

AH3000 SERIES 180MM CHART MULTI-POINT TYPE HYBRID RECORDER



MODEL AH37 □□-□□□

AH3000 series conforming to CE-marking, 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 and other unique features. A package software "KIDS" for data processing of measured values and a package software "PASS" for programming parameters are available.



■ FEATURES

- **Simultaneous digital displays of multi point data**

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

- **Universal input**

The recorders accept total 57 ranges of 10 DC voltage ranges, 36 thermocouple ranges and 11 resistance thermometer ranges, and these ranges can be programmed for each channel.

- **Package software "KIDS" for data acquisition**

The data acquisition software "KIDS" is available for data acquisition with real-time data/trend displays and historical data/trend displays.

- **Engineering package software "PASS"**

Parameters (inputs, printings and others) and message printings can be executed through a personal computer by the engineering package software "PASS".

- **CE-marking, UL and CSA**

The recorders manufactured in our ISO9001 certified facilities conform to the rules of safety standards of CE-marking, UL and CSA (C-UL).

- **Universal power supply**

100 V to 240 VAC, 50/60Hz

- **Communications interface (option)**

RS-232C, RS-422A, or RS-485 with MODBUS protocol for easy configuration with your personal computer.

- **Clear printing**

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

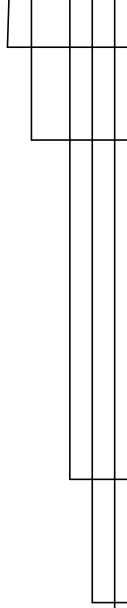
- **Chart illumination**

Convenient to confirm printed data in night or dark places.

■ MODELS

• Standard input type

AH37 □ □ □ □



Input points

6: 6 points, 2: 12 points,
4: 24 points

Display

0: Multi-point sequential display
5: Multi-point simultaneous display
(6-point and 12-point inputs:
Simultaneous display of all points
24-point input:
Alternative display of 2 groups for each 12-point simultaneous display)

Communications interface (option)

N: None, A: RS-422A,
R: RS-232C, S: RS-485

Alarm output/remote contacts (options)

0: None
1: 6 (MOS relay) outputs + remote contacts
2: 6 (mechanical relay "c" contact) outputs + remote contacts (*see note)
3: 12 (MOS relay) outputs + remote contacts
4: 12 (mechanical relay "c" contact") outputs + remote contacts (*see note)
5: 24 (MOS relay) outputs + remote contacts
6: 24 (mechanical relay "c" contact) output + remote contacts (*see note)
A: 6 (mechanical relay "a" contact) outputs + remote contacts
B: 12 (mechanical relay "a" contact") outputs + remote contacts
C: 24 (mechanical relay "a" contact) output + remote contacts

Others (option)

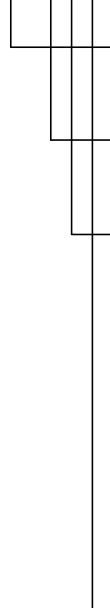
0: None
1: Printing format + high-speed trace printing

Note: Not conforming to CE-marking, UL and CSA (C-UL)

■ MODELS

• Communications input type

AH300 □ □ □ □



Input type

5: Multi-point type simultaneous display (12-point display)

Communications interface

A: RS-422A, R: RS-232C,
S: RS-485

Alarm output/remote contacts (options)

0: None
1: 6 (MOS relay) outputs + remote contacts
2: 6 (mechanical relay "c" contact) outputs + remote contacts (*see note)
3: 12 (MOS relay) outputs + remote contacts
4: 12 (mechanical relay "c" contact") outputs + remote contacts (*see note)
5: 24 (MOS relay) outputs + remote contacts
6: 24 (mechanical relay "c" contact) output + remote contacts (*see note)
A: 6 (mechanical relay "a" contact) outputs + remote contacts
B: 12 (mechanical relay "a" contact") outputs + remote contacts
C: 24 (mechanical relay "a" contact) output + remote contacts

Others (option)

0: None
1: Printing format + high-speed trace printing

Note: Not conforming to CE-marking, UL and CSA (C-UL)

■ INPUT SPECIFICATIONS

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

Input signals:
Refer to the table of inputs

Range setup:
Program input types and ranges by keys

Scale setup:
Program maximum values, minimum values, and engineering units by keys

Accuracy rating:
Refer to the table of inputs. (The indication equivalent to maximum 200 μ V may vary under the test environment requested by EMC directive.)

Temperature drift:
 $\pm 0.01\%$ of full scale/ $^{\circ}$ C
[Input signals except resistance thermometer inputs: Converted into reference ranges (refer to the table of inputs)]

Measuring cycle:
About 5 seconds/6 points, about 10 seconds/12 points, about 20 seconds/24 points

Reference junction compensation accuracy:
K, E, J, T, N, Platinel Maximum $\pm 0.5^{\circ}$ C
R, S, Ni-NiMo, AuFe-Cr, WWR_e5-26, WWR_e0-26, U, L Maximum $\pm 1.0^{\circ}$ C
(The above errors are added to the accuracy ratings for internal reference junction compensation.)

Input resolution:
About 1/56000 (converted into reference ranges)

Burnout:
With a function to detect input signal disconnection for thermocouple inputs and resistance thermometer inputs
Up-scale burnout, down-scale burnout or burnout disabled is selectable for each input.

Allowable signal source resistance:
Thermocouple inputs, DC voltage inputs ...
Maximum 1k Ω (burnout disabled)
Resistance thermometer inputs ...
Maximum 10 Ω per wire: 3 wires – same resistance (Pt100, JPt100)

Maximum input voltage:
Thermocouple inputs ...
Maximum ± 10 VDC
DC voltage inputs (under ± 2 VDC)
Maximum ± 10 VDC
DC voltage inputs (above ± 5 VDC)
Maximum ± 60 VDC
Resistance thermometer inputs
Maximum ± 6 VDC

Input resistance:
Thermocouple inputs, DC voltage inputs* ...
About 8M Ω
* About 1M Ω for ranges above ± 5 VDC

Input compensation:
Zero compensation, span compensation and shift compensation for each channel

Maximum common mode voltage:
30VAC

Common mode rejection ratio:
Minimum 130dB (50/60Hz)

Series mode rejection ratio:
Minimum 50dB (50/60Hz)

Terminal board:
Detachable type, removable on wiring

■ PRINTING SPECIFICATIONS

Printing interval:
About 5 seconds/point

Printing dead band:
0.1%

Printing system:
Wire-dot type 6-color ribbon

Printing color:
Trace printing

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

Digital printing
Periodic data printing, digital data printing:
Repetition of red, black, blue, green, brown and purple

Alarm printing: Red

Channel number printing:
Same color as trace printing

Fixed-time printing:
Range (scale), tag, engineering unit ...
Same color as trace printing
Month/day, time, time line ... black

List printing:
Programmed parameters ... Same color as trace printing, Others ... black

Programming change mark:
Black

Chart:
Fan-fold type, effective width 180mm, total width 200mm, total length 20m

Chart speed:
1 to 1500mm/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.

■ PRINTING SPECIFICATIONS (Continued)

Alarm printing:

Alarm-activated...

Time, channel number, alarm type and level (alarm point number) in right side of a chart

Alarm-reset...

Time, channel number and level (alarm point number) in right side of a chart

Memory capacity ...Maximum 48 data

Programming change mark:

Marking ▲ (black) in right side of chart whenever programmed parameters change.

List printing:

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

Subtract printing:

Print of difference of two channels or between channel and reference value (programmed value).

Fixed-time printing:

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

Skip function:

Both display and printing of channels of which ranges are not programmed.

■ DISPLAY SPECIFICATIONS

Display items:

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

Multi-point simultaneous display (LCD):

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

Status display:

Multi-point sequential display:

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

Multi-point simultaneous display:

Printing status, key lock, and alarm-activation condition

■ ALARM SPECIFICATIONS

Alarm display:

Multi-point sequential display:

"ALARM" illumination and flashing of alarm-activated channel number display (up to 12 points)

Multi-point simultaneous display:

"ALARM" illumination and flashing of measured values on alarm-activated channels

Alarm types:

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

Alarm programming:

Individual programming for each channel, maximum 4 levels (alarm points)/channel

Alarm deadband:

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

Alarm output:

Option (refer to list of options)

■ PROGRAMMING/OPERATION

Programming parameters:

Time, chart speed, periodic data printing, ranges, scales, engineering units, tags, alarms, burnout, subtract printing, °C/°F, 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 sequential display:

Multi-point sequential or 1-point continuous display

Multi-point simultaneous display:

Simultaneous display of 6/12-channel measured values, or time, others

■ GENERAL SPECIFICATIONS

Rated power supply:

100 to 240VAC, 50/60Hz

Power consumption: Maximum 45VA

Environmental conditions:

- Reference operating condition ...
 - Ambient temperature/humidity range:
 - 21 to 25°C, 45 to 65%RH
 - Power voltage: 100VAC \pm 1%
 - Power frequency: 50/60Hz \pm 0.5%
 - Attitude: Left/right 0°, Forward tilting 0°, Backward tilting 0°
 - Warm-up time: More than 30 minutes
- Normal operating condition ...
 - Ambient temperature/humidity range:
 - 0 to 40°C, 20 to 80%RH
 - Power voltage: 90 to 264VAC
 - Power frequency: 50/60Hz \pm 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, Less than 49m/s²
 - Impact: Less than 392 m/s²
- Storage condition ...
 - Ambient temperature/humidity range:
 - 20 to 60°C, 5 to 90%RH (No dew condensation)

Power failure protection:

Programmed parameters stored into EEPROM memory

Clock circuit sustained for minimum 10 years by a lithium battery (at the operation more than 8 hours/day)

Insulation resistance:

Between secondary terminals and protective conductor terminal ...

More than 20M Ω at 500VDC

Between primary terminals and protective conductor terminal ...

More than 20M Ω at 500VDC

Between primary terminals and secondary terminals ...

More than 20M Ω at 500VDC

Between alarm terminals (mechanical relay, "c" contact) and other secondary terminals ...

More than 20M Ω at 500VDC

Note: Primary terminals:

Power (L, N), Alarm (MOS relay, mechanical relay "a" contact)

Secondary terminals:

Input, Alarm (mechanical relay "c" contact), 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 (mechanical relay) and other secondary terminals ...

1 minute at 1000VAC

Note: Primary terminals:

Power (L, N), Alarm (MOS relay, mechanical relay "a" contact)

Secondary terminals:

Input, Alarm (mechanical relay "c" contact), Remote contacts, Communications

Case assembly material:

Door ABS resin (frame),

Enclosure ... Steel

Color:

Door 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:

Within \pm 2 minutes per 30-day (under reference operating conditions)

Except errors by turning power supply on or off

Terminal screws:

Power terminals M4.0

Protective conductor terminals M4.0

Measuring input terminals M3.5

Alarm terminals M3.5

Remote contact terminals M3.5

Communications terminals M3.5

■ STANDARDS

CE-marking: EN55011 group 1 Class A, EN5008-2, EN61010-1 + A2

UL: UL3111-1

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

IP: IEC529 IP54 (Front part)

■ OPTIONS

Options	Explanations	
External contacts	By signals of 4-point contacts and 2-point common contacts, the following operations are executed. Selection of 3-chart-speed/printing off, digital data printing and list printing	
Alarm output	6, 12, 24-point individual output, OR output possible Maximum contact rating: MOS relay output: 240V(AC, DC), 50mA (Resistive load) Mechanical relay output (common to "a" contact and "c" contact): 100V AC 0.5A (Resistive load) 240V AC 0.2A (Resistive load) 100V DC 0.3A (Resistive load) [The mechanical relay "c" contact output is not conformed to CE-marking, UL and CSA (C-UL).]	
Printing format*	Zone printing	Printing area is divided into a maximum of 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 overrange or underrange
Communications interface	3 kinds of RS-232C, RS-422A, RS-485 (to be specified) Parameter programming, operation and data acquisition (MODBUS protocol)	
High-speed printing	Printing interval about 2.5 seconds (standard: 5 seconds)	
Shunt-resistor	Measurement of current by adding a resistor of 250Ω (for 20mA) or 100Ω (for 50mA)	
Mathematics	Arithmetic, Square root, Logarithm (natural, common), Exponential, Maximum, Minimum, Average, Temperature/humidity	
Totalising	Totalising of measured data or calculated data (Interval: 00:01 to 24:00 and no totalising)	

Select and program 1 kind from 3 kinds of the printed format.

INPUTS

Input signals	Measuring ranges	Reference ranges	Accuracy ratings	Display resolutions	Input signals	Measuring Ranges	Reference ranges	Accuracy ratings	Display resolutions			
DC voltage	-13.8 to 13.8mV	±13.8mV	±0.1%±1 digit	10μV	Thermocouple	WVRe0-26	0 to 2320°C	±69.0mV	±0.15%±1 digit	1°C		
	-27.6 to 27.6mV	±27.6mV		10μV		WVRe5-26	0 to 2320°C	±69.0mV	±0.2%±1 digit	1°C		
	-69.0 to 69.0mV	±69.0mV		10μV		PR5-20	0 to 1800°C	±13.8mV		1°C		
	-200 to 200mV	±200.0mV		100μV		PR20-40	0 to 1880°C	±13.8mV		1°C		
	-500 to 500mV	±500.0mV		100μV		Ni-NiMo	0 to 290°C	±13.8mV		0.1°C		
	-2 to 2V	±2V		10mV			0 to 600°C	±27.6mV		0.1°C		
	-5 to 5V	±5V		10mV			0 to 1310°C	±69.0mV		1°C		
	-10 to 10V	±10V		10mV		AuFe-Cr	0 to 300K	±13.8mV		0.1K		
	-20 to 20V	±20V		10mV		Platinel	-100 to 350°C	±13.8mV		±0.15%±1 digit	0.1°C	
	-50 to 50V	±50V		10mV			-100 to 650°C	±27.6mV			0.1°C	
Thermocouple	K	-200 to 300°C	±13.8mV	0.1°C	Thermocouple	U	-100 to 1390°C	±69.0mV			±0.15%±1 digit	1°C
		-200 to 600°C	±27.6mV	0.1°C			-100 to 250°C	±13.8mV	0.1°C			
		-200 to 1370°C	±69.0mV	1°C			-100 to 500°C	±27.6mV	0.1°C			
	E	-200 to 200°C	±13.8mV	0.1°C		L	-100 to 600°C	±69.0mV	0.1°C			
		-200 to 350°C	±27.6mV	0.1°C			-100 to 250°C	±13.8mV	±0.1%±1 digit			0.1°C
		-200 to 900°C	±69.0mV	1°C			-100 to 500°C	±27.6mV				0.1°C
	J	-200 to 250°C	±13.8mV	0.1°C		Pt100 (1)	-100 to 900°C	±69.0mV				1°C
		-200 to 500°C	±27.6mV	0.1°C			-140 to 150°C	160Ω	±0.15%±1 digit			0.1°C
		-200 to 1200°C	±69.0mV	1°C			-200 to 300°C	220Ω		±0.1%±1 digit		0.1°C
	T	-200 to 250°C	±13.8mV	0.1°C		Resistance Thermometer	Pt100 (2)	-200 to 850°C				400Ω
		-200 to 400°C	±27.6mV	0.1°C	-140 to 150°C			160Ω	±0.15%±1 digit		0.1°C	
	R	0 to 1200°C	±13.8mV	1°C	JPt100		-200 to 300°C	220Ω		±0.1%±1 digit	0.1°C	
		0 to 1760°C	±27.6mV	1°C			-200 to 649°C	400Ω			0.1°C	
	S	0 to 1300°C	±13.8mV	1°C			Pt50	-140 to 150°C	160Ω		±0.15%±1 digit	0.1°C
		0 to 1760°C	±27.6mV	1°C	-200 to 300°C			220Ω	±0.1%±1 digit	0.1°C		
	B	0 to 1820°C	±13.8mV	1°C	Pt-Co		-200 to 649°C	220Ω		±0.1%±1 digit	0.1°C	
		-200 to 400°C	±13.8mV	0.1°C			4 to 374K	220Ω	±0.15%±1 digit		0.1K	
	N	-200 to 750°C	±27.6mV	±0.15%±1 digit	0.1°C							
		-200 to 1300°C	±69.0mV		1°C							

Note) Accuracy ratings are of measuring ranges at reference operation conditions. The reference junction compensation accuracy is not included with the accuracy ratings of thermocouple inputs.

K, E, J, T, R, S, B, N: IEC584 (1977, 1982), JIS C1602-1995
 U(Cu-CuNi), L (Fe-CuNi): DIN43710
 Platinel: Platinel alloy No. 5355 (+), Platinel alloy No. 7674 (-)
 WVRe5-26: W-5% Re/W-26% Re (Hoskins manufacturing Company)
 Pt100(1): IEC751(1995), JIS C1604-1997
 Pt100(2): IEC751(1983), JIS C1604-1989, JIS C1606-1989
 JPt100: JIS C1604-1981, JIS C1606-1986

■ SOFTWARE PACKAGES

Data acquisition software package "KIDS"

The "KIDS" is a software package, through a communications interface (optional) of AL3000 and AH3000 series recorders, for storing data being measured and for playing back of the stored data.

Main functions and features

- Data processing: Maximum 100 channels (up to 5 sets)
Data acquisition, replay, trend graph, daily report creation, etc.
- Communications interfaces:
RS-232C, RS-422A or RS-485
- Stored data: Can be exported to Microsoft Excel, Lotus 1-2-3 and other application software.
- OS: Windows95/98, WindowsNT4.0

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 (°C, °F), alarm deadband, communications specification (for programming through a configuration port only)
- OS: Windows95/98, WindowsNT4.0

■ EXTERNAL DIMENSIONS

1. Panel cutout
2. Minimum clearance for mounting multiple units
3. * 236mm (for communications interface or remote contacts/alarm output added)
247mm (for mechanical relay "a" contact output)
4. Unit: mm

Specifications subject to change without notice. Original 2001.4

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