

HS Series

High Shock Turbine Flow Meters

Description

Flow Technology's High Shock turbine flow meters utilize a proven flow measurement technology to provide exceptionally reliable digital outputs. Because of their versatility, these flowmeters are the solution for a wide variety of liquid flow sensing applications.

The High Shock flow meter is specifically designed to withstand pressure spikes that create hydraulic shock waves in the fluid when actuators or rams are activated. The downstream end of the meter's housing has a small step, rather than a retaining ring, which prevents internal components from being pushed through by hydraulic shock. The upstream end of the housing includes either a robust retaining ring, or in extreme cases, a threaded retaining ring which is screwed into the housing, clamping the internals between the downstream step and the retaining ring. Additionally, the meter's supports are mechanically locked in place so they cannot rotate in the housing.

The High Shock flow meter's rotor blades are thicker than those found on a standard turbine meter. A radius is machined at the intersection of the blades and rotor hub, eliminating the stress point created by a 90-degree cut. In hydraulic fluid applications requiring the use of ball bearings, a step is located in the upstream bore of the rotor so it cannot be pushed over the bearing.

High Shock meters are available in sizes from 3/8-inch to 2-1/2 inches, and are capable of measuring liquid flow rates from 0.03 to 450 GPM (0.1 to 1,700 LPM). The meters' standard range is 10:1, but can be extended to 100:1.

Operation

A volumetric device that measures the flow of liquids, the turbine flowmeter's design is based on a freely-suspended turbine rotor which is rotated by the flow of fluid through the meter body.



HS Series Turbine Flowmeters

Applications

Flow Technology's High Shock turbine flowmeters are a rugged flow measurement instrument designed for use in environments with high line pressures, hydraulic shock loads and other extreme conditions. The meter incorporates unique features making it well-suited for use in such applications as hydraulic R&D, production testing, and control of rams and valves in the petroleum industry.

Features

- Designed for environments with high line pressures and hydraulic shock loads
- Utilizes special, reinforced rotor blades
- High turndown capability, up to 100:1
- Excellent speed of response
- Repeatability of $\leq \pm 0.05\%$
- Linearity of $\leq \pm 0.5\%$ of reading over normal 10:1 range for liquid
- Operating pressure determined by end fitting selected
- Liquid flow rates from 0.03 to 450 GPM (0.1 to 1,700 LPM)
- Choice of NPT, MS, SAE 4-Bolt, Autoclave, and Dynamic Beam Seal end fittings
- Additional end fittings available as special configurations



HS Series

Model Numbering System

HS Sizing

HS Sizing										Extended Range														
5-Digit Series & Size	AE, NE & 62 End Fitting Nominal	DB End Fitting SAE 85720/01	AC End Fitting Auto-clave	Meter ID		Normal Flow Range 10:1				Ball Bearings				Journal Bearings						Based on Normal Range Nominal K-Factor Approx.				
						GPM		LPM		RF Min		Mag Min		RF Min		MAG Min							ALL Max	
				in.	mm	min	max	min	max	GPM	LPM	GPM	LPM	GPM	LPM	GPM	LPM	GPM	LPM	P/G	P/L	Hz		
HS 4-6	3/8	-06	N/A	.30	7.6	.25	2.5	.95	9.5	.03	.11	.10	.38	.10	.38	.12	.45	3	11	48000	12680	2000		
HS 4-8	1/2	-07	9/16	.30	7.6	.25	2.5	.95	9.5	.03	.11	.10	.38	.10	.38	.12	.45	3	11	48000	12680	2000		
HS 6-8	1/2	-07	3/4	.37	9.4	.50	5.0	1.9	19	.05	.19	.12	.45	.15	.57	.20	.76	5	19	25000	6600	2100		
HS 8-8	1/2	-08	3/4	.40	10	.75	7.5	2.8	28	.08	.30	.16	.60	.20	.76	.25	.95	8	30	16000	4200	2000		
HS-08	1/2	-09	3/4	.44	11	1.00	10.0	3.8	38	.10	.38	.20	.76	.25	.95	.30	1.1	10	38	12000	3170	2000		
HS-10	*5/8, 3/4	-10	3/4	.50	13	1.25	12.5	4.7	47	.15	.57	.30	1.1	.30	1.1	.40	1.5	15	56	9600	2540	2000		
HS-12	3/4	-12	1	.56	14	2	20	7.6	76	.25	.95	.50	1.9	.50	1.9	.50	1.9	25	94	6000	1580	2000		
HS-16	1	-16	N/A	.86	22	5	50	19	190	0.6	2.3	1.0	3.8	1.0	3.8	1.0	3.8	60	227	2400	635	2000		
HS-20	1-1/4	-20	N/A	1.00	25	9	90	34	340	1.0	3.8	1.5	5.7	1.0	3.8	1.5	5.7	100	378	1300	345	1950		
HS-24	1-1/2	N/A	N/A	1.32	34	15	150	57	570	1.6	6.0	2.5	9.5	1.6	6.0	2.5	9.5	160	605	600	160	1500		
HS-32	2	N/A	N/A	1.75	44	22	225	85	850	2.5	9.5	3.5	13	2.5	9.5	3.5	13	250	946	350	92	1300		
HS-40	2-1/2	N/A	N/A	2.22	56	40	400	151	1510	4.5	17	5.0	19	4.5	17	5.0	19	450	1700	180	48	1200		

Abbreviations for Units of Measure:

GPM = Gallons per Minute

LPM = Liters per Minute

P/G = Pulses per Gallon

P/L = Pulses per Liter

Black = English (US) Units

Blue = Metric (SI) Units

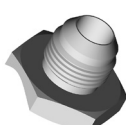
English units in GPM

Metric units in LPM

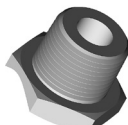
End Fittings

Code	End Fittings
AE*	AN (or MS) external straight threads, 37° flare per SAE AS 4395
NE*	NPT external threads
DB	Dynamic Beam Seal, per SAE AS 85720/01 Note: "DB" fitting available up to size HS-20
AC	Autoclave
62*	SAE Code 62, 4-bolt split flange Note: "62" fitting available for HS 4-8 – HS-32

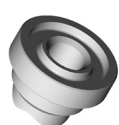
*HS-10 "AE" fitting is 5/8". NE and 62 fittings are 3/4".



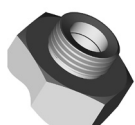
AN (MS)



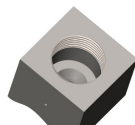
NPT



SAE Code 62



Dynamic Beam Seal



AC

Calibration

Code	Description
Note:	W=Water, S=Solvent, B=Oil Blend Viscosity must be provided with oil blend calibrations "B"
NW	10-point, normal 10:1 range, in water
NS	10-point, normal 10:1 range, in solvent
NB	10-point, normal 10:1 range, in oil blend
XW	10-point, extended range, in water
XS	10-point, extended range, in solvent
XB	10-point, extended range, in oil blend
TW	20-point, normal 10:1 range, in water
TS	20-point, normal 10:1 range, in solvent
TB	20-point, normal 10:1 range, in oil blend
YW	20-point, extended range, in water
YS	20-point, extended range, in solvent
YB	20-point, extended range, in oil blend
U2	Universal Viscosity Curve, 2 Viscosities (specify minimum viscosity & maximum viscosity). 10 points each viscosity
U3	Universal Viscosity Curve, 3 Viscosities (specify minimum viscosity & maximum viscosity). 10 points each viscosity

H	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Meter Size					End Fittings		Calibration		Special		Material	Bearing	Pickoff	Optional Designators				

HS Series

Special

Code	
-	Standard or UVC calibration
S	Special / Range or Units to signify one or more of the following: <ul style="list-style-type: none"> Units of measure other than GPM Special calibration range other than 10:1 normal or extended range

Liquid

Materials of Construction

Material Code	Housing	Rotor
E	316 SST	430F SST

Bearings

Bearing selection will affect flow range. Refer to sizing specification table for correct flow ranges.	
Code	
A	Ball Bearings (440 C)
B	Ball Bearing (Ceramic)
D	Carbide Journal (Carbide Shaft & Sleeve)

Pickoffs

The following is a listing of some of the pickoffs that are available from Flow Technology.

Code	
-1	Modulated Carrier, MS connector
-2	Magnetic, MS connector
-3	Magnetic, flying leads/threaded connection
-5	Modulated Carrier, flying leads/threaded connection
-6	Magnetic, MS connector, 750° F/400° C max.
-7	Magnetic, flying leads/threaded connection 750° F/400° C max.
-L	Modulated Carrier, MS connector, 750° F/400° C max.
-M	Modulated Carrier, flying leads/threaded connection 750° F/400° C max.
T1	Modulated Carrier w/RTD, MS connector
T2	Magnetic w/RTD, MS connector
T3	Magnetic w/RTD, flying leads/threaded connection
T5	Modulated Carrier w/RTD, flying leads/threaded connection
-X	Modulated Carrier, I.S. approved, MS connector
XX	Modulated Carrier, I.S. approved, flying leads/threaded body
-U	Magnetic, I.S. approved, MS connector
TT	Magnetic, I.S. approved, flying leads/threaded body
Notes:	
1.	Maximum temperature rating of pickoffs are 350° F (177° C) unless otherwise noted.
2.	See Amplifier Link literature for amplified pickoff codes.

Please note:

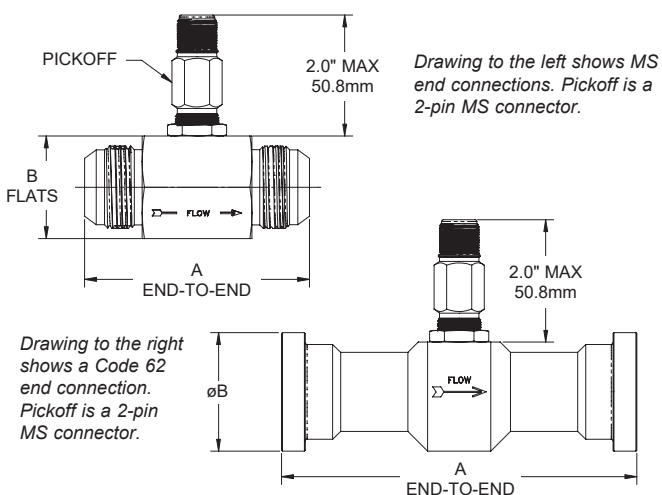
Highlighted areas indicate standard base price configuration.

H	S	X	X	X	X	X	X	X	X	L	X	X	X	X	X	X	X
Meter Size					End Fittings		Calibration		Special		Material	Bearing	Pickoff		Optional Designators		

HS Series

Dimensions

AE, NE or DB Fittings					Code 62 Fittings				
Series	A		B		Series	A		B	
	in.	mm	in.	mm		in.	mm	in.	mm
HS4-6	2.45	62	1.00	25	HS__8	4.64	118	1.25	32
HS__8	2.45	62	1.00	25	HS-10	5.13	130	1.63	41
HS-10	2.72	69	1.38	35	HS-12	5.13	130	1.63	41
HS-12	3.25	83	1.38	35	HS-16	5.63	143	1.88	48
HS-16	3.56	90	1.63	41	HS-20	5.63	143	2.13	54
HS-20	4.06	103	1.88	48	HS-24	6.63	168	2.50	64
HS-24	4.59	117	2.25	57	HS-32	7.63	194	3.13	80
HS-32	6.06	154	2.75	70					
HS-40	8.90	226	3.50	89					



Performance Specifications

Performance specifications are based on a viscosity of 1.2 centistokes using ball bearings.

Calibration Accuracy	≤ ±0.05% of reading (accuracy of primary flow calibration standard directly traceable to NIST)
Repeatability	≤ ±0.05% of reading
Linearity	≤ ±0.5% of reading over the normal 10:1 flow range
	±0.1% of reading with linearizing electronics
Pressure Drop	Less than 700 mBAR (10 psid) at maximum 10:1 flow range
Dynamic Response	Less than 10 mS response to a step input change of flow rate

Specifications are for reference only and are subject to change without notice.

Specifications

Materials of Construction

Standard

316 SST Housing
430F SST Rotor
440 C Ball Bearings
Stainless steel all other wetted parts

Operating Temperature Range

Defined by pickoff and bearing selection

Bearing Type

Temperature Limits:

440 C stainless steel or
ceramic ball bearings
Note: Not recommended for water service.

-450° F to +300° F (-270° C to +150° C)

Tungsten carbide
journal bearings

-100° F to +1,200° F (-75° C to +650° C)

Pickoff Type

Magnetic

Output:

Temperature Limits:

High Temp. Magnetic

Output:

Modulated Carrier (RF)

High Temp. (RF)

-430° F to +350° F (-260° C to +177° C)

10 mV min.

-430° F to +750° F (-260° C to +400° C)

10 mV min.

-300° F to +350° F (-185° C to +177° C)

Up to 750° F (400° C)

Pickoff Electronic Connections

MS Connector

2-pin, standard pickoff:

3-pin, amplified pickoff:

4-pin, pickoff with RTD:

15-89515-101

15-89515-102

15-93825-01

Threaded Connection
with Leads

Junction Box with Terminal:

73-31836-105

Operating Pressure Range

Defined by end connection

Filtration Recommendations

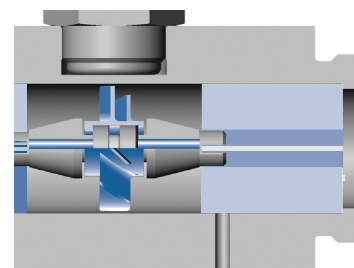
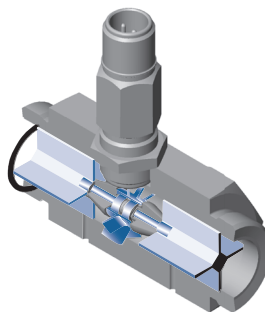
Ball Bearings

10 micron to 100 micron (with
less filtration for large sizes)

Journal Bearings

100 micron

Diagrams



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