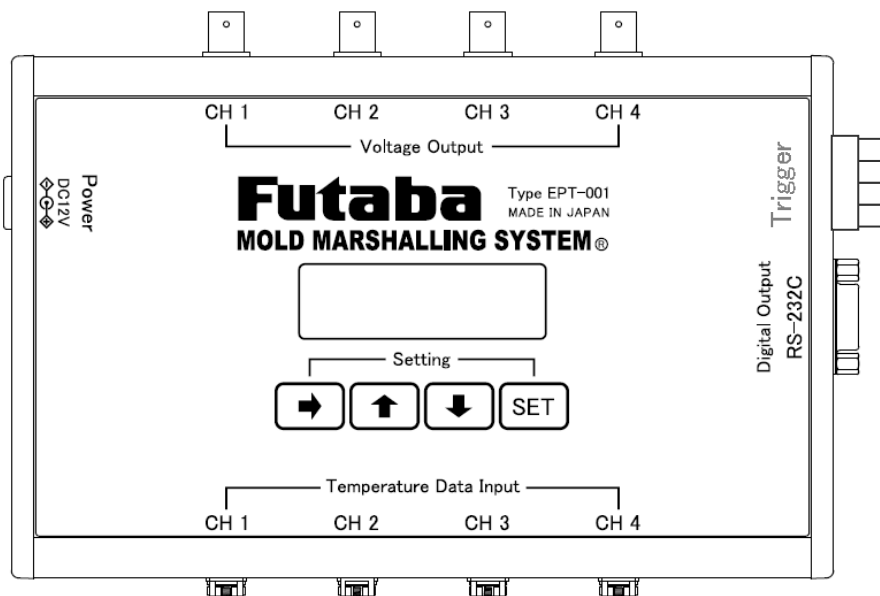


Instruction Manual

MOLD MARSHALLING SYSTEM

EPT-001 series

Resin Temperature Measuring Amplifier
(Voltage Output Type)



We would like to express our appreciation for choosing our product.

Please read this instruction manual carefully so that this product serves you for many years to come.

It is not recommended to use this product by means other than specified in this manual.

Safety Concerns (Be sure to read before use.)

■ Before Use

Please read this “Safety Concerns” and the instruction manual carefully before use.

After reading them, please retain them in nearby for future reference.

When you use the product, please observe the following safety precautions fully.

We are not responsible for or can't guarantee against any failures caused by the misuse of the product.

■ For safety use, this “Safety Concerns” uses the following warnings and cautions.



:If the product is mishandled, the user might die or be seriously injured.



:If the product is mishandled, the user might be disabled or the product is damaged.

WARNING

● Power Source

To prevent a fire, make sure that the power-supply voltage of the AC adapter for this product is the same as that you are going to use before you turn on the product.

● AC Adapter

Be sure to use the AC adapter supplied by us for the prevention of electric shocks and a fire.

● External Connection

To prevent electric shocks and protect the product from damage, make sure to unplug the AC adapter before the product is connected to measuring machines or external control circuits.

● Prohibition of Storage and Use of the Product in an Explosive Gas Atmosphere or in an Explosive Gas-Filled Room

Do not store or use this product in an explosive gas atmosphere or in an explosive gas-filled room. It is dangerous to use the product in such an environment.

Introduction

The EPT-001 series of the resin temperature measurement system is a noncontact infrared thermometer. Since this is superior to the contact-type thermocouple in responsiveness, it is possible to accurately detect variations in temperature of the resin inside a mold. The main features of the product are as follows.

- High Responsiveness

Responsivity : 8m s (Actual measured value, 63.2%response)

- Wide Measuring Range

It is possible to measure the resin temperature in the 60 to 430°C range by the same equipment.

*The temperature of the upper limit to be measured changes, depending on the type of the sensor.

- Multichannel Measurement

It is possible to measure temperatures in four channels as a standard, which is effective for checking the cavity balance in multiple pieces of molding.

- Ambient Temperature Correction Function

This product has the temperature correction function that senses ambient temperatures of the sensor and the pre amplifier.

The measurement of high precision is possible in the 10 to 40°C range of operating temperature. (The upper temperature limit of the sensor is 150°C.)

- One-Touch Sensitivity Correction

The correction of the sensor is implemented by only setting a sensitivity code on the display of the amplifier.

Complicated corrections that are needed in a general infrared thermometer are not required for this product.

- Reasonable Price

Compared to a conventional infrared thermometer, we have achieved a reasonable price for this product.

By separating the main amplifier from the relay one, we can offer the product at a minimum cost.

It is strongly recommended to read the instructions carefully before use and to use this product properly.

If you have any questions about this product, feel free to contact our office directly or your nearest agency.

Standard Accessories

This package includes the following accessories. Make sure that these are packed in the box.

Main Unit of Amplifier	Type :EPT - 001	One set
AC Adapter		One piece

Accessories Sold Separately

- Pre amplifier Type: EPT – JB001
- BNC Voltage Output Cable

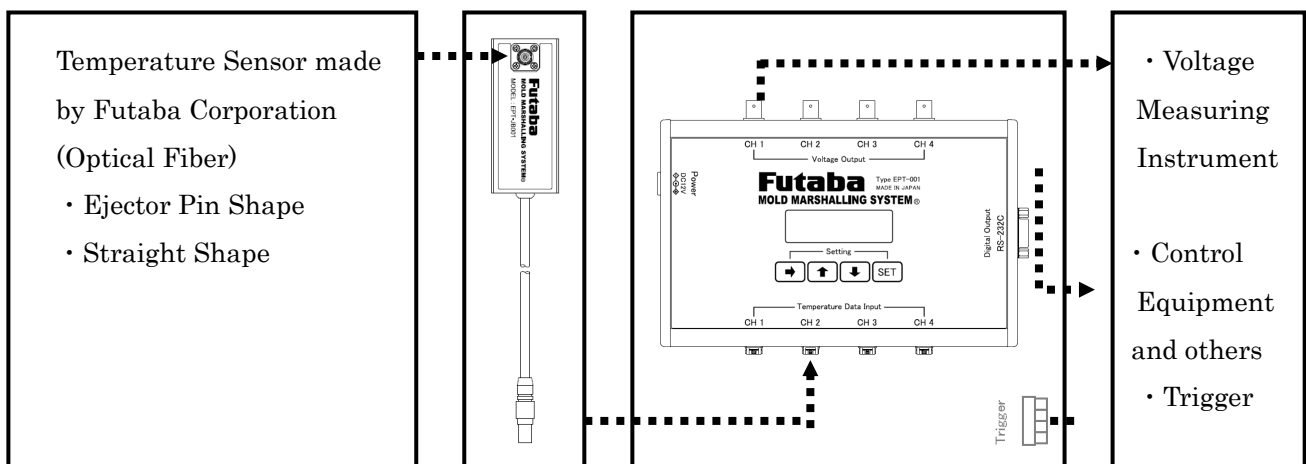
Cautions for Handling

- Do not use this product in an environment where the temperature extremely goes up or goes down.
 The product must be used in the 10 to 40°C range. When the product is used in a place exposed to direct sunlight, it must be protected with an awning. And if it is used outdoors in the cold weather region, it must be kept warm.
- Avoid using this product in a damp place.
 It is recommended to use this product in a place where humidity level is below 85% RH. If this product gets wet or is used in a high-humidity environment, malfunctions of the product might be caused.
- Do not use the product in a dusty area.
 The product decreases in performance when dust reaches its inside. Therefore, protect the product from dust not only in use but also during storage. While the sensor is not connected, attach the accompanying cap to the connector of the pre amplifier to keep the product free from dust.

System Configuration

The diagram below shows a typical system configuration for measuring the resin temperature using the EPT -001 series of the resin temperature measuring system.

- Temperature Sensor
 Pre amplifier
 Main Amplifier
 External Equipment



The resin in the process of being formed emits infrared rays. The amount of the rays changes depending on the resin temperature.

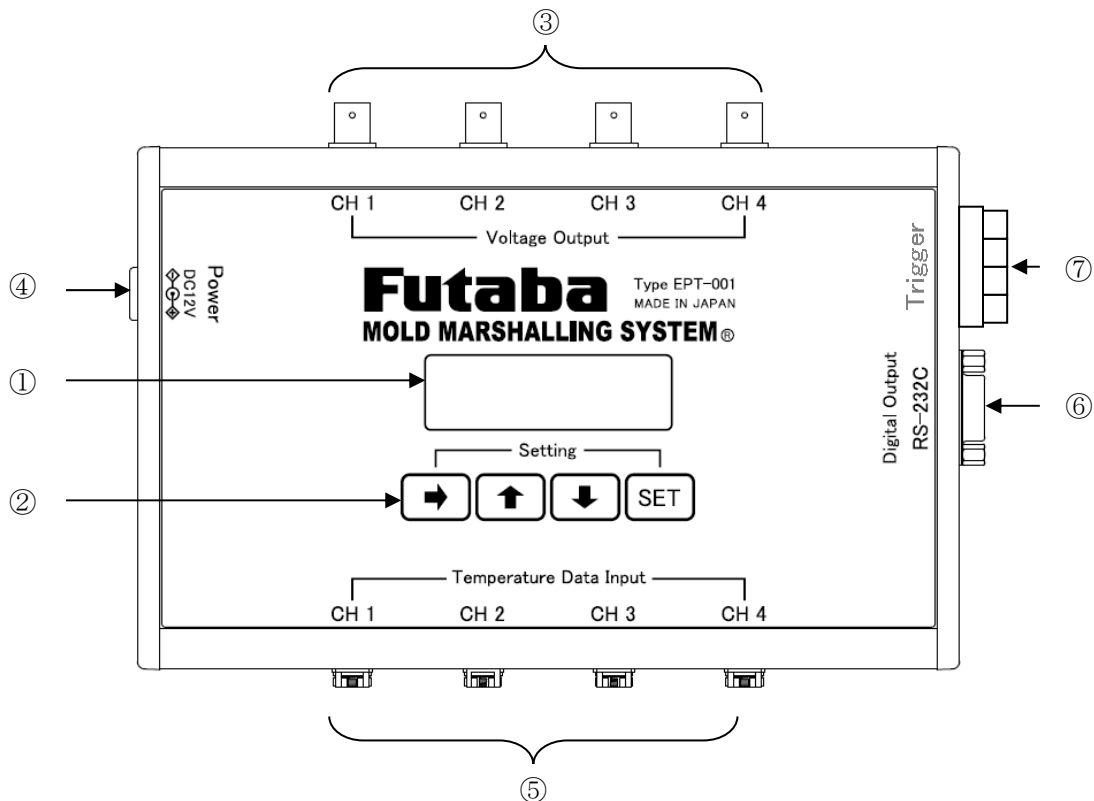
The infrared rays are lead to EPT –JB001 of the pre amplifier by the temperature sensor (optical fiber).

The infrared rays (optical energy) are converted to electrical signals by the pre amplifier.

The electrical signals amplified by the pre amplifier are computed by EPT – 001 of the main amplifier.

The voltage signal is output from the main amplifier to the external measuring instrument through the voltage output cable. (One volt is output relative to 100°C of the resin temperature.)

1. Part Names and Main Functions of the Main Amplifier



① Display Panel for Displaying Information and Settings·

The sensitivity of a sensor, corrected temperatures and settings of temperature corrections are displayed in this panel.

② Key Switches for Settings

Using these keys, settings of codes for the sensitivity of a sensor, corrected temperatures and temperature corrections are executed.

③ BNG Connectors for Voltage Output (4 channels)

Connect with the voltage measuring instrument with a voltage output cable that is sold separately.

One volt is output relative to 100°C. (For example, 2.5V is output when the resin temperature is 250°C.)

④ Connector for the AC Adapter

Connect the attached AC adapter (12V) to this amplifier. The input voltage is AC100V.

⑤ Connectors for the Pre amplifier (4 channels)

These connectors are for the plugs of the pre amplifier.

Insert the plugs with the red mark facing up.

⑥ Connector for Serial Communications

In general, you do not use it. We connect it when adjusting the product.

⑦ Input Terminal for Trigger Signal

Connect to the amplifier with a cable to send the mold closing signal, and set the temperature measured at the time the trigger signal is input as a preset corrected temperature. By doing this, temperature measurement errors caused by the influence of ambient temperatures around the measuring system can be corrected. Normally, the mold temperature is set as the corrected temperature.

2. Preparations

Before switching on the product or connecting the AC adapter, the following preparations are required.

2-1 Setting of the Main Amplifier

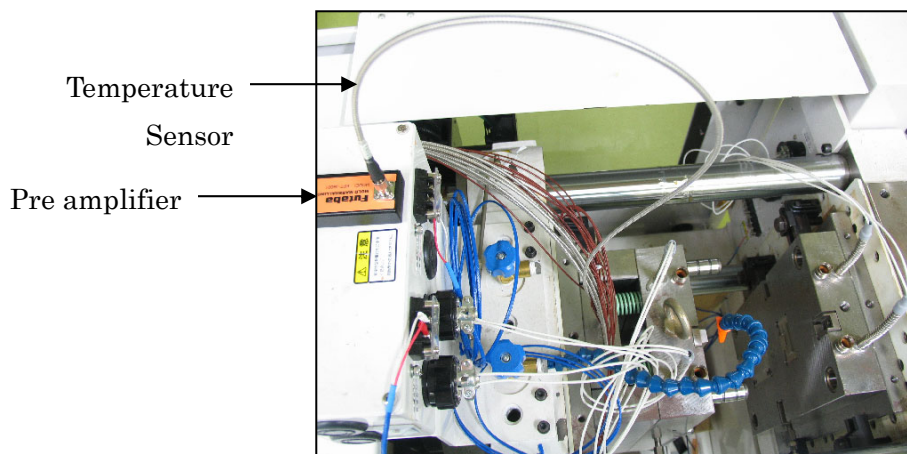
Place the main amplifier on a flat surface with the display panel facing up.

2-2 Setting of the Pre amplifier

The pre amplifier is backed with a magnet. Place it on a flat surface near the mold.

If the sensor is set on the moving side of the mold, it is required to determine the position of the pre amplifier in order not to add unnecessary pressure to the sensor cable when the mold opens or closes

The operating temperature limit of the pre amplifier is in the 10 to 40°C range. To secure stable measurements, do not attach the pre amplifier to the mold.



* The pre amplifier has a built-in IC chip for measuring the substrate temperature. The temperature of the amplifier is displayed in the bottom section of the display panel. Place the amplifier in an area where the temperature to be set is within the operating temperature limit. The operating temperature limit is in the 10 to 40°C. Before measuring the temperature, the amplifier should be warmed up for more than 30 minutes.

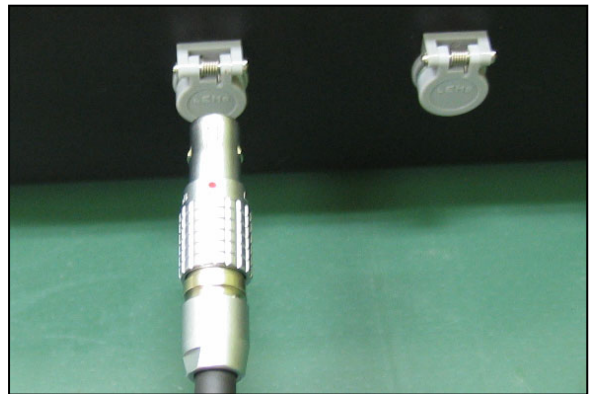
* If the temperature of the pre amplifier drops to below 0°C or rises above 50°C, the protection system works and the 「* *」 of the sensitivity sign is displayed. At the same time, the voltage output is set to 0V automatically, which makes it impossible to measure the temperature.

* When the temperature of the pre amplifier returns to the 0 to 50°C range, the sensitivity sign is displayed and temperature measuring starts again automatically.

2-3 Connection between Main Amplifier and Relay Amplifier

Connect the pre amplifier to the main one.

Push the plug of the pre amplifier all the way into the connector of the main amplifier with the red mark on the plug facing up.



2-4 Connection between Pre amplifier and Temperature Sensor

Connect the temperature sensor to the relay amplifier.

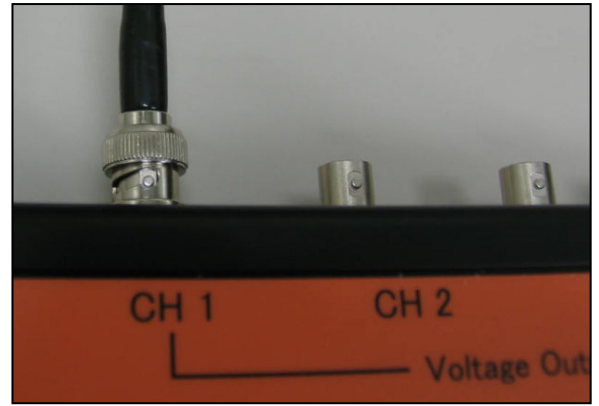
Screw the sensor connector onto the amplifier after matching the connector's salient with the amplifier's notch. When matching the salient with the notch, do not twist the sensor's cable forcedly. Otherwise the optical fiber inside the cable might be damaged.



2-5 Connection with External Measuring Equipment

Prepare a recorder or a voltmeter (e.g. oscilloscope) to read the temperature signal that is converted to voltage.

Connect such equipment with the main amplifier, using a BNC voltage output cable sold separately.



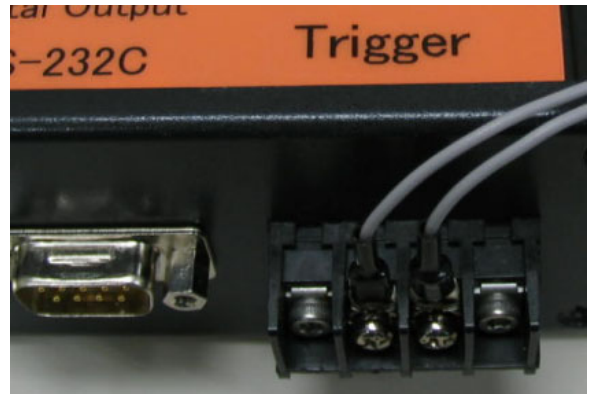
2-6 Connection of Trigger Signal

Input signals from the molding machine into the trigger to make temperature corrections automatically at every shot. Normally the mold closing signal is input.

- * Do not send any signals that indicate the opening of the molding machine or the ejector sticking out of the machine.

Correction errors might be caused by outside light.

- * Regarding the specifications of the output signal for the molding machine to be used, refer to its instruction manual.



< Circuit Specifications of Trigger Signal Input Terminal >

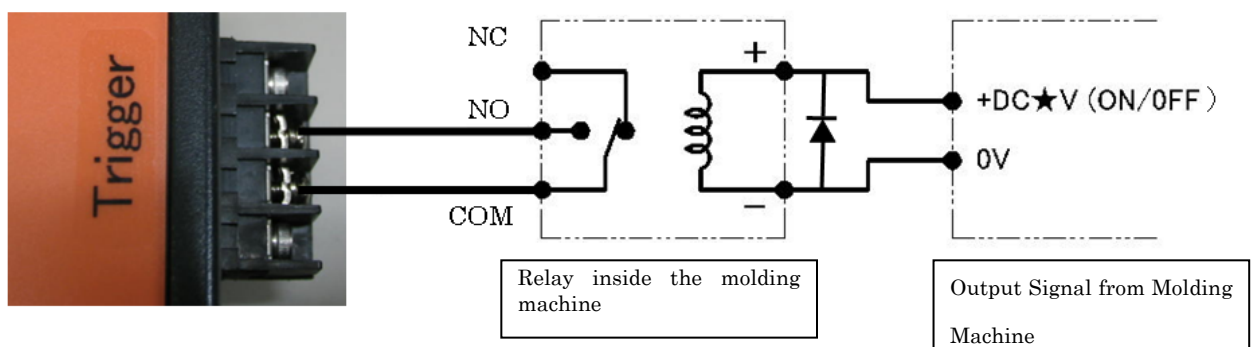


**Trigger input to the amplifier is a contact input.
Don't apply a voltage.**

Example 1 : When the output from the connected molding machine is "voltage output", connect with a relay sequence circuit that fits the output voltage of signals from the molding machine.

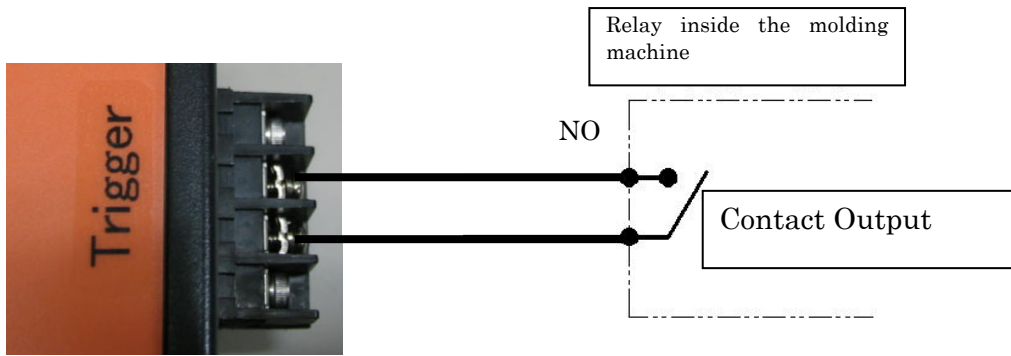
- * Use a relay sequence circuit that absorbs a coil surge.

The following diagram shows an example of connecting the trigger signal with the relay when the output signal from the molding machine is DC★V (ON/OFF).



Example 2 : When the output from the connected molding machine is “relay output (contact output)”,

The following diagram shows an example of connecting the trigger signal when the output signal from the molding machine is the contact output.



3. Measuring

3-1 Application of Power

After confirming all connections, insert the accompanying AC adapter into the amplifier and turn on the power. The display panel shows the sensitivity of the sensor and the setting screen after the following messages.

FUTABA CORPORATION
↓
MOLD MARSHALLING SYSTEM
↓
EPT-001 Version number
↓

1 ED	2 ED	3 ED	4 ED
2 5	2 5	2 5	2 5

* "ED" is set in all channels before shipment.

* The bottom part of the display shows the circuit temperatures of the connected pre amplifier.

3-2 Warming-Up Operation

After turning on the power, the product is in operating condition. However, built-in electronic parts and semiconductor components are not in thermal stability just after power distribution. Especially instability of the peripheral circuit of the photodiode causes sensitivity variations or drifts at the zero point.

To secure its stable operational conditions, keep a warming-up time for about **30 minutes**.

3-3 Switching of Display Screens (3 screens)

- Every time **【SET】** is pressed, a screen shown in the display panel changes.

Screen 1 : Displaying the Sensitivity of Sensor/Setting Screen (top of the screen)

1 ED	2 ED	3 ED	4 ED
2 5	2 5	2 5	2 5

* "ED" is set in all channels before shipment.

* The bottom part of the display shows the circuit temperatures of the connected pre amplifier.



Screen 2 : Setting Screen for Corrected Temperatures

MOLD TEMP. = 0 2 0 °C
CAL. = ON

* It is set at 20°C before shipment.



Screen 3 : Execution Screen for Temperature Corrections

TRIGGER INPUT
PRESS [→]

* Temperature corrections are executed by pressing **【 → 】**.

- * The corrections can also be executed automatically at every shot by connecting the trigger signal line.

3-4 Setting of the Sensitivity of Sensor

- The sensitivity of the sensor and the setting screen are displayed by pressing **【SET】** .

1 E D	2 E D	3 E D	4 E D
2 5	2 5	2 5	2 5

- Set the sensitivity of the sensor with the key switches. Move sideways with **【→】**, and change codes with **【↑】** or **【↓】** . When all is set, press **【SET】** for completion.

- * The sensitivity code for the sensor is attached to the connector of the sensor cable.



3-5 Setting of Corrected Temperatures

It is required to set a corrected temperature to cancel out measurement errors caused by the ambient temperature of the measuring system.

Set the corrected temperature to the known temperature. In general, it is the mold temperature (the temperature the sensor is facing).

To perform the corrections more accurately, use the actual measured value of the mold temperature.

- Display the corrected temperature setting screen with **【SET】** .

MOLD TEMP. = 0 2 0 °C
CAL. = ON

- Set the corrected temperature with **【↑】** or **【↓】** .

While holding down the key, the temperature can be set by 10°C. And the temperature is determined with **【SET】** .

- * Enablement or disablement of the temperature correction function can be selected.

Switch the function on and off with **【→】**, **【↑】** or **【↓】** , and determine with **【SET】** .

- < Enablement > CAL. = ON
- < Disablement > CAL. = OFF

3-6 Performance of Temperature Corrections

- Display the temperature correction execution screen with **【SET】** .

TRIGGER INPUT
PRESS [→]

- Temperature corrections are performed with **【→】** .

(At this point, the words, “TRIGGER INPUT”, flash one time.)

<If the mold temperature fluctuates greatly, >、<If more accurate measuring is required, >

- Set the room temperature as the corrected one. (e.g. 20°C)
- Cover the edge of the sensor with black cardboard while the mold opens.
- Perform the temperature correction with **【→】** .

* In this way, however, the automatic temperature correction function that works by inputting the trigger signal cannot be executed.

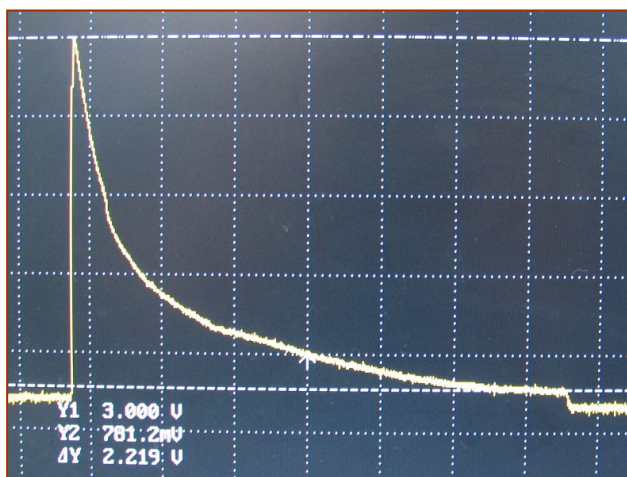
* It is a good thing to attach a push-button switch to the trigger signal input terminal.

3-7 Measuring

Read the voltage displayed on the recorder. **One volt is output relative to 100°C of the resin temperature.**

The following chart shows actual measured values. When the peak output voltage was 3.00V , the resin temperature was 300°C.

And the resin temperature was 78°C since about 780m V was output just before the mold opened.



Pattern of the Resin Temperature in Operation (Actual measured values)

4. Specifications

4 – 1 Specification Description

<Main Amplifier>

Number of Measurement Channels : 4

Accuracy : $\pm 2\%$ F.S.

Output Voltage : 1V relative to 100°C

Output Impedance : 100 Ω

Connector for Output : BNC connector

Sampling Period : 1ms

Available Measuring Range : 60 to 430°C

(Depending on the specification of the temperature sensor)

Operating Temperature Limits : 10 to 40°C

External Dimensions : 220x140x55mm,

excluding the projection portion.

<Pre amplifier>

Applicable Sensor : Infrared Temperature

Sensor made by Futaba Corporation

Length of Transmission Cable : 2m

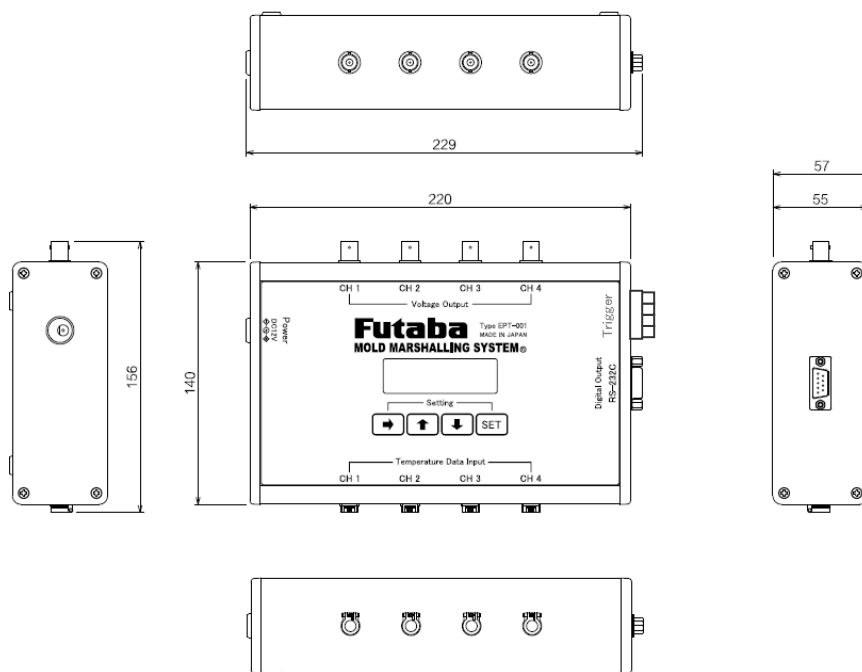
Method of Fixation : Fix with two magnets on the bottom surface

Operating Temperature Limits : 10 to 40°C

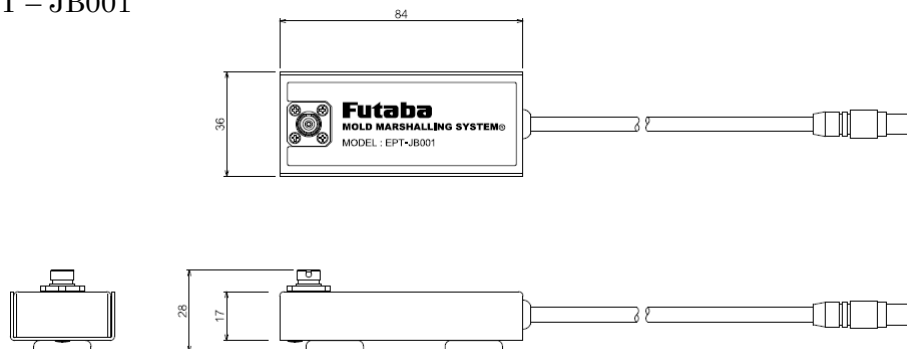
External Dimensions : 220x140x55mm, excluding the projection portion.

4 – 2 External Dimensions

■ Main Amplifier EPT - 001



■ Pre amplifier EPT – JB001



Contact Information for Inquiries

If you need technical consultations or have technical questions, please contact the following office.

〒299-4395

1080 Yabuzuka, Chosei Village, Chosei-gun, Chiba Prefecture

Futaba Corporation

TEL 0475-32-6358

- (1) All rights reserved. URL : <http://www.futaba.co.jp>
- (2) The contents of this manual may be revised for improvement without notice.
- (3) This manual is prepared without loose ends. However, if any unclear explanations, errors or important items left out are found, please contact our sales office listed at the end of this manual.
- (4) Any manuals with binding errors or missing pages will be replaced free of charge.

The contents of this instruction manual is as of May 2010.

MMS EPT-001S-2010-6-Rev.05JP YI

●The specifications and external appearance of the product may change without notice.