

Turbine Meter PNF

- **Particularly suited to fiscal metering applications**
- **High accuracy**
- **Ranges from 28 to 8000m³/h**
- **Sizes from 100mm to 500mm (4in to 20in)**
- **Digital output**
- **Compact size**
- **Intrinsically safe or flameproof versions**



PNF Turbine Meter

Introduction

ABB Kent-Taylor PNF Turbine Flowmeters are designed to measure the flow of both lubricating and non-lubricating liquids over a flow range of 28 to 8000m³/h (103 to 29,300 imperial gallons per minute) in 10 different sizes. The meters offer good linearity ($\pm 0.25\%$) and excellent repeatability ($\pm 0.02\%$) over wide flow ranges (typically 10:1) and are suitable for use over a wide operating pressure and temperature span. The meter output is a digital signal directly proportional to the flow in a convenient form for processing.

The PNF meter incorporates a rim around the outer periphery of the rotor blade tips and the output signal is generated from ferritic inserts in this rim. This provides the high pulse

resolution that is required for meter prover duty, greater mechanical strength and partial viscosity compensation.

The complete rotor assembly of the PNF meter is statically balanced.

PNF Turbine Meters are widely used on major oil pipelines and for royalty and custody fiscal measurement.

The only moving component in the meter is the rotor and the only component subject to wear is the bearing assembly. The tungsten carbide bearings enable the meters to be guaranteed against wear for two years from the date of despatch, providing that the meter is operated within the published specifications.

Principle of Operation

The basic construction of an ABB Kent-Taylor turbine meter is a bladed rotor suspended in the fluid stream with its axis of rotation parallel to the flow direction.

The rotor is driven by impingement of the liquid on the blades and the rotational speed is proportional to the fluid velocity which in turn is proportional to the volumetric flow rate.

The rotation of the rotor is detected by a pick-off coil fitted to the outside of the meter housing. The output signal is a continuous train of voltage pulses of sinusoidal form with each pulse representing a small discrete volume of liquid.

Floating Rotor

All ABB Kent-Taylor turbine meters feature a patented 'floating rotor' action which completely eliminates all end thrust and wear over the meter's linear flow range, improves the repeatability and extends the linear flow range.

Specification

Sizes

4in, 5in, 6in, 8in, 10in, 12in, 14in, 16in, 18in and 20in.
100mm, 125mm, 150mm, 200mm, 250mm, 300mm,
350mm, 400mm, 450mm and 500mm.

Maximum Operating Pressure

Limited by flange pressure rating.

Operating Temperature Range

-50° to 150°C.

Linearity

Better than $\pm 0.25\%$ over full linear range.
Better than $\pm 0.15\%$ over restricted flow range.

Repeatability

Better than $\pm 0.02\%$ of reading (when installed in conjunction with a meter prover)

Downstream Pressure

To ensure satisfactory operation of the meter it is essential that cavitation does not occur at any point in the meter. Contact ABB Kent-Taylor if any doubt exists about there being sufficient downstream pressure.

Response Time

Average 10ms for 50% step flow change.

Voltage Output

> 10mV r.m.s. into 22k Ω load at minimum flow rate.

Electrical Connector

Cannon type (mating connector supplied with each coil).

Coil Protection Box

All PNF meters are fitted with three threaded bosses to accept a coil protection box. The boss thread is M32 with a PG21 adaptor.

Recommended Cables

Twin core 14/0.0076in (16/0.2mm) twisted screened cable PVC covered with tinned copper braid.

Signal Transmission

Read-out equipment may be located up to 500m from the turbine meter.

Safety

Intrinsically Safe Systems

The use of an appropriate zener barrier provides a fully certified intrinsically safe system. Certificate details: BASEEFA certificate to SFA 3012, covered by No. Ex 75033/B
Code Ex ia IIC T4 and system certificate No. Ex 75034.

Flameproof systems

Alternatively the pick-off coil can be fitted into a flameproof conduit box to BS4683 Part 2 for Group IIB Temperature Class T6. BASEEFA certificate No. Ex82170 code Ex d IIB T6.

Filtration

The use of a strainer upstream of the turbine meter is recommended to prevent damage due to solids. ABB Kent-Taylor can make recommendations against plant detail.

Installation

Full instructions for the correct mechanical and electrical installation of the equipment are contained in the comprehensive users handbook supplied with each instrument.

Special Meters

Details given here apply to standard turbine meters. Meters of special material or with special couplings can also be supplied.

Meter Proving

PNF turbine meters are suitable for use with Meter Provers designed to minimum A.P.I. volume.

Notes

Minimum Linear Flow:

is the minimum flow at which the linearity (pulses per unit volume) is maintained within the specified limits.

Maximum Linear Flow:

is the normal maximum continuous rating of meter.

Extended Linear Flow:

is an overspeed figure for intermittent operation only i.e. in case of transients etc. Operation of a turbine meter at flows in excess of these latter figures may result in permanent damage to the unit.

Repeatability:

is the ability of the turbine meter to reproduce its output during consecutive proving runs under constant operating conditions within the normal linear flow range.

Viscosity:

all figures relate to a calibration on water (1 centistoke). An increase in viscosity tends to increase the minimum linear flow figure. For details of calibration at viscosities which differ from that of water, consultation with ABB Kent-Taylor is advised.

Specific Gravity:

low specific gravities also tend to increase the minimum linear flow figure.

Materials

Bearing and thrust washers: Tungsten carbide
 Pulse generation inserts: Mu metal
 Tube: Stainless steel to AISI 316
 Flanges: Forged from either Carbon steel to ASTMA-105 (max. carbon content 0.23%) or Stainless steel to ASTMA182 Grade F316.

Flow

Uni-directional

Flanges

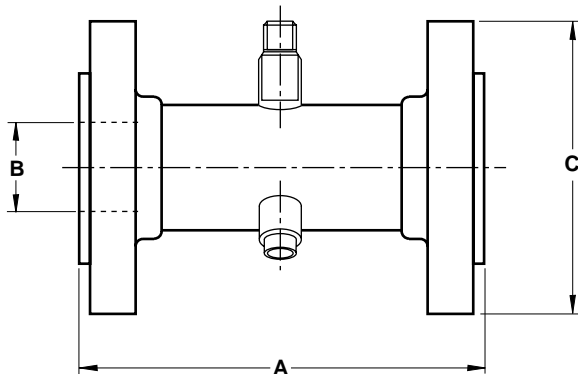
To mate with the Standards quoted in the Ordering Code.

End couplings

'Slip-on' type flanges.
 Flanges not in contact with the liquid.

Dimensions and Weights

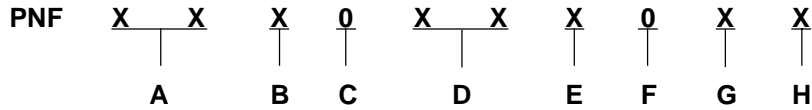
Nominal Size		Minimum Linear Flowrate		Maximum Linear Flowrate		Extended Linear Flowrate		Meter Factor ±10%		Approximate Press. Drop at Maximum Continuous Linear Flow (lbf/in)
mm	in	m/hr	Imperial gal/min	m/hr	Imperial gal/min	m/hr	Imperial gal/min	per coil per m	Pulses per imp gal	
100	4	28	103	280	1026	340	1246	22300	101.4	9
125	5	40	147	400	1466	480	1760	8200	37.3	6
150	6	70	255	655	2400	820	3000	5000	22.7	6
200	8	120	440	1130	4150	1400	5130	1581	7.2	5
250	10	195.0	715	1750	6400	2200	8050	1035	4.7	6
300	12	280.0	1025	2500	9160	3100	11350	720	3.2	5
350	14	330.0	1210	2950	10800	3640	13400	614	2.7	5
400	16	500.0	1830	4000	14650	5000	18350	440	2.0	4
450	18	630.0	2310	5050	18500	6300	23100	352	1.6	4.5
500	20	800.0	2930	6540	24000	8000	29300	286	1.3	5



Size nominal bore		Approx. Weight Flange Class (ANSI)			
mm	in	150		300	
		kg	lb	kg	lb
100	4	17.7	39.00	25.90	57.00
125	5	20.80	46.00	33.00	73.00
150	6	26.30	58.00	44.50	98.00
200	8	50.00	110.00	75.00	166.00
250	10	77.00	170.00	112.00	246.00
300	12	119.00	262.00	165.00	364.00
350	14	161.00	355.00	233.00	513.00
400	16	209.00	460.00	324.00	714.00
450	18	285.00	628.00	430.00	948.00
500	20	352.00	775.0	499.00	1100.00

Size nominal bore		A Overall length		B Bore at inlet		C Flange Class (ANSI)			
mm	in	mm	in	mm	in	150		300	
						mm	in	mm	in
100	4	273	10.65	102.40	3.99	229.00	8.93	254.00	9.91
125	5	286	11.25	128.50	5.06	254.00	10.00	279.00	11.00
150	6	299	11.75	154.20	6.07	279.00	11.00	318.00	12.50
200	8	406	16.00	202.60	7.795	343.00	13.50	381.00	15.00
250	10	508	20.00	254.00	10.01	406.00	16.00	445.00	17.50
300	12	610	24.00	303.00	11.93	483.00	19.00	521.00	20.50
350	14	711	28.00	333.00	13.11	533.00	21.00	584.00	23.00
400	16	813	32.00	380.00	14.95	597.00	23.50	648.00	25.50
450	18	889	35.00	435.00	17.14	635.00	25.00	711.00	28.00
500	20	889	35.00	464.00	18.25	698.00	27.50	774.00	30.50

Ordering Code



A Size

32 4in	37 150mm	44 12in	52 16in
33 100mm	38 8in	45 300mm	53 450mm
34 5in	41 200mm	46 14in	54 18in
35 125mm	42 10in	47 350mm	55 500mm
36 6in	43 250mm	51 400m	56 20in

B Material Certification ¹/Inspection Standard

- 1 No certification
- 2 N.A.C.E. Standard to MR -01-75 (Para. 3.3, 3.5, 3.6, and Tables 1 and 2) and/or AD Merkblatt W2 DIN 50049 3.1B
- 3 Independent Inspectorate Certification

C Not allocated (enter 0)

D Flange Type/Material

22 ANSI 16.5 (ASA) 300 Carbon Steel
23 ANSI 16.5 (ASA) 150 Carbon Steel
26 ANSI 16.5 (ASA) 300 Stainless Steel
27 ANSI 16.5 (ASA) 300 Stainless Steel
99 Any other

E Pick-off Coil

- 1 Standard
- 2 Intrinsically Safe *
- 3 2off Standard
- 4 2off Intrinsically Safe *
- 5 3off Standard
- 6 3off Intrinsically Safe *

* G Coded 4, 5 or 6.

F Not allocated (enter 0)

G Cable Entry

- 1 One plug and socket
- 2 Two plugs and sockets
- 3 Three plugs and sockets
- 4 One plug and socket in mechanical protection box
- 5 Two plugs and sockets in mechanical protection box
- 6 Three plugs and sockets in mechanical protection box
- 7 One plug and socket in flameproof box
- 8 Two plugs and sockets in flameproof boxes
- 9 Three plugs and sockets in flameproof boxes

H Calibration

- 4 Standard
- 5 Standard – Witnessed

Note

1. Material certification only applies to the flanged housing and not other components of the meter.



The Company's policy is one of continuous product improvement and the right is reserved to modify the specifications contained herein without notice.

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