YAMATAKE

No.CP—PC—1364E

High-Flow Mass Flow Meter

CML Series

Yamatake's μF (Micro Flow) Sensor Technology for a New Style of High Gas Flow Measurement

The CML high-flow mass flow meter is equipped with Yamatake's μF sensor to effectively measure flows of up to 1600 m³/h (normal). Integrating fine sensing technology with original flow passage design, the μF sensor delivers high performance, accuracy and exceptional rangeability of 160:1. The CML Series introduces a new style of gas mass flow measurement.

High-Flow, Stable and Highly Accurate Flow Measurement Made Possible by μF(Micro Flow) Sensor Technology.

CML Series

The μF sensor can reliably measure gas mass flow to a maximum of 1600m³/h (normal).

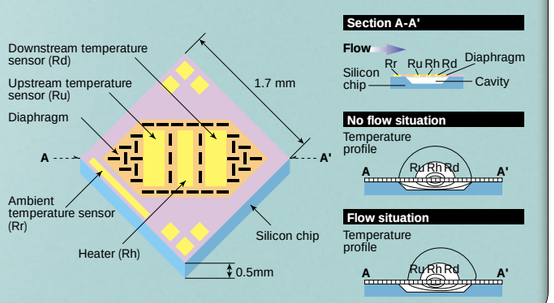
Note: "normal" indicates the volume flow converted to the conditions of 0°C and 1 atmospheric pressure.

Structure and features of μF (Micro Flow) sensor

•Manufactured by silicon micro-machining and thin-film technologies, this thermal type flow sensor is a mere 1.7mm (squared) and 0.5mm thickness.

•The use of ultra-precision machining technology minimizes variations in element layout and thermal capacity. High resolution of 1 mm/s in flow speed and high-speed response of approx. 2ms are achieved at the sensor chip level.

[Principle of Measurement] When gas flow does not exist, the temperature distribution around the heater is symmetric. When the gas starts to flow from Ru to Rd, the temperature at Ru upstream begins to decrease, while the temperature at Rd downstream increases, thus causing a distortion in the symmetry in temperature distribution. This temperature difference between Ru and Rd is used to calculate the mass velocity (velocity x density).

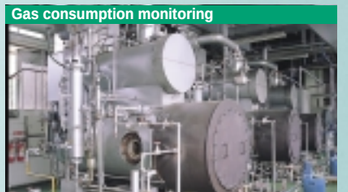


Applications

Air consumption monitoring

A mass flow meter is necessary to measure the actual load and air consumption of a compressor. The CML can precisely measure the flow with no need for adjustment in temperature and pressure.

Gas consumption monitoring



The CML is most suitable as a meter for managing boiler and burner operations. Its high rangeability allows flow monitoring of low loads, whitch makes it ideal for energy management.

Various types of flow measurement equipment and control devices

The CML offers high response of 160ms scanning speed which makes it appropriate for a variety of high-speed equipment. Its high rangeability covers a wide range of flow measurement, thus eliminating the use of multiple meters.

The μF (Micro Flow) sensor unaffected by changes in temperature and pressure

As the CML is a thermal type flow meter, the CML is unaffected by changes in temperature and pressure. With no need for any computing device to correct performance, the CML is effective in reducing cost.

High accuracy (±2%RD) and high rangeability from low to high flow region

Two sets of sensors for high and low flow ranges are mounted on the flow passage walls of the sensing unit at 90° intervals. By selecting sensors according to flow region and rate, the CML delivers high accuracy and rangeability in flow measurement.

Superior structure for outdoor applications

The CML has a protective structure that meets IP65 standards of water-proof structures for outdoor applications. When installed in direct sunlight, the CML requires a sun-blind.

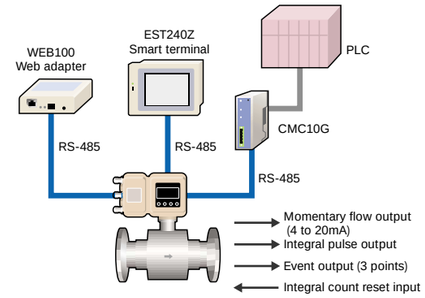
Broad lineup of models Four connecting port sizes are available.

Connecting port size	Flow range	Reference
50A	160m³/h(normal)	-
80A	400m³/h(normal)	-
100A	650m³/h(normal)	-
150A	1600m³/h(normal)	Sales release in 2001

Note: "normal" indicates the volume flow converted to the conditions of 0°C and 1 atmospheric pressure.

A variety of advanced functions, including communication functions, equipped as standard

The CML is equipped with the following standard functions to flexibly respond to various application needs: Analog output function, LCD display (momentary, conversion and integration), integral pulse output and alarm contact output.



Photoelectric touch sensors adopted for easy setting

Event output or pulse weight etc. can be set or reset from the front panel of the operating section. Photoelectric touch sensors are used to allow easy setting without opening the case.

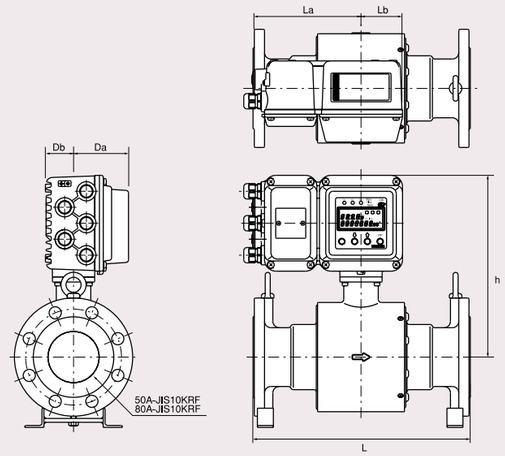
Low pressure loss is ideal in a range of applications

The CML has a structure for low pressure loss (2.5kPa max. at 50kPa air), and is effective in reducing loss of measuring energy. The CML is suitable in applications that need to control the pressure loss.

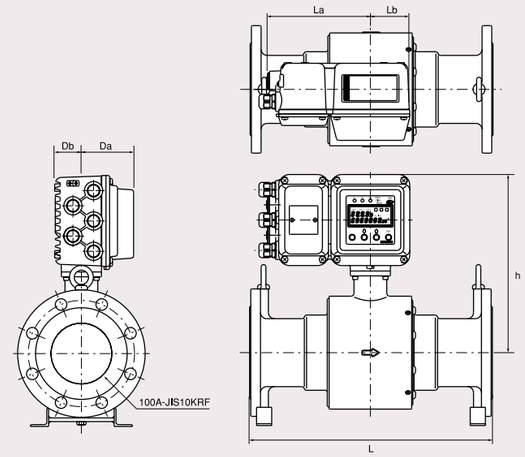
Dimensions

(unit:mm)

CML050/080 Connecting port size 50A/80A



CML100 Connecting port size 100A



Model No.	L	h	La	Lb	Da	Db
	Face-to-face	Height	Converter length at terminal unit side (from center)	Converter length (from center)	Converter thickness at front side	Converter thickness at rear side
CML050	255	285	166	65	85	40
CML080	340	285	166	65	85	40
CML100	400	294	166	65	85	40

Specifications

Model number	CML050	CML080	CML100	CML150
Control flow rate range(Note)	160m³/h(normal)	400m³/h(normal)	650m³/h(normal)	1600m³/h(normal)
Type of gas	Air/nitrogen. Note that corrosive components such as chlorine, sulfur and acid must not be included in these gases.			
Measurement accuracy (Total accuracy including repeatability)	Differs by measurement flow X m³/h(normal) range			
	1.0 ≤ X < 8.0 ±3%RD 8.0 ≤ X ≤ 160.0 ±2%RD	2.5 ≤ X < 20.0 ±3%RD 20.0 ≤ X ≤ 400.0 ±2%RD	4.0 ≤ X < 32.5 ±3%RD 32.5 ≤ X ≤ 650.0 ±2%RD	10.0 ≤ X < 80.0 ±3%RD 80.0 ≤ X ≤ 1600.0 ±2%RD
	Calibration reference at 20°C and 1 atmospheric pressure			
Applicable pressure	0 to 1.0MPa			
Operating temperature	-25 to +60°C			
Storage temperature	-30 to +70°C			
Humidity	10 to 90%RH (no condensation allowed)			
Flow rate output	Instantaneous flow output: 4 to 20mAdc (allowable load resistance 600Ω max.) 24mA max.			
Contact output (3 points)	SPST relay contact (common), Contact rating: 250Vac/30Vdc, 3A max. (resistive load) Minimum load for switching: 100mVdc, 100μA			
Integrated pulse output (2 points)	Pulse output 1 (P1): Open collector, Contact rating: 30Vdc, 50mA max., Pulse weight 10L/pulse, 100L/pulse, 1000L/pulse, changeable by key operation			
	Pulse output 2 (P2): Open collector, Contact rating: 30Vdc, 50mA max., Pulse weight 1L/pulse,fixed.			
External contact input (standard function) (1 point)	Counter circuit: Dry contact or open collector Function: Dedicated for resetting an integrated count			
Flow rate indication	Instantaneous flow rate indication: LCD 5 digits, Integrated flow rate indication: LCD 7+2 digits			
Instantaneous flow rate indication range	0.0 to 192.0	0.0 to 480.0	0.0 to 780.0	0.0 to 1920.0
Integrated flow rate	Indication unit: 0.01m³, Indication range: 0 to 9999999.99(7+2 digits), Data memory: Automatic back-up at power failure, Indication status: Instantaneous/integrated/setting status			
Power supply	100Vac			
Material in gas flow passage	SUS304 / SCS13A			
Connection method	JIS10K RF			
Weight	18kg	25kg	31kg	38kg

Note: m³/h(normal) volume flow per hour converted to the conditions of 0℃ and 1 atmospheric pressure.

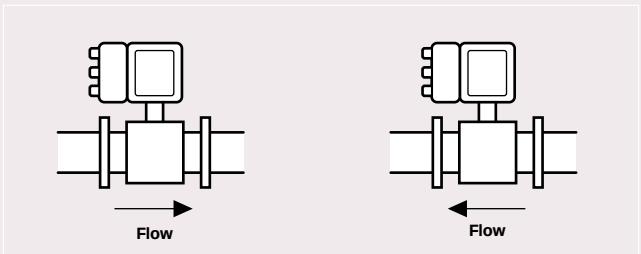
Selection Guide

·Example: CML0800SJN01000D0

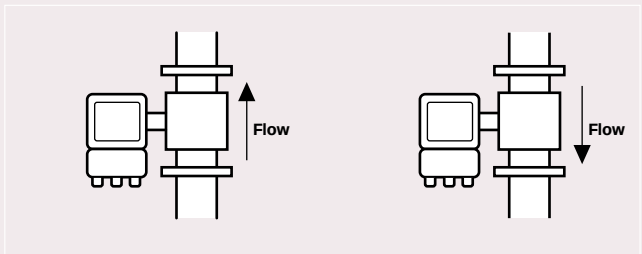
Table	Selection		Description
I	Basic model No.	**CML**	High-flow mass flow meter
II	Connecting port size	**050**	Size 50A (2B)
		080	Size 80A (3B)
		100	Size 100A (4B)
		150	Size 150A (6B)
III	Type	**0**	Applicable pressure range: 0 to 1MPa
IV	Material	**S**	Body: SUS304/SCS13A
V	Connection	**J**	JIS10KRF flange
VI	Type of gas	**N**	Air/Nitrogen (setting changeable to city gas LNG)
VII	Output	**0**	4 to 20mAdc + pulse output
VIII	Power supply	**0**	24Vdc
		1	100Vac 50/60Hz
		2	200Vac 50/60Hz
IX	Communication	**0**	(None)
X	Flow direction	**0**	Horizontal (Flow: Left ． Right) *
		1	Horizontal (Flow: Right ． Left) *
		2	Vertical (Flow: Down ． Up) *
		3	Vertical (Flow: Up ． Down) *
XI	Option 1	**0**	(None)
		1	Oil elimination process used on gas passage material
XII	Option 2	**D**	With test data
XIII	Design code	**0**	Product design

Note: *Flow direction can be selected from the 4 types shown below. LCD display is sideways to the piping in case of vertical mounting.

•Horizontal



•Vertical



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Specification are subject to change without notice.

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