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Form No. 13C195 10-66

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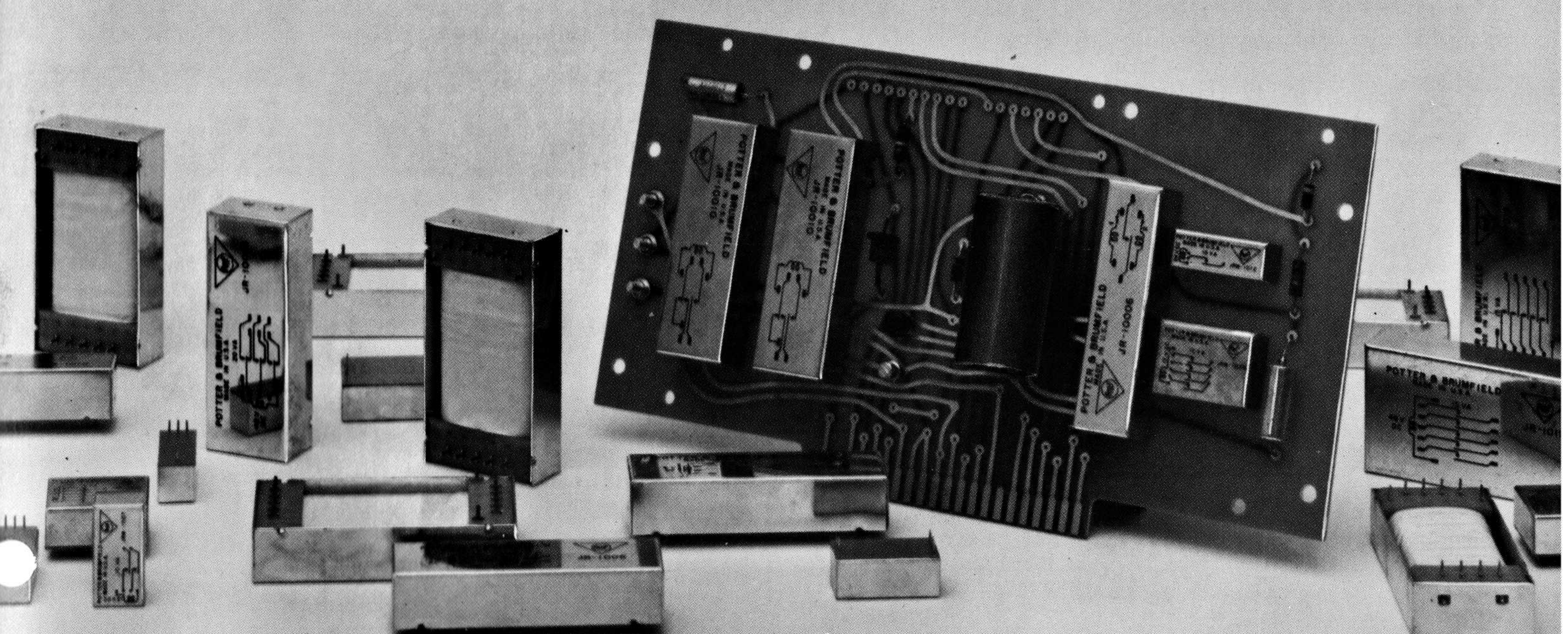
JR

POTTER & BRUMFIELD

DRY REED RELAYS



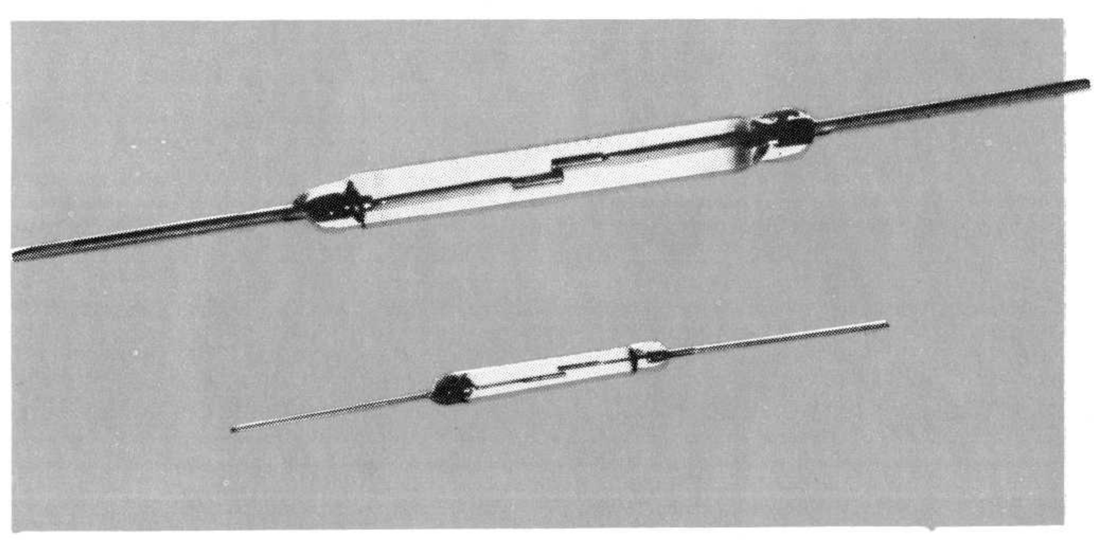
JR
Series dry reed relays

Engineering Data

Fast response, reliable performance, and long life make Potter & Brumfield JR standard and JRM miniature series dry reed relays especially suited for applications where fast operating time and low power are required. Their high sensitivity and comparatively small size recommend them for data processing applications, computer equipment, logic circuitry, for voltage or current sensing and various other types of sophisticated control circuits.

DESIGN ADVANTAGES

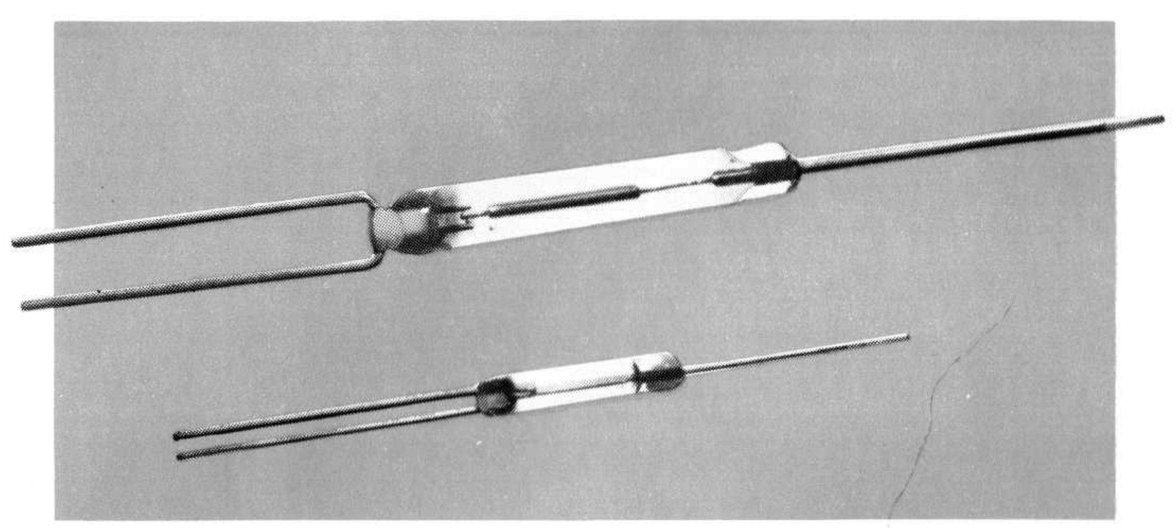
Potter & Brumfield dry reed relays are available in two basic types, the JR standard and the JRM miniature series. Besides their respective sizes, the primary difference between the two types is their load carrying characteristics



and operational specifications. JR relays measure $2\frac{13}{16}''$ long, while JRM relays measure only $1\frac{1}{8}''$ long. Both types employ dry reed switches consisting of thin, reed-like contact blades hermetically sealed in a glass capsule with terminations extending from both ends of the capsule. The sealed glass capsule provides excellent protection against environmental contaminations.

CONSTRUCTION ADVANTAGES

The operating coils are wound on special nylon bobbins with from one to five cavities. The capsules or dry reed switches are then inserted into the cavities, forming a coil-switch assembly. The standard JR series reed terminals are welded to terminal pins which extend as printed circuit terminals on .200″ x .200″ grid-spacings, providing an exceptionally sturdy termination arrangement. The relay assembly is then securely fastened inside a steel cover. The terminals of the

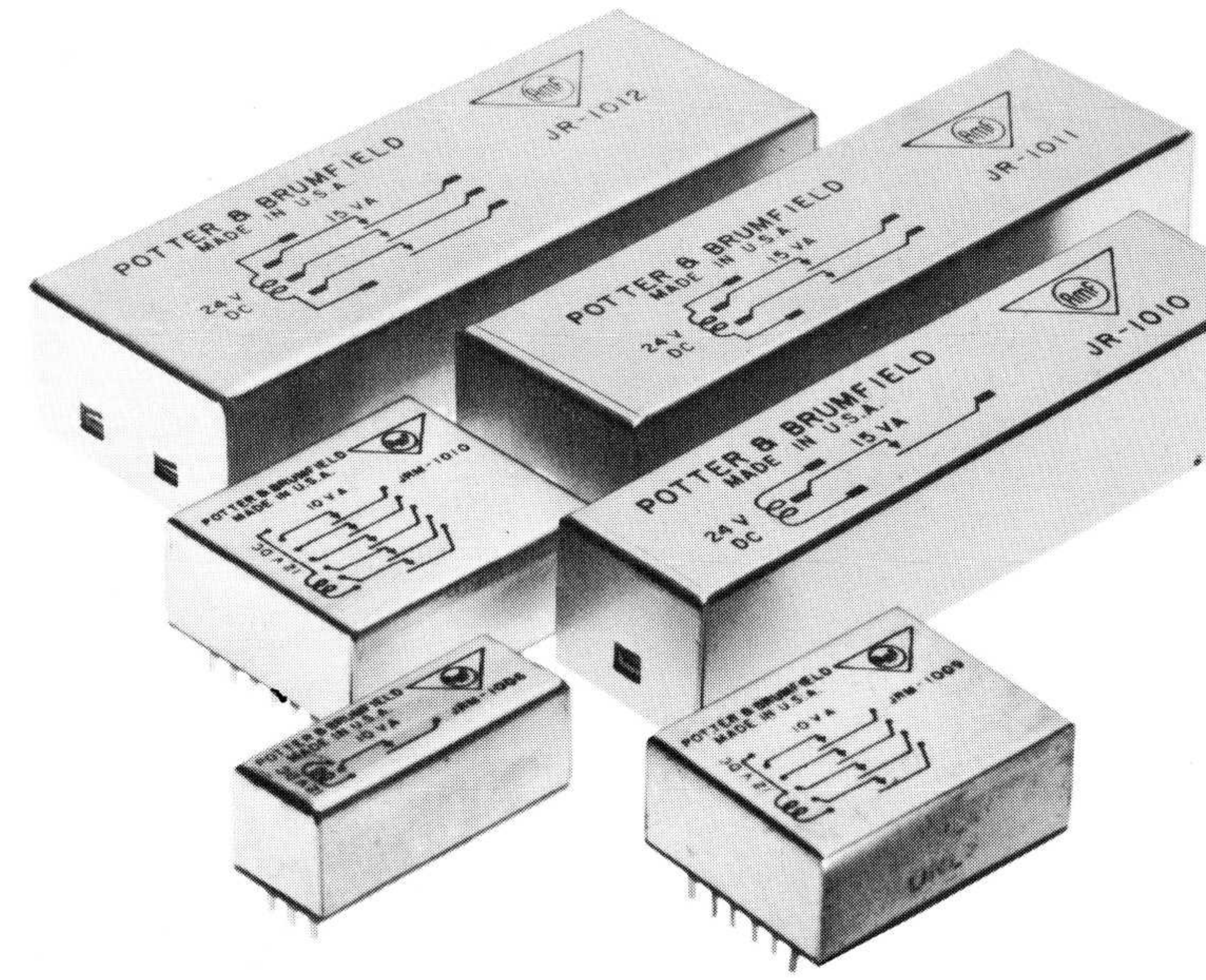


JRM series are formed by extending the reed wires to the bottom of the switch-coil assembly as printed circuit terminals on .100″ x .100″ grid-spacings. Potting this assembly in a steel case covered by a phenolic terminal plate assures a compact and strong miniature relay.

CONTACT CONFIGURATIONS

Both JR and JRM relays are furnished in two basic contact arrangements: Form A (SPST-NO), or True Form C (SPDT). A third arrangement, Form B (SPST-NC) is made by biasing a Form A with a permanent magnet. A somewhat more economical Form C break-before-make

JR series standard relays
JRM series miniature relays



arrangement is also available by combining one Form A with one Form B capsule.

By the use of two or more reed switches of either contact arrangement or by biasing with magnets, a wide range of contact arrangements is possible.

The reeds are sealed inside the capsule in an atmosphere of dry inert gas. The tips of the reeds may be coated with diffused gold, rhodium or other types of contact metals to form the contact surfaces. Contact life in the order of 20 million operations may be expected at rated load with proportionately greater life expectancy at reduced loads.

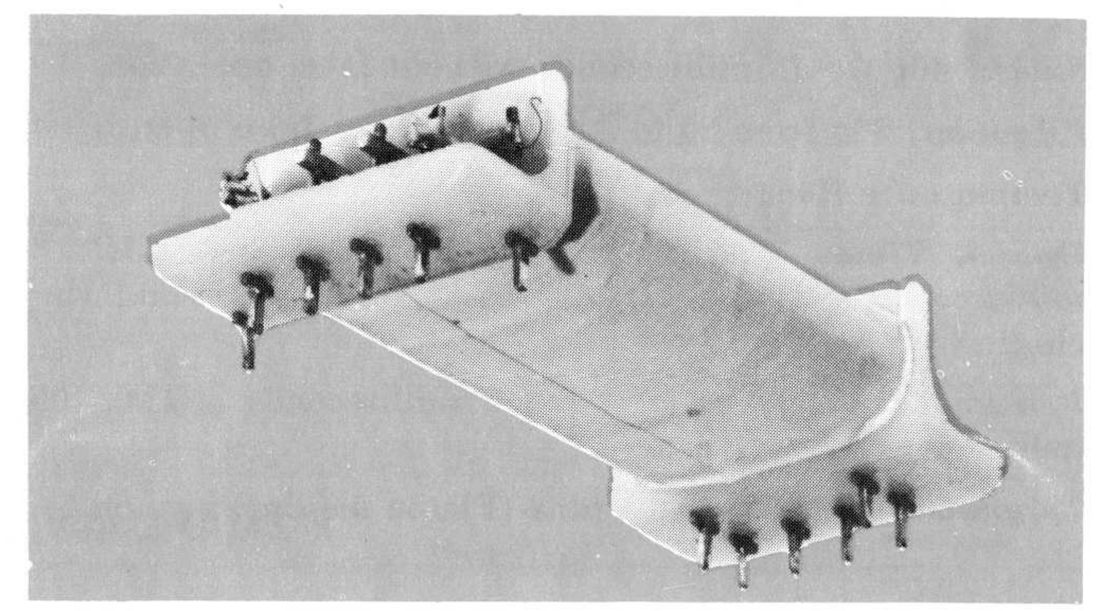
COIL ARRANGEMENTS

Type JR relays are available in a standard range of coil voltages to 48 volts DC. From one to five cavity bobbins are used for nesting from one to five reed switches. JRM relays are offered in a standard range of coil voltages to 24 volts DC, and are nested in from one to five cavity bobbins. The bobbins of both JR/JRM series are molded of a special glass-filled nylon. Internal dividers are used in the JR series to separate two or more switches. These assemblies provide compact, safe arrangements and protect the glass switch capsule against breakage.

ENCLOSURES

Both JR and JRM Series employ five graduated sizes of metal covers for various combinations of capsule-coil assemblies. These covers provide magnetic shielding, reduce interaction between relays, eliminate stray magnetic fields and protect the relay assembly against mechanical damage.

The molded JR bobbin extends to a stand-off flange at each end. Cross-shaped pins are inserted through the bottom of the stand-off flanges with one end welded to the reed extension, while the other end forms the printed circuit termination. In this arrangement, stresses are transmitted to the stand-off flanges instead of the reed extensions, thereby protecting the glass seals of the capsule. It also assures an extra safety factor in insulation and dielectric strength between the relay and printed circuit board. The relay enclosures are equipped with small tabs at each end of the enclosure. These serve to locate and support the relay assembly. After insertion of the relay assembly, the case is crimped over the stand-off flanges, holding the assembly securely inside the cover.



The enclosure of JRM relays contains the coil assembly with the terminals extending from the glass capsule and shaped to end as printed circuit pins. This assembly is covered with a potting compound with the pins extending from the enclosure. A phenolic plate with pre-drilled openings for the pins is then placed over the enclosing case to complete a coherent miniature plug-in relay.

A wiring diagram identifying terminals is printed on the top of each JR/JRM relay case.

special considerations

VARIOUS REED SWITCHES

JR/JRM series reed relays can be supplied with various types of reed switches to best meet the requirements of specific applications.

OPERATE TIME

The total operate time is less than 3 milliseconds for JR relays and 1 millisecond or less for JRM relays (at nominal coil power). High speed switching response for both types is up to 200 cycles per second. When a relay uses two or more switches within the same coil, switch operate times generally differ slightly. This is due to minor variations in switch sensitivity and the effect of magnetic shunting by closed switches.*

These relays can be mounted in any position as they are not position sensitive.

CONTACT BOUNCE

The characteristic of dry reed relays that produces contact bounce (during closure time only) is due to the magnetic force or speed of contact closure, also the weight, size and inherent frequency of the cantilevered reeds. The degree of contact bounce is contingent upon the amount of overdrive to which the relay coil is subjected. Average contact bounce time is in the range of 0.5 milliseconds for the JR series and 0.1 millisecond for the JRM series, and is included in the total operate time ratings of both series.*

CONTACT PROTECTION

Where peak voltages in inductive circuits may damage reed relays, contact arc suppression is required to reduce these voltages to safe levels. This also applies to resistive voltages in excess of 15V DC. Please see "Contact Protection" suggestions on page 5.

OVERVOLTAGE ON FORM B RELAYS

Voltage in excess of approximately one and one-half times of nominal will cause the normally closed contacts of Form B contact arrangements to re-close almost instantaneously after opening.

general specifications

Insulating Materials: Nylon, acetate film, glass, and potting compound.

Insulation Resistance: 1000 megohms @ 25°C minimum between all insulated parts.

Breakdown Voltage @ Sea Level: JR series 500 volts rms 60 Hz between all insulated parts. For JRM series 300 volts rms 60 Hz. Breakdown between open contacts depends upon type of switch used and switch sensitivity.

Shock: 40g for 11 milliseconds without false operation.

Vibration: 30g from 50 to 200 Hz, without false operations.

Temperature Range: −50°C to +85°C.

Operate Time: At nominal coil voltage @ 25°C*. JR: 3 milliseconds (including bounce). JRM: 1 millisecond (including bounce).

Release Time: At 25°C* JR: .5 milliseconds. JRM: .05 milliseconds.

Terminals: Printed circuit pins (Please see drawings on 5).

CONTACTS:

Arrangements: Please see table on page 3.

Rated Load: JR: Form A, B, C (A + B): 15 watts DC resistive max.; to 1 amp max.; to 250 volts DC max. 50 watts DC resistive max.; to 3 amps max.; to 250 volts DC max. True Form C: 10 watts DC resistive max.; to 0.250 amps max.; to 250 volts DC max. JRM: Form A, B, C (A + B): 10 watts DC resistive max.; to .5 amp max.; to 250 volts DC max. True Form C: 4 watts DC resistive max.; to .125 amps max.; to 28 volts DC max.

Contact Resistance: JR: Initial: Form A, B and C: 100 milliohms max. True Form C: 150 milliohms max: JRM: Form A, B, C (A + B) and True Form C: 200 milliohms max. JR/JRM switches with lower initial contact resistance available on special order.

Capacitance: JR: 15 watt Form A—1.0 picofarads. 50 watt Form A—1.2 picofarads. 10 watt True Form C—3.0 picofarads. JRM: 10 watt Form A—.8 picofarads. 4 watt True Form C—1.3 picofarads.

COILS:

For all JR/JRM series coil operating characteristics please see JR/JRM Relay Selection Table.

Duty: Continuous.

***JR Series**—Applicable to Form A SPST-NO and Form B SPST-NC reeds only. True Form C SPDT reeds will have nominal operate times of 1 ms. or less depending on coil drive. Typical contact bounce of 4 milliseconds on the NC contact and 1.5 milliseconds on the NO contact can be expected.

JRM Series—Applicable to Form A SPST-NO and Form B SPST-NC reeds only. True Form C SPDT reeds will have nominal operate times of .6 ms. or less depending upon coil drive. Typical contact bounce of 2 milliseconds on the NC contact and 0.5 milliseconds on the NO contact can be expected.

contact protection suggestions:

Dry reed switches possess characteristics that make them suitable for an extremely wide range of switching applications. However, the reed switch contacts, with their small air gap and relatively low release spring force, must be protected in some applications to provide the extended service inherent in the design.

For extended relay life, the following suggestions for contact protection should be considered:

resistor alone; capacitor alone; resistor and capacitor; diode; diode and resistor; bi-directional suppressor; neon glow lamp and varistor.

Whenever contact protection is used within the circuit, its effectiveness should be thoroughly tested, not only for the protection it affords the contacts, but for other possible reactions such as slower operate or release times of the relay, or increased current drain.

data required for proper selection

The services of our application engineers are at your disposal. For the fulfillment of the utmost in performance and long life of reed relays please supply the following information:

1. What is the application of the relay?
2. How many reeds in each relay, 1, 2, 3, 4, or 5?
3. Contact arrangement.
4. Which wiring diagram was selected?
5. Contact load.
6. Does coil require single, or two independent windings?
7. What is the value of operating currents?
8. Maximum ambient operating temperature.
9. Special requirements:
   A. Vibration
   B. Potted or encapsulated?
   C. Shock
   D. Special electrostatic shields
   E. Speed of operation
   F. Mounting
   G. Finish
   H. Marking

Outline Drawings

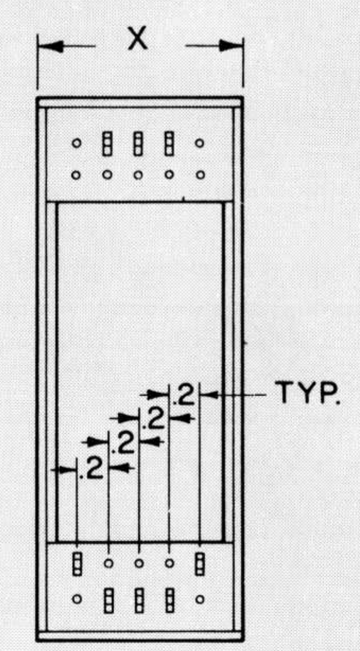


FIG. I
3 CAVITIES

WEIGHTS

JR Standard Relays	Weights
X = 1 Cavity = .659"	1.50 ozs.
X = 2 Cavities = .862"	2.00 ozs.
X = 3 Cavities = 1.065"	2.50 ozs.
X = 4 Cavities = 1.268"	3.00 ozs.
X = 5 Cavities = 1.487"	3.50 ozs.

JRM Miniature Relays	
X = 1 Cavity = .420"	.366 oz.
X = 2 Cavities = .545"	.395 oz.
X = 3 Cavities = .686"	.530 oz.
X = 4 Cavities = .796"	.620 oz.
X = 5 Cavities = .951"	.781 oz.

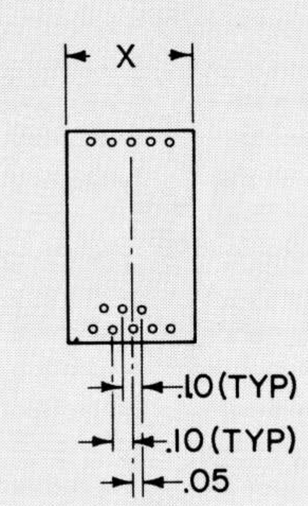
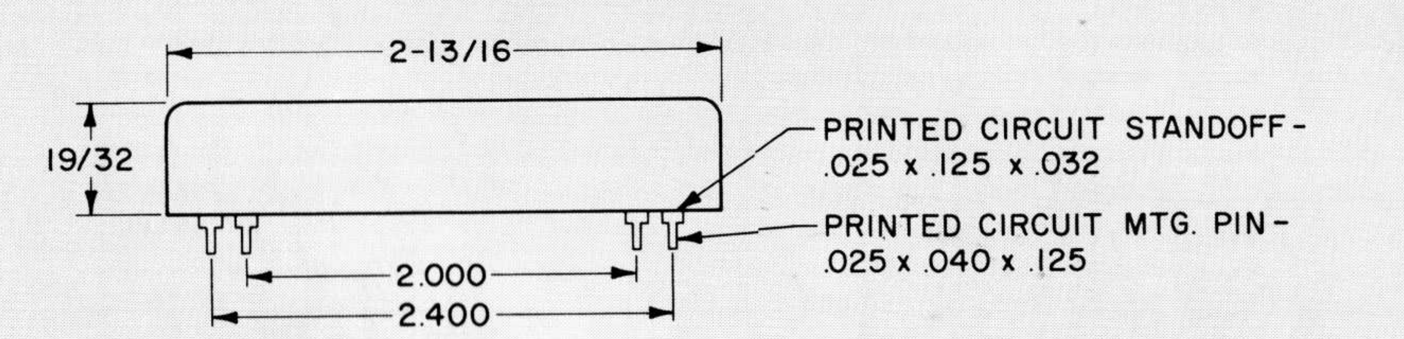
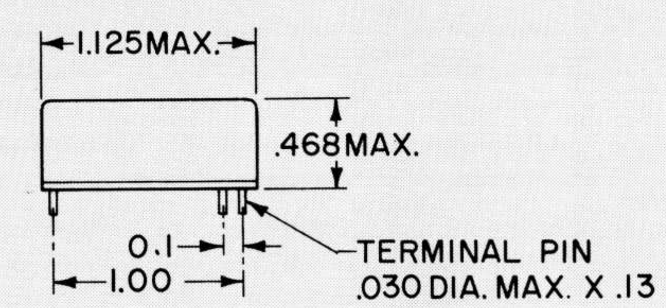
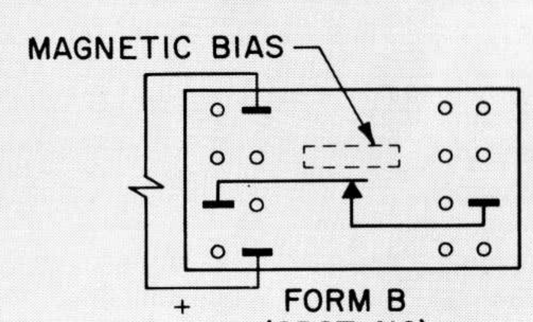


FIG. 2
3 CAVITIES
(TYP. JRM)

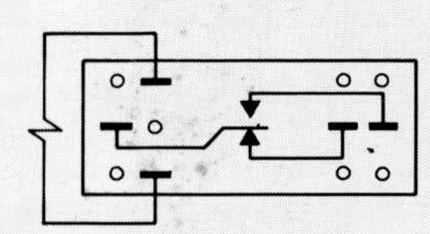




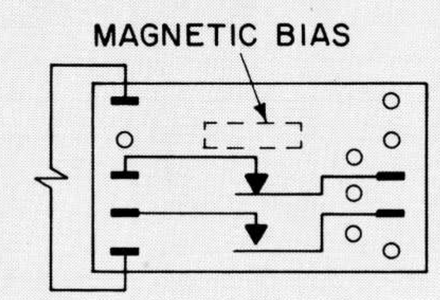
TYPICAL WIRING DIAGRAMS



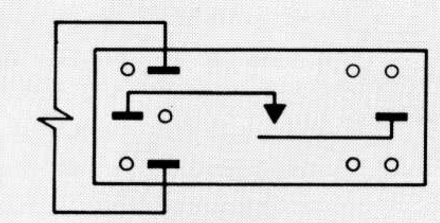
FORM B
(SPST, NC)



FORM C
(SPDT)



FORM C(A+B)
(SPDT)



FORM A
(SPST, NO)

selection table
JR standard dry reed relays

Relay Type	Coil Resistance ±10% Ohms @ 25°C	Coil Turns	Nom. Coil V DC	Coil MA @ Nom. V	Coil Power @ Nom. V	No. of Forms Per Relay	Contact Arrange-ment	Contact VA Rating*	Bobbin Cav. Req'd.	Relay Inductance Henries @ 1000 Cycles
•JR1000	150	4,500	6	40	.240	1	A	15	1	.225
•JR1001	100	3,100	6	60	.360	2	A	15	2	.176
JR1002	50	1,900	6	120	.720	3	A	15	3	.096
•JR1003	37.5	1,450	6	160	.960	4	A	15	4	.067
JR1004	24	1,025	6	250	1.500	5	A	15	5	.042
•JR1005	600	9,500	12	20	.240	1	A	15	1	1.000
•JR1006	400	5,900	12	30	.360	2	A	15	2	.640
JR1007	200	3,650	12	60	.720	3	A	15	3	.340
•JR1008	150	2,900	12	80	.960	4	A	15	4	.280
JR1009	96	2,000	12	125	1.500	5	A	15	5	.134
•JR1010	2,400	17,400	24	10	.240	1	A	15	1	3.000
•JR1011	1,600	11,600	24	15	.360	2	A	15	2	2.600
JR1012	800	7,400	24	30	.720	3	A	15	3	1.440
•JR1013	600	5,800	24	40	.960	4	A	15	4	1.120
JR1014	384	3,950	24	62.5	1.500	5	A	15	5	.620
JR1015	9,600	36,500	48	5	.240	1	A	15	1	16.000
JR1016	6,400	23,000	48	7.5	.360	2	A	15	2	10.400
JR1017	3,200	14,500	48	15	.720	3	A	15	3	6.100
JR1018	2,400	11,000	48	20	.960	4	A	15	4	4.400
JR1019	1,536	7,800	48	31.25	1.500	5	A	15	5	2.570
•JR1020	150	4,500	6	40	.240	1	A	50	1	.250
•JR1021	100	3,100	6	60	.360	2	A	50	2	.200
JR1022	50	1,900	6	120	.720	3	A	50	3	.102
JR1023	37.5	1,450	6	160	.960	4	A	50	4	.077
JR1024	24	1,025	6	250	1.500	5	A	50	5	.045
•JR1025	600	9,500	12	20	.240	1	A	50	1	1.040
•JR1026	400	5,900	12	30	.360	2	A	50	2	.700
JR1027	200	3,650	12	60	.720	3	A	50	3	.370
JR1028	150	2,900	12	80	.960	4	A	50	4	.300
JR1029	96	2,000	12	125	1.500	5	A	50	5	.172
•JR1030	2,400	17,400	24	10	.240	1	A	50	1	3.650
•JR1031	1,600	11,600	24	15	.360	2	A	50	2	2.800
JR1032	800	7,400	24	30	.720	3	A	50	3	1.540
JR1033	600	5,800	24	40	.960	4	A	50	4	1.180
JR1034	384	3,950	24	62.5	1.500	5	A	50	5	.660
JR1035	9,600	36,500	48	5	.240	1	A	50	1	17.200
JR1036	6,400	23,000	48	7.5	.360	2	A	50	2	11.600
JR1037	3,200	14,500	48	15	.720	3	A	50	3	6.200
JR1038	2,400	11,000	48	20	.960	4	A	50	4	4.500
JR1039	1,536	7,800	48	31.25	1.500	5	A	50	5	2.650
•JR1040	150	4,500	6	40	.240	1	C**	10	1	.300
JR1041	100	3,100	6	60	.360	2	C**	10	2	.230
JR1042	50	1,900	6	120	.720	3	C**	10	3	.120
JR1043	37.5	1,450	6	160	.960	4	C**	10	4	.082
JR1044	24	1,025	6	250	1.500	5	C**	10	5	.050
•JR1045	600	9,500	12	20	.240	1	C**	10	1	1.300
JR1046	400	5,900	12	30	.360	2	C**	10	2	.790
JR1047	200	3,650	12	60	.720	3	C**	10	3	.412
JR1048	150	2,900	12	80	.960	4	C**	10	4	.325
JR1049	96	2,000	12	125	1.500	5	C**	10	5	.180
•JR1050	2,400	17,400	24	10	.240	1	C**	10	1	3.950
JR1051	1,600	11,600	24	15	.360	2	C**	10	2	3.100
JR1052	800	7,400	24	30	.720	3	C**	10	3	1.700
JR1053	600	5,800	24	40	.960	4	C**	10	4	1.300
JR1054	384	3,950	24	62.5	1.500	5	C**	10	5	.700
JR1055	9,600	36,500	48	5	.240	1	C**	10	1	17.000
JR1056	6,400	23,000	48	7.5	.360	2	C**	10	2	12.000
JR1057	3,200	14,500	48	15	.720	3	C**	10	3	6.600
JR1058	2,400	11,000	48	20	.960	4	C**	10	4	4.800
JR1059	1,536	7,800	48	31.25	1.500	5	C**	10	5	2.800
JR1060	100	3,100	6	60	.360	1	B	15	2	.084
JR1061	50	1,900	6	120	.720	2	B	15	3	.049
JR1062	24	1,025	6	250	1.500	3	B	15	5	.019
JR1063	400	5,900	12	30	.360	1	B	15	2	.283
JR1064	200	3,650	12	60	.720	2	B	15	3	.166
JR1065	96	2,000	12	125	1.500	3	B	15	5	.083
JR1066	1,600	11,600	24	15	.360	1	B	15	2	1.050
JR1067	800	7,400	24	30	.720	2	B	15	3	.720
JR1068	384	3,950	24	62.5	1.500	3	B	15	5	.303
JR1069	6,400	23,000	48	7.5	.360	1	B	15	2	5.000
JR1070	3,200	14,500	48	15	.720	2	B	15	3	3.600
JR1071	1,536	7,800	48	31.25	1.500	3	B	15	5	1.250
JR1072	100	3,100	6	60	.360	1	B	50	2	.080
JR1073	50	1,900	6	120	.720	2	B	50	3	.047
JR1074	24	1,025	6	250	1.500	3	B	50	5	.020
JR1075	400	5,900	12	30	.360	1	B	50	2	.275

• Stocked by Leading Electronic Parts Distributors
* Other ratings available upon request

** True Form C
† A + B

selection table
JR standard dry reed relays

Relay Type	Coil Resistance ±10% Ohms @ 25°C	Coil Turns	Nom. Coil V DC	Coil MA @ Nom. V	Coil Power @ Nom. V	No. of Forms Per Relay	Contact Arrange-ment	Contact VA Rating*	Bobbin Cav. Req'd.	Relay Inductance Henries @ 1000 Cycles
JR1076	200	3,650	12	60	.720	2	B	50	3	.172
JR1077	96	2,000	12	125	1.500	3	B	50	5	.072
JR1078	1,600	11,600	24	15	.360	1	B	50	2	1.000
JR1079	800	7,400	24	30	.720	2	B	50	3	.650
JR1080	384	3,950	24	62.5	1.500	3	B	50	5	.294
JR1081	6,400	23,000	48	7.5	.360	1	B	50	2	4.300
JR1082	3,200	14,500	48	15	.720	2	B	50	3	2.600
JR1083	1,536	7,800	48	31.25	1.500	3	B	50	5	1.200
•JR1084	50	1,900	6	120	.720	1	C†	15	3	.065
JR1085	24	1,025	6	250	1.500	2	C†	15	5	■
•JR1086	200	3,650	12	60	.720	1	C†	15	3	.244
JR1087	96	2,000	12	125	1.500	2	C†	15	5	■
•JR1088	800	7,400	24	30	.720	1	C†	15	3	.920
JR1089	384	3,950	24	62.5	1.500	2	C†	15	5	■
JR1090	3,200	14,500	48	15	.720	1	C†	15	3	3.400
JR1091	1,536	7,800	48	31.25	1.500	2	C†	15	5	■
JR1092	50	1,900	6	120	.720	1	C†	50	3	.070
JR1093	24	1,025	6	250	1.500	2	C†	50	5	■
JR1094	200	3,650	12	60	.720	1	C†	50	3	.235
JR1095	96	2,000	12	125	1.500	2	C†	50	5	■
JR1096	800	7,400	24	30	.720	1	C†	50	3	.960
JR1097	384	3,950	24	62.5	1.500	2	C†	50	5	■
JR1098	3,200	14,500	48	15	.720	1	C†	50	3	3.600
JR1099	1,536	7,800	48	31.25	1.500	2	C†	50	5	■

■ Inquire at factory

JRM miniature dry reed relays

Relay Type	Coil Resistance ±10% Ohms @ 25°C	Coil Turns	Nom. Coil V DC	Coil MA @ Nom. V	Coil Power @ Nom. V	No. of Forms Per Relay	Contact Arrange-ment	Contact VA Rating*	Bobbin Cav. Req'd.	Relay Inductance Henries @ 1000 Cycles
JRM1000	200	3,600	6	30	180	1	A	10	1	.101
JRM1001	130	2,220	6	46	275	2	A	10	2	.053
JRM1002	86	1,830	6	70	420	3	A	10	3	.046
JRM1003	67	1,520	6	90	540	4	A	10	4	.041
JRM1004	50	1,025	6	120	720	5	A	10	5	.026
JRM1006	800	7,100	12	15	180	1	A	10	1	.350
JRM1007	520	4,400	12	23	275	2	A	10	2	.220
JRM1008	344	3,650	12	35	420	3	A	10	3	.193
JRM1009	268	3,100	12	45	540	4	A	10	4	.180
JRM1010	200	2,500	12	60	720	5	A	10	5	.140
JRM1012	3,200	14,000	24	7.5	180	1	A	10	1	1.120
JRM1013	2,080	8,730	24	11.5	275	2	A	10	2	.720
JRM1014	1,376	7,400	24	17.5	420	3	A	10	3	.690
JRM1015	1,072	5,700	24	22.5	540	4	A	10	4	.570
JRM1016	800	4,800	24	30	720	5	A	10	5	.530
JRM1018	200	3,600	6	30	180	1	C**	4	1	.094
JRM1019	130	2,200	6	46	275	2	C**	4	2	.071
JRM1020	86	1,830	6	70	420	3	C**	4	3	.067
JRM1021	67	1,520	6	90	540	4	C**	4	4	.046
JRM1022	50	1,025	6	120	720	5	C**	4	5	.032
JRM1024	800	7,100	12	15	180	1	C**	4	1	.360
JRM1025	520	4,400	12	23	275	2	C**	4	2	.240
JRM1026	344	3,650	12	35	420	3	C**	4	3	.220
JRM1027	268	3,100	12	45	540	4	C**	4	4	.200
JRM1028	200	2,500	12	60	720	5	C**	4	5	.162
JRM1030	3,200	14,000	24	7.5	180	1	C**	4	1	1.060
JRM1031	2,080	8,700	24	11.5	275	2	C**	4	2	.830
JRM1032	1,376	7,400	24	17.5	420	3	C**	4	3	.790
JRM1033	1,072	5,700	24	22.5	540	4	C**	4	4	.635
JRM1034	800	4,800	24	30	720	5	C**	4	5	.580
JRM1036	130	2,220	6	46	275	1	B	10	2	.023
JRM1037	86	1,830	6	70	420	2	B	10	3	.024
JRM1038	50	1,025	6	120	720	3	B	10	5	.008
JRM1040	520	4,400	12	23	275	1	B	10	2	.081
JRM1041	344	3,650	12	35	420	2	B	10	3	.095
JRM1042	200	2,500	12	60	720	3	B	10	5	.064
JRM1044	2,080	8,730	24	11.5	275	1	B	10	2	.295
JRM1045	1,376	7,400	24	17.5	420	2	B	10	3	.345
JRM1046	800	4,800	24	30	720	3	B	10	5	.240
JRM1048	86	1,830	6	70	420	1	C†	10	3	.021
JRM1049	50	1,025	6	120	720	2	C†	10	5	.031
JRM1050	344	3,650	12	35	420	1	C†	10	3	.103
JRM1051	200	2,500	12	60	720	2	C†	10	5	.142
JRM1052	1,376	7,400	24	17.5	420	1	C†	10	3	.360
JRM1053	800	4,800	24	30	720	2	C†	10	5	.550

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** True Form C
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