

ARMORED THROUGH-FLOW FLOWRATOR METER with optional electronic or pneumatic transmission

SPECIFICATION

10A2152*

File:
Section
10A5

10A2152 Series

The 10A2152 Series Magnarator® Flowrator® Meter is a metal tube variable-area flowmeter with through-flow design for liquid, vapor or gas applications. No extension is required for indication or transmission because an indicator or a pneumatic transmitter or a two-wire electronic transmitter can be integrally mounted and magnetically coupled to the meter float.

DESIGN FEATURES

- Straight-through flow design to eliminate recessed or stagnant areas
- Linear measurement and transmission
- Completely protected float extension guide

ENGINEERING SPECIFICATIONS

PERFORMANCE

Accuracy

Standard: ± 2 per cent of maximum flow rate

Optional: ± 1 per cent of maximum flow rate

Rangeability: 10 to 1, maximum to minimum flow

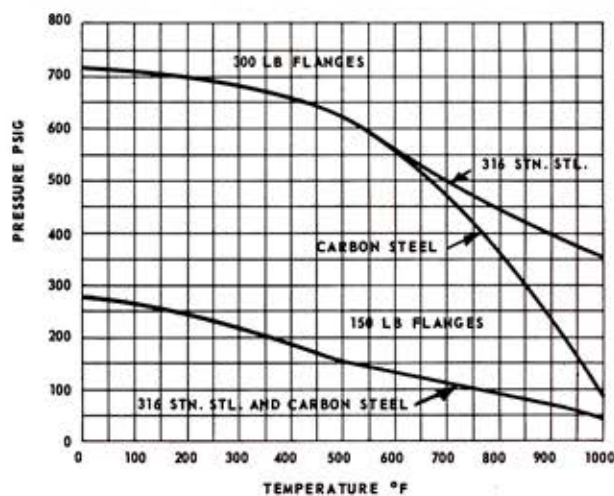
Speed of response: 1 second full scale (including viscous fluid damping)

OPERATIONAL LIMITS

Temperature

Indicator or pneumatic transmitter: Ambient, 30 F to 300 F; process fluid, 30 F to 600 F.

Electronic transmitter: Ambient, 30 F to 212 F; process fluid, 30 F to 400 F.



*Supersedes Specification 10A5/10A2152 and 10A5/2152A-50EL1020.

FISCHER & PORTER

Complete Process Instrumentation



CONNECTIONS

Type: Vertical Flanged

Ratings: Standard - 150-pound or 300-pound raised face ASA.

Note: For other flange facings and ratings refer to Warminster.

Size

| Meter Size | Connection Size (Inches) | |
|------------|--------------------------|----------------------|
| | Standard Meter | Steam Jacketed Meter |
| 4 to 6 | 1 | 2 |
| 8 | 1-1/2 | 3 |
| 9 | 2 | 3 |

Note: Maximum allowable pressure for steam jacket is 150 psi saturated steam.

MOUNTING: Pipe mounted in line

MATERIALS OF CONSTRUCTION

Tubes (magnetic materials not available)

304 or 316 Stainless Steel K-Monel¹
Hastelloy² C Alloy 20

Hastelloy C, K-Monel and Alloy 20 not available in steam jacketed models.

Floats (magnetic materials not available)

316 Stainless Steel K-Monel
Hastelloy C Alloy 20

Fittings

304 or 316 Stainless Steel K-Monel
Steel Alloy 20
Hastelloy C Monel

Steam Jacket

Stainless Steel

Housing

General Purpose (suitable for Class 1, Group D, Division 2 service)

Cover - Fiberglass

Base - Aluminum

Gasket - Silicone rubber

Trim - Stainless steel



10A2152A-50EL1021
Indicating Electronic Transmitter with General Purpose Housing

10A2152A-50EL1023
Indicating Electronic Transmitter with Explosion-Proof Housing

Explosion-Proof (suitable for Class 1, Group D, Division 1 service)

Cover - Cast aluminum with window

Base - Aluminum

Note: Only the Magnarator electronic transmitter is available with either general purpose or explosion-proof housing.

SCALES

Indicator and Indicating Electronic Transmitter

Flow rate scale: 2-1/2-inch horizontal type with black numerals on white background. Per cent or direct reading. Standard full scale values available - 10, 12.5, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, and 90.

Indicating Pneumatic Transmitter

Float position scale (normally covered):
2-1/2-inch horizontal type with black numerals on white background. Direct or per cent reading supplied as standard.

Flow rate scale: 4-inch vertical type with black numerals on white background. Per cent or direct reading, linear to flow rate. Standard full scale values available - same as indicating only flow rate scale above.

Transmitter Output Scale: 4-inch vertical type with black numerals on white background. Linear to flow rate reading 4.2 to 15 psig with calibration marks for 6, 9, 12 and 15 psig.

UNIT WEIGHT

| Size | Maximum Weight |
|------|----------------|
| 4 | 12 pounds |
| 5 | 13 pounds |
| 6 | 15 pounds |
| 8 | 20 pounds |
| 9 | 30 pounds |

PNEUMATIC TRANSMITTER

SPECIFICATIONS

Type: Motion balance

Supply: 20 psig filtered air

Output: 3 to 15 psig (calibrated 4.2 to 15 psig for 10 to 100 per cent of flow)

Consumption: 0.4 scfm, steady state

Connections: 1/4-inch NPT supply and output

ELECTRONIC TRANSMITTER

SPECIFICATIONS

Type: Two-wire

Supply: 45 volts d-c $\pm 10\%$ (4-20 ma output);
72 volts d-c $\pm 10\%$ (10-50 ma output).

Note: Power supply is self contained in F&P receiving instruments for 4-20 ma only. External supply necessary for 10-50 ma receivers and other operating equipment. One external power supply will operate up to five transmitters.

Output: 4-20 ma d-c into 0-1000 ohms
10-50 ma d-c into 0-700 ohms

Connections: 1/2-inch conduit.

SIZING

For sizing flowmeters with type 316 stainless steel floats, when the required flow is of liquid (density 1.0 g/cc), or of gas (sp gr of air and at 14.7 psia and 70 F) the capacity table may be entered directly.

The conversion equations shown below permit the capacity tables to be used for other operating conditions.

LIQUID CONVERSION

$$\text{gpm H}_2\text{O} = \text{gpm} \sqrt{\frac{7.02 \times \rho}{\rho_f - \rho}}$$

or

$$\text{gpm H}_2\text{O} = \frac{\text{lbs/min}}{8.33 \times \rho} \sqrt{\frac{7.02 \times \rho}{\rho_f - \rho}}$$

where:

gpm = desired maximum flow rate in gpm

lbs/min = desired maximum flow rate in pounds per minute

ρ_f = density of the float required for the application and selected from the following list

316 stainless steel = 8.02

Hastelloy C = 8.94

Nickel = 8.91

Monel = 8.84

ρ = fluid density, g/cc at operating conditions

gpm H₂O = equivalent flow rate in gpm H₂O

GAS CONVERSION

$$\text{scfm air at 14.7 psia and 70 F} = \text{scfm} \sqrt{\frac{\text{sp gr} \times 14.7 \times T_{op} \times 8.02}{1.0 \times P_{op} \times 530 \times \rho_f}}$$

or

$$\text{scfm air at 14.7 psia and 70 F} = \text{lbs/min} \times 13.34 \sqrt{\frac{1.0 \times 14.7 \times T_{op} \times 8.02}{\text{sp gr} \times P_{op} \times 530 \times \rho_f}}$$

where:

scfm = desired maximum flow rate in scfm

sp gr = specific gravity of gas at standard temperature and pressure, referred to air at standard temperature and pressure (14.7 psia and 70 F)

T_{op} = absolute temperature, (460 + °F) at operating pressure

P_{op} = absolute pressure in psia at operating conditions

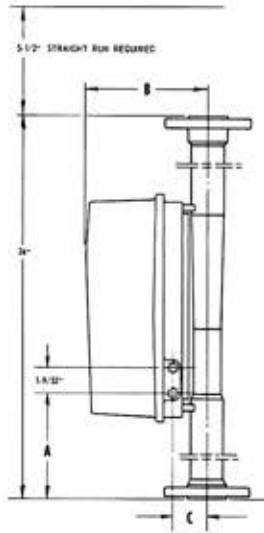
scfm air = equivalent flow rate in scfm of air at 14.7 psia and 70 F

| CAPACITIES | | | MAXIMUM FLOW RATES | | | | |
|--------------|---------------|--------------|---------------------------|-----------------------|----------------------------------|--------------------------------|---------------|
| | | | LIQUID SERVICE | | | GAS SERVICE | |
| Meter Size | Metering Tube | Float | Max. gpm Liquid sp gr 1.0 | Viscosity Ceiling (2) | ΔP "H ₂ O (1) | Max. scfm Air @ 14.7 psia, 70F | Min. psia (3) |
| 4 | M4-13-5 | 4-SVKF-.246 | 0.98 - 1.12 | 5 | 15.5 | 4.04 - 1.12 | 186.0 |
| | | 4-SVKF-.442 | 1.15 - 1.31 | 5 | 20.5 | 4.74 - 5.40 | 251.0 |
| | | 4-SVKF-.614 | 1.34 - 1.53 | 5 | 25.5 | 5.52 - 6.31 | 347.0 |
| | M4-20-5 | 4-SVKF-.246 | 1.53 - 1.76 | 5 | 17.0 | 6.31 - 7.22 | 159.0 |
| | | 4-SVKF-.442 | 1.78 - 2.05 | 5 | 23.0 | 7.33 - 8.44 | 218.0 |
| | | 4-SVKF-.614 | 2.12 - 2.43 | 5 | 28.0 | 8.73 - 10.0 | 306.0 |
| | M4-26-5 | 4-SVKF-.246 | 2.19 - 2.51 | 5 | 21.0 | 9.05 - 10.35 | 76.0 |
| | | 4-SVKF-.442 | 2.54 - 2.93 | 5 | 27.0 | 10.45 - 12.05 | 103.0 |
| | | 4-SVKF-.614 | 3.10 - 3.53 | 5 | 35.0 | 12.77 - 14.55 | 149.0 |
| | M4-35-5 | 4-SVKF-.246 | 3.19 - 3.66 | 5 | 31.0 | 13.15 - 15.10 | 41.0 |
| | | 4-SVKF-.442 | 3.76 - 4.33 | 5 | 40.0 | 15.5 - 17.35 | 58.0 |
| | | 4-SVKF-.614 | 4.58 - 5.28 | 5 | 53.0 | See Note 4 | 86.0 |
| | | 4-NSVKF-.246 | 4.24 - 4.81 | 1 | 51.3 | | 37.0 |
| | | 4-NSVKF-.442 | 5.03 - 5.78 | 1 | 66.0 | | 54.0 |
| 4-NSVKF-.614 | | 6.42 - 7.28 | 1 | 87.0 | 85.0 | | |
| 5 | M5-25-5 | 5-SVKF-.173 | 4.73 - 5.51 | 15 | 12.0 | 19.5 - 22.7 | 62.0 |
| | | 5-SVKF-.320 | 5.25 - 6.13 | 20 | 14.0 | 21.6 - 25.2 | 77.0 |
| | | 5-SVKF-.442 | 5.96 - 6.91 | 25 | 16.0 | 24.6 - 28.4 | 97.0 |
| | M5-35-5TT | 5-SVKF-.173 | 7.13 - 8.42 | 15 | 14.0 | 29.3 - 34.7 | 86.0 |
| | | 5-SVKF-.320 | 7.93 - 9.41 | 20 | 16.0 | 32.6 - 38.7 | 64.0 |
| | | 5-SVKF-.442 | 8.89 - 10.45 | 25 | 18.0 | 36.7 - 43.1 | 81.0 |
| | | 5-SVKF-.614 | 10.86 - 12.87 | 15 | 25.0 | See Note 4 | 121.0 |
| | | 5-NSVKF-.442 | 12.33 - 14.70 | 5 | 25.0 | | 81.0 |
| | | 5-NSVKF-.614 | 15.44 - 18.26 | 3 | 34.0 | | 124.0 |
| | | | | | | | |
| 6 | M6-35-5TT | 6-SVKF-.163 | 11.25 - 12.76 | 5 | 12.0 | 46.4 - 52.5 | 45.0 |
| | | 6-SVKF-.320 | 12.42 - 14.12 | 5 | 15.0 | 51.3 - 58.2 | 57.0 |
| | | 6-SVKF-.442 | 14.06 - 15.98 | 5 | 19.0 | 57.9 - 65.8 | 71.0 |
| | | 6-NSVKF-.163 | 15.43 - 17.58 | 5 | 16.0 | 63.6 - 72.4 | 45.0 |
| | | 6-SVKF-.614 | 16.94 - 19.26 | 5 | 25.0 | See Note 4 | 104.0 |
| | | 6-NSVKF-.442 | 19.35 - 22.00 | 5 | 25.0 | | 71.0 |
| | | 6-NSVKF-.614 | 23.72 - 26.64 | 5 | 35.0 | | 104.0 |
| | | | | | | | |
| 8 | M8-27-5 | 8-SVKF-.124 | 17.95 - 21.00 | 10 | 10.3 | 74.0 - 86.5 | 40.0 |
| | | 8-SVKF-.320 | 20.55 - 23.90 | 10 | 12.8 | 84.6 - 98.5 | 50.0 |
| | | 8-SVKF-.442 | 22.70 - 26.45 | 15 | 16.0 | 93.5 - 109.0 | 63.0 |
| | M8-35-5TT | 8-SVKF-.124 | 26.40 - 30.35 | 10 | 12.0 | 108.9 - 125.0 | 39.0 |
| | | 8-SVKF-.320 | 29.00 - 33.00 | 10 | 14.0 | 119.0 - 136 | 49.0 |
| | | 8-SVKF-.442 | 32.40 - 38.00 | 15 | 17.0 | 133.5 - 156.5 | 58.0 |
| | | 8-NSVKF-.124 | 37.50 - 43.00 | 2 | 18.0 | 154.5 - 179.0 | 38.0 |
| | | 8-SVKF-.614 | 40.00 - 45.40 | 20 | 22.0 | See Note 4 | 86.0 |
| | | 8-NSVKF-.442 | 48.25 - 55.40 | 3 | 25.0 | 198.5 - 226.0 | 57.0 |
| | | 8-NSVKF-.614 | 57.00 - 65.00 | 4 | 35.0 | See Note 4 | 91.0 |
| | | | | | | | |
| 9 | M9:35-5TT | 9-SVKF-.124 | 45.70 - 52.60 | 40 | 11.0 | 188.3 - 216.5 | 33.0 |
| | | 9-SVKF-.320 | 51.25 - 59.00 | 50 | 13.0 | 211.0 - 243.0 | 41.0 |
| | | 9-SVKF-.442 | 56.60 - 65.20 | 60 | 15.0 | 233.0 - 268.5 | 51.0 |
| | | 9-SVKF-.614 | 68.30 - 79.10 | 70 | 20.0 | See Note 4 | 72.0 |
| | | 9-NSVKF-.320 | 74.40 - 86.20 | 10 | 17.0 | 306.0 - 355.0 | 44.0 |
| | | 9-NSVKF-.442 | 82.20 - 95.00 | 12 | 19.0 | 338.5 - 391.0 | 53.0 |
| | | 9-NSVKF-.614 | 101.00 - 115.00 | 14 | 25.0 | 416.0 - 473.0 | 76.0 |

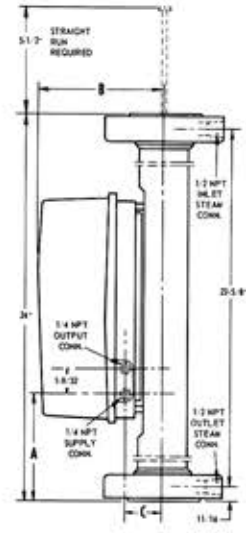
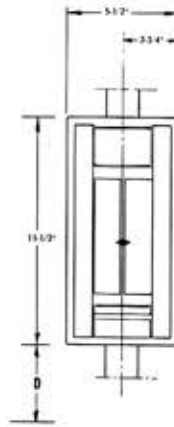
- NOTES: 1. Pressure drop is total pressure loss across meter.
2. Meter is unaffected by viscosity when the value of $\frac{\text{cps}}{\sqrt{\text{g/cc}}}$ at operating conditions is less than Viscosity Ceiling listed.
3. Meters not recommended for gas service where pressure is below the minimum shown.
4. These sizes not recommended for gas service.

DIMENSIONS

GENERAL PURPOSE CASE -- Indicating Pneumatic Transmitter



STANDARD METER

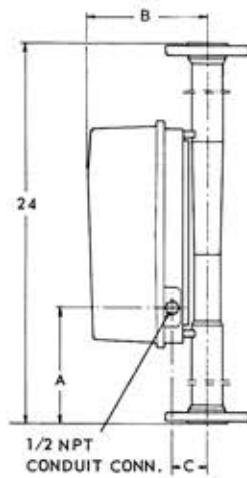


JACKETED METER

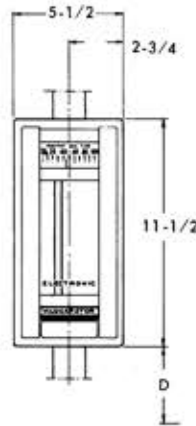
| Meter Size | Standard | | | | Jacketed | | | |
|------------|----------|---------|--------|---------|----------|---------|---------|---------|
| | A | B | C | D | A | B | C | D |
| 4 | 8-3/8 | 5-11/16 | 1-3/8 | 6-15/16 | 8-3/8 | 5-13/16 | 1-1/2 | 6-15/16 |
| 5 | 8-3/8 | 5-7/8 | 1-9/16 | 6-15/16 | 8-3/8 | 6 | 1-11/16 | 6-15/16 |
| 6 | 8-1/8 | 6-1/16 | 1-3/4 | 6-11/16 | 8-1/8 | 6-3/16 | 1-7/8 | 6-11/16 |
| 8 | 7-11/16 | 6-3/8 | 2-1/16 | 6-9/32 | 7-11/16 | 6-9/16 | 2-1/4 | 6-9/32 |
| 9 | 8-1/16 | 6-13/16 | 2-1/2 | 6-21/32 | 8-1/16 | 6-15/16 | 2-5/8 | 6-21/32 |

GENERAL PURPOSE CASE--Indicator & Indicating Electronic Transmitter

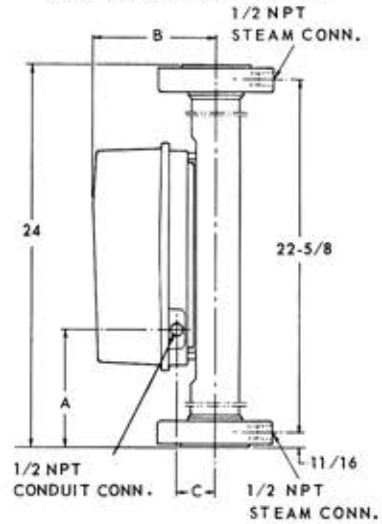
5-1/2" STRAIGHT RUN REQUIRED



STANDARD METER



5-1/2" STRAIGHT RUN REQUIRED
1/2 NPT STEAM CONN.



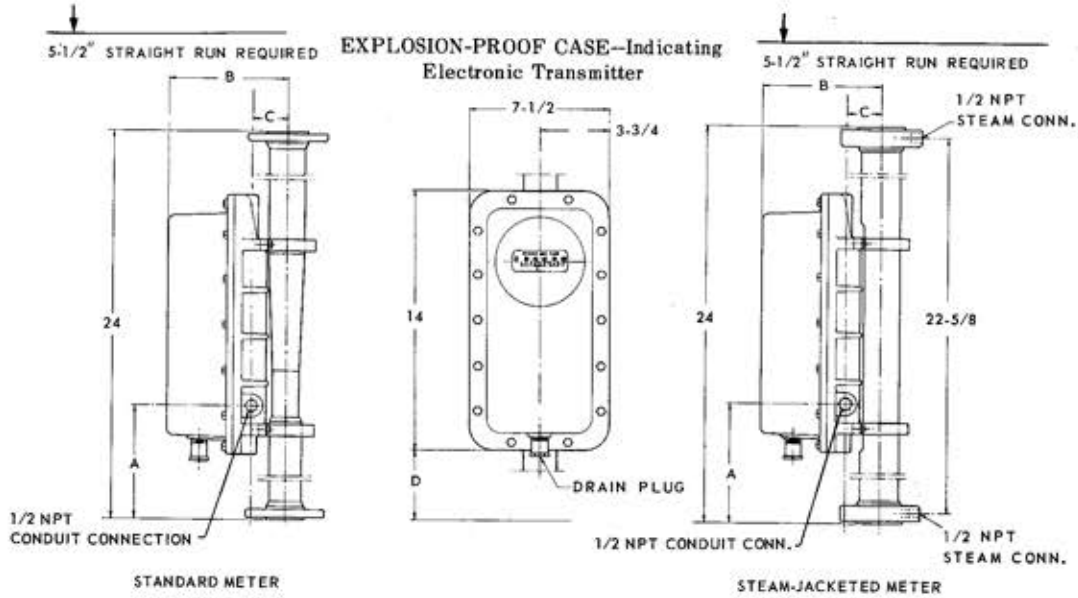
STEAM-JACKETED METER

NOTE: ALL DIMENSIONS IN INCHES.

| METER SIZE | STANDARD | | | | STEAM-JACKETED | | | |
|------------|---------------------------------|---------------------------------|--------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| | A | B | C | D | A | B | C | D |
| 4 | 9 ¹ / ₆₄ | 5 ¹¹ / ₁₆ | 1 ³ / ₈ | 6 ¹⁵ / ₁₆ | 9 ¹ / ₆₄ | 5 ¹³ / ₁₆ | 1 ¹ / ₂ | 6 ¹⁵ / ₁₆ |
| 5 | 9 ¹ / ₆₄ | 5 ⁷ / ₈ | 1 ⁹ / ₁₆ | 6 ¹⁵ / ₁₆ | 9 ¹ / ₆₄ | 6 | 1 ¹¹ / ₁₆ | 6 ¹⁵ / ₁₆ |
| 6 | 8 ⁴⁹ / ₆₄ | 6 ¹ / ₁₆ | 1 ³ / ₄ | 6 ¹¹ / ₁₆ | 8 ⁴⁹ / ₆₄ | 6 ³ / ₁₆ | 1 ⁷ / ₈ | 6 ¹¹ / ₁₆ |
| 8 | 8 ²¹ / ₆₄ | 6 ³ / ₈ | 2 ¹ / ₁₆ | 6 ⁹ / ₃₂ | 8 ²¹ / ₆₄ | 6 ⁹ / ₁₆ | 2 ¹ / ₄ | 6 ⁹ / ₃₂ |
| 9 | 8 ⁴⁵ / ₆₄ | 6 ¹³ / ₁₆ | 2 ¹ / ₂ | 6 ²¹ / ₃₂ | 8 ⁴⁵ / ₆₄ | 6 ¹³ / ₁₆ | 2 ⁵ / ₈ | 6 ²¹ / ₃₂ |

DIMENSIONS APPLY TO 150 lb. AND 300 lb. ASA FLANGES

DIMENSIONS (cont'd.)



DIMENSIONS APPLY TO
150 lb. and 300 lb. ASA
FLANGES

| METER SIZE | STANDARD | | | | STEAM-JACKETED | | | |
|------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| | A | B | C | D | A | B | C | D |
| 4 | 8 ⁶¹ / ₆₄ | 5 ²³ / ₃₂ | 1 ⁹ / ₃₂ | 6 ²¹ / ₆₄ | 8 ⁶¹ / ₆₄ | 6 ¹ / ₃₂ | 1 ¹³ / ₃₂ | 6 ²¹ / ₆₄ |
| 5 | 8 ⁶¹ / ₆₄ | 6 ³ / ₃₂ | 1 ¹⁵ / ₃₂ | 6 ²¹ / ₆₄ | 8 ⁶¹ / ₆₄ | 6 ⁷ / ₃₂ | 1 ¹⁹ / ₃₂ | 6 ²¹ / ₆₄ |
| 6 | 8 ⁴⁵ / ₆₄ | 6 ⁹ / ₃₂ | 1 ²¹ / ₃₂ | 6 ⁵ / ₆₄ | 8 ⁴⁵ / ₆₄ | 6 ¹³ / ₃₂ | 1 ²⁵ / ₃₂ | 6 ⁵ / ₆₄ |
| 8 | 8 ¹⁷ / ₆₄ | 6 ¹⁹ / ₃₂ | 1 ³¹ / ₃₂ | 5 ⁴¹ / ₆₄ | 8 ¹⁷ / ₆₄ | 6 ²⁵ / ₃₂ | 2 ⁵ / ₃₂ | 5 ⁴¹ / ₆₄ |
| 9 | 8 ⁴¹ / ₆₄ | 7 ¹ / ₃₂ | 2 ¹³ / ₃₂ | 6 ¹ / ₆₄ | 8 ⁴¹ / ₆₄ | 7 ⁵ / ₃₂ | 2 ¹⁷ / ₃₂ | 6 ¹ / ₆₄ |

STANDARD MODEL DESIGNATIONS

METER MODEL

Standard - 10A2152A

Steam Jacketed - 10A2152J

Thermonized - 10A2152K

INDICATOR OR TRANSMITTER MODEL

- 50KF1001 - Indicator only
- 50KF1005 - Indicating Pneumatic Transmitter
- 50EL1021 - Indicating Electronic Transmitter, 4-20 ma dc, General Purpose Case
- 50EL1022 - Indicating Electronic Transmitter, 10-50 ma dc, General Purpose Case
- 50EL1023 - Indicating Electronic Transmitter, 4-20 ma dc, Explosion-proof Case
- 50EL1024 - Indicating Electronic Transmitter, 10-50 ma dc, Explosion-proof Case

Note: Complete model number includes meter model and indicator or transmitter model designations. For example, 10A2152J-50EL1021 is the complete model number for a steam jacketed indicating electronic transmitter with a 4-20 ma dc output, housed in a general purpose case.

OPTIONAL EQUIPMENT AND ACCESSORIES

- Steam jacketing
- Companion flanges
- Thermonizing - meter is steam traced and packed with heat conductive material to insure even distribution of heat over entire surface of the meter.
- Combination filter regulator with or without gage

ORDERING INFORMATION

- Specify:
- Complete model number Accuracy
 - Materials of construction Fluid density
 - Fluid measured Fluid viscosity
 - Maximum flow rate
 - Scale units
 - Allowable pressure drop
 - Operating temperature and pressure