Line Voltage Source		120 V. (+10 —15%) 50/60 Hz.
Current Rating	Continuous	1 Amp. RMS (Resis. or Induc.)
	Inrush	10 Amp. R.M.S. (for 2 Cycles)
	Minimum	20 Milliamperes
Open "Contact" Leakage Current		3 Milliamperes Max.
Closed "Contact" Resistance (At Rated Load and Voltage)		Less Than 1 Ohm Typical

OPERATING DATA

Mounting Position	Any
Operating Temperature Range	0 – 60° C.
Recommended Circuit Fusing*	2 Amps. — 125 Volt Quick Acting Type Fuse (Buss Limitron Type KAA-2)
Number of Outputs ("Contacts") That Can be Connected in Series or Parallel	3
Multipole Poles	Each Device Contains Two Separate Single Pole Relays. For Multiple Poles Connect "Coils" in Parallel

SPEED OF OPERATION

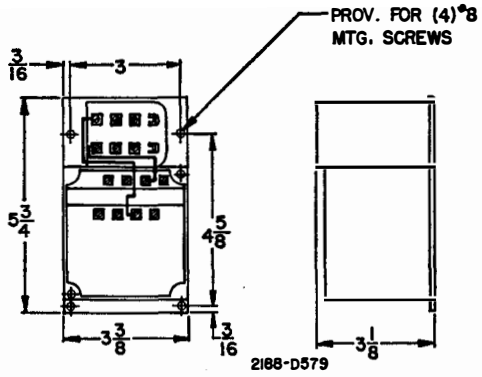
Pickup	N.O. Relay	10–18 Milliseconds	Dropout	N.O. Relay	4–18 Milliseconds
	N.C. Relay	2–12 Milliseconds		N.C. Relay	2–12 Milliseconds

*Fuse can be mounted in a Class 9080 Type KH fusible terminal block.

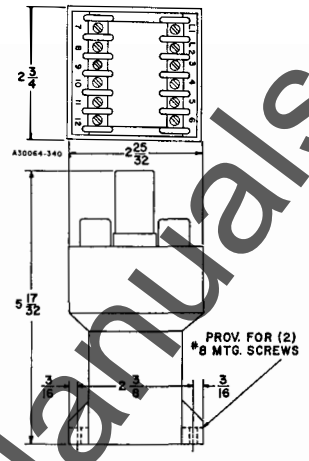
SUPERSEDES:
Class 8501
Dimension, Page 19
December, 1965

SOLID STATE RELAYS

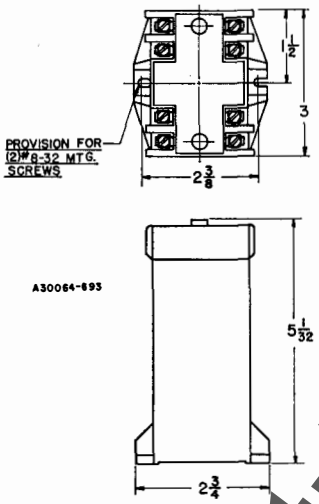
Approximate Dimensions and Shipping Weights



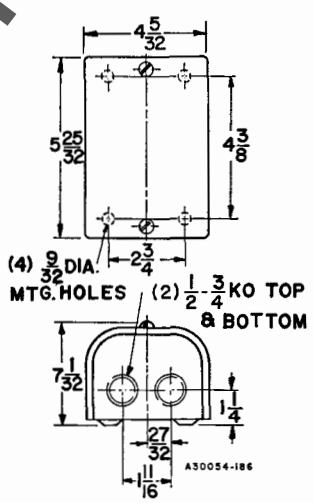
Type TO-20
Open Type
Weight — 4 Pounds



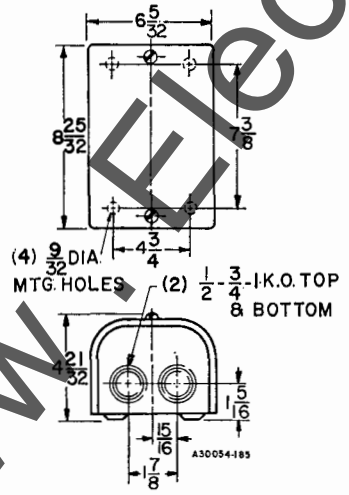
Type TO-21
Open Type
Weight — 2 Pounds



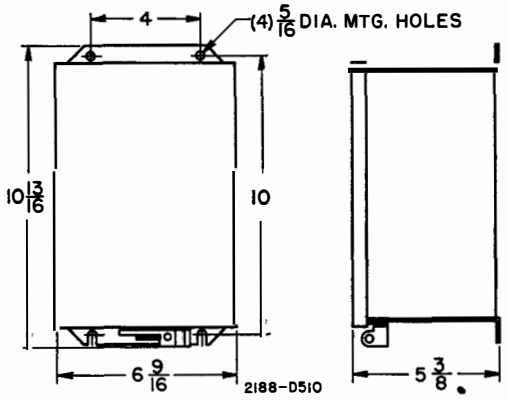
Type TSO-20,11,02
Open Type
Weight — 2 Pounds



Type TG-21 & for
Enclosing Type TSO-20, 11, 02
General Purpose Enclosure
Type UE-4
Weight — 5 Pounds



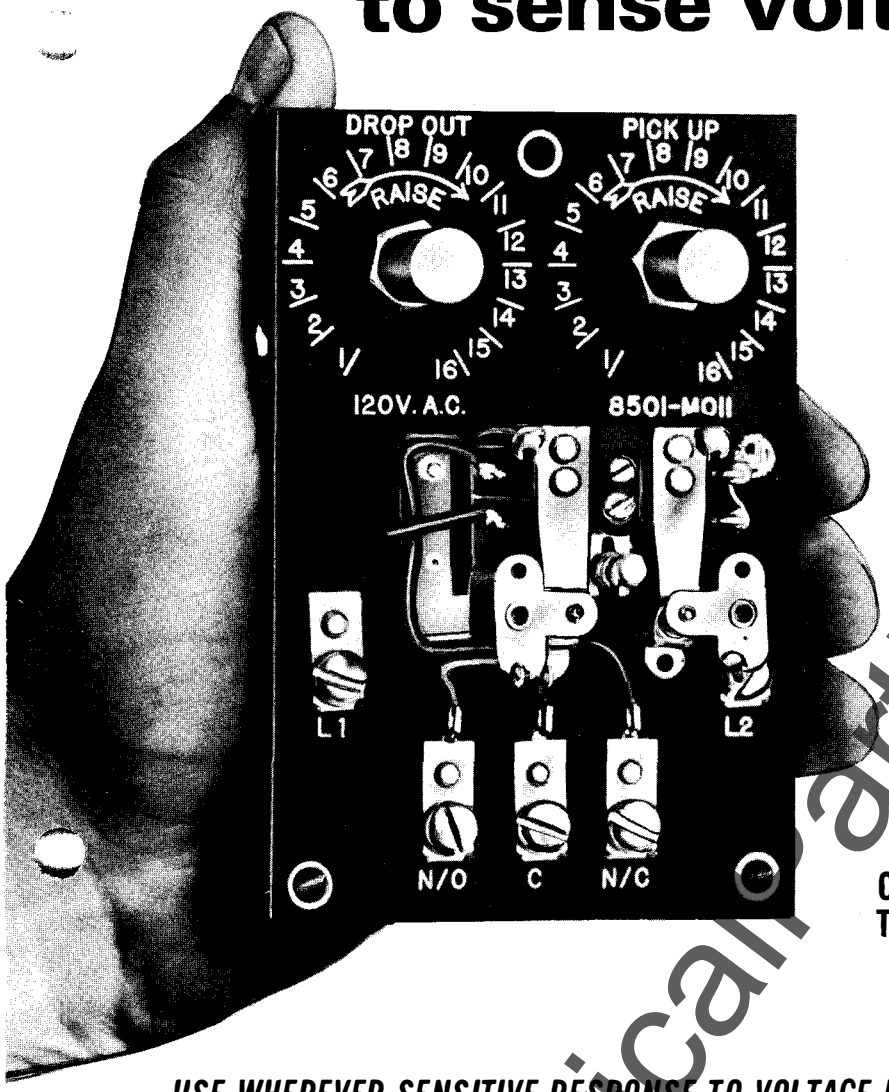
Type TG-20
Weight — 7.5 Pounds



Type TA-20
Weight — 8.5 Pounds

All dimensions are in inches.

to sense voltage fluctuation

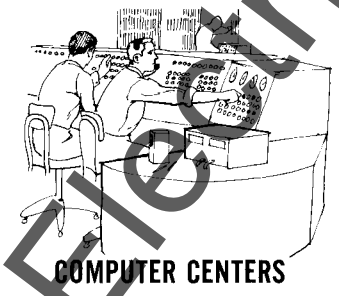


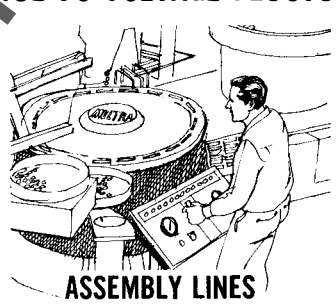
SPECIFY – SQUARE D VOLTAGE SENSITIVE RELAY

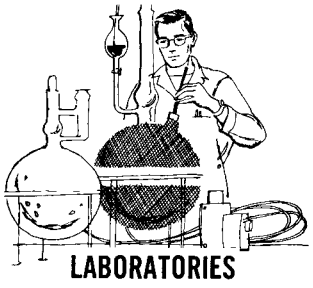
CLASS 8501
TYPE M

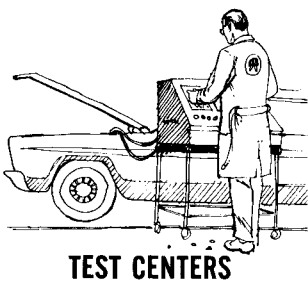
USE WHEREVER SENSITIVE RESPONSE TO VOLTAGE FLUCTUATION IS A PRIME CONSIDERATION


HOSPITALS


COMPUTER CENTERS


ASSEMBLY LINES


LABORATORIES


TEST CENTERS

- For initiating automatic transfer panels to a standby emergency source when normal voltage is too low.
- For alarm indication or shutdown of operations when voltage is below or above safe limits, to protect delicate instruments, computer centers, electronic equipment or process lines.
- For precision laboratory type work, where it is optionally available with calibrated dials. A matching chart is provided to indicate the exact pick-up and drop-out voltages for various potentiometer settings.
- For preventing start-up of critical processes until voltage is at a proper level.

This unique relay provides sensitive response to the impressed voltage, with a high degree of repeat accuracy. Yet it is rugged in construction to make it suitable for industrial applications. No separate power other than the sensing voltage is required to operate the relays. It is easily adjustable over a wide range of pick-up and drop-out voltages by means of two clearly marked potentiometers. To discourage adjustment of the potentiometers by unauthorized personnel, sealing caps are supplied over the potentiometer shafts on the standard relays. The optional relays with calibrated dials are furnished with pointer knobs on the rheostats in place of sealing caps. It is available in an open type for use in a custom-built control system, or in its own general purpose steel enclosure.

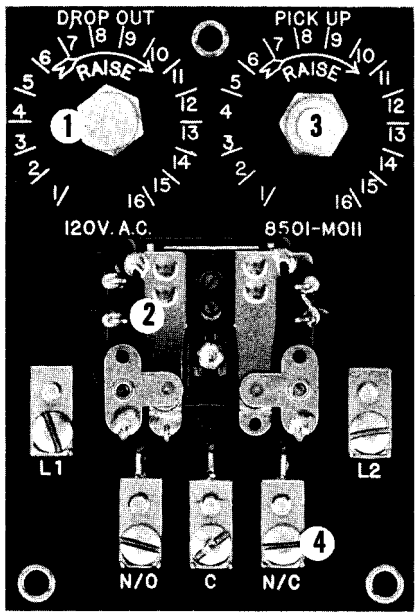
the **VOLTAGE SENSITIVE RELAY** *is a quality product designed for years of trouble-free service featuring...*

1 Protective sealing caps over potentiometer adjustments.

2 Rugged control relay providing single pole double throw output contacts.

3 Screwdriver adjustment under sealing cap.

4 Clearly marked line and output terminals suitable for #12 wire or smaller.



FRONT VIEW

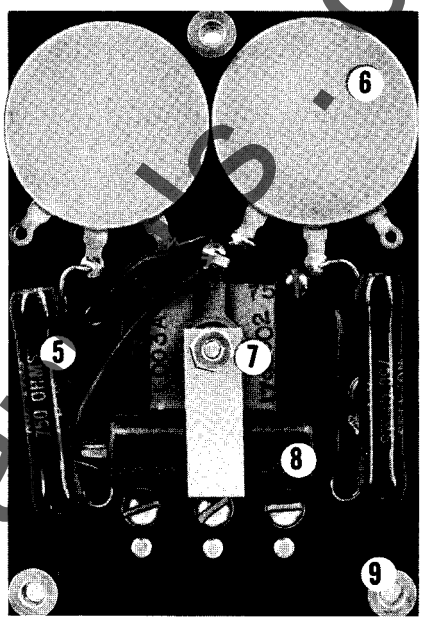
5 Reliable, conservatively applied fixed resistors.

6 Enclosed potentiometer for added protection against mechanical damage, or dusty atmosphere.

7 Single phase rectifier provides DC to operate the relay.

8 Capacitor prevents contact chatter on voltage dips.

9 Stand-off posts provide 3-point mounting, allow relay to be mounted on steel panel.



BACK VIEW

FEATURES

The Class 8501 Type M Voltage Sensitive Relay is designed for operation on 120 volts AC or 115 volts DC two-wire systems. For higher AC voltages a step-down transformer is furnished, and for polyphase systems two or more relays may be used.

The output contacts are arranged for single pole double throw operation, with a common terminal between the normally open and normally closed poles.

Pick-up voltage may be adjusted between approximately 85 and 130 volts. The drop-out differential is adjustable from approximately 5 to 20 volts. These ranges will be multiplied by the transformer ratio used on nominal voltages above 120 volts AC.

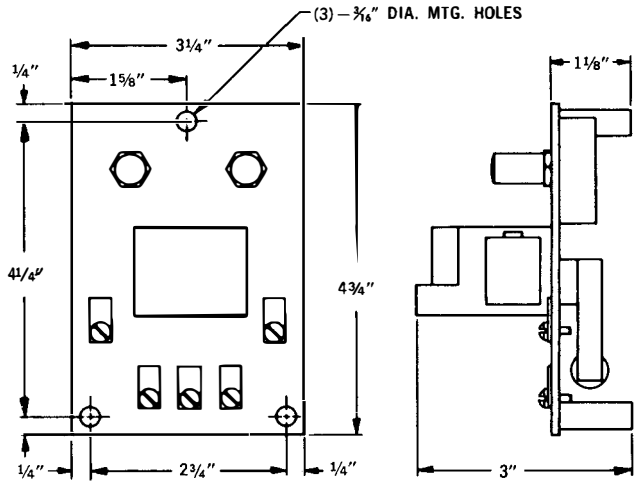
A.C. CLASS 8501 120-480 VOLTS

Description	RATINGS Volts	Non-Inductive Amps N/O	Non-Inductive Amps N/C	General Purpose Enclosure NEMA Type 1 Type	W	H	D	Open Type Type	W	H	D
Single Pole—Double Throw	120	15	5	M6-11	6⅝"	9⅝"	4½"	M0-11	3¼"	4¾"	3"
	*240	10	2								
	*480	5	1								

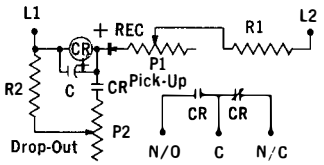
*Furnished with suitable transformer having 120 Volt Secondary

ORDERING INSTRUCTIONS

1. Specify Class and Type number of relay.
2. Specify operating voltage and frequency.
3. If special features are required such as 115V DC operation, calibrated dial, or for mounting in an area with excess vibration, add "Form Y35" to the type number, and describe the modification desired.



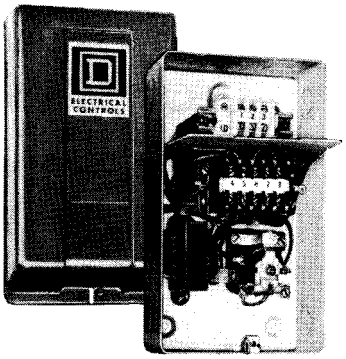
OUTLINE DIMENSIONS



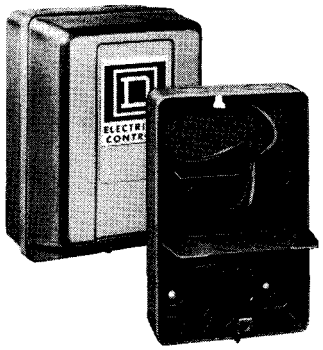
SQUARE D COMPANY

INTRINSICALLY SAFE RELAYS
TYPE T

CLASS 8501



Type TG-33



Type TG-32

The Intrinsically Safe ac relay control contains solid state energy limiting components encapsulated in an epoxy resin module. The module is mounted in a NEMA 1 enclosure complete with a barrier which provides an exclusive wiring area for the Intrinsically Safe circuits. When applying this device, the control is mounted in a non-hazardous area and actuated by general purpose pilot devices located in the hazardous area. All controllers are approved by Underwriter's Laboratories for actuation by Intrinsically Safe (low energy) pilot circuits extending into a hazardous location Class I Group A, B, C, or D or Class II Group E, F, or G.

- SAFETY BY DESIGN
- REDUCES EQUIPMENT COSTS
- PROVIDES EASIER MAINTENANCE
- WIRING COSTS LESS
- UL LISTED FOR CLASS I GROUP A LOCATIONS

Description of Output	Supply Voltage 50-60 Hz. AC	General Purpose Enclosure **NEMA Type 1** (For Mounting Outside Hazardous Area)	
		Type	Price
Relay Contact: 10 A., 600 V., Single Pole Double Throw	120	TG-31	**$460.**
Relay Contact: 10 A., 600 V., Single Pole Double Throw	240/480, 550	TG-33	**644.**
Solid State Equivalent to Normally Open Contact	120	TG-32	**307.**

APPLICATION DATA

Pilot Circuit Data and Sensitivity:

Maximum open circuit voltage between terminals 1 and 3 ..... 12 VDC

Maximum current in pilot circuit connected to terminals 2 and 3 ..... 56 milliamperes

Sensitivity: (Pilot Circuit Total)

Pick-up resistance ..... 0-20 ohms

Drop-out resistance ..... 15000 ohms or greater

Maximum allowable separation between pilot control device and Intrinsically Safe Relay

Minimum Gage Wire in Pilot Circuit	Allowable Separation
No. 14 Awg	3750 feet
No. 16 Awg	2500 feet

Ambient Temperature Range: − 10° C to + 60° C

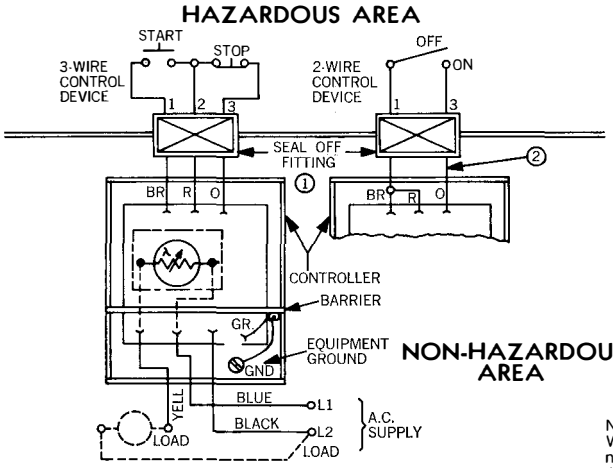
ELECTRICAL CONTACT RATINGS

Device	Volts	AC AMPERES				Maximum Single Phase Horsepower	
		Inductive Pilot Duty 35% Power Factor			**Resistive** 75% Power Factor		
		Make	Break	Continuous	Make, Break and Continuous	115 V.	230 V.
TG-31, TG-33	120 240 480 600	60 30 15 12	6 3 1.5 1.2	10 10 10 10	10 10 5 5	½	¾
TG-32 (Solid state equivalent to N.O. contact)	120	15 VA	10 VA	.087 amps.	.087 amps.	....	....

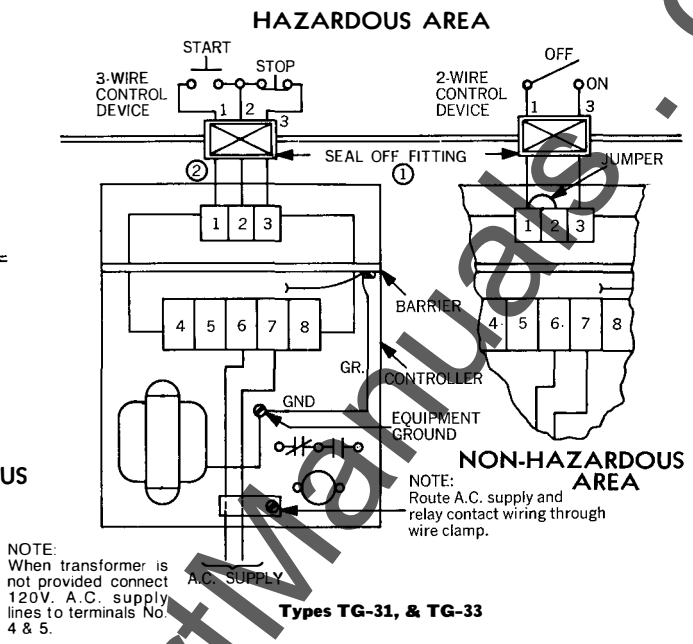
ORDERING INFORMATION REQUIRED: 1. Class and type number. 2. Supply voltage and frequency.

INTRINSICALLY SAFE RELAYS
APPLICATION DATA — TYPE T

WIRING DIAGRAMS



Type TG-32



Types TG-31, & TG-33

Note 1: The conductors of the intrinsically safe circuit must be sealed in rigid conduit, at the point where the wiring enters the hazardous area. The intrinsically safe relay must be mounted in a non-hazardous area.

Note 2: Control wiring must be kept isolated from all other panel and power wiring.

DIMENSIONS AND SHIPPING WEIGHTS

UNDERWRITERS LABORATORIES LISTING

These devices are listed in Underwriter's Laboratories Hazardous Location Equipment list for industrial control equipment related to hazardous locations in the categories of motor controllers.

1. Magnetic Devices (TG-31 and TG-33) UL Guide No. 184N13.13.
2. Auxiliary Devices (TG-32) UL Guide No. 184N13.1.

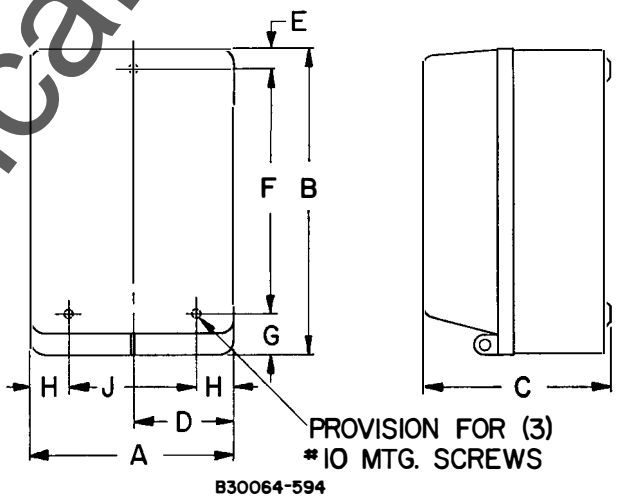


Figure 1

B30064-594

Class	NEMA Type 1 — Figure 1									Weight (Lbs.)
	A	B	C	D	E	F	G	H	J	
TG-31	6	10	5	3	7/8	8 1/2	1	15/16	4 1/8	7
TG-32	4 13/16	7 1/4	4 1/4	2 13/32	...	5 13/16	29/32	29/32	3	3 1/2
TG-33	6	10	5	3	7/8	8 1/2	1	15/16	4 1/8	7

SOLID STATE RELAYS
TYPE LS

The Type LS solid state relay can provide more than ten times the operating life normally expected of standard mechanical relays. These relays are ideal for high cyclic rate applications. If requirements include the use of solid state controls on machinery normally provided with mechanical relays, the Type LS can be the easiest and most economical solution. Standard relay terminology, symbols, and panel layout can be used so the Type LS can be directly substituted without redesigning the system or retraining personnel. Standard Type LS relays are supplied with the number of Type LSC convertible solid state contact cartridges shown in the table. Each can easily be changed from normally open to normally closed by movement of a conversion switch. A relay cover plate prevents unintentional conversion.

- Extremely long life
- Convertible contacts
- Relay symbols and terms
- Arcless, bounceless switching
- Can control up through Size 4 contactor
- Input/Output Isolation
- Standard pilot light
- Transient protected

Number of Normally Open Solid State Convertible Contacts	Open Type	
	Type	Price
1	LSO-10*	**$154.**
2	LSO-20*	**210.**
3	LSO-30	**272.**
4	LSO-40	**328.**

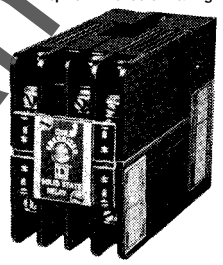
*Device has provision for **2** output contact cartridges **max.**

ACCESSORIES AND PARTS

Type LSC
Contact Cartridge

Description	Type	Price
Solid State Contact Cartridges		
N.O. (Fixed)	LSA	**$ 42.**
N.C. (Fixed)	LSB	**42.**
N.O. (Convertible)	LSC	**56.**
Reed Contact Cartridge — Convertible	LRC	**42.**
Relay Base — Less Contact Cartridges		
Spaces for 2 Contact Cartridges	LS-2*	**98.**
Spaces for 4 Contact Cartridges	LS-4	**104.**

*Device has provision for **2** output contact cartridges **max.**



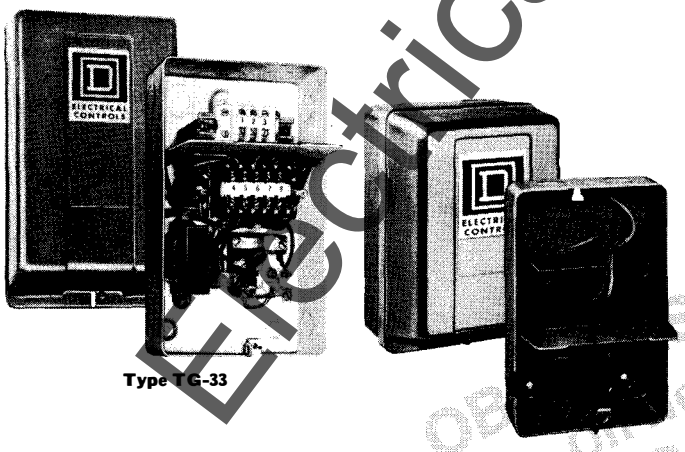
Type LSO-40 Relay

ENCLOSURE

Separately packed NEMA 1 sheet steel enclosure for Type LS relays: Class 9991 Type UE-7 (formerly Class 8501). Price **$28.00**.

ORDERING INFORMATION — Class and type number

INTRINSICALLY SAFE RELAYS
TYPE T



Type TG-33

Type TG-32

The Intrinsically Safe ac relay control contains solid state energy limiting components encapsulated in an epoxy resin module. The module is mounted in a NEMA 1 enclosure complete with a barrier which provides an exclusive wiring area for the Intrinsically Safe circuits. When applying this device, the control is mounted in a non-hazardous area and actuated by general purpose pilot devices located in the hazardous area. All controllers are approved by Underwriter's Laboratories for actuation by Intrinsically Safe (low energy) pilot circuits extending into a hazardous location Class I Group A, B, C, or D or Class II Group E, F, or G.

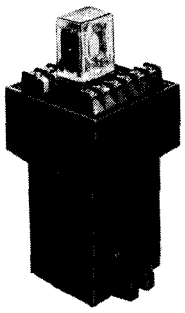
- SAFETY BY DESIGN
- REDUCES EQUIPMENT COSTS
- PROVIDES EASIER MAINTENANCE
- WIRING COSTS LESS
- UL LISTED FOR CLASS I GROUP A LOCATIONS

Description of Output	Supply Voltage 50-60 Hz. AC	General Purpose Enclosure **NEMA Type 1** (For Mounting Outside Hazardous Area)	
		Type	Price
Relay Contact: 10 A., 600 V., Single Pole Double Throw	120	TG-31	**$460.**
Relay Contact: 10 A., 600 V., Single Pole Double Throw	240/480, 550	TG-33	**644.**
Solid State Equivalent to Normally Open Contact	120	TG-32	**307.**

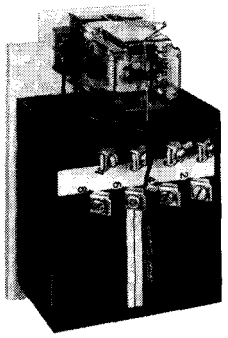
ORDERING INFORMATION REQUIRED: 1. Class and type number. 2. Supply voltage and frequency.

RESISTANCE SENSITIVE RELAYS
TYPE T

JULY, 1983
Supersedes Class 8501
Page S2 dated 1/81
SUPPLEMENTARY



Type TO-21



Type TO-20

The Type T resistance sensitive relays are devices with input sensitivity which enable them to operate from substantially lower currents than standard electromechanical relays. They are particularly well suited to applications where the initiating contacts have low current carrying capabilities, where it is desired to detect the opening or closing of high resistance contacts, or to detect changes in resistance.

TYPICAL INITIATING DEVICES

- PHOTO CELLS
- LEVEL PROBES
- REED RELAYS
- DROP WIRES
- LOW CURRENT CONTACTS

Description of Output Relay	Supply Voltage	Open Type		General Purpose **NEMA Type 1** Enclosure	
		Type	Price	Type	Price
10 Amp. DPDT Relay	120 or 240/50-60 Hz	TO-20	**$295.**	TG-20	**$331.**
5 Amp. DPDT Relay	120/50-60 Hz	TO-21	**202.**	TG-21	**235.**

GENERAL DESCRIPTION

Both these relays are well suited for applications requiring initiation from low levels of current or where the detection of the opening and closing of high resistance contacts is desired. The Type TO-20 relay is energized by a decrease in the resistance in the initiation devices; e.g., closing contacts, illumination of a photo-conductive cell, etc. The Type TO-21 has the added feature of being able to be energized also by increasing resistance; e.g., opening contacts, darkening of a photo-conductive cell, etc. Both relays can be energized using an external DC voltage source. The table gives data for applying the relays in these various operating modes. Note the values of resistance of the initiating device for pickup and dropout. In the case of contacts, the pickup resistance (closed contact) will normally be zero; however, in some cases the resistance will be higher. The open contact resistance can be as high as infinity, but in many cases leakage paths can substantially reduce this resistance. Therefore, the pickup and dropout resistances should be considered even when the contact initiating devices are used. The table data can also be used to determine the compatibility of a particular photo-conductive cell pilot input device. Determine the ambient or dark resistance of the cell and its resistance when exposed to the initiating light source.

When the relay is initiated from an external voltage source, it may be necessary to add a current limiting resistor to hold the current to within the limits of 0.7 ma and 15 ma. Resistor values shown will accomplish this for the specific source voltage.

ORDERING INFORMATION REQUIRED 1. Class and type number. 2. Supply voltage and frequency.