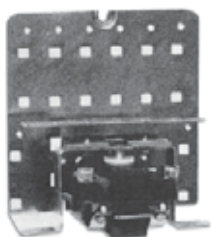
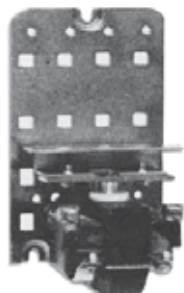
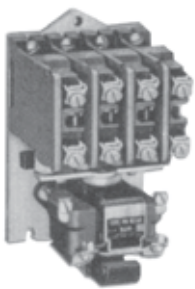
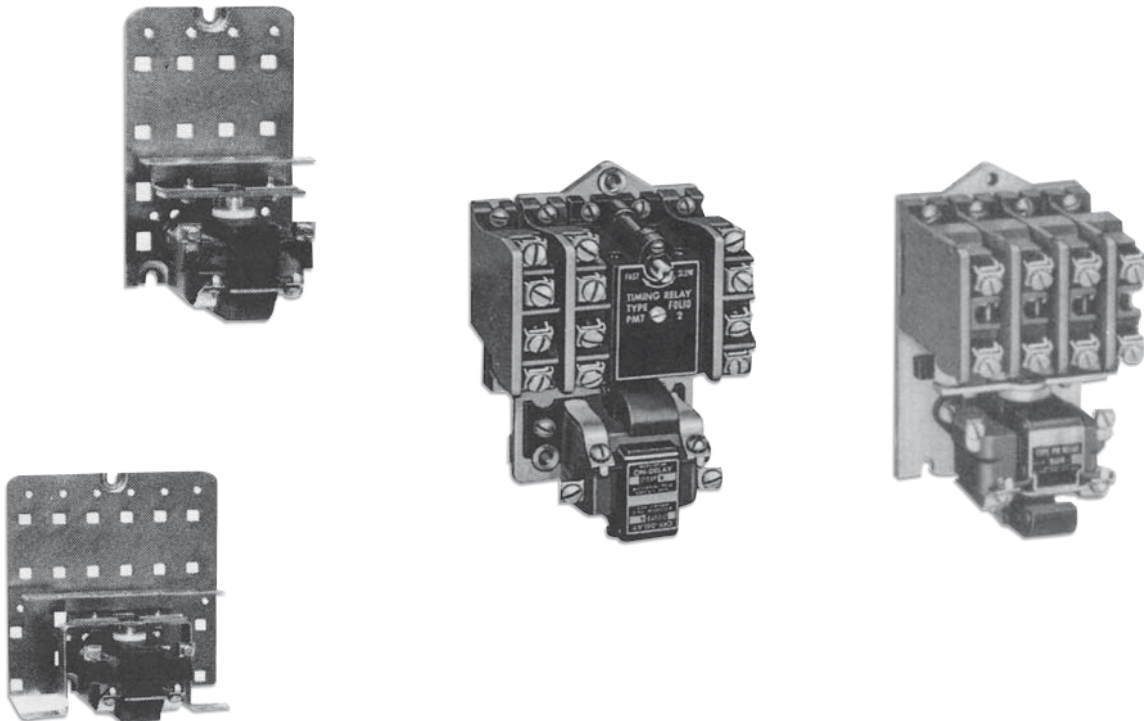


RELAYS

Index

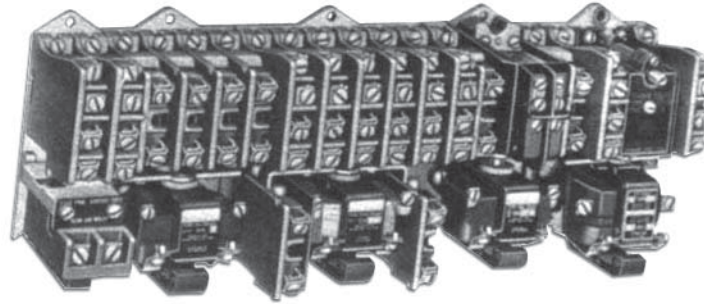


| Description..... | Page Number |
|--|-------------|
| General Information..... | G2 |
| <u>PM AC Relays</u> | |
| PM Convertible, PMA, PMF, AC Relays..... | G4 |
| PM Latching, PML, PMAL, AC Relays..... | G5 |
| Pole Arrangement, Diagrams, PM, PMA, PMF..... | G6 |
| Dimensional Data, PM, PML, PMA, PMAL, PMF..... | G7 |
| PMS, Slim Jim AC Relays..... | G8 |
| PMT, AC Pneumatic Timing Relays..... | G10 |
| PM Relay Parts and Modification Kits..... | G11 |
| <u>PM DC Relays</u> | |
| PM Convertible DC Relays..... | G12 |
| PML Latching DC Relays..... | G13 |
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| Series 447 Relays..... | G18 |



RELAYS - PM

General Information

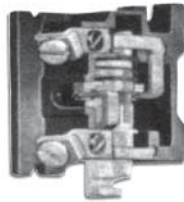
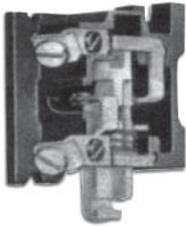


The Joslyn Clark PM Family of control relays provides flexibility, versatility and reliability. The exclusive design concept and rugged construction of the PM line offers many advantages for the designer and builder of today's complex control panels.

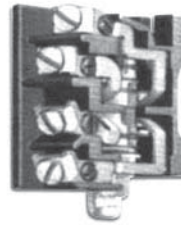
Features:

- Modular Construction -allows field addition, replacement or conversion of poles for unlimited flexibility.
- Uniformity of Design -simplifies engineering, installation and maintenance.
- Interchangeability of Parts - reduces inventory requirements. Flexibility of Application - provided by many modifications including noble metal, gold bonded, anti-weld and overlapping contacts.

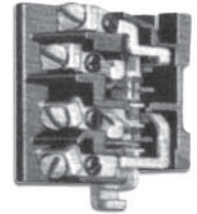
G



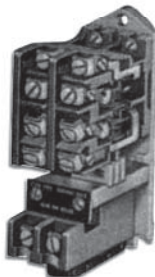
Convertible Poles contain one contact, either NO or NC and can be easily field converted from one to the other. Identified by WHITE operating rod.



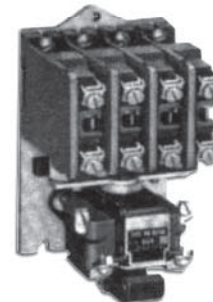
Universal Poles contain two independent isolated contacts, one NO and one NC. Identified by RED operating rod.



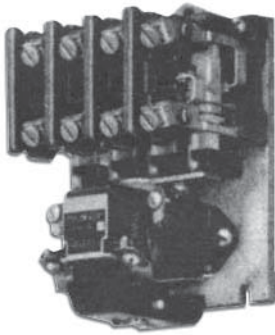
Duplex Poles contain two independent isolated contacts, both NO. Identified by GREEN operating rod.



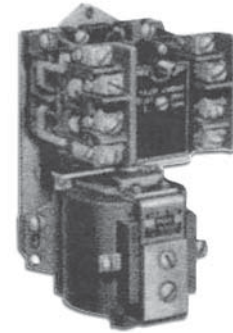
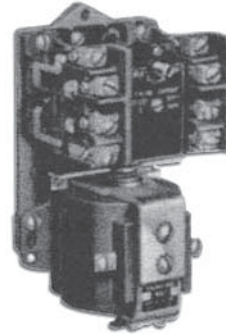
PMS Slim Jim Relays are 1 - 1/2" wide. They are the smallest members of the PM Family. Available with up to 4 contacts; they provide the reliability of heavy duty 600 Volt relays in the smallest possible space.



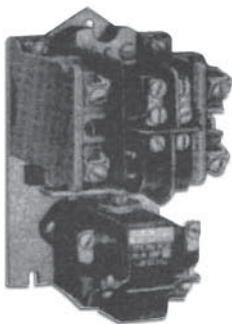
PM Convertible Pole Relays use white rod poles and are offered with up to 8 contacts in any combination of NO and NC contacts. Relays with up to 12 contacts using double deck bases can be supplied.



Type Relays, using universal poles have up to 12 contacts. Relays with up to 14 contacts are available, using some convertible poles. Type PMF Relays, combining several types of poles can have up to 14 contacts.



Type PMT Pneumatic Timing Relays, these relays are available for either "on-delay" operation (time delay after energization) or "off-delay" (time delay after de-energization). They may also be field converted from on to "off-delay" and vice versa, by merely inverting the operating magnet. Type PMT Time Delay relays are adjustable over a timing range from 0.2 seconds to 3 minutes with repetitive accuracy of $\pm 10\%$.



Latch Relays are available with either white rod convertible poles or red rod universal poles. The latching unit with continuous duty trip coil replaces the two pole modules directly above the relay magnet.

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RELAYS - PM

AC Relays



Type PM Convertible, PMA Universal, PMF Duplex (Type 7305)

| Total No. of Contacts ⁴ | Normally Open Contacts | Normally Closed Contacts | Type PM Relays | | Type PMA Relays | | Type PMF Relays | |
|------------------------------------|------------------------|--------------------------|--------------------------------------|-------|---|---|--|---|
| | | | Convertible Pole White Operating Rod | | Universal Pole Red Operating Rod ¹ | | Duplex Pole Green Operating Rod ² | |
| | | | Catalog Number | | Catalog Number | | Catalog Number | |
| 2 | 2 | 0 | 5U2 | * | — | — | — | — |
| | 1 | 1 | 5U2-1 | * | — | — | — | — |
| | 0 | 2 | 5U2-2 | * | — | — | — | — |
| 3 | 3 | 0 | 5U3 | * | — | — | — | — |
| | 2 | 1 | 5U3-1 | * | — | — | — | — |
| | 1 | 2 | 5U3-2 | * | — | — | — | — |
| 4 | 0 | 3 | 5U3-3 | * | — | — | — | — |
| | 4 | 0 | 5U4 | * | — | — | 5UFK4 | * |
| | 3 | 1 | 5U4-1 | * | — | — | 5UFK4-1 | * |
| 4 | 2 | 2 | 5U4-2 | * | 5UU2 | * | — | — |
| | 1 | 3 | 5U4-3 | * | — | — | — | — |
| | 0 | 4 | 5U4-4 | * | — | — | — | — |
| 6 | 6 | 0 | 5U6 | * | — | — | 5UF6 | * |
| | 5 | 1 | 5U6-1 | * | — | — | 5UF6-1 | * |
| | 4 | 2 | 5U6-2 | * | — | — | 5UF6-2 | * |
| | 3 | 3 | 5U6-3 | * | 5UU3 | * | — | — |
| | 2 | 4 | 5U6-4 | * | — | — | — | — |
| | 1 | 5 | 5U6-5 | * | — | — | — | — |
| 8 | 0 | 6 | 5U6-6 | * | — | — | — | — |
| | 8 | 0 | 5U8 | * | — | — | 5UF8 | * |
| | 7 | 1 | 5U8-1 | * | — | — | 5UF8-1 | * |
| | 6 | 2 | 5U8-2 | * | — | — | 5UF8-2 | * |
| | 5 | 3 | 5U8-3 | * | — | — | 5UF8-3 | * |
| | 4 | 4 | 5U8-4 | * | 5UU4 | * | — | — |
| | 3 | 5 | 5U8-5 | * | — | — | — | — |
| | 2 | 6 | 5U8-6 | * | — | — | — | — |
| 10 | 1 | 7 | 5U8-7 | * | — | — | — | — |
| | 0 | 8 | 5U8-8 | * | — | — | — | — |
| | 10 | 0 | — | — | — | — | 5UF10 | * |
| | 9 | 1 | — | — | — | — | 5UF10-1 | * |
| 12 | 8 | 2 | — | — | — | — | 5UF10-2 | * |
| | 7 | 3 | — | — | — | — | 5UF10-3 | * |
| | 12 | 0 | — | — | — | — | 5UF12 | * |
| | 11 | 1 | — | — | — | — | 5UF12-1 | * |
| 14 | 10 | 2 | — | — | — | — | 5UF12-2 | * |
| | 9 | 3 | — | — | — | — | 5UF12-3 | * |
| | 6 | 6 | — | — | 5UU6 | * | — | — |
| 14 | 14 | 0 | — | — | — | — | 5UF14 | * |
| | 13 | 1 | — | — | — | — | 5UF14-1 | * |
| | 12 | 2 | — | — | — | — | 5UF14-2 | * |
| | 11 | 3 | — | — | — | — | 5UF14-3 | * |
| | 10 | 4 | — | — | — | — | 5UF14-4 | * |
| | 9 | 5 | — | — | — | — | 5UF14-5 | * |
| | 8 | 6 | — | — | 5UU86 | * | — | — |
| | 7 | 7 | — | — | 5UU77 | * | — | — |
| 6 | 8 | — | — | 5UU68 | * | — | — | |

¹ See notes 3,5 and 6 page G5 & G7 ² See note 2 page G5

Ordering Information

- Use complete catalog no. replace the (*) with suffix from coil Table, (Located on Page G5)



Type PM Latch Relays, PML Convertible, PMAL Universal (Type 7305)

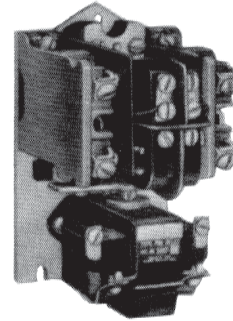
| Total No. of Contacts ⁴ | Normally Open Contacts | Normally Closed Contacts | Type PML | Type PMAL |
|------------------------------------|------------------------|--------------------------|--------------------------------------|----------------------------------|
| | | | Convertible Pole White Operating Rod | Universal Pole Red Operating Rod |
| | | | Catalog Number | Catalog Number |
| 2 | 2 | 0 | 5UH2 * | — |
| | 1 | 1 | 5UH2-1 * | — |
| | 0 | 2 | 5UH2-2 * | — |
| 3 | 3 | 0 | 5UH3 * | — |
| | 2 | 1 | 5UH3-1 * | — |
| | 1 | 2 | 5UH3-2 * | — |
| | 0 | 3 | 5UH3-3 * | — |
| 4 | 4 | 0 | 5UH4 * | — |
| | 3 | 1 | 5UH4-1 * | — |
| | 2 | 2 | 5UH4-2 * | 5UUH2 * |
| | 1 | 3 | 5UH4-3 * | — |
| | 0 | 4 | 5UH4-4 * | — |
| 6 | 6 | 0 | 5UH6 * | — |
| | 5 | 1 | 5UH6-1 * | — |
| | 4 | 2 | 5UH6-2 * | — |
| | 3 | 3 | 5UH6-3 * | 5UUH3 * |
| | 2 | 4 | 5UH6-4 * | — |
| | 1 | 5 | 5UH6-5 * | — |
| | 0 | 6 | 5UH6-6 * | — |
| 8 | 4 | 4 | — | 5UUH4 * |
| 10 | 6 | 4 | — | 5UUH64 * |
| | 5 | 5 | — | 5UUH55 * |
| | 4 | 6 | — | 5UUH46 * |

Latch Relays

The latch unit occupies the space of two poles directly above the magnet, and provides a means of holding the relay in the energized position after the coil of the main operating magnet is

de-energized. Momentarily energizing the continuous duty coil of the latch unit allows the relay to return to the normal, de-energized position.

Relay Enclosure P6E-01



5U4B - * 4 pole base only
5U8B - * 8 pole base only

G

- 1 Maximum of 8 contacts only.
- 2 PMF relays with N.C. contacts have universal red rod & duplex green rod poles. Maximum of 8 contacts only on 25 hz.
- 3 Includes open type relay complete with operating coil. Latching relays include latch unit with continuous duty trip coil.
- 4 Overlapping contacts are available. Specify when ordering.
- 5 For Dimensions, refer to page G7 For modification Kits, refer to page G11.
- 6 Additional relays with alternate pole configurations available.

Ordering Information

- Use complete catalog number. Replace the (*) with suffix coil table.
- Ex. 4 Pole Relay with 120V, 60Hz. coil; 5UH4-76.
- Latch Relays are supplied with main coil and latch coil of the same voltage. For variations, consult factory.

* Suffix Coil Table

| Volts | Hertz | |
|---------|-------|-----|
| | 60 | 50 |
| 24 | —96 | —95 |
| 110-120 | —76 | —75 |
| 220-240 | —26 | —25 |
| 380 | —36 | —35 |
| 440-480 | —46 | —45 |
| 550-600 | —56 | —55 |

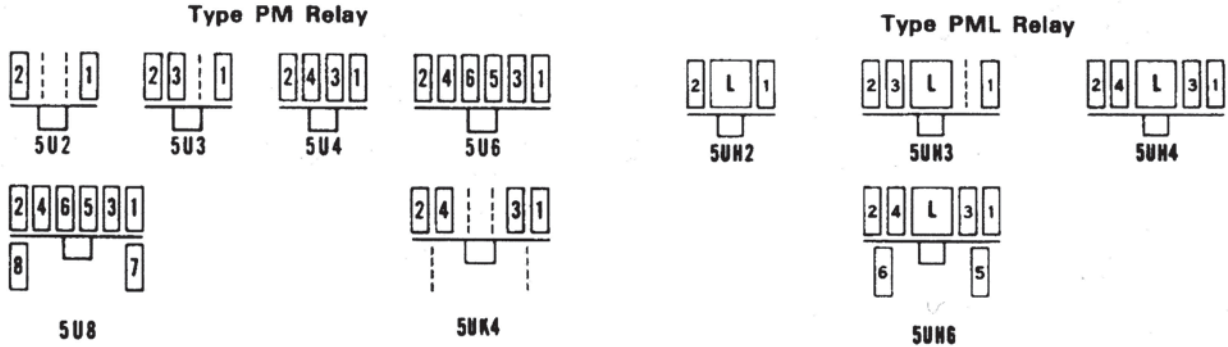
RELAYS - PM

AC Relays



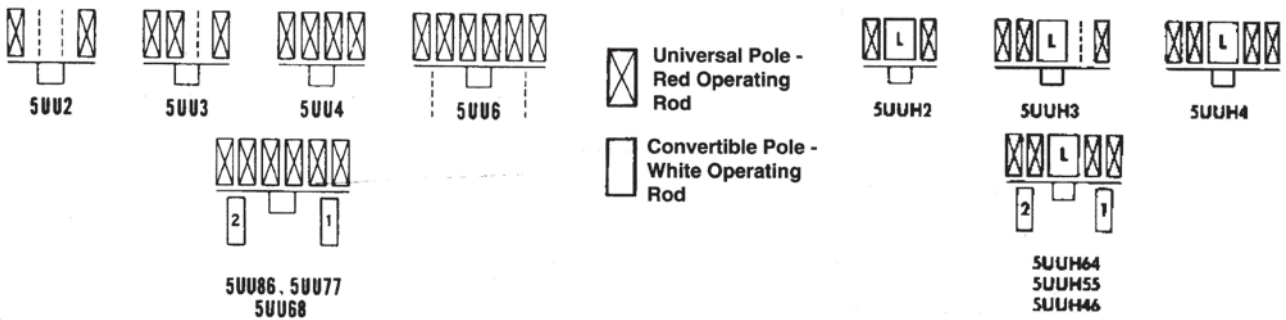
Contact Arrangement Type PM Convertible Pole Relays

Numbers in pole locations indicate the sequence in which normally closed poles are mounted when required.



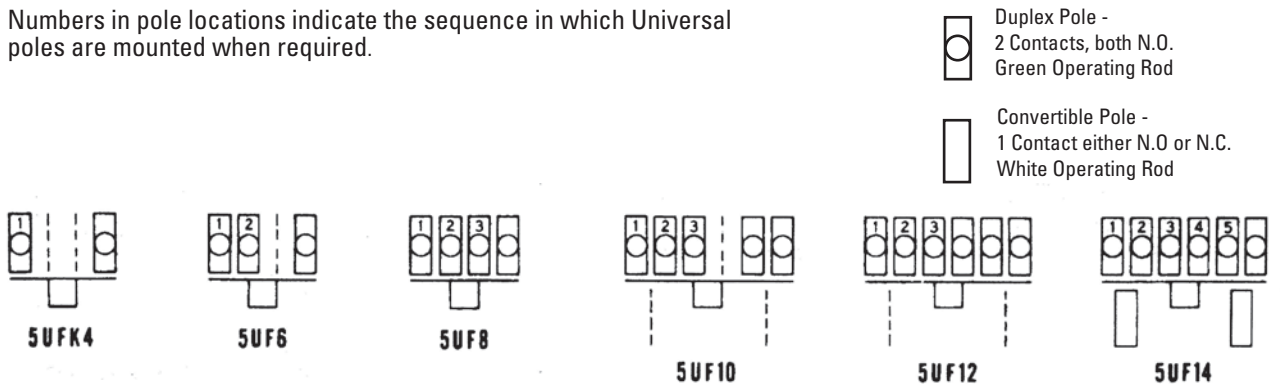
Type PMA Universal Pole Relays

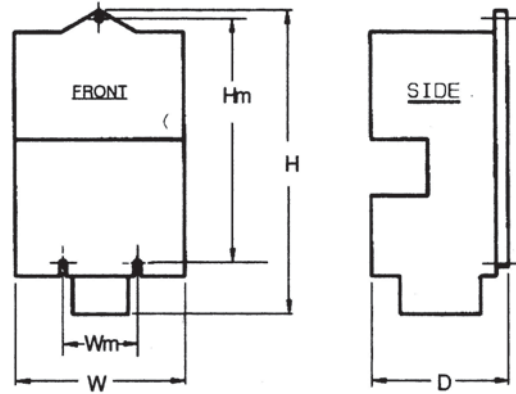
Numbers in pole locations indicate the sequence in which normally closed convertible poles are mounted when required.



Type PMF Duplex Pole Relays

Numbers in pole locations indicate the sequence in which Universal poles are mounted when required.





All relays require a minimum of 7/8" clearance below magnet for coil change 1/8" horizontal spacing between relay is recommended.

Mounting Holes for #10 Screws

| Relay Type | Open Relay Cat. Number | H | W | D | Hm | Wm |
|------------|----------------------------|--------|-------|-------|-------|----|
| PM | 5U2, 5U3, 5U4 | 5 5/16 | 3 | 3 | 4 1/2 | 2 |
| | 5U6 | 5 7/16 | 4 1/2 | 3 | 4 1/2 | 2 |
| | 5U8, 5UK4 | 5 7/16 | 4 1/2 | 3 | 4 1/2 | 2 |
| PML | 5UH2 | 5 5/16 | 3 | 3 5/8 | 4 1/2 | 2 |
| | 5UH3, 5UH4 | 5 5/16 | 4 1/2 | 3 5/8 | 4 1/2 | 2 |
| | 5UH6 | 5 7/16 | 4 1/2 | 3 5/8 | 4 1/2 | 2 |
| PMA | 5UU2, 5UU3, 5UU4 | 5 5/16 | 3 | 3 1/4 | 4 1/2 | 2 |
| PMF | 5UFK4, 5UF6 | 5 5/16 | 4 1/2 | 3 1/4 | 4 1/2 | 2 |
| | 5UU6, FUF10, 5UF12 | 5 5/16 | 4 1/2 | 3 1/4 | 4 1/2 | 2 |
| | 5UU86, 5UU77, 5UU68, 5UF14 | 5 7/16 | 4 1/2 | 3 1/4 | 4 1/2 | 2 |
| PMAL | 5UUH2 | 5 5/16 | 3 | 3 5/8 | 4 1/2 | 2 |
| | 5UUH3, 5UUH4 | 5 5/16 | 4 1/2 | 3 5/8 | 4 1/2 | 2 |
| | 5UUH64, 5UUH55, 5UUH46 | 5 7/16 | 4 1/2 | 3 5/8 | 4 1/2 | 2 |
| | 713UP; 1-2 Pole | 5 1/2 | 3 | 3 3/8 | 4 1/2 | 2 |
| | 713UP; 3 Pole | 5 1/2 | 3 3/4 | 3 3/8 | 4 1/2 | 2 |
| | 713UP; 4 Pole | 5 1/2 | 4 1/2 | 3 3/8 | 4 1/2 | 2 |
| | 713UPD; 1-2 Pole | 5 5/8 | 3 | 3 3/8 | 4 1/2 | 2 |
| | 713UPD; 3 Pole | 5 5/8 | 3 3/4 | 3 3/8 | 4 1/2 | 2 |
| | 713UPD; 4 Pole | 5 5/8 | 4 1/2 | 3 3/8 | 4 1/2 | 2 |

RELAYS - PMS

AC Relays



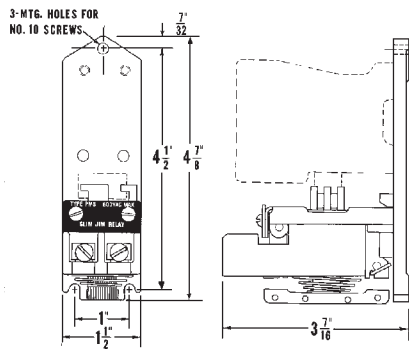
AC Relays - Slim Jim Type PMS - Bulletin 7305

| Pole ‡ Arrangement | Contacts | | Description | Rod Color | Open Type Cat. No. |
|-----------------------|----------|------|--|--------------|--------------------------|
| | N.O. | N.C. | | | |
| | 1 | 0 | 1 Convertible Pole | White | 5SW * |
| | 2 | 0 | 2 Convertible Poles | White | 5SWW * |
| | 2 | 0 | 1 Duplex Pole | Green | 5SG * |
| | 4 | 0 | 2 Duplex Poles | Green | 5SGG * |
| | 1 | 1 | 1 Universal Pole | Red | 5SR * |
| | 2 | 2 | 2 Universal Poles | Red | 5SRR * |
| | 3 | 1 | 1 Universal Pole and 1 Duplex Pole | Red Green | 5SRG * |

Relay Enclosure P6E-01

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Approximate Dimensions In Inches



‡ Pole Symbols

- Represents one Convertible Pole, which includes one normally open contact.
- Represents one Duplex Pole, which includes two normally open contacts.
- Represents one Universal Pole, which includes two contacts, one normally open and one normally closed.
- Represents one space where a Convertible, Duplex or Universal Pole may be added.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Example: Cat. No. 5SRR-76 (110-120 Volt, 60 Hertz).
- Engineering Data
- Modification page K9

* Coil Table

| 60Hz Voltage | Suffix | 60 Hz Voltage | Suffix |
|----------------------|--------|---------------|--------|
| 24 Separate Control | -96 | 200-240 | -26 |
| 120 Separate Control | -76 | 440-480 | -46 |
| | | 550-600 | -56 |



Pole Assemblies

| Contacts | | Rod | Pole | Kit |
|----------|------|--------|--|----------|
| N.O. | N.C. | Color | Description | Cat. No. |
| 1 | 0 | White | Convertible Pole | KPM-1A |
| 0 | 1 | White | Convertible Pole | KPM-2A |
| 1 | 1 | Red | Universal Pole | KPMA-1 |
| 2 | 0 | Green | Duplex Pole | KPMF-1 |
| 1 | 0 | White | Convertible Pole — Anti-Weld Contacts | KPM-31A |
| 0 | 1 | White | Convertible Pole — Anti-Weld Contacts | KPM-32A |
| 1 | 1 | Orange | Overlap Contact | KPMA-21 |
| 1 | 1 | Red | Universal Pole — Anti-Weld Contacts | KPMA-2 |
| 2 | 0 | Green | Duplex Pole — Anti-Weld Contacts | KPMF-2 |
| 1 | 1 | Orange | Overlap. Anti- Weld Contacts | KPMA-22 |



KPMA - 1



KPMF - 1



KPM - 1A

Relay Bases Only

| Coil | | Base |
|---------|-------|----------------|
| Voltage | Hertz | Catalog Number |
| 24 | 60 | 5S-96 |
| 110-120 | 60 | 5S-76 |
| 110 | 50 | 5S-75 |
| 220-240 | 60 | 5S-26 |
| 220 | 50 | 5S-25 |
| 380 | 50 | 5S-46 |
| 440-480 | 60 | 5S-46 |
| 550-600 | 60 | 5S-56 |

Ordering Information

Coil Data

Coil Table

| | | | | | |
|--------------------------------|--|----------------------|--------|---------------|--------|
| • Use complete catalog number. | Inrush volt-amperes (at 60 hertz) <u>61</u> | 60Hz Voltage | Suffix | 60 Hz Voltage | Suffix |
| | Holding volt-amperes (at 60 hertz) <u>16</u> | 24 Separate Control | -96 | 200-240 | -26 |
| | | 120 Separate Control | -76 | 440-480 | -46 |
| | | | | 550-600 | -56 |

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RELAYS - PMT

Delay Relays



AC Pneumatic Time Delay Relays - Type PMT Bulletin 7313

Timing Range Adjustable From 0.2 Second To 3 Minutes - Accuracy + 10%

| Oper'ng Mode | No. of Univ. Poles | Contacts | | | | Universal Pole ⁶ Arrangement | Open Type Relays |
|-----------------------|--------------------|------------|------|-------------|------|---|------------------|
| | | Time Delay | | Instan.Aux. | | | Catalog No |
| | | N.O. | N.C. | N.O. | N.C. | | |
| On Delay Off Delay | 1 | 1 | 1 | None | None | | 713UP * |
| | | 1 | 1 | None | None | | 713UPD * |
| On Delay Off Delay | 2 | 1 | 1 | 1 | 1 | | 713UPA * |
| | | 1 | 1 | 1 | 1 | | 713UPDA * |
| On Delay Off Delay | 2 | 2 | 2 | None | None | | 713UPE * |
| | | 2 | 2 | None | None | | 713UPDE * |
| On Delay Off Delay | 3 | 1 | 1 | 2 | 2 | | 713UPB * |
| | | 1 | 1 | 2 | 2 | | 713UPDB * |
| On Delay Off Delay | 3 | 2 | 2 | 1 | 1 | | 713UPF * |
| | | 2 | 2 | 1 | 1 | | 713UPDF * |
| On Delay Off Delay | 4 | 1 | 1 | 3 | 3 | | 713UPC * |
| | | 1 | 1 | 3 | 3 | | 713UPDC * |
| On Delay Off Delay | 4 | 2 | 2 | 2 | 2 | | 713UPG * |
| | | 2 | 2 | 2 | 2 | | 713UPDG * |

Notes

1. Includes open type relay complete with timing head and operating coil. To complete Cat. No., add coil suffix.
2. On Delay - Timed interval occurs between energization of the coil and actuation of timed contact.
3. Off Delay - Timed interval occurs between de-energization of the coil and actuation of timed contact.
4. Each universal pole consists of two independent isolated contacts suitable for 600 volts at opposite polarity.
5. Relays may be converted in the field from On Delay to Off Delay and vice versa, using only a screwdriver. When this conversion is made, normally open contacts become normally closed contacts and vice versa.
6. On sketches showing universal pole arrangements: Letters T indicate locations of time delay poles. Letters I indicate locations of instantaneous poles. Dotted lines indicated locations where universal poles may be added. Class A relays may have two timed poles maximum.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Example: Cat. No. 713UPA (110-120 Volt, 60 Hertz).
- Overlapping contacts are available in the same contact block.

- Engineering Data
- Modification page K11

Coil Table

| 60Hz Voltage | Suffix | 60 Hz Voltage | Suffix |
|----------------------|--------|---------------|--------|
| 24 Separate Control | -96 | 200-240 | -26 |
| 120 Separate Control | -76 | 440-480 | -46 |
| | | 550-600 | -56 |

Modification Kits for Type PM Family - Discount Schedule JC55

| Description | Catalog Number |
|---|----------------|
| Kits for BUL. 7305 Type PM Convertible Pole Relays | |
| Pole Kits (All are convertible) | |
| N.O. Non-Overlap Contacts, Closed Top | KPM-1A |
| N.C. Non-Overlap Contacts, Closed Top | KPM-2A |
| N.O. Non-Overlap Contacts, Open Top | KPM-3A |
| N.C. Non-Overlap Contacts, Open Top | KPM-4A |
| N.O. Non-Overlap Anti-Weld Contacts, Closed Top | KPM-31A |
| N.C. Non-Overlap Anti-Weld Contacts, Closed Top | KPM-32A |
| N.O. Non-Overlap Anti-Weld Contacts, Open Top | KPM-33A |
| N.C. Non-Overlap Anti-Weld Contacts, Open Top | KPM-34A |
| N.O. Non-Overlap Gold Bonded Contacts, Closed Top | KPM-41 |
| N.C. Non-Overlap Gold Bonded Contacts, Closed Top | KPM-42 |
| N.O. Non-Overlap Gold Bonded Contacts, Open Top | KPM-43 |
| N.C. Non-Overlap Gold Bonded Contacts, Open Top | KPM-44 |
| Kits for BUL. 7305 Type PMA Universal Pole Relays | |
| Pole Kit - | |
| N.O. & N.C. Non-Overlap Contacts, Closed Top | KPMA-1 |
| N.O. & N.C. Non-Overlap Anti-Weld Contacts, Closed Top | KPMA-2 |
| N.O. & N.C. Overlapping Contacts, Closed Top | KPMA-21 |
| N.O. & N.C. Overlapping Anti-Weld Contacts, Closed Top | KPMA-22 |
| Kits for BUL. 7305 Type PMF Duplex-Pole Relays | |
| Pole Kits - | |
| 2 N.O. Non-Overlap Contacts, Closed Top | KPMF-1 |
| 2 N.O. Non-Overlap Anti-Weld Contacts, Closed Top | KPMF-2 |
| Kit for BUL. 7305 Type PML or PMAL Latch Relays | |
| Latch Kit, with coil - Specify trip coil voltage suffix: - 76 (110-120v 60hz). —26 (220-240v 60hz), - 46 (440-480v 60hz). Specify other voltages | KPMH-12 |
| Kits for BUL. 7313 Type PMT Timing Relays | |
| Contact Operating Link for R.H. Timed Pole | KPMT-1 |
| Contact Operating Link for Instantaneous Pole | KPMT-2 |
| Contact Mounting Bracket and Arm Assembly (R.H.) | KPMT-3 |
| Contact Mounting Bracket and Arm Assembly (L.H.) | KPMT-4 |



KPM - 1A



KPMF - 1



KPMA - 1

Renewal Parts Kits - Discount Schedule JC80

| Renewal Parts Kits for BUL. 7305 Type PM Convertible Pole Relays | Cat. No. |
|--|----------|
| Contact Arm, Short (4 Pole) with screws | KPM-7 |
| Contact Arm, Long (6 Pole) with screws | KPM-8 |
| Assembled Magnet and Rod (Straight-End Bracket) A-c Relays | KPM-9 |
| Assembled Magnet and Rod (Hooked-End Bracket) A-c Relays | KPM-10 |
| Assembled Magnet and Core. 2,3 & 4 Pole D-c Relays (Includes Rod, Bracket & Contact Arm) | KPM-16 |
| Assembled Magnet and Core, 6 & 8 Pole D-c Relays (Includes Rod, Bracket & Contact Arm) | KPM-17 |
| Renewal Parts for BUL. 7313 Type PMT Timing Relays | |
| Assembled Magnet and Rod (Folio 2 Relays) | KPMT-10 |
| Timing Head (without dial) (Folio 2 Relays) | KPMT-12 |



Kit KPMH - 12



Kit KPMT - 12

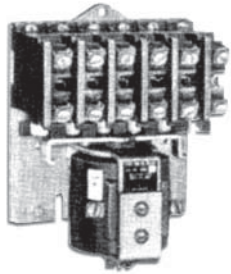
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RELAYS - PMS

DC Relays



DC Relays - Type PM Bulletin 7304



General Description

Bulletin 7304, Type PM, D-C Convertible Pole Relays feature many of the same time-proven advantages offered by the highly successful Bulletin 7305 Type PM A-C Relay. For example, normally open poles are quickly and easily convertible to normally closed and vice versa. Each pole is contained in its own molded housing mounted by a single screw. Thus, each pole may be removed, installed or replaced individually without disturbing the others. The large double-break contacts are made of fine silver alloy, and are rated for both inductive and resistive loads. The contacts are designed with wipe action to assure maximum reliability.

For long trouble-free relay life, the D-C coil on Bulletin 7304 Relays is molded with tough epoxy resin to keep out dirt and moisture, and to prevent physical damage. The magnet used is a vertical lift type with no springs that require adjustment. It is designed with pull-in characteristics that keep magnet slam to a minimum. Extra wide pressure terminals are front mounted for ready accessibility. As many as three lugs for No. 12 wire can be connected to each terminal.

Bulletin 7304 Relays are available in 2,3,4,6 and 8-pole arrangements.

| Total Number Of Poles | Contact Arrangement | Poles ² Normally Open | Normally Closed | Open Type Catalog Number |
|-----------------------|---------------------|----------------------------------|-----------------|--------------------------|
| 2 | | 2 | 0 | 4U2 * |
| | | 1 | 1 | 4U2-1 * |
| | | 0 | 2 | 4U2-2 * |
| 3 | | 3 | 0 | 4U3 * |
| | | 2 | 1 | 4U3-1 * |
| | | 1 | 2 | 4U3-2 * |
| | | 0 | 3 | 4U3-3 * |
| 4 | | 4 | 0 | 4U4 * |
| | | 3 | 1 | 4U4-1 * |
| | | 2 | 2 | 4U4-2 * |
| | | 1 | 3 | 4U4-3 * |
| | | 0 | 4 | 4U4-4 * |
| 6 | | 6 | 0 | 4U6 * |
| | | 5 | 1 | 4U6-1 * |
| | | 4 | 2 | 4U6-2 * |
| | | 3 | 3 | 4U6-3 * |
| | | 2 | 4 | 4U6-4 * |
| | | 1 | 5 | 4U6-5 * |
| | | 0 | 6 | 4U6-6 * |
| 8 | | 8 | 0 | 4U8 * |
| | | 7 | 1 | 4U8-1 * |
| | | 6 | 2 | 4U8-2 * |
| | | 5 | 3 | 4U8-3 * |
| | | 4 | 4 | 4U8-4 * |
| | | 3 | 5 | 4U8-5 * |
| | | 2 | 6 | 4U8-6 * |

Contact Ratings - 10 Amps Continuous

| D-C Applications | | | |
|------------------|----------------------------|-------|----------------|
| Volts | Ampere Interrupting Rating | | |
| | Resistive Load | | |
| | Non-Inductive | | Inductive Load |
| | N.O. | N.C. | N.O. or N.C. |
| 64 or less | 10 | 10 | 2.2 |
| 120 | 8 | 6 | 1.1 |
| 240 | 2 | 1 | .55 |
| A-C Applications | | | |
| Volts | Make | Break | |
| 110 | 60 | 6 | |
| 220 | 30 | 3 | |
| 440 | 15 | 1.5 | |
| 550 | 12 | 1.2 | |

Notes:

- Numbers in pole locations shown in sketches indicate the sequence in which normally closed poles are mounted when required.
- Normally open contacts may be changed in the field to normally closed and vice versa, using only a screw driver.

Spare Parts Page G11

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Overlapping contacts are available in the same contact block.
- Enclosures supplied separately
- For 32 & 64 volt coils, use coil suffix 32 or 64.
- 10 Piece Min

* Coil Table DC Voltage

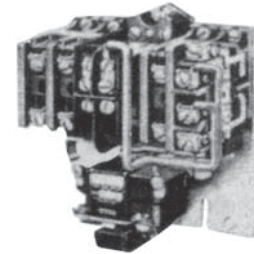
| DC Voltage | Suffix | DC Voltage | Suffix |
|------------|--------|------------|--------|
| 12 | 012 | 95 | 095 |
| 24 | 024 | 120 | 120 |
| 48 | 048 | 240 | 240 |



DC Latch Relays - Type PML Bulletin 7305

Bulletin 7305, Type PML, D-C Latch Relays are identical in design, construction and dimension to the Type PML, A-C Convertible Pole Latch Relays except they incorporate the use of one "universal" pole on the relay to permit continuous application of voltage to the relay "Close" coil and latch "Trip" coil. The schematic diagram below illustrates how this is accomplished.

Up to 8 convertible poles in any combination of N.O. and N.C. contact arrangement are available for circuit use. The contracts can be readily converted in the field from N.O. to N.C. operation, and vice versa. The latch mechanism is the same rugged unit used on Type PML-A-C latch relays.



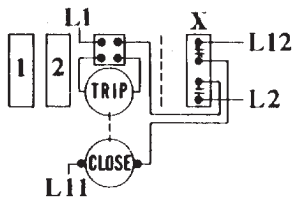
Contact Ratings - 10 Amps Continuous

| D-C Applications | | | |
|------------------|-----------------------------|-------|----------------|
| Volts | Amperes Interrupting Rating | | |
| | Resistive Load | | |
| | Non-Inductive | | Inductive Load |
| | N.O. | N.C. | N.O. or N.C. |
| 64 or less | 10 | 10 | 2.2 |
| 120 | 8 | 6 | 1.1 |
| 240 | 2 | 1 | .55 |
| A-C Applications | | | |
| Volts | Make | Break | |
| 110 | 60 | 6 | |
| 220 | 30 | 3 | |
| 440 | 15 | 1.5 | |
| 550 | 12 | 1.2 | |

Typical Circuit



Universal Pole (Kit Catalog No. KPMA-21). Normally closed contact connected in series with relay "Close" coil. Normally open contact connected in series with relay "Trip" coil as shown below. Permits continuous application of voltage to the coil circuits.



| Total Number Of Poles | Contact Arrangement | Poles ² | | Open Type Catalog Number |
|-----------------------|---------------------|--------------------|-----------------|--------------------------|
| | | Normally Open | Normally Closed | |
| 2 | | 2 | 0 | 5UHD2 * |
| | | 1 | 1 | 5UHD2-1 * |
| | | 0 | 2 | 5UHD2-2 * |
| 3 | | 3 | 0 | 5UHD3 * |
| | | 2 | 1 | 5UHD3-1 * |
| | | 1 | 2 | 5UHD3-2 * |
| | | 0 | 3 | 5UHD3-3 * |
| 4 | | 4 | 0 | 5UHD4 * |
| | | 3 | 1 | 5UHD4-1 * |
| | | 2 | 2 | 5UHD4-2 * |
| | | 1 | 3 | 5UHD4-3 * |
| | | 0 | 4 | 5UHD4-4 * |
| 6 | | 6 | 0 | 5UHD6 * |
| | | 5 | 1 | 5UHD6-1 * |
| | | 4 | 2 | 5UHD6-2 * |
| | | 3 | 3 | 5UHD6-3 * |
| | | 2 | 4 | 5UHD6-4 * |
| | | 1 | 5 | 5UHD6-5 * |
| 8 | | 8 | 0 | 5UHD8 * |
| | | 7 | 1 | 5UHD8-1 * |
| | | 6 | 2 | 5UHD8-2 * |
| | | 5 | 3 | 5UHD8-3 * |
| | | 4 | 4 | 5UHD8-4 * |
| 3 | 5 | 5UHD8-5 * | | |

Notes:

- Numbers in pole locations shown in sketches indicate the sequence in which normally closed poles are mounted when required.
 - Normally open contacts may be changed in the field to normally closed and vice versa, using only a screw driver.
- ± Relay pole cannot be located here.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Overlapping contacts are available in the same contact block.
- Enclosures supplied separately

Coil Table DC Voltage

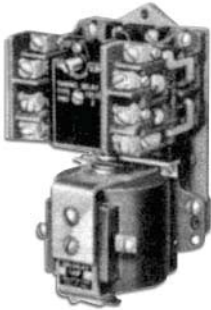
| DC Voltage | Suffix |
|------------|--------|
| 120 | 120 |
| 240 | 240 |

RELAYS - PMT

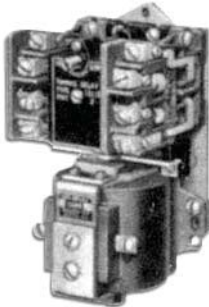
DC Time Delay Relays



DC Pneumatic Time Delay Relays - Type PMT Bulletin 7314 (.2 seconds to 3minutes)



"On-Delay"
Operation






"Off-Delay"
Operation

Bulletin 7314 D-C Time Delay Relays are identical in construction to the Bulletin 7313 Timing Relays except for the use of a conventional 2 lead operating coil rather than a tapped (3-lead) coil. They feature the same accurate piston-type timing head as used on all other timing relays in the PM family.

Universal poles, with two electrically isolated contacts per pole-one normally open and one normally closed-are also used. These timing relays are available for either On Delay or Off Delay operation in three basic models: (1) with timed pole; (2) with one timed and one instantaneous pole or (3) with two timed poles.

Timing range adjustable from 0.2 seconds to 3 minutes Accuracy + 10%

| Type Oper'n Plus Delay | No. of Univ. Poles | Contacts | | | | Universal Pole Arrangement | Open Type Relays Without Dial Catalog No |
|------------------------|--------------------|------------|------|-------------|------|---|--|
| | | Time Delay | | Instan.Aux. | | | |
| | | N.O. | N.C. | N.O. | N.C. | | |
| On Delay | 1 | 1 | 1 | | |  714UP 714UPD | |
| Off Delay | | 1 | 1 | | | | |
| On Delay | 2 | 1 | 1 | 1 | 1 |  714UPA 714UPDA | |
| Off Delay | | 1 | 1 | 1 | 1 | | |
| On Delay | 2 | 2 | 2 | | |  714UPE 714UPDE | |
| Off Delay | | 2 | 2 | | | | |

Coil Burden 17.2 watts

Notes:

- 1 On Delay - timed interval occurs between energization of the coil and actuation of timed contact.
Off Delay - timed interval occurs between de-energization of the coil and actuation of timed contact. Field conversion of relays from On Delay to Off Delay operation, or vice-versa, is not recommended because a special technique is required.
- 2 Each universal pole consists of 1 N.O. & 1 N.C. independent isolated contacts suitable for 600 volts at opposite polarity, a-c or d-c.
- 3 Letter T on relay sketches indicated location of time delay poles. Letter I on relay sketches indicates location of instantaneous poles. Dotted lines indicate where universal poles may be added.

Spare Parts Page G11

Contact Ratings - 10 Amps Continuous

| D-C Applications | | | |
|------------------|--|-------|-----------------------------|
| Volts | Amperes Interrupting Rating Resistive Load | | |
| | Non-Inductive N.O. | N.C. | Inductive Load N.O. or N.C. |
| 64 or less | 10 | 10 | 2.2 |
| 120 | 8 | 6 | 1.1 |
| 240 | 2 | 1 | .55 |
| A-C Applications | | | |
| Volts | Make | Break | |
| 110 | 60 | 6 | |
| 220 | 30 | 3 | |
| 440 | 15 | 1.5 | |
| 550 | 12 | 1.2 | |

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Overlapping contacts are available in the same contact block.
- For timer with dial, specify "with dial".

Coil Table DC Voltage

| DC Voltage | Suffix |
|------------|--------|
| 120 | 120 |
| 240 | 240 |






RELAYS - PMT

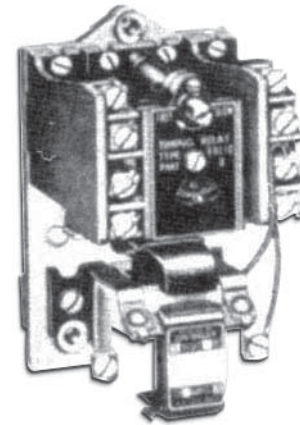
DC Time Delay Relays

DC Pneumatic Time Delay Relays - Type PMT Bulletin 7313 (.2 seconds to 3minutes)

Bulletin 7313, Type PMT, D-C Time Delay Relays are identical in construction and size to the A-C timing relays except they incorporate a tapped (3-lead) d-c operating coil and, hence, require the use of one N.C. contact in a universal pole to economize the coil (see sketches below. However, the N.O. contact in that pole remains available for customer use. Timing relays with conventional 2-lead coils can also be supplied. Refer to Bulletin 7314-PMT.

Timing Range Adjustable From 0.2 Second to 3 Minutes - Accuracy $\pm 10\%$

| Oper'ng Mode | No. of Univ. Poles | Contacts | | | | Universal Pole Arrangement | Open Type Relays | |
|--------------|--------------------|------------|------|-------------|------|---|------------------|--|
| | | Time Delay | | Instan.Aux. | | | Without Dial | |
| | | N.O. | N.C. | N.O. | N.C. | | Catalog No | |
| On Delay | 1 | 1 | 1 | None | None |  | 713UP-DC * | |
| Off Delay | | 1 | 1 | None | None | | 713UPD-DC * | |
| On Delay | 2 | 1 | 1 | 1 | 1 |  | 713UPA-DC * | |
| Off Delay | | 1 | 1 | 1 | 1 | | 713UPDA-DC * | |
| On Delay | 2 | 2 | 2 | None | None |  | 713UPE-DC * | |
| Off Delay | | 2 | 2 | None | None | | 713UPDE-DC * | |
| On Delay | 3 | 1 | 1 | 2 | 2 |  | 713UPB-DC * | |
| Off Delay | | 1 | 1 | 2 | 2 | | 713UPDB-DC * | |
| On Delay | 3 | 2 | 2 | 1 | 1 |  | 713UPF-DC * | |
| Off Delay | | 2 | 2 | 1 | 1 | | 713UPDF-DC * | |



Coil Burden: Inrush 350 Watts
Sealed 5 Watts

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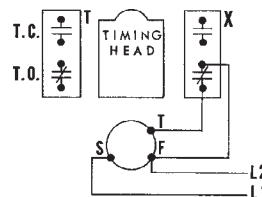
Contact Ratings - 10 Amps Continuous

| D-C Applications | | | |
|------------------|--|-------|----------------|
| Volts | Amperes Interrupting Rating Resistive Load | | |
| | Non-Inductive | | Inductive Load |
| | N.O. | N.C. | N.O. or N.C. |
| 64 or less | 10 | 10 | 2.2 |
| 120 | 8 | 6 | 1.1 |
| 240 | 2 | 1 | .55 |
| A-C Applications | | | |
| Volts | Make | Break | |
| 110 | 60 | 6 | |
| 220 | 30 | 3 | |
| 440 | 15 | 1.5 | |
| 550 | 12 | 1.2 | |

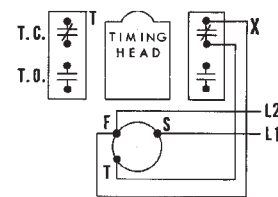
Functioning of Economizing Interlock Pole On D-C Relays
X - Economizing electrical interlock (used in coil circuit) is one contact of standard universal pole.
Typical connection of three terminal coil is shown.

Spare Parts Page G11

"ON-DELAY"
(Time Delay after energization)



"OFF-DELAY"
(Time Delay after deenergization)



Ordering Information

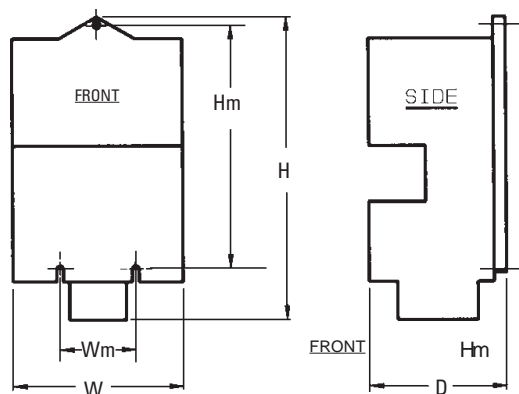
- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Overlapping contacts are available in the same contact block.
- For timer with dial, specify "with dial".

Coil Table DC Voltage

| DC Voltage | Suffix |
|------------|--------|
| 120 | 120 |
| 240 | 240 |

RELAYS - PM

Engineering Data



DC Contact Rating - P600

| Volts | Amperes | | Volt Amperes ² | | Continuous Amperes |
|-------|---------|-------|---------------------------|------------------|--------------------|
| | Make | Break | Make | Break | |
| 125 | 1.1 | 1.1 | 138 | 138 | 5 |
| 250 | 0.55 | 0.55 | 138 | 138 | 5 |
| 600 | 0.20 | 0.20 | 138 ² | 138 ² | 5 |

² 300 Volts or Less

All relays require a minimum of 7/8 in. clearance below magnet for coil change.

A horizontal space of 1/8 in. between relays is recommended.

Mounting Holes For #10 Screws

| Relay Type | Open Relay Cat. Number | H | W | D | Hm | Wm |
|------------|------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| PM-DC | 4U2,4U3,4U4 | 6 ¹ / ₈ | 3 | 3 ¹ / ₄ | 4 1/2 | 2 |
| | 4U6,4U8 | 6 ¹ / ₈ | 4 ¹ / ₂ | 3 ¹ / ₄ | 4 ¹ / ₂ | 2 |
| PML-DC | 5UHD2 | 5 ⁵ / ₁₆ | 3 | 3 ⁵ / ₈ | 4 ¹ / ₂ | 2 |
| | 5UHD3, 5UHD4 | 5 5/16 | 4 ¹ / ₂ | 3 ⁵ / ₈ | 4 ¹ / ₂ | 2 |
| PMT-DC | 714UP | 6 ¹ / ₈ | 3 | 3 ¹ / ₈ | 4 ¹ / ₂ | 2 ¹ / ₂ |
| | 713UP-DC 1,2-Pole | 5 ¹ / ₂ | 3 | 3 ³ / ₈ | 4 ¹ / ₂ | 2 |
| | 713UP-DC 3 Pole | 5 ¹ / ₂ | 3 ¹ / ₄ | 3 ³ / ₈ | 4 ¹ / ₂ | 2 |
| | 713UP-DC 4 Pole | 5 ¹ / ₂ | 4 ¹ / ₂ | 3 ³ / ₈ | 4 ¹ / ₂ | 2 |

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Standard catalog listed AC relays ordered will have the proper coils as determined by the voltage and frequency suffix to the catalog number. Changing the circuit arrangement on a relay also changes the mechanical load on the magnet and may require a change of operating coil to assure proper operation. The information on this page will enable you to select the correct operating coil for any circuit arrangement required. Voltage-ampere requirements are provided to help in designing your panels.

To select the proper operating coil for all basic and latch relays **except** the Slim Jim, first determine the mechanical load on the magnet simply by totalling the load represented by the individual components operated by the magnet, using the mechanical load factors shown below. Select the proper coil from Table 1. When selecting the proper coil for Slim Jim Relays and Time Delay Relays, it is not necessary to determine the mechanical load factor.

As shown in Table 1, one coil for each voltage and frequency will operate all pole combinations.

| Mechanical Load Factors: | |
|---|------------|
| Convertible Pole - Normally Open | 10 |
| Convertible Pole - Normally Closed | 12 |
| Double Contact Pole - Universal or Duplex | 36 |
| Latch Mechanism | 20 |
| Example: | |
| A relay with 1 N.O. and 9 N.C. convertible poles and a latch mechanism will have a mechanical load factor as follows: | |
| 1 N.O. Convertible Pole | 10 |
| 9 N.C. Convertible Poles | 108 |
| Accumulation Factor ¹ | 30 |
| 1 Latch Mechanism | 20 |
| Total Mechanical Load Factor | 168 |

¹ For relays with 9 or more normally closed convertible poles, an accumulation factor of 30 must be added to the total mechanical load factor for the relay

For Example:

Table 1 indicates that the proper coil number for 110 volts, 60 hertz application is TB113-61, since the load factor of 168 falls within the Mechanical Load Range of 145 to 192.

Coil Application Tables - Type PM Relay Family

Table 1

| AC Volts | Hertz | Basic And Latch Relays | | | | Slim Jim Relays All Pole Combinations | Trip Coil on Latch Relays, All Pole Combinations | Time Delay Relays |
|--|-------|--|----------|----------|----------|--|--|----------------------------------|
| | | Mechanical Load Range (Does Not Apply To Slim Jim Relays) | | | | | | Class A All Pole Combinations |
| | | 20-72 | 73-144 | 145-192 | 193-240 | | | |
| Coil Catalog Numbers - Bulletin 7303 & 7305 PM & PML | | | | | | | | |
| 24 | 60 | TB113-36 | TB113-37 | TB113-60 | --- | TB139-10 | TB127-14 | TB135-16 |
| 110-120 | 60 | TB113-1 | TB113-3 | TB113-61 | TB130-13 | TB139-1 | TB127-20 | TB135-1 |
| 110 | 50 | | | | | | | |
| 220-240 | 60 | TB113-4 | TB113-6 | TB113-62 | TB130-14 | TB139-2 | TB127-21 | TB135-2 |
| 220 | 50 | | | | | | | |
| 380 | 60 | TB113-65 | TB113-64 | TB113-63 | TB130-3 | TB139-3 | TB127-3 | TB135-3 |
| | 50 | TB113-7 | TB113-28 | TB113-64 | TB130-9 | TB139-4 | TB127-4 | TB135-9 |
| 440-480 | 60 | TB113-7 | TB113-9 | TB113-64 | TB130-9 | TB139-4 | TB127-11 | TB135-4 |
| 440 | 50 | | | | | | | |
| 550-600 | 60 | TB113-16 | TB113-11 | TB113-66 | TB130-6 | TB139-6 | TB127-6 | TB135-6 |
| 550 | 50 | | | | | | | |
| Volt -Amperes | | | | | | | | |
| INRUSH | 60 | 67 | 108 | 141 | 161 | 61 | 16 | 215 |
| SEALED | | 23 | 36 | 47 | 53 | 16 | 8 | 35 |
| INRUSH | 50 | 51 | 93 | 124 | 180 | 51 | Refer to Sales Office | 180 |
| SEALED | | 18 | 33 | 45 | 49 | 13 | | |



RELAYS - 447

Control Relays

Description

Series 447 relays are designed for AC and DC circuits where high reliability, versatility of contact and operating coil combinations, compact size, and high speed operation are required. The 447 relays are available up to 8 convertible poles, current ratings to 30 amps AC and 20 amps DC.

Components (Table 1)

| Baseand Coil Voltage | | Cat. No. |
|----------------------------|---------------------------|-------------|
| 4 Pole Base- | 120 VAC Coil ¹ | 447-9402-11 |
| | 208 VAC Coil | 447-9402-21 |
| | 240 VAC Coil | 447-9402-31 |
| | 480 VAC Coil | 447-9402-31 |
| 8 Pole Base- | 120 VAC Coil ² | 447-9801-11 |
| | 208 VAC Coil | 447-9801-21 |
| | 240 VAC Coil | 447-9801-21 |
| 4 Pole Base- | 115 VDC Coil ¹ | 447-9405-13 |
| | 230 VDC Coil | 447-9405-23 |
| 8 Pole Base- | 115 VDC Coil ² | 447-9805-13 |
| | 230 VDC Coil | 447-9805-23 |

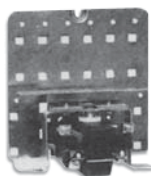
- 1 Heavy Duty Coil, Suitable For Up To 4 Circuits
 2 Heavy Duty Coil, Suitable For Up To 8 Circuits

Notes:

Other AC and DC coil voltages are available.
 Please contact factory.



4-Pole Base



8-Pole Base

Unit Poles - AC Load (Table 2) 460VAC Max

| Description | Cat. No. |
|-----------------------|----------|
| 10A, N.O. | 447-9046 |
| 10A, N.C. | 447-9047 |
| 20A, N.O. | 447-9048 |
| 20A, N.C. | 447-9049 |
| 30A ³ N.O. | 447-9071 |
| 30A ³ N.C. | 447-9072 |

³ Tungsten or Resistive Loads,
 277 VAC Max.

Unit Poles - DC Load (Table 3) 250VDC Max

| Description ⁴ | Cat. No. |
|--------------------------|----------|
| 20A, N.O. 1-Blowout | 447-9019 |
| 20A, N.O. 2-Blowout | 447-9020 |
| 20A, N.C. 1-Blowout | 447-9021 |
| 20A, N.C. 2-Blowout | 447-9022 |

⁴ All DC contacts require a "Blowout Mechanism" to extinguish the "arc" during contact opening. See Rule "B" below.

Rules to Select and Install Contacts

A. When installing "AC" or "DC" contacts you should balance the mechanical load on the coil magnet preferably by placing the contacts together in the center and working your way out.

- For a 4-pole contact install the contacts in sequence per the diagram listed below.

3 2 1 4

- For an 8-pole contact install the contacts per this diagram.

5 3 2 1 4 6 8 7

B. When installing DC contacts, using the contact sequence above, the last contact on the left must have two blowouts.

All others will have only one.

Example:

If you have four contacts on the 4-pole base (table 1), number 3 must have two blowouts. If you have only two contacts, then number 2 must have two blowouts.

If you have six contacts on the 8-pole base (table 1), number 5 must have two blowouts.

Contacts seven and eight on the 8-pole base must have two blowouts.

Ordering Information

Select and Price Base and Power Plant and Unit Poles Separately.

1 - 447-9402-11

Example: 120 VAC 4 Pole relay with 2 N.O., 2 N.C., 10 Amp Poles.

2 - 447-9046

Dimensions: See Section H Page 6.

2 - 447-9047

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