

# ULTRASONIC FLOW METER FOR AIR

## DATA SHEET

**FWD**

It is ultrasonic flow meter that measures flow rate of the air or nitrogen gas in the pipe.

Pipe size up to 25mm to 200mm are applicable as a product line-up.

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.

## FEATURES

### 1. Pressure loss="0", therefore, energy loss="0"

Ultrasonic type measuring principle is adopted  
No obstructions inside the measuring pipe, so there is no pressure loss.

### 2. Strong resistance to oil and vapor provides high durability

No moving parts means high resistance to fluids containing oil, vapor, and dust.

### 3. Battery power supply makes power line construction unnecessary

The built-in battery type (with a life of 10 years) makes power line construction unnecessary.  
In addition, the external power supply type (24V DC) is also available in this product lineup.

### 4. Wide range ability with ratio of 1:60

The wide range ability allows for accurate measurement of even smaller flow rates.

### 5. Various output functions enable system maintenance and control

In addition to unit pulse, 4 to 20mA DC analogue output, upper/lower limit alarm output.

## 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 <sup>3</sup> /h)	[Reference] NORMAL flow-rate range at 0°C, 0.5MP(Nm <sup>3</sup> /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



25, 32mm dia.    40 ~ 80mm dia.    100 ~ 200mm dia.

Accuracy: (Actual flow)

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

Accuracy of conversion into NORMAL: ±2.5%

Low flow cut-off:

(Actual flow)

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

Update rate: 0.5 seconds (2 seconds for Built-in battery type)

Display: • Main display: Changeover selection of the following contents by the "Left button"

[In case of selection of Forward Flow Indication Mode]

Forward flow accumulated volume (Total) (Nm<sup>3</sup>) · Forward flow accumulated volume (Trip) (Nm<sup>3</sup>) · Instantaneous flow-rate (NL/min)

[In case of selection of Reverse Flow Indication Mode]

Forward flow accumulated volume (Total) (Nm<sup>3</sup>) · Reverse flow accumulated volume (Total) (Nm<sup>3</sup>) · Instantaneous flow-rate (NL/min)

- Sub display:

Changeover selection of the following contents by the "Right button"

Instantaneous flow-rate (Nm<sup>3</sup>/h) · Pressure (kPa) · Temperature (°C)

**Display digits:** <When pipe size is 25 to 80mm>

- Main display

Forward flow accumulated volume (Total):

00000000.0 (Nm<sup>3</sup> or m<sup>3</sup>) 9 digits

Forward flow accumulated volume (Trip):

0000000.0 (Nm<sup>3</sup> or m<sup>3</sup>) 8 digits

Reverse flow accumulated volume (Total):

-0000000.0 (Nm<sup>3</sup> or m<sup>3</sup>) 8 digits

Instantaneous flow-rate:

00000.00 (NL/min or L/min) 7 digits

Note) In case of selection of Actual Flow Indication (m<sup>3</sup>) 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 (For less than 200) 5 digits

0000.0 (For 200 to less than 2000) 5 digits

0000 (For 2000 and above) 4 digits

Unit: Nm<sup>3</sup>/h or m<sup>3</sup>/h

Pressure : 0000.0 (kPa) 5 digits

Temperature: 00.0 (°C) 3 digits

**Display digits:** <When pipe size is 100 to 200mm>

- Main display

Forward flow accumulated volume (Total):

000000000 (Nm<sup>3</sup> or m<sup>3</sup>) 10 digits

Forward flow accumulated volume (Trip):

00000000 (Nm<sup>3</sup> or m<sup>3</sup>) 9 digits

Reverse flow accumulated volume (Total):

-00000000 (Nm<sup>3</sup> or m<sup>3</sup>) 9 digits

Instantaneous flow-rate\*:

0000000 (NL/min or L/min) 7 digits

- Sub display:

Instantaneous flow-rate\*:

0000.0 (For less than 200) 5 digits

00000 (For 200 to less than 2000) 5 digits

Unit: Nm<sup>3</sup>/h or m<sup>3</sup>/h

\* If pipe size is 200mm, indication is displayed 10 times indication based on original number. (magnification is indicated on the screen)

Pressure : 0000 (kPa) 4 digits

Temperature : 00.0 (°C) 3 digits

**Current output:** 4 to 20mA DC

(battery build-in type is not available)

Current output accuracy: ±0.5%FS

Load resistance: 400Ω or less

(Changeover of "Instantaneous flow-rate", "Pressure", "Temperature" is available with button operation)

In case of selection of instantaneous flow-rate  
<In case of Forward flow indication mode>

Zero output current:

4mA (Reverse flow to low flow cut-off)

Output current lower limit: 4mA

Output current higher limit: 22mA

<In case of 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 (Initial setting value):

Type	Nominal diameter	Initial setting value (Nm <sup>3</sup> /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

(Possible to be changed by button operation)

**Contact pulse output:** <battery build-in type is not available>

Open drain output: 2 output circuits

Output 1: Unit pulse output (Forward flow)

Output 2:

Unit pulse output (Reverse flow), Flow-rate upper/lower alarm output, (Selection of one of them by button operation)

Maximum Load: 2 4V DC · 10mA

Saturation voltage at ON: 1V or less

Current at OFF: 50μA or less

Pulse output

Output of unit pulses corresponding to increase of accumulated flow

Pulse unit: 100NL/P (20 to 80mm dia., Initial setting value)

1 Nm<sup>3</sup>/h (100 to 200mm dia., Initial setting value)

(Possible to change by button operation)

Maximum output frequency: 10 Hz

Duty: 35 to 65%

Flow-rate upper/lower alarm

Output of alarm signal when flow-rate becomes higher or lower than set values.

(Possible to set alarm output upper and lower limit flow-rates and alarm judgment hysteresis by button operation)

**Fluid to be measured:**

Air (Mainly factory air, compressor air) or Nitrogen (Not available for 100 to 200mm dia.)

**Fluid temperature:**

-10 to +60°C, 90%RH or less

**Working pressure:**

0 to Less than 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:  
1.1W Maximum (Current consumption:  
40mA maximum)

- Build-in lithium battery (battery life is 10years at environment temperature 20°C)

**Flow direction:** Measurement of forward and reverse flows is possible (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:** Extremely small (Equivalent to a straight pipe)

**Protection structure:**

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

**Weight:** Refer to Outline dwg.

**Materials:**

- Outer casing:  
Aluminum alloy
  - Measured pipe:  
Aluminum alloy  
(25 to 80mm dia.)  
Stainless alloy  
(100 to 200mm dia.)
  - Sensor holder:  
PPS
  - Sensor rubber:  
FVMQ (Fluorosilicone rubber)
  - Display portion casing:  
Aluminum alloy
- \*The portions with ○ mark touch with fluid.

•Piping conditions

- 1) To achieve stable measurement, furnishing of straight pipe portion of 10D length (D: Nominal Diameter) or more at upstream and downstream of the flow meter is recommended.
- 2) In case fluid contains a lot of mist and/or dust, install the meter with vertical piping.

## CODE SYMBOLS

			FWD										
			4	5	6	7	8	9			10	11	
Digit	Specifications	Note					1	-					
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 Build-in Battery							D B					
8	Modification No.							1					
9	<Fluid to be measured> Air Nitrogen	Note1							A N				
10	<Power supply/output cable> None 5m 20m	Note2								0 5 2			
11	<Instruction Manual> None Japanese English									0 1 2			

Note1) for nitrogen, subject nominal diameter is from 25 to 80mm

Note2) When power supply is build-in battery, please select the "none" regarding cable

Accessory Part

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

## Cautions in handling

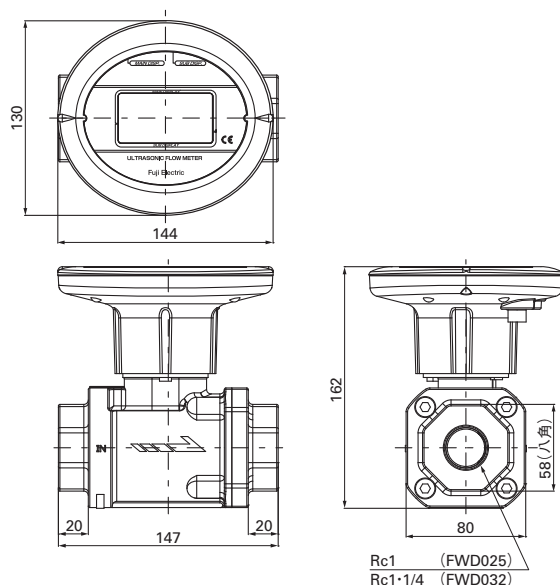
•Installation environment

- 1) Although the electronic display having high weather resistance is applied, in case of installation at place exposed to direct sunlight, provide a sunshade for the flow meter.
- 2) Do not install at any place with a lot of electromagnetic noises and/or in corrosive environment.
- 3) This product is possible to be installed outdoor, but do not install it where there is possibility of submergence and/or of exposure to water always.

## OUTLINE DIAGRAMS (Unit : mm)

Screw-in type

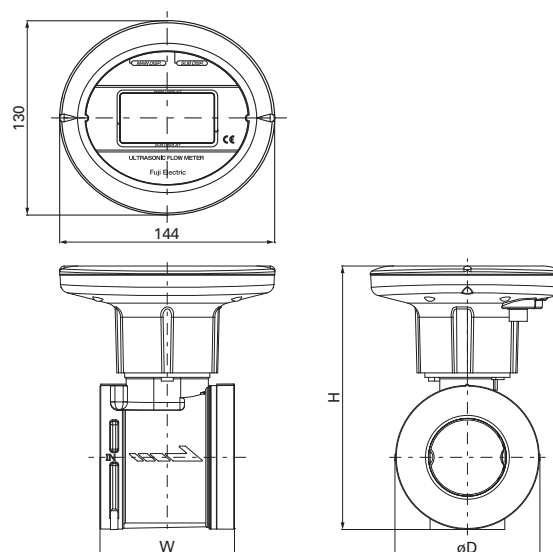
<Nominal diameter: 25,32mm>



Type	Mass. (kg)
FWD025	1.7
FWD032	1.6

Wafer connection type

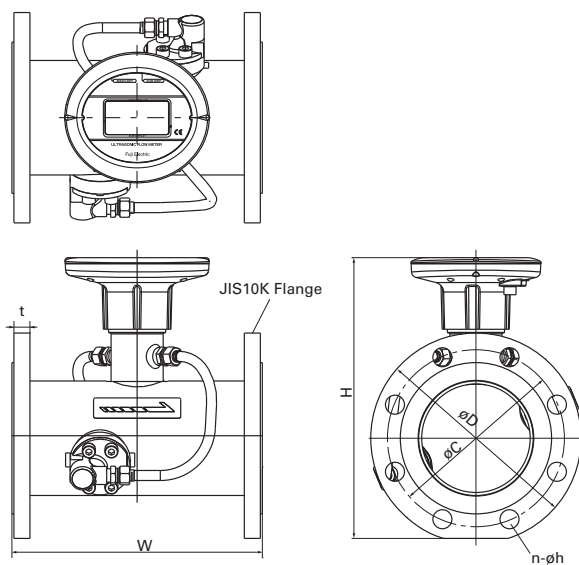
<Nominal diameter: 40 to 80mm>



Type	W	H	øD	Mass. (kg)
FWD040	76	163	82	1.1
FWD050	90	176	97	1.3
FWD065	108	197	116	1.6
FWD080	117	220	127	1.8

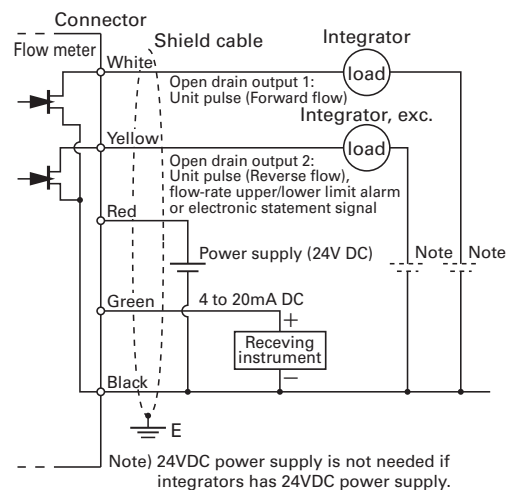
JIS10K pipe flange type

<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 DIAGRAMS (External power supply type)



⚠ Caution on Safety

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

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