

azbil

No. CP-PC-1453E



Digital Mass Flow Controller

CMQ-V Series

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

CE



The Ultra Fast μ 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

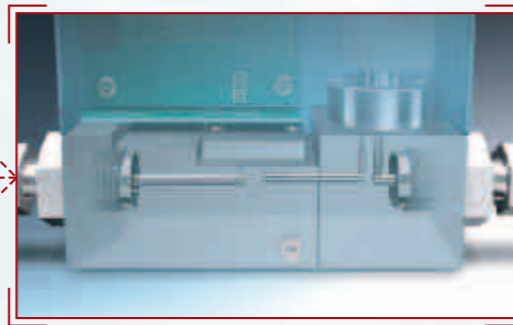
(* 500ms for the MQV9005/9200/9050B and C, 700ms for the MQV0050/0200/0500/1000J and K)

The **CMQ-V** Series features high performance digital gas mass flow controllers that incorporate the ultra small μ F (Micro Flow[®]) sensor developed by Yamatake, a pioneer in MEMS (micro electromechanical systems) flow sensors. The **CMQ-V** uses μ 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.

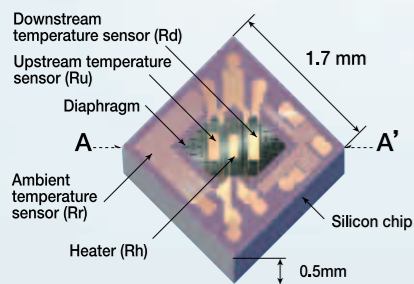


New sensor for very low flow rates!

A new, specially designed sensor is now used for very low flow rate ranges below 50 mL/min. Mass flow controllers featuring high-speed control, low differential pressure operation, and a wide flow rate control range are now available for very low flow rate applications.

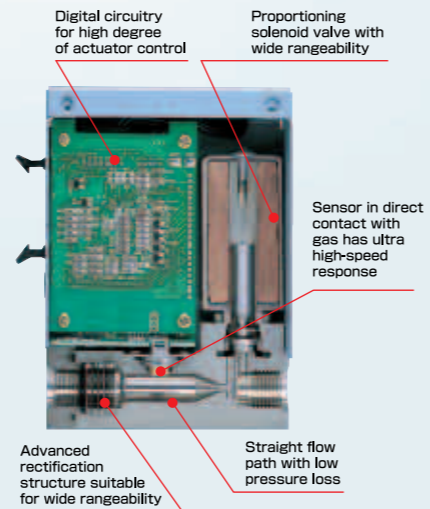
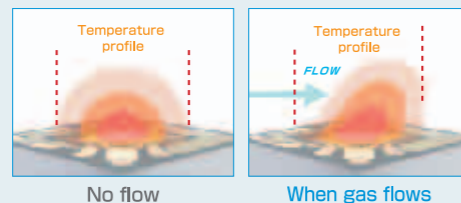


Structure and features of the μ F sensor



Principle of measurement

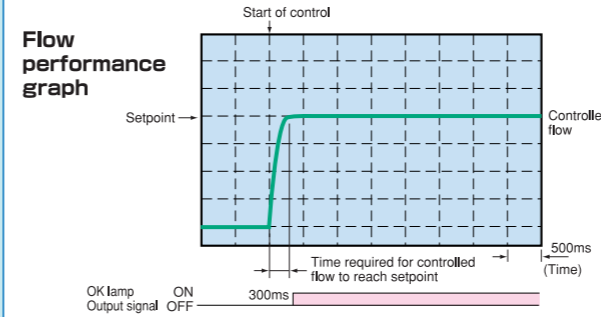
When there is no gas flow, the temperature distribution around the heater is symmetric. When the gas starts to flow from Ru to Rd, the temperature at Ru upstream decreases and the temperature at Rd downstream increases, thus causing a distortion of the symmetry in temperature distribution. The temperature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



► 12 advantages of CMQ-V Series flow controllers

Advantage 1 Advanced 300ms high-speed controllability

Achieves 300ms high-speed control (700ms for the MQV0050/0200/0500/1000J and K). The **CMQ-V** 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 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

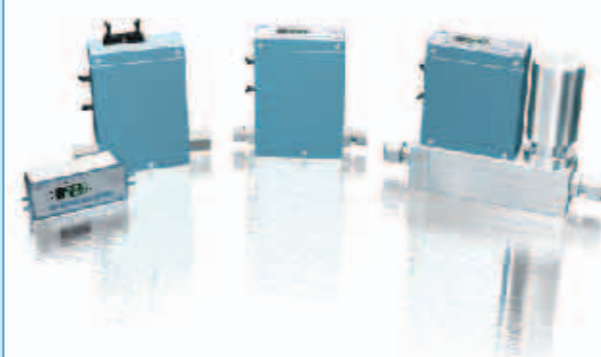
Control range: 1 to 100% FS

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



Advantage 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.

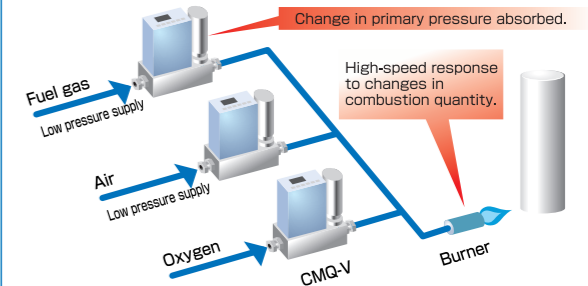


Advantage 4 Operation at low differential pressure is a standard feature

The **CMQ-V** Series offers a low differential pressure control of less than 50kPa as a standard specification, making it suitable for low pressure supply applications, such as fuel gas supply.

Optimum for low pressure gas control applications

Ex.: production of halogen lamps, backlights, fluorescent lamps, etc.



Note: Controllable gas flow rate differs depending on pressure and type of gas.

Advantage 5 Wide range of standard functions

The **CMQ-V** 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 **CMQ-V** 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

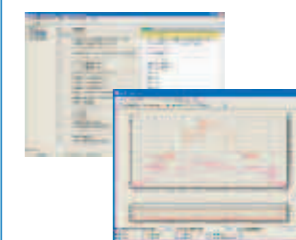
Six easy-to-operate buttons, superior indication function, and SP change even in control run mode.



(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 MLP 100)

▶ Sample applications

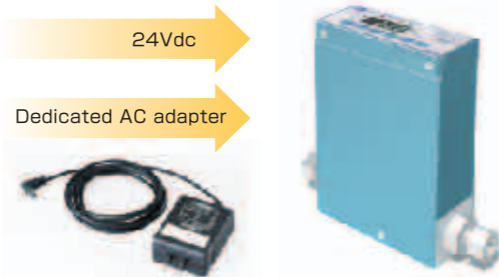
Advantage 7 A variety of available input and output signals



Voltage signal (0–5Vdc and 1–5Vdc)
 Current signal (4–20mA and 0–20mA) (Selectable by setting)
 Switch between 3 inputs and between 2 event outputs
 RS-485 communications (optional)
 Dedicated port for connection to a PC

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

The internal power supply circuit of this device is isolated from its analog circuits. When multiple **CMQ-Vs** are controlled by PLC analog input/output, even if the analog module of the PLC is not isolated between channels, a common power supply can be used. Even without individual power supplies, there is no negative effect from surrounding circuits. An AC adapter (100 to 240Vac) is also available by separate purchase.



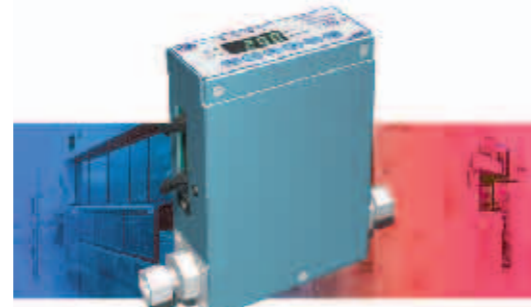
Advantage 9 Engineered for flexible installation

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 **CMQ-V** can be used from -10 to +60°C (ambient temperature and gas temperature).



-10°C to +60°C

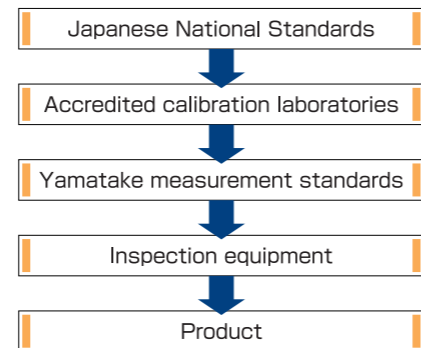
Advantage 11 CE marking

The **CMQ-V** is CE-compliant.



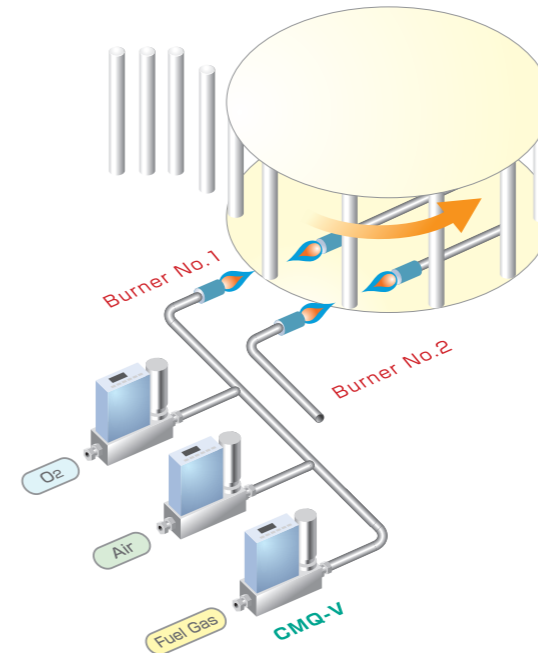
Advantage 12 JCSS traceability

The **CMQ-V** 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 (AISS).



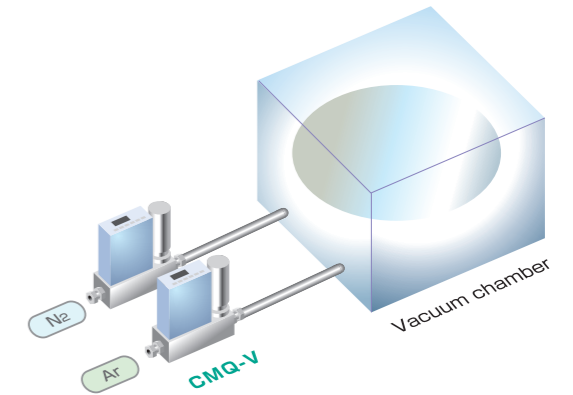
Air/fuel ratio control for burner

- Manufacturing of backlights
- Halogen lamps
- Glass-forming



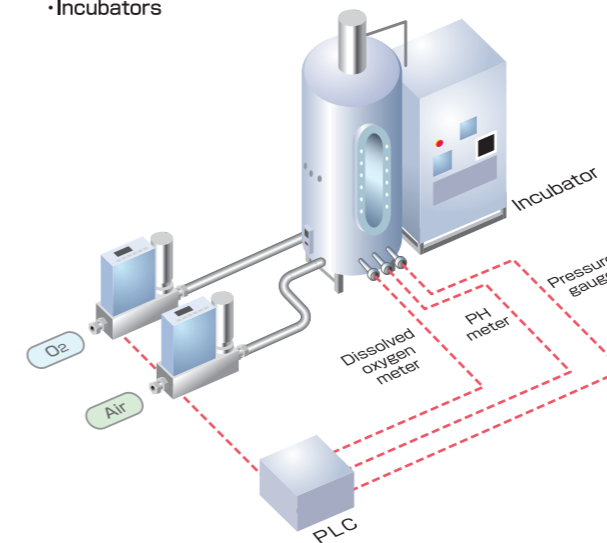
Gas flow rate control for vacuum

- Evaporation coating
- Sputtering
- Plasma cleaning



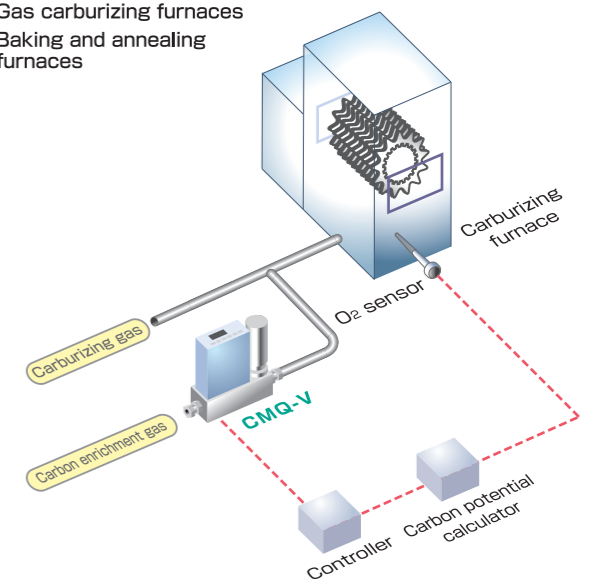
Various test equipment

- Evaluation equipment
- Gas analyzers
- Incubators



Control of furnace internal atmosphere

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



Standard gas model / special gas model

Model No.	MQV9005	MQV9020	MQV9200	MQV9500	MQV0002	MQV0005	MQV0020	MQV0050 (B,C)	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)	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)	200L/min (standard)	500L/min (standard)	
Gas types	Air/nitrogen (N ₂), oxygen (O ₂), argon (Ar). The gas must be dry, without corrosive components (chlorine, sulfur, acid), it must also be clean, without dust or oil mist. Air/nitrogen (N ₂), oxygen (O ₂), argon (Ar), carbon dioxide (CO ₂), city gas 13A (LNG: 45MJ/m ³), city gas 13A (LNG: 46MJ/m ³), methane 100% (CH ₄), propane 100% (C ₃ H ₈), butane 100% (C ₄ H ₁₀). (Note 2) The gas must be dry, without corrosive components (chlorine, sulfur, acid). It must also be clean, without dust or oil mist. (Note 3)										
Control	Control range: 2 to 100% FS (see Table 1 below) / 1 to 100% FS (see Table 1 below)										
Valve output update cycle	5ms										
Response (at std. differential pressure)	0.5s for SP ±2% FS (typ.) / 0.3s for SP ±2% FS (typ.) / 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)	±1% FS (1) Standard model: ±0.5% FS (0% FS ≤ Q ≤ 50% FS) / ±1% FS (50% FS < Q ≤ 100% FS) (2) High accuracy model: ±0.2% FS (0% FS ≤ Q < 20% FS) / ±1% SP (20% FS ≤ Q ≤ 100% FS) (Note 5)										
Repeatability	±0.5% FS (1) Standard model: ±0.25% FS (0% FS ≤ Q ≤ 50% FS) / ±0.5% FS (50% FS < Q ≤ 100% FS) (2) High accuracy model: ±0.1% FS (0% FS ≤ Q < 20% FS) / ±0.5% SP (20% FS ≤ Q ≤ 100% FS) (Note 5)										
Pressure	Standard differential pressure (Note 6): 100kPa / 200kPa / 200kPa (Inlet pressure: 200kPa (gauge), Outlet pressure: 0kPa (gauge)). Required differential pressure (Note 7): Hydrogen: 2.5kPa / Helium: 5kPa / Hydrogen: 10kPa / Helium: 20kPa / Hydrogen: 20kPa / Helium: 40kPa / Hydrogen: 80kPa / Helium: 150kPa / Hydrogen: 20kPa / Helium: 40kPa / Hydrogen: 100kPa / Helium: 180kPa / Hydrogen: 40kPa / Helium: 80kPa / Hydrogen: 150kPa / Helium: 250kPa Operating differential pressure range (Note 8): 300kPa max. (-10°C ≤ T ≤ 60°C) Max. inlet pressure: 0.5MPa (gauge) (Note 9) Pressure resistance: 1MPa (gauge)										
Temp.	Operating temp.: -10 to +60°C										
Humidity	Operating humidity: 10 to 90% RH (no condensation allowed)										
Flow rate setup	Setup method: (1) Key input, (2) External analog input, (3) Dedicated PC loader connection (Note 11), (4) RS-485 communications (3-wire type) (Note 12)										
Totalizing function	Display range: 0.0 to 9,999,999.9mL / 0 to 99,999,999mL / 0.00 to 999,999.99L / 0.0 to 9,999,999.9L / 0 to 99,999,999L / 0.00 to 99,999,999m ³ / 0.00 to 999,999.99m ³ Display resolution: 0.1mL / 1mL / 0.01L / 0.1L / 1L / 0.001m ³ / 0.01m ³										
Analog output	Output type: Instantaneous flow rate (PV) or flow rate setpoint (SP) selectable Output scale: 0 to full scale flow rate (scale changeable) Output range: 0-5Vdc / 1-5Vdc / 0-20mAdc / 4-20mAdc (selectable)										
Alarm/event output	Number of outputs: Alarm: 1, Event: 2 Output rating: 30Vdc, 30mA max. (open collector non-insulated output) Totalizer pulse rate: 1 pulse/0.1mL / 1 pulse/1mL / 1 pulse/0.01L / 1 pulse/0.1L / 1 pulse/1L / 1 pulse/0.001m ³ / 1 pulse/0.01m ³										
External switching input	Input type, number of inputs: External 3-way switching inputs: 1, External contact inputs (2-way switching): 3. Ext. device circuit type: Non-voltage contact, or open collector										
Communications	System: (1) Dedicated PC loader connection (Note 11) (2) RS-485 communications (3-wire system) (Note 12) Transmission rate: 2400, 4800, 9600, 19200, 38400bps (19200bps only for PC loader connection)										
Power	Rating: 24Vdc, current consumption 300mA max. / 24Vdc, current consumption 400mA max. / 24Vdc, current consumption 500mA max. Allowable power voltage range (ripple 5% max.): 21.6 to 26.4Vdc (1) 21.6 to 26.4Vdc (-10°C ≤ T ≤ 40°C) / (2) 23.5 to 26.4Vdc (40°C ≤ T ≤ 60°C) (1) 21.6 to 26.4Vdc (-10°C ≤ T ≤ 35°C) / (2) 23.5 to 26.4Vdc (35°C ≤ T ≤ 60°C)										
Matl. of gas-contacting parts	SUS316, Teflon, fluororubber, borosilicate glass, silicon / Standard gas model to SUS316, Teflon, Viton / Special gas model to SUS316, Teflon, ethylene-propylene										
Connection method	1/4" Swl, 1/4" VCR / Rc 1/4", 1/4" Swl, 1/4" VCR, 9/16-18 UNF / Rc 1/2", 1/2" Swl, 3/8" VCR, 3/4-16 UNF / Special gas model to 1/4" Swl only. / Special gas model to 1/2" Swl only.										
Mounting orientation	Horizontal. Note that the display panel must not face down.										
Weight	Approx. 1.1kg / Approx. 1.2kg / Approx. 3.5kg										
Standards compliance	EN61326:1997/A1:1998/A2:2001/A3:2003										
Certifications	CE marking										

Hydrogen / helium gas model

Model No.	MQV9020	MQV9050	MQV9500	MQV0005	MQV0010	MQV0050	MQV0200	MQV0500	MQV1000
Valve type	Proportional solenoid valve								
Valve operation	Normally closed when de-energized (N.C.)								
Standard full-scale flow rate (Note 1)	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)	500L/min (standard)	1000L/min (standard)
Gas types	Hydrogen (H ₂), helium (He). (Note 13) The gas must be dry and not contain corrosive components (chlorine, sulfur, acid). It must also be clean, without dust or oil mist. (Note 3)								
Control	Control range: 1 to 100% FS (see separate Table 2)								
Valve output update cycle	5ms								
Response (at std. differential pressure)	500ms for SP ±2% FS (typ.) / 0.3s for SP ±2% FS (typ.) / 0.7s for SP ±2% FS (typ.) (When control is started from fully closed condition, and when setting is changed while control is performed.)								
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 ≤ 40%FS) / ±1.0%FS (40%FS < Q ≤ 80%FS) / ±2.0%FS (80%FS < Q ≤ 100%FS) (0%FS ≤ Q ≤ 50%FS) / ±1.0%FS (0%FS ≤ Q ≤ 100%FS)								
Repeatability	±0.5%FS (50%FS < Q ≤ 100%FS) / ±0.25%FS (0%FS ≤ Q ≤ 40%FS) / ±0.5%FS (40%FS < Q ≤ 100%FS) (0%FS ≤ Q ≤ 50%FS) / ±0.25%FS (0%FS ≤ Q ≤ 100%FS)								
Pressure	Standard differential pressure (Note 6): 100kPa / 200kPa. Inlet pressure: 200kPa (gauge). Outlet pressure: 0kPa (gauge). Required differential pressure (Note 7): Hydrogen: 2.5kPa / Helium: 5kPa / Hydrogen: 10kPa / Helium: 20kPa / Hydrogen: 20kPa / Helium: 40kPa / Hydrogen: 80kPa / Helium: 150kPa / Hydrogen: 20kPa / Helium: 40kPa / Hydrogen: 100kPa / Helium: 180kPa / Hydrogen: 40kPa / Helium: 80kPa / Hydrogen: 150kPa / Helium: 250kPa Operating differential pressure range (Note 8): 300kPa max. (-10°C ≤ T ≤ 60°C) Max. inlet pressure: 0.5MPa (gauge) (Note 9) Pressure resistance: 1MPa (gauge)								
Temp.	Operating temp.: -10 to +60°C								
Humidity	Operating humidity: 10 to 90% RH (no condensation allowed)								
Flow rate setup	Setup method: (1) Key input, (2) External analog input, (3) Dedicated PC loader connection (Note 11), (4) RS-485 communications (3-wire type) (Note 12)								
Totalizing function	Display range: 0 to 99,999,999mL / 0.00 to 999,999.99L / 0 to 99,999,999L / 0.00 to 999,999.99m ³ / 0.00 to 999,999.99m ³ Display resolution: 1mL / 0.01L / 0.1L / 1L / 0.01m ³ / 0.1m ³								
Analog output	Output type: Instantaneous flow rate (PV) or flow rate setpoint (SP), selectable Output range: 0-5Vdc / 1-5Vdc / 0-20mAdc / 4-20mAdc (selectable)								
Alarm/event output	Number of outputs: Alarm: 1, Event: 2 Output rating: 30Vdc, 30mA max. (open collector non-insulated output) Totalizer pulse rate: 1 pulse/1mL / 1 pulse/0.1L / 1 pulse/0.01L / 1 pulse/0.1L / 1 pulse/1L / 1 pulse/0.01m ³ / 1 pulse/0.1m ³								
External switching input	Input type, number of inputs: External 3-way switching inputs: 1, External contact inputs (2-way switching): 3. Ext. device circuit type: Non-voltage contact, or open collector								
Communications	System: (1) Dedicated PC loader connection (Note 11) (2) RS-485 communications (3-wire system) (Note 12) Transmission rate: 2400, 4800, 9600, 19200, 38400bps (19200bps only for PC loader connection)								
Power	Rating: 24Vdc, current consumption 300mA max. / 24Vdc, uses 400mA max. Allowable power voltage range (ripple 5% max.): 21.6 to 26.4Vdc (1) 21.6 to 26.4Vdc (-10°C ≤ T ≤ 40°C) / (2) 23.5 to 26.4Vdc (40°C ≤ T ≤ 60°C) (1) 21.6 to 26.4Vdc (-10°C ≤ T ≤ 35°C) / (2) 23.5 to 26.4Vdc (35°C ≤ T ≤ 60°C)								
Matl. of gas-contacting parts	SUS316, Teflon, fluororubber, borosilicate glass, silicon / SUS316, Teflon, Viton								
Connection method	1/4" Swl, 1/4" VCR / Rc 1/4", 1/4" Swl, 1/4" VCR, 9/16-18 UNF / Rc 1/2", 1/2" Swl, 3/8" VCR, 3/4-16 UNF								
Mounting orientation	Horizontal. Note that display panel must not face down.								
Weight	Approx. 1.1kg / Approx. 1.2kg / Approx. 3.5kg								
Standards compliance	EN61326:1997/A1:1998/A2:2001/A3:2003								
Certifications	CE marking								

Notes for pages 05-06

- L/min (standard) indicates the volumetric 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. See Table 1.
- When used with ammonia, acetylene, or ethylene oxide gas, select a special gas model (with EPDM seal). For ammonia, be sure to use under dry conditions with a dewpoint of -20°C or less. In addition, do not use a special gas model with gases other than the above gases and nitrogen. Doing so may degrade the O-ring sealing characteristics. The special gas model is set for air/nitrogen use before factory shipment. Before using the model, set the gas type conversion factor (C.F.). Contact Yamatake Corporation for the conversion factor.
- Prevent foreign matter from entering the device. If rust, water droplets, oil mist, or dust in the piping enters the device, measurement error or damage to the device might result. If there is a possibility of foreign matter entering the device, provide an upstream filter, strainer or mist trap capable of eliminating foreign matter 0.1µm or greater in diameter, and be sure to periodically inspect and replace the filter.
- Accuracy information applies to air/nitrogen or oxygen (oxygen gas models). For accuracy with other gases, contact Yamatake Corporation.
- ±xx% SP indicates how accurately the controlled flow rate matches the flow rate setpoint.
- Temperature and pressure during calibration.
- Differential pressure required to control the full-scale flow rate. (Conditions: outlet pressure = 0kPa (gauge)).
- Operation is possible even below the required differential pressure, but the controllable flow rate range is narrower. For details on the relationship between differential pressure and flow rate when the valve is fully open, refer to the user's manual, CP-SP-1204E (standard gas model) or CP-SP-1205E (hydrogen/helium gas model).
- For use at inlet pressures higher than 0.5 MPa (gauge), contact Yamatake.
- Maximum operating differential varies according to power supply voltage.
- A dedicated PC loader package (sold separately) is required.
- Applies only to models with the optional RS-485 communications function.
- May also be used for mixed gases containing hydrogen or helium (excluding corrosive gases or gases within explosive limits). For details, contact Yamatake Corporation.

CMQ-V special 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 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]
		B										Integrated display
		C										Separate display
			S									SUS316, Teflon, EPDM
				S								1/4" Swagelok
					E							Special gases (seal material: EPDM) [Note 2]
						O						(None)
							O					(None)
								1				RS-485 (CPL) communications
												(None)
									1			Gas-contacting parts treated to be oil-inhibited
										O		(None)
										D		Inspection certificate provided
										Y		Traceability certificate provided
											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 2 to 200L/min (standard) [Note 1]
	0500											4 to 500L/min (standard) [Note 1]
		J										Integrated display (side-to-side dimension 150mm)
		K										Separate display (side-to-side dimension 150mm)
			S									SUS316, Teflon, EPDM
				S								1/2" Swagelok
					E							Special gases (seal material: EPDM) [Note 2]
						O						(None)
							O					(None)
								1				RS-485 (CPL) communications
												(None)
									1			Gas-contacting parts treated to be oil-inhibited
										O		(None)
										D		Inspection certificate provided
										Y		Traceability certificate provided
											O	Product version

- Notes
- 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.
 - Applies only to ammonia, acetylene and ethylene oxide gas. Since the factory setting is air/nitrogen, be sure to set the gas type conversion factor (C.F.) before use.

CMQ-V 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 0.2 to 20.0mL/min (standard) [Note 1]
	9050											0.4 to 50.0mL/min (standard) [Note 1]
	9500											0.004 to 0.500L/min (standard) [Note 1]
	0005											0.04 to 5.00L/min (standard) [Note 1]
	0010											0.10 to 10.00L/min (standard) [Note 1]
	0050											0.4 to 50.0L/min (standard) [Note 1]
	0200											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
						O						(None)
							O					(None)
								1				RS-485 (CPL) communications
												(None)
									1			Gas-contacting parts treated to be oil-inhibited
										O		(None)
										D		Inspection certificate provided
										Y		Traceability certificate provided
											O	Product version

Medium flow rate Ex. MQV0500JSRH000100

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	0500											Digital mass flow controller 4 to 500L/min (standard) [Note 1]
	1000											10 to 1000L/min (standard) [Note 1]
		J										Integrated display (side-to-side dimension 150mm)
		K										Separate display (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
					H							Hydrogen/helium
						O						(None)
							O					(None)
								1				RS-485 (CPL) communications
												(None)
									1			Gas-contacting parts treated to be oil-inhibited
										O		(None)
										D		Inspection certificate provided
										Y		Traceability certificate provided
											O	Product version

Table 3. Optional parts (sold separately)

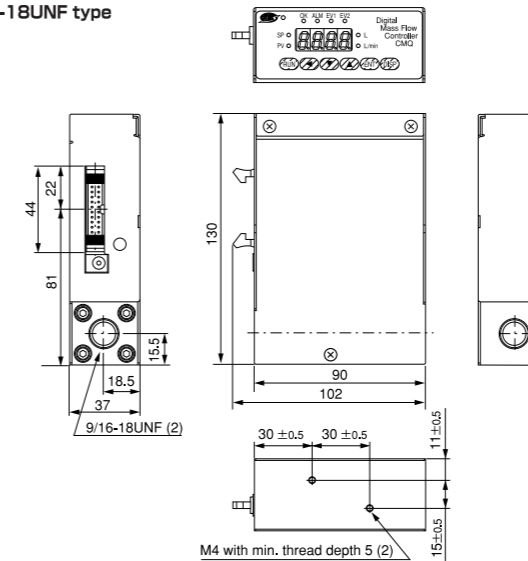
Name	Part No.	Description
Cable with dedicated connector	81446681-001	2m 20-core flat cable
Cable with dedicated connector	81446951-001	5m 20-core shielded cable
AC adapter	81446957-001	Rating: 24Vdc 650mA
Potentiometer for setting flow rate	81446683-002	Digital dial, 5kΩ, 10 turns
Front cover for separate display	81446858-001	Resin
PC loader package	MLP100A100	A dedicated software & cable

Standard gas model/special gas model: MQV9005/9020/9200/9500/0002/0005/0020/0050B,C

Hydrogen/helium gas model: MQV9020/9050/9500/0005/0010/0050/0200B,C

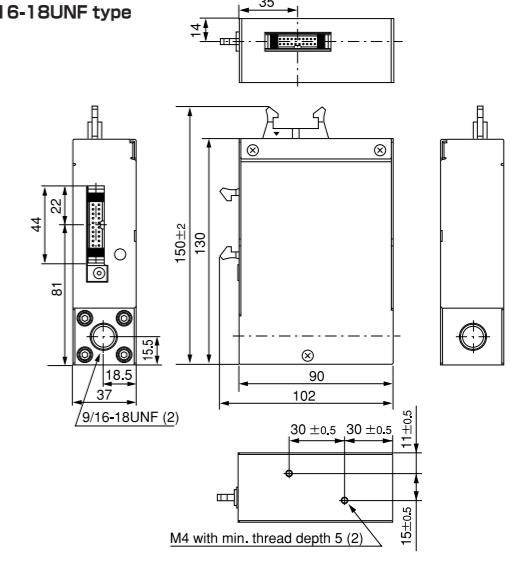
With integrated display

Ex.: 9/16-18UNF type



With separate display

Ex.: 9/16-18UNF type

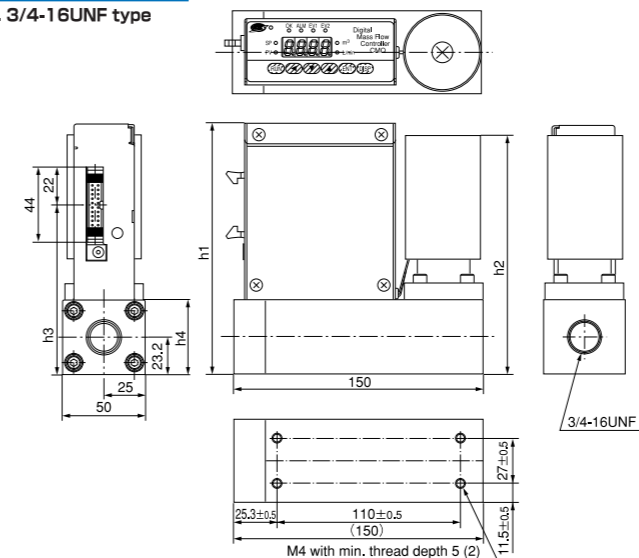


Standard gas model/special gas model: MQV0050/0200/0500J,K

Hydrogen/helium gas model: MQV0500/1000J,K

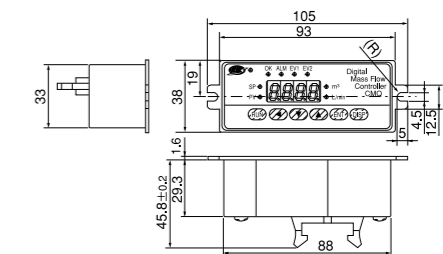
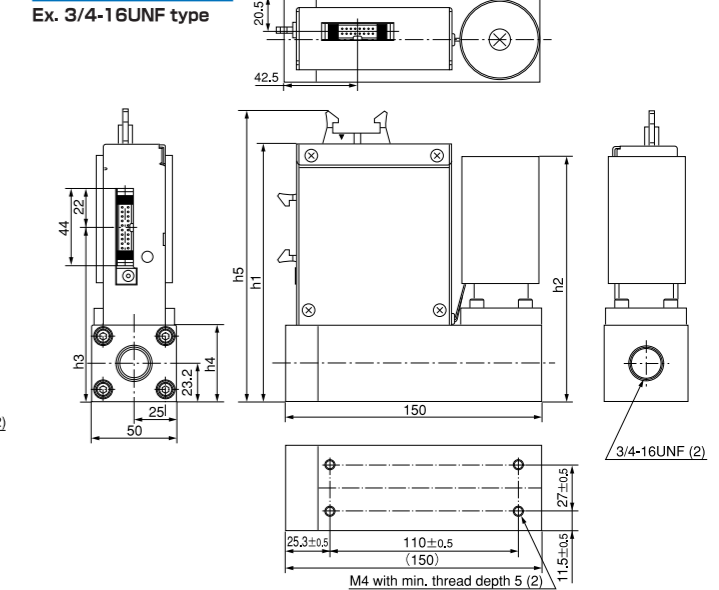
With integrated display

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
Hydrogen/helium: MQV0500/1000					
MQV0500J,K	152	146	103	46	173

Warnings and Cautions for CMQ-V 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 Yamatake 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 special gas model with gases other than those below. Doing so may degrade the O-ring seal.
 - Compatible gases: Nitrogen (N_2), air, argon (Ar), carbon dioxide (CO_2), ammonia (NH_3), ethylene oxide ($\text{C}_2\text{H}_4\text{O}$), and acetylene (C_2H_2).
- If a special 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.

RESTRICTIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment. Accordingly, when used in 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.

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Specifications are subject to change without notice.

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