

OUTLINE

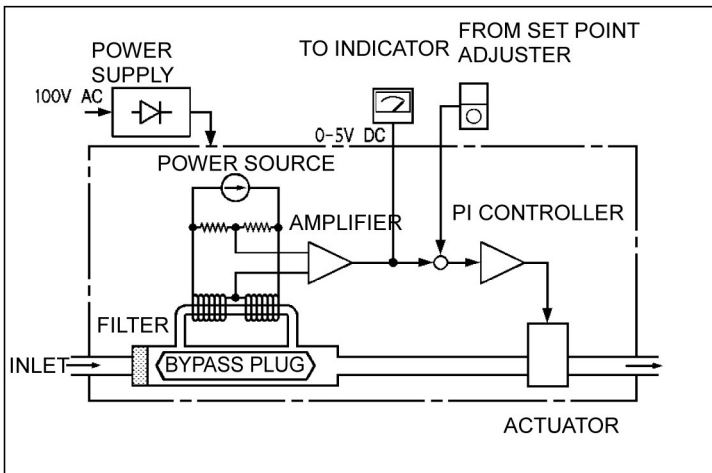
THE MODEL MF5100B MASS FLOW CONTROLLER FEATURES EXTENDED CAPABILITY OF RANGES UP TO 400 SLM, HIGHER TEMPERATURE STABILITY AND MANY FUNCTIONS.

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
MF5111B	Mass Flow Meter	5 SCCM ~ 20 SLM
MF5141B	Mass Flow Controller (N/C)	
MF5151B	Mass Flow Controller (N/O)	30 ~ 200 SLM
MF5112B	Mass Flow Meter	
MF5142B	Mass Flow Controller (N/C)	
MF5152B	Mass Flow Controller (N/O)	
MF5113B	Mass Flow Meter	400 SLM
MF5143B	Mass Flow Controller (N/C)	

Block Diagram



MF5141B



MF5142B



MF5143B

A  
B  
C  
D  
E  
F  
G  
H  
I  
J

SPECIFICATIONS

MODEL	MASS FLOW METER			MASS FLOW CONTROLLER		
	MF5111B	MF5112B	MF5113B	MF5141B (Normal Close) MF5151B (Normal Open)	MF5142B (Normal Close) MF5152B (Normal Open)	MF5143B (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	8 - 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 (Note 2)	-			34 to 275 kPa	69 to 275 kPa	108 to 275 kPa
Flow rate fluctuation	±0.25 % F.S. max. (Note3)					
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) (Note 6)					
Leakage	1.013 × 10 <sup>-9</sup> Pa·m <sup>3</sup> /s (He) max.,			1.013 × 10 <sup>-10</sup> Pa·m <sup>3</sup> /s (He) option		
Influence of physical Orientation error	±0.5% F.S. max. any orientation available					
Control set point input	-			5 kΩ potentiometer or 0 to 5 VDC voltage, 1 to 5 VDC voltage option		
Output performance	0 to 5 VDC, 2 kΩ min., Ripple 20 mVp_p max.			0 to 5 VDC, 2 kΩ min., Ripple 20 mVp_p max. 1 to 5 VDC for 1 to 5 VDC optional set point		
Process materials	Stainless steel SUS316 and Viton® (Note 4)			Stainless steel SUS316, Teflon® & Viton® (Note 4)		
Process connection	1/4 Swagelok®, VCR®/VCO® op.	3/8 Swagelok®, VCR®/VCO® op.	1/2 Swagelok®, VCR®/VCO® option	1/4 Swagelok®, VCR®/VCO® option	3/8 Swagelok®, VCR®/VCO® op.	1/2 Swagelok®, VCR®/VCO® option
Dimensions W×H×D (mm) (exclude connector)	Swagelok® 126.9×110×25 VCR® 123.3×110×25	150.5×121.5×50 ; 151.1×131.5×50 150.3×121.5×50 ; 152.1×131.5×50	151.7×131.5×50 146.5×131.5×50	126.9×110×25 123.3×110×25	196.1×121.5×50 ; 196.5×131.5×50 195.9×121.5×50 ; 197.7×131.5×50	204.7×131.5×50 199.5×131.5×50
Weight (power supply & cable excluded)	600 g	1.6 kg	2 kg	750 g	3 kg	3.7 kg
Power input	Supplied by model SE5000C 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	1 VA 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.

Note6: Available for 0 to 5 VDC output only.

CONVERSION FACTOR

SERVICE GAS AVAILABILITY AND CONVERSION FACTOR (CF)

GAS	SYMBOL	CF	GAS	SYMBOL	CF
Argon	Ar	1.40	Hydrogen	H <sub>2</sub>	1.00
Air	Air	1.00	Helium	He	1.40
Diborane	B <sub>2</sub> H <sub>6</sub>	0.46	Ammonia	NH <sub>3</sub>	0.78
Methane	CH <sub>4</sub>	0.74	Neon	Ne	1.39
Ethane	C <sub>2</sub> H <sub>6</sub>	0.51	Nitrogen monoxide	NO	0.99
Propane	C <sub>3</sub> H <sub>8</sub>	0.34	Nitrogen dioxide	NO <sub>2</sub>	0.75
Butane	C <sub>4</sub> H <sub>10</sub>	0.32	Nitrous oxide	N <sub>2</sub> O	0.74
Acetylene	C <sub>2</sub> H <sub>2</sub>	0.66	Nitrogen	N <sub>2</sub>	1.00
Ethylene	C <sub>2</sub> H <sub>4</sub>	0.64	Oxygen	O <sub>2</sub>	0.99
Propylene	C <sub>3</sub> H <sub>6</sub>	0.44	Phosphine	PH <sub>3</sub>	0.78
Carbonic acid	CO <sub>2</sub>	0.74	Silane	SiH <sub>4</sub>	0.66
Carbon monoxide	CO	1.00	Sulfur dioxide	SO <sub>2</sub>	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 MF5100B 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
1B	5 SCCM to 20 SLM
2B	30 SLM to 200 SLM
3B	400 SLM

CODE	RANGE	MASS FLOW METER	MASS FLOW CONTROLLER	
01	0 to 5 SCCM	0.1 to 5 SCCM		1B
02	0 to 10 SCCM	0.2 to 10 SCCM		
03	0 to 20 SCCM	0.4 to 20 SCCM		
04	0 to 30 SCCM	0.6 to 30 SCCM		
05	0 to 50 SCCM	1 to 50 SCCM		
06	0 to 100 SCCM	2 to 100 SCCM		
07	0 to 200 SCCM	4 to 200 SCCM		
08	0 to 300 SCCM	6 to 300 SCCM		
09	0 to 500 SCCM	10 to 500 SCCM		
10	0 to 1000 SCCM	20 to 1000 SCCM		
11	0 to 2000 SCCM	40 to 2000 SCCM		
12	0 to 3000 SCCM	60 to 3000 SCCM		
13	0 to 5000 SCCM	100 to 5000 SCCM		
14	0 to 10 SLM	0.2 to 10 SLM		2B
15	0 to 20 SLM	0.4 to 20 SLM		
16	0 to 30 SLM	0.6 to 30 SLM		
17	0 to 50 SLM	1 to 50 SLM		
18	0 to 100 SLM	2 to 100 SLM		
19	0 to 200 SLM	4 to 200 SLM		
20	0 to 400 SLM	8 to 400 SLM		
99	Custom (Consult Ohkura)	Custom (Consult Ohkura)		3B

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

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

CODE	SETPOINT INPUT / OUTPUT
0	Mass Flow Meter
1	0 to 5 VDC input / 0 to 5 VDC output standard
2	0 to 5 VDC input / 0 to 5 VDC output with optional Soft Start (Note1)
3	1 to 5 VDC input / 1 to 5 VDC output
4	1 to 5 VDC input / 1 to 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 <sup>-9</sup> Pa·m <sup>3</sup> /s Standard
2	1.013×10 <sup>-10</sup> Pa·m <sup>3</sup> /s Option

CODE	TEMPERATURE EFFECT
1	0.1 % /°C F.S. max. Standard
2	0.05 % /°C F.S. max. Option (Note3)
9	Custom (Consult Ohkura)

CODE	SETPOINT ADJUSTER / INDICATOR
A	No adjuster / indicator
B	Digital indicator included
D	Digital potentiometer & Digital indicator included
F	Analog potentiometer & Digital indicator included
T	1 to 5 VDC Digital indicator
V	Digital potentiometer & Custom indicator
W	Analog potentiometer & Custom indicator
X	Custom adjuster & Digital indicator
Z	Custom adjuster & indicator

CODE	POWER SUPPLY
0	Power supply not required
1	Single output model SE5101C01
2	4 output model SE5401C01

CODE	CABLE
0	None
1	Standard 2m, Mass Flow Meter WMSU0392A0201
2	Optional 3m, Mass Flow Meter WMSU0392A0202
3	Optional 5m, Mass Flow Meter WMSU0392A0203
4	Standard 2m, Mass Flow Controller WMSU0392A0101
5	Optional 3m, Mass Flow Controller WMSU0392A0102
6	Optional 5m, Mass Flow Controller WMSU0392A0103
8	Custom, Mass Flow Meter
9	Custom, Mass Flow Controller

CODE	FILTER (Note 2)
0	None
1	Installed

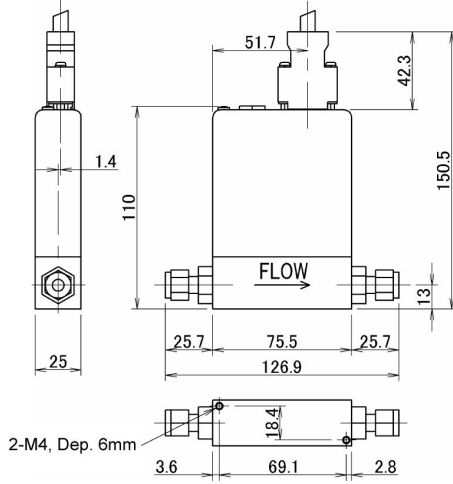
Note2: Filter to be designated as "installed" unless a custom filter is installed by customer. A filter is installed for 400 SLM model.

Note3: Available for 0 to 5 VDC output only.

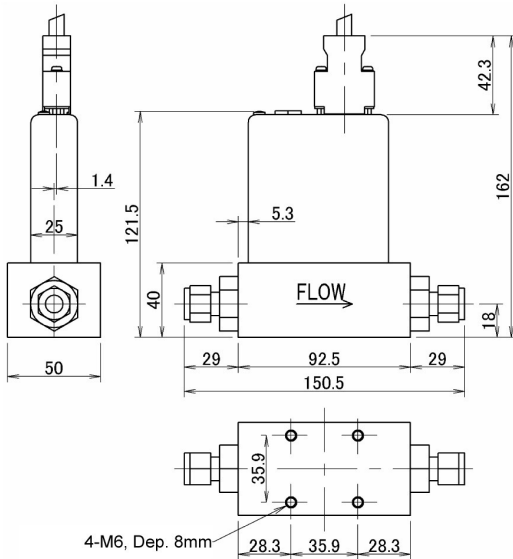
DIMENSIONS

(Unit: mm)

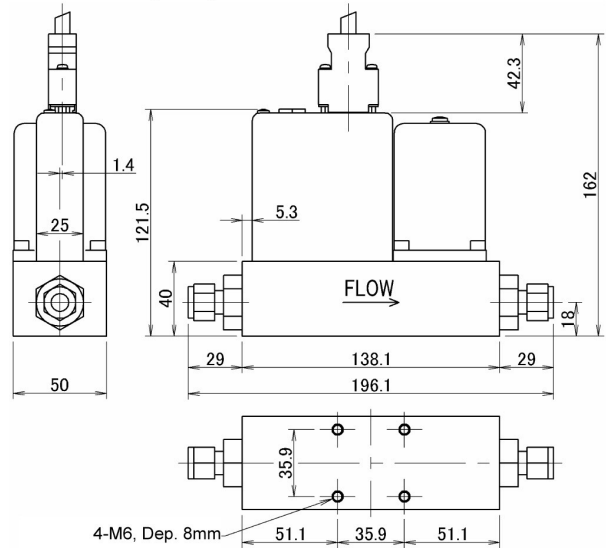
MF5141B (N.C.)  
MF5151B (N.O.)  
MF5111B



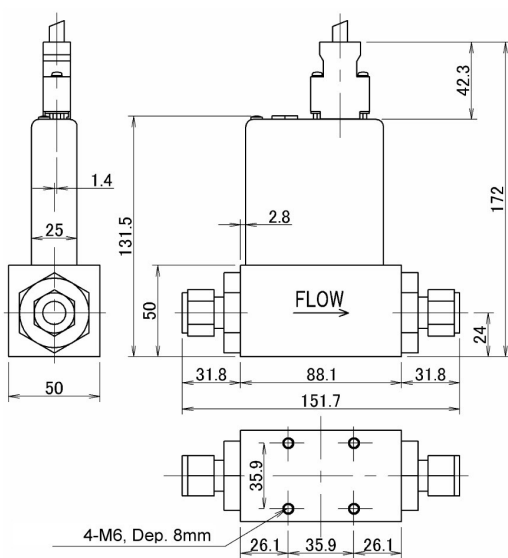
MF5112B



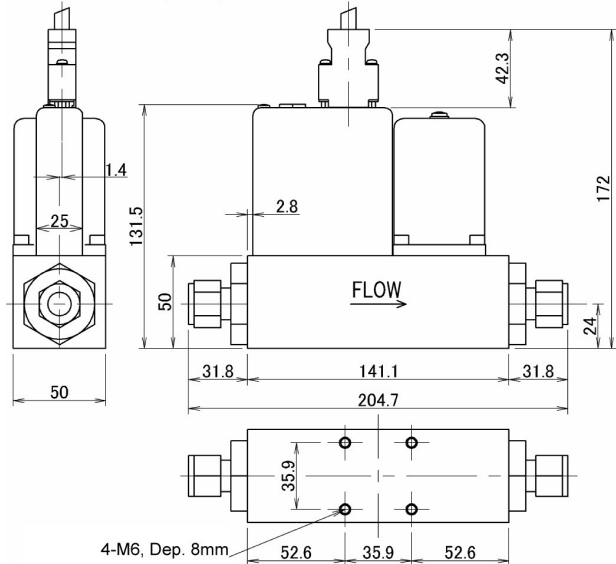
MF5142B (N.C.)  
MF5152B (N.O.)



MF5113B



MF5143B (N.C.)



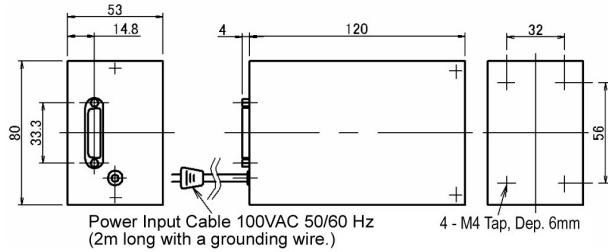
POWER SUPPLY

SPECIFICATION

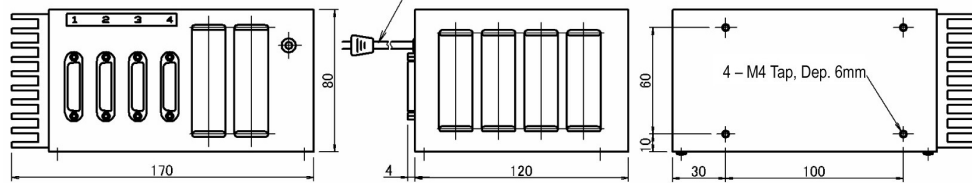
Model	SE5101C01	SE5401C01
Number of outputs	1	1 to 4
Output voltage	+15VDC 50mA -15VDC 350mA +5VDC 250mA	+15VDC 0.2A -15VDC 1.4A +5VDC 1.0A
Power input	100 VAC ±10% 50/60Hz	
Operating temperature range	5 to 45 °C	
Mounting	Wall mount	
Case finish	Metallic silver	
Weight	Approx. 0.8 kg	Approx. 2 kg

DIMENSIONS (Unit: mm)

Model code: SE5101C01



Model code: SE5401C01



INDICATOR

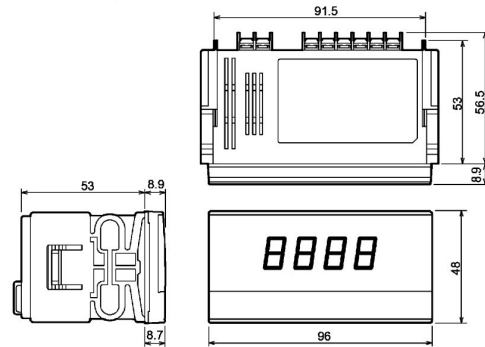
DIGITAL INDICATOR SPECIFICATIONS

Model Code Number HMSU2428B + CODE below

Model Code Number HMSU2091E + CODE below

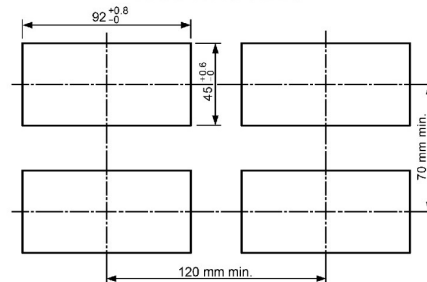
CODE	RANGE	CODE	RANGE
01	0 ~ 5.00 SCCM	11	0 ~ 2.00 SLM
02	0 ~ 10.00 SCCM	12	0 ~ 3.00 SLM
03	0 ~ 20.0 SCCM	13	0 ~ 5.00 SLM
04	0 ~ 30.0 SCCM	14	0 ~ 10.00 SLM
05	0 ~ 50.0 SCCM	15	0 ~ 20.0 SLM
06	0 ~ 100.0 SCCM	16	0 ~ 30.0 SLM
07	0 ~ 200 SCCM	17	0 ~ 50.0 SLM
08	0 ~ 300 SCCM	18	0 ~ 100.0 SLM
09	0 ~ 500 SCCM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

DIMENSIONS (Unit: mm)



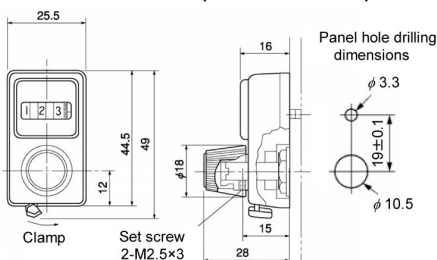
Model Code Number	HMSU2091Exx	HMSU2428Bxx
INPUT	0 to 5VDC	1 to 5 VDC
Max. Readout	1999	
Display	7 segment LED, red	
Over Scale Indication	Blink "1999"	
Power Input	±5V DC±5%	
Power Consumption	Approx. 1.1VA	
Weight	Approx. 85g	

PANEL CUTOUT

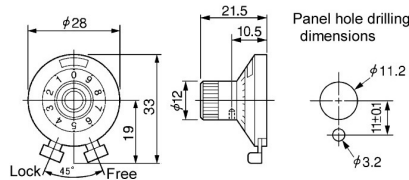


POTENTIOMETER

DIGITAL SETPOINT ADJUSTOR (HMSU1869A01)

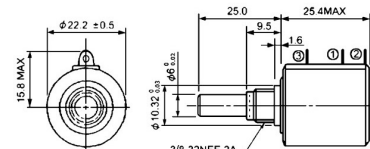


ANALOG SETPOINT ADJUSTOR (HMSU1869A02)



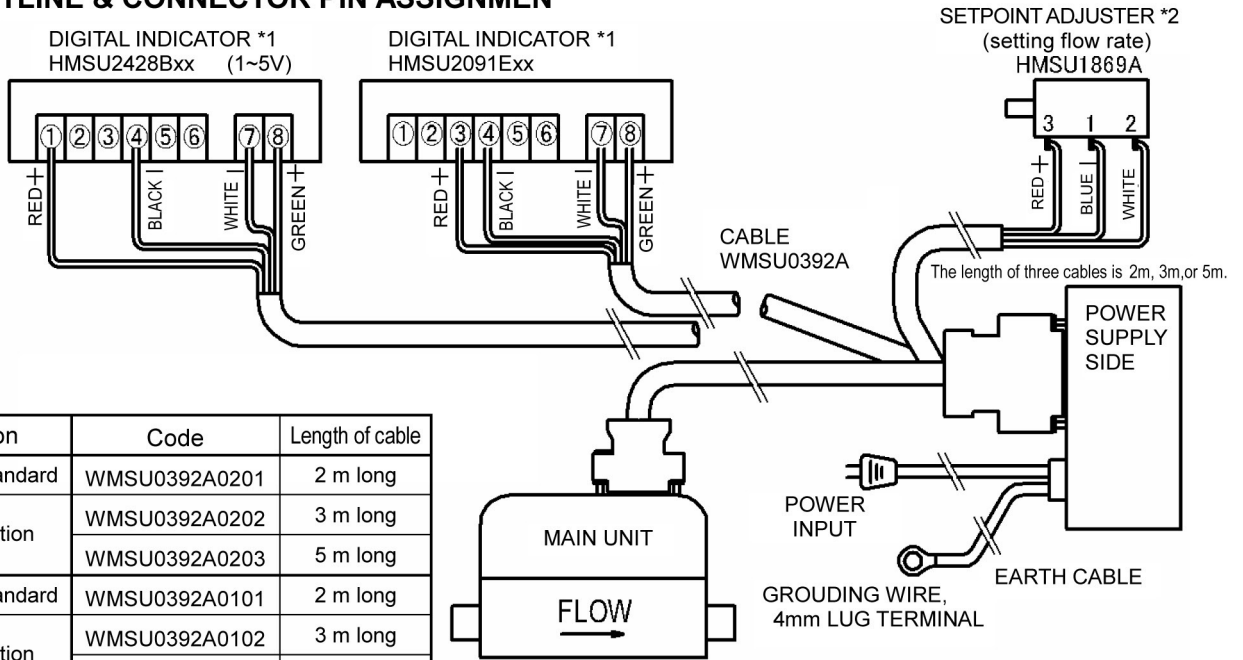
POTENTIOMETER

\* The potentiometer will be supplied together with the dial setting device or analog dial setting device.



WIRE HOOKUP

CABLE OUTLINE & CONNECTOR PIN ASSIGNMEN

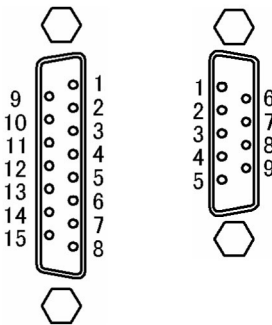


Description		Code	Length of cable
Mass Flow Meter	Standard	WMSU0392A0201	2 m long
	Option	WMSU0392A0202	3 m long
		WMSU0392A0203	5 m long
Mass Flow Controller	Standard	WMSU0392A0101	2 m long
	Option	WMSU0392A0102	3 m long
		WMSU0392A0103	5 m long

- \*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	Internal use
2	Flow rate output 0 to 5 or 1 to 5 VDC
3	Power output -15VDC
4	Power output COM
5	Flow rate output COM
6	Setpoint input COM (1)
7	NC
8	Power output for indicator 0VDC
9	Setpoint input 0 to 5 or 1 to 5VDC
10	Ref. voltage output +5VDC
11	Power output for actuator -15VDC
12	Power output for actuator COM(2)
13	Power output for actuator COM(2)
14	Power output +15VDC
15	Power output for indicator +5VDC
CASE	Ground



INSTRUMENT CONNECTOR

Pin No.	Assignment
1	Internal use
2	Output 0 to 5 or 1 to 5 VDC
3	Power output +15VDC
4	Power, actuator COM(2)
5	Power, actuator -15VDC
6	Setpoint input 0 to 5 or 1 to 5VDC
7	Power, COM(1)
8	Power -15VDC
9	Ref. voltage output +5VDC
CASE	Ground