

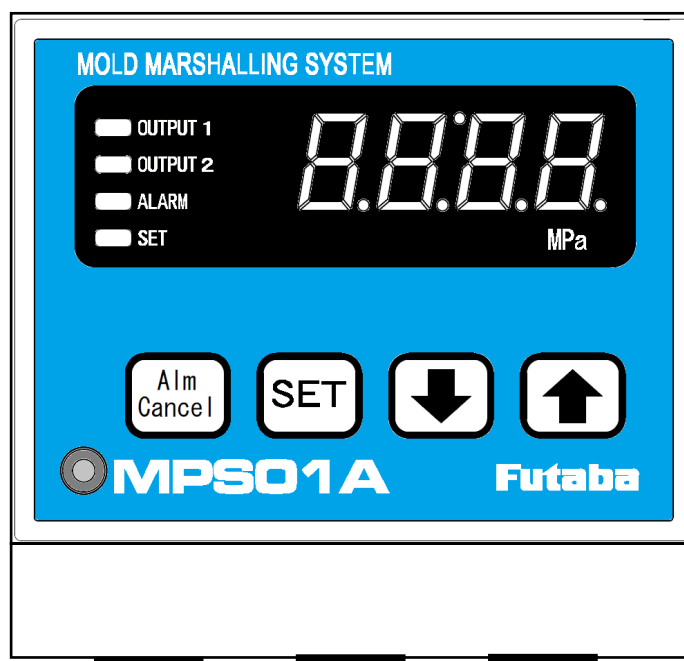
Mold Marshalling System for Measuring Resin Pressure inside Molds

Pressure measuring unit **MPSO1A**

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 the product in any way other than explained in this
instruction manual.



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Contents

Safety Precautions	
Preface	1
Standard Accessories	1
Handling Precautions	2
System Configuration	3
1. Names and Major Functions of Components	4
1-1 Operating Panel	4
2. Preparation	5
2-1 Installing the System	5
2-1-1 Installing the pressure sensor	5
2-1-2 Installing the measuring unit	5
2-2 Connecting the I/O Signal	5
2-3 Connecting the Power Supply	8
3. Basic Operation of Measuring Unit	9
3-1 Turning the Power ON/OFF	9
3-2 Operating the Measuring Unit	9
3-2-1 Setting measurement conditions	9
3-2-2 Setting sensor sensitivity	10
3-2-3 Setting alarm monitoring conditions	11
3-2-4 Setting control output signal	12
3-2-5 Operating the measurement window	14
3-2-6 Communication setting	16
4. Checking the Operation	17
4-1 Checking the I/O Signal	17
4-2 Checking the Operation of Sensors	17
4-2-1 Checking the connection of a sensor	17
4-2-2 Quick sensor checking	17
5. Measuring with an External Measuring Device	18
5-1 Connecting an External Measuring Device	18
5-2 Relationship between Output Voltage and Pressure Value	18
5-3 Observing Pressure Waveforms	18
6. Specifications	19
7. Appendix	21

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 read 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 the 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 product or connecting cables, be sure to disconnect the power cable from the outlet in advance.

Failure to do so could result in electric shock or malfunction.



WARNING

Do not use a broken cable or a cable with a flaw in the covering.

Doing so could result in fire, electric shock, or device damage or failure.



WARNING

Use an insulated stabilized power supply.

Keep the product away from the noise source as much as possible.



CAUTION

Do not soak the pressuring measuring unit and pressure sensors into water.

Doing so could result in electric shock or device damage.

Preface

“Mold Marshalling System MPS01A Series” is a system for measuring resin pressure inside injection molds using a strain gage pressure sensor of Futaba Corporation.

Using a separately sold measuring software allows you to observe pressure waveforms, store data, and set various conditions on the personal computers.

Major features are as follows:

- The system can display peak pressure, point pressure (pressure at t second point) and eject pressure values.
- It enables peak, point and eject pressure monitoring.
- It outputs an alarm signal when the measured waveform falls outside the preset alarm monitoring zone.
- It detects the arrival of the resin and outputs signals.
- Using a commercially available measuring device, it can display the waveforms of measured pressure based on the analog voltage output (ratio of 20MPa/V).
- It can transmit log data to external devices (PC, PLC) using RS-485 communication standard.
- It has a self-diagnosis function capable of detecting a broken sensor cable and other system defects.

Standard Accessories

■ **This equipment comes with the following standard accessories.**

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

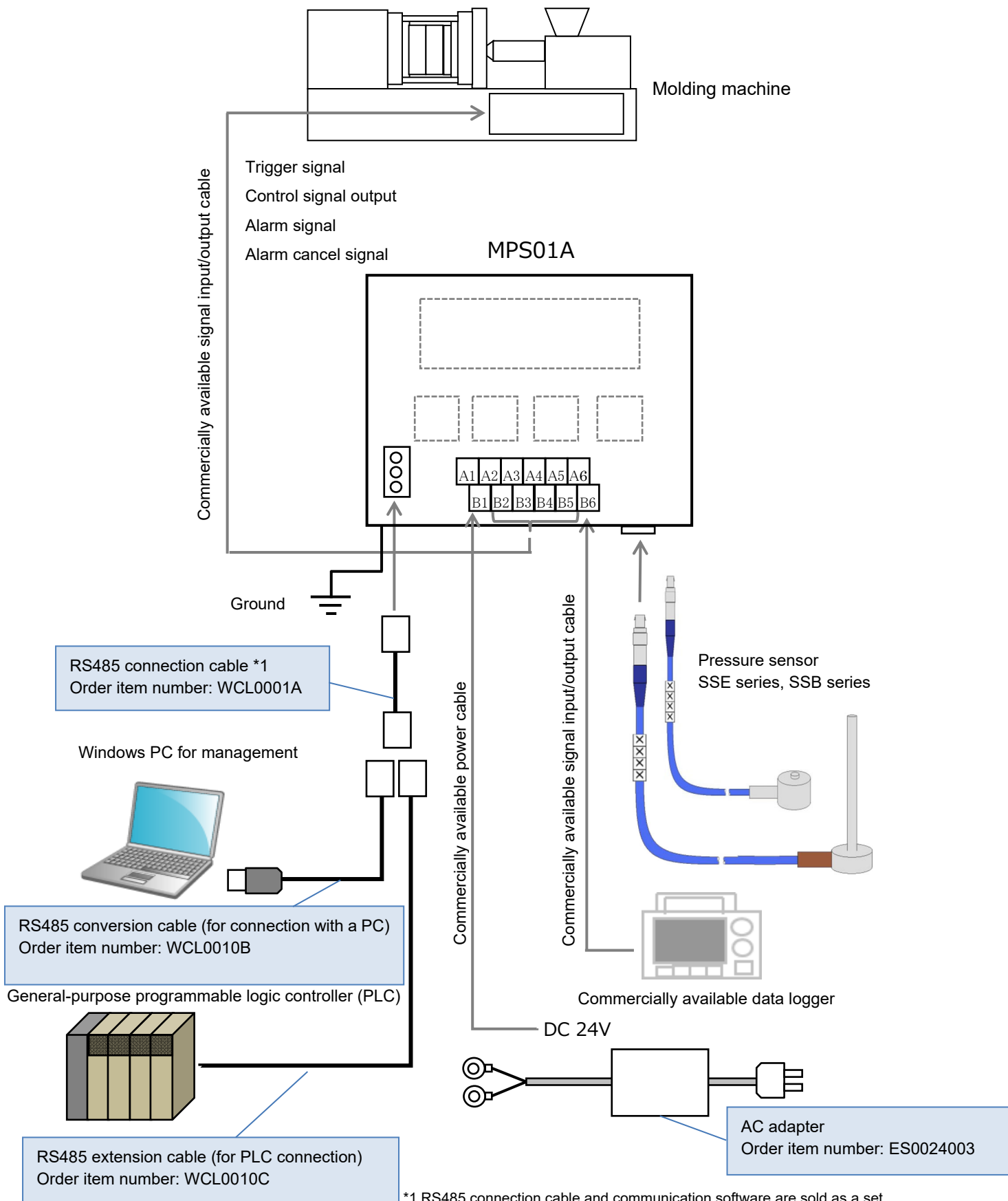
- Pressure measuring unit “MPS01A”1
- Instruction manual (this manual)1
- Warranty and Certificate of Registration1

Handling Precautions

- After making all the connections, turn on the power to the unit.
- 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.
- Warm up the system before use, for about 30 minutes after 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 unit but is not stored properly if the power is turned off soon after the setting operation.
- When measurement is performed, “zero point setting” is executed at the timing when the trigger signal is input from the molding machine.
- 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 (RH) 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. 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.
- 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 erroneous measurements.

System Configuration

The following figure shows a system configuration that measures pressure inside the mold using Mold Marshalling system “MPS01A”.

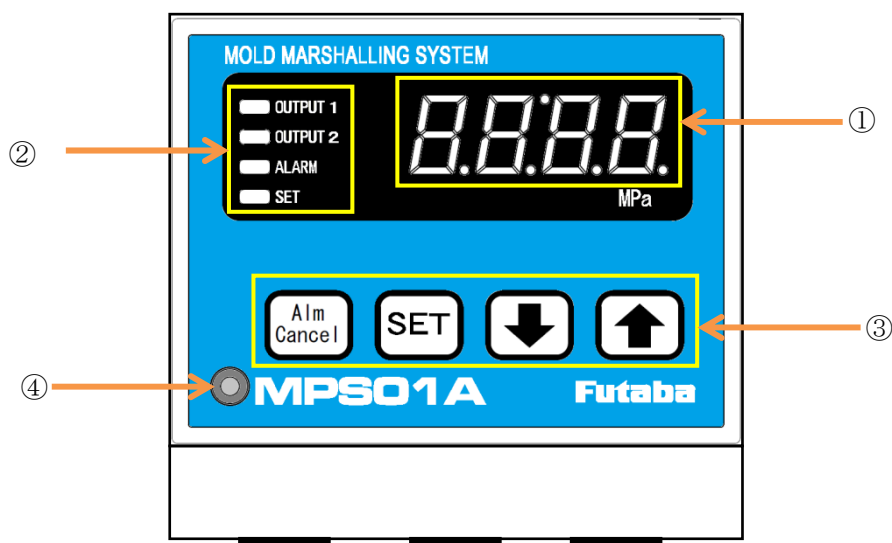


*1 RS485 connection cable and communication software are sold as a set.

*2 This unit is not bundled with an AC adapter because it is designed to enable a commonly used control power supply (24V DC) to connect to the terminal block.

1. Names and Major Functions of Components

1-1 Operating Panel



- ① Display panel.....Displays pressure measurements, setting values stored on the unit
- ② Lamp.....Shows status (see the figure below)
- ③ Control key.....Used to make various settings (see the figure below)
- ④ Cover fixing screw.....Used to open or close the cover

■ Overview of the keys and display

No.	Name	Key	Display color	Function description
1	Alm Cancel	○	-	Press this key to cancel the alarm.
2	SET	○	-	Press this key to start or change settings.
3	↓	○	-	Used to decrement setting values.
4	↑	○	-	Used to increment setting values.
5	OUTPUT 1	-	Red	Displays OUTPUT1 output status.
6	OUTPUT 2	-	Red	Displays OUTPUT2 output status.
7	ALARM	-	Orange	Displays alarm output status.
8	SET	-	Green/orange	Lit in green during setting. This key also displays control output status (in orange).
9	Number display	-	Red/green/orange	Displays measured values and setting values.

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

For the procedure for installing the sensors on the mold, refer to the “Pressure sensor installation reference diagram” supplied with the purchased sensor.

2-1-2 Installing the measuring unit

Install the measuring unit in a location where the display can be easily viewed, using the separately sold magnets or DIN rail mounting feet. Its operating temperature ranges from 0 to 50°C.

* Fix the unit at the position where it does not prevent the movement of the sensor cables.

2-2 Connecting the I/O Signal

Loosen the cover fixing screw, and open the operating panel.

Wire the cables at the terminal block on the unit according to the figure below.

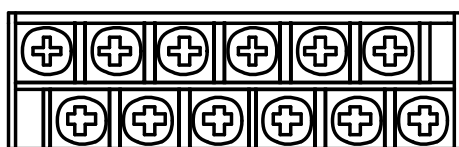
When closing the cover, be careful not to get the cables caught in it.

* In order to measure in-mold pressure waveforms, the trigger signal (Mold closing complete signal, etc.) needs to be connected.

* The customer is requested to cut a slit in the filmed grommet (black rubber) to allow the cable to run through it.

■ Terminal block pin connection

Upper tier A1 ----- A6



Lower tier B1 ----- B6

No.	Signal name	Remarks	No.	Signal name	Remarks
A1	0V	Power supply	B1	+24V	Power supply
A2	Alarm cancel		B2	Trigger input	
A3	Control signal		B3	Input COM	Common terminal (COM) for A2 and B2
A4	Alarm output 2 (Alarm 2)		B4	Alarm output 1 (Alarm 1)	
A5	Output COM	Common terminal (COM) for A3, A4, B4, and B5	B5	Alarm output 3 (Alarm 3)	
A6	Analog voltage output (-)		B6	Analog voltage output (+)	

* Pin assignment on the terminal block is also shown on the bottom surface of the operating panel.

<<What is the input signal?>>

The input signal means a signal input to the unit from an external device such as a molding machine or ejector machine.

■ Connecting the Trigger input signal

Input the Trigger signal from the injection molding machine in order to start measurement and perform pressure zero point adjustment.

Upon input of the Trigger signal, “zero point resetting” is performed.

Input the Trigger signal under the condition with no pressure loaded to the sensor.

Unless there is any specific reason, connect the “mold closing complete signal”.

- * It takes about 0.1 second for zero point resetting. If the injection start signal is used as a trigger, zero point resetting may not be finished in time and accordingly normal measurement may not be performed.

■ Trigger input terminal circuit specification

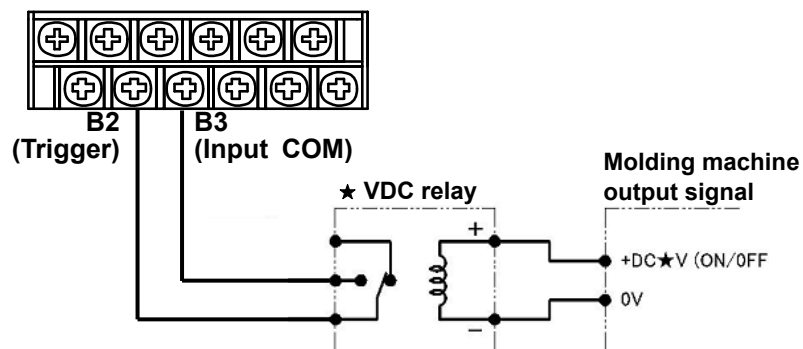


Input the signal to the measuring unit via a contact closure.
Do not apply voltage.

- ◆ When the output of the molding machine connected to the measuring unit is “voltage output”:
Connect the signal by using a relay adaptable to the output voltage of the output signal from the molding machine.

《Caution》 When using a contact relay, use a relay equipped with the coil surge absorption circuit.

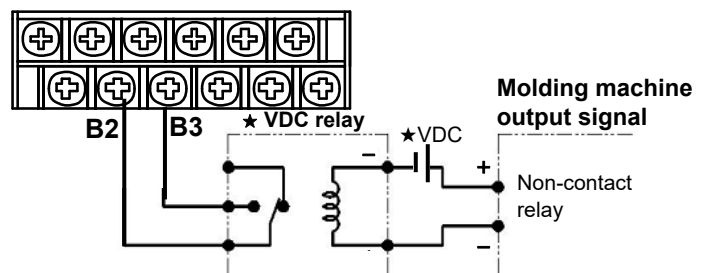
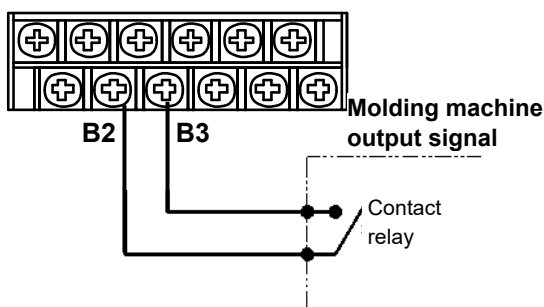
Connect the input signal using a relay when the molding machine output signal is ★VDC ON/OFF output.



- ◆ When the output of the molding machine connected to the measuring unit is “relay output”:

Example of connection using contact relay

Example of connection using non-contact relay



■ Connecting the alarm cancel input signal

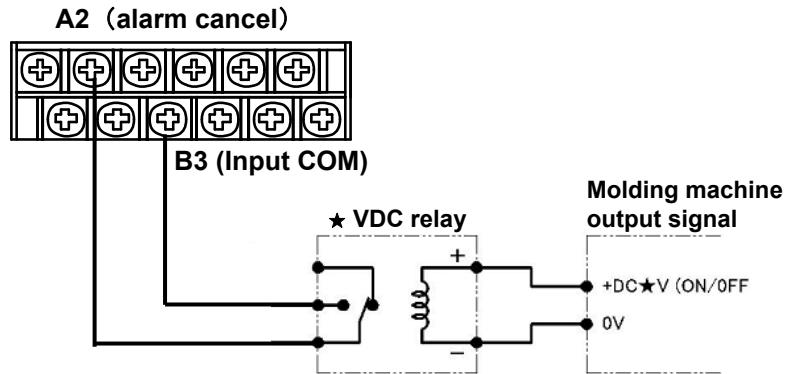
Connect the alarm cancel signal to cancel the alarm signal being output. Connect the signal as needed.

- * The alarm signal can be cleared by pressing the “Alm Cancel” key on the unit, or automatically by specifying the error cancel time “tEd”. If the alarm canceling with the key entry on the unit or the automatic clear at the specified time causes no operational problem, the connection of the alarm cancel signal can be omitted.

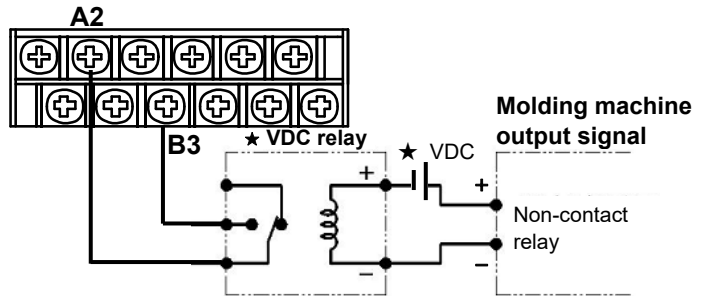
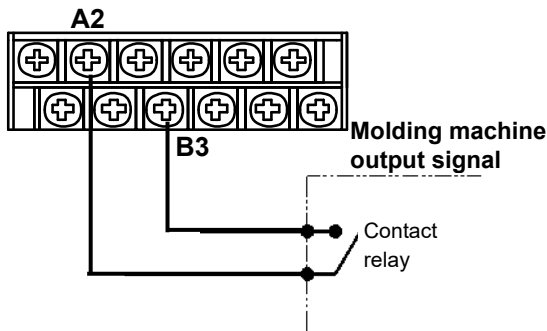
《Caution》 For the output terminal specifications of the external devices to which the alarm cancel signal is connected, refer to the instruction manuals of the respective devices.

- ◆ When the output of the molding machine connected to the measuring unit is “voltage output”:
Connect the signal by using a relay adaptable to the output voltage of the output signal from the molding machine.
《Caution》 When using a contact relay, use a relay equipped with the coil surge absorption circuit.

Connect the input signal using a relay when the molding machine output signal is ★ VDC ON/OFF output.



- ◆ When the output of the molding machine connected to the measuring unit is “relay output”:
Example of connection using contact relay Example of a connection using non-contact relay



<<What is the output signal?>>

The output signal means a signal output from the measuring unit to an external device such as a molding machine or ejector robot.

■ Connecting control output signal

A control signal is output when a specified pressure is reached. This signal is used to control the molding machine.

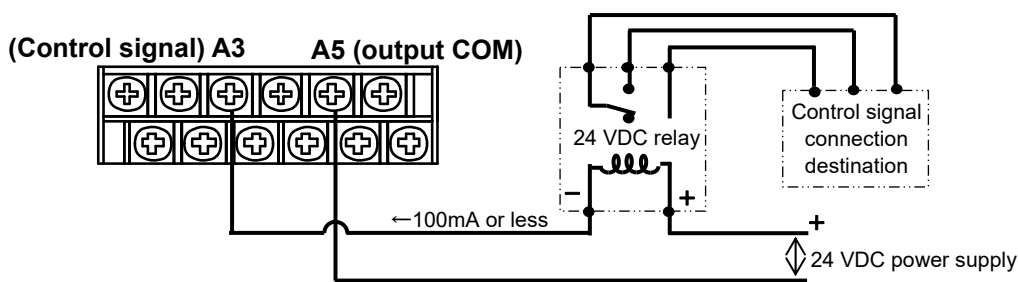
■ Output signal circuit specifications (control output signal)



The alarm output from the measuring unit is up to 100 mA (30 V or less) in the NPN open collector. Use the power supply with the negative side connected to the ground.

Example: Connect output signals using the 24 VDC power supply and 24 VDC relay.

- * When using a contact relay, use a relay equipped with the coil surge absorption circuit.



■ Connecting alarm output signal

Setting alarms allows you to output alarm signals to external devices (molded product ejector robot or warning buzzer). Select connection destinations in accordance with specific purposes.

- To check for defective products, connect this signal to the devices that can sort out products such as the shooter and ejector machine.
- To inform someone about the occurrence of alarms, connect this signal to the devices that can give warning such as lamp and buzzer.
- To stop the molding machine, connect this signal to the molding machine stop or emergency stop input.

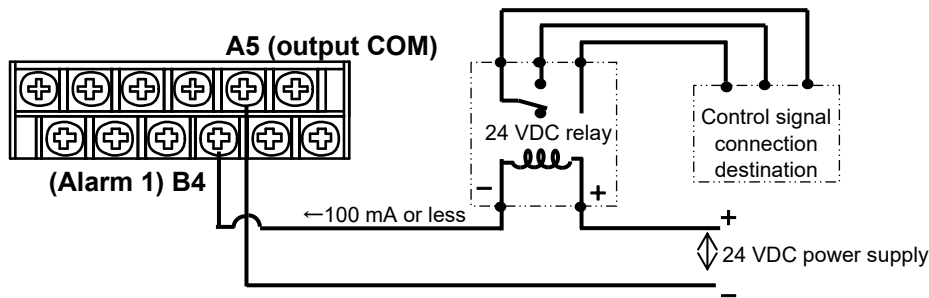
《Caution》 For the input terminal specification of the external devices to which alarm output signal is connected, refer to the instruction manuals of the respective devices.

- * Alarm monitoring can be set independently for each of the three points to output an alarm output signal to each point.

■ Output signal circuit specifications (alarm output signal)



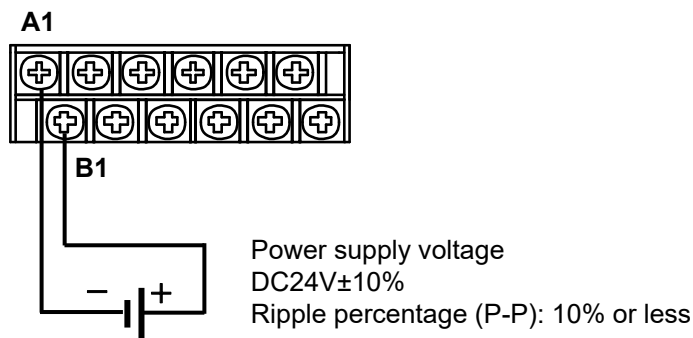
The alarm output from the measuring unit is up to 100 mA (30 V or less) in the NPN open collector. Use the power supply with the negative side connected to the ground.



2-3 Connecting the Power Supply

Make sure that the power supply is not energized.

Connect the 24 V cable from the power supply to B1 on the terminal block, and the 0 V cable to A1 on the terminal block.



WARNING

Do not turn on the power supply until all the wiring and connection procedures are fully completed. Doing so could result in electric shock, fire or failure.

- This unit does not have a power switch. The power switch should be installed separately by the customer.
- When the FG terminal is connected, be sure that the wire is grounded.
- Warm up the unit for 30 minutes or more after power on. Insufficient warmup could make measurements unstable.

3. Basic Operation of Measuring Unit

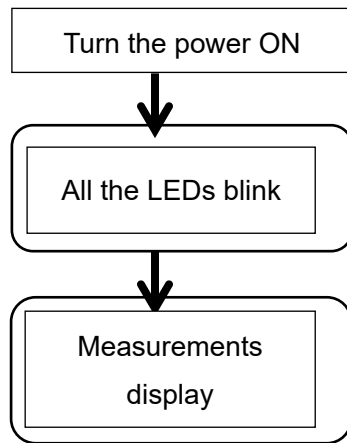
This section describes the basic operation of the measuring unit “MPS01A”.

3-1 Turning the Power ON/OFF

■ Turing the power On

Turn on the power to the measuring unit by referring to section 2-3, “Connecting the Power Supply”. (Page 8)

When the power is turned on, all the LEDs blink, and then measurements are displayed.



Note: If no sensor is connected, “Err0” code is displayed.

■ Turning the power OFF

Turn off the 24 VDC power supply.

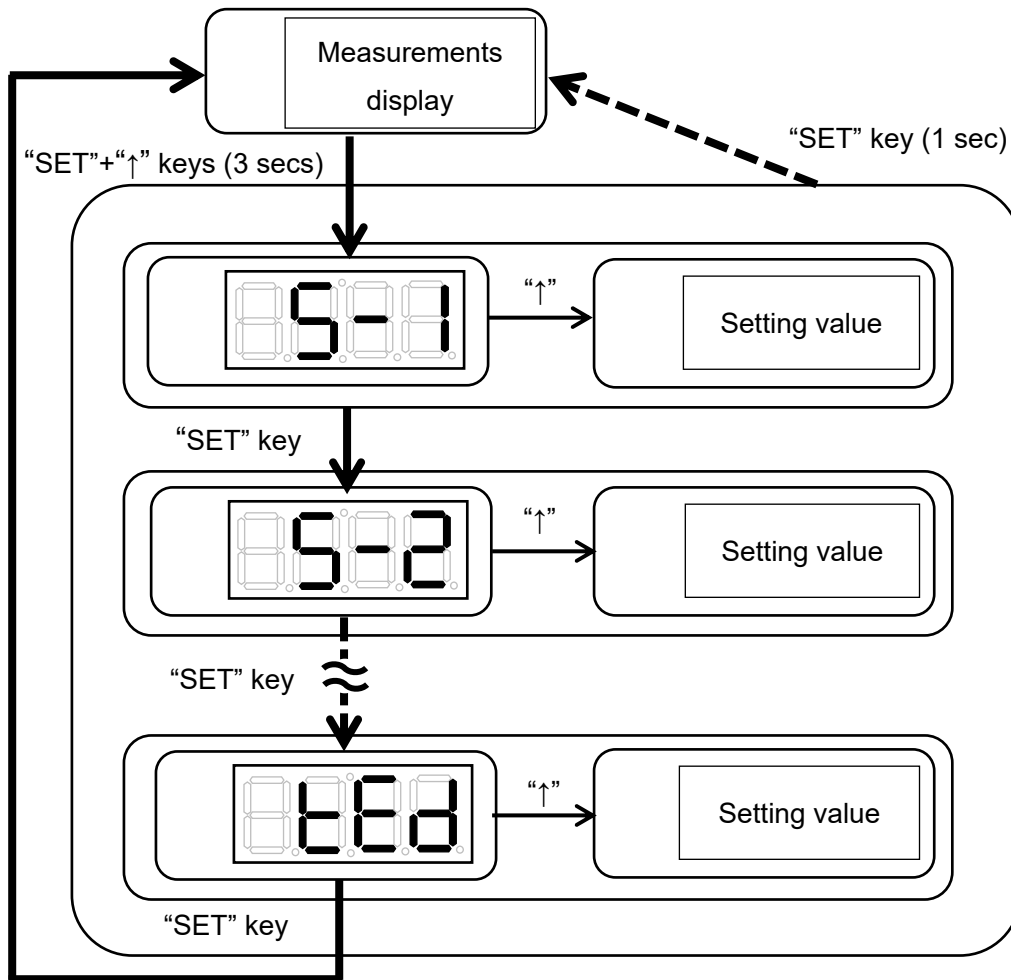
If the separately sold AC adapter is used, unplug the AC plug from the AC outlet.

3-2 Operating the Measuring Unit

3-2-1 Setting measurement conditions

Make initial settings by following the steps below:

- ① Hold down the “SET”+“↑” keys (for 3 seconds) to enter the setting window.
During the setting, the “SET” lamp is lit in green.
- ② When “S-1” is displayed in green letter, press the “↑” key to enter the input window.
Then, press the “↑” key or “↓” key to change the numerical values.
- ③ After completing the setting, press the “SET”. The system moves on to the second setting parameter, and “S-2” is displayed. In the same way, press the “↑” key to enter the input window and change the values. To speed up the increment or decrement of the values, hold down the “↑” or “↓” key.
- ④ Repeat the same steps for the subsequent parameters. For the details of the setting, refer to the “Initial Settings” section on Page 13. After the setting of parameter No.19, error cancel time is completed, the system returns to the measurement window.
To return to the measurement window half way through the setting process, hold down “SET” key (for 1 second). The conditions once set are saved on the unit.



3-2-2 Setting sensor sensitivity

■ Selection of sensor type and input of sensor sensitivity

The five-digit number and one-digit alphabet labeled on the sensor cable need to be input on the unit.



① ② ③

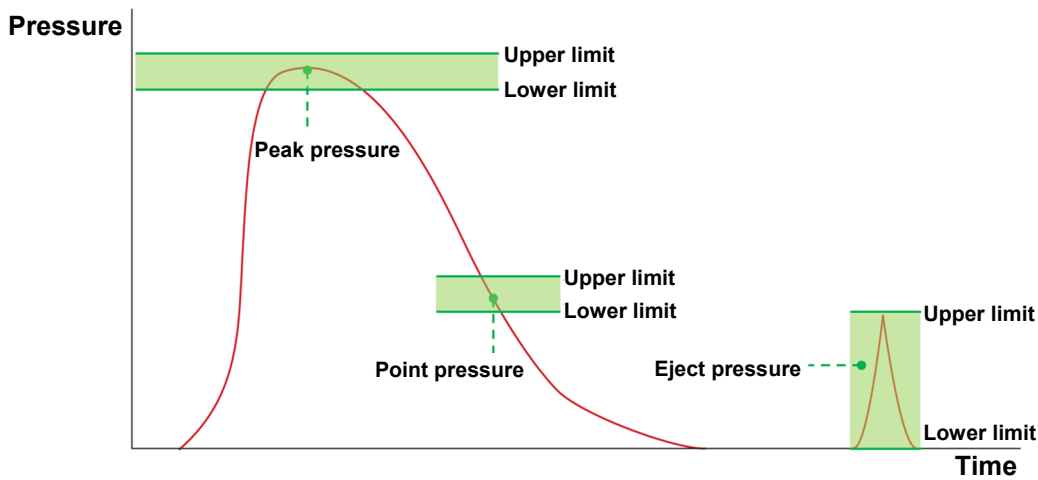
No.	Description	Parameter display code
①	Sensor product type	S-1
②	Sensitivity	S-2
③	Curvature coefficient	S-3

Sensor product type	Description	Sensor product type	Description
1	Ejector pin-type 100 MPa	6	Button-type 1000 N
2	Ejector pin-type 200 MPa	7	200°C heat-resistant button-type 50 N
4	Button-type 50 N	8	200°C heat-resistant button-type 200 N
5	Button-type 200 N	9	200°C heat-resistant button-type 1000 N

3-2-3 Setting alarm monitoring conditions

Perform alarm setting as needed. If alarm setting is not required, set the “output” to “0”.

This function allows you to determine whether the molding product is good or bad by setting an upper limit and a lower limit on each of in-mold pressure values such as peak, point and eject pressure values, outside of which range an alarm signal is output.



■ Alarm output behavior and lamp display

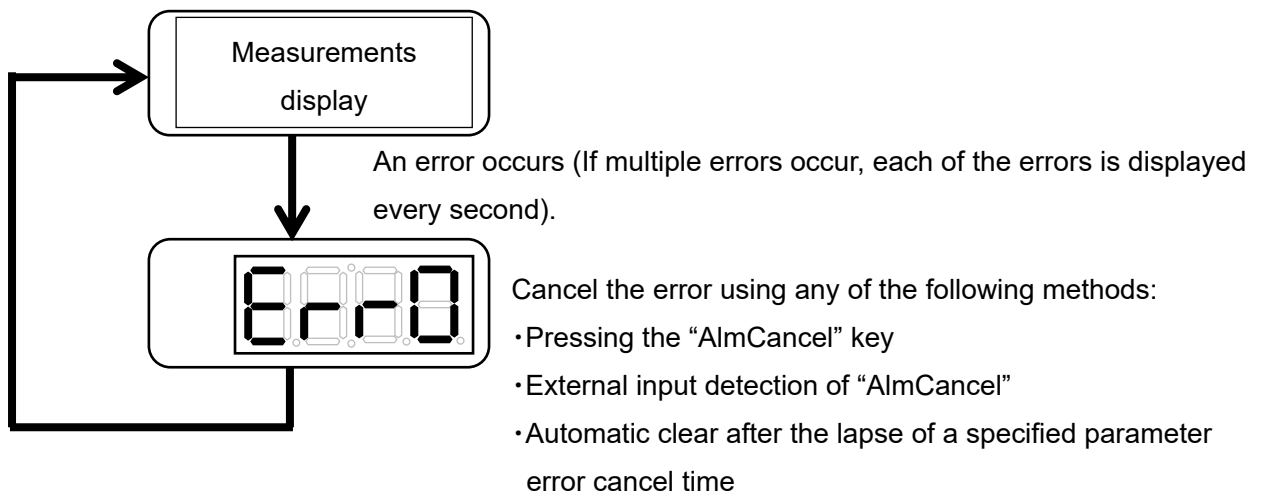
You can check for any errors during peak, point and eject monitoring by selecting conditions, such as whether or not to monitor for errors using the monitoring parameter, alarm display lamps and alarm output terminals. The monitoring errors “AL1” through “AL6” are output after one molding cycle has been completed.

Monitoring parameter used to check for errors	Selection of parameter output	Error display code	Alarm display lamp	Alarm output terminal
Peak monitoring (upper & lower limits)	0	Not to be performed	Not lit	None
	1	AL1 or AL2	OUTPUT1, ALARM	Alarm 1
	2	AL1 or AL2	OUTPUT2, ALARM	Alarm 2
	3	AL1 or AL2	ALARM	Alarm 3
Point monitoring (upper & lower limits)	0	Not to be performed	Not lit	None
	1	AL3 or AL4	OUTPUT1, ALARM	Alarm 1
	2	AL3 or AL4	OUTPUT2, ALARM	Alarm 2
	3	AL3 or AL4	ALARM	Alarm 3
Eject monitoring (upper & lower limits)	0	Not to be performed	Not lit	None
	1	AL5 or AL6	OUTPUT1, ALARM	Alarm 1
	2	AL5 or AL6	OUTPUT2, ALARM	Alarm 2
	3	AL5 or AL6	ALARM	Alarm 3

■ Error display

When any error occurs, the corresponding error display code is displayed.

The “Err0” and “Err1” are displayed in combination with the “ALARM” lamp when detected.

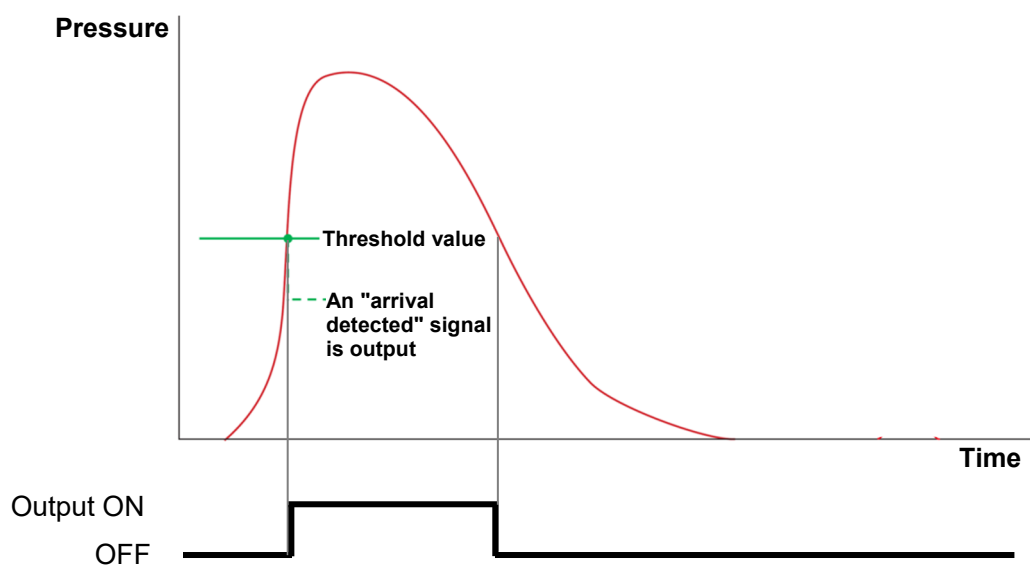


Error	Display code	Description
Sensor error	Err0	Sensor connection error, broken sensor cable, abnormal sensor resistance
Trigger input error	Err1	Trigger input was accepted during measurement
Peak pressure upper limit exceeded	AL1	Peak pressure monitoring upper limit alarm
Peak pressure lower limit not reached	AL2	Peak pressure monitoring lower limit alarm
Point pressure upper limit exceeded	AL3	Point pressure monitoring upper limit alarm
Point pressure lower limit not reached	AL4	Point pressure monitoring lower limit alarm
Eject pressure upper limit exceeded	AL5	Eject pressure monitoring upper limit alarm
Eject pressure lower limit not reached	AL6	Eject pressure monitoring lower limit alarm

3-2-4 Setting control output signal

This function allows you to set a threshold value on in-mold pressures, beyond which a voltage signal is output enabling the unit to work with the molding machine and other external devices. When the specified threshold is reached, a signal is output from the control output terminal. At this time, the “SET” lamp is lit in orange.

The following figure shows the operating status.



■ Initial settings

No.	Parameter	Parameter display code	Setting range	Factory default value	Remarks
1	Sensor product type	S-1	1 to 9	1	
2	Sensitivity	S-2	0 to 9999	4000	
3	Curvature coefficient	S-3	A to Z	A	
4	Pressure receiving area	rA	0.01 to 99.99 mm ²	1.0 mm ²	※1
5	Molding cycle	SYC	3 to 600 s	20s	
6	Peak pressure upper limit	Ph-	0.0 to 200.0 MPa	55.0 MPa	
7	Peak pressure lower limit	PL-	0.0 to 200.0 MPa	45.0 MPa	
8	Output (peak pressure)	Pout	0 to 3	0	※2
9	T-second point in monitoring	tS	0.0 to 600.0 s	5.0 s	
10	Point pressure upper limit	th-	0.0 to 200.0 MPa	50.0 MPa	
11	Point pressure lower limit	tL-	0.0 to 200.0 MPa	40.0 MPa	
12	Output (Point)	tout	0 to 3	0	※2
13	Eject monitoring start time	Jt1	0.0 to 600.0 s	15.0 s	
14	Eject monitoring end time	Jt2	0.0 to 600.0 s	19.0 s	
15	Eject pressure upper limit	Jh-	0.0 to 200.0 MPa	10.0 MPa	
16	Eject pressure lower limit	JL-	0.0 to 200.0 MPa	5.0 MPa	
17	Output (Eject)	Jout	0 to 3	0	※2
18	Threshold value	tH	0.0 to 200.0 MPa	10.0	
19	Error cancel time	tEd	0 to 600 s	0 s	※3

※1: This parameter is valid only for the button-type sensors of which type is 4 through 9.

Input the tip area of the ejector pin referring to the “Quick reference table for pressure receiving area of ejector pin” on Page 21.

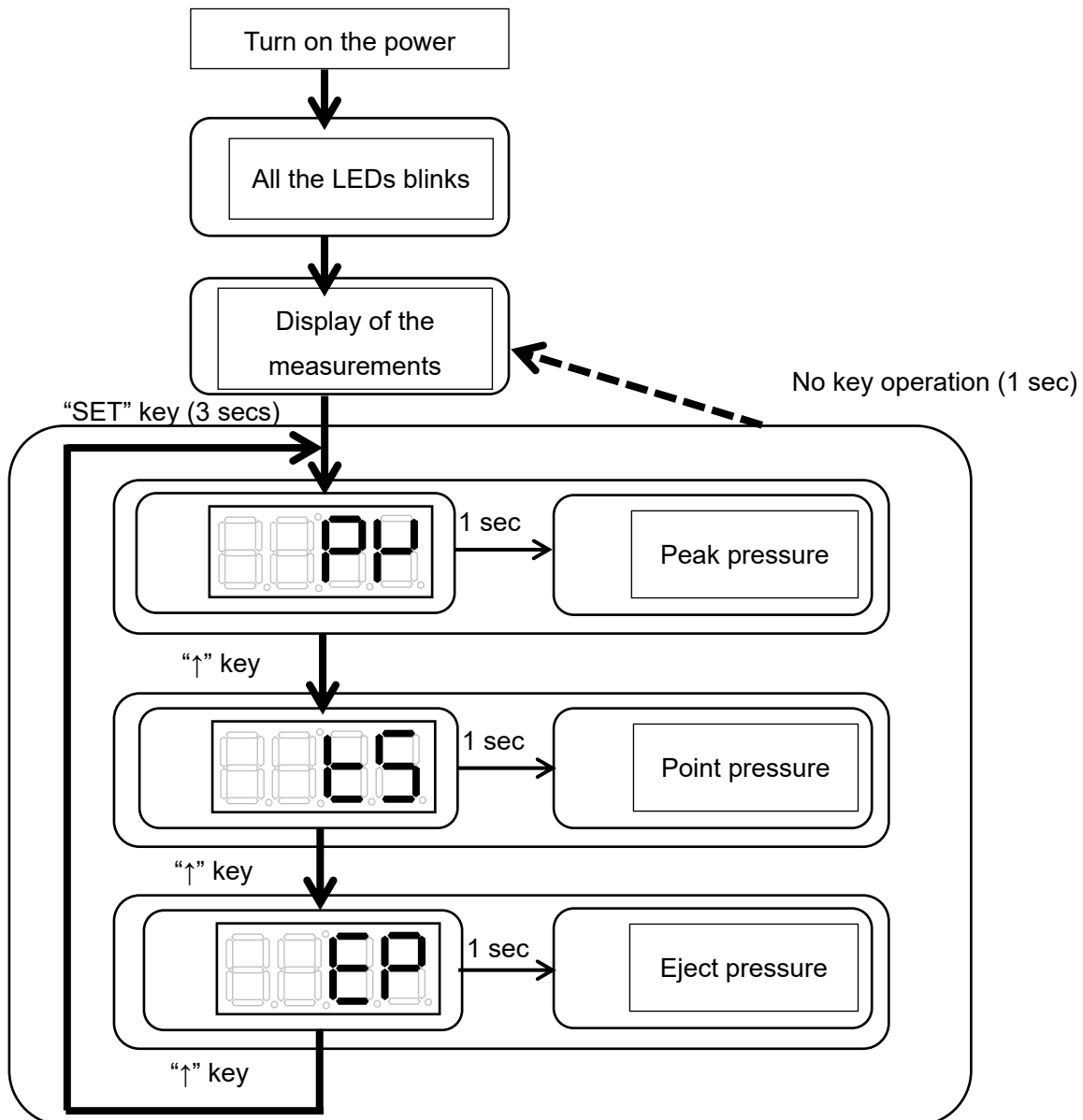
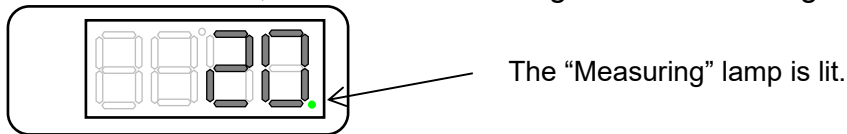
※2: Values other than “0” cannot be set at the same time.

※3: If “0” is set for the output setting, this parameter is invalid.

3-2-5 Operating the measurement window

You can select the measurement value by following the steps below:

- ① Hold down the “SET” key (for 3 seconds) to enter the setting window.
After parameter display code “PK” is displayed, every time when you press the “↑” key, the windows are switched.
Select the parameter that you want to display.
For details on the display of measurements, refer to “Measurements display” on Page 15 .
- ② If you make no operation for 3 seconds, the system automatically returns to the measurements display window.
- ③ When measurements are displayed, you can check their upper limit values using the “↑” key and the lower limit values using the “↓” key.
- ④ During the measurement, a dot at the lower right corner is lit in green.



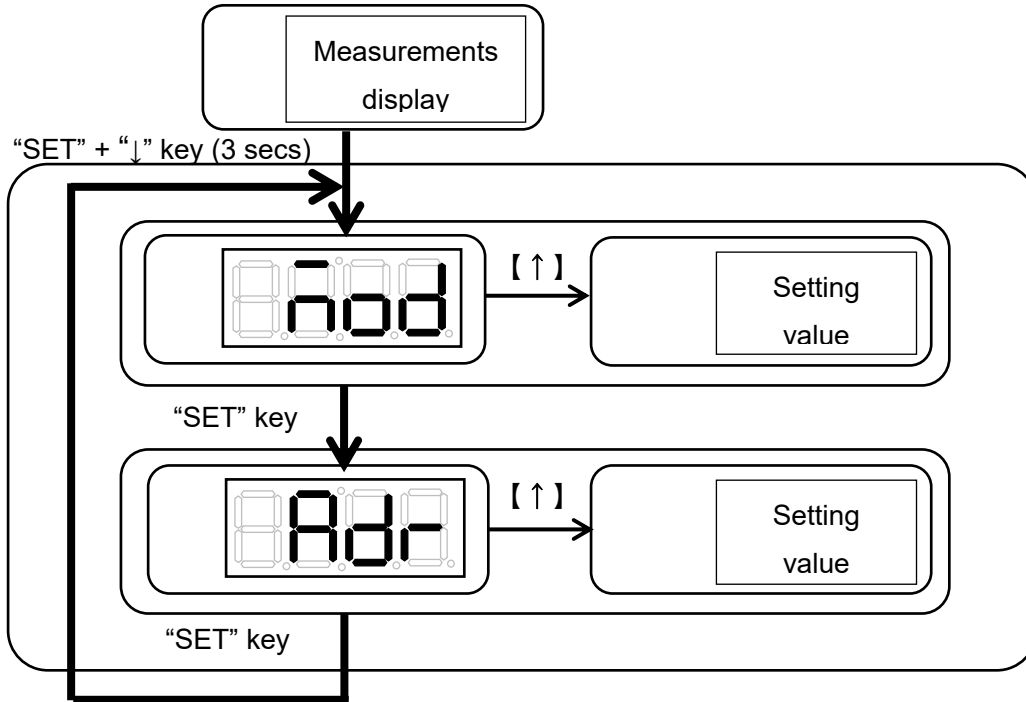
● Measurements display

No.	Parameter	Display code	Information displayed	Factory default value
1	Peak pressure display	PK	<p>① Measuring The peak value is displayed.</p> <p>② Stopped The peak value of the previous shot is displayed.</p> <p>③ Press the “↑” key to display the upper limit value.</p> <p>④ Press the “↓” key to display the lower limit value.</p>	○
2	Point pressure display	tS	<p>① Measuring</p> <ul style="list-style-type: none"> •Until the lapse of t seconds The currently measured values are displayed. •After the lapse of t seconds The point value (value at t second point) is displayed. <p>② Stopped</p> <p>③ Press the “↑” key to display the upper limit value.</p> <p>④ Press the “↓” key to display the lower limit value.</p>	
3	Eject pressure display	EP	<p>① Measuring</p> <ul style="list-style-type: none"> •Until the preset eject time The currently measured values are displayed. •After the preset eject time starts The highest value during the eject period is displayed. <p>② Stopped</p> <p>The previous eject pressure is displayed.</p> <p>③ Press the “↑” key to display the upper limit value.</p> <p>④ Press the “↓” key to display the lower limit value.</p>	

3-2-6 Communication setting

Connect the unit to the external devices (PC or PLC) to output measurements data to them.

- ① Hold down the “SET”+“↓” keys (for 3 seconds) to enter the setting window.
- ② When “mod” is displayed, press “↑” key and select a mode.
 Select “log” to output the measurement result of each shot.
 Select “Set” to output the waveform data of one cycle.



■ Communication setting

No.	Parameter	Display code	Setting range	Factory default value	Remarks
1	Communication code	mod	Log, Set	Log	
2	Communication address	Adr	0 to 247	1	

Log (log mode)Outputs log data of each shot.

Set (Setup mode)Outputs waveform data.

When any communication setting is made, it is necessary to power the system off and on again to allow the new setup to take effect.

4. Checking the Operation

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

4-1 Checking the I/O Signal

Check whether the connected I/O signal works normally.

■ Checking the operation of input signal

Input a signal (trigger signal). If it is input normally, a measurement is started and the dot at the lower right corner is lit in green during the molding cycle.

■ Checking the operation of the output signal

- ① Set the lower limit value of peak pressure to 0 or higher (factory default value: 45 MPa).
- ② Set the output value of peak pressure to “1”.
- ③ Set the measurement time to about 5 seconds and input the input signal (trigger signal).
At this time, do not apply a force to the sensor.
- ④ Verify that the measurement is started, after 5 seconds later, a peak lower limit error (AL2) is displayed, OUTPUT1 and ALARM lamps are lit, and a signal is output from Alarm 1.
- ⑤ In the same way, you can verify the output operations of point and eject pressure.

4-2 Checking the Operation of Sensors

4-2-1 Checking the connection of a sensor

With a sensor connected, if “Err0” is not displayed, the sensor is properly connected. If “Err0” is displayed, sensor connection error, broken cable or sensor failure is assumed.

4-2-2 Quick sensor checking

- ① Input the input signal (trigger signal) and put the unit into the measurement state.
- ② Press the tip of the sensor to verify that the value fluctuates (this is only a simple test to check whether the sensor works).
 - * When applying a load to the tip of the sensor, use a soft object, etc. so as not to damage the sensor or mold (scratches, corrosion etc.).
 - * When applying a load to the tip of the sensor, never apply a load exceeding the ratings or a shock load. It could damage the sensor.
 - * Perform a simple operation check at the customer’s own risk.

5. Measuring with an External Measuring Device

The pressure measuring unit “MPS01A” 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.

5-1 Connecting an External Measuring Device

- Connect an external measuring device to the A6 (-), B6 (+) by referring to the “Terminal block pin connection” on Page 5.

* The connector should be prepared by the customer.

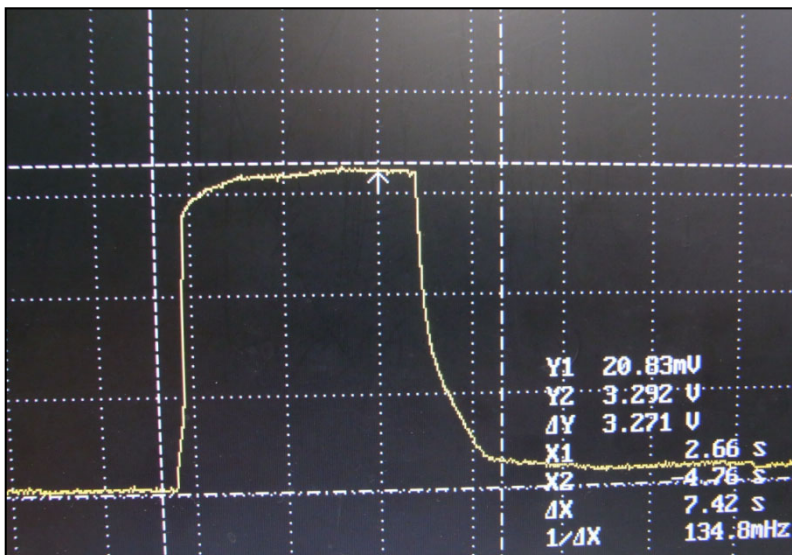
5-2 Relationship between Output Voltage and Pressure Value

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

- 50 mV is output per 1 MPa (Voltage output range: 0 to 10 V).
(Example: When pressure is 100 MPa, 5 V is output.)

5-3 Observing Pressure Waveforms

The following is a screen example of a commercially available data logger.



6. Specifications

■ List of specifications

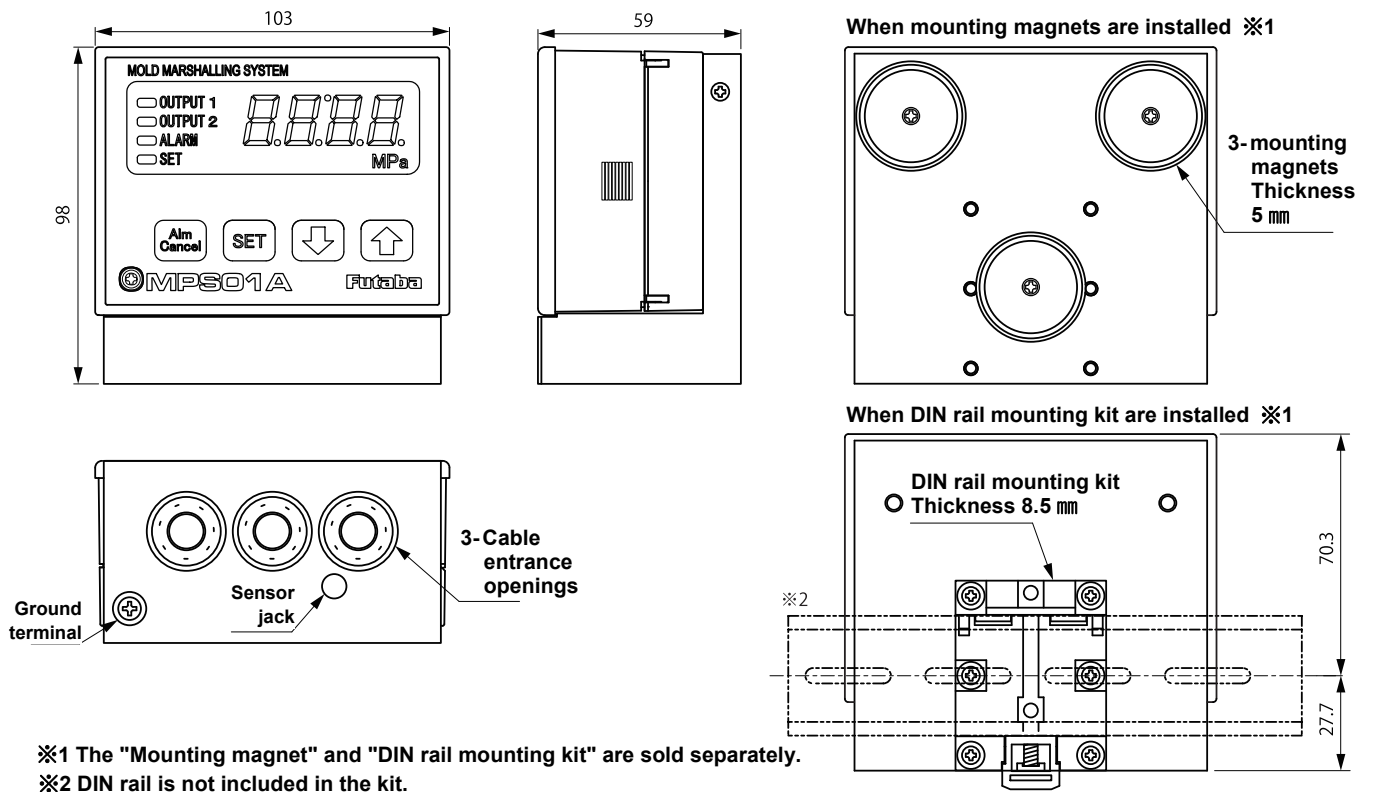
<Pressure measuring unit MPS01A>

Product name	MPS01A	
Number of measuring points	1	
Accuracy	±2% F.S.	
Measurement range	0 to 200MPa	
Compatible sensor	SSE series, SSB series	
Sampling period	1ms	
Sampling time	Up to 600 sec	
Resolution	0.1 MPa	
Analog voltage output (waveform data)	0.0 to 10.0 (20MPa/V)	
Control input (trigger/alarm cancel)	Non-voltage contact input	
Control output (alarm)	NPN open collector, up to 100 mA (30 V or less)	
Power specifications	DC24V (power supply sold separately)	
Environmental resistance	Operation ambient temperature	0 to 50°C
	Operating ambient humidity	35 to 85%RH (no condensation)
Weight	About 500 g	

■ Accessories

Name	Product code
AC adapter (3.6 m)	ES0024003
RS485 connection cable (0.1 m, common for external output) Comes with RS485 communication software	WCL0001A
RS485 conversion cable (For PC connection, USB cable 1 m)	WCL0010B
RS485 extension cable (For PLC connection, cable 1 m)	WCL0010C
Mounting magnet (set of 3)	AMMPS01
DIN rail mounting kit (The kit contains a mounting plate and 6 mounting screws)	ARMPS01

■ Outline drawing (Unit: mm)



※1 The "Mounting magnet" and "DIN rail mounting kit" are sold separately.
 ※2 DIN rail is not included in the kit.

7. Appendix

■ Quick reference table for pressure receiving area of ejector pin

Pin diameter [mm]	Pressure receiving area [mm ²]	Pin diameter [mm]	Pressure receiving area [mm ²]
0.4	0.13	3.1	7.55
0.5	0.20	3.2	8.04
0.6	0.28	3.3	8.55
0.7	0.38	3.4	9.08
0.8	0.50	3.5	9.62
0.9	0.64	3.6	10.18
1.0	0.79	3.7	10.75
1.1	0.95	3.8	11.34
1.2	1.13	3.9	11.95
1.3	1.33	4.0	12.57
1.4	1.54	5.0	19.63
1.5	1.77	6.0	28.27
1.6	2.01	7.0	38.48
1.7	2.27	8.0	50.27
1.8	2.54	9.0	63.62
1.9	2.84	10.0	78.54
2.0	3.14	11.0	95.03
2.1	3.46		
2.2	3.80		
2.3	4.15		
2.4	4.52		
2.5	4.91		
2.6	5.31		
2.7	5.73		
2.8	6.16		
2.9	6.61		
3.0	7.07		

Futaba

FUTABA Corporation

URL <http://www.futaba.co.jp>

The specifications may be changed for improvement without prior notice.

MPS01A-1611W-A1E