Digital Mass Flow Controllers
Further Notes on Model MQV0100

This document provides further notes on the MQV0100 Digital Mass Flow Controller. Use this document together with the user's manual.
All information in this document supersedes the information in the user's manual.

■ Model selection table

Basic model Nos.	Control flow rate range	Type	Gas-contacting material	Connection method	Gas type	Optional functions 1	2	3	4	5	Appended No.	Description
MQV												Digital mass flow controller
	0100											1.0 to 100.0 L/min (standard) *1 *4
		B										Integrated display (body length: 90 mm)
		C										Separate display (body length: 90 mm)
			S									SUS316
				R								Rc1/4"
				S								3/8" Swagelok
				U								9/16-18 UNF
				V								1/2" VCR
					N							Air/nitrogen *2 *4
					S							Oxygen *3 *4
						0						Without optional functions
							0					Without optional functions
							1					RS-485 (CPL) communications
								0				Without optional functions
									0			Without optional functions
									1			Oil-inhibiting treatment for gas-contacting parts *5
										0		Without optional functions
										D		Inspection record
										Y		Traceability certification
											0	Product version

*1. L/min (standard) indicates the volumetric flow rate per minute (L/min) converted to conditions of 20 °C and 101.325 kPa (1 atm). The reference temperature can be changed to 0, 25, or 35 °C.
*2. The MQV is set initially for air/nitrogen use before shipment from the factory. However, the gas type can be changed to argon or carbon dioxide (CO_2).
*3. The MQV is set initially for oxygen use before shipment from the factory. However, the gas type can be changed to air/nitrogen, argon or carbon dioxide (CO_2). But if the MQV is used even once for a gas other than oxygen, do not use it for oxygen.
*4. The stated flow rate range applies to air/nitrogen and oxygen. The controllable flow rate range varies depending on the gas type.
☞ Gas Types and Flow Rate Ranges (next page).
*5. If oxygen is selected as the gas type, "1" (oil-inhibiting treatment for gas-contacting parts) must be selected in optional function 4.

■ Specifications (differences from the MQV0050B/C)

Other than the items shown below, the specifications are the same as those of the MQV0050B/C.
☞ Chapter 7, SPECIFICATIONS, in the user's manual.

		MQV0100	MQV0050B/C
Standard full scale (FS) flow rate *1		100.0 L/min (standard)	50.0 L/min (standard)
Standard compatible gas type		Air/nitrogen (N_2), oxygen (O_2), argon (Ar), carbon dioxide (CO_2)	Air/nitrogen (N_2), oxygen (O_2), argon (Ar), carbon dioxide (CO_2), city gas 13A (LNG: 45 MJ/m^3 or 46 MJ/m^3), 100 % methane (CH_4), 100 % propane (C_3H_8), 100 % butane (CH_4H_{10})
Control	Accuracy *2 (at the standard temperature and standard differential pressure. Q: flow rate)	(1) ± 2 % FS (80 % FS < Q ≤ 100 % FS) (2) ± 1% FS (0 % FS ≤ Q ≤ 80 % FS)	(1) ± 1 % FS (50 % FS < Q ≤ 100 % FS) (2) ± 0.5 % FS (0 % FS ≤ Q ≤ 50 % FS)
	Repeatability (Q: flow rate)	(1) ± 1 % FS (80 % FS < Q ≤ 100%FS) (2) ± 0.5 % FS (0 % FS ≤ Q ≤ 80 % FS)	(1) ± 0.5 % FS (50 % FS < Q ≤ 100 % FS) (2) ± 0.25 % FS (0 % FS ≤ Q ≤ 50 % FS)
	Temperature characteristics	0.06 % FS max. per °C	0.08 % FS max. per °C
	Pressure characteristics	0.2% FS max. per 100 kPa	←
Pressure	Standard differential pressure	300 kPa (inlet pressure: 300 kPa [gauge]; outlet pressure: 0 kPa [gauge])	200 kPa (inlet pressure: 200 kPa [gauge]; outlet pressure: 0 kPa [gauge])
	Minimum differential pressure *3	250 kPa	100 kPa
	Operating differential pressure range *4	400 kPa max.	300 kPa max.
	Allowable inlet pressure *5	0.5 MPa (gauge)	←
	Pressure resistance	1 MPa (gauge)	←
Flow rate indication	Indication accuracy (at the standard temperature and standard differential pressure, Q: flow rate)	(1) ± 2 % FS ± 1 digit (80 % FS < Q ≤ 100 % FS) (2) ± 1 % FS ± 1 digit (0 % FS ≤ Q ≤ 80 % FS)	(1) ± 1 % FS ± 1 digit (50 % FS < Q ≤ 100 % FS) (2) ± 0.5 % FS ± 1 digit (0 % FS ≤ Q ≤ 50 % FS)
Totalizing function	Display range	0.01 to 999,999.99 m^3	0 to 99,999,999 L
	Display resolution	0.01 m^3	1 L
	Backup cycle	Every 1 m^3	Every 500 L
Connection method		9/16-18 UNF, Rc1/4", 3/8" Swagelok, and 1/2" VCR	9/16-18 UNF, Rc1/4", 1/4" Swagelok, and 1/4" VCR

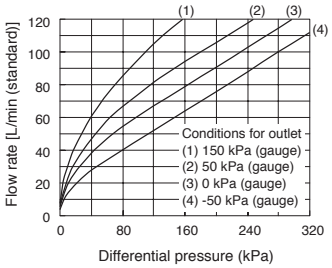
*1. L/min (standard) indicates the volumetric flow rate per minute (L/min) converted to conditions of 20 °C and 101.325 kPa (1 atm). The reference temperature can be changed to 0, 25, or 35 °C. The controllable flow rate range varies depending on the gas type.
☞ ■ Gas Types and Flow Rate Ranges (next page).
*2. Accuracy applies to air/nitrogen and oxygen (for oxygen-compatible models). For the accuracy of other gases, contact the azbil Group.
*3. Minimum requisite differential pressure for control of full scale flow rate (condition: outlet pressure = 0 kPa [gauge]).
*4. Operation is possible at less than the minimum requisite differential pressure. (However, the flow rate range narrows.)
☞ ■ Relationship between Differential Pressure and Flow Rate When the Valve Is Open Fully (next page).
*5. For the advisability of using an inlet pressure greater than 0.5 MPa (gauge), contact the azbil Group.

■ Gas Types and Flow Rate Ranges

The controllable flow rate range varies depending on the gas type. See the table below.

Model No. / Gas type	MQV0100	
	Control flow rate range (L/min [standard])	Setting and display resolution (L/min [standard])
Air/nitrogen	1.0 to 100.0	0.5
Oxygen	1.0 to 100.0	0.5
Argon	1.0 to 100.0	0.5
Carbon dioxide (CO_2)	1.0 to 80.0	0.5

■ Relationship between Differential Pressure and Flow Rate When the Valve Is Open Fully (for Air).



• For an output pressure not shown on the graph at left, calculate the flow rate with one of the formulas below.

(1) If P2/P1 > 0.53 :

$$Q = C1\sqrt{(P1-P2)\,P2}$$

(2) If P2/P1 ≤ 0.53 :

$$Q = C2 \bullet P1$$

P1: inlet absolute pressure [kPa (abs)]
P1: outlet absolute pressure [kPa (abs)]
(absolute pressure = gauge pressure + atmospheric pressure)
Q: flow rate [L/min (standard)]
C1, C2: constant for the model
MQV0100: C1 = 0.6031, C2 = 0.3011

• For a gas other than air, use the formula below for conversion.

Flow rate = air flow rate ÷ $\sqrt{\text{specific gravity of the desired gas}}$

Specific gravity of standard compatible gases (air = 1.0)

Gas type	Specific gravity
Oxygen	1.11
Argon	1.38
Carbon dioxide (CO_2)	1.53

■ Function setup items (differences from the MQV0050B/C).

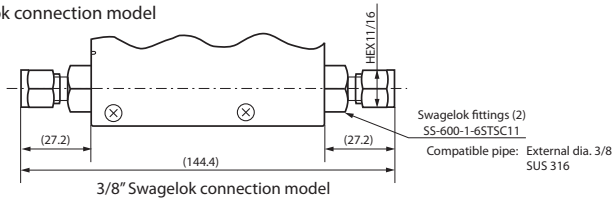
Other than the items shown below, the setup items are the same as those of the MQV0050B/C.
For details on function setup items and method, see Chapter 5, ADVANCED OPERATION, in the user's manual.

Display item	Item name	Settings		Default
		MQV0100	MQV0050B/C	
C-18	Gas type 1	0: C.F. set by user according to the gas type 1: air/nitrogen 2: oxygen 3: argon 4: carbon dioxide	0: C.F. set by user according to the gas type 1: air/nitrogen 2: oxygen 3: argon 4: carbon dioxide 5 to 8, 11: flammable gas	1 or 2
C-26	Gas type 2			
C-36	Operating differential pressure (control optimization)	0: low differential pressure (200 kPa max.) 1: standard differential pressure (300 ± 100 kPa) 2: high differential pressure (400 +0, -100 kPa)	0: low differential pressure (50 ± 50 kPa) 1: standard differential pressure (200 ± 100 kPa) 2: high differential pressure (300 +0, -100 kPa)	1

■ External Dimensions

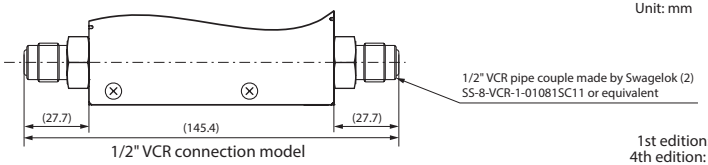
Dimensions except for those shown below are the same as those of the MQV0050B/C.
☞ External Dimensions in Chapter 7, SPECIFICATIONS, in the user's manual.

3/8″ Swagelok connection model



3/8″ Swagelok connection model

1/2" VCR connection model



1/2" VCR connection model

1st edition: July 2010 (T)
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