

FFM04 Industrial grade high accuracy turbine flow meter



Metal SUS Ceramics	Low loss power & pressure	Microflow amount	(VS / VH) (RS / RH)	420 bar	4 mm 40 mm	Low viscosity liquid	SUS Anti-pollution & corrosion 304/316
Core Bearings	Power	Precision Measurement	Sensor	Withstand Pressure	Diameter	Measuring Medium	Material

Introduction

Fluid flowing through FFM04 causes the rotor to revolve. As the rotor blade pass the pickoffs, electrical pulses are produced in which frequency is proportional to the flow rate. The revolutions per minute and the K-factor (number of pulses/gallon) make it possible to obtain the flow volume passing through the unit. FFM04 series are used to measure medium or lower viscosity media, such as water, light fuel, solvent, hydraulic oil, lubricating oil etc.

Feature

- Bearable high-pressure, high-temperature and low-temperature
- Low pressure loss, low power consumption
- Fast response time
- High repeatability and accuracy
- Resistant to contamination and anti-corrosion
- Compact design and easy maintenance
- Low flow measurement

Applications

- Petrochemical / Hydraulic / Lubrication system
- Water treatment / Gas industry / Laboratory equipment / Industrial boiler
- Test bench / Semiconductor integrated circuit
- Pharmaceutical, Vacuum equipment
- Defense science and technology
- Coal gas / Natural gas pipeline

Specification

Specifications

Nominal Diameter	DN4...DN40
Applicable Medium	Medium or lower viscosity liquids
Accuracy	Better than $\pm 1\%$ of reading $\pm 0.5\%$ / $\pm 0.2\%$ selectable
Repeatability	$\pm 0.1\%$ of reading
Pressure Rating	MAX. 420bar
Ambient Temperature	- 40 ... 85 °C
Medium Temperature	- 40... 120 °C , - 40 ... 180 °C (high temperature type)

Materials	
Body / Rotor Support	304 stainless steel (316 stainless steel optional)
Turbine	Stainless steel
Shaft	Tungsten carbide / ceramic
Bearing	Stainless steel ball bearing, Tungsten carbide/ceramic journal bearing
Process Connection	BSPP female thread, NPT female thread

Parameter Table

Type	Measuring Range L / Min		Max. Pressure Rating(bar)	DN (mm)	Process Connection (BSPP/NPT)	Filtration (micron)	
	Magnetic Pickoff	Carrier frequency Pickoff				Journal Bearing	Ball Bearing
FFM04...4.5L	0.6-4.5	0.3—4.5	420	4	G1/4 or 1/4"NPT	75	-
FFM04...10L	1.6-10	0.8—10	420	6	G1/4 or 1/4" NPT	75	-
FFM04...20L	3-20	1.5—20	420	10	G3/8 or 3/8" NPT	100	30
FFM04...36L	4-36	2—36	420	13	G1/2 or 1/2" NPT	150	50
FFM04...100L	10-100	5—100	420	15	G1/2 or 1/2" NPT	150	50
FFM04...130L	13-130	6—130	420	20	G3/4 or 3/4" NPT	150	50
FFM04...170L	17-170	8—170	420	25	G1 or 1" NPT	150	70
FFM04...250L	25-250	12—250	420	32	G1-1/4 or 1-1/4"NPT	200	100
FFM04...320L	32-320	16—320	420	40	G1-1/2 or 1-1/2"NPT	200	100

VS / VH :

Magnetic pickoffs can sense a ferrous rotor and is ideal for use in all types of turbine flow meters.

Options include cryogenic, high temperature and explosion proof.

Option : extremely low and high temperature.

RS / RH :

Carrier frequency pickoffs offer low speed response, no drag, large sensing distance and can sense non-ferrous metals like aluminum or nonmagnetic stainless steel in addition to ferrous metal.

Unlike magnetic pickoff, an carrier frequency pick off is not a passive device and requires coupling with a signal conditioners/preamplifier.

These devices produce a square wave output versus the analog sine wave of the magnetic pickoff.

Bearings

- Tungsten carbide journal bearing - Applicable to low or non-lubricating media, narrow turndown ratio of the flow meter relative with ball bearing.
- Stainless steel ball bearing - Applicable to lubricating media, with low friction, lower limit for flow meter and wider turndown ratio.
- Ceramic journal bearing - Self-lubricating, applicable to non-lubricating media such as liquid nitrogen, narrow turndown ratio of the flow meter relative with ball bearing

Product Accessories (optional)

VS : Magnetic pickoffs with pulse output amplifier
RS : Carrier frequency pickoffs with pulse output amplifier



Power Supply	12...30VDC
Current Consumption	8mA
Outputs	NPN OC output; NPN OC output+pull-up resistor
Reverse Polarity Proof	Yes
Short-circuit Proof	Yes
Operating Temperature	-40 ... 120 °C
Ambient Temperature	-40 ... 85 °C
Electrical Connection	M12 x 1 Plug DIN43650-A Plug (solenoid plug)
Protection Class	M12 x 1 Plug : IP67 DIN43650-A Plus : IP65

VH : High temperature magnetic pickoffs with pulse output amplifier
RH : High temperature carrier frequency pickoffs with pulse output amplifier

Operating Temperature	VH - 40 ... 180 °C RH - 40 ... 180 °C
Ambient Temperature	- 40 ... 85 °C
Option : extremely low and high temperature.	
Other parameters please refer to the above	

Wiring - Pusle Output

Wiring	PNP output	NPN output												
<table border="1"> <tr><th>Signal</th><th>Plut</th><th>Cable</th></tr> <tr><td>U +</td><td>1</td><td>Brown</td></tr> <tr><td>Pulse</td><td>4</td><td>Black</td></tr> <tr><td>U -</td><td>3</td><td>Blue</td></tr> </table> <p>M12 x 1 plug</p>	Signal	Plut	Cable	U +	1	Brown	Pulse	4	Black	U -	3	Blue		
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Signal	Plut													
U +	1													
Pulse	3													
U -	2													

VA : Magnetic pickoffs with analog output amplifier
RA : Carrier frequency pickoffs with analog output amplifier



Power Supply	12 ... 30VDC
Current Consumption	Voltage analog output : 7 mA
Outputs	Current analog output : < 12mA
Outputs	0 ... 10 V 3-wire (0) 4 ... 20 mA
Reverse Polarity Proof	Yes
Short-circuit Proof	Yes
Operating Temperature	-40 ... 120 °C
Ambient Temperature	-40 ... 85 °C
Electrical Connection	M12 x 1 Plug DIN43650-A Plug (solenoid plug)
Protection Class	M12X1 Plug : IP67 DIN43650-A Plus : IP65

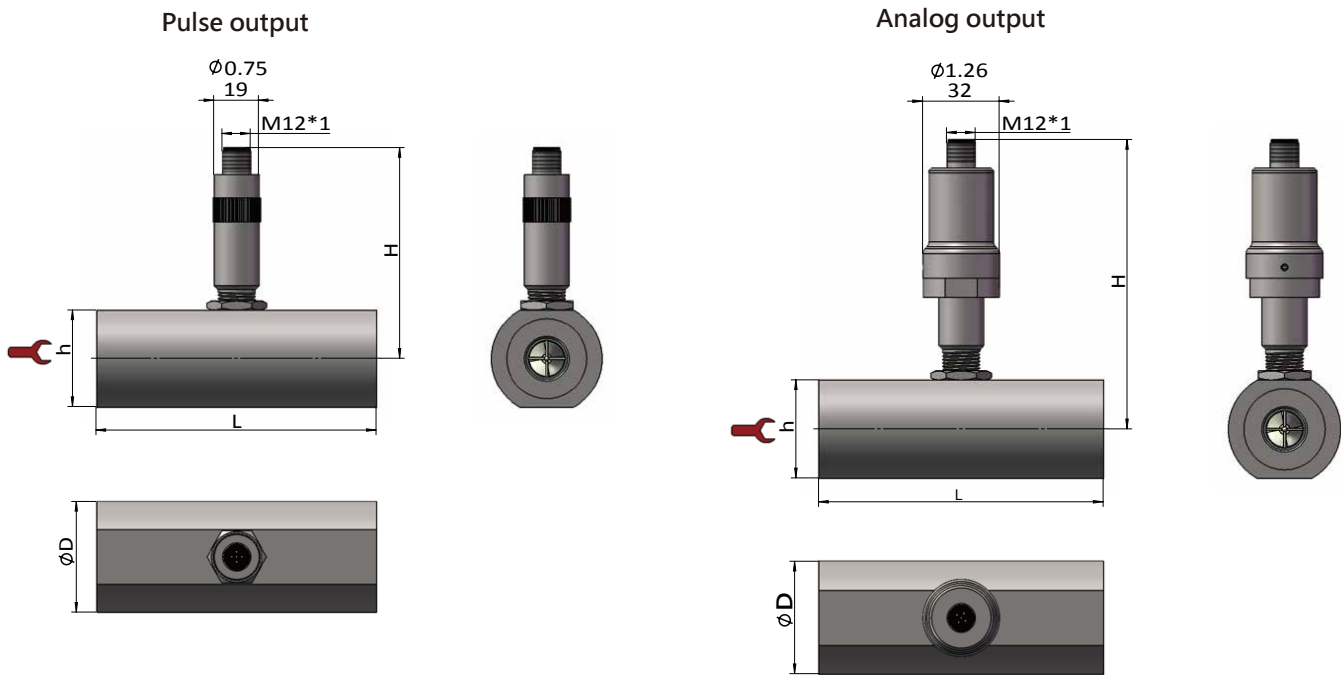
VAH : High temperature magnetic pickoffs with analog output amplifier
RAH : High temperature carrier frequency pickoffs with analog output amplifier

Operating Temperature	VAH - 40 ... 180 °C RAH - 40 ... 180 °C
Ambient Temperature	- 40 ... 85 °C
Option : extremely low and high temperature.	
Other parameters please refer to the above	

Wiring - Analog Output : 3-wiring / 4 ... 20mA

Wiring	4...20mA (3-wire)												
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Signal	Plut												
U +	1												
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Dimension



DN Comparison table

Nominal Diameter (BSP/NPT)	Process Connection (BSP/NPT)	L inch (mm)	h inch (mm)	D inch (mm)	H for pulse output inch (mm)	H four tapuatlog inch (mm)
DN4	G1/4 or 1/4" NPT	2.44 (62)	1.06 (27)	1.3 (33)	3.35 (85)	5.16 (131)
DN6	G1/4 or 1/4" NPT	2.44 (62)	1.06 (27)	1.3 (33)	3.39 (86)	5.2 (132)
DN10	G3/8 or 3/8" NPT	2.48 (63)	1.18 (30)	1.42 (36)	3.46 (88)	5.28 (134)
DN13	G1/2 or 1/2" NPT	4.3 (109)	1.61 (41)	1.85 (47)	3.54 (90)	5.35 (136)
DN15	G1/2 or 1/2" NPT	4.3 (109)	1.61 (41)	1.85 (47)	3.54 (90)	5.35 (136)
DN20	G3/4 or 3/4" NPT	5.0 (127)	1.81 (46)	2.05 (52)	3.66 (93)	5.47 (139)
DN25	G1 or 1" NPT	6.46 (164)	1.97 (50)	2.2 (66)	3.74 (95)	5.55 (141)
DN32	G1-1/4 or 1-1/4" NPT	6.85 (174)	2.36 (60)	2.6 (66)	3.9 (99)	5.71 (145)
DN40	G1-1/2 or 1-1/2" NPT	7.76 (197)	2.76 (70)	3.0 (76)	4.06 (103)	5.87 (149)

Ordering Guide

Item	FFM04	—	GF	10	TC	C	20L	1	VS	—	H	
Type	BSPF female thread (G thread) NPT female thread		GF NF									
Nominal diameter	DN4 DN6 DN10 DN13 DN15 DN20 DN25 DN32 DN40			04 06 10 13 15 20 25 32 40								
Bearings	SUS ball bearing (unavailable for DN4 / DN6 / DN10) Tungsten carbide journal bearing Ceramic journal bearing				BB TC CC							
Accuracy	0.2% of reading 0.5% of reading 1% of reading					A B C						
Measuring Range	4.5L / MIN 10L / MIN 20L / MIN 36L / MIN 100L / MIN 130L / MIN 170L / MIN 250L / MIN 320L / MIN						4.5L 10L 20L 36L 100L 130L 170L 250L 320L					
Turndown ratio (Meter with wide turndown ratio (40 : 1 or 50 : 1) should be used with carrier frequency pickoffs and stainless steel ball bearing.)	10:1 20:1 30:1 40:1 50:1							1 2 3 4 5				
Pickoffs type	Magnetic pickoffs with pulse output amplifier High Temp. magnetic pickoffs with pulse output amplifier Magnetic pickoffs with analog output amplifier High Temp. magnetic pickoffs with analog output amplifier Carrier frequency pickoffs with pulse output amplifier High Temp. carrier frequency pickoffs with pulse output amplifier Carrier frequency pickoffs with analog output amplifier High Temp. carrier frequency pickoffs with analog output amplifier								VS VH VA VAH RS RH RA RAH			
Output	Pulse 0-20mA 4-20mA 0-5V 1-5V 0-10V									— A020 A420 V005 V105 V010		
Electrical connection	DIN43650-A M12 x1 plug with cable										H S	
Option	Housing material SS316											SS316