



Proven Performance
for Over 50 Years

81 Series Industrial Flowmeter

ADVANTAGES

- High accuracy
- Wide flow range
- Fast response to rate changes
- Simplicity of construction with few parts
- Cost Effective
- Calibration traceable to NIST

DESCRIPTION

COX Ball Bearing Industrial Turbine Flowmeters produce a high resolution pulse rate output signal proportional to fluid velocity, and hence, to volumetric flow rate. The turbine meter incorporates a free-moving axially-mounted rotor that spins on a bearing system in a housing with a magnetic signal pick-off. Liquid flowing through the meter makes the rotor turn in an angular velocity directly proportional to the rate of flow. As the rotor turns, the blades induce an alternating current in the signal pick-off. The frequency of the signal generated is proportional to the rate of flow and provides high linearity over a wide flow range. The calibration factor for the turbine flowmeter is derived by dividing the number of pulses received from the pick-off by a known standard volume or weight of liquid passed through the meter. COX Industrial ball bearing construction provides maximum flow range and minimum sensitivity to viscosity changes with clean, nonabrasive liquids. The 81 Series Meter is recommended for use with light, lubricating, hydrocarbon liquids.

INSTALLATION RECOMMENDATIONS

To obtain the rated accuracy of the turbine flowmeter, it is required that the fluid stream be free of rotational components. The forward support provides a straightening effect, but for best results the following is recommended:

- 10 diameters of straight upstream pipe and 5 diameters of straight pipe downstream of meter.
- Installation of flow straighteners for maximum accuracy.

Performance Specifications

Accuracy	±0.50% of actual flow rate over linear flow range
Linearity	±0.50%
Repeatability	±0.05% of actual flow rate over linear flow range
Response Time	2.5 to 16 ms (depending on line size) for a 63% recovery to step change in flow rate



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Turbine Flowmeter Capacities									
Size Code	Range Limits for a 0.5% Linearity				Typical K-factor		Typical Pulse Rate at Maximum Flow Rate	Maximum Press Drop Based on Water at Maximum Flow Rate	
	L/M Sz 1/2" -2 to 1		U.S. GPM		P/L Sz 1/2" -2 to 1	P/U.S. Gal			
	m³/hr Sz 1-1/2" to 12				P/M³ Sz 1-1/2" to 12				
	Min	Max	Min	Max	PPS	kPa	PSI		
Cox Industrial Turbine Flowmeter Capacities with water at 15.6°C (60°F)									
1/2-2	1.250	8.70	0.33	2.3	7962	30000.00	1150	28	4.0
1/2-1	1.890	15.10	0.50	4.0	6341	24000.00	1600	40	8.0
1/2	2.270	30.30	0.60	8.0	1982	7500.00	1000	55	8.0
5/8-1	2.270	30.30	0.60	8.0	1982	7500.00	1000	55	8.0
3/4-1	3.790	56.80	1.00	15.0	1691	6400.00	1600	48	7.0
3/4	4.730	94.60	1.25	25.0	951	3600.00	1500	46	6.5
1-1	4.730	94.60	1.25	25.0	951	3600.00	1500	46	6.5
1	13.900	189.00	3.50	50.0	185	700.00	583	40	6.0
1-1/2	1.700	27.30	7.50	120.0	66000	250.00	500	40	6.0
2	2.270	50.00	10.00	220.0	63400	240.00	880	54	7.5
3	4.540	145.00	20.00	640.0	12000	45.30	483	40	6.0
4	12.500	262.00	55.00	1150.0	5970	99.60	452	28	4.0
6	34.100	545.00	150.00	2400.0	2250	8.51	341	30	4.5
8	63.600	908.00	280.00	4000.0	1060	4.02	268	35	5.0
10	108.000	1408.00	475.00	6200.0	655	2.48	257	35	5.0
12	182.000	2000.00	800.00	8800.0	436	1.65	242	35	5.0
81A Option 1 (High Pulse Rate Output) Turbine Flowmeter Capacities for 0.25% linearity, water at 15.6°C (60°F)									
4	29.500	262.00	130.00	1150.0	12600	47.62	952	55	8.0
6	68.100	545.00	300.00	2400.0	12600	47.62	1905	40	6.0
8	114.00	908.00	500.00	4000.0	6920	26.19	1746	40	6.0

TURBINE METER SELECTION

For Example:	Size	Style	End Connections	Materials	Bearings	Optional Items
	2	81A	F6	C	1	SJ
Your order would therefore be 2-81AF6C1-SJ.						

Style

- 81 T3 Ball Bearing Design
- 81A NPT & Flanged Ball Bearing Design

End Connections

- T3 Male Flared Tube (MS33656)
- T4 Threaded External NPT
- F5 ANSI Class 150 RF Flange D5 DIN Class PN20 RF
- F6 ANSI Class 300 RF Flange D6 DIN Class PN50 RF
- F8 ANSI Class 600 RF Flange D8 DIN Class PN100 RF

Materials

- C 81 & 81A Series Stainless Steel Body & Flanges if Applicable

Bearings

- 1 AISI 440C SS Ball Bearings with AISI type 400 SS retainers

Options

- A High Resolution pulse out 81A style (sizes 4, 6, & 8) .25% linearity with 10 point calibration
- WC Coil 1/2 NPT with 3 feet of wire
- BD 90° Electrical Spaced Dual Coils for Bi-Directional Flow
- DC Dual Coils (Contact sales engineer for details)
- SJ Steam Jacket (Sizes 1/2 through 4)

Calibration

(Will not appear in model number—clearly define)

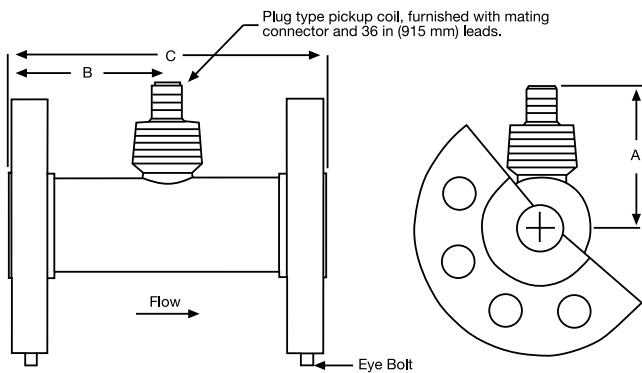
- 10 Point Calibration
- Calibration in other liquids to a maximum of 300 GPM (Water Standard)

Physical Specifications

Materials	
Flowmeter Body	ASTM Type 300 Series stainless steel
Rotor	Sizes 1/2 through 8 in., 17-4 PH ss (10 & 12in., 17-7 PH ss blades & 17-4 PH ss, HUB)
Min. Output Voltage	28 mV peak-to-peak at minimum linear flow range
Overrange	To 150% of maximum rated flow for short periods (consult factory)
Process Temperature Limits	(Not to exceed ANSI B16.5-1988 flange ratings) -100° to +450° F (-75° to +230° C)
End Connectors	
Flanged:	ANSI-RF, sized 1/2" through 8"
Threaded:	External, NPT, sizes 1/2" through 1" - 1 External, tubing, sized 5/8" - 1 and 1" - 1
Pressure Rating	
Flanged:	150-600# ANSI Class Rating
Threaded:	NPT, 7 Mpa (1000 psi)
Threaded:	Tubing, 20 Mpa (3000 psi)
Max. Pressure Drop:	See Turbine Flow Capacities Table
Outlet Pressure (absolute):	Must be greater than twice the pressure drop, plus 1.3 times the vapor pressure of the measured liquid at operating temperature.

Flange Meter Dimensions													
Size Code	A in mm	B in mm	C in mm	ANSI Flange Rating Class	Flange Diameter		Bolt Hole Diameter		Bolt Circle Diameter		Bolt Hole Quantity	81 & 81A Series Approx. Weights	
					in	mm	in	mm	in	mm		Lbs.	Kg.
1/2	2.73	2.50	5.00	150	3.50	89	0.62	16			4	5	2.3
	69.30	63.50	127.00	300	3.75	95	0.62	16	2.62	67.0	4	7	3.2
				600	3.75	95	0.62	16	2.62	67.0	4	8	3.8
3/4	2.87	2.50	5.00	150	3.88	99	0.62	16	2.75	70.0	4	6	2.7
	72.90	63.50	127.00	300	4.62	117	0.75	19	3.25	83.0	4	8	3.6
				600	4.62	117	0.75	19	3.25	83.0	4	10	4.5
1	2.99	2.50	5.00	150	4.25	108	0.62	16	3.12	79.0	4	7	3.2
	75.90	63.50	127.00	300	4.88	124	0.75	19	3.50	89.0	4	9	4.1
				600	4.88	124	0.75	19	3.50	89.0	4	11	5.0
1-1/2	3.21	3.00	6.00	150	5.00	127	0.62	16	3.88	99.0	4	10	4.5
	81.50	76.20	152.40	300	6.12	155	0.88	22	4.50	114.0	4	14	0.4
				600	6.12	155	0.88	22	4.50	114.0	4	16	7.3
2	3.45	3.580	6.50	150	6.00	152	0.75	19	4.75	121.0	4	15	6.8
	87.60	90.90	165.10	300	6.50	165	0.75	19	5.00	127.0	8	20	9.1
				600	6.50	165	0.75	19	5.00	127.0	8	24	10.9
3	4.15	6.59	10.00	150	7.50	191	0.75	19	6.00	152.0	4	30	13.6
	105.40	167.40	254.00	300	8.25	210	0.88	22	6.62	188.0	8	40	18.1
				600	8.25	210	0.88	22	6.62	168.0	8	48	20.9
4	4.57	8.43	12.00	150	9.00	229	0.75	19	7.50	191.0	8	42	19.1
	116.10	214.10	304.80	300	10.00	254	0.88	22	7.55	200.0	8	65	29.5
				600	10.75	273	1.00	25	8.50	216.0	8	95	43.1
6	5.54	10.36	14.00	150	11.00	279	0.88	22	9.50	241.0	8	80	36.3
	140.70	263.10	355.60	300	12.50	318	0.88	22	10.62	270.0	12	120	54.4
				600	14.00	355	1.12	28	11.50	292.0	12	200	90.7
8	6.45	13.32	18.00	150	13.50	343	0.88	22	11.75	298.0	8	143	64.9
	163.80	338.30	457.20	300	15.00	381	1.00	25	13.00	330.0	12	200	90.7
				600	16.50	419	1.25	32	13.75	349.0	12	315	142.9
10	7.43	20.01	25.00	150	16.00	406	1.00	25	14.25	362.0	12	250	113.4
	188.70	508.30	635.00	300	17.50	445	1.12	28	15.25	387.4	16	325	147.4
				600	20.00	508	1.38	35	17.00	431.8	16	510	231.3
12	8.35	24.14	30.00	150	19.00	483	1.00	25	17.00	431.8	12	400	181.4
	212.10	613.20	762.00	300	20.50	521	1.25	32	17.75	450.9	16	500	226.8
				600	22.00	559	1.38	35	19.25	489.0	20	895	315.2

FLANGED TURBINE FLOWMETERS

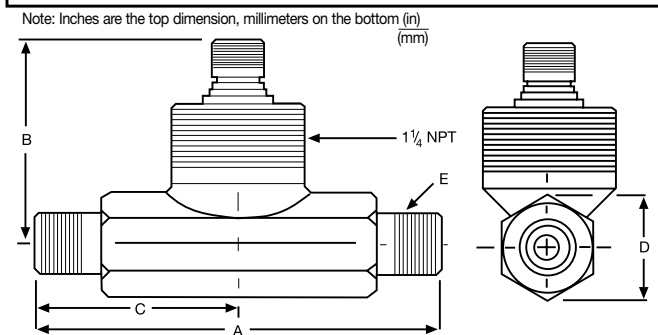


Eye bolt on both ends, 1.2 in. (30 mm) diameter hole on size 6 through 12 flowmeters.

NPT TURBINE FLOWMETERS

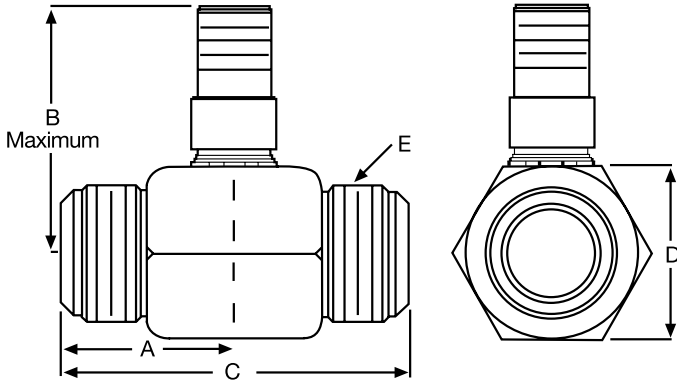
81AT4 NPT Threaded					
Size Code	A	B	C	D	E
1/2 15	5.0 127	2.7 69	2.5 64	1.25 HEX	1/2 NPT
3/4* 20	5.0 127	2.8 72	2.5 64	1.50 HEX	1 NPT

* Model Code is 1-1-81AT4



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AN (37° FLARED) TURBINE FLOWMETERS



81T3 Flared Tube

Size Code	A	B	C	D	E
½-2	$\frac{1.2}{30}$	$\frac{2.7}{69}$	$\frac{2.5}{64}$	$\frac{1.00}{2.54}$.750-16UNF
½-1	$\frac{1.2}{30}$	$\frac{2.7}{69}$	$\frac{2.5}{64}$	$\frac{1.00}{2.54}$.750-16UNF
¾-1	$\frac{1.4}{36}$	$\frac{2.8}{71}$	$\frac{2.7}{69}$	$\frac{1.25}{31.8}$.875-14UNF
¾-1	$\frac{1.7}{42}$	$\frac{2.9}{72}$	$\frac{3.3}{83}$	$\frac{1.38}{34.9}$	1.060-12UN
¾	$\frac{1.6}{41}$	$\frac{2.9}{74}$	$\frac{3.3}{84}$	$\frac{1.38}{34.9}$	1.312-12UN
1	$\frac{1.8}{48}$	$\frac{2.9}{74}$	$\frac{3.6}{91}$	$\frac{1.63}{41.2}$	1.875-12UN
1-½	$\frac{2.9}{74}$	$\frac{3.2}{81}$	$\frac{4.6}{117}$	$\frac{2.13}{54.0}$	1.875-12UN
2	$\frac{4}{102}$	$\frac{3.4}{86}$	$\frac{6}{152}$	$\frac{2.75}{69.9}$	2.500-12UN

81 SERIES APPLICATION CHART

Process Liquid	Rate	Process Liquid	Rate	Process Liquid	Rate
Acetone	C	Ethyl Alcohol	C	Mineral Oil	A
Acrylonitrile	-	Ethyl Chloride	C	Naptha	C
Adiponitrile	-	Ethylene	-	Nitrogen Tetroxide	C
Aerozine	B	Ethylene Glycol	C	Oil, Crude	B
Alcohols	C	Ethylene Oxide	B	Oil, Hydraulic	A
Alkylate	-	Formaldehyde	B	Oil, Mineral	A
Amino Silanes	-	Freon (R11)	C	Oil, Motor	A
Ammonia, Anhydrous	C	Freon (R113)	C	Oil, Vegetable	A
Ammonium Hydroxide (2)	C	Freon (R12)	C	Olefins	-
Ammonium Nitrate	B	Freon (R114)	C	Pentane	C
Aviation Gasoline	B	Fuel Oil (SAE 2 to 6)	A	Platformate	C
Beer	B	Gasoline	B	Propane, Liquid	C
Benzene	B	Heptane	B	Propyl Alcohol	C
Boric Acid	C	Hexane	B	Propylene	-
Butadiene	B	Hydraulic Oil	A	Reformate	C
Butane	C	Hydrazine	B	Styrene	-
Butyl Alcohol	B	Isobutane	C	Tetaethyl Lead (TEL)	A
Butylenes	-	Isopopanol	C	Tetramethyl Lead	A
Calcium Stearate/CO ₂ Liquid	-	Jet Fuel	B	Toluene	B
Carbon Tetrachloride	C	Kerosene	B	Turpentine	A
Caustis- 50%	C	Liquefied Petroleum Gas (LPG)	B	Vegetable Oil	A
Crude Oil	B	Lubricating Oil	B	Vinyl Chloride Monomer (1)	C
Diesel Fuels	A	Methane, Liquid	B	Xylenes	B
Ethane	B	Methyl Alcohol	C		

(1) The vinyl chloride monomer must be clean and strained.

RATING CODE

- A = **BEST CHOICE** with the listed liquid.
- B = **FREQUENTLY USED** with the liquid, but some corrosion to be expected.
- C = occasionally used, but **WITH CAUTION**.
- = **NO DATA** available

For more information, contact
COX Instruments or your local
COX Instruments representative.



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