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 sheet and MIL-PRF-39016.

FIGURE 1. Configuration and circuit diagram.
NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ±0.010 (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. Indicated terminal shall be identified with contrasting band.
7. The shape of lug terminals is optional.
8. Coil symbol is optional in accordance with MIL-STD-1285.
9. Finish: Finish shall provide the operational, environmental, and interface characteristics to provide a reliable interconnect to gold plated contacts. One system for gold plating that may be used is ASTM-B488, type 3, class 1.25, knoop hardness 130 to 240, nickel underplate 50 to 150 microinches thick. The gold plating shall enable the product to meet the performance requirements of this specification and shall be approved by the qualifying activity.

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.

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

Lamp: 0.10 ampere at 28 V dc.

Low level: 10 μA to 50 μA at 10 mV 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 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.
MIL-PRF-39016/53D

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/

<table>
<thead>
<tr>
<th></th>
<th>Sea level V rms (60 Hz)</th>
<th>Altitude V rms (60 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between case, frame, or enclosure, and between all contacts in the energized and deenergized position</td>
<td>750</td>
<td>350</td>
</tr>
<tr>
<td>Between case, frame, or enclosure and coil(s)</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Between all contacts and coil(s)</td>
<td>750</td>
<td>All terminals to case</td>
</tr>
<tr>
<td>Between open contacts in the energized and deenergized positions</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Between contact poles</td>
<td>750</td>
<td></td>
</tr>
</tbody>
</table>

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 (sinusodial): MIL-STD-202-204. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Vibration (random): MIL-STD-202-214, 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-202-213, 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.
MIL-PRF-39016/53D

Dimensions and configuration: See figure 1 and table I.

Weight: 8.5 grams (0.30 ounce) maximum.

Identification marking (full): Applicable.

### TABLE I. Dash numbers and characteristics

<table>
<thead>
<tr>
<th>Dash number 2/</th>
<th>Mount</th>
<th>Leads</th>
<th>Coil voltage V dc 3/</th>
<th>Rated</th>
<th>Max</th>
<th>At 25°C Specified pickup value (volt-age) (V dc)</th>
<th>Specified hold value (volt-age) (V dc)</th>
<th>Specified dropout value (volt-age) (V dc)</th>
<th>Specified pickup value (volt-age) (V dc)</th>
<th>Specified hold value (volt-age) (V dc)</th>
<th>Specified dropout value (volt-age) (V dc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Flange</td>
<td>Wire (SP)</td>
<td></td>
<td>6</td>
<td>7</td>
<td>28</td>
<td>2.7</td>
<td>1.6</td>
<td>0.3</td>
<td>3.8</td>
<td>2.2</td>
</tr>
<tr>
<td>002</td>
<td>Flange</td>
<td>Wire (SP)</td>
<td></td>
<td>9</td>
<td>11</td>
<td>73</td>
<td>4.2</td>
<td>2.5</td>
<td>0.4</td>
<td>5.6</td>
<td>3.4</td>
</tr>
<tr>
<td>003</td>
<td>Flange</td>
<td>Wire (SP)</td>
<td></td>
<td>12</td>
<td>14</td>
<td>115</td>
<td>5.4</td>
<td>3.2</td>
<td>0.6</td>
<td>7.6</td>
<td>4.3</td>
</tr>
<tr>
<td>004</td>
<td>Flange</td>
<td>Wire (SP)</td>
<td></td>
<td>18</td>
<td>22</td>
<td>280</td>
<td>8.4</td>
<td>5.0</td>
<td>0.8</td>
<td>11.2</td>
<td>6.7</td>
</tr>
<tr>
<td>005</td>
<td>Flange</td>
<td>Wire (SP)</td>
<td></td>
<td>22</td>
<td>27</td>
<td>430</td>
<td>10.3</td>
<td>6.0</td>
<td>1.0</td>
<td>14.0</td>
<td>8.0</td>
</tr>
<tr>
<td>006</td>
<td>Flange</td>
<td>Wire (SP)</td>
<td></td>
<td>26.5</td>
<td>35</td>
<td>720</td>
<td>13.5</td>
<td>8.1</td>
<td>1.5</td>
<td>18.0</td>
<td>10.8</td>
</tr>
<tr>
<td>007</td>
<td>Flange</td>
<td>Wire (SP)</td>
<td></td>
<td>36</td>
<td>42</td>
<td>1,040</td>
<td>17.5</td>
<td>10.5</td>
<td>1.9</td>
<td>22.8</td>
<td>14.0</td>
</tr>
</tbody>
</table>

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.
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>
<thead>
<tr>
<th>TABLE II. Qualification inspection and sample size. 1/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single submission</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>22 units plus 1 open unit for level L at C = 0  2/</td>
</tr>
<tr>
<td>33 units plus 1 open unit for level M at C = 0  2/</td>
</tr>
<tr>
<td>Qualification inspection as applicable</td>
</tr>
</tbody>
</table>

M39016/53-011
M39016/53-001
M39016/53-003
M39016/53-007
M39016/53-009
M39016/53-013
M39016/53-006
M39016/53-026

2/ The number of units required for qualification testing will be increased as required in group IV, table II, MIL-PRF-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.

1/ For retention of qualification or extension of qualification to low failure rate levels, all life test data accumulated on MIL-PRF-39016/54 may be used in addition to MIL-PRF-39016/53 data. Prior to performance of retention of qualification inspection testing; the relay manufacturer shall preselect the sampling plan.
Qualification inspection (reduced testing) and sample size: See table III. If the relays produced for MIL-PRF-39016/53 are similar in construction and design except for the diodes and coils to the relays produced for MIL-PRF-39016/54 then reduced testing for qualification of MIL-PRF-39016/53 relays may be performed concurrent with or subsequent to successful qualification of MIL-PRF-39016/54.

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

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

Referenced documents: In addition to MIL-PRF-39016, this document references the following:

- MIL-PRF-39016/54
- MIL-STD-202-204
- MIL-STD-202-214
- MIL-STD-202-213
- MIL-STD-750
- MIL-STD-1285
- ASTM-B488

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 previous issue.

Custodians: Preparing activity:
- Army - CR
- Navy - EC
- Air Force - 85
- DLA - CC

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

(Project 5945-2018-042)

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/.