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www.fujielectric.com/products/instruments/

Thank you for purchasing the Fuji digital temperature controller.
Once you have confirmed that this is the product you ordered, please use it in accordance with the following instructions.
For detailed information on operating this equipment, please refer to the separate user's manual.
In addition, please keep this instruction manual within easy reach of the actual person using this equipment.

Confirming Specifications and Accessories

- Before using the product, confirm that it matches the type ordered.
  (For model code, please refer to "12. Model Specifications".)
- Confirm that all of the following accessories are included.
  - Temperature Controller 1 unit
  - Mounting bracket 1 pc
  - Instruction Manual 1 copy
  - Waterproof packing 1 pc

Option		
Name	Quantity	Order No.
PC loader communication cable	1 cable	ZZP*TQ501923C3
Without alarm functions 8-pin socket TP48X type (for rail mounting)	1 pc	*ZZPPXF2-C100
Without alarm functions 8-pin socket TP48SB type (for panel mounting)	1 pc	*ZZPPXF2-C101
With alarm functions 11-pin socket TP411X type (for rail mounting)	1 pc	*ZZPPXF2-C102
With alarm functions 11-pin socket TP411SBA type (for panel mounting)	1 pc	*ZZPPXF2-C103

Related Information

Refer to the following reference materials for details about the items described in this manual.

Document	Reference No.
Micro Controller (Model: PXF) Operation Manual	INP-TN5A2400-E

The latest manuals can also be downloaded at the following URL:
https://www.fujielectric.com/products/instruments/

Safety Information (Please Read First)

Please read this section thoroughly before using and observe the mentioned safety warnings fully.

Safety warnings are categorized as "Warning" or "Caution". Failure to follow the instructions may result in a safety hazard.

⚠ Warning	Mishandling may lead to minor or serious personal injury, fire, and/or property damage.
⚠ Caution	Mishandling may cause injury to the user or property damage.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

― CAUTION ―

The contents of this manual are subject to change without notice. This manual is complied with possible care for the purpose of accuracy, however, Fuji Electric shall not be held liable for any damages, including indirect damage, caused by typographical errors, absence of information or use of information in this manual.

1. ⚠ Warning

1-1. Limitations in Use

This product is a temperature controller which was developed, designed and manufactured on the premise that it would be used for general machinery. In particular, if this product is to be used for applications that require the utmost safety as described below, please take into consideration of the safety of the entire system and the machine by adopting such means as a fail-safe design, a redundancy design as well as he conducting of periodical inspections.

- Safety devices for the purpose of protecting the human body
- Direct control of transportation equipment
- Airplanes
- Space equipment
- Atomic equipment, etc.

Please do not use this product for applications which directly involve human lives.

1-2. Installation and Wiring

- This equipment is intended to be used under the following conditions.

Ambient temperature	-10 °C to 50 °C	
Ambient humidity	90% RH or below (with no condensation)	
Overvoltage category	II	by IEC 61010-1
Pollution degree	2	
Recommended fuse	250 V AC, 0.1 A, T(Time-Lag) (100 to 240 V AC), 400 V DC/AC, 1 A, T(Time-Lag) (24 V DC/AC)	
Usage environment	Indoor use	

- For 24 V DC/AC power supply model, if the equipment is connected to the Safety Extra Low Voltage (SELV) circuit, a basic insulation* must be provided between the SELV circuit and the power input terminals. Otherwise, the power input terminals must be connect to Extra Low Voltage (ELV) circuit so as to prevent the electric shock.

⚠ About safety standard
Please observe the following instructions to meet the requirements of safety standard. Failure to observe these instructions violates safety standards. (This product is not a safety equipment.)

- Install a recommended fuse, which is specified in the instruction manual, between the external main power (mains circuit) and this equipment.
- If accessible Safety Extra Low Voltage (SELV) circuits are to be connected to Signal input terminal, SSR Drive output terminal or Current output terminal, ensure to provide a basic insulation* between the SELV circuits and these terminals (For example, use transformer which has a basic insulation* or higher degree of insulation).
- Whole this equipment must be mounted in an enclosure in order to prevent the electric shock and spread of fire.
- Be sure to install an appropriate external protective circuit to prevent excessive temperature rise etc.
- When performing wiring work, be sure to turn the power off and to wear protection gloves or safety glasses, to prevent an electric shock.
- Set proper parameter input signals which correspond to each input to be connected. Be careful not to confuse voltage input with current input, or vice versa.
- Do not use this equipment for the measurement of circuits which falls under measurement categories II, III, or IV.
- Do not use this equipment for measurement of signals to which a voltage over 30 VRMS or over 60 V DC is applied.

* The basic insulation requires a clearance at least 1.5 mm and a creepage of at least 3.0 mm. If such insulation is not provided, the UL61010 and EN61010 safety compliance may become invalid.

- If the voltage exceeds 50 V DC (which is called as hazardous voltage), install a basic insulation between all terminals and the ground, and supplementary insulation on the digital outputs.
  Note that the insulation class for this equipment is as follows. Before installing, please confirm that the insulation class for equipment meets usage requirements.
  - ― Basic insulation (1500 V AC)
  - ― Functional insulation (500 V AC)
  - ···· No insulation

Power supply (100 to 240 V AC)	Internal circuit
Power supply (24 V DC/AC)	
Control output 1 (relay contact)	Process value input
Alarm output 1 to 2 (relay contact)	Control output 1 (SSR drive, current)

- In case where damage or problems with this equipment may lead to serious accidents, install appropriate external protective circuits.
- As this equipment has no power switch or fuse, install them separately as needed.
  If you install a fuse, be sure to place it between the main power switch and this equipment. (Main power switch: double-pole breaker, fuse rating: 250V, 1A)
- A power switch or a circuit breaker should be installed within the power supply facility.
- A power switch or a circuit breaker should be properly installed within easy reach of an operator.
- A power switch or a circuit breaker should be identified as the one for this product.
- Electrical wiring must be made by the qualified personnel only and in accordance with your local and national standards.
- For power supply wiring, use wire equal to 600 V vinyl insulated wire or above.
- To prevent damage and failure of the equipment, provide the rated power voltage.
- To prevent shock and equipment failure, do not turn the power ON until all wiring is complete.
- Before turning on power, confirm that clearance space has been secured to prevent shock or fire.
- Do not touch the terminal while the machine is on. Doing so risks shock or equipment errors.
- Never disassemble, convert, modify or repair this equipment. Doing so risks abnormal operation, shock or fire.
- If any failure occurs, please contact the manufacturer and return the product.
- Output relay is the part has a limited life. When output relay contact comes to the end of its life, it might remain on-state, or off-state. For safety, use a protective circuit outside.
- The factory default setting of this equipment is as follows. Change the setting as necessary so as the equipment to meet your application. Please note that the improper settings may result in overheat or unexpected damage. For the details of operation, refer to the separate volume, "Operation Manual (INP-TN5A2400-E)".
  - Control output 1: heating control
  - Alarm output 1 to 2 (optional): No function
- Symbols on the instrument
  ⚠: Read this instruction manual thoroughly before using the product, and use the product safely.

1-3. Maintenance

- When installing or removing the equipment, turn the power OFF. Otherwise, shock, operational errors or failures may be caused.
- Periodic maintenance is recommended for continuous and safe use of this equipment.
- Some parts installed on this equipment have a limited life and/or may deteriorate with age.
- The warranty period for this unit (including accessories) is three years after the date of manufacture, if the product is used properly.

3. Limited warranty

3-1. Scope of warranty

If malfunction occurs in the period of warranty due to Fuji Electric, the malfunctioning parts are exchanged or repaired for free. However, in the case where an engineer needs to visit your place for replacement or repair, you will be charged our call out fee. Please note that we cannot provide commissioning and/or readjustment for whole system including our product at repair or replacement of failed parts.
The warranty does not apply to the following cases.
(1) The malfunction occurs due to inappropriate conditions, environment, handling or usage that is not instructed in a catalog, instruction book or user's manual.
(2) The malfunction is caused by the factors that do not originate in the purchased or delivered product.
(3) The malfunction is caused by other devices or software design that does not originate in Fuji Electric products.
(4) The malfunction occurs due to an alteration or repair that is not performed by Fuji Electric.
(5) The malfunction occurs because the expendable parts listed in an instruction book or connectable were not maintained nor exchanged in an appropriate manner.
(6) The malfunction occurs due to factors that were not foreseeable by the practical application of science and technology at the time of purchase or delivery.
(7) The malfunction occurs because the product is used for an unintended purpose.
(8) The malfunction occurs due to a disaster or natural disaster that Fuji Electric is not responsible for.

3-2. Exclusion of liability for loss of opportunity

Regardless of the time period of the occurrence, the amount of compensation assumed by Fuji Electric for damage, excluding which is caused by intentional acts or acts of gross negligence or illegal act by Fuji Electric, shall not exceed the amount stipulated

2. ⚠ Caution

2-1. Cautions when Installing

- Please avoid installing in the following locations.
  - Locations in which the ambient temperature falls outside the range of –10 to 50 °C when equipment is in use.
  - Locations with rapid temperature changes, leading to dew condensation
  - Locations with corrosive gases (especially sulfide gas, ammonia, etc.) or flammable gases.
  - Locations with vibration or shock directly. (Vibration and shock may cause output relay malfunction.)
  - Locations in contact with water, oil, chemicals, steam or hot water. (If the equipment gets wet, there is a risk of electric shock or fire, so have it inspected by Fuji distributor.)
  - Locations with high concentrations of atmospheric dust, salt or iron particles.
  - Locations with large inductive interference, resulting in static electricity, magnetic fields or noise
  - Locations in direct sunlight.
  - Locations that build up heat from radiant heat sources, etc.
- Recommended site conditions
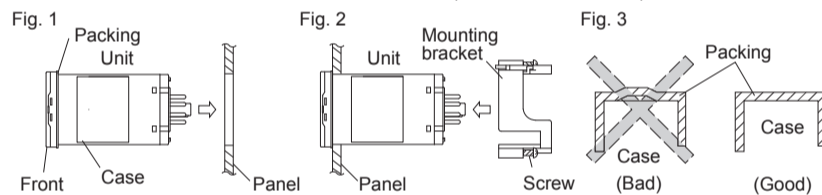 - A place where the ambient humidity during operaion is between 45 to 85% RH.

⚠ About EMC standard

- This equipment is a class A , for industrial locations, equipment. Do not use this equipment in domestic establishment, such as residential areas, or it may cause radio interference. If you use this equipment in domestic locations, take adequate measures on the outside of the equipment to reduce radio interference.
- Under the requirement of EMC standard, the maximum length of external cable including a sensor to be connected to this equipment is 30 m. Do not connect the sensor longer than 30 m.

2-2. Cautions when Attaching to the Panels

- Insert the controller unit into the panel cutout from the front, and then put the mounting bracket from the rear. The mounting bracket should be pushed in until the controller is securely fixed to the panel. If there is a slight gap remaining, gently tighten the two screws until the gap disappears. (Make sure not to over tighten the screws, as doing so may result in the mounting bracket separating from the stopper.)
- The front of this equipment is waterproof in compliance with NEMA-4X standards (IP66- equivalent). To effect waterproof, the included packing is shall be attached between the controller and the panel according to the guidelines below. (Incorrect attachment may cause the equipment to lose its waterproof capabilities.)
  (1) As shown in Fig. 1, insert to the panel after attaching the packing to the equipment case.
  (2) As shown in Fig. 2, tighten the screws of the mouthing bracket so that no gaps can remain between the equipment face, the packing and the panels. Once finished, confirm that there are no changes in shape such as displaced or improperly-fitted packing, etc. as shown in Fig. 3

< Attachment on vertical surface (Horizontal attachment) >

Fig. 1 — Packing, Unit, Front, Case
Fig. 2 — Unit, Mounting bracket, Panel, Panel
Fig. 3 — Packing, Case, Screw, (Bad), (Good)

- Note that NEMA-4X and IP66 are not subject to UL/cUL certificate.
- If the panel does not have enough strength, gaps may develop between the packing and the panel to lose waterproofing capabilities.
- In order to aid heat dissipation, do not block the sides of the equipment.
- Do not block the air vents on the top and bottom of the case.

2-3. Cautions for Wiring

- For thermocouple input, use the designated compensation lead; for resistance bulb input, use wires with small lead wire resistance and without any resistance difference among the three wires.
- To avoid noise conductor effects, input signal wires should be separated from electric power lines or load lines.
- Input signal wire and output signal wire should be separated each other. And both should be shield wire.
- If there is a lot of noise from the power source, adding an insulation transducer and using a noise filter is recommended. Always attach a noise filter to a panel that is grounded securely, and keep the wiring between the noise filter output side and the measuring equipment power terminal wiring to a minimum length. Please do not attach fuses and switches, etc. to the noise filter output wiring; otherwise the filter's effectiveness will be decreased.
- Twisting the power wires is effective when connecting the wires. (The shorter the pitch of the twist, the more effective the connection is against noise.)
- Operation preparation time is required for the contact output when power is turned on. If using it as a signal to an external interlock circuit, please couple it with a delayed relay.
  Concerning the output relay, connecting the maximum rated load will shorten the product's life; so please attach an auxiliary relay. If the output operation frequency is high, selecting a SSR drive output type is recommended.
  [Proportionate cycles] Relay output: 30 seconds or more, SSR drive output: 1 second or more
- When inductive loads such as magnetic opening/closing equipment, etc. as relay output equipment are connected, use of a surge absorber is recommended in order to protect the contacts against opening/closing surges and to ensure long-term use. Recommended specification for the surge absorber

Example

Voltage	Nominal varistor voltage
100 V	240 V
200 V	470 V

Attachment position: between the relay control output contacts.
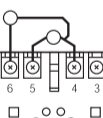
2-4. Key Operation Cautions/Error Operations

- The alarm function does not work properly when an error takes place unless the settings are made correctly. Always verify its setting before operation.
- If the input wiring breaks, the display will read "UUUU" or "LLLL". When replacing the sensor, always turn the power OFF.

2-5. Others

- Please do not wipe the equipment with organic solvents such as alcohol or benzene, etc. If wiping is necessary, use a neutral cleaning agent.
- Do not use mobile phones near this equipment (within 50 cm). Otherwise a malfunction may result.
- Trouble may occur if the equipment is used near a radio, TV, or wireless device.
- This equipment should be treated as an industrial waste when it is disposed of.

in the contract with the customer.
Fuji Electric is not liable for the damage to products that were not manufactured by Fuji Electric, incidental damages or consequential damages, or damage caused due to special situations regardless of whether it was foreseeable or not, or passive damages such as opportunity loss or lost profits of the purchaser.

3-3. Scope of application

- This equipment must be used under the following conditions:
  The use of the equipment incurs no risk of a serious accident even if a failure or malfunction occurs on the equipment, and in case of product failure or malfunction, safety measures such as redundant design, prevention of malfunction, fail safe setting, foolproof mechanism are provided outside of the equipment by the user.
- The product described in this document is designed and manufactured as a general-purpose products for general industrial applications.
- The warranty does not apply to the following cases:
  - For the use not described in or beyond the conditions or environment specified in the instruction manual or the user manual.
  - For the use which has large influence on publicity including nuclear power and other power generation, gas, and/or water,
  - For the use in which safety is especially required, because it may seriously affect railroads, vehicles, combustion equipment, medical equipment, entertainment devices, safety equipment, defense equipment, and/or human lives and property.
  However, we will study the possibility of application of the equipment for the above use, if the user limits the usage of it and agrees to require no special quality. Please consult us.

4. Specifications

Power supply voltage	• 100 (-15%) to 240 (+10%) V AC, 50/60 Hz • 24 (±10%) V DC/AC, 50/60 Hz	Loader interface	TTL Level • Connection method: dedicated cable • Communication method: Half-duplex bit serial, asynchronous communication • Transmission rate: 38400 bps, no parity • Protocol: Modbus RTU compatible
Power consumption	10 VA MAX. (100 to 240 V AC), 5 VA MAX. (24 V DC/AC)		
Control output	Relay contact output • 1 SPDT contact, 250 V AC/ 30 V DC, 5 A (resistive load)		
	SSR drive output (voltage pulse output)* • ON voltage: 12 V DC (10.7 to 13.2 V DC) • OFF voltage: 0.5 V DC or lower • Maximum current: 20 mA DC • Load resistance: 600 Ω MIN.	Storage temperature and humidity	-20 to 60°C, 90%RH or less (no condensation)
		Operating temperature and humidity	-10 to 50°C, 90%RH or less (no condensation)
		Altitude	up to 2000 m
		Recommended fuse	250 V AC, 0.1A T(Time-Lag) for 100 to 240 V AC Power supply, 400 V DC/AC, 1 A T(Time-Lag) for 24 V DC/AC Power supply
	Current output • 0 to 20 mA DC/4 to 20 mA DC • Accuracy ±5%FS • Load resistance: 500 Ω MAX.	Service life	Service life: 10 years (at an average temperature of 25°C) The life is shortened by half when the temperature rises by 10°C (Arrhenius' law). If you use the controller inside a cabinet or the like, please note that the ambient temperature can rise.

Process value input	Accuracy
	 • Thermocouple input: 0.5%FS±1digit±1°C
	   *except: Thermocouple B: 0 to 400°C: no accuracy assurance
	     Thermocouple R: 0 to 500°C: 1%FS±1digit±1°C
	     Other thermocouples: -200 to -100°C: ±2°C ±1 digit
	 • RTD: either ±0.8°C ±1 digit or ±0.2% ±1 digit, whichever is larger
	 • mV input, voltage input, current input: ±0.3%FS ±1 digitmV
	 *Note that the sensor should be sufficiently warmed up to secure the accuracy.		

Alarm output	Relay contact output (AL1 to AL2) • 1 SPST contact, 250 V AC/30 V DC, 1 A (resistive load)		

*The following table shows the difference of outputs among other micro-controller X series models.

	SSR driving output		Allowable load resistance for
	Voltage	Maximum current	4 to 20mA DC output
PXR3	15 V DC	20 mA	100 to 500 Ω
PXR4/5/7/9	24 V DC	20 mA	600 Ω or less
PXV3	5.5 V DC	20 mA	600 Ω or less
PXV/W/Z	24 V DC	20 mA	600 Ω or less
PXF	12 V DC	20 mA	500 Ω or less

5. Installation and Mounting

5-1. External Dimensions (unit: mm)
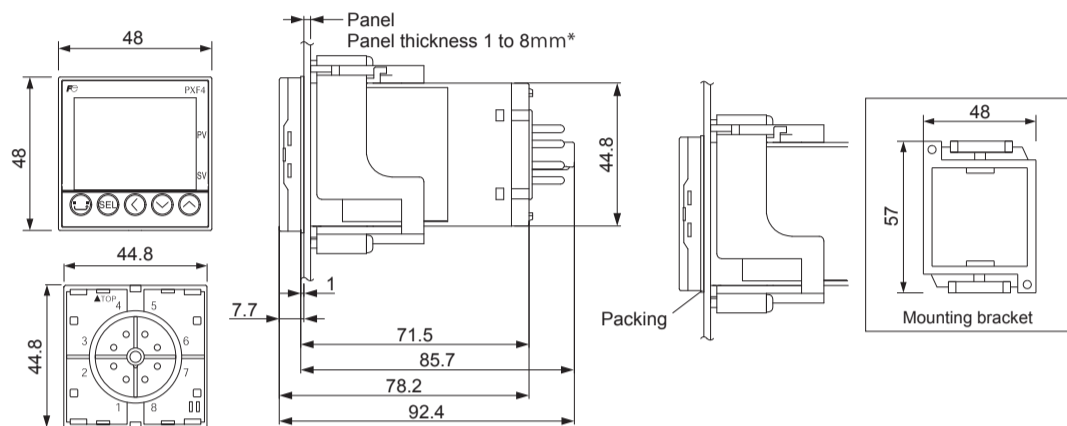
* When using the parameter loader with PXF being mounted on a panel: t (panel thickness) 1 ≤ t ≤ 4

5-2. Panel Cut Dimensions (unit: mm)

Side stick mounting (n units)

Number of units	2	3	4	5	6
a	93	141	189	237	285
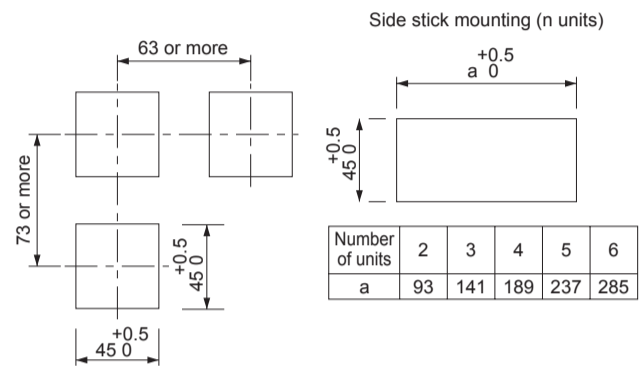
• Panel cut dimensions should also meet the above dimensions after the panel is coated.
• Cautions when Side stick mounting:
  • In this installing, the waterproof of PXF is lost.
  • When the power supply is 200 V AC, keep the maximum ambient temperature at 45°C. (We recommend use of a fan, as a heat radiating measure.)
  • If any equipment or walls which have a depth of 70 mm exist around this instrument, keep a clearance of at least: 30 mm on the both sides, 50 mm below, 30 mm above.

6. Wiring

6-1. Terminal Connection Diagram (Without alarm functions 8-pin socket)
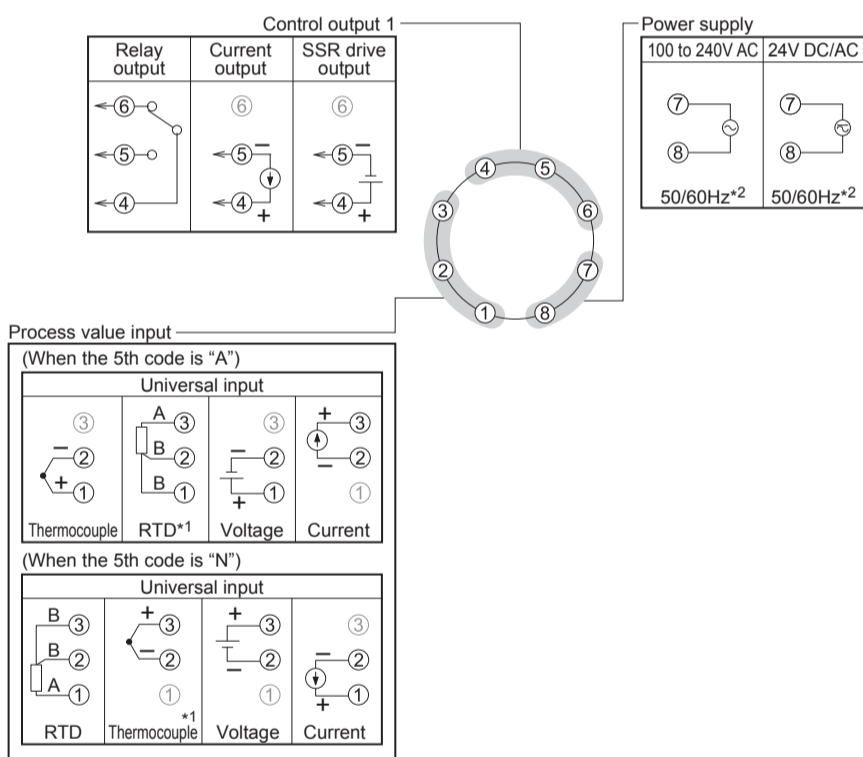
*1: The terminal layout differs from that of PXW4/PXZ4/PXV4.

6-2. Terminal Connection Diagram (With alarm functions 11-pin socket)
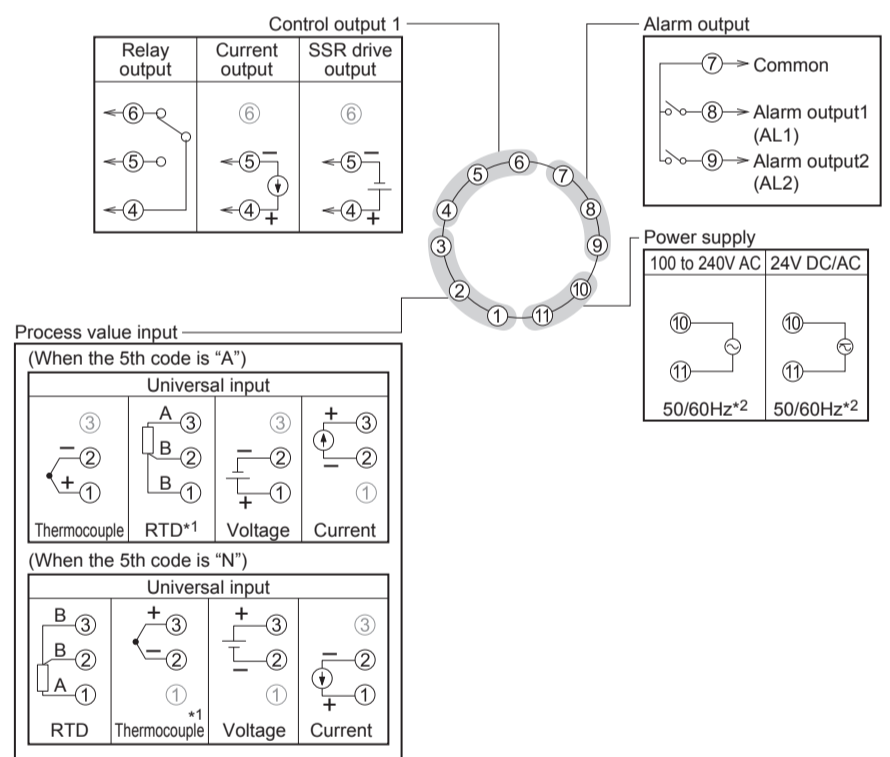
*2: Check the power supply voltage before installation.

7. Part names and functions

7-1. Operation keys
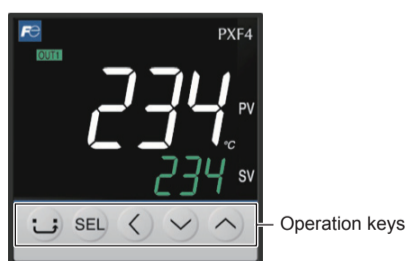
Key	Name	Allows you to…
USER	USER	• switch between SV and MV, in the operation mode or during standby. • return to the operation mode from the parameter setup mode.
SEL	SEL	• enter the parameter setup mode from the operation mode or standby. • finish selecting and save change.
LEFT	LEFT	• move the digit when you editing the numerals.
UP	UP	• change the set value when PXF is in the operation mode or standby. • select a parameter in the parameter selection mode.
DOWN	DOWN	• change a parameter setpoint in the parameter editing mode.

7-2. Display
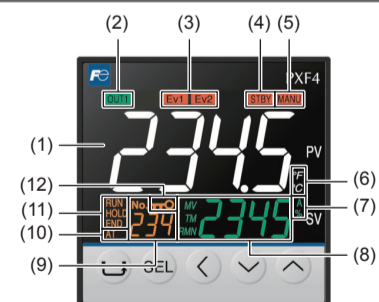
(1) **Process variable (PV)**
  • Indicates the measured value.
  • In the Operation control mode and the Setup mode, the parameter name is displayed.
  • In the Channel selection mode, the channel number is displayed.

(2) **OUT1 indicator**
Lights during control output is ON.

(3) **EV1, EV2 indicators**
Lights during digital output 1 to 2 are ON.

(4) **STBY indicator**
Lights during standby.

(5) **MANU indicator**
Lights during manual mode.

(6) **°C/°F indicator**
Shows the temperature unit under use.

(7) **A, % indicator**
Shows the unit being applied to values on SV screen during the operation mode.

(8) **Set Value (SV)/Manipulated variable (MV)**
Indicates the set value or the manipulated variable. The MV indicator lights during MV display.

(9) **Screen No.**
Shows screen No. when in parameter setting.

(10) **AT indicator**
Lights during auto tuning.

(11) **RUN/HOLD/END indicators**
Lights during ramp/soak operation.

(12) **Lock indicator**
Lights during key lock.

8. Basic Operations

< Operation mode >

To switch between SV, MV and power

Each time you press 😊, the displayed value switches in the following order:

SV → MV → Power (cycles back to SV)

To change the setpoint

1. Press 😊 to display the SV.
2. Press ⌄ or ⌃ to change the value.
   Press ‹ to move to the next digit.
3. Press SEL to save the change.

Press and hold SEL

< Channel selection mode >

To change the channel

1. Press ⌄ or ⌃ .

CH1	CH2	CH3	CH4	CH5	CH6
Pid	Plt	PRG	MoN	ALM	SEt
CH7	CH8	CH11	CH12	CH13	
SYS	MAtH	dSP	CFG	PASS	

→ See the "Parameter list" on the right page.

Press and hold SEL

< Setup mode >

To change a parameter setpoint

1. Press ⌄ or ⌃ to select the parameter you want to edit.
2. Press SEL.
   → The parameter setpoint starts blinking.
3. Press ⌄ or ⌃ to change the value.
   To change the digit, use ‹ .
4. Press SEL.

→ For details of the parameters, See the "Parameter list" on the right page.

< Operation control mode >

To change the setpoint

1. Press ⌄ or ⌃ to change the parameter.
2. Press SEL select the parameter you want to edit.
   → The parameter setpoint starts blinking.
3. Press ⌄ or ⌃ to change the setpoint.
4. Press SEL to save the change.

→ See the "Parameter list" on the right page.

- **Operation mode**
  In this mode the normal operation is performed. The process value (PV) and the set value (SV) are displayed. The device starts in this mode when you turn on the power. You can change the set value (SV) in this mode. You can check the output value (MV) and the amount of electric ower by switchin the screen.

- **Operation control mode**
  In this mode you can put the device to standby or change the alarm set value.

- **Channel selection mode**
  In this mode you can select the parameter channel to be displayed.

- **Setup mode**
  In this mode you can setup each parameter. This mode includes the parameter selection submode and the parameter editing submode, which can be switched by 😊 key. In the parameter selection submode, you can switch between parameters by using ⌃⌄ keys. In the parameter editing submode, you can change parameter values by using ⌃⌄ keys.

Changing MV (control output values)

1. Press SEL to switch to the Operation control mode.
2. Press SEL to change the value of the parameter "MAN".
3. Press ⌃ to change "oFF" to "oN", and then press SEL to save the change. (MANU indicator appears.)
4. Press 😊 to display the MV. (MANU indicator appears.)
5. Press ⌃ or ⌄ to change the MV. (Changes are reflected to the MV as it is changed.)

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9. Setting the Temperature Controller

9-1. Input Setting

Set the type and the range for input sensor. Input can be set in the setup menu (" Ch5 SEt ").
For more on input types, input scaling, decimal point location, and input codes, see "10. Input Range and Codes (standard range)".

1. **Choose an input type (" PVt ")**
   Check the type of the thermocouple or resistance bulb which is used.

2. **Set the PV scaling (input range) (" PVb " / " PVF ")**
   Set Pvb to the lower limit of the temperature range and PvF to the upper limit.
   It is recommended to set the values at the standard range, even though they can be set at values beyond of it.
   There is no standard range for DC voltage or DC current input. (-1999 to 9999, lower limit<upper limit)

3. **Set the decimal point location (" PVd ")**
   Sets whether or not to display digits after the decimal point. Two digits can also be displayed after the decimal point when using 1 to 5V DC, and 4 to 20mA DC.

Point | PV scaling and decimal point location can be used with the factory settings.

9-2. Output Setting

Sets the control output. (Only when the output is current or voltage.)

1. **Sets the range of the control output (OUT1) (" C 1P ")**
   Choose any of 0 to 5V, 1 to 5V, 0 to 10V, 2 to 10V, 0 to 20mA or 4 to 20mA DC.

9-3. Control Setting

Sets controls to normal operation or reverse operation.
- **Reverse operation:**
  As the process value (PV) rises, the control output (MV) becomes smaller. Used to heat the control object.
- **Normal operation:**
  As the process value (PV) rises, the control output (MV) becomes larger. Used to cool the control object.

1. **Set the normal or reverse operation (" REV ")**
   Choose any of the following combinations of heat and cool to suit your system.

REV	Control output 1
RV--	Reverse
No--	Normal

9-4. Alarm Output Setting

Changing the DO type setting, set as below.
- Set the "do2t" to the value output from AL1.
- Set the "do3t" to the value output from AL2.

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11. Error Indications

This controller has a display function to indicate several types of error code shown below. If any of the error code is displayed, please eliminate the cause of error immediately. After the cause is eliminated, turn off the power once, and then re-start the controller.

Display	Possible cause	Control output
" UUUU "	(1) Thermocouple burnout. (2) Resistance bulb sensor (A) burnout. (3) PV exceeds upper limit of the range by 5%FS.	The controller outputs the specified value for an error. (The value can be set in parameter Flo1)
" LLLL "	(1) Resistance bulb sensor B or C wire burnout. (2) Resistance bulb sensor (between A & B or A & C) short. (3) PV is below lower limit of the range by 5%FS. (4) Burnout or short in the voltage input.	
	PV < -199.9	Control operation is continued Note) Control operation is continued as long as the accuracy is above -5%FS. When the accuracy declines to be lower than -5%FS, the controller outputs the specified value for an error.
" ERR " (SV flickers)	Incorrect setting (Pvb/PvF)	The controller outputs the specified value for an error. (The value can be set in parameter Flo1)
PV is not displayed	Check the set value of DSPT.	Normal control *The controller does not have to be restarted
SV is not displayed	Check the set value of DSPT.	Normal control *The controller does not have to be restarted
Parameters may not be displayed	Check the settings of Ch11 DSP.	Normal control *The controller does not have to be restarted
" ALM1 ", " ALM2 "	Alarm 1 or alarm 2 is occurred under the condition that ALMF is set to 1 or 3.	Normal control
" ALMr "	The number that relay has operated reached the RYCN (relay contact life limit) under the condition that ALMF is set to 1 or 3.	
" ALMo "	The number of days that the device has operated reached the oPtM (upper limit of operating days) under the condition that ALMF is set to 1 or 3.	

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10. Input Range and Codes (standard range)

Input type		Input code	Measurement range (°C) (PVT)	Minimum input increment (°C)	Measurement range (°F) (PVb, PVF)	Minimum input increment (°F)
RTD JIS (IEC)	JPt 100	JPT1	0.0 to 150.0	0.1	32.0 to 302.0	0.1
		JPT2	0.0 to 300.0	0.1	32.0 to 572.0	0.1
		JPT3	0.0 to 500.0	0.1	32.0 to 932.0	0.1
		JPT4	0.0 to 600.0	0.1	32 to 1112	1
		JPT5	-50.0 to 100.0	0.1	-58.0 to 212.0	0.1
		JPT6	-100.0 to 200.0	0.1	-148.0 to 392.0	0.1
		JPT7	-199.9 to 600.0	0.1	-328 to 1112	1
	Pt 100	PT1	0.0 to 150.0	0.1	32.0 to 302.0	0.1
		PT2	0.0 to 300.0	0.1	32.0 to 572.0	0.1
		PT3	0.0 to 500.0	0.1	32.0 to 932.0	0.1
		PT4	0.0 to 600.0	0.1	32 to 1112	1
		PT5	-50.0 to 100.0	0.1	-58.0 to 212.0	0.1
		PT6	-100.0 to 200.0	0.1	-148.0 to 392.0	0.1
		PT7	-199.9 to 600.0	0.1	-328 to 1112	1
		PT8	-200 to 850	1	-328 to 1562	1
Thermocouple	J	J1	0.0 to 400.0	0.1	32.0 to 752.0	0.1
		J2	-20.0 to 400.0	0.1	-4.0 to 752.0	0.1
		J3	0.0 to 800.0	0.1	32 to 1472	1
		J4	-100 to 1000	1	-148 to 1832	1
	K	K1	0 to 400	0.1	32 to 752	0.1
		K2	-20.0 to 500.0	0.1	-4.0 to 932.0	0.1
		K3	0.0 to 800.0	0.1	32 to 1472	1
		K4	-200 to 1300	1	-328 to 2372	1
	R	R	0 to 1700	1	32 to 3092	1
	B	B	0 to 1800	1	32 to 3272	1
	S	S	0 to 1700	1	32 to 3092	1
	T	T1	-199.9 to 200.0	0.1	-199.9 to 392.0	0.1
		T2	-199.9 to 400.0	0.1	-199.9 to 752.0	0.1
	E	E1	0.0 to 800.0	0.1	32 to 1472	1
		E2	-150.0 to 800.0	0.1	-238 to 1472	1
		E3	-200 to 800	1	-328 to 1472	1
	L	L	-100 to 850	1	-148 to 1562	1
	U	U1	-199.9 to 400.0	0.1	-199.9 to 752.0	0.1
		U2	-200 to 400	1	-328 to 752	1
	N	N	-200 to 1300	1	-328 to 2372	1
	W	W	0 to 2300	1	32 to 4172	1
	PL-II	PL-2	0 to 1300	1	32 to 2372	1
DC voltage	0 to 5 V DC	0-5V	-1999 to 9999 (Range where scaling is allowed)	—	-1999 to 9999 (Range where scaling is allowed)	—
	1 to 5 V DC	1-5V				
	0 to 10V DC	0-10				
	2 to 10V DC	2-10				
	0 to 100mV DC	MV				
DC current	0 to 20 mA DC	0-20				
	4 to 20 mA DC	4-20				

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12. Model Specifications

PXF 4 [ ] U 2 - [ ] Y 0 0

Digit positions: 4 5 6 7 8 9 10 11 12 13

Digit	Specifications	Note	Code
4	<Front panel size W × H> 48×48mm		4
5	<Input signal> Universal input		A
	Universal input (PXW/Z/V)		N
6	<Control output> Relay contact (SPDT)		B
	SSR drive output		C
	Current output		E
7	<Terminal form> Socket type		U
8	<Revision code>		2
9	<Alarm output> None		4
	2 points		G
10	<Power supply voltage> 100 to 240V AC		V
	24 V AC/DC		B
11	—		Y
12			0
13			0

Parameter List

The following explains each channel parameter.
- The list also shows the operational range of set values for parameters that are limited.
- When the PV input lower limit (Pvb), PV input upper limit (PvF), or decimal place position (Pvd) is changed, reconfigure all the initial parameter setting values.
- When the parameter that has [RESET] on its Remarks column is changed, turn off the power once, and then re-start the controller.

Operation control parameter

No	Display	Parameter Name	Function	Factory default setting	Remarks
1	MAN	Switchover between auto and manual mode	Switchover between auto and manual modes	oFF	Note 1
2	Stby	Switchover between RUN and standby	Switchover the operation mode between RUN and standby	oFF	
4	ProG	Ramp soak control command	Changes ramp soak run states	oFF	Note 2
5	At	Auto-tuning run command	Runs auto-tuning.	oFF	
6	LACH	Alarm output latch release command	Cancels the alarm output latch state	oFF	
7	SVN	SV selection	Chooses the SV No. used for control	LoCL	Note 3
8	PLM	PID selection	Chooses the PID No. used for control	LoCL	
9	AL1				
10	A1-L	ALM1 set value	Sets the alarm value for ALM1.	2.50%FS	
11	A1-H				
12	AL2				
13	A2-L	ALM2 set value	Sets the alarm value for ALM2.	2.50%FS	
14	A2-H				
27	WCMd	Electric power calculation command	Switches among on/off/hold of electric power calculation.	oFF	
28	LoC	Key lock	Sets the key lock to prevent wrong operation	oFF	

CH1 PID (control parameters)

No	Display	Parameter Name	Function	Factory default setting	Remarks
50	P	Proportional band (%)	Sets the proportional band of the PID parameter.	5.0%	
51	i	Integration time	Sets the integration time of the PID parameter. Setting "0" will turn off integration.	240 (sec)	
52	d	Differential time	Sets the differential band of the PID parameter. Setting "0" will turn off differentiation.	60.0 (sec)	
53	HYS	ON/OFF control hysteresis	Sets the hysteresis width for the ON/OFF control.	0.25%FS	
54	CooL	Cooling proportional band coefficient	Sets the proportional band coefficient for cooling. Setting "0.0" will turn the cooling into an ON/OFF control.	1.0	
55	db	Dead band (%)	Shifts the cooling proportional band from the set value	0.0%	
56	bAL	Output convergence value (%)	Offset value which is added to the MV output value	0	
57	AR	Anti-reset windup	Sets the range of integration control	100%FS	
58	REV	Normal/reverse operations	Sets the control action (normal or reverse).	RV--	[RESET]
59	SvL	SV limit (lower)	Sets the lower limit of SV	0.00%FS	Note 4
60	Svh	SV limit (upper)	Sets the upper limit of SV	100.00%FS	Note 4
61	tC1	OUT1 proportion cycle	Sets the proportion cycle of the control output (OUT1) (contacts, SSR drive).	30 (relay) 2 (SSR) 1 (current)	
63	PLC1	OUT1 lower limit	Sets the lower limit of the control output (OUT1)	-5.0%	
64	PHC1	OUT1 upper limit	Sets the upper limit of the control output (OUT1)	105.0%	
67	PCUt	Type of output limiter	Sets the type of output limiter	0	
73	ALPA	Alpha	Sets 2-degrees-of-freedom coefficient α	40.0%	
74	bEtA	Beta	Sets 2-degrees-of-freedom coefficient β	100.0%	

CH2 PLT (PID palette parameters)

No	Display	Parameter Name	Function	Factory default setting	Remarks
100	SV1	SV1	Sets the SV (set value)	0%FS	Note 4
101	P1	Proportional band 1 (%)	Sets the proportional band.	5.0%	
102	i1	Integration time 1	Sets the integration time.	240 (sec)	
103	d1	Differential time 1	Sets the differential time.	60.0 (sec)	
104	HYS1	ON/OFF control hysteresis 1	Sets the hysteresis when using the ON/OFF control.	0.25%FS	
105	CoL1	Cooling proportional band 1 (%)	Sets the cooling proportional band.	1.0	
106	db1	Dead band 1 (%)	Sets the dead band	0.0%	
107	bAL1	Output convergence value 1 (%)	Offset value which is added to the control output	0	
108	AR1	Anti-reset windup 1	Sets the anti-reset windup	100%FS	
109	REV1	Normal/reverse 1	Sets the control action (normal or reverse).	RV--	[RESET] Note 5
⋮					
160	SV7	SV 7	Sets the SV (set value)	0%FS	Note 4
161	P7	Proportional band 7 (%)	Sets the proportional band.	5.0%	
162	i7	Integration time 7	Sets the integration time.	240 (sec)	
163	d7	Differential time 7	Sets the differential time.	60.0 (sec)	
164	HYS7	ON/OFF control hysteresis 7	Sets the hysteresis when using the ON/OFF control.	0.25%FS	
165	CoL7	Cooling proportional band 7 (%)	Sets the cooling proportional band.	1.0	
166	db7	Dead band 7 (%)	Sets the dead band	0.0%	
167	bAL7	Output convergence value 7 (%)	Offset value which is added to the control output	0	
168	AR7	Anti-reset windup 7	Sets the anti-reset windup	100%FS	
169	REV7	Normal/reverse 7	Sets the control action (normal or reverse).	RV--	[RESET] Note 5
170	REF1	PID switching point 1	Sets the PID switching point for palette 1.	0%FS	
⋮					
176	REF7	PID switching point 7	Sets the PID switching point for palette 7.	0%FS	
177	SVMx	Max SV selection number	Choosing SV with the user key sets it to the maximum possible number.	Sv7	
178	PLM	Max PID selection number	Choosing PID with the user key sets it to the maximum possible number.	Pid7	

CH 3 PRG (ramp soak parameters)

No	Display	Parameter Name	Function	Factory default setting	Remarks
200	PtN	Ramp soak operation pattern (Step No.)	Sets which steps to use in the ramp soak operation pattern	14 (uses steps 1 to 64)	Note 6
201	tiMU	Ramp soak time units	Sets the units of the ramp soak time	hh.MM	
202	SV-1	Ramp soak 1 seg/SV 1	Sets the SV	0%FS	
203	tM1R	Ramp soak 1 seg ramp time	Sets the ramp time.	00:00	
204	tM1S	Ramp soak 1 seg soak time	Sets the soak time.	00:00	
205	SV-2	Ramp soak 2 seg/SV 2	Sets the SV	0%FS	
206	tM2R	Ramp soak 2 seg ramp time	Sets the ramp time.	00:00	
⋮					
389	t63R	Ramp soak 63 seg ramp time	Ramp soak 63 seg ramp time	00:00	
390	t63S	Ramp soak 63 seg soak time	Ramp soak 63 seg soak time	00:00	
391	SV64	Ramp soak 64 seg/SV 64	Ramp soak 64 seg/SV 64	0%FS	
392	t64R	Ramp soak 64 seg ramp time	Ramp soak 64 seg ramp time	00:00	
393	t64S	Ramp soak 64 seg soak time	Ramp soak 64 seg soak time	00:00	
394	Mod	Ramp soak mode	Ramp soak mode	0	
395	GSoH	Guaranty soak ON/OFF	Guaranty soak ON/OFF	oFF	
396	GS-L	Guaranty soak band (Lower)	Guaranty soak band (Lower)	1.25%FS	
397	GS-H	Guaranty soak band (Upper)	Guaranty soak band (Upper)	1.25%FS	
398	PVSt	PV start	PV start	oFF	
399	CoNt	Restore mode	Restore mode	rES	
400	PtNM	Max pattern selection	Max pattern selection	14	
401	PMiN	Min pattern selection	Min pattern selection	0	

CH 4 MON (monitor parameters)

No	Display	Parameter Name	Function	Factory default setting	Remarks
420	StAt	Ramp soak progress	Displays the progress of the ramp soak	—	
421	MV1	MV1(%)	Displays the output value of the control output (OUT1)	—	
424	RSV	Remote SV	Shows a remote SV.	—	
425	Ct1	Heater current (A)	Shows a heater current value. (A current value when OUT1 is ON.)	—	
427	LC1	SSR leak current (A)	Shows a leak current value. (A current value when OUT1 is OFF.)	—	
429	tM1	Remaining time on timer 1	Displays the remaining time on timer 1	—	
430	tM2	Remaining time on timer 2	Displays the remaining time on timer 2	—	
436	CUR1	Current (A)	Shows a value measured by CT.	—	
438	PoW	Electric power	Shows a calculated value for electric power.	—	
439	kWH	Power	Displays the calculated amount of electric power.	—	
440	PCN1	Number of opetating times (control relay 1)	Displays the number of times control relay 1 has operated.	—	
442	PUNt	Operating days	Displays the number of days oparated, converted from total operating time.	—	
443	FALt	Error source	Displays the source of an error	—	
446	PLNo	Current palette No.	Displays the PID palette No. currently selected.	—	
447	PtNo	Current pattern No.	Displays the pattern No. of the ramp soak currently selected.	—	

CH5 ALM (monitor parameters)

No	Display	Parameter Name	Function	Factory default setting	Remarks
470	A1tP	ALM1 alarm type	Set the alarm type for ALM1.	0	
471	A1HY	ALM1 hysteresis	Sets the hysteresis for alarm output 1 ON/OFF	0.25%FS	
472	dLY1	ALM1 delay	Sets the delay before detecting alarm output 1	0	
473	dL1U	ALM1 delay time units	Sets the delay time units for alarm output 1	sec	
474	AoP1	ALM1 option	Assigns the optional functions to ALM1 ● Ones digit: alarm output latch ● Tens digit: error alarm output ● Hundreds digit: inverted output ● Thousands digit: hold reset	0000	
475	A2tP	ALM2 alarm type	Set the alarm type for ALM2.	0	
476	A2HY	ALM2 hysteresis	Sets the hysteresis for alarm output 2 ON/OFF	0.25%FS	
477	dLY2	ALM2 delay	Sets the delay before detecting alarm output 2	0	
478	dL2U	ALM2 delay time units	Sets the delay time units for alarm output 2	sec	
479	AoP2	ALM2 option	Assigns the optional functions to ALM2 ● Ones digit: alarm latch bit mask ● Tens digit: error alarm bit mask ● Hundreds digit: inverted output bit mask ● Thousands digit: hold reset bit mask	0000	
511	WHAL	Electricity alarm	Sets the value for electricity alarm.	0	

CH 6 SET (setup parameters)

No	Display	Parameter Name	Function	Factory default setting	Remarks
530	PVt	PV input type	Sets the type of input sensor	K1	[RESET]
531	PVb	PV input lower limit	Sets the lower limit of PV input	0	[RESET]
532	PVF	PV input upper limit	Sets the upper limit of PV input	400	[RESET]
533	PVd	Decimal point position	Sets the decimal point position for the PV/SV	0	[RESET]
535	CUt	Square-root extractor cut point	Sets the cut point for square root calculation.	-0.1%	
536	PVoF	PV input shift	Sets the amount of shift for PV input	0.00%FS	
538	tF	PV input filter	Sets the time constant for the PV input filter	5.0 sec	
547	C1R	OUT1 range	Sets the range of the control output 1(OUT1)	4-20	Note 7
549	FLo1	MV1 during FALT	Sets the output value for the control output (MV1) during FALT	-5.0%	
551	SFo1	MV1 during Soft Start	Sets the value for the control output (MV1) during soft start	105.0%	
553	SFtM	Soft Start set time	Sets the time from startup to the finish of soft start	00:00	
554	Sbo1	MV1 during standby	Sets the value for the control output (MV1) during standby	-5.0%	
556	SbMd	Standby mode	Sets on/off of the alarm output during standby	0	[RESET]
561	VoLt	Fixed voltage value	Sets the voltage for calculating electric power	100 (100 V)	
562	CUR	Current value for simple power calculation	Sets the current value for simple power calculation	0 (0.0A)	
564	WdP	Decial point position for electric power	Sets the position of decimal point for calculationed power consumption.	1 : 0.1	Note 8
565	PHY	Power factor for simple calculation	Sets the power factor for simple calculation	1.00	
566	RYCN	Upper limit of relay contact operation	Sets the upper limit on the number of times a relay contact can operate. If you set it to 0, no alarm will be generated.	100 (100,000 times)	
567	oPtM	Upper limit of operating days	Sets the upper limit on the number of days the device operates. If you set it to 0, no alarm will be generated.	3650 (3650 days)	

Ch 7 SYS (system parameters)

No	Display	Parameter Name	Function	Factory default setting	Remarks
590	UKY1	USER key	Assigns the function to the [USER] key	0	
591	UKY2	USER + UP key	Assigns the function to the [USER]+ Λ key	1	
592	UKY3	USER + DOWN key	Assigns the function to the [USER]+ V key	5	
599	oU1t	OUT1 output type	Selects the content to be output from OUT1	1	
602	do2t	DO1 output type	Sets the trigger for DO1	3	
603	do3t	DO2 output type	Sets the trigger for DO2	4	
607	LoU1	LED indicator assignment (OUT1)	Selects the content for OUT1 to indicate.	1	
609	LEV1	LED indicator assignment (Ev1)	Selects the content for EV1 lamp to indicate.	110	
610	LEV2	LED indicator assignment (Ev2)	Selects the content for EV2 lamp to indicate.	111	
615	LStb	LED indicator assignment (STBY)	Selects the content for STBY lamp to indicate.	12	
616	LMAN	LED indicator assignment (MANU)	Selects the content for MAN lamp to indicate.	13	
617	RMP	Ramp SV ON/OFF	Sets the ramp SV ON/OFF	oN	
618	RMPL	Ramp SV-Decline	Sets the slope for a falling SV during ramp SV operations	0.00%FS	
619	RMPH	Ramp SV-Incline	Sets the slope for a rising SV during ramp SV operations	0.00%FS	
620	RMPU	Ramp SV-slope time unit	Sets the unit of time for the slope during ramp SV operations	hoUr	
621	SVt	Ramp SV - display mode	Displays the SV during ramp operations or the SV goal value on the SV display	rMP	
622	CtRL	Control method	Selects the control method.	Pid	
626	StMd	Start mode	Sets the operation mode during startup	AUTO	
627	dt	Control operation cycle	Sets the control operation cycle.	0.1S	
628	PLtS	PID palette switching method	Sets the method for switching among PID pallette.	0	

Ch 8 MATH (calculation parameters)

No	Display	Parameter Name	Function	Factory default setting	Remarks
650	MAtH	Simple calculation ON/OFF	Sets ON/OFF of simple calculation	oFF	Note 9

Ch 11 DSP (parameter mask)

No	Display	Parameter Name	Function	Factory default setting	Remarks
1	—	Parameter mask	Sets the parameters to be displayed/not displayed.	—	Values differ depending on the model.

Ch 12 CFG (configuration parameters)

No	Display	Parameter Name	Function	Factory default setting	Remarks
940	toUt	Operation timeout (return to PV/SV display)	Sets the time until the display returns to PV/SV screen from setting screen.	60S	
942	SoFH	Blinking SV during Soft Start	Sets whether or not to blink SV during Soft Start.	ON	
943	ALMF	Blinking PV/SV at ALM	Sets whether or not to blink PV/SV when alarm becomes ON.	0	
944	LoFF	Display timeout	Sets the time until the display automatically turns off.	oFF	
945	dSPt	PV/SV Display off	Sets ON/OFF of PV and SV display	0	
946	FALt	Blinking PV at input error	Sets whether or not to blink PV at an input error	0	
947	bLit	Brightness	Sets the brightness of LED backlight	3	3 is the brightest
948	bCoN	Control at burnout	Sets whether to continue or to stop control when the device detects a burnout of PV input	oFF	
950	PLO1			P	
951	PLO2	Model code	Shows model code	X	
952	PLO3			F	
⋮					
962	PL13				
963	RSt	Reset	Resets the controller	oFF	
965	VER1				
966	VER2	Software version	Shows the software version	—	
967	VER3				
968	VER4				

Ch 13 PASS (password parameters)

No	Display	Parameter Name	Function	Factory default setting	Remarks
990	PAS1	Password1 setup	Sets password 1.	0000	
991	PAS2	Password2 setup	Sets password 2.	0000	
992	PAS3	Password3 setup	Sets password 3.	0000	

Note 1: This parameter is not displayed in default setting. If you need to change this parameter, change the setting of "Ch11 dSP" so that it appears.
Note 2: Displays End (when ending) or GS (during guaranty soak).
Note 3: When changing the SV with the front key, do not change the "Svn" parameter via communication. Otherwise, the changed SV may not be stored correctly.
Note 4: "SvL" and "Svh" must be set so that SvL < Svh. When you change the values for "SvL" and "Svh", check SV 1 ("Sv1 Ch2") through SV 7 ("Sv7 Ch2").
Note 5: Set the same value as the one for the Normal/Reverse setting ("rEv Ch1").
Note 6: Do not change this parameter during the ramp soak operation. Be sure to set "PrG" = "oFF" before changing the parameter.
Note 7: Displayed when OUT1 is current or voltage output.
Note 8: Do not change it during calculation.
Note 9: Refer to the Operation Manual for the detail of calculation functions.

For details, refer to the operation manual (INP-TN5A2400-E) available from our website:
www.fujielectric.com/products/instruments/