

Mold Marshalling System for
Measuring Resin Pressure inside Molds

Pressure Measuring Amplifier

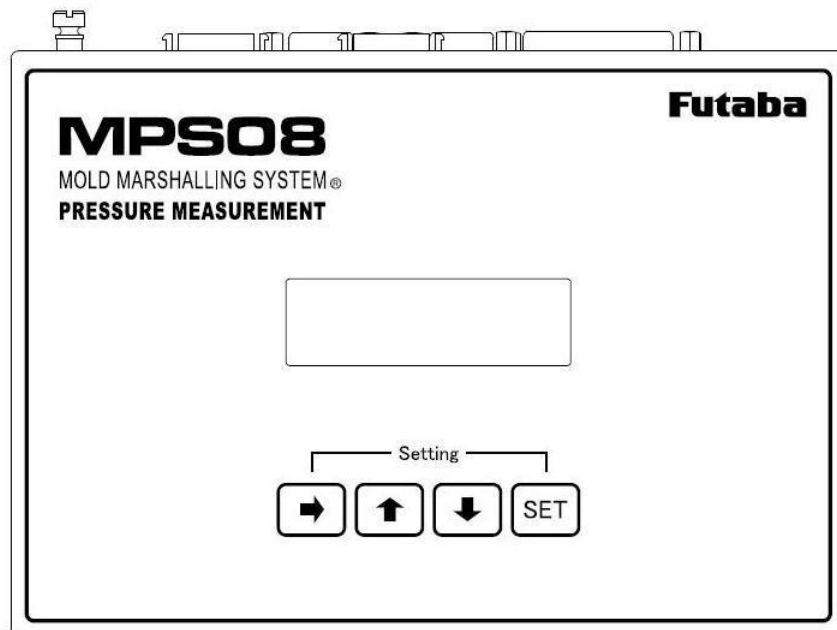
MPS08

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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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” is a system for measuring resin pressure inside injection molds using a strain gage pressure sensor of Futaba Corporation.

Using the attached measurement software allows you to observe pressure waveforms, store data, and monitor and set alarms on the personal computer.

Major features are as follows:

- A standard system can measure up to eight channels concurrently.
- Sensitivity of the pressure sensor can be easily performed. (It only needs to input numbers and alphabet.)
- Waveform and historical data of each shot is automatically saved.
- Data is saved in CSV format and can be easily read with commercially available spreadsheet software.
- Six alarm monitoring items can be set for each channel.
- When an alarm occurs, it is possible to output a signal to the robot to sort the defective products.
- Even an amplifier alone enables alarm monitoring. (In this case, data is not saved.)
- The waveforms being measured can be overlaid on the waveforms saved in the past.

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.

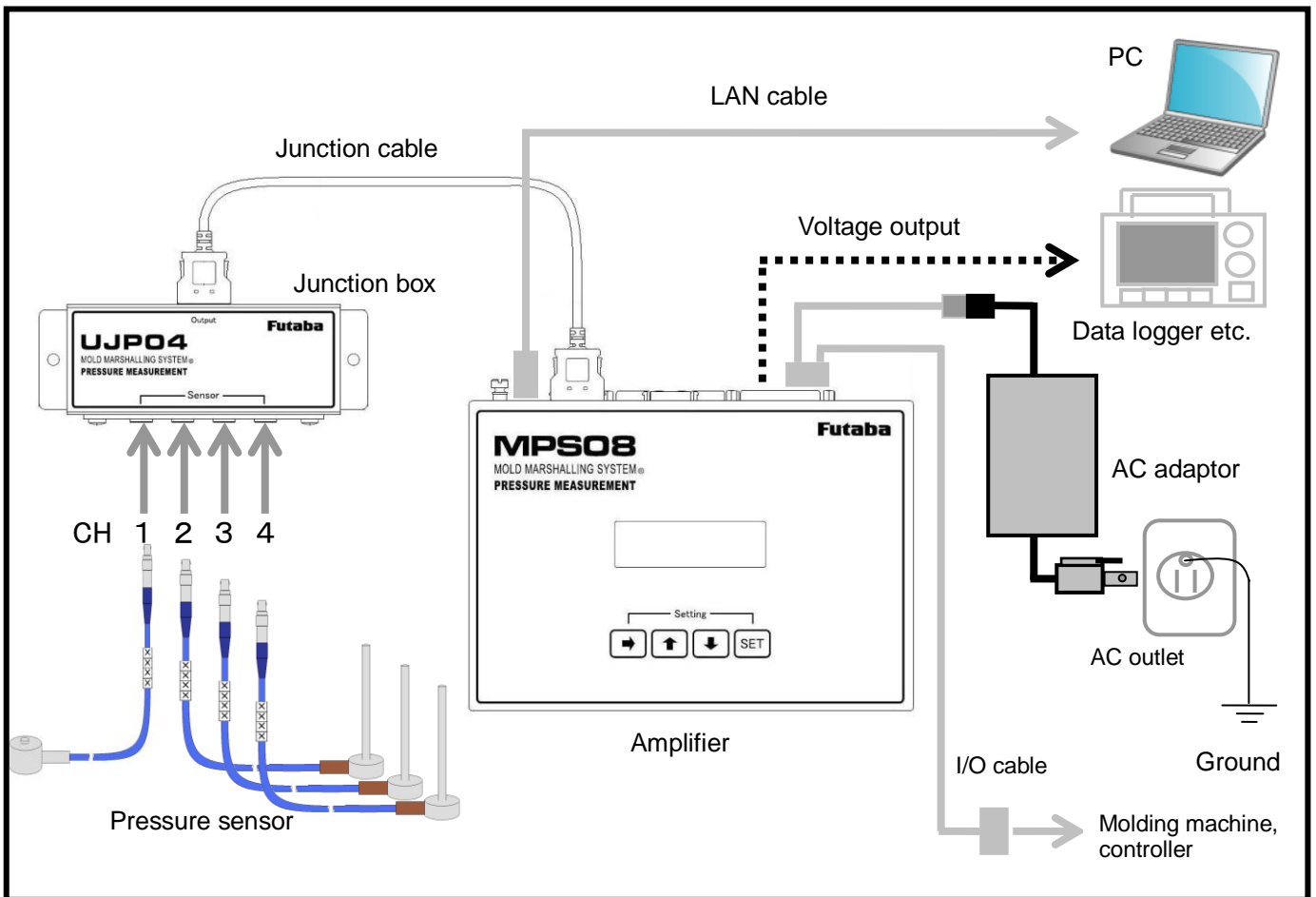
- Pressure measurement amplifier “MPS08”:	1
- Junction box “UJP04”:	1 (or 2 if two boxes are ordered)
- Junction cable “WJP0430”:	1 (or 2 if two cables are ordered)
(One ferrite core for noise suppression comes with one cable.)	
- AC adaptor “ES0024010”:	1
(One ferrite core for noise suppression comes with the adaptor.)	
- I/O cable “WCI005”:	1
- LAN cable “WCL0020”:	1
- Software “PPS series” (CD-ROM, the latest version at the time of shipment):	1
- Instruction Manual (This Manual):	1
- Installation 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.
- Warm up the system before use, for about 30 minutes after power on.
- Before turning off the power to the amplifier, be sure to exit the measurement software. If the power is turned off with the software running, communication operation may not be terminated normally and an unexpected failure may occur.
- When the amplifier is used alone, disconnect the LAN cable only after exiting the measurement software and turning off the power to the amplifier. If the LAN cable is disconnected with the software running or with the amplifier power on, communication operation may not be terminated normally and an unexpected failure may occur.
- 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.
- This system stores the data measured by the amplifier in the storage device (such as a hard disk) of PC. To prevent the degradation of PC performance or unexpected failure, the system is designed to stop saving data when the amount of stored data exceeds a certain level. Move the data frequently.
- When performing measurement in maintenance mode, be sure to execute “set zero point”. Without doing “set zero point”, pressure cannot be measured correctly.
 - * When measurement is performed in monitor mode, “set zero point” is executed when the signal (IN1) is input from the molding machine or when the “SET” key on the amplifier is pressed.
- 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 “MPS08 series”.



As shown in the above figure, the “MPS08” connects a strain gage type pressure sensor to the input.

The pressure sensor is connected to the Junction box that can accommodate four channels and, via the Junction cable, connected to the amplifier. Two Junction boxes can be connected to one amplifier.

The amplifier and PC exchange data via the LAN cable. The measurement software that comes with the system needs to be installed in advance in PC. Pressure waveform data and historical data are stored in PC.

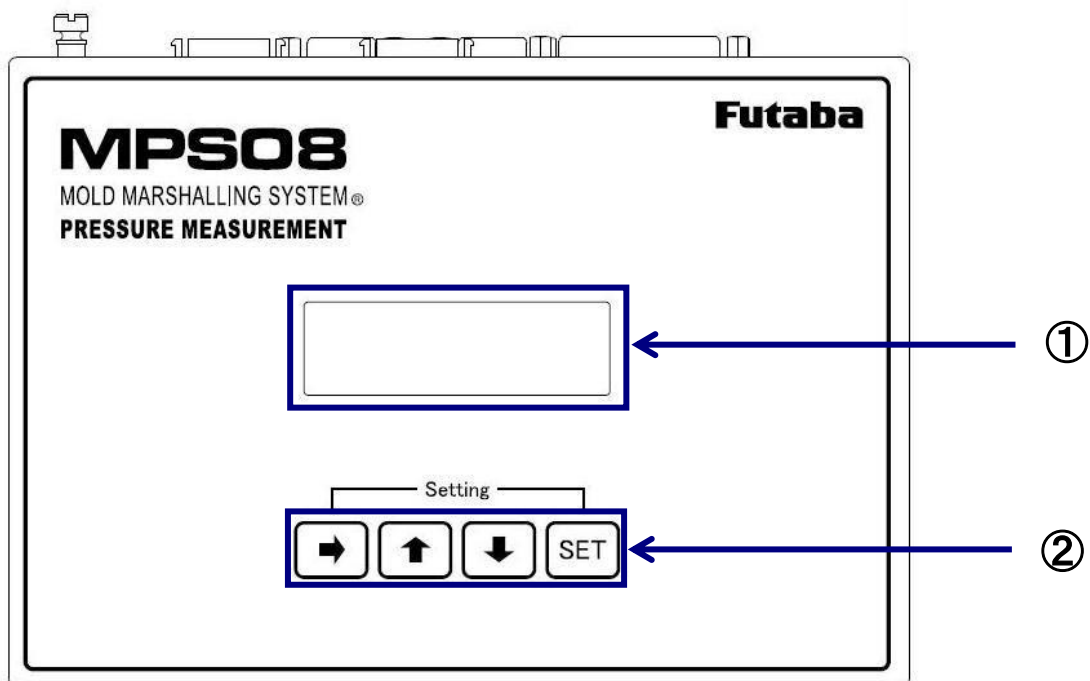
The “MPS08” can run with the amplifier alone. After PC is connected and the setting conditions are stored in the amplifier, the monitor function works even with PC disconnected. (Data cannot be saved to the amplifier and therefore only the alarm check function is available if the PC is disconnected.)

Connect the system to the molding machine and peripheral control equipment using the I/O cables that come with the system. Doing so enables automatic start of measurement, output of alarm signals, and clearing alarm signals.

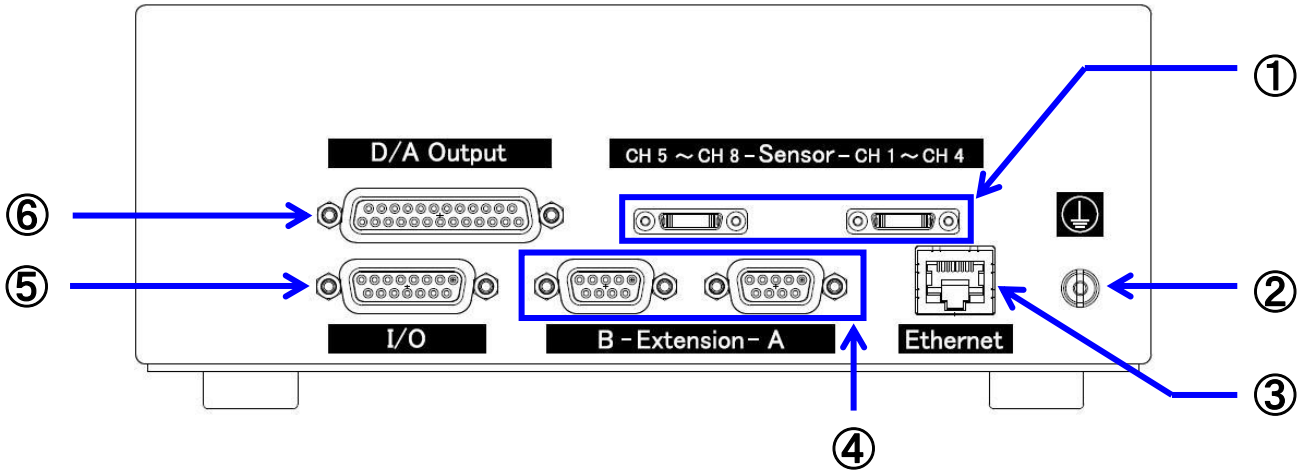
The “MPS08” has the voltage output feature, so a commercially available data logger can be connected to measure pressure waveforms.

1. Names and Major Functions of Components

1-1 Front



- ① Display panel..... Displays the status of measurement, setting file name, shot counter, and setting conditions in the amplifier.
- ② Control keys “→”, “↑”, “↓”, “SET” “→” key: Changes the display content when held down.
“↑”, “↓” key: Changes the setting.
“SET” key: Fixes the setting changed.
In monitor mode, pressing this starts measurement. (Usable as the manual trigger)



- ① Junction box connector..... Connected to the Junction box using the dedicated Junction cable. Two Junction boxes can be connected.

- ② Grounding terminal..... Terminal for ground.

- ③ Wired LAN jack..... Connected to PC using the LAN cable.

- ④ Connector for expansion..... Reserved for expansion in the future.

- ⑤ I/O cable connector Inputs a trigger signal and alarm clear signal, outputs an alarm signal, and also supplies power.

- ⑥ Voltage output connector Connected to external measuring equipment such as the data logger and oscilloscope.

2. Preparation

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

2-1 Setting up the Network Connections

Make settings for communication between the amplifier MPS08 and PC.

* For the Network Connections procedure, refer to the “Measurement Software (PPS) Installation Manual”.

2-2 Installing PC Software

2-2-1 Hardware Requirements

■ Operation system

This software has been checked normal operation with the following operation systems.

Windows XP(32bit), Windows 7(32bit), Windows 7(64bit), Windows 8(32bit), Windows 8(64bit)

■ Capability

For your pleasant use of software, the recommended specifications of PC are:”Core2 Duo” CPU and 1GB or more memory. Approximately, it may be a PC with 1GB memory released in 2007 or later.

2-2-2 Installation

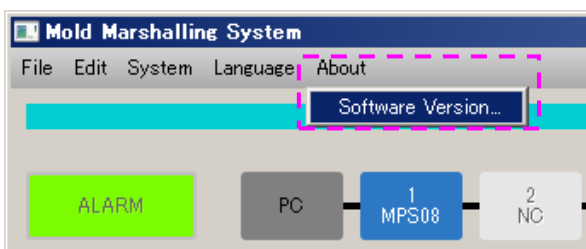
* For the installation procedure, refer to the “Measurement Software (PPS) Installation Manual”.

2-2-3 Checking the version

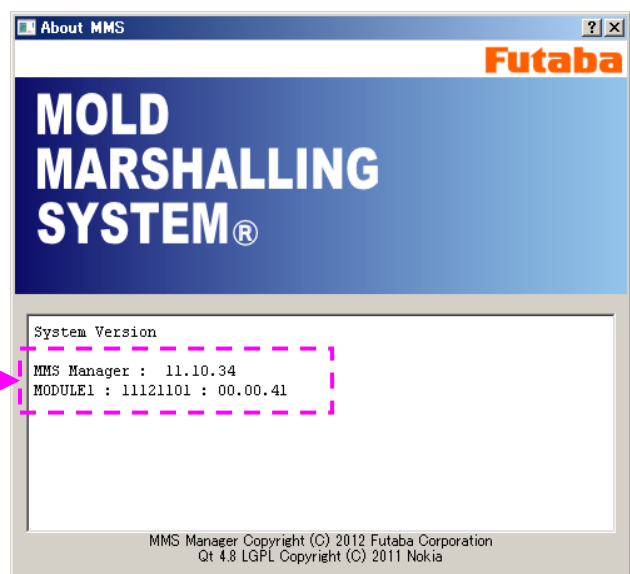
The version of the software currently used can be checked.

* Unless there is particular reason, always use the latest software for operation.

From the main menu, select [About ...] → [About...].



PC software version on the upper row
Amplifier software version on the lower row



2-3 Updating Software

■ This section describes how to update the PC software and amplifier software (hereafter referred to as firmware).

* For the acquisition of the latest software, contact the nearest Futaba sales office.

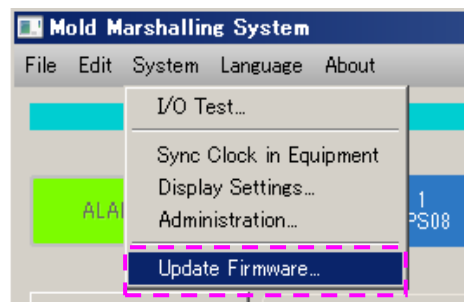
2-3-1 Updating PC software

Execute the installer file. (Extension name is “msi ”.)

It is no need to remove the old version software previously installed on PC.

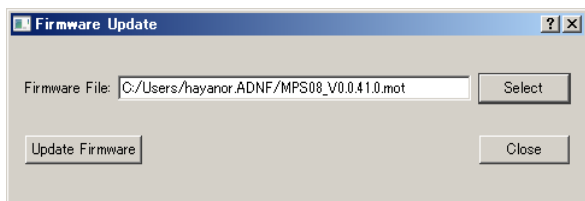
2-3-2 Updating firmware

Step 1: Select “Update firmware” from “System” in the main menu.

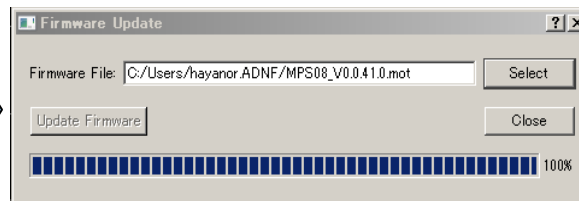


Step 2: The file specification window appears.

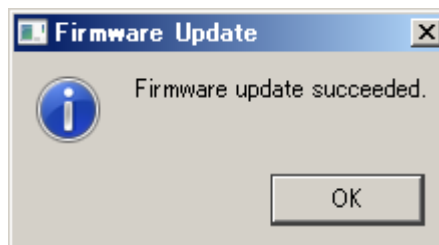
Select the file and click “Update firmware”.



Step 3: Firmware update begins.



Step 4: If the firmware is updated successfully, the message shown at right is displayed. Press OK to finish.



* After the firmware is updated, the amplifier restarts. So, even when the above message is displayed, do not turn off the power until the amplifier completes the restart. (It takes about 10 seconds.)

■ In the case of the failure of Firmware updating

There is possibility to cause the failure of firmware updating when the firewall is working on Windows7 or Windows8. In this case, you can perform the firmware updating by the either methods as follows.

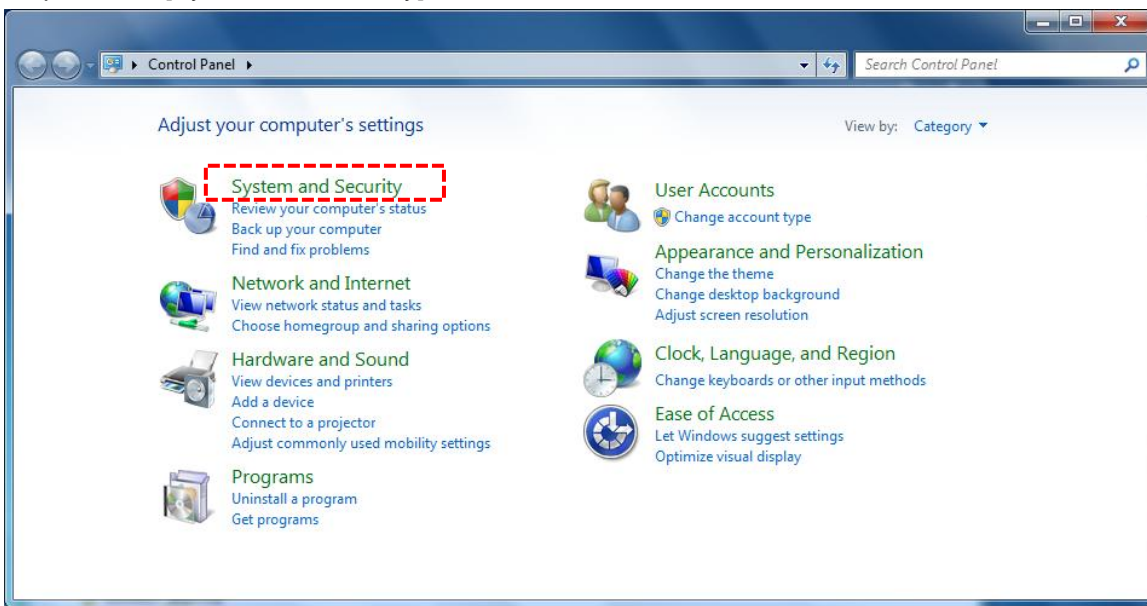
- (1) Turning off Windows Firewall
- (2) Turning off Firewall application filter for FTP client

These methods should be performs under the supervision of your internet administrator.

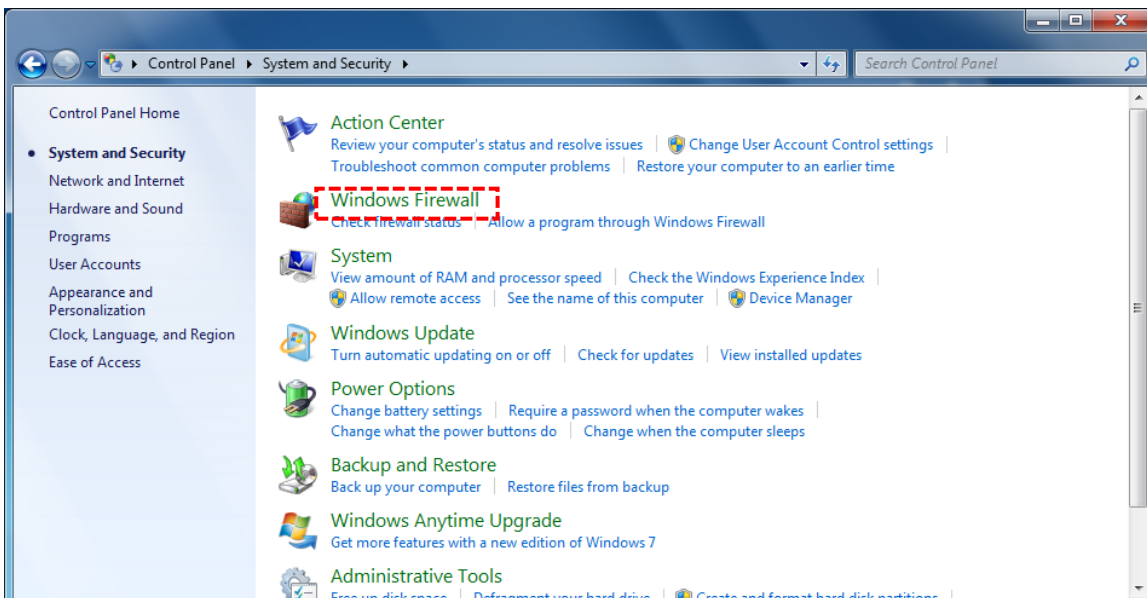
(1) Method of turning off Windows Firewall

Step1 : Push [Start] Button and click [Control Panel]

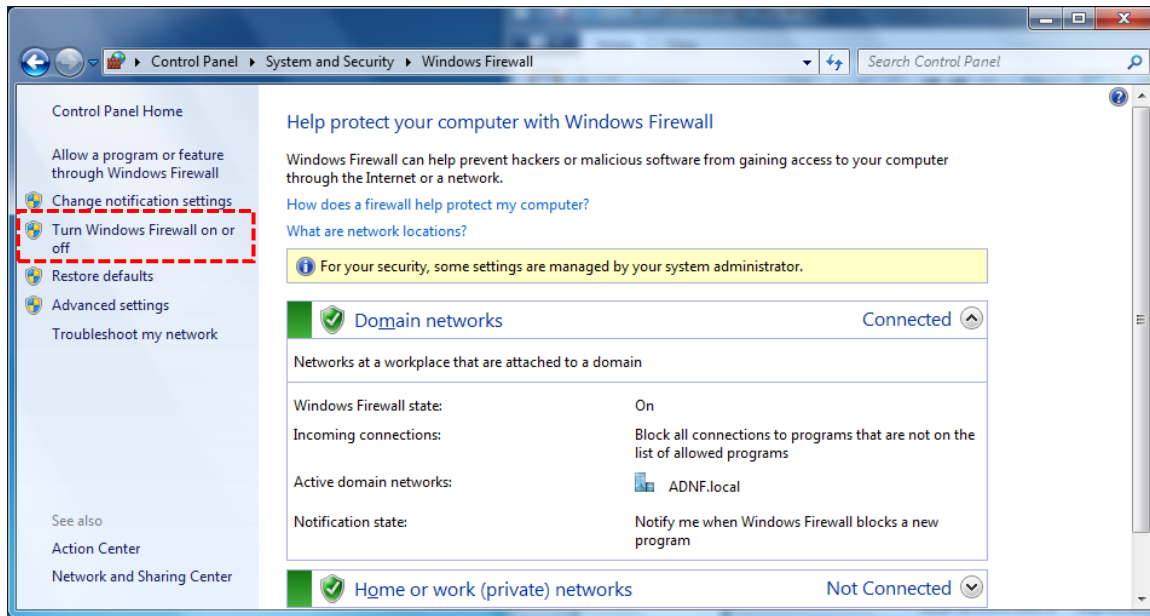
Step2 : Click [System and Security]



Step3 : Click [Windows Firewall]

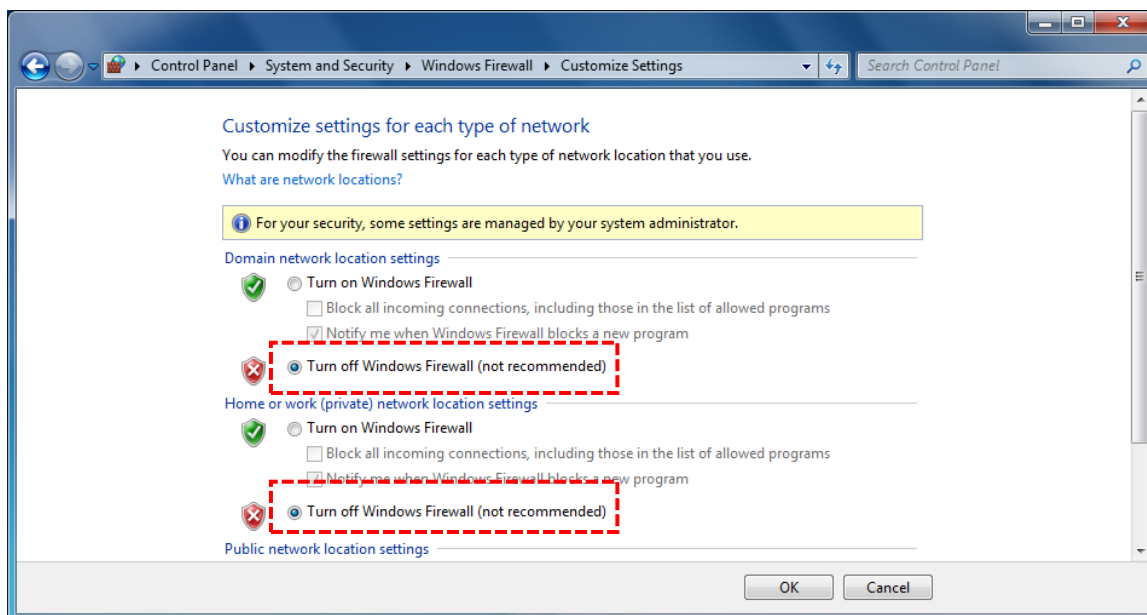


Step4 : Click [Turn Windows Firewall on or off]



Step5 : Select [Windows Firewall on (Not recommended)] and push [OK]

These setting changes should be done under the supervision of your internet administrator.

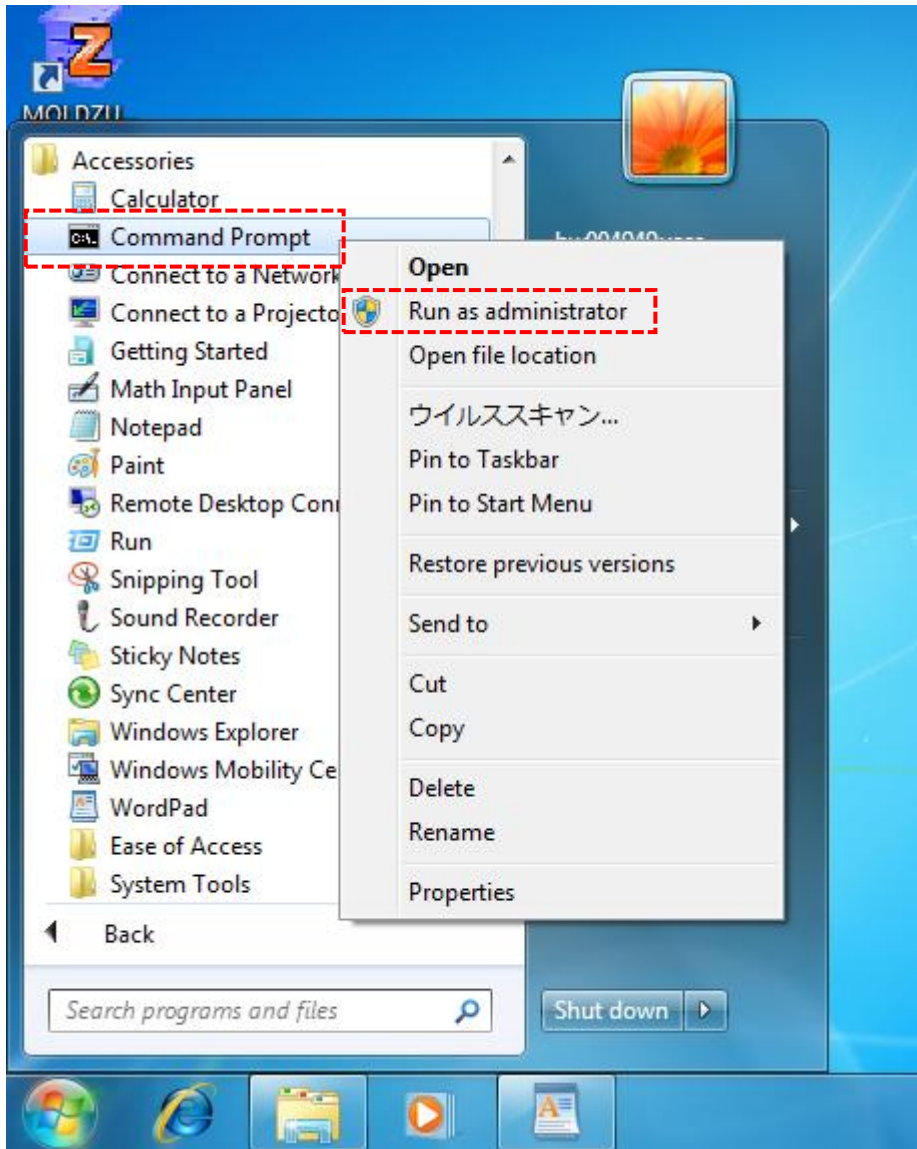


(2) Method of turning off Firewall application filter for FTP client

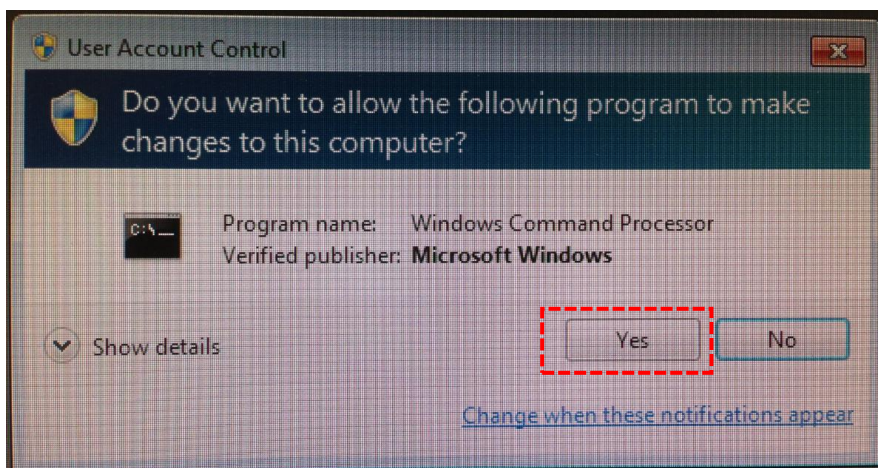
Step1 : Push [Start] button and select [Accessories].

Right click [Command Prompt] and click [Run as administrator]

These methods should be performs under the supervision of your internet administrator.

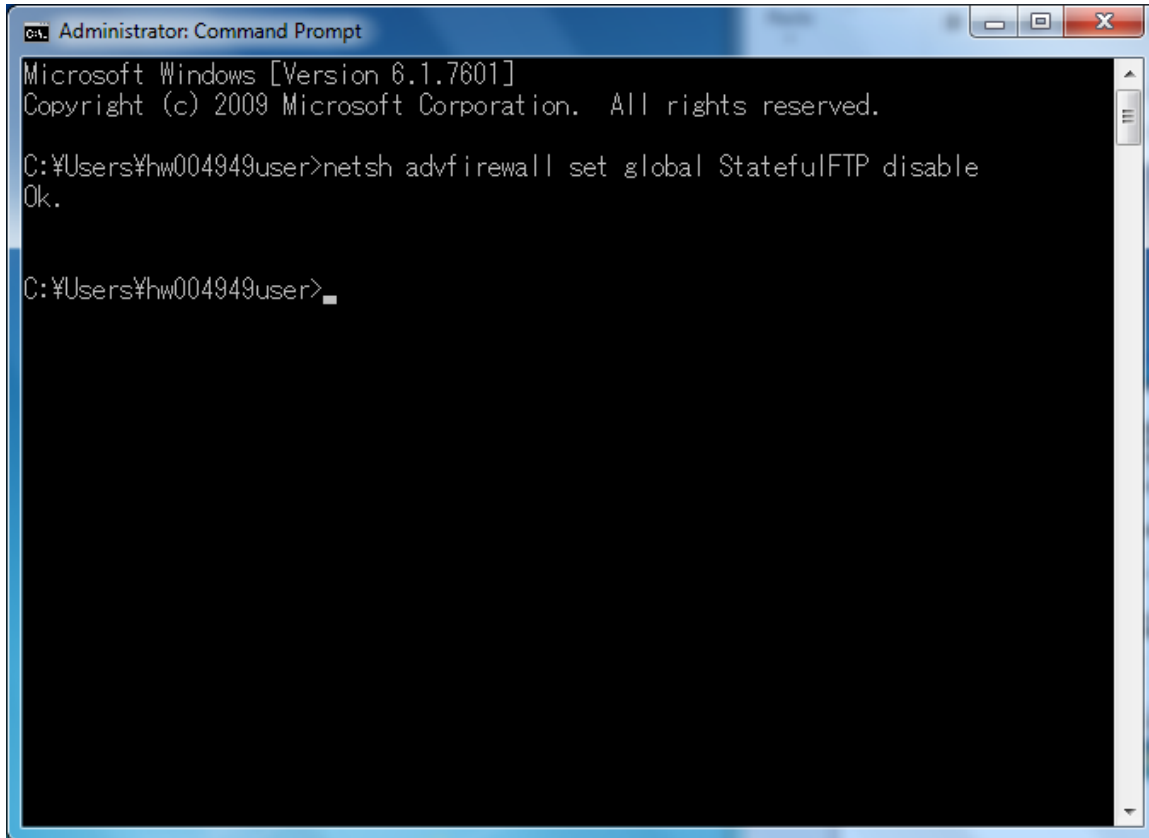


Click [Yes] when User Account Control shows.



Step2 : Execute the following command on the Command Prompt

netsh advfirewall set global StatefulFTP disable



```
Administrator: Command Prompt
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\hw004949user>netsh advfirewall set global StatefulFTP disable
Ok.

C:\Users\hw004949user>
```

This setting change should be done under the supervision of your internet administrator.

2-4 Installing the System

2-4-1 Installing the pressure sensor

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

2-4-2 Installing the Junction box

Install the Junction box near the mold. The temperature limit is 70°C. Be careful not to expose it to temperature higher than that.

The following three ways of installation are available. In any ways, install the box so that the sensor cable does not get caught or is not pulled during movement of the mold.

- ① Screw the box near the mold. (The customer is requested to perform M4 tapping.)
- ② Fix the box using magnets (sold separately) near the mold.
 - * Magnets may come off and cause unexpected loss. Use them at customer's own risk.
- ③ Fix the box using mounting fixtures (brackets, L-shaped angles etc. to be prepared by the customer).
 - * When opening or closing the mold, be careful not to make the pressure sensor cable and the Junction cable get caught in the mold.

2-4-3 Wiring the Junction cable

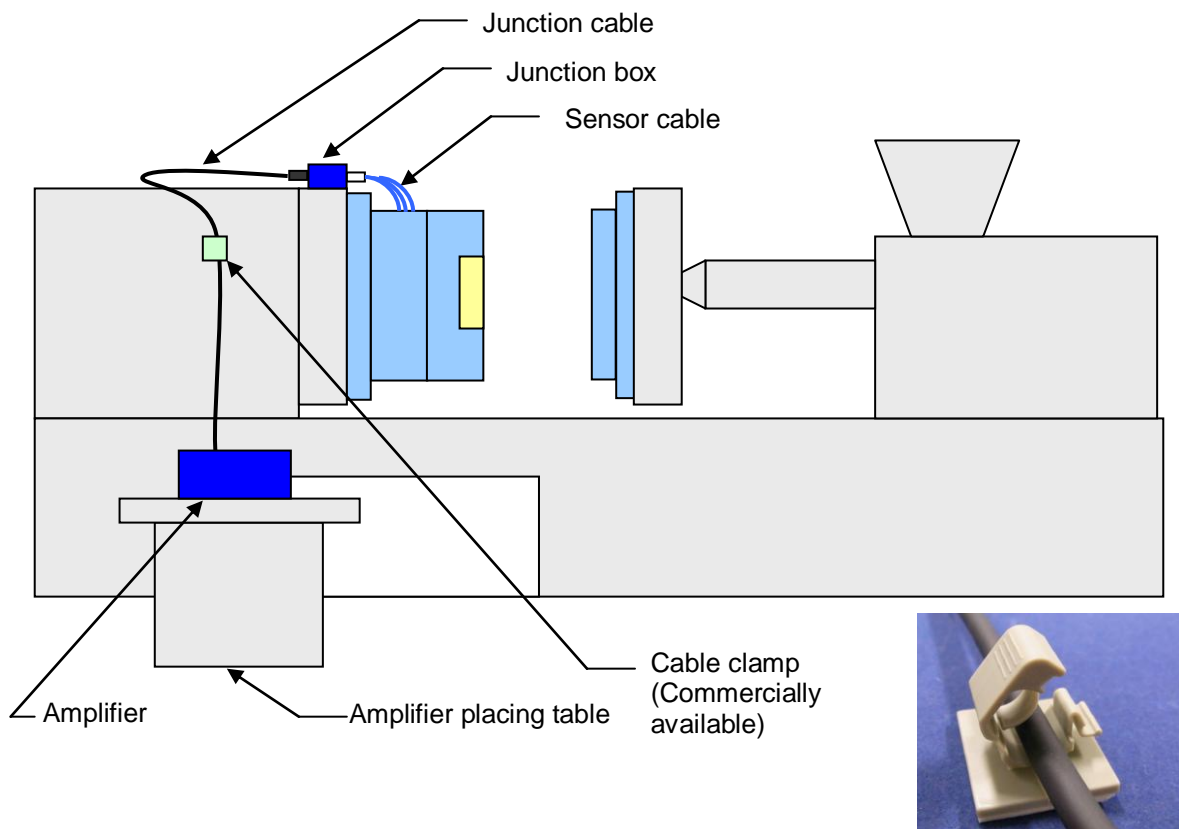
Wire the Junction cable in such a way that the cable connectors (on both ends of the Junction box and amplifier) are not pulled while the mold is opened or closed. The temperature limit is 70°C. Be careful not to expose it to temperature higher than that.

- * It is convenient to use commercially available cable clamps (an example is shown in the photo below).

2-4-4 Installing the amplifier

Prepare a dedicated placing table and put the amplifier on the level surface. Operating temperature ranges from 0 to 50°C.

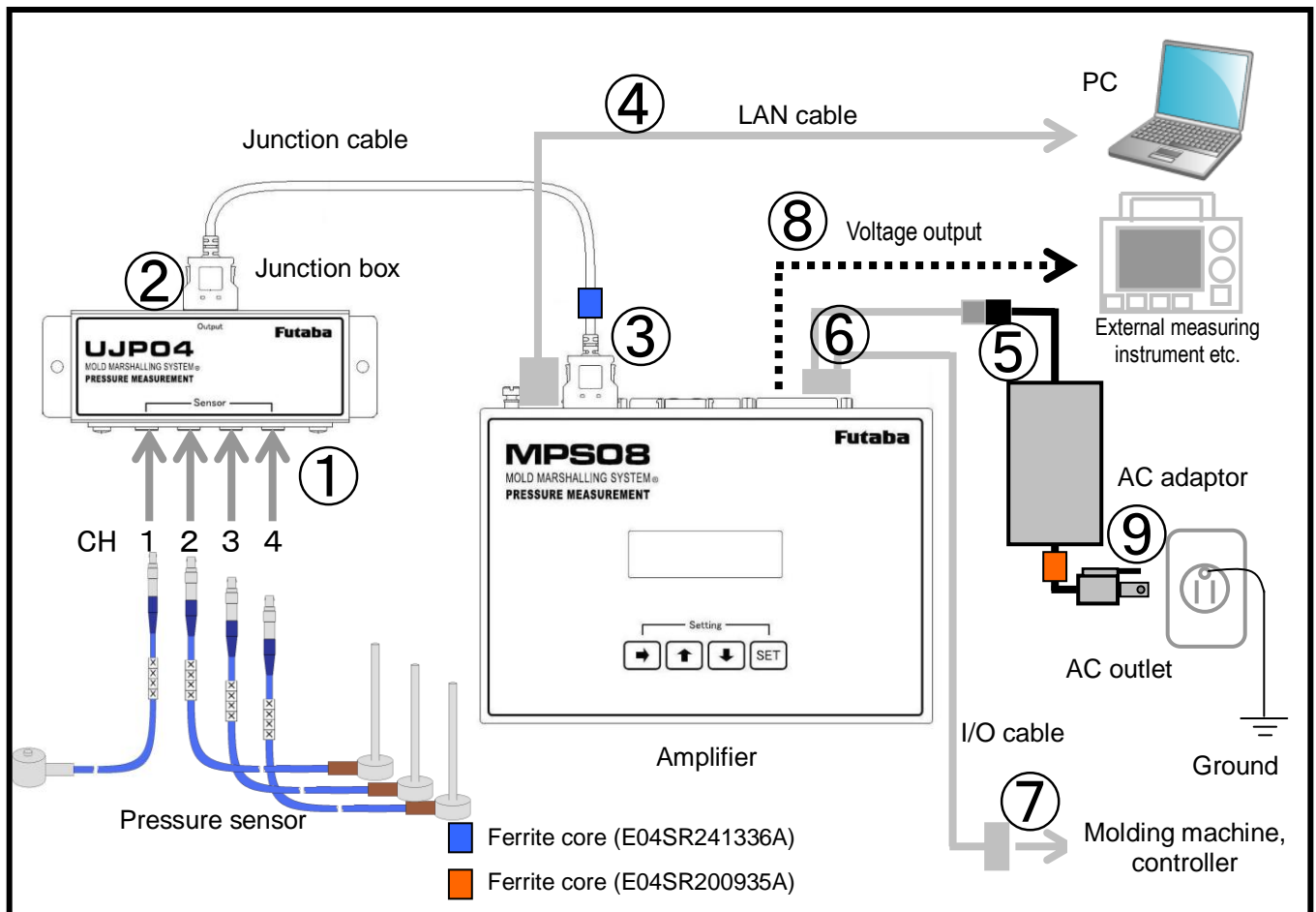
- * Do not move the placing table. If it is moved during measurement, the cables are pulled, which could result in not only measurement failure but also damage to the system.



2-5 Connections in System

■ Connect the components in order of the numbers shown in the following figure.

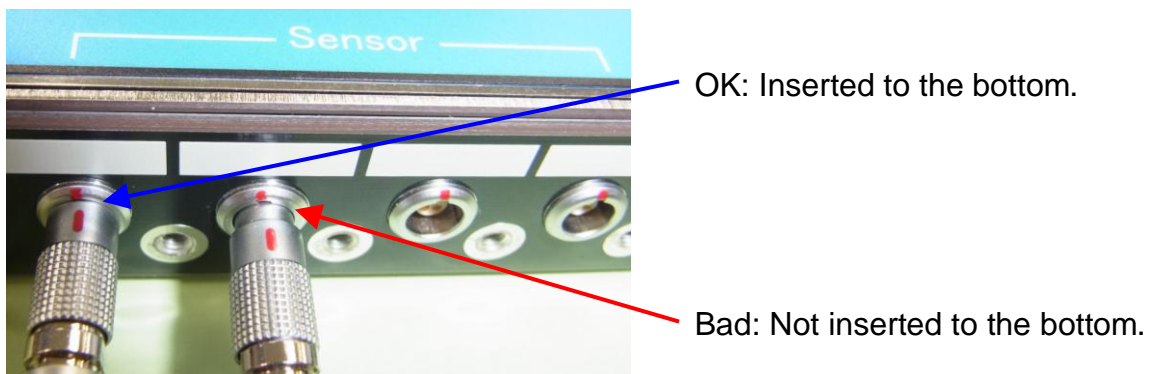
Connect the power supply ⑨ after completing the connections ① to ⑧.



① Connect the sensors to the Junction box.

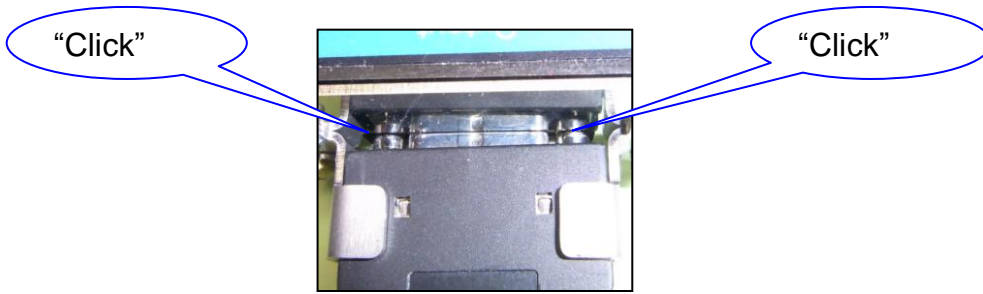
While aligning the red marks on each of the Junction box connector and sensor plug, insert the plug.

Ensure that the sensor plugs are inserted to the bottom.



② Connect the Junction cable to the Junction box.

Make sure that the two locks on both sides of the connector are locked with a “click”.



③ Connect the Junction cable to the amplifier.

Make sure that the two locks on both sides of the connector are locked with a “click”.



* Before doing the above, attach the ferrite core for noise suppression, which comes with the product, to the Junction cable on the amplifier connection side. Attach the ferrite core by winding the cable one turn around the ferrite core.



Ferrite core part No.: E04SR241336A

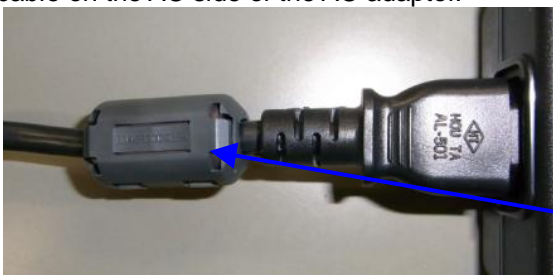
④ Connect the LAN cable to the amplifier and PC.

Make sure the connector is locked with a “click”.

⑤ Connect the I/O cable and AC adaptor connectors.

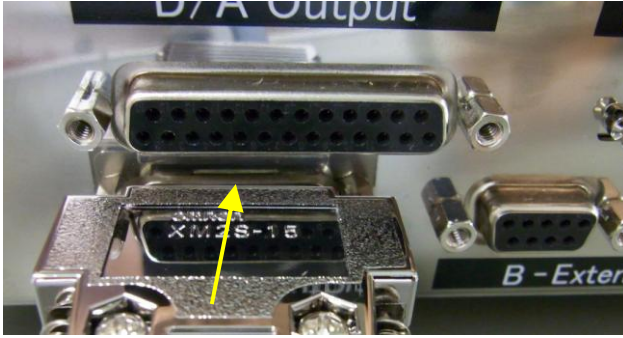


* Before doing the above, attach the ferrite core for noise suppression, which comes with the product, to the cable on the AC side of the AC adaptor.



Ferrite core part No.: E04SR200935A

⑥ **Connect the I/O cable to the amplifier.**



⑦ **Connect the I/O cable to the I/O signal device.**

Refer to Section 2-6, “Connecting the I/O Signal”. (→ Page 15)

⑧ **Connect the external measuring device (to output voltage).**

Refer to Section 8-1, “Connecting an External Measuring Device”. (→ Page 38)

⑨ **Connect the power supply.**

Refer to Section 2-7, “Connecting the Power Supply”. (→ Page 18)

2-6 Connecting the I/O Signal

<<What is the input signal?>>

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

Trigger signal Required to start measurement. 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.

Clear Alarm signal Connected to clear the alarm signal being output from the amplifier. Connect the signal as needed.

* The alarm signal can be cleared automatically by specifying the time in the software settings. (→ Page 23)
If automatic clear at the specified time causes no operational problem, the connection of the Clear Alarm signal can be omitted.

<<What is the output signal?>>

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

Alarm signal An alarm signal is output when the monitoring range defined by software is exceeded.

This signal is used to check for defective items and control external devices such as to stop the molding machine.

* Alarm monitoring can be set for eight channels individually but the alarm output signal is one for all channels.

- Wire these signal wires to the DSUB9 connector of the I/O cable by referring to the following.
- * At least the trigger signal must be wired (Close Mold signal etc.) to continuously monitor the pressure waveforms in the mold.

● DSUB9 connector pin connections

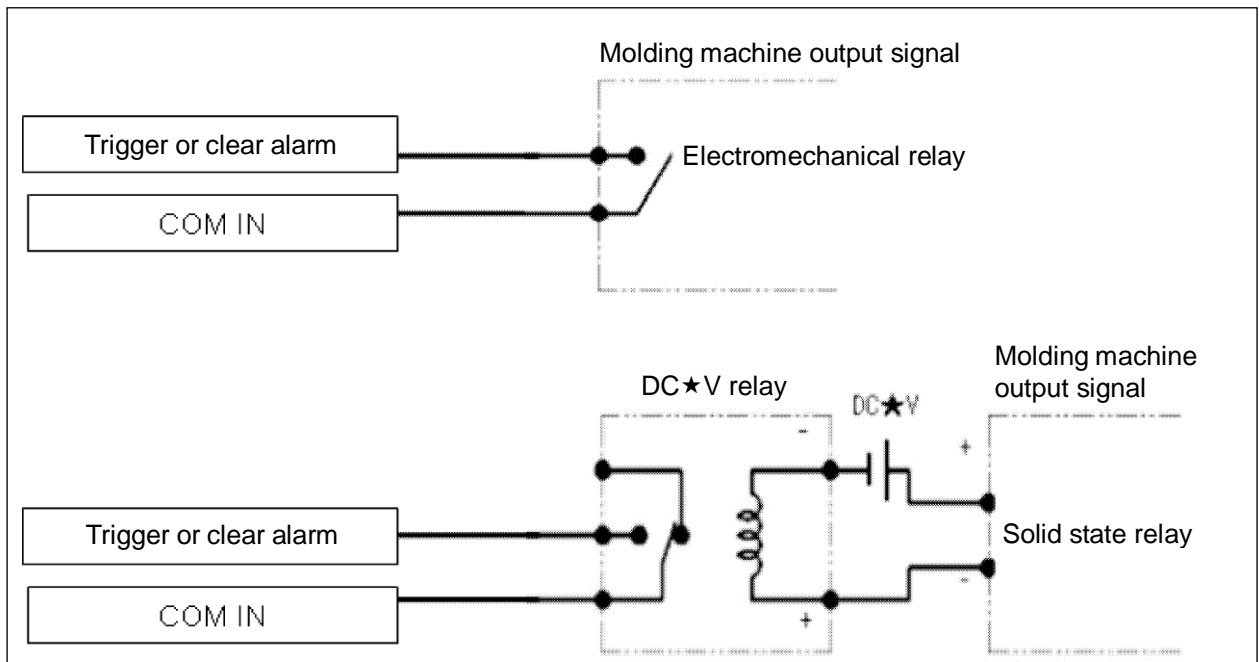
Pin No.	Signal name	Pin connection
1	Trigger	
2	Clear Alarm	
3	Alarm Output	
4	Blank	
5	Blank	
6	COM (IN)	
7	COM (IN)	
8	COM (OUT)	
9	Blank	

● Input signal circuit specifications (trigger signal, clear alarm signal)

	<p>Input the signal to the amplifier via the electromechanical relay. Do not apply voltage.</p>
--	---

Example 1: When the output of the molding machine connected to the amplifier is “relay output”

Example of connection of input signal when the molding machine output signal is contact output

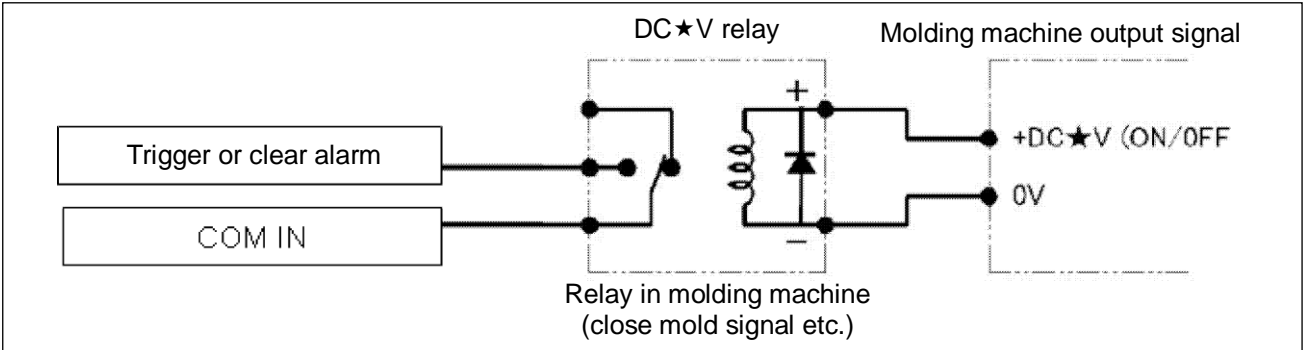


Example 2: When the output of the molding machine connected to the amplifier is “voltage output”

Connect the signal by using a relay adaptable to the output voltage of the output signal from the molding machine.

* When using an electromechanical relay, use a relay equipped with the coil surge absorption circuit.

Example of connection of input signal using a relay when the molding machine output signal is DC★V ON/OFF output

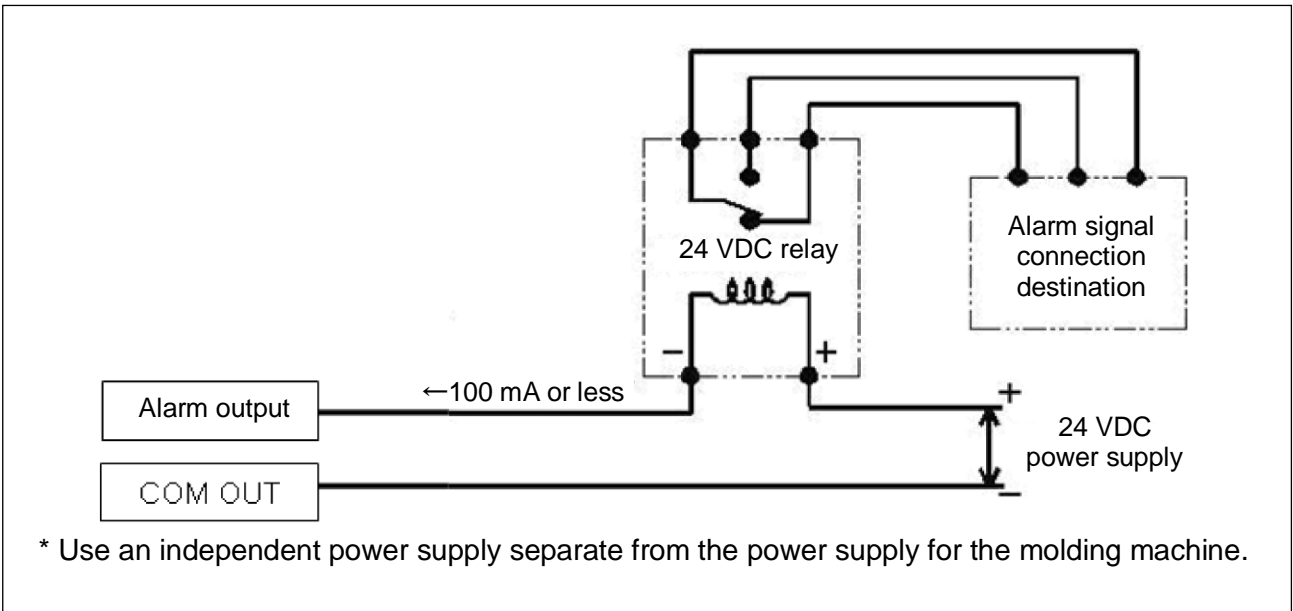


●Output signal circuit specifications (alarm output)

	<p>The alarm output from the amplifier 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.</p>
--	---

Example: Connect I/O signals using the 24 VDC power supply and 24 VDC relay.

* When using an electromechanical relay, use a relay equipped with the coil surge absorption circuit.



* Use an independent power supply separate from the power supply for the molding machine.

2-7 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.**

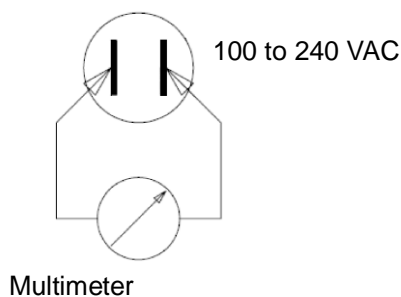
- Check the supply voltage before connecting the AC adapter to the AC power source.

The operating voltage of the AC adapter is 100 to 240 VAC.

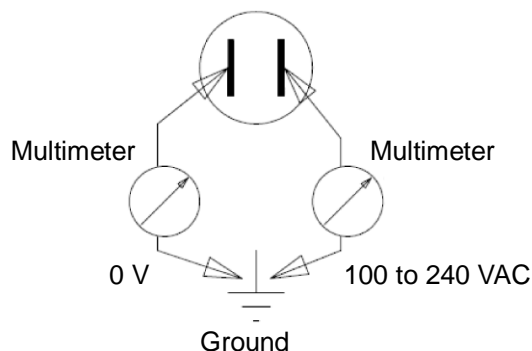
- * If the supply voltage is out of the above voltage range or each terminal voltage of the power supply has higher potential than the supply voltage against the ground, never connect it to this equipment. It could cause failure or accidents.

- Check the supply voltage as follows.

- ① Using a multimeter, measure the voltage between the terminals of the AC power outlet to make sure that it is 100 to 240 VAC.



- ② Using a multimeter, measure the voltage between each terminal of the AC power outlet and the ground to make sure that one is 0 V and the other is 100 to 240 V.



- ③ In the field where equipment that generates noise such as an induction motor or electric welder is used, the power condition is expected to be bad with much noise. Take measures against noise by using commercially available isolation transformer or noise cut transformer.

- Warm up the system for 30 minutes or more after power on. Insufficient warmup could make measurements unstable.

3. Basic Operation of Amplifier

This section describes the basic operation of amplifier “MPS08”.

3-1 Turning Power ON/OFF

■ Turning power ON

Turn on the power to the amplifier by referring to Section 2-7, “Connecting the Power Supply”. (→ Page 18).

■ Turning power OFF

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

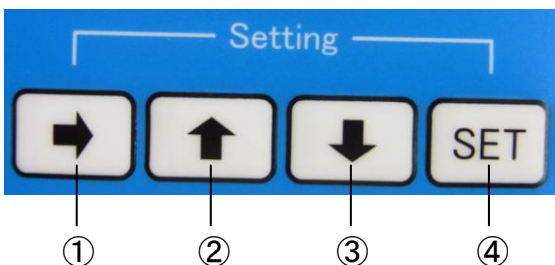
* **The amplifier does not have a power switch. Never turn power on or off by connecting or disconnecting the I/O cable. It could damage not only the amplifier and AC adapter but also other devices connected.**

3-2 Operating the Amplifier

3-2-1 Operating the key switches

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

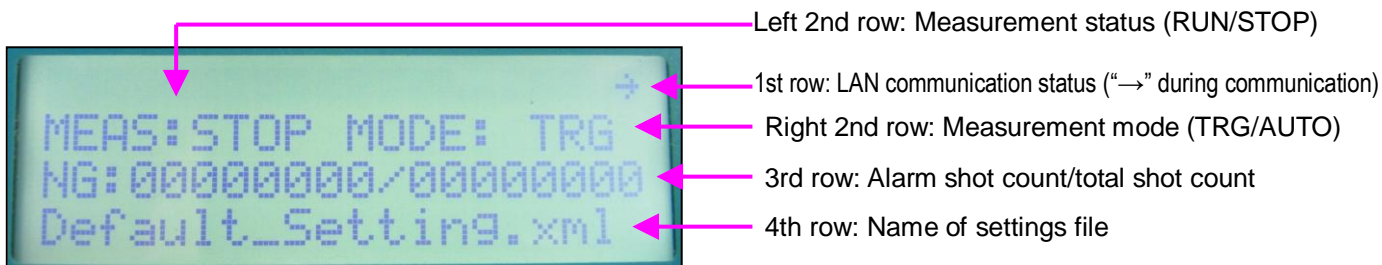
- Checking the conditions set in the amplifier (such as when using the amplifier in standalone mode)
- Starting measurement manually (pressing the SET key in monitor mode starts measurement)



①	“→” key	Changes the display content when held down.
②	“↑” key	Used to change the setting.
③	“↓” key	
④	“SET” key	Fixes the setting changed. In monitor mode, pressing this starts measurement. (Usable as the manual trigger)

3-2-2 LCD window display

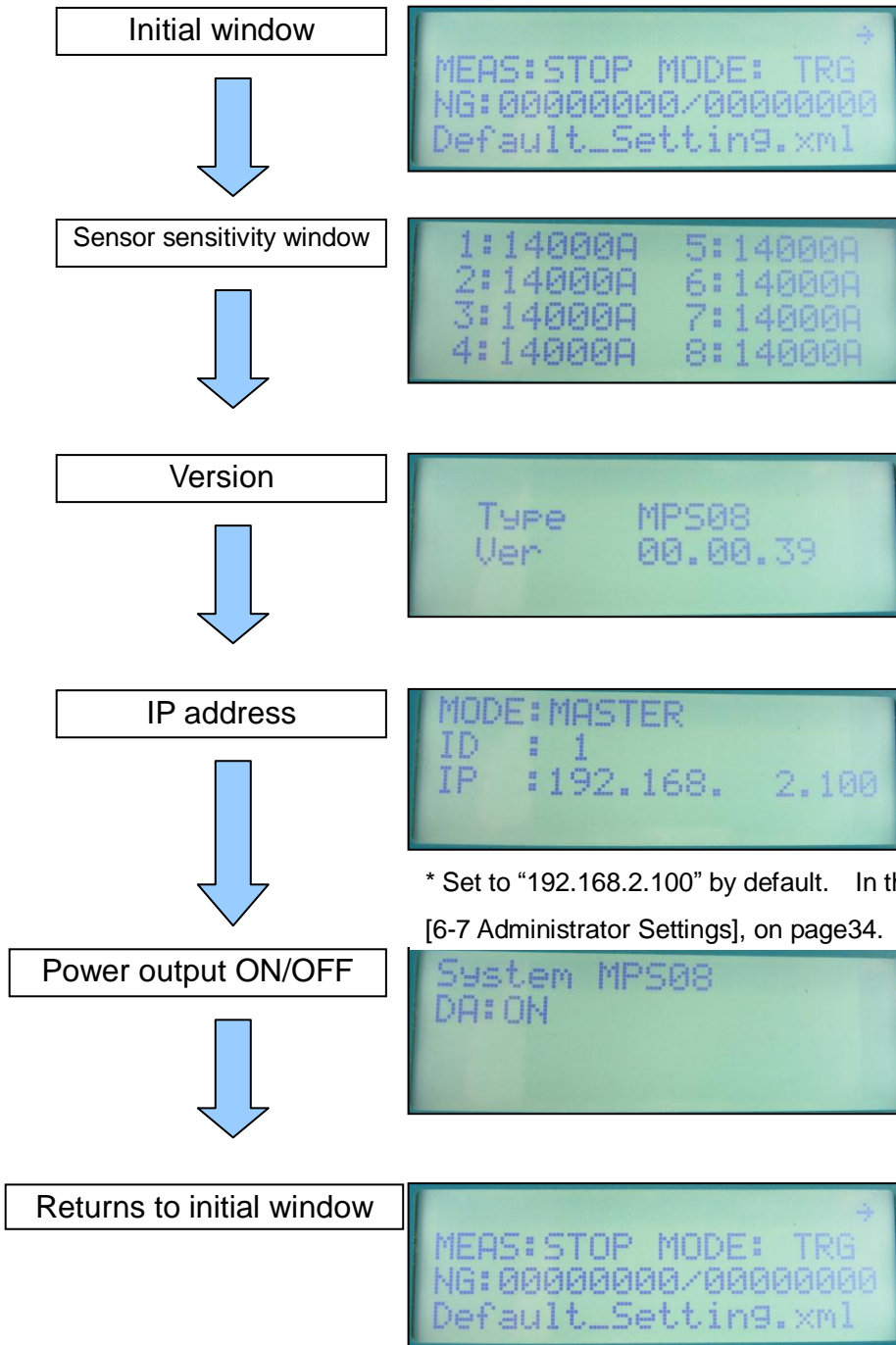
Turning on the power displays the following LCD window. (The photo below shows the default window when shipped.)



■ Holding down the “→” key (1 second or more) changes the display content.

- * After checking the display content by switching the window, return to the initial window.
- * If not returned to the initial window, measurement cannot be started by the “SET” key.

■ Window changes as follows.



* Set to "192.168.2.100" by default. In the case of changing IP address, see [6-7 Administrator Settings], on page34.

3-2-3 Using the amplifier by stand-alone

The MPS08 allows the amplifier to operate in standalone mode. Once the set conditions are saved to the amplifier by operating the connected PC, the monitor functions even after PC is separated from the amplifier.

■ To do so, follow the procedure below.

- Step 1: Connect PC and make necessary settings. (Refer to Section 4-4, "Setting the Conditions", on page 23.)
- Step 2 : Save the set conditions into the amplifier. (Refer to Sections 4-5, "Saving Settings As", and 4-6, "Saving Settings", on page 27.)
- Step 3 : Exit the measurement software. (Refer to Section 4-1, "Starting and Exiting Software", on page 21.)
- Step 4 : Turn off the power to the amplifier. (Refer to Section 3-1, "Turning Power ON/OFF", on page 19.)
- Step 5 : Disconnect the LAN cable.
- Step 6 : Turn on the power to the amplifier. (Refer to Section 3-1, "Turning Power ON/OFF", on page 19.)

* If PC is not connected, only the alarm function is possible and the data cannot be saved in the amplifier.

4. Basic Operation of Measurement Software

This section describes the basic operation of measurement software.

4-1 Starting and Exiting Software

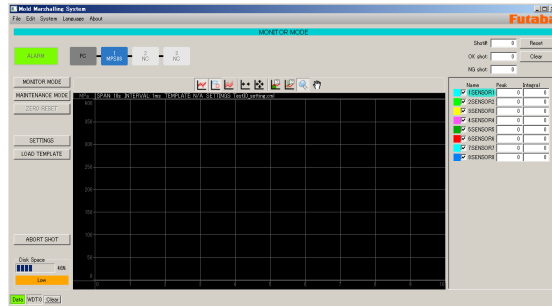
Starting software

Double-click the shortcut “MMS” on the desktop.

* If the shortcut “MMS” is not found, specify the “MMS” executable file in “home/username/MMS/app” and click “Create Link” to create a shortcut.

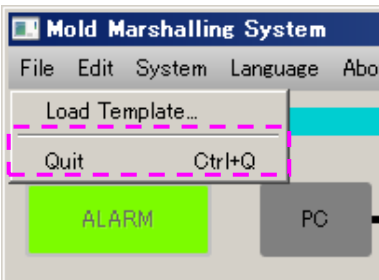


The main screen appears.

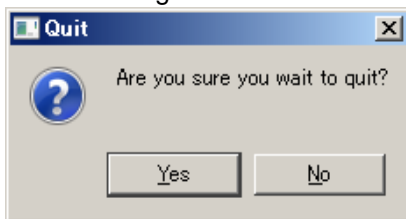


Exiting software

Select “Quit” from the main menu, or click close button “x” on the upper right corner of the screen.

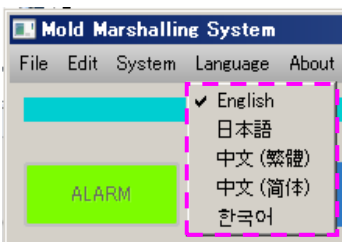


The following confirmation message is displayed. To exit, select “Yes”.



4-2 Changing the Language

The language can be changed by selecting “Language” from the main menu.



* Japanese or English can be selected.

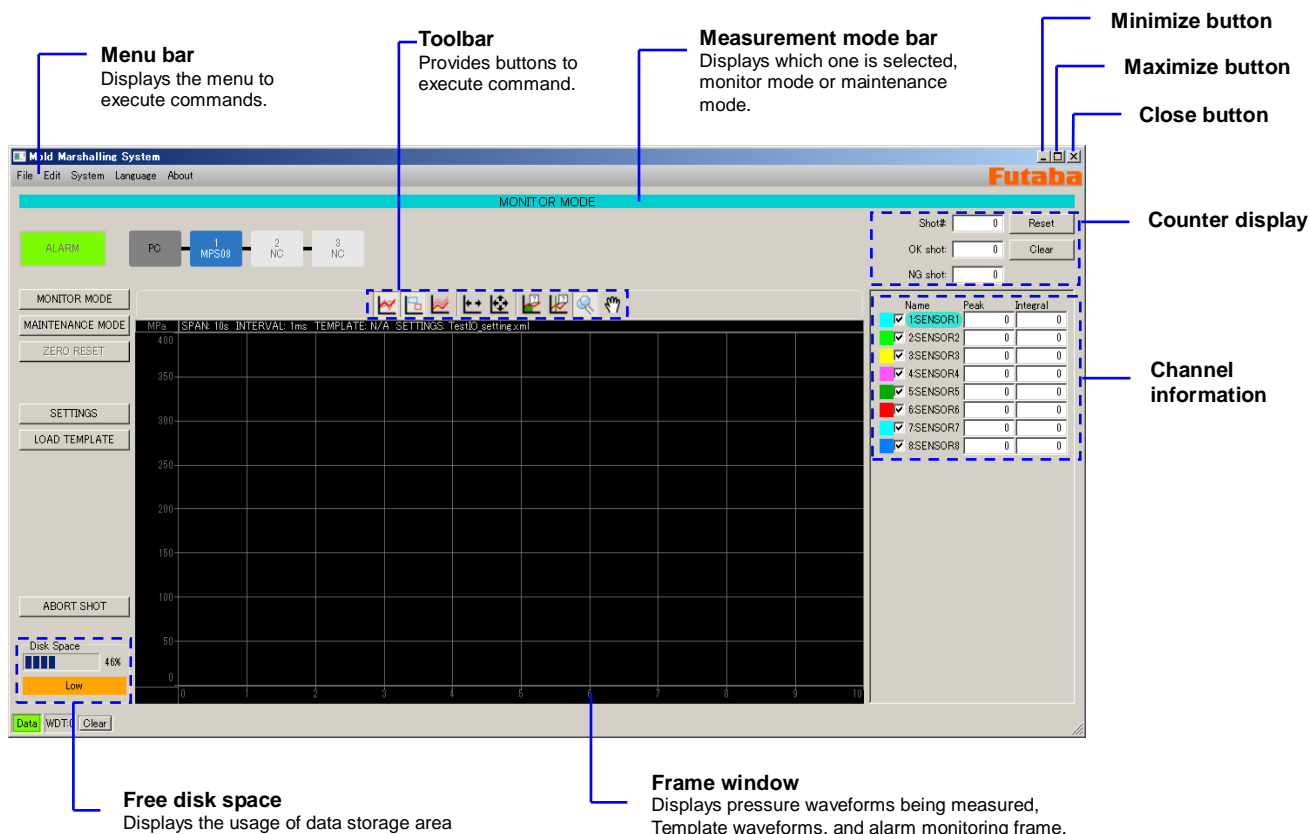
(As of December 12, 2012)

4-3 Names and Functions of Screen Components

This section explains the basic screen components and the operations that are often used.

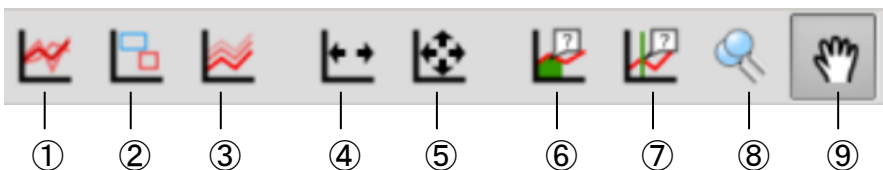
■ Operation screen

When software starts up, the screen shown below appears. This screen is referred to as the operation screen. Here, remember the concepts of individual screen components.



■ Toolbar

The frequently used commands are provided as buttons. The functions of individual commands are explained below.



①	Show/Hide Template wave	Shows or hides the Template waveforms read into the frame screen.
②	Show/Hide monitoring frame	Shows or hides the alarm monitoring frame that has been set.
③	Show/Hide overlay	Shows or hides waveform overlay every shot.
④	Fit to measurement time	After enlarging the view, zooms out only in the time axis direction.
⑤	Fit to measurement conditions	Zooms out along both the time axis and pressure axis (according to the measurement conditions).
⑥	Integration cursor tool	Displays the pressure integral value (area) at the cursor position.
⑦	Cursor tool	Displays the pressure value at the cursor position.
⑧	Zoom	Enlarges the specified view.
⑨	Hand tool	Drags and moves the enlarged view.

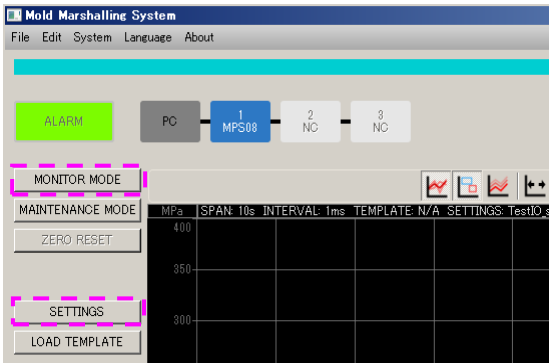
4-4 Setting the Conditions

Here, set the conditions under which data is retrieved. The conditions once set are saved to the setting file, so the same conditions are automatically set when the setting file is read next and after.

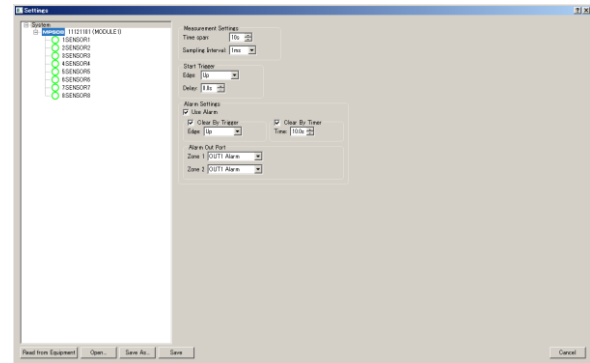
- Set “measurement conditions”, “sensor sensitivity,” and “alarm monitoring conditions” sequentially in this order.
 - * “Measurement conditions” and “sensor sensitivity” must be set. Set “alarm monitoring conditions” as needed.

4-4-1 Setting measurement conditions

Click the SETTINGS button.

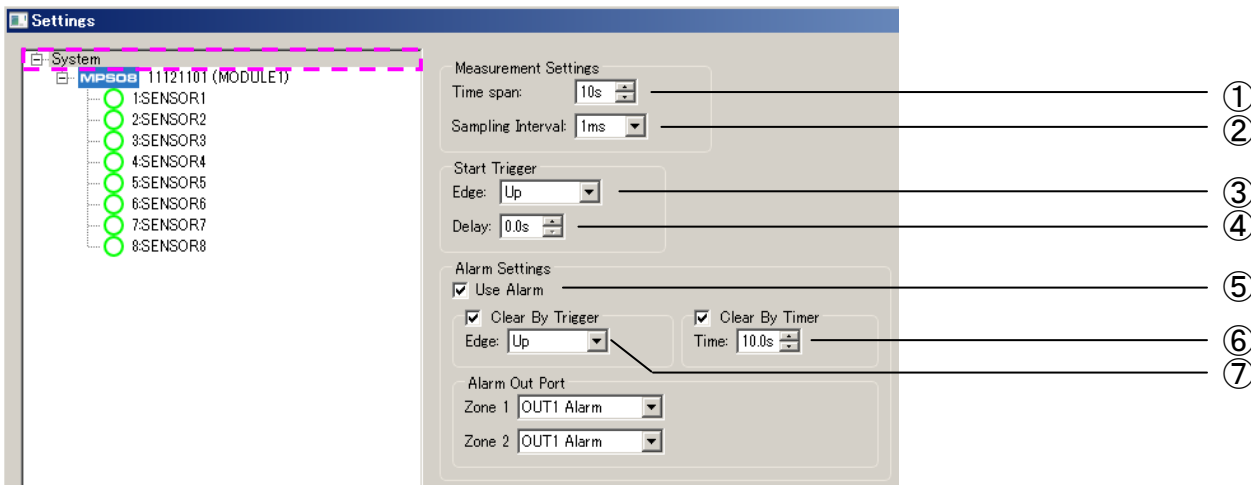


The measurement conditions setting screen appears.



* MONITOR MODE must be selected in advance.

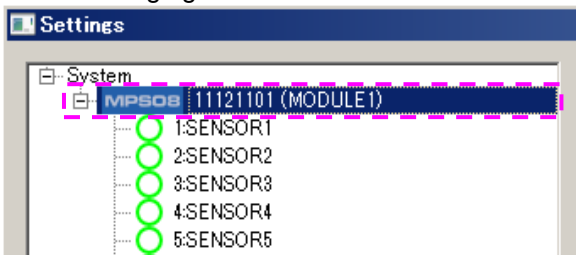
Make settings related to measurement.



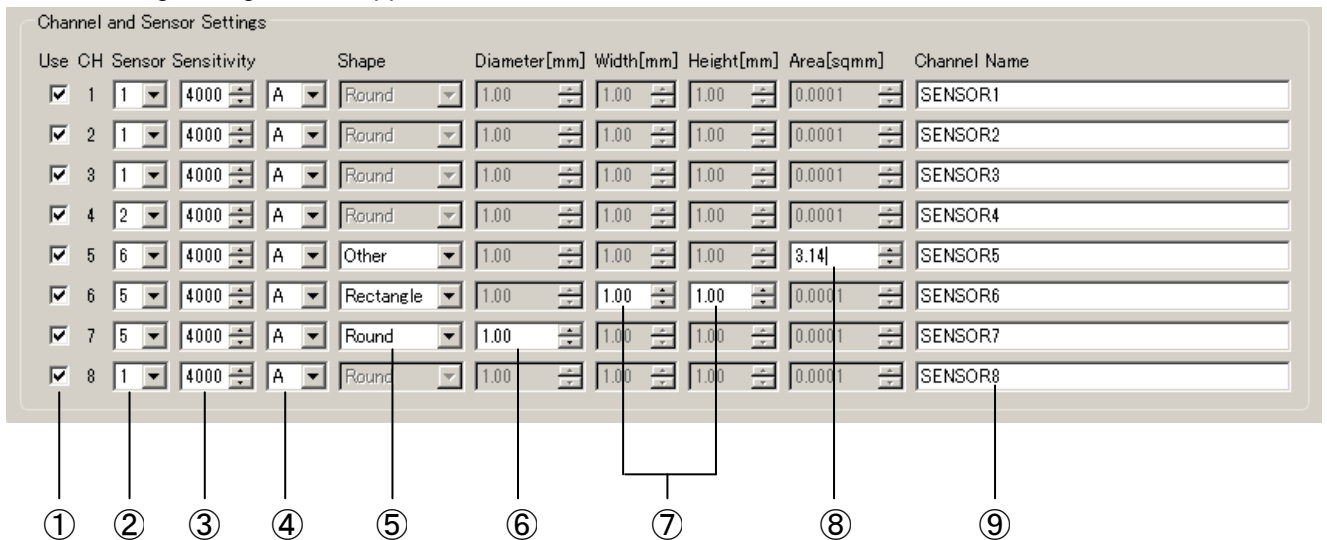
①	Measurement time (Time span)	Set in units of seconds from 1 to 120. Set a shorter time than the molding cycle time.
②	Sampling interval	Select one from 1, 5, 10, and 20 ms.
③	Trigger start	Select according to the specifications of the signal input from the molding machine. When the mold close complete signal is connected, select “Up”.
④	Trigger delay setting	Measurement starts after the lapse of the specified time after input of the trigger signal. When the mold close complete signal is connected, set 0 second.
⑤	Alarm setting	Select the check box to enable the output of an alarm signal.
⑥	Clear Alarm setting by timer	The alarm signal is automatically cleared in the specified time after output of the alarm signal.
⑦	Clear Alarm setting by trigger	Used when the alarm signal is to be cleared by the external trigger signal. Set according to the output signal of the connection destination.

4-4-2 Setting sensor sensitivity

- Set the sensitivity of sensors after setting the measurement conditions. Click the inside of the dotted frame in the following figure.

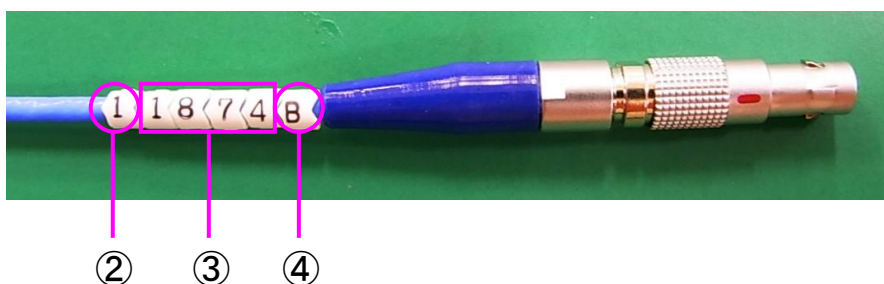


The following setting window appears.



①	Enable/disable measurement CH	Check the channel(s) to be measured. For the unchecked channel, waveforms are not displayed even when the sensor is connected.
②	Sensor type selection	Select the type of a sensor. Select the first digit of the number attached to the sensor cable.
③	Input of sensor sensitivity (numeric value)	Input the sensitivity (numerical value) of a sensor. Input the second to fifth digits of the number attached to the sensor cable.
④	Input of sensor sensitivity (Alphabet)	Input the sensitivity (symbol) of a sensor. Input the alphanumeric value at the end of the number attached to the sensor cable.
⑤	Selection of shape of pressure receiving surface	This setting is required when a button type sensor is selected. Select "Round", "Rectangle", or "Other".
⑥	Input of tip diameter of round pin	This setting is required when a button type sensor is selected. Input the tip diameter of a pressure transmission pin.
⑦	Input of tip size of square pin	This setting is required when a button type sensor is selected. Input the dimensions of the tip of a pressure transmission pin.
⑧	Input of sectional area of tip of pin	This setting is required when a button type sensor is selected. The cross-sectional area of the tip of a pressure transmission pin can be input directly.
⑨	Input of channel name	Input a channel name in up to 16 alphanumeric characters.

- Selection of sensor type and input of sensor sensitivity

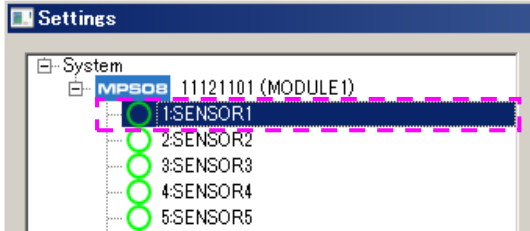


4-4-3 Setting alarm monitoring conditions

Perform alarm setting as needed. If alarm setting is not required or only measurement is performed, save the settings after setting the measurement conditions and the sensitivity of the sensors. After the settings are saved, the operation screen is restored.

* For saving the settings, refer to Sections 4-5, "Saving Settings As," and 4-6, "Saving Settings". (→Page 27)

■ When performing alarm setting following the setting of sensor sensitivity, click the inside of the dotted frame in the following figure.

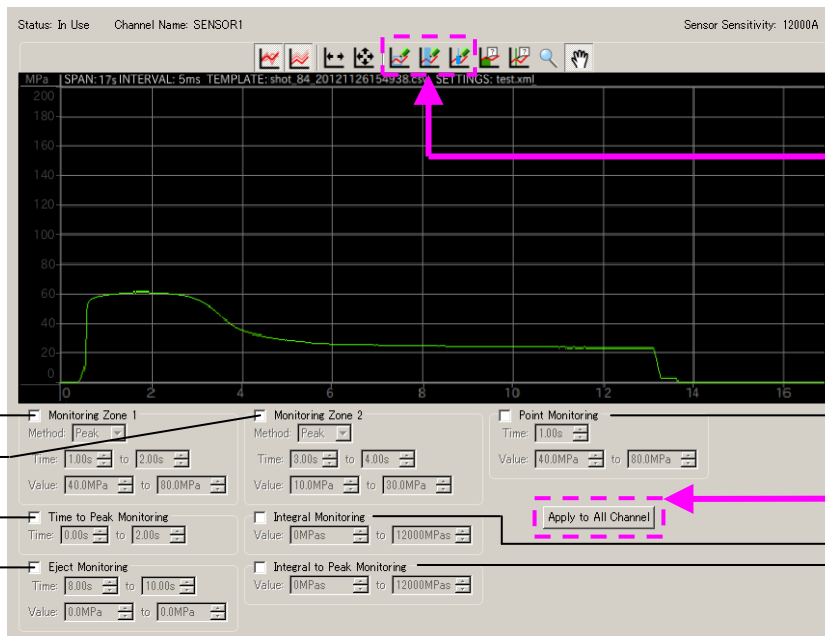


The figure at left shows an example of alarm setting for channel 1.

■ The setting window appears. The following figure shows the window displaying Template waveforms.

* Reading the Template waveforms in advance in the frame window displays the Template waveforms also in the alarm setting window and makes it easy to set alarm conditions.

* For reading the Template waveforms, refer to Section 6-1, "Displaying Template Waveforms". (→ Page 30)



Alarm conditions can be easily set using the monitoring range edit tools.

The specified monitoring conditions are applied to all channels.

■ Six alarm monitoring items are provided.

Set these items by directly entering numerical values or using the monitoring range edit tool on the toolbar.

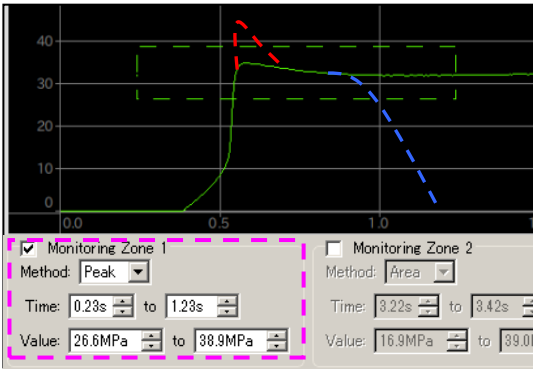
■ Multiple monitoring items can be set for one sensor.

Do it as needed. (Refer to the following page for details of the procedure for setting monitoring items.)

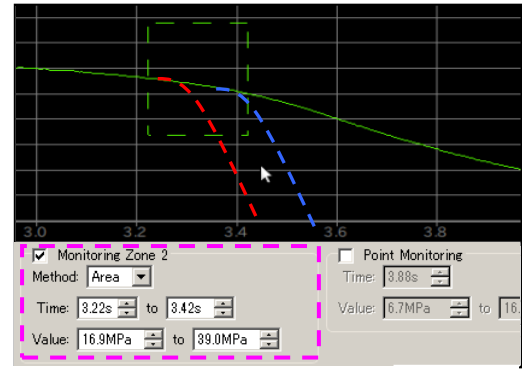
①	Monitoring zone 1	Monitors the maximum pressure value in the set range of the monitoring time whether it is within the pressure range set. (Judgment: Peak) Monitors all measurement values in the set range of the monitoring time whether they are within the pressure range set. (Judgment: Area)
②	Monitoring zone 2	Same as above
③	Point monitoring (Monitor after t seconds)	Monitors the pressure values in the elapsed time set whether they are within the pressure range set.
④	Time-to-peak monitoring	Monitors the maximum pressure value (peak pressure value) in the measurement time whether it is within the set range of the monitoring time.
⑤	Integral monitoring	Monitors the entire waveform area (an area surrounded by pressure waveforms and time axis) whether it is within the set range of integral values.
⑥	Integral to peak monitoring	Monitors the integral value up to the maximum pressure value (peak pressure value) in the measurement time whether it is within the set range of integral values.

■ Supplement to alarm monitoring settings

① ② Monitoring zone

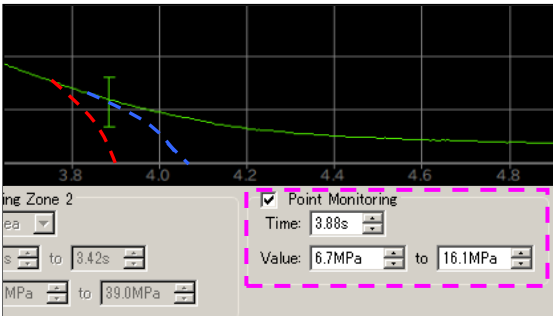


<Peak judgment>
Blue dotted waveform: OK; Red dotted waveform: Alarm



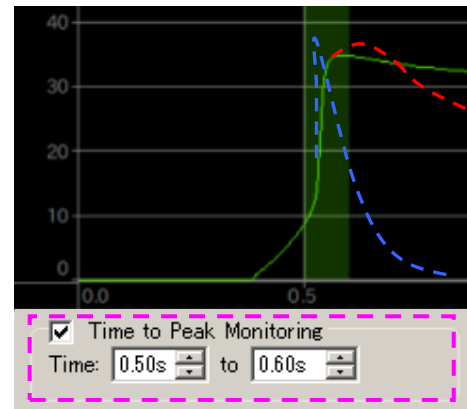
<Area judgment>
Blue dotted waveform: OK; Red dotted waveform: Alarm

③ Point monitoring



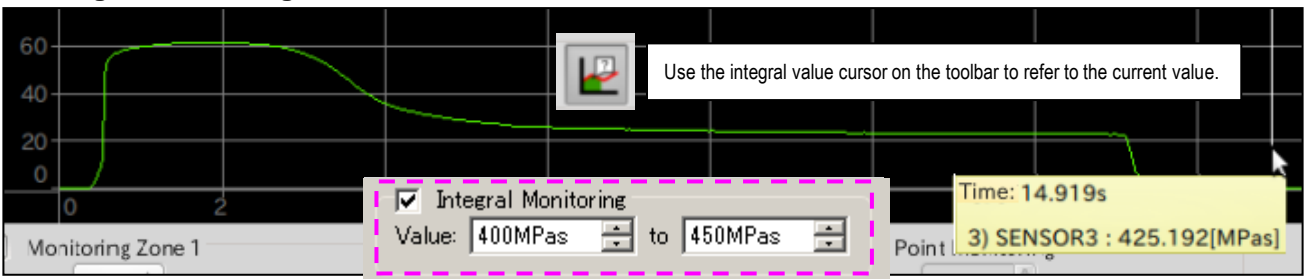
Blue dotted waveform: OK; Red dotted waveform: Alarm

④ Time-to-peak monitoring

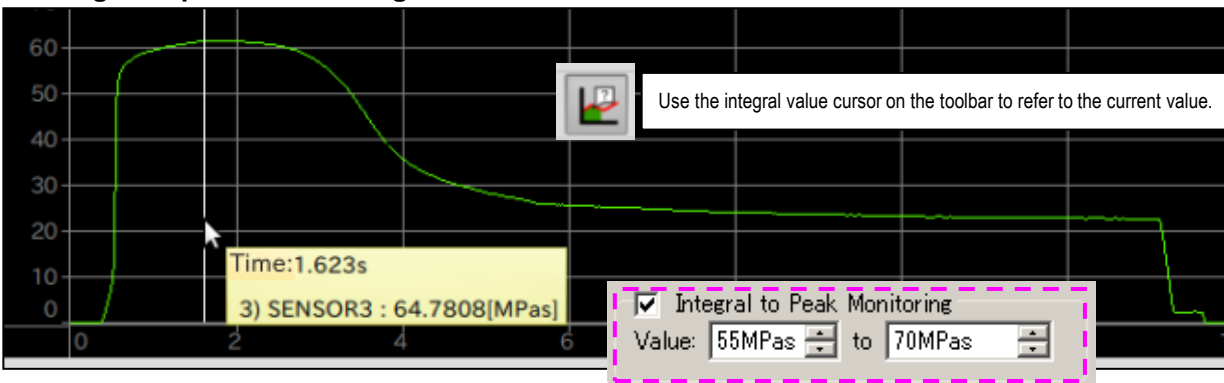


Blue dotted waveform: OK; Red dotted waveform: Alarm

⑤ Integral monitoring



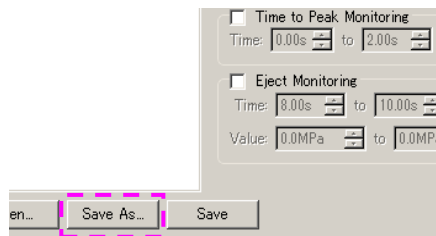
⑥ Integral to peak monitoring



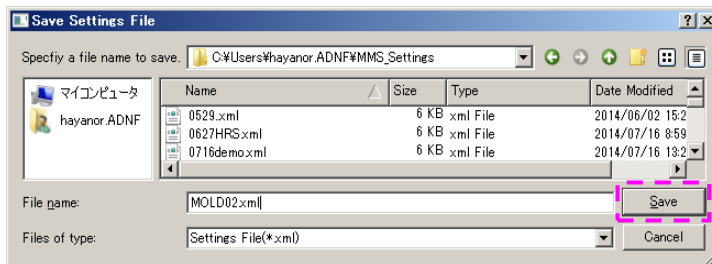
4-5 Saving Settings As

After completion of setting the measurement condition, sensitivity of sensors, and alarm monitoring conditions, save the new settings. To save the settings by assigning a name as a new file and replace the current setting file stored in the amplifier, press the “Save As” button.

- Press the “Save As” button.



- The file name input window appears.
Enter a file name with up to 16 alphanumeric characters and press “Save”. The window automatically returns to the operation window.



The setting file set in the amplifier is replaced with the newly saved one.

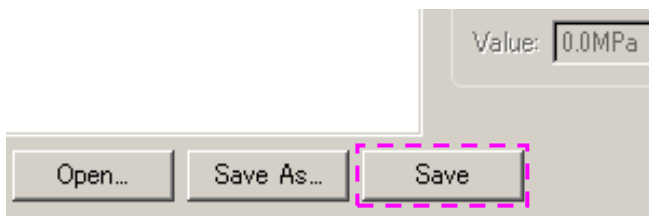
The newly saved setting file is also saved to PC simultaneously.

* The setting file storage destination can be changed using “Administrator Setting” in the main menu.

4-6 Saving Settings

To overwrite the setting file set in the amplifier, press “Save”.

- Press the “Save” button. The window returns to the operation window automatically.



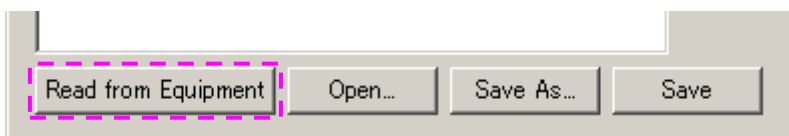
The contents of the setting file set in the amplifier are updated.

At the same time, the setting file with the same name stored in the PC is also updated.

4-7 Reading Settings from Amplifier

The set conditions stored in the amplifier can be read and checked.

- Press “Read from Equipment”. The setting data in the amplifier is displayed.



5. Using the System

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

5-1 Selecting Measurement Mode

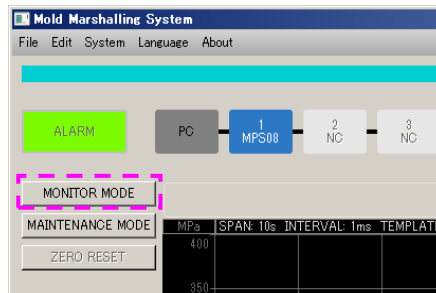
This software has two measurement modes: monitor mode and maintenance mode.

This section explains the observation of waveforms in monitor mode which is used for normal operation.

* For the observation of waveforms in maintenance mode, refer to Section 7-3-2, "Quick sensor checking". (→ Page 37)

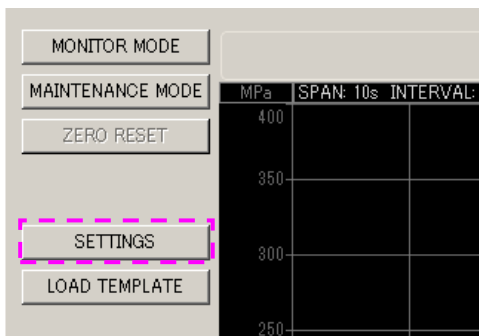
■ Press the "MONITOR MODE" button.

The system is waiting for a trigger signal (measurement start signal) from the molding machine.



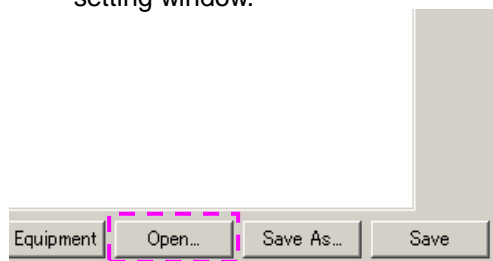
5-2 Selecting Setting File

■ Press the "SETTINGS" button.

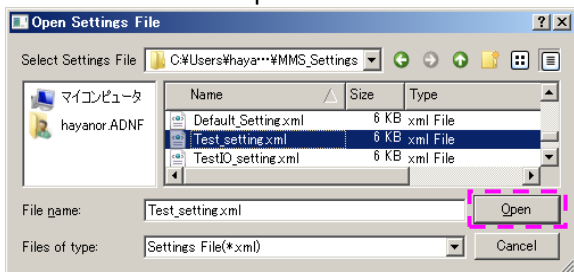


■ Press the "Open..." button.

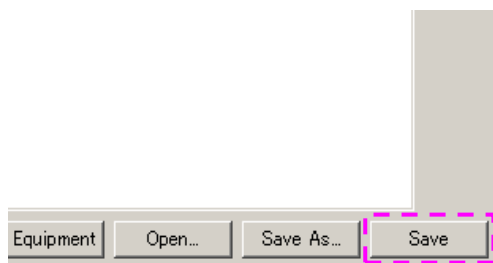
* It is located at the lower left of the setting window.



■ Select the file and press the "Save" button.



■ Press "Save".



The conditions in the selected settings file are displayed.

The setting file is saved in the amplifier.

* At shipment, the default settings file "Default_Setting.xml" is stored in the amplifier and PC.

* For creating and saving the setting file, refer to Section 4-4, "Setting the Conditions". (→ Page 23)

5-3 Starting Measurement

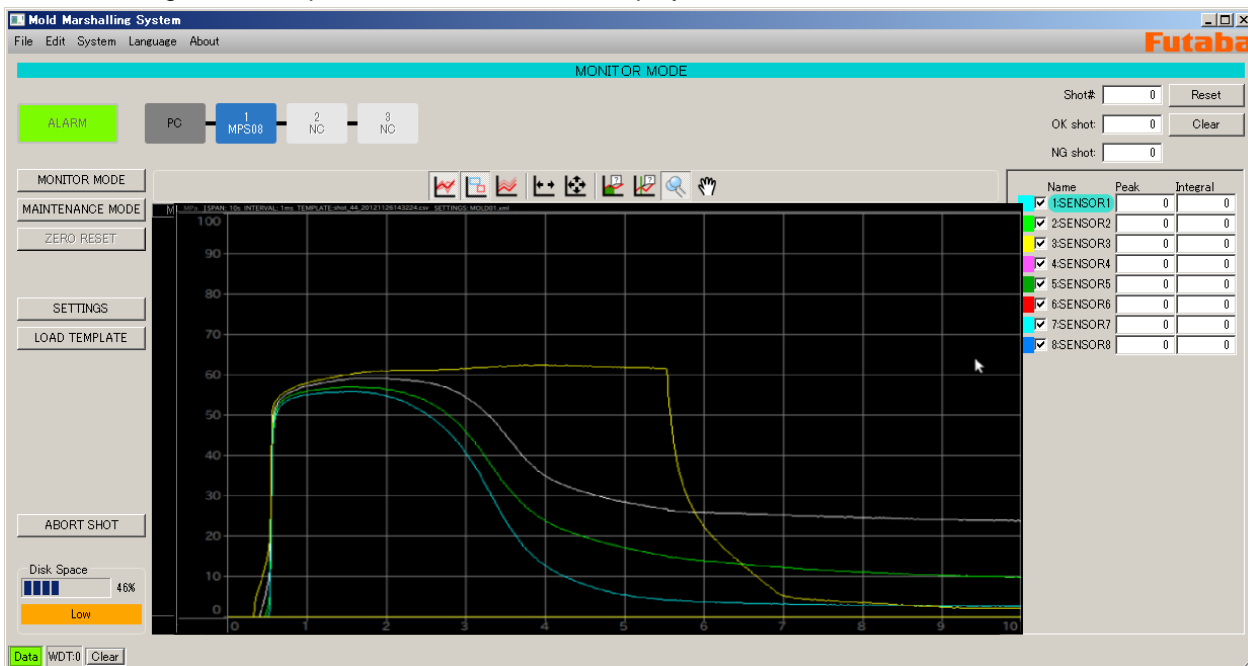
Now, the system is completely ready to observe waveforms.

- 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.

5-4 Observing Pressure Waveforms

- When molding is started, pressure waveforms are displayed.



* 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 display channel checked? → Confirm the check mark in the channel information display section (at the right side of the operation window).
- ③ Is the system connected correctly?
(Sensor, Junction box, Junction cable, power supply, LAN, trigger signal)
→ Check the connections by referring to Section 2-5, "Connections in System". (→ Page 13)
- ④ Is the Network settings correct? → Check the Network settings by referring to Section 2-1, "Setting up the Network Connections." (→Page 6)
- ⑤ Isn't the sensor damaged? → Open- or short-circuit of the cable can be checked easily using a multimeter connection cable (sold separately).

6. Function Description

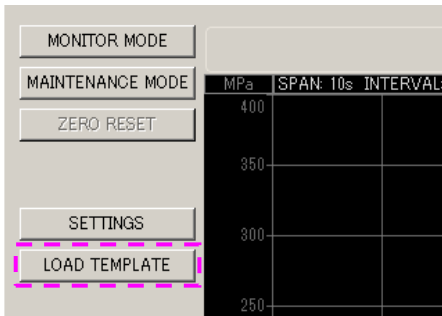
This section explains specific functions and advanced operations.

6-1 Displaying Template Waveforms

- Pressure waveforms stored in the past can be displayed in the frame window.

Overlaying the Template waveforms on the waveforms being measured makes it possible to visually check “pressure transition at molding condition adjustment”, “pressure variation during mass production,” and “pressure change when the molding conditions are changed”.

- Press the “LOAD TEMPLATE” button.

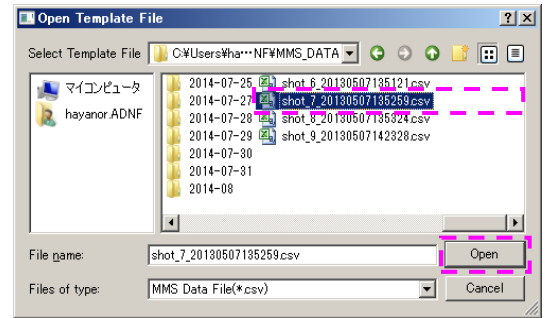
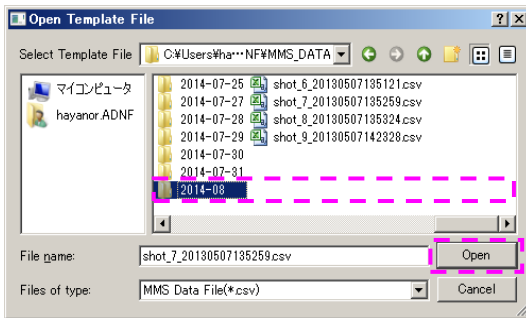


- The file name selection window appears.

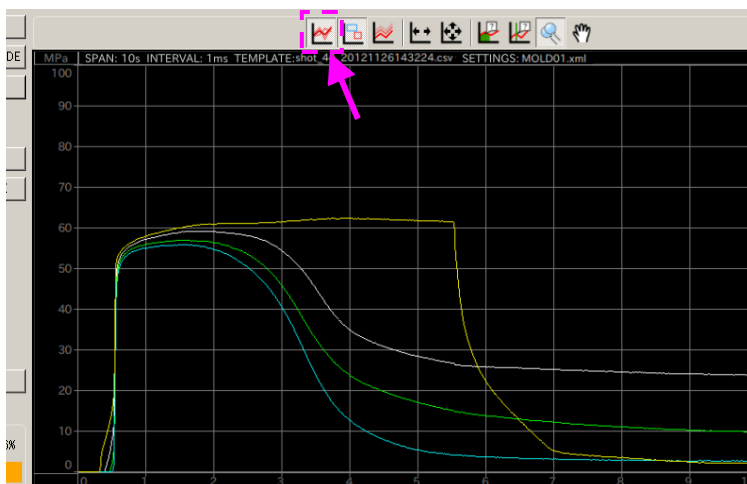
Select a file from the folder displayed with the date, and press “Open”.

* Template waveform files are stored in the “c:\document and settings\username\MMS_DATA year-month-date folder.

* Each Template waveform file is automatically stored with a name consisting of a shot number, date, and time.



- The Template waveform is displayed in the frame window.



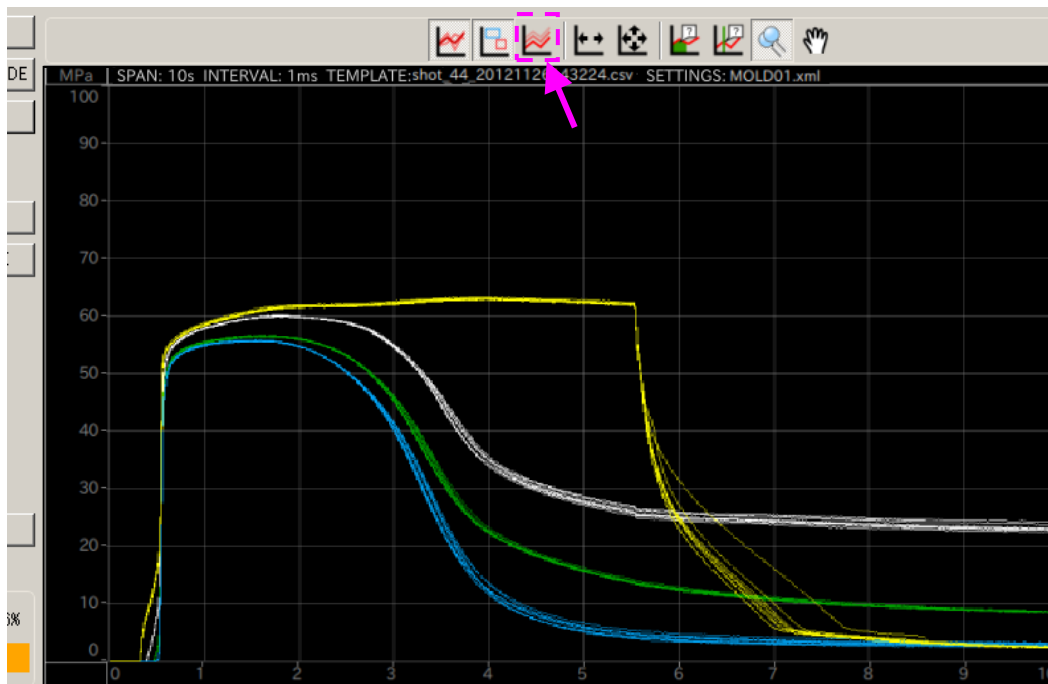
* If the Template waveform is not displayed, check whether the “Show/Hide Template waveform” button on the toolbar is set to “Hide”.

* The density of the display color of the Template waveform can be adjusted by selecting [System] from the main menu → [Display setting] → [Opacity of Template waveform]. (→ Page 33)

6-2 Overlaying Waveforms

■ The waveform can be overlaid up to 99 times.

* The overlay count can be set by selecting [System] from the menu bar → [Overlay]. (→ Page 33)

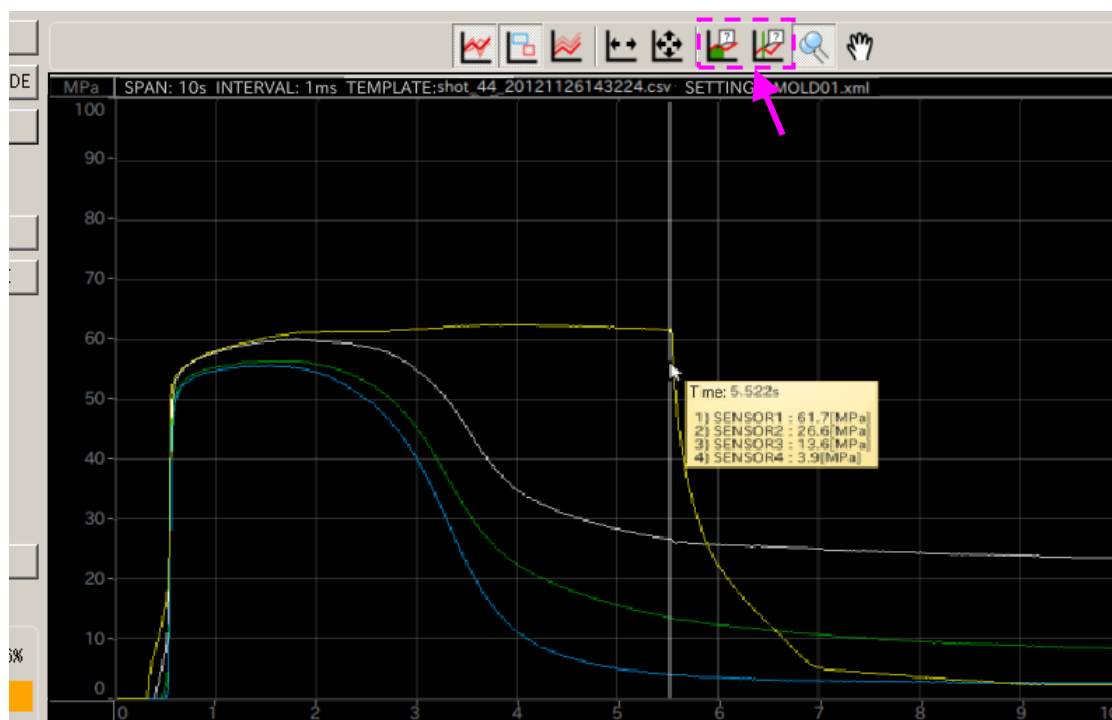


* If the overlay waveforms are not displayed, check whether the “Show/Hide overlay” button on the toolbar is set to “Hide”.

6-3 Using the Cursor Functions

■ Pressure values or pressure integral values can be displayed by placing the cursor on the waveform being measured.

To do so, use “Cursor tool” or “Integral cursor tool” on the toolbar.

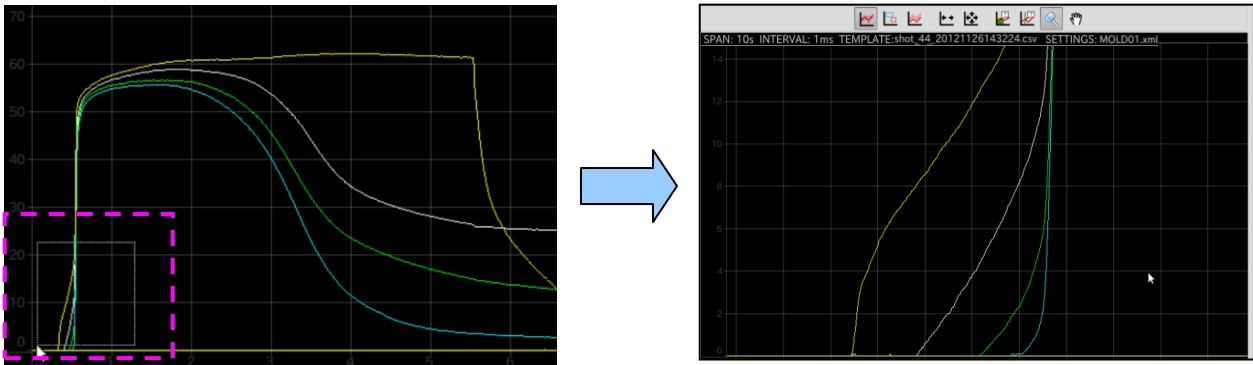


* The above figure shows the cursor displayed when “Cursor tool” is used.

6-4 Waveform Display Settings

6-4-1 Enlarging waveforms (zoom)

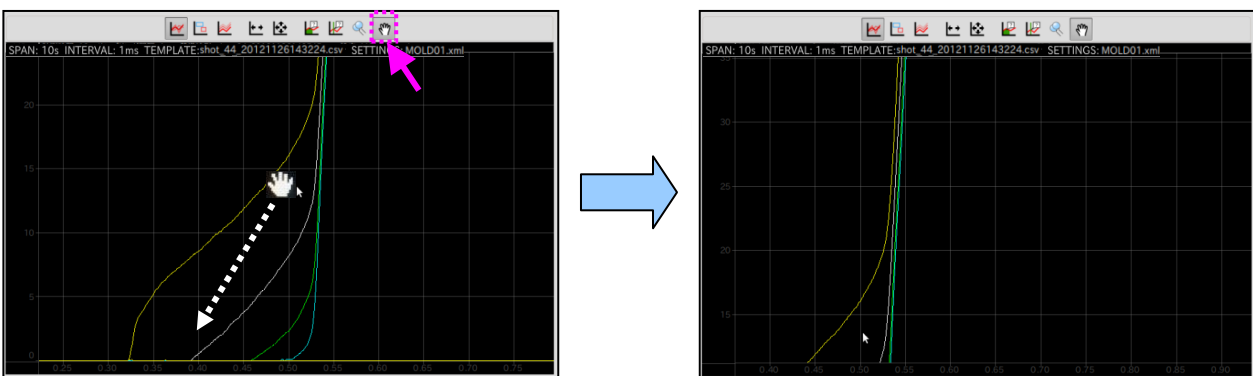
- Using the “Zoom” button on the toolbar, select the part to enlarge.



- * Mouse operation: Enclose the start point to the end point of the part to be enlarged, and release the mouse button.

6-4-2 Moving the waveform position

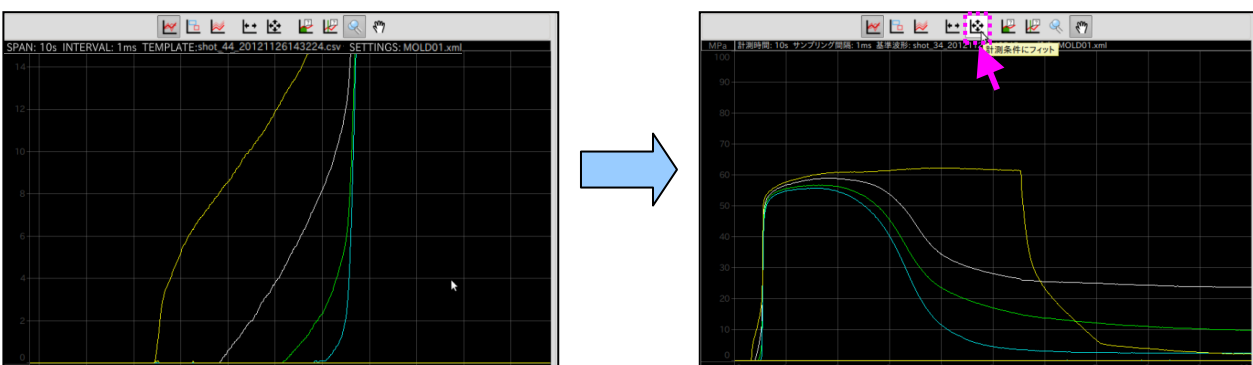
- A position in the enlarged part can be moved by using the “Hand” button on the toolbar.



- * Mouse operation: Drag the position to be moved to the target position and then release the mouse button.

6-4-3 Displaying the entire waveforms (zoom out)

- The entire waveform display can be restored by using the “Fit to measurement conditions” button on the toolbar.

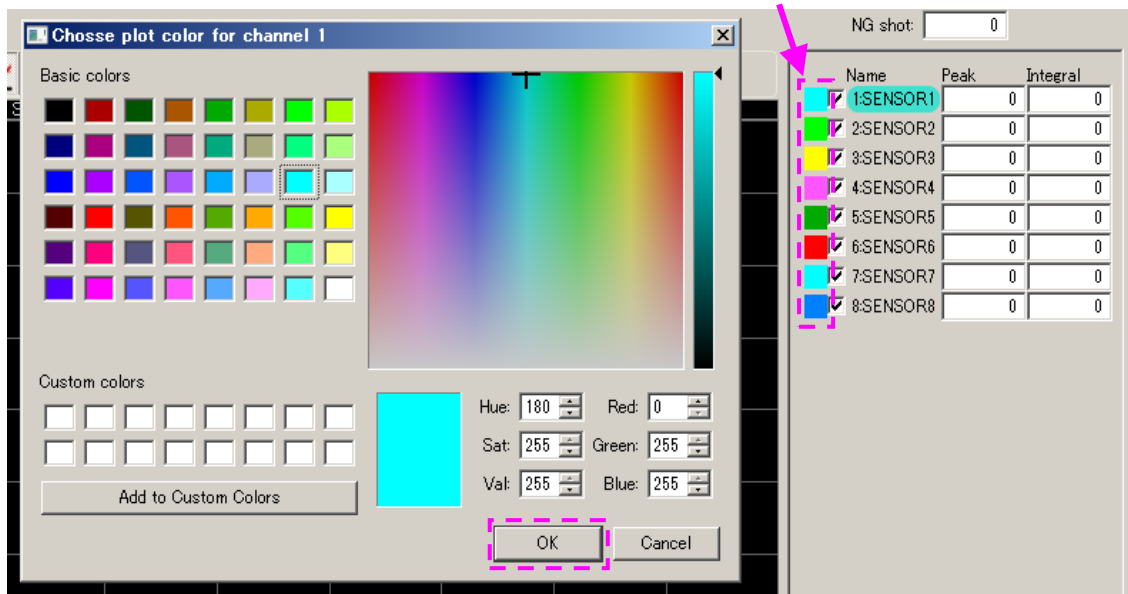


- * The full scale of the pressure display can be set by selecting [System] from the main menu → [Display setting] → [Full scale]. (Set to 200 MPa by default)
- * To zoom out in only the direction of time axis, press the “Fit to measurement time” button. (→ Page 22)

6-4-4 Changing the color of waveforms

- Click the color box in the channel information display area.

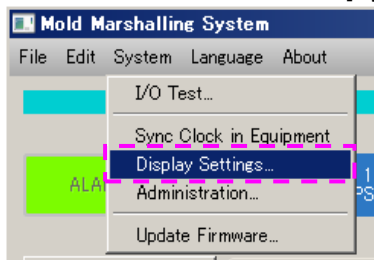
Select desirable drawing color and click OK.



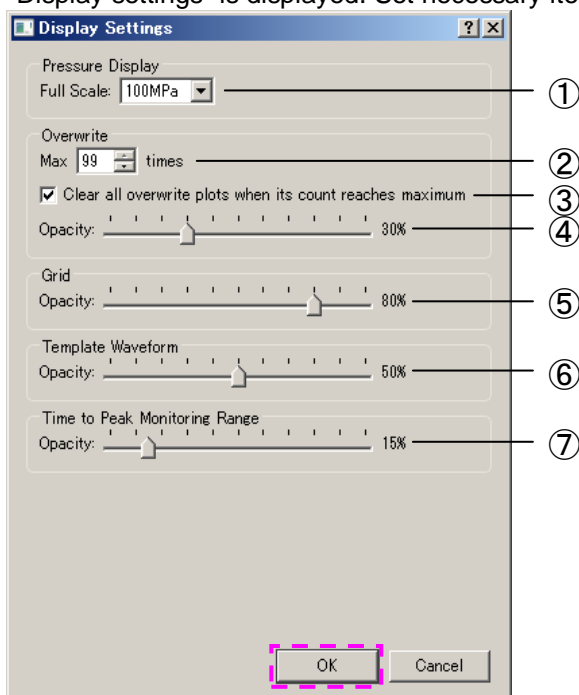
6-5 Other Display Settings

This section explains the other settings related to display.

- From the main menu, select [System] → [Display settings...].



- “Display settings” is displayed. Set necessary items and click OK.



①	Selection of full-scale pressure	Select one from 100, 200, and 400 MPa. This setting is applied when the entire waveforms is displayed.
②	Overwrite count setting	Select a count from 0 to 99.
③	Overlaid-waveform display setting	- Check: After overlay is performed the specified number of times, the overlaid-waveforms are entirely erased. - Uncheck: Overlaid-waveforms are erased in order from the old one.
④	Overlaid-waveform opacity setting	A value can be set in steps of 5% in the range from 0 to 100%. As the value is increased, overlaid waveforms are displayed darker.
⑤	Grid opacity setting	A value can be set in steps of 5% in the range from 0 to 50%. As the value is increased, grids are displayed darker.
⑥	Template-waveform opacity setting	A value can be set in steps of 5% from 0 to 100%. As the value is increased, the template waveform is displayed darker.
⑦	Opacity setting for time to peak monitoring range	A value can be set in steps of 5% from 0 to 100%. As the value is increased, the time to peak monitoring range is displayed darker.

6-6 Saving Data

6-6-1 Types of saved data

This software can save setting files, waveform data, and numerical data.

Data type	Item	Extension	Save destination folder	Remarks																
Setting file	Condition settings	.xml	C:\Document and settings\%username%\MMS_Settings	A setting file contains conditions that are set to perform measurement and monitoring. Select one from the relevant folder in PC and save it in the amplifier to use.																
Waveform data	Pressure waveform	.csv	C:\Document and settings\%username%\MMS_DATA\%year-month-date folder	- Saved for each shot number. - Can be read as Template waveform data into MPS08 software. - Can be read to spreadsheet software to edit data.																
Numerical data (monitoring item)	Date & time saved (Time)	Time to peak (Time at Peak)	C:\Document and settings\%username%\MMS_DATA\%year-month folder	- Saved by date. - Can be read to spreadsheet software to edit data. - Alarms detected with regard to the respective monitoring items are recorded using the respective codes listed in the following table.																
	Trigger interval (Interval)	Pressure value after t seconds (Value at point)																		
	Shot number (Shot)	Ejection pressure value (Peak over eject)																		
	Alarm judgment result (Result)	Integral value (Integral)																		
	Alarm check content (CHX_Result)	Peak integral value (Integral to peak)																		
	Peak value (Peak)																			
				<table border="1"> <thead> <tr> <th>Code</th> <th>Monitoring item</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>No alarm</td> </tr> <tr> <td>Z1</td> <td>Monitoring frame 1</td> </tr> <tr> <td>Z2</td> <td>Monitoring frame 2</td> </tr> <tr> <td>PT</td> <td>Time at peak</td> </tr> <tr> <td>T</td> <td>Time at point t</td> </tr> <tr> <td>I</td> <td>Integral</td> </tr> <tr> <td>PI</td> <td>Integral to peak</td> </tr> </tbody> </table>	Code	Monitoring item	None	No alarm	Z1	Monitoring frame 1	Z2	Monitoring frame 2	PT	Time at peak	T	Time at point t	I	Integral	PI	Integral to peak
Code	Monitoring item																			
None	No alarm																			
Z1	Monitoring frame 1																			
Z2	Monitoring frame 2																			
PT	Time at peak																			
T	Time at point t																			
I	Integral																			
PI	Integral to peak																			

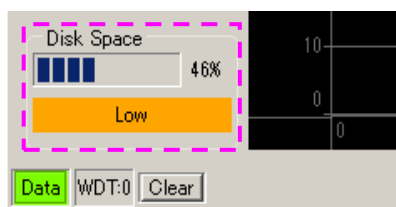
6-6-2 Setting the save folder

Data is saved to the respective pre-specified folders.

The save folder can be changed by selecting [System] from the main menu → [Administration...]. (→ Page 34)

6-6-3 Displaying storage space

Data is saved to the respective pre-specified folders.



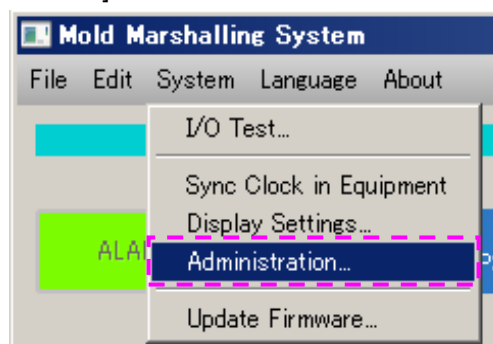
Free space	Status display
50% to 100%	OK
30% to 50%	Low
Less than 30%	Little/suspended

* Software automatically calculates and displays the amount of free disk space to save data. The user is requested to move data frequently before “Low” is displayed.

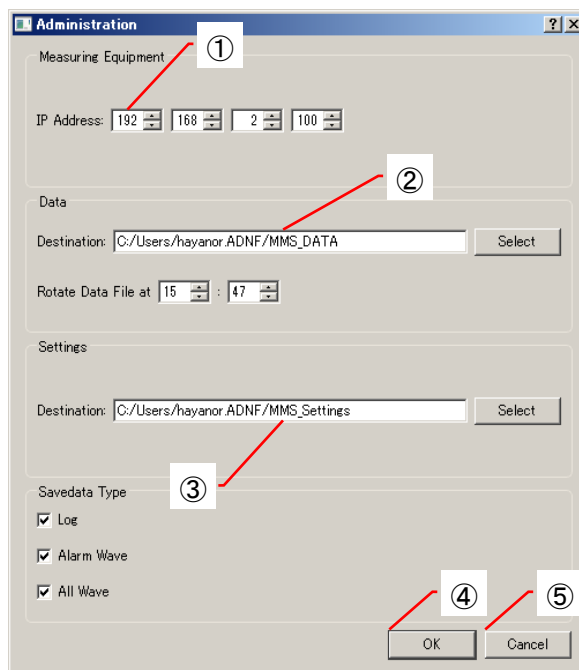
6-7 Administrator Settings

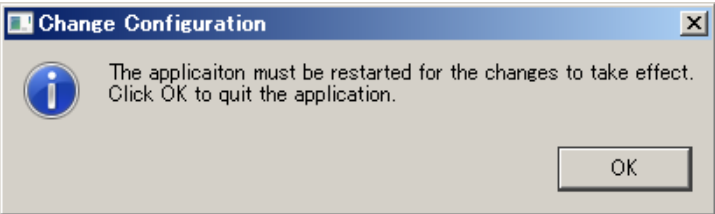
This section explains the settings should be performed by administrator.

■ From the main menu, select [System] → select [Administration...].



In the Administration menu, it is possible to change IP address of MPS08 and saved data destination of data and setting file.



No.	Term	Function
①	IP Address of MPS08	<ul style="list-style-type: none"> Set the IP Address of MPS08. Set IP Address will be valid after rebooting of application.
②	Data Destination	<ul style="list-style-type: none"> Set the Path for saved data. Set Path will be valid after rebooting of application Default settings is as follows. <In the case of Windows XP> C:¥Documents and Settings¥User name¥MMS_DATA <In the case of Windows 7 or Windows 8 > C:¥Users¥user name¥MMS_DATA
③	Settings Destination	<ul style="list-style-type: none"> Set the Path for saved Settings. Set Path will be valid after rebooting of application <In the case of Windows XP> C:¥Documents and Settings¥user name¥MMS_Settings <In the case of Windows 7 or Windows 8 > C:¥Users¥user name¥ MMS_Settings
④	OK	<ul style="list-style-type: none"> Save changes and show the following message. Click [OK] and then application will exit. 
⑤	Cancel	<ul style="list-style-type: none"> Cancel setting changes to exit the Administrator Setting.

7. Checking the Operation

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

7-1 Checking the Communication between Amplifier and PC

The amplifier communicates with the PC through LAN connection. Whether the communication is implemented normally can be checked with the color of the **Data** mark at the lower left of the operation window. (Green: Normal, Red: Faulty)

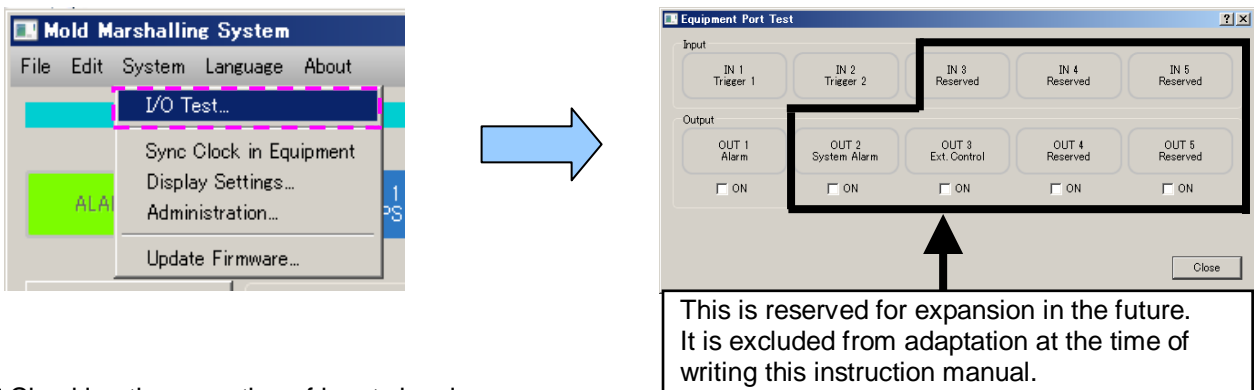


- * [WDT:] indicates the number of times of self-recovery performed when communication was suspended. Clicking the **Clear** button clears the count to 0.

7-2 Checking the I/O Signal

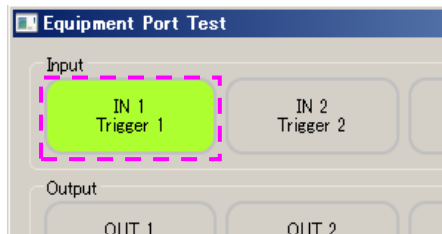
Check whether the connected I/O signal works normally.

- From the main menu, select [System] → [I/O Test...].

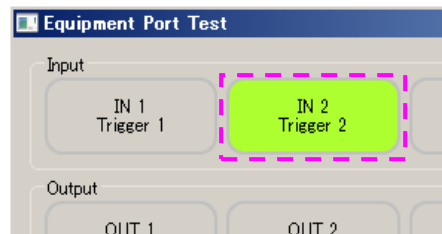


- Checking the operation of input signal

Input a signal (trigger signal or clear alarm signal). If it is input normally, the signal name is displayed in green as shown in the following figure.



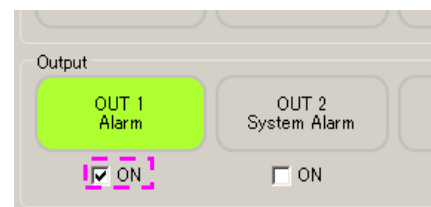
When trigger signal IN1 is input



When clear alarm signal IN2 is input

- Checking the operation of output signal

Check the “ON” check box shown in the right figure. The signal name illuminates in green and an alarm signal is forcibly output. Check whether the signal operates normally at the output signal connection destination.



7-3 Checking the Operation of Sensor

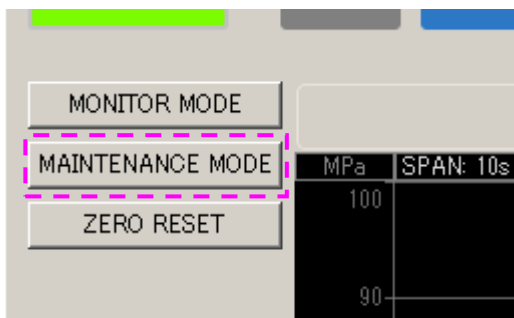
7-3-1 Sensor calibration

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 the back cover).

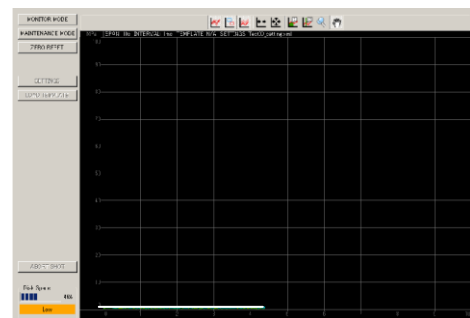
7-3-2 Quick sensor checking

Follow the procedure below to simply check the operation of a sensor.

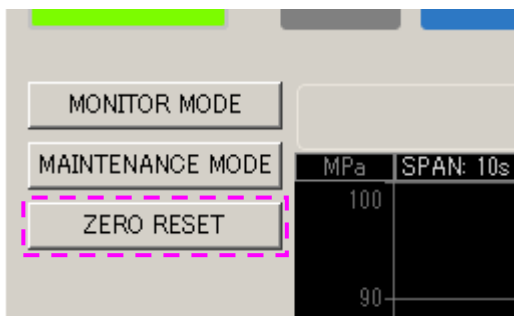
■ Press “MAINTENANCE MODE”.



■ Measurement starts



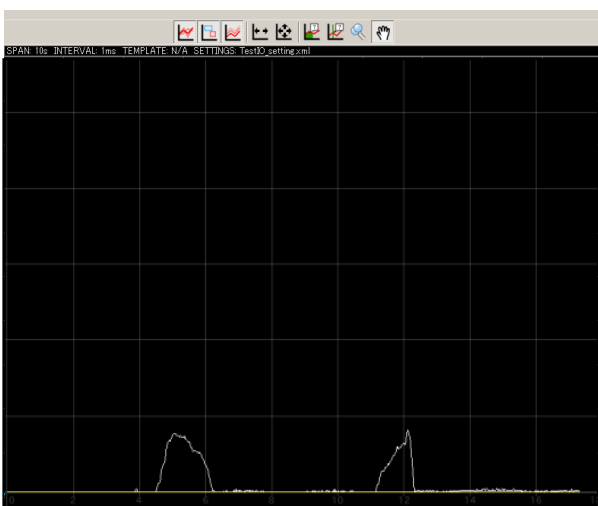
■ Press the “ZERO RESET” button.



- * The output of the sensor is forcibly reset to 0. When pressing “ZERO RESET”, make sure that no force (load) is applied to the sensor.

■ Press the tip of the sensor to check whether waveforms are displayed.

(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.

8. Measuring with an External Measuring Device

The pressure measuring amplifier MPS08 can output voltage according to the pressure value.

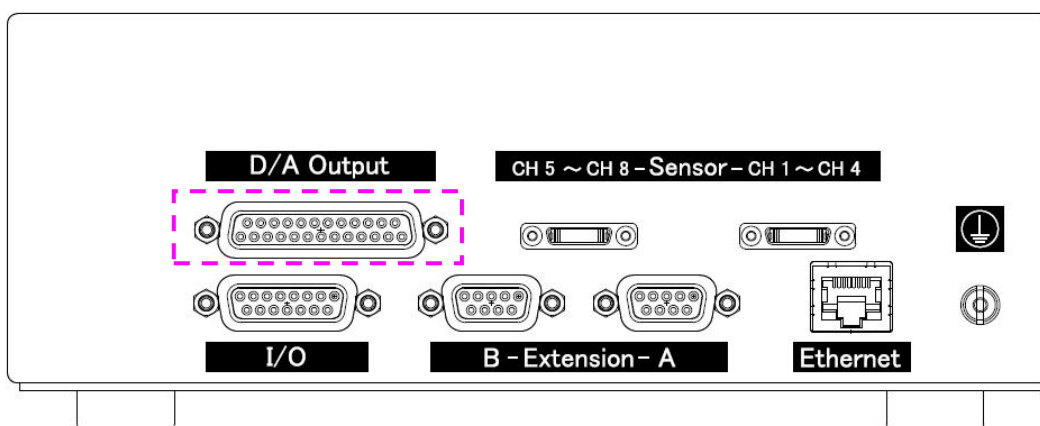
This section explains how to connect the system to an external measuring device and view pressure waveforms.

8-1 Connecting an External Measuring Device

■ Connect an external measuring device to the voltage output connector (D/A Output) by referring to the following.

* A DSUB25 connector should be prepared by the customer.

● D/A output connector



● DSUB25 connector pin assignments

Pin No.	Signal name	Pin No.	Signal name	Pin assignments
1	Not used			
2	Not used	14	Not used	
3	Not used	15	Not used	
4	Not used	16	Not used	
5	Not used	17	Not used	
6	CH8 output	18	GND	
7	CH7 output	19	GND	
8	CH6 output	20	GND	
9	CH5 output	21	GND	
10	CH4 output	22	GND	
11	CH3 output	23	GND	
12	CH2 output	24	GND	
13	CH1 output	25	GND	

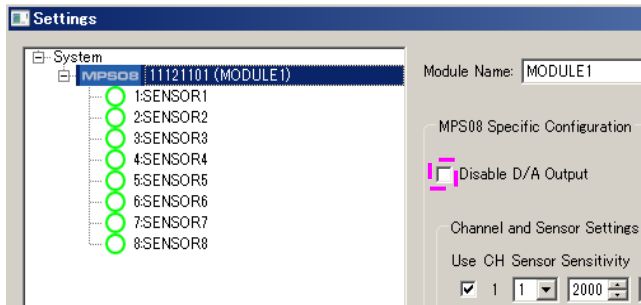
8-2 Relationship between Output Voltage and Pressure Value

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

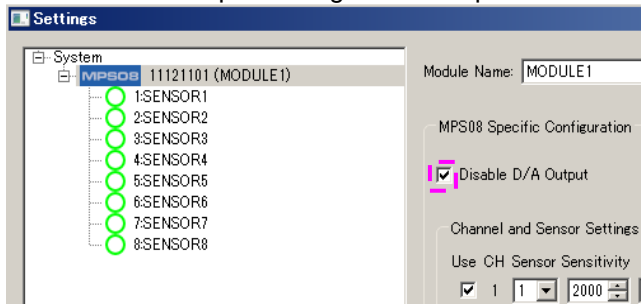
- 50 mV is output per 1 MPa. (Voltage output range: 0 to 10 V)
(Example: When pressure is 100 MPa, 5 V is output.)

8-3 Enabling the Voltage Output Function

- Use the conditions setting window to enable or disable the voltage output function.
 - Disable D/A output: Voltage is output.



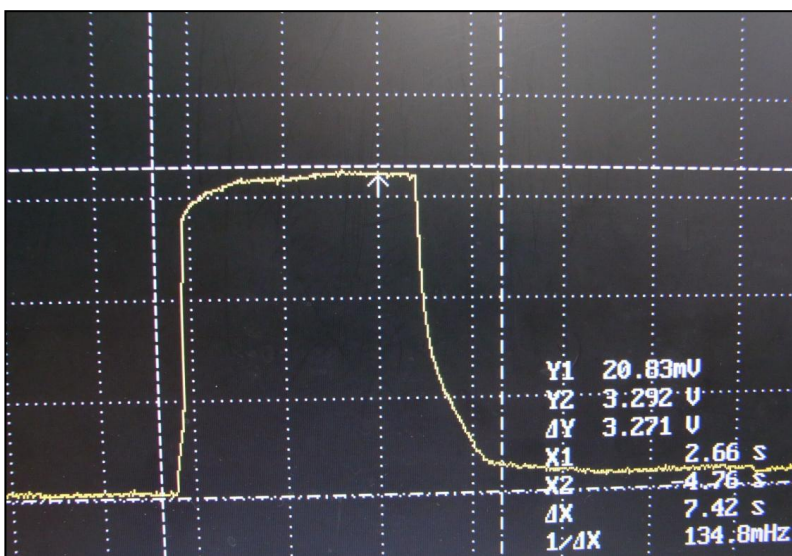
- Disable D/A output: Voltage is not output.



* Voltage output is enabled by default.

8-4 Observing Pressure Waveforms

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



9. Specifications

■ List of specifications

<Pressure measuring amplifier MPS08>

Number of measurement points	8
Measurement range	0 to 200 MPa
Accuracy	±2% F.S.
Sampling period	1 ms / 5 ms / 10 ms / 20 ms
Sampling time	Up to 120 sec.
Control input	Non-voltage contact input
Control output	NPN open collector; up to 100 mA (30 V or less)
Analog output	0 to 10 V (corresponding to pressure 0 to 200 MPa) Output impedance: About 100 Ω
Internally stored data	Data for one settings file (written to non-volatile memory) (Waveform data and numerical data are not stored in the amplifier.)
Operating ambient temperature	0 to +50°C
Operating ambient humidity	35 to 85%RH (no condensation)
Vibration resistance	10 to 55 Hz, double amplitude 1.5 mm, 2 hours in each direction of X, Y, and Z
Warm-up time	About 30 minutes
Power specifications	Dedicated AC adaptor should be used. Input: 100 to 240 VAC, 1.2 to 0.5 A
Weight	About 1,900 g

<Junction box UJPO4>

Connected sensor	SS or EPS series of Futaba Corporation (The EPS series requires a conversion adaptor sold separately.)
Operating temperature range	0 to +70°C
Vibration resistance	10 to 55 Hz, double amplitude 1.5 mm, 2 hours in each direction of X, Y, and Z
Weight	About 160 g

<Junction cable WJPO430>

Total length	3 m
Operating temperature range	0 to +70°C
Weight	About 160 g

<LAN cable WCL0020>

Specification	CAT 7
Total length	2 m
Operating temperature range	0 to 40°C

<AC adaptor ES0024010>

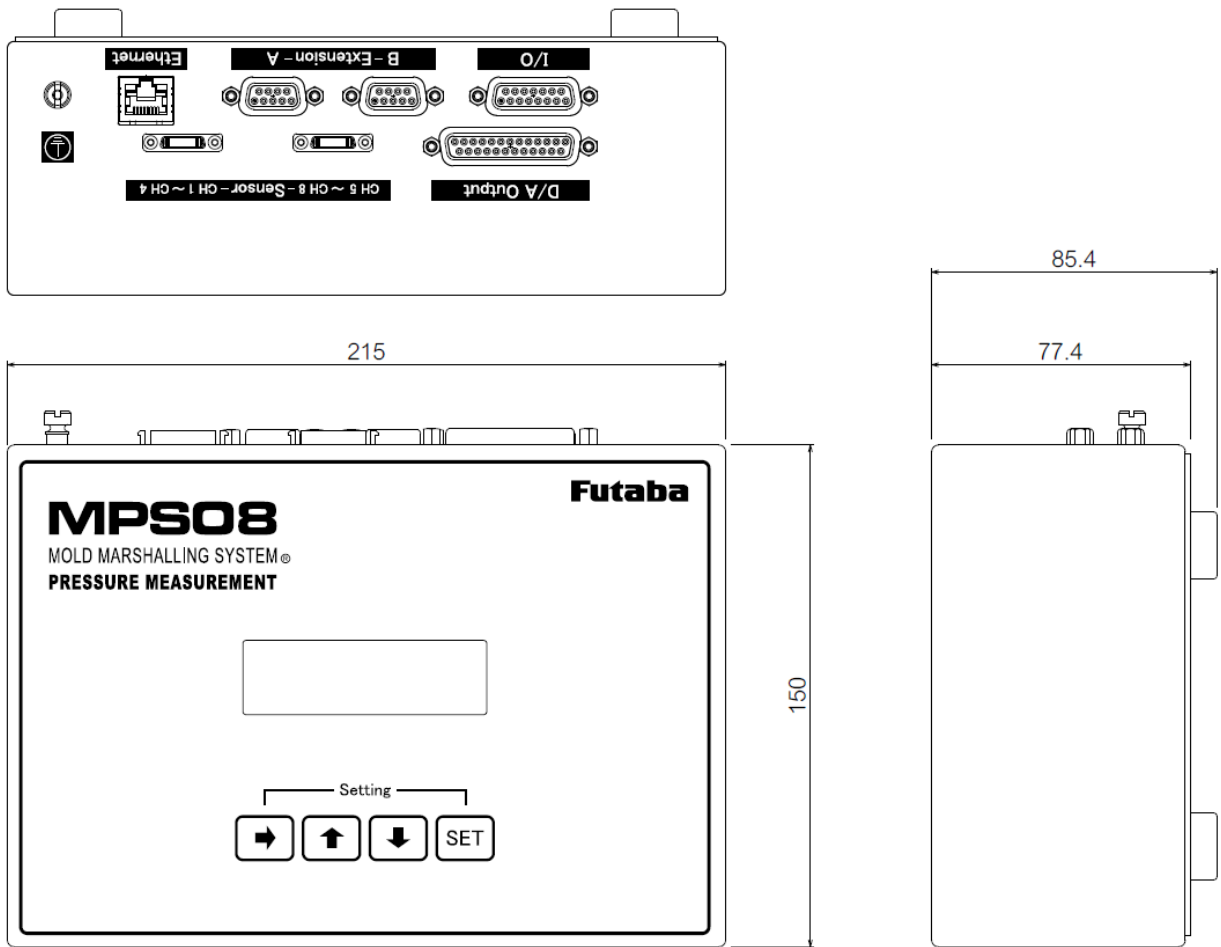
Total length	3.1 m
External dimensions (main unit)	146 × 76 × 43 [mm]
Operating temperature range	0 to +40°C
Power specifications	Input: 100 to 240 VAC, 1.2 to 0.5 A Output: 24 VDC, 4.16 A
Weight	About 710 g

<Signal I/O cable WCI005>

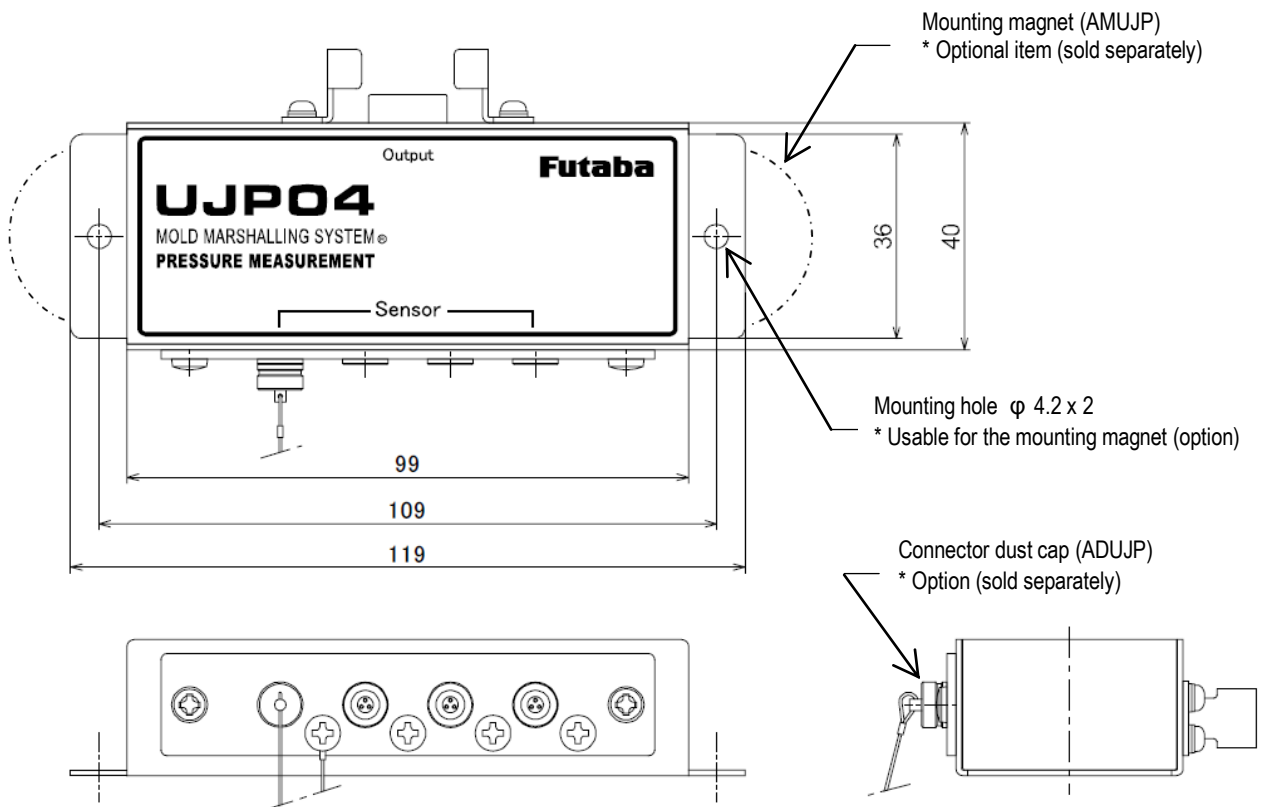
Total length	0.5 m
Operating temperature range	0 to +40°C

■ Outline drawing [Unit: mm]

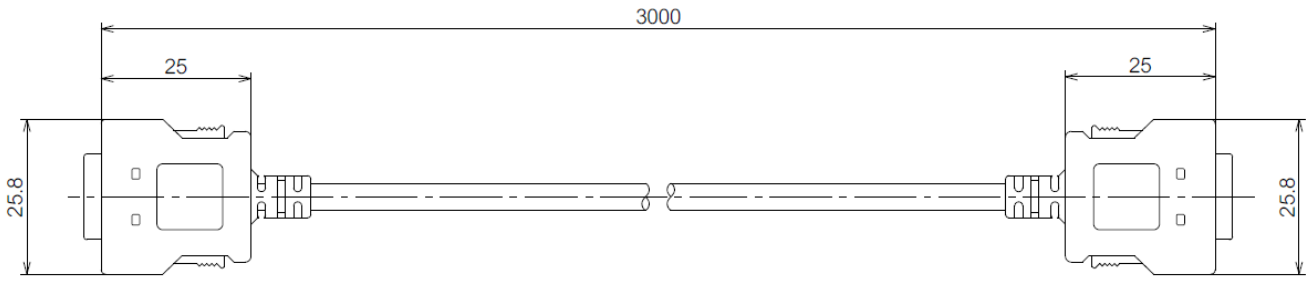
<Pressure measuring amplifier MPS08>



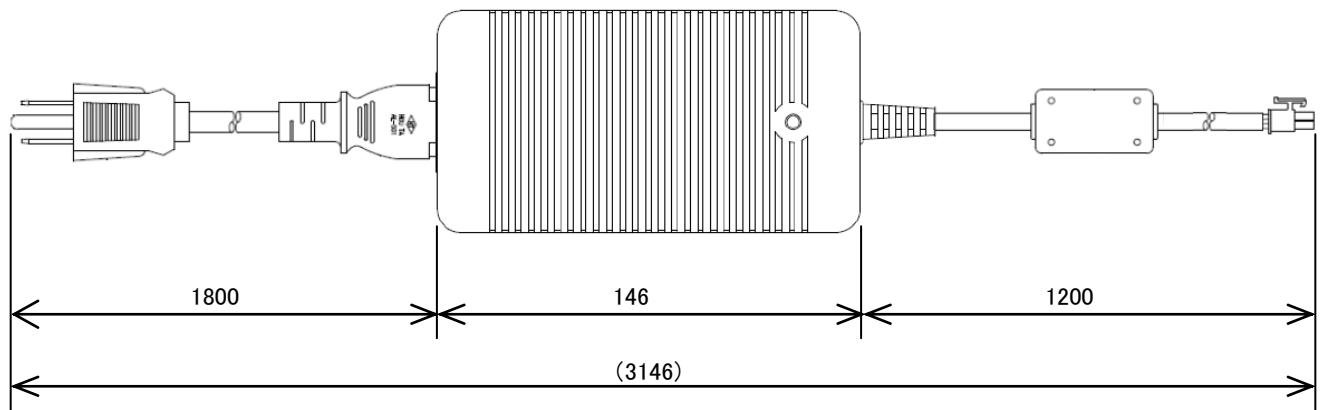
<Junction box UJP04>



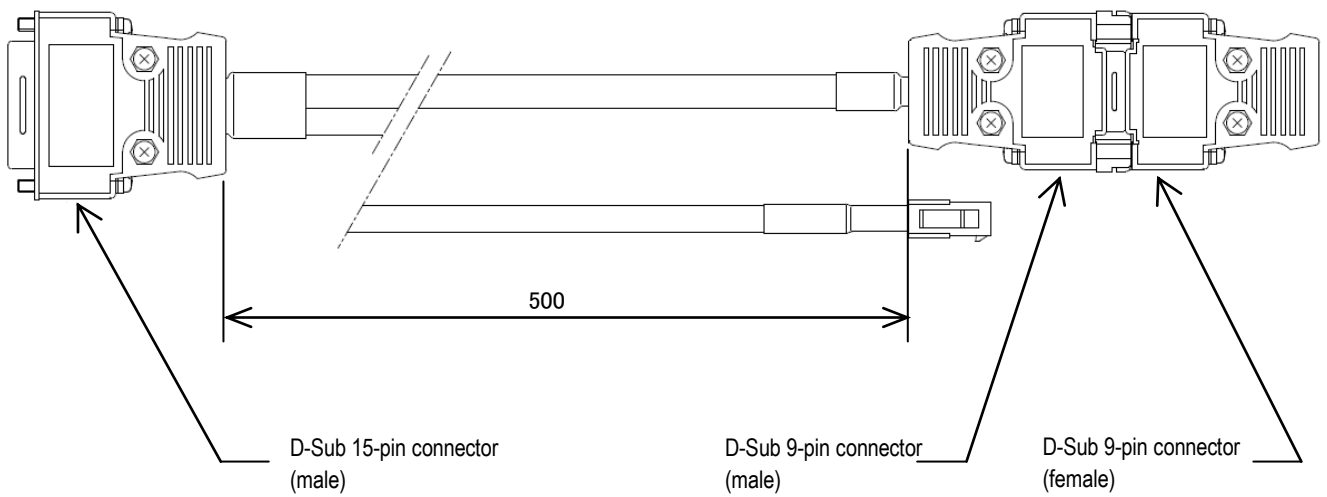
<Junction cable WJP0430>



<AC adaptor ES0024010>



<Signal I/O cable WCI005>



Futaba

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Huntsville Office	101 Electronics Boulevard, Huntsville, Alabama 35824,U.S.A.	TEL:1-256-461-9399	FAX:1-256-461-1059
El Paso(Distribution Center)	24 Spur Dr, El Paso, TX, United States	TEL:1-915-771-7858	

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

The specifications may be changed for improvement without prior notice.

MPS08-1512W-A1E