



The fast 100ms sampling rate makes the PYH perfect for controlling rapidly changing processes like pressure and flow.

PERFECT Perfect for Controlling Process as well as Temperature *The Fuji Electric PYH series high performance controller*

THIS ONE'S FAST. To keep up with the applications it was designed to control, it's got to be. While most temperature control systems can be maintained sufficiently with the twice-per-second sampling rate found in other controllers, the PYH reads the process variable ten times per second and makes control decisions at the same rate. That's what makes this controller well-suited to control pressure, flow rates, and temperature of low mass systems like a single metal filament. With a fast sampling rate and full PID control, the PYH minimizes overshoot and oscillation around the setpoint which normally would occur before most controllers would detect them.

The PYH can also handle slower responding processes and offers autotuning capability to optimize control parameters. For remote operation and factory automation, up to 31 separate controllers can be monitored at the same time. Setpoint and other control values can easily be reset at your command with free custom software.

The PYH offers another unique feature called position feedback. This capability lets you know and control the exact position of a valve at any time. To initiate position feedback, the operator simply indicates two valve positions—fully open and fully closed. The controller does the rest, keeping track of the valve position at all times. Knowing the precise position of the valve is critical in boosting system performance and avoiding motor burnout where a controller without position feedback might try to open or close a valve that's already reached its limit.

PYH SPECIFICATIONS

INPUT

Thermocouple:

J, K, R, B, S, T, E, PR40/20, Tungsten. (Programmable upscale, downscale, hold)

Lead wire effect: 0.5 μ V/ Ω

Lead wire resistance: 10 Ω max

RTD: Pt100 IEC, Pt100 JIS, RTD break protection

(Programmable upscale, downscale, hold)

Lead wire resistance: 10 Ω max

Current/voltage:

4–20mA DC, 1–5V DC, 0–10mV DC, 0–50mV DC

Lead wire resistance: 10 Ω max

SUB-CONTROL (ALARMS)

Setting type: Deviation and absolute value.

Alarm type: High, Low, Low with hold on start-up, High/Low, High/Low with hold on start-up.

Output: 2 SPDT relays: 1A, 220V AC resistive load.

Heater Break Alarm: Optional

Input: 1–30A or 20–50A 50/60Hz for current sensing transformer.

Output: Relay: 1A, 220V AC, SPST (resistive load).

Setting: Voltage and current trip point (programmable).

Fault alarm: LLLL: Under-range condition

UUUU: Over-range condition

EEPROM: Error

INPUT RANGE

Thermocouple:	Maximum range:	Minimum span:
J:	0 – 1000°C (32 – 1832°F)	400°C (720°F)
K:	0 – 1200°C (32 – 2192°F)	400°C (720°F)
R:	0 – 1600°C (32 – 2912°F)	1000°C (1800°F)
B:	0 – 1800°C (32 – 3272°F)	1500°C (2700°F)
S:	0 – 1600°C (32 – 2912°F)	1000°C (1800°F)
T:	-200 – 400°C (-328 – 752°F)	400°C (720°F)
E:	0 – 800°C (32 – 1472°F)	400°C (720°F)
PR40/20:	0 – 1800°C (32 – 3272°F)	1800°C (3240°F)
Tungsten:	0 – 2400°C (32 – 4352°F)	2400°C (4320°F)
RTD:	Maximum range:	Minimum span:
IEC:	-150 – 400°C (-238 – 752°F)	50°C (90°F)
JIS:	-150 – 400°C (-238 – 752°F)	50°C (90°F)
4–20mA DC:	-999–9999 Engineering Units	
1–5V DC:	-999–9999 Engineering Units	
0–10mV DC:	-999–9999 Engineering Units	
0–50mV DC:	-999–9999 Engineering Units	

CONTROL

Control Mode Output 1:

Proportional band: 0–3276% FS (autotunable)

Integral time: 0.1–3276 sec (autotunable)

Derivative time: 0–900 sec (autotunable)

Cycle time: 1–255 sec (for relay and voltage pulse)

Anti-reset: 0–FS (programmable High/Low)

Non-linear gain: 0.0–327.7% (programmable)

Hysteresis: 0.0–100.0% FS (programmable)

Control Mode Output 2:

Proportional band: 0–3276% FS (autotunable)

Integral time: 0.1–3276 sec (autotunable)

Derivative time: 0–900 sec (autotunable)

Cycle time: 1–255 sec (relay, 10–27V DC)

Dead band/Overlap: -50.0 – +50.0% (control output FS)

Manual control:

Manual mode: Local: A/M key on the front panel.

Remote: digital input

Manual setting: -25–125% control output

OUTPUT 1

Relay:

3A at 220V AC, SPDT (resistive load)

Electrical life: 10⁵ operations.

Mechanical life: 10⁷ operations.

Voltage (Pulsed):

10–27V DC (DC drive for SSR)

ON: 10–27V DC typical, 20mA DC max

OFF: 0.5V DC max

Current:

Linear 4–20mA DC resistive load

Impedance: 600 Ω or less

Ripple effect: 1.5% FS/2Hz with power supply

Transmitter supply: for inverter control (PYH9 only)

Position Feedback:

3A, 220V AC SPST (two relays)

Electrical life: 10⁵ operations

Mechanical life: 10⁷ operations

Dead band between relays (programmable)

Output 2: Optional

Same choices as Output 1, except if position feedback output is chosen for Output 1.

INDICATION

Main displays: Process (PV), Setpoint (SV),

% Output (MV) PV is displayed on the top by a red, 4-digit, 7-segment LED.

SV or MV are displayed on the bottom, one at a time, by a green, 4-digit, 7-segment LED.

Status Indicators: Control outputs, alarm outputs, heater break alarm, fault alarm, auto/manual, remote setpoint. (Programmable to indicate status of other alarm conditions.)

Span of Display:

Thermocouple: Temperature range (programmable)

RTD: Temperature range (programmable)

DC: -999–9999 units (programmable)

Display over-range: 25% of range

Display under-range: 12.5% of range

Setting: Tactile dome keys on front panel.

Continuous selection forward and backward.

Setting range is programmable within span of display.



PYH SPECIFICATIONS

AUXILIARY INPUT

Remote setpoint (optional): 1–5V DC

Input resistance: 1M Ω or greater

Selectable setpoint (optional): PYH9—up to 7 setpoint settings, PYH5—up to 3 setpoint settings

Remote auto/manual: Digital switching

Valve Position Potentiometer: For position feedback control
100–1000 Ω 3-wire potentiometer. Zero and span adjustment programmable.

OPTIONS

Digital outputs: Optional alarms

Setting type: Deviation and absolute value

Alarm type: High, Low, High/High, Low/Low, change in PV, change in MV.

Output type: PYH9 up to three 1A, 30V DC relays.

PYH5 one 1A, 30V DC relay (open collector).

Auxiliary output (analog retransmission): Optional

Retransmission of PV, SV, or MV

Output signal: Linear 1–5V DC

Impedance: 500K Ω or more

Communications: Optional

Interface: RS-485

System: Half duplex

Synchronizing: Start-stop

Data length: 8 bits

Parity: None, odd or even (programmable)

Stop Bit: 1 or 2 bits (programmable)

Baud rate: 9600 or 19200 (programmable)

Distance: 1km max.

Address: 31 addressable units max

PERFORMANCE

Indicating accuracy: $\pm 0.2\%$ FS ± 1 digit

Remote setting accuracy: $\pm 0.2\%$ FS ± 1 digit

Temperature stability: 5 μ V/ $^{\circ}$ C

Repeatability: .83 $^{\circ}$ C

Sampling time: 0.1–3276 sec (programmable)

OTHER

Memory: Non-volatile (EEPROM)

Diagnostics: Monitored by watchdog timer

Mounting: Panel mount

Enclosure: Black ABS plastic

Termination: Compression type terminal (IEC IP00)

Front panel: Lexan drip and dust proof plastic (IEC IP55)

Power supply: 85–264V AC

Transmitter Power supply for inverter control

Power consumption: 15 Watts at 110V AC or 30 Watts at 220V AC

Dielectric strength: Input: 500V AC

Power Supply: 1500V AC

Insulation resistance: 20M Ω or more at 500V AC

Noise rejection: Common mode: 100db typical

Normal mode: 50db typical

Ambient temperature: -10–50 $^{\circ}$ C

Storage temperature: -10–70 $^{\circ}$ C

Ambient humidity: 0–90% relative humidity (non-condensing).

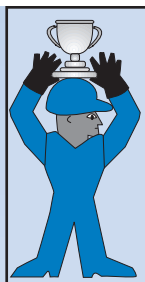
PYH PRIMARY MENU PROGRAMMING

Parameter	Meaning	Description
REM	Remote setpoint (analog)	Setting: 0—Remote setpoint disabled 1—Remote setpoint enabled
SCE	Host communications	Setting: 0—Host communication disabled 1—Host communication enabled
LOC	Lock-out	Setting: 00—All data is selectable 01—All data is locked-out 02—All data except setpoint is locked out
AL1	Alarm setpoint 1	Settable within input range
AL2	Alarm setpoint 2	Settable within input range
HBA	Heater break alarm current setpoint	Setting range: 0–50A. Not indicated without heater break alarm option
SV1 to SV7	Remote setpoints (digital)	Activated by digital switching. PYH9: Up to 7 setpoints PYH5: Up to 3 setpoints Setting: 0–100% FS Not indicated without the selectable setpoint option
AT	Autotuning	Selects optimal PID parameters (reverse or direct) Setting: 00—Autotuning disabled 01—Autotuning enabled
P	Proportional band	Setting range: 0.0–3276% FS for on/off control set to 0
PC	Proportional band for control output 2	Setting range: 0.0–3276% FS not indicated without the control output 2 option. For on/off control set to 0
I	Integral time or “reset”	Setting range: 0.1–3276 sec
D	Derivative time or “rate”	Setting range: 0.0–900 sec Derivative action is off when set to 0.
GAP	Hysteresis	Setting range: 0.0–100% FS
PGP	Position feedback dead band	Setting range: 0.0–100% FS not indicated without the position feedback option
DB	Control Output 2 dead band/overlap	Setting range: -50–50% FS of control output not indicated without the control output 2 option
PAS	Pass code key	Code to allow passage to system programming sub-menus. Setting range: 0000–FFFF hexadecimal
PSS	Pass code setting	Pass code key must match pass code setting to enter system programming sub-menus. Setting range: 0000–FFFF hexadecimal.

PYH SECONDARY MENU PROGRAMMING

Parameter	Meaning	Description
Secondary Alarm and Range Limits Sub-Menu		
SH	Setpoint High Limit	Setting range: -25.0–125.0% FS
SL	Setpoint Low Limit	Setting range: -25.0–125.0% FS
MH	% Output High Limit	Setting range: -25.0–125.0%
ML	% Output Low Limit	Setting range: -25.0–125.0%
Operation Changes Sub-Menu		
TF	Digital filter for input signal	Setting range: 0.0–900 sec
KNL	Non-linear Gain or “reset”	Setting range: 0.0–327.7%
CUT	Square root cut point or “extractor”	Selects a starting point when controlling flow. Setting range: -25–125% FS
DT	Sampling rate	Setting range: 0.1–3276 sec
REV	Control action	Setting: 00—Reverse acting 01—Direct acting
ARH	Anti-reset High Limit	Setting range: 0–125% FS
ARL	Anti-reset Low Limit	Setting range: 0–125% FS
EXM	Remote Manual Output Setting	Setting range: -25–125% of control output
C1	Cycle time Control Output 1	Setting range: 1–255 sec
C2	Cycle Time Control Output 2	Setting range: 1–255 sec
System Changes Sub-menu		
PVF	Input range full-scale limit	Setting range: -999–9999 Engineering Units
PVB	Input range base scale limit	Setting range: -999–9999 Engineering Units
PVD	Decimal point position	Setting: 00—Integers 01—Tenths of a degree 02—Hundredths of a degree 03—Thousandths of a degree
PVT	Input type	Setting: Thermocouple and RTD Model Current and Voltage Model
PVU	Input type scale	Setting: 00—°C 01—°F 02—Other
SFT	Input shift	Settings range: -50–50% FS
AOT	Analog output type or “re-transmission”	Setting: 00—Process variable (PV) 01—Setpoint Variable (SV) 02—Control Output Variable (MV)
1TP	Alarm 1	Setting: Choices: Deviation, absolute, and combination alarm configurations

Parameter	Meaning	Description
System Changes Sub-menu (Continued)		
2TP	Alarm 2	Setting: Choices: Deviation, absolute, and combination alarm configurations
1HS	Alarm 1 hysteresis	Setting range: 0–100% FS
2HS	Alarm 2 hysteresis	Setting range: 0–100% FS
MIH	Manual inhibitor	Setting: 00—Manual operation enabled 01—Manual operation disabled
CND	Start-up control condition	Setting: 00—Automatic operation 01—Manual operation
BRN	Sensor break protection	Setting: 00—Hold 01—Downscale burnout protection 02—Upscale burnout protection
POT	Position feedback zero and span Adjustments	Setting: 00—No adjustment 01—Zero Point Adjustment 02—Span Point Adjustment
RES	Reset	Setting: 00—No reset 01—Reset: After changing any parameters in the system change sub-menu as well as the other sub-menus
RS-485 Communications Sub-menu		
STN	Station number or “address”	Setting range: 00–FF hexadecimal
SPD	Transmission Speed	Setting: 03—9600 baud rate 04—19200 baud rate
BIT	Bit format	Setting: 01—No parity, 1 stop bit 02—No parity, 2 stop bits 11—Odd parity, 1 stop bit 12—Odd parity, 2 stop bits 21—Even parity, 1 stop bit 22—Even parity, 2 stop bits
Output Configuration Sub-menu		
DO1 to DO3	Digital output setting: Alarm Types	Choices: Deviation, absolute, and delta alarm configurations. Only operable on models including digital outputs
Autotuning Sub-menu		
SVM	Autotune mode	Setting: 00—Standard, tune at SV 01—Low PV, tune at SV -10% FS
STM	Autotune start-up mode	Setting: 00—Does not autotune on start-up 01—Autotune on start-up



PYH BENEFITS:

100ms sampling rate—handles fast responding processes like flow and pressure

Dual display—shows PV and SV or MV simultaneously

Offset adjustments—allows you to synchronize several controllers

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—J, K, R, T, S, B, E, 1–5V DC, 0–10mV DC, 0–50mV DC, 4–20mA, RTD

Outputs—relay, DC voltage, 4–20mA, position feedback relay

Password protection—prevent accidental or unauthorized changing of parameters

Fault indication—LEDs identify existing system problems

Digital filtering—suppresses noise on input signal of fast acting systems

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

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

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

FREE technical support—from our team of factory-trained engineers

Three-year warranty—protects against manufacturing defects

Some of the available options:

Position feedback—compatible with systems using a slide wire to indicate valve position

RS-485 communications—allows you to monitor and control your systems remotely

Transmitter power supply—24V DC signal for loop powered devices. Prevents signal corruption when transmitting over a long distance

FREE Software The Fuji PYH 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 PC. This software has been designed with the novice user in mind. It's easy to operate and install using a simple diskette and a standard twisted shielded pair type wiring. The source code for this software is also provided, which allows you to rewrite your system easily and inexpensively.

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

MODEL CONFIGURATION

P Y H ☐ ☐ ☐ ☐ 2 ☐ ☐ ☐ ☐ ☐

PANEL SIZE	CODE
1/8 DIN (96H X 48W X 150D mm)	5
1/4 DIN (96H X 96W X 150D mm)	9

CONTROL FUNCTIONS	
Single output control	A
Single output control with selectable setpoints	B
Inverter Control with selectable setpoints	C
Position feedback control	D
Position feedback control with selectable setpoints	E
Dual output control	F
Dual output control with selectable setpoints	G

CONTROL OUTPUT 1	
Relay: SPDT, 3A at 220V AC	1
Voltage pulse: 10–27V DC for triggering an SSR	2
4–20mA	3
Position feedback output for motor drive valves: two 3 amp relays at 220V AC	4

CONTROL OUTPUT 2, DUAL CONTROL TYPE ONLY	
None	0
Relay: SPDT, 3A at 220V AC	1
Voltage pulse: 10–27V DC for triggering an SSR	2
4–20mA	3

ADDITIONAL SPECIFICATIONS 1	
None	0
With heater break alarm, available on PYH with relay outputs only	1

DIGITAL COMMUNICATIONS FUNCTION	
None	Y
With RS–485*	R

ADDITIONAL SPECIFICATIONS 2	
None	Y
With remote setpoint, not available on PYH with selectable setpoints	A
With retransmission output	B
With remote setpoint and retransmission output, not available on PYH with selectable setpoints	C

INPUT SPECIFICATION	
Thermocouple, RTD, mV	A
4–20mA DC, 1–5V DC	B
4–20mA with transmitter power supply, inverter control only (PYH9 only)	C

DIGITAL OUTPUT	
None	Y
With one digital output	A
With two digital outputs, PYH9 only	B
With three digital outputs, PYH9 only	C

*RS485 to RS232 converter, part no. RSFC24 recommended for direct link to PC

