

The Fuji Electric PHE recorder offers color printing, and low-cost, high-quality inkjet recording.

PHE

**The
Latest
in
low-cost,
inkjet
recording.**

Fuji Electric offers the latest in low-cost inkjet recording with the PHE Inkjet Series Recorder. This 100mm recorder, built with polymer plastic mold technology to make it lightweight and durable, boasts many useful features. The PHE, which is available in one or two channel recording, offers continuous analog trending on the same axis which eliminates the phase shift syndrome exhibited by conventional pen recorders. In addition, it has many digital printing capabilities—periodic data, scale line, alarm condition, burnout, and parameter printing.

Featuring an affordable inkjet print mechanism in a strip chart recorder, the PHE prints crisp, no-smudge characters without physical contact with the paper. This print-head sprays the ink in tiny dots to create a trace in vivid colors for one or two channel continuous recording.

Utilizing a piezoelectric element, the PHE recorder creates stunning reports and print quality for the same price as a pen recorder. In addition, the PHE offers the convenience of refillable inkjet cartridges to keep your maintenance costs to a minimum.

While analog pen recorders have many moving parts and frequently require maintenance and repairs in order to keep them in working condition, the PHE recorders are extremely reliable and will give you years of trouble-free operation because they have a third of the parts of conventional strip chart recorders. If that's not enough, the PHE is backed by a two-year warranty.

So, if you're looking for an economical recorder that offers many of the features found in higher-priced instruments, look no further than the Fuji Electric PHE.

PHE SPECIFICATIONS

INPUT

Input points: 1 or 2 continuous recording

Input signals:

Thermocouple input—B, R, S, K, E, J, T, N, W, L, U, PN

RTD input—Pt 100Ω

DC voltage input—50 mV, 500 mV, 5V, 50V range

DC current input—4 to 20mA, converted into voltage with 10Ω or 250Ω shunt resistor

Max. allowable input voltage:

Thermocouple, RTD and DC voltage (50 mV, 500 mV range)—
±10V DC or less

DC voltage input (5V, 50V range)— ±100V DC or less

Input range: See table below

Burnout function:

When the thermocouple or RTD input is disconnected, the recording is deflected to full scale

Kind		Reference range	Reference range
Thermocouple	B	400 to 1760°C	752 to 3200°F
	R	0 to 1760°C	32 to 3200°F
	S	0 to 1760°C	32 to 3200°F
	K	-200 to 1370°C	-328 to 2498°F
	E	-200 to 800°C	-328 to 1472°F
	J	-200 to 1100°C	-328 to 2012°F
	T	-200 to 400°C	-328 to 752°F
	N	0 to 1300°C	32 to 2372°F
	W	0 to 1760°C	32 to 3200°F
	L	-200 to 900°C	-328 to 1652°F
	U	-200 to 400°C	-328 to 752°F
	PN	0 to 1300°C	32 to 2372°F
RTD	Pt100	-200 to 600°C	-328 to 1112°F
DC voltage		-50 to +50 mV -500 to +500 mV -5 to +5V -50 to +50 V	Scaling is possible within the range of -32767 to +32767 (Decimal points may be placed as necessary)

RECORDING

Recording Method: Inkjet type, 3 colors

Recording Points: 1 or 2 continuous

Chart Paper: Effective width— 100mm, Z-folding type, length—15.08m.

Measuring Cycle: 200msec/point

Recording Cycle: Depends on chart speed, 2 seconds or more.

Recording cycle (seconds) = 400 ÷ chart speed (mm/hour), or 2 seconds, whichever is greater

Recording Accuracy: Indicating accuracy ±0.2%

Recording resolution: 0.1mm

Recording Colors:

- 1 continuous: analog recording— black, digital printing— black
- 2 continuous: channel 1— red, channel 2— blue, digital printing— black

Chart Speed: 10, 20, 24, 30, 50, 120, 200, 300, 400, 1000, 1200, 1500mm/hour, set from the keyboard

Ink life: Depends on operating conditions

1 point: approx. 20 months. 2 points: approx. 12 months

DISPLAY

Display Method: LED (7-segment), 6-digits, green

Display Characters: 7-seg. alphanumeric, 10mm high, 5mm wide

Display Contents:

Channel number: 1 digit

Measured value: 5 digits (including sign)

Temperature— 1 digit below decimal point

Voltage/Current— as per scaling

Time, Hour, Minute:

Status Display: Code indicating alarm, burn-out, carriage failure

Measured value display cycle:

Channel changeover—3 seconds

and/reset channel—1 second

data update in the same channel – 1 second

Operation Keys: 3 keys and one reset key

Keylock: Soft key lock available by key operation

PRINTING

Printing Method: Inkjet

Ink Colors: Black, blue, red, yellow

Periodic Print-out: Printing start line, channel number, measured value, chart speed, lapse from recording start

Note: Printing intervals are automatically determined by chart speed

Scale Print-out: Scale lines for sequential channels are printed alternately with periodic print-outs

Note: Printing intervals are automatically determined by chart speed

Alarm Print-out: At input alarm occurrence and reset, prints channel number, alarm kind, and lapse from recording start

Burn-out Print-out: At burn-out occurrence, prints channel number and lapse from recording start

Other Print-outs: Recording start mark, Chart speed change mark

Following print-outs activated by keying suspends analog recording. At the end of print-out, analog recording is resumed.

Instantaneous Value: Print-out of measured value (instantaneous value and engineering unit, lapse of time, channel number)

Parameter List: Print-out of input signal, input range, recording range, unit, alarm, input filter, chart speed

Scale Print-out: Print-out of scale line of desired channel

Test Pattern: Print-out of color pattern and test characters

ALARMS

Setting Method: Set from keyboard

Number of Settings: Max. 2 points for each channel (H & L types)

Display: On detection, output relay number for each channel is displayed

Print-out: Print-out of channel number, alarm kinds, and time lapse after recording start

Hysteresis Amplitude: About 0.2% of recording span

Alarm Relay Output: See Optional Specifications section

POWER REQUIREMENT

Rated Power Supply Voltage: 100 to 120V AC or 200 to 240V AC

Range of Operating Voltage: 85 to 132V AC or 180 to 264V AC

Supply Frequency: 50/60Hz

Power Consumption: At 100 to 120V AC, 200 to 240V AC

Without options—approx. 13 VA

With options—approx. 15 VA

OPTIONAL SPECIFICATIONS

Alarm Output Relay:

Form A contact output for two points (1 channel) or four points (2 channels)

Outputs are available as individual or common (OR operation)

Contact capacity: 240V AC, 3A; 30V DC, 3A (resistive load)

External Control Input:

With external control input, the following operations are possible
2-stage change-over of chart speed (set by the keypad)

Setting the sub chart speed to 0mm allows recording start/stop change-over

Note: External control unit is not insulated, so an external relay should be used. External contact capacity: 12V DC/0.05A, Form A contact

PERFORMANCE AND CHARACTERISTICS

Input resistance:

Thermocouple, 50 mV range: $\geq 10M\Omega$

500 mV range: $\geq 100K\Omega$

5V and 50V range: $\geq 1M\Omega$

Chart speed accuracy:

$\pm 0.1\%$ (expansion and contraction of paper is not included)

Isolation:

100M Ω (between each terminal and ground, at 500V DC)

Withstand Voltage:

Between two input terminals—500V AC, 1 minute

Power terminal to ground—2000V AC, 1 minute

Input terminal to ground—500V AC, 1 minute

Reference junction compensation accuracy:

K, E, J, T, N, L, U, PN— $\pm 0.5^\circ\text{C}$

R, S, B, W— $\pm 1^\circ\text{C}$

Common mode noise rejection:

120 dB or more at 50/60Hz $\pm 0.1\text{Hz}$

Normal mode noise rejection:

30 dB or more at 50/60Hz $\pm 0.1\text{Hz}$

CONSTRUCTION

Mounting Method: Panel flush mounting, side by side mounting is possible. Inclination angle— 90° to 60° from horizontal

External Dimensions: 144(w) x 144(h) x 175(d)mm

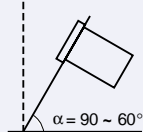
(5.67 x 5.67 x 6.89in.); panel cutout:

137mm x 137 mm (+1.5, -0)

Mass: Approx. 1.2kg (2.64 lbs.)

Case: Plastic mold, color— black

External Terminals: Screw terminals (M4 thread)



NORMAL OPERATING ENVIRONMENT

Temperature limits: 32° to 122°F (0° to 50°C)

Humidity limits:

20 to 80% RH, non-condensing (temperature x humidity < 3200)

Vibration: 10 to 60Hz, 0.2m/s² (0.02g) or less

Mounting position:

Front inclination 0°, rear inclination 30°, left/right inclination 0°

Signal source resistance:

Thermocouple input—1k Ω or less

Voltage input—Less than 0.1% of input resistance

RTD input—Less than 10 Ω per wire (resistance of each wire of 3-wire system should be balanced with others)

Shock: No external shock

EFFECTS OF OPERATING ENVIRONMENT

Input signal source resistance or wiring resistance influence:

Thermocouple—10 μV per 100 Ω

Voltage input—Variation of 0.1% change of resistance

Change in indication— $\pm(0.1\%$ of reference range + 1 digit) max.

Change in recording— $\pm 0.2\%$ of recording span, max.

RTD—Variations of resistance with changes in 10 Ω per wire

Change in indication— $\pm(0.1\%$ of reference range + 1 digit) max.

Change in recording— $\pm 0.2\%$ of recording span, max.

Temperature influence:

Change in indication— $\pm 0.2\%$ of reference range/10°C, max.

Change in recording— $\pm 0.5\%$ of recording span/10°C, max.

Reference junction compensation— $\pm 0.27^\circ\text{C}/10^\circ\text{C}$, max.

Chart paper influence:

Standard temperature/humidity: 20°C, 65% RH

Expansion at 85% RH—0.4% max.

Contraction at 35% RH—0.5% max.

Vibration influence:

Linear vibration with 10-60Hz and 0.02g is applied to each of 3 directions for 2 hours.

Change in indication— $\pm(0.1\%$ of reference range + 1 digit) max.

Change in recording— $\pm 0.2\%$ of recording span, max.

REFERENCE STANDARDS

Safety Standard: IEC 1010-1 (1990)

EMC Standard: EN50081-1 (1992), EN50082-1 (1992)

Dust/drip-proofing: IP50

STANDARD FUNCTIONS

Function	Description	
Skip function	Skips recording, indication or alarm of desired channel	
Listing Function	Instantaneous values list	Prints measured value, unit, lapsed time and channel number
	Parameter list	Prints input signal, scale, recording range, units, alarm, chart speed, etc.
	Test pattern	Prints test characters and color bars
	Scale print-out	Prints scale of desired channel
Periodic print-out function	Prints start time, channel number, measured value, units, chart speed, and lapse of time	
Scale print-out function	Prints scale of channels alternately with periodic print-out	
Alarm print-out function	Prints channel number, alarm kind, and lapse of time at alarm occurrence and reset	
PV shift function	Subjects measured value to summation and subtraction to shift the values displayed or recorded in order to offset the difference in values measured by other instruments	
Input filter	Slows the response to abrupt changes in input signal for each channel (first order lag filter). Time constant range: 0 to 255 sec.	
Burn-out function	In case of thermocouple or RTD open circuiting, recording swings to the maximum value side of range and simultaneously displays and prints the input	