

# Air Mass Flow Sensor

## MCS100

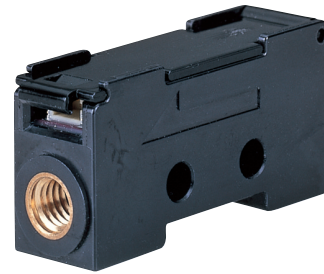
The MCS100 is a compact, fast response air mass flow sensor equipped with Yamatake's original  $\mu$ F (Micro Flow) sensor chip.

The MCS100 outputs mass flow signal according to the standard condition (20°C, 1 atm) of the gas flow without temperature nor pressure compensation.

The MCS100 offers a various flow range, in addition to its wide rangeability.

The MCS100 is suited for in a variety of flow measurement such as physics, medical and industry applications.

- Compact and lightweight  
33.5\*10.5\*17.0mm, just 9g (without cable)
- Fast response time  
5ms max.
- High accuracy and high repeatability  
Accuracy:  $\pm 5\%$ FS, Repeatability:  $\pm 2.0\%$ FS (depending on each model number)
- Positive/Negative flow measurement due to its symmetrical structure.
- Low power consumption  
12mA max. at 24Vdc
- Free mounting position and not required straight piping



- length
- Typical applications
  - Air Volume Sample
  - Gas Analyzers
  - Oxygen Concentrators
  - Pick and Place detection

### ■ Specifications

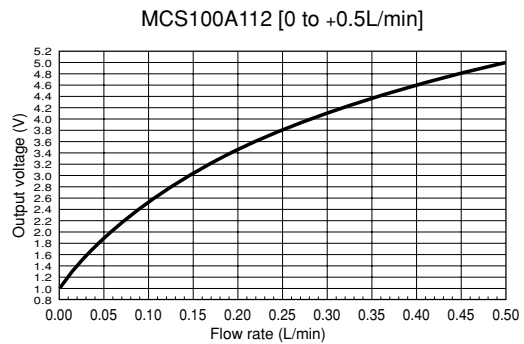
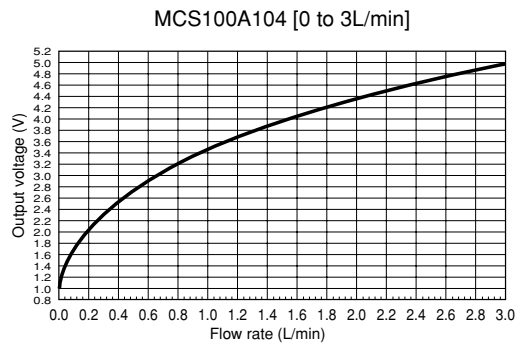
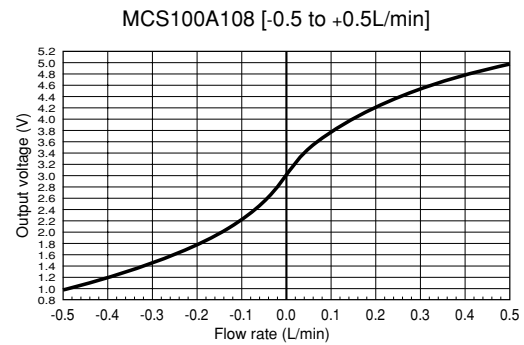
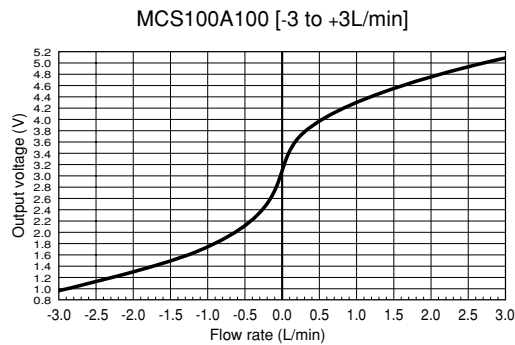
Model No.	MCS100A100	MCS100A104	MCS100A108	MCS100A112
<b>Flow range</b>	-3 to +3L/min	0 to 3L/min	-0.5 to +0.5L/min	0 to 0.5L/min
	Volume flow converted to the conditions of 20°C and 1 atm			
<b>Applicable gas</b>	Air and Nitrogen. Gas must be dry not containing any corrosive components (chlorine, sulfur, acid). The gas must also be free of any dust or oil mist.			
<b>Response</b>	5ms max. (95% response to a step state flow rate changing)			
<b>Output signal</b>	1 to 5Vdc (non-linear characteristics, refer to the standard output characteristics graph), allowable load resistance 10k $\Omega$ or more			
<b>Operating temperature range</b>	0 to 50°C (for both ambient temperature and gas temperature)			
<b>Storage temperature</b>	-10 to +60°C			
<b>Operating humidity range</b>	10 to 80%RH (no condensation allowed)			
<b>Operating pressure range</b>	-100 to +200kPa (Range for assured pressure characteristics: -70 to +200kPa)			
<b>Pressure resistance</b>	300kPa			
<b>Measurement accuracy</b>	$\pm 5\%$ FS max.	$\pm 5\%$ FS max.	$\pm 5\%$ FS max.	$\pm 6\%$ FS max.
	Output voltage 4V (5 to 1V) for full scale			
<b>Typical characteristics of output voltage</b>	0.0L/min: 3.00 $\pm$ 0.15V 0.5L/min: 3.88 $\pm$ 0.15V 1.5L/min: 4.49 $\pm$ 0.15V 3.0L/min: 5.00 $\pm$ 0.20V	0.0L/min: 1.00 $\pm$ 0.20V 0.5L/min: 2.75 $\pm$ 0.15V 1.5L/min: 3.97 $\pm$ 0.24V 3.0L/min: 5.00 $\pm$ 0.20V	0.0L/min: 3.00 $\pm$ 0.20V 0.1L/min: 3.77 $\pm$ 0.20V 0.3L/min: 4.53 $\pm$ 0.20V 0.5L/min: 5.00 $\pm$ 0.20V	0.0L/min: 1.00 $\pm$ 0.24V 0.1L/min: 2.54 $\pm$ 0.24V 0.3L/min: 4.06 $\pm$ 0.24V 0.5L/min: 5.00 $\pm$ 0.24V
	Full scale is to the output voltage 4V under the conditions of 20°C and 1 atm. (101.325kPa abs.)			
<b>Repeatability</b>	$\pm 3.5\%$ FS max.	$\pm 7.0\%$ FS max.	$\pm 2.0\%$ FS max.	$\pm 2.0\%$ FS max.
	Under the same temperature and pressure conditions. Output voltage 4V (5 to 1V) for full scale.			
<b>Pressure characteristics</b>	$\pm 0.01\%$ FS/kPa	$\pm 0.02\%$ FS/kPa	$\pm 0.01\%$ FS/kPa	$\pm 0.02\%$ FS/kPa
	Pressure range: -70 to +200kPa Full scale is to the output voltage 4V under the conditions of 20°C and 1 atm. (101.325kPa abs.)			

Model No.	MCS100A100	MCS100A104	MCS100A108	MCS100A112
<b>Temperature characteristics</b>	0.0L/min: $\pm 0.1\%FS/^{\circ}C$ 1.5L/min: $\pm 0.15\%FS/^{\circ}C$	0.0L/min: $\pm 0.1\%FS/^{\circ}C$ 1.5L/min: $\pm 0.15\%FS/^{\circ}C$	0.0L/min: $\pm 0.1\%FS/^{\circ}C$ 0.3L/min: $\pm 0.15\%FS/^{\circ}C$	0.0L/min: $\pm 0.2\%FS/^{\circ}C$ 0.3L/min: $\pm 0.2\%FS/^{\circ}C$
	Temperature range: 0 to 50°C Full scale is to the output voltage 4V under the conditions of 20°C and 1 atm. (101.325kPa abs.).			
<b>Power supply voltage</b>	12 to 24Vdc, Ripple: 5% max. at 12Vdc drive and 10% max. at 24Vdc drive. ( <b>Note 2</b> )			
<b>Power fluctuation range</b>	When 12Vdc drive: $\pm 2\%FS$ max. to the output value at 12Vdc within the range of 11.4 to 13.2Vdc. When 24Vdc drive: $\pm 2\%FS$ max. to the output value at 24Vdc within the range of 21.6 to 26.4Vdc.			
<b>Current consumption</b>	12mA max. at 24Vdc			
<b>Dielectric strength</b>	500Vac (1 min) or 600V (1sec) between each external connector terminal and body			
<b>Insulation resistance</b>	50M $\Omega$ (500Vdc megger) between each external connector terminal and body			
<b>Connection type</b>	M5 female (brass insertion), tightening torque 2.5N·m max.			
<b>Material</b>	Parts exposed to gas: PPS resin, ceramic (printed wiring board) and brass (connecting part) Cover: PC (Polycarbonate) resin			
<b>Mounting position</b>	Free			
<b>Mounting conditions</b>	When using the mounting holes of body, use M3 screws and tighten with 0.6N·m max. torque. Install a filter in upstream side of this device to trap the dust or oil mist of 10 $\mu$ m or larger.			
<b>Straight piping length</b>	Not required for both upstream and down stream sides			
<b>Vibration resistance</b>	10 to 55Hz, 1.5mm peak-to-peak amplitude, 2 hours each in XYZ directions			
<b>Weight (mass)</b>	9g			
<b>Electronic connection (Dedicated connector connection)</b>	Cable with dedicated connector (sold separately) : 81446888-001 (2m), 81446888-002 (3m)			
	MCS side : SM03B-SRSS-G-TB manufactured by J.S.T.Mfg Co. Ltd., Counterpart side : SHR-03V-S-B (housing) and SSH-003GA-P.2 (contact) manufactured by the same company.			

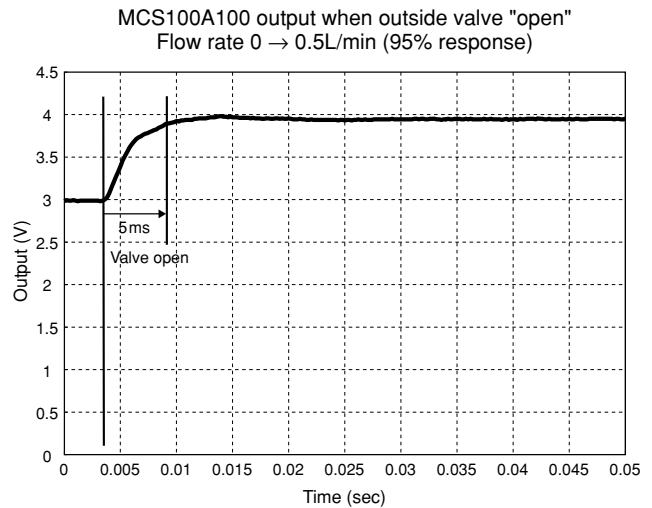
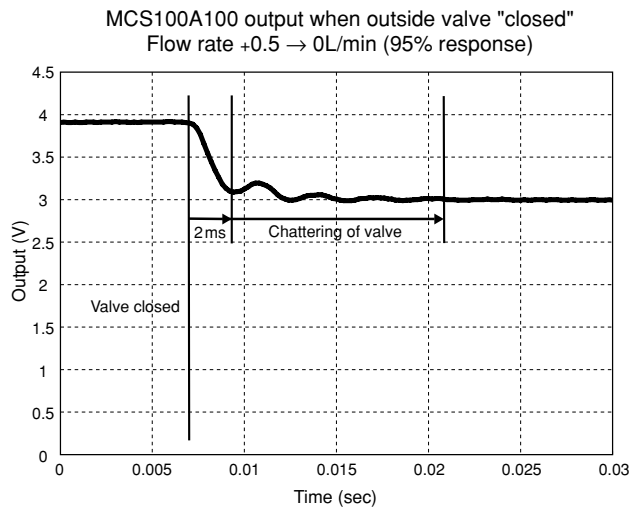
**Note 1:** For the %FS in the above description, 4V of output voltage (1-5V) is specified as a full-scale.

**Note 2:** When used at 24Vdc drive, the output change may occur within  $\pm 1\%FS$  max. after flowrate stabilization in the vicinity of measurement range upper limit flowrate (the amount of drift after 500s from the flowrate stabilization).

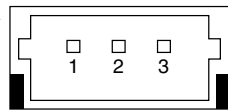
## ■ Standard flow rate characteristics



## ■ 5ms fast response by $\mu\text{F}$ (Micro Flow) sensor of Yamatake's original technology



## ■ Connection



View from connector terminal side

Applicable connector:

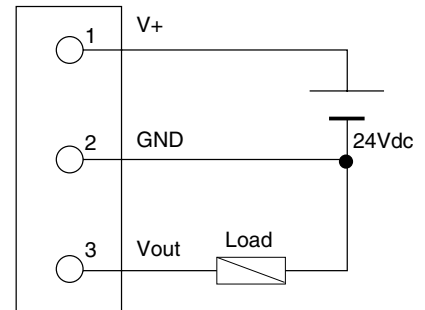
Housing: SHR-03V-S-B  
made by J.S.T. Mfg Co. Ltd.

Contact pin: SSH-003GA-P0.2  
made by J.S.T. Mfg Co. Ltd.

Pin No.	Signal name	Description
1	V+	Power supply +
2	GND	GND
3	Vout	Sensor output

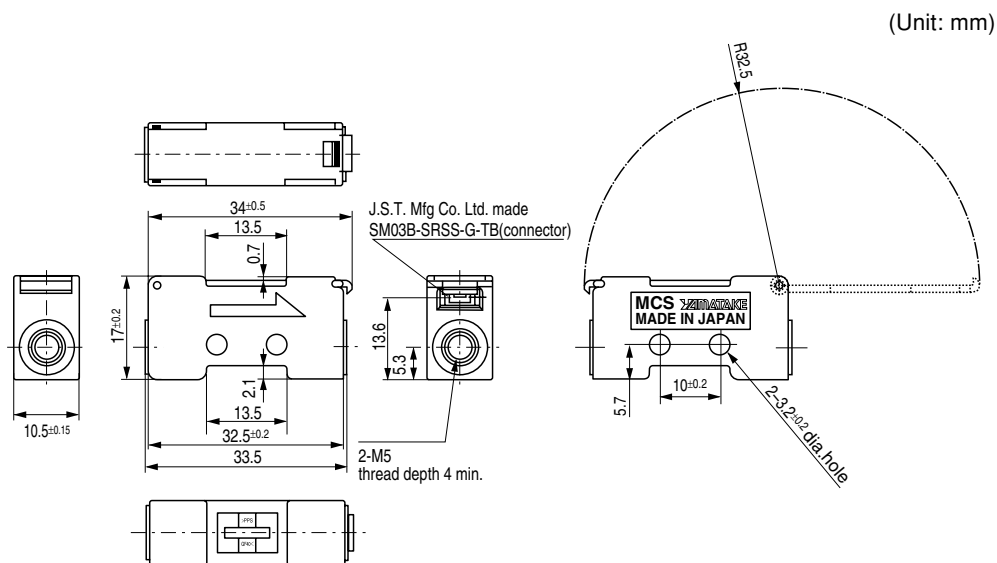
Note: Not insulated between inputs and outputs

Recommended connection example



Note: Allowable load resistance is 10k $\Omega$  min.

## ■ Dimensions



## RESTRICTIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment. Accordingly, when used in the applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- **Safety devices for plant worker protection**
- **Start/stop control devices for transportation and material handling machines**
- **Aeronautical/aerospace machines**
- **Control devices for nuclear reactors**

Never use this product in applications where human safety may be put at risk.

*Specifications are subject to change without notice.*

**azbil**

### **Yamatake Corporation Advanced Automation Company**

1-12-2 Kawana, Fujisawa  
Kanagawa 251-8522 Japan  
URL: <http://www.azbil.com>

Printed in Japan. (H)  
1st Edition: Issued in Apr. 2005

Printed on recycled paper.

(07)