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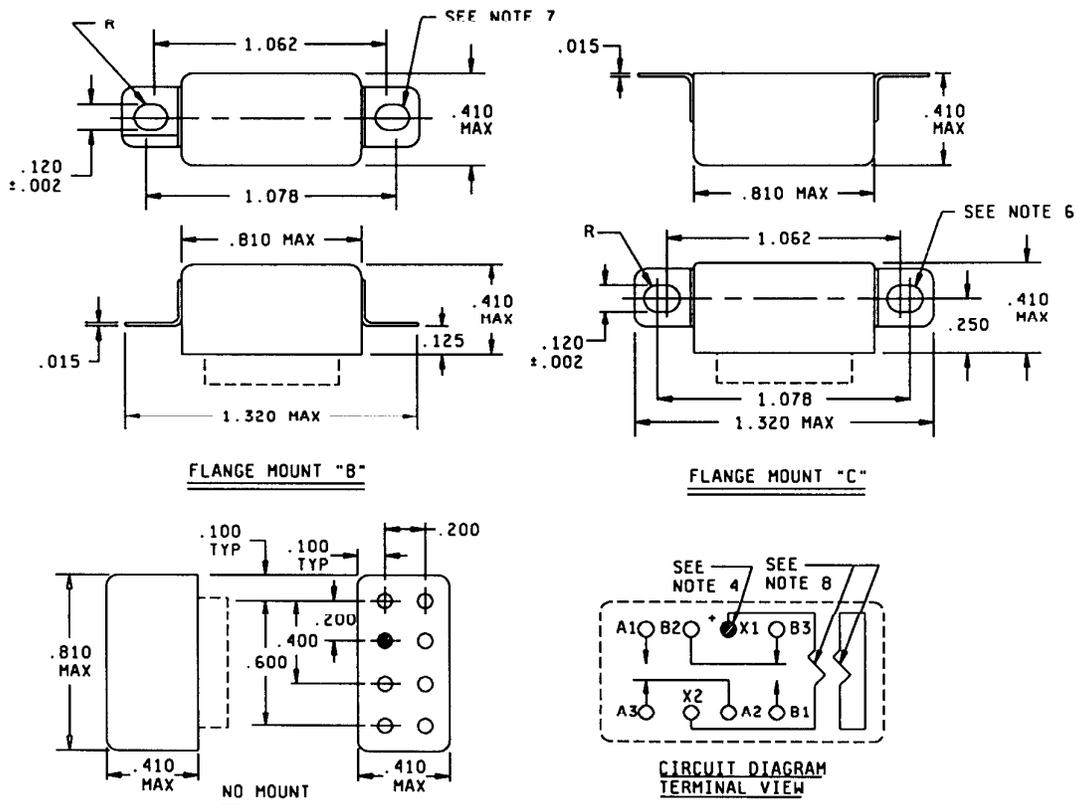
MIL-PRF-39016/22D  
 20 JULY 1988  
 SUPERSEDING  
 MIL-R-39016/22C  
 19 June 1981

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT,  
 LOW LEVEL TO 2 AMPERES (0.200-INCH TERMINAL SPACING)  
 COIL TRANSIENT SUPPRESSED

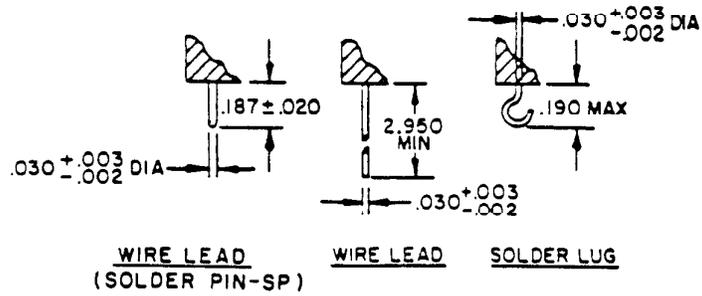
This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification and the latest issue of MIL-R-39016.



① FIGURE 1. Dimensions and configuration

① denotes changes



Inches	mm
.002	0.05
.003	0.08
.020	0.51
.030	0.76
.100	2.54
.120	3.05
.125	3.18
.187	4.75
.190	4.83
.200	5.08
.250	6.35
.400	10.16
.410	10.41
.600	15.24
.810	20.57
1.062	26.97
1.078	27.38
1.320	33.53
2.950	74.93

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are  $\pm .010$  (0.25 mm) for three place decimals and  $\pm .03$  (0.8 mm) for two place decimals.
4. Indicated terminal shall be marked with a contrasting bead.
5. Terminal numbers A1 and A3 shall be marked on the relay.
6. Circuit diagram marked on top if legible from the mounted position, otherwise marking surface is optional.
7. Mounting screw head clearances based on use on no. 4 fillister head screws.
8. Coil symbols are optional per MIL-STD-1285.

Ⓓ FIGURE 1. Dimensions and configuration - Continued.

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded).

Resistive: 2 amperes at 28 V dc; .100 ampere maximum at 115 V ac, (60 and 400 Hz). For qualification testing, 400 Hz loads not required.

Inductive: .50 ampere maximum at 28 V dc maximum with 200 millihenries minimum.

Ⓓ Lamp: 0.160 ampere maximum at 28 V dc maximum.

Low level: 10 to 50  $\mu$ A at 10 to 50 mV dc or peak ac.

Intermediate current: Applicable.

Contact resistance and voltage drop:

Ⓓ Initial: 0.050 ohm maximum.

High level:

During life: Not more than 5 percent of open circuit voltage.

After life: .100 ohm maximum.

Low level:

During life: 33 ohms maximum.

Ⓓ After life: 0.150 ohm maximum.

Intermediate current:

During intermediate current: 1 ohm maximum.

Ⓓ After intermediate current: .300 ohm maximum.

Contact bounce: 2.0 milliseconds (ms) maximum. (Applicable to failure rate level "L").

Contact stabilization time: 2.5 milliseconds (ms) maximum. (Applicable to failure rate level "M", "P", and "R").

Overload (high level only): Two times rated current.

Ⓓ COIL DATA: See table I.

Operate time: 5 ms maximum over temperature range with rated coil voltage.

Release time: 5 ms maximum over temperature range from rated coil voltage.

ELECTRICAL DATA:

Ⓓ Insulation resistance: 10,000 megohms minimum.

Dielectric withstanding voltage:

	Sea Level Vrms (60 Hz)	Altitude Vrms (60 Hz)
Between case, frame, or enclosure, and between all contacts in the energized and deenergized positions	1,000	} 350 All terminals to case
Between case, frame, or enclosure and coil(s) - - - -	500	
Between all contacts and coil(s) - - - - -	1,000	
Between open contacts in the energized and deenergized positions - - - - -	500	
Between contact poles - - - - -	1,000	

④ COIL TRANSIENT CHARACTERISTICS: 1/

Maximum negative transient: See table I.

ENVIRONMENTAL DATA:

Temperature range: -65° to +125°C.

- ④ Vibration (sinusoidal): MIL-STD-202, method 204. Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts.
- ④ Vibration (random): MIL-STD-202, method 214, test condition IG. Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts. Applicable to qualification and group C testing only.
- ④ Shock (specified pulse): MIL-STD-202, method 213, test condition C (100 g's). Contact chatter shall not exceed 10 microseconds maximum for closed contacts and, 1 microsecond maximum closure for open contacts.

Magnetic interference: Applicable.

Resistance to soldering heat: Applicable.

Acceleration: Applicable.

PHYSICAL:

Terminals: See figure 1 and table I.

Terminal strength: 3 ±0.3 pounds pull.

- ④ Solderability: Applicable.

Terminal twist test: Applicable to wire leads.

Dimensions and configuration: See figure 1.

Weight: 9.92 grams (0.35 ounce) maximum.

Identification marking (full): Applicable.

- ④ 1/ The following test shall be added to all qualification and group A testing performed on relays supplied to this specification. In all tables, sequence after coil resistance. Coil transient suppression: Apply rated voltage to coil using a cathode ray oscilloscope to monitor the voltage across the relay coil, instantaneously remove the coil voltage (or current) with a mercury switch and observe the monitor to verify that any transient generated does not exceed the specified value. Repeat the test applying opposite polarity to the coil. For qualification only, legible photographs are required.

## LIFE TEST REQUIREMENTS:

- Ⓓ High level: 100,000 cycles per relay.
- Ⓓ Low level: 100,000 cycles, plus 900,000 cycles mechanical life.

PART NUMBER: M39016/22-(dash number from table I and suffix letter designating failure rate level).

Ⓓ TABLE I. Dash number and applicable characteristics. 1/

Dash number 2/			Mount	Coil voltage V dc 3/		Coil resistance ohms ±10%	At 25°C				Over temperature range		
Solder lug	Wire lead (SP)	Wire lead		Rated	Max		Specified pick-up value (V dc)	Specified hold value (V dc)	Specified drop-out value (V dc)	Specified pick-up value (V dc)	Specified hold value (V dc)	Specified drop-out value (V dc)	Max coil transient voltage
004 007 ---	005 --- 009	006 008 010	Flange "B" Flange "C" No mount	26.5	32.0	700	15.0	8.0	1.5	20.0	14.0	1.0	48.0
011 014 ---	012 --- 016	013 015 017	Flange "B" Flange "C" No mount	12.0	15.0	160	7.2	4.0	0.7	9.6	5.8	0.50	24.0
018 021 ---	019 --- 023	020 022 024	Flange "B" Flange "C" No mount	6.0	7.5	40	3.6	2.0	0.35	4.8	2.9	0.25	12.0

- 1/ Each relay possesses high level and low level capabilities. However, relays previously tested or used above 10 mA resistive at 6 V dc maximum or peak ac open circuit are not recommended for subsequent use in low level applications.
- 2/ The suffix letter L, M, P, or R to designate the applicable failure rate level shall be added to the applicable listed dash number. Failure rate level (percent per 10,000 operations): L, 3.0; M, 1.0; P, 0.1; R, 0.01. Example, 004L - - - - 024R.
- 3/ CAUTION: The use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.

④ TABLE II. Qualification inspection and sample size. 2/

Single submission	Group submission	
20 units plus 1 open unit for level L at C = 0 1/ 33 units plus 1 open unit for level M at C = 0 1/ Qualification inspection as applicable.	M39016/22-004	20 units plus 1 open unit for level L at C = 0 1/ 33 units plus 1 open unit for level M at C = 0 1/ Qualification inspection as applicable.
	M39016/22-023	2 units, qualification inspection table, group II.
	M39016/22-013	2 units, qualification inspection table, group II, and shock, vibration, acceleration, terminal strength, and seal.

1/ The number of units required for qualification testing will be increased as required in group V, table II, MIL-R-39016, if the relay manufacturer elects to test the number of units permitting one or more failures. Prior to performance of qualification inspection testing, the relay manufacturer shall preselect the sampling plan.

2/ For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-R-39016/6 may be used in addition to MIL-R-39016/22 data. Prior to performance of retention of qualification testing, the relay manufacturer shall preselect the sampling plan.

QUALIFICATION INSPECTION (reduced testing): See table III.

If the relays produced for MIL-R-39016/22 are similar in construction and design except for the coil to the relays produced for MIL-R-39016/6, then reduced testing for qualification of MIL-R-39016/22 relays may be performed concurrent with or subsequent to successful qualification of MIL-R-39016/6 relays.

④ TABLE III. Qualification inspection (reduced testing).

Examination or test
2 units each coil voltage - Group II of qualification inspection table.
1 unsealed sample unit - Internal examination.

CONCLUDING MATERIAL

Custodians:

Army - ER  
Navy - EC  
① Air Force - 85

Review activities:

Army - SL, AR  
Navy - AS, OS, SH  
① Air Force - 99  
DLA - ES

User activities:

Navy - MC  
① Air Force - 11, 19

Preparing activity:  
Navy - EC

Agent:  
DLA - ES

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