



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.



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.
 (*700ms for the MQV0050/0200/0500/1000J and K)

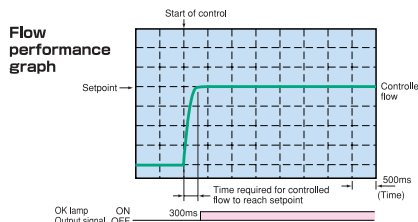
The CMQ-V Series features high performance digital gas mass flow controllers that incorporate the ultra small μ F (Micro Flow[®]) sensor developed by Yamatake, a pioneer in MEMS (micro electromechanical systems) flow sensors. The CMQ-V uses μ F sensor output and advanced PID control technology to drive a proportional actuator.



These models offer superb high-speed control, operation at low differential pressure, and a wide flow rate control range to meet the most demanding application needs. With a wide variety of models available, the CMQ-V is perfect for numerous applications.

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

Repeatability: $\pm 0.25\%$ FS

High accuracy model (standard gas model only)

Accuracy: $\pm 1.0\%$ SP

Repeatability: $\pm 0.5\%$ SP

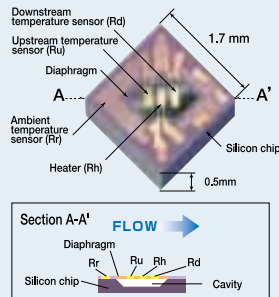
Control range: 1 to 100% FS

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

Digital circuitry for high degree of actuator control

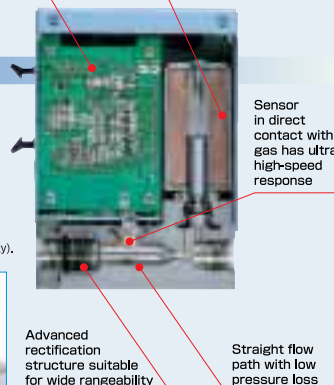
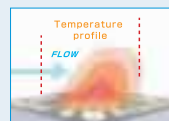
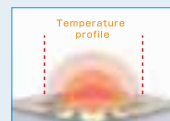
Proportioning solenoid valve with wide rangeability

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 \times density).

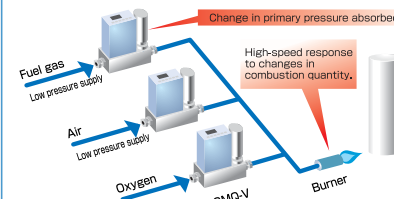


Advantage 3 Operation at low differential pressure is a standard feature

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 4 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 6 A variety of available input and output signals



Advantage 7 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 8 Engineered for flexible installation

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



Specifications

Standard gas model

Model No.	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]	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), 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 10]: Note that gas must be dry, without corrosive components (chlorine, sulfur, acid). It must also be clean, without dust or oil mist. [Note 12]								
Control	Control range	1 to 100% FS (see Table 1 below)							
	Valve output update cycle	5ms							
	Response (at std. differential pressure)	0.3s for SP $\pm 2\%$ FS (typ.)					0.7s for SP $\pm 2\%$ FS (typ.)		
	(When control is started from fully closed condition, and when the setpoint is changed while control is in progress.)								
	Accuracy [Note 2] (at standard temperature and differential pressure; Q is flow rate)	(1) Standard model: $\pm 0.5\%$ FS (0% FS $\leq Q \leq 50\%$ FS) $\pm 1\%$ FS (50% FS $\leq Q \leq 100\%$ FS)					(1) Std. model: $\pm 0.5\%$ FS (0% FS $\leq Q \leq 40\%$ FS) $\pm 1\%$ FS (40% FS $\leq Q \leq 80\%$ FS) $\pm 1.5\%$ FS (80% FS $\leq Q \leq 100\%$ FS)		
	(2) High accuracy model: $\pm 0.2\%$ FS (0% FS $\leq Q < 20\%$ FS) $\pm 1\%$ SP (20% FS $\leq Q \leq 100\%$ FS) [Note 3]						(2) High accuracy model: $\pm 0.3\%$ FS (0% FS $\leq Q \leq 25\%$ FS) $\pm 1.2\%$ SP (25% FS $\leq Q < 80\%$ FS) [Note 3] $\pm 1.5\%$ SP (80% FS $\leq Q \leq 100\%$ FS)		
Repeatability	(1) Standard model: $\pm 0.25\%$ FS (0% FS $\leq Q \leq 50\%$ FS) $\pm 0.5\%$ FS (50% FS $\leq Q \leq 100\%$ FS)						(1) Std. model: $\pm 0.25\%$ FS (0% FS $\leq Q \leq 40\%$ FS) $\pm 0.5\%$ FS (40% FS $\leq Q \leq 80\%$ FS) $\pm 0.75\%$ FS (80% FS $\leq Q \leq 100\%$ FS)		
	(2) High accuracy model: $\pm 0.1\%$ FS (0% FS $\leq Q < 20\%$ FS) $\pm 0.5\%$ SP (20% FS $\leq Q \leq 100\%$ FS) [Note 3]						(2) High accuracy model: $\pm 0.15\%$ FS (0% FS $\leq Q \leq 25\%$ FS) $\pm 0.6\%$ SP (25% FS $\leq Q < 80\%$ FS) [Note 3] $\pm 0.75\%$ SP (80% FS $\leq Q \leq 100\%$ FS)		
Pressure	Standard differential pressure [Note 4]	200kPa Inlet pressure: 200kPa(gauge) Outlet pressure: 0kPa(gauge)			150kPa Inlet pressure: 150kPa(gauge) Outlet pressure: 0kPa(gauge)	200kPa Inlet pressure: 200kPa(gauge) Outlet pressure: 0kPa(gauge)		20kPa Inlet pressure: 20kPa(gauge) Outlet pressure: 0kPa(gauge)	200kPa Inlet pressure: 200kPa(gauge) Outlet pressure: 0kPa(gauge)
	Required differential pressure [Note 5]	50kPa	5kPa	50kPa	5kPa	50kPa	100kPa	10kPa	100kPa 150kPa
	Operating differential pressure range [Note 6]	300kPa max.							
	Pressure resistance (max. inlet pressure)	1MPa (gauge)							
	Temp.	-10 to +60°C							
	Humidity	10 to 90% RH (no condensation allowed)							
	Flow rate setup	(1) Key input, (2) External analog input, (3) Dedicated PC loader connection, (4) RS-485 communications (3-wire type)							
Totalizing function	External analog input	Input range: 0-5Vdc / 1-5Vdc / 0-20mVdc / 4-20mVdc (selectable)							
	Display range	0.00 to 999,999.99L	0.0 to 9,999,999.9L	0 to 99,999,999L	0.000 to 99,999,999m ³	0.00 to 999,999.99m ³	0.00 to 999,999.99m ³	0.00 to 999,999.99m ³	0.0 to 999,999.9m ³
Analog output	Display resolution	0.01L	0.1L	1L	0.001m ³	0.01m ³	0.01m ³	0.01m ³	0.1m ³
	Output type	Instantaneous flow rate (PV) or flow rate setpoint (SP) selectable							
Alarm/event output	Output scale	0 to full scale flow rate (scale changeable)							
	Output range	0-5Vdc / 1-5Vdc / 0-20mVdc / 4-20mVdc (selectable)							
	Number of outputs	Alarm: 1. Event: 2.							
	Output rating	30Vdc, 30mA max. (open collector non-insulated output)							
	Totalizer pulse rate	1 pulse/0.01L	1 pulse/0.1L	1 pulse/1L	1 pulse/0.001m ³	1 pulse/0.01m ³	1 pulse/0.01m ³	1 pulse/0.01m ³	1 pulse/0.1m ³
External switching input	Input type, number of inputs	External 3-way switching inputs: 1.							
	Ext. device circuit type	External contact inputs (2-way switching): 3.							
Communications	System	Non-voltage contact, or open collector							
	Transmission rate	(1) Dedicated PC loader connection [Note 8] (2) RS-485 communications (3-wire system) [Note 9]							
Power	Rating	2400, 4800, 9600, 19200, 38400bps (19200bps only for PC loader connection)							
		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 $\leq T$ \leq 40°C) (2) 23.5 to 26.4Vdc (40°C $\leq T$ \leq 60°C)		(1) 21.6 to 26.4Vdc (-10°C $\leq T$ \leq 35°C) (2) 23.5 to 26.4Vdc (35°C $\leq T$ \leq 50°C)
	Isolation	Power circuit is isolated from input/output circuit.							
Matl. of gas-contacting parts	SUS316, Teflon, Viton								
Connection method	Rc 1/4", 1/4" Swt, 1/4" VCR, 9/16-18 UNF					Rc 1/2", 1/2" Swt, 3/8" VCR, 3/4-16 UNF			
Mounting orientation	Horizontal. Note that the display panel must not face down.								
Weight	Approx. 1.2kg					Approx. 3.5kg			
Standards compliance	EN61326:1997/A1:1998/A2:2001/A3:2003								

■ Notes for pages 03-04

1. 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.
2. Accuracy information applies to air/nitrogen or oxygen (oxygen gas gauge). For accuracy with other gases, contact Yamatake Corporation.
3. $\pm 0.5\%$ SP indicates how accurately the controlled flow rate matches the flow rate setpoint.
4. Temperature and pressure during calibration.
5. Differential pressure required to control the full-scale flow rate. (Conditions: outlet pressure = 0kPa (gauge)).
6. 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).
7. Maximum operating differential varies according to power supply voltage.
8. A dedicated PC loader package (sold separately) is required.

9. Applies only to models with the optional RS-485 communications function.

10. 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 (CF). Contact Yamatake Corporation for the conversion factor.
11. May also be used for mixed gases containing hydrogen or helium (excluding corrosive gases or gases within explosive limits). For details, contact Yamatake Corporation.
12. 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.

Hydrogen gas model

Model No.	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]	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 11] The gas must be dry and not contain corrosive components (chlorine, sulfur, acid). It must also be clean, without dust or oil mist. [Note 12]						
Control	Control range	1 to 100% FS (see separate Table 1)					
	Valve output update cycle	5ms					
	Response (at std. differential pressure)	0.3s for SP $\pm 2\%$ FS (typ.)				0.3s for SP $\pm 2\%$ 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)	$\pm 0.5\%$ FS (0% FS $\leq Q \leq 40\%$ FS) $\pm 1.0\%$ FS (40% FS $\leq Q \leq 80\%$ FS) $\pm 2.0\%$ FS (80% FS $\leq Q \leq 100\%$ FS)				$\pm 1.0\%$ FS (0% FS $\leq Q \leq 80\%$ FS) $\pm 2.0\%$ FS (80% FS $\leq Q \leq 100\%$ FS)	
	Repeatability	$\pm 0.25\%$ FS (0% FS $\leq Q \leq 40\%$ FS) $\pm 0.5\%$ FS (40% FS $\leq Q \leq 100\%$ FS)				$\pm 0.5\%$ FS (0% FS $\leq Q \leq 80\%$ FS) $\pm 1.0\%$ FS (80% FS $\leq Q \leq 100\%$ FS)	
Pressure	Standard differential pressure [Note 4]	200kPa. Inlet pressure: 200kPa (gauge). Outlet pressure: 0kPa (gauge).					
	Required differential pressure [Note 5]	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 6]	300kPa max.					
	Pressure resistance (max. inlet pressure)	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, (4) RS-485 communications (3-wire type)					
	External analog input	Input range: 0-5Vdc / 1-5Vdc / 0-20mVdc / 4-20mVdc (selectable)					
Totalizing function	Display range	0.00 to 999,999.99L	0.0 to 9,999,999.9L	0 to 99,999,999L	0.00 to 99,999,99m ³	0.0 to 999,999.9m ³	0.0 to 999,999.9m ³
	Display resolution	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 / 0-20mVdc / 4-20mVdc (selectable)					
Alarm/event output	Number of outputs	Alarm: 1. Event: 2.					
	Output rating	30Vdc, 30mA max. (open collector non-insulated output)					
External switching input	Totalizer pulse rate	1 pulse/0.01L	1 pulse/0.1L	1 pulse/1L	1 pulse/0.01m ³	1 pulse/0.01m ³	1 pulse/0.1m ³
	Input type, number of inputs	External 3-way switching inputs: 1.					
Communications	Ext. device circuit type	External contact inputs (2-way switching): 3.					
	System	Non-voltage contact, or open collector					
Power	Transmission rate	(1) Dedicated PC loader connection [Note 8] (2) RS-485 communications (3-wire system) [Note 9]					
	Rating	2400, 4800, 9600, 19200, 38400bps (19200bps only for PC loader connection)					
	Allowable power voltage range (ripple 5% max.)	24Vdc, current consumption 300mA max.				24Vdc, uses 400mA max.	
	Isolation	21.6 to 26.4Vdc				(1) 21.6 to 26.4Vdc (-10°C $\leq T$ \leq 40°C) (2) 23.5 to 26.4Vdc (40°C $\leq T$ \leq 60°C)	
Matl. of gas-contacting parts	Power circuit is isolated from input / output circuit.						
Connection method	SUS316, Teflon, Viton						
Mounting orientation	Rc 1/4", 1/4" Swt, 1/4" VCR, 9/16-18 UNF				Rc 1/2", 1/2" Swt, 3/8" VCR, 3/4-16 UNF		
Weight	Horizontal. Note that display panel must not face down.						
Standards compliance	Approx. 1,2kg				Approx. 3,5kg		
	EN61326:1997/A1:1998/A2:2001/A3:2003						

Table 1. Control flow rate range and setting/display resolutions (factory settings) (Units: L/min (standard), but mL/min (standard) for the CMQV9200) (Notes 14, 15, 16)

Standard gas model

		MQV9200		MQV9500		MQV0002		MQV0005		MQV0020		MQV0050 (B.C)		MQV0050 (J.K)		MQV0200		MQV0500	
		Control flow rate range	Setting/display resolution	Control flow rate range	Setting/display resolution	Control flow rate range	Setting/display resolution	Control flow rate range	Setting/display resolution	Control flow rate range	Setting/display resolution	Control flow rate range	Setting/display resolution	Control flow rate range	Setting/display resolution	Control flow rate range	Setting/display resolution	Control flow rate range	Setting/display resolution
		L/min		L/min		L/min		L/min		L/min		L/min		L/min		L/min		L/min	
Gas type (see 15)	Air, nitrogen	2 to 200	1	0.004 to 0.030	0.002	0.02 to 2.00	0.01	0.04 to 5.00	0.02	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
	Oxygen	2 to 200	1	0.004 to 0.030	0.002	0.02 to 2.00	0.01	0.04 to 5.00	0.02	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
	Argon	2 to 200	1	0.004 to 0.030	0.002	0.02 to 2.00	0.01	0.04 to 5.00	0.02	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
	Carbon dioxide	1.0 to 120	0.5	0.003 to 0.030	0.001	0.01 to 1.20	0.005	0.03 to 3.00	0.01	0.1 to 12.0	0.05	0.3 to 30.0	0.1	0.3 to 30.0	0.1	1 to 120	0.5	4 to 400	2
	City gas 13A (LNG: 45MJ/m ³)	2 to 200	1	0.004 to 0.030	0.002	0.02 to 1.80	0.01	0.04 to 5.00	0.02	0.2 to 20.0	0.1	0.4 to 50.0	0.2	0.4 to 50.0	0.2	2 to 180	1	4 to 400	2
	City gas 13A (LNG: 46MJ/m ³)	2 to 200	1	0.004 to 0.030	0.002	0.02 to 2.00	0.01	0.04 to 5.00	0.02	0.2 to 20.0	0.1	0.4 to 50.0	0.2	0.4 to 50.0	0.2	2 to 180	1	4 to 400	2
Methane 100%	0.1 to 63.0	0.2	0.001 to 0.030	0.0001	0.01 to 0.20	0.001	0.01 to 100.0	0.001	0.2 to 20.0	0.1	0.4 to 50.0	0.2	0.4 to 50.0	0.2	2 to 200	2	4 to 500	2	
	0.1 to 63.0	0.2	0.001 to 0.030	0.0001	0.01 to 0.20	0.001	0.01 to 100.0	0.001	0.2 to 20.0	0.1	0.4 to 50.0	0.2	0.4 to 50.0	0.2	2 to 200	2	4 to 500	2	
	Butane 100%	0.4 to 50.0	0.2	0.01 to 100.0	0.5	0.01 to 100.0	0.001	0.02 to 100.0	0.005	0.4 to 40.0	0.02	0.1 to 10.0	0.05	0.1 to 10.0	0.5	0.4 to 50.0	0.2	2 to 180	1

Selection guide

■ CMQ-V Standard gas model

Low flow rate Ex. MQV9200BSRN000000

[illegible]

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) [Note 1]	
	0200											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 (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) [Note 2]	
					S							Oxygen [Note 3]	
						O						(None)	
							O					(None)	
								I				RS-485 (CPL) communications	
									O			(None)	
										O		(None)	
											1	Gas-contacting parts treated to be oil-inhibited	
											O	(None)	
											D	Inspection certificate provided	
											Y	Traceability certificate provided	
												O	Product version

Low flow rate, high accuracy model = 1000

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) [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 (included)
			S									SUS316, Teflon, Viton
				R								Rc 1/4"
				S								1/4" Swagelok
				V								1/4" VCR
					1							Air/nitrogen
					2							Oxygen [Note 3]
						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. 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
MGV												Digital mass flow controller
	0200											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 (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 [Note 3]
						S						High accuracy
							1					(None)
								0				RS-485 (CPL) communications
									0			(None)
									1			(None)
										Y		Gas-contacting parts treated to be oil-inhibited Traceability certificate provided
										O		Product version

■ Notes
 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.
 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 (CO₂), natural gas LNG (45MJ/m³, 46MJ/m³), methane 100%, propane 100%, butane 100%).
 3. When oxygen is selected, make sure to specify "1": Gas-contacting parts treated to be oil-inhibited of the reference function. For the model with oxygen sensor, the model cannot be used for oxygen.

- Notes
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.
 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 (CO₂), natural gas LNG (45MJ/m³, 46MJ/m³), methane 100%, propane 100%, butane 100%).
 3. When oxygen is selected, make sure to select "1: Gas-containing parts treated to be oil-inhibited" of the optional function. Be aware that oxygen cannot be used in the model numbers other than that for oxygen.

■ CMQ-V Hydrogen/helium gas model

Low flow rate Ex. MQV9500BSRH0000100

[illegible]

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												Digital mass flow controller
	0500											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									SS316, Teflon, Viton
				R								Rc 1/2"
				S								1/2" Swagelok
				V								3/8" VCR
				U								3/4-16 UNF
					H							Hydrogen/helium [Note 2]
						O						(None)
							O					(None)
							I					RS-485 (CPL) communications
								O				(None)
									O			Gas-contacting parts treated to be oil-inhibited
										O		(None)
										D		Inspection certificate provided
										Y		Traceability certificate provided
											O	Product version

■ Notes:

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.

2. Although the gas type is set to hydrogen at the factory, it can be changed to helium.

■ CMQ-V special gas model

■ Notes

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.
2. Although the gas type is set to hydrogen at the factory, it can be changed to helium.

- 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												Digital mass flow controller
	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]
		B										Integrated display
		C										Separate display
			S									SUS316, Teflon, EPDM
				S								1/4" Swagelok
					E							Special gases (seal material EPDM) [Note 3]
						O						(None)
							O					(None)
								I				RS-485 (CPL) communications
									O			(None)
										I		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												Digital mass flow controller
	0200											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)
						O						(None)
							O					(None)
								1				RS-485 (CPL) communications
									O			(None)
										1		Gas-contacting parts treated to be oil-inhibited
											O	(None)
												Inspection certificate provided
											Y	Traceability certificate provided
												Product version
											O	

■ Notes
 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.
 2. Although the gas type is set to hydrogen at the factory, it can be changed to helium.
 3. Applies only to ammonia, acetylene and ethylene oxide gas.
 4. The flow rate can be set to zero by using the zero setting factor (Z.F.) before use.

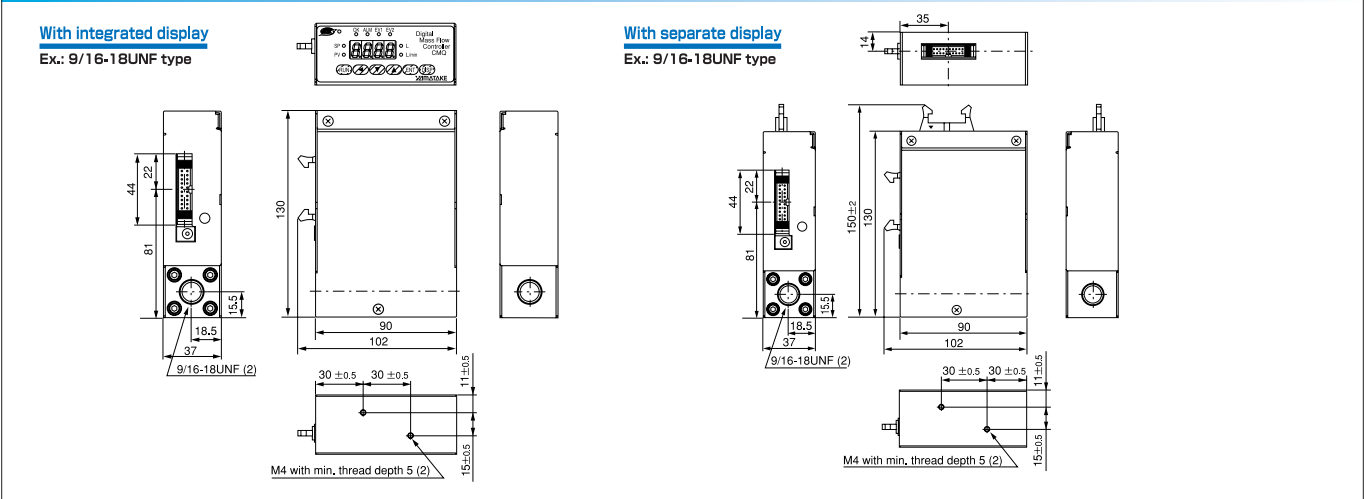
■ Notes

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.
 2. Although the gas type is set to hydrogen at the factory, it can be changed to helium.
 3. 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.

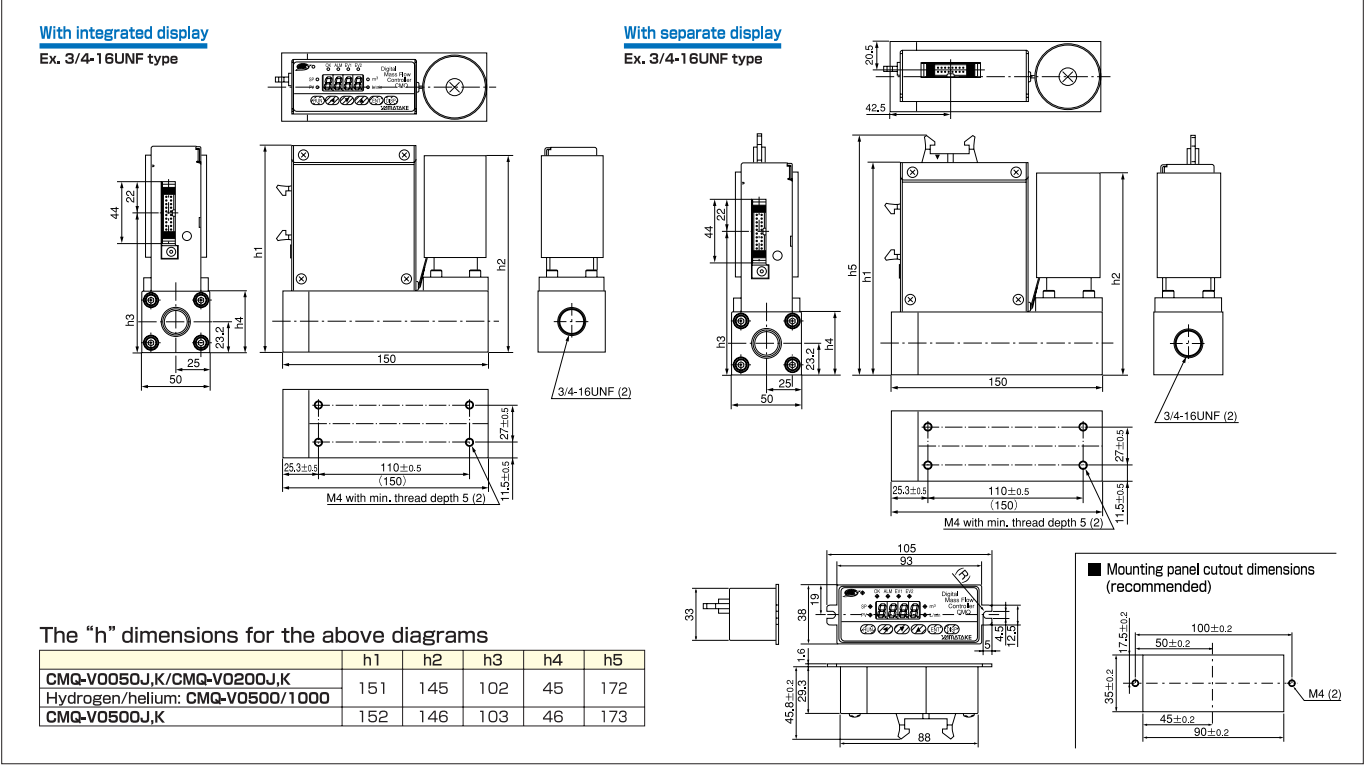
■ Table 2. Optional parts (sold separately)

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, 5k Ω , 10 turns
Front cover for separate display	81446858-001	Resin

Standard gas model: MQV9200/9500/0002/0005/0020/0050B,C
Hydrogen/helium gas model: MQV9500/0005/0010/0050/0200B,C



Standard gas model: MQV0050/0200/0500J,K
Hydrogen/helium gas model: MQV0500/1000J,K



⚠ 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.