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An American National Standard

Standard Specification for Solid State Bargraph Meters for Shipboard Use [Metric][1]

This standard is issued under the fixed designation F1755M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification provides the requirements for design, construction, performance, and testing of solid state bargraph-type indicating meters.

1.2 The solid state bargraph meters covered by this specification are intended for use in shipboard applications of electrical measurement. This specification covers the requirements and quality assurance provisions for solid state, panel-type (edgewise), and rectangular switchboard-type instruments, which use light-emitting diodes (LEDs) for bargraph indication and optional digital displays.

1.3 This specification's requirements may be invoked for specialized measurement applications where another quantity, for example, position, weight, concentration of a trace element in an atmosphere sample, and so forth, is converted to electrical energy for display and measurement. Special dial markings shall be specified for such cases.

1.4 The values stated in metric units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B117 Practice for Operating Salt Spray (Fog) Apparatus
D3951 Practice for Commercial Packaging
F1166 Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities

2.2 *Federal Specifications:*

TT–E–529 Enamel, Alkyd, Semigloss, Low VOC Content[3]

2.3 *Federal Standards:*

H28 Screw Thread Standards for Federal Services[3]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *accuracy, n*—the accuracy is a number that defines the limit of errors expressed as a percentage of full-scale value.

3.1.2 *center-zero meter, n*—meter with display mode characterized by a sequentially illuminated string of LEDs starting at the center scale zero position and extending in either direction from zero, proportional to the polarity and magnitude of the input signal.

3.1.3 *dual bargraph display, n*—two completely independent bargraph displays included in a single enclosure.

3.1.4 *end-scale value, n*—the value of the actuating electrical quantity that corresponds to end scale indication. When zero is not at the end or at the electrical center of the scale, the higher value is used. See Table 1.

3.1.5 *end-zero meter, n*—meter with display mode characterized by a sequentially illuminated string of LEDs starting from a zero point, normally at the left for switchboard-style meters or horizontally installed edgewise meters, or the bottom of vertically installed edgewise meters, that extends in the direction of full-scale value.

3.1.6 *full-scale value, n*—full-scale value is the largest value of the actuating electrical quantity, which can be indicated on the scale. For instruments with zero between the ends of the scale, the full-scale value is the arithmetic sum of the values of the actuating electrical quantity corresponding to the two ends of the scale.

3.1.7 *response time, n*—the response time is the time required for the indicating means to display a new value after a step change has occurred in the measured quantity to a new constant value.

3.1.8 *scale division, n*—a scale division is the increment between the centers of two consecutive scale marks. The number of scale marks is one more than the number of scale divisions. For example, 10 scale divisions require 11 scale marks.

3.1.8.1 *linear scale divisions, n*—linear scale divisions are scale divisions that are spaced an equal distance apart and of the same value, for example, scale divisions spaced 5 A apart on a 100–A meter.

[1] This specification is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.10 on Electrical.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111–5098, ATTN: NPODS.

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TABLE 1 End-Scale Values

Range	End-Scale Values (for Ratings)	End-Scale Values
0-150	0, 150	150
50-0-150	50, 150	150
150-0-150	150, 150	150
90-140	90, 140	140

3.1.8.2 *nonlinear scale divisions, n*—nonlinear scale divisions are scale divisions of the same value spaced an unequal distance apart.

3.1.9 *scale length, n*—the scale length is the length of the path described by the pattern of the LEDs in moving from one end of the scale to the other. For multiple scale meters, the longest scale shall be used to determine the scale length.

3.1.10 *scale visibility, n*—scale visibility is the maximum horizontal or vertical viewing angle measured from a line normal to the scale from which all scale marks and arcs, but not necessarily all markings, may be seen.

4. Classification

4.1 *Classification*—Bargraph meters covered in this specification shall be classified by type and style as specified in 4.2-4.3.

4.2 *Type*—The type designation defines the physical configuration of the meter and the scale.

4.2.1 Rectangular/switchboard-type meters present angular displays from 90 to 270° scale for the measured parameter(s). Fig. 1 provides typical dimensional and mounting data for rectangular/switchboard-type meters.

4.2.2 Edgewise/panel-type meters present linear displays for measured parameters. Fig. 2 provides typical dimensional and mounting data for edgewise type meters.

4.2.2.1 *Orientation of Meter*—For edgewise/panel-type meters, the scale marking shall be specified either for a vertical or horizontal mounting condition.

4.3 *Style*—The style designation defines the meters display attributes as follows:

4.3.1 *Bargraph Display*—The bargraph display shall consist of light-emitting diode (LED) elements that illuminate to produce a bar image proportional to the input signal. The display designation defines whether the meter has single or dual bargraph displays.

4.3.2 *Digital Display*—The digital display designation defines the number of digits in the digital display as follows:

4.3.2.1 3-digit display.

4.3.2.2 3½-digit display.

4.3.2.3 4-digit display.

4.3.2.4 4½-digit display

4.3.2.5 No digital display.

5. Ordering Information

5.1 Purchase orders or inquiries for bargraph meters of this specification shall specify the following:

5.1.1 Title, date, and year of this specification.

5.1.2 Quantity.

5.1.3 Type and for edgewise meter, the orientation (see 4.2).

5.1.4 Style of display (single or dual, digital display) (see 4.3).

5.1.5 Window type (plastic or shatterproof glass) (see 7.5).

5.1.6 Dial colors (see 7.9.1.1).

5.1.7 Range(s) (see 7.9.2).

5.1.8 Power supply voltage (see 8.1.1).

5.1.9 Signal input (analog or digital) (see 8.1.2).

5.1.10 Color(s) of bargraph display (see 8.2.2).

5.1.11 Optional features available:

5.1.11.1 Anti-glare windows (see 7.5.1).

5.1.11.2 Splashproof or spraytight window (see 7.5.2).

5.1.11.3 Internal illumination (see 7.6).

5.1.11.4 External accessories (see 7.8).

5.1.11.5 Alarm set points (see 8.1.4).

5.1.11.6 Digital display:

5.1.11.7 Nonstandard range values (see 8.2.4).

5.1.11.8 Dot matrix display types (see 8.2.4).

5.1.11.9 Intensity control (see 8.2.5).

5.1.12 Certification requirements (See 10).

5.1.13 Packaging requirements.

5.1.14 Testing requirements (include only if tests other than the production tests required by this specification are to be performed).

6. Materials and Manufacture

6.1 *Materials*—All materials used in the construction of these bargraph meters shall be of a quality suitable for the purpose intended and shall conform to the requirements of this specification.

6.1.1 *Metals*—Metals and the treatment of metals shall be corrosion-resistant.

6.1.2 *Plastics*—Plastic, when used, shall be suitable thermoplastic or thermosetting material so molded as to produce a dense solid structure, uniform in texture, finish, and mechanical properties.

6.1.3 *Glass*—Glass used for the meter window shall be the shatterproof type.

6.1.4 *Gaskets*—Material used in gaskets shall not cause corrosion of metal parts with which they come in contact.

6.2 *Manufacture:*

6.2.1 *Finishes:*

6.2.1.1 *External Finishes*—The portion of the meter case exposed to view from the front of the panel or switchboard shall have a black semigloss finish. No nickel or bright trimmings shall be used. The external finish may be epoxy-coated, electro-coated, or painted in accordance with TT–E–529. Metal cases shall be rendered resistant to corrosion prior to the application of the final finish.

6.2.1.2 *Internal Finishes*—Internal finishes shall be of a material that shall not melt, crack, chip, blister, or scale as a result of the tests specified herein.

6.3 *Threaded Parts*—Threaded parts shall be in accordance with FED-STD-H28. Where practical, threads shall be in conformity with the coarse-thread series. The fine-thread series shall be used only for applications that might show a definite advantage through their use. Where a special diameter pitch combination is required, the thread shall be of a length in

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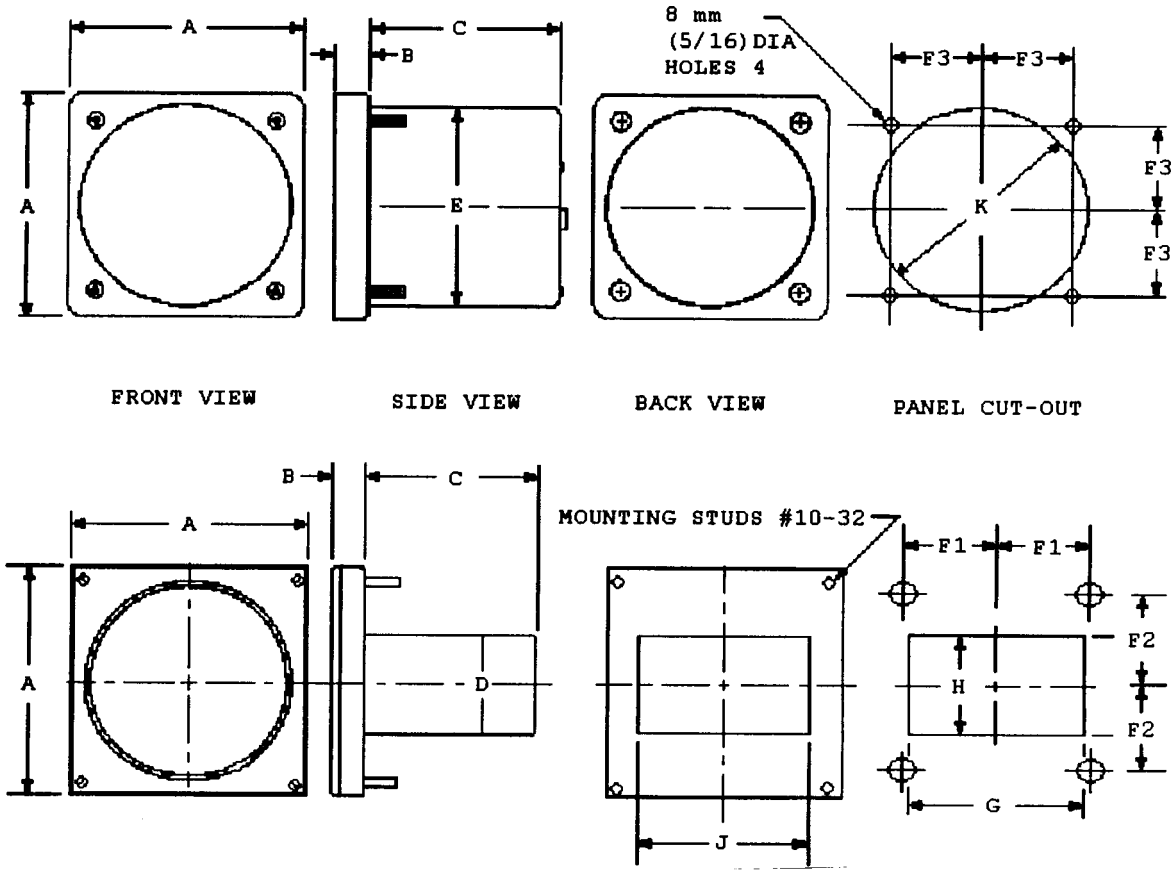

DIMENSIONAL CHARACTERISTICS FOR RECTANGULAR/SWITCHBOARD-TYPE METERS

A	B	C	D	E	F_1	F_2	F_3	G	H	J	K
112 mm (4.43 in)	17.4 mm (0.69 in)	135 mm (5.31 in)	—	101 mm (3.98 in)	—	—	43 mm (1.69 in)	—	—	—	101.6 mm (4.0 in)
216 mm (8.75 in)	26.2 mm (1.03 in)	135 mm (5.31 in)	—	101 mm (3.98 in)	—	—	43 mm (1.69 in)	—	—	—	101.6 mm (4.0 in)
123 mm (4.84 in)	19 mm (0.75 in)	142 mm (5.6 in)	50.8 mm (2.0 in)	—	43 mm (1.69 in)	43mm (1.69 in)	—	114 mm (4.49 in)	54 mm (2.13 in)	109 mm (4.3 in)	—
118 mm (4.63 in)	22.3 mm (0.88 in)	142 mm (5.6 in)	50.8 mm (2.0 in)	—	43 mm (1.69 in)	43 mm (1.69 in)	—	95 mm (3.75 in)	57 mm (2.25 in)	86 mm (3.38 in)	—
118 mm (4.63 in)	22.3 mm (0.88 in)	142 mm (5.6 in)	50.8 mm (2.0 in)	—	43 mm (1.69 in)	43 mm (1.69 in)	—	114 mm (4.49 in)	54 mm (2.13 in)	108 mm (4.26 in)	—
181 mm (7.13 in)	22.3 mm (0.88 in)	217 mm (8.55 in)	40.6 mm (1.6 in)	—	63.5 mm (2.5 in)	83 mm (3.26 in)	—	172 mm (6.78 in)	47 mm (1.84 in)	137 mm (5.38 in)	—

NOTES: All dimensions are in millimeters (inches are in parenthesis and are nominal unless otherwise specified).

FIG. 1 Rectangular/Switchboard/Type Meters

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