# KR3000 SERIES
# GRAPHIC RECORDER

PERFORMANCE SPECIFICATION
CHINO

KR3000 Series are network-compatible paperless recorders with high performance and high operating function employed high visibility 12.1" TFT color LCD display and touch panel operation system. High speed of sampling rate 100ms for 48 points and high accuracy of ±0.1% were realized, and measured data is stored into internal memory and maximum 2GB compact flash card (CF card).
As it can be monitored by a web browser display on several computers on intranet or internet, FTP transfer of data file and E-mail notification are also available.


## ■ FEATURES

**●Large sized 12.1" TFT color LCD display**

- Large-sized high visibility display with various display functions. Real time/Historical trend screen, Bar-graph screen, Data screen are selectable for various applications.
- Combination display for selected 4 screens is available. It is easy to switch to individual screen by touching panel.

**●Large capacity of data memory and various recording method**

- Compact flash card (CF card) slot is equipped as standard external memory. Large capacity storage of maximum 2GB is available.
- Various data storing methods are selectable such as schedule programming by time of day and time of date, recording start-up by external signal and event, and data logging of before and after trigger points for alarm.

**●Multi points recording with high speed/high accuracy**

- High-speed recording of approximately 100ms for 48 points and high accuracy of ±0.1% were realized. Stable measuring and recording are possible with high speed.
- High withstand voltage of 1000V AC between input channels.

**●Easy operating and programming without manuals**

- Easy operating by dedicated keys for each function and touch panel.
- USB port is prepared in front compartment. Setting file and data file are stored in USB memory stick.

**●LAN network capability**

- Various networked environment such as remote monitoring by browser, FTP server, FTP client and E-mail notification are applied as Ethernet is equipped as standard.

**●Analyzing/data acquisition application software**

- It is easy to replay and edit the recorded data file. Replay display has functions of vertical/horizontal trend, circular trend, and also wave-analyzing and marking by using the cursor.

## ■ MODELS

**KR31□□-□□A**

Measuring points/sampling rate
- 20: 12 points/100ms
- 40: 24 points/100ms
- 60: 36 points/100ms
- 80: 48 points/100ms
- 21: 12 points/1s
- 41: 24 points/1s
- 61: 36 points/1s
- 81: 48 points/1s

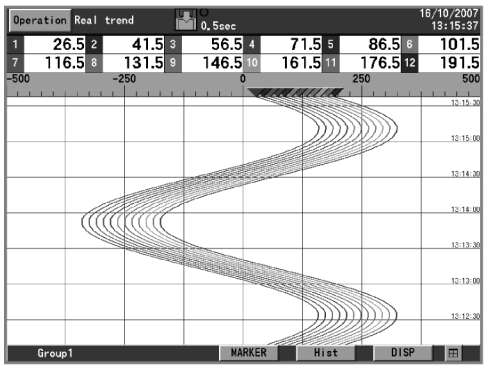
Communications interface (option)
- N: None
- R: High-order (RS232C)
- S: High-order (RS422A/RS485)

Digital input/alarm output (option)
- 0: None
- 1: Alarm output 12 points (a contact)
- 2: Alarm output 6 points (c contact)
- 3: Alarm output 24 points (a contact)
- 4: Alarm output 12 points (c contact)
- 5: Alarm output 12 points (a contact) + 6 points (c contact)
- A: Digital input 8 points
- B: Digital input 8 points + alarm output 12 points (a contact)
- C: Digital input 8 points + alarm output 6 points (c contact)
- D: Digital input 8 points + alarm output 24 points (a contact)
- E: Digital input 8 points + alarm output 12 points (c contact)
- F: Digital input 8 points + alarm output 12 points (a contact) + alarm output 6 points (c contact)

## ■ SCREENS

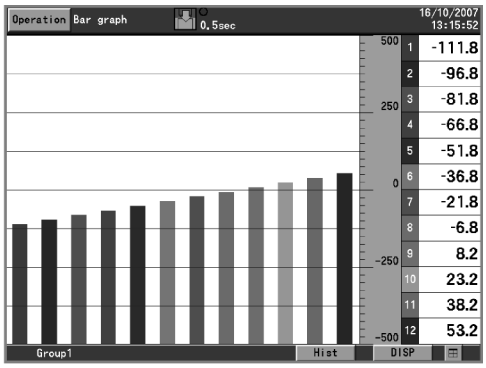
### ●Real-time trend screen

Displays data (measured and virtual) of selected group.
Vertical trend and horizontal trend selectable.



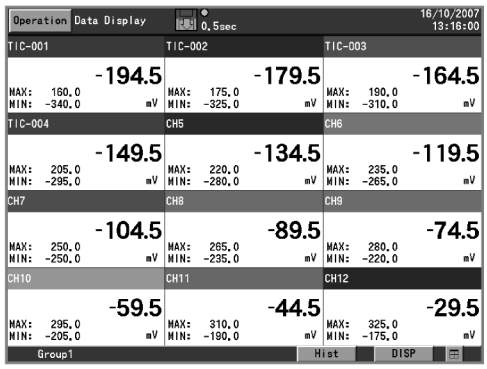

### ●Bar-graph screen

Displays data (measured and virtual) of selected group.
Combination display with real-time trend is available.



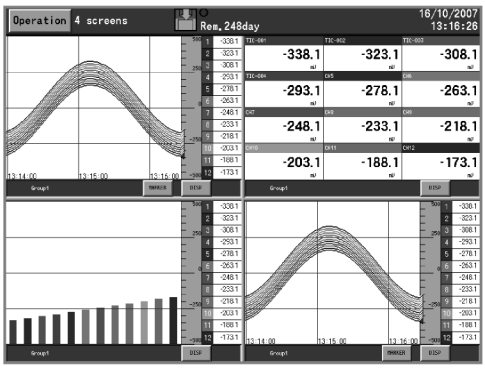

### ●Data screen

Displays data (measured and virtual) of selected group.
Simultaneous display of alarm status.

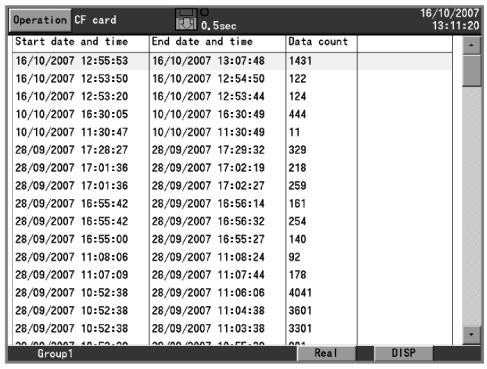



### ●4 separate screen

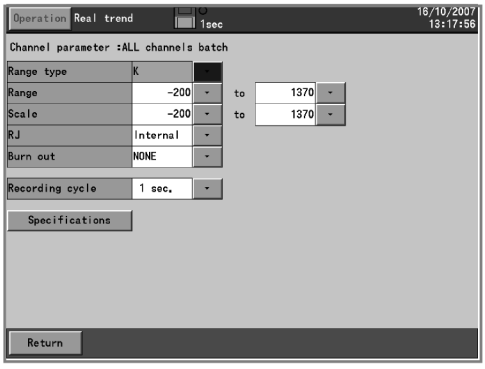
Switchable from displayed 4 screens to individual screen by touch panel.



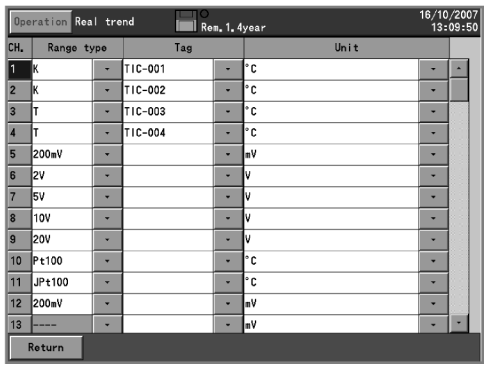

### ●Information screen



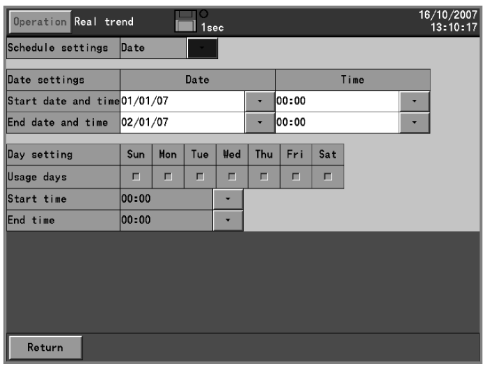

### ●HOME setting screen




### ●Channel setting screen




### ●Schedule setting screen



## ■ INPUT SPECIFICATIONS

Measuring points: 12 points, 24 points, 36 points and 48 points
Input types: Universal
DC voltage --- ±13.8mV, ±27.6mV, ±69.0mV
±200mV, ±500mV, ±2V
±5V*, ±10V*, ±20V*, ±50V*
(*with built-in voltage divider)
DC current --- With external shunt resistor (sold separately)
Thermocouple --- B, R, S, K, E, J, T, N, PtRh40-PtRh20, W-WRe26, WRe5-WRe26, Platinel Ⅱ, NiMo-Ni, CR-AuFe, U, L
Resistance thermometer --- Pt100, JPt100, Pt50, Pt-Co
Accuracy ratings: Refer to the table of measuring range, accuracy ratings and display resolution
Reference junction compensation accuracy:
K, E, J, T, N, Platinel Ⅱ --- ±0.5ºC or less
R, S, W-WRe26, WRe5-WRe26, NiMo-Ni, CR-AuFe, U, L --- ±1.0 ºC or less
Sampling rate: 100ms --- Approximately 100ms for all points
1s --- Approximately 300ms for all points
Burnout: Disconnection of input signal is detected on thermocouple and resistance thermometer input. UP/DOWN/DISABLE is selectable for each input
Scaling: Range/scale is selectable when DC voltage/current is programmed
Digital filter: FIR filter
Allowable signal source resistance:
Thermocouple input (burnout disable)/
DC voltage input (±2V or less) --- 1kΩ or less
DC voltage input (±5V or more) --- 100Ω or less
Resistance thermometer --- Per wire 10Ω or less (same resistance for 3 wires)
Input resistance: DC voltage, thermocouple input --- Approximately 1 MΩ
Maximum input voltage: DC voltage input (±2V or less)/
thermocouple input (burnout disable) --- ±10VDC
DC voltage input (±5V to ±50V) --- ±60VDC
Dielectric strength between channels:
1000V AC or more between each channel
(High strength semiconductor relay used)
(B terminal of resistance thermometer is shorted inside between channels.)
Common mode rejection ratio:
120dB
Series mode reiection ratio: 50dB

## ■ RECORDING SPECIFICATIONS

Memory for history: 136MB
Additional memory: CF card (Up to 2GB)
Recording cycle: 100, 200, 500ms
1, 2, 3, 5, 10, 15, 20, 30s
1, 2, 3, 5, 10, 15, 20, 30, 60min
Logging data: Measured data --- File name (group name), time of day, month and year of recording start, tag, measured data, alarm status/types, makertext
Setting parameter
Storing types: Binary/CSV type
Storing methods: Manual start/stop (dedicated key operation)
Schedule (designation for time of day and date)
Trigger signal (alarm event, digital input)
Data logging of before and after trigger points
* Pre-trigger is selectable
Measuring numbers of pre-trigger --- Max 950 data
Recording group: 6 groups of 56 points/group can be programmed
(Up to Total of 128 points)

When 12 channels recorded in sampling mode (real data).

| Recording cycle | 128MB | 256MB | 512MB | 1GB | 2GB |
|---|---|---|---|---|---|
| 0.1 sec | 3.16 days | 6.32 days | 12.6 days | 25.3 days | 50.6 days |
| 1sec | 31.6 days | 63.2 days | 126 days | 253 days | 1.4 yrs |
| 60 sec | 5.2 yrs | 10 yrs | 21 yrs | 42 yrs | 83 yrs |

When 24 channels recorded in sampling mode (real data).

| Recording cycle | 128MB | 256MB | 512MB | 1GB | 2GB |
|---|---|---|---|---|---|
| 0.1 sec | 1.58 days | 3.16 days | 6.32 days | 12.6 days | 25.3 days |
| 1sec | 15.8 days | 31.6 days | 63.2 days | 126 days | 253 yrs |
| 60 sec | 2.6 yrs | 5.2 yrs | 10 yrs | 21 yrs | 42 yrs |

When 36 channels recorded in sampling mode (real data).

| Recording cycle | 128MB | 256MB | 512MB | 1GB | 2GB |
|---|---|---|---|---|---|
| 0.1 sec | 1.05 days | 2.11 days | 4.20 days | 8.43 days | 16.9 days |
| 1sec | 10.5 days | 21.1 days | 42.0 days | 84.3 days | 168 days |
| 60 sec | 1.7 yrs | 3.3 yrs | 7 yrs | 14 yrs | 27 yrs |

When 48 channels recorded in sampling mode (real data).

| Recording cycle | 128MB | 256MB | 512MB | 1GB | 2GB |
|---|---|---|---|---|---|
| 0.1 sec | 18.9 days | 1.58 days | 3.16 days | 6.32 days | 12.6 days |
| 1sec | 7.9 days | 15.8 days | 31.6 days | 63.2 days | 126 yrs |
| 60 sec | 1.3 yrs | 2.6 yrs | 5.2 yrs | 10 yrs | 21 yrs |

## ■ COMPUTATION SPECIFICATIONS

Computation points: Maximum 128 points
Computation cycle: 100ms for all points
Computation types:
Arithmetic operations --- Addition, subtraction, multiplication, division, remainder, exponential
Comparison operations --- Equality, inequality, great, less, equality/great, equality /less
Logical operations --- AND, OR, XOR, NOT
General functions --- Round-up, round-down, absolute value, square root, exponent of e, natural logarithm, common logarithm
Integration operations --- Analog integration, digital integration
Channel data operations --- Measured data computation, calculated data computation
Others --- Dew point, relative humidity, F-value
Remaining amount of CFcard

## ■ ALARM SPECIFICATIONS

Setups: Up to 4 alarms can be programmed per channel
Alarm types: Upper limit, lower limit, differential upper limit, differential lower limit (deadband is selectable), abnormal data
Delay function: Setup range of alarm delay --- 1 to 3600 seconds
Alarm settings: AND/OR selectable
Alarm outputs: Refer to option specification

## ■ DISPLAY SPECIFICATIONS

Display: 12.1" TFT color LCD
Display types: Measured data display
(Trend screen, Data screen, Bar-graph screen)
Historical trend display
(simultaneous display with Real-time trend is available)
Information display
(alarm display, marker list, file list)
Setting screen
(alarm, computation, memory, system, maintenance, communication, etc.)
Trend screen: 48 colors selectable
Display screen--- 6 screens (6 groups)
Display points --- Maximum 56 points/screen
Time axis direction --- Vertical or horizontal
Line width --- 1 to 5 dot selectable
Scale display --- 4 scales
Tag/data display --- Show/hide selectable
Marker display
Data screen: Display screen --- 6 screens (6 groups)
Display points --- Maximum 56 points/screen
Display contents --- Measured value, channel/tag, unit, alarm status
Bargraph screen:
48 colors selectable
Display screen --- 6 screens (6 groups)
Display points --- Maximum 56 points/screen
Display direction --- Vertical or horizontal
Scale display --- 1 scale
Information display:
Alarm display (alarm activation/released history display)
Marker list
File list (group data file list display)
Unit information (Model, serial no., option, etc.)
LCD back light:
Auto/manual OFF function
Brightness --- 4 levels adjustment

*The LCD display may contain some pixels that alw ays or never illuminate, and the brightness of some areas of the display may appear uneven. There are typical LCD performance characteristics and do not constitute malfunctions.

## ■ COMMUNICATION FUNCTIONS

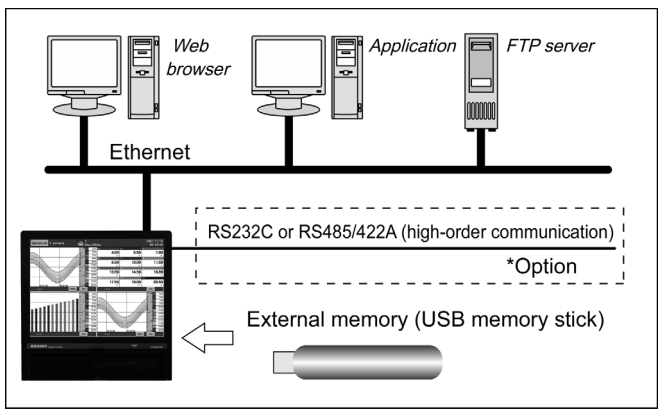
### ● Network

Communication type:
Ethernet (10BASE-T/100BASE-TX)
FTP server : Data file can be read from the network computer
FTP client : Transfer a data file to a network server
SNTP client : The time can be synchronized to the time of SNTP server
Web server : Conformed to HTTP1.0 --- Display the alarm, information of maintenance by browser software (InternetExplorer5.0 or later, NetScape6.0 or later, Opera7 or later)
* User's ID and passw ord registration available.
E-Mail: E-Mail notification at specified time for alarm activation
Report data at specified time is selectable from all registered data
Notification address --- Maximum 8 contacts

### ● USB Communications

Communication type:
USB2.0 (full speed), host function
USB memory stick is used as external memory
Some USB memory stick can not be used.

## ■ CONNECTIVITY



## ■ PROGRAMING/OPERATION

Operation method: Touch panel/dedicated key
Operation keys: HOME, MENU, DISP, MARKER, SCROLL, CURSOR, START, STOP, DIRECTION keys, ENTER, ESC
HOME settings: Simple recording settings --- Common setting to all channels
Parameter programming for all channels together, recording cycle, selection settings
MENU settings: Input/computation programming --- Input parameter, computation parameter
DISP Settings --- Data channel parameter, group parameter, common parameter (combination display, trend vertical/horizontal)
Alarm settings
File settings (6 individual files) --- Storing method settings
Marker text settings
System settings --- Communication, clock, maintenance, key lock, password, screen, etc.
DISP operations: Operating screen selection --- Trend, data, bar-graph, historical trend, alarm display, maker list
Display selection on each screen --- Group 1 to 6 selectable

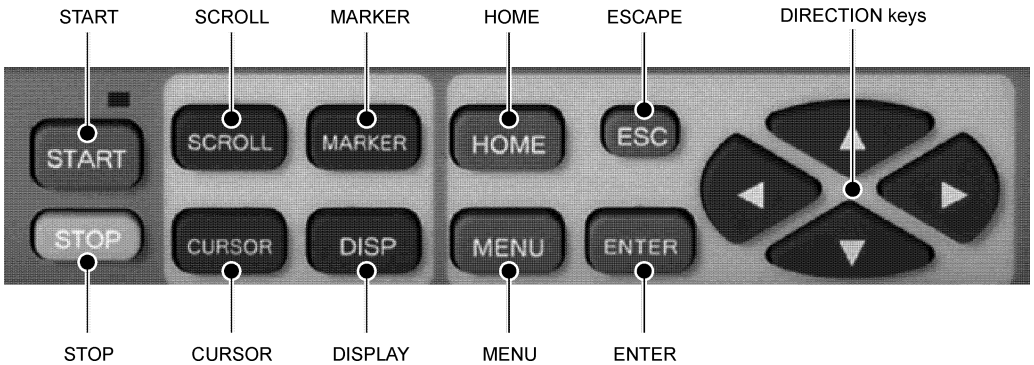
## ■ GENERAL SPECIFICATIONS

Rated power voltage: 100 to 240V AC (universal power supply) 50/60Hz
Maximum power consumption:
65VA
Reference operating condition:
Ambient temperature --- 21 to 25ºC,
Ambient humidity --- 45 to 65%RH
Power voltage --- 100V AC±1.0%
Power frequency --- 50/60Hz±0.5%
Attitude --- Left/right 0°, forward/backward 0°
Warm-up time --- Longer than 30 minutes
Normal operating condition:
Ambient temperature --- 0 to 50ºC
Ambient humidity --- 20 to 80%RH
Power voltage --- 90 to 264V AC
Power frequency --- 50/60Hz±2%
Attitude --- left/right 0°, forward tilting 0°, backward tilting 0° to 20°
Transport condition (at the packed condition on shipment from our factory):
Ambient temperature --- -20 to 60 ºC
Ambient humidity --- 5 to 90%RH (No dew condensation)
Vibration --- 10 to 60Hz 4.9m/ $S^2$ (0.5G) or less
Impact --- 392m/$S^2$ (40G) or less
Storage condition: Ambient temperature --- -20 to 60ºC
Ambient humidity --- 5 to 90%RH (No dew condensation)
Power failure protection: Setups and data are backed up by flash memory.
Clock:Lithium battery backs up RAM
(Minimum 5 years)
Insulation resistance: Secondary terminals and protective conductor terminals --- 20MΩ or more at 500V DC
Primary terminals and protective conductor terminals --- 20MΩ or more at 500V DC
Primary and secondary terminals --- 20MΩ or more at 500V DC
Primary terminals: pow er terminals (L,N), alarm output terminals
Secondry terminals: measuring input terminals, digital input terminals, communications terminals
Dielectric strength: Secondary terminals and protective conductor terminals --- 1 minute at 500V AC
Primary terminals and protective conductor terminals --- 1 minute at 1500V AC
Primary and secondary terminals --- 1 minute at 2300V AC
Primary terminals:pow er terminals (L,N), alarm output tereminals
Secondry terminals: measuring input terminals, digital input terminals communications terminals
Case assembly material: Front bezel --- ABS resin
Case --- Steel
Color: Front bezel --- Black (equivalent to Mussel N3.0)
Case --- Painting color, gray (equivalent to Mussel N7.0)
Weight: 7.2kg
Mounting: Panel mounting
Terminal screws: Power terminals/protective conductor terminals/communications terminals --- M4.0
Measuring input terminals/alarm output terminals/digital input terminals --- M3.5

## ■ OPTIONS

| Options | Specifications | |
|---|---|---|
| Alarm output | Mechanical relay contact output for abnormal input and alarm activation<br>Output: 24 points (a contact), 12 points (a contact, c contact), 6 points (c contact)<br>Contact rating: Mechanical relay --- 100V AC 0.5A, 240V AC 0.2A, 30V DC 0.3A | |
| Communications interface | High-order communications | Communications interface for high-order units<br>RS232C,RS422A/RS485 (MODBUS) switchable<br>*Ethernet is standard equipped |
| Digital inputs | ON/OFF signal | ON/OFF input recording |
| | Pulse input | Maximum 10Hz pulse input<br>Used for flow, operating time and frequency<br>Input system: Photocoupler isolation (Common use for contact and pulse input)<br>Built-in isolated power supply (approx. 5V)<br>Input type: Non-power contact, open collector (TTL or transistor) |
| | Remote contact | The following operations are available by contact input 8 points and common signal 4 points (Selectable by parameter).<br>・Data memory triggering<br>Start data recording by conductive signal from OFF to ON<br>Data recording while conductive signal is ON<br>・Marker display<br>Registered makers display by conductive signal from OFF to ON<br>・Integration operations<br>Reset data for integration operations (all channels simultaneously) |
| Others | Point indication card | |

## ■ OPERATION KEYS



## ■ MEASURING RANGES/ACCURACY RATINGS

| Input type | | Measuring range | Accuracy rating |
|---|---|---|---|
| DC voltage | | -13.80 to 13.80mV<br>-27.60 to 27.60mV<br>-69.00 to 69.00mV<br>-200.0 to 200.0mV<br>-500.0 to 500.0mV<br>-2.000 to 2.000V | ±0.1%±1digit |
| (with built-in voltage divider) | | -5.000 to 5.000V<br>-10.00 to 10.00V<br>-20.00 to 20.00V<br>-50.00 to 50.00V | |
| T/C | K | -200.0 to 300.0ºC<br>-200.0 to 600.0ºC<br>-200 to 1370ºC | ±0.1%±1digit<br>*-200 to 0ºC:<br>±0.2%±1digit |
| | E | -200.0 to 200.0ºC<br>-200.0 to 350.0ºC<br>-200 to 900ºC | |
| | J | -200.0 to 250.0ºC<br>-200.0 to 500.0ºC<br>-200 to 1200ºC | |
| | T | -200.0 to 250.0ºC<br>-200.0 to 400.0ºC | |
| | R | 0 to 1200 ºC<br>0 to 1760 ºC | ±0.1%±1digit<br>*0 to 400ºC:<br>±0.2%±1digit |
| | S | 0 to 1300ºC<br>0 to 1760ºC | |
| | B | 0 to 1820ºC | ±0.1%±1digit<br>*0 to 400ºC: Out of accuracy ratings<br>*400 to 800ºC:<br>±0.15%±1digit |
| | N | -200.0 to 400.0ºC<br>-200.0 to 750.0ºC<br>-200 to 1300ºC | ±0.15%±1digit<br>*-200 to 0ºC:<br>±0.3%±1digit |
| | W-WRe26 | 0 to 2315ºC | ±0.15%±1digit<br>*0 to 100ºC:<br>±4%±1digit<br>*100 to 400ºC:<br>±0.5%±1digit |
| | WRe5-WRe26 | 0 to 2315ºC | ±0.2%±1digit |
| | PtRh40-PtRh20 | 0 to 1888ºC | ±0.2%±1digit<br>*0 to 300ºC:<br>±1.5%±1digit<br>*300 to 800ºC:<br>±0.8%±1digit |
| | NiMo-Ni | -50.0 to 290.0 ºC<br>-50.0 to 600.0 ºC<br>-50 to 1310 ºC | ±0.2%±1digit |
| | CR-AuFe | 0.0 to 280.0K | ±0.2%±1digit<br>*0 to 20K:<br>±0.5%±1digit<br>*20 to 50 K:<br>±0.3%±1digit |
| | Platinel Ⅱ | 0.0 to 350.0ºC<br>0.0 to 650.0ºC<br>0 to 1395ºC | ±0.15%±1digit |
| | U | -200.0 to 250.0ºC<br>-200.0 to 500.0ºC<br>-200.0 to 600.0ºC | ±0.15%±1digit<br>*-200 to 0ºC:<br>±0.3%±1digit |
| | L | -200.0 to 250.0ºC<br>-200.0 to 500.0ºC<br>-200 to 900 ºC | ±0.1%±1digit<br>*-200 to 0ºC:<br>±0.2%±1digit |
| RTD | Pt100 | -140.0 to 150.0ºC<br>-200.0 to 300.0ºC<br>-200.0 to 850.0ºC | ±0.1%±1digit<br>*-140.0 to 150.0ºC:<br>700 to 850ºC:<br>±0.15%±1digit |
| | JPt100 | -140.0 to 150.0ºC<br>-200.0 to 300.0ºC<br>-200.0 to 649.0ºC | ±0.1%±1digit<br>*-140.0 to 150.0ºC:<br>±0.15%±1digit |
| | Pt50 | -200.0 to 649.0ºC | ±0.1%±1digit |
| | Pt-Co | 4.0 to 374.0K | ±0.15%±1digit<br>*4 to 50K:<br>±0.3%±1digit |

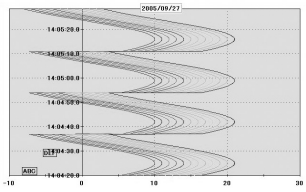
Note: The accuracy ratings are converted into the measuring range under reference operating condition. Thermocouple input does not contain reference junction compensation accuracy.
K,E,J,T,R,S,B,N:IEC584,JIS C1602-1995
W-WRe26,WRe5-WRe26,PtRh40-PtRh20,Platinel Ⅱ,NiMo-Ni,
Cr-AuFe:ASTM Vol14.03
U(Cu-CuNi),L(Fe-CuNi):DIN43710
Pt100:IEC751(1995),JIS C1604-1997,
JPt100:JIS C1606-1989

## ■ APPLICATION SOFTWARE ZAILA (sold separately)

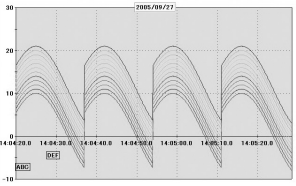
The software is applied for replay display/wave editing operation of recorded data in KR3000 series. It has replay display of vertical/horizontal trend and circular trend function, and also analyzing function such as magnify/reduce/partially magnify of graphs and message insert.

### ●Display examples

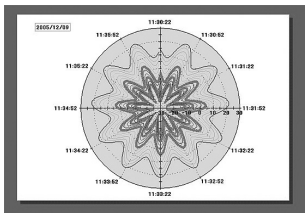
Trend display window (vertical flow)



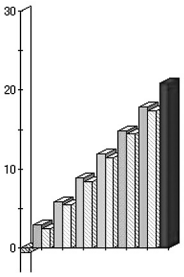
Trend display window (horizontal flow)



Trend display window (circular trend)



Bar-graph



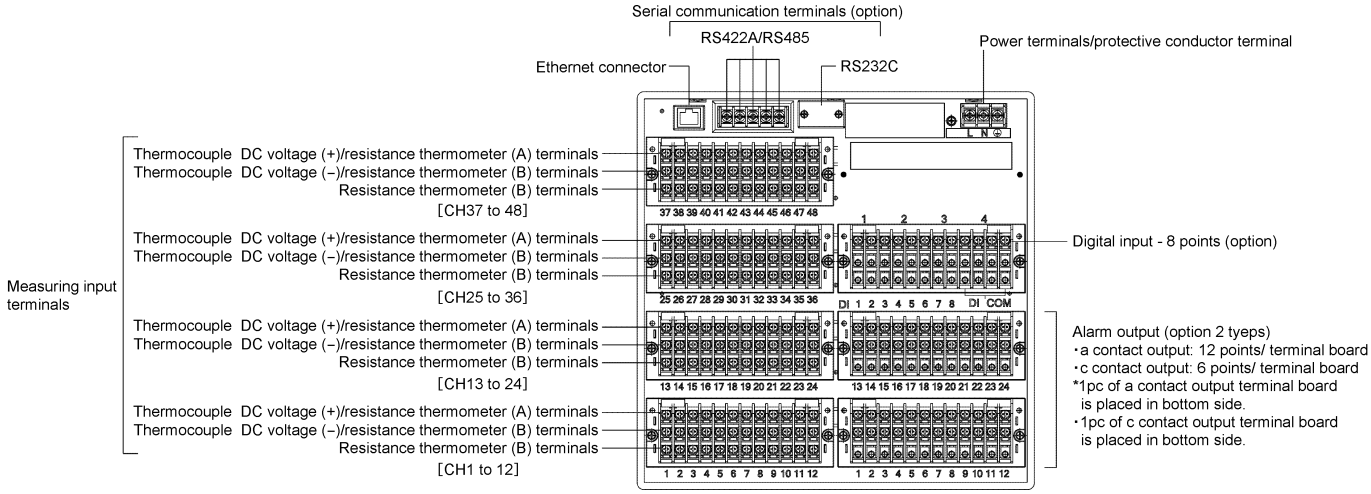
### ●Main functions

■ Trend display
Selectable from trend display window (vertical flow, horizontal flow) and circular trend display window.
■ Continuous replay display window
Trend is scrolled continuously (automatically).
Scroll changes by speed and renewal data no.
■ Data list display window
Displays registered data as list display
■ Bar-graph
Displays by bar. Message can be inserted into bar-graph.
■ Data between markers
Displays date/time, time difference between 2 data, data difference, maximum, minimum, average, standard deviation and median among all data.
■ Alarm display
Points for alarm activation at each level are displayed on a trend graph.
■ Settings
Cursor, trend line, scale axis, time axis, title input on the graph, graph assistant and magnify/reduce/rotation of graphs
■ Data conversion
Exporting to Excel, and converting to CSV file or TEXT file are available.

## ■ ENVIRONMENT

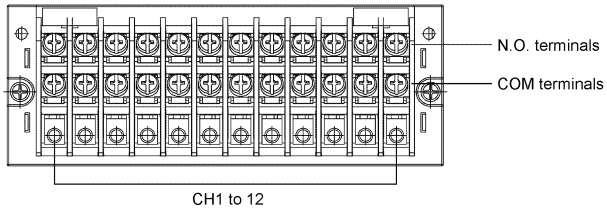
| | |
|---|---|
| CPU | 1GHz or faster |
| OS | Windows 98/Me<br>Windows 2000/XP Home/XP Pro<br>*Internet Explorer 4.0 or later |
| Memory | 256MB or more<br>(512MB or more recommended) |
| Disk drive | CD-ROM drive: 1 drive or more<br>Hard disk drive: Disk space of 1 drive or more for 100MB or more |
| Language | Japanese, English, Chinese (simplified and traditional characters), Korean |

## ■ TERMINAL ARRANGEMENT

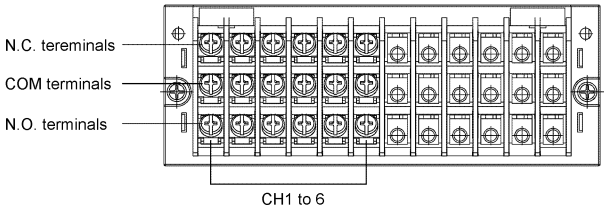



### Alarm/Digital input terminals

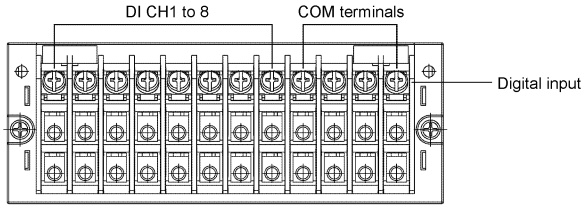
●Alarm output (a contact output 12 points)

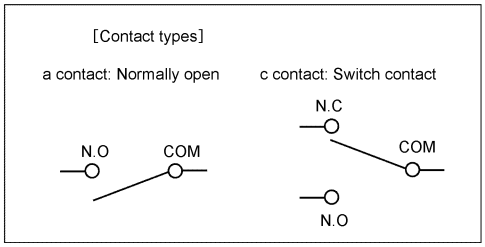



●Alarm output (c contact output 6 points)

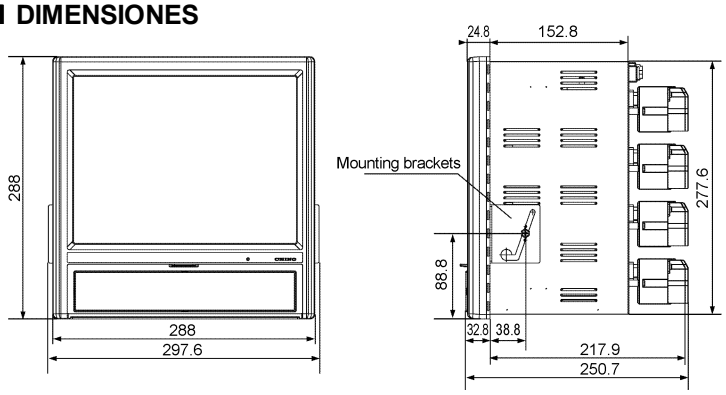



●Digital input



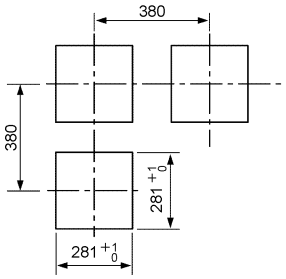




## ■ DIMENSIONES




Unit: mm

## ■ Panel cutout and minimum clearance




Unit: mm



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