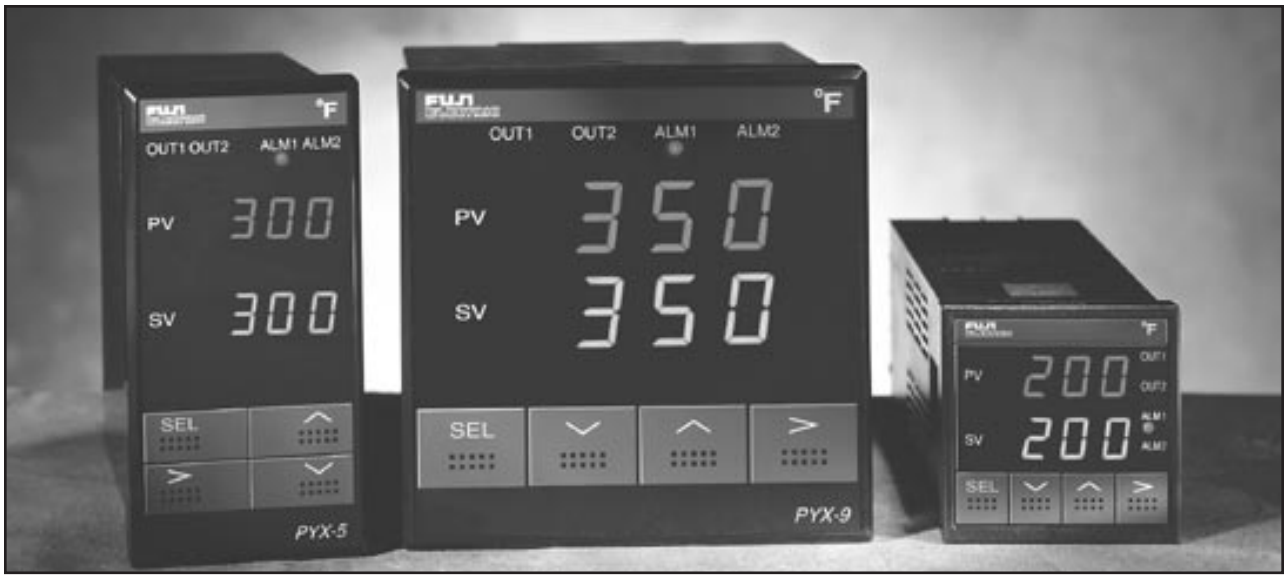


The Fuji PYX series fuzzy logic controllers with free communications software turn your computer into a controller command center.

PYX

Say Goodbye to Overshoot

Fuji Electric PYX series fuzzy logic controllers

EXPERIENCE. You use it constantly to make life's everyday decisions. Wouldn't it be nice if a process controller could use past experience to make decisions that eliminate costly problems like overshoot? Now, there's a controller that can do just that! The Fuji PYX uses a type of artificial intelligence called "fuzzy logic" to learn your system's particular characteristics.

During autotune (a procedure which automatically fine-tunes your controller) and during normal operation, the PYX is studying your system's responses to changing conditions. It remembers how the system responded at start-up and to disturbances (such as opening an oven door). Once it gets to know your process, the PYX actually anticipates the extent of the fluctuation and takes corrective action before a minor deviation becomes a major problem. That means an end to troublesome overshoot—even the minor overshoot associated with PID control. It also means a virtual lock on the target setpoint once it's been reached, without wandering.

The PYX also boasts a host of other indispensible features. Users can input an eight-segment program that leads a process smoothly through a predetermined series of thermal steps. And when it comes to communicating with a computer, the PYX is unsurpassed. Along with the RS-485 communications option, we provide free software that lets you monitor up to 31 controllers at the same time. As with our simple front panel keypad menu, the software can be installed and run easily even by first-time users.

As you can see, the PYX can do a lot of complicated things—but it also can do the simple stuff too, such as PID autotune, display Fahrenheit or Celsius, and control in direct or reverse action modes.

PYX SPECIFICATIONS

GENERAL SPECIFICATIONS

Size (HxWxD): PYX-4—48mm x 48mm x 115mm
PYX-5—96mm x 48mm x 100mm
PYX-9—96mm x 96mm x 100mm
Kinds of input:
Thermocouple: J, K, R, B, T, E, S, N, U, WRe5-26, PL-II
RTD: 3-wire Pt100Ω
DC voltage/current
Input accuracy: ±0.5% FS, ±1 digit (±1°C [TC])
Input sampling cycle: 0.5 sec
Control action: PID or PID w/ fuzzy logic
Control Output:
Relay contact
Voltage pulse output (for SSR drive)
Current output
Alarm output: 2 SPST contacts max (ALM1, ALM2)
Operation mode:
Fixed value operation or manual operation
Options:
Analog retransmission
Communication function: Via RS-485
Programmable alarms: 2 points max
Dual output
Scalable analog remote SV
Heater break alarm: 1 point
Ramp/soak function: 8 ramp/soak segments
Dual setpoint (DI): 1 point
Transmitter power supply: 24V DC
Power source: 100 (-15%)–240 (+10%) AC 50/60Hz

OUTPUT

(1) Control output
Standard type—of the following types, any one should be specified:

Relay contact output	Normally open SPST contact. SPDT contact in PYX-5 and PYX-9.	Electrical expected life: More than 10^5 operations at 220V AC, 3A (resistive load) Mechanical expected life: More than 2 x 10^7 operations
SSR/SSC drive output	Transistor output	ON: 20mA 24V max OFF: 0.5V or less
Current output	4~20mA DC	Allowable load resistance: 600Ω or less. Output ripple: About 0.2% FS

Dual output type—of the following output types, any one should be specified for each of the heating and cooling sides:

Relay contact output	Normally open SPST contact. SPDT contact in PYX-5 and PYX-9.	Electrical expected life: More than 10^5 operations at 220V AC, 3A (resistive load)
SSR/SSC drive output (*)	Transistor output	ON: 20mA 24V max OFF: 0.5V or less
Current output n/a PYX-4	4~20mA DC	Allowable load resistance: 600Ω or less. Output ripple: About 0.2% FS

(*) In case of SSR/SSC drive, the current total output must not exceed 20mA on total of cooling and heating sides.
(2) **Auxiliary analog output** (retransmission option)
Number of output points: 1 point
Output data: Selectable between PV, SV, and MV
Output accuracy: ±0.5% FS
Kind of output: 1–5V DC

INPUT

(1) Process variable input signal

Kind of input		Description
Thermocouple	J K R B T E S N (Nichrosil-Nisil) U WRe5-26 (tungsten rhenium) PL-II (Platinel)	• Cold junction compensation comprised • Burn-out circuit built in
RTD	Pt100	• Burn-out circuit built in • Allowable wiring resistance 10Ω max (per wire)
Voltage input	DC 1~5V DC 0~5V	Input resistance 1 MΩ Min
Current input	DC 4~20 mA	Input resistance 250Ω

Remarks:
1. For 4–20mA DC input specification, a 250Ω resistor is furnished with the controller.
2. The 250Ω resistor is not required for voltage input.
(a) Input accuracy: ±0.5% FS, ±1 digit
Cold junction compensation error: ±1°C.
(b) Input range (reference 2nd table)
(c) Input sampling cycle: 500ms
(d) Burn-out
• The value to be output at occurrence of burn-out is freely settable.
• For resistance bulb input decision is allowed.
(2) Digital Input (option)
Number of input points: 1 pt
Spec: DC 16V, 15mA

Kinds of Input		Code	Temperature range (°C)	Temperature range (°F)	0.1°C display	0.1°F display
RTD	Pt100	00	0 ~ 150°C	32 ~ 302°F	0	0
		01	0 ~ 300°C	32 ~ 527°F	0	0
		02	0 ~ 500°C	32 ~ 932°F	0	0
		03	0 ~ 600°C	32 ~ 1112°F	0	X
		04	-50 ~ 100°C	-58 ~ 212°F	0	0
		05	-100 ~ 200°C	-148 ~ 392°F	0	0
		06	-150 ~ 600°C	-238 ~ 1112°F	0	X
		07	-150 ~ 850°C	-238 ~ 1562°F	X	X
Thermo couple	J	20	0 ~ 400°C	32 ~ 752°F	0	0
	J	21	0 ~ 800°C	32 ~ 1472°F	0	X
	K	22	0 ~ 400°C	32 ~ 752°F	0	0
	K	23	0 ~ 800°C	32 ~ 1472°F	0	X
	K	24	0 ~ 1200°C	32 ~ 2192°F	X	X
	R	25	0 ~ 1600°C	32 ~ 2912°F	X	X
	B	26	0 ~ 1800°C	32 ~ 3272°F	X	X
	T	27	-199.9 ~ 200°C	-328 ~ 392°F	0	X
	T	28	-150 ~ 400°C	-328 ~ 752°F	0	X
	E	29	0 ~ 800°C	32 ~ 1472°F	0	X
	E	2A	-199.9 ~ 800°C	-328 ~ 1472°F	0	X
	S	2B	0 ~ 1600°C	32 ~ 2912vF	X	X
	N	2C	0 ~ 1300°C	32 ~ 2372°F	X	X
	U	2D	-199.9 ~ 400°C	-328 ~ 752°F	0	X
	WRe 5--26	2E	0 ~ 2300°C	32 ~ 4172°F	X	X
	PL-II	2F	0 ~ 1300°C	32 ~ 2372°F	X	X
Voltage	DC1~5V DC0~5V	40 41	Scale set between -1999–9999		O: Enabled X: Disabled	
Current	DC4~ 20 mA	40				

CONTROL FUNCTIONS

(1) Fuzzy control: Fuji's original fuzzy control. (The basic actions in PID control have been realized according to fuzzy control rules.)
(2) PID control with autotuning:
Proportional band (P): 0–999.9%
(2-position action when P=0)
Integral time (I): 0–3,200 sec
(Integral action off when I=0)
Rate time (D): 0–999.9 sec
(Derivative action off when D=0)
(Fuzzy control action or PID action with autotuning is selectable by using the front panel key.)
(3) Proportional cycle time: 1–120 sec
(4) Input sampling cycle time: 0.5 sec

SETTING AND INDICATION

(1) Accuracy: ±0.5% FS, ±1 digit
(2) Setting method: Key operation
(3) Indication method: Numerical display; Each of PV and SV independently displayed (PV: Red, SV: Green)
(4) Status indication:
- Control outputs 1 and 2
- Alarms 1 and 2

ALARM (OPTION)

(1) Upper/lower limit alarm: Desired alarm type is selectable by using the front panel key. Alarm output: 2 points
(2) Heater break alarm*
A break is detectable only when a single-phase heater is used.
Primary input of current detector (CT)**: 1–50 A.
Output: use ALM1 or ALM2 output.

Heater power voltage correcting function is provided.
(This function is effective when the heater and this controller share the same power supply.)
Relay contact output: normally open SPST contact, 220V AC, 3A (resistive load)

* Only available on time proportioned outputs
**Note: The current detector (CT) needs to be ordered separately from this controller. (CT is installed outside the controller.)

Protection from power failure: Set value and all programming parameters, etc. are retained in the non-volatile memory unit.
Self-diagnosis: Program error is monitored with a watchdog timer.

OPERATING AND STORAGE CONDITIONS

(1) Allowable ambient temperature: -10–50°C
(2) Allowable ambient humidity: 90% RH max (free from condensation)
(3) Storage temperature: -20–60°C

RATING

(1) Power supply: 100(-15%)to 240(+10%)V AC
(2) Power consumption: About 10VA, 100V AC
(3) Dielectric strength: 1,500V AC for 1 min between power terminal and input terminal, communication terminal, output terminal, and relay terminal. 500V AC for 1 min (at other locations)
(4) Insulation resistance: 20MΩ Min (at 500V DC)

PYX BENEFITS:

True fuzzy logic control—uses artificial intelligence to learn your system

Auto/manual operation—manual override allows you to take control of the process at any time

PID autotuning—automatically calculates PID control settings for you, thereby optimizing system performance

Inputs—E, J, K, R, T, S, B, PL-II, 0–5V DC, 1–5V DC, 4–20mA, RTD

Outputs—relay, DC voltage pulsed, 4–20mA

Dual display—shows SV and PV simultaneously

Digital filtering—suppresses factory noise

Sensor break protection—protects your process if the input sensor fails

User-selectable temperature scale—allows you to choose either °F or °C indication

ABS case and front panel overlay—stands up to the factory environment

FREE calibration—for the first three years you own your Fuji controller

Three-year warranty—against manufacturing defects

Some of the available options:

Programmable alarms—allows you to customize alarm outputs as absolute, deviation, zone or combination alarms as well as heater break and loop break alarms

RS-485 communications—monitor and control your systems remotely

Analog retransmission—real-time transfer of PV, SV, or MV values

8-segment ramp/soak program—program ramp time and dwell time for four distinct setpoints

Dual setpoint—switch between two setpoints using an external contact

Transmitter power supply—provides a 24V DC supply for loop

STRUCTURE

(1) Mounting method: Panel mount
(2) Enclosure: Plastic housing
(3) External dimensions:
PYX-4: 48mm (H) x 48mm (W) x 115mm (D)
PYX-5: 96mm (H) x 48mm (W) x 100mm (D)
PYX-9: 96mm (H) x 96mm (W) x 100mm (D)
(4) Approx. Weight:
PYX-4: 175g
PYX-5: 300g
PYX-9: 400g
(5) Finish color: munsell N1.5 (black)
(6) External terminal: Screw terminal M3.5

DELIVERY

Most items available from stock

8-Segment Ramp/Soak Saves You Money

THE PYX SAVES YOU MONEY by eliminating the need for expensive programmable controllers with too many segments and too much memory. An eight-segment programming option allows you to select four setpoints, four ramp rates, and four soak periods. The PYX gives you flexibility for precise control of any application that uses a limited number of ramp/soak cycles.

RS-485 Communications–

Keep in touch with your process

The RS-485 communications option on the Fuji PYX controllers comes with two, FREE, easy-to-install software programs—one to set up individual controllers and one to supervise all controllers on the RS-485 loop.

The Set-Up program selects the station number of the controller being polled and displays only those control parameters that are available in that controller. These parameters can then be changed to suit the user. The Supervisory program, with up to 31 controllers on one screen, displays station number, PV, SV, and alarm condition. At a glance, the user can check the condition of each controller on the loop.

These programs appear in full color and run in MS-DOS and Windows™ environments.

PYX MODEL CONFIGURATION

1	2	3	4	5	6	7	8		9	10	11	12	13
P	Y	X	□	M	□	□	1	–	□	□	□	□	□

4
5
9

FRONT PANEL SIZE (W X H) mm	CODE
48 X 48	4
48 X 96	5
96 X 96	9

KINDS OF INPUT	CODE
TC/RTD/voltage/current input	M

CONTROL OUTPUT 1	CODE
Relay (reverse action)	A
Relay (direct action)	B
SSR drive (reverse action)	C
SSR drive (direct action)	D
4–20mA DC (reverse action)	E
4–20mA DC (direct action)	F

CONTROL OUTPUT 2	CODE
Without	Y
Relay (reverse action)	A
Relay (direct action)	B
SSR drive (reverse action)	C
SSR drive (direct action)	D
4–20mA DC (reverse action)*	E
4–20mA DC (direct action)*	F

* only on PYX-5 and PYX-9

ALARM FUNCTION CODE	
Without	0
1 point (1 SPST contact)	1
2 points (2 SPST contacts)	2
HB detection	3
HB detection + 1 point	4

INPUT RANGE CODE	CODE
See input specification table	

ADDITIONAL FUNCTION	CODE
Without	Y
Dual setpoints (DI)	P
Ramp/soak 8 segments	Q
RS-485*	R
RS-485* + 8 ramp/soak	S
Re-transmission	A
Re-transmission + 8 ramp/soak	B
Remote SV	C
Transmitter power supply	T

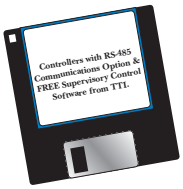
* Requires RS-485 to RS-232 converter, Part No. RSFC24 recommended

FRONT PANEL LABEL	CODE
°C	C
°F	F
Engineering units	E

PYX X-tras

FREE Software

The Fuji PYX series is available with an RS-485 communications option. When you buy this option, you get FREE software that enables you to run 31 controllers per port from your IBM-compatible computer. Two programs are available: **The Supervisory Program** allows you to monitor all of your controllers and **The Set-Up Program** allows you to program individual controllers. This software has been designed with the novice user in mind. It's easy to operate and install using a simple diskette and standard twisted-shielded pair type wiring. The source code for this software is provided which allows you to rewrite your system easily and inexpensively.

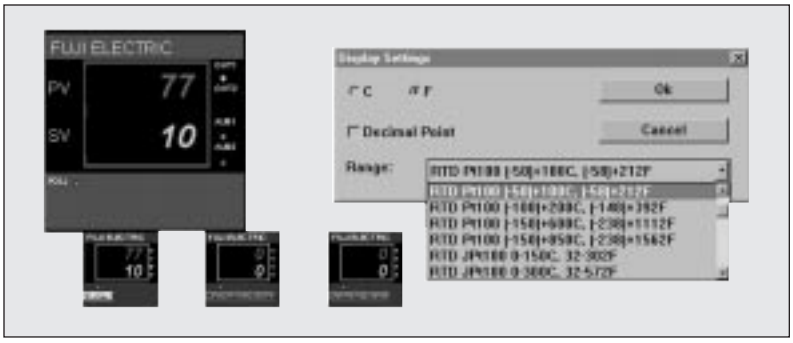


If you've been considering automating your plant but don't want to spend a fortune on distributed control software, this is an ideal solution.

NEW!

PYX-LITE Data Logging Software

- Introducing PYX-LITE, an inexpensive Windows™-based software package for PYX controllers. It operates in Windows 3.1, Windows 95, and Windows NT environments.
- PYX-LITE supports Windows DDE (Dynamic Data Exchange) and provides data logging output in an easy to use comma-delimited format. PYX-LITE offers on-line help, easy set-up, and is user friendly.
- It supports up to 31 PYX controllers from a single workstation and is capable of displaying all 31 controllers simultaneously.
- PYX-LITE offers both Supervisory Mode for viewing the entire network at a glance, and Single Station Master Mode for viewing all parameters for one controller on a single screen.



- It is perfect for applications which require a "clean room" or any application where access to equipment is limited. It allows personnel to set-up, monitor, and control the entire PYX network from a single workstation on only two wires (RS-485 communication).

FREE Calibration

Along with your 3-year warranty, you'll get three years of FREE calibration on every Fuji controller you buy. Calibrating your controllers gives you greater accuracy in your process for precise control. We sell products we know about, believe in, and stand behind. Once you see our commitment to quality service, you'll be a customer of ours for years to come.