DR130
Portable Hybrid Recorder

NEW

CE

RS-232-C
GP-IB

★
Safety Standards ; CSA1010.1 , EN61010-1
EMI Standard ; EN55011 Group 1 Class A
Immunity Standard ; EN50082-2 : 1995

DR130
338 × 221 × 335mm 9.3 kg
(13-3/8 × 8-3/4 × 13-1/4" 20.5 lbs)

The DR130 portable hybrid recorder comes with a large VFD monitor, and has a wide range of functions including multi-point, high speed, precision measurement and recording, and the ability to save data to a floppy disk. It has excellent mobility, enabling it to be used anywhere at all.

The measurement data can be effectively utilized by a personal computer via a general purpose communication interface or a memory device (floppy disk). A wealth of application software provides powerful support for PC measurement.

The new DR130 hybrid recorder, which was developed to meet the demands of the downsizing era, is the latest addition to the DARWIN series.

FEATURES

■ **Small, light-weight and portable**
The DR130 is smaller and lighter (9.3 kg) than the popular HR1300, and is considerably more portable. The mobility of this instrument is noticeably superior.

■ **Data can be saved to a floppy disk**
You can transfer settings and measurement data to a personal computer or save them to a memory device (floppy disk).
The saved measurement data can also be converted to the Excel or Lotus 1-2-3 format by means of conversion software (standard).

■ **A wealth of PC-based application software**
The DR130 comes with various drivers for commercially available software in addition to configuration and data logging software. This enables you to easily configure a personal computer-based data recording environment.

■ **Mutually isolated channels, and universal inputs**
The input section, in which each channel is isolated from the other, contains a signal conditioner function, permitting universal measurement of various inputs including voltage, thermocouple (TC), resistance temperature detector (RTD), and contact signals.

■ **High environmental toughness and high reliability to withstand severe field environments**
The DR130 uses high breakdown voltage solid state relays developed by YOKOGAWA and also conforms to world safety standards, ensuring high reliability.
The instrument comes with complete filter functions, resulting in greater immunity to field noise.

■ **Comes with a large display, and is designed for ease of operation.**
The DR130 has a large, 3-line VFD display for improved visual recognition of data. Also, various messages are displayed when you operate the instrument, thus making for improved operability.

■ **Number of input channels: 10 channels or 20 channels (specify when ordering)**

■ **Measurement intervals: Max 2 seconds**

■ **Effective recording width: 150 mm**

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FUNCTIONS

The DR130 was designed for user economy and environmental toughness in the field. It is compact and light, making for improved portability, and also occupies little space. The cost of the converter has been reduced due to the wide range of inputs. In addition, high breakdown voltage solid state relays are employed, resulting in higher reliability and maintainability. This hybrid recorder has a wide range of functions including realtime computation and memory functions, enabling it to meet a variety of applications.

■ PORTABLE AND SIMPLE CONSTRUCTION

The recorder proper contains the input/output section and also a wealth of functions. In addition, the instrument is smaller and lighter than the HR1300. The simple integrated construction enables the instrument to be moved about very easily.

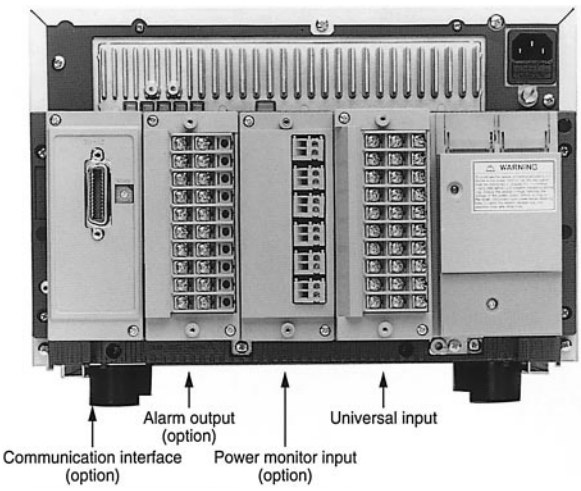
■ EXCELLENT INPUT FUNCTIONS

You can freely set a wide range of inputs including DC voltage, thermocouple, RTD, and contact signals, by a simple key operation. A lineup of high cost performance models designed exclusively for voltage, thermocouple and contact inputs is also available. In addition, you can select power monitor input options that enable you to measure RMS values of AC voltage and current, active power, apparent power, reactive power, frequency, power factor and phase angle (for both single phase and 3-phase applications).

● Mutual channel isolation.
Reliable high withstand voltage and noise immunity

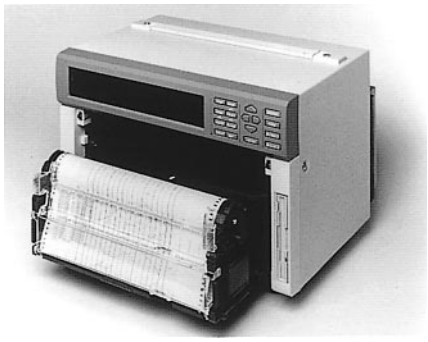
Each channel of the input circuit is isolated from the others by high breakdown voltage solid state relays*1. As a result, the common mode rejection voltage is 250 V AC*2 rms, and the withstand voltage is 1,500 V AC*2 (1 minute). Excellent noise rejection is ensured by the built-in power line noise rejection filter employing an integrating type A/D converter, low-pass filter, and moving average digital filter*3.

*1: RTD inputs share a common line within the same module.
*2: Depends on input module types
*3: The shortest measurement interval varies depending upon the integration mode and the low-pass filter mode.



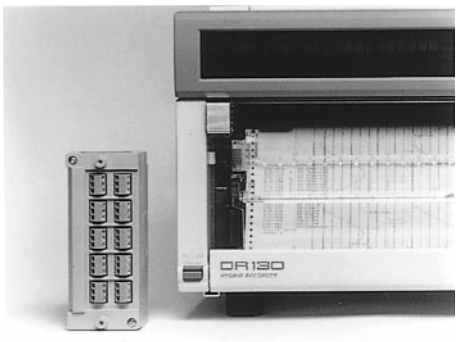
Rear view of the DR130

■ REPLACING CASSETTE TYPE CONSUMABLES



A removable cassette type ink ribbon is used, enabling the ink ribbon to be replaced easily. Also, the chart holder is a pull-out type enabling the chart to be replaced with ease.
The ink ribbon and chart paper are completely interchangeable with the ribbon and paper used in Yokogawa's HR1300 hybrid recorder.

■ REMOVABLE INPUT MODULE



The input/output section is of modular construction (10-channel or 20-channel units), enabling you to remove it to carry out wiring work.

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■ MONITORING FUNCTIONS

The DR130 comes with a large 3-line VFD display, enabling you to recognize data easily, even from a remote point. The instrument is operated using a dialog method which makes full use of this VFD display. Various guidance displays are provided for making settings, thus simplifying operation.

● Employing large VFD display, versatile display formats

The DR130 has a large VFD which can display a total of 102 characters (one line of 22 large characters, and two lines of 40 characters each). This ensures that the measurement results and alarm status are easy to read and can be transmitted accurately. A wide range of display formats is available. These include 5-channel simultaneous digital measurement values, bar graphs, and alarm relay status displays.

● Realization of simple operations using a dialog method

You can make settings easily using a dialog method by fully utilizing the display which can display a total of 102 characters.
The setting item is always displayed in large characters at the top of the display, and the guidance display (auxiliary information), such as the setting range, is displayed in detail at the bottom of the display.
Also, items that are normally used frequently are grouped separately from items which, once set, are not changed frequently, thus simplifying routine operations.

Range setting screen

Chart speed setting screen

■ COMPUTATION FUNCTIONS (partially optional)

The DR130 can perform various computations such as the four arithmetic operations, measurement data integration processing, and detection of maximum and minimum values, in realtime. The results of computations are sent together with the measurement data to a PC thus reducing the burden of analysis work and improving the measurement efficiency.
The main computation functions of the DR130 are as follows.

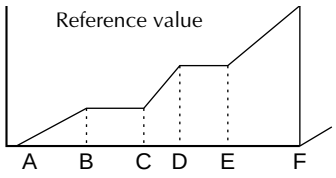
Standard computation functions:
Linear scaling, moving average, differential computation

Computation options:
Four arithmetic operations, logic operations, related operations, computation of absolute and relative values, and statistical computations (maximum, minimum, mean, and integrated values)

● Moving average function

This function renews the measured value while computing the moving average, hence it is effective for monitoring the trend of a varying input signal over a long period. It can also be used as a digital filter when noise components are present on the input signal. You can set the number of moving average scans by selecting a value between 2 and 64.

● Batch integration

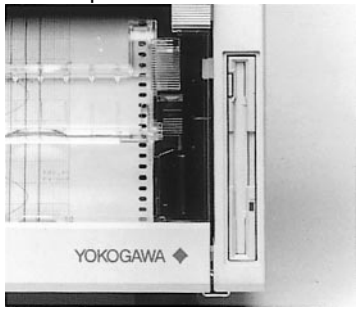


A: Start of integration by means of a contact
B: Integrated value hold
C: Re-start of integration
D: Integrated value hold
E: Re-start of integration
F: Alarm output, end of computation, and resetting of the integrated value when the reference value is reached

By using the DR130 in combination with the optional DI/DO module or alarm function, you can easily perform batch processing.

■ MEMORY FUNCTION (specify when ordering)

You can select a floppy disk function as an external memory device. You can save a number of set values and recall them whenever necessary, and in addition store the measurement data before and after an alarm, and also computed results.



You can record the memorized data on a chart, or analyze it or make it into a report using a personal computer and commercially available spreadsheet software.

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DR130

- If the floppy disk drive function is selected, the measurement data is stored in a binary format in the 512 kB (SRAM) internal buffer memory. You can also copy measurement data from the internal buffer memory to a floppy disk while converting it into the ASCII format.
- By combining the memory function with a remote function, timer, key operation, etc., you can memorize data at fixed intervals (e.g. 1 hour), or save the results of statistical computations alone (integrated value or maximum and minimum values).
- The DR130 comes with standard data conversion software, enabling you to convert data into the ASCII, Excel, or Lotus 1-2-3 format.

■ Other standard functions

Function		Description
Input	Integration mode selection	You can select the 50/60 Hz or 10 Hz integration mode. The 10 Hz integration mode is useful when power line noise containing both 50 Hz and 60 Hz components is superimposed on the signal. (When the 10 Hz integration mode is activated, the minimum measurement interval is 4 seconds.)
	Low-pass filter	You can insert a low-pass filter in the path of a signal on which noise components are superimposed. (When the hard filter is ON, the measurement interval becomes at least 3 seconds.)
	Scaling	The input signal is displayed and/or recorded as an industrial quantity or a physical quantity.
	Burn-out	When the termocouple input goes open circuit, the indicator mores to the 100 or 0% side.
	Differential computation	The difference between the reference channel and measured channel is measured.
Recording	Zone recording	The recording area can be set freely for each channel.
	Partially compressed and expanded recording	Unimportant parts are compressed, and only necessary parts are expanded, thus enabling the recording resolution to be increased.
	Group channel trend	Only channels that belong to a specified group are recorded. Switchover between groups can be done using a remote contact.
	Alarm generation channel trend	Trend recording takes place only for channels that emit an alarm.
Setting	Memory backup	The set data is protected by a lithium battery inside the unit.
	Security	The unit comes with a standard password lock function, preventing mis-operation and also protecting the set data.
Alarm (Output is optional)	Setting	You can set a 4-level alarm (upper and lower limits, difference between upper and lower limits, percentage change rising and falling limits) for each channel.
	Re-breakdown re-alarm	The alarm output can be refreshed when an alarm is emitted.
	Hold function	Once an alarm is emitted, the alarm indication and relay state are held until the operator acknowledges the alarm.
Optional functions		General purpose communication function (GP-IB, RS-232-C) and alarm output relay (10 make contacts) DI/DO functions (recorder action control function, fail function, chart end function), etc.
Conformity to standards		Safety standards: IEC 10101-1: 1995, EN61010, CSA C22.2 No.1010.1-92 Electromagnetic interference standards: EN55011; 1991, Class A Group 1 Electromagnetic environment conformity standards: EN 50082-2; 1995

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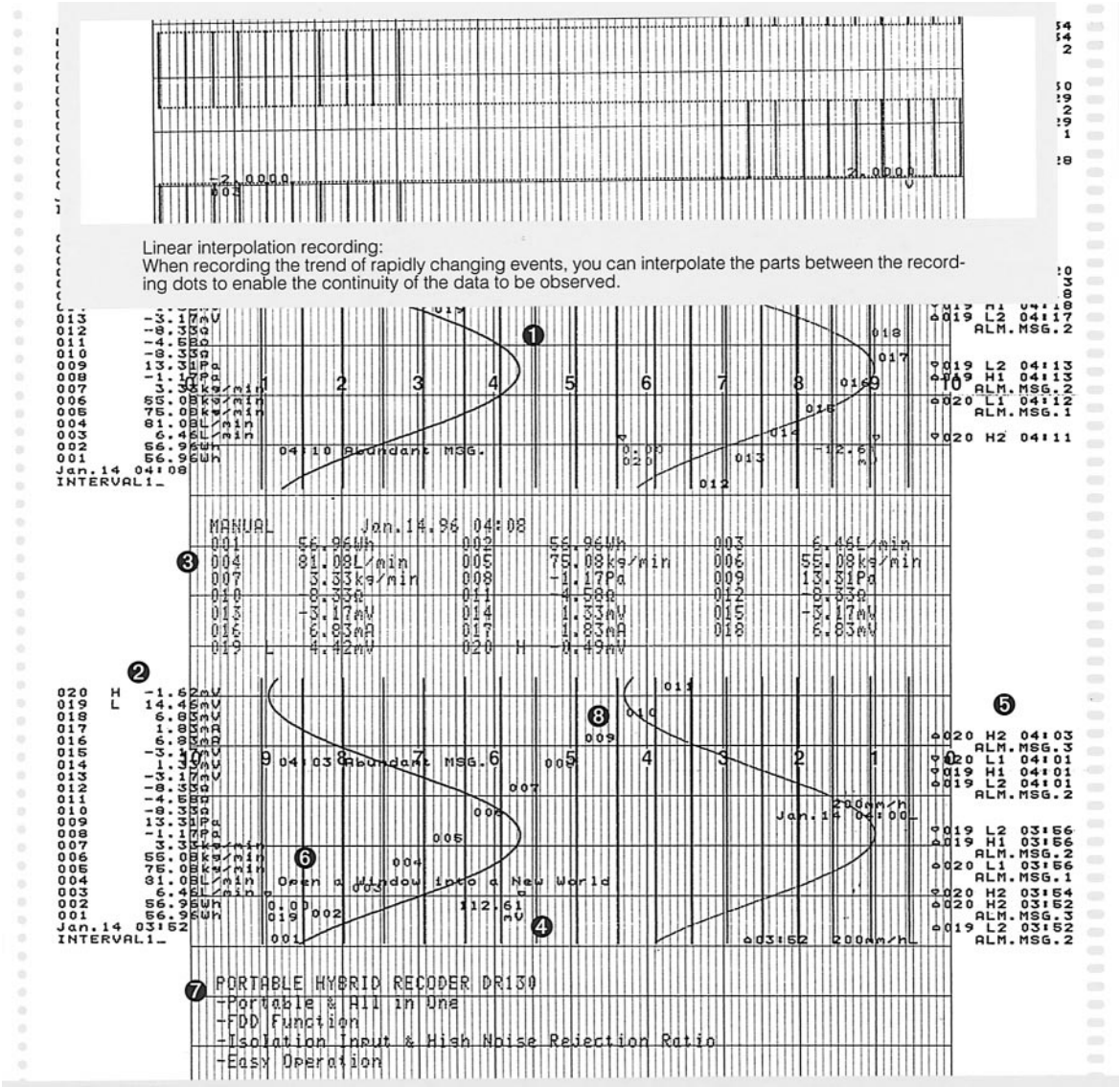
■ HYBRID RECORDING FUNCTIONS

A recorder's performance is determined by the readability of the information on its printed chart. The DR130 can record clearly, in 10 colors, data from all measurement points, at 2-second intervals. It has a variety of recording functions including analog trend recording over an effective recording width of 150 mm, recording of digital measured values, recording of various messages, zone recording, and partially compressed and expanded recording, thus enabling data to be read off speedily.

●Clear, high speed 10-color recording at 2-second intervals ●A large variety of recording formats

●A full range of axiliary printing functions



1. Analog trends
Records clearly in 10 colors. You can assign a recording color to each channel.
2. Digital recording
Measured values are recorded digitally either at an interval based on the chart speed or at an interval that you specify. You can also start recording of data by a remote contact input.
3. Manual recording
By pressing a key, you can interrupt analog recording and digitally record one scan's worth of measured values.
4. Scale printout
The recording scale is printed out for each channel.
5. Alarm printout
A change of the alarm status (ON/OFF state and time, for each channel) is printed out.
6. Message printout
The contents of a preset message are printed out by pressing a key, when an input is received from a remote contact, or when an alarm is detected. You can preset up to 20 messages of 16 characters each.
7. Header printout
Headers are printed as comments (five rows of 60 characters).
8. Printing channel No. and tag No.
The channel number or tag No. are printed periodically.

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APPLICATION SOFTWARES

In addition to performing realtime recording and data saving to a medium, the DR130 functions as a high speed multiplexer A/D converter of 20 ch/2 seconds which contains a signal conditioner function. It also comes with a full range of application software and driver software.

Logging software for configuration and data acquisition (optional) and also software for converting data saved to a memory device (standard) is available in the form of packages. By using this package software, you can configure the measurement conditions and create data acquisition programs without difficulty. You can easily configure a personal computer-based data recording environment. This software is available for both MS-DOS and Windows 3.1.

(The contents of the display screen differ depending upon OS environment.)

■ **DP200 BASIC SOFTWARE PACKAGE (optional)**

This software package is intended for configuring the measurement conditions of the DR130 and performing simplified logging.

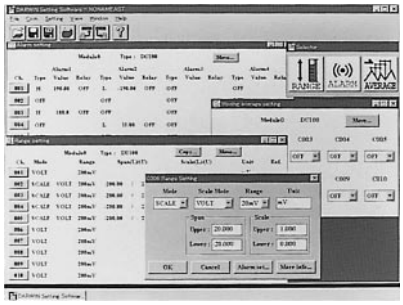
● **Simplified logging & viewer function**

This function enables you to save measurement data in a maximum of 20 channels to the hard disk of a PC, at 2-second intervals*.
You can display the trend of the measurement values and also display digital values, for 10 channels in realtime.
You can re-display saved data, or convert data into the ASCII, Lotus 1-2-3 or Excel format in 10-channel units.
You can also perform computation or processing of data using commercially available spreadsheet software.

* Differs depending upon the PC, OS environment and number of channels used.

● **Measurement condition configuration function**

You can set the measurement range, measurement interval and alarm level of the DR130 using a mouse, enabling you to easily configure a suitable operation environment.

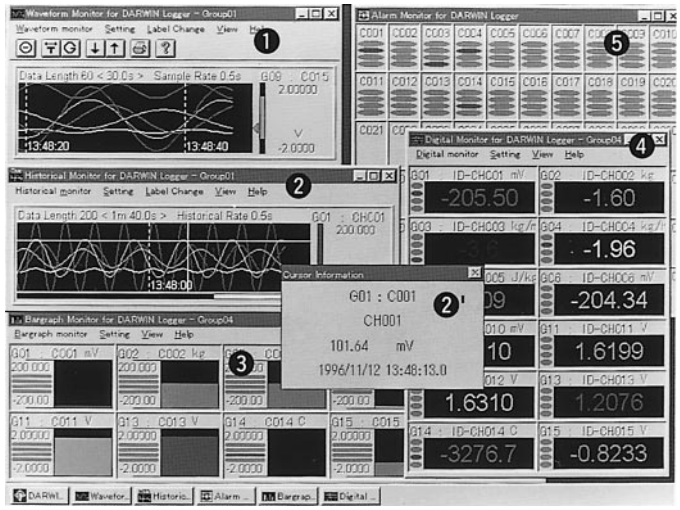


Example of measurement condition setting screen (Windows screen)

■ **DP300 ENHANCED DATA LOGGING SOFTWARE PACKAGE (optional)**

This software package enables you to monitor the measurement results for multiple channels at the rate of 32 channels/1 frame, in realtime.
A complete range of monitoring functions including level meter display, alarm monitor and historical trend functions are provided. When using the historical trend function you can change the display timebase, even while data logging is taking place, in order to confirm the trend of changes over a long period, and also review past data by using the cursor function.
You can zoom or scroll stored data, and also convert it into the ASCII, Lotus 1-2-3 or Excel format while using the cursor function, thus facilitating data conversion. In addition, you can perform statistical computation processing including maximum, minimum and P-P values between cursors.
Also, by using this software, you can re-display or convert data saved to a floppy disk using the DR130.
This software can be used with other DARWIN series instruments (DA100, DR230) as well.

Example of Windows Screen Display



1. **Trend display**
   Monitor information in multiple channels using a waveform display, and enlarge the time axis and refer to the data change trends, even during measurement.
2. **Historical trend display**
   Display past long-term trend data, or by using the cursor function, read data or scroll the screen to display past data.
3. **Bar graph display**
   Display measurement data as a bar graph, and display alarm information at the same time.
4. **Digital value display**
   Display measurement data as digital values, and display alarm information at the same time.
5. **Alarm display**
   Displays the state of an alarm by a red (ON) or green (OFF) lamp.

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SPECIFICATIONS

Input section

■**Measurement interval**
2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60 seconds
Maximum of 2 seconds/20 channels

■**A/D integration period**
Munual selection: 20 ms (50 Hz), 16.7 ms (60 Hz) and 100 ms (10 Hz) or
Automatic switchover between 50 and 60 Hz

Filter ON/OFF / Cutoff frequency / Number of channels	Low Pass Filter OFF		Low Pass Filter ON	
	20 ms(50Hz) 16.7 ms(60Hz)	100ms(10Hz)	20ms(50Hz) 16.7ms(60Hz)	100 ms(10Hz)
10	2 s	4 s	3 s	12 s
20	2 s	5 s	4 s	15 s

General specifications

■**External dimensions**
Approx. 338 (W) × 221 (H) × 335 (D) mm

■**Weight**
9.3 kg (when 20 input channels and an alarm output are installed)

■**Materials**
Steel plate, aluminum alloy, plastic moldings

■**Paint color**
Display: Slate Gray light (equivalent to Munsell 0.1 PB 4.6/0.2)
Core: Ice White (equivalent to Munsell 6.6Y 7.9/0.5)

■**Measurement range**

Kind of Input	Range	Measurement Range	Measurement (digital display and recording)		
			Measurement Accuracy		Min. Resolution
DC voltage	20 mV	-20.000 to 20.000 mV	±(0.05% or rdg + 5digits)		1 µV
	60 mV	-60.00 to 60.00 mV	±(0.05% or rdg + 2digits)		10 µV
	200 mV	-200.00 to 200.00 mV	±(0.05% or rdg + 2digits)		10 µV
	2 V	-2.0000 to 2.0000 V	±(0.05% or rdg + 2digits)		100 µV
	6 V	-6.000 to 6.000 V	±(0.05% or rdg + 2digits)		1 mV
	20 V	-20.000 to 20.000 V	±(0.05% or rdg + 2digits)		1 mV
	50 V	-50.00 to 50.00 V	±(0.05% or rdg + 2digits)		10 mV
Thermocouple; (Does not include the reference junction compensation accuracy.)	R*1	0.0 to 1760.0°C	±(0.05% of rdg + 1°C) However R, S: 0 to 100°C, ±3.7°C 100 to 300°C, ±1.5°C B: 400 to 600°C, ±2°C accuracy less than 400°C is not specified		0.1°C
	S*1	0.0 to 1760.0°C			
	B*1	0.0 to 1820.0°C			
	K*1	-200.0 to 1370.0°C	±(0.05% of rdg + 0.7°C) However, K attains an accuracy of ±(0.05% of rdg. + 1°C) within the range between -200 and -100°C.		
	E*1	-200.0 to 800.0°C	±(0.05% of rdg + 0.5°C) However, J and L attains an accuracy of ±(0.05% of rdg. + 0.7°C) within the range between -200 and -100°C.		
	J*1	-200.0 to 1100.0°C			
	T*1	-200.0 to 400.0°C			
	L*2	-200.0 to 900.0°C			
	U*2	-200.0 to 400.0°C			
	N*3	0.0 to 1300.0°C	±(0.05% of rdg + 0.7°C)		
	W*4	0.0 to 2315.0°C	±(0.05% of rdg + 1°C)		
	$KP_{VS}Au7Fe$	0.0 to 300.0K	±(0.05% of rdg + 0.7K)		0.1K
RTD	Pt100 (1 mA)*5	-200.0 to 600.0°C	±(0.05% of rdg + 0.3°C)		0.1°C
	Pt100 (2 mA)*5	-200.0 to 250.0°C	±(0.05% of rdg + 0.3°C)		0.1°C
	JPt100 (1 mA)*5	-200.0 to 550.0°C	±(0.05% of rdg + 0.3°C)		0.1°C
	JPt100 (2 mA)*5	-200.0 to 250.0°C	±(0.05% of rdg + 0.3°C)		0.1°C
	Pt50 (2 mA)*5	-200.0 to 550.0°C	±(0.05% of rdg + 0.3°C)		
	Ni100 (1 mA)*6 SAMA	-200.0 to 250.0°C	±(0.05% of rdg + 0.3°C)		
	Ni100 (1 mA) DIN *6	-60.0 to 180.0°C	±(0.05% of rdg + 0.3°C)		
	Ni120 (1 mA)*7	-70.0 to 200.0°C			
	J263*B	0.0 to 300.0K	±(0.05% of rdg + 0.3K)		0.1K
	Cu10 GE	-200.0 to 300.0°C	±(0.2% of rdg + 0.7°C)	-84.4 to 170.0°C*8	0.1°C
	Cu10 L&N			-75.0 to 150.0°C*8	
	Cu10 WEED			-20.0 to 250.0°C*8	
	Cu10 BAILEY			-20.0 to 250.0°C*8	
High resolution RTD	Pt100 (1 mA)*5	-140.00 to 150.00°C	±(0.05% of rdg + 0.3°C)		0.01°C
	Pt100 (2 mA)*5	-70.00 to 70.00°C	±(0.05% of rdg + 0.3°C)		
	JPt100 (1 mA)*5	-140.00 to 150.00°C	±(0.05% of rdg + 0.3°C)		
	JPt100 (2 mA)*5	-70.00 to 70.00°C	±(0.05% of rdg + 0.3°C)		
Contact	Voltage input	Less than 2.4 V OFF, 2.4 or more ON detection (TTL)			
	Contact input	Contact ON/OFF			

*1 R, S, B, K, E, J, T: ANSI, IEC 584, DIN IEC 584, JIS C 1602-1981
*2 L: Fe-CuNi, DIN-43710, U: Cu-CuNi, DIN 43710
*3 N: Nicorosil-Nisil, IEC584, DIN IEC 584
*4 W: W.5%Re-w.26%Re (Hoskins Mfg Co)
*5 P150: JIS C 1604-1981, JIS C 1606-1986 P1100: JIS C 1604-1989, JIS C1606-1989, IEC 751, DIN IEC 751JP1100: JIS C 1604-1981, JIS C 1606-1989
*6 SAMA/DIN
*7 McGRAW EDISON
*8 Accuracy guarantee range

■**Input method**
Floating unbalanced input, each channel mutually isolated (channel independent)
The RTD range has a common potential (terminal b).

■**A/D resolution**
±20000

■**The standard operating conditions**
23±2°C, 55±10%RH, warming-up time 30 minutes or more, vibration and others not affecting instrument operation.

■**Compensation for the reference junction**
Switchable internally or externally for each channel.

■**Compensation accuracy for the reference junction**
(Measured at 0°C, used for a bundle line of thermocouple at ϕ0.5 or less.
When the input terminals are balanced Frontwards: 0° Backwards: 0° horizontal)
Type R, S, B, W: ±1°C
Type K, J, E, T, N, L, U: ±0.5°C

■**Maximum allowable input voltage**
2 V DC range or lower, thermocouple, RTD, DI (CONT): ± 10 V DC
6 V DC range or greater, DI (LEVEL): ± 60 V DC

■**Normal mode voltage**
Voltage, thermocouple: 1.2 times or less (at peak value, including 50 or 60Hz signal component)
RTD: 50 mV or lower (at peak value)

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■**Normal mode rejection ratio**
40 dB or greater (50/60 Hz ±0.1%)
■**Common mode noise voltage**
250 V AC rms (50/60 Hz)
■**Common mode rejection ratio**
120 dB or greater (50/60 Hz ±0.1%, 500 Ω unbalanced, between the negative measurement terminal and ground)
■**Maximum noise between channels**
150 V AC rms (50/60Hz) (except for RTD)
■**Noise rejection**
Rejection by integration type A/D, lowpass filter, or moving averaging.
■**Lowpass filter**
50/60/10 Hz
■**Input resistance**
Min. 10 MΩ at 2 V DC or lower, thermocouple range
Approx. 1 MΩ at 6 V DC or higher (Power off: 10 MΩ or more)
■**Insulation resistance**
Min. 20 MΩ at 500 V DC between the input terminal and ground.
■**Input bias current**
Max.: 10 nA
■**Dielectric strength**
1,000 V AC (50/60 Hz) for 1 minute:Between input terminals (except for RTD)
1,500 V AC (50/60 Hz) for 1 minute:Beetween an input terminal and ground
■**Input source resistance**
DCV, thermocouple: 2 kΩ or lower
RTD: 10 Ω or lower per line (Pt100 Ω)
5 Ω or lower per line (Pt150 Ω)
1 Ω or lower per line (Cu10 Ω)
The same resistance including 3-line.
■**Temperature coefficient**
Zero: 0.01% of range/°C
Full span: 0.01% of range/°C (0.02% of span/°C for Cu10 Ω)
■**Thermocouple burn out:**
Detected in a thermocouple range (On/Off enabled), current of 4 µA, detectable pulse width of approx. 5 ms.
2 kΩ or lower is considered to be 'Normal'
100kΩ or greater is considered to be 'Disconnected'

Recording section

■**Recording method**
Raster scan method, 10-color wire dot recording
■**Number of recording points**
Measurement result: 20 points + AC 6 points* or 2 points*
Computation results 30 points
*To be released later
■**Recording paper**
Effective recording width: 150 mm (for dot recording)
■**Recording accuracy**
Dot: ±(0.2% of recording span + measurement accuracy)
Digital value: Determined by the measurement accuracy.
■**Maximum recording resolution**
Dot: 0.1 mm
Digital value: Depends upon the measurement resolution.
■**Recording colors**
Analog trend mode
Dot recording: Purple, red, green, blue, brown, black, navy blue, yellow-green, red-purple, orange (Color can be specified separetely for each channel.)
Digital printout: Black
Alarm printout: Red (Alarm cancel mark: Blue)
Logging mode
Logging recording: Purple
■**Recording interval**
Analog recording interval in analog trend mode
FIX: Recording takes place in synchronism with the measurement interval between 2 and 60 seconds.
AUTO: Recording takes place in synchronism with the measurement interval and the recording paper feed speed.
Recording interval for digital printing in the analog trend mode
MULTIPLE: Specify from six kinds for each channel (1 minute to 24 hours, specify in 1-minute units).
SINGLE: Automatically determined from the paper feed speed, the number of recording channels whose numerical values are to be printed, and the number of rows.
Digital value recording interval in the logging mode:
MULTIPLE: Specify from six kinds for each channel (1 minute to 24 hours, specify in 1-minute units).
SINGLE: Common to all points (between 1 minute and 24 hours, specify in 1-minute intervals)
Recording interval switchover: 2 kinds
Switched over according to event/action function
■**Recording paper feed**
Paper feed speed: 1 to 1,500 mm/h
Recording paper speed change: 2 kinds
Switched over according to the event/action function
Recording paper feed method: Pulse motor
Paper feed accuracy: ±0.1% of the feed distance (Does not include the elongation or contraction of the recording paper when continuous recording is performed over a distance of at least 1000 mm.)

■**Recording mode**
NORMAL: Starting and stopping recording by pressing a key
Alarm generation channel trend:
TRIGGER ... Recording starts only for a channel in which an alarm is detected.
Stopping recording by pressing a key.
LEVEL ... Recording of only a channel in which an alarm is generated takes place.
(Recording starts when an alarm is detected, and stops when the alarm is chanceled.)
Group trend: The measurement channels are divided into groups, and recording takes place only for channels belonging to the specified group. The selection of the group to be recorded can be made using the event/action function.
■**Auxiliary printing functions**
Common: Printing takes place in the analog trend mode.
Chart speed (mm/h) × dot recording interval (s) must be no greater than 3000 (≤ 3000).
Time printing: Hours, minutes
Unit printing (UNIT): Arbitrary setting within 6 characters
Channel No./TAG printing: Arbitrary setting between 7 and 16 characters
Alarm printing: Channel No., kind of alarm, ON/OFF time (hours, minutes)
Scale printing: 0, 100%/0, 50, 100%/every 20%
Message printing: 20 kinds of messages (16 characters) and the time are printed. Periodic printing. Printed is started by a key operation or the event/action function.
■**Others**
Setting the recording time: The recording start/stop times can be set.
Manual printing: One scan's worth of data can be digitally printed by means of a key operation or the event/action function.
Analog trend recording is interrupted.
List printing: The set contents are printed (printing is started by a restart).
Header printing: A character array consisting of 80 characters × 5 lines is printed (the measurement value recording is interrupted). Printing is started by a key operation or the event/action function.
Recording zone: The recording width and the recording positions (0% and 100% positions) can be set in mm units for each channel.
Partial compression: Can be set for each channel (Only one boundary value can be set).
Event/action function: Alarm detection/remote control signal input/Chart end signal/Time/Recording starts by means of a key operation./ The chart speed can be changed, etc.

Memory Function section

■**Memory media**
●3.5" floppy disk drive
When measurement data is saved to a floppy disk, it is first stored in the buffer memory (512 KB, SRAM).
■**Kind of memroy**
Set values, measurement values, computed values (except /M3 report value).
■**Data length**
10 items of data/channel to 50 k items of data/channel
However, the total memory length must be within the capacity of the vacant memory.
■**Memory format**
Binary
However, when copying the data in the buffer memory to a floppy disk, it is possible to convert the data into ASCII (CSV) form.
■**Sample rate**
In synchronism with the measurement interval of the recorder, or 1/2/5/10 minutes, or when an event occurs.

Data conversion software

Data is measured using a DR recorder by means of DR data conversion software, and the file format of the data saved to a floppy disk is converted.
File conversion: ASCII format, Lotus 1-2-3 format, Excel format
File conversion range: Specified by means of the number of data points.
OS: MS-DOS, Windows 3.1
PC: IBM-PC compatible machine that has a CPU of at least 486DX2

Display section

■**Display section**
Display: VFD display (5 × 7 dot matrix, 3 lines)
Number of characters: 22 characters (Large/1 line), 40 characters (2 lines)
■**Display contents**
Digital value display: The data for an arbitrary channel is displayed on one line (1 ch/1 line, max 5 ch).
CH No./TAG (7 characters), alarm search, measurement value, and unit are displayed with respect to time.
Measurement value bar graph display:
Values are displayed as 0 to 100%.
Auxiliary information: Clock, alarm status, alarm relay status, recording format, recording ON/OFF, key lock ON/OFF, and recorder operation (print format)

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DR130

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Alarms

■Number of settings
UP to four alarm settings can be made for each channel.
Kinds of alarms: Select from upper and lower limits, difference between upper and lower limits, and percentage change rising and falling limits).
Percentage change alarm time interval: Measurement interval × 1 to 15 settings are possible (common to rising and falling limits).

■Output mode
AND/OR mode selection, and output hold/non-hold designation are possible.
Re-breakdown re-alarm output 6 contacts can be available.

■Number of alarm output points
Max 12 points (when /A4 or /R1 optional specifications are specified)

■Alarm information recording
Trend mode: Channel No., TAG, kind of alarm, and ON/OFF time (hours, minutes) are printed in the right margin.
Logging mode: The kind of alarm and ON/OFF time (hours, minutes) are printed when the measurement values are recorded.

■Displaying alarm information
Alarm status display: Lights when an alarm is detected. A flashing display can also be set.
Alarm acknowledge display: The alarm point flashing display stops when a key is pressed.

Standard computation functions

■Kinds of computation
Difference between arbitrarily selected channels, linear scaling (scaling), moving average

■Linear scaling
Scalable range: DC voltage, termocouple, RTD, contact
Scaling range: -30,000 to +30,000
Decimal point: Arbitrarily set
Measurement accuracy during scaling: Measurement accuracy during scaling (digits) = Measurement accuracy (digits) × Scaling span (digits)/ Measurement span (digits) + 2 digits (Digits below the decimal point are discarded.)

■Moving average
The moving average result for 2 to 64 scans is computed.

Power supply section

Rated supply voltage: 100 to 240 V AC
Usable supply voltage range: 90 to 250 V AC
Rated supply frequency: 50/60 Hz
Power consumption: Approx. 130 VA max (when 20 input channels are selected)

Others

Clock: Comes with calendar function(Western calendar)
Clock accuracy: ±100 ppm. However, this does not include the delay when the power is switched ON/OFF once (no more than 1 second).
Fail: Contact output (when the /R1 option is specified)
Key lock: The set condition is locked with software.
Set value backup: Lithium battery backup (approx. 10 years)
Insulation resistance: Between the power supply terminal and ground, between each terminal and ground, and between input terminals At least 20 MΩ (measured with 500 V DC)
Withstand voltage: Between power supply terminal and ground of DR130 ... 1,500 V AC (50/60 Hz) for 1 minute
Between input terminal and ground of **DR130** ... 1,500 V AC (50/60 Hz) for 1 minute
Between output terminal and ground of **DR130** ... 2,300 V AC (50/60 Hz) for 1 minute

Normal operating conditions

Supply voltage: 90 to 250 V AC
Supply frequency: 50 Hz ± 2%, 60 Hz ± 2%
Ambient temperature: 0 to 50°C (5 to 40°C when FDD is installed)
Ambient humidity:

Ambient temperature	Ambient humidity
0 to 40°C	20 to 80%PH
40 to 50°C	10 to 50%RH
*Condensation is not allowed.	

Vibration: 10 to 60 Hz 0.2 m/s2
Impact: Not allowed
Magnetic field: 400 A/m max (50/60 Hz)
Position: The instrument must be installed left-right horizontally, or vertically.

Optional specifications

Computation functions (/M1)

■Kinds of computations
Four arithmetic operations, SQR (square root), ABS (absolute value), LOG (common logarithm), LN (natural logarithm), EXP (exponent, satistic computations, logic computations (AND/OR/NOT/XOR), relative computations, power, previous measurement value reference, hold, reset, remote RJC computations
Number of channels on which computations can be performed: Max 30
Computation interval: Each measurement interval (However, if computation processing becomes difficult to perform during each measurement interval because of the kind of computation or the number of channels, a warning is output.)
Computation range: $\pm 10^{308}$
Display range: -9,999,999 to +99,999,999 (Decimal point can be set to have 1 to 4 digits on the right of the decimal point.)
Communication input: The digit value (ASCII number row) input due to the communication interface is recorded as an analog trend.
Starting and stopping computation: Can be controlled by communication commands, function keys, the event/action function (key operation, remote control signal, time setting, alarm status, etc.).
Computation value hold: Computation can be temporarily interrupted or the computation result can be temporarily held by means of the event/action function (key operation, remote control signal, time specifiecation, alarm status, etc.).
Statistical computations restart from the hold point after computation is restarted.

■Statistical computations
CLOG: Computation processing in groups specified at the same time (total, maximum, minimum, average, maximum - minimum)
TLOG: Computation processing of a time system concerning a certain channel (total, maximum, minimum, average, maximum - minimum)
Statistical computation interval: Interval setting by means of the event/action function

■Remote RJC
Range: Termocouple (TC)
Accuracy: (Standard thermocouple input measurement accuracy × 2) + (Difference in temperature between the terminal of the remote terminal and the remote terminal temperature measurement thermocouple)
Thermocouple burnout: Cannot be selected.

Report Function (/M3)
Instantaneous values of measured data, as well as maximum, minimum, average and total, for each hour, day or month are printed in tabular form on recording paper. Analog recording is interrupted while a report is being made.
Report calculation channels: Up to 30chs.
Note: DP380 report software supports this function.
FDD function of the **DR130** does not support this function.

Power monitor option (/N7 or /N8)

■Outline specifications
Number of channels: For single phase: (voltage 1 channel, current 1 channel)
For 3 phase: (voltage 3 channels, current 3 channels)
Terminal shape: Clamp
Measurement interval: 2S
Input method: Transformer-isolated input
Measurement items: Six items can be selected from the following: RMS value of AC voltage/current, active power apparent power, reactive power, frequency, power factor and phase angle (There is a restriction in combining a selected item with another.)
Measurement range (resolution):
Voltage: 250 V (0.1 Vrms), 25 V (0.01 Vrms)
Current: 5 A (0.001 Arms), 0.5 A (0.0001 Arms)
Measurement accuracy: ±(0.5% of span when RMS V or A is measured)
Measurement frequency: 45 to 65 Hz (Must be the same frequency for all channels.)
Crest factor: 3 max
Power integration: Calculated by /M1 (computation functions) option. /M1 must be specified to the **DR130**.

GP-IB communication input option (/C1)

■Functions
Control of measurement value output, set value output, setting of measurement conditions, starting/stopping of measurement, etc.

■Outline specifications
Electrical and mechanical specifications: Conforms to IEEE St'd 488-1978.
Code used: ISO (ACCII) code
Address: 0 to 15

RS-232-C communication input option (/C2)

■Functions
Control of measurement value output, set value output, setting of measurement conditions, starting/stopping of measurement, etc.

■Outline specifications
Electrical and mechanical specifications: Conforms to EIA RS-232-C.
Connection method: Point-to-point
Communication method: Half duplex
Syncrhnization method: Start-stop synchronization (synchronization by start/stop bit)
Baud rate: 150, 300, 600, 1200, 2400, 4800, 9600, 19200
Start bit: 1 bit fixed
Data length: Select from 7 and 8 bits.

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DR130

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Parity: Select from EVEN, ODD and no parity.
Stop bits: Select from 1 and 2 stop bits.
Transmission distance: Max 15 m
Connector: D-sub 25-pin connector

Alarm contact output option (/A4)
■Outline specifications
Number of output points: 10 points
Contact mode: Make contact: Normally open - common terminal
Terminal shape: Screw
Output mode: Can be switched between excited and non-excited.
Can be switched between hold and non-hold.
Re-beakdown re-alarm: Max 6 contacts can be specified.
Contact capacity: 250 V DC/0.1 A (resistive load)
250 V AC/2 A (resistive load)
30 V DC/2 A (resistive load)
Withstand voltage: 2300 V AC (50/60 Hz) for one minute between output terminal and ground

DI/DO interface option (/R1)
■Alarm contact output
Number of output points: 2 points
Output refresh interval: Each measurement interval
Contact mode: SPDT
(normally open - common - normally closed contacts)
Shape of terminal: Screw
Output mode: Can be switched between excited and non-excited.
Can be switched between hold and non-hold.
Re-breakdown re-alarm can be specified.
Contact capacity: 250 V DC/0.1 A (resistive load)
250 V AC/2 A (resistive load)
30 V DC/2 A (resistive load)
Withstand voltage: 2300 V AC (50/60 Hz) for one minute between output terminal and ground

■Recorder function remote control
Function outline: The following functions can be controlled by a contact input.
- Starting/stopping analog recording
- Starting manual printing
- Starting digital recording of measurement values
- Starting message printing, and header printing
- Changing the recording paper feed speed
- Changing the digital recording interval
- Resetting the digital recording interval
- Starting and resetting statistical computations (when /M1 has been added)
- Temporarily holding the results of statistical computations (when /M1 has been added)
- Resetting the alarm contact hold function
- Starting measurement data save (memory write)

Input signal: No-voltage contact open collector (TTL or transistor)
Input signal width: 1 second min
Withstand voltage: Between input terminal and ground 1500 V AC (50/60 Hz) 1 minute

■Fail output
Outline of function: If a system abnormality is detected, the fail output terminal becomes non-excited.
Contact mode: SPDT
(normally open -common -normally closed contacts)
Cannot be switched between excited and non-excited.
Contact capacity: 250 V DC/0.1 A (resistive load)
250 V AC/2 A (resistive load)
30 V DC/2 A (resistive load)
Withstand voltage: Between the output terminal and ground 2300 V AC (50/60 Hz) 1 minute

■Chart end output
Outline of function: When the end of the recording paper is detected, the chart end output terminal is excited.
Contact mode: SPDT
(normally open - common - normally closed contacts)
Cannot be switched between excited and non-excited.
Contact capacity: 250 V DC/0.1 A (resistive load)
250 V AC/2 A (resistive load)
30 V DC/2 A (resistive load)
Withstand voltage: Between the output terminal and ground 2300 V AC (50/60 Hz) 1 minute

AVAILABLE MODELS

● DR130 Portable Hybrid Recorder

Model	Suffix codes		Description	
DR130			Portable Hybrid Recorder	
Memory	**-0**		No memory (For software, always specify "0.")	
	-1		3.5-inch FD	
Software	**0**		Data conversion software unnecessary (specify "0" when "-0" is selected as the memory code)	
	2		Data conversion software provided	
Input channel	**-1**		10 ch	
	-2		20 ch	
Input	**1**		Universal input, screw	
	2		Universal input, clamp	
	3		DC V/TC/DI input screw	
	4		DC V/TC/DI input clamp	
Power supply voltage	**-1**		100 to 240 V AC	
Power inlet, power cord	**D**		3-pin power inlet w/UL, CSA cable	
	F		3-pin power inlet w/VDE, cable	
	R		3-pin power inlet w/SAA, cable	
	S		3-pin power inlet w/BS, cable	
Optional specifications		**/M1**	Computation functions (including RRJC)	
		/M3	Report function	
		/C1	GP-IB interface	Must not coexist
		/C2	RS-232-C interface	
		/N7	Power monitor for single phase	Must not coexist
		/N8	Power monitor for 3 phase	
		/A4	Alarm output module (A type 10 contacts)	
		/R1	2-point alarm output, remote control signal input, fail output, and chart end output	
		/D2	°F display	

●Options
The maximum allowable number for the /N□/C□, /A4, /R1 options is determined according to the specified number of input channels, as shown below.
10 channels: Three kinds of options can be specified.
20 channels: Two kinds of options can be specified.
●Standard accessories
One fold of recording paper, one ink ribbon, instruction manual

● Spares

Part No.	Part name	Minimum ordering quantity
B9627AZ	10-color ribbon	1
B9855AY	Foldable recording paper (20 m)	10

● Accessories

Model	Description
DV300-011	Shunt resistor 10 Ω Screw type
DV300-012	Shunt resistor 10 Ω Clamp type
DV300-101	Shunt resistor 100 Ω Screw type
DV300-102	Shunt resistor 100 Ω Clamp type
DV300-251	Shunt resistor 250 Ω Screw type
DV300-252	Shunt resistor 250 Ω Clamp type
DV400-015	Rack mounting kit For **DR130** Conforms to ANSI/EIA standard.
DV400-025	Rack mounting kit For **DR130** Conforms to JIS standard

● Software

Model	Description	OS Environment
DP200-03	DR basic softwre (DR setting, simplified data acquisition)	MS-DOS
DP200-13		Windows3.1
DP300-03	DR/DA enhanced data logging software	MS-DOS
DP300-13		Windows3.1
DP380-13	Report softwre	Windows3.1
DP400-03	DR data conversion software (One package is provided when the DR memory function is specified)	MS-DOS, Windows3.1

DIMENSIONS

Unit : mm (inch)