

AL3000 SERIES 100MM CHART MULTI-POINT TYPE HYBRID RECORDER



MODEL AL3765-□□□

AL3000 series conforming to CE-marking, UL and CSA are 100mm multi-point type hybrid recorders with a simultaneous display of multi-channel data, bargraph display and other unique features. A package software "KIDS" for data processing of measured values is available.



FEATURES

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

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

- **Universal input**

The recorders accept total 54 ranges of 7 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.

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

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

- **Other features**

- **Universal power supply**

100 V to 240 VAC, 50/60Hz

- **Communications interface (option)**

RS232-C, 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.

■ MODELS

AL3 7 6 5 -



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 (mechanical relay) alarm outputs + remote contacts (*see note)

Others

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

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

■ INPUT SPECIFICATIONS

Number of measuring points:

6 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-point

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 an 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)

Input resistance:

Thermocouple inputs, DC voltage inputs ...

About 8M Ω

*About 1M Ω (with voltage-divider)

Maximum input voltage:

Thermocouple inputs, DC voltage inputs ...

Maximum ± 10 VDC

Resistance thermometer inputs ...

Maximum ± 6 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 interval is longer for chart speeds of less than 6mm/hr.)

Printing dead band: 0.2%

Printing system: Wire-dot type 6-color ribbon

Printing color:

Trace printing

Channel No.	1	2	3	4	5	6
Colors	Red	Black	Blue	Green	Brown	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, 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

Chart: Fan-fold type, effective width 100mm, total width 114mm, total length 10m

Chart speed:

1 to 1500mm/hr (Default ... 20mm/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-on ... Time, channel number, alarm type and level in right side of a chart

Alarm-reset...Time, channel number and level in right side of a chart

Memory capacity ...Maximum 48 data

Programming change mark:

Mark in right side of chart whenever programmed parameters change.

List printing:

Print of year, month, day, 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, chart speed, 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:

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

Status display:

Printing status, key lock and alarm-on.

■ ALARM SPECIFICATIONS

Alarm display:

"ALARM" illumination and flashing alarm-on channels

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 list of options)

■ PROGRAMMING/OPERATION

Programming:

By key strokes

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):

Measured values display and multi-point sequential bargraph display, or Measured values display and 1-point continuous bargraph display, or Time/other displays and 1-point continuous bargraph display.

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	WRe5-26	0 to 2320°C	±69.0mV	±0.2%±1 digit	1°C
	-27.6 to 27.6mV	±27.6mV		10μV	PR5-20	0 to 1800°C	±13.8mV		1°C
	-69.0 to 69.0mV	±69.0mV		10μV	PR20-40	0 to 1880°C	±13.8mV		1°C
	-200 to 200mV	±200.0mV		100μV	Ni-NiMo	0 to 290°C	±13.8mV		0.1°C
	-500 to 500mV	±500.0mV		100μV		0 to 600°C	±27.6mV		0.1°C
	-2 to 2V	±2V		1mV		0 to 1310°C	±69.0mV		1°C
	-5 to 5V	±5V		1mV	AuFe-Cr	0 to 300K	±13.8mV		0.1K
Thermocouple	K	-200 to 300°C	±0.1%±1 digit	0.1°C	Thermocouple	100 to 350°C	±13.8mV	0.1°C	
		-200 to 600°C		0.1°C		Platinel	-100 to 650°C	±27.6mV	0.1°C
		-200 to 1370°C		1°C		-100 to 1390°C	±69.0mV	±0.15%±1 digit 0.1°C	
	E	-200 to 200°C		0.1°C		200 to 250°C	±13.8mV		
		-200 to 350°C		0.1°C		U	-200 to 500°C	±27.6mV	0.1°C
		-200 to 900°C		1°C		-200 to 600°C	±69.0mV	0.1°C	
	J	-200 to 250°C		0.1°C		-200 to 250°C	±13.8mV	0.1°C	
		-200 to 500°C		0.1°C		L	-200 to 500°C	±27.6mV	±0.1%±1 digit 0.1°C
		-200 to 1200°C		1°C		-200 to 900°C	±69.0mV	1°C	
	T	-200 to 250°C		0.1°C	Resistance Thermometer	-140 to 150°C	160Ω	±0.15%±1digit	0.1°C
		-200 to 400°C		0.1°C		Pt100(1)	-200 to 300°C	220Ω	±0.1%±1digit 0.1°C
	R	0 to 1200°C		1°C		200 to 850°C	400Ω		
		0 to 1760°C		1°C		-140 to 150°C	160Ω	±0.15%±1digit	0.1°C
	S	0 to 1300°C		1°C		Pt100(2)	-200 to 300°C	220Ω	±0.1%±1digit 0.1°C
		0 to 1760°C		1°C		-200 to 649°C	400Ω		
	B	0 to 1820°C		1°C		-140 to 150°C	160Ω	±0.15%±1digit	0.1°C
						JPt100	-200 to 300°C	220Ω	±0.1%±1digit
	N	-200 to 400°C		0.1°C			-200 to 649°C	400Ω	0.1°C
		-200 to 750°C		0.1°C					
		-200 to 1300°C		1°C		Pt50	-200 to 649	220Ω	±0.1%±1 digit
	WRe0-26	0 to 2320°C		1°C		Pt-C0	4 to 374K	220Ω	±0.15%±1digit

K, E, J, T, R, S, B, N: IEC584, JIS C1602-1995

U(Cu-CuNi), L (Fe-CuNi): DIN43710

Platinal: Platinel alloy No. 5355 (+), Platinel alloy No. 7674 (-)

WRe5-26: W-5% Re/W-26% Re (Hoskins manufacturing Company)

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.

Pt100(1): IEC751(1995), JIS C1604-1997

Pt100(2): IEC751(1983), JIS C1604-1989, JIS C1606-1989

JPt100: JIS C1604-1981, JIS C1606-1986

■ GENERAL SPECIFICATIONS

Rated power voltage:

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 0.5G
 - Impact: Less than 40G
- 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) and other secondary terminals ...

More than 20M Ω at 500VDC

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)

Secondary terminals:

Input, Alarm (mechanical relay),
 Remote contacts, Communications

Case assembly material:

Door ... ABS resin (frame), Polycarbonate (front plate), Enclosure ... Steel

Color: Door ... Black (frame - equivalent to Munsell N3.0),
 Transparent (front plate), Enclosure Gray (equivalent to Munsell N7.0)

Mounting:

Panel mounting

Weight:

About 3.0kg (full options)

External dimensions and panel cutout:

144(H) x 144(W) x 237(D)mm (external dimensions), 138 x 138mm (panel cutout)

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

OPTIONAL SPECIFICATIONS

Options		Explanations
Remote contacts		By signals of 4-point contacts and 2-point common contacts, the following operations are executed. Selection of 3-chart-speed/stop, digital data printing and list printing
Alarm output		6-point individual output OR output possible Maximum contact rating: MOS relay output: 240V(AC, DC) 50mA(AC, DC) Resistive load Mechanical relay 100V AC 0.5A output*: 240V AC 0.2A 100V DC 0.2A Resistive load * [Not conforming to CE-marking, UL and CSA]
Printing format	Zone printing	Printing area is divided into 2 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		3 kinds of RS-232C, RS-422A, RS-485 (to be specified) Parameter programming, operation and data dogging (MODBUS protocol)
High-speed trace Printing		Printing interval about 2.5 seconds (standard: 5 seconds) Note: Printing interval is longer for chart speeds of less than 12mm/hr.
Voltage divider		Voltage divider (1/1000) is externally added for inputs exceeding $\pm 5V$ to $\pm 60V$.
Shunt-resistor		Measurement of current by adding a resistor of 250Ω (for 20mA) or 100Ω (for 50mA)
16m chart		Total length of 15.6m

1 kind of the printed format is to be specified.

STANDARDS

CE-marking: EN55011 Group 1 Class A, EN50082-2, EN61010-1 + A2
UL: UL3111-1 (Approval pending)
CSA (C-UL): C22.2, No.1010(Approval pending)
IP: IEC529 IP54 (Front part)

Data acquisition package software "KIDS"

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

Main function and features

- Data processing: Maximum 100 channels (up to 5 sets)
Alarm output Real-time data, real-time trend, historical data, historical trend and daily report
- 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.

EXTERNAL DIMENSIONS

Specifications subject to change without notice. Original 2001.4