ULTRASONIC FLOW METER FOR AIR

DATA SHEET FWD···2

FWD is an ultrasonic flow meter that measures flow rate of the air or nitrogen gas in pipes from 25mm to 200mm. As a Air flow meter it is ideal for management of the operating load rate of the compressor, management of the amount of the used air in the factory and detecting of the air leakage in the factory.

25, 32mm 40 to 80mm 100 to 200mm

FEATURES

1. No pressure loss
   Ultrasonic measurement involves no obstructions inside the measuring pipe, so there is no pressure loss.
2. Strong resistance to oil and vapor
   No moving parts means high resistance to fluids containing oil, vapor, and dust.
3. Battery-powered
   The built-in battery type (with a life of 10 years) makes power line construction unnecessary.
   The external power supply type (24V DC) is also available.
4. Wide rangeability 1:60
   The wide rangeability allows for accurate measurement of even smaller flow rates.
5. Various output functions
   Unit pulse, 4 to 20mA DC, upper/lower limit alarm, device error alarm

SPECIFICATIONS

Nominal diameter (mm):
25, 32, 40, 50, 65, 80, 100, 150, 200

Flow-rate range:
(Actual flow) (Accuracy guarantee range)

Type	Nominal diameter	Flow-rate range (m^3/h)	[Reference] NORMAL flow rate (m^3/h)*
FWD025	25mm	±0.6 to ±35	±3.6 to ±210
FWD032	32mm	±1.1 to ±65	±6.5 to ±390
FWD040	40mm	±1.3 to ±80	±7.7 to ±470
FWD050	50mm	±2.5 to ±150	±15.0 to ±890
FWD065	65mm	±4.0 to ±240	±24.0 to ±1420
FWD080	80mm	±5.0 to ±300	±30.1 to ±1780
FWD100	100mm	±10 to ±500	±59 to ±2970
FWD150	150mm	±24 to ±1200	±140 to ±7120
FWD200	200mm	±40 to ±2000	±240 to ±11870

*This column shows flow rates converted into the normal flow rates (flow rates at 0°C and 1 atm), assuming the measurement is carried out under a temperature of 0°C and a pressure of 0.5 MPa.

Accuracy:
(Actual flow)

Type	Nominal diameter	±5% of rate	±2% of rate
FWD025	25mm	±0.6 to ±3.5m^3/h	over ±3.5 to ±35m^3/h
FWD032	32mm	±1.1 to ±6.5m^3/h	over ±6.5 to ±65m^3/h
FWD040	40mm	±1.3 to ±8m^3/h	over ±8 to ±80m^3/h
FWD050	50mm	±2.5 to ±15m^3/h	over ±1 to ±150m^3/h
FWD065	65mm	±4.0 to ±24m^3/h	over ±24 to ±240m^3/h
FWD080	80mm	±5.0 to ±30m^3/h	over ±30 to ±300m^3/h
FWD100	100mm	±10 to ±50m^3/h	over ±50 to ±500m^3/h
FWD150	150mm	±24 to ±120m^3/h	over ±120 to ±1200m^3/h
FWD200	200mm	±40 to ±200m^3/h	over ±200 to ±2000m^3/h

NORMAL conversion accuracy (accuracy of flow rates converted into the ones under "normal" conditions):
FWD025…FWD080: ±2.5% of rate (at 0.5 MPa, 25°C, dry air)
FWD100…FWD200: ±2.0% of rate (at ≥ 300 kPa)

Low flow cut-off:
(Actual flow)

Type	Nominal diameter	Low flow cut-off
FWD025	25mm	±0.1m^3/h or less
FWD032	32mm	±0.2m^3/h or less
FWD040	40mm	±0.2m^3/h or less
FWD050	50mm	±0.4m^3/h or less
FWD065	65mm	±0.6m^3/h or less
FWD080	80mm	±0.8m^3/h or less
FWD100	100mm	±2.6m^3/h or less
FWD150	150mm	±5.0m^3/h or less
FWD200	200mm	±9.0m^3/h or less

Update rate:
0.5 seconds (2 seconds for Built-in battery type)
Calculates the moving average of instantaneous flow rates (default setting: a set of four measurements)

Flow rate conversion:
Normal flow rate:
a flow rate converted into the one under the conditions of 0°C and 1 atm.
Standard flow rate:
a flow rate converted into the one at the user-defined temperature and 1 atm.

Unit:
Accumulated flow rate: m^3, L
Instantaneous flow rate: L/min, m^3/h
Pressure: kPa
Temperature: °C
Note: Flow rates are indicated in either form of the actual flow rate or the converted flow rate, and the latter is further divided into the normal flow rate and the standard flow rate. For their definitions, see "flow rate conversion" on Page 1. The factory default setting for flow rate indication is Normal flow rate.

Display: You can change the indication mode and display contents by using buttons.
- Main display:
  [Forward Flow Indication Mode]
  Forward flow accumulated volume (Total) (m^3)· Forward flow accumulated volume (Trip) (m^3)· Instantaneous flow-rate (L/min).
  [Reverse Flow Indication Mode]*
  Forward flow accumulated volume (Total) (m^3)· Reverse flow accumulated volume (Total) (m^3)· Instantaneous flow-rate (L/min)
- Sub display:
  Instantaneous flow-rate (m^3/h) · Pressure (kPa)· Temperature (°C)

*If you set the instantaneous flow rate for the main display, the sub display will be blank.

<When pipe size is 25 to 80mm>
Display digits:
- Main display
  Forward flow accumulated volume (Total):
  00000000.0 (m^3) 9 digits
  Forward flow accumulated volume (Trip):
  0000000.0 (m^3) 8 digits
  Reverse flow accumulated volume (Total):
  -0000000.0 (m^3) 8 digits
  Instantaneous flow-rate:
  00000.00 (L/min) 7 digits
  Note) In case of selection of Actual Flow Indication (m^3) at "Forward flow accumulated volume (Total)", "Forward flow accumulated volume (Trip)" "Reverse flow accumulated volume (Total)", 2 digits after the decimal point are to be indicated.
- Sub display:
  Instantaneous flow-rate:
  000.00 (< 10000) 5 digits
  00000 (≥ 10000) 5 digits
  Unit: m^3/h
  Pressure: 0000.0 (kPa) 5 digits
  Temperature: 00.0 (°C) 3 digits

<When pipe size is 100 to 200mm>
Display digits:
- Main display
  Forward flow accumulated volume (Total):
  000000000 (m^3) 10 digits
  Forward flow accumulated volume (Trip):
  00000000 (m^3) 9 digits
  Reverse flow accumulated volume (Total):
  -00000000 (m^3) 9 digits
  Instantaneous flow-rate:
  0000000 (L/min) 7 digits
- Sub display:
  Instantaneous flow-rate:
  0000.0 (< 10000) 5 digits
  00000 (≥ 10000) 5 digits
  Unit: m^3/h
  Pressure: 0000.0 (kPa) 5 digits
  Temperature: 00.0 (°C) 3 digits

Current output: 4 to 20mA DC (Unavailable for the built-in battery type)
Current output accuracy: ±0.5%FS
Load resistance: 400Ω or less
(Changeover of "Instantaneous flow-rate", "Pressure", "Temperature" is available with button operation)
The following is an example when you selected the instantaneous flow rate.
<Forward flow indication mode>
Zero output current: 4mA (Reverse flow or low flow)
Output current lower limit: 4mA
Output current higher limit: 22mA
<Reverse flow indication mode>
Zero output current: 12mA (Within low flow cut-off)
Output current lower limit: 2mA
Output current higher limit: 22mA
Full scale flow-rate:

Type	Nominal diameter	Initial setting value (m^3/h)
FWD025	25mm	300
FWD032	32mm	600
FWD040	40mm	700
FWD050	50mm	1200
FWD065	65mm	2000
FWD080	80mm	2500
FWD100	100mm	5000
FWD150	150mm	10000
FWD200	200mm	20000

(The above indicated are the default values. You can change them by button operation.)

Contact pulse output: (Unavailable for the built-in battery type)
Open drain output: 2 outputs
Output 1: Unit pulse output (forward flow)
Output 2:
Unit pulse output (reverse flow), or Flow-rate upper/lower alarm output.
Maximum Load: 24V DC, 50mA
Saturation voltage at ON: 1.5V or less
Current at OFF: 50μA or less
Pulse output
Output of unit pulses corresponding to increase of accumulated flow
Pulse unit (initial setting): 100 L/P (25 to 80mm)
1 m^3/P (100 to 200mm)
Maximum output frequency: 10 Hz
Duty: 35 to 65% or One shots (50, 100, 125, 250, 500ms)
Flow-rate upper/lower alarm
An alarm signal is emitted when the flow rate reaches user-defined upper limit or lower limit. You can also define the alarm hysteresis.

Fluid to be measured:
Air (mainly factory air, compressor air) or nitrogen (not available for 100 to 200mm.)

Fluid temperature:
-10 to +60°C, 90%RH or less

Working pressure:
0 to 1MPa (gauge pressure)

Ambient conditions:
-10 to +60°C, 90%RH or less (No dew condensation)

Storage ambient conditions:
-20 to +70°C (No dew condensation)

Power supply:
- 24VDC±10%,
  Power consumption:
  1.5W Maximum (Current consumption: 40mA maximum)
- Built-in lithium battery (battery life is 10 years under ar ambient temperature of 20°C)

Flow direction:
forward or reverse (Direction indicated by the arrow mark is regarded as forward flow)

Connection method:
1) Nominal diameter 25mm
   Rc1
2) Nominal diameter 32mm
   Rc 1-1/4
3) Nominal diameter 40mm to 80mm
   Wafer connection (Installation between JIS10K flanges and by tightening with bolts)
4) Nominal diameter 100mm to 200mm
   JIS10K flange

Installation position:
Horizontal (LCD display is to face upwards) or vertical

Pressure drop:
Negligible (Equivalent to a straight pipe)

Protection structure:
IP64 (JIS C0920: Dust-proof, splash-proof type), Possible to install outdoor

Weight: Refer to "Oultine diagrams".

Materials:
- ○ Outer casing:
  Aluminum alloy
- ○ Measurement pipe:
  Aluminum alloy (25 to 80mm dia.)
  Stainless alloy (100 to 200mm dia.)
- ○ Sensor holder:
  PPS
- ○ Sensor rubber:
  FVMQ (Fluorosilicone rubber)

Display casing:
Aluminum alloy

*Those marked with ○ are the parts contact with fluid.

Installation Requirements

- Add a sunshade for the flowmeter if it is exposed to direct sunlight.
- Avoid places where:
  - the electromagnetic noise level is high
  - the atmosphere is corrosive
  - there is a risk of submersion
  - the flowmeter constantly gets wet

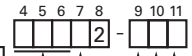
Piping Requirements

- It is recommended to secure at least 10D (D: diameter) straight pipe run both on upstream and downstream of the flowmeter.
- If the fluid contains a large amount of mist and/or dust, install the flowmeter on vertical piping.

EU Directive Compliance CE

EMC (2014/30/EU)
EN 61326-1
RoHS (2011/65/EU)
EN 50581
PED (2014/68/EU)
*Applicable to FWD150 and FWD200 only
EN 10216-5

CODE SYMBOLS



Digit	Specifications	Note	4 5 6
4	<Nominal diameter(mm)>		
5	25		0 2 5
6	32		0 3 2
	40		0 4 0
	50		0 5 0
	65		0 6 5
	80		0 8 0
	100		1 0 0
	150		1 5 0
	200		2 0 0
7	<Power supply>		
	24V DC		D
	Build-in Battery		B
8	Modification No.		2
9	<Fluid to be measured>		
	Air		A
	Nitrogen	Note1	N
10	<Power cable>		
	None	Note2	0
	5m		5
	20m		2
11	<Instruction Manual>		
	None		0
	Japanese		1
	English		2

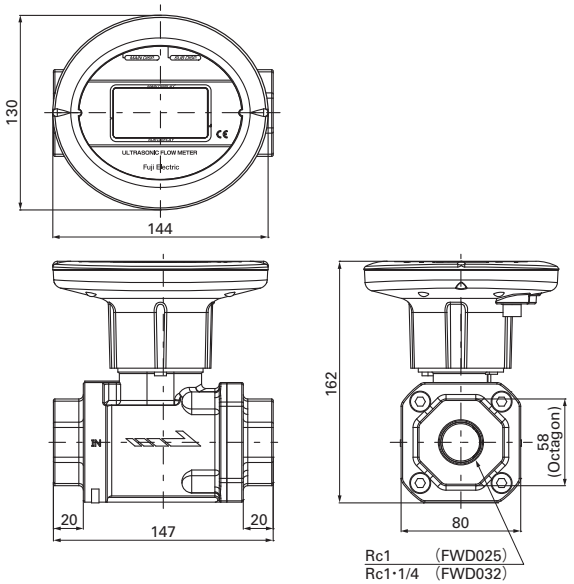
Note1) Applicable pipe diameters for nitrogen measurement are from 25 to 80 mm.
Note2) If you select the built-in battery type (7th code "B"), select "none "(code "0") in the 10th digit.

Accessories

Nominal diameter	Accessory
25, 32mm	M4 Hexagonal wrench
40, 50, 65, 80mm	M4 Hexagonal wrench, Center adjusting collar, Flange gaskets, Bolt set
100, 150, 200mm	M4 Hexagonal wrench, Center adjusting collar

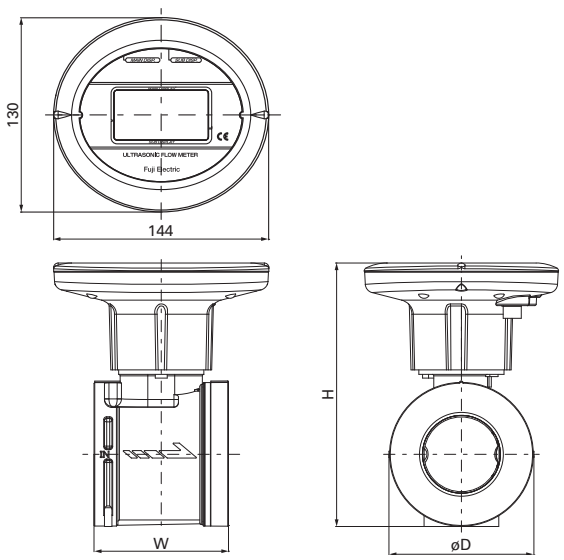
OUTLINE DIAGRAMS (Unit : mm)

Screw-in type
<Nominal diameter: 25,32mm>



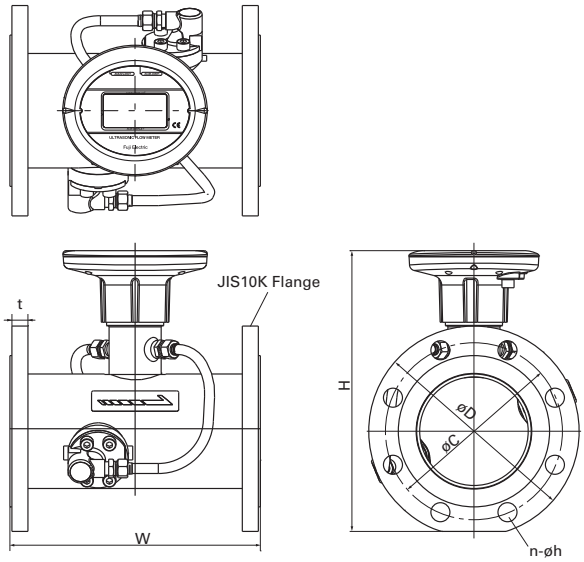
Type	Mass. (kg)
FWD025	1.7
FWD032	1.6

Wafer connection type
<Nominal diameter: 40 to 80mm>



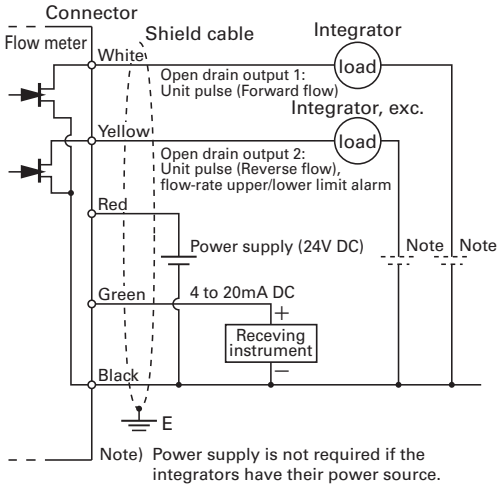
Type	W	H	øD	Mass. (kg)
FWD040	76	163	81	1.1
FWD050	90	176	96	1.3
FWD065	108	197	117	1.6
FWD080	117	220	126	1.8

JIS10K pipe flange type
<Nominal diameter: 100to 200mm>



Type	W	H	øD	øC	t	n	øh	Mass. (kg)
FWD100	250	280	210	175	18	8	19	10.0
FWD150	300	341	280	240	22	8	23	18.3
FWD200	350	391	330	290	22	12	23	24.1

CONNECTION DIAGRANS (External power supply type)



⚠ Caution on Safety

*Before using this product, be sure to read its instruction manual.

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