



MF5100A

MASS FLOW CONTROLLER

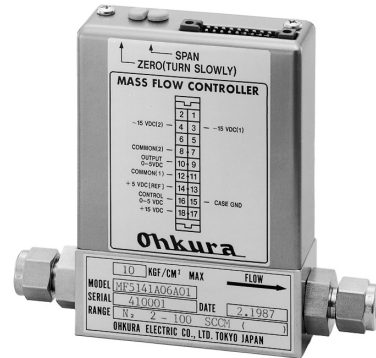
OUTLINE

THE MODEL MF5100 MASS FLOW CONTROLLER FEATURES EXTENDED CAPABILITY OF RANGES UP TO 400 SLM, HIGHER TEMPERATURE STABILITY AND MANY FUNCTIONS.

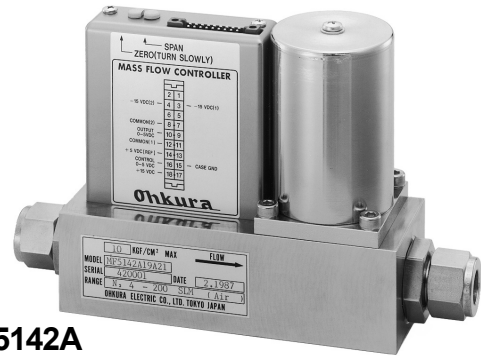
FEATURES

- MINIMUM RANGE OF 5 SCCM & UP TO 400 SLM
- COMPACT SIZE
- STANDARD SOFT-START FUNCTION
- MINIMUM LEAKAGE OF $1.013 \times 10^{-10} \text{ Pa}\cdot\text{m}^3/\text{s} (\text{He})$

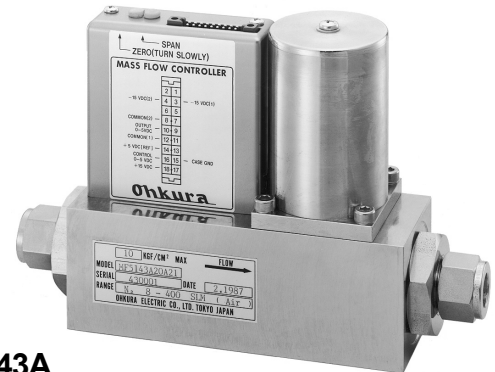
MODEL	DESCRIPTION	FLOW RATE
MF5111A	Mass Flow Meter	5 SCCM
MF5141A	Mass Flow Controller (N/C)	~ 20 SLM
MF5151A	Mass Flow Controller (N/O)	
MF5112A	Mass Flow Meter	30
MF5142A	Mass Flow Controller (N/C)	~ 200 SLM
MF5152A	Mass Flow Controller (N/O)	
MF5113A	Mass Flow Meter	400SLM
MF5143A	Mass Flow Controller (N/C)	



MF5141A

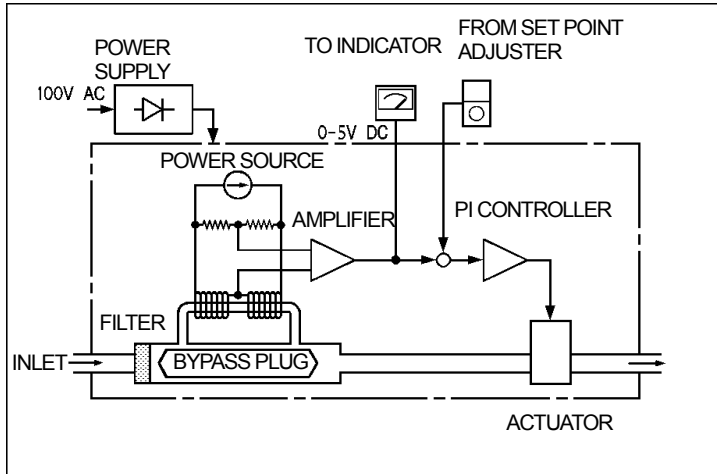


MF5142A



MF5143A

Block Diagram



SPECIFICATIONS

MODEL	MASS FLOW METER			MASS FLOW CONTROLLER				
	MF5111A	MF5112A	MF5113A	MF5141A (NORMAL CLOSE)	MF5142A (NORMAL CLOSE)	MF5143A		
				MF5151A (NORMAL OPEN)	MF5152A (NORMAL OPEN)	(NORMAL CLOSE)		
Range (Note1)	0 - 5 SCCM 0 - 10 SCCM 0 - 20 SCCM 0 - 30 SCCM 0 - 50 SCCM 0 - 100 SCCM 0 - 200 SCCM 0 - 300 SCCM 0 - 500 SCCM 0 - 1 SLM 0 - 2 SLM 0 - 3 SLM 0 - 5 SLM 0 - 10 SLM 0 - 20 SLM	0 - 30 SLM 0 - 50 SLM 0 - 100 SLM	0 - 200 SLM 0 - 400 SLM	0.1 - 5 SCCM 0.2 - 10 SCCM 0.4 - 20 SCCM 0.6 - 30 SCCM 1 - 50 SCCM 2 - 100 SCCM 4 - 200 SCCM 6 - 300 SCCM 10 - 500 SCCM 20 - 1000 SCCM 40 - 2000 SCCM 60 - 3000 SCCM 0.1 - 5 SLM	0.2 - 10 SLM 0.4 - 20 SLM 1 - 50 SLM 2 - 100 SLM	0.6 - 30 SLM 1 - 50 SLM 4 - 200 SLM	8.0 - 400 SLM	
Accuracy	±1% F.S. max.		±2% F.S. max.	±1% F.S. max.		±2% F.S. max.		
Linearity	±0.5% F.S. max.							
Repeatability	±0.2% F.S. max.							
Setting time	3 s max. to a point within 2% of a set point							
Line pressure	1.0 MPa max.							
Over pressure	1.5 MPa max.							
Loss of head	5 kPa max		10 kPa max	16 kPa max	—————			
Differential pressure (Note2)	—————			34 to 275 kPa	69 to 275 kPa	69 to 275 kPa	108 to 275 kPa	
Flow rate fluctuation	—————							
Operating temperature range	5 to 45°C (Including sample gas temperature)							
Temperature stability	±0.1% /°C F.S. max. within the operation temperature range ±0.05% /°C F.S. max. option (to be specified)							
Leakage	1.013 × 10 ⁻⁹ Pa·m ³ /s (He) max., 1.013 × 10 ⁻¹⁰ Pa·m ³ /s (He) option							
Influence of physical orientation error	±0.5% F.S. max. any orientation available							
Control set point input	—————			5kΩ potentiometer or 0 to 5VDC voltage, 1 to 5VDC voltage option				
Output performance	0 to 5VDC, 2kΩ min., Ripple 20mV _{p-p} max.			0 to 5VDC, 2kΩ min., Ripple 20mV _{p-p} max. 1 to 5VDC for 1 to 5VDC optional set point,				
Process materials	Stainless steel SUS316 and Viton® (Note5)			SUS316, Teflon® & Viton® (Note4)				
Process connection	1/4 Swageloc®, VCR®/VCO® option	3/8 Swageloc®, VCR®/VCO® option	1/2 Swageloc®, VCR®/VCO® option	1/4 Swageloc®, VCR®/VCO® option	3/8 Swageloc®, VCR®/VCO® option	1/2 Swageloc®, VCR®/VCO® option		
Dimensions W×H×D (mm) (exclude connector)	126.9×103×25 Swageloc® 123.3×103×25 VCR®	150.5×114.5×50 Swageloc® 150.3×114.5×50 VCR®	151.1×114.5×50 Swageloc® 152.1×114.5×50 VCR®	151.7×124.5×50 Swageloc® 146.5×124.5×50 VCR®	126.9×103×25 Swageloc® 123.3×103×25 VCR®	196.1×114.5×50 Swageloc® 195.9×114.5×50 VCR®	196.5×114.5×50 Swageloc® 197.7×114.5×50 VCR®	204.7×124.5×50 Swageloc® 199.5×124.5×50 VCR®
Weight (power supply & cable excluded)	600g	1.6kg	2kg	750g	3kg	3.7kg		
Power input	Supplied by model SE5000B power supply							
Electrical wiring	2 meter long with a connector standard, 3 and 5 meter option			2 meter long with a connector standard, 3 and 5 meter option				
Power consumption	1VA max.			3VA max.	5VA max.			
Soft start (Note5)	—————			Option				

Note1: Standard ranges are calibrated with air or nitrogen gas. The ranges may subject to change in service gases.

SCCM : Standard Cubic Centimeter per Minute at 0°C, 1013hPa, SLM : Standard Liter per Minute at 0°C, 1013hPa

Note2: In case of operation at minimum differential pressure, lower secondary pressure to vacuum may cause an error in necessary flow rate. Consult ohkura or its agents, if secondary pressure is negative.

Note3: The specification shown indicates maximum change in mass flow rate caused by a change in primary pressure at maximum line pressure and maximum differential pressure.

Note4: Consult ohkura or its agents, for optional process materials.

Note5: Available at only normal close model.

CONVERSION FACTOR

SERVICE GAS AVAILABILITY AND CONVERSION FACTOR (CF)

GAS	SYMBOL	CF	GAS	SYMBOL	CF
Argon	Ar	1.40	Hydrogen	H ₂	1.00
Air	Air	1.00	Helium	He	1.40
Diborane	B ₂ H ₆	0.46	Ammonia	NH ₃	0.78
Methane	CH ₄	0.74	Neon	Ne	1.39
Ethane	C ₂ H ₆	0.51	Nitrogen monoxide	NO	0.99
Propane	C ₃ H ₈	0.34	Nitrogen dioxide	NO ₂	0.75
Butane	C ₄ H ₁₀	0.32	Nitrous oxide	N ₂ O	0.74
Acetylene	C ₂ H ₂	0.66	Nitrogen	N ₂	1.00
Ethylene	C ₂ H ₄	0.64	Oxygen	O ₂	0.99
Propylene	C ₃ H ₆	0.44	Phosphine	PH ₃	0.78
Carbonic acid	CO ₂	0.74	Silane	SiH ₄	0.66
Carbon monoxide	CO	1.00	Sulfur dioxide	SO ₂	0.70

A flow rate changes depending on a gas. Ratio of a flow rate of a service gas to the flow rate of Nitrogen gas provides a conversion factor (CF). Model MF5100A Mass Flow Controller is calibrated with nitrogen gas at factory. Service to another gas than indicated on an instrument requires a correction by conversion factor (CF).

In case of service of an instrument calibrated to gas "A" to gas "B", the actual flow rate "QB" of "B" gas to a readout of flow rate "QA" of "A" gas is calculated using each conversion factor as follows;

$$QB = QA \cdot CF_B / CF_A$$

We recommend recalibration with a service gas for accuracy if required.

Consult factory for an availability of a gas other than listed above.

MODEL CODE NUMBER

MODEL	DESCRIPTION
MF511	Mass Flow Meter
MF514	Mass Flow Controller (Normal Close)
MF515	Mass Flow Controller (Normal Open)
MF519	Custom (Consult Ohkura)

CODE	RANGE OF FLOW RATE
1A	5 SCCM ~ 20 SLM
2A	30 SLM ~ 200 SLM
3A	400 SLM

CODE	RANGE	MASS FLOW METER	MASS FLOW CONTROLLER
01	0 ~ 5 SCCM	0 ~ 5 SCCM	0.1 ~ 5 SCCM
02	0 ~ 10 SCCM	0 ~ 10 SCCM	0.2 ~ 10 SCCM
03	0 ~ 20 SCCM	0 ~ 20 SCCM	0.4 ~ 20 SCCM
04	0 ~ 30 SCCM	0 ~ 30 SCCM	0.6 ~ 30 SCCM
05	0 ~ 50 SCCM	0 ~ 50 SCCM	1 ~ 50 SCCM
06	0 ~ 100 SCCM	0 ~ 100 SCCM	2 ~ 100 SCCM
07	0 ~ 200 SCCM	0 ~ 200 SCCM	4 ~ 200 SCCM
08	0 ~ 300 SCCM	0 ~ 300 SCCM	6 ~ 300 SCCM
09	0 ~ 500 SCCM	0 ~ 500 SCCM	10 ~ 500 SCCM
10	0 ~ 1000 SCCM	0 ~ 1000 SCCM	20 ~ 1000 SCCM
11	0 ~ 2000 SCCM	0 ~ 2000 SCCM	40 ~ 2000 SCCM
12	0 ~ 3000 SCCM	0 ~ 3000 SCCM	60 ~ 3000 SCCM
13	0 ~ 5000 SCCM	0 ~ 5000 SCCM	100 ~ 5000 SCCM
14	0 ~ 10 SLM	0 ~ 10 SLM	0.2 ~ 10 SLM
15	0 ~ 20 SLM	0 ~ 20 SLM	0.4 ~ 20 SLM
16	0 ~ 30 SLM	0 ~ 30 SLM	0.6 ~ 30 SLM
17	0 ~ 50 SLM	0 ~ 50 SLM	1 ~ 50 SLM
18	0 ~ 100 SLM	0 ~ 100 SLM	2 ~ 100 SLM
19	0 ~ 200 SLM	0 ~ 200 SLM	4 ~ 200 SLM
20	0 ~ 400 SLM	0 ~ 400 SLM	8 ~ 400 SLM
99	Custom (Consult Ohkura)	Custom (Consult Ohkura)	Custom (Consult Ohkura)

CODE	SERVICE GAS
A	Nitrogen (N ₂)
B	Air
C	Oxygen (O ₂)
D	Hydrogen (H ₂)
E	Helium (He)
F	Argon (Ar)
Z	Other than listed above

CODE	PROCESS CONNECTION
0	Swageloc [®] 1/4 (5 SCCM ~ 20 SLM)
1	Swageloc [®] 3/8 (30 SLM ~ 100 SLM)
2	Swageloc [®] 1/2 (200 SLM ~ 400 SLM)
3	VCR [®] 1/4 (5 SCCM ~ 20 SLM) Option
4	VCR [®] 3/8 (30 SLM ~ 100 SLM) Option
5	VCR [®] 1/2 (200 SLM ~ 400 SLM) Option
6	VCO [®] 1/4 (5 SCCM ~ 20 SLM) Option
7	VCO [®] 3/8 (30 SLM ~ 100 SLM) Option
8	VCO [®] 1/2 (200 SLM ~ 400 SLM) Option
9	Custom (Consult Ohkura)

CODE	SETPOINT INPUT/ OUTPUT
0	Mass Flow Meter
1	0 ~ 5 VDC input / 0 ~ 5 output standard
2	0 ~ 5 VDC input / 0 ~ 5 output with optional Soft Start (Note1)
3	1 ~ 5 VDC input / 1 ~ 5 VDC output
4	1 ~ 5 VDC input / 1 ~ 5 VDC output / Soft Start (Note1)
9	Custom (Consult Ohkura)

Note 1: Available for Normal Close model only.

Above codes are indicated in serial tag plate on an instrument. Additional code below to be designated following to an above code numbers on an order sheet. A product serial number to be provided for an inquiry of an additional code numbers of the product after the shipment to a customer.

Additional code numbers

CODE	BODY MATERIAL
1	Stainless steel, SUS316

CODE	SEAL MATERIAL
1	Viton [®]
2	Neoprene [®]
9	Custom (Consult Ohkura)

CODE	LEAKAGE
1	1.013×10 ⁻⁹ Pa·m ³ /s Standard
2	1.013×10 ⁻¹⁰ Pa·m ³ /s Option

CODE	TEMPERATURE EFFECT
1	0.1% /°C F.S. max. Standard
2	0.05% /°C F.S. max. Option
9	Custom (Consult Ohkura)

CODE	SETPOINT ADJUSTER / INDICATOR
A	No adjuster / indicator
B	Digital indicator included
C	Analog indicator included
D	Digital potentiometer & Digital indicator included
E	Digital potentiometer & Analog indicator included
F	Analog potentiometer & Digital indicator included
G	Analog potentiometer & Analog indicator included
T	1 ~ 5 VDC Digital indicator
U	1 ~ 5 VDC Analog indicator
V	Digital potentiometer & Custom indicator
W	Analog potentiometer & Custom indicator
X	Custom adjuster & Digital indicator
Y	Custom adjuster & Analog indicator
Z	Custom adjuster & indicator

CODE	POWER SUPPLY
0	Power supply not required
1	Single output model SE5101B01
2	4 output model SE5401B01

CODE	CABLE
0	None
1	Standard 2m, Mass Flow Meter HMSU2090A0201
2	Optional 3m, Mass Flow Meter HMSU2090A0202
3	Optional 5m, Mass Flow Meter HMSU2090A0203
4	Standard 2m, Flow Controller HMSU2090A0101
5	Optional 3m, Flow Controller HMSU2090A0102
6	Optional 5m, Flow Controller HMSU2090A0103
8	Custom, Mass Flow Meter
9	Custom, Mass Flow Controller

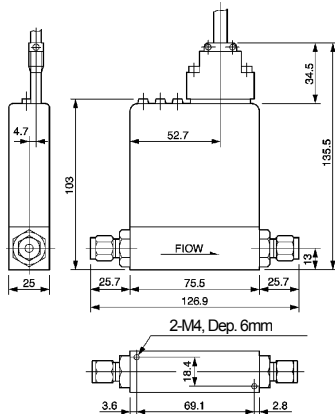
CODE	FILTER (Note 2)
0	None
1	Installed

Note2: Filter to be designated as "installed" unless a custom filter is installed by customer. A filter is installed for 400 SLM model.

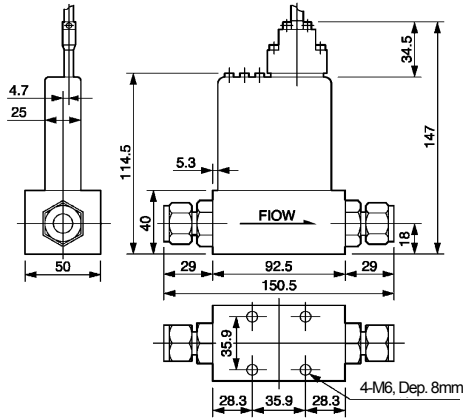
DIMENSIONS

(Unit: mm)

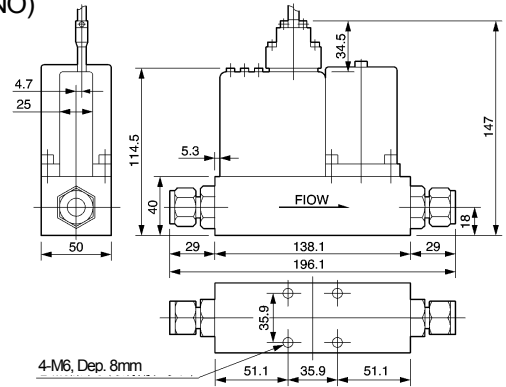
MF5141A (NC)
MF5151A (NO)
MF5111A



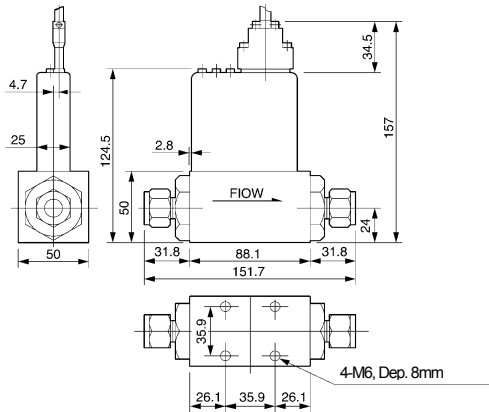
MF5112A



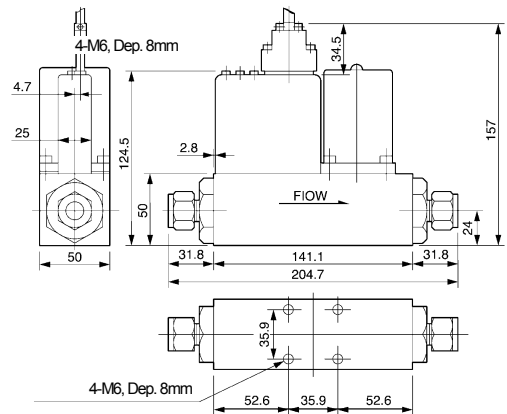
MF5142A (NC)
MF5152A (NO)



MF5113A



MF5143A (NC)

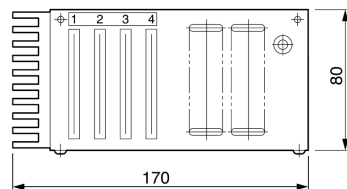


POWER SUPPLY

SPECIFICATION

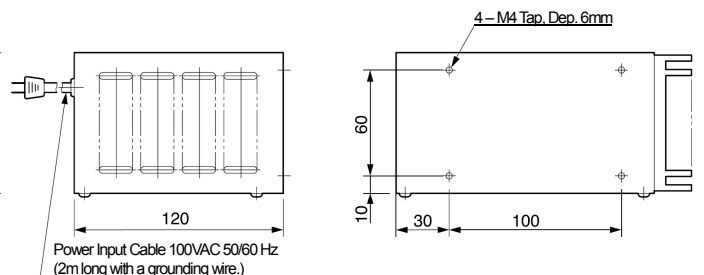
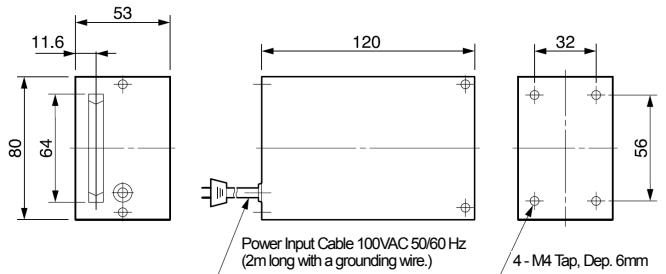
Model	SE5101B01	SE5401B01
Number of outputs	1	1 to 4
Output voltage	+15VDC 50mA -15VDC 350mA +5VDC 250mA	+15VDC 0.2A -15VDC 1.4A +5VDC 1.0A
Power input	100 VAC ± 10% 50/60Hz	
Operating temperature range	5 ~ 45 °C	
Mounting	Wall mount	
Case finish	Metallic silver	
Weight	Approx. 0.8 kg	Approx. 2 kg

Model code: SE5401B01



DIMENSIONS (Unit: mm)

Model code: SE5101B01



INDICATOR SPECIFICATIONS

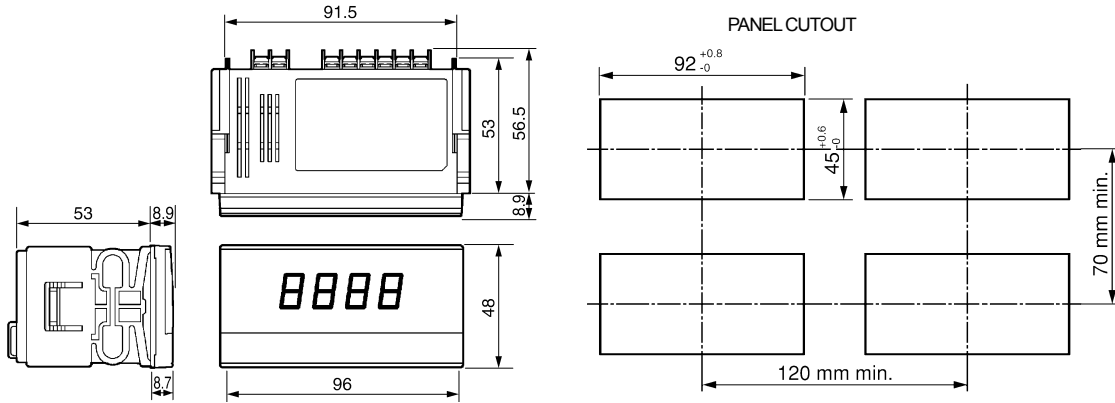
DIGITAL INDICATOR SPECIFICATIONS

Model Code Number	HMSU2091Exx	HMSU2428Bxx
INPUT	0 ~ 5 VDC	1 ~ 5V DC
Max. Readout	1999	
Display	7 segment LED, red	
Over Scale Indication	Blink "1999"	
Power Input	±5V DC±5%	
Power Consumption	Approx. 1.1VA	
Weight	Approx. 85g	

Model Code Number HMSU2091E + CODE below
 Model Code Number HMSU2428B + CODE below

CODE	RANGE	CODE	RANGE	CODE	RANGE
01	0 ~ 5.00 SCCM	08	0 ~ 300 SCCM	15	0 ~ 20.0 SLM
02	0 ~ 10.00 SCCM	09	0 ~ 500 SCCM	16	0 ~ 30.0 SLM
03	0 ~ 20.0 SCCM	10	0 ~ 1000 SCCM	17	0 ~ 50.0 SLM
04	0 ~ 30.0 SCCM	11	0 ~ 2.00 SLM	18	0 ~ 100.0 SLM
05	0 ~ 50.0 SCCM	12	0 ~ 3.00 SLM	19	0 ~ 200 SLM
06	0 ~ 100.0 SCCM	13	0 ~ 5.00 SLM	20	0 ~ 400 SLM
07	0 ~ 200 SCCM	14	0 ~ 10.00 SLM	99	Custom

DIMENSIONS (Unit: mm)



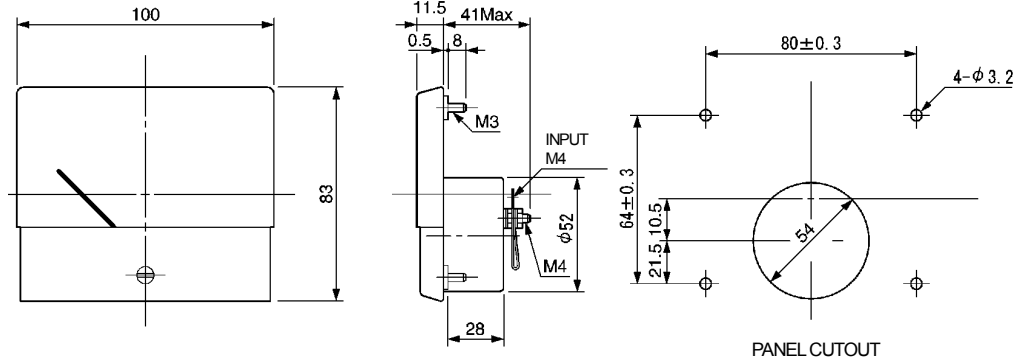
ANALOG INDICATOR SPECIFICATION

PART NUMBER	HMSU2092Axx
Class	2.5
Scale length	73.0mm
Weight	Approx. 110g

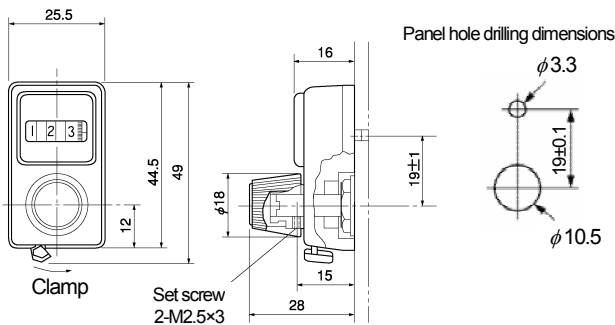
Model Code Number HMSU2092A + CODE below

CODE	RANGE	CODE	RANGE	CODE	RANGE
01	0 ~ 5 (SCCM)	08	0 ~ 3×100 (SCCM)	15	0 ~ 2×10 (SLM)
02	0 ~ 1×10 (SCCM)	09	0 ~ 5×100 (SCCM)	16	0 ~ 3×10 (SLM)
03	0 ~ 2×10 (SCCM)	10	0 ~ 1×1000 (SCCM)	17	0 ~ 5×10 (SLM)
04	0 ~ 3×10 (SCCM)	11	0 ~ 2×1000 (SCCM)	18	0 ~ 1×100 (SLM)
05	0 ~ 5×10 (SCCM)	12	0 ~ 3×1000 (SCCM)	19	0 ~ 2×100 (SLM)
06	0 ~ 1×100 (SCCM)	13	0 ~ 5×1000 (SCCM)	20	0 ~ 4×100 (SLM)
07	0 ~ 2×100 (SCCM)	14	0 ~ 1×10 (SLM)	99	Custom

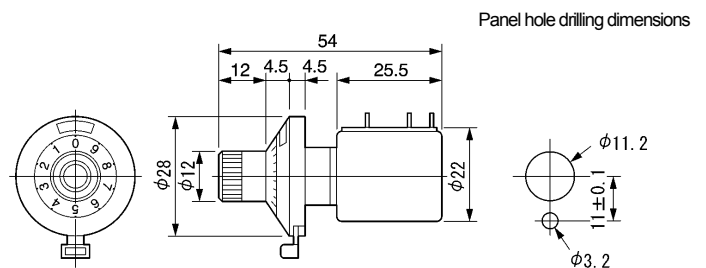
DIMENSIONS (Unit: mm)



DIGITAL SETPOINT ADJUSTOR (HMSU1869A01)

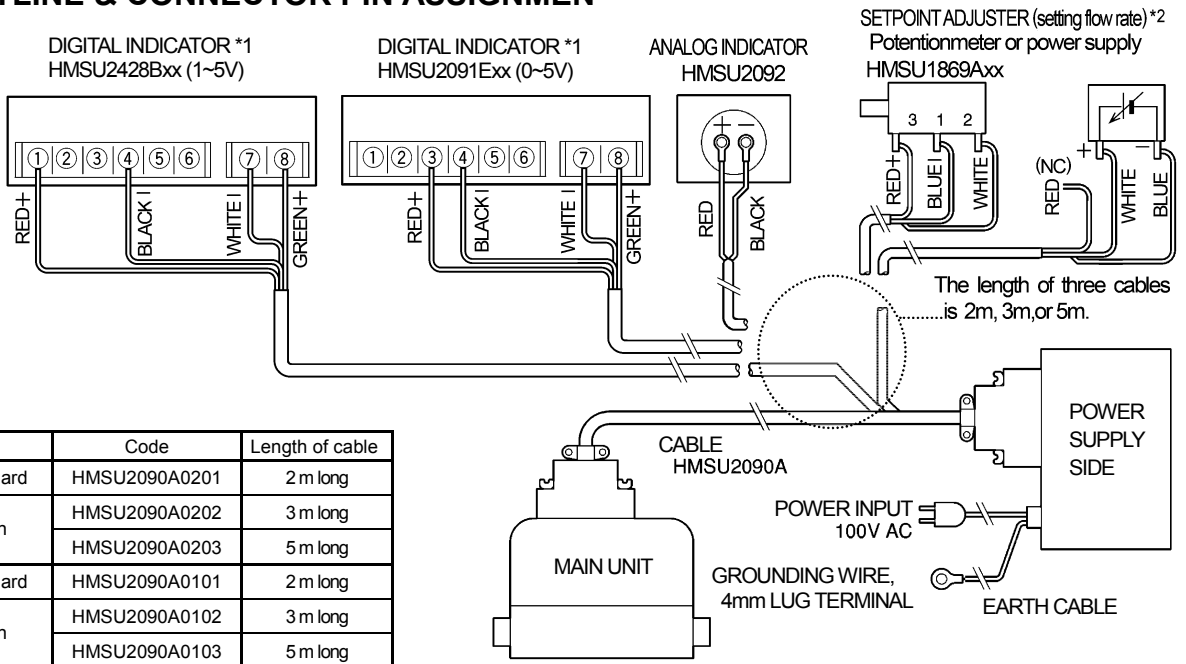


ANALOG SETPOINT ADJUSTOR (HMSU1869A02)



WIRE HOOKUP

CABLE OUTLINE & CONNECTOR PIN ASSIGNMEN

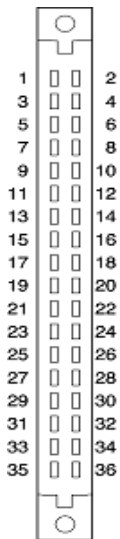


Description		Code	Length of cable
Mass Flow Meter	Standard	HMSU2090A0201	2 m long
	Option	HMSU2090A0202	3 m long
		HMSU2090A0203	5 m long
Mass Flow Controller	Standard	HMSU2090A0101	2 m long
	Option	HMSU2090A0102	3 m long
		HMSU2090A0103	5 m long

*1: On hooking up indicators, please watch the terminal arrangement which is different up to Part No.

*2: Set point adjuster is not attached to Mass flow meter.

POWER SUPPLY CONNECTOR



PIN No.	ASSIGNMENT
1 2	Flow rate output COM
3	Power output -15VDC
4	Power output for actuator -15VDC
5	Setpoint input COM (1)
6	Power output COM
7 8	Power output for actuator COM(2)
9 10	Flow rate output 0 ~ 5 or 1 ~ 5 VDC
11 12	Power output for indicator 0VDC
13 14	Power output for indicator +5VDC
15	Ground
16	NC
17 18	Power output +15VDC
19 20	Ref. voltage output +5VDC
21 22	Setpoint input 0 ~ 5 or 1 ~ 5VDC
23 - 36	NC

INSTRUMENT CONNECTOR



PIN No.	ASSIGNMENT
1 , 2	NC
3	Power -15VDC
4	Power, actuator -15VDC
5 , 6	NC
7 , 8	Power, actuator COM(2)
9 , 10	Output 0 ~ 5 or 1 ~ 5 VDC
11 , 12	Power, COM(1)
13 , 14	Ref. voltage +5VDC
15	Ground
16	Setpoint input 0 ~ 5 or 1 ~ 5VDC
17 , 18	Power output +15VDC

Teflon[®], Viton[®] and Neoprene[®] are regitered trade mark of U. S. DUPON.

Swageloc[®], VCR[®] and Neoprene[®] are regitered trade mark of U. S. Swageloc.

CAUTION

Do not install this device before consulting instruction manual

Specifications are subject to change without notice.

For further information, a quotation or a demonstration please contact to:

Ohkura

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Head Office / Factory
Sales Offices
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