

Sarasota FD900 Sarasota ID900 Sarasota PD900

Gas Density Meters for Gas Metering and Control

The Sarasota range of gas density meters meets the challenges of fiscal/custody transfer gas metering, liquefied gas metering, fuel gas management, and burner control through the continuous, accurate measurement of density or density related variables within the oil and gas, petrochemical, and power industries. The savings achievable through the use of the meters, the availability of near real time control signals, and the low cost of ownership compared with alternative measurement methods such as chromatographs, make plant efficiency and optimization a reality.



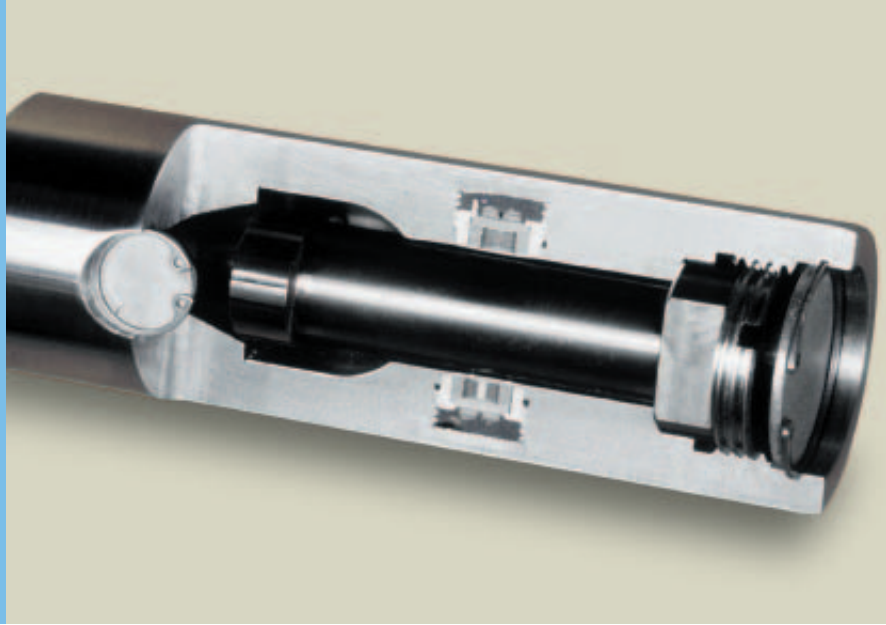
Process optimization and product quality control are achieved through the close control of process parameters and final product quality. The composition of any gas or low viscosity liquid is often characterized by its density or specific gravity. The continuous and accurate monitoring of this density, or a density related variable, will instantly detect any variation of process constituents or final product quality. This allows improved productivity, minimized product wastage and reduced costs, through real time control, when compared to sampling methods.

Thermo Electron Corporation's Sarasota range of gas density meters is designed for the continuous, inline, high accuracy measurement of density or density related variables within the oil and gas, petrochemical, and power industries. From this measurement, output variables such as specific gravity, calorific value, or molecular weight can be provided either by a third party flow computer or by a Sarasota density converter. The Sarasota HME900 field mounted density converter option provides a direct HART® compatible output, whereas the Sarasota CM200 panel mounted electronics unit carries out calculations as a critical element of a gas metering system or fuel gas management system.



Features

- Continuous, online density monitoring
- Measurement at true process conditions
- Insertion, sample by-pass, and pocket options
- Compact design
- Hazardous area approvals
- Converter electronics to suit application



General Features of the Range

The reliability and high accuracy required for fiscal applications are achieved using the proven technology of a vibrating cylinder (spool) design, with several additional design features to ensure the high integrity of the measurement.

An integral, high grade PT100 resistance temperature device mounted within the instrument gives a live temperature reading at process conditions to ensure precise compensation of the density coefficients and the ability to compensate the process fluid to reference or other conditions. The effects of any dirt in the process fluid are minimized by the probe sampling method and the use of instrument filters, according to the model. Pressure effects are eliminated on all models because the sensor remains completely surrounded

by the process fluid. Different sensor material options and BS EN ISO 15156/NACE MR0175 conformance treatment are available to meet the extreme demands of corrosive, cryogenic, high temperature, or high pressure applications.

Offering hazardous area approvals, the rugged meters are suitable for use in even the most hostile of environments.

Density Converter Electronics

A choice of density converter solutions offers end users full flexibility in the processing of the measurement data to best suit the application.

A field mounted Sarasota HME900 headmounted electronics unit conditions the output signal to give a HART compatible 4-20mA output that can then be interrogated by any HART system. An optional local

display on the Sarasota HME900 allows the process engineer to view the prime variable value either in engineering units alone, or with an alternating display of percent of chosen span.

Alternatively, the frequency and PRT (RTD) outputs from the density meter may be taken to a third party flow computer or remote Sarasota CM200 density converter. The Sarasota CM200 is a versatile unit that can be configured as required depending on the input/output requirements of the end user's application. The unit performs calculations to give the required density or density derived parameter.

Full information about the density converters is available in the Sarasota HME900 and Sarasota CM200 density converter specification sheet.





Applications

- Fiscal/custody transfer gas metering
- Fuel gas analysis
- Burner control
- Ethane cracking and ethylene production
- Energy management systems
- Stack emissions analysis and control
- LNG metering and control
- Tank density systems
- Calorific value estimation
- Specific gravity measurement
- Process/quality control
- Product identification
- Blending/peak shaving

Thermo's Applications Expertise

Thermo has over 30 years of applications expertise in the density measurement of gases and liquefied gases, particularly in the oil and gas, petrochemical, chemical, and power industries. To accommodate the needs of the industries' differing configuration requirements, the Sarasota range of gas density meters comprises three models including the Sarasota ID900 direct insertion, Sarasota FD900 by-pass, and Sarasota PD900 pocket models.

The optimum choice of Sarasota density meter is determined by factors including the pipeline or sample line size; line pressure and flow rate; process fluid temperature and type; accuracy required; maintenance requirements; new or retrofit installation; and hazardous area requirements.

Sarasota ID900 for Direct Insertion Applications

The Sarasota ID900 insertion density meter is installed directly into the pipeline or vessel, generally using its integral flanges or the Sarasota RTR900 instrument retractor. The Sarasota RTR900 allows the meter to be removed from a pressurized line without having to shut down the line or process, avoiding downtime.

With its uniquely designed measuring chamber, the effects of any dirt in the process fluid are minimized. The use of insertion techniques ensures that process fluid, density and temperature measurements are at true process conditions. This, together with the absence of pressure or temperature differentials

associated with sample or by-pass lines, ensures that the high accuracy and repeatability required for fiscal applications or fuel management systems are achievable at a relatively low installed cost.

Sarasota PD900 for Pocket Applications

The Sarasota PD900 pocket density meter offers many of the same design features as the Sarasota ID900 but is mounted into a thermowell pocket that is installed directly into the pipeline. Since the pocket is in the pipeline, density and temperature measurements are at near process conditions and the use of an inlet filter prevents dirt or moisture from entering the measuring chamber. The process fluid passes through the measuring chamber from a sample line and is subsequently returned to the sample line. Removal and servicing of the meter does not require pipeline shutdown thereby minimizing disruption and process downtime.

The meter can be installed on a retrofit basis into the pockets of other manufacturers' pocket density meters giving end users the benefit of optimum density measurement, high temperature and NACE treatment options, with minimal installation costs.

Sarasota FD900 for By-pass Applications

The Sarasota FD900 is normally installed on a by-pass sample line, but where the line size is 25 mm (1 in) or less, may be placed directly inline. A choice of fittings and flange options is available to suit the pipe work configuration. Density and temperature measurements are therefore at line or near line conditions.

In applications where the gas is particularly dirty or wet and requires filtering prior to the measurement, and where SG or molecular weight (MW) can be used to infer density elsewhere in the plant, the Sarasota SG900 Specific Gravity Analyzer is recommended. The Sarasota SG900 system incorporates a Sarasota FD792 density meter and may also include a high accuracy, quick response temperature element, pressure transmitter, filters, flow meters, flow regulators, drains, and safety relief vents to suit the application.

The Sarasota FD900 and Sarasota SG900 systems have a key role in energy determination, blending control, standard volume flow calculation and fuel gas monitoring.

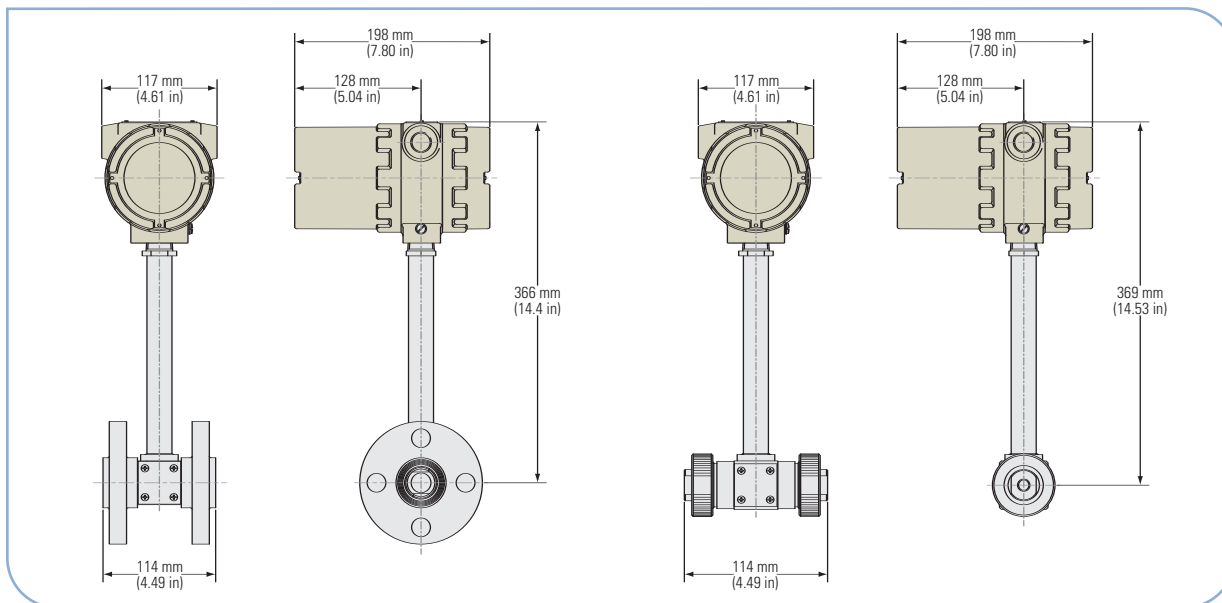
Full information about the Sarasota SG900 is available in the Sarasota SG900 Specific Gravity Analyzer specification sheet.

Calibration and Service

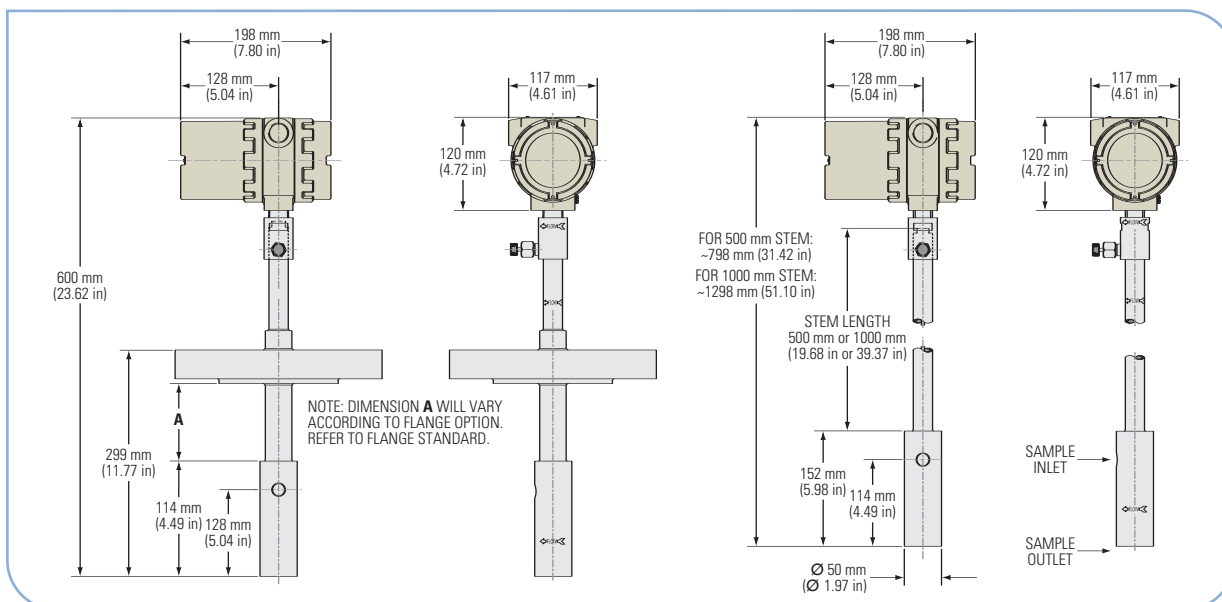
The calibration of the gas density meters is undertaken in-house on a calibration rig that is traceable to national standards. Supporting documentation is available including a traceable equipment list.

For most applications, installation is straightforward, on-site calibration is generally unnecessary and the instruments are usually maintenance free. However, Thermo's dedicated service team offers an installation, commissioning, maintenance, and repair service for the gas density meter range and associated electronics. On-site visits, in-house repairs and maintenance contracts can be arranged as required.

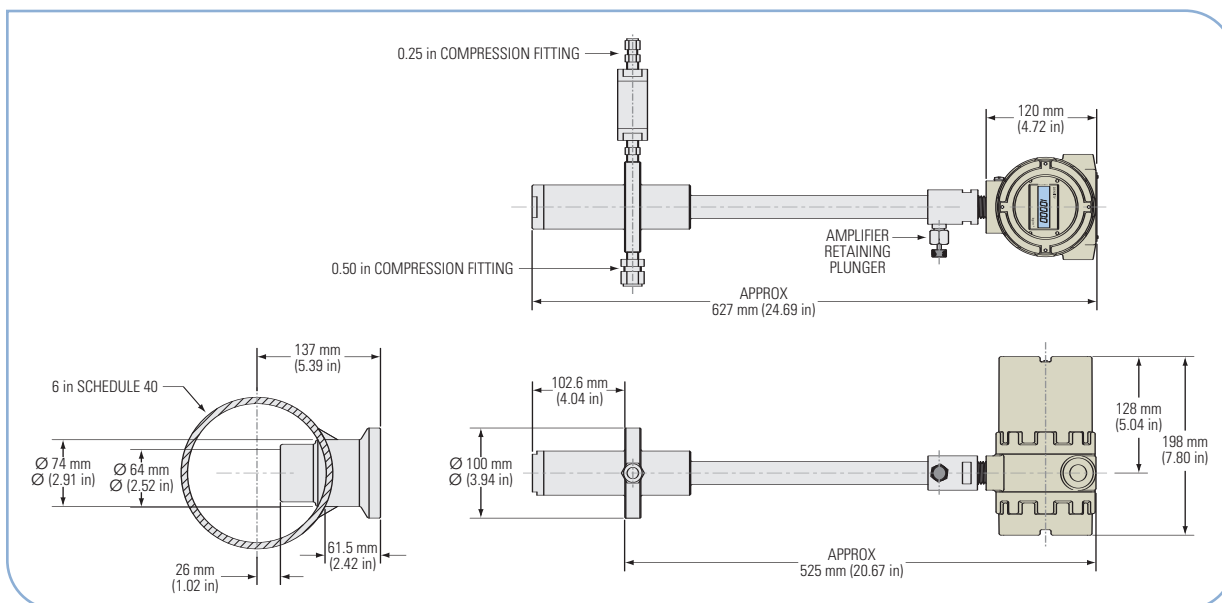
Sarasota FD900 Dimensional Diagram



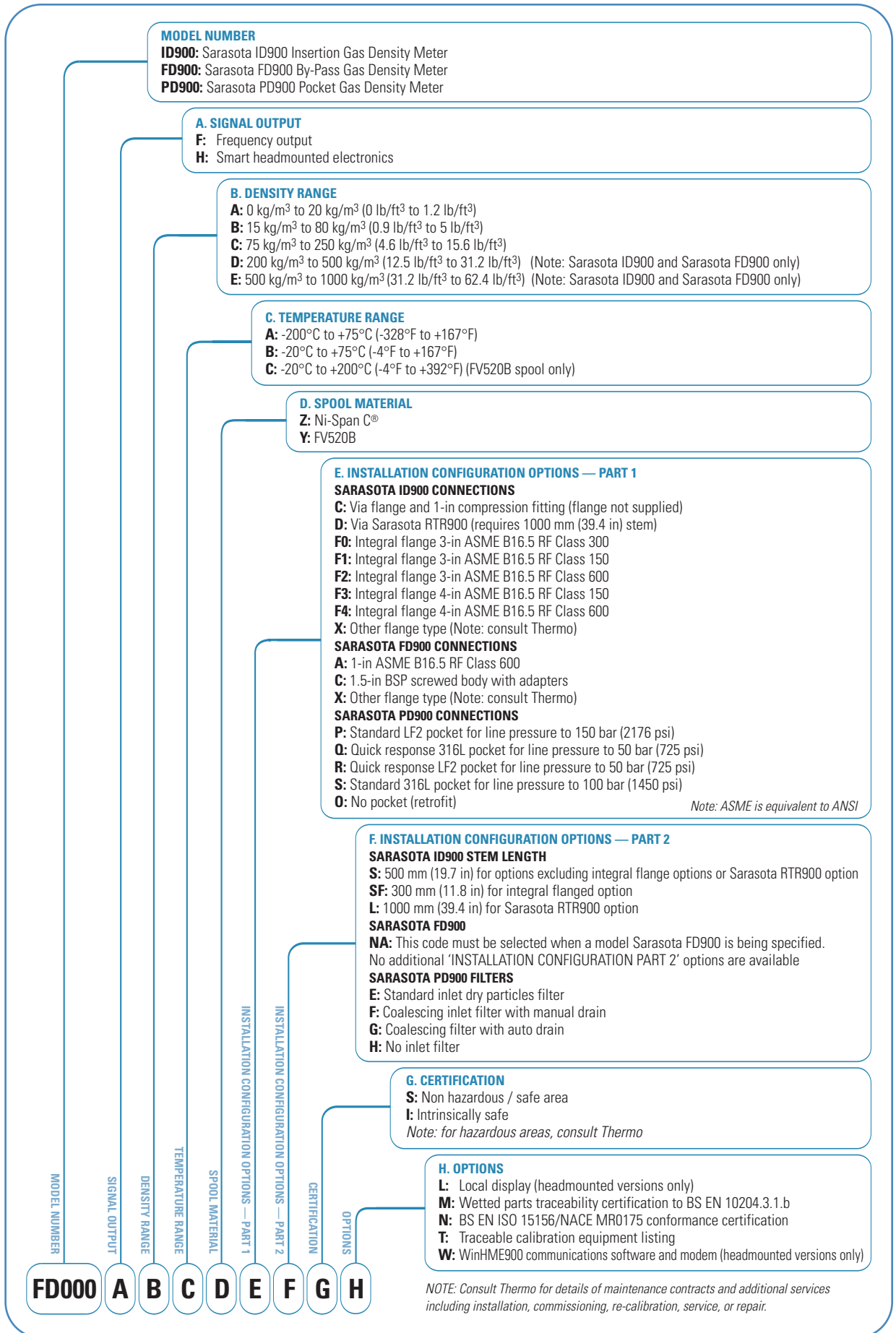
Sarasota ID900 Dimensional Diagram



Sarasota PD900 Dimensional Diagram



Trim this page short (7.625 inches) to accommodate potential hole punching by end users



MODEL NUMBER
ID900: Sarasota ID900 Insertion Gas Density Meter
FD900: Sarasota FD900 By-Pass Gas Density Meter
PD900: Sarasota PD900 Pocket Gas Density Meter

A. SIGNAL OUTPUT
F: Frequency output
H: Smart headmounted electronics

B. DENSITY RANGE
A: 0 kg/m³ to 20 kg/m³ (0 lb/ft³ to 1.2 lb/ft³)
B: 15 kg/m³ to 80 kg/m³ (0.9 lb/ft³ to 5 lb/ft³)
C: 75 kg/m³ to 250 kg/m³ (4.6 lb/ft³ to 15.6 lb/ft³)
D: 200 kg/m³ to 500 kg/m³ (12.5 lb/ft³ to 31.2 lb/ft³) (Note: Sarasota ID900 and Sarasota FD900 only)
E: 500 kg/m³ to 1000 kg/m³ (31.2 lb/ft³ to 62.4 lb/ft³) (Note: Sarasota ID900 and Sarasota FD900 only)

C. TEMPERATURE RANGE
A: -200°C to +75°C (-328°F to +167°F)
B: -20°C to +75°C (-4°F to +167°F)
C: -20°C to +200°C (-4°F to +392°F) (FV520B spool only)

D. SPOOL MATERIAL
Z: Ni-Span C®
Y: FV520B

E. INSTALLATION CONFIGURATION OPTIONS — PART 1

SARASOTA ID900 CONNECTIONS

- C:** Via flange and 1-in compression fitting (flange not supplied)
- D:** Via Sarasota RTR900 (requires 1000 mm (39.4 in) stem)
- F0:** Integral flange 3-in ASME B16.5 RF Class 300
- F1:** Integral flange 3-in ASME B16.5 RF Class 150
- F2:** Integral flange 3-in ASME B16.5 RF Class 600
- F3:** Integral flange 4-in ASME B16.5 RF Class 150
- F4:** Integral flange 4-in ASME B16.5 RF Class 600
- X:** Other flange type (Note: consult Thermo)

SARASOTA FD900 CONNECTIONS

- A:** 1-in ASME B16.5 RF Class 600
- C:** 1.5-in BSP screwed body with adapters
- X:** Other flange type (Note: consult Thermo)

SARASOTA PD900 CONNECTIONS

- P:** Standard LF2 pocket for line pressure to 150 bar (2176 psi)
- Q:** Quick response 316L pocket for line pressure to 50 bar (725 psi)
- R:** Quick response LF2 pocket for line pressure to 50 bar (725 psi)
- S:** Standard 316L pocket for line pressure to 100 bar (1450 psi)
- O:** No pocket (retrofit)

Note: ASME is equivalent to ANSI

F. INSTALLATION CONFIGURATION OPTIONS — PART 2

SARASOTA ID900 STEM LENGTH

- S:** 500 mm (19.7 in) for options excluding integral flange options or Sarasota RTR900 option
- SF:** 300 mm (11.8 in) for integral flanged option
- L:** 1000 mm (39.4 in) for Sarasota RTR900 option

SARASOTA FD900

NA: This code must be selected when a model Sarasota FD900 is being specified. No additional 'INSTALLATION CONFIGURATION PART 2' options are available

SARASOTA PD900 FILTERS

- E:** Standard inlet dry particles filter
- F:** Coalescing inlet filter with manual drain
- G:** Coalescing filter with auto drain
- H:** No inlet filter

G. CERTIFICATION

- S:** Non hazardous / safe area
 - I:** Intrinsically safe
- Note: for hazardous areas, consult Thermo*

H. OPTIONS

- L:** Local display (headmounted versions only)
- M:** Wetted parts traceability certification to BS EN 10204.3.1.b
- N:** BS EN ISO 15156/NACE MR0175 conformance certification
- T:** Traceable calibration equipment listing
- W:** WinHME900 communications software and modem (headmounted versions only)

NOTE: Consult Thermo for details of maintenance contracts and additional services including installation, commissioning, re-calibration, service, or repair.

Sarasota Gas Density Meters

Specification	
Functional Specifications	
Transducer Calibration Accuracy	2 kg/m ³ (0.125 lb/ft ³) and above: ±0.1% reading; below 2 kg/m ³ (0.125 lb/ft ³): ±0.002 kg/m ³ (±0.000125 lb/ft ³)
Repeatability	±0.01% span
Flow Range	Sarasota FD900/Sarasota PD900: Ideally 4 l/min to 20 l/min (0.5 ft ³ /min to 2.7 ft ³ /min) Sarasota ID900: Normal pipeline velocities. Accuracy unaffected by velocity
Operating Density Range	Sarasota FD900/Sarasota ID900: 0 kg/m ³ to 1000 kg/m ³ (0 lb/ft ³ to 62.4 lb/ft ³) Sarasota PD900: 0 kg/m ³ to 250 kg/m ³ (0 lb/ft ³ to 15.6 lb/ft ³)
Pressure Effect (corrected)	0.003 kg/m ³ /bar (0.000013 lb/ft ³ /psi)
Temperature Effect (corrected)	0.001 kg/m ³ /°C (0.000035 lb/ft ³ /°F) note: correction coefficients applied
Installation	Ideally within 15° of vertical, for other orientations consult Thermo
Density Meter Dimensions	See dimensional diagrams
Shipping Dimensions	Sarasota FD900: 610 mm x 360 mm x 360 mm (approx 24 in x 14 in x 14 in); Sarasota ID900/1 m stem: 1320 mm x 230 mm x 230 mm (approx 52 in x 9 in x 9 in); Sarasota PD900: 740 mm x 320 mm x 390 mm (approx 29 in x 13 in x 15 in)
Net Weight	Sarasota FD900/flanged: typically 6 kg (14 lb); Sarasota ID900/1 m stem: typically 7 kg (16 lb); Sarasota PD900: typically 5 kg (11 lb)
Shipping Weight	Sarasota FD900/flanged: typically 7 kg (15 lb); Sarasota ID900/1 m stem: typically 8 kg (18 lb); Sarasota PD900: typically 8.5 kg (19 lb)
Environmental Rating	IP65 (NEMA 4X)
Electrical Connections	Screw terminals; Cable entry: 2 x 3/4-in NPT
Temperature Measurement	High accuracy 1/2 DIN integral 4-wire PT100
Local Display (H option)	4 1/2-digit 7.6 mm (0.3 in) 7-segment LCD display. Resolution 0.1% or 0.01% depending on display variable.
Factory Calibration Range	Depends on range selected
Operating Temperature Range	-20°C to +60°C (-4°F to +140°F) ambient
Process Temperature Range	-200°C to +200°C (-328°F to +392°F)
Maximum Operating Pressure	Sarasota FD900: 170 bar (2465 psi) or flange rating; Sarasota ID900: 150 bar (2175 psi) or flange rating; Sarasota PD900: standard stainless steel pocket: 100 bar (1450 psi); standard carbon steel pocket: 150 bar (2175 psi) quick response stainless steel pocket: 50 bar (725 psi); quick response carbon steel pocket: 50 bar (725 psi)
Output	F option (frequency output): Frequency related to density on 2-wire current modulated loop 6 mA to 18 mA; 4-wire PT100 H option (headmounted electronics): Analog 4-20 mA related to density or density derived variable; HART protocol
Power Supply	F option (frequency output): 13-28 VDC 10 mA average (peak 18 mA) H option (headmounted electronics): 2 x 13-28 VDC 25 mA
Materials	
Spool	Ni-Span C or FV520B
Other Wetted Parts	Stainless steel (316L/1.4404)
Non Wetted Parts	Stainless steel (316L/1.4404)
Electronics Housing	Copper free aluminium grey epoxy finish; Plate glass window for local display option
Pocket (Sarasota PD900 only)	Standard pocket: carbon steel ASTM A350 LF2 or stainless steel 316L/1.4404 Quick response pocket: carbon steel ASTM A350 LF2 or stainless steel 316L/1.4404
Installation Configuration	
Sarasota FD900	Note: ASME is equivalent to ANSI 1-in ASME B16.5 RF Class 600; 1.5-in BSP screwed body with adapters, for other flange types consult Thermo
Sarasota ID900	Integral flange 3-in ASME B16.5 RF (Class 150, 300, 600); Integral flange 4-in ASME B16.5 RF (Class 150, 600); For other integral flanges: consult Thermo; Flange and 1-in compression fitting (flange not supplied); Via Sarasota RTR900 instrument retractor
Sarasota PD900	Installed into pocket supplied or retrofit pocket (consult Thermo for retrofit advice)
Sarasota PD900 Filters	Inlet dry particles filter (standard); coalescing inlet filter with manual or auto drain
Other Flange Types	Consult Thermo
Compliance/Certification	
Quality Assurance	ISO 9001:2000
CE mark	Compliant
Electromagnetic Compatibility	Compliant (EN 61326:1997)
Pressure Equipment Directive (97/23/EC)	SEP (sound engineering practice)
Low Voltage Directive	Compliant
Safe Area Use	As standard
BS EN ISO 15156 / NACE MR0175	
Conformance	Available as option
ATEX Conformance: Intrinsically Safe (94/9/EC)	F option (frequency output): Ex II 1 G EEx ia IIC T6 (-20°C ≤ Ta ≤ +60°C) H option (headmounted electronics): Ex II 1 G EEx ia IIC T4 (-20°C ≤ Ta ≤ +60°C)
Canadian Standards Association (CSA)	Explosion proof Class 1, Groups B, C, and D
Calibration Certification	Calibration traceable to national standards. Calibration certificates supplied as standard. Optional traceable calibration equipment listing available
Material Traceability	Wetted parts traceability to BS EN 10204.3.1.b; Certification available

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