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MIL-PRF-39016/53B
 20 JULY 1988
 SUPERSEDING
 MIL-R-39016/53A
 2 August 1985

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, HERMETICALLY SEALED, 4PDT,
 LOW LEVEL TO 2 AMPERES (.150-INCH TERMINAL SPACING)
 WITH INTERNAL DIODE FOR COIL TRANSIENT SUPPRESSION

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.

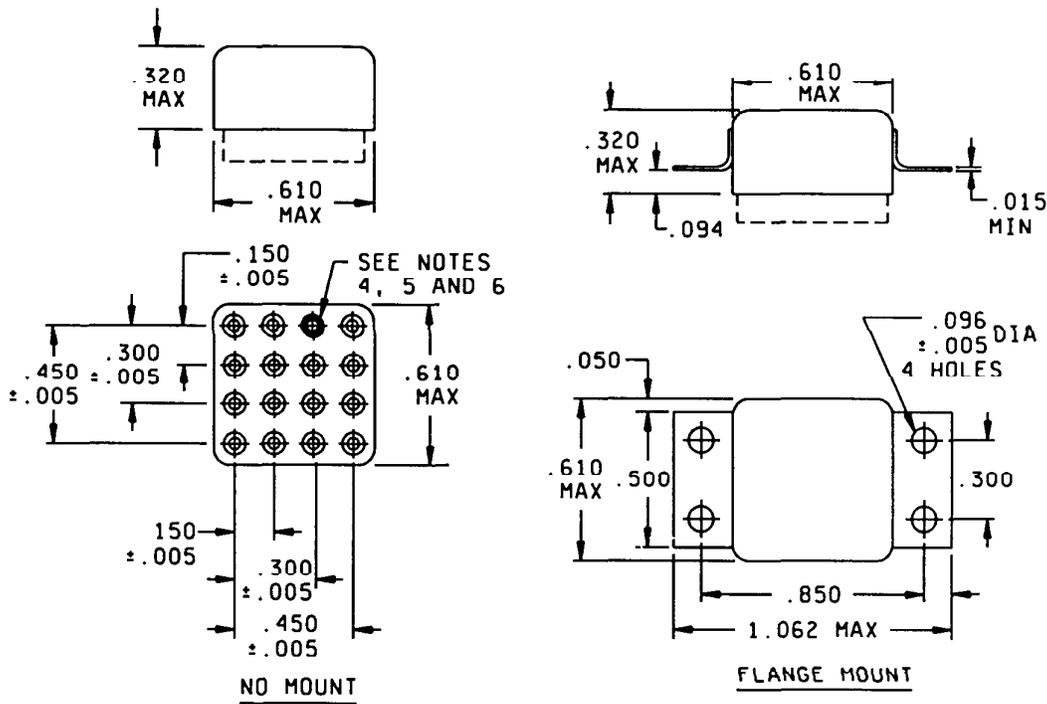
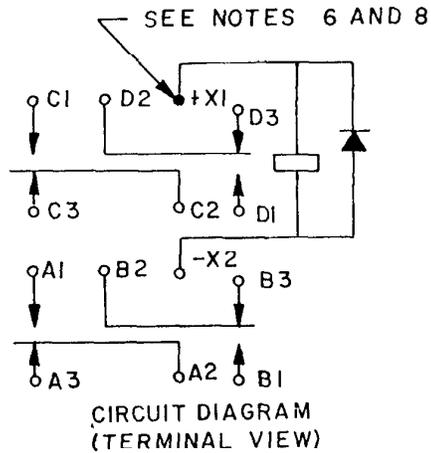
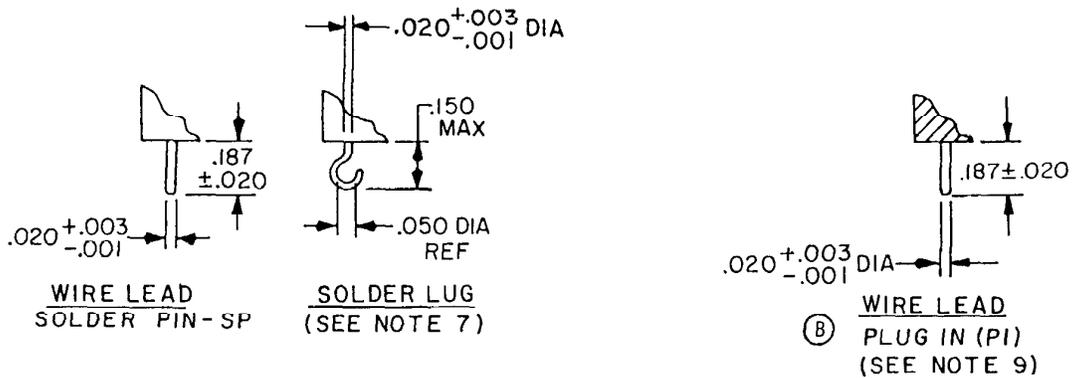


FIGURE 1. Configuration and circuit diagram.

Ⓟ denotes changes



Inches	mm	Inches	mm
.001	0.03	.100	2.54
.002	0.05	.150	3.81
.003	0.08	.187	4.75
.005	0.13	.300	7.62
.015	0.38	.320	8.13
.020	0.51	.450	11.43
.030	0.76	.500	12.70
.050	1.27	.610	15.49
.080	2.03	.850	21.59
.094	2.39	1.062	26.97
.096	2.44		



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is $\pm .010$ (0.25 mm).
4. Terminal locating dimensions shown are applicable to all type mounts.
5. Terminal numbers in circuit diagram are for reference only. Numbers do not appear on relay.
- ⑥ 6. Indicated terminal shall be identified with contrasting bead.
7. The shape of lug terminals is optional.
8. Coil symbol is optional per MIL-STD-1285.
- ⑥ 9. Finish gold plated per MIL-G-45204, type II, class I, with a nickel underplating that shall be in accordance with QQ-N-290 (50 to 150 microinches thick), grade D except knoop hardness shall be 200 minimum.

Figure 1. Configuration and circuit diagram - Continued.

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded):

ⓑ Resistive: 2 amperes at 28 V dc; 0.125 ampere at 115 V ac, (60 and 400 Hz); 0.5 ampere at 115 V ac, (60 and 400 Hz) with case not grounded. 400 Hz life test not required for qualification testing.

ⓑ Inductive: 0.5 ampere at 200 mH inductive at 28 V dc.

Lamp: 0.10 ampere at 28 V dc.

Low level: 10 to 50 μ 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: 0.150 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: 3 ohms 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 levels "M", "P", and "R").

Overload (high level only): 4 amperes resistive at 28 V dc, 1.0 ampere inductive at 28 V dc. (ac not applicable).

COIL DATA: See table I.

Operate time: 4.0 ms maximum over temperature range with rated coil voltage.

Release time: 6.0 ms maximum over temperature range from rated coil voltage.

ELECTRICAL DATA:

Insulation resistance: 1/ 10,000 megohms minimum, except the resistance between coil and case at high temperature shall be 1,000 megohms minimum.

Dielectric withstanding voltage: 1/

	Sea level V rms (60 Hz)	Altitude V rms (60 Hz)
Between case, frame, or enclosure, and between all contacts in the energized and deenergized positions	750	} All terminals to case
Between case, frame, or enclosure and coil(s) - - - -	500	
Between all contacts and coil(s)- - - - -	750	
Between open contacts in the energized and deenergized positions - - - - -	500	
Between contact poles - - - - -	750	

ⓑ DIODE CHARACTERISTICS:

Maximum negative transient: 1.0 V.

ⓑ Coil transient suppression: Applicable (Warning: reverse polarity on coil terminals will destroy the diode).

ⓑ Semiconductor in process screening: Applicable, visual inspection of semiconductors shall be in accordance with MIL-STD-750, method 2074.

ENVIRONMENTAL DATA:

Temperature range: -65°C to +125°C.

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.

ⓑ 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).

Shock (specified pulse): MIL-STD-202, method 213, test condition C (100 g). 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: 1.5 ±0.2 pounds (pull).

Solderability: Applicable (except to gold plated terminals).

Terminal twist test: Applicable to wire leads.

1/ Connect coil leads together to avoid damage to diode.

Dimensions and configuration: See figure 1 and table I.

Weight: 8.5 grams (0.30 ounce) maximum.

Identification marking (full): Applicable.

⑧ TABLE I. Dash numbers and characteristics. 1/

Dash number 2/	Mount	Leads	Coil voltage V dc 3/		At 25°C				Over temperature range		
			Rated	Max	Coil resistance Ohms ±10%	Specified pickup value V dc	Specified hold value (voltage) (V dc)	Specified dropout value (voltage) (V dc)	Specified pickup value (V dc)	Specified hold value (V dc)	Specified dropout value (V dc)
001 002 015 016	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	6	7	28	2.7	1.6	0.3	3.8	2.2	0.18
003 004 017 018	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	9	11	73	4.2	2.5	0.4	5.6	3.4	0.25
005 006 019 020	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	12	14	115	5.4	3.2	0.6	7.6	4.3	0.36
007 008 021 022	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	18	22	280	8.4	5.0	0.8	11.2	6.7	0.5
009 010 023 024	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	22	27	430	10.3	6.0	1.0	14.0	8.0	0.6
011 012 025 026	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	26.5	35	720	13.5	8.1	1.5	18.0	10.8	0.9
013 014 027 028	Flange No mount Flange Flange	Lug Wire (SP) Wire (SP) Wire (PI)	36	42	1040	17.5	10.5	1.9	22.8	14.0	1.1

- 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 cycles): L, 3.0; M, 1.0; P, 0.1; R, 0.01. Example, 001L - - - - - 003R.
- 3/ CAUTION: The use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.

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LIFE TEST REQUIREMENTS:

High level: 100,000 cycles.

ⓑ Low level: 100,000 cycles plus 900,000 cycles mechanical life.

PART NUMBER: M39016/53-(dash number from table I and suffix letter designating failure rate level).

QUALIFICATION INSPECTION:

Qualification inspection and sample size: See table II.

ⓑ TABLE II. Qualification inspection and sample size. 1/

Single submission		Group submission
22 units plus 1 open unit for level L at C = 0 2/	M39016/53-011	22 units plus 1 open unit for level L at C = 0 2/
33 units plus 1 open unit for level M at C = 0 2/		33 units plus 1 open unit for level M at C = 0 2/
Qualification inspection as applicable.		Qualification inspection as applicable.
	M39016/53-001 M39016/53-003 M39016/53-007 M39016/53-009 M39016/53-013	2 units, each part number, qualification inspection table, group II,
	M39016/53-006 M39016/53-026	2 units, qualification inspection table, group II, and shock, vibration, acceleration, terminal strength, and seal.

1/ For retention of qualification or extension of qualification to low failure rate levels, all life test data accumulated on MIL-R-39016/54 may be used in addition to MIL-R-39016/53 data. Prior to performance of retention of qualification inspection testing; the relay manufacturer shall preselect the sampling plan.

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

Qualification inspection (reduced testing) and sample size: See table III. If the relays produced for MIL-R-39016/53 are similar in construction and design except for the diodes and coils to the relays produced for MIL-R-39016/54 then reduced testing for qualification of MIL-R-39016/53 relays may be performed concurrent with or subsequent to successful qualification of MIL-R-39016/54.

ⓑ TABLE III. Qualification inspection (reduced testing) and sample size.

Examination or test
2 units each coil voltage
Group II of qualification inspection table.
((Plus shock and vibration testing shall be performed on -013)
1 unsealed sample unit for internal inspection.

CONCLUDING MATERIAL

Custodians:

Army - ER
Navy - EC
⑧ Air Force - 85

Review activities:

Army - AR
Navy - AS, OS, SH
⑧ Air Force - 99
DLA - ES

User activities:

Navy - MC
⑧ Air Force - 11, 19

Preparing activity:

Navy - EC

Agent:

DLA - ES

(Project 5945-0757-43)