mindman **MFPS** Series

● Precautions for Use

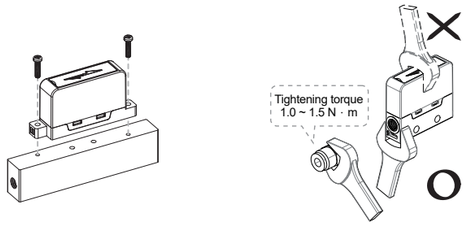
① **Operate within the specified voltage.**
Malfunction or damaged product, electric shock or fire may be resulted by exceeding the specified voltage range.
② **Please follow the rated range of flow and pressure to avoid damage.**
③ **Do not use flammable fluids and/or permeable fluids.**
They may cause fire, explosion or corrosion.
④ **Do not use in an explosive gas atmosphere.**
The sensor does not have explosion-proof structure, fire, explosion or corrosion can result.
⑤ **Do not use near a surge voltage generated area.**
If product is nearby the device of surge voltage (e.g., lightning strikes, solenoid lifters, high frequency induction furnaces, motors, etc.), please take measures against the surge sources to prevent damage.
⑥ **Do not use in an environment where sensors could be splashed by water or oil.**
With IP40 compliance, please protect the sensor against dust and water splash.
⑦ **Do not use in an environment subject to large temperature cycling.**
Internal components of the sensor will be damaged by large heating/cooling cycles other than ordinary changes in temperature.
⑧ **Do not mount the product in locations where it is exposed to radiant heat.**

● Installation Precautions

① **This product can be installed in any direction; top, bottom, left, or right.**
② **MFPS-□-01 can be installed with 2 through holes (Ø2).**

Port thread	Tightening torque N·m
M2	0.2 ~ 0.3 N·m

③ **When mounting, please use wrench on specified position as below.**
Using on other parts of the product with a wrench may damage the product.
④ **Please ensure the size of fittings are within the width of MFPS-□-01-M5 while connecting multiple sensors side by side.**
⑤ **Please be aware the tightening torque when mounting.**
⑥ **After installing, please take a leakage test to ensure the installation is appropriate.**



● Fluid

① **Check the regulator and flow adjustment valve before introducing the fluid.**
② **On the inlet side, be sure to install an air filter below the filtration level of 10um.**
The sensing element cannot measure properly if foreign matter adheres to it.

● Use and Maintenance

① **Ensure the flow direction of the fluid.**
Install the pipe by following the arrow indication that shows the air flow direction on the product.
② **Flush out all dirt and dust by air blow before connecting the piping to the sensor.**
③ **Do not drop or hit.**
When installation, do not drop, hit or apply excessive shock (100m/s^2), permanent damage to the internal component of the sensor may occur.
④ **Please avoid repeatedly bending, carrying heavy objects, or stretching the lead wire.**
Securing the wire near the sensor can prevent repeated bending stress, tensile stress, movement, or vibration of the wire, avoiding wire damage or poor contact with the connector.
⑤ **Minimizing the wiring length can help avoid noise interference.**
⑥ **Check wire color and terminal number when wiring.**
Incorrect wiring can cause permanent damages to the sensor, check wire color and terminal number according to the manual before wiring.
⑦ **Confirm wiring insulation**
Please avoid poor insulations (and interference from another circuit, poor insulation between terminals, etc.) it can lead to over current being applied to the product, causing damage.
⑧ **Please use a separate route for the sensor product wiring and keep separate from any other power or high voltage wiring to avoid noise interruption.**
⑨ **Do not connect wire when the power is on.**
⑩ **Analog output signal will chatter 2 to 3% within 5 minutes when supplying power.**
⑪ **Please follow the specified tightening torque.**
⑫ **Ensure the safety of products, please confirm ESD device before use.**
⑬ **Do not disassemble or modify the product.**
⑭ **The accuracy could change by 2 to 3% when the mesh and mesh holding screw of MFPS-□-01-M5 is removed or replaced.**
⑮ **Do not touch terminals or connectors when power is on.**
⑯ **Sensors at end-of-life must be disposed of in accordance with E-Waste regulations of the country/region, NOT disposed of with regular garbage.**

● Nozzle Size Reference

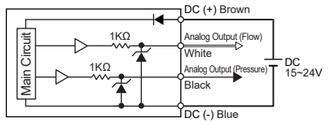
Flow Rate Range (L/min)	Nozzle Size (mm)	Application
-0.3 ~ 0.3	≤ Ø 0.1	Quartz Oscillator, Solder Ball,Micro LEDs
-0.5 ~ 0.5	Ø 0.2	Chip Resistor, Chip Capacitor, Optical Parts, Mini LEDs
-1.0 ~ 1.0	Ø 0.3	
-5.0 ~ 5.0	Inverted Pyramid Die Collets	Silicone wafer (Bear Die Chip Bonder), General Parts
-10 ~ 10	Inverted Pyramid Die Collets	

A. SPECIFICATIONS

MODEL		003	005	010	050	100	R003	R005	R010	R050	R100
Flow	Measured flow rate range	0~0.3 L/min	0~0.5 L/min	0~1 L/min	0~5 L/min	0~10 L/min	-0.3~0.3 L/min	-0.5~0.5 L/min	-1~1 L/min	-5~5 L/min	-10~10 L/min
	Flow Direction	Unidirection					Bidirectional				
Pressure	Rated Pressure Range	-100 ~ 100 kPa									
Withstand Pressure		300 kPa									
Fluid		Dry air, N_2, Non-corrosive / Non-flammable gas									
Power Supply Voltage		15 ~ 24V DC ±10% · Ripple (P-P) ≤ 10%									
Current Consumption		≤ 30mA									
Flow	Repeatability	≤ ± 2% F.S.									
	Linearity	Non-linearity ※1									
	Temp. Characteristic ※2	≤ ± 0.6% F.S./°C					≤ ± 0.3% F.S./°C				
	Pressure Characteristic ※3	± 10% F.S.					± 5% F.S.				
Pressure	Repeatability	≤ ± 1% F.S.									
	Linearity	± 0.5% F.S.									
	Temp. Characteristic ※2	± 2% F.S.									
Response Time	Flow	≤ 5ms (90% Response time)									
	Pressure	≤ 1ms									
Switch on Indicator		Green LED · Orange LED · Red LED									
Analog Output	Flow	Voltage Output Range : 1~5V ±5% F.S. (±0.2V) (Non-linearity) Output Impedance : 1 KΩ									
	Pressure	Voltage Output Range : 1~5V ±1% F.S. (±0.04V) (Linearity) Output Impedance : 1 KΩ									
Environment	Enclosure	IP40									
	Working Fluid Temp.	0 ~ 50°C (No condensation or freezing)									
	Ambient Temp. Range	Operation : 0 ~ 50°C ; Storage : -10 ~ 60°C (No condensation or freezing)									
	Ambient Humidity Range	Operation / Storage : 35 ~ 85% R.H. (No condensation)									
	Withstand Voltage	1000V AC in 1-min (between case and lead wire)									
	Insulation Resistance	≥ 50MΩ (500V DC · between case and lead wire)									
	Vibration	Total amplitude 1.5mm or 10G · 10 Hz - 55 Hz - 10 Hz scan for 1 minute · 2 hours each direction of X, Y and Z									
	Shock	100m/s² (10G) · 3 times each in direction of X, Y and Z									
Lead Wire		Ø2.9 PUR - 28 AWG (0.078 mm²) - 4 cores									
Weight	Product	Approx. 8.6 g (w/o Port) ; Approx. 12.2 g (M5 Port)									
	Lead Wire (3M)	+ 34.5 g									

【NOTE】
※1 : Approximate linearity analog output (±10% F.S.) except 0 ~ 10 L and 10 ~ 10 L.
※2 : Benchmark : 25°C (Temperature range : 0 ~ 50°C)
※3 : Benchmark : 150 kPa (Pressure range : -100 ~ 200kPa)

B. OUTPUT CIRCUIT WIRING DIAGRAMS



C. ORDERING INFORMATION

M F P S - 0 0 3 - 0 1 - M 5

Flow Rate Range
003 : 0 ~ 0.3 L/min
005 : 0 ~ 0.5 L/min
010 : 0 ~ 1 L/min
050 : 0 ~ 5 L/min
100 : 0 ~ 10 L/min
R003 : -0.3 ~ 0.3 L/min
R005 : -0.5 ~ 0.5 L/min
R010 : -1 ~ 1 L/min
R050 : -5 ~ 5 L/min
R100 : -10 ~ 10 L/min

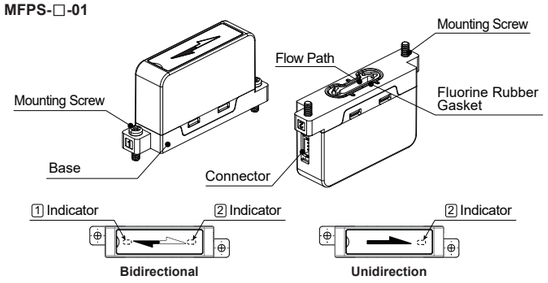
Output Specifications
01 : 2 Analog output (1 ~ 5V)

Port Size
Blank : None
M5 : M5 female thread

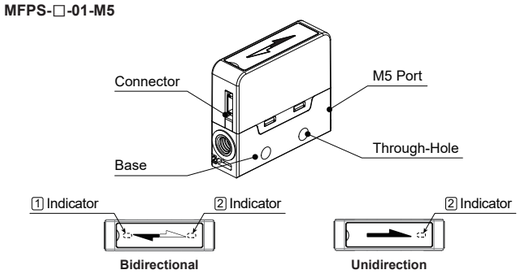
Optional Parts
MP-A29-1 : fit with 1 sensor (brackets + M3x0.5Px15L screws)
MP-A29-2 : fit with 2 sensors (brackets + M3x0.5Px25L screws)
MP-A29-3 : fit with 3 sensors (brackets + M3x0.5Px35L screws)
MP-A29-4 : fit with 4 sensors (brackets + M3x0.5Px45L screws)
MP-A29-5 : fit with 5 sensors (brackets + M3x0.5Px55L screws)

D. PARTS DESCRIPTION

● **MFPS-□-01**

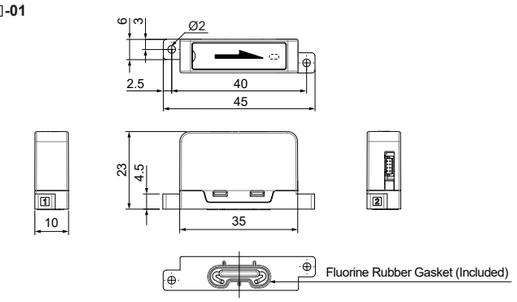


● **MFPS-□-01-M5**

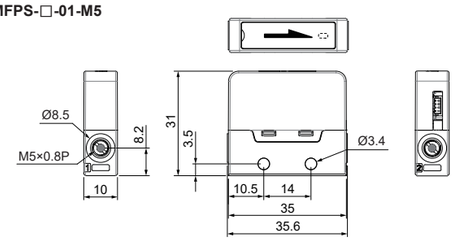


E. DIMENSIONS

● **MFPS-□-01**

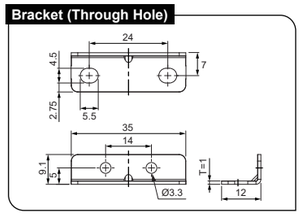


● **MFPS-□-01-M5**

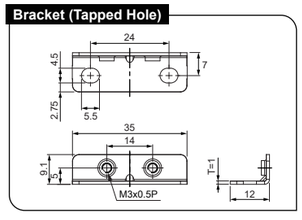


F. OPTIONAL PARTS DIMENSIONS

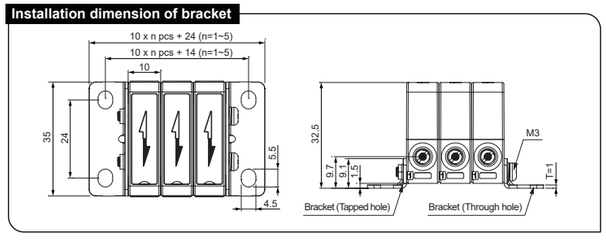
Bracket (Through Hole)



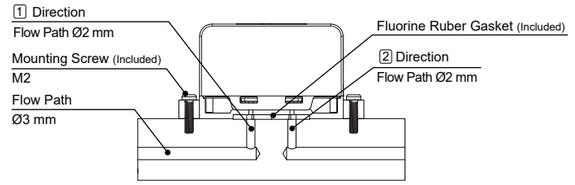
Bracket (Tapped Hole)



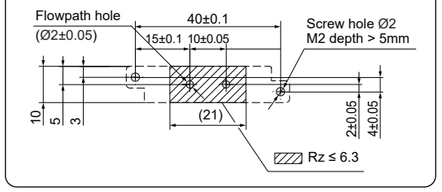
Installation dimension of bracket



G. INSTALLATION DIMENSION OF MFPS-□-01

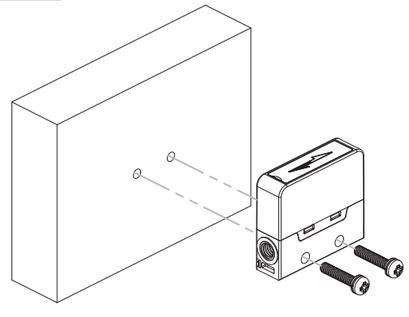


Dimension for MFPS-□-01 Base (Top View)

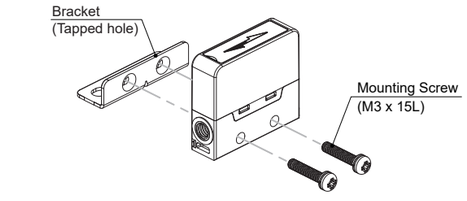


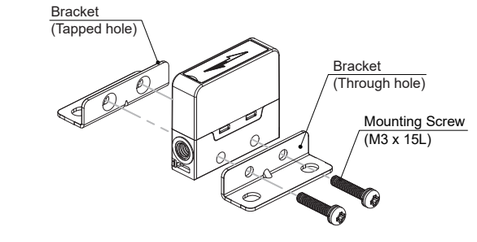
H. MOUNTING BRACKET

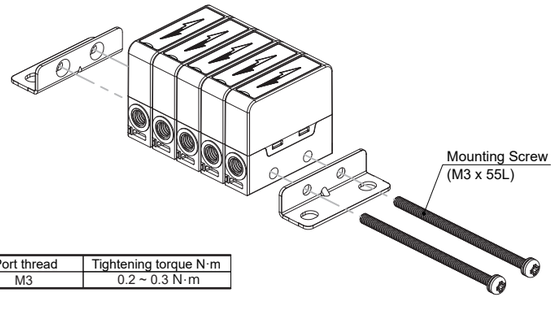
1. Horizontal mounting



2. Bracket mounting



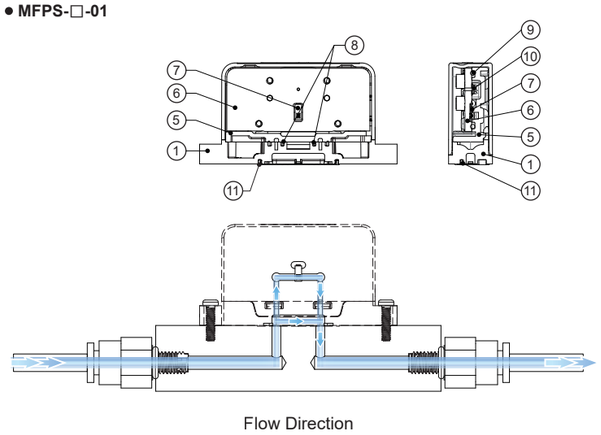




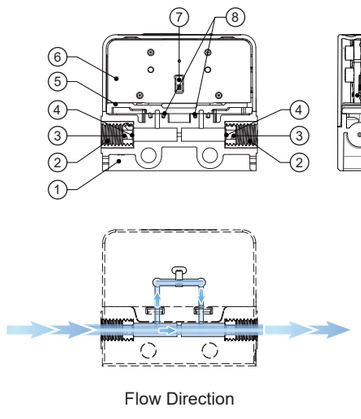
Port thread	Tightening torque N·m
M3	0.2 ~ 0.3 N·m

I. WETTED PARTS

● **MFPS-□-01**



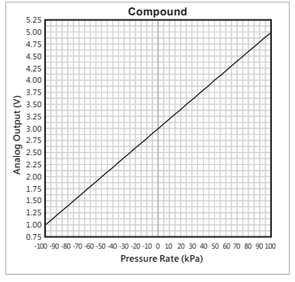
● **MFPS-□-01-M5**



Component Parts

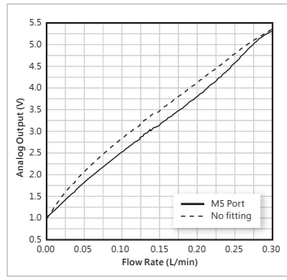
NO.	Description	Material
1	Base	PBT
2	Fitting for piping	SUS 303
3	Mesh holding screw	POM
4	Mesh	SUS 304
5	PCB-Holder	PBT
6	Sensor Board	GE4F
7	Sensor	Si
8	Gasket	Viton
9	Gasket	Viton
10	Sensor	Si
11	Gasket	Viton

J. OUTPUT CHARACTERISTICS (PRESSURE)

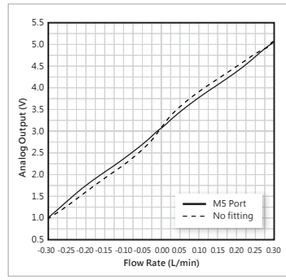


K. OUTPUT CHARACTERISTICS (FLOW)

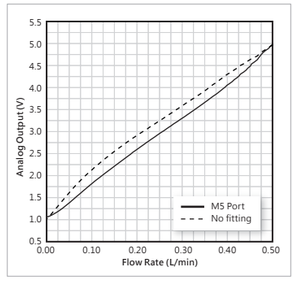
● **MFPS-003 (0 ~ 0.3 L/min)**



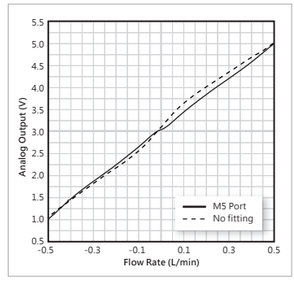
● **MFPS-R003 (-0.3 ~ 0.3 L/min)**



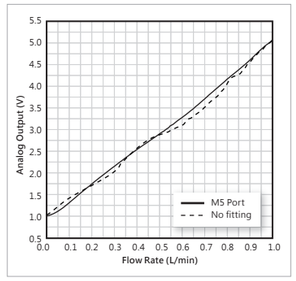
● **MFPS-005 (0 ~ 0.5 L/min)**



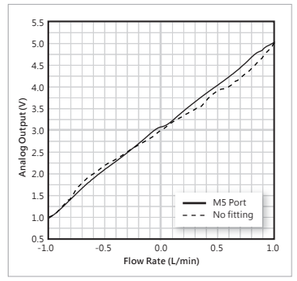
● **MFPS-R005 (-0.5 ~ 0.5 L/min)**



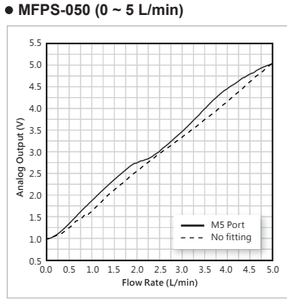
● **MFPS-010 (0 ~ 1 L/min)**



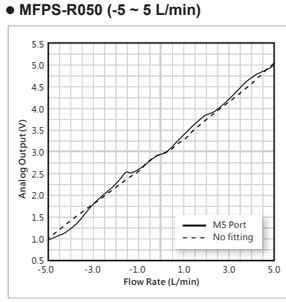
● **MFPS-R010 (-1 ~ 1 L/min)**



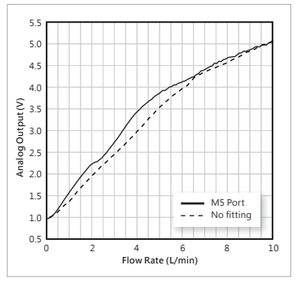
● **MFPS-050 (0 ~ 5 L/min)**



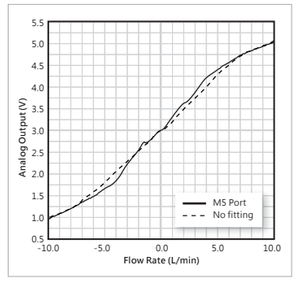
● **MFPS-R050 (-5 ~ 5 L/min)**



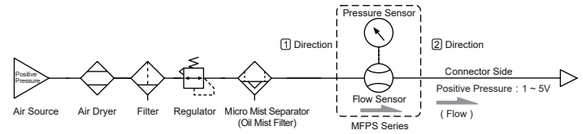
● **MFPS-100 (0 ~ 10 L/min)**



● **MFPS-R100 (-10 ~ 10 L/min)**



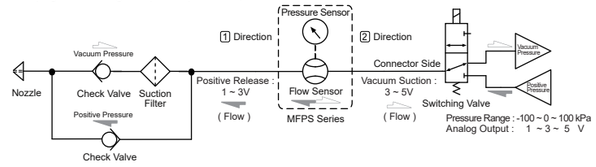
L. RECOMMENDED INSTALLATION OF COMPRESSED AIR LINE



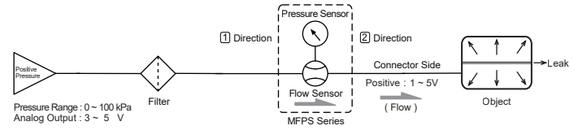
Example :

Check Adsorption (Bidirectional)

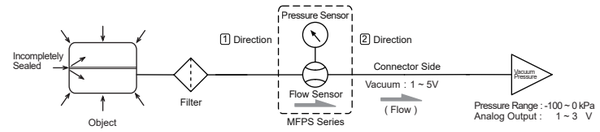
※ Response speed of the sensor might be delayed due to the piping volume between the suction nozzle and flow sensor.
Piping volume: Large=response speed slow ; Small= response speed fast.



Positive Pressure Leak Detection (Unidirection)



Vacuum Leak Detection (Unidirection)

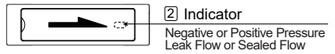


M. LED INDICATOR DESCRIPTION

The real-time status of the fluid such as flow rate, flow direction, positive pressure or vacuum pressure is displayed by the "3-color LED indicator".

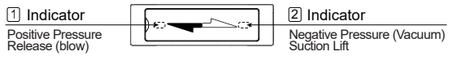
According to **L. RECOMMENDED INSTALLATION OF COMPRESSED AIR LINE**, the description of LED indicator is as follows. (※ Depending on the piping, LED indicator may be displayed differently.)

● **Unidirectional**



Flow Range (L/min)	Indicator Color	2 Indicator		
		Flow (L/min)	Vacuum Pressure (kPa)	Positive Pressure (kPa)
0 ~ 0.3	Green	0.03 ↓	-50 ↑	50 ↑
	Orange	0.03 ↑	-50 ↑	50 ↑
	Red	0.03 ↑	-50 ↓	50 ↓
0 ~ 0.5	Green	0.05 ↓	-50 ↑	50 ↑
	Orange	0.05 ↑	-50 ↑	50 ↑
	Red	0.05 ↑	-50 ↓	50 ↓
0 ~ 1.0	Green	0.1 ↓	-50 ↑	50 ↑
	Orange	0.1 ↑	-50 ↑	50 ↑
	Red	0.1 ↑	-50 ↓	50 ↓
0 ~ 5.0	Green	0.5↓	-50 ↑	50 ↑
	Orange	0.5 ↑	-50 ↑	50 ↑
	Red	0.5 ↑	-50 ↓	50 ↓
0 ~ 10	Green	1.0 ↓	-50 ↑	50 ↑
	Orange	1.0 ↑	-50 ↑	50 ↑
	Red	1.0 ↑	-50 ↓	50 ↓

● **Bidirectional**



Flow Range (L/min)	Indicator Color	1 Indicator Positive Pressure		2 Indicator Vacuum Pressure	
		Flow (L/min)	Pressure (kPa)	Flow (L/min)	Pressure (kPa)
-0.3 ~ 0.3	Green	0.08 ↑	100 ↓	0.08 ↓	-50 ↑
	Orange	0.08 ↑	100 ↑	0.08 ↑	-50 ↑
	Red	0.08 ↓	100 ↑	0.08 ↑	-50 ↓
-0.5 ~ 0.5	Green	0.13 ↑	100 ↓	0.13 ↓	-50 ↑
	Orange	0.13 ↑	100 ↑	0.13 ↑	-50 ↑
	Red	0.13 ↓	100 ↑	0.13 ↑	-50 ↓
-1.0 ~ 1.0	Green	0.25 ↑	100 ↓	0.25 ↓	-50 ↑
	Orange	0.25 ↑	100 ↑	0.25 ↑	-50 ↑
	Red	0.25 ↓	100 ↑	0.25 ↑	-50 ↓
-5.0 ~ 5.0	Green	1.25 ↑	100 ↓	1.25 ↓	-50 ↑
	Orange	1.25 ↑	100 ↑	1.25 ↑	-50 ↑
	Red	1.25 ↓	100 ↑	1.25 ↑	-50 ↓
-10 ~ 10	Green	2.5 ↑	100 ↓	2.5 ↓	-50 ↑
	Orange	2.5 ↑	100 ↑	2.5 ↑	-50 ↑
	Red	2.5 ↓	100 ↑	2.5 ↑	-50 ↓