

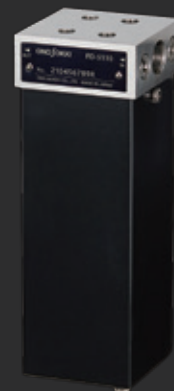
High-precision Fuel Flow Meter

ONOSOKKI

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



Volumetric Flow Detector



Fuel Density Meter



Digital Flow Meter

FM-3100

Digital Flow Meter

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.

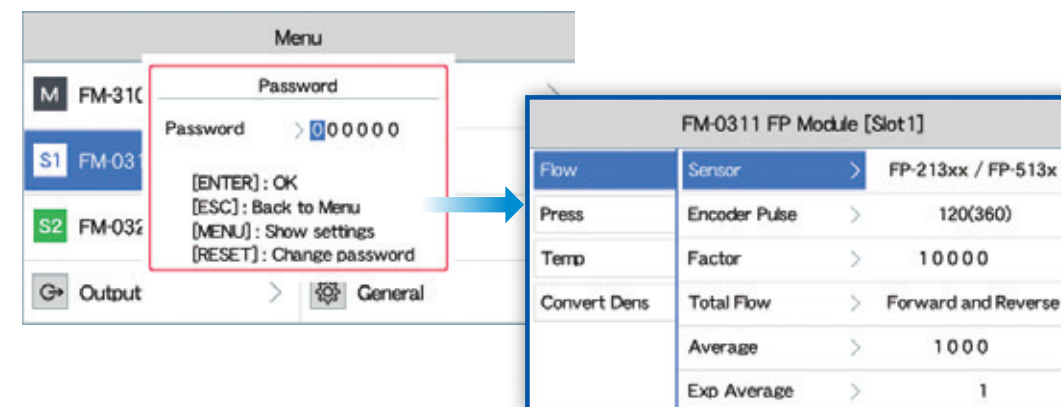
The FM-3100 is the answer that meets various requirements in the field of engine development.



FM-3100

Password setting function (option)

This function allows you to prevent unintended setting and check the history of important setting changes that directly affect measurement, such as Factor.



A password is required for any changes that affect the measurement data, such as changing the FP series factor or the scale for output.

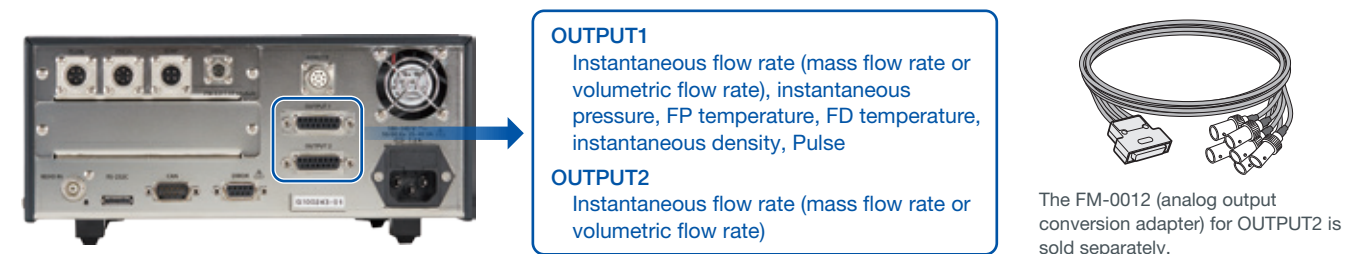
- FP related menu** Since the Factor is a detector-specific value, it is locked so that only the administrator can change it. The change history of Factor is also available.
- FZ related menu** The Zero CAL and Low Flow Cut settings are not locked as they are routinely performed. However, the change history is recorded to check whether there is any abnormal operation.
- OUTPUT menu** Scale changes are locked so that only administrators can make them.

Main unit function upgraded

Number of analog output increased and more flexible setting of input range for pressure sensor.

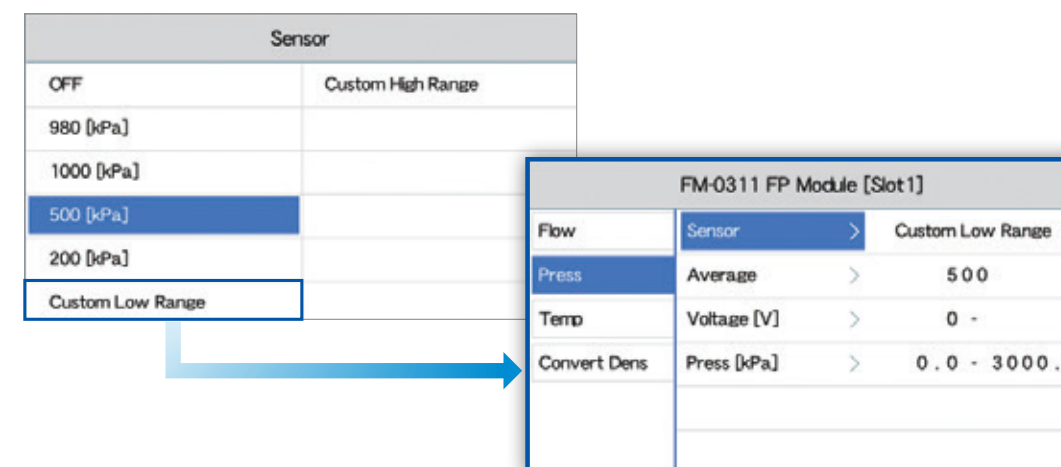
1. Simultaneous output of volumetric flow rate and mass flow rate on analog output

When using a module, analog output was only available from OUTPUT 1, however, it can also be output from OUTPUT 2. This allows the volumetric flow rate and mass flow rate to be output simultaneously.



2. Applicable to various range of pressure sensors

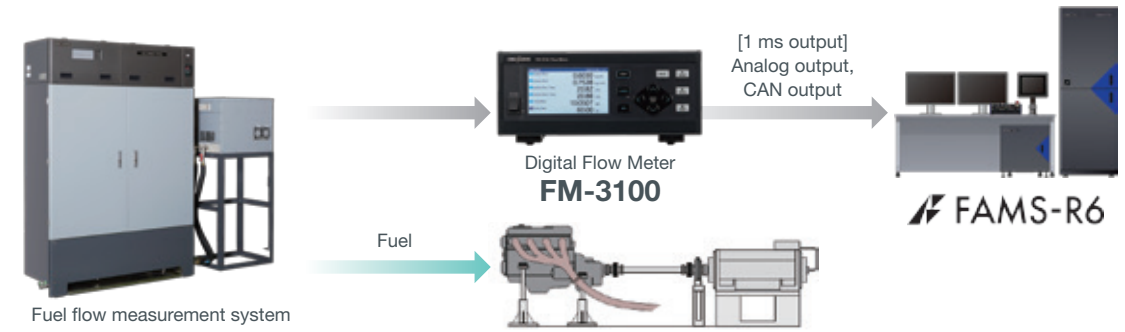
You can manually set the input voltage and pressure values, thus you can use your own pressure sensor to measure.



*Not compatible with current output sensors

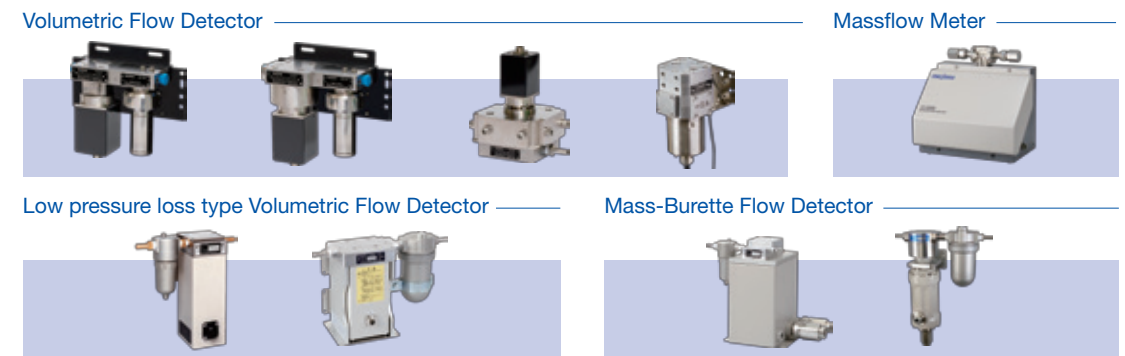
High-speed response measurement for the transient flow changes

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



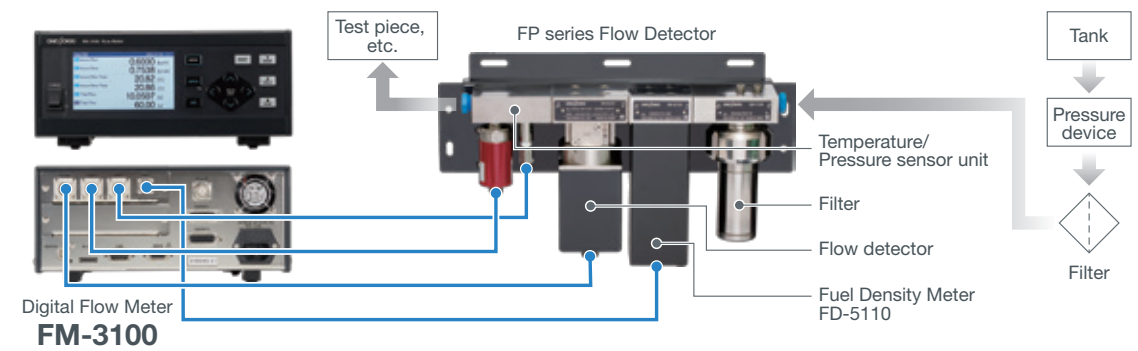
Applicable to various detectors

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

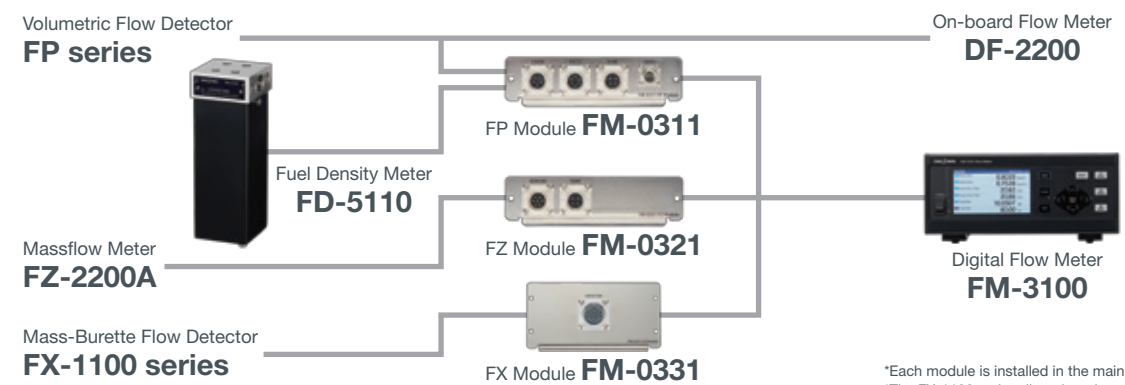


Provide accurate measurement stably with compensation function

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.



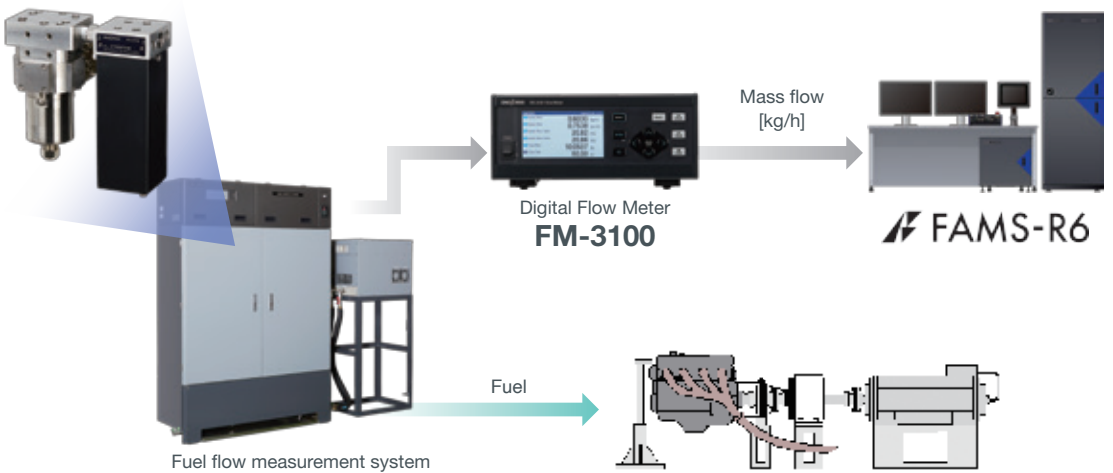
Digital Flow Meter System Configuration



Various measurement system according to your application

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

Controlling the temperature and pressure supplied to the engine allows you to perform tests with good reproducibility.



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.

The fuel flow rate can be measured on an actual vehicle.



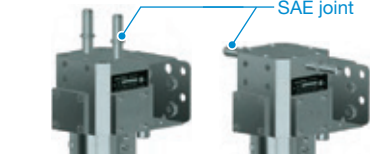
Option SAE joint for FP-4135

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



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.

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.

Volmetric Flow Detector

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

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-5130 series
0.05 to 108 L/h



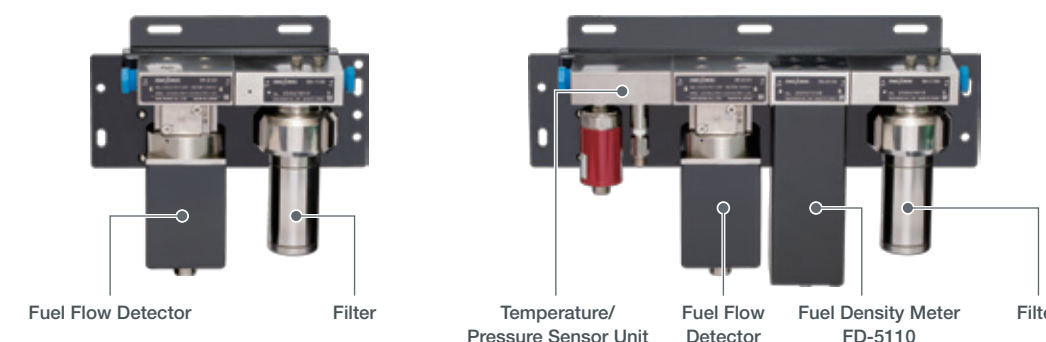
FP-5140 series
0.3 to 600 L/h



FP-5150 series
1 to 1440 L/h

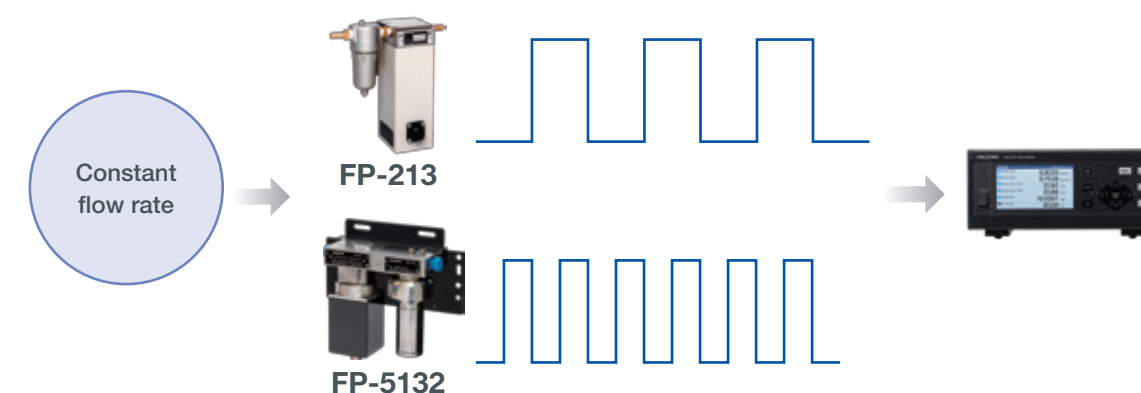
Compact and space-saved design

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.



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).



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.



FD-5110 Fuel Density Meter

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

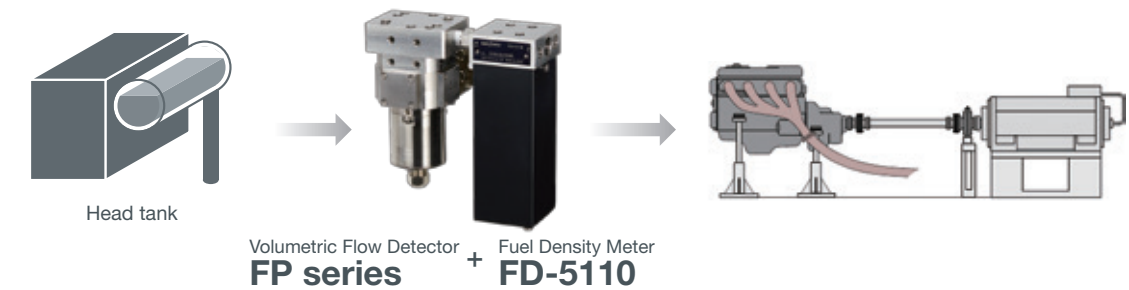
Improving the energy efficiency of an engine is now an important issue to tackle. The FD-5100 Fuel Density Meter and FP series Volumetric Flow Detectors with real-time measurement and wide rangeability are the best choice for achieving the accurate mass flow measurement.



FD-5110

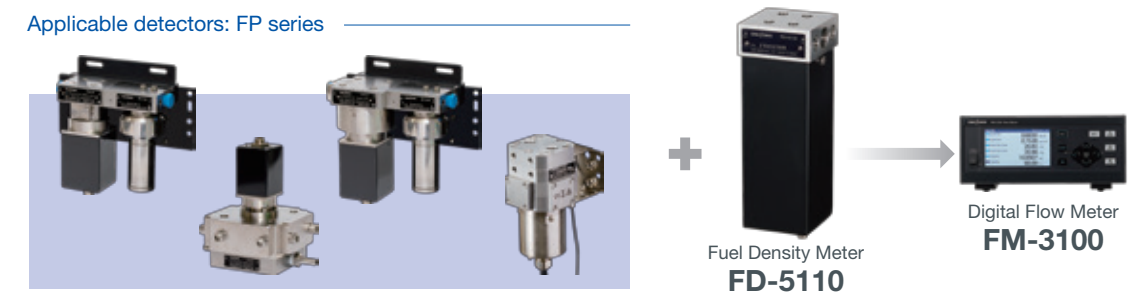
Low pressure loss

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.



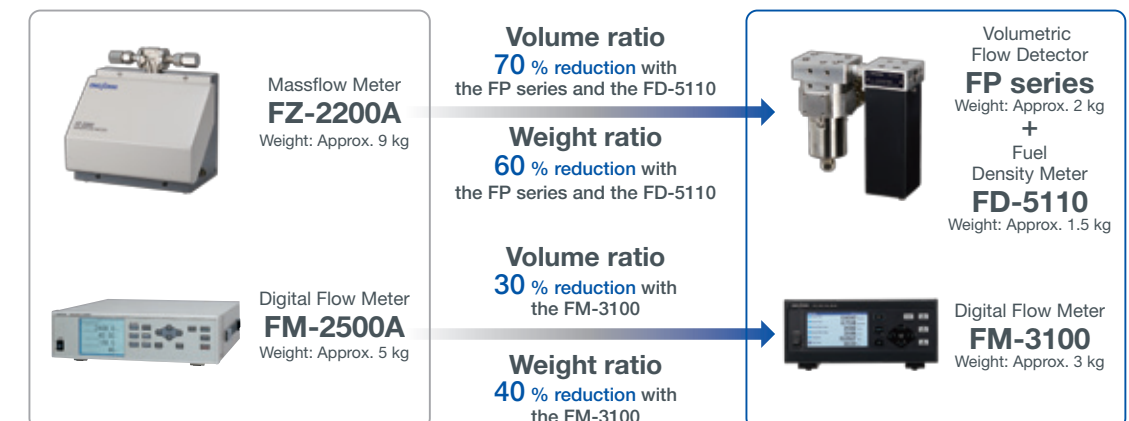
Applicable to various volumetric flow detectors

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



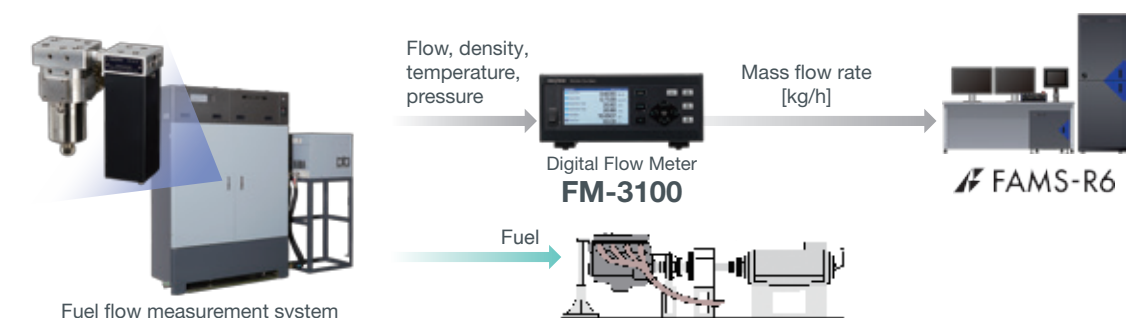
Compact and light weight system

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



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 measurement and the mass conversion.



Specifications

Standard type

		Small flow rate type	Medium flow rate type	Large flow rate type
Model (series)		FP-5130 series	FP-5140 series	FP-5150 series
Usable liquid	Standard	Gasoline, light oil, kerosene, alcohol biofuel and general petroleum-based hydraulic oil*1		
	Alcohol applicable (option)	Alcohol		
Measurement range		FP-5131/5132: 0.05 to 60 L/h FP-5133/5134: 0.05 to 108 L/h*2	FP-5141/5142: 0.3 to 300 L/h FP-5143/5144: 0.3 to 600 L/h	FP-5151/5152: 1 to 1440 L/h
Accuracy		±0.0009 L/h (0.05 to 0.18 L/h) ±0.5 % of rdg (0.18 to 108 L/h)	±0.2 % of rdg	±0.5 % of rdg
Minimum resolution		FP-5131/5133: 0.001 mL/Pulse FP-5132/5134: 0.0005 mL/Pulse	FP-5141/5143: 0.01 mL/Pulse FP-5142/5144: 0.005 mL/Pulse	FP-5151: 0.1 mL/Pulse FP-5152: 0.05 mL/Pulse
Pressure loss		8 kPa or less (at 40 L/h <gasoline>)	2 kPa or less (at 60 L/h <gasoline>)	7.5 kPa or less (at 500 L/h <light oil>)
Operating temperature	Liquid	0 to 65 °C		
	Environment	0 to 65 °C		
Inlet/outlet port	Size	IN: Rc3/8*3 OUT: Rc3/8*3		IN: Rc1/2 OUT: Rc1/2
Maximum operating pressure		1 MPa		3.4 MPa
Weight		Approx. 3.5 kg	Approx. 5.0 kg	Approx. 13.5 kg
Accessory		Instruction manual, line filter (EH-1130 or EH-1150), mounting bracket (Appropriate stand bracket for FP-5130/5140 series is supplied according to the selection of options.)		
Flow signal cable		Optional: FP-0015 (5 m), FP-0016 (10 m), FP-0017 (20 m)		
Temperature/pressure measurement		EH-0830 (option, detector, filter, and density meter can be connected together.)		EH-0850 (option)
Measurement range	Temperature	0 to 100 °C		
	Pressure	0 to 1 MPa		
Accuracy	Temperature	Pt 100 class A		
	Pressure	±0.25 % FS		
Temperature/pressure signal cable		Optional: FP-0025 (5 m), FP-0026 (10 m), FP-0027 (20 m) Optional: FP-0035 (5 m), FP-0036 (10 m), FP-0037 (20 m)		
Density measurement		FD-5110 (option, detector, filter, and density meter can be connected together.)		FD-5110 (option)
Measurement range		0.5000 to 2.0000 g/cm³		
Accuracy		±0.0010 g/cm³ (Light oil, Cleansol HS at 20 °C)		
Density signal cable		Optional: FD-0011 (5 m), FP-0012 (10 m), FP-0013 (15 m)		
Applicable flow meter		FM-3100 + FP-0311A + FP-0312 DF-2200 (not applicable to High resolution spec: FP-5132, 5134, FP-5142, 5144) FM-2500A + DF-0400A (not applicable to High resolution spec: FP-5132, 5134, FP-5142, 5144) (When using FD-5110, only FM-3100 is supported.)		
Filter		EH-1130 (standard)		EH-1150 (standard)
Element		EH-0031A		EH-0051A

Please take note that the instantaneous flow rate may be varied;

1. if the inlet pressure is lower than the pressure loss of device.
2. if the outlet of the detector is open to the atmosphere.

*1 Please contact to your nearest distributor.

*2 Made-to order for the measurement range from 0.02 L/h. Please contact to your nearest distributor.

*3 Option joint (SAE joint) is available. Please contact to your nearest distributor.

Low pressure loss type/Environment resistant type

		Low pressure loss type (small flow rate)	Low pressure loss type (medium flow rate)	Environment resistant type (on-board)
Model		FP-213S	FP-2140S	FP-4135
Usable liquid	Standard	Gasoline, light oil, kerosene, general petroleum-based hydraulic oil*1		Gasoline, light oil, kerosene, alcohol biofuel, petroleum-based general hydraulic oil*1
	Alcohol applicable (option)	Gasoline, light oil, kerosene, general petroleum-based hydraulic oil*1, methanol, ethanol or mixture of alcohol and gasoline		Alcohol is measurable as standard.
Measurement range	Flow rate	0.06 to 60 L/h*2 (1 to 1000 mL/min, 0.02 to 16.7 mL/s)	0.05 to 200 L/h (0.83 to 3333 mL/min, 0.01 to 55.5 mL/s)	0.1 to 200 L/h
Accuracy	Flow rate	±0.5 % of rdg (over the entire 0.06 to 60 L/h range)	±0.2 % of rdg (over the entire 0.05 to 200 L/h)	±0.2 % of rdg (measurement condition: 20 °C, 50 % RH, Cleansol HS)
Minimum resolution		0.01 mL/Pulse		
Pressure loss		0.01 kPa or less (excluding filter pressure loss)		4 kPa or less (at 60 L/h <gasoline>)
Operating temperature	Liquid	0 to 60 °C	0 to 60 °C	Flow detecting part: -30 to 100 °C (environment temperature, liquid temperature, with no condensation) Signal processing part: -30 to 70 °C (environment temperature)
	Environment	0 to 60 °C	0 to 50 °C	
Inlet/outlet port	Size	IN: Rc1/4 OUT: Rc1/8	IN: Rc3/8 OUT: Rc3/8	IN: Rc1/4 OUT: Rc1/4
Maximum operating pressure		980 kPa		8 MPa
Weight		Approx. 2.5 kg (including filter)	Approx. 9 kg (including filter)	Flow detecting part: approx. 2.0 kg Signal processing part: approx. 0.4 kg
Accessory		Line filter EH-106A, Instruction manual, mounting bracket, screw (M5×4)	Line filter EH-1050, Instruction manual, mounting bracket	Instruction manual
Flow signal cable		Option: FP-0011 (5 m), FP-0012 (10 m), FP-0014 (20 m)	Option: FP-0015 (5 m), FP-0016 (10 m), FP-0017 (20 m)	
Temperature/pressure measurement		EH-0081 Temperature sensor (option)/ EH-0082 Pressure sensor (option)		A built-in temperature sensor/ EH-0082 Pressure sensor (option)
Measurement range	Temperature	0 to 100 °C		-30 to 100 °C
	Pressure	0 to 1 MPa		
Accuracy	Temperature	Pt 100 class A		
	Pressure	±0.25 % FS		
Temperature signal cable		Option: FP-0025 (5 m), FP-0026 (10 m), FP-0027 (20 m)		
Pressure signal cable		Option: FP-0035 (5 m), FP-0036 (10 m), FP-0037 (20 m)		
Density measurement		FD-5110 (option)		
Measurement range		0.5000 to 2.0000 g/cm³		
Accuracy		±0.0010 g/cm³ (Light oil, Cleansol HS at 20 °C)		
Density signal cable		Option: FD-0011 (5 m), FP-0012 (10 m), FP-0013 (15 m)		
Applicable flow meter		DF-2200 FM-3100 + FP-0311A + FP-0312 FM-2500A + DF-0400A FM-1500 + DF-0400A *When using FD-5110, only FM-3100 is supported.		
Filter		EH-106A provided as standard	EH-1050 provided as standard	Built-in the sensor 33 μm (inlet side), 770 μm (outlet set)
Element		-	EH-015 for EH-1050 (one set for 5 pieces, paper, 5 μm)	FP-0411

Please take note that the instantaneous flow rate may be varied;

1. if the inlet pressure is lower than the pressure loss of device.
2. if the outlet of the detector is open to the atmosphere.

*1 Please contact to your nearest distributor.

*2 Made-to order for the measurement range from 0.02 L/h. Please contact to your nearest distributor.

Specifications

Digital Flow Meter

	FM-3100	DF-2200
Power supply	AC 100 to 240 V ± 10 %	Battery connecting: DC 10 to 28 V When using AC adapter (option): AC 100 to 240 V, 50/60 Hz
Power consumption	80 VA or less (when connected to the FP-2140S and the FM-3100)	28 VA or less (when DC 12 V)
Environment	Indoor	Indoor, on-board
Altitude	2000 m or lower	
Operating temperature range	0 to 50 °C	0 to 50 °C *When using AC adapter: 0 to 40 °C
Operating humidity range	10 to 85 % (without condensation)	5 to 80 %
Storage temperature range	-10 to 60 °C	-10 to 60 °C
Storage humidity range	10 to 85 % (without condensation)	5 to 85 %
Outer dimension	240(W) × 99(H) × 297(D) mm *The projection is not included.	170 (W)× 49(H)× 120(D) mm
Weight	Approx. 3 kg	Approx. 800 g
Safety	IEC61010-1: Over-voltage category II Protection ClassI Pollution level II	IEC61010-1: Over-voltage category II Protection Class II Pollution level II *When using AC adapter (option)
Conforming standard	CE marking (FM-0311A, or FM-0311A + FM-0312) Low Voltage Directive 2014/35/EU Standard EN61010-1 EMC Directive 2014/30/EU Standard EN61326-1 RoHS Directive 2011/65/EU Standard EN IEC 63000	CE marking Low Voltage Directive 2014/35/EU Standard EN61010-1 (with AC adapter) EMC Directive 2014/30/EU Standard EN61326-1 RoHS Directive 2011/65/EU Standard EN IEC 63000
Applicable detectors	FP series/FD-5110/FX series/FZ series The modules (sold separately) that are compatible with each detectors are required.	FP series (*excluding high resolution spec and FP-5150 series, MF-3200
Accessory	AC power cable, FM-0012 analog output conversion adapter (D-Sub to BNC jack 0.5m), instruction manual	Battery clip type cable, rubber foot, instruction manual

Options

FM series Digital Flow Meter

Model name	Product name	Remarks
FM-0311A	Measurement Module for FP series	CE compliant when combined with FM-3100
FM-0312	FD additional connector	For FM-0311A, when combined with FD. Installation fee is required.
FM-0321A	Module for FZ series	
FM-0331	Module for FZ series	
FM-0351	For Chinese version	
FM-0371	Password lock function option	Password required when changing Factor/Output scale History saved when chaging Factor/ZeroCal/LowFlowCut
FM-0200	Remote box	For FM-1500/2500/3100, with 2 m cable
FM-0011	Mounting fixture	
FM-0012	Analog output conversion adapter	For FM-3100
LC-0860	CAN cable (2 m)	No termination resistor
	RS-232C adapter	Adapter for converting to D-sub 9-pin (male) connector (0.1 m)

DF series On-Board Flow Meter

Model name	Product name	Remarks
DF-0221	Auto stop function	
DF-0222	RS-232C communication function	CAN communication cannot be used. (DF-0225 cannot be used at the same time.)
DF-0223	Remote box	
DF-0224	High-speed output function	
DF-0225	CAN integrated value output function	CAN communication cannot be used. (DF-0222 cannot be used at the same time.)
LC-0860	CAN interface cable (2 m)	No termination resistor
	AC adapter	Power cord is required.
	Power cord	VM1391-VM1700 (2 m) for Japan only

FP-5000 series Volumetric Flow Detector

Model name	Product name	Remarks
EH-0830	Temperature/pressure sensor units for FP-513X, FP-514X	Common for FP-513x, FP-514x EH-0830 is a combination of EH-0081 and EH-0082.
EH-0850	Temperature/pressure sensor units	For FP-515X
EH-0731	Mounting bracket for FP513x (single unit)	1UNIT: Flow detector including line filter
EH-0732	Mounting bracket for FP513x (2 units)	2UNIT: Flow detector + Density meter or Temperature/pressure sensor unit
EH-0733	Mounting bracket for FP513x (3 units)	3UNIT: Flow detector + Density meter + Temperature/pressure sensor unit
EH-0741	Mounting bracket for FP514x (single unit)	1UNIT: Flow detector including line filter
EH-0742	Mounting bracket for FP514x (2 units)	2UNIT: Flow detector + Density meter or Temperature/pressure sensor unit
EH-0743	Mounting bracket for FP514x (3 units)	3UNIT: Flow detector + Density meter + Temperature/pressure sensor unit
EH-0730A	Stand bracket for FP513x/514x	Use at 9.8 m/s² or less

FP-4135 On-board Volumetric Flow Detector

Model name	Product name	Remarks
FP-0411	For FP-4135: Inlet/Outlet filter set	Inlet/Outlet filter and O-ring set
FP-0412	For FP-4135: O-ring set for filter maintenance	O-ring set for filter maintenance
FP-0413	For FP-4135: O-ring set for filter maintenance	O-ring set for filter maintenance
FP-0414	For FP-4135: Temperature sensor	Standard, class A
FP-0415	For FP-4135: Additional pressure sensor set	Pressure measurement: 0 to 1 MPa, F.S. ±0.5 %
FP-0417	For FP-4135: Top cover block (side port)	Inlet/outlet Rc1/4 port (side)
FP-0418	For FP-4135: Front mounting fixture 1	Front mounting fixture
FP-0419	For FP-4135: Rear mounting fixture 2	Rear mounting fixture 2 (not suitable for on-board)
FP-0420	For FP-4135: Mounting fixture for signal processing part (M6)	For M6 screw hole
FP-0421	For FP-4135: φ6 mm SAE (side) block	φ6.3 operating pressure 500 kPa
FP-0422	For FP-4135: φ8 mm SAE (side) block	φ8 operating pressure 500 kPa
FP-0423	For FP-4135: φ6 mm SAE (top) block	φ6.3 operating pressure 500 kPa
FP-0424	For FP-4135: φ8 mm SAE (top) block	φ8 operating pressure 500 kPa

Cables

Model name	Product name	Remarks
FP-0011	Flow signal cable 5 m	Signal cable between the FP series detectors and FM/DF series Applicable detectors: except FP-5000 series, FP-2140S, FP-4135
FP-0012	Flow signal cable 10 m	
FP-0014	Flow signal cable 20 m	
FP-0015	Flow signal cable 5 m	
FP-0016	Flow signal cable 10 m	Signal cable between the FP series detectors and FM/DF series Applicable detectors: FP-5000 series, FP-2140S, FP-4135
FP-0017	Flow signal cable 20 m	
FP-0025	Temperature signal cable 5 m	Signal cable between the FP series detectors and FM/DF series for temperature
FP-0026	Temperature signal cable 10 m	
FP-0027	Temperature signal cable 20 m	
FP-0035	Pressure signal cable 5 m	Signal cable between the FP series detectors and FM/DF series for pressure
FP-0036	Pressure signal cable 10 m	
FP-0037	Pressure signal cable 20 m	
FD-0011	Density signal cable 5 m	Signal cable between the FD-5110 Fuel Density Meter and FM/DF series
FD-0012	Density signal cable 10 m	
FD-0013	Density signal cable 15 m	
FZ-0011	Flow signal cable 5 m	Signal cable between the FZ series detectors and FM series
FZ-0012	Flow signal cable 10 m	
FZ-0013	Flow signal cable 20 m	
FX-0021	Flow signal cable 5 m	Signal cable between the FX series detectors and FM series
FX-0022	Flow signal cable 10 m	
FX-0023	Flow signal cable 20 m	

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	±0.0009 L/h (0.05 to 0.18 L/h)	±0.5 % of rdg (0.18 to 60 L/h)	0.001
	Small flow rate		FP-5132				0.0005
	Small flow rate		FP-5133	0.05 to 108	±0.0009 L/h (0.05 to 0.18 L/h)	±0.5 % of rdg (0.18 to 108 L/h)	0.001
	Small flow rate		FP-5134				0.0005
	Medium flow rate		FP-5141	0.3 to 300	±0.2 % of rdg		0.01
	Medium flow rate		FP-5142				0.005
	Medium flow rate		FP-5143	0.3 to 600	±0.2 % of rdg		0.01
	Medium flow rate		FP-5144				0.005
Standard*2	Large flow rate		FP-5151	1 to 1440	±0.5 % of rdg		0.1
	Large flow rate		FP-5152				0.05
Environment resistant	Environment resistant		FP-4135	0.1 to 200	Within ±0.2 % of rdg		0.01
Low pressure loss	Small flow rate		FP-213S	0.06 to 60	±0.5 % of rdg		0.01*3
	Medium flow rate		FP-2140S	0.05 to 200	±0.2 % of rdg		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.
^{*4} It can be changed to 1 ms as option.

The electrification of automobiles such as EVs, HEVs, and PHEVs has been progressing to reduce CO₂. 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.

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 rdg 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 rdg 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	

JCSS Calibration Service for Flow Meter

Ono Sokki provides reliable and high level calibration as "Accredited Calibration Laboratory" (Fluid flow scope), which is certificated by JCSS*¹ calibration laboratory accreditation system, base on the skills and know-how of quality assurance system which has been acquired through many years of practice. Under the JCSS of calibration laboratory accreditation system, Ono Sokki is assessed and accredited as Accredited Calibration Laboratories to meet the requirements of the Measurement Law, relevant regulations and ISO/IEC 17025.

In December 2016, calibration flow range of 0.02 L/h to 300 L/h (test liquids: industrial gasoline, diesel) is available. Further, Ono Sokki can issue the calibration certificates with the JCSS accreditation symbol, which assures the traceability to National Measurement Standards as well as a laboratory's technical and operational competence, and is acceptable in the world through the ilac*²-MRA*³.

*¹ JCSS (Japan Calibration Service System)

*² ilac: International Laboratory Accreditation Cooperation

*³ MRA: Mutual Recognition Arrangements

Calibration details

Scope of Accreditation : Fluid Flow

Calibration Procedures : Liquid Flow meter

Type of instruments : Flow meter for oil (light oil, industrial gasoline)

Range : From 0.02 L/h less than 300 L/h
(From 0.00002 m³/h less than 0.3 m³/h)

Applicable flow meters

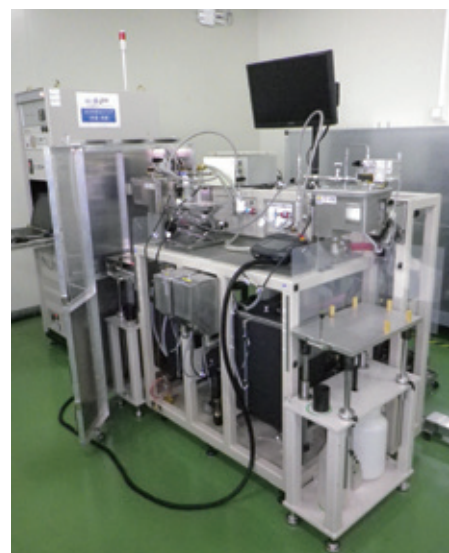
FP-2000/200 series : FP-213, 213S, 2140H, 2240H, 2240HA, 215*¹, 2250A*¹

FP-4000 series : FP-4135

FP-5000 series : FP-5131, 5132, 5133, 5134, 5141, 5142, 5143*¹, 5144*¹, 5151*¹, 5152*¹

FZ-2000 : FZ-2100, 2200, 2200A

*¹ Range is limited.



Page 1 of 2
Certificate No. 123-XXXX

Sample

Calibration Certificate

Customer Name: ONO SOKKI
Customer Address: 2171 Executive Drive, Suite 400 Addison, IL 60101, U.S.A.
Type: Flow meter for oil (light oil, industrial gasoline)
Serial Number: 123456789
Manufacturer Name: ONO SOKKI Co., Ltd.
Calibration Method: JIS B 7502-2013
Calibration Location: Flow Rate Calibration Room, ONO SOKKI Co., Ltd. 2-1-13 Nishikawabetsu, Chiyomizu-ku, Fukuoka 815-0105, Japan
Calibration Results: As in Page 2
Calibration Conditions: As in Page 2
Date of Application: 2024.01.01
Date of Calibration: 2024.01.01

We certify that the results of this calibration are as follows.

Approved Signature: [Signature]
Quality Management Group
ONO SOKKI Co., Ltd.
2-1-13 Nishikawabetsu, Chiyomizu-ku, Fukuoka 815-0105, Japan

This certificate is issued in accordance with the Measurement Law and indicates the result of calibration in accordance with measurement standards according to Primary Measurement Standards (National Standards) or both within the physical units of measurement according to the International System of Units (SI). The accreditation symbol is an indication of which the result of calibration is traceable to Primary Measurement Standards (National Standards).
The certificate shall not be reproduced except in full, without the written approval of the issuing laboratory.
The calibration laboratory is to issue the calibration certificate conforms to ISO/IEC 17025:2017.
This calibration certificate was issued by the calibration laboratory, accredited by ILAC, who is a signatory to the Mutual Recognition Arrangement (MRA) of International Laboratory Accreditation Cooperation (ILAC) and Asia-Pacific Accreditation Cooperation (APAC). The (These calibration results may be accepted internationally through ILAC/ILAC-MRA).
Calibration laboratory is to identify calibration status easily by attaching some information of Calibration Certificate to the calibration item.

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Calibration Results

Item	Value	Unit	Uncertainty	Expanded Uncertainty	Reference
Flow rate	100.0	L/h	±0.5	±1.0	JIS B 7502-2013
Flow rate	200.0	L/h	±1.0	±2.0	JIS B 7502-2013
Flow rate	300.0	L/h	±1.5	±3.0	JIS B 7502-2013

Calibration Conditions

1. Test conditions: Temperature: 20.0 ± 0.5 °C, Pressure: 1.013 × 10⁵ Pa, Humidity: 45% ± 5%, Test liquid: Industrial gasoline.

2. Calibration method: Gravimetric method.

3. Test results: The flow rate of the flow meter is within the specified range.

4. Remarks: The calibration results are traceable to the National Measurement Standards (NMS) of Japan.

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Ono Sokki Co., Ltd. is accredited as a calibration laboratory of JCSS, which is compliant with MRA. JCSS 0170 is the accreditation identification number.

ONO SOKKI

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* Outer appearance and specifications are subject to change without prior notice.

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