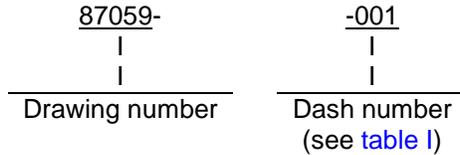


1. SCOPE

1.1 Scope. This drawing describes the requirements for a family of circuit breakers with shock enhancement for use in overcurrent protection.

1.2 Part or Identifying Number (PIN). The complete PIN is as follows:



2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

[MIL-PRF-39019](#) - Circuit Breakers, Magnetic, Low-Power, Sealed, Trip-Free, General Specification for

| (Copies of this document is available online at <http://quicksearch.dla.mil>.)

2.3 Non-Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents are those cited in the solicitation or contract (see 6.2).

| SAE INTERNATIONAL

[SAE-AMS-QQ-N-290](#) - Nickel Plating (Electrodeposited).

| (Copies of this document are available online at <http://www.sae.org/>.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Interface and physical dimensions. The interface and physical dimensions shall be as specified herein (see [table I](#), [table II](#), [table III](#), and [figure 1](#)).

3.2 Voltage and frequency rating. 50 V dc, maximum and 240 V ac, maximum at 60 and 400 Hz.

3.3 Current rating. See [table I](#).

3.5 Time delay. Time delay shall be in accordance with [table I](#), [table II](#), and [table III](#).

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3.6 Shock.

3.6.1 Shock (100 g's). When circuit breakers are tested as specified in 4.2.1, main circuit breaker contacts shall not trip. There shall be no closing of open main contacts, nor opening of closed main contacts in excess of 10 μ s duration, nor shall there be any evidence of mechanical or electrical damage.

3.6.2 Shock (150 g's). When circuit breakers are tested as specified in 4.2.2, the main circuit breaker contacts shall not trip. There shall be no evidence of mechanical or electrical damage.

3.6.3 Shock (200 g's). When circuit breakers are tested as specified in 4.2.3, the main circuit breaker contacts shall not trip. There shall be no evidence of mechanical or electrical damage.

3.7 Endurance. Endurance shall be in accordance with MIL-PRF-39019, except that the number of operations shall be 5,000.

3.8 Resistance or impedance. See table I.

3.9 Interrupting capacity. Interrupting capacity shall be in accordance with MIL-PRF-39019.

3.10 Dielectric withstanding voltage. Dielectric withstanding voltage shall be in accordance with MIL-PRF-39019.

3.11 Vibration. Vibration shall be in accordance with MIL-PRF-39019.

3.12 Insulation resistance. Insulation resistance shall be in accordance with MIL-PRF-39019.

3.13 Lever operating force. Lever operating force shall be in accordance with MIL-PRF-39019 except for the following: One-pole breaker: 7 pounds maximum; two-pole breaker: 10 pounds maximum; and three-pole breaker: 16 pounds maximum.

3.14 Auxiliary contacts. Auxiliary contacts shall be 0.5 amperes maximum at 120 V ac or 50 V dc.

3.15 Marking. Marking shall be as specified in MIL-PRF-39019, except the drawing PIN in accordance with 1.2 herein shall be used instead of the military part number.

3.16 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.17 Manufacturer eligibility. To be eligible for listing as an approved source of supply, a manufacturer shall be listed on the MIL-PRF-39019 Qualified Product List for at least one part, or perform the Group A inspection specified herein on a sample of parts agreed upon by the manufacturer and DLA Land and Maritime-VA.

3.18 Certificate of compliance. A certificate of compliance shall be required from a manufacturer requesting to be an approved source of supply.

3.19 Workmanship. Parts shall be free of flash pits, voids, and excessive mold marks. Visible parting line is acceptable.

4. VERIFICATION

4.1 Conformance inspection.

4.1.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection of MIL-PRF-39019.

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4.1.2 Certification. The acquiring activity, at its discretion, may accept a certificate of compliance with group A requirements in lieu of performing group A tests (see 6.2c).

4.1.3 Inspection of packaging. Inspection of packaging shall be in accordance with MIL-PRF-39019.

4.2 Shock.

4.2.1 Shock (100 g's).

- a. Mounting method: Normal mounting means.
- b. Test condition: Method 213 of MIL-STD-202, test condition C (100 g's, 6 ms).
- c. Electrical-load conditions and measurements: Of the three shocks in each direction required, two shocks shall be performed with the circuit breaker energized at 100 percent of rated current, at 12 V dc, except that for the directions with the operating lever pivot up (table mount) and the operating lever pivot down (ceiling mount), no voltage or current shall be applied. Each energized shock shall be monitored to determine opening of the main or auxiliary circuit breaker contacts. The remaining shock in each direction shall be performed with the circuit breaker contacts open and unenergized and shall be monitored to determine closing of the main or auxiliary contacts.

4.2.2 Shock (150 g's).

- a. Mounting method: Normal mounting means.
- b. Test condition: Special.
 - (1) Peak: 150 g's.
 - (2) Duration: 6 ms.
 - (3) Waveform: Sawtooth.
- c. Electrical-load conditions and measurements: Of the three shocks in each direction required, all shocks shall be performed with the circuit breaker energized at 100 percent of rated current at 12 V dc, except that for the directions with the operating lever pivot up (table mount), and the operating lever pivot down (ceiling mount), no voltage or current shall be applied.

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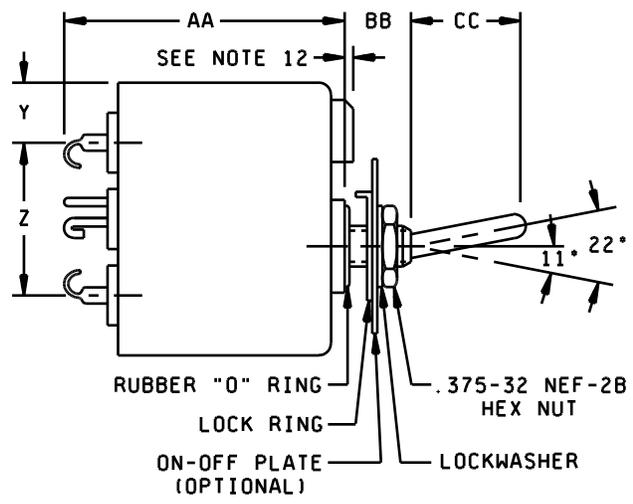
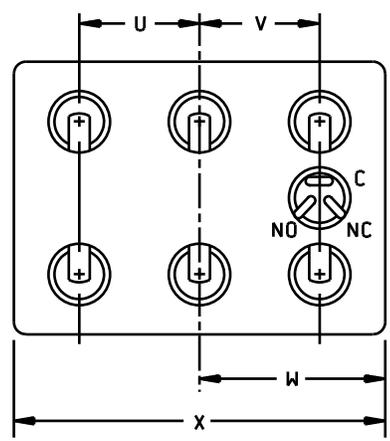
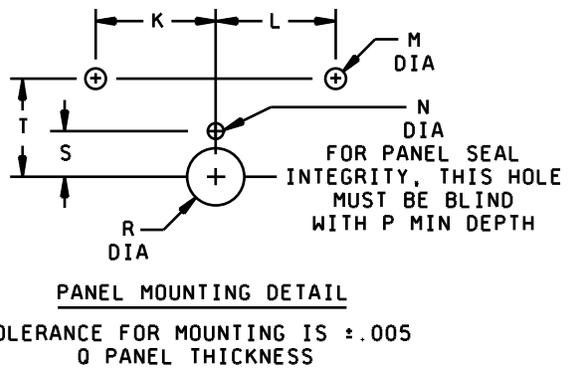
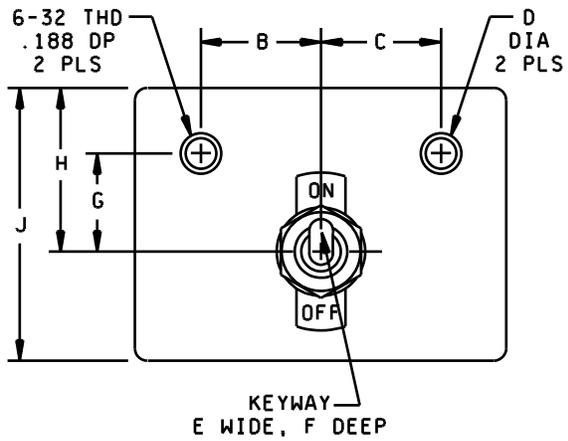


FIGURE 1. Interface and physical dimensions.

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Ltr	Inches		mm	
	Min	Max	Min	Max
B	.656	.718	16.66	18.24
C	.656	.718	16.66	18.24
D	.219	.281	5.56	7.14
E	.060	.065	1.52	1.65
F	.026	.030	0.66	0.76
G	.594	.656	15.09	16.66
H	---	.875	---	22.23
J	---	1.562	---	39.67
K	.684	.690	17.37	17.53
L	.684	.690	17.37	17.53
M	.145 dia	.149 dia	3.68 dia	3.78 dia
N	.094 dia	.156 dia	2.39 dia	3.96
P	.075	---	1.91	---
Q	.125	.156	3.18	3.96
R	.360 dia	.422 dia	9.14 dia	10.72 dia
S	.294	.356	7.47	9.04
T	.594	.656	15.09	16.66
U	.594	.656	15.09	16.66
V	.594	.656	15.09	16.66
W	.906	.968	23.01	24.59
X	---	1.937	---	49.20
Y	.281	.343	7.14	8.71
Z	.844	.906	21.44	23.01
AA	---	1.780	---	45.21
BB	---	.380	---	9.65
CC	---	.625	---	15.88

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ± 0.031 and $\pm 5^\circ$ on angles.
4. Envelope design optional.
5. Hex mounting nut .375-32 UNEF-2B thread, $.500 \pm .010$ across flats, $.093 \pm .005$ thick, brass nickel plated, [SAE-AMS-QQ-N-290](#) nonglare, or stainless steel.
6. Internal tooth lockwasher, .507/.493 O.D., .392/.382 I.D., $.025 \pm .005$ thick, stainless steel.
7. Auxiliary contact terminals shall be located at the back side of the circuit breaker (same surface as main terminals), but otherwise their location, style, and design shall be optional, consistent with dimensional or other specified requirements. Auxiliary contact terminals shall accommodate 2 number 20 AWG wires.
8. The effective bushing thread length (not including mounting hardware) is .280 minimum.
9. Marking may appear on any surface except the mounting surface.
10. Lock ring not required if on-off plate has locking tab.
11. Numerical marking optional on circuit diagram.
12. Threaded inserts exceed seated height of bushing by .005 to .015.

FIGURE 1. Interface and physical dimensions - Continued.

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TABLE I. Circuit breaker dash number and applicable characteristics.

PIN 87059-	Current rating (amps)	Time delay 1/	Resistance or impedance (ohms - max) 2/			PIN 87059-	Current rating (amps)	Time delay 1/	Resistance or impedance (ohms - max) 2/		
			DC	60 Hz	400 Hz				DC	60 Hz	400 Hz
001	0.05	A	680.0	690.0	710.0	023	4.0	A	0.10	0.10	0.12
002	0.05	B	680.0	690.0	710.0	024	4.0	B	0.10	0.10	0.12
003	0.1	A	150.0	170.0	180.0	025	5.0	A	0.061	0.063	0.072
004	0.1	B	150.0	170.0	180.0	026	5.0	B	0.061	0.063	0.072
005	0.25	A	20.0	26.0	27.0	027	6.0	A	0.042	0.043	0.050
006	0.25	B	20.0	26.0	27.0	028	6.0	B	0.042	0.043	0.050
007	0.5	A	5.4	6.0	6.6	029	7.0	A	0.036	0.036	0.040
008	0.5	B	5.4	6.0	6.6	030	7.0	B	0.036	0.036	0.040
009	0.75	A	2.5	2.7	2.8	031	7.5	A	0.031	0.031	0.038
010	0.75	B	2.5	2.7	2.8	032	7.5	B	0.031	0.031	0.038
011	1.0	A	1.35	1.5	1.61	033	8.0	A	0.027	0.028	0.035
012	1.0	B	1.35	1.5	1.61	034	8.0	B	0.027	0.028	0.035
013	1.25	A	0.9	1.0	1.1	035	9.0	A	0.022	0.022	0.028
014	1.25	B	0.9	1.0	1.1	036	9.0	B	0.022	0.022	0.028
015	1.5	A	0.65	0.70	0.75	037	10.0	A	0.018	0.021	0.024
016	1.5	B	0.65	0.70	0.75	038	10.0	B	0.018	0.021	0.024
017	2.0	A	0.40	0.40	0.50	039	12.5	A	0.012	0.013	0.015
018	2.0	B	0.40	0.40	0.50	040	12.5	B	0.012	0.013	0.015
019	2.5	A	0.25	0.25	0.27	041	15.0	A	0.009	0.009	0.010
020	2.5	B	0.25	0.25	0.27	042	15.0	B	0.009	0.009	0.010
021	3.0	A	0.15	0.15	0.17	043	20.0	A	0.006	0.006	0.007
022	3.0	B	0.15	0.15	0.17	044	20.0	B	0.006	0.006	0.007

1/ All dash numbers include inertial delay with the time delay.

2/ The corresponding maximum wattage losses, which in no case shall exceed 3.0 watts, may be calculated as I^2R or I^2Z .

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TABLE II. Calibration tripping times (seconds) at +25°C ±2°C.

Percent of rated current	Time delay A (fast)		Time delay B (slow)	
	Min	Max	Min	Max
100	No trip 1 hour	No trip 1 hour	No trip 1 hour	No trip 1 hour
150	0.2	7.0	3.0	70.0
200	0.055	2.0	0.5	20.0
400	Inst <u>1/</u>	0.24	Inst <u>1/</u>	1.75
600	Inst <u>1/</u>	0.13	Inst <u>1/</u>	0.6
800	Inst <u>1/</u>	0.06	Inst <u>1/</u>	0.1 <u>2/</u>
800 at 60 Hz <u>3/</u>	No trip	No trip	No trip	No trip
1,400 at 400 Hz <u>4/</u>	No trip	No trip	No trip	No trip

1/ (Inst) instantaneous is defined as less than 0.015 second.

2/ This time is extended to 0.3 second for dc and 400 Hz.

3/ Eight hundred percent peak, one 1/2 sine pulse at 60 Hz.

4/ One thousand and four hundred percent peak, one 1/2 sine pulse at 400 Hz.

TABLE III. High and low temperature tripping times (seconds).

Percent of rated current	Time delay A (fast)		Time delay B (slow)	
	-40°C ± 2°C	+100°C ± 2°C	-40°C ± 2°C	+100°C ± 2°C
	Max	Min	Max	Min
100	No trip 1 hour	No trip 1 hour	No trip 1 hour	No trip 1 hour
150	800.0	---	1,000.0	---
200	10.0	0.015	50.0	0.04
400	0.7	Inst <u>1/</u>	10.0	Inst <u>1/</u>
500	0.5	Inst <u>1/</u>	2.0	Inst <u>1/</u>
800	0.06	Inst <u>1/</u>	0.1 <u>2/</u>	Inst <u>1/</u>
800 at 60 Hz <u>3/</u>	No trip	No trip	No trip	No trip
1,400 at 400 Hz <u>4/</u>	No trip	No trip	No trip	No trip

1/ (Inst) instantaneous is defined as less than 0.015 second.

2/ This time is extended to 0.3 second for dc and 400 Hz.

3/ Eight hundred percent peak, one 1/2 sine pulse at 60 Hz.

4/ One thousand and four hundred percent peak, one 1/2 sine pulse at 400 Hz.

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4.2.3 Shock (200 g's).

- a. Mounting method: Normal mounting means.
- b. Test condition: Special.
 - (1) Peak: 200 g's.
 - (2) Duration: 1.5 ms.
 - (3) Waveform: Half-sine.
- c. Electrical-load conditions and measurements; Of the three shocks in each direction required, all shocks shall be performed with the circuit breaker energized at 100 percent rated current at 12 V dc, except that for the directions with the operating lever pivot up (table mount) and the operating lever pivot down (ceiling mount), no voltage or current shall be applied.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. Devices conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application.

6.2 Ordering data. The contract or purchase order should specify the following:

- a. Complete PIN (see 1.2).
- b. Requirements for delivery of one copy of the conformance inspection data or certificate of compliance that parts have passed conformance inspection with each shipment of parts by the manufacturer.
- c. Whether the manufacturer performs the group A tests or provides certification of compliance with group A requirements.
- d. Requirements for notification of change of product to the contracting activity, if applicable.
- e. Requirements for packaging and packing.

6.3 Users of record. Coordination of this document for future revisions is coordinated only with the approved source(s) of supply and the users of record of this document. Requests to be added as a recorded user of this drawing may be achieved online at CircuitProtect@dla.mil or if in writing to: DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-0548 or DSN 850-0548.

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6.4 Approved source(s) of supply. Approved source(s) of supply are listed herein. Additional sources will be added as they become available. Assistance in the use of this drawing may be obtained online at CircuitProtect@dla.mil, or by contacting DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990 or by telephone (614)-692-0548 or DSN 850-0548.

DLA Land and Maritime drawing PIN 87059- <u>1/</u>	Vendor similar designation or type number <u>1/</u>	Vendor CAGE	Vendor name and address
001	AP112-R-87059-001	82647	Sensata Technologies, Incorporated 529 Pleasant Street Attleboro, MA 02703-2421 Phone number: (508) 236-3287 Facsimile number: (508) 236-1598 E-mail: cmbinfo@pp.sensata.com Uniform Resource Locator (URL): http://www.sensata.com
002	AP112-R-87059-002		
003	AP112-R-87059-003		
004	AP112-R-87059-004		
005	AP112-R-87059-005		
006	AP112-R-87059-006		
007	AP112-R-87059-007		
008	AP112-R-87059-008		
009	AP112-R-87059-009		
010	AP112-R-87059-010		
011	AP112-R-87059-011		
012	AP112-R-87059-012		
013	AP112-R-87059-013		
014	AP112-R-87059-014		
015	AP112-R-87059-015		
016	AP112-R-87059-016		
17	AP112-R-87059-017		
018	AP112-R-87059-018		
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041	AP112-R-87059-041		
042	AP112-R-87059-042		
043	AP112-R-87059-043		
044	AP112-R-87059-044		

1/ Parts must be purchased to this DLA Land and Maritime PIN to assure all performance requirements and tests are met.

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