High-precision Fuel Flow Meter

ONO SOKKI

Measure transient flow rate change with high-speed response and high accuracy

Volumetric Flow Detector

Fuel Density Meter

Digital Flow Meter

A variety of lineup for the fuel flow measurement

Volumetric Flow Detector

			Model	Measurement range [L/h]	Accuracy		Resolution [mL/Pulse]
Standard*1	Small flow rate		FP-5131	0.05 to 60	Within ±0.0009 L/h (0.05 to 0.18 L/h)	Within ±0.5 % of reading (0.18 to 60 L/h)	0.001
	Small flow rate		FP-5132				0.0005
	Small flow rate		FP-5133	0.05 to 108	Within ±0.0009 L/h (0.05 to 0.18 L/h)	Within ±0.5 % of reading (0.18 to 108 L/h)	0.001
	Small flow rate		FP-5134				0.0005
	Medium flow rate		FP-5141	0.3 to 300	Within ±0.2 % of reading		0.01
	Medium flow rate		FP-5142				0.005
	Medium flow rate		FP-5143	0.3 to 600	Within ±0.2 % of reading		0.01
	Medium flow rate		FP-5144				0.005
Standard*2	Large flow rate		FP-5151	1 to 1440	Within ±0.5 % of reading		0.1
	Large flow rate		FP-5152				0.05
Environment resistant	Environment resistant		FP-4135	0.1 to 200	Within ±0.2 % of reading		0.01
Low pressure loss	Small flow rate		FP-213S	0.06 to 60	Within ±0.5 % of reading		0.01*3
	Medium flow rate		FP-2140S	0.05 to 200	Within ±0.2 % of reading		0.01

*1 EH-0830 Temperature/ Pressure Sensor Unit can be added as an option. *2 EH-0850 Temperature/ Pressure Sensor Unit can be added as an option. *3 It can be increased to 0.1 as an option.

The electrification of automobiles such as EVs, HEVs, and PHEVs has been progressing to reduce CO_2. It is essential to improve the energy efficiency of internal combustion engines in many automobiles, including HEVs and PHEVs. We provide a wide lineup of products for fule efficiency measurement of engine evaluation.

Mass-Burette Flow Detector

		Model	Measurement range [g/s]	Accuracy	Resolution	
Small flow rate / Medium flow rate / Large flow rate		FX-1110	0 to 10	±0.2% of reading value, ±0.01% of full scale	0.001 g/s (instantaneous)	0.01 g (integration)
		FX-1120	0 to 25	±0.2% of reading value, ±0.01% of full scale	0.01 g/s (instantaneous)	0.01 g (integration)
		FX-1130	0 to 50	±0.2% of reading value, ±0.01% of full scale	0.01 g/s (instantaneous)	0.1 g (integration)

Massflow Meter

		Model	Measurement range [kg/h]	Accuracy	
Large flow rate		FZ-2200A	1 to 1090	± (0.027 kg/h / flow) × 100 % at 1 to 27 kg/h	±0.1 % of reading value at 27 to 1090 kg/h

On-Board Flow Detector

	Model	Measurement range [L/h]	Accuracy
	MF-3200	0.3 to 120	±0.2% of reading value

Fuel Density Meter

	Model	Measurement range [g/cm³]	Accuracy [g/cm³]	Resolution [g/cm³]
	FD-5110	0.5000 to 2.0000	±0.0010	0.0001

Digital Flow Meter

	Model	Analog output	Pulse output
	DF-2200	Update cycle: 10 ms*4	Number of output pulse: 0.001/0.01/0.1 (mL/Pulse or g/Pulse) and Direct
	FM-3100	Update cycle: 1 ms	Number of output pulse: 0.0005/0.001/0.01/0.1/1/10/60 (mL/Pulse or g/Pulse) and Direct (with FM-0311 FP Module)

Signal cable between detectors and display units

5 m	10 m	15 m	20 m	Applicable detectors
FP-0011	FP-0012	-	FP-0014	FP-213S/MF-3200
FP-0015	FP-0016	-	FP-0017	FP-5130 series/FP-5140 series/FP-5150 series/ FP-2140S/FP-4135
FX-0021	FX-0022	-	FX-0023	FX-1110/FX-1120/FX-1130
FZ-0011	FZ-0012	-	FZ-0013	FZ-2200A
FD-0011	FD-0012	FD-0013	-	FD-5110

*4 It can be changed to 1 ms as option.

Achieve accurate and wide range of mass flow measurement from small to large flow rate

In engine evaluations such as emission mode tests and transient tests for performance evaluation, the requirement for evaluating the fuel consumption characteristics in transient duration has been increasing as well as the total fuel consumption for each mode. The FP-5000 series has achieved high pulse resolution to detect changes in the flow rate effectively and responsively. In addition, a wide range of measurement is available, which supports large volume flow such as when using alcohol fuel.

FP-5130
series

FP-5140
series

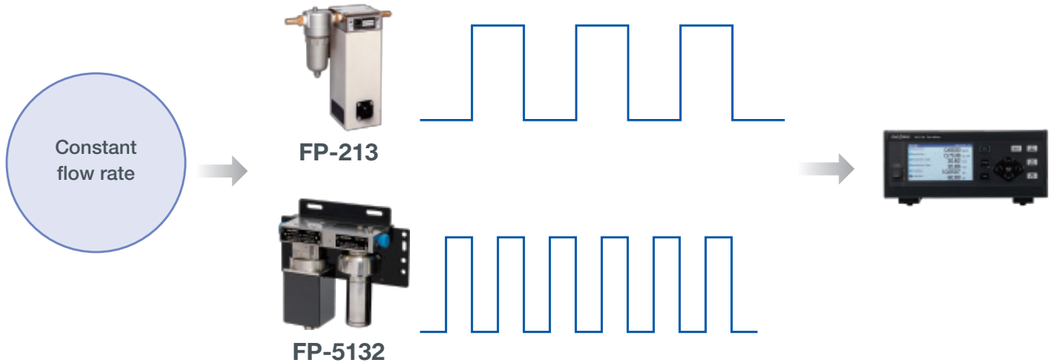
FP-5150
series

Volumetric Flow Detector

FP-5000
series

1 Measuring even small amount of changes in the flow rate

Achieves pulse resolution (0.0005 mL/pulse) up to 20 times of the existing models (when using FP-5130 series).



2 Wide detector lineup supports from small to large flow rate

The flow rate required to calculate the energy from an engine can be accurately measured from a small flow rate. Please select the detector that matches the flow rate to be measured.

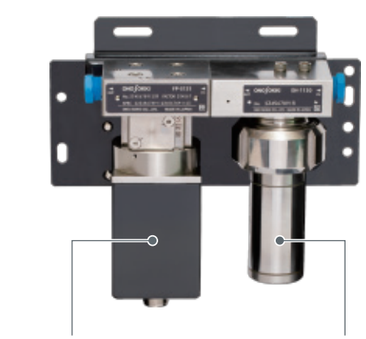
FP-5131
0.05 to 60 L/h

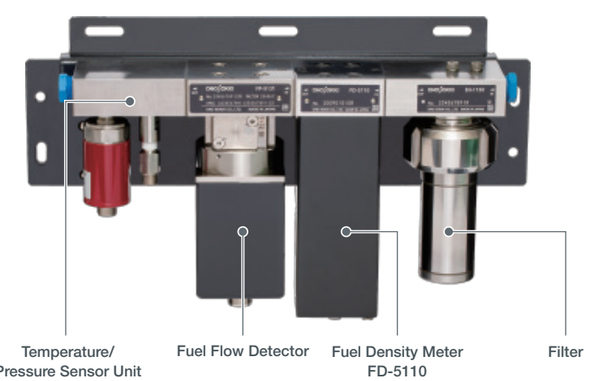
FP-5141
0.3 to 300 L/h

FP-5151
1 to 1440 L/h

3 Compact and space-saved design

A filter, the Fuel Density Meter FD-5110, a flow detector, and a temperature/pressure sensor unit can be connected together, and achieved space saving. You can select each detector in combination according to your needs.





4 Applicable to alcohol mixed fuel as standard

The flow detector can measure alcohol mixed fuel as standard.
With the movement toward carbon neutral, it is compatible with alcohol mixed fuel that requires corrosion resistance, which was not necessary for fossil fuels.

Achieve mass flow measurement with high rangeability by combining a new fuel density meter and volumetric flow detector

Improving the energy efficiency of an engine is now an important issue to tackle. The FD-5100 Fuel Density Meter and FP series Volumetric Flow Detectors with real-time measurement and wide rangeability are the best choice for achieving the accurate mass flow measurement.

Fuel Density Meter

FD-5110

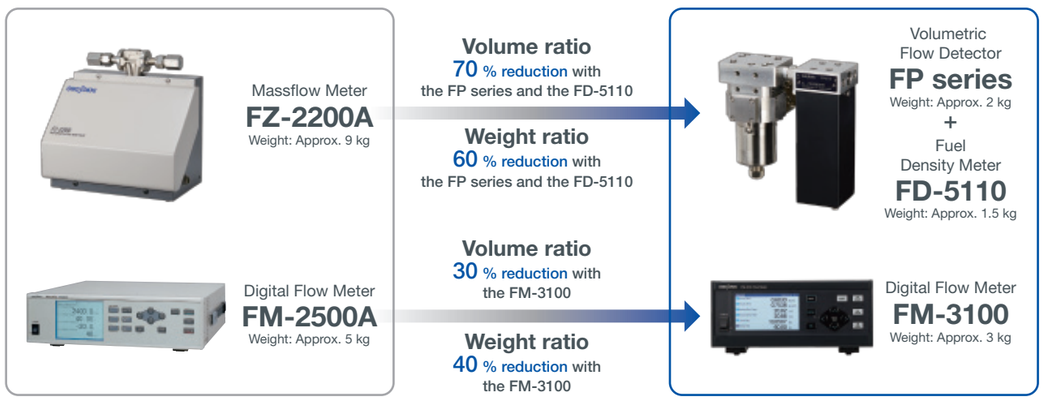
1 Low pressure loss

Achieve the pressure loss of 20 kPa or less (at 60 L/h) using with the FP series volumetric flow detector. The detector can be installed with the minimum pressure fluctuations in the flow path.

Volumetric Flow Detector **FP series** + Fuel Density Meter **FD-5110**

2 Compact and light weight system

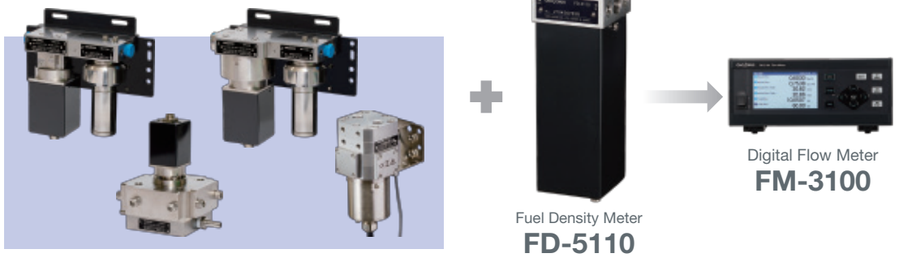
50 % size reduction compared to the existing model has achieved compact and space-saving.



3 Applicable to various volumetric flow detectors

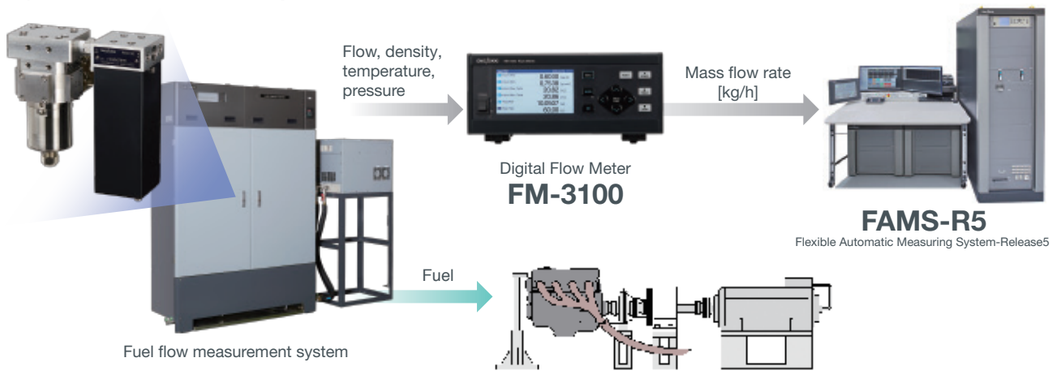
Achieve various mass flow measurement selecting a volumetric flow detector from small to large flow.

Applicable detectors: FP series



4 Make the procedures in mode and performance tests simple

Depending on the area and installation location, various factors such as fuel type and density are varied. Ono Sokki's mass flow measurement system does not require the troublesome density data input with real-time density measurment and the mass conversion.



High-speed response measurement for the transient flow changes

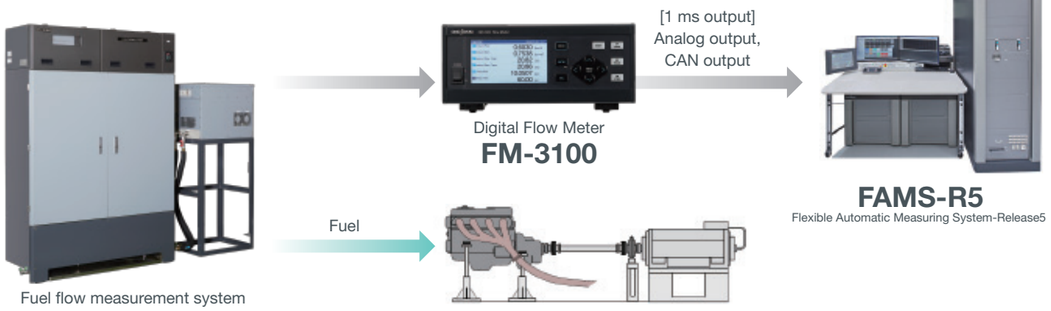
In the field of engine development, it is required to improve the accuracy of flow rate measurement in the small flow rate range and to evaluate the fuel consumption characteristics in transient duration. The FM-3100 is the answer that meets various requirements in the field of engine development.

Digital Flow Meter

FM-3100

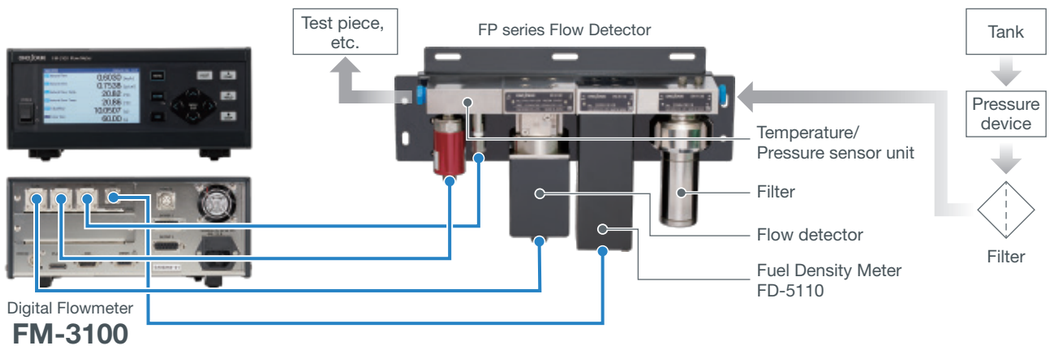
1 High-speed response measurement for the transient flow changes

It captures transient flow rate changes. Analog output and CAN output are available at 1 ms of update cycle.



2 Provide accurate measurement stably with compensation function

The FM-3100 has the function to compensate the density based on the calculation of the temperature fluctuation between the FD-5110 Fuel Density Meter and the Flow Detector, which enables the accurate mass flow measurement.



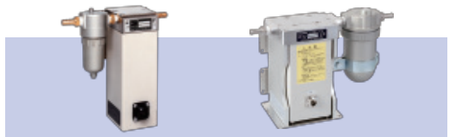
3 Applicable to various detectors

It connects to FP series Volumetric Flow Detectors, FX series Mass-Burette Flow Detector and FZ series Coriolis type Massflow Meter.

Volumetric Flow Detector

Massflow Meter

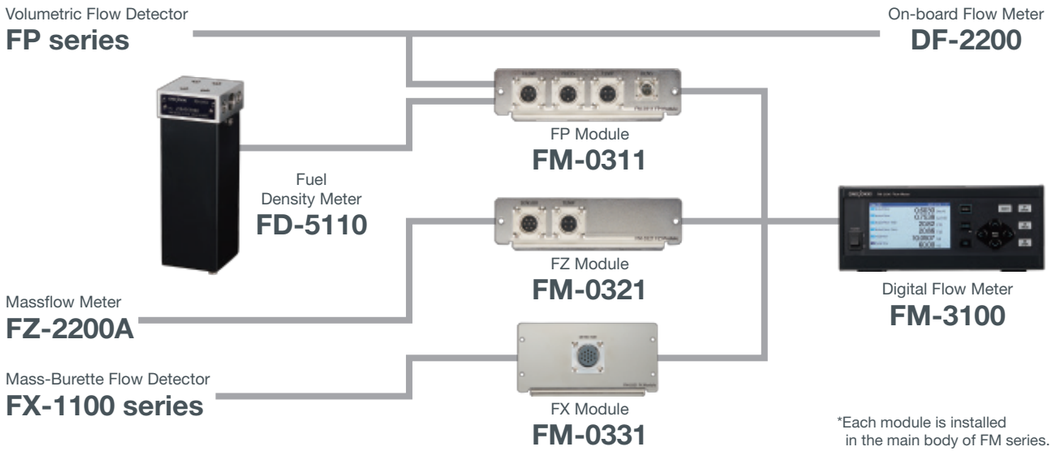
Low pressure loss type Volumetric Flow Detector



Mass-Burette Flow Detector

Fuel Density Meter

Digital Flow Meter System Configuration



*Each module is installed in the main body of FM series.

Various measurement system according to your application

We provide the measurement system that supports a wide variety of tests from on-board to on-bench.

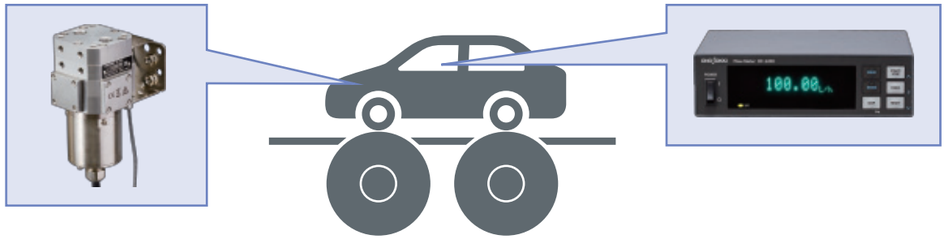
Fuel flow measurement system Environmental resistance type

On-board flow detector

Fuel flow measurement system with temperature/pressure control

1 Engines with fuel returnless system

For gasoline engines that do not have pipes to return excess fuel to the fuel tank, an environmental resistance type volumetric flow detector and a fuel density meter are available for the mass flow measurement.

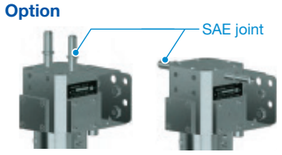


Option SAE joint for actual vehicle

The SAE joint for actual vehicle can be reassembled on the upper section of the detector according to the request. Since the pipe of the actual vehicle is not necessary to cut, the risk of fuel leakage can be reduced.

Standard

Option

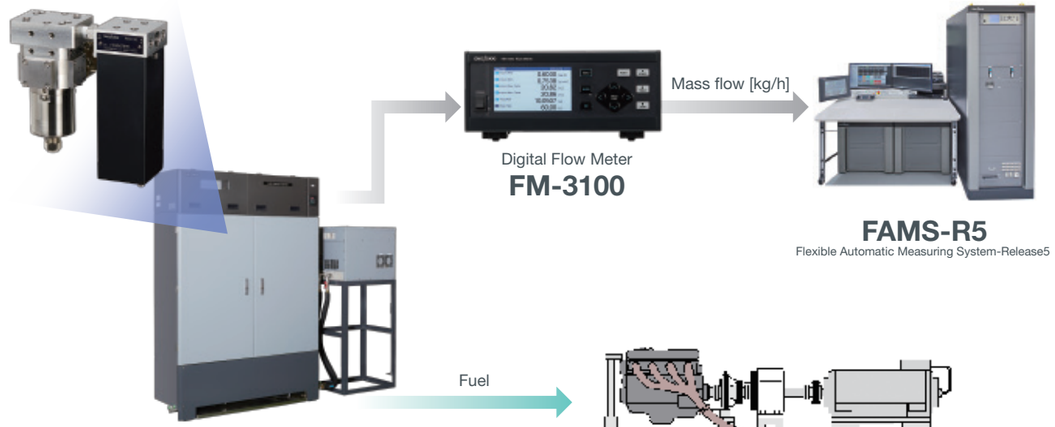


2 Engines with fuel rerun system

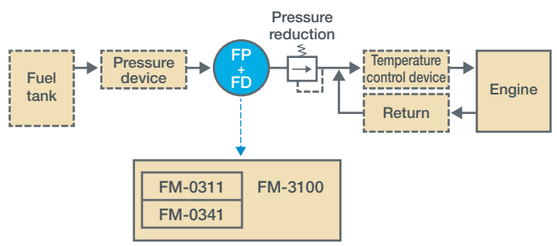
For diesel engines that have pipes to return excess fuel to the fuel tank, we provide the on-board type fuel flow meter. The flow detector has a fuel return processing function.

3 Engine bench

On the engine bench, controlling temperature and pressure of fuel supplying to the engine enables to measure fuel consumption under conditions similar to the actual vehicle.



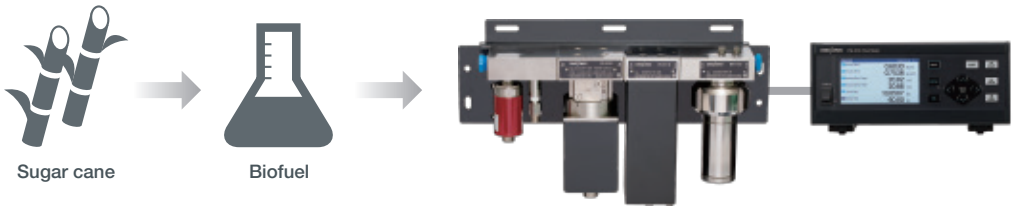
- **Continuous measurement without being affected by temperature, pressure, and density**
- **Wide measurement range**
- **Function for removing air bubbles in fuel supply**
- **Initial air purging function in replacement of a testing engine**



Advantages of our mass flow measurement system FP-5000+FD-5110+FM-3100

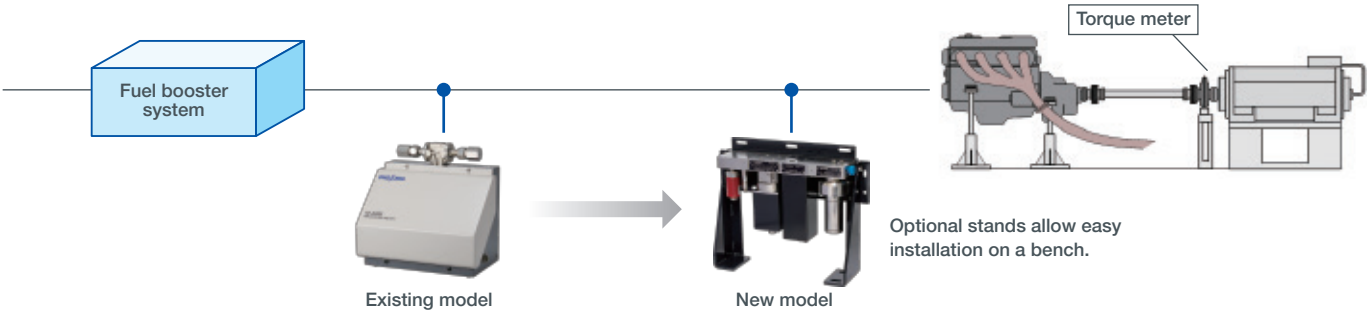
The mass flow measurement system, which includes the new flow detector (FP-5000 series), the fuel density meter (FD-5110), and the digital flow meter (FM-3100), can calculate the amount of energy input to the engine in real time. The real time density measurement makes the process of emission mode tests and performance tests simple, which contributes to improve the efficiency of future engine development.

Applicable to alcohol mixed fuel as standard



Compact, light weight, and easy installation

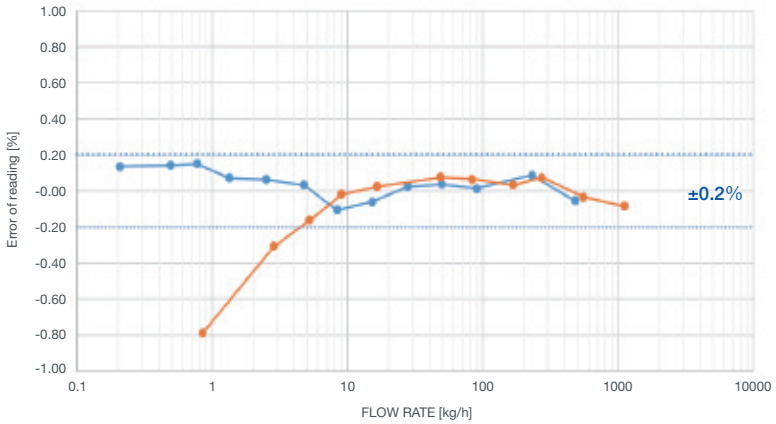
Easy to install with space-saving design, even near engines.
The minimum pipe length prevents the fuel temperature change and reduces the error.



High accuracy of mass flow measurement in low flow range

New model: FP-5144 + FD-5110

Existing model: FZ-2200A



ONO SOKKI

WORLDWIDE ONO SOKKI CO., LTD.
3-9-3 Shin-Yokohama, Kohoku-ku, Yokohama 222-8507, Japan
Phone : +81-45-476-9725 Fax : +81-45-476-9726
E-mail : overseas@onosokki.co.jp

URL: https://www.onosokki.co.jp/English/english.htm

U.S.A.
Ono Sokki Technology Inc.
2171 Executive Drive, Suite 400
Addison, IL. 60101, U.S.A.
Phone : +1-630-627-9700
Fax : +1-630-627-0004
E-mail : info@onosokki.net
http://www.onosokki.net

THAILAND
Ono Sokki (Thailand) Co., Ltd.
1/293-4 Moo.9 T.Bangphud
A.Pakkred
Nonthaburi 11120, Thailand
Phone : +66-2-584-6735
Fax : +66-2-584-6740
E-mail : sales@onosokki.co.th

INDIA
Ono Sokki India Private Ltd.
Plot No.20, Ground Floor, Sector-3,
IMT Manesar Gurgaon-122050,
Haryana, INDIA
Phone : +91-124-421-1807
Fax : +91-124-421-1809
E-mail : osid@onosokki.co.in

P.R.CHINA
Ono Sokki Shanghai Technology Co., Ltd.
Room 506, No.47 Zhengyi Road, Yangpu
District, Shanghai, 200433, P.R.C.
Phone : +86-21-6503-2656
Fax : +86-21-6506-0327
E-mail : admin@shonosokki.com

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