AH3000 SERIES 180MM CHART MULTI-POINT TYPE HYBRID RECORDER

PERFORMANCE SPECIFICATION
CHINO

MODEL AH3 7 ☐ ☐ - ☐ ☐ ☐

AH3000 series conforming to CE, UL and CSA are 180mm multi-point type hybrid recorders for 6-point, 12-point and 24-point with a simultaneous display of multi-channel data, universal input, alarm display/printing and other unique features. Software packages of "KIDS" for data processing of measured values and “PASS” for programming parameters are available.

■ FEATURES

- **Simultaneous digital displays of multipoint data**
  Simultaneous digital display of 6 or 12 points allows measured data to be viewed at a glance.

- **Universal input**
  The recorders accept total 56 ranges of 10 DC voltage ranges, 35 thermocouple ranges and 11 resistance thermometer ranges, and these ranges can be programmed for each channel.

- **Data acquisition software package "KIDS"**
  The data acquisition software package "KIDS" is available for data processing by a personal computer.

- **Engineering software package "PASS"**
  Parameters (including inputs and printings) and message printings can be executed through a personal computer by the engineering software package "PASS".

- **Communications interface (option)**
  RS-232C, RS-422A or RS-485 with MODBUS protocol for easy configuration with your personal computer

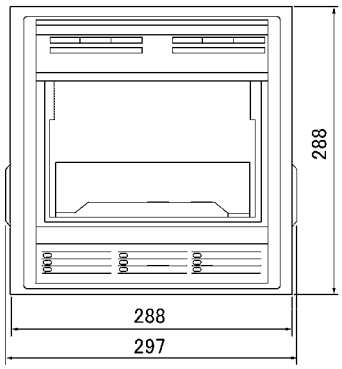
- **Clear trend and digital printings**
  Cassette type wire-dotting system 6-color ink ribbon for clear trend and digital printings

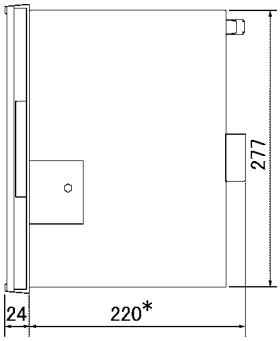
- **Universal power voltage**
  100VAC to 240VAC, 50/60Hz

- **Chart illumination**
  Convenient to confirm printed data in night or dark places

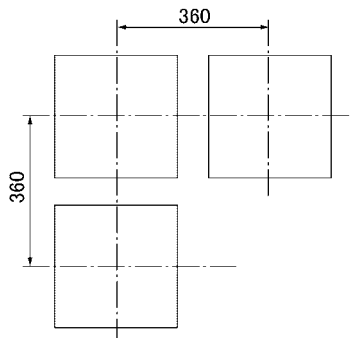
- **CE, UL and CSA**
  The recorder conforms to the rules of safety standards of CE, UL and CSA (C-UL).
  The front panel is the structure with water-proof and dust-proof (IP54).

■ DIMENSIONS





Panel cutout and minimum clearance for installation



* 236mm for adding alarm output of MOS relay or Form C mechanical relay, and communications interface
* 247mm for adding Form A mechanical relay

Unit: mm

■ MODELS

AH3 7 □ □ - □ □ □

Input point	6: 6 points/5 seconds, 2: 12 points/10 seconds, 4: 24 points/20 seconds Option (Note 1): A: 6 points/1 second, B: 12 points/2 seconds, D: 24 points/4 seconds
Display	0: Multi-point sequential display 5: Multi-point simultaneous display (6-/12-point input: Simultaneous display of all points, 24-point input: Alternative display of 2 groups for 12-point simultaneous display)
Communications interface (option)	N: None A: RS-422A R: RS-232C S: RS-485
Alarm output/ remote contacts (option)	0: None, 1: 6 (MOS relay) alarm outputs + remote contacts 2: 6 (Form C mechanical relay) outputs + remote contact (Note 2) 3: 12 (MOS relay) alarm outputs + remote contacts 4: 12 (Form C mechanical relay) outputs + remote contact (Note 2) 5: 24 (MOS relay) alarm outputs + remote contacts 6: 24 (Form C mechanical relay) outputs + remote contact (Note 2) A: 6 (Form A mechanical relay) outputs + remote contacts B: 12 (Form A mechanical relay) outputs + remote contacts D: 24 (Form A mechanical relay) outputs + remote contacts
Others (option)	0: None 1: Printing format + high-speed trace printing

Note 1: The options of A, B and D: Multi-point simultaneous digital display only
Note 2: Not conforming to CE, UL and CSA

■ INPUT SPECIFICATIONS

Number of measuring points: 6 points, 12 points, 24 points

Input signals:

Universal input

DC voltage, thermocouple, resistance thermometer

DC current (by adding shunt resistors)

Range setup:

Programming of input types and ranges by keys

Scale setup:

Programming of maximum values, minimum values and engineering units by keys

Accuracy rating: Refer to the table of inputs.

Temperature drift:

±0.01% of full scale/ºC

[Input signals except resistance thermometer inputs: Converted into reference ranges (reference: the table of inputs)]

Measuring cycle:

About 5 seconds/6 points, about 10 second/12 points, About 20 seconds/24 points

Reference junction compensation accuracy:

K, E, J, T, N, Platinel II ……. ±0.5ºC or less

R, S, NiMo-Ni, CR-AuFe, W-WRe26, WRe5-WRe26

U, L ……. ±1.0ºC or less

(The above errors are added to the accuracy ratings for internal reference junction compensation.)

Burnout:

For thermocouple inputs and resistance thermometer inputs

Up-scale burnout, down-scale burnout or burnout disable is selectable for each input.

Input resolution:

About 1/56000 (converted into reference ranges)

Allowable signal source resistance:

Thermocouple inputs, DC voltage inputs ...

1kΩ (burnout disabled) or lower

Resistance thermometer inputs ...

10Ω or lower (per wire)

(same resistance for 3 wires)

Input resistance:

Thermocouple inputs, DC voltage inputs … about 8MΩ

DC voltage ±5 V or higher … about 1MΩ

Maximum input voltage:

Thermocouple inputs, DC voltage inputs (for ±2VDC or lower range) …

±10VDC or lower

DC voltage inputs (for ±5VDC or higher range) …

±60VDC or lower

Resistance thermometer inputs ...

±6VDC or lower

Input correction:

Zero/span correction and shift correction for each channel

Maximum common mode voltage: 30VAC

Common mode rejection ratio:

130dB or more (50/60Hz)

Series mode rejection ratio:

50dB or more (50/60Hz)

Terminal board:

Detachable type, removable for wirings

■ PRINTING SPECIFICATIONS

Printing interval: About 5 seconds/point

Printing deadband: 0.1%

Printing system: Wire-dot type 6-color ribbon

Printing color:

Trace printing

Channel No.	1, 7, 13, 19	2, 8, 14, 20	3, 9, 15, 21	4, 10, 16, 22	5, 11, 17, 23	6, 12, 18, 24
Colors	Red	Black	Blue	Green	Brown	Purple

Digital printing

Periodic data printing, digital data printing:

Repetition of red, black, blue, green, brown and purple

Channel number printing:

Same color as trace printing

Periodic printing:

Range (scale), tag, engineering unit … Same color as trace printing

Month/day or year/month/day, time, time line, chart speed … black

List printing:

Programmed parameters ... Same color as trace printing

Others ... black

Programming change mark: Black

Alarm printing: Red

Chart: Fan-fold type, total width 200mm, total length 20m

Effective chart width: 180mm

Chart speed: 1 to 1500 mm/hr (Default ... 25mm/hr)

Periodic data printing:

Digital printing of time, channel numbers and measured values on trace printing

Interval time (hour, minute) … optional programming (limited by chart speeds)

Digital data printing:

Digital printing of time and measured values by interrupting trace printing on demand.

Alarm printing:

Alarm activated ... Time, channel number, alarm type and level (alarm setpoint No.) in right side of a chart

Alarm reset... Time, channel number and level (alarm setpoint No.) in right side of a chart

Memory capacity ... Maximum 48 data

Programming change mark:

Marking a black in right side of chart when a parameter is changed

Subtract printing:

Printing of difference between two channels or between a channel and a referenced value (programmed value)

List printing:

Printing of year/month/day, chart speed, parameters of each channel and others.

Fixed-time printing:

Printing of month/day, time, time line, ranges (scales), tags and engineering units every fixed-time (interlocking to chart speed)

Skip function:

No display or printing of channels of which ranges are not programmed.

■ DISPLAY SPECIFICATIONS

Display items:

Multi-point simultaneous display (LCD):

Simultaneous display of 6-/12–channel measured values, or time (year/month/day/hour/minute), alarm-activated channel, and chart speed

Multi-point sequential display (fluorescent vacuum display tube):

Channel number, measured value (multi-point sequential display or 1-point continuous display), time, and chart speed

Status display:

Multi-point simultaneous display:

Printing status, key lock, and alarm activation

Multi-point sequential display:

Printing status, key lock, digital print condition, alarm-activation condition, and programming error information

■ ALARM SPECIFICATIONS

Alarm display:

Multi-point simultaneous display:

"ALARM" illumination and flushing of measured values on alarm activated channels

Multi-point sequential display:

"ALARM" illumination and flashing of alarm activated channel number display.

Alarm types:

Absolute value alarm, differential alarm, rate-of-change alarm

Alarm programming:

Individual programming for each channel

Maximum 4 levels/channel

Alarm deadband:

0.1 to 9.9% of scale programming range (Default: 0.1%)

Alarm output:

Option (Refer to the list of options.)

■ PROGRAMMING/OPERATION

Programming parameters:

Time, chart speed, periodic data printing, ranges, scales, engineering units, tags, alarms, burnout, subtract printing, ºC/ ºF, passcode (key lock)
(Options: Communications, printing format)

Printing operation:

RECORD ON/OFF.. Printing on/off
FEED ……. Fast-feeding of chart
LIST ……. List printing
DATA PRINT ……. Digital data printing

Data display selection: (Key selection):

Multi-point simultaneous display:
Simultaneous display of 6-/12-channel measured values
Multi-point sequential display:
Multi-point sequential or 1-point continuous display

■ GENERAL SPECIFICATIONS

Rated power voltage:

100 to 240VAC, 50/60Hz

Maximum power consumption: 45VA

Environmental conditions:

- Reference operating condition ...
  - Ambient temperature/humidity range: 21 to 25°C, 45 to 65%RH
  - Power voltage: 100VAC ± 1%
  - Power frequency: 50/60Hz ± 0.5%
  - Attitude: Left/right 0°, Forward tilting 0°, Backward tilting 0°
  - Warm-up time: 30 minutes or longer
- Normal operating condition …
  - Ambient temperature/humidity range: 0 to 40°C, 20 to 80%RH
  - Power voltage: 90 to 264VAC
  - Power frequency: 50/60Hz ± 2%
  - Attitude: Left/right 0 to 10°, Forward tilting 0°, Backward tilting 0 to 30°
- Transportation condition (at the packed condition on shipment from our factory) …
  - Ambient temperature/humidity range: -20 to 60°C, 5 to 90%RH (No dew condensation)
  - Vibration: 10 to 60Hz, 4.9m/s^2 or less
  - Impact: 392m/s^2 or less
- Storage condition …
  - Ambient temperature/humidity range: -20 to 60°C, 5 to 90%RH (No dew condensation)

Insulation resistance:

Between secondary terminals and protective conductor terminal … 20MΩ or more at 500VDC
Between primary terminals and protective conductor terminal ……. 20MΩ or more at 500VDC
Between primary terminals and secondary terminals ... 20MΩ or more at 500VDC
Between alarm terminals (Form C mechanical relay) and other secondary terminals ... 20MΩ or more at 500VDC
Note: Primary terminals: Power (L, N), Alarm (MOS relay, Form A mechanical relay)
Secondary terminals: Input, Alarm (Form C mechanical relay), Remote contacts, Communications

Dielectric strength:

Between secondary terminals and protective conductor terminal …… 1 minute at 500VAC
Between primary terminals and protective conductor terminal …….. 1 minute at 1500VAC
Between primary terminals and secondary terminals ……. 1 minute at 2300VAC
Between alarm terminals (Form C mechanical relay) and other secondary terminals ... 1 minute at 1000VAC
Note: Primary terminals: Power (L, N), Alarm (MOS relay, Form A mechanical relay)
Secondary terminals: Input, Alarm (Form C mechanical relay), Remote contacts, Communications

Power failure protection:

Programmed parameters stored into EEPROM memory
Clock circuit sustained for 10 years or longer by a lithium battery (at the operation of 8 hours or longer per day)

Case assembly material:

Door … ABS resin (frame) with glass
Enclosure ... Steel

Color: Door (frame) … Black (frame - equivalent to Munsell N3.0)
Enclosure ….. Gray (equivalent to Munsell N7.0)

Mounting: Panel mounting

Weight: About 8.5kg (full options)

Clock accuracy:

±2 minutes or shorter per 30-day (under reference operating conditions, except errors by turning power supply on or off)

Terminal screws:

Power, Protective conductor terminals…. M4.0
Measuring, Alarm, Remote contact terminals, Communications terminals …….. M3.5

■ STANDARDS

CE: EN61326 + A1 Class A,
EN61000-3-2 + A14
EN61000-3-3, EN61010-1 + A2

UL: UL3111-1

CSA (C-UL): C22.2, No.1010

Front protection: Conforming to IEC529 IP54

■ MEASURING RANGES/ACCURACY RATING/DISPLAY RESOLUTION

The accuracy ratings are based on the measuring ranges (under the reference operating condition).
For thermocouple inputs, the accuracy of reference junction compensation is not included with the accuracy ratings.
The indication equivalent to maximum 200μV or 5ºC may vary under the test environment by EMC directives.

[Reference operating condition] Ambient temperature/humidity range: 21 to 25ºC, 45 to 65%RH
Power voltage: 100VAC ± 1%
Power frequency: 50/60Hz ± 0.5%
Attitude: Left/right 0°, Forward tilting 0°, Backward tilting 0°
Warm up time: 30 minutes or longer

Input kinds		Measuring ranges			Reference ranges	Accuracy ratings	Display resolution
Thermocouple	K	-200	to	300ºC	±13.8mV	±0.1% ± 1 digit	0.1ºC
		-200	to	600ºC	±27.6mV		0.1ºC
		-200	to	1370ºC	±69.0mV		1ºC
	E	-200	to	200ºC	±13.8mV		0.1ºC
		-200	to	350ºC	±27.6mV		0.1ºC
		-200	to	900ºC	±69.0mV		1ºC
	J	-200	to	250ºC	±13.8mV		0.1ºC
		-200	to	500ºC	±27.6mV		0.1ºC
		-200	to	1200ºC	±69.0mV		1ºC
	T	-200	to	250ºC	±13.8mV		0.1ºC
		-200	to	400ºC	±27.6mV		0.1ºC
	R	0	to	1200ºC	±13.8mV		1ºC
		0	to	1760ºC	±27.6mV		1ºC
	S	0	to	1300ºC	±13.8mV		1ºC
		0	to	1760ºC	±27.6mV		1ºC
	B	0	to	1820ºC	±13.8mV		1ºC
	N	-200	to	400ºC	±13.8mV	±0.15% ± 1 digit	0.1ºC
		-200	to	750ºC	±27.6mV		0.1ºC
		-200	to	1300ºC	±69.0mV		1ºC
	W-WRe26	0	to	2315ºC	±69.0mV		1ºC
	WRe5-WRe26	0	to	2315ºC	±69.0mV	±0.2% ± 1 digit	1ºC
	PtRh40-PtRh20	0	to	1880ºC	±13.8mV		1ºC
	NiMo-Ni	-50	to	290ºC	±13.8mV		0.1ºC
		-50	to	600ºC	±27.6mV		0.1ºC
		-50	to	1310ºC	±69.0mV		1ºC
	CR-AuFe	0	to	280 K	±13.8mV		0.1 K
	Platinel II	0	to	350ºC	±13.8mV	±0.15% ± 1 digit	0.1ºC
		0	to	650ºC	±27.6mV		0.1ºC
		0	to	1395ºC	±69.0mV		1ºC
	U	-200	to	250ºC	±13.8mV		0.1ºC
		-200	to	500ºC	±27.6mV		0.1ºC
		-200	to	600ºC	±69.0mV		0.1ºC
	L	-200	to	250ºC	±13.8mV	±0.1% ± 1 digit	0.1ºC
		-200	to	500ºC	±27.6mV		0.1ºC
		-200	to	900ºC	±69.0mV		1ºC

K, E, J, T, R, S, B, N: IEC584, JIS C1602-1995
U (Cu-CuNi), L (Fe-CuNi): DIN43710
W-WRe26, WRe5-WRe26, PtRh20-PtRh5, PtRh40-PtRh20, NiMo-Ni, CR-AuFe, Platinel II: ASTM Vol. 14.03

Input kinds		Measuring ranges			Reference ranges	Accuracy ratings	Display resolution
DC voltage		-13.8	to	13.8mV	±13.8mV	±0.1% ± 1 digit	10μV
		-27.6	to	27.6mV	±27.6mV		10μV
		-69.0	to	69.0mV	±69.0mV		10μV
		-200	to	200mV	±200.0mV		100μV
		-500	to	500mV	±500.0mV		100μV
		-2	to	2V	±2V		1mV
		-5	to	5V	±5V		1mV
		-10	to	10V	±10V		10mV
		-20	to	20V	±20V		10mV
		-50	to	50V	±50V		10mV
Resistance thermometer	Pt100(1)	-140	to	150ºC	160Ω	±0.15% ± 1 digit	0.1ºC
		-200	to	300ºC	220Ω	±0.1% ± 1 digit	0.1ºC
		-200	to	850ºC	400Ω		0.1ºC
	Pt100(2)	-140	to	150ºC	160Ω	±0.15% ± 1 digit	0.1ºC
		-200	to	300ºC	220Ω	±0.1% ± 1 digit	0.1ºC
		-200	to	649ºC	400Ω		0.1ºC
	JPt100	-140	to	150ºC	160Ω	±0.15% ± 1 digit	0.1ºC
		-200	to	300ºC	220Ω	±0.1% ± 1 digit	0.1ºC
		-200	to	649ºC	400Ω		0.1ºC
	Pt50	-200	to	649ºC	220Ω	±0.1% ± 1 digit	0.1ºC
	Pt-Co	4	to	374K	220Ω	±0.15% ± 1 digit	0.1 K

Pt100 (1): IEC751 (1995), JIS C1604-1997
Pt100 (2): IEC751 (1983), JIS C1604-1989, JIS C1606-1989
JPt100: JIS C1604-1981, JIS C1606-1986

■ EXCEPTION OF ACCURACY RATINGS

Input kinds	Measuring range			Accuracy rating
K, E, J, T, L	-200	to	0ºC	±0.2% ± 1 digit
R, S	0	to	400ºC	±0.2% ± 1 digit
B	0	to	400ºC	Not specified
	400	to	800ºC	±0.15% ± 1 digit
N, U	-200	to	0ºC	±0.3% ± 1 digit
W-WRe26	0	to	100ºC	±4% ± 1 digit
	100	to	400ºC	±0.5% ± 1 digit
PtRh20-PtRh5	0	to	100ºC	±4% ± 1 digit
	100	to	400ºC	±0.5% ± 1 digit
PtRh40-PtRh20	0	to	300ºC	±1.5% ± 1 digit
	300	to	800ºC	±0.8% ± 1 digit
CR-AuFe	0	to	20 K	±0.5% ± 1 digit
	20	to	50 K	±0.3% ± 1 digit
Pt100 (1)	700	to	850ºC	±0.15% ± 1 digit
Pt-Co	4	to	50 K	±0.3% ± 1 digit

Note) The accuracy ratings of thermocouple input are the converted accuracy into reference ranges.

■ OPTIONS

Options	Explanations
Measuring interval	About 1 second/6 points, about 2 seconds/12 points, about 4 seconds/24 points, CE conformance for multi-point simultaneous display only, (UL approval pending), Common mode rejection ratio: 120db or more (50/60Hz), Series mode rejection ratio: 50db or more (50/60Hz) Condition: Peak value of noise including signal is limited to 1.5 times or more of reference range. The indication equivalent to maximum 2mV or 25ºC may vary under the test environment by EMC directives.
Remote contacts	By 4-point contact input (2-point common) signal, the following operations are selectable. Chart speed 3-speed/record off, digital data print, list print
Alarm output	Alarm output: 6 points independent output, OR output enabled Maximum contact rating: MOS relay output …….. 240V (AC, DC), 50mA (AC, DC), resistive load Mechanical relay output…… 100VAC 0.5A, 240VAC 0.2A, (common to Form A and Form C) 100VDC 0.3A, resistive load (Form C: not conforming to CE, UL and CSA.)
Printing format (Note)	Zone printing: Printing area is divided into maximum 4 zones. Compressed/ expanded printing: A part of printing area of each channel is printing compressed or expanded. Automatic range-shift printing: Printing range is automatically changed into a new printing area in the event of over-range or under-range
Communications interface	3 kinds of RS-232C, RS-422A, RS-485 (to be specified) Parameter programming, operation, data acquisition (MODBUS protocol)
High-speed trace printing	Printing interval about 2.5 seconds (standard: 5 seconds)
Shunt resistor for current	Measurement of current by adding a resistor of 250Ω (for 20mA) or 100Ω (for 50mA)
Basic mathematics	The following math-function can be executed in time order or between channels. Arithmetic, Square root, Logarithm, Natural Logarithm, Exponential, Maximum, Minimum, Average, Temperature/humidity
Totalizing	Totalizing of measured data and calculated results Interval: 00:01 to 24:00, or none

Note: One from 4 printing formats is to be specified.

■ Data acquisition software package "KIDS"

The "KIDS" is a software package for storing data being measured by AL3000 and AH3000 series recorders and for replaying of the stored data.

Main function and features:

- Data processing: Up to 5 sets (max. 100 channels)
  Real-time data, real-time trend, historical data, historical trend and daily report
- Communications interfaces: RS-232C, RS-422A or RS-485
- Stored data: Enable to export to Microsoft Excel, Lotus 1-2-3 and other application software.
- OS: Windows 95/98, Windows NT4.0

■ Engineering software package "PASS"

The "PASS" is a software package, through a communications interface (optional) or a configuration port, for programming parameters of AL3000 and AH3000 series recorders by a personal computer.

Main functions and features

- Input parameters:
  Ranges, scales, tags, engineering units, alarms, burnout
- Printing parameters:
  Chart speed, data interval, subtract printing, zone printing, compressed/expanded printing, automatic range-shift printing
- Operation: Message printing
- Others:
  Clock setting, temperature units (ºC, ºF), alarm deadband, communications specification (for programming through a configuration port only)
- OS: Windows95/98, WindowsNT4.0

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