

INCH-POUND

MIL-PRF-39016/35D
13 August 2012
SUPERSEDING
MIL-PRF-39016/35C
15 June 2005

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, HERMETICALLY SEALED, 4 PDT
LOW LEVEL TO 2 AMPERES (0.150-INCH TERMINAL SPACING), LATCHING,
WITH INTERNAL DIODES FOR COIL TRANSIENT SUPPRESSION

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

The complete requirements for acquiring the relays described herein shall consist of this specification sheet and the
latest issue of [MIL-PRF-39016](#).

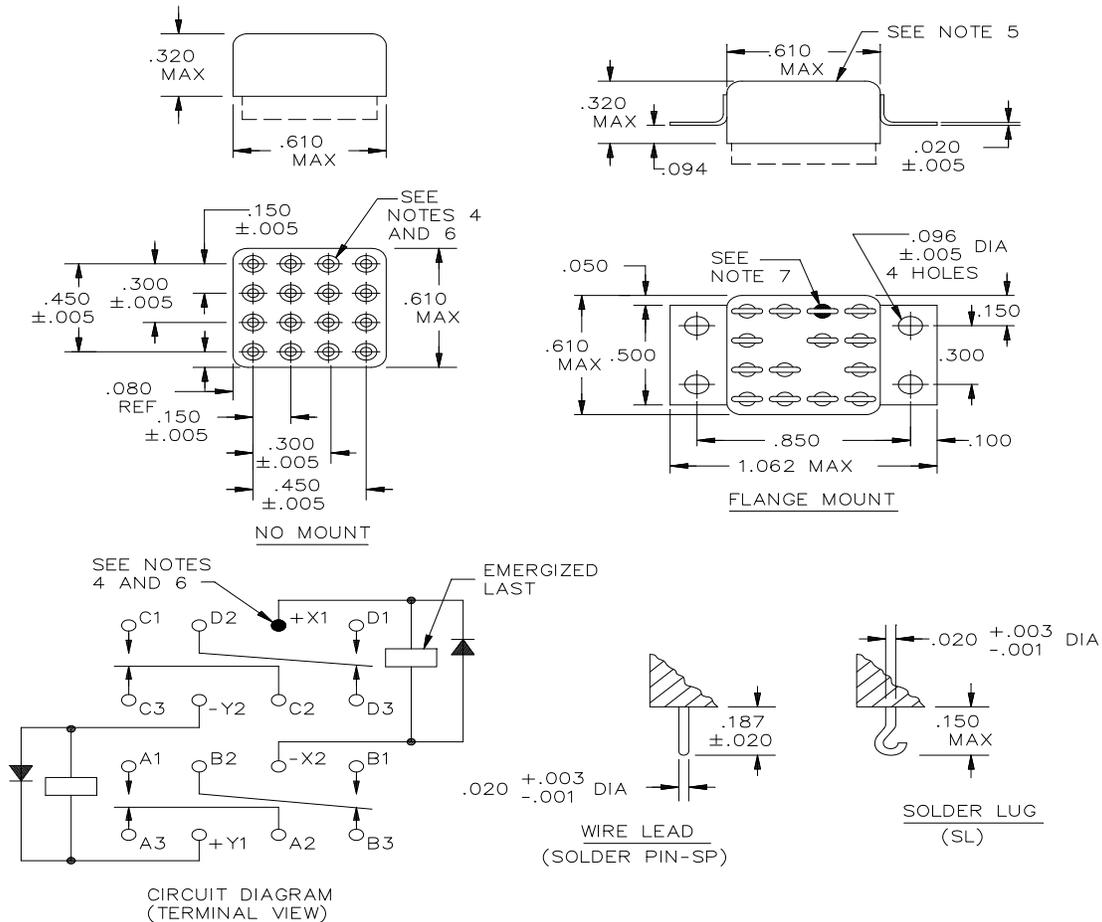


FIGURE 1. Dimensions and configuration.

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| Inches | mm | Inches | mm |
|--------|------|--------|-------|
| .001 | 0.03 | .150 | 3.81 |
| .002 | 0.05 | .187 | 4.75 |
| .003 | 0.08 | .300 | 7.62 |
| .005 | 0.13 | .320 | 8.13 |
| .020 | 0.51 | .450 | 11.43 |
| .050 | 1.27 | .500 | 12.70 |
| .080 | 2.08 | .610 | 15.49 |
| .094 | 2.39 | .850 | 21.59 |
| .096 | 2.44 | 1.062 | 26.97 |

NOTES:

1. Dimensions are in inches.
2. Unless otherwise specified, tolerance is ± 0.010 (0.25 mm).
3. Metric equivalents are given for general information only.
4. Terminal indicated shall be identified by a contrasting bead. Relay shall have (+) and (-) signs placed on the circuit diagram as shown above.
5. Circuit diagram marked on top of relay.
6. Energizing the indicated coil with the indicated polarity and voltage shall cause the relay contacts to assume the position shown.
7. Coil symbol optional in accordance with [MIL-STD-1285](#).
8. Terminal numbers in circuit diagram are for reference only. Numbers do not appear on relay.

FIGURE 1. Configuration and circuit diagram - Continued.

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded):

Resistive: 2.0 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) (case ungrounded).

Inductive: 0.5 ampere at 28 V dc with 0.20 henry inductance.

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

Low level: 10 to 50 μ A 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: 1 ohm maximum.

After: 0.300 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 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).

Neutral screen: Applicable.

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COIL DATA (Each coil): (See [table I](#)).

Operate time (latch and reset): 4.0 ms maximum over temperature range with rated coil voltage.

Release time: Not applicable.

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:

| | 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 coils. | 500 | 350 |
| Between all contacts and coils. | 750 | All terminals to case |
| Between open contacts in the latch and reset positions. | 500 | |
| Between contact poles. | 750 | |
| Between coils of dual coil relays. | 500 | |

DIODE CHARACTERISTICS: [2/](#)

Maximum negative transient: 1.0 volt.

Coil transient suppression: Applicable.

Semiconductor in process screening: Applicable, visual inspection of semiconductors shall be in accordance with [MIL-STD-750](#), method 2074.

ENVIRONMENTAL DATA:

Temperature: -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.

Magnetic interference: Applicable.

Resistance to soldering heat: Applicable.

[1/](#) Connect each set of coil terminals together to avoid damage to the diodes.

[2/](#) WARNING: Reverse polarity on coil terminals will destroy the diode.

Acceleration: Applicable.

PHYSICAL DATA:

Terminals: See [figure 1](#) and [table I](#).

Terminal strength:

Pull test: 1.5 ±0.2 pounds.

Bend test: Not applicable.

Solderability: Applicable.

Dimensions and configuration: See [figure 1](#).

Weight: 7.6 grams (0.27 ounce) maximum.

Minimum marking: Military part number, "J" with the date code (example J0430), circuit diagram, manufacturer's name or source code.

LIFE TEST REQUIREMENTS:

High level: 100,000 cycles per relay.

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

PART NUMBER: M39016/35- (dash number from table I and suffix letter designating failure rate level).

TABLE I. [Dash number and characteristics.](#) [1/](#) [2/](#)

| Dash number 3/ | Mount | Terminal | Coil voltage (V dc) | | Coil resistance at +25°C tolerance ±10% (ohms) | Specified pickup (latch/reset) value (voltage) (V dc) 5/ | |
|-----------------------------------|----------|----------------|--------------------------|------|--|---|-------|
| | | | Rated 4/ | Max | | 25°C | 125°C |
| -001 | No mount | Wire lead (SP) | 6.0 | 7.2 | 37 | 2.6 | 3.8 |
| -002 | No mount | Wire lead (SP) | 12.0 | 14.5 | 145 | 5.2 | 7.6 |
| -003 | No mount | Wire lead (SP) | 26.5 | 35.0 | 975 | 13.5 | 18.0 |
| -004 | Flange | Solder lug | 6.0 | 7.2 | 37 | 2.6 | 3.8 |
| -005 | Flange | Solder lug | 12.0 | 14.5 | 145 | 5.2 | 7.6 |
| -006 | Flange | Solder lug | 26.5 | 35.0 | 975 | 13.5 | 18.0 |

[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 circuits not recommended for subsequent use in low level applications.

[2/](#) WARNING: When latching relays are installed in equipment, the latch and reset coils should not be pulsed simultaneously. Coils should not be pulsed with less than the rated coil voltage.

[3/](#) 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 - - - - 006R.

[4/](#) CAUTION: Use of any coil voltage less than the rated voltage will compromise the operation of the relay.

[5/](#) A 10% increase in latch and reset voltages is allowed during and after rated life.

TABLE II. Qualification inspection and sample size. ^{1/}

| Single submission | Group submission | |
|--|------------------|---|
| 24 units plus 1 open unit. level L at C = 0 ^{2/} 33 units plus 1 open unit for level M at C = 0 ^{2/} Qualification inspection as applicable | M39016/35-006 | 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 |
| | M39016/35-002 | 2 units qualification inspection Q1. |
| | M39016/35-001 | 2 units qualification inspection Q1, and terminal strength, resistance to soldering heat, and seal. |

- ^{1/} For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on [MIL-PRF-39016/36](#) may be used in addition to MIL-PRF-39016/35 data. Prior to performance of retention of qualification inspection; the relay manufacturer shall preselect the sample size.
- ^{2/} The number of units required for qualification testing will be increased as required in Q5, [MIL-PRF-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 sample size.

QUALIFICATION INSPECTION (reduced testing): See [table III](#).

If the relays produced for MIL-PRF-39016/35 are similar in construction and design except for the steering diode to the relays produced for MIL-PRF-39016/36, then reduced testing for qualification of MIL-PRF-39016/35 relays may be performed concurrent with or subsequent to successful qualification of [MIL-PRF-39016/36](#) relays.

TABLE III. Qualification inspection (reduced testing).

| Inspection |
|---|
| 2 units each coil voltage - Q1 of qualification inspection table. |
| 1 unsealed sample unit for 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-PRF-39016/36](#)
- [MIL-STD-202](#)
- [MIL-STD-750](#)
- [MIL-STD-1285](#)

Custodians:

Army - CR
Navy - EC
Air Force - 85
DLA - CC

Preparing activity:

DLA - CC

Review activities:

Army - AR
Navy - AS, MC, OS, SH
Air Force - 19, 99

(Project 5945-2012-028)

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>.