PHE

FUJI ELECTRIC

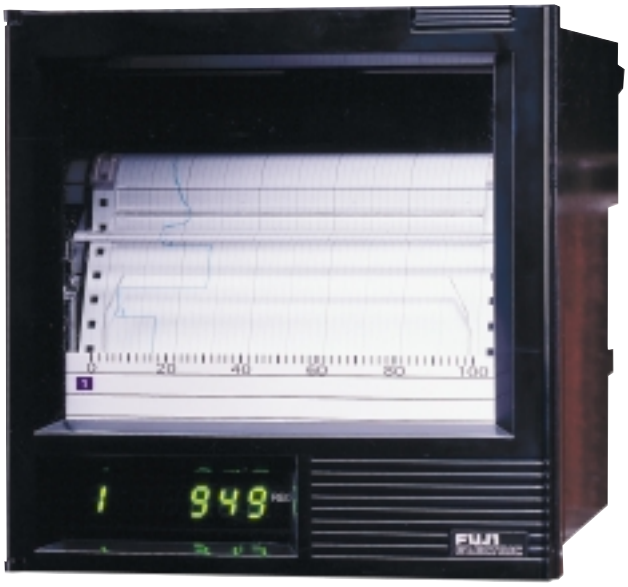
1- OR 2-CHANNEL INKJET STRIP-CHART RECORDER

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.



CE

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

SPECIFICATIONS

GENERAL SPECIFICATIONS

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 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.
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 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
KEY-ACTIVATED PRINTING	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
POWER REQUIREMENT	Rated Power Supply Voltage: 100 to120V 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
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. 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 – ≥ 10MΩ. 500 mV range – ≥ 100KΩ. 5V and 50V range – ≥ 1MΩ Chart Speed Accuracy: ±0.1% (expansion and contraction of paper is not included) Isolation: 100MΩ (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: ±0.5°C. R, S, B, W: ±1°C Common Mode Noise Rejection: 120 dB or more at 50/60Hz ±0.1Hz Normal Mode Noise Rejection: 30 dB or more at 50/60Hz ± 0.1Hz

INPUT AND ACCURACY

INPUT POINTS	1 or 2 continuous recording
MAX. ALLOWABLE INPUT VOLTAGE	Thermocouple, RTD and DC voltage: ±10V DC or less (50 mV, 500 mV range) DC voltage input (5V, 50V range): ±100V DC or less
BURNOUT FUNCTION	When the thermocouple or RTD input is disconnected, the recording is deflected to full scale
INPUT RANGE	Thermocouple: B, R, S, K, E, J, T, N, W, I, U, PN RTD: Pt100Ω 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 10Ω or 250Ω shunt resistor

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 – violet, digital printing – violet 2 Continuous: Channel 1 – red, channel 2 – blue, digital printing – violet
CHART SPEED	10, 20, 24, 30, 50, 120, 200, 300, 400, 1000, 1200, 1500mm/hour, set from the keyboard
INK LIFE	1 Point: Approx. 20 months (Depends on operating conditions) 2 Points: Approx. 12 months (Depends on operating conditions)

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

SPECIFICATIONS, CONTINUED

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

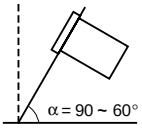
STANDARD FUNCTIONS

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 date/time
SCALE PRINT-OUT FUNCTION	Prints scale of channels alternately with periodic print-out
ALARM PRINT-OUT FUNCTION	Prints channel number, alarm kind, and date/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

OPERATING AND STORAGE CONDITIONS

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: 1kΩ or less. Voltage Input – Less than 0.1% of input resistance. RTD Input – Less than 10Ω per wire (resistance of each wire of 3-wire system should be balanced with others) Shock: No external shock
INPUT SIGNAL SOURCE RESISTANCE OR WIRING RESISTANCE INFLUENCE	Thermocouple: 10μV per 100Ω Voltage Input: Variation of 0.1% change of resistance. Change in indication – ±(0.1% of reference range + 1 digit) maximum. Change in recording – ±0.2% of recording span, max. RTD: Variations of resistance with changes in 10Ω per wire. Change in indication – ±(0.1% of reference range + 1 digit) maximum. Change in recording – ±0.2% of recording span, max.
TEMPERATURE INFLUENCE	Change in Indication: ±0.2% of reference range/10°C, max. Change in Recording: ±0.5% of recording span/10°C, max. Reference Junction Compensation: ±0.27°C/10°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: ± (0.1% of reference range + 1 digit) max. Change in recording: ±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

STRUCTURE

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

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	$ 949
2	= 2 continuous recording	1,349

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	$ 155
A	= 1-ch. recorder, 2-point/with external control	215
2	= 2-ch. recorder, 4-point/no external control	220
B	= 2-ch. recorder, 4-point/with external control	278

ACCESSORIES & SPARE PARTS

PHZH1001	Recording Head	$ 135
PEX00DL1-5000B	Chart Paper 1 Box (6 pkg.)	100
—	10 or 250Ω Shunt Resistor	4.25