4" Steel Model F4

Bulletin SS01012 Issue/Rev. 1.3 (11/21)

Smith Meter® PD Meters

The Smith Meter model F4 is a 4", steel, double-case, straight-through (S3 through S8), rotary-vane, positive displacement meter. Applications for the F4 include blending, batching, dispensing, inventory control, and custody transfer of oils, solvents, chemicals, paints, fats, and fertilizers.

Generic Illustration

Features

- Superior Accuracy—Smith Meter's rotary-vane meter principle, combined with the meter's uniquely designed (offset) inlet and outlet nozzles, maximizes accuracy by minimizing pressure drop across the measuring chamber reducing slippage (flow through meter clearances).
- Low pressure drop—Streamlined flow path provides low pressure drop.
- Positive and accurate registration—High-torque drive calibrator with adjustment in 0.05 percent (%) increments ensures accurate registration.
- Long service life—Low-friction ball bearings, fixed cam-type timing, and rugged construction give sustained accuracy and long service life.

Options

- High-viscosity meter clearances extend operation at maximum flow rate from 400 to 2,000 millipas-cal-second (mPa•s).
- High-temperature clearances extend operating temperatures from 150 to 200 degrees Fahrenheit (°F) (65 to 93 degrees Celsius (°C)).
- All iron trim option for operating temperatures above 200 °F (93 °C).
- Liquefied petroleum gas (LPG) trim option for low-lubricity liquids, such as LPG.
- Compliant with NACE standard MR-01-75.
- ASME Section VIII vessel construction is available for model F4-S3.

Operating Specifications

Maximum Flow Rate		
	USGPM	L/min
Continuous rating with standard trim	600	2,250
Intermittent rating[1] with standard trim	750	2,725
Continuous/intermittent rating with all iron and LPG trim	450	1,700

US gallons per minute (USGPM) and liters per minute (L/min)

Minimum Flow Rates (Typical Performance)							
Linearity[2]	**Units**	**Viscosity (Centipoise—mPa•s)**					
		.5	**1**	**5**	**20**	**100**	**400**
±0.15%	USGPM	100[3]	60	25	6	1.25	0.30
	L/min	375[3]	227	95	23	4.75	1.14
±0.25%	USGPM	75	45	18	4	1.00	0.25
	L/min	284	170	68	15	3.80	0.95
±0.50%	USGPM	50	30	12	3	0.60	0.15
	L/min	190	114	45	11	2.25	0.57

1 Intermittent rating applies to service on clean, refined products where continuous operation is not required (for example, truck loading, rail loading, and other batching applications).
2 Linearity based on a maximum flow rate of 600 USGPM (2,250 L/min) unless otherwise stated.
3 Linearity based on a maximum of 500 USGPM (1,875 L/min).

Repeatability
±0.02%

Viscosity
Standard: 400 mPa•s[4] (2,000 Seconds Saybolt Universal (SSU)) maximum

Optional: 2 pascal seconds (Pa•s) (10,000 SSU) maximum, specify “High Viscosity Meter Clearances”

Over 2 Pa•s: Specify "High Viscosity Meter Clearances" and derate maximum flow rate in direct proportion to viscosity over 2 Pa•s. For example, at 4 Pa•s, derate maximum flow rate to 50% of normal continuous rating 300 USGPM.

Temperature

Standard meter clearances with:

Buna N/PTFE[5]:	-20 °F to 150 °F (-29 °C to 65 °C)
FKM[6]:	10 °F to 150 °F (-12 °C to 65 °C)
Low temp. FKM[6,10]:	-50 °F to 150 °F (-46 °C to 65 °C)

High temperature meter clearances with:

Buna N/PTFE[5]:	-20 °F to 200 °F (-29 °C to 93 °C)
FKM[6]:	10 °F to 200 °F (-12 °C to 93 °C)
Low temp. FKM[6,10]:	-50 °F to 200 °F (-46 °C to 93 °C)

All iron trim with:

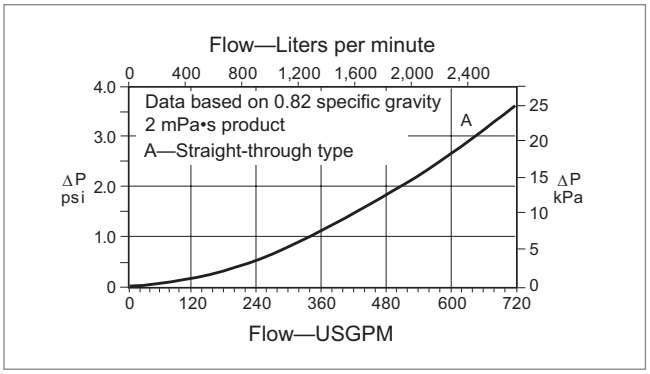
Buna N:	-20 °F to 225 °F (-29 °C to 108 °C)
PTFE[5]:	-20 °F to 400 °F (-29 °C to 205 °C)
FKM[6]:	10 °F to 400 °F (-12 °C to 205 °C)
Low temp. FKM[6,10]:	-50 °F to 400 °F (-46 °C to 205 °C)

Meter Gearing
Five US gallons or 1 dekaliter and 1 barrel or 5 dekaliters per revolution of meter calibrator output shaft.

Maximum Working Pressure

Model	Flange	PSI[7,9]	kPa[7,9]
F4-S3	150	285[7]	1,965[7]
F4-S6	300	740[7]	5,102[7]
F4-S7	600	1,480[7]	10,204[7]
F4-S8	900	2,220[7]	15,306[7]
Flange class per ANSI B16.5 raised-face (RF) flange.			

Pressure Drop (ΔP)



Materials of Construction

Trim	Housing	Internals	Seals
Standard	Steel	Iron, steel, stainless steel, and aluminum	Buna N[8], FKM[6], PTFE[5], or low temp. FKM[6,10]
LPG	Steel	Iron, steel, stainless steel, rulon, and nylon	Buna N[8], FKM[6], PTFE[5], or low temp. FKM[6,10]
All iron	Steel	Iron, steel, and stainless steel	Buna N[8], FKM[6], PTFE[5], or low temp. FKM[6,10]

Installation
It is recommended that the meter be protected with a suitable mesh strainer.

Weights and Measures Approvals
NTEP Certificate of Conformance 95-054
Canadian Notice of Approvals (NOA) S.WA-0615
Australia NMI 5-6B-55B
Brazil—INMETRO Dimel No. 0148
EU—PTB Issued MID (Measuring Instrument Directive)
PTB Issued OIML R117 Test report
Russia—GOST
For other, consult factory.

Pressure Safety Requirements
PED—Pressure Equipment Directive (EU)
CRN—Canadian Registration Number
For other, consult factory.

4 1,000 mPa•s = 1,000 cP = 1 Pa•s.
5 Polytetrafluoroethylene (PTFE).
6 Fluoroelastomer (FKM).
7 Maximum working pressure at 100 °F (38 °C).
8 Standard.
9 See catalog code for more options.
10 Only available for F4-S3 with low temperature material and ASME Section VIII design. Low temperature FKM is the standard sealing material for meters with the ASME Section VIII design.

Catalog Code

The following guide defines the correct PD meter for a given application and the respective catalog code. This code is part of the ordering information and should be included on the purchase order.

Example:

1	2	3	4	5	6	7	8	9	10
K	F	4	S	1	G	B	S	0	0

Position 1: Code

K—Catalog code

Positions 2 and 3: Model/Flange Size

F4—4"

Position 4: Flow Path

S—Straight

Position 5: Pressure Class and End Connections

Standard (raised-face flanges)

3—Class 150, 285 psig/1,965 kPa
6—Class 300, 740 psig/5,102 kPa
7—Class 600, 1,480 psig/10,204 kPa
8—Class 900, 2,220 psig/15,306 kPa

PED (raised-face flanges)

3—Class 150, 285 psig/1,965 kPa
6—Class 300, 740 psig/5,102 kPa
7—Class 600, 1,480 psig/10,204 kPa

All flanges designed to ANSI B16.5 with pressure ratings at maximum working pressure of 100 °F.

Position 6: Meter Gearing

G—Gallons
B—Barrels
D—Dekaliters
I—Imperial gallons[11]
P—Pound[11]

Position 7: Seals

B—Buna-N
V—FKM[6]
T—PTFE[5]
L—Low Temp. FKM[10]

Position 8: Trim

S—Standard
A—All iron
L—LPG

Position 9: Temperature Compensation

0—None
A—ATC
B—ATG

Position 10: Special Requirements

0—Standard
P—European Pressure Equipment Directive (PED)[12]
C—CRN and Low Temp. Material[10]
L—Low Temp. Material[10]

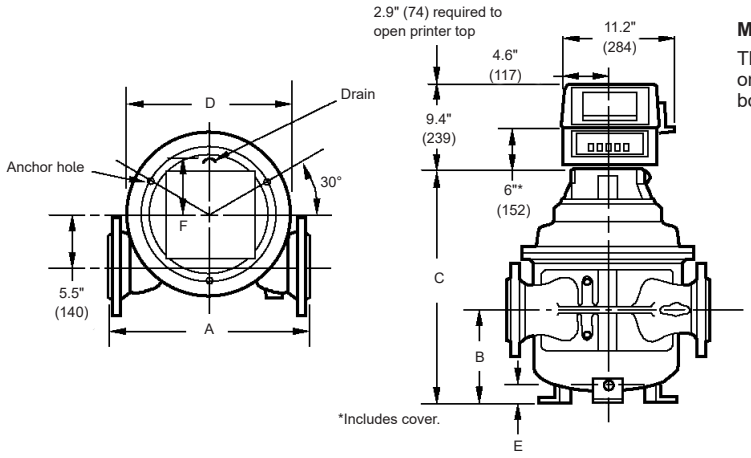
5 Polytetrafluoroethylene (PTFE).
6 Fluoroelastomer (FKM).
10 Only available for F4-S3 with low temperature material and ASME Section VIII design. Low temperature FKM[6] is the standard sealing material for meters with the ASME Section VIII design.
11 Consult factory for model number when selecting imperial or pound gearing.
12 PED required for all European countries. Equipment must be manufactured by Ellerbek, Germany facility.

Dimensions

Inches (mm)

Note: Dimensions are inches to the nearest tenth (millimeters to the nearest whole mm), each independently dimensioned from respective engineering drawings.

Model F4-S3 through S8



Meter anchor bolt holes

Three 0.8" (20 mm) bolt holes on a 13.5" (343 mm) diameter bolt circle

Model	A	B	C	D	E	F	Weight—lb (kg)
F4-S3	20.0" (508)	9.3" (235)	24.7" (627)	17.6" (447)	1.3" (33)	5.4" (137)	300 (136)
F4-S3 Low Temp. Material	20.0" (508)	9.3" (235)	25.1" (638)	18.5" (470)	1.2" (31)	5.4" (137)	450 (205)
F4-S6	24.9" (632)	9.4" (239)	25.6" (650)	19.8" (503)	1.6" (41)	6.0" (152)	540 (245)
F4-S7	26.6" (676)	9.8" (249)	27.8" (706)	21.0" (533)	1.7" (43)	6.3" (160)	830 (376)
F4-S8	28.6" (726)	20.6" (523)	37.1" (942)	28.0" (711)	6.2" (157)	13.5" (342)	1,885 (942)

Ordering Information	
Application	Batching, loading, blending, inventory, process control, etc.
Operating Conditions	Liquid—name, specific gravity or API gravity, flow range[13], temperature range[13], viscosity range[13], maximum working pressure
Seals	Buna N[14], FKM[6], PTFE[5], or low temp. FKM[6,10]
Units of Registration	Gallons, barrels, litres, dekalitres, pounds, kilograms
Direction of Flow	Left-to-right is standard unless right-to-left flow is specified
Style	Straight-through
Options and accessories	As required

5 Polytetrafluoroethylene (PTFE).
6 Fluoroelastomer (FKM).
10 Only available for F4-S3 with low temperature material and ASME Section VIII design. Low temperature FKM[6] is the standard sealing material for meters with the ASME Section VIII design.
13 Specify minimum, normal, and maximum.
14 Standard seals supplied unless optional material specified.

Accessories

Strainer

- 4" steel, raised-face (RF) flanged, 4-mesh or finer screen

Mechanical Preset Valves

- 4" straight-through type, steel, flanged, 300 pounds per square inch (psi) maximum working pressure

Hydraulic Valves

- 4" globe-type, steel, RF flanged, 300 psi maximum working pressure

Air Eliminator

- 4" steel, RF flanged, 300 psi maximum working pressure

Counters

- 200 Series—Accumulative, nine-digit, non-reset type
- 600 Series—Five large digit reset, eight small digit non-reset

Printer

- Seven-digit accumulative
- Optional six-digit zero start

Preset Counter

- 300C Series—Four-digit (five-digit optional) mechanical pushbutton preset with valve linkage
- Microswitch package for hydraulic valve, pump control, or other interlock is optional

Pulse Transmitters

- Universal pulse transmitter (UPT)—Quad-channel, infrared, security pulse transmitter in an explosion-proof housing (up to 1,000 pulses/revolution)
- Large number counters (LNC) pulse transmitter (adapts to 600 Series counters)
  - Low-resolution—1 to 10 pulses[15]
  - High-resolution—50 or 100 pulses[15]

Flow Rate Indicator

- Direct-mount mechanical
- Remote electronic

Remote Registration

- Electro-mechanical counters
- Electronic totalizers

Automatic Temperature Compensation Models

- Automatic Temperature Compensator (ATC)—Factory-set for a given product
- Automatic Temperature Gravity (ATG)—Field-adjustable for different products

15 Per revolution of LNC right-hand heel.

Revisions included in SS01012 Issue/Rev. 1.3 (11/21):
F4-S3 ASME Section VIII low temperature material information added. Page 2: Removed F4-V3 from maximum working pressure table. Page 3: Removed vertical flow path option from catalog code. See position 4.
The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.

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