INCH-POUND

MIL-PRF-39016/37D
2 June 2014
SUPERSEDING
MIL-PRF-39016/37C
5 August 2003

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT, LOW LEVEL TO 2 AMPERES (0.150-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-PRF-39016.

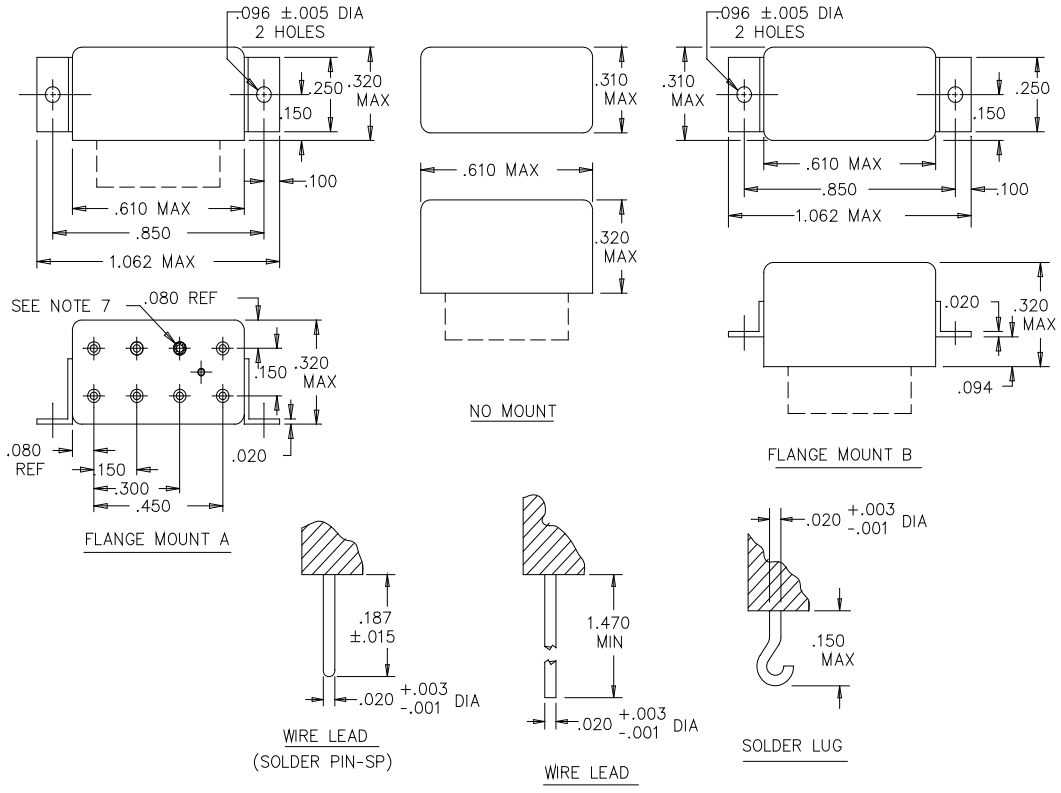
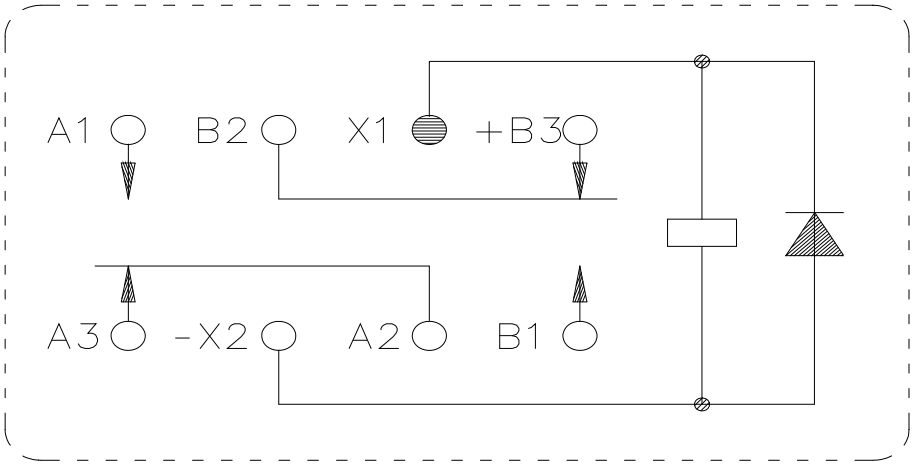


FIGURE 1. Dimensions and configuration.



CIRCUIT DIAGRAM
TERMINAL VIEW
DEENERGIZED POSITION
SEE NOTES 6,7,8 AND 9

Inches	mm	Inches	mm
.001	0.03	.250	6.35
.003	0.08	.300	7.62
.005	0.13	.310	7.87
.020	0.51	.320	8.13
.080	2.03	.450	11.43
.094	2.39	.610	15.49
.096	2.44	.850	21.59
.100	2.54	1.062	26.97
.150	3.81	1.470	37.34
.187	4.75		

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ± .010 (0.25 mm).
4. Terminal locating dimensions shown are applicable to all type mounts.
5. The shape of lug terminals is optional.
6. Coil symbol is optional per MIL-STD-1285.
7. X1 terminal shall be identified with contrasting bead.
8. Terminal markings A1 and A3 shall appear on the circuit diagram; other terminal markings are for reference only.
9. Relays shall have a plug sign marked on the circuit diagram as shown.

FIGURE 1. Dimensions and configuration – Continued.

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded):

Resistive: 2 amperes at 28 V dc (50,000 cycles). 1 ampere 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.

Inductive: 0.3 ampere at 200 mH inductive at 28 V dc.

Lamp: 0.10 ampere at 28 V dc – Life test not required.

Low level: 10 to 50 µA at 10 to 50 mV dc or peak ac.

Intermediate current: Applicable.

Contact resistance or 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: 0.300 ohm maximum.

Contact bounce: 1.5 milliseconds (ms) maximum. (Applicable to failure rate level “L”).

Contact stabilization time: 2.0 milliseconds (ms) maximum. (Applicable to failure rate levels “M”, “P”, and “R”).

Overload (high level only): 4 amperes resistive at 28 V dc, 0.6 ampere inductive at 28 V dc (ac not applicable). Post overload life test shall be 25,000 cycles.

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 all contacts in the energized and de-energized positions: ……..	750	
Between case, frame, or enclosure and coil:……..	500	350
Between all contacts and coil:……	750	All terminals
Between open contacts in the energized and deenergized positions:……	500	to case
Between contact poles:……..	750	

DIODE CHARACTERISTICS:

Maximum negative transient: 1.0 volt.

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's). Contact chatter shall not exceed 10 µs maximum for closed contacts, and 1 µs maximum closure for open contacts.

1/ Insulation resistance and dielectric withstanding voltage tests must always precede all other specified measurements. Connect all coil terminals together to avoid damage to the diode.

Magnetic interference: Applicable.

Resistance to soldering heat: Applicable.

Acceleration: 100 g.

PHYSICAL DATA:

Terminals: See figure 1 and table I.

Terminal strength: 1.5 ± 0.2 lbs. (pull).

Solderability: Applicable.

Terminal twist test: Applicable to wire leads.

Dimensions and configuration: See figure 1 and table I.

Weight: 4.82 grams (0.17 ounce) maximum.

Identification marking (full): Applicable (see figure 1, note 8).

LIFE TEST REQUIREMENTS:

High level: 100,000 cycles.

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

PART NUMBER: M39016/37- (dash number from table I and suffix letter designation failure rate level).

TABLE I. Dash number and chacteristics. 1/

Dash number 2/			Mount	Coil Voltage 3/ V dc		At 25°C				Over temp range		
Wire lead (SP)	Solder lug	Wire lead		Rated	Max	Coil Resist-ance ohms ±10%	Speci-fied pickup voltage (V dc)	Speci-fied hold voltage V dc)	Speci-fied dropout voltage (V dc)	Speci-fied pickup voltage (V dc)	Speci-fied hold voltage (V dc)	Speci-fied dropout voltage (V dc)
001	--	002	No mount	5	7	44	2.4	1.45	0.26	3.3	2.0	0.16
003	--	004		6	8	56	2.7	1.6	0.3	3.8	2.2	0.18
--	005	006	A									
007	008	009	B									
010	--	011	No mount	9	12	140	4.4	2.6	0.5	6.0	3.6	0.3
012	--	013		12	16	210	5.4	3.2	0.6	7.4	4.5	0.36
--	014	015	A									
016	017	018	B									
019	--	020	No mount	18	24	650	9.5	5.6	1.0	12.8	7.7	0.6
021	--	022		26.5	35	1350	13.5	8.1	1.5	18.0	10.8	0.9
--	023	024	A									
025	026	027	B									

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 (percent per 10,000 cycles): L, 3.0; M, 1.0; P, 0.1; R, 0.01.
Example, 001L --- 027R.

3/ CAUTION: The use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.

TABLE II. Qualification inspection and sample size. 1/

Single submission	Group submission	
24 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/ Qualification inspection as applicable.	M39016/37-023	24 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/ Qualification inspection as applicable.
	M39016/37-001 M39016/37-006 M39016/37-010 M39016/37-019	2 units, each part number, qualification inspection table, group II.
	M39016/37-018	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 lower failure rate levels, all life test data accumulated on MIL-PRF-39016/38 may be used in addition to MIL-PRF-39016/37 data. Prior to performance of retention of qualification testing; the relay manufacturer shall preselect the sample size.

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

QUALIFICATION INSPECTION (reduced testing): See table III.

If the relays produced for MIL-PRF-39016/37 are similar in construction and design except for the steering diode and coil to the relays produced for MIL-PRF-39016/38, then reduced testing for qualification of MIL-PRF-39016/37 relays may be performed concurrent with or subsequent to successful qualification of MIL-PRF-39016/38 relays.

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.

Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Referenced documents. In addition to MIL-PRF-39016, this document references the following:
MIL-STD-1285 MIL-STD-750 MIL-STD-202 MIL-PRF-39016/38

Custodians:
Army – CR
Navy – EC
Air Force – 85
DLA – CC

Review activities:
Army – AR
Navy – AS, MC, OS, SH
Air Force – 19, 99

Preparing activity:
DLA – CC

(Project 5945-2014-004)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.dla.mil/.