

INCH-POUND

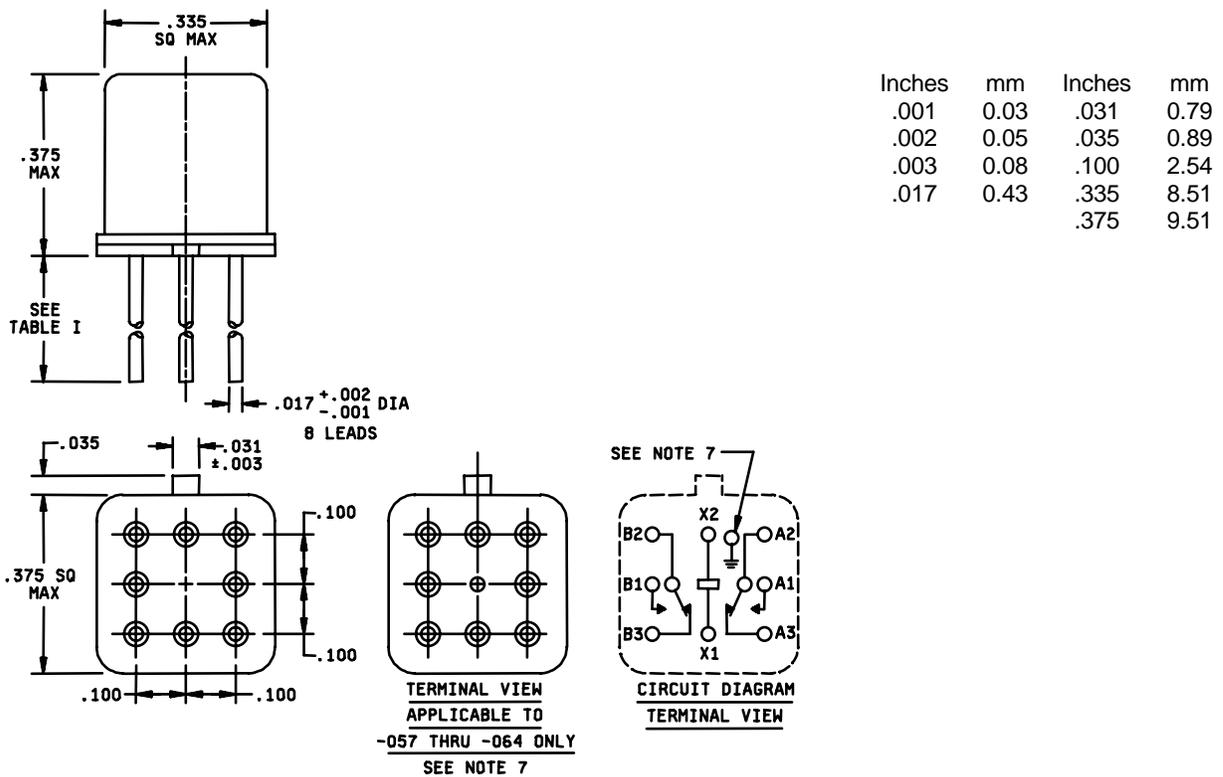
MIL-PRF-39016/41E
15 June 2005
SUPERSEDING
MIL-PRF-39016/41D
20 July 1988

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT,
LOW LEVEL TO 1 AMPERE, TERMINALS 0.100-INCH GRID PATTERN
SENSITIVE, 60 MILLIWATTS, COIL OPERATE POWER AT 25°C

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

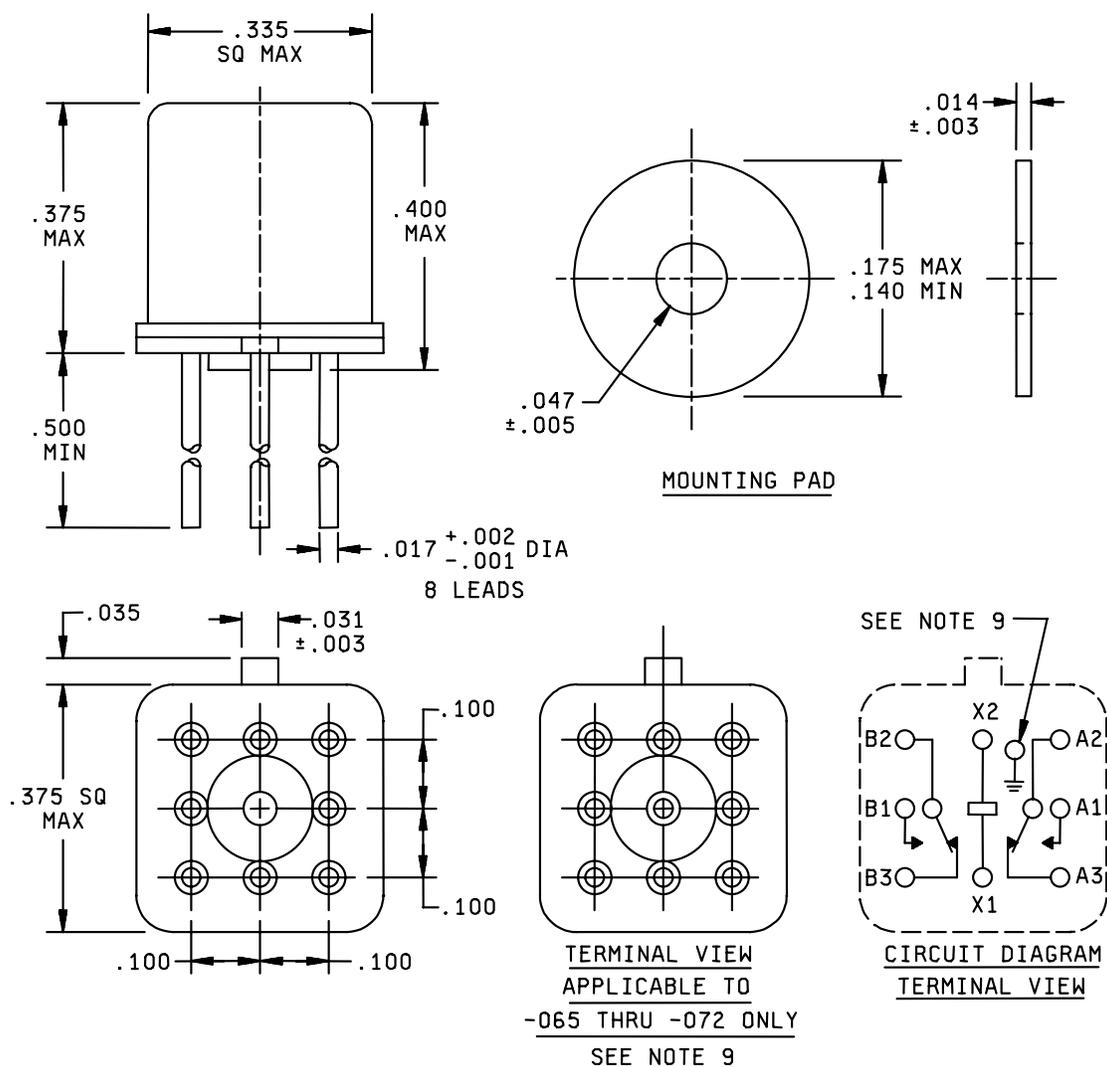
The complete requirements for acquiring the relays described herein shall
consist of this specification sheet and the latest issue of MIL-PRF-39016.



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 numbers shown above are for reference only. Numbers do not appear on the relay.
5. Coil symbol optional in accordance with MIL-STD-1285.
6. Circuit diagram shown on part is the terminal view.
7. Dash numbers -057 through -064 shall be supplied with a case grounding pin welded to the header as shown.

FIGURE 1. Dimensions and configuration.



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 numbers shown above are for reference only. Numbers do not appear on relay.
5. Coil symbol optional in accordance with MIL-STD-1285.
6. Circuit diagram shown on part is the terminal view.
7. Spacer mounting pad shall be a polyester film per MIL-I-631, type G, class I.
8. Dash numbers -065 through -072 shall be supplied with a case grounding pin welded to the header as shown.

FIGURE 2. Dimensions and configuration (relay with spacer mounting pad).

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded):

Resistive:

1.0 ampere at 28 V dc.

250 milliamperes at 115 V ac 60 and 400 Hz case not grounded.

100 milliamperes at 115 V ac 60 and 400 Hz case grounded.

Inductive: 0.2 ampere at 28 V dc with 0.32 henry inductance.

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 or voltage drop:

Initial: 0.10 ohm maximum (0.110 ohm maximum with spacer mounting pad).

High level:

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

After life: 0.20 ohm maximum (0.210 ohm maximum with spacer mounting pad).

Low level:

During life: 100 ohms maximum.

After life: 0.15 ohm maximum (0.160 ohm maximum with spacer mounting pad).

Intermediate current:

During intermediate current: 3 ohms maximum.

After intermediate current: 0.20 ohm maximum (0.210 ohm maximum with spacer mounting pad).

Contact bounce: 1.5 milliseconds maximum (applicable to failure rate level "L").

Contact stabilization time: 2.5 milliseconds maximum (applicable to failure rate levels "M", "P", and "R").

Overload (high level only): Two times rated current. Not applicable to ac load ratings.

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COIL DATA: (See table I).

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

Release time: 2.5 ms maximum over temperature range with rated coil voltage.

ELECTRICAL DATA:

Insulation resistance: 10,000 megohms minimum at 500 V dc, 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)	Post intermediate current life test 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.	500	500	125 All terminals to case
Between case, frame, or enclosure and coils.	500	500	
Between all contacts and coils.	500	500	
Between open contacts in the energized and de-energized positions.	500	375	
Between contact poles.	500	500	
Between coils of dual coil relays.	N/A	N/A	

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 B (75 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.

Acceleration: Applicable.

Salt atmosphere (corrosion): In accordance with MIL-STD-750, method 1041.

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PHYSICAL DATA:

Terminals:

Termination strength: 1 pound pull minimum.

Terminal twist test: As specified in MIL-PRF-39016.

Dimensions and configuration: See figure 1 and table I.

Terminations: See figure 1 and table I.

Weight: 4.30 grams (0.15 ounce) maximum.

Solderability: Applicable.

Minimum marking: Military part number "J" with the date code (example J0430), circuit diagram, manufacturers' 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 or Identifying Number (PIN): M39016/41 - (dash number from table I and suffix letter designating failure rate level).

TABLE I. Dash numbers and characteristics. 1/

Dash numbers 2/					Coil voltage V dc 5/		AT +25°C				Over temperature range		
Lead length .500 min	Lead length .187 ±.010	Spacer mounting pads (fig.2) 3/	Lead length .500 min with ground pin 4/	Spacer mounting pads (fig.2) with ground pin 3/ 4/	Rated	Max	Coil resist- ance ohms ±010%	Speci- fied pickup value (voltage) (V dc)	Speci- fied hold value (voltage) (V dc)	Speci- fied dropout value (voltage) (V dc)	Speci- fied pickup value (voltage) (V dc)	Speci- fied hold value (voltage) (V dc)	Speci- fied dropout value (voltage) (V dc)
033	041	049	057	065	5.0	7.5	100	2.6	1.4	0.23	3.5	2.5	0.12
034	042	050	058	066	6.0	10.0	200	3.4	2.0	0.28	4.5	3.2	0.18
035	043	051	059	067	12.0	20.0	800	7.0	4.0	0.64	9.0	6.5	0.41
036	044	052	060	068	26.5	40.0	3,200	14.0	8.0	1.4	18.0	13.0	0.89
037	045	053	061	069	36.0	57.0	6,500	20.0	10.0	1.8	27.0	19.0	1.25
038	046	054	062	070	48.0	75.0	11,000	25.8	13.0	2.4	36.0	26.0	1.60
039	047	055	063	071	9.0	15.0	400	4.85	3.0	0.55	6.8	4.9	0.35
040	048	056	064	072	18.0	30.0	1,600	9.8	6.0	0.92	13.5	10.0	0.59

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/ 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, 033L - - - - -56R.

3/ Relays supplied with spacer mounting pads (-049 through -056 and -65 through -072) shall have the spacer mounting pad rigidly attached.

4/ Dash numbers 057 through -072 shall be supplied with a case grounding pin welded to the relay header (see figures 1 and 2).

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

QUALIFICATION INSPECTION:

Qualification inspection and sample size: See table II.

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

Single submission	Group submission	
18 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	M39016/41-036	18 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
	M39016/41-033	2 units each part number Qualification inspection Q1.
	M39016/41-034	
	M39016/41-035	
	M39016/41-037	
	M39016/41-038	
	M39016/41-039	
	M39016/41-040	1 unit terminal strength and solderability
M39016/41-060		

^{1/} For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on MIL-PRF-39016/42 and MIL-PRF-39016/43 may be used in addition to MIL-PRF-39016/41 data. Prior to performance of retention of qualification testing, the relay manufacturer shall preselect the sampling plan.

^{2/} The number of units required for qualification testing shall 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 sampling plan.

Qualification inspection (reduced testing) (sample size - 2 units each coil voltage and 1 unsealed unit): See table III.

If the relays produced for MIL-PRF-39016/41 are similar in construction and design except for the suppressor and steering diodes to the relays produced for MIL-PRF-39016/42 and MIL-PRF-39016/43, then reduced testing for qualification of MIL-PRF-39016/41 relays may be performed concurrent with or subsequent to successful qualification of MIL-PRF-39016/42 and MIL-PRF-39016/43.

TABLE III. Qualification inspection (reduced testing).

Examination or test
2 units each coil voltage - Q1 qualification inspection table
1 unsealed sample unit for internal examination.

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Initial qualification of relays supplied with spacer mounting pads (-049 through -056 and -065 through -072), shall be tested as specified below:

Perform the following tests as specified in the qualification inspection table of MIL-PRF-39016, in the order shown below:

Before installation of spacer mounting pad; screening, visual and mechanical inspection (internal), thermal shock, resistance to solvents, vibration (sinusoidal), vibration (random), shock (specified pulse), acceleration, terminal strength, magnetic interference (when specified), capacitance (when specified), coil life (applicable to continuous duty relays only), resistance to soldering heat, salt spray (corrosion), overload (applicable to high level relays only), life, terminal strength, and intermediate current.

After installation of spacer mounting pad, perform the following tests as specified in the qualification inspection table of MIL-PRF-39016, in the order shown below:

Insulation resistance, dielectric withstanding voltage, static contact resistance, specified pickup, hold, and dropout values (voltages), coil resistance, operate and release time, contact dynamic characteristics, coil transient suppression (when specified), solderability, seal, visual and mechanical inspection (external).

Qualification inspection (reduced testing for previously qualified relays) for relays supplied with spacer mounting pads (-049 through -056 and 065 through -072) two units of the 26.5 volt rated coil voltage (-052) shall be tested as specified below:

Before installation of spacer mounting pad, perform the following tests as specified in the qualification inspection table of MIL-PRF-39016 in the order shown below:

For failure rate level L only: Screening. (Failure rate level "L" is inactive for new design).
For failure rate levels M, P, and R: Vibration (sinusoidal) test duration shall be 10 minutes, vibration (random), and screening.

After installation of spacer mounting pad, perform the following tests as specified in the qualification inspection table of MIL-PRF-39016 in the order shown below:

Insulation resistance, dielectric withstanding voltage, static contact resistance, specified pickup, hold, and dropout values (voltages), coil resistance, operate and release time, contact dynamic characteristics, coil transient suppression (when specified), solderability, seal, visual, and mechanical inspection (external).

Group A testing for relays supplied with spacer mounting pads (-049 through -056 and -065 through -072) shall be tested as specified below:

Perform seal test immediately preceding the A2 electrical tests. Relay leads shall be formed and the spacer mounting pad removed before the seal test. After the seal test, the spacer mounting pad shall be rigidly attached to the relay and the remaining group A tests performed (The seal test is not performed with group A4.)

SUPERSESSSION DATA:

Supersession data: See table IV.

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TABLE III. Supersession data. 1/ 2/

Superseded part no. M39016/41-	New part no. M39016/41-		Superseded part no. M39016/41-	New part no. M39016/41-
001	033		017	033
002	034		018	034
003	035		019	035
004	036		020	036
005	037		021	037
006	038		022	038
007	039		023	039
008	040		024	040
009	041		025	041
010	042		026	042
011	043		027	043
012	044		028	044
013	045		029	045
014	046		030	046
015	047		031	047
016	048		032	048

1/ Dash numbers -001 through -032, .350 inch high cans have been canceled and superseded by -033 through-048, .375 inch high cans. The .350 inch high cans are no longer manufactured.

2/ Complete part number shall consist of M39016/41- a dash number and suffix letter designating failure rate level (see 2/ of table I).

For Government logistical support: See table V.

TABLE V. Cross reference for Government logistical support. 1/

Superseded part number M39016/41-	New part number M39016/41-	Support with part number M39016/41-	Superseded part number M39016/41-	New part no. M39016/41-	Support with part number M39016/41-	New part number M39016/41-	Support with part no. M39016/41-
001	033	033	025	041	033	049	049
002	035	034	026	042	034	050	050
003	035	035	027	043	035	051	051
004	036	036	028	044	036	052	052
005	037	037	029	045	037	053	053
006	038	038	030	046	038	054	054
007	039	039	031	047	039	055	055
008	040	040	032	048	040	056	056
009	041	033		033	033	057	057
010	042	034		034	034	058	058
011	043	035		035	035	059	059
012	044	036		036	036	060	060
013	045	037		037	037	061	061
014	046	038		038	038	062	062
015	047	039		039	039	063	063
016	048	040		040	040	064	064
017	033	033		041	033	065	065
018	034	034		042	034	066	066
019	035	035		043	035	067	067
020	036	036		044	036	068	068
021	037	037		045	037	069	069
022	038	038		046	038	070	070
023	039	039		047	039	071	071
024	040	040		048	040	072	072

1/ See 2/ of table IV.

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

MIL-I-631
MIL-PRF-39016/42, /43
MIL-STD-202
MIL-STD-750
MIL-STD-1285

Changes from previous issue: Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

Review activities:
Navy - AS
Air Force - 99

(Project 5945-1266)

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 <http://assist.daps.dla.mil>.