

Mold Marshalling System for In-Mold Measurement

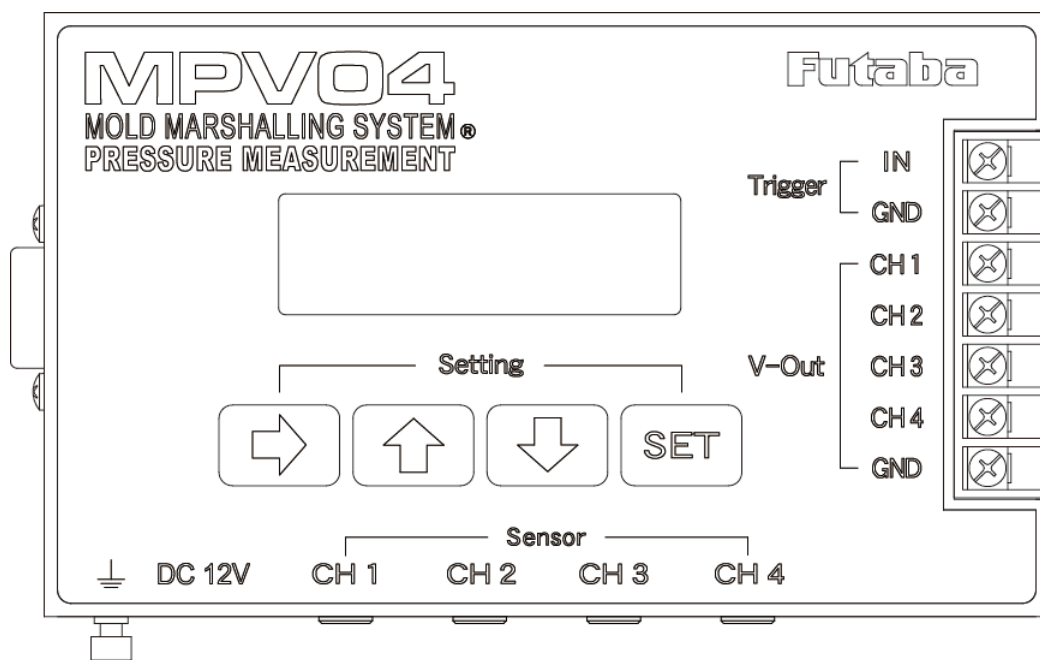
Pressure Measuring Amplifier

MPV04

Instruction Manual

Thank you for your purchasing a product of Futaba Corporation.

Please read this instruction manual carefully and patronize the product for many years to come. Do not use this product in a manner not specified in this manual.



Unauthorized duplication or reproduction of this product in whole or in part is strictly prohibited. This product is the copyrighted work of Futaba Corporation and the ownership of the product belongs to Futaba Corporation. The information contained in this manual is subject to change without prior notice.

Safety Precautions (Be sure to read before use)

■ Before Use

Before using the product, read this “Safety Precautions” and the instruction manual carefully.

After reading the manual, keep it in a safe place so that it can be used whenever needed.

When using the product, be sure to observe the following safety precautions.

Futaba Corporation assumes no liability for the injury caused by using the product contrary to these precautions.

■ This manual uses the following alert symbols for safe use of the product.



WARNING Failure to observe the instructions with this symbol could result in death or serious personal injury.



CAUTION Failure to observe the instructions with this symbol could result in injury or only damage to property.

■ General Precautions

- When starting product operation, make sure in advance that the functions of the product are normally working with normal performance.
- If the product fails, use adequate safety measures to prevent various types of damage.
- Note that we cannot guarantee the functionality and performance for use of the product not conforming to the specifications or any remodeled product.
- When using the product in combination with other equipment, evaluate it thoroughly because the functionality and performance may not be satisfactory depending on the use conditions and environment.

■ Precautions



WARNING

When installing the product or connecting cables, be sure to disconnect the power cable from the outlet in advance. It could result in electric shock or malfunction.



WARNING

Do not use a broken cable or a cable with a flaw in the covering. It could result in fire, electric shock, or device damage or failure.



WARNING

Use the power to the AC adaptor within the range (100 to 240 V) stipulated in the specifications. Using power outside the range could result in fire or device damage or failure.



WARNING

Use the AC adaptor that comes with the product. Using any other AC adaptor could result in device damage or failure.



CAUTION

Keep the sensor, amplifier, Junction box, and Junction cable away from water. It could result in electric shock or device damage.

Preface

“Mold Marshalling System MPV04” is a system for measuring resin pressure inside the mold of an injection molding machine using a strain gage pressure sensor of Futaba Corporation.

It outputs the measured values as voltage to external measuring equipment such as a data logger and injection machine to allow you to monitor and manage data.

- Measures up to four channels concurrently.
- Measures the pressure of resin inside the mold with a 1 ms sampling period and outputs voltage according to the pressure.
- No PC is required. The MPV04 can operate and be configurable standalone.
- Compact design for easy installation.
- Easy-to-handle voltage output, which allows this equipment to be easily connected to your measuring equipment as well as molding machine.
- Display panel employs a fluorescent display tube that has a high level visibility.
- “SSE series” or “SSB series” can be connected as the pressure sensors.

Please read this instruction manual carefully and use the product correctly.

If you have any questions, please contact our sales department.

Standard Accessories

■ This equipment comes with the following standard accessories.

After unpacking the equipment, make sure that all accessories are included.

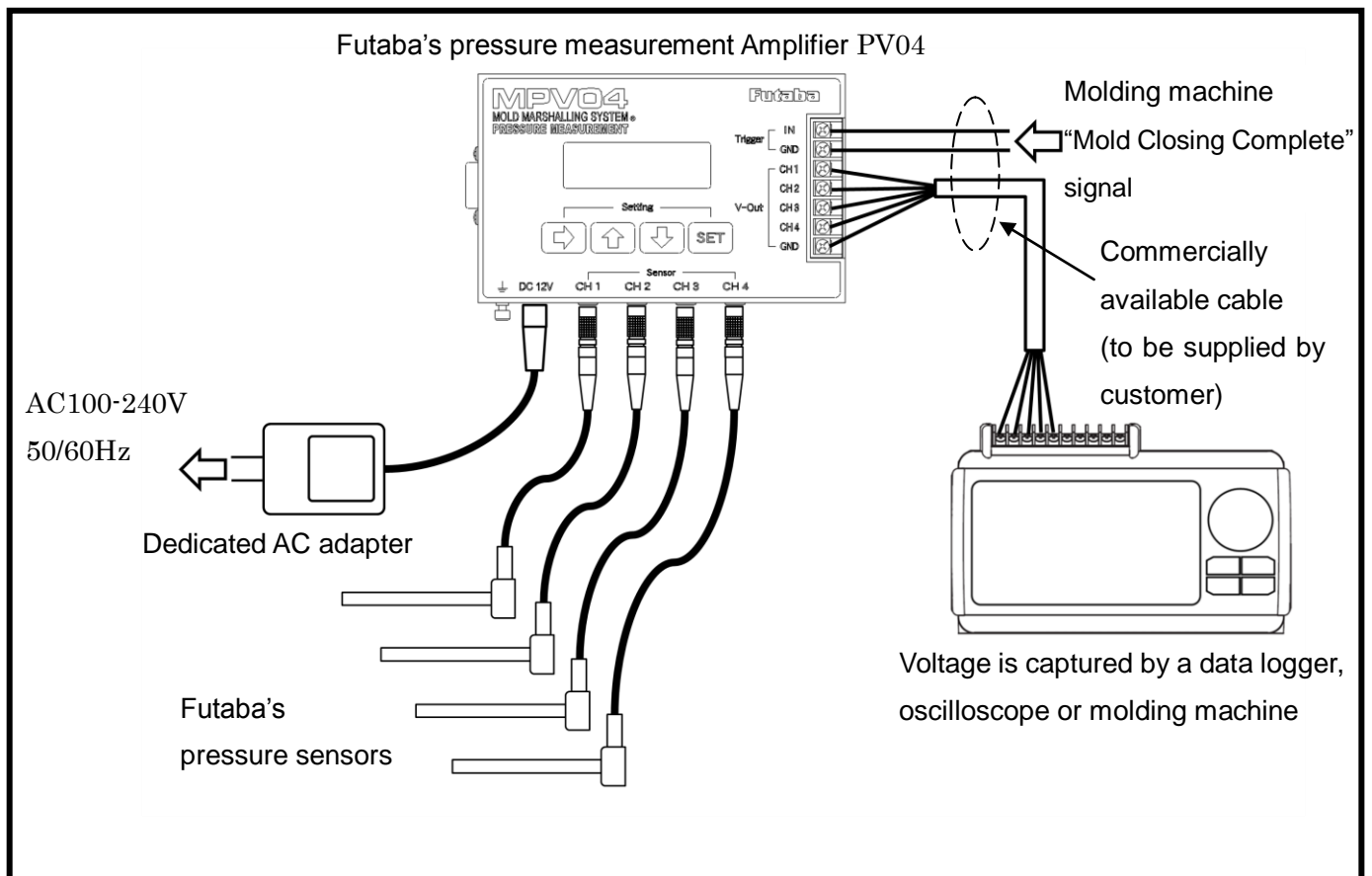
•Pressure measurement amplifier “MPV04”	1
•AC adapter “ES0012001”	1
•Instruction Manual (this manual)	1
•Warranty and Certificate of Registration	1

Handling Precautions

- Turn on the power to the amplifier after connecting between the systems. Be sure to connect the power cable of the amplifier to the AC outlet. Do not turn on/off the power supply by disconnecting and connecting the I/O cable connector. It could damage the amplifier and AC adaptor.
- When the power is once turned off, wait for at least 5 seconds before turning it on again. If the power is turned on within 5 seconds or turned on and off repeatedly, power failure may be caused by rush current generated at power on.
- When turning off the power after setting operation is performed, wait at least 3 seconds. The setting is stored in the non-volatile memory in the amplifier but is not stored correctly if the power is turned off soon after the setting operation.
- Avoid using the system in an environment subject to remarkably high or low temperature. The allowable range of operating temperature is 0 to 50°C. If it is unavoidable to use the system at a place subject to direct sunlight or in a cold area, protect it from sunlight or keep it warm.
- Use the system in the relative humidity range from 35 to 85%. Using it out of the humidity range or in an environment subject to water splashes could result in performance deterioration or failure.
- Do not use the system in a dusty place. Performance degrades if the dust gets inside. Prevent dust from getting inside not only during operation but also during storage. Use the system in an environment in which personal computers can be used.
- If the environment changes drastically, do not operate the system soon. Leave the system in the new operating environment to adapt it to the environment and then use it. If the ambient temperature or humidity is changed drastically due to movement, condensation may cause performance degradation and failure.
- Do not use the system in an environment subject to vibration or impact. Continuous vibration or large impact could cause performance degradation or failure.
- Do not use the system in strong electromagnetic fields. Use it in an environment in which personal computers can be used. Using it in the vicinity of a radio, microwave oven, or electric furnace that generates a strong electromagnetic field could cause performance degradation, malfunction, or failure.
- Do not use the system in locations with poor power supply conditions. Use it with a power supply at 100 to 240 VAC, 50/60 Hz, free from momentary power failure and noise.
- Do not pull connection cables. Connect each connection cable with a margin so that excessive force is not applied to the connection. Pulling the cable or applying excessive force to it could cause failure, measurement interruption, or abnormal measurements.

System Configuration

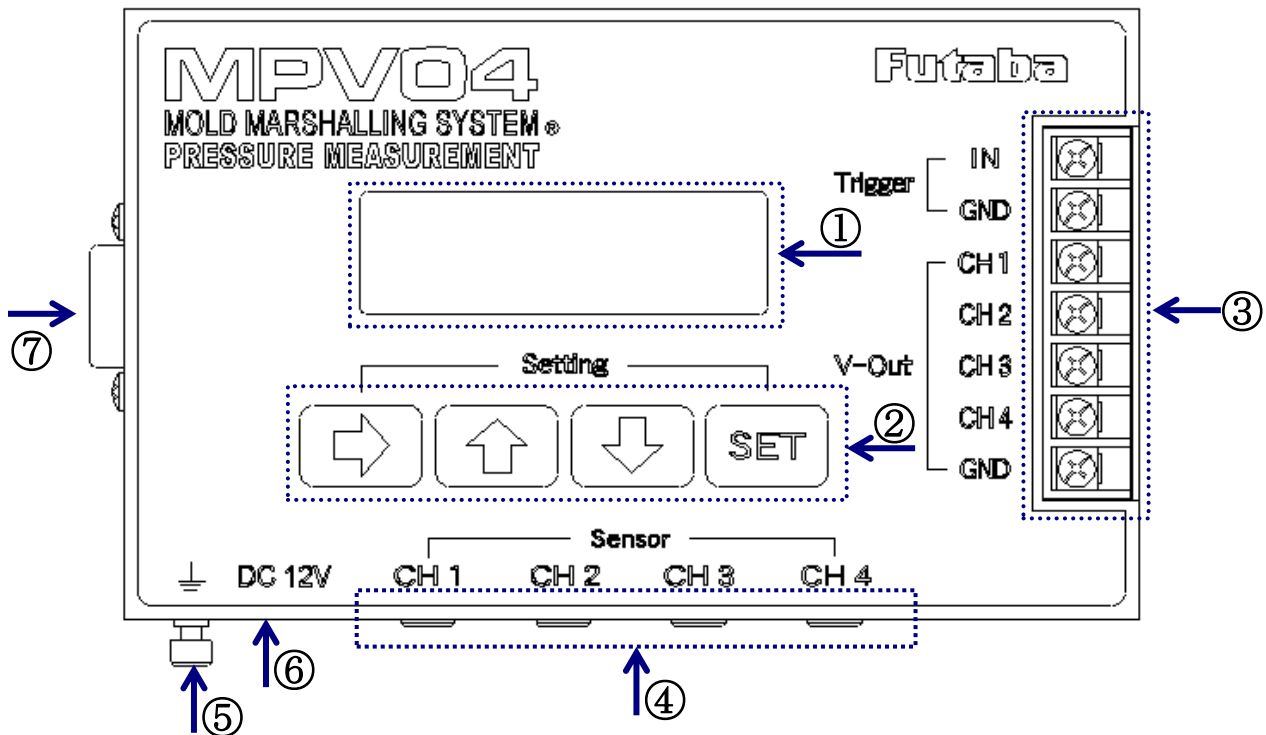
The following figure shows a system configuration that measures pressure inside the mold using Mold Marshalling system “MPV04 series”.



The MPV04 can connect four sensors and measure all the sensors simultaneously. The values measured at 1 ms sampling period are continuously output as voltage (0-10V, 20MPa/V). Capturing this voltage into commercially available measuring equipment such as a data logger, etc. allows you to observe pressure waveforms, set molding conditions and keep track of molding status.

1. Names and Major Functions of Components

1-1 Front



	Name	Function	
①	Display panel	Displays the status and settings of the MPV04.	
②	Control key	"→" key	Changes the display content, moves the cursor.
		"↑", "↓" key	Changes the setting.
		"SET" key	Fix the setting changed. Input a trigger signal manually.
③	Input output terminal block	Trigger IN	Trigger signal input terminal + side.
		Trigger GND	Trigger signal input terminal GND side.
		V-Out CH1	CH1 analog voltage output terminal + side.
		V-Out CH2	CH2 analog voltage output terminal + side.
		V-Out CH3	CH3 analog voltage output terminal + side.
		V-Out CH4	CH4 analog voltage output terminal + side.
		V-Out GND	Analog voltage output terminal GND side (common for all the V-Out channels)
③	Sensor jack	Pressure sensors can be connected to CH1-CH4 jacks.	
④	Grounding (earth) terminal	Terminal for functional ground	
⑥	Power jack	Jack for dedicated adapter. Supplies power to MPV04.	
⑦	Communication port for maintenance	Communication port used for maintenance.	

2. Preparation

This section explains the preparation required before turning on the power.

2-1 Installing the System

2-1-1 Installing the pressure sensor

Install the pressure sensor (SSE series or SSB series of Futaba Corporation) on the mold. For the procedure for installing the sensor on the mold, refer to the catalog or “Pressure sensor installation reference diagram” attached to the purchased sensor.

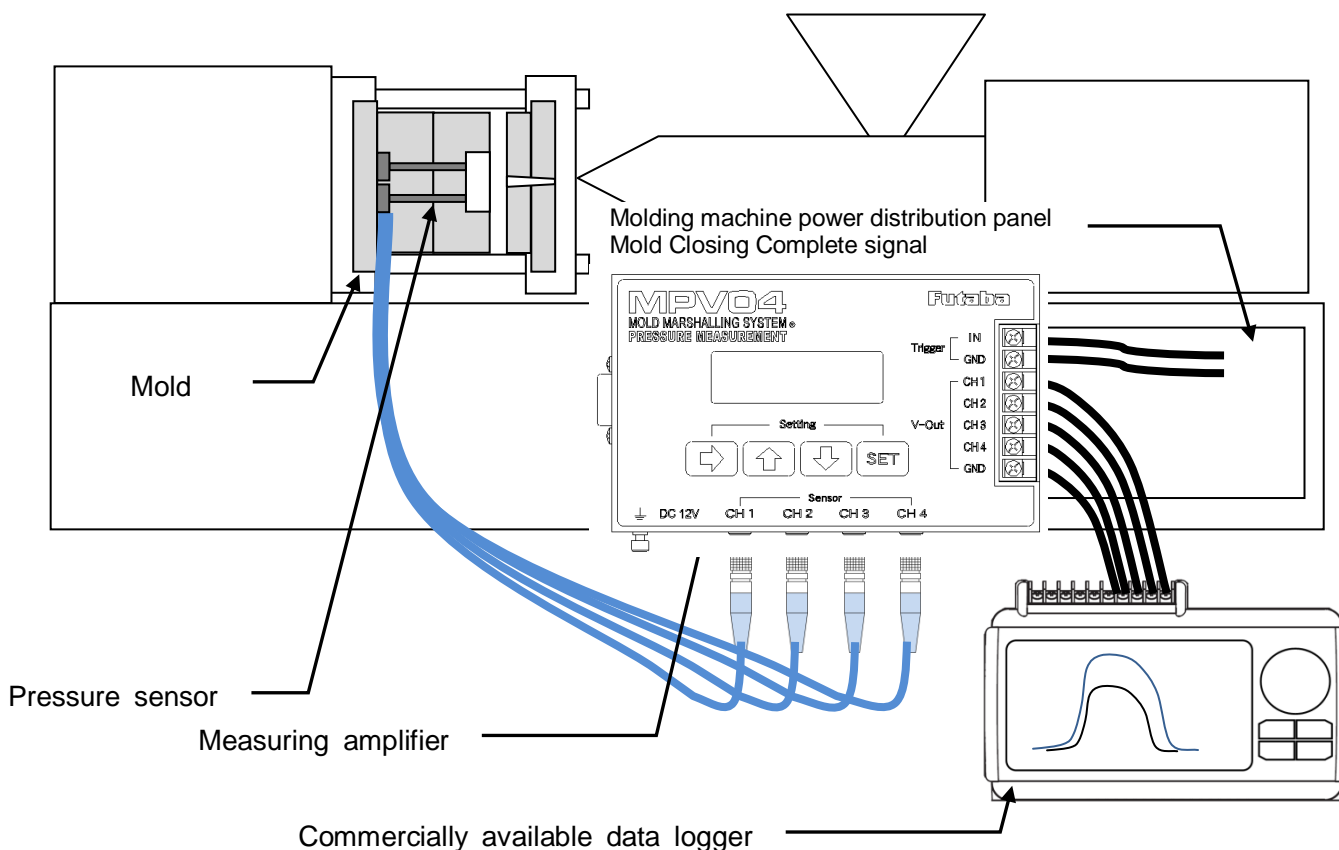
2-1-2 Installing the amplifier

Place the amplifier on the level surface. Note that the operating temperature ranges from 0 to 50°C. Install it at the appropriate place while taking into count the molding behaviors such as opening and closing movements of the mold and ejector protrusion, etc.

Wire the cable while ensuring there is no crush, torsion or tension in the cable.

Also, take care not to wet the cable.

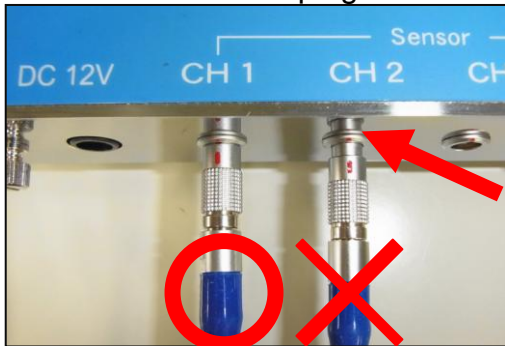
* If the routing of wiring is inappropriate, the cable may get pulled, not only preventing normal measurement but also causing equipment breakdown.



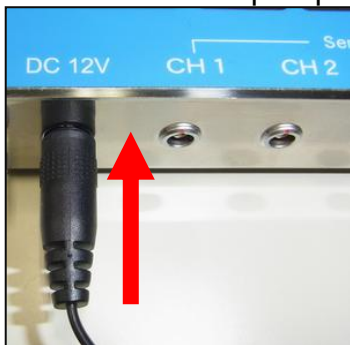
- Connect the components in order of the number shown below.
Operate the amplifier after completing the connections ① to ⑥.

① Connect the sensors to MPV04.

While aligning the red marks on each of the MPV04 jack and sensor plug, insert the plug. Ensure that the sensor plugs are inserted to the bottom.



② Connect the AC adapter power jack to the MPV04.



③ Connect the trigger signal (→Page 7 to 8)

Input Mold Closing Complete signal (contact signal). Connect the signal to the Trigger IN and GND on the terminal block. By shorting the two terminals, a zero reset is performed. Wire the cable so that the length of the cable becomes 3 m or less.

④ Connect output signal (voltage output) to external measuring equipment (→Page 9)

The output impedance of the MPV04 is 100Ω. Use the measuring equipment, including an oscilloscope and data logger, that has a high impedance (1 MΩ or higher as a guide). Wire the cable so that the length of the cable becomes 3 m or less.

⑤ Connect the power supply

Plug the supplied AC adapter for supplying power into the 100-240 VAC outlet.

⑥ Connect the grounding terminal)

The grounding terminal is designed for the grounding called “functional ground” that is meant to ensure stable operation. When measurement conditions are unstable or there are many noises, use this terminal by connecting it to appropriate place.

2-3 Connecting the I/O Signal

The size of the connection screws for wiring the terminal block is M3.

Select the solderless terminal appropriate to the size of the cable used.

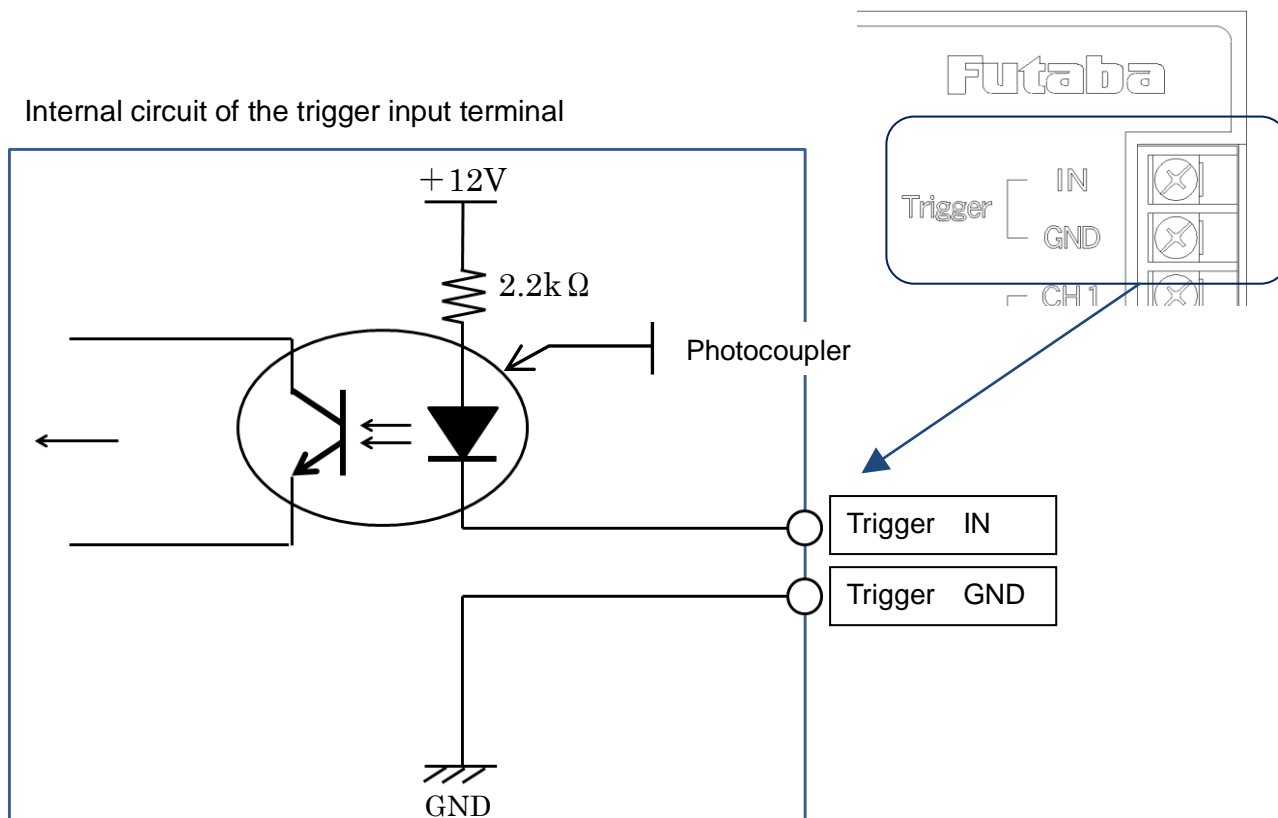
Wire the cable so that the interconnection length from the amplifier becomes 3 m or less.

2-3-1. Notes on trigger signal


- Under normal conditions, connect the “Mold Closing Complete” signal as a trigger.
- In conjunction with the trigger signal, the MPV04 performs a “zero reset”. It also cancel a zero-point drift caused by temperature changes at the same time. Therefore, be sure to input the trigger signal for use.
- Upon input of the trigger, a zero reset is performed. Therefore, be sure to input the trigger signals under the conditions with no pressure loaded to the sensor.
- Even when you cannot connect a trigger signal, you can perform a zero reset by pressing the “SET” button.
- It takes about 1 second to perform a zero reset by pressing the SET button whereas a zero reset performed by inputting a trigger signal from the terminal block takes about 0.03 seconds.
- As the value of the zero reset performed by inputting a trigger signal from the terminal block is stored in the volatile memory, the zero-point value is cleared when this equipment is restarted.
- In the case of the zero reset performed by pressing the “SET” button on the unit, the value is stored in the internal non-volatile memory. Therefore, the zero-point value is retained even after the MPV04 is restarted.
- As signals are detected through the contact input, do not input a voltage.

< Internal circuit >

The following figure shows the internal circuit of the trigger input terminal. The terminal uses a photocoupler to transfer (input) a signal when two terminals are shorted.

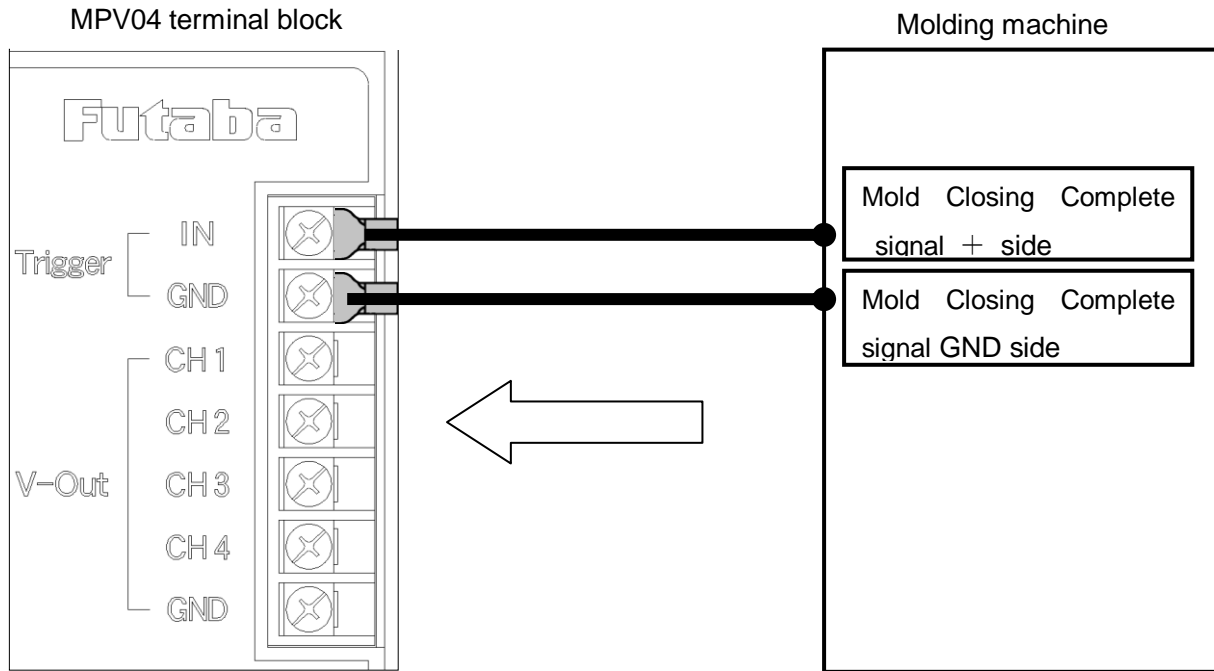


2-3-2. Connect the trigger signal

 Input the trigger signal via the electromechanical (contact) relay.
Do not apply voltage.

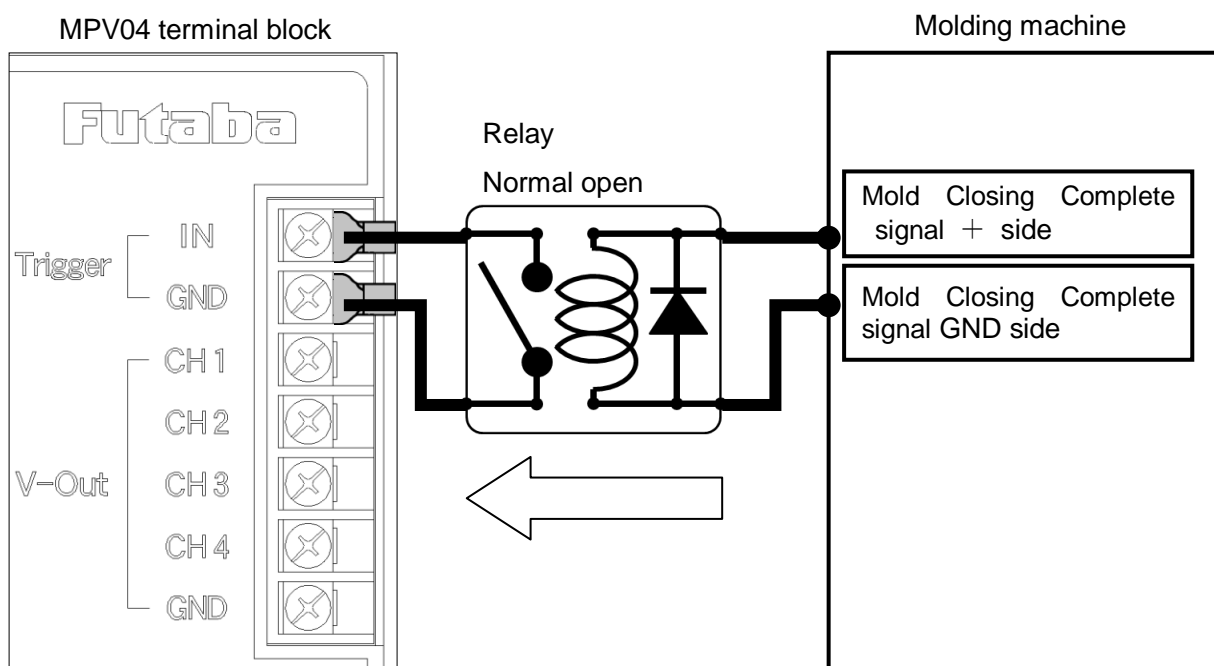
■ Wire the cable by referring the following.

● When the output signal of the molding machine is contact signal



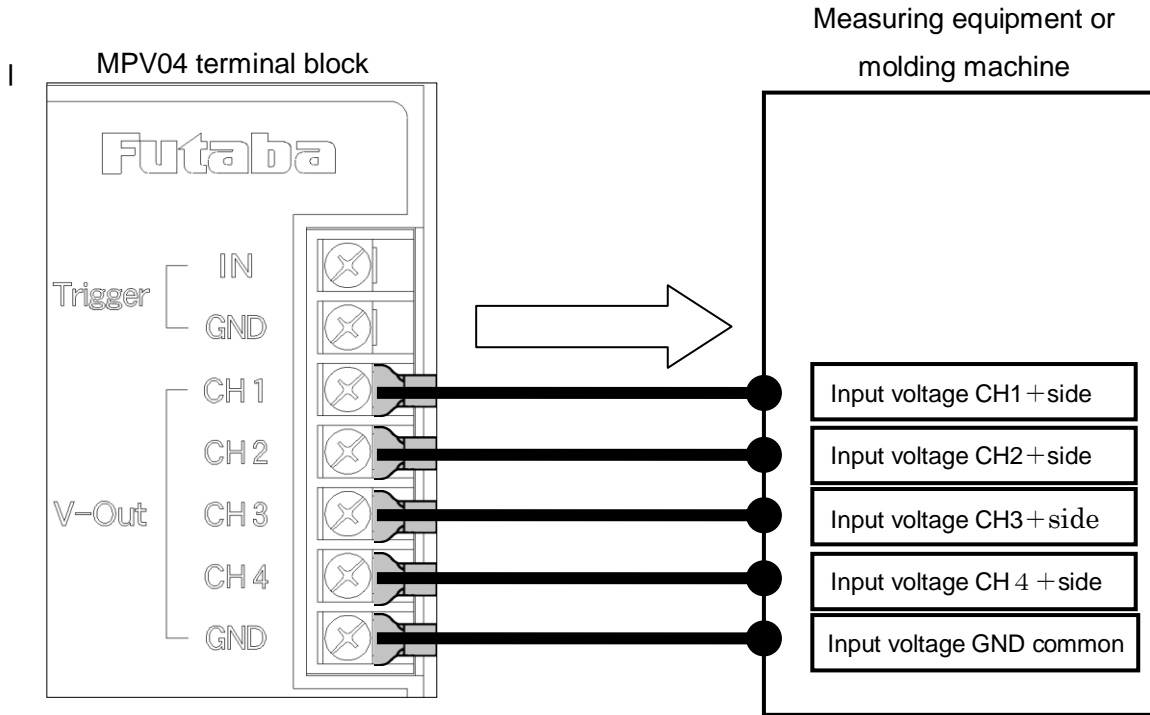
● When the output signal of the molding machine is voltage signal

When the output of the molding machine is voltage output, connect the signal after converting the voltage signal to the contact signal by using a relay. Use a relay equipped with the coil surge absorption circuit.



2-3-3. Connect the output signal (voltage output)

The values measured by the MPV04 and pressure sensors are output as voltage signals. The values measured with a 1ms sampling period and calculated as pressure values are converted to voltage output at the ratio of 10V per 200 MPa (10V/200MPa). Capturing this voltage into oscilloscope, data logger and molding machine allows you to observe and make use of the in-mold pressure waveforms.



2-4 Connecting the Power Supply

■ Supply power to this equipment through the AC adapter that comes with this equipment.

* The amplifier does not have a power switch. Never turn power on or off by connecting or disconnecting the I/O cable. It could damage not only the amplifier and AC adapter but also other devices connected.

■ Check the supply voltage before connecting the AC adapter to the AC power source.

The operating voltage of the AC adapter is 100 to 240VAC, 50/60Hz.

* If the supply voltage is out of the above voltage range or each terminal voltage of the power supply has higher potential than the supply voltage against the ground, never connect it to this equipment. It could cause failure or accident.

3. Basic Operation of Amplifier

This section describes the basic operation of amplifier “MPV04”.

3-1 Turning Power ON/OFF

■ Turning power ON

Turn on the power to the amplifier by referring to Section 2-4 “Connecting the Power Supply” (→ Page 9)

■ Turning power OFF

Disconnect the AC plug of the AC adapter from the AC outlet.

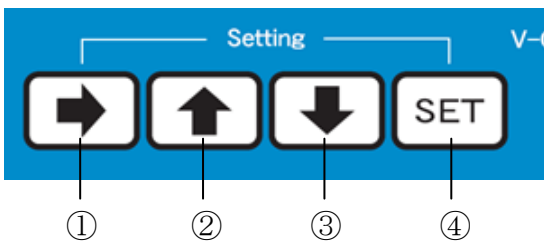
* The amplifier does not have a power switch. Never turn on or off by connecting or disconnecting the I/O cable. It could damage not only the amplifier and AC adapter but also other devices connected.

3-2 Operating the Amplifier

3-2-1 Operating the key switches

■ Operate the keys on the amplifier as needed in the following cases.

- When checking or changing each sensor CH settings or version information, etc., which are set in the amplifier
- When performing a zero reset manually



①	“→” key	Feeds the display screen or moves the cursor position
②	“↑” key	Moves to the display window for changing the sensitivity class.
③	“↓” key	Used to change the setting.
④	“SET” key	Fixes the change made. At the same time, the change is stored in the memory and a zero set is performed.

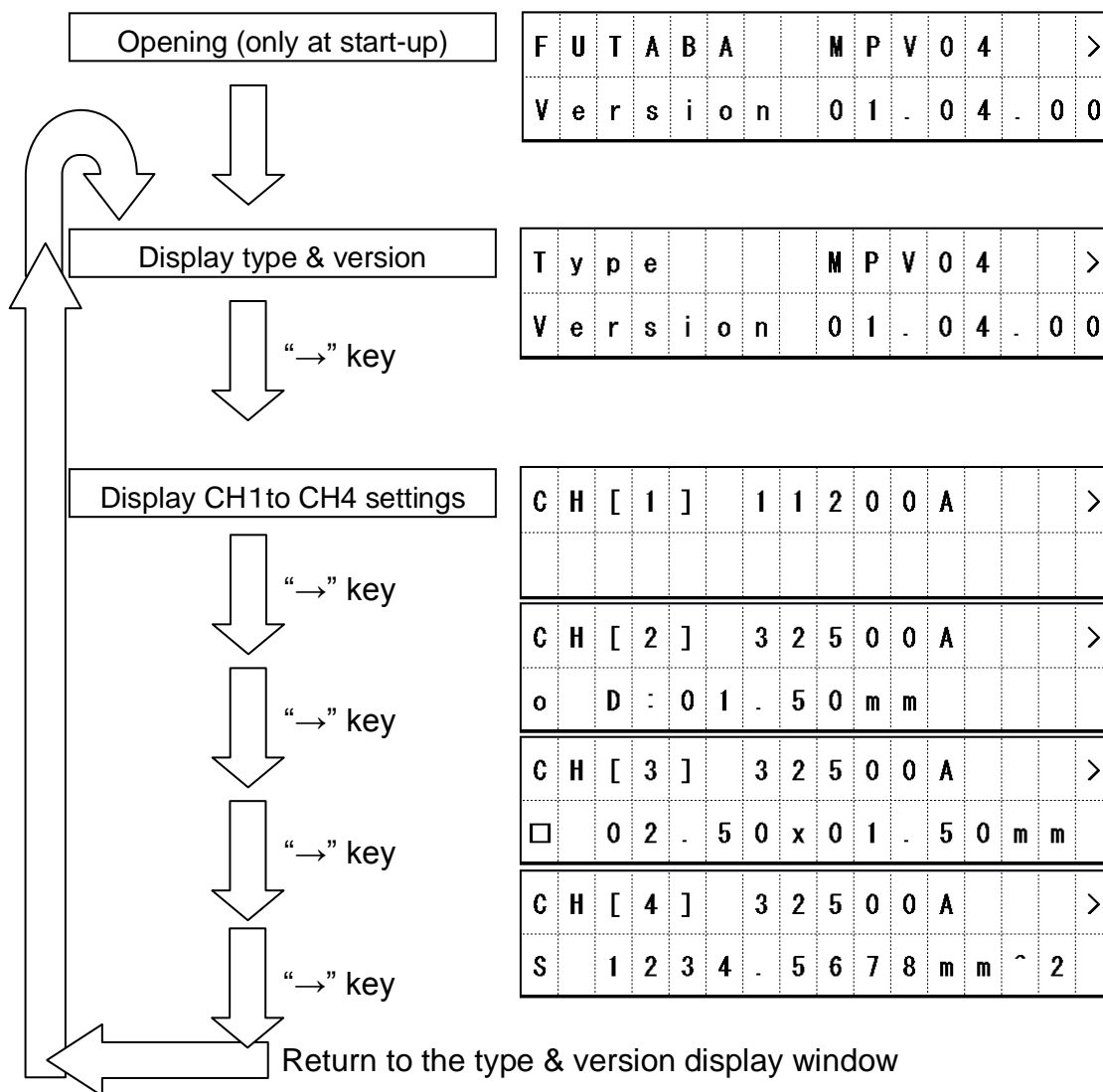
3-2-2 Checking the display window

When the power is turned on, the display panel window on this equipment shifts as follows.

■ Shifting of the display window

The windows shifts in the following order.

After the opening is finished, switch the display contents by using “→” key.



※The version of the MPV04 is current as of October 2014. It is subject to change without prior notice.

4. Basic Operation

4-1 Setting the Sensor Sensitivity Class

The MPV04 allows you to make measurements by connecting pressure sensors. To adjust any variance of sensors, a series of values called a sensitivity class should be entered on the MPV04 as shown below before use. The sensitivity class is indicated on the label attached to the sensor connector (see right figure).



T	y	p	e					M	P	V	0	4		>	
V	e	r	s	i	o	n		0	1	.	0	4	.	0	0



C	H	[<u>1</u>]				1	4	0	0	0	A		>
---	---	---	----------	---	--	--	--	---	---	---	---	---	---	--	---



C	H	[1]				<u>1</u>	4	0	0	0	A		>
---	---	---	---	---	--	--	--	----------	---	---	---	---	---	--	---

C	H	[	1	]				5	4	0	0	0	A		>
o	D	:	0	3	.	0	0	m	m						



C	H	[<u>2</u>]				1	1	3	0	0	A		>
---	---	---	----------	---	--	--	--	---	---	---	---	---	---	--	---

C	H	[<u>3</u>]				2	2	5	0	0	A		>
---	---	---	----------	---	--	--	--	---	---	---	---	---	---	--	---

C	H	[<u>4</u>]				2	2	5	0	0	A		>
---	---	---	----------	---	--	--	--	---	---	---	---	---	---	--	---



C	H	[	<u>4</u>	]				2	2	5	0	0	A		>
E	E	P	R	O	M			W	R	I	T	E		O	K

T	y	p	e					M	P	V	0	4		>	
V	e	r	s	i	o	n		0	1	.	0	4	.	0	0

Press “↑” and “↓” keys to select the channel to be set.

Press “→” key to move the cursor to the position to enter the sensitivity class and change the value by using “↑” and “↓” keys. The digit to be set is underlined. For a button type pressure sensor, an “area of load” input item is displayed in the lower row.

Press “→” key to return the cursor to the channel selection window. Use “↑” and “↓” keys to switch the channel to continue to enter the sensitivity class for all the sensors.

After the settings of all the channels are completed, press “SET” key to fix and reflect the changes.

A message “EEPROM WRITE OK” is displayed in the lower row, and then the window shifts to the version display screen.

5. Using the System

The previous operations have finished the necessary preparation. Now, the user can run the system and observe pressure waveform.

5-1 Starting Measurement

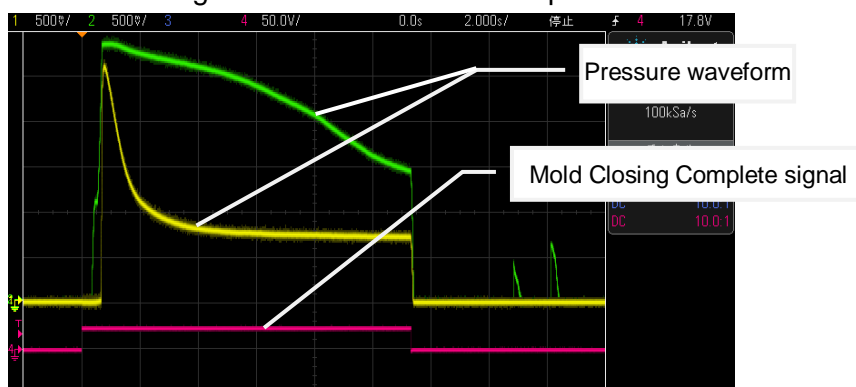
Now, the system is completely ready to observe waveforms.

- Measurement of pressure waveforms begins when a trigger signal (measurement start signal) is input from the molding machine.

* A trigger signal can also be input manually by pressing the SET key of the amplifier. However, it is hard to press the SET key every time according to the operation of the molding machine. Consider this manual operation as an emergency response.

5-2 Observing Pressure Waveforms

Capturing the output voltage into an external equipment allows you to observe the pressure waveforms. The figure below shows an example of a measurement made with an oscilloscope.



*** If waveforms are not displayed, check the following.**

- ① Has resin reached the sensor?
→ Check the molded parts and the sensor mounting position.
- ② Is the system connected correctly? (sensors, power supply, trigger signal, cables for output voltage)
→ Check the connections by referring to Section 2-2 “Connections in System” (→ Page 6)
- ③ Has a trigger signal been input properly?
→ Has a trigger signal been input properly and is the “ZERO ADJUSTMENT” message displayed in the lower row on the display panel window?
→ Is the timing of the trigger input correct?
→ Has a contact signal been input?
→ Has a trigger signal been input with no load applied to the pressure sensor?
- ④ Isn't the sensor damaged?
→ Open- or short-circuit of the cable can be checked easily using a multimeter connection cable (sold separately).
→ Is there any open-circuit or connector damage, etc.?

6. Checking the Operation

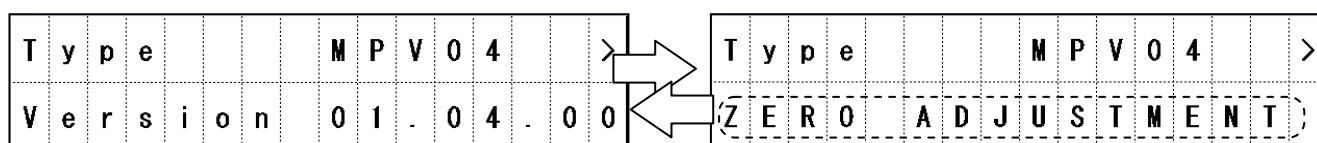
This section explains how to check whether the system runs normally.

6-1 Checking a Trigger Input Signal

Check whether the connected input signal works normally.

■ Checking the operation of input signals

Input a trigger signal. If it is input normally, the message in the lower row on the display panel of the main unit changes as shown below, and then returns to the original display.



6-2 Checking the Output Signal

■ Checking the operation of output signal

If “waveforms are not displayed” or “the pressure value is too low (or too high)” and you think that a pressure sensor is faulty, it is recommended to calibrate the sensor. Sensor calibration is available for a fee. Please contact the nearest Futaba Sales office (written on back cover).

6-2-1 Quick sensor checking

Follow the procedure below to check the operation of a sensor with it installed in the mold.

- ① Simply check whether a pressure sensor is operating normally.
 - With the mold opened, protrude an ejector pin, and perform a zero reset manually. Then, push the tip of an ejector pin that has a pressure sensor connected to it by hand or with some tool to check whether the waveform fluctuates up and down, reacting to the pushing force.
- ② Check the accuracy of a pressure sensor
 - Prepare a load measuring device called push-pull gauge. With the mold opened, perform a zero reset of both the MPV04 and push-pull gauge. Then, push the tip of an ejector pin that has a sensor connected to it with the push-pull gauge to measure the load. Calculate the pressure value that should be detected when the load is applied, compare it with the measured value and check whether the difference is within the accuracy specification range.

The following table shows the load that corresponds to a pressure of 100 MPa for each pin diameter case. If you apply one tenth of the indicated load, $100\text{MPa} \times (1/10) = 10\text{MPa} (=0.5\text{V})$ will be output.

Area of load pin diameter [mm]	φ0.8	φ1.0	φ1.2	φ1.5	φ2.0	φ2.5	φ3.0
Load at 100MPa [kfg]	5.13	8.01	11.53	18.02	32.04	50.06	72.08
Load at 100MPa [N]	50.27	78.54	113.10	176.71	314.16	490.87	706.86

7. Measuring with an External Measuring Device

The pressure measuring amplifier MPV04 can output voltage according to the pressure value. This section explains how to connect the system to an external measuring device and view pressure waveforms.

7-1 Connecting an External Measuring Device

- Connect the input port of an external measuring device to the MPV04 output voltage (terminal board).

The size of the connection screws for wiring the terminal block is M3.

7-2 Setting the External Measuring Device

Set the voltage collection conditions of the external measuring device by referring to the following.

The MPV04's sampling and data updating interval is 1 ms. Set the sampling speed commensurate with the waveforms on the external measuring device to obtain data.

< Ratio of measured pressure value to output voltage >

- A measured value of 1 MPa is output as 50 mV voltage (Voltage output range: 0 to 10 V)

Measured pressure value		Output voltage
200 MPa	→	10 V
100 MPa	→	5 V
50 MPa	→	2.5 V
20 MPa	→	1 V

7-3 Observing Pressure Waveforms

Observe and log pressure waveforms with a data logger, etc.

Observing in-mold resin pressure allows you to keep track of the molding status or analyze the resin behavior when a defective molded product is produced.

The use of an alarm function of a data logger also help you to determine whether the molded product is good or bad. As the performance of the alarm function depends on the specifications of the data logger, refer to the instruction manual of your data logger.

8. Reference

8-1 Sensitivity Class Conversion Table for Older Pressure Sensor (EPS Series)

- Here is a sensitivity class conversion table for using older pressure sensors (EPS series) and a conversion adapter (ACAE01).

EPS sensitivity class	Sensitivity class input value
B A	12000A
B B	12040A
B C	12080A
B D	12120A
B E	12160A
B F	12200A
B G	12240A
B H	12280A
B I	12320A
B J	12360A
B K	12400A
B L	12440A
B M	12480A
B N	12520A
B P	12560A
B Q	12600A
B R	12640A
B S	12680A
B T	12720A
B U	12760A
B V	12800A
B W	12840A
B X	12880A
B Y	12920A
B Z	12960A
C A	13000A
C B	13040A
C C	13080A
C D	13120A
C E	13160A
C F	13200A
C G	13240A
C H	13280A
C I	13320A
C J	13360A
C K	13400A
C L	13440A
C M	13480A
C N	13520A
C P	13560A
C Q	13600A
C R	13640A
C S	13680A
C T	13720A
C U	13760A
C V	13800A
C W	13840A
C X	13880A
C Y	13920A
C Z	13960A

EPS sensitivity class	Sensitivity class input value
D A	14000A
D B	14040A
D C	14080A
D D	14120A
D E	14160A
D F	14200A
D G	14240A
D H	14280A
D I	14320A
D J	14360A
D K	14400A
D L	14440A
D M	14480A
D N	14520A
D P	14560A
D Q	14600A
D R	14640A
D S	14680A
D T	14720A
D U	14760A
D V	14800A
D W	14840A
D X	14880A
D Y	14920A
D Z	14960A
E A	15000A
E B	15040A
E C	15080A
E D	15120A
E E	15160A
E F	15200A
E G	15240A
E H	15280A
E I	15320A
E J	15360A
E K	15400A
E L	15440A
E M	15480A
E N	15520A
E P	15560A
E Q	15600A
E R	15640A
E S	15680A
E T	15720A
E U	15760A
E V	15800A
E W	15840A
E X	15880A
E Y	15920A
E Z	15960A

EPS sensitivity class	Sensitivity class input value
J A	22000A
J B	22040A
J C	22080A
J D	22120A
J E	22160A
J F	22200A
J G	22240A
J H	22280A
J I	22320A
J J	22360A
J K	22400A
J L	22440A
J M	22480A
J N	22520A
J P	22560A
J Q	22600A
J R	22640A
J S	22680A
J T	22720A
J U	22760A
J V	22800A
J W	22840A
J X	22880A
J Y	22920A
J Z	22960A
K A	23000A
K B	23040A
K C	23080A
K D	23120A
K E	23160A
K F	23200A
K G	23240A
K H	23280A
K I	23320A
K J	23360A
K K	23400A
K L	23440A
K M	23480A
K N	23520A
K P	23560A
K Q	23600A
K R	23640A
K S	23680A
K T	23720A
K U	23760A
K V	23800A
K W	23840A
K X	23880A
K Y	23920A
K Z	23960A

EPS sensitivity class	Sensitivity class input value
L A	24000A
L B	24040A
L C	24080A
L D	24120A
L E	24160A
L F	24200A
L G	24240A
L H	24280A
L I	24320A
L J	24360A
L K	24400A
L L	24440A
L M	24480A
L N	24520A
L P	24560A
L Q	24600A
L R	24640A
L S	24680A
L T	24720A
L U	24760A
L V	24800A
L W	24840A
L X	24880A
L Y	24920A
L Z	24960A
M A	25000A
M B	25040A
M C	25080A
M D	25120A
M E	25160A
M F	25200A
M G	25240A
M H	25280A
M I	25320A
M J	25360A
M K	25400A
M L	25440A
M M	25480A
M N	25520A
M P	25560A
M Q	25600A
M R	25640A
M S	25680A
M T	25720A
M U	25760A
M V	25800A
M W	25840A
M X	25880A
M Y	25920A
M Z	25960A

9. Specifications

■ List of specifications

<Pressure measuring amplifier MPV04>

Number of measurement points	4
Measurement range	0 to 200 MPa ※1
Accuracy	±2% F.S.
Sampling period	1 ms ※2
Control input	Non-voltage contact input
Analog output	0 to 10 V (corresponding to pressure 0 to 200 MPa) ※3 Output impedance: about 100 Ω
Sensors to be connected	SSE series, SSB series of Futaba Corporation (For EPS series, separately sold conversion adapter ACAE01 is required for each measurement CH)
Case material	SUS430
Operating temperature range	0 to +50°C
Operating ambient humidity	35 to 85%RH (no condensation)
Vibration resistance	10 to 55Hz, double amplitude 1.5 mm, 2 hours in each direction of X, Y, and Z
Warm-up time	About 30 minutes (recommended)
Power specifications	Dedicated AC adapter ES0012001 should be used. Input: 100 to 240 VAC (50/60 Hz), 0.3 A
Conformity standard	CE Compliant (applicable standard: EN61326-1)
Weight	About 510g

※1 The upper limit of the amplifier's measurement range changes depending on the pressure sensor's measurement range.

※2 This is a cycle at which data is sampled. 1 millisecond (ms) is 1/1000 of a second, 1000 samples of data is taken per second.

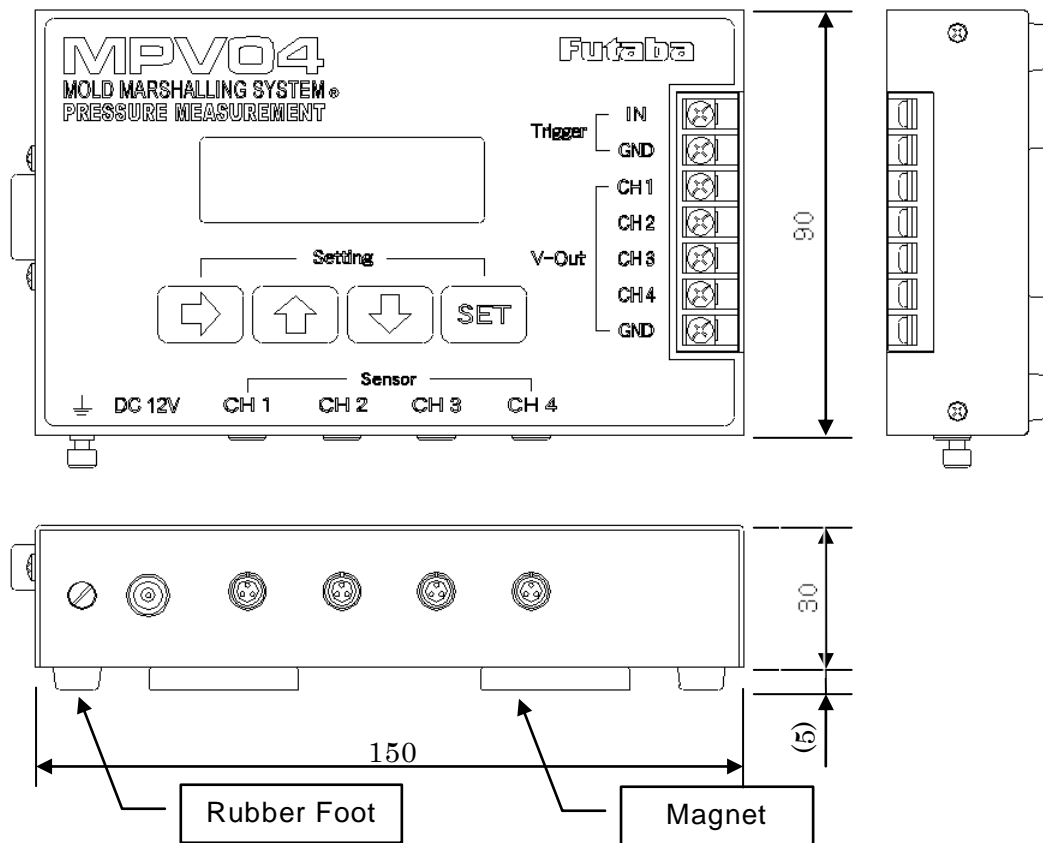
※3 The output voltage of 5 V corresponds to the in-mold resin pressure of 100 MPa.

<AC adapter ES0012001>

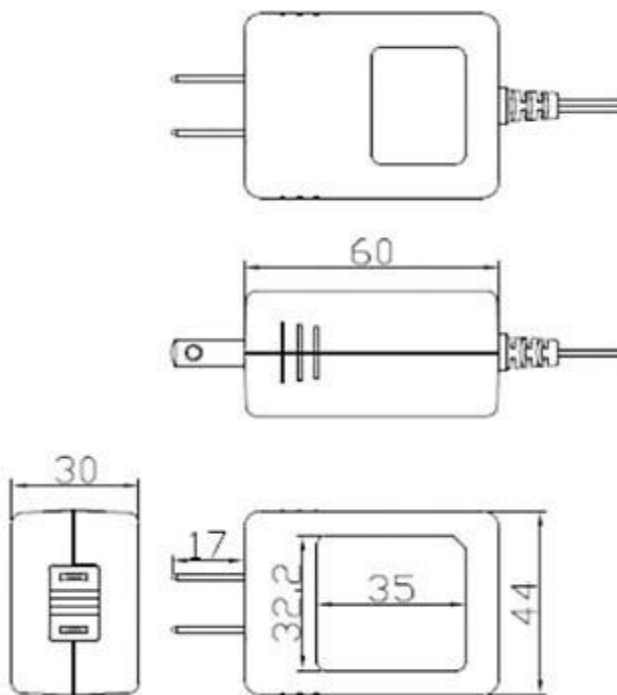
Total length	About 1,900 mm (DC cable length: about 1,800 mm)
Power specifications	Input: 100 to 240 V AC (50/60 Hz), 0.3 A Output: 12 VDC, 1.0 A
External dimension (main unit)	60×44×30 mm
Operating temperature range	0 to +40 °C
Operating ambient humidity	10 to 90 % RH (no condensation)
Output plug	DC plug EIAJ-4 (φ5.5×φ3.3×φ1.0 mm) Polarity: center plus Shape: straight
Weight	About 130 g

■ Outline drawing [Unit: mm]

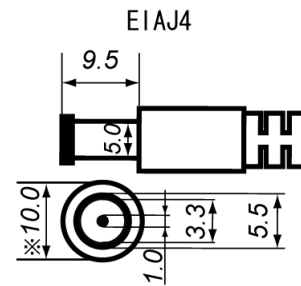
<Pressure measuring amplifier MPV04>



<AC adaptor ES0012001>



<DC plug of AC adaptor>



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The specifications may be changed for improvement without prior notice.

MPV04-1410X-A1E