

IE Piston Meters

POSITIVE DISPLACEMENT METERS

Description

The IE-Piston Meter is a versatile, rugged meter of extremely simple design. A full complement of registers, pulsers and read-out accessories are available. It is possible to apply this meter line to a broad application range, from mechanical totalization and batching to remote display of total volume, flow rate, and remote batch control. With the addition of our Pulse-to-Analog Signal Converters, electrical or pneumatic signals can be produced that will drive all standard indicators, recorders, controllers, and can be used as feed-back signals to computers. Accuracy – Repeatability With the IE-Piston Meter, the basic accuracy rating has been established, using water as the testing liquid. Flow ranges have been extended to the limits covered by an accuracy rating of $\pm 0.5\%$ and a reasonable pressure drop value. This is then, a total variation over the recommended range of each size meter. Final calibration of each meter is accomplished through proper selection of calibration gearing. In this way the flow curve is positioned as close as possible to the 100% line on the proof chart. The IE-Piston Meter can continually reproduce this curve to a repeatability rating of within $\pm 0.1\%$ Entrained Solids By definition, the IE-Piston Meter is used for the measurement of liquids. In order to provide the high level of accuracy associated with this meter, all mating parts must be machined to very close tolerances. The result is a limited capability to pass entrained solid particles. Viscosity Liquid viscosity must be given consideration when sizing any meter. The concern is to control pressure drop limits across the meter in order to provide realistic service life. An increase in viscosity produces a proportionate increase in pressure drop for any given flow rate. For this reason the upper flow range ratings are lowered when the liquid viscosity exceeds 200 CP (1000 ssu). This is then, a limitation dictated by pressure drop, not by accuracy. As a general rule, liquids in the 0.2 CP to 0.8 CP range are very effective solvents, and as such not only have a very low viscosity but also have very poor lubricating qualities. Holding the accuracy limits to $\pm 0.5\%$ restricts the recommended flow range. Pressure drop in these cases is not the controlling factor. With liquids having viscosities of 1 CP to 200 CP there is generally an improvement in lubricity. This combination of conditions provides the broadest flow range ratings with sustained $\pm 0.5\%$ accuracy.



IE PISTON METERS

Design Features

- The data contained in the selection guide will make it possible to easily and accurately select the proper size IE Piston Meter for a wide variety of liquid measurement applications. Principle advantages of the IE-Piston Meter
- Highly dependable meter performance
- Long service life characteristics
- Very practical accuracy
- Good repeatability
- Extremely reasonable cost
- Low maintenance
- Inexpensive replacement parts

Selecting Meter Size:

Both viscosity of the liquid at operating conditions and acceptable materials of construction should be known at this point

- Find the meter size by first finding the proper viscosity group in the Meter Size Selection Chart.
- Within this group select the proper piston material column.
- Move down this column until required flow rate is covered by the flow range values given.

The high flow limits shown represent a reasonable service life factor for the meter under continuous duty service. This is interpreted to mean an 8 hour service day.

- From this point on the chart, move horizontally to the right to find the IE-Piston Meter size in the intersecting vertical column headed by the proper materials of construction.

The number given in this intersecting block identifies the meter size covering your requirements.

- All piston materials are not available with every body material. Verify selection in chart adjacent to selection chart.

Explanation of Viscosity Groups: Assuming Specific Gravity of (1)

Liquids given are viscosity reference only –

- Up to 30 SSU (20 TO .75 centipoises)
Liquids range from Freon 12, to Water at 90°F (32°C) and above. Included are Ether; Toluene; M.E.K; Carbon Tetrachloride.
- 31 to 450 SSU (1 to 90 CPS)
Liquids from Water at 80°F (27°C) (and below) to Olive Oil. Included are Ammonia; Blood; Sulphuric Acid; Turpentine; SAE 10 Oil at 80°F (27°C)
- 500 to 1000 SSU (110 to 220 CPS)
Liquids such as SAE 30 Oil at 100°F (38°C); Sucrose 64 to 68 Brix at 70°F (21°C); Grade 4 Road Tar at 120°F (49°C); Corn Starch 24°B at 70°F (21°C)
- 2000 to 5000 SSU (440 to 1100 CPS)
Liquids such as paints; Castor Oil; Ketchup; Glycerine at 79°F (26°C); RC-1 Blended Asphalt at 100°F (38°C); Black Liquor at 122°F (50°C)
- 10,000 to 20,000 SSU (2,200 to 4,400 CPS)
Printers Ink; Wood Resin at 200°F (93°C); RC-4 Blended Asphalt at 140°F (60°C); Bunker "C" Oil at 100°F (38°C).
- 25,000 to 50,000 SSU (5,000 to 11,000 CPS)
Liquids such as Honey at 70°F (21°C); Black strap Molasses at 70°F (21°C); Road Tar Grade 8 above 100°F (38°C); Corn Syrup at 41°B at 80°F (27°C)

Meter Size Selection Chart (Capacities in GPM)

I & II UP to 450 SSU (.20 to 90 CPS)			III & IV 500 to 5000 SSU (110 to 1100 CPS)			V 10,000 TO 20,000 SSU (2,200 TO 4,400 CPS)			VI 25,000 to 50,000 SSU (5,000 to 11,000 CPS)			Meter Body Material			
Piston Material			Piston Material			Piston Material			Piston Material			Bronze	Iron	Steel	Stn Stl
Alum	Bronze NiResist	Tefzel	Alum	Bronze NiResist	Tefzel	Alum	Bronze NiResist	Tefzel	Alum	Bronze NiResist	Tefzel	Meer Size	Meter Size	Meter Size	Meter Size
¾" -7	1-5	--	½" -7	½" -5	--	½" -5	½" -3½	--	¼" -3	¼" -2	--	3/8x1/2	3/8x1/2	3/8x1/2	--
1½ -15	2-10	--	1 -15	1½ -10	--	1-8	1½ -5	--	½" -4	¾" -2½	--	½"	½"	½"	--
2½ -25	4-20	5-25	1½ -25	3-20	3-25	1-18	2-14	2-18	1-12	2-10	2-12	¾"	¾"	¾"	¾"
4-40	6-30	10-50	3-40	5-30	7-50	2-33	3-25	5-35	2-20	3-15	4-22	1"	1"	1"	1"
7-70	10-50	20-100	6-70	8-50	15-100	5-48	7-34	10-62	4-25	5½ -18	8-32	1½"	1½"	1½"	1½"
12-120	15-80	30-150	10-120	12-80	20-150	9-52	11-58	15-70	8-32	10-35	10-40	2"	2"	2"	2"

Body- Piston – Chamber Material

Body	Bronze	Iron	Steel	Stn. Stl.
Piston	Aluminium Bronze	Aluminium Bronze Ni-Resist	Aluminium Bronze Ni-Resist	Tefzel
Chamber	Bronze	Ni-Resist Bronze	Ni-Resist Bronze	Stn. Stl.

Piston Material/Temperature Limits.

Piston	Temperature	
	°F	°C
Aluminium	250	121
Bronze	300	149
Ni-Resist	300	149
Tefzel	200	93

Before final temperature rating is established, the piston material temperature limit must be verified.

Pressure (PSIG) Temperature °F

Case Material	Model Number	Size Connection	Max. Safe Working Pressure		Max. Safe Working Temperature	
			PSI	kPa	°F	°C
Bronze	ER-11L	1/2" NPT	150	1034	200	93
	ER-11	1/2" NPT	150	1034	200	93
	ER-12	3/4" NPT	150	1034	200	93
	ER-13	1" NPT	150	1034	200	93
	ER-15	*1-1/2"	125	862	200	93
	ER-16	*2"	125	862	200	93
Cast Iron	ER-11L	1/2" NPT	150	1034	200	93
	ER-11	1/2" NPT	150	1034	200	93
	ER-12	3/4" NPT	150	1034	200	93
	ER-13	1" NPT	150	1034	200	93
	ER-15	*1-1/2"	125	862	200	93
	ER-16	*2"	125	862	200	93
Cast Steel	ER-11LHP	1/2" NPT	400	2758	300	149
	ER-11HP	1/2" NPT	400	2758	300	149
	ER-12HP	3/4" NPT	400	2758	300	149
	ER-13HP	1" NPT	400	2758	300	149
Cast Steel	ER-15HP	†1-1/2"	275	1896	300	149
	ER-16HP	†2"	275	1896	300	149
	ER-15HP	**1-1/2"	400	2758	300	149
	ER-16HP	**2"	400	2758	300	149
Stainless Steel		3/4" NPT	150	1034	200	93
		1" NPT	150	1034	200	93
		† 1-1/2"	150	1034	200	93
		† 2"	150	1034	200	93

* ANSI 125 lb. Flat Faced Flanges

**ANSI 300 lb Flat Face Flanges

† ANSI 150 lb Raised Face Flanges

Readout Function Selection Chart

The following chart provides a ready reference to all of the standard functions to which the IE-Piston Meters can be Applied by size. Further description and index to specification bulletins is given on the page entitled "Register/Readout Selection Guide"

(+= available; 0=not available)

Meter Size	Totalization		Batching				Flow Rate			Output Signals			
	Mech.	Elect.	Manual	Mech.	Elect.	Pneu.	Tac(1)	Elect.	Pneu.	Digital	Analog	Digital	Analog
(2) 3/8 x 1/2	+	+	+	0	+	+	+	+	+	+	+	+	+
(2) 1/2	+	+	+	0	+	+	+	+	+	+	+	+	+
3/4	+	+	+	+	+	+	+	+	+	+	+	+	+
1	+	+	+	+	+	+	+	+	+	+	+	+	+
1-1/2	+	+	+	+	+	+	+	+	+	+	+	+	+
2	+	+	+	+	+	+	+	+	+	+	+	+	+

(1) Self-Contained Tachometer Generator Driven by meter.

(2) Mechanical automatic temperature compensation is available with all sizes except 3/8" x 1/2" and 1/2".

REGISTER/READOUT SELECTIVE GUIDE

TOTALIZING

Mechanical Series 10

Horizontal straight reading register 6-digit non-reset odometer, with full dial sweep hand. Weight 2 lbs., Height 2-1/4".

BATCHING

Electrical – Local

Large Dial Preset Register with 5-digit display (maximum reading 99,999) is linked to the knockoff switch assembly. Once the predetermined batch is attained, the knockoff switches provide single or two-stage trip signal to operate valve, pump, alarm, etc.

Electronic (Remote) Model 412 S

Two-stage batch pre-set with L.E.D. 5-digit display. Maximum batch setting is 99,999. For panel mounting. Operated by impulse contractors on IE-Piston-Meter.

Electrical Model

Panel mounted meter operated by analog signal. High Speed pulse generator on Piston Meter produces frequency signal that is fed to Model PMI FA converter. Analog voltage output is fed to panel meter.

OUTPUT SIGNAL

Electrical Digital (Pulse)

High Frequency Pulse Generator – This is a photo-pulse unit which produces a 1 to 9 V square wave signal. Power Required: 135 mA 12 Vdc

Electrical Analog

The High Frequency Pulse Generator signal is fed into the Model 400 PMI. Choice of Analog signals are: 0-100 mv, 0-5 v, 0-10 v, 1-5 ma, 4-20 ma, 10-50 ma, 0-5 ma, 0-20 ma, 0-50 ma.

Specifications subject to change without notice