Hybrid Recorder

DR240

Advanced instrumentation technology for cost-effective data logging and data acquisition.

Data Acquisition and Recording Windows for now and the future.

The following product was discontinued as of March 31, 2014.
Discontinued product: DR242
The DR240 is a high performance panel-mounted hybrid recorder that can measure data from 10 to 300 channels in 500 ms. Compact input modules measure input variables, such as temperature, flow rate, strain, etc. and can simultaneously record and transfer the measured data to a personal computer or store it in a memory device (floppy disk).

The DR240 is available in two versions, a stand-alone model which has an integrated input, output and recording section and a maximum capacity of 30 channels. The expandable model uses input modules which can be easily expanded from 10 to 300 channels in 10-channel increments. Alarm output modules are also available. The input and output sections of the expandable model are modularized, enabling you to freely configure the optimum data acquisition environment.

This highly reliable, expandable and economical unit was developed as the next generation hybrid recorder. It also meets a wide range of needs from small-scale data logging to multi-point data acquisition.

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**Highly Advanced, Versatile, 250 mm Hybrid Recorder that Meets Your Present and Future Needs**

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**DR240 stand-alone model**

This general-purpose model measures and records up to 30 channels. Specify 10, 20 or 30 channels at the time of ordering. The construction of this DR240 model provides excellent cost performance.

- **Input channels**: From 10 to 30 channels, connected directly to the main unit
- **Measurement interval**: 2 s minimum
- **Universal inputs**: DCV, TC, RTD, contact, power monitor (option)
- **Memory devices (specified when ordering)**: 3.5" floppy disk drive

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**DR240 expandable model**

Connecting the main unit to each subunit with dedicated cables, you can easily configure a multi-channel hybrid recorder.

- **Input channels**: The number of input channels can be increased from 10 to 300 channels in steps of 10 channels.
- **Measurement interval**: 500 ms maximum
- **Inputs**: Universal (DCV, TC, RTD), DI, DCV/TC/DI dedicated, power monitor, pulse, strain and direct current (mA) modules
- **Up to six subunits can be connected to one main unit.
- **Up to six subunits can be connected to one subunit.
- **Subunits can be separated from the main unit by up to 500 m total cable length.
- **Memory devices (specified when ordering)**: 3.5" floppy disk drive
Highly Expandable and Cost Effective

DR240 Expandable Model

The DR240 expandable model enables you to start with a small number of channels, and conveniently expand, up to 300 channels. The architecture of the DR240 allows you to increase the number of input and/or output modules as your application needs change.

The versatility of the DR240 recorder enables you to freely configure a recording/data acquisition environment that matches your particular application, while effectively reducing your initial investment.

Input Module

The input module is a 10-channel small remote multiplexer that A/D-converts the measured signals as fast as every 500 ms. The input signals include not only DC voltage and temperature, but also contact, power monitor, pulse, strain and DCA (mA) signals.

- **Universal Input Module**: The universal input module permits measurement of DC voltages between 20 mV and 500 V, thermocouple inputs, IRD inputs, and contact signals in up to 500 ms intervals.
- **Alarm output module**: Enables you to start with a small number of channels, and conveniently expand, up to 300 channels. The minimum measurement interval is 0.5 second and the data update cycle is one second.
- **Power Monitor Module**: The power monitor module receives AC voltage or current input signals and measures RMS values, active power, apparent power, reactive power, frequency, power factor, and phase angle. The minimum measurement interval (data update cycle) is 2 seconds.
- **Strain Measurement Module**: The strain measurement module measures static strain, and comes in two types. One corporate a 120 or 350 mV bridge resistor, the other is for connecting an external bridge box. One module enables data in 10 channels to be measured, however, it requires two 120 or 350 mV bridges per terminal. The minimum measurement interval (data update cycle) is 500 ms.
- **Direct Current (mA) Module**: The short resistor (100 Ω) is pre-installed to measure the DCA signal.

Alarm output module

This is a 4-channel or 10-channel output module which outputs contact alarm signals according to preset conditions. You can set four alarm levels per channel (choose from upper limit, lower limit, delta high limit, delta low limit, or rate-of-change). You can install alarm output modules on the subunits.

General-purpose communications module

You can connect an Ethernet, RS-422/485, RS-232C, or GP-IB (general-purpose communications module) to the back panel of the main unit. All measured data is transferred in real time via the installed communications module.

Ethernet module

The Ethernet module enables you to achieve high-speed, multi-channel, remote data communication via Ethernet. The module supports all commands generally used for DARWIN and permits the DR240 to control up to the maximum of four personal computers (configured to do so with user-created software).

DI/DO module

This module enables the DR240 hybrid recorder to be controlled from a remote location, and also outputs the chart end and recorder fail signals to your external annunciator.

Extension module

Using an extension module, you can supply power directly from a subunit for each input/output module, mounted on an extension base unit. One subunit will be at a separate location from the main unit. When a subunit is connected, it will be at a separate location from the main unit. When a subunit is mounted on the back of a main unit, a dedicated cable is required between them.

DV250-001 Cable adapter

The DV250-001 cable adapter is used as a junction for connecting different terminal cables, not only between the DARWIN units but also as an adapter for connecting the dedicated cable to different cable types.

Examples of extension modules and base units with DS402 subunit
Structural Simplicity
DR240 Stand-alone Model

This model has a simple building block architecture, and comes with I/O and communications modules installed on the back of the main unit. Specify 10, 20 or 30 input channels, and desired options, at the time of ordering.

Simple integrated construction
You can connect 10, 20 or 30 channels directly to the main unit. The DR240 stand-alone model, which comes with I/O modules already installed, is a cost-effective general-purpose model. The external appearance, recorder function, memory and communications functions of this model are identical to those of the expandable model. Because this model is of integrated construction, it can be carried about easily.

Universal and power monitor range
Universal inputs permit measurement of a variety of inputs including DC voltage, thermocouple, RTD and contact signals. Low-cost model for measuring only voltage and thermocouple signals is available. You can also select power monitor (optional) for measuring AC voltage and current.

Variety of options, including general-purpose communications and DI/DO functions
General-purpose communications (Ethernet, RS-232C, RS-422A/485, and GP-IB), 10-point SPDT alarm output relays, DI/DO (2 alarm relays, remote control of recorder, CPU fail and chart end contacts). Specify your required options when ordering.

Comparison of expandable and stand-alone models

<table>
<thead>
<tr>
<th>Model</th>
<th>DR240 hybrid recorder</th>
<th>Expandable model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features</td>
<td>Integrated type that can measure up to 30 channels. Can be carried about easily, and is suitable for small scale data logging.</td>
<td>Expandable up to 300 channels. By connecting subunits to the main unit, you can perform multi-channel measurement with the minimum amount of wiring.</td>
</tr>
<tr>
<td>Number of input channels</td>
<td>10/20/30 channels (Specify when ordering.)</td>
<td>10 to 300 channels. Connect to subunits.</td>
</tr>
<tr>
<td>Input</td>
<td>Universal, DCV/TC/RTD, power monitor (optional).</td>
<td>Universal, DCV/TC/RTD, power monitor (optional).</td>
</tr>
<tr>
<td>Connection of subunits and remote measurement distance</td>
<td>Not applicable. Up to six subunits can be connected, 500 m max.</td>
<td>Not applicable. Up to six subunits can be connected, 500 m max.</td>
</tr>
<tr>
<td>Max. scanning speed</td>
<td>0.5 s/all channels</td>
<td>0.5 s/all channels</td>
</tr>
<tr>
<td>Max. recording speed</td>
<td>Common (2 s/channel)</td>
<td>Common (2 s/channel)</td>
</tr>
<tr>
<td>Memory device</td>
<td>Common (3.5-inch FDD)</td>
<td>Common (3.5-inch FDD)</td>
</tr>
<tr>
<td>Power supply</td>
<td>AC or DC (specify when ordering.)</td>
<td>AC</td>
</tr>
</tbody>
</table>

Universal input
Communication interface (optional)
Power monitor (optional)
Alarm output (optional)

Rear panel of the stand-alone model

AC or DC power terminal
**Versatile Operator Display and Ease of Operation**

**Monitoring/Configuration Functions**

The DR240 incorporates a 3-line, large vacuum fluorescent display (VFD) which can be used as a process monitor enabling you to readily view data or check alarm statuses, even from a remote location. The DR240 is interactively configured using the easily-read display.

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**Versatile display formats**

The large vacuum fluorescent display shows a total of 102 characters, one line of 22 large characters, and two lines of 44 smaller characters. It displays the measured results and alarm statuses in an easily readable format. There are a large number of display formats including up to 5-ch digital data, bar graph, and alarm relay status. Tag names and engineering units are displayed, making process monitoring easier than ever.

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**Simple setup**

The DR240 is interactively configured using the 102 character VFD display. The setup items are always displayed in large characters at the top, with the range of choices and other information displayed at the bottom. In addition, the setup menus separate items that are frequently used from those that are rarely changed once set, thus simplifying configuration.

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**Replacing consumables**

The ink ribbon is a quickly replaceable cassette. 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 HR2400 hybrid recorder.

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**Removable input/output modules**

The input and output sections are of modular construction, enabling them to be removed when performing wiring. Also, the universal input modules are available with either screw or push-in (clamp) type terminals.
Clear Hybrid Recording Functions

A recorder's performance is measured by the readability of the information on its printed chart. The DR240 can record clearly, in 10 colors, data from all measurement points, at 2-second intervals. It has a wide variety of recording functions including analog trend recording over an effective recording width of 250 mm, recording of digital measured values, recording of various messages, zone recording, and partially compressed and expanded recording, that help interpret the data.

- High speed recording at 2-second intervals
- Versatile recording formats
- Programmable ten-color recording

The interpolation function enables data points of each channel to be linked by lateral line segments so as to show the continuity of the data.

(1) Analog trends
Records clearly in 10 colors. You can assign the recording color to each channel.

(2) Digital recording
Measured values are recorded digitally either at an interval based on the chart speed, or at your specified interval. You can also start the recording of data by a remote contact input.

(3) Manual recording
By pressing a key, analog recording can be interrupted and measured values of one scan recorded digitally.

(4) Alarm printout
A change in the alarm status (ON/OFF state and time, for each channel) is printed out.

(5) Scale printout
The recording scale is printed out for each channel.

(6) Message printout
The contents of a preset message are printed out by pressing a key, contact closure on a remote control terminal, or when an alarm is detected. You can preset up to five messages of 16 characters each.

(7) Header printout
Headers are printed as comments (five rows of 80 characters) for experiments or process monitoring.

(8) Printing channel No. and tag No.
The channel number or tag are printed periodically.
PC-Friendly
Data Acquisition Software is designed to run under Windows 98/Me/NT4.0/2000/XP

In addition to performing real time recording in the field and saving measured data to a removable memory media, the DR240 functions as a PC based high speed multi-point data acquisition unit. Various kinds of application software are available.

Software for configuration and data acquisition, and software for converting data saved to a removable memory device, is available. This application software makes your tasks of configuration and data acquisition quick and easy.

DARWIN DAQ32 Software
The data acquisition software 32 (DAQ32) is the standard software for common use with all the data gathering instruments in the DARWIN series. The software includes hardware setup, simplified data logging, simplified data viewing, data conversion (Excel, Lotus 1-2-3 or ASCII format), preference setting, system diagnosis and calibration functions, all in one package. All models of the DA100 data acquisition unit and DC100 data collector come standard with this software. For each model of the DR130, DR230 and DR240 hybrid data recorders, you can specify whether software is necessary or unnecessary when ordering. When you specify software as "necessary," DAQ32 software comes standard with the model.

Example of hardware setup display

DARWIN DAQ32Plus Software
The data acquisition software 32PLus (DAQ32Plus) is the enhanced software for common use with all the data gathering instruments in the DARWIN series. Like the standard DAQ32, this software includes hardware setup, simplified data logging, simplified data viewing, data conversion (Excel, Lotus 1-2-3 or ASCII format), preference setting, system diagnosis, calibration, and tag number setting functions, all in one package. DAQ32Plus is far more powerful than DAQ32, however, in terms of the data monitoring and logging functions. It contains a number of additional functions not found in DAQ32. Additions include a display of up to 30 data groups each having a maximum of 32 channels’ worth of data per window (as compared with the DAQ32’s display of up to 2 data groups each having a maximum of 10 channels’ worth of data per window); displays of various meters including level meters, analog meters and thermometers (not offered by DAQ32); alarm displays; as well as a DDE server, logger autostart, retry, password and tag setting function.

Example of date logging display

Example of date viewing display
The DR240 provides many economic benefits for the user, such as reduced wiring for remote measurement, space saving due to compact design, and optimized signal conversion costs due to the availability of a large variety of input modules.

In addition, it provides superb environmental ruggedness, and onboard computation and memory functions, enabling it to be used for a wide range of applications.

Remote Measurement Reduces Wiring (expandable model)
You can connect subunits to a main unit over a distance of up to 500 m using a single dedicated cable. Consequently, you can greatly reduce field wiring and installation costs. For example, in the case of a 60-channel thermocouple input, 120 wires must normally be connected to the main unit, but by using a subunit you can replace these wires by a single cable.

- **Convenient power to the input modules**
  By using an extension module, you can supply power to each input module directly from the main unit or subunit.

Space saving due to compact design
The depth of the main unit of the DR240 hybrid recorder has been greatly reduced. It is about 60%* of previous models in the case of the 60-channel model, and about 80%* in the case of the 30-channel general-purpose model. Also, the use of high breakdown voltage solid-state relays and a planar transformer developed by YOKOGAWA has enabled the volume of the 60-point input remote measurement section to be reduced to 1/5*** of that of previous models, resulting in a highly compact unit. The mass of the unit has also been reduced to about 1/2*. This makes for more efficient use of control room or laboratory space and reduces total costs.

- Compared to YOKOGAWA’s DA2500E remote scanner plus a subunit in which six input modules are installed.

Complete channel isolation and high-voltage measurement
Channels at the input circuit are fully isolated with high-voltage solid-state relays.* The DR240 can withstand a common-mode voltage of up to 250 VAC** and a withstand voltage of up to 1500 VAC** (for a duration of one minute). These features ensure that the model can be used even for multi-point measurement in the field.

* RTD and pulse inputs share a common line within the same module.
** Depends on module types.

Superb environmental ruggedness
Every effort has been made in the design of the DR240 to reduce power consumption, thereby minimizing temperature rise. As a result, the subunits can be operated over an ambient temperature range of –10 to 60°C. The DR240 can also withstand severe conditions encountered in the field. The front door of the main unit of the recorder is of dustproof and drip-proof construction (conforms to DIN 40050-IP54), thus preventing dust or water droplets from getting inside the unit when installed in a panel.

Max. 500 ms/300 channel high speed measurement (expandable model)
Parallel processing of data is used by the dedicated A/D converter inside each input module. 1 Mbps high speed data transfer is accomplished between the main unit and each subunit. Furthermore, the use of a distributed multi-CPU control method for the overall system achieves high speed measurement of data from 300 channels over an interval of 500 ms. The DR240 has a time axis resolution four times that of the previous model (DA2500E), achieving better time synchronization between channels.

By installing a subunit near the measurement location in the field, you can reduce wiring and also provide a greater degree of environmental protection for the data acquisition system.

Monitoring room

Field

By installing a subunit near the measurement location in the field, you can reduce wiring and also provide a greater degree of environmental protection for the data acquisition system.
Computing functions
The main unit of the DR240 with optional MATH feature can perform the four arithmetic operations, integration of measured data, and computations such as detection of maximum and minimum values, in realtime. Even without the optional feature, the DR240 can compute linear scaling, difference and moving average. The results of such computations are transferred with the measured data to a PC, thus reducing system requirements on the PC and also resulting in more efficient analytical processing.

The main computing functions are as follows. (The shortest computation period differs depending on the kind of computation.)

Standard computing functions
Linear scaling, moving average, differential calculation, pulse integration (when a pulse input module is recognized)

Optional functions
The four arithmetic operations, logic operations, related operations, calculation of absolute and relative values, and statistical calculations (maximum, minimum, mean, and integrated values for fixed intervals)

Moving average function
This function renews the measured value while calculating the moving average, it is effectively 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
By using the DR240 in combination with the optional DI/DO module or alarm function, you can easily perform batch processing.

Report function (JM3)
You can calculate the maximum, minimum, average values, and integrated values of the measured results, and print hourly, daily and monthly reports. The calculated values are also recorded in the report results.

Memory function
You can select a floppy disk function with 512 kB SRAM capability for storage of information on a removable media. You can save several configuration setups and in addition store the measured data before and after an alarm, and also calculated values.

You can record the memorized data on DR240 chart, transfer it off-line to a PC, or analyze it or make it into a report using commercially available spreadsheet software.

Optional features

● You can save the measured data in the following cases:
  ● By manual command or when a communication command is input
  ● When an alarm is detected
  ● When the end of the chart is reached

The save modes are as follows:
  ● Single: Data of the specified length is sampled once only.
  ● Repeat: Data of the specified length is sampled exactly the number of times specified in advance.

* When measured values are saved to a floppy disk, they are first stored in the buffer memory (512 kB DRAM).

Other standard functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Integration mode selection</td>
</tr>
<tr>
<td></td>
<td>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 s.)</td>
</tr>
<tr>
<td></td>
<td>Low-pass filter</td>
</tr>
<tr>
<td></td>
<td>You can insert a low-pass filter in the path of a signal on which noise components are superimposed. (When the filter is ON, the minimum measurement period becomes more than 3 seconds, depending on the input types and channels.)</td>
</tr>
<tr>
<td></td>
<td>Scaling</td>
</tr>
<tr>
<td></td>
<td>The input signal is displayed and/or recorded as an industrial quantity or a physical quantity.</td>
</tr>
<tr>
<td></td>
<td>Burn-out</td>
</tr>
<tr>
<td></td>
<td>When the thermocouple input goes open circuit, the indicator moves to the 100% or 0% side.</td>
</tr>
<tr>
<td></td>
<td>Differential calculation</td>
</tr>
<tr>
<td></td>
<td>The difference between the reference channel and measured channel is measured.</td>
</tr>
<tr>
<td>Record</td>
<td>Zone recording</td>
</tr>
<tr>
<td></td>
<td>The recording area can be set freely for each channel.</td>
</tr>
<tr>
<td></td>
<td>Partially compressed and expanded recording</td>
</tr>
<tr>
<td></td>
<td>Unimportant parts are compressed, and only necessary parts are expanded, thus enabling the recording resolution to be increased.</td>
</tr>
<tr>
<td></td>
<td>Group channel trend</td>
</tr>
<tr>
<td></td>
<td>Only channels that belong to the specified group are recorded. Switchover between groups can be done using a remote contact.</td>
</tr>
<tr>
<td></td>
<td>Alarm generation channel trend</td>
</tr>
<tr>
<td></td>
<td>Trend recording takes place only for channels that emit an alarm.</td>
</tr>
<tr>
<td>Setting</td>
<td>Memory backup</td>
</tr>
<tr>
<td></td>
<td>The set data is protected by a lithium battery inside the unit.</td>
</tr>
<tr>
<td></td>
<td>Security</td>
</tr>
<tr>
<td></td>
<td>The unit comes with a standard password lock function, preventing mis-operation and also protecting the set data.</td>
</tr>
<tr>
<td>Alarm</td>
<td>Re-breakdown re-alarm</td>
</tr>
<tr>
<td></td>
<td>The alarm output can be refreshed when an alarm is emitted.</td>
</tr>
<tr>
<td></td>
<td>Hold function</td>
</tr>
<tr>
<td></td>
<td>Once an alarm is emitted, the alarm indication and relay state are held until the operator acknowledges the alarm.</td>
</tr>
<tr>
<td></td>
<td>Switchover between excitation and non-excitation</td>
</tr>
<tr>
<td></td>
<td>The alarm mode can be switched between the alarm output relay excitation/non-excitation state.</td>
</tr>
</tbody>
</table>
High breakdown voltage solid state relay (SSR)

Developed by YOKOGAWA, the SSR switches the inputs when performing multi-channel measurement. A semiconductor device takes the place of the contacts and drive part of a mechanical relay, thus overcoming the problem of defective measurement caused by faulty or worn contacts of the mechanical type relay. YOKOGAWA’s solid state relay has a high breakdown voltage (1500 VDC), enhancing safety in the field. Also, its low leakage current (1 nA) enables the very low level voltage signals from a thermocouple to be measured with high accuracy.

YOKOGAWA currently uses this SSR in its hybrid recorders and the advanced μR series of industrial recorders. Over 800 thousand channels of this technology have performed successfully in various field and laboratory applications, thus verifying the reliability of the relay device.

A new surface-mounted version of this highly reliable SSR is used in the DARWIN family. This permits a high degree of miniaturization, low power consumption, long device life and quiet operation.

Planar transformer

A planar transformer is a revolutionary integrated transformer which takes the place of the conventional wire-wound transformer, the most antiquated of all electronic components. This small, thin transformer consists of multi-layer precision thin film coils, enhancing insulation, and also reducing heat and noise emission. This concept design means that the power supply unit occupies just 1/2 to 1/4 of the volume of conventional units.

All of the transformers in the main unit, subunits and input and output modules of the DR240 are planar transformers. This is an important factor in achieving the large degree of miniaturization and weight reduction of the DR240.

Adoption of ASICs

The DR240 uses ASICs (Application Specific Integrated Circuit) which were developed with more than 40 years of data acquisition know-how accumulated by YOKOGAWA. Moreover, a high degree of integration has been attained by gate arrays, used around the A/D converter, communication interface, recording and display control circuits. As a result of this high degree of integration, the DR240 has become smaller and lighter, and power consumption and heat generation reduced, improving the reliability of the overall system.

Supported standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSA</td>
<td>Obtained CSA22.2 No.1010.1, Installation category (Overvoltage category): II, Degree of pollution: 2</td>
</tr>
<tr>
<td>UL</td>
<td>Obtained UL3111-1 (CSA/NRTL/C)</td>
</tr>
<tr>
<td>CE</td>
<td>EMC Directive EN61326, EN61000-3-2, EN61000-3-3, EN55011 Class A Group 1</td>
</tr>
<tr>
<td>Low voltage</td>
<td>EN61010-1, Measurement category: II, Degree of pollution: 2</td>
</tr>
<tr>
<td>C-Tick</td>
<td>AS/NZS 2064 Class A Group 1</td>
</tr>
</tbody>
</table>
**Specifications**

**DR240 Main Unit**
- Stand-alone model (DR241) or Expandable model (DR242)

**DR240 Subunit**
- DS460 or DS600

**General Specifications**
- **External Dimensions:** (with I/O module installed)
  - DR241: approximately 444 (W) × 334 (D) mm; approximately 16 kg
  - DR242: approximately 444 (W) × 334 (D) mm; approximately 12 kg
  - DS460: approximately 336 (W) × 165 (H) × 100 (D) mm; approximately 2.5 kg
  - DS600: approximately 422 (W) × 176 (H) × 100 (D) mm; approximately 3.5 kg
- **AC Power Supply**
  - Rated supply voltage: 100 to 240 VAC
  - Usable supply voltage: 90 to 265 VAC
  - Rated supply frequency: 50/60 Hz
- **DC Power Supply**
  - Runs on a DC power supply only. Specify when ordering.
  - Rated supply voltage: 12 to 28 VDC
  - Usable supply voltage: 10 to 32 VDC
  - Terminal: Screw terminals
- **Insulation Resistance**
  - Between 20 mA at 500 VDC between the power supply and ground, between each terminal and the ground, and between terminals:
  - Withstanding Voltage: 1.5 kV for 1 min.
  - Between input/output terminal and ground: 1.5 kV for 1 min.
- **Normal Operating Conditions**
  - Ambient temperature: DR241, DR242 0 to 50 °C (FD operation 5 to 40 °C)
  - DS400, DS600 Panel mount –10 to 60 °C
- **Supply frequency:** 50/60 Hz

**Display Section**
- **Display**: VFD display (5 x 7 dot matrix, 3 lines)
- **Number of characters:** 40 characters (large/1 line), 40 characters (2 lines)

**Memory Function Section**
- **Memory Media**: 3.5-inch floppy disk drive with 512 kB SRAM buffer memory
- **Data Capacity**: 10 data/105 kbyte/channel (Total data memory should be less than total memory length.)
- **Applicable data**: Setting values, measurement values and computed values except report calculating values
  - **Memory Mode**: Binary
  - **Sample Rate**: Synchronized with the measurement interval of the recorder unit, or synchronized with event.
  - **Alarms**:
    - Number of Settings: Up to four settings can be made for each channel.
    - Kinds of Alarms: Upper/lower limit, difference upper/lower limit, upper/lower limit only for the results of computation
  - **Percentage change alarm time interval**: 1 to 15 scans
  - **Number of Alarm Output Points**: DR241: 12 maximum (alarm option: 10; DI/DO option: 2)
  - **DR242**: 300 in total

**Standard Computation Functions**
- **Kinds of Computation**: Difference between arbitrarily selected channels, linear scaling, moving average, pulse integration
  - **Scalable range**: DC voltage, thermocouple, RTD, contact
  - **Scaling range**: –30,000 to +30,000
  - **Moving average**: 2 to 64 scans
  - **Pulse integration**: Effective when a pulse input module is recognized (up to 60 channels)

**Fail, Chart End Output**
- **Automatic output**: The DR stand-alone model uses the /R1 option.
- **Functions**: Refer to the DI/DO modules.

**Optional Specifications**
- **Computation Function** (IM1)
  - Number of Computation Channels: DR241: 30 channels maximum
  - DR242: 60 channels maximum
- **Kinds**: Remote I/O, four arithmetic operations, SQR (square root), ABS (absolute value), LOG (common or natural logarithm), EXP (exponential), statistics processing (CLOG, TLOG), logic (AND, OR, NOT, XOR), relative computation, previous data reference.
  - **CLOG**: Mathematical processing within a group of data that was measured at the same time (total, maximum, minimum, average, max. - min.)
  - **TLOG**: Mathematical processing of data from a certain channel over a period of time (24 hours maximum)
    - (total, maximum, minimum, average, max. - min.)

**Report Function** (IM3)
- 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 60 channels
- **Note**: This function does not allow the results of the report and computing function to be saved on floppy disks. (Thus, to be able to transfer the results to a personal computer, the DP380 report software is needed. Note that the DP380 software cannot be run on the GP-IB module)

**Power Monitor Options** (*N7, *N8)
- **Applicable models and outline specifications**
  - **DR241 stand-alone model** (For the DR242, the power monitor module is sold separately.)
  - **Refer to the power monitor module**

**GP-IB Communications Option** (*C1)
- **Applicable models and outline specifications**
  - **DR241 stand-alone model** (For the DR242, the GP-IB module is sold separately.)
  - Refer to the GP-IB module.
Universal, DCV/TC/DI input module:

A/D integration time: Manual selection or automatic switchover between

± Voltage: 250 V (0.1 Vrms), 25 V (0.01 Vrms)

Measurement range (resolution): measured variables:

Six items can be selected from the following:

± DCV/TC/DI Input Modules

Between input terminal and ground: 1,500 VAC (50/60 Hz) for one minute

Input method: Transformer isolation

Max. 60 channels

Burnout: Detected within thermocouple-input range

DC Current Input Modules

Model Number of Channels Type of Terminals Measuring Interval
DU200-11 10 Screw 0.5 s
DU200-12 10 Clamp 0.5 s

Input method:
Floating imbalance input, and inter-channel isolation
RTD and pulse inputs are of the same potential within the same input module.

A/D resolution: ±0.0000

A/D integration time: Manual selection or automatic switcher between
20 ms (50 Hz), 16.7 ms (60 Hz) and 100 ms (10 Hz)

Measurement Range

DC voltage range: 20 mV to 50 V


Contact input: Voltage-free contact input or voltage input

Mixed input is allowed for DC voltage, thermocouple, RTD and contact inputs.

(An DCV/TC/DI input module, Input DC voltage, contact input is not allowed.)

Measurement accuracy: ±(0.05% of reading + 2 digits)

(±0% to ±20% RH)

Noise correction: By means of integrating A/D, low-pass filter or moving average

Power Monitor Modules

Model Number of Channels Type of Terminals Measuring Interval
DU200-22 For single phase 1 for voltage and 1 for current Clamp 2 s
DU200-32 For 2 phases 3 for voltage and 3 for current Clamp 2 s

Input method: Transformer isolation

Measurable parameters:

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 selecting combined items.)

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)
Fail Output
Function: If an abnormality is found in the total system, the fail output terminal is de-energized.
Output mode: Make contact (NO, NC). Cannot be switched between excited and non-excited.
Contact capacity: 250 VDC/0.1 A (resistive load) 30 VDC/2 A (resistive load)
300 VAC/2 A (resistive load)
Remote Control Signal Input
Function: Start and stop recording
Contact: Screw terminal
Start message printing
Start and stop (memory sampling)
Control statistical calculation interval
Input signal: Non-voltage contact or open collector (TTL or transistor)

Extension Modules
Unit to connect with: DS400 or DS600 subunit (one for each subunit)
Number of input modules: One input module can be mounted on an extension base unit. Up to 3 extension base units can be connected to one extension module in series.
Type of input modules: 10-ch universal input module
10-ch DCV/TC/CI input module
Extensible distance: Up to total length of 30 m

Communications Modules
Specifications Common to Communications Modules
• Functions, Common Specifications
Outline of functions: Output of measured values, output of set points, setup of measurement conditions, control of start/stop of measurement, etc.
Withstanding voltage: 1,500 VAC (50/60 Hz) for one minute between output terminal and ground

RS-485 Modules
Electrical and mechanical specifications:
Addresses: Based on IEEE standard 488-1978
0 to 15
RS-232C Modules
Electrical and mechanical specifications: Based on EIA RS-232C
Communications format: Half duplex
Synchronization: Start-stop synchronization (synchronization by means of the start and stop bits)
Baud rate: Maximum of 15 m
Transmission distance: Minimum of 15 m
Connector: D-sub 25-pin connector

RS-422/485 Modules
Electrical and mechanical specifications:
Addresses: Based on EIA RS-422A and EIA RS-485
Connection method: Multi-drop
Address: 1 to 31
Communications format: Half-duplex, 4-wire method/2-wire method
Synchronization: Start-stop synchronization (synchronization by means of start and stop bits)
Baud rate: 300, 600, 1200, 2400, 4800, 9600, 19200 or 38400 bps
Transmission distance: Maximum of 1200 m
Connector: 6-screw terminal

Ethernet Modules
Network configuration: Ethernet (10Base-T)
10Base-T modular connector: 1
Baud rate: 10 Mbps
Communication protocol: TCP, UDP, IP, ARP or ICMP
Input data: ASCII
Output data: ASCII or binary

Model and Suffix Codes
DR240 Stand-alone model

DR241 Panel mount type hybrid recorder
Memory 0 No memory
1 3.5-inch FD
Software 0 No DAQ32 software included
1 DAQ32 software included
Input channel 1 10 ch
2 20 ch
3 30 ch
Input 1 Universal input, screw
2 Universal input, clamp
3 DCV/TC/CI input screw
4 DCV/TC/CI input clamp
Power supply voltage 1 100 to 240 VAC
2 12 to 28 VDC (DC power supply only)
Power input, power cable T Screw terminal
F Screw terminal for DC power supply (not power cord)

Additional specifications
M1 Computing functions
M2 Report function
M3 RS-232C
C2 RS-232C (isolated)
C3 RS-422/485 (isolate)
C4 Ethernet
I1 Power monitor for single phase
I2 Power monitor for 3 phase
A4 Alarm output module (A type: 10 contacts)
R1 Power alarm input, setup control signal input for output, and fault end output
H1 Internal illumination
D2 T display

Model and Suffix Codes
DR240 Expandable model

DR441 Panel mount type hybrid recorder
Memory 0 No memory
1 3.5-inch FD
Software 0 No DAQ32 software included
1 DAQ32 software included
Input channel 1 10 ch
2 20 ch
3 30 ch
Input 1 Universal input, screw
2 Universal input, clamp
3 DCV/TC/CI input screw
4 DCV/TC/CI input clamp
Power supply voltage 1 100 to 240 VAC
Power input, power cable T Screw terminal
W Screw terminal for DC power supply (not power cord)

Additional specifications
M1 Computing functions
M2 Report function
M3 RS-232C
M4 RS-422/485 (screw)
I1 Internal illumination
I2 T display

Model and Suffix Codes
Subunit: DS400, DS600

DS400 Panel 4-module connection type subunit
Memory 0 Always 0
2 DAQ32 software included
Input channel 1 always 0
2 100 to 240 VAC
Power input, power cable T 3-pin power input w/UL, CSA cable
F 3-pin power input w/UL cable
W 3-pin power input w/UL cable
R 3-pin power input w/UL cable
S 3-pin power input w/UL cable
W With 3-pin power input screw connection terminal

Configuration example of the expandable model
DR400, DS600, DS422, 20-ch alarm output
• 100-ch 0.5 s universal input with RS-332C and 20-ch alarm output
• DR400 expandable main-unit: DR420 × 1
• Sub-unit: DS600 × 2
• Universal input module: DU100-11 or -12 × 10
• Communication module: DT300-21 (RS-232C) × 1
• Alarm output module: DT300-21 × 2
• Extension cable × 2
## Input modules

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Required size</th>
<th>Terminal type</th>
<th>Max. measuring period</th>
<th>Max. measuring period</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU100-11</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Screw</td>
<td>0.5 s</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-21</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Screw</td>
<td>0.5 s</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-31</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-12</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-22</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-32</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
<td>2 s</td>
</tr>
<tr>
<td>DU200-11</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Screw</td>
<td>0.5 s</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU200-21</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Screw</td>
<td>0.5 s</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU200-31</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
<td>2 s</td>
</tr>
<tr>
<td>DU200-12</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
<td>2 s</td>
</tr>
<tr>
<td>DU200-22</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
<td>2 s</td>
</tr>
<tr>
<td>DU200-32</td>
<td>Extrinsic universal input (DC-, TC-, RTD)</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
<td>2 s</td>
</tr>
</tbody>
</table>

## Software

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Applicable Operating System</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP200-23</td>
<td>Extrinsic data logger software</td>
<td>Windows 98, Windows Me, Windows NT4.0, Windows 2000, Windows XP</td>
</tr>
</tbody>
</table>

## Spares

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Name</th>
<th>Order qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>5B627X2</td>
<td>10-color ribbon</td>
<td>4</td>
</tr>
<tr>
<td>5B627TY</td>
<td>Z-fold paper (30 m)</td>
<td>10</td>
</tr>
<tr>
<td>5B623TY</td>
<td>Z-fold paper (30 m)</td>
<td>10</td>
</tr>
</tbody>
</table>

## Optional accessories

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU100-01</td>
<td>Extension module</td>
</tr>
<tr>
<td>DU100-02</td>
<td>Extension base unit</td>
</tr>
<tr>
<td>DU100-03</td>
<td>Extension cable (0.5 m)</td>
</tr>
<tr>
<td>DU100-04</td>
<td>Extension cable (1 m)</td>
</tr>
<tr>
<td>DU100-05</td>
<td>Extension cable (2 m)</td>
</tr>
<tr>
<td>DU100-06</td>
<td>Extension cable (3 m)</td>
</tr>
<tr>
<td>DU100-07</td>
<td>Extension cable (4 m)</td>
</tr>
<tr>
<td>DU100-08</td>
<td>Extension cable (6 m)</td>
</tr>
<tr>
<td>DU100-09</td>
<td>Extension cable (9 m)</td>
</tr>
<tr>
<td>DU100-10</td>
<td>Extension cable (12 m)</td>
</tr>
<tr>
<td>DU100-11</td>
<td>Extension cable (15 m)</td>
</tr>
<tr>
<td>DU100-12</td>
<td>Extension cable (18 m)</td>
</tr>
<tr>
<td>DU100-13</td>
<td>Extension cable (21 m)</td>
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<tr>
<td>DU100-14</td>
<td>Extension cable (24 m)</td>
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<tr>
<td>DU100-15</td>
<td>Extension cable (30 m)</td>
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<td>DU100-16</td>
<td>Extension cable (36 m)</td>
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<td>DU100-17</td>
<td>Extension cable (42 m)</td>
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<td>DU100-18</td>
<td>Extension cable (48 m)</td>
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<td>DU100-19</td>
<td>Extension cable (54 m)</td>
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<td>DU100-20</td>
<td>Extension cable (60 m)</td>
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<tr>
<td>DU100-21</td>
<td>Extension cable (72 m)</td>
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<tr>
<td>DU100-22</td>
<td>Extension cable (90 m)</td>
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<tr>
<td>DU100-23</td>
<td>Extension cable (100 m)</td>
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<tr>
<td>DU100-24</td>
<td>Extension cable (150 m)</td>
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<td>DU100-25</td>
<td>Extension cable (200 m)</td>
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<tr>
<td>DU100-26</td>
<td>Extension cable (250 m)</td>
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<tr>
<td>DU100-27</td>
<td>Extension cable (300 m)</td>
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<tr>
<td>DU100-28</td>
<td>Extension cable (350 m)</td>
</tr>
<tr>
<td>DU100-29</td>
<td>Extension cable (400 m)</td>
</tr>
<tr>
<td>DU100-30</td>
<td>Extension cable (450 m)</td>
</tr>
<tr>
<td>DU100-31</td>
<td>Extension cable (500 m)</td>
</tr>
<tr>
<td>DU100-32</td>
<td>Extension cable (550 m)</td>
</tr>
<tr>
<td>DU100-33</td>
<td>Extension cable (600 m)</td>
</tr>
<tr>
<td>DU100-34</td>
<td>Extension cable (650 m)</td>
</tr>
<tr>
<td>DU100-35</td>
<td>Extension cable (700 m)</td>
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<tr>
<td>DU100-36</td>
<td>Extension cable (750 m)</td>
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<tr>
<td>DU100-37</td>
<td>Extension cable (800 m)</td>
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<tr>
<td>DU100-38</td>
<td>Extension cable (850 m)</td>
</tr>
<tr>
<td>DU100-39</td>
<td>Extension cable (900 m)</td>
</tr>
<tr>
<td>DU100-40</td>
<td>Extension cable (950 m)</td>
</tr>
<tr>
<td>DU100-41</td>
<td>Extension cable (1000 m)</td>
</tr>
</tbody>
</table>

## External Dimensions (DR242 with DS600 subunit on the rear panel)

- **Unit**: mm (inches)

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**Represented by:**

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