

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT,
 LOW LEVEL TO 2 AMPERES (0.200-INCH TERMINAL SPACING)

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.

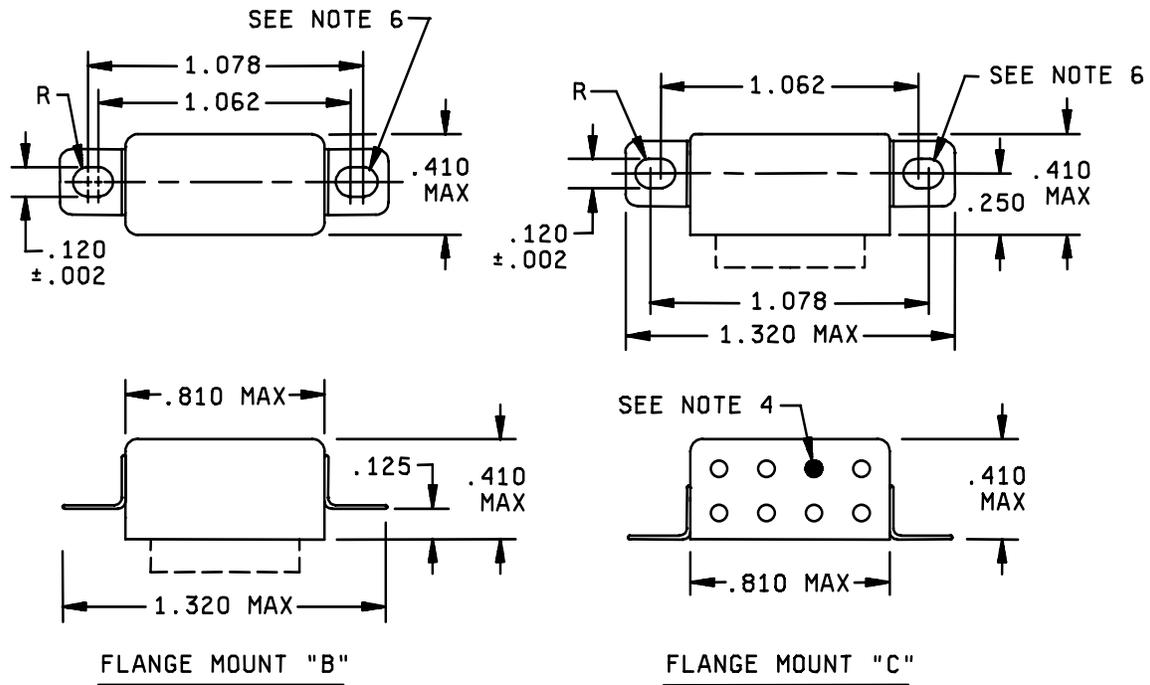


FIGURE 1. Dimensions and configuration.

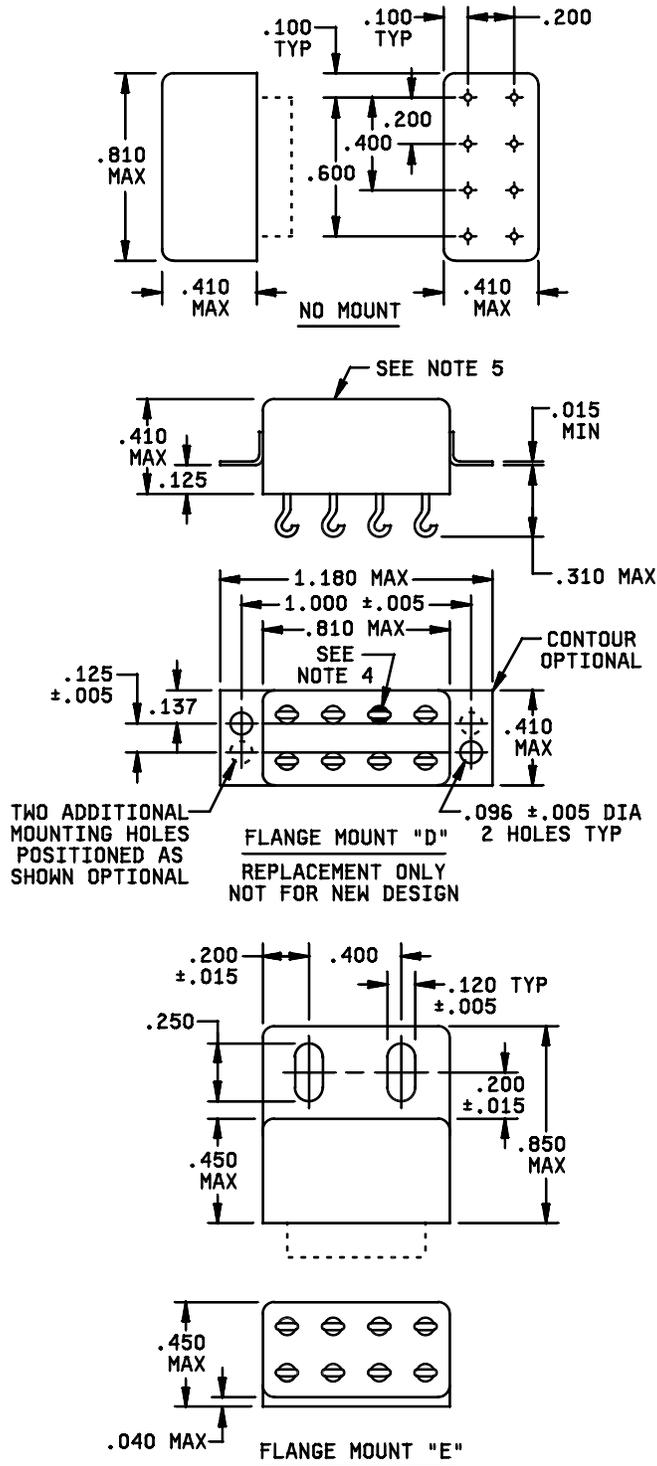
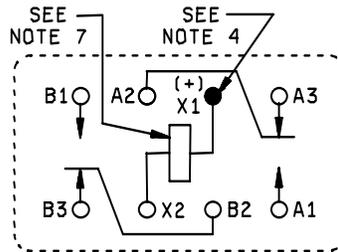
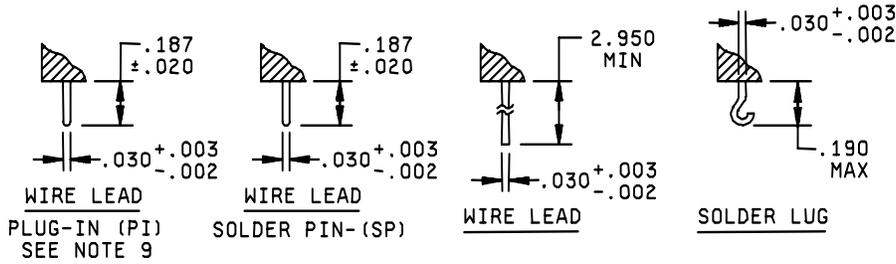


FIGURE 1. Dimensions and configuration - Continued.

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CIRCUIT DIAGRAM
TERMINAL VIEW
DEENERGIZED POSITION

Inches	mm	Inches	mm	Inches	mm
.002	0.05	.125	3.18	.600	15.24
.003	0.08	.137	3.48	.810	20.57
.005	0.13	.187	4.75	.850	21.59
.015	0.38	.190	4.83	1.000	25.40
.020	0.51	.200	5.08	1.062	26.97
.030	0.76	.250	6.35	1.078	27.38
.040	1.02	.310	7.87	1.180	29.97
.096	2.44	.400	10.10	1.320	33.53
.100	2.54	.410	10.41	2.950	74.93
.120	3.05	.450	11.43		

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. Indicated terminal shall be marked with a contrasting bead.
5. Circuit diagram (including terminal designations) shall be marked on top if legible from the mounted position, otherwise marking surface is optional.
6. Mounting screw head clearances are based on use of .112 diameter fillister head screws.
7. Coil symbol shall be in accordance with MIL-STD-1285.
8. Mounting surface finish shall be compatible with aluminum (duralumin type) as defined by MIL-STD-889.
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. Dimensions and configuration - Continued.

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REQUIREMENTS:

CONTACT DATA:

Load ratings:	<u>Type 1</u> ^{1/}	<u>Type 2</u> ^{1/}
High level (relay case grounded):		
Resistive:	2 A at 28 V dc 0.3 A at 115 V ac (60 and 400 Hz)	2 A at 28 V dc 0.1 A at 115 V ac (60 and 400 Hz)
Inductive:	0.75 A at 28 V dc with 0.200 H inductance	0.5 A at 28 V dc with 0.200 H inductance
Lamp:	0.160 A at 28 V dc	0.160 A at 28 V dc
Low level:	10 to 50 μ A at 10 to 50 mV dc or peak ac	10 to 50 μ A at 10 to 50 mV dc or peak ac
Intermediate current:	Applicable	Applicable

Contact resistance and voltage drop:

High level:

Before life: 0.050 Ω maximum.
During life: Not more than 5 percent of open circuit voltage.
After life: 0.100 Ω maximum.

Low level:

Before life: 0.050 Ω maximum.
During life: 33 Ω maximum.
After life: 0.150 Ω maximum.

Intermediate current:

Before: 0.050 Ω maximum.
During: 1 Ω maximum.
After: 0.100 Ω maximum.

Contact bounce: 2.0 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): Two times rated current.

COIL DATA: See table I.

Operate time: 4 ms maximum over temperature range with rated coil voltage.

Release time: 4 ms maximum over temperature range from rated coil voltage.

^{1/} Original equipment manufacturers (OEM's) should use type 2 relays whenever the ac resistance or dc inductive load ratings are satisfactory.

ELECTRICAL DATA:

Insulation resistance: 10,000 MΩ 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.	1,000	350 All terminals to case
Between case, frame, or enclosure and coil.	500	
Between all contacts and coil	1,000	
Between open contacts in the energized and de-energized positions	500	
Between contact poles	1,000	

ENVIRONMENTAL DATA:

Temperature range: -65°C to +125°C.

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

Magnetic interference: Applicable.

Resistance to soldering heat: Applicable.

Acceleration: Applicable.

PHYSICAL DATA:

Terminals: See figure 1 and table I.

Terminal strength: 3 ±0.3 pounds pull.

Terminal solderability: Applicable.

Terminal twist test: Applicable to wire lead terminals.

Dimensions and configuration: See figure 1.

Weight: 13 grams (0.46 ounce) maximum.

Identification marking (full): Applicable.

Seal: Hermetic.

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LIFE TEST REQUIREMENTS:

High level: 100,000 cycles.

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

Part or Identifying Number (PIN): M39016/6- (plus dash number from table I and suffix letter designating failure rate level).

TABLE I. Dash numbers and applicable characteristics. 1/

Dash numbers 2/				Mount	Load rating	Coil voltage 4/ (V dc)		At +25°C				Over temperature range 3/		
Wire lead (PI) 6/	Solder lug	Wire lead (SP)	Wire lead			Rated	Max	Coil resistance ohms ±10%	Specified pickup voltage (V dc) max 3/	Specified hold voltage (V dc) 3/	Specified drop-out (V dc) max 3/	Specified pickup voltage (V dc) max	Specified hold voltage (V dc)	Specified drop-out voltage (V dc)
141 --- --- 142 ---	104 107 128 129 149	105 125 --- 109 ---	106 108 --- 110 ---	B C D 5/ None E	Type 1	26.5	32.0	700	13.5	8.0	1.5	18.0	14.0	1.0
241 --- --- 242 ---	204 207 228 229 249	205 225 --- 209 ---	206 208 --- 210 ---	B C D 5/ None E	Type 2									
143 --- 144 ---	111 114 130 150	112 126 116 ---	113 115 117 ---	B C None E	Type 1	12.0	15.0	160	6.4	4.0	0.7	9.0	5.8	0.50
243 --- 244 ---	211 214 230 250	212 226 216 ---	213 215 217 ---	B C None E	Type 2									
145 --- 146 ---	118 121 131 151	119 127 123 ---	120 122 124 ---	B C None E	Type 1	6.0	7.5	40	3.2	2.0	0.35	4.5	2.9	0.25
245 --- 246 ---	218 221 231 251	219 227 223 ---	220 222 224 ---	B C None E	Type 2									

See footnotes on next page.

TABLE 1. Dash numbers and applicable characteristics - Continued. 1/

Dash numbers <u>2/</u>				Mount	Load rating	Coil voltage <u>4/</u> (V dc)		At +25°C				Over temperature range <u>3/</u>		
Wire lead (PI) <u>6/</u>	Solder lug	Wire lead (SP)	Wire lead			Rated	Max	Coil resistance ohms $\pm 10\%$	Specified pickup voltage (V dc) max <u>3/</u>	Specified hold voltage (V dc) <u>3/</u>	Specified pickup voltage (V dc) max <u>3/</u>	Specified pickup voltage (V dc) max	Specified hold voltage (V dc)	Specified drop-out voltage (V dc)
147	132	133	134	B	Type 1	5.0	6.0	27	2.7	1.65	0.29	3.8	2.4	0.21
---	135	136	137	C										
148	138	139	140	None										
---	152	---	---	E	Type 2	5.0	6.0	27	2.7	1.65	0.29	3.8	2.4	0.21
247	232	233	234	B										
---	235	236	237	C										
248	238	239	240	None										
---	252	---	---	E										

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 failure rate level, shall be added to the applicable dash number. Failure rate level (percent per 10,000 operations): L, 3.0, M, 1.0; P, 0.1; R, 0.01. Example, 204M - - - - 204R.

3/ Pick-up, hold and dropout voltages as shown are for test purposes only and are not to be used as design criteria.

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

5/ Not for new design.

6/ Solderability for plug-in relays is not applicable.

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QUALIFICATION INSPECTION AND SAMPLE SIZE: See table II.

TABLE II. Qualification inspection and sample size.

Single submission	Group submission		
	Type 1	Type 2	
33 units plus 1 open unit for level M at C = 0 ^{1/} Qualification inspection as applicable.	M39016/6-104	M39016/6-204	33 units plus 1 open unit for level M at C = 0 ^{1/} Qualification inspection as applicable.
	M39016/6-115 M39016/6-149	M39016/6-215 M39016/6-249	2 units, qualification inspection table, group II, and shock, vibration, acceleration, terminal strength, and seal.
	M39016/6-141 M39016/6-142	M39016/6-241 M39016/6-242	2 units, qualification inspection table, group II, shock, and vibration.
	M39016/6-123 M39016/6-132	M39016/6-223 M39016/6-236	2 units, qualification inspection Q2.
	For extension of qualification to type 2	For extension of qualification to type 1	
	M39016/6-204	Not applicable	1 unsealed sample unit.

^{1/} 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 sample size.

QUALIFICATION INSPECTION (REDUCED TESTING) AND SAMPLE SIZE: See table III. If the relays produced for MIL-PRF-39016/6 are similar in construction and design to the relays produced for MIL-PRF-39016/55 (except for the diodes and coils, as applicable), then reduced testing for qualification of MIL-PRF-39016/6 relays may be performed concurrent with or subsequent to successful qualification of MIL-PRF-39016/55.

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

Examination or test
Q2 of qualification inspection table (2 units each coil voltage)
1 unsealed sample unit for internal examination (submitted with test report)

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SUPERSESSSION DATA: See table IV.

TABLE IV. Supersession data. 1/

Dash number (type 1) PIN M39016/6-	Dash number (type 2) PIN M39016/6-	Superseded PIN MIL-R-5757/9-	Superseded PIN MIL-R-5757/10-
104	204	005, 006	005, 011, 017
105	205	007, 008, 057, 058	006, 012, 018
106	206	009, 010	---
107	207	011, 012	001, 007, 013
108	208	015, 016	002, 008, 014
109	209	003, 004, 061, 062	062
110	210	019, 020	---
111	211	021, 022	---
112	212	023, 024, 063, 064	---
113	213	025, 026	---
114	214	027, 028	---
115	215	031, 032	---
116	216	035, 036, 067, 068	---
117	217	037, 038	---
118	218	039, 040	---
119	219	041, 042, 069, 070	---
120	220	043, 044	---
121	221	045, 046	---
122	222	049, 050	---
123	223	053, 054, 073, 074	061
124	224	055, 056	---
125	225	013, 014, 059, 060	---
126	226	029, 030, 065, 066	---
127	227	047, 048, 071, 072	---
128	228	001, 002	019, 021
129	229	017, 018	---
130	230	033, 034	---
131	231	051, 052	---
132	232	---	---
133	233	---	---
134	234	---	---
135	235	---	---
136	236	---	---
137	237	---	---
138	238	---	---
139	239	---	---
140	240	---	---
141	241	---	---
142	242	---	---
143	243	---	---
144	244	---	---
145	245	---	---
146	246	---	---
147	247	---	---
148	248	---	---
149	249	---	---
150	250	---	---
151	251	---	---
152	252	---	---

1/ The listed M39016/6-100 series PIN's may be substituted for the M39016/6-200 series, the M5757/9 and the M5757/10 PIN's. However, the M39016/6-200 series, the M5757/9 and the M5757/10 PIN's shall not be substituted for the M39016/6-100 series PIN's.

CROSS REFERENCE FOR GOVERNMENT SUPPORT: See table V.

TABLE V. Cross reference for Government logistical support.

Superseded PIN M5757/9-	Superseded PIN M5757/10-	Superseded PIN M39016/6-	Support with PIN M39016/6-
005, 006	005, 011, 017	204	104
007, 008, 057, 058	006, 012, 018	205	105
009, 010	---	206	106
011, 012	001, 007, 013	207	107
015, 016	002, 008, 014	208	108
003, 004, 061, 062	062	209	109
019, 020	---	210	110
021, 022	---	211	111
023, 024, 063, 064	---	212	112
025, 026	---	213	113
027, 028	---	214	114
031, 032	---	215	115
035, 036, 067, 068	---	216	116
037, 038	---	217	117
039, 040	---	218	118
041, 042, 069, 070	---	219	119
043, 044	---	220	120
045, 046	---	221	121
049, 050	---	222	122
053, 054, 073, 074	061	223	123
055, 056	---	224	124
013, 014, 059, 060	---	225	125
029, 030, 065, 066	---	226	126
047, 048, 071, 072	---	227	127
001, 002	019, 021	228	128
017, 018	---	229	129
033, 034	---	230	130
051, 052	---	231	131
---	---	232	132
---	---	233	133
---	---	234	134
---	---	235	135
---	---	236	136
---	---	237	137
---	---	238	138
---	---	239	139
---	---	240	140
---	---	241	141
---	---	242	142
---	---	243	143
---	---	244	144
---	---	245	145
---	---	246	146
---	---	247	147
---	---	248	148
---	---	249	149
---	---	250	150
---	---	251	151
---	---	252	152

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

ASTM B488
MIL-PRF-39016/55
MIL-STD-202
MIL-STD-889
MIL-STD-1285

Custodians:

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

Preparing activity:

DLA - CC

Review activities:

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

(Project 5945-1243)

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://www.dodssp.daps.mil>.