

MAGNETIC RELAYS

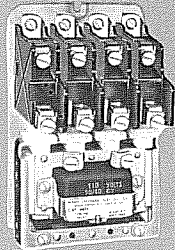
600 volt industrial control type HR
 MULTI-POLE • A.C. U.L. LISTED AND D.C. • SOLENOID TYPE

series
447
 DISCOUNT SCHEDULE IV

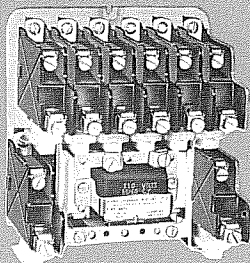
SELECT-A-RELAY...
 fully assembled

OR SELECT-A-BASE
 with A.C. or D.C. power plant

A.C. RELAYS

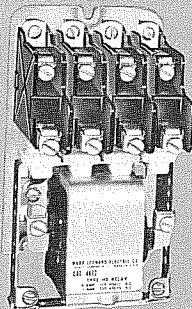


4-pole A.C. Relay

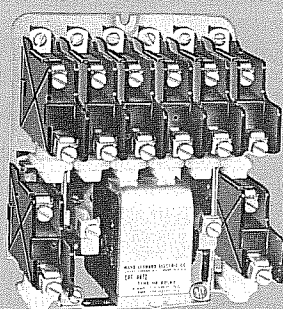


8-pole A.C. Relay

D.C. RELAYS

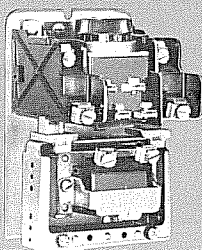


4-pole D.C. Relay



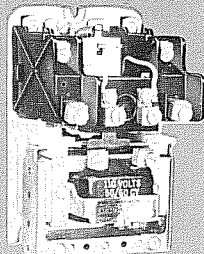
8-pole D.C. Relay

TIMER

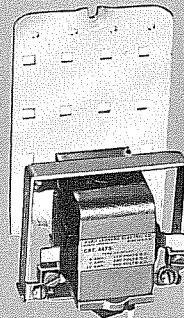


Timer on 4-pole

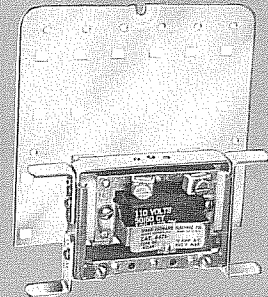
LATCH



Latch on 4-pole
 A.C. base

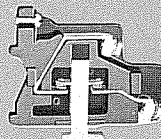


4-pole base with
 A.C. or D.C. power plant
 (D.C. shown)



8-pole base with
 A.C. or D.C. power plant
 (A.C. shown)

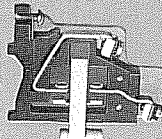
ADD-A-UNIT POLE or Kit as needed



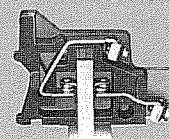
10 amp. pole



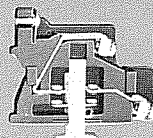
10 amp. bi-pole



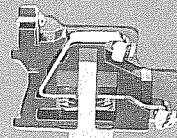
20 amp. pole



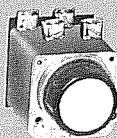
20 amp. D.C. pole



30 amp. tungsten pole



low power pole

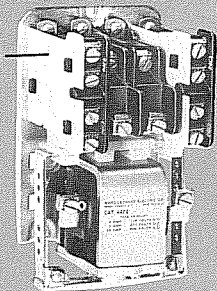


timer kit

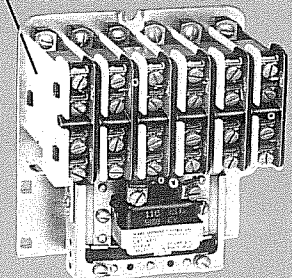


latching kit

ASSEMBLED RELAY— in a few seconds



D.C. Relay with
 2 bi-poles and
 2 low power poles



A.C. Relay with
 6 bi-poles
 (12 circuits)

The most versatile 600 volt relay on the market ... now available with convertible poles.

Check these outstanding features too!

- Wide selection of A.C. and D.C. operating coils
- Kits for timer, latch, mechanical interlock
- Add-a-pole flexibility
- ALL STOCKED for immediate shipment.

MAGNETIC RELAYS

600 volt industrial control type HR

MULTI-POLE • A.C. U. L. LISTED AND D.C. • SOLENOID TYPE

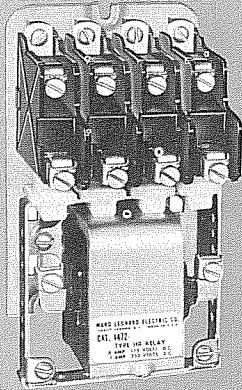


Fig. 1 D.C. Type HR Relay — 4-pole base with four 10 amp. standard unit poles.

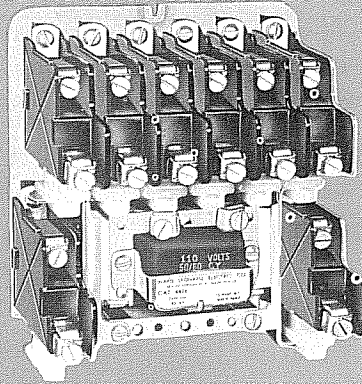


Fig. 2 A.C. Type HR Relay — 8-pole base with eight 10 amp. standard unit poles.



Fig. 3 A.C. Type HR Relay — 4-pole base with four 10 amp. standard unit poles.

APPLICATION

Series 447 Type HR relays are designed for A.C. or D.C. industrial control circuits requiring high electrical reliability, versatility of contact and operating coil combinations, high speed operation and compact size. Machine tool, process and other automated industrial controls typify type HR relay applications.

CONSTRUCTION

The unit construction of Series 447 relays affords large industrial users and panel builders extreme versatility, lower assembly costs and minimum stocking.

Two standard size steel base plates with identical mounting hole spacing accommodate from 1 to 8 single or 1 to 6 bi-pole contacts. Unit pole molded housings, totally enclose the contacts as a protection against accumulations of dust, foreign particles, etc. A single captive screw accessible from the front secures each unit pole to the base plate, permitting extra poles to be added in seconds. Each 10 and 20 amp. unit pole is field convertible N.O. to N.C. or N.C. to N.O.

Self-cleaning, self-aligning double break silver-to-silver (or precious alloy contacts) are designed for exceptionally long, trouble-free life. The definite contact wiping action provided assures high electrical reliability.

Coils for A.C. and D.C. operation are molded and designed for heavy duty continuous service. A.C. coils are removable from the front.

The E-shaped magnet frame for A.C. relays has a floating, self-aligning armature that rides in nylon guides for virtually friction-free operation. This vertical action solenoid supplies fast, consistent operation and minimum noise level.

All contact and coil terminals are equipped with pressure connectors for permanent, shake-proof connections. Con-

nectors accommodate one or two #12 or #14 solid or stranded wires. Terminals are tilted 15° from vertical making hook-up faster and eliminating fishing for blind terminal holes.

Series 447 relays are offered in a wide selection of unit poles for increased versatility. Unit poles available include single circuit 10 amp., 20 amp., 20 amp. D.C., 30 amp. tungsten, low power (for dry electronic circuits) and 10 amp. dual circuit (bi-pole). See Table 1 for contact ratings. Unit poles can be intermixed to meet circuit requirements. The maximum number of circuits allowable for 4 and 8 pole bases is given in Table 2.

For catalog listings of standard 10 amp. single circuit and 10 amp. bi-pole relays, see Tables 5 and 7 respectively.

CONTACT RATINGS

Table 1

Type Unit Pole	A.C. Amps		D.C. Amps ▲		
	110-600V max.	115V. max.	230V. max.		
	N.O. and N.C.	N.O.	N.C.	N.O.	N.C.
10 amp. Standard Single CKT	10	6	5	1	1
20 amp. Single CKT	20†	6	5	1	1
20 amp D.C. Single CKT with P.M. Blowouts	—	20	20	20	20
10 amp. Bi-Pole Dual CKT	10	6	5	1	1
30 amp. Tungsten N.O. Single CKT	30*	N/A	N/A	N/A	N/A
Low Power Single CKT	3**	3	3	—	—

† Horsepower rated as NEMA Size 0 contactor. (N.O. contacts only)

** 277 volt max. N.O. (tungsten load).

** 120 volt max N.O. or N.C. (resistive load). ▲ Non-inductive loads

MAGNETIC RELAYS

600 volt industrial control type HR

MULTI-POLE • A.C. U.L. LISTED AND D.C. • SOLENOID TYPE



DISCOUNT SCHEDULE IV

MAX. NO. OF CIRCUITS

Table 2

Type Relay Base	Type of Unit Pole											
	10 Amp. Standard Single Circuit		10 Amp. Bi-Pole Dual Circuit		20 Amp. Single Circuit		20 Amp. Single Circuit with P.M. Blowouts		30 Amp. N.O. Tungsten Single Circuit		Low Power Single Circuit	
	Max. Number		Max. Number		Max. Number		Max. Number		Max. Number		Max. Number	
	Ckts.	N.C. Ckts.	Ckts.	N.C. Ckts.	Ckts.	N.C. Ckts.	Ckts.	N.C. Ckts.	Ckts.	N.C. Ckts.	Ckts.	N.C. Ckts.
4-Pole A.C.	4	4	8	4	4	4	4	4	4	N/A	4	4
8-Pole A.C.	8	8	12	3	8	8	6	6	8	N/A	8	8
4-Pole D.C.	4	4	8	4	4	4	4	4	4	N/A	4	4
8-Pole D.C.	8	8	12	4	8	8	6	6	8	N/A	8	8

A.C. COIL DATA

Table 3

No. of Relay Poles	A.C. Coil Volts		Ohms $\pm 10\%$ @ 20 C	V.A. (Approx.)		Coil No.	Price
	50 Hz	60 Hz		Inrush	Sealed		
2-4	110	115	70	60	18	271L1	\$26.
	220	208-230	250			271L2	26.
	440	460	998			271L3	26.
	550	575	2585			271L4	30.
	24	24	3.3			271L5	40.
	12	12	0.70			271L6	40.
	48	48	10.6			271L7	40.
5-8†	110	115	40	96	28	271L11	\$26.
	220	208-230	160			271L12	26.
	440	460	660			271L13	30.
	550	575	1030			271L14	48.
	24	24	1.75			271L15	60.
	12	12	0.44			271L16	60.
	48	48	7.0			271L17	60.
6*	—	115	27.85	—	—	271L111	\$40.
	—	208-230	109.7			271L112	40.

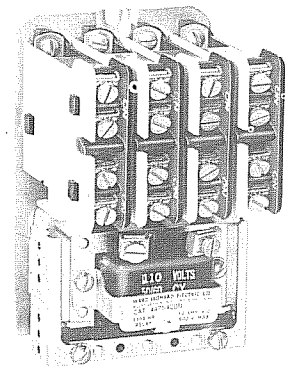


Fig. 4 A.C. Type HR Relay — 4-pole base with four 10 amp. bi-pole unit poles.

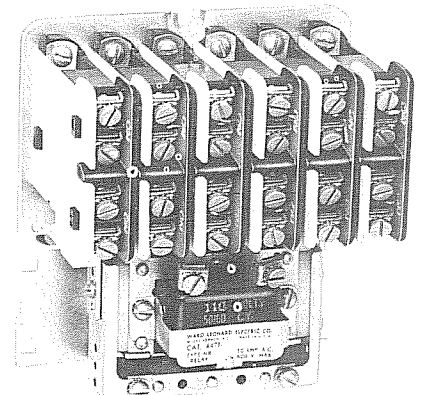


Fig. 5 A.C. Type HR Relay — 8-pole base with six 10 amp. bi-pole unit poles.

† Also for relays with timing module.

* For 5 or 6 bi-pole (10 or 12 circuits respectively) relays only.

D.C. COIL DATA

Table 4

No. of Relay Poles	Coil Volts D.C.	Ohms $\pm 10\%$ @ 20 C	Coil No.	Price
2-8	115	950	272L1	\$30.
	230	3700	272L2	30.
	24	39	272L5	30.
	12	9.8	272L6	30.
	48	156	272L7	30.



DISCOUNT SCHEDULE IV

MAGNETIC RELAYS

600 volt industrial control type HR

MULTI-POLE • A.C. U.L. LISTED AND D.C. • SOLENOID TYPE

TYPE HR RELAYS—STANDARD SINGLE CIRCUIT CONTACTS
A.C. 10 amps., 600V. max.; D.C. 6 amps., 115V.; 1 amp., 230V.

Table 5

Total No. of Circuits or Contacts	Contacts		STANDARD POLES			
	N.O.	N.C.	Relays with A.C. Coil		Relays with D.C. Coil	
			Cat. No.	Price	Cat. No.	Price
2 (4-Pole Base)	2	0	447-1200-*	\$72.	447-2202-*	\$100.
	1	1	447-1210-*	72.	447-2212-*	100.
	0	2	447-1220-*	72.	447-2222-*	100.
3 (4-Pole Base)	3	0	447-1300-*	84.	447-2302-*	112.
	2	1	447-1310-*	84.	447-2312-*	112.
	1	2	447-1320-*	84.	447-2322-*	112.
	0	3	447-1330-*	84.	447-2332-*	112.
4 (4-Pole Base)	4	0	447-1400-*	92.	447-2402-*	120.
	3	1	447-1410-*	92.	447-2412-*	120.
	2	2	447-1420-*	92.	447-2422-*	120.
	1	3	447-1430-*	92.	447-2432-*	120.
	0	4	447-1440-*	92.	447-2442-*	120.
6 (8-Pole Base)	6	0	447-1600-*	132.	447-2602-*	160.
	5	1	447-1610-*	132.	447-2612-*	160.
	4	2	447-1620-*	132.	447-2622-*	160.
	3	3	447-1630-*	132.	447-2632-*	160.
	2	4	447-1640-*	132.	447-2642-*	160.
	1	5	447-1650-*	132.	447-2652-*	160.
	0	6	447-1660-*	132.	447-2662-*	160.
8 (8-Pole Base)	8	0	447-1800-*	156.	447-2802-*	184.
	7	1	447-1810-*	156.	447-2812-*	184.
	6	2	447-1820-*	156.	447-2822-*	184.
	5	3	447-1830-*	156.	447-2832-*	184.
	4	4	447-1840-*	156.	447-2842-*	184.
	3	5	447-1850-*	156.	447-2852-*	184.
	2	6	447-1860-*	156.	447-2862-*	184.
	1	7	447-1870-*	156.	447-2872-*	184.
0	8	447-1880-*	156.	447-2882-*	184.	

*For complete Catalog Number add coil suffix numbers in 8th and 9th digits. See Table 8 for coil suffix numbers.

Notes: Prices include unwired relay with coil as selected from Table 8.

For Bi-Pole (dual circuit) relays see Table 7.

For other types of poles, i.e. 20 amp., 30 amp. tungsten, low power, etc. See Table 9.

ORDER BY Catalog Number from Table 5 and add Coil Suffix Number from Table 8.

20 AMP. RELAYS

For Assembled 20 Amp. Relays order from Bulletin Series 447-5. To order Sub-Assemblies refer to Table 9.

LATCH RELAYS

To order Assembled Latch Relays, change 7th digit in Catalog Number (from Table 5) to "8" for A.C. Latch Coil Relays and to "9" for D.C. Latch Coil Relays. Add \$56.00 for latch to relay price.

EXAMPLE: To order a 447-1200-11 A.C. relay with assembled latch, specify Cat. No. 447-1208-11. List price each \$128.

MAGNETIC RELAYS

600 volt industrial control type HR

MULTI-POLE • A. C. U. L. LISTED AND D. C. • SOLENOID TYPE



DISCOUNT SCHEDULE IV

TYPE HR RELAYS—BI-POLE DUAL CIRCUIT CONTACTS
 A.C. 10 amps., 600V., max.; D.C. 6 amps., 115 V.; 1 amp., 230 V.

Table 7

Total No. of Circuits or Contacts	Contacts		BI-POLE			
	N.O.	N.C.	Relays with A.C. Coil		Relays with D.C. Coil	
			Cat. No.	Price	Cat. No.	Price
4 (4-Pole Base)	4	0	447-3200-*	\$ 80.	447-4202-*	\$108.
	3	1	447-3210-*	80.	447-4212-*	108.
	2	2	447-3220-*	80.	447-4222-*	108.
6 (4-Pole Base)	6	0	447-3300-*	120.	447-4302-*	148.
	5	1	447-3310-*	120.	447-4312-*	148.
	4	2	447-3320-*	120.	447-4322-*	148.
	3	3	447-3330-*	120.	447-4332-*	148.
8 (4-Pole Base)	8	0	447-3400-*	144.	447-4402-*	172.
	7	1	447-3410-*	144.	447-4412-*	172.
	6	2	447-3420-*	144.	447-4422-*	172.
	5	3	447-3430-*	144.	447-4432-*	172.
	4	4	447-3440-*	144.	447-4442-*	172.
10 (8-Pole Base)	10	0	447-3500-*	156.		
	9	1	447-3510-*	156.		
	8	2	447-3520-*	156.		
	7	3	447-3530-*	156.		
	6	4	447-3540-*	156.		
12 (8-Pole Base)	5	5	447-3550-*	156.		
	12	0	447-3600-*	176.		
	11	1	447-3610-*	176.		
	10	2	447-3620-*	176.		
	9	3	447-3630-*	176.		

*For complete Catalog Number add coil suffix numbers in 8th and 9th digits. See Table 8 for coil suffix numbers.

Notes: Prices include unwired relay with coil as selected from Table 8, but without maintaining contact for 3-wire control.

For other types of poles, i.e. 20 amp., 30 amp. tungsten, low power, etc. See Table 9.

For standard 10 amp. single circuit poles see Table 5.

ORDER BY Catalog Number from Table 7 and add Coil Suffix Number from Table 8.

COIL SUFFIX NOS.

Table 8

A.C. Coil Volts		Suffix Number	D.C. Vots	Suffix Number
50 Hz	60 Hz			
110	115	11	115	13
220	208-230	21	230	23
440	460	31	24	33
550	575	41	12	43
24	24	51	48	53
12	12	61	—	—
48	48	71	—	—
—	277	81	—	—



MAGNETIC RELAYS

600 volt industrial control type HR

MULTI-POLE • A.C. U.L. LISTED AND D.C. • SOLENOID TYPE

DISCOUNT SCHEDULE IV

PNEUMATIC TIMING MODULES (ATTACHMENTS)

Pneumatic timing module kits for field installation on Series 447 relays are available for a.c. or d.c. control circuit use where accurate, adjustable and reliable timing in the 0.2 to 150 second range is required. Type 1 "ON-DELAY" (time delay after relay coil is energized) and Type 2 "OFF-DELAY" (time delay after relay is de-energized) timing modules install in place of two center poles on four and eight pole relays. See Table 9 for kit numbers and timing ranges. For technical data on timing modules refer to Series 640. For assembled timing relays see Series 640.

Base and Power Plant for Series 447 Relays with Pneumatic Timing Module (Attachment)

The following Base and Power Plants must be used in conjunction with Pneumatic Timing Modules:

A.C. Coil Volts	Cat. No. 4-Pole	Base and Power Plant Only		List Price
		List Price	Cat. No. 8-Pole	
110	447-9402-11	\$56.	447-9801-11	\$48.00
208/220	447-9402-21	56.	447-9801-21	48.00

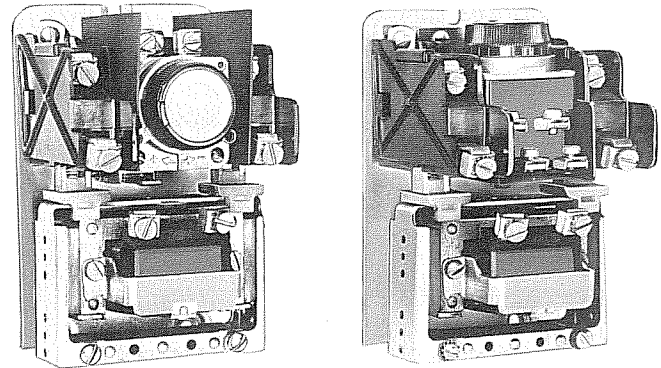


Fig. 6 Typical Series 447 relay with pneumatic timing modules. Type 1 "ON-DELAY" (left), Type 2 "OFF-DELAY" (right).

SUB-ASSEMBLIES

In addition to standard assemblies listed in Tables 5 and 7, Ward Leonard offers an extensive line of Series 447 sub-assemblies enabling manufacturers to take advantage of the economies made possible by assembling the exact relay for their specific needs. Interchangeable poles in six types, mechanical interlocks, latch kits, timing modules, 4- and 8-pole base plates with a.c. or d.c. power plants and reversing base plates comprise the sub-assembly line. See Table 9 for Series 447 relay sub-assembly listings and quantity prices. For further quantity discounts, contact the Home Office.

UNIT POLE INSTALLATION — When installing a single unit pole, the pole must be mounted in the center rather than in the outside position for proper balance. On two pole relays for correct balance the poles should be mounted in the middle position or one pole in each outside location.

SUB-ASSEMBLIES for Type HR Relays

Table 9

Description	Cat. No.	List Price
UNIT POLES		
10 Amp. Standard—N.O.	447-9046	\$13.20
10 Amp. Standard—N.C.	447-9047	13.20
20 Amp.—N.O.	447-9048	17.60
20 Amp.—N.C.	447-9049	17.60
Low Power—N.O.	447-9050	18.80
Low Power—N.C.	447-9051	18.80
20 Amp. D.C.—N.O. (one blowout)	447-9019	20.80
20 Amp. D.C.—N.O. (2 blowouts)	447-9020	22.80
20 Amp. D.C.—N.C. (one blowout)	447-9021	20.80
20 Amp. D.C.—N.C. (2 blowouts)	447-9022	22.80
30 Amp. Tungsten—N.O., 277V. max.	447-9071	20.40
30 Amp. Tungsten—N.C. 277V. max.	447-9072	20.40
10 Amp. Bi-Pole—2 N.O.	447-9044	15.20
10 Amp. Bi-Pole—1 N.O., 1 N.C.	447-9045	15.20
Special Bi-Pole—1 N.O., 1 N.C. (make before break) used for coil clearing on latch	447-9069	15.20
BASES AND POWER PLANTS		
4-Pole A.C.—110V. coil	447-9401-11	38.00
4-Pole A.C.—208-220V. coil	447-9401-21	38.00
4-Pole A.C.—440V. coil	447-9401-31	38.00
4-Pole A.C. with 110V. heavy duty coil for Bi-Pole Relays, 5-8 circuits	447-9402-11	56.00
8-Pole A.C.—110V. coil	447-9801-11	48.00
8-Pole A.C.—220V. coil	447-9801-21	48.00
8-Pole A.C. with 110V. heavy duty coil for Bi-Pole Relays, 9-12 circuits	447-9802-11	70.00
4-Pole D.C.—115V. coil	447-9405-13	60.00

continued

MAGNETIC RELAYS

600 volt industrial control type HR

MULTI-POLE • A. C. U. L. LISTED AND D. C. • SOLENOID TYPE

series
447

DISCOUNT SCHEDULE IV

MECHANICAL INTERLOCKS

mechanical interlocks for use between two 4-pole or two 8-pole relays, or one 4-pole and one 8-pole relay are available in kit form. See Table 9.

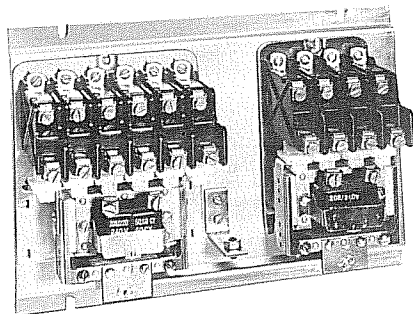


Fig. 7 Typical 6-pole and 4-pole Series 447 relay mechanically interlocked.

LATCH RELAYS

Where control circuits must function independently of circuit or power failure or where "quiet" operation is necessary, type HRLR Latch Relays (mechanically held) can be furnished. The latch assembly Fig. 8 mounts in place of two center unit poles.

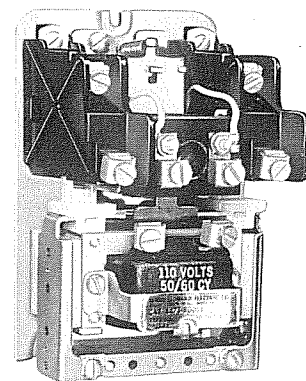


Fig. 8 Typical Series 447 Latch Relay.

Continuous duty latch coil and main relay coil operate on same voltage and frequency unless otherwise specified. Kits for field installation of latch assemblies are listed in Table 9.

SUB-ASSEMBLIES for Type HR Relays—continued

Table 9

Description	Cat. No.	List Price
4-Pole D.C.—230V. coil	447-9405-23	\$60.00
8-Pole D.C.—115V. coil	447-9805-13	68.00
8-Pole D.C.—230V. coil	447-9805-23	68.00
ELECTRO-MECHANICAL LATCHES		
115V. A.C.	447-9108-11	\$48.00
230V. A.C.	447-9108-21	48.00
460V. A.C.	447-9108-31	48.00
575V. A.C.	447-9108-41	48.00
12V. A.C.	447-9108-61	48.00
24V. A.C.	447-9108-51	48.00
48V. A.C.	447-9108-71	48.00

SUB-ASSEMBLIES for Type HR Relays—continued

Table 9

Description	Cat. No.	List Price
MECHANICAL INTERLOCK for:		
Two 4-Pole D.C.	447-9123	\$ 23.20
Two 4-Pole A.C.	447-9124	23.20
Two 8-Pole D.C. or one 4-Pole and one 8-Pole D.C.	447-9125	23.20
Two 8-Pole A.C. or one 4-Pole and one 8-Pole A.C.	447-9126	23.20
MOUNTING PANEL for:		
Two 4-Pole A.C. or D.C. relays	447-9127	10.00
Two 8-Pole A.C. or D.C. relays; or one 4-Pole and one 8-Pole AC. or D.C. relays	447-9128	10.00
TIMING MODULES—Pneumatic Type		
Type 1 "ON DELAY" 0.2-30 Sec.	447-9710	128.00
Type 1 "ON-DELAY" 10-150 Sec.	447-9711	128.00
Type 2 "OFF-DELAY" 0.2-30 Sec.	447-9910	128.00
Type 2 "OFF-DELAY" 10-150 Sec.	447-9911	128.00
TIMING MODULES — Solid State		
"ON DELAY" 0.2 to 20 sec.	601-1100-11	220.00
"ON DELAY" 2 to 200 sec.	601-1110-11	220.00
"OFF DELAY" 0.2 to 20 sec.	601-2100-11	220.00
ENCLOSURES		
NEMA 1 General Purpose	5999-5011	48.00
NEMA IV Water-tight	5999-5014	80.00
NEMA XII Dust-tight	5999-5018	56.00
MOUNTING PLATE		
For mounting relay in NEMA 1 Enclosure	5999-5010	5.60

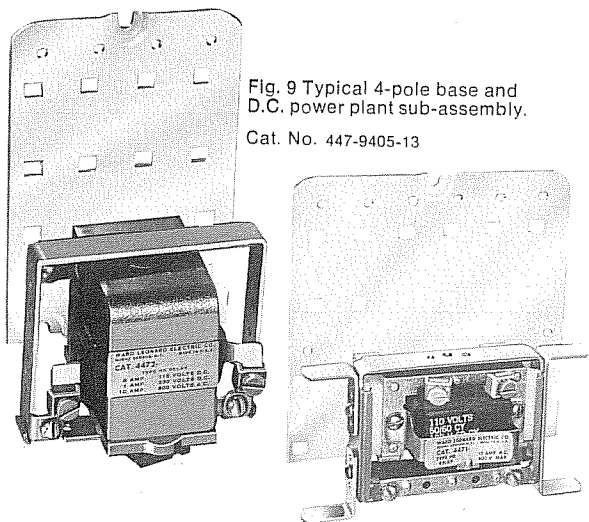


Fig. 9 Typical 4-pole base and D.C. power plant sub-assembly.
Cat. No. 447-9405-13

Fig. 10 Typical 8-pole base and A.C. power plant sub-assembly.
Cat. No. 447-9801-11

MAGNETIC RELAYS

600 volt industrial control type HR

DISCOUNT SCHEDULE IV

MULTI-POLE • A.C. U.L. LISTED AND D.C. • SOLENOID TYPE

DIMENSIONS — Approximate

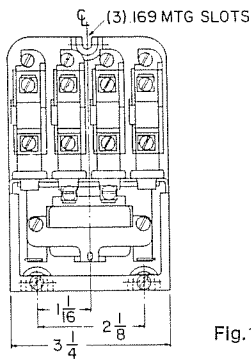


Fig. 11 A.C. 2, 3 or 4-Pole.

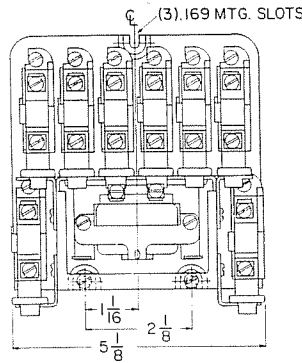
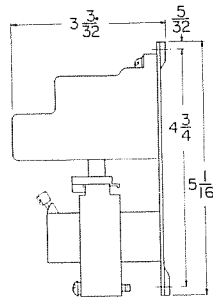


Fig. 12 A.C. 6 or 8-Pole.

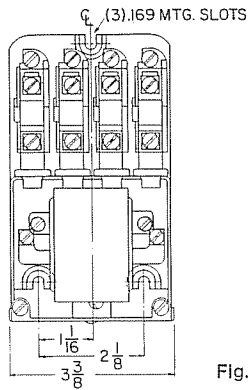
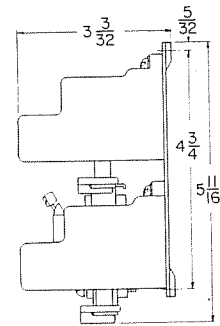


Fig. 13 D.C. 2, 3 or 4-Pole.

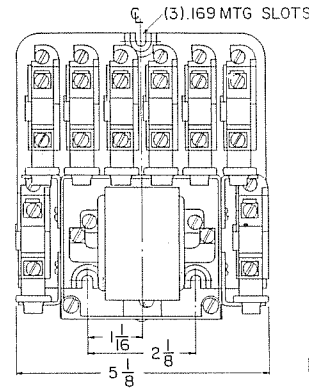
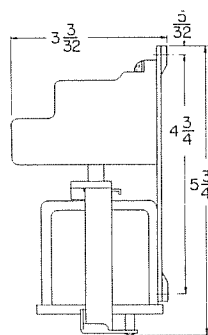
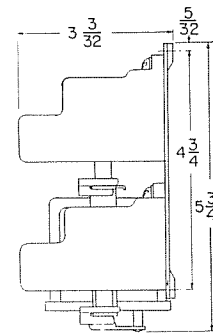


Fig. 14 D.C. 6 or 8-Pole.



DIMENSIONS — Approximate

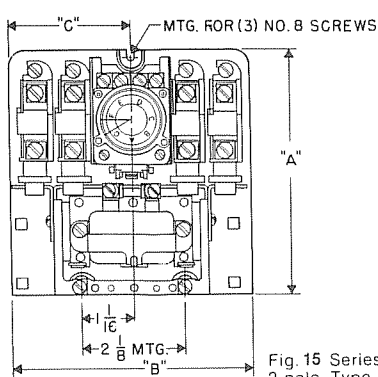


Fig. 15 Series 640 Pneumatic Timing Relay. 2-pole. Type 1 "ON-DELAY"

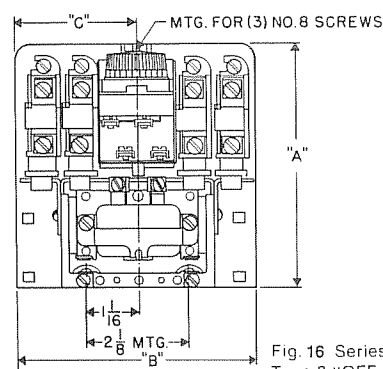
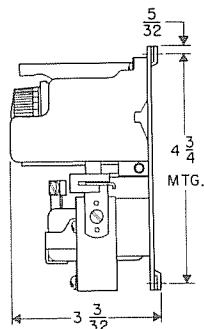
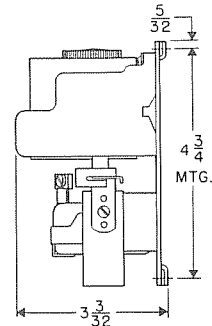


Fig. 16 Series 640 Pneumatic Timing Relay. Type 2 "OFF-DELAY"



Dimensions — Approx. — Series 447 Relays with Pneumatic Timing Module.

Table 10

Number of Contacts					Dimensions in Inches						
Instantaneous Poles		Timed (Fixed)		Dim. Fig.	Type 1 "ON-DELAY"			Type 2 "OFF-DELAY"			
N.O.	N.C.	N.O.	N.C.		A.C. Relays†			A.C. Relays†			
					A	B	C	Dim. Fig.	A	B	C
STANDARD POLES											
2	0	1	1								
1	1	1	1	15	5 1/4	3 1/4	1 1/4	16	5 1/4	3 1/4	1 1/4
0	2	1	1								
6	0	1	1								
5	1	1	1	15	5 1/4	5	2 1/2	16	5 1/4	5	2 1/2
4	2	1	1								
BI-POLES											
3	0	1	1								
2	1	1	1	15	5 1/4	3 1/4	1 1/4	16	5 1/4	3 1/4	1 1/4
1	2	1	1								
4	0	1	1								
3	1	1	1	15	5 1/4	3 1/4	1 1/4	16	5 1/4	3 1/4	1 1/4
2	2	1	1								

† For D.C. Relays 4-pole max. A = 5 3/4", B = 3 3/8", C = 1 5/8".
For D.C. Relays 6-pole max. A = 5 3/4", B = 5 1/8", C = 2 1/8".