

# Warnings and Cautions for MQV series Flow Controllers

(For installation and use of this device, refer to the warnings and cautions in the user's manual.)

- Never allow gases that are within explosive limits to pass through this device. Doing so might result in an explosion accidents.
  - Never use a device for oxygen gas if it is not a special oil-free oxygen gas model. Doing so could cause the gas to ignite. Even if gas-contacting sections have been treated to be oil-free, they cannot be used for oxygen if they have previously been used for some other gas.
  - If the device is used for burner air-fuel ratio control, take the necessary countermeasures with the equipment to prevent the occurrence of backfire and to avoid any influence to the device even if backfire occurs. Pressure increase or fire in the pipes caused by the backfire of the burner could damage the controller.
  - Prevent foreign matter from entering the device. If rust, water droplet, oil mist, or dust in the pipes enters the device, measurement or control error or damage might occur.
  - If there is a possibility of foreign matter entering the device, provide a filter, strainer or mist trap capable of eliminating foreign matter 0.1 μm or greater in diameter at the upstream. Be sure to inspect and replace the filter at regular intervals.
  - Use the device within the operating differential pressure range. Also, do not subject it to pressure beyond the rated pressure resistance range. Doing so might damage it.
  - Do not subject this device to pressure beyond its rated pressure resistance. Doing so might result in damage.
  - Be sure to use within the flow rate range stated in the product specifications. To prevent excessive flow rate, design instrumentation that includes, as appropriate, supply pressure management, a throttle valve, etc. Exceeding the upper limit of the range may result in display and output values that are considerably lower than the actual flow rate.
  - If a problem with this device could result in damage, include appropriate redundancy in the system design.
  - The valve on this device cannot completely shut a flow off. If complete shutoff is required, provide a shutoff valve separately. When the external valve is closed, it is necessary also to fully close the valve of the device using either of the following methods:
    - Set the flow rate setpoint to zero.
    - Make the valve operation mode to fully closed.
- If this valve remains in normal control status when the external shutoff valve is closed (zero flow rate), there will be an excessively large flow as soon as the external shutoff valve is opened. For the **MQV0050(J/K)**, **MQV0200(J/K)**, and **MQV0500(J/K)**, if the external shutoff valve is closed continuously for 5 minutes or more in control mode or with the valve forced fully open, the valve overheating limit (AL71) will be activated and the current to the valve will be forcibly limited.

- Before connecting pipes with Swagelok or VCR connections, check the precautions in the instruction provided by the connecting joint manufacturer. When separately purchasing a connecting joint, use the following made by Swagelok Co., Ltd:
  - 1/4" Swagelok: SS-400-1-6ST (standard)
  - SS-400-1-6STSC11 (oil-inhibited)
  - 1/2" Swagelok: SS-810-1-8ST (standard)
  - SS-810-1-8STSC11 (oil-inhibited)
  - 1/4" VCR: SS-4-VCR-1-00032SC11
  - 3/8" VCR: SS-8-VCR-1-8STSC11 or equivalent
- Observe the following when using the device (oil-free model) for oxygen gas:
  - Piping should be carried out by a specialist skilled in handling oxygen gas.
  - Use oil-free pipes and parts.
  - Be sure to remove foreign matter, burrs, etc. from the pipes before connecting the device.
  - Install a filter upstream of the device.
- Mount securely in order to prevent vibration. Otherwise, equipment failure could result.
- Mount the device horizontally. Do not mount it with the display facing down. Doing so might cause measurement error or equipment failure.
- For the **MQV0050(J,K)/0200(J,K)/0500(J,K)/1000(J,K)**, to keep pressure loss in the piping as low as possible, use as large a diameter pipe as possible. If the pressure loss in the piping is high, the gas supply pressure to this device (operating differential pressure) may fluctuate greatly, resulting in unstable control.
- When using a relay for external contact input and/or external 3-way switching input, always use a relay designed for micro-current use (with gold contacts). Failure to do so could cause faulty contact, resulting in malfunction.
- If there is a risk of a power surge caused by lightning, use Azbil Corporation's SurgeNon to prevent possible fire or equipment failure.
- Gas type switching by external contact input, flow rate switching, and analog input/output voltage range switching by external 3-way input switching should be done only after setting the operation mode to fully closed. Switching while controlling could cause large fluctuations.
- Do not use a semi-standard gas model with gases other than those below. Doing so may degrade the O-ring seal.
  - Compatible gases: Nitrogen (N<sub>2</sub>), air, argon (Ar), carbon dioxide (CO<sub>2</sub>), ammonia (NH<sub>3</sub>), and acetylene (C<sub>2</sub>H<sub>2</sub>).
- If a semi-standard gas model is used for a gas with an ammonia component, be sure the gas is dry, with a dew point of -20°C or less. Otherwise the sensor may be damaged.

Please read the "Terms and Conditions" from the following URL before ordering or use:

<http://www.azbil.com/products/bi/order.html>

Other product names, model numbers and company names may be trademarks of the respective company.

## Azbil Corporation

Advanced Automation Company

Yamatate Corporation changed its name to Azbil Corporation on April 1, 2012.

1-12-2 Kawana, Fujisawa  
Kanagawa 251-8522 Japan

URL: <http://www.azbil.com>

1st Edition : Issued in Mar. 2006-ST  
7th Edition : Issued in Nov. 2014-SK/AZ

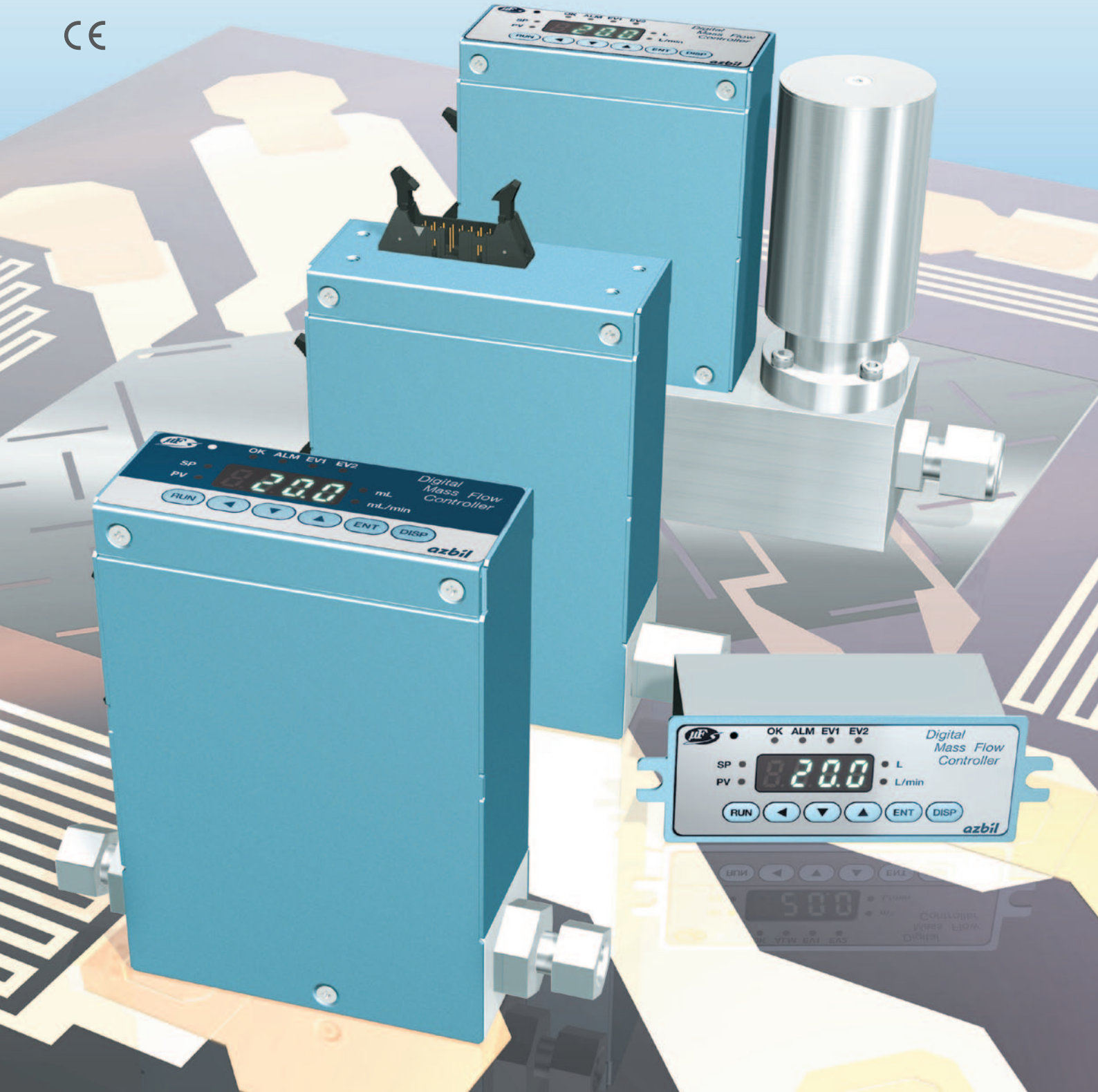
[Notice] Specifications are subject to change without notice.  
No part of this publication may be reproduced or duplicated without the prior written permission of Azbil Corporation.

**azbil**



# Digital Mass Flow Controller

New advances in finely honed control capability!  
Superior high-speed control (300ms) with an enhanced variety of functions.





# The Ultra Fast $\mu$ F Sensor, Combined with Advanced Actuator Control Technology

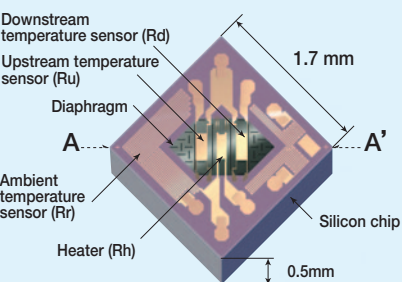
300ms\* high-speed control can be used for low differential pressure work. Selectable control range, power circuit isolation(an industry first), and emphasis on usability

(\* 500ms for the MQV9005/9200/9050B and C, 700ms for the MQV0050/0200/0500/1000J and K)

The **MQV series** features high performance digital gas mass flow controllers that incorporate the ultra small  $\mu$ F (Micro Flow<sup>®</sup>) sensor developed by Azbil Corporation, a pioneer in MEMS (micro electromechanical systems) flow sensors. The **MQV series** uses  $\mu$ F sensor output and advanced PID control technology to drive a proportional actuator. Very low flow rate models of 5, 20, and 50 mL/min have been added to the lineup, expanding the available application ranges.

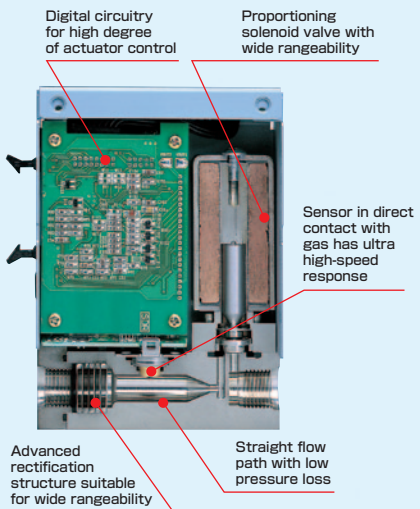
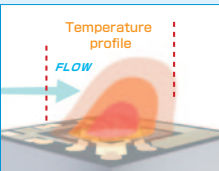
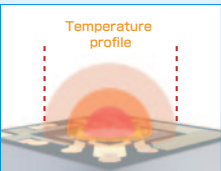
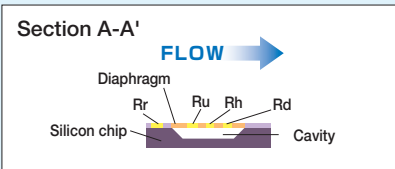


## Structure and features of the $\mu$ F sensor



### Principle of measurement

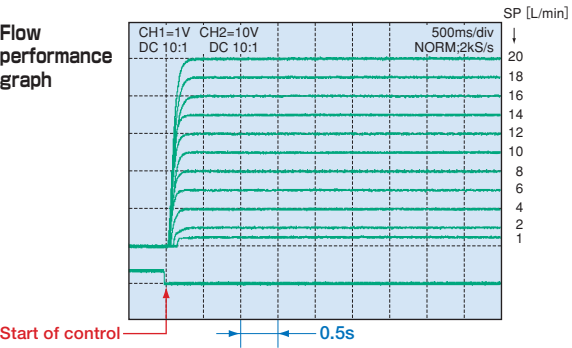
When there is no gas flow, the temperature distribution around the heater is symmetric. When the gas starts to flow from Ru to Rd, the temperature at Ru upstream decreases and the temperature at Rd downstream increases, thus causing a distortion of the symmetry in temperature distribution. The temperature difference between Ru and Rd is used to calculate the mass flow rate (flow rate x density).



## 12 advantages

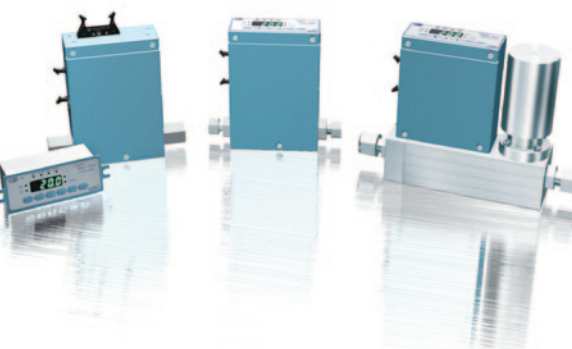
### Advantage 1 Advanced 300ms high-speed controllability

Achieves 300ms high-speed control (700ms for the MQV0050/0200/0500/1000J and K). The **MQV series** offers exceptionally fast response from no flow to the stable setpoint flow rate, and after setpoint changes. This high-speed response to changes in primary gas pressure can minimize the effects on secondary flow.



### Advantage 3 Broad lineup of models

The lineup includes models with or without integrated display, and models for standard gas, for hydrogen/helium, and for special gases. Select the optimum model for your application needs.



### Advantage 2 Reliable control

Standard model  
Accuracy:  $\pm 0.5\%$  FS /  $\pm 1.0\%$  FS  
Repeatability:  $\pm 0.25\%$  FS /  $\pm 0.5\%$  FS

High accuracy model (standard gas model only)  
Accuracy:  $\pm 1.0\%$  SP  
Repeatability:  $\pm 0.5\%$  SP

Control range: 1 to 100% FS

Note: For detailed specifications, refer to page 3.  
% SP refers to deviation from the setpoint.

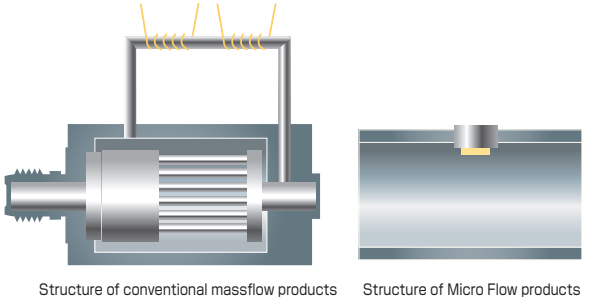


### Advantage 4 Operation at low differential pressure is a standard feature

The **MQV series** does not use capillaries that have large pressure loss.  
So The **MQV series** can control in the low pressure difference.

Optimum for low pressure gas control application

Ex.: Brazing, production of fluorescent lamps, etc.



### Advantage 5 Wide range of standard functions

The **MQV series** comes with a multitude of standard functions such as flow rate indication and totalizing. Without the need to process software like a PLC, the **MQV series** handles a wide range of applications with ease.

#### Major functions

- Flow rate indication
- Flow rate totalizing
- Valve open/close indication
- OK flow rate indication/output
- Indication of amperage to valve
- Flow rate unit and decimal point location change
- Up to 8 preset setpoints
- Valve forced open/closed
- Automatic valve shut-off
- Gas type changeover
- Gas type selection (freely change gas conversion factor)
- Selectable control range
- SP ramp setting
- Slow start option
- Control dead zone setting
- External switch input (for SP change, gas type changeover and range changeover)
- Event output (abnormal flow rate, operation mode)
- Alarm output

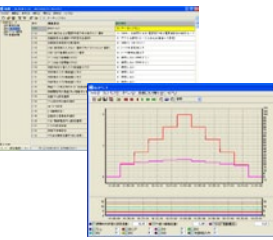
Six easy-to-operate buttons, superior indication function, and SP change even in control run mode.



(Control and display unit)

### Advantage 6 PC loader communications functions

A convenient personal computer loader function has been integrated as a standard feature. The MLP loader software, which is sold separately, allows not only configuration of various settings, but also monitoring of flow rate trends and other operating status information on the PC screen. Acquired data can also be saved as a CSV file.

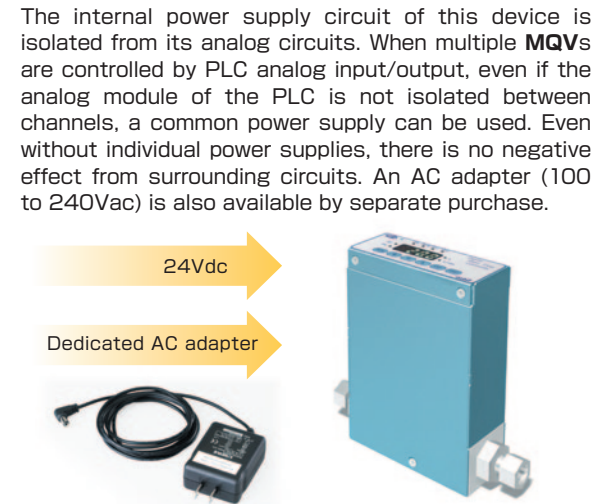


Easy connection using a dedicated USB (PC side) communications cable (included with the MLP100)

### Advantage 7 A variety of available input and output signals



### Advantage 8 Can be connected to a regular 24Vdc power supply



### Advantage 9 Engineered for flexible installation

On models with an integrated display, the display direction can be changed 180 degrees.



### Advantage 10 Wide temperature range

As a product developed for general industrial markets, the **MQV series** can be used from -10 to +60°C (ambient temperature and gas temperature).



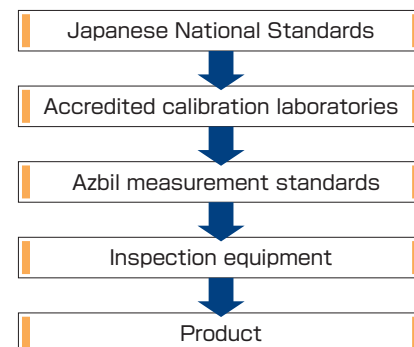
### Advantage 11 CE marking

The **MQV series** is CE-compliant.



### Advantage 12 JCSS traceability

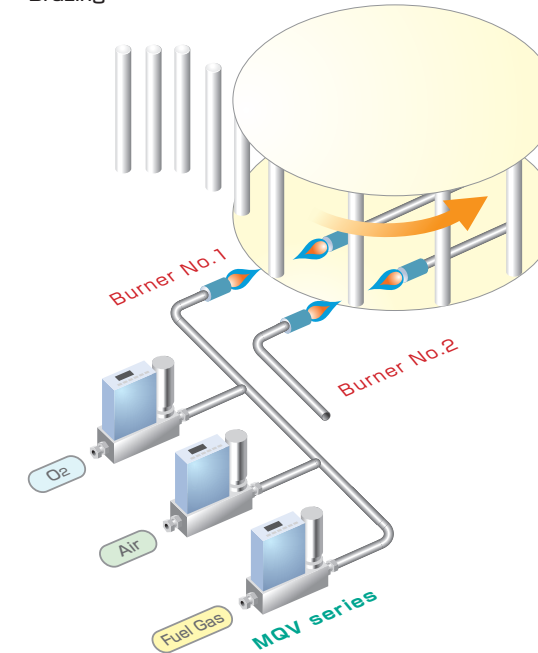
The **MQV series** offers Japan Calibration Service System (JCSS) traceability, based on Japanese National Standards and Japanese measurement law, and in conjunction with Advanced Industrial Science and Technology (AIST).



## Sample applications

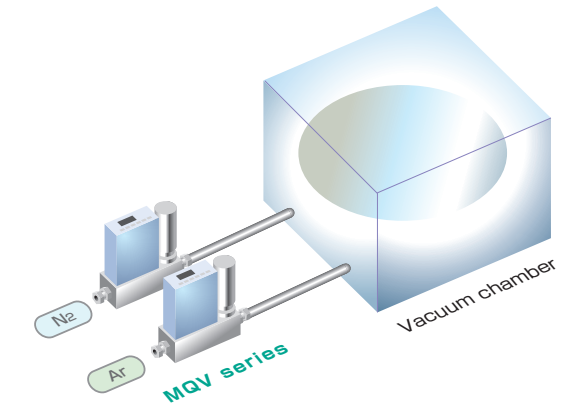
### Air/fuel ratio control for burner

- Manufacturing of backlights
- Halogen lamps
- Glass-forming
- Brazing



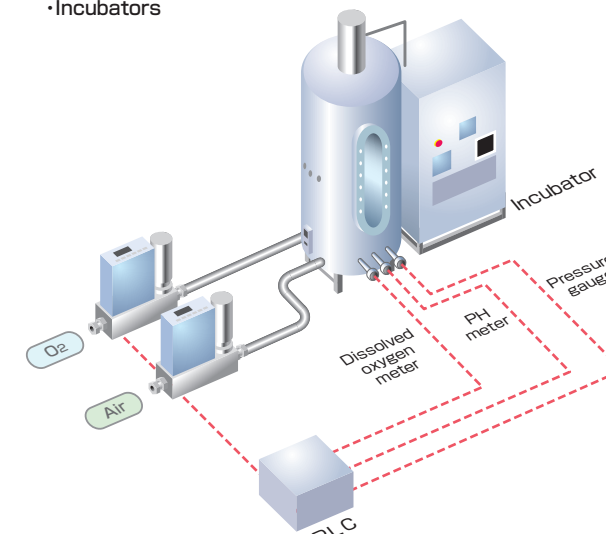
### Gas flow rate control for vacuum

- Sputtering
- Plasma cleaning



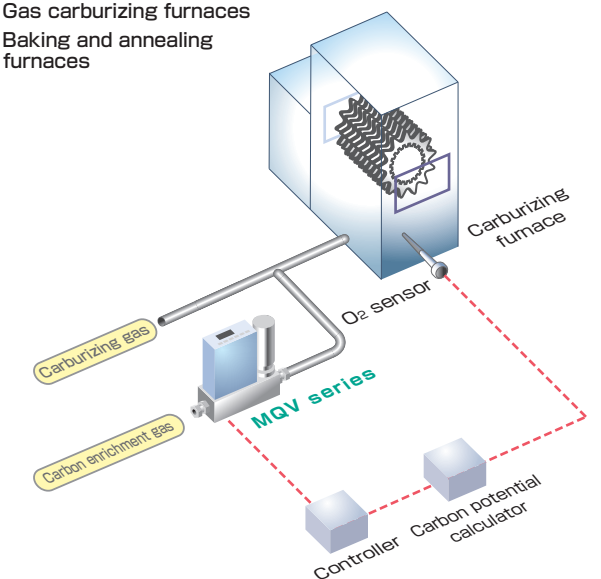
### Various test equipment

- Evaluation equipment
- Gas analyzers
- Incubators



### Control of furnace internal atmosphere

- Baking furnaces for electronics parts
- Gas carburizing furnaces
- Baking and annealing furnaces





Specifications

Standard gas model / Small-Flow Type

Model No.		MQV9005	MQV9020	MQV9200	MQV9500	MQV0002	MQV0005	MQV0020	MQV0050 (B,C)	MQV0100	
Valve type		Proportional solenoid valve									
Valve operation		Normally closed when de-energized (N.C.)									
Standard full-scale flow rate <small>(Note 1)</small>		5mL/min (standard)	20mL/min (standard)	200mL/min (standard)	0.500L/min (standard)	2.00L/min (standard)	5.00L/min (standard)	20.0L/min (standard)	50.0L/min (standard)	100L/min (standard)	
Gas types		Air/nitrogen (N2), oxygen (O2), argon (Ar).		Air/nitrogen (N2), argon (Ar), carbon dioxide (CO2), city gas 13A (LNG: 45MJ/m³), city gas 13A (LNG: 46MJ/m³), methane 100% (CH4), propane 100% (C3H8), butane 100% (C4H10).					Air/nitrogen (N2), oxygen (O2), argon (Ar), carbon dioxide (CO2)		
		The gas must be dry, without corrosive components (chlorine, sulfur, acid). It must also be clean, without dust or oil mist. <small>(Note 3)</small>									
Control	Response(at std. differential pressure)	0.5s for SP ±2% FS (typ.)			0.3s for SP ±2% FS (typ.)						
	Accuracy <small>(Note 4)</small> (at standard temperature and differential pressure; Q is flow rate)	± 1% FS			Standard model: ±0.5% FS (0% FS≤Q≤50% FS) ± 1% FS (50% FS<Q≤100% FS)  High accuracy model: ±0.2% FS (0% FS≤Q<20% FS) ± 1% SP (20% FS≤Q≤100% FS) <small>(Note 5)</small>					Std. model: ±1% FS (0% FS<Q≤80% FS)  ±2% FS (80% FS<Q≤100% FS)	
Pressure	Required differential pressure <small>(Note 6)</small>	5kPa	30kPa	50kPa	5kPa	50kPa	5kPa	50kPa	100kPa	250kPa	
	Operating differential pressure range	300kPa max.								400kPa max.	
	Max. inlet pressure	0.5MPa (gauge) <small>(Note 7)</small>									
Temp.	Operating temp.	− 10 to +60°C									
Humidity	Operating humidity	10 to 90% RH (no condensation allowed)									
Analog output	Output range	0–5Vdc / 1–5Vdc / 0–20mAdc / 4–20mAdc (selectable)									
Alarm/event output	Number of outputs	Alarm: 1. Event: 2.									
External switching input	Input type, number of inputs	External 3-way switching inputs: 1. External contact inputs (2-way switching): 3.									
Communications	System	(1) Dedicated PC loader connection <small>(Note 9)</small> (2) RS-485 communications (3-wire system) <small>(Note 10)</small>									
Power	Rating	24Vdc, current consumption 300mA max.									
	Isolation	Power circuit is isolated from input/output circuit.									
Matl. of gas-contacting parts		SUS316, Teflon, fluororubber, borosilicate glass, silicon			SUS316, Teflon, fluororubber						
Connection method		1/4" Swl, 1/4" VCR			Rc 1/4", 1/4" Swl, 1/4" VCR, 9/16-18 UNF					9/16-18 UNF, Rc 1/4", 3/8" Swl, 3/8" VCR	
Mounting orientation		Horizontal. Note that the display panel must not face down.									
Weight		Approx. 1.1kg			Approx. 1.2kg						
Certifications		CE marking									

Standard gas model / Medium-Flow Type

Model No.		MQV0050 (J,K)		MQV0200		MQV0500	
Valve type		Proportional solenoid valve					
Valve operation		Normally closed when de-energized (N.C.)					
Standard full-scale flow rate [Note 1]		50.0L/min (standard)		200L/min (standard)		500L/min (standard)	
Gas types		Air/nitrogen (N <sub>2</sub> ), oxygen (O <sub>2</sub> ), argon (Ar), carbon dioxide (CO <sub>2</sub> ), city gas 13A (LNG: 45MJ/m <sup>3</sup> ), city gas 13A (LNG: 46MJ/m <sup>3</sup> ), methane 100% (CH <sub>4</sub> ), propane 100% (C <sub>3</sub> H <sub>8</sub> ), butane 100% (C <sub>4</sub> H <sub>10</sub> ). The gas must be dry, without corrosive components (chlorine, sulfur, acid). It must also be clean, without dust or oil mist. [Note 3]					
Control	Response(at std. differential pressure)	0.7s for SP ±2% FS (typ.) (When control is started from fully closed condition, and when the setpoint is changed while control is performed.)					
	Accuracy [Note 4] (at standard temperature and differential pressure; Q is flow rate)	Standard model:±0.5% FS (0% FS≤Q≤40% FS) ±1% FS (40% FS<Q≤80% FS) ±1.5% FS (80% FS<Q≤100% FS)					
		(None)	High accuracy model: ±0.3% FS (0% FS≤Q<25% FS) ±1.2% SP (25% FS≤Q<80% FS) [Note 5] ±1.5% SP (80% FS≤Q≤100% FS)				
Pressure	Required differential pressure [Note 6]	10kPa		100kPa		150kPa	
	Operating differential pressure range	100kPa max.	300kPa max. (−10℃≤T≤40℃) 180kPa max. (40℃<T≤60℃)		300kPa max. (−10℃≤T≤35℃) 240kPa max. (35℃<T≤50℃)		
			(Condition: power supply voltage = 24.0V) [Note 8]				
	Max. inlet pressure	0.5MPa (gauge)					
Temp.	Operating temp.	− 10 to +60℃				− 10 to +50℃	
Humidity	Operating humidity	10 to 90% RH (no condensation allowed)					
Analog output	Output range	0–5Vdc / 1–5Vdc / 0–20mAdc / 4–20mAdc (selectable)					
Alarm/event output	Number of outputs	Alarm: 1. Event: 2.					
External switching input	Input type, number of inputs	External 3-way switching inputs: 1. External contact inputs (2-way switching): 3.					
Communications	System	(1) Dedicated PC loader connection [Note 9] (2) RS-485 communications (3-wire system) [Note 10]					
Power	Rating	24Vdc, current consumption 400mA max.				24Vdc, current consumption 500mA max.	
	Isolation	Power circuit is isolated from input/output circuit.					
Matl. of gas-contacting parts		Standard gas model to SUS316, Teflon, fluororubber					
Connection method		Rc 1/2", 1/2" Swl, 3/8" VCR, 3/4-16 UNF					
Mounting orientation		Horizontal. Note that the display panel must not face down.					
Weight		Approx. 3.5kg					
Certifications		CE marking					

Semi-Standard Gas Model

Model No.		MQV9200	MQV9500	MQV0002	MQV0005	MQV0020	MQV0050 (B,C)	MQV0200	MQV0500
Valve type		Proportional solenoid valve							
Valve operation		Normally closed when de-energized (N.C.)							
Standard full-scale flow rate [Note 1]		200mL/min (standard)	0.500L/min (standard)	2.00L/min (standard)	5.00L/min (standard)	20.0L/min (standard)	50.0L/min (standard)	200L/min (standard)	500L/min (standard)
Gas types		Air/nitrogen (N <sub>2</sub> ), argon (Ar), carbon dioxide (CO <sub>2</sub> ), acetylene (C <sub>2</sub> H <sub>2</sub> ), ammonia (NH <sub>3</sub> ) [Note 2] The gas must be dry, without corrosive components (chlorine, sulfur, acid). It must also be clean, without dust or oil mist. The dew point of the ammonia gas must be -20° or below. [Note 3]							
Control	Response(at std. differential pressure)	0.3s for SP ±2% FS (typ.)					0.7s for SP ±2% FS (typ.)		
	Accuracy [Note 4] (at standard temperature and differential pressure; Q is flow rate)	(When control is started from fully closed condition, and when the setpoint is changed while control is performed.)							
Pressure		±0.5% FS (0% FS≤Q≤50% FS) ± 1% FS (50% FS<Q≤100% FS)					±0.5% FS (0% FS≤Q≤40% FS) ± 1% FS (40% FS<Q≤80% FS) ± 1.5% FS (80% FS<Q≤100% FS)		
	Required differential pressure [Note 6]	50kPa	5kPa	50kPa	5kPa	50kPa	100kPa	100kPa	150kPa
	Operating differential pressure range	300kPa max.					300kPa max. (-10℃≤T≤40℃) 180kPa max. (40℃<T≤60℃) (Condition: power supply voltage = 24.0V)[Note 8]		300kPa max. (-10℃≤T≤35℃) 240kPa max. (35℃<T≤50℃)
	Max. inlet pressure	0.5MPa (gauge) [Note 7]							
Temp.	Operating temp.	- 10 to +60℃							- 10 to +50℃
Humidity	Operating humidity	10 to 90% RH (no condensation allowed)							
Analog output	Output range	0-5Vdc / 1-5Vdc / 0-20mAdc / 4-20mAdc (selectable)							
Alarm/event output	Number of outputs	Alarm: 1. Event: 2.							
External switching input	Input type, number of inputs	External 3-way switching inputs: 1. External contact inputs (2-way switching): 3.							
Communications	System	(1) Dedicated PC loader connection [Note 9] (2) RS-485 communications (3-wire system) [Note 10]							
Power	Rating	24Vdc, current consumption 300mA max.					24Vdc, current consumption 400mA max.	24Vdc, current consumption 500mA max.	
	Isolation	Power circuit is isolated from input/output circuit.							
Matl. of gas-contacting parts		Standard gas model to SUS316, Teflon, EPDM							
Connection method		Rc 1/4", 1/4" Swl, 1/4" VCR						1/2" Swl,	
Mounting orientation		Horizontal. Note that the display panel must not face down.							
Weight		Approx. 1.2kg					Approx. 3.5kg		
		CE marking							

Hydrogen / Helium gas model

Model No.		MQV9020	MQV9050	MQV9500	MQV0005	MQV0010	MQV0050	MQV0200
Valve type		Proportional solenoid valve						
Valve operation		Normally closed when de-energized (N.C.)						
Standard full-scale flow rate <small>[Note 1]</small>		20.0mL/min (standard)	50.0mL/min (standard)	0.500L/min (standard)	5.00L/min (standard)	10.00L/min (standard)	50.0L/min (standard)	200L/min (standard)
Gas types		Hydrogen (H <sub>2</sub> ), helium (He). The gas must be dry and not contain corrosive components(chlorine, sulfur, acid). It must also be clean, without dust or oil mist. <small>[Note 3]</small>						
Control	Response(at std. differential pressure)	500ms for SP ±2% FS (typ.) (When control is started from fully closed condition, and when setting is changed while control is performed.)			0.3s for SP ±2% FS (typ.)			
	Accuracy (at standard temperature and differential pressure; Q is flow rate)	± 1.0%FS (50%FS<Q≤100%FS) ±0.5%FS (0%FS≤Q≤50%FS)	± 1.0%FS (0%FS≤Q≤100%FS)	±0.5% FS (0% FS≤Q≤40% FS) ± 1.0% FS (40% FS<Q≤80% FS) ±2.0% FS (80% FS<Q≤100% FS)				
	Pressure	Required differential pressure <small>[Note 6]</small>	Hydrogen: 25kPa Helium: 5kPa	Hydrogen: 10kPa Helium: 20kPa	Hydrogen : 20kPa Helium : 40kPa	Hydrogen: 80kPa Helium: 150kPa	Hydrogen: 20kPa Helium: 40kPa	Hydrogen: 100kPa Helium: 180kPa
	Operating differential pressure range	300kPa max. (−10℃≤T≤60℃)						
	Max. inlet pressure	0.5MPa (gauge) <small>[Note 7]</small>						
Temp.	Operating temp.	− 10 to +60℃						
Humidity	Operating humidity	10 to 90% RH (no condensation allowed)						
Analog output	Output range	0–5Vdc / 1–5Vdc / 0–20mAdc / 4–20mAdc (selectable)						
Alarm/event output	Number of outputs	Alarm: 1. Event: 2.						
External switching input	Input type, number of inputs	External 3-way switching inputs: 1. External contact inputs (2-way switching): 3.						
Communications	System	(1) Dedicated PC loader connection <small>[Note 9]</small> (2) RS-485 communications (3-wire system) <small>[Note 10]</small>						
Power	Rating	24Vdc, current consumption 300mA max.						
	Isolation	Power circuit is isolated from input / output circuit.						
Matl. of gas-contacting parts		SUS316, Teflon, fluororubber, borosilicate glass, silicon			SUS316, Teflon, fluororubber			
Connection method		1/4" Swl, 1/4" VCR			Rc 1/4", 1/4" Swl, 1/4" VCR, 9/16-18 UNF			
Mounting orientation		Horizontal. Note that display panel must not face down.						
Weight		Approx. 1.1kg			Approx. 1.2kg			
Certifications		CE marking						

■ Table 1.

		MQV9005		MQV9020		MQV9200		MQV9500		MQV0002		MQV0005	
		Control flow rate range	Setting/display resolution (Note 2)	Control flow rate range	Setting/display resolution (Note 2)	Control flow rate range	Setting/display resolution (Note 2)	Control flow rate range	Setting/display resolution (Note 2)	Control flow rate range	Setting/display resolution (Note 2)	Control flow rate range	Setting/display resolution (Note 2)
Gas type	Air, nitrogen	0.10 to 5.00	0.02	0.2 to 20.0	0.1	2 to 200	1	0.004 to 0.500	0.002	0.02 to 2.00	0.01	0.04 to 5.00	0.02
	Oxygen	0.10 to 5.00	0.02	0.2 to 20.0	0.1	2 to 200	1	0.004 to 0.500	0.002	0.02 to 2.00	0.01	0.04 to 5.00	0.02
	Argon	0.10 to 5.00	0.02	0.2 to 20.0	0.1	2 to 200	1	0.004 to 0.500	0.002	0.02 to 2.00	0.01	0.04 to 5.00	0.02
	Carbon dioxide	—	—	—	—	1.0 to 120.0	0.5	0.003 to 0.300	0.001	0.010 to 1.200	0.005	0.03 to 3.00	0.01
	City gas 13A (LNG: 45MJ/m³)	—	—	—	—	2 to 200	1	0.004 to 0.500	0.002	0.02 to 2.00	0.01	0.04 to 5.00	0.02
	City gas 13A (LNG: 46MJ/m³)	—	—	—	—	2 to 200	1	0.004 to 0.500	0.002	0.02 to 1.60	0.01	0.04 to 5.00	0.02
	Methane 100%	—	—	—	—	2 to 200	1	0.004 to 0.500	0.002	0.02 to 2.00	0.01	0.04 to 5.00	0.02
	Propane 100%	—	—	—	—	0.6 to 60.0	0.2	0.002 to 0.160	0.001	0.006 to 0.600	0.002	0.02 to 1.60	0.01
	Butane 100%	—	—	—	—	0.4 to 50.0	0.2	1.0 to 120.0 (Note 1)	0.5 (Note 1)	0.004 to 0.400	0.002	0.010 to 1.200	0.005

		MQV0020		MQV0050 (B, C)		MQV0100		MQV0050 (J, K)		MQV0200		MQV0500	
		Control flow rate range	Setting/display resolution (Note 2)	Control flow rate range	Setting/display resolution (Note 2)	Control flow rate range	Setting/display resolution (Note 2)	Control flow rate range	Setting/display resolution (Note 2)	Control flow rate range	Setting/display resolution (Note 2)	Control flow rate range	Setting/display resolution (Note 2)
Gas type	Air, nitrogen	0.2 to 20.0	0.1	0.4 to 50.0	0.2	1.0 to 100.0	0.5	0.4 to 50.0	0.2	2 to 200	1	4 to 500	2
	Oxygen	0.2 to 20.0	0.1	0.4 to 50.0	0.2	1.0 to 100.0	0.5	0.4 to 50.0	0.2	2 to 200	1	4 to 500	2
	Argon	0.2 to 20.0	0.1	0.4 to 50.0	0.2	1.0 to 100.0	0.5	0.4 to 50.0	0.2	2 to 200	1	4 to 500	2
	Carbon dioxide	0.10 to 12.00	0.05	0.3 to 30.0	0.1	1.0 to 80.0	0.5	0.3 to 30.0	0.1	1.0 to 120.0	0.5	4 to 400	2
	City gas 13A (LNG: 45MJ/m³)	0.2 to 20.0	0.1	0.4 to 50.0	0.2	—	—	0.4 to 50.0	0.2	2 to 200	1	4 to 500	2
	City gas 13A (LNG: 46MJ/m³)	0.2 to 20.0	0.1	0.4 to 50.0	0.2	—	—	0.4 to 50.0	0.2	2 to 200	1	4 to 400	2
	Methane 100%	0.2 to 20.0	0.1	0.4 to 50.0	0.2	—	—	0.4 to 50.0	0.2	2 to 200	1	4 to 500	2
	Propane 100%	0.06 to 6.00	0.02	0.2 to 16.0	0.1	—	—	0.2 to 16.0	0.1	0.6 to 60.0	0.2	2 to 200	1
	Butane 100%	0.04 to 4.00	0.02	0.10 to 10.00	0.05	—	—	0.10 to 12.00	0.05	0.4 to 40.0	0.2	2 to 160	1

■ **Table 2. Semi-Standard Model Control flow rate range and setting/display resolutions (factory settings)** (Units: mL/min (standard) for **9200**, L/min (standard) for other models)

		MQV9200		MQV9500		MQV0002		MQV0005		MQV0020		MQV0050 (B, C)	
		Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]
Gas type	Acetylene (C <sub>2</sub> H <sub>2</sub> )	1.0~120.0	0.5	0.003~0.300	0.001	0.010~1.200	0.005	0.03~3.00	0.01	0.10~12.00	0.05	0.3~30.0	0.1
	Ammonia (NH <sub>3</sub> )	2~160	1	0.004~0.400	0.002	0.02~1.60	0.01	0.04~4.00	0.02	0.2~16.00	0.1	0.4~40.0	0.2
	Air, nitrogen	2~200	1	0.004~0.500	0.002	0.02~2.00	0.01	0.04~5.00	0.02	0.2~20.0	0.1	0.4~50.0	0.2
	Argon	2~200	1	0.004~0.500	0.002	0.02~2.00	0.01	0.04~5.00	0.02	0.2~20.0	0.1	0.4~50.0	0.2
	Carbon dioxide	1.0~120.0	0.5	0.003~0.300	0.001	0.010~1.200	0.005	0.03~3.00	0.01	0.10~12.00	0.05	0.3~30.0	0.1
		MQV0200		MQV0500									
		Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]								
Gas type	Acetylene (C <sub>2</sub> H <sub>2</sub> )	1.0~120.0	0.5	4~400	2								
	Ammonia (NH <sub>3</sub> )	2~160	1	4~400	2								
	Air, nitrogen	2~200	1	4~500	2								
	Argon	2~200	1	4~500	2								
	Carbon dioxide	1.0~120.0	0.5	4~400	2								

■ Table 3.

Hydrogen gas model													
Control flow rate range and setting/display resolutions (factory settings) (Units: mL/min (standard) for MQV9020/9050, L/min (standard) for other models)													
		MQV9020		MQV9050		MQV9500		MQV0005		MQV0010		MQV0050	
		Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]	Control flow rate range	Setting/display resolution [Note 2]
Gas type	Hydrogen	0.2 to 20.0	0.1	0.4 to 50.0	0.2	0.004 to 0.500	0.002	0.04 to 5.00	0.02	0.10 to 10.00	0.05	0.4 to 50.0	0.2
	Helium	0.2 to 20.0	0.1	0.4 to 50.0	0.2	0.004 to 0.500	0.002	0.04 to 5.00	0.02	0.10 to 10.00	0.05	0.4 to 50.0	0.2
		MQV0200											
		Control flow rate range	Setting/display resolution [Note 2]										
Gas type	Hydrogen	2 to 200	1										
	Helium	2 to 200	1										

**[Note 1]** When the gas type of **MQV9500** is set to butane 100%, the flow rate display unit is mL/min.

**[Note 2]** If an analog signal is applied to the setting input and the flow rate output, the resolution will increase greatly. Contact Azbil Corporation for more information.

### Compatible gases for each model

	O-ring material	Sensor	Gas type						
			Air, Nitrogen	Oxygen	Argon	Carbon dioxide	City gas 13A	Methane 100%	Propane 100%
Standard gas model	Fluororubber	Standard	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Special gas model	Ethylene-propylene	Standard	○		○	○			
Hydrogen/helium gas model	Fluororubber	Dedicated hydrogen/helium use							

	O-ring material	Sensor	Gas type					
			Butane 100%	Ammonia	Acetylene	Ethylene, oxide gas	Hydrogen	Helium
Standard gas model	Fluororubber	Standard	⊙					
Special gas model	Ethylene-propylene	Standard		⊙	⊙	⊙		
Hydrogen/helium gas model	Fluororubber	Dedicated hydrogen/helium use					⊙	⊙

Note: For use with gases other than the above, contact Azbil Corporation.

## Selection guide

- Standard gas model

Low flow rate Ex. MQV9200BSRN000000

Basic model No.	Flow rate range	Display	Material	Connection	Gas type	Option (1)	Option (2)	Option (3)	Option (4)	Option (5)	Design code	Description
MQV												Digital mass flow controller
	9005											0.10 to 5.00mL/min (standard) [Note 1]
	9020											0.2 to 20.0mL/min (standard) [Note 1]
	9200											2 to 200mL/min (standard) [Note 1]
	9500											0.004 to 0.500L/min (standard) [Note 1]
	0002											0.02 to 2.00L/min (standard) [Note 1]
	0005											0.04 to 5.00L/min (standard) [Note 1]
	0020											0.2 to 20.0L/min (standard) [Note 1]
	0050											0.4 to 50.0L/min (standard) [Note 1]
	0100											1.0~100.0L/min (standard)
		B										Integrated display (side-to-side dimension 90mm)
		C										Separate display (side-to-side dimension 90mm)
			S									SUS316, Teflon, Viton
				R								Rc 1/4" (except 9005, 9020)
				S								1/4" Swagelok (In use of 0100 change to 3/8" Swagelok)
				V								1/4" VCR (In use of 0100 change to 3/8" VCR)
				U								9/16-18 UNF (except 9005, 9020)
					N							Air/nitrogen (changeable to standard gases) [Note 2]
					S							Oxygen [Note 3]
						O						(None)
							O					(None)
								O				RS-485 (CPL) communications
									O			(None)
										O		(None)
											O	Gas-contacting parts treated to be oil-inhibited
											D	(None)
											Y	Inspection certificate provided
												Traceability certificate provided
											O	Product version

Medium flow rate Ex. MQV0050, ISBN000000

Medium flow rate Ex. MQV0050JSRN000000

Basic model No.	Flow rate range	Display	Material	Connection	Gas type	Option (1)	Option (2)	Option (3)	Option (4)	Option (5)	Design code	Description
MQV												Digital mass flow controller
	0050											0.4 to 50.0L/min (standard) <b>[Note 1]</b>
	0200											2 to 200L/min (standard) <b>[Note 1]</b>
	0500											4 to 500L/min (standard) <b>[Note 1]</b>
		J										Integrated display (side-to-side dimension 150mm)
		K										Separate display (included) (side-to-side dimension 150mm)
			S									SUS316, Teflon, Viton
				R								Rc 1/2"
				S								1/2" Swagelok
				V								3/8" VCR
				U								3/4-16 UNF
					N							Air/nitrogen (changeable to standard gases) <b>[Note 2]</b>
					S							Oxygen <b>[Note 3]</b>
						O						(None)
							O					(None)
								1				(None)
									O			RS-485 (CPL) communications
										O		(None)
										1		(None)
												Gas-contacting parts treated to be oil-inhibited
											O	(None)
											D	Inspection certificate provided
											Y	Traceability certificate provided
												Product version
											O	

Low flow rate high accuracy model Ex. MQV9200BSR1S000Y0

Low flow rate high accuracy model Ex. MQV9200BSR1S000Y0

Basic model No.	Flow rate range	Display	Material	Connection	Gas type	Option (1)	Option (2)	Option (3)	Option (4)	Option (5)	Design code	Description
MQV												Digital mass flow controller
	9200											2 to 200mL/min (standard) <b>[Note 1]</b>
	9500											0.004 to 0.500L/min (standard) <b>[Note 1]</b>
	0002											0.02 to 2.00L/min (standard) <b>[Note 1]</b>
	0005											0.04 to 5.00L/min (standard) <b>[Note 1]</b>
	0020											0.2 to 20.0L/min (standard) <b>[Note 1]</b>
	0050											0.4 to 50.0L/min (standard) <b>[Note 1]</b>
		B										Integrated display (side-to-side dimension 90mm)
		C										Separate display (side-to-side dimension 90mm)
			S									SUS316, Teflon, Viton
				R								Rc 1/4"
				S								1/4" Swagelok
				V								1/4" VCR
					1							Air/nitrogen
					2							Oxygen <b>[Note 3]</b>
						S						High accuracy
							0					(None)
							1					RS-485 (CPL) communications
								0				(None)
									0			(None)
									1			Gas-contacting parts treated to be oil-inhibited
										Y		Traceability certificate provided
											O	Product version

Medium flow rate high accuracy model Ex MQV0200-ISR1S000V0

Medium flow rate high accuracy model Ex. MQV0200JSR1S000Y0

Basic model No.	Flow rate range	Display	Material	Connection	Gas type	Option (1)	Option (2)	Option (3)	Option (4)	Option (5)	Design code	Description
MQV												Digital mass flow controller
	0200											2 to 200L/min (standard) <b>[Note 1]</b>
	0500											4 to 500L/min (standard) <b>[Note 1]</b>
		J										Integrated display (side-to-side dimension 150mm)
		K										Separate display (included)(side-to-side dimension 150mm)
			S									SUS316, Teflon, Viton
				R								Rc 1/2"
				S								1/2" Swagelok
				V								3/8" VCR
					1							Air/nitrogen
					2							Oxygen <b>[Note 3]</b>
						S						High accuracy
							0					(None)
							1					RS-485 (CPL) communications
								O				(None)
									O			(None)
									1			Gas-contacting parts treated to be oil-inhibited
										Y		Traceability certificate provided
											O	Product version

**[Note 1]** L/min (standard) indicates the air flow rate (L/min) converted to 20°C, one atmosphere (1 atm). The reference temperature can be changed to 0°C, 25°C, or 35°C. The controllable flow rate range varies according to the gas type.

**[Note 2]** Although gas type is set to air/nitrogen at the factory, it can be changed to other standard compatible gas types (argon, carbon dioxide (CO<sub>2</sub>), natural gas LNG (45MJ/m<sup>3</sup>, 46MJ/m<sup>3</sup>), methane 100%, propane 100%, butane 100%).

**[Note 3]** When oxygen is selected, make sure to specify "1: Gas-contacting parts treated to be oil-inhibited" of the optional configuration.

**[Note 1]** L/min (standard) indicates the air flow rate (L/min) converted to 20°C, one atmosphere (1 atm). The reference temperature can be changed to 0°C, 25°C, or 35°C. The controllable flow rate range varies according to the gas type.

**[Note 2]** Although gas type is set to air/nitrogen at the factory, it can be changed to other standard components such as carbon dioxide (CO<sub>2</sub>), natural gas LNG (45MJ/m<sup>3</sup>, 46MJ/m<sup>3</sup>, methane 100%, propane 100%, butane 100%).

**[Note 3]** When oxygen is selected, make sure to specify "1": Gas-contacting parts treated to be oil-inhibited or the optional function. Be aware that oxygen cannot be used in the model numbers other than that for oxygen.

Selection guide

Semi-standard gas model

Low flow rate Ex. MQV9200BSSE000100

Basic model No.	Flow rate range	Display	Material	Connection	Gas type	Option (1)	Option (2)	Option (3)	Option (4)	Option (5)	Design code	Description
MQV	9200											Digital mass flow controller
	9500											2 to 200mL/min (standard) [Note 1]
	0002											0.004 to 0.500L/min (standard) [Note 1]
	0005											0.02 to 2.00L/min (standard) [Note 1]
	0020											0.04 to 5.00L/min (standard) [Note 1]
	0050											0.2 to 20.0L/min (standard) [Note 1]
												0.4 to 50.0L/min (standard) [Note 1]
		B										Integrated display model (body length 90mm)
		C										Separate display model (body length 90mm)
			S									SUS316
				R								Rc 1/4"
				S								1/4" Swagelok
				V								1/4" VCR
					E							Semi-standard gas [Note 2]
						O						(None)
							O					(None)
								1				Model with RS-485 communications (CPL) function
												Without optional functions
												Oil-inhibiting treatment for gas-contacting parts
										O		(None)
										D		With inspection certificate
										Y		With traceability certificate
											O	Product version

Medium flow rate Ex. MQV0200JSSE000100

Basic model No.	Flow rate range	Display	Material	Connection	Gas type	Option (1)	Option (2)	Option (3)	Option (4)	Option (5)	Design code	Description
MQV	0200											Digital mass flow controller
	0500											2 to 200L/min (standard) [Note 1]
												4 to 500L/min (standard) [Note 1]
		J										Integrated display model (body length 150mm)
		K										Separate display model (body length 150mm)
			S									SUS316
				S								1/2" Swagelok
					E							Semi-standard gas
						O						(None)
							O					(None)
								1				Model with RS-485 communications (CPL) function
												(None)
												Oil-inhibiting treatment for gas-contacting parts
										O		(None)
										D		With inspection certificate
										Y		With traceability certificate
											O	Product version

[Note 1] L/min (standard) indicates the flow rate (L/min) converted to 20°C, one atmosphere (1 atm). The reference temperature can be changed to 0°C, 25°C, or 35°C. The controllable flow rate range varies according to the gas type. [Note 2] Applies only to ammonia, acetylene. Since the factory setting is air/nitrogen, be sure to set the gas type conversion factor (C.F.) before use.

Hydrogen/helium gas model

Low flow rate Ex. MQV9500BSRH0000100

Basic model No.	Flow rate range	Display	Material	Connection	Gas type	Option (1)	Option (2)	Option (3)	Option (4)	Option (5)	Design code	Description
MQV	9020											Digital mass flow controller
	9050											0.2 to 20.0mL/min (standard) [Note 1]
	9500											0.4 to 50.0mL/min (standard) [Note 1]
	0005											0.004 to 0.500L/min (standard) [Note 1]
	0010											0.04 to 5.00L/min (standard) [Note 1]
	0050											0.10 to 10.00L/min (standard) [Note 1]
	0200											0.4 to 50.0L/min (standard) [Note 1]
												2 to 200L/min (standard) [Note 1]
		B										Integrated display
		C										Separate display
			S									SUS316, Teflon, Viton
				R								Rc 1/4"
				S								1/4" Swagelok
				V								1/4" VCR
				U								9/16-18 UNF
					H							Hydrogen/helium [Note 2]
						O						(None)
							O					(None)
								1				RS-485 (CPL) communications
												(None)
												Gas-contacting parts treated to be oil-inhibited
										O		(None)
										D		Inspection certificate provided
										Y		Traceability certificate provided
											O	Product version

[Note 1] L/min (standard) indicates the hydrogen flow rate (L/min) per minute converted to 20°C, one atmosphere (1 atm). The reference temperature can be changed to 0°C, 25°C, or 35°C. The controllable flow rate range varies according to gas type. [Note 2] Although the gas type is set to hydrogen at the factory, it can be changed to helium.

Table 3. Optional parts (sold separately)

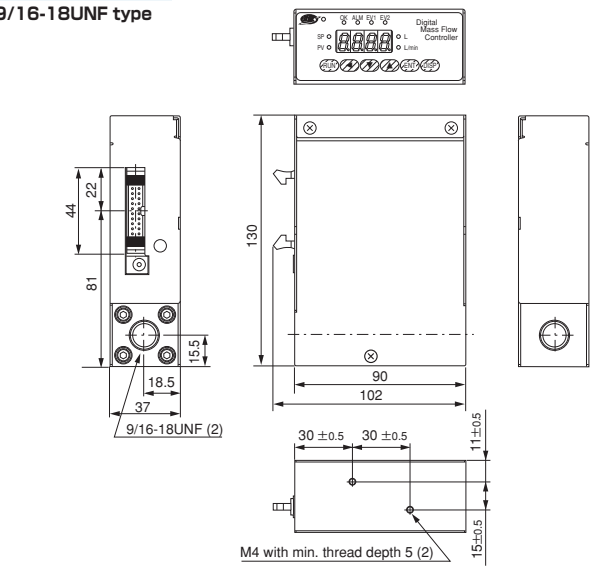
Name	Part No.	Description
Cable with dedicated connector	81446681-001	2m 20-core flat cable
Cable with dedicated connector	81446951-001	5m 20-core shielded cable
AC adapter	81446957-001	Rating: 24Vdc 750mA
Potentiometer for setting flow rate	81446683-002	Digital dial, 5kΩ, 10 turns
Front cover for separate display	81446858-001	Resin
PC loader package	MLP100A100	A dedicated software & cable

External Dimensions (Unit: mm)

Standard gas model/semi-standard gas model: MQV9005/9020/9200/9500/0002/0005/0020/0050B,C  
Hydrogen/helium gas model: MQV9020/9050/9500/0005/0010/0050/0200B,C

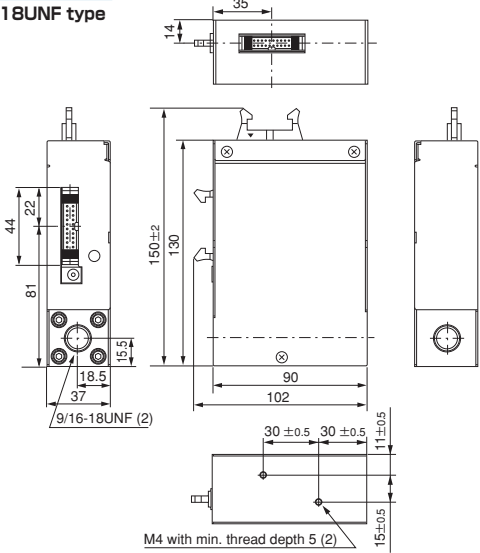
With integrated display

Ex.: 9/16-18UNF type



With separate display

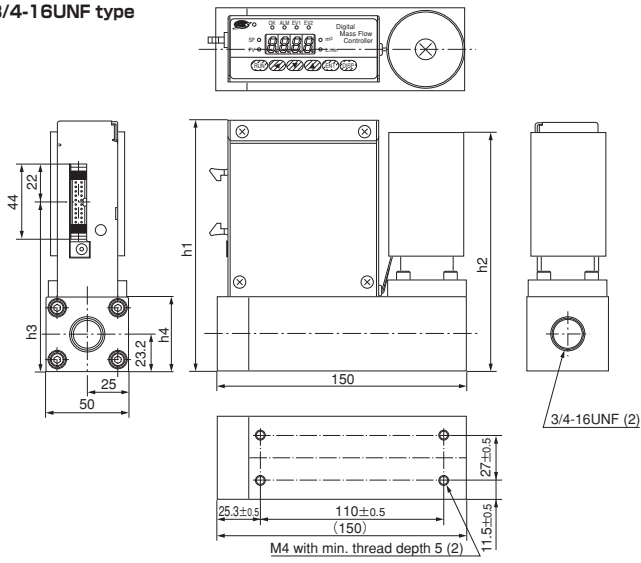
Ex.: 9/16-18UNF type



Standard gas model/semi-standard gas model: MQV0050/0200/0500J,K

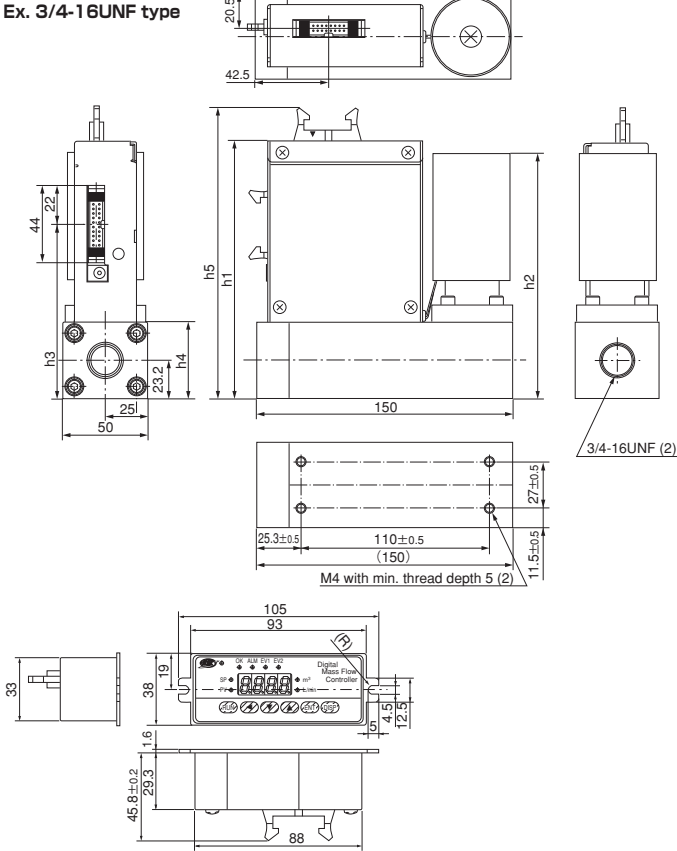
With integrated display

Ex. 3/4-16UNF type

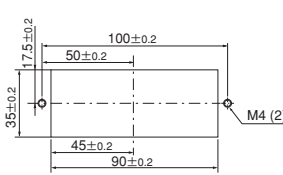


With separate display

Ex. 3/4-16UNF type



Mounting panel cutout dimensions (recommended)



The "h" dimensions for the above diagrams

	h1	h2	h3	h4	h5
MQV0050J,K/MQV0200J,K	151	145	102	45	172
MQV0500J,K	152	146	103	46	173