

Instruction Manual

Micro Control X Model : PXE4

Fuji Electric Co., Ltd.

INP-TN2PXE4-E

Thank you for your purchasing "Fuji Digital Temperature Controller." Please check that the product is exactly the one you ordered and use it according to the following instructions. (Please refer to a separate operation manual for details.) Dealers are cordially requested to ensure the delivery of this Instruction Manual to hands of the end-users

Safety Precautions

Before using this product, the user is requested to read the following precautions carefully to ensure the safety. Safety precautions must be taken by every user to prevent accidents. Failure to comply with the instructions contained in this manual may reduce the safety of the instrument.

The safety requirements are classified into "Warning" and "Caution" according to the following interpretations :



<Front dimensions>

48 X 48mm

6 <Control output>

8 <Revision code

Alarm (1 pc.)

Relay contact output SSR driving output

Suggesting that the user's mishandling can result in nersonal death or serious injury

Suggesting that the user's mishandling can result in personal injury or damage to the property.

1. / Warning

1.1 Installation and wiring

his controller designed to	be installed at	the fo	llowing conditions.		
Operating temperature -10 to +55 [°C]					
Operating humidity 90%RH or less (Non condensation)					
Installation category	II		Conforming to IEC61010-1		
Pollution degree	2		Contonning to IEC61010-1		

The controller must be installed such that with the exception of the connection to the mains, creepage and clearance distances shown in the table below are maintained between the temperature probe and any other assemblies which use or generate a voltage shown in the table below.

ailure to maintain these minimum distances would invalidate the EN 61010 safety appro-					
Voltage used or generated by any assemblies	Clearance (mm)	Creepage (mm)			
Up to 50Vrms or Vdc	0.2	1.2			
Up to 100Vrms or Vdc	0.2	1.4			
Up to 150Vrms or Vdc	0.5	1.6			
Up to 300Vrms or Vdc	1.5	3.0			
Above 300Vrms or Vdc	Contact with o	ur sales office.			

If the voltage shown above exceeds 50Vdc (i.e. hazardous voltage), the basic insulation is required between all terminals of this controller and the ground, and supplementary insulation is required for

narm output.

tion class of this controller is as shown below. Be sure to check that the isolation class of the older satisfies your requirements before installation.

Basic insulation (150)	IOV AC) —— Functional i	nsulation (500V AC)	Non-insulation
Power	source		
Contact output	1(relay contact)		value input
Alarm output 1 (relay contact) or contact output 2 (relay contact)	Alarm output 1 (relay contact) or contact output 2 (relay contact)		al circuit
Alarm output 2 (relay contact)	Alarm output 2 (relay contact)	Control outpu	t 1 (SSR drive)
		/	

When the 9th code is "J" Alarm utput 1 and 2: independent common Alarm output 1 to 2: shared common

- When the services 2 codeponent common. Alam volupe 1 to 2 shade common.

 If there is a danger of a serious accident resulting from a failure or a defect in this unit, provide the unit with an appropriate external protective circuit to prevent an accident.

 The unit is normally supplied without a power switch and fuses.

 Make wings on that the fuse is placed between the main power supply switch and this controller. (Main power supply: 2 pole breaker, fuse rating; 250V, 1A)

 A witch for a circuit-breaker) must be included in the installation.

 A witch for a circuit-breaker) must be suitably focated and easily reached.

 A switch for a circuit-breaker must be suitably focated and easily reached.

 Supply wrings shall be prepared by installers in accordance with national regulations.

 When wring the power supply terminal, use vinyl insulated 600 volt cable or equivalent.

 To avoid the damage and failure of controller, supply the prover voltage fifting to the rating.

 To avoid an electric shock and controller failure, do not turn ON the power before all wiring is completed.

- completed.

 Be sure to check that the distance is kept to avoid electric shock or firing before turning the power ON.
- Keep away from terminals while the circuit is energized in order to avoid an electric shock and a malfunction.

Outline dimensions

1.2	Mainte	nance p	recauti	ons			
_		44.4			 		

- Be sure to turn off the power before this controller is installed or removed in order to avoid an electric shock, malfunction, and fault.

- Regular maintenance is recommended a longer service life of this controller. Some parts of this controller have a limited life span, or they will be deterio-rated with the lapse of time.

- One-year warranty is guaranteed for this unit including accessories, provided that the controller is properly used.

Never attempt to disassemble, fabricate, modify, or repair this unit because tampering with the unit may result in a malfunction, electric shock, or a fire.
 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.

2. ACaution 2.1 Cautions on installation

- wold the following places for installation.
 a place where the ambient temperature may reach beyond the range of from 0 to 50°C while in
- operation.
 a place where the ambient humidity may reach beyond the range of from 45 to 85% RH while in operation.
 a place where a change in the ambient temperature is so rapid as to cause condensation.
 a place where corrosive gases (sulfide gas and ammonia gas, in particular) or combustible gases are

- emitted.

 a place where the unit is subject directly to vibration or shock.
 (Vibration or shock may cause output relay malfunction.)

 a place exposed to water, oil, chemicals, steam and vapor.
 (If immersed with water, take the inspection by sales office to avoid an electr-ical leakage and firing)

 a place where the unit is exposed to dust, salt air, or air containing iron par-ficles.

 a place where the unit is subject to intereference with static electricity, mag-netism, and noise.

 a place where the unit is exposed to direct salt untight.

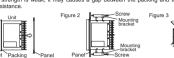
 a place where the unit is exposed to direct suntight.

- 2.2 Caution on installation on panel
- 2.2 Caultion on installation on panel
 -insert the mounting bracket (accessory) from the rear side until the main unit is securely fit into the
 panel. If there are some gaps, tighten two screws until the gaps are eliminated. (Do not tighten the
 screws excessively because the mounting bracket can be removed from the stopper by the force.)
 The front side of this controller conforms to NEMAX (equivalent with IP66). To ensure the
 atterpronfess between the instrument and the panel, use packings that are provided as
 accessories in the following manner: (The improper fitting of packings will ruin the waterpronfess.)
 O As shown in Figure 1, fit a packing to the case of the unit and then insert it in the panel.
 Tighten screws on the fixing frame or fixtures so that no gaps are given between the front of
 controller and packing and between panels. Check that there are no deformation of packing as
 shown in Fig.3.
 If panel strength is weak, it may causes a gap between the packing and the panel, thus impairing
 water resistance.

Note) Panel coating procedure must be taken into account, for the panel cutout

an instrument of more than 70mm depth or a wall on the right side of the

Side-by-side installation may sacrifice the controller's waterproof property.



dimension should still conform with the dimensions listed

Three-year warranty does not cover in case of side by side installation Caution on wiring

• Terminals at the left hand side (from No.1 to 6) should be used first

4. Terminal Connection Diagram

Alarm output

Alarm output1 (AL1) -



Control output1 (OUT1) Relay output SSR drive output

(Good)

2.3 Precautions in wiring connection

- For the thermocouple sensor type, use thermocouple compensation wires for wiring.

 For the RTD type, use a wiring material with a small lead wire resistance and no resistance.
- ntials among three wires. rpput lines away from power line and load line to avoid the influence from noise induced. input and output signal lines, be sure to use shielded wires and keep them away from each
- For the input and output signal lines, be sure to use shielded wires and keep them away from each other.

 If a noise level is excessive in the power supply, the additional installation of an insulating transformer and the use of a noise filter are recommended.

 Make sure that the noise filter is installed to a place such as a panel that is properly grounded. The wing between the noise filter output terminal and the instrument power supply terminal should be made as short as possible. None of fuses or switches should be installed to the wiring on the noise filter output side because the filter effect will be degraded by such a installation.

 A better anti-noise effect can be expected by using stranded power supply cable for the instrument. (The shorter the stranding pitch is, the better the nati-noise effect can be expected.)

 A setup time is required for the contact output when the power is turned on. If the contact output is used as a signal for an external interlock circuit, use a delay relay at the same time.

 Use the auxiliary relay since the life is shortened if full capacity load is connected to the output relay. SSR drive output type is preferred if the output operations cour frequently. [Proportional interval] relay output 30 seconds or more,

 SSR consecond or more,

 SSR c

Varistor voltage Voltage 100V 240V 200V 470V

Where to install: Connect it between contacts of the relay control output



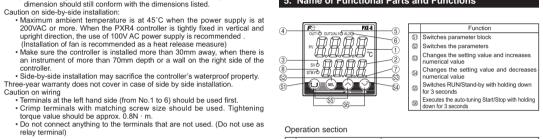
2.4 Requirement for key operation/operation in abnormalities

Prior to the operation, be sure to check alarm functions, since a failure in the proper setting will result in a failure in the proper output of an alarm in case of an abnormality.
 A display of UUUI or LLLL will appear in case of a break in the input. Be sure to turn off the power

2.5 Others

Do not use organic solvents such as alcohol and benzine to wipe this controller. Use a neutral detergent for wiping the controller.

5. Name of Functional Parts and Functions

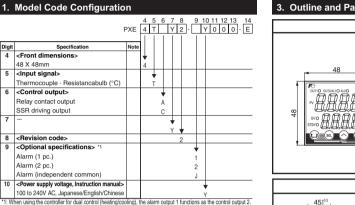


Operation section

	Name	Function
1	Process value (PV)	Displays a process value (PV) or the parameter symbols.
2	Setting value (SV)	Displays a set value (SV) or a parameter set value.
3	SV lamp	Lamp is lit when a set value is displayed at lower line.
4	Control output 1 (OUT 1) lamp	Lamp lights up during the control output 1 is ON.
(5)	Alarm output 1 (AL 1) lamp or Control output 2 (OUT 2) lamp (note 2)	Each lamp lights up during the corresponding output is ON.
6	Alarm 2 lamp	Lamp OFF while alarm is OFF.
7	Auto-tuning lamp	Lamp is brink during auto-tuning Lamp is OFF while control is being operated. Note 1
8	Standby lamp	Lamp is lit while control is standby (or stop) Lamp is OFF while control is being operated.
Note	e1) Alarm 2 function is optional	

Note2) When using the controller for dual control (heating/cooling), the alarm output 1 function as the control output 2.

3. Outline and Panel Cutout Dimensions



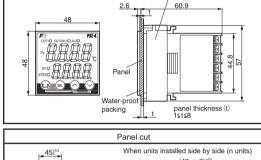
100 to 240V AC, Japanese/English/Chinese

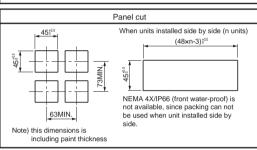
Input signal, measurement range, and set value at the time of deliver are as follows. Thermocouple K, Measurement range; 0 to 400°C, Set value; 0C input signal of the thermocouple and the resistance bulb can be switched by key operation on the front panel.

2. Scope of Delivery

Temperature controller1 unit Mounting bracket1 pcs Instruction manual1 copy Watertight packing1 pcs

*: Additionally, refer to the operation manual. Operation manual is available for download from Fuji's home page (http://www.fujielectric.co.jp/products/instruments/)



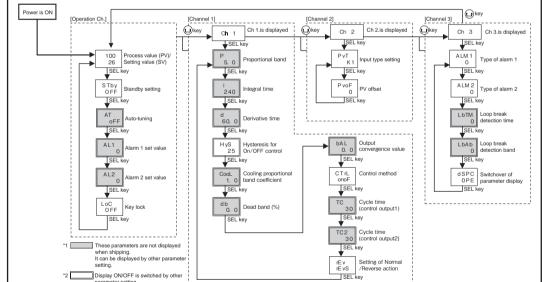


Control output 2 (OUT 2) (Note2) 2 τ_®= Alarm output2 (AL2) < 2 6 **8**→ 3 9 Common 4 10 asured value input Alarm output (independent common) (11) Alarm output1 (AL1) < 1 € ° (10) A 6 (12) (I)B Control output 2 (OUT 2) (Note2) Alarm output1 (AL1) <----2 ower supply ₁₂B or Control output 2 (OUT 2) Common : Check the power supply voltag before installation. : When using the controller for dual control (heating/cooling), the alarm output 1 functions as the control output 2. Alarm output2 (AL2) -3

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6. Operation Flow Diagram

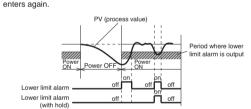


7. List of Alarm Type

Type Alarm № Alarm type		Alarm type	Action diagram			
	0	No alarm	→ PV			
	1	Upper limit	ALn PV			
Absolute value	2	Lower limit	ALn PV			
alarm	3	Upper limit (with hold)	ALn PV			
	4	Lower limit (with hold)	ALn PV			
	5	Upper limit	ALn SV			
	6	Lower limit	ALn SV			
Deviation	7	Upper/Lower limit	ALn ALn SV			
alarm	8	Upper limit (with hold)	ALn SV			
	9	Lower limit (with hold)	ALn SV			
	10	Upper/Lower limit (with hold)	ALn ALn SV			
Zone 11		Upper/Lower limit	ALn ALn SV			
Break	12	Loop break alarm				

Point What is alarm with hold?

The alarm is not turned ON immediately even when the process value is in the alarm band. It turns ON when it goes out the alarm band and



Note) • When alarm action type code is changed, alarm set value may

Please check these parameters, turn off the power once, and

then re-start the controller, before starting control.

8. List of Setting Parameter

Operation parameter						
	Parameter display symbol	Parameter	Description of contents	Default setting	Note	
1	-	PV/SV display	Process value and setting value	-		
2	SLPA	Standby settings	Changeover between RUN and Standby. On: control standby (control output and alarm output: OFF) oFF: control RUN (control output and alarm output: ON)	OFF		
3	Ar	Auto-tuning	Start/stop of auto-tuning. oFF: stop on: normal auto-tuning L-on: low PV auto-tuning	OFF	а	
4	AL I	Alarm 1 set value	Trigger point for the alarm 1. Used to configure the alarm 1 in combination with the "Alarm type". Setting is available within the input range.	2.5% of range	i, e	
5	AL 2	Alarm 2 set value	Trigger point for the alarm 2. Used to configure the alarm 2 in combination with the "Alarm type". Setting is available within the input range.	2.5% of range	b, e	
6	LοC	Key lock	Restriction on parameter change OFF: all parameters can be changed ALL: all parameters are locked. Changeover between AT and standby by using the block key and the up/down key is also invalid. PA/A: only SV can be changed. Changeover between AT and standby by using the block key and the up/down key is also invalid.	OFF		

Cha	annel 1 param	eter			
	Parameter display symbol	Parameter	Description of contents	Default setting	Note
7	Ρ	Proportional band	Setting range: 0.1 to 999.9%	5.0%	а
8	-	Integral time	Setting range: 0 to 3200 seconds	240 seconds	а
9	В	Derivative time	Setting range: 0.0 to 999.9 seconds	60.0 seconds	а
10	HYS	Hysteresis for ON/OFF control	Setting range: 0.00 to 50.00%FS	2.5% of range	С
11	Cool	Cooling proportional band coefficient	Setting range: 0.0 to 100.0	1.0	j
12	dЬ	Dead band	Offset of the cooling proportional band against the set value (Setting range: -50.0 to 50.0%)	0.0%	k
13	ЬЯL	Output convergence value	Offset added to the MV output (Setting range: -100.0 to 100.0%)	0.0%	а
14	EFFL	Control method	onoF: ON/OFF control Pid: normal PID control FUZY: fuzzy control 2FrE: 2-degrees PID control"	onoF	
15	۲۲	OUT 1 proportional control cycle	Setting range: 1 to 150 seconds	Relay: 30 s SSR: 2 s	а
16	rce	OUT 2 proportional control cycle	Setting range: 1 to 150 seconds	30 seconds	j
17	rEū	Normal/reverse action	Define the control action. revS: reverse action (single control) noML: normal action (single control) rvno: reverse on heating side, normal on cooling side (dual	revS	

Channel 2 parameter

	display symbol	Parameter	Description of contents	Delauit setting	Note
18	Pür	Input type	Input type	K1	h
19	PüoF	PV offset	Setting range: -10.00 to 10.00%FS	0.00% of range	
01	1.0	- 1			\equiv
Cha	annel 3 param	eter			
	Parameter display symbol	Parameter	Description of contents	Default setting	Note
20	ALN I	Alarm type 1	Alarm action of the alarm 1. (Setting range: 0 to 12)	5	g,l
21	ALN2	Alarm type 2	Alarm action of the alarm 2. (Setting range: 0 to 12)	1 alarm : 0 2 alarms: 9	g
22	LPLU	Open loop detection time	Time until the loop is assumed to be open. (Setting range: 0 to 9999 seconds)	0 seconds	d
23	LBRB	Open loop detection band	Temperature range by which the loop is assumed to be open. (Setting range: 0.00 to 100.00%FS)	2.50% of range	d
24	dSPC	Changeover of parameter display	A set of parameters to be displayed on the controller. Refer to the operation manual for the detail. oPE: operator level ENG: engineer level	oPE (The controller always starts in oPE.)	f

- ENG: engineer level
 - Appears when the control method (CTrL) is PID, FUZY, or 2FER.

 Does not appear when the alarm type 2 (ALM2) is "0".

 Appears when the control method (CTrL) is "onoF".

 Appears when the alarm type 1 (ALM1) and/or the alarm type2 (ALM2) is set to "12" (loop break alarm).
- Setting range: 0 to 100%FS (absolute value alarm), –100 to 100%FS (deviation
- Setting range: 0 to 100%FS (absolute value alarm), -100 to 100%FS (deviation alarm).

 Returns to the operator level every time the power is turned off.

 Refer to '7. List of alarm type'.

 Refer to '10. Measuring input signal'.

 Does not appear when the alarm type 1 (ALM1) is '0' or the normal/reverse action (rEv) is "rvno" (dual control) and the control method (CTrL) is PID, FUZY, or 2FER.

 Appears when the normal/reverse action (rEv) is "rvno" (dual control).

 Does not appear when the normal/reverse action (rEv) is "rvno" (dual control).

9. Error Indications

This controller has a display function to indicate several types of error code shown below. If any of the error codes 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

Error code	Possible cause	Control output
UUUU	① Thermocouple burnt out. ② RTD (A) line burnt out. ③ PV value exceeds P-SU by 5% FS.	OFF
LLLL	① The RTD line (B or C) burnt out. ② The RTD line (between A and B or A and C) short. ③ PV value is below P-SL by 5% FS.	
LLLL	① PV value < -199.9 Note) In case of RTD input, "LLLL" is not displayed even if the temperature becomes below -150 C.	Control is continued until the value reaches –5% FS or less, after turn OFF.
Err (SV indication flickers)	Incorrect range setting (Pvb/PvF).	OFF

also become different from previous settings.

· ALn means alarm set value (AL1, AL2)

10. Measuring Input Signal JPt100 RTD (IEC)

	Pt100	PT2	-199.9	to	500.0	[°C]
	J	J1	0	to	800	[°C]
		J2	0.0	to	400.0	[°C]
		K1	0	to	400	[°C]
	K	K2	-200	to	1200	[°C]
		K3	0.0	to	400.0	[°C]
	Т	T1	-200	to	400	[°C]
Thermocouple		T2	-199.9	to	400.0	[°C]
	R	R	0	to	1600	[°C]
	В	В	0	to	1800	[°C]
	S	S	0	to	1600	[°C]
	E	E	-200	to	800	[°C]
	N	N	0	to	1300	[°C]
	PL- II	PL-2	0	to	1300	[°C]

(±0.5% of process value or 1°C whichever is greater ±1digit±1°C Thermocouple -100°C or less: (±2% of process value) 1digit±1°C

Correct indication is not ensured within a range from 0 to 500°C for R type thermocouple and from 0 to 400°C for B type thermocouple.

11. Specification

Power voltage
Power consumption
Relay contact output
SSR driving output
SSR Tontact 220V AC/30V DC 1A (resistive loadoutput)
SPST contact 220V AC/30V DC 1A (resistive loadoutput) 100 (–15%) to 240V AC (+10%), 50/60Hz 5VA or less (at 100V AC), 6VA or less (at 220V AC) SPST contact 220V AC/30V DC 3A (resistive load) ON: 10.2 to 15V DC 20mA or less OFF: 0.5V DC or less SPST contact 220V AC/30V DC 1A (resistive load) –10 to 60°C 90%RH or less

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