

INCH-POUND

MIL-C-2212G(SH)
AMENDMENT 1
30 July 1991

MILITARY SPECIFICATION

CONTACTORS AND CONTROLLERS, ELECTRIC MOTOR
AC OR DC, AND ASSOCIATED SWITCHING DEVICES

This amendment forms a part of MIL-C-2212G(SH), dated 12 February 1990, and is approved for use by the Naval Sea Systems Command, Department of the Navy and is available for use by all Departments and Agencies of the Department of Defense.

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2.1.2: Add

"DRAWINGS

Naval Sea Systems Command (NAVSEA)
803-1385850 - Piping, Instrument Pressure for
All Service.

(Application for copies should be addressed to: Commander, Portsmouth Naval Shipyard, Code 202.2, Portsmouth, NH 03801.)"

Delete:

"(Application for copies should be addressed to the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)"

and substitute:

"(Application for copies should be addressed to the Standardization Documents Order Desk, BLDG. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)"

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Add as new paragraph 3.16.7.1:

" 3.16.7.1 Pressure switches. Pressure switches shall have ranges that are specified in tables A and B (ranges shown are minimum; switches having a wider range are acceptable). When specified (see 6.2), pressure switches shall be supplied with ambient pressure compensation. Pressure switches shall withstand a pressure of at least three times the maximum operating pressure, but no longer need to be operational."

AMSC N/A

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FSC 6110

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Add as new table A:

"TABLE A. Range for pressure switches. 1/, 8/

Symbol	Adjustment operating/working pressure range <u>2/</u>	Maximum proof pressure <u>2/</u> (lb/in ²)	Maximum allowable variation from setting (plus or minus)	Optimum differential	Connection for pressure supply
1	15 to 28 inches mercury	5	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
2	1 to 15 lb/in ²	80	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
3	15 to 50 lb/in ²	125	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
4	50 to 150 lb/in ²	200	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
5	100 to 300 lb/in ²	400	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
6	300 to 900 lb/in ²	900	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
7	500 to 1500 lb/in ²	2000	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
8	1000 to 5000	5100	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>

- 1/ Unless otherwise specified, for pressure switches, the ranges to be specified are the operating pressure range and the resetting differential are relative to gauge pressure.
- 2/ Unless otherwise specified, is in gauge pressure. Maximum proof pressure is upper pressure at which performance of switch in the operating range will not be disturbed and shall exceed maximum operating pressure.
- 3/ Unless otherwise specified in the contract or order, type of connection shall be in accordance with Drawing 803-1385850 that is, a mechanical threaded connection. Straight threads shall be standard for all new construction.
- 4/ Manufacturer's name and part number shall be given on the identification plate by which to obtain from manufacturer all the information for which headings are given in this table. The information shall be supplied by the manufacturer to the Naval Sea Systems Command (NAVSEA) for each switch delivered under this specification.

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- 5/ Shall be specified in the ordering data.
- 6/ Repeatability of all switches shall be within 1 percent of the maximum proof pressure for all switches rated for 200 lb/in² and above and within 0.5 percent of the maximum proof pressure for all others. Repeatability, plus operator error, plus gauge error equals maximum allowable variation from setting (tolerance).
- 7/ Differentials (make/break) will vary widely due to applications. Switch capabilities must match ordering data.
- 8/ Ambient pressure compensation (Absolute pressure switch) shall be in the ordering data, if required."

Add as new table B:

"TABLE B. Range for differential pressure switches. 1/

Symbol	Adjustment operating/working pressure range ^{2/}	Maximum proof pressure ^{2/} (lb/in ²)	Maximum allowable variation from setting (plus or minus)	Optimum differential	Connection for pressure supply
1	0.3 to 3 lb/in ²	5	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
2	5 to 30 lb/in ²	80	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
3	10 to 70 lb/in ²	125	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
4	20 to 150 lb/in ²	200	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
5	25 to 250 lb/in ²	400	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
6	100 to 800 lb/in ²	900	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>
7	200 to 1300 lb/in ²	2000	<u>6/</u>	<u>4/</u> , <u>5/</u> , <u>7/</u>	<u>3/</u>

- 1/ Unless otherwise specified, for differential pressure switches, the ranges to be specified are the operating pressure range and the resetting differential are relative to pressure difference.
- 2/ Unless otherwise specified, is in gauge pressure. Maximum proof pressure is upper pressure at which performance of switch in the operating range will not be disturbed and shall exceed maximum operating pressure.

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- 3/ Unless otherwise specified in the contract or order, type of connection shall be in accordance with Drawing 803-1385850 that is, a mechanical threaded connection. Straight threads shall be standard for all new construction.
- 4/ Manufacturer's name and part number shall be given on the identification plate by which to obtain from manufacturer all the information for which headings are given in this table. The information shall be supplied by the manufacturer to the Naval Sea Systems Command (NAVSEA) for each switch delivered under this specification.
- 5/ Shall be specified in the ordering data.
- 6/ Repeatability of all switches shall be within 1 percent of the maximum proof pressure for all switches rated for 200 lb/in² and above and within 0.5 percent of the maximum proof pressure for all others. Repeatability, plus operator error, plus gauge error equals maximum allowable variation from setting (tolerance).
- 7/ Differentials (make/break) will vary widely due to applications. Switch capabilities must match ordering data."

Add as paragraph 3.16.7.2:

"3.16.7.2 Temperature switches. Temperature switches shall have a range that is specified in table C (ranges shown are minimum; switches having a wider range are acceptable). Sensing bulbs of temperature control shall be mounted in the position specified by the manufacturer."

Add as new table C:

"TABLE C. Range for temperature switches.

Symbol	Operating temperature range(°F)	Maximum proof temperature ₁ / (°F)	Maximum allowable variation from setting (°F)	Optimum differential
1	<u>2/</u> 0 to 0	-	<u>4/</u>	<u>2/</u> , <u>5/</u>
2	0 to 50	-	<u>4/</u>	<u>2/</u> , <u>5/</u>
3	30 to 90	120	<u>4/</u>	<u>2/</u> , <u>5/</u>
4	90 to 150	190	<u>4/</u>	<u>2/</u> , <u>5/</u>
5	140 to 200	240	<u>4/</u>	<u>2/</u> , <u>5/</u>
6	190 to 240	270	<u>4/</u>	<u>2/</u> , <u>5/</u>
7	230 to 280	310	<u>4/</u>	<u>2/</u> , <u>5/</u>
8	260 to 320	350	<u>4/</u>	<u>2/</u> , <u>5/</u>
9	290 to 360	380	<u>4/</u>	<u>2/</u> , <u>5/</u>
10	300 to 400	430	<u>4/</u>	<u>2/</u> , <u>5/</u>
11	375 to 480	500	<u>4/</u>	<u>2/</u> , <u>5/</u>

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- 1/ Maximum proof temperature is temperature at which the performance in the operating range will not be disturbed and shall exceed the maximum operating temperature.
- 2/ The manufacturer's name and part number shall be given on the identification plate by which to obtain from manufacturer all the information for which headings are given in this table. The information shall be supplied by manufacturer to NAVSEA for each switch type delivered under this specification.
- 3/ Shall be specified in the ordering data.
- 4/ Repeatability of switches shall be within +/- .5°F at the top of a range and +/- 1.5°F at the bottom of a range, assuming controlled test conditions at a temperature change rate of 1°F per minute in liquid with standard switch construction. Optional construction for applications will affect repeatability. Switches with optional construction shall have a repeatability within +/- 2°F at the top of a range and +/- 5°F at the bottom of a range in most cases. Switches with optional construction shall be marked with their repeatabilities. Repeatability, plus operator error, plus gauge error equals maximum allowable variation from setting (tolerance).
- 5/ Differentials (make/break) will vary widely due to applications. Switch capabilities shall match ordering data.
- 6/ Ambient pressure or temperature compensation shall be in the ordering data, if required."

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3.26.4: Add:

"(f) Pressure switches. Pressure switches with ranges of less than or equal to 100 psi, the switches shall be tested at 10 percent above the setpoint and at 10 percent below the setpoint or reset, whichever is greater, and successfully operate within that interval. Pressure switches with ranges greater than 100 lb/in², the switches shall be tested at 5 percent above the setpoint and below the setpoint or reset, whichever is greater, and successfully operate within that interval. Setpoint is defined as the 50 percent point of a range."

"(g) Temperature switches. Temperature switches with ranges of less than or equal to 100 degrees C, the switches, which are substituted for the equivalent pressure switches, shall be tested at 10 percent above the setpoint and at 10 percent below the setpoint or reset, whichever is greater, and successfully operate within that interval. Temperature switches with ranges above 100 degrees C, the switches, which are substituted for the equivalent pressure switches, shall be tested at 5 percent above the setpoint and at 5 percent below the setpoint or reset, whichever is greater, and successfully operate within that interval. Setpoint is defined as the 50 percent point of a range."

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3.26.13: Delete and substitute:

"3.26.13 EMI. Motor controllers and the associated switching devices shall meet the EMI requirements of MIL-STD-461 for class A4 and A5 electrical equipment.

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Table VIII: Add EMI test as a qualification inspection for the controller, contactor, relay, and the switch and add the paragraphs 3.26.13 and 4.8.18 for the requirement and test method, respectively.

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4.8.18: Delete and substitute:

"EMI. EMI emission and susceptibility tests of MIL-STD-462 which determine conformance to the limits specified in MIL-STD-461 (see 3.26.13) shall be performed for the qualification inspections only. EMI emission and susceptibility tests are not required for quality conformance inspections unless a change is made in the design which the government deems sufficiently substantial. Then the test will be performed."

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6.2(h): Delete "(see 3.3)", and substitute "(see 6.3)".

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6.3: Delete and substitute:

"Reference Paragraph	DID Number	DID Title	Suggested Tailoring
4.5	DI-EMCS-80199	Electromagnetic Interference Control Plan	
4.5	DI-EMCS-80201	Electromagnetic Interference Test Plan	
4.5	DI-EMCS-80200	Electromagnetic Interference Test Plan"	

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Add as paragraph 6.7.96:

"6.7.96 Repeatability. Repeatability is the degree of correspondence between successive readings of the same transition when measured in the same manner. It is expressed as plus or minus deviations."

Preparing activity:
Navy - SH
(Project 6110-N369)