

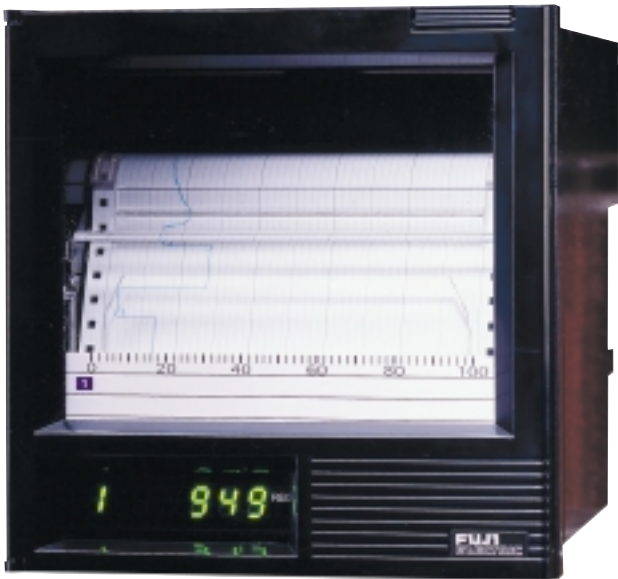
## 1- OR 2-CHANNEL INKJET STRIP-CHART RECORDER

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 printhead 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.

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 three-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.



Fuji Electric is an  
**ISO 9001**  
facility

### FEATURES

- **Inkjet Printing Technology Without Physical Contact with the Paper**

Eliminates mechanical wear and provides crisp, color recordings

- **Low-Cost**

Meets your budgetary demands

- **Available in One- or Two-Channel Continuous Trace**

More capabilities your application demands

- **Continuous Analog Trending on the Same Axis**

Without the phase shift syndrome exhibited by conventional pen recorders

- **Many Digital Printing Capabilities**

Periodic data, scale line, alarm condition, burnout, and parameter printing

- **Built with Polymer Plastic Mold Technology**

The recorder is lightweight and durable

- **The PHE Offers Many of the Features Found in Higher-Priced Instruments**

You get more recorder for your dollar

- **Three-Year Warranty**

Protects you from manufacturing defects

## PHE, CONTINUED

### SPECIFICATIONS

#### GENERAL SPECIFICATIONS

<b>DISPLAY METHOD</b>	LED (7-segment), 6-digits, green
<b>DISPLAY CHARACTERS</b>	7-seg. alphanumeric, 10mm high, 5mm wide
<b>DISPLAY CONTENTS</b>	Channel Number: 1 digit Measured Value: 5 digits (including sign). Temperature: 1 digit below decimal point Voltage/Current: as per scaling Status Display: Code indicating alarm, burn-out, carriage failure Measured Value Display Cycle: Channel changeover – 3 sec. Data update in the same channel – 1 sec.
<b>OPERATION KEYS</b>	3 keys and one reset key Keylock: Soft key lock available by key operation
<b>PRINTING</b>	Printing Method: Inkjet Ink Colors: Black, blue, red Periodic Print-Out: Printing start line, channel number, measured value, chart speed, date/time. Printing intervals are automatically determined by chart speed Scale Print-Out: Scale lines for sequential channels are printed alternately with periodic print-outs. Printing intervals are automatically determined by chart speed Alarm Print-Out: At input alarm occurrence and reset, prints channel number, alarm kind, and date/time. Burn-Out Print-Out: At burn-out occurrence, prints channel number and date/time Other Print-Outs: Recording start mark, Chart speed change mark
<b>KEY-ACTIVATED PRINTING</b>	These print-outs, activated by keying, suspend analog recording. At the end of print-out analog recording is resumed Instantaneous Value: Print-out of measured value (instantaneous value and engineering unit, date/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
<b>POWER REQUIREMENT</b>	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 – approximately 13 VA. With options – approximately 15 VA
<b>OPTIONAL SPECIFICATIONS</b>	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. 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:  $100M\Omega$  (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  $\pm 0.1\text{Hz}$

#### INPUT AND ACCURACY

<b>INPUT POINTS</b>	1 or 2 continuous recording
<b>MAX. ALLOWABLE INPUT VOLTAGE</b>	Thermocouple, RTD and DC voltage: $\pm 10\text{V}$ DC or less (50 mV, 500 mV range) DC voltage input (5V, 50V range): $\pm 100\text{V}$ DC or less
<b>BURNOUT FUNCTION</b>	When the thermocouple or RTD input is disconnected, the recording is deflected to full scale
<b>INPUT RANGE</b>	Thermocouple: B, R, S, K, E, J, T, N, W, I, U, PN RTD: Pt100 $\Omega$ 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) DC current: 4 to 20mA, converted into voltage with $10\Omega$ or $250\Omega$ shunt resistor

#### RECORDING

<b>RECORDING METHOD</b>	Inkjet type, 3 colors
<b>RECORDING POINTS</b>	1 or 2 continuous
<b>CHART PAPER</b>	Effective width – 100mm, Z-folding type, length–15.08m.
<b>MEASURING CYCLE</b>	200msec/point
<b>RECORDING CYCLE</b>	Depends on chart speed, 2 seconds or more. Recording cycle (seconds) = $400 \div \text{chart speed (mm/hour)}$ , or 2 seconds, whichever is greater
<b>RECORDING ACCURACY</b>	Indicating accuracy $\pm 0.2\%$
<b>RECORDING RESOLUTION</b>	0.1mm
<b>RECORDING COLORS</b>	1 Continuous: Analog recording – violet, digital printing – violet 2 Continuous: Channel 1 – red, channel 2 – blue, digital printing – violet
<b>CHART SPEED</b>	10, 20, 24, 30, 50, 120, 200, 300, 400, 1000, 1200, 1500mm/hour, set from the keyboard
<b>INK LIFE</b>	1 Point: Approx. 20 months (Depends on operating conditions) 2 Points: Approx. 12 months (Depends on operating conditions)

#### ALARMS

<b>SETTING METHOD</b>	Set from keyboard
<b>NUMBER OF SETTINGS</b>	Max. 2 points for each channel (H & L types)
<b>DISPLAY</b>	On detection, output relay number for each channel is displayed

## PHE, CONTINUED

### SPECIFICATIONS, CONTINUED

<b>PRINT-OUT</b>	Print-out of channel number, alarm kinds, and time lapse after recording start
<b>HYSTERESIS AMPLITUDE</b>	About 0.2% of recording span
<b>ALARM RELAY OUTPUT</b>	See Optional Specifications section

#### STANDARD FUNCTIONS

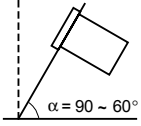
<b>SKIP FUNCTION</b>	Skips recording, indication or alarm of desired channel
<b>LISTING FUNCTION</b>	Instantaneous Values List: Prints measured value, unit, lapsed time and channel number Parameter List: Prints input signal, scale, recording range, units, alarm, chart speed, etc. Test Pattern: Prints test characters and color bars Scale Print-Out: Prints scale of desired channel
<b>PERIODIC PRINT-OUT FUNCTION</b>	Prints start time, channel number, measured value, units, chart speed, and date/time
<b>SCALE PRINT-OUT FUNCTION</b>	Prints scale of channels alternately with periodic print-out
<b>ALARM PRINT-OUT FUNCTION</b>	Prints channel number, alarm kind, and date/time at alarm occurrence and reset
<b>PV SHIFT FUNCTION</b>	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
<b>INPUT FILTER</b>	Slows the response to abrupt changes in input signal for each channel (first order lag filter). Time Constant Range: 0 to 255 sec.
<b>BURN-OUT FUNCTION</b>	In case of thermocouple or RTD open circuiting, recording swings to the maximum value side of range and simultaneously displays and prints the input

#### OPERATING AND STORAGE CONDITIONS

<b>NORMAL OPERATING ENVIRONMENT</b>	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/s <sup>2</sup> (0.02g) or less Mounting Position: Front inclination 0°, rear inclination 30°, left/right inclination 0° Signal Source Resistance: Thermocouple Input: 1k $\Omega$ or less. Voltage Input – Less than 0.1% of input resistance. RTD Input – Less than 10 $\Omega$ per wire (resistance of each wire of 3-wire system should be balanced with others) Shock: No external shock
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<b>INPUT SIGNAL SOURCE RESISTANCE OR WIRING RESISTANCE INFLUENCE</b>	Thermocouple: 10 $\mu$ V per 100 $\Omega$ Voltage Input: Variation of 0.1% change of resistance. Change in indication – $\pm$ (0.1% of reference range + 1 digit) maximum. Change in recording – $\pm$ 0.2% of recording span, max. RTD: Variations of resistance with changes in 10 $\Omega$ per wire. Change in indication – $\pm$ (0.1% of reference range + 1 digit) maximum. Change in recording – $\pm$ 0.2% of recording span, max.
<b>TEMPERATURE INFLUENCE</b>	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°C/10°C, max.
<b>CHART PAPER INFLUENCE</b>	Standard Temperature/Humidity: 20°C, 65% RH Expansion at 85% RH: 0.4% max. Contraction at 35% RH: 0.5% max.
<b>VIBRATION INFLUENCE</b>	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.
<b>REFERENCE STANDARDS</b>	Safety Standard: IEC 1010-1 (1990) EMC Standard: EN50081-1 (1992), EN50082-1 (1992) Dust/Drip-Proofing: IP50

#### STRUCTURE

<b>MOUNTING METHOD</b>	Panel flush mounting, side by side mounting is possible. Inclination angle: 90° to 60° from horizontal	
<b>EXTERNAL DIMENSIONS (WxHxD)</b>	5.67 x 5.67 x 6.89in. (144 x 144 x 175mm) Panel Cutout: 137mm x 137 mm (+1.5, -0)	
<b>CASE</b>	Plastic mold, color– black	
<b>EXTERNAL TERMINALS</b>	Screw terminals (M4 thread)	

## PHE, CONTINUED

### PHE ORDERING INFORMATION

**P H E A B C D 2 - E E F E V**

To create an ordering code fill in the boxes above with the appropriate number and/or letter from the corresponding box below.

#### Box A: Recording Points

1 = 1 continuous recording	\$1,039
2 = 2 continuous recording	1,479

#### Box B: Input Signal for Ch. 1

X = B Thermocouple	N/C
R = R Thermocouple	N/C
S = S Thermocouple	N/C
K = K Thermocouple	N/C
E = E Thermocouple	N/C
J = J Thermocouple	N/C
T = T Thermocouple	N/C
N = N Thermocouple	N/C
W = W Thermocouple	N/C
L = L Thermocouple	N/C
U = U Thermocouple	N/C
P = PN Thermocouple	N/C
H = Pt100Ω RTD	N/C
A = DC 1-5V	N/C
B = DC 4-20mA with shunt resistor	N/C
C = DC 10-50mA with shunt resistor	N/C
M = DC ±50mV	N/C
Q = DC ±500mV	N/C
V = DC ±5V	N/C
F = DC ±50V	N/C

#### Box C: Input Signal for Ch. 2

Y = None	N/C
X = B Thermocouple	N/C
R = R Thermocouple	N/C
S = S Thermocouple	N/C
K = K Thermocouple	N/C
E = E Thermocouple	N/C
J = J Thermocouple	N/C
T = T Thermocouple	N/C
N = N Thermocouple	N/C
W = W Thermocouple	N/C
L = L Thermocouple	N/C
U = U Thermocouple	N/C
P = PN Thermocouple	N/C
H = Pt100Ω RTD	N/C
A = DC 1-5V	N/C
B = DC 4-20mA with shunt resistor	N/C
C = DC 10-50mA with shunt resistor	N/C
M = DC ±50mV	N/C
Q = DC ±500mV	N/C
V = DC ±5V	N/C
F = DC ±50V	N/C

#### Box D: Power Supply

3 = 100V/120V AC, 50/60 Hz	N/C
4 = 200V/240V AC, 50/60 Hz	N/C

#### Box E: Scale Range

5Y = One channel	N/C
55 = Two channels	N/C

#### Box F: Alarm Output

0 = None	N/C
1 = 1-ch. recorder, 2-point/no external control	\$ 170
A = 1-ch. recorder, 2-point/with external control	235
2 = 2-ch. recorder, 4-point/no external control	240
B = 2-ch. recorder, 4-point/with external control	300

### ACCESSORIES & SPARE PARTS

PHZH1001	Recording Head	\$ 145
PEX00DL1-5000B	Chart Paper 1 Box (6 pkg.)	100
—	10 or 250Ω Shunt Resistor	4.25