Data Acquisition Unit

DA100

Advanced instrumentation technology for cost-effective data logging and data acquisition.
Data Acquisition and Recording WINdows for now and the future.

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A highly reliable, functional expert tool—ideal for data acquisition and recording

Highly Configurable
Versatile configuration of your PC-based data acquisition environment

The personal computer has spread rapidly, not only in the laboratory but at the production site as well. In the field of data acquisition, compatibility between data acquisition equipment and the PC has become a necessity. The DA100 is a member of the DARWIN family which ushers in a new era of data acquisition using a variety of hardware and software “windows”. It is uniquely suitable for compactly configuring a data acquisition environment using a PC as a human interface.

The streamlined DA100 is available in two versions, a stand-alone model that can acquire data from up to 40 channels, plus an expandable model with a maximum of 300 channels. Both models transfer your measured variables, such as temperature, flow rate, strain, etc. using a new level of small size, field changeable input modules, via a general purpose communications interface (Ethernet, RS-232C, RS-422A/RS-485, or GP-IB), in realtime to a PC.

The DA100 is compatible with a personal computer and offers excellent expandability and economic benefits for a wide range of applications, from small-scale data logging to multi-point data acquisition.

PC-friendly
A PC-based data acquisition environment can be easily configured.

Cost-effective
The DA100 units are much smaller and lighter than previous models, occupying significantly less space. A DA100 configuration can also greatly reduce the amount of wiring needed, particularly for remote measurements, offering good cost-performance.

High Expandability
The DA100 can be flexibly configured and expanded to meet a wide range of needs, from small-scale data logging to multi-point data acquisition. The data acquisition hardware accepts a wide variety of inputs including: voltage, temperature (thermocouple, RTD), contact, strain, pulse, power monitor and direct current (mA) signals.

High Reliability and Environmental Durability
The data acquisition components have been designed to provide high reliability and performance over a wide range of environmental conditions.

High Speed Measurement
A DA100 expandable model configuration can provide a scanning speed of 500 ms/300 channels.

Network Data Acquisition
The DA100 realizes realtime data logging via Ethernet, a general-purpose communications network.

DA100 Expandable Model
You can readily configure a multi-channel data acquisition environment by connecting the main unit to multiple subunits with a dedicated cable.
- The number of input channels can be increased from 10 to 300 channels in 10-channel increments.
- Measurement interval: As fast as 500 ms
- Up to six subunits can be connected to one main unit, and up to six input and/or output modules can be connected to each subunit. Subunits can be separated from the main unit by up to 500 m total system cable length.
The DA100 comes in two versions. The stand-alone model consists of the main unit and various input/output modules that you can install or remove. The expandable model enables you to easily connect subunits to the main unit with a twisted pair cable. The availability of a wide variety of modules combined with the simple, readily adaptable construction, enables the configuration of the DA100 to be easily and quickly changed or expanded in order to meet changes in the application requirements, even in the field. The simple configurability of the DA100 enables the user to freely configure a data acquisition environment that matches the particular application, and is also effective in reducing initial investment and maintenance costs, while considering future expansion requirements.

The DA100 expandable model consists of the main unit, subunits and input/output modules. You can easily configure a multi-channel data acquisition environment by connecting the main unit to several subunits using dedicated cables. You can connect the main unit to subunits over a total distance of up to 500 m using a single dedicated cable, thus reducing the amount of wiring required to perform remote measurement.

Main Unit (DA100-2, for the DA100 expandable model)
The main unit acquires data measured by input modules installed on a subunit, and transfers it to a PC via a general-purpose communications module. You can also connect one communications module and up to three alarm modules to the main unit. You cannot connect an input module directly to the main unit.

Subunit (DS400 or DS600, for DA100 expandable model)
A subunit acts as an interface for connecting the main unit of the DA100 expandable model to one or several input modules. There are two types of subunits, the DS400 which permits connection of up to four input and output modules, and the DS600 which permits connection of up to six input and output modules.

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, data high limit, data low limit, or rate-of-change). You can install alarm output modules on both the main unit and subunits.

DI/DO Module
This module outputs the system fail signals as well as 2 channels of alarm outputs, and also enables the computation interval to be controlled from a remote location.

General-purpose Communications Module
You must connect a Ethernet, RS-422A/RS-485, RS-232C, or GP-IB general-purpose communications module to the main unit. All measured data is transferred in realtime 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 data access from a maximum of four personal computers (configured to do so with user-created software).

RS-232C Communication Interface
The module supports all commands generally used for DARWIN and permits data communication via the installed communications module.

Comparision of Expandable and Stand-alone Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Data Acquisition Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA100 stand-alone model</td>
<td>Excellent expandability and economy provide you with an efficient data acquisition environment.</td>
</tr>
<tr>
<td>DA100 expandable model</td>
<td>Excellent expandability and economy provide you with an efficient data acquisition environment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feature</th>
<th>DA100 stand-alone model</th>
<th>DA100 expandable model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of input channels</td>
<td>Up to 40 channels</td>
<td>Up to 300 channels</td>
</tr>
<tr>
<td>Input types</td>
<td>Voltage, temperature, contact, power, pulse, strain, direct current (mA) signals</td>
<td>Voltage, temperature, contact, power, pulse, strain, direct current (mA) signals</td>
</tr>
<tr>
<td>Main unit I/O connections</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Subunit I/O connections</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Extension modules</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Extension capacity</td>
<td>Max. 100 channels</td>
<td>Max. 300 channels</td>
</tr>
<tr>
<td>Alarm output module</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Alarm output capacity</td>
<td>Max. 50 channels</td>
<td>Max. 100 channels</td>
</tr>
</tbody>
</table>

Retransmission Module
Retransmission modules deal with data that are measured or computed by the DARWIN series, or set by a personal computer via a communications interface. The modules convert them to 1-5 V analog voltages or 4-20 mA analog current signals for output.
Generous Applications
The DA100 offers a wide variety of applications that are both reliable and inexpensive.

The DA100 has been designed in strict pursuit of improved user economy and environmental durability in field use. The result is a reduced number of cables by means of remote-control measurement, smaller installation area due to its compact design, and reduced expense to users of converters through a wide choice of input modules. Plus, the model features enhanced environmental durability, such as improved insulation capabilities and withstanding voltages across the input channels and a wider range of operating temperature. With all these features, the DA100 data acquisition terminal lends itself to a broad range of applications with amazing versatility, from high-speed, multi-point measurement to computational and statistical processing to applications with alarm output capabilities.

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, thus greatly reducing field wiring and installation costs. For example, in the case of a 60-channel TC input, 120 wires must be connected to the main unit, but you can replace these wires by a single twisted 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.

Complete Channel Isolation and High-voltage Measurement
Channels at the input circuit are fully isolated with high-voltage solid-state relays.* The DA100 can withstand a common-mode voltage of up to 250 VAC** rms and a withstanding voltage of up to 1500 VAC** (for a duration of one minute). These features ensure that the model is even applicable to multi-point measurement in the field.

Superb Environmental Ruggedness
Every effort has been made in the design of the DA100 to reduce power consumption, thereby minimizing temperature rise. As a result, the unit can be operated over an ambient temperature range of –10°C to 60°C. It can also withstand severe conditions encountered in the field.

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 stand-alone model can measure data at the rate of 40 channels/500 ms). The DA100 has a time axis resolution four times that of the previous model (DA2500E), achieving better time synchronization between channels.

Space Saving due to Compact Design
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 measurement section to be reduced to 1/5* that of previous models. This makes for more efficient use of control room or laboratory space and reduces total costs. This saves space and reduces costs, for example, for panel instrumentation.

* DA100 stand-alone model
** Depends on module types.
The highly flexible DA100 exhibits its true performance both in the field and laboratory.

**A Full Lineup of Input Modules**

The input module is a 10-channel small remote multiplexer that A/D converts the measured signals as fast as every 500 ms.** The modular architecture provides a wide input range with plug-in flexibility.

* Power monitor modules are 2 or 6 channels.
* If input modules of different measurement intervals are mixed, the resulting measurement interval is that of the longest interval input module.

- **Universal Input Module**
  - The universal input module permits measurement of DC voltages between 20 mV and 50 V, thermocouple inputs, RTD inputs, and contact signals in up to 500-ms intervals. Other cost-effective universal input modules are available that measure data from 20 or 30 channels in 2-second intervals, and low-cost dedicated input modules that accept voltages and thermocouple outputs.

- **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 incorporates a 120 or 350 Ω 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 slots worth of space.

- **Pulse Input Module**
  - The pulse input module receives TTL or contact signals from a flow or tachometer, and counts and/or integrates the number of pulses. The minimum measurement interval is 0.5 second and the data update cycle is one second.

- **Direct Current (mA) Module**
  - The direct current (mA) module measures currents or charges, and counts and/or integrates the number of pulses. The minimum measurement interval is 0.5 second and the data update cycle is one second.

**Computing Functions (some are optional)**

The main unit of the DA100 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 DA100 can compute linear scaling, difference and moving average. The results of such computations are transferred with the measured data to a PC, thus reducing the system requirements on the PC and also resulting in more efficient analytical processing. The number of computing channels with the MATH option is 30 for the stand-alone model, and 60 for the expandable model.

The main computing functions are as follows (the number differs depending upon 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)

- **Batch Integration**
  - By using the DA100 in combination with the optional DI/DO module or alarm function, you can easily perform batch processing. (See illustration.)

- **Moving Average Function**
  - This function reduces the measured value while calculating the moving average, effectively monitoring the trend of a varying input signal over a long period. It is also usable 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.
PC-based application
DARWIN DAQ32 and DAQ32Plus Softwares
Data Acquisition Software is Designed to Run Under Windows 98/Me/NT4.0/2000/XP.

DARWIN DAQ32 Software
The DARWIN DAQ32 software 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.

DARWIN parameter setting software
Use this software to provide the DA100 data acquisition unit, DC100 data collector or DR series recorder with the required settings. You can exchange various setup data items, such as the measuring range, measurement interval, start-of-measurement time, alarm, event/action and computational expression, with a personal computer. Save the setup data on hard disk or a floppy disk so you can reuse them.

System setup, diagnosis, and calibration software
Using this software, you can define the method of communicating with the DARWIN main unit and set up a directory from which you acquire data. You can also view information in the ROM of the DARWIN main unit and initialize the settings of the main unit. This software can show the configuration of the DARWIN main unit, including the installed modules, as a graphic image. You can also rebuild the system when changes need to be made to the modules installed in the DA100 data acquisition unit, DC100 data collector or DR series recorder (expandable model).

Tag setting software (DAQ32Plus)
Tags are available in two types: tags that can accept a maximum of 16 characters and tag IDs that can accept 8 characters. Tags can be shown in place of channel numbers using the data logging software or data viewer software. In addition, the DC100 data collector and DR series recorder are designed so that tags configured using the operation keys on the DARWIN main unit are read into the tag setup software, and the information on tags set using the software are sent to the DARWIN main unit.
DARWIN DAQ32Plus Software

The DARWIN DAQ32Plus software 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 number setting function.

Data Logging Software

The data logging software has two functions: the display function that visually shows measured and computed data on the display unit, and the data acquisition function that saves these data in an external storage unit, such as a hard disk drive, at fixed intervals. In the monitor window, you can freely arrange graphic tools such as analog trend waveforms, digital display windows, various meters (level meters, analog meters and thermometers), and alarm overview windows. This feature enables you to configure the optimum screen for each individual application. You can define a maximum of 30 data groups, each to which you can freely assign up to 32 measurement or computation channels. You can also monitor data on multiple channels by having two or more windows open at one time. Other features include simplified printing.

Data Viewer Software

The data viewer software can show data — saved in external storage units using data logging software or saved on floppy disks using the DC100 data collector or DR series recorder — in multiple windows and in various forms including analog trend waveforms, digital-value data, or alarm-history data.

Image Printing (Analog Trend Waveforms)

The on-screen image can be output to a color printer.
Crystallization of Technology

High performance and compactness resulting from YOKOGAWA’s measurement and production technology provides you with cost-effective data acquisition.

● 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 5R 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 compact 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 DA100 are planar transformers. This is an important factor in achieving the large degree of miniaturization and weight reduction of the DA100.

● Integration of the Design, Manufacture and Quality Evaluation System

Routine installation work is automated, preventing careless mistakes during the production process from assembly through inspection. The result is a high grade, highly reliable product. We also use precision test equipment on the production line to further increase reliability.

● Adoption of ASICs and Gate Arrays

The DA100 uses ASICs (Application Specific Integrated Circuit) which were developed with more than 40 years of data acquisition know-how accumulated by YOKOGAWA. As a result, a high degree of integration has been attained. Also, a gate array is used as the peripheral control circuit. This high degree of integration enables the DA100 to become smaller and lighter, and power consumption and heat generation reduced, improving the reliability of the overall system.

● Supported Standard

<table>
<thead>
<tr>
<th>CSA</th>
<th>Obtained CSA22.2 No.1012.1, Installation category (Overvoltage category) : II, Degree of pollution : 2</th>
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<td>UL</td>
<td>Obtained UL3111-1 (CSA NRTL/JC)</td>
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<td>CE</td>
<td>EMC directive</td>
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<td>EN61326</td>
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<tr>
<td></td>
<td>EN61000-3-2</td>
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<tr>
<td></td>
<td>EN61000-3-3</td>
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<tr>
<td></td>
<td>EN55011 Class A Group 1</td>
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<tr>
<td>Low voltage</td>
<td></td>
</tr>
<tr>
<td>directive</td>
<td>EN61010-1</td>
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<tr>
<td></td>
<td>Measurement category : II, Degree of pollution : 2</td>
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<tr>
<td>C-Tick</td>
<td>AS/NZS 2064 Class A Group 1</td>
</tr>
</tbody>
</table>
Specifications

**DA100 Main Unit**
- Stand-alone model (DA100-1)
- Expandable model (DA100-2)

**DA100 Subunit**
- DS400
- DS600

### General Specifications

**External Dimensions**
- DA100-1: approximately 422 (W) x 165 (H) x 100 (D) mm
- DA100-2: approximately 336 (W) x 165 (H) x 100 (D) mm
- DS400: approximately 422 (W) x 176 (H) x 100 (D) mm
- DS600: approximately 422 (W) x 176 (H) x 100 (D) mm

**Weight**
- DA100-1: approximately 3.5 kg
- DA100-2: approximately 2.5 kg
- DS400: approximately 3.5 kg

**AC Power Supply**
- Rated supply voltage: 100 to 240 VAC
- Usable supply voltage: 90 to 250 VAC
- Rated supply frequency: 50 Hz
- DC power supply (Run): +24 VDC (DC power supply only. Specify when ordering.)

**Ambient temperature**
- DA100: 0˚ to 50˚C
- DS400: –10 to 60˚C
- DS600: –10 to 60˚C

**Humidity**
- DA100: 20 to 90% RH (between -10˚C and 40˚C)
- DS400, DS600: Panel mount –10 to 60˚C

**Insulation Resistance**
- At least 20 MΩ at 500 VDC between the power supply and ground, and between each terminal and the ground, and between input terminals

**Withstanding Voltage**
- Between power supply terminal and ground: 1,500 VAC (50/60 Hz) for one minute
- Between input/output terminal and ground: 1,500 VAC (50/60 Hz) for one minute

### Universal Input Modules

- **A/D resolution:**
  - DA100-1: ±0.05% or 60 Hz
  - DA100-2: ±0.05% or 60 Hz
  - DS400: ±0.05% or 60 Hz

- **Types of Computations**
  - Max., min., average, total values. Reporting result is transferred to the PC via a communication interface.

- **Remote RJC**
  - 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

- **Input Module Specifications**
  - Universal (mV, TC, RTD and DI), DCV/TC/DI, dedicated, power monitor, strain, pulse and direct current (mA)
  - Connectable to DA100-1, DS400 and DS600

### General-purpose Computation Functions (/M1)

- TLOG: Time-series mathematical processing of data for a particular channel (maximum of 24 hours) (total, maximum, minimum, average, max. - min.

### Hourly, Daily, or Monthly Report (/M3)

- Computation

### Specifications Common to Input Module

- Normal Operating Temperature/Humidity Range
  - Universal or DCV/TC/DI input module: –10˚ to 60˚C, 20 to 80% RH (non-condensing)
  - mA, power monitor, strain, pulse input module: 0 to 50˚C, 20 to 80% RH (non-condensing)

- Withstanding Voltage
  - Between input terminals: 1,000 VAC (50/60 Hz) for one minute
  - Strain modules: 50 VDC (50/60 Hz) for one minute

### Universal Input Modules

#### DCV/TC/DI Input Modules

- Number of Input Channels: 10 to 40 channels. Expandable on a module basis.
- Number of Input Channels: 0 channel. Expandable up to 300 channels by connecting subunits.
- Types of Input Modules
  - Universal (DC voltage, thermocouple, RTO and contact), DCV/TC/DI dedicated, power, strain, pulse and direct current (mA)
- Measurement Range
  - See the specifications for each input module.
- Measurement Interval
  - 0.5, 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60 seconds
  - DA100-1: Minimum of 500 ms per 40 channels

### Topology

- DA100-2: Minimum of 500 ms per 300 channels (including the subunit).

### General Specifications

- A/D Integration Period
  - Manual selection or automatic switchover between 20 ms (50 Hz), 16.7 ms (60 Hz) and 100 ms (10 Hz).

- Minimum measurement interval when the 100-ms integration mode becomes:
  - DA100-1: 4 seconds per 40 channels
  - DA100-2: 4 seconds per 300 channels (including the subunit)

### Alarm

- Number of Settings
  - Up to four settings can be made for each channel.

- Types of Alarms
  - Selection from upper limit, lower limit, difference upper limit, difference lower limit, upper limit of percentage change, lower limit of percentage change (upper or lower limit only for the results of computation)

- Percentage change time interval: 1 to 15 scans

- Number of Alarm Output Points when alarm contact output modules are connected: 1 in DA100-1; a total of 30; DA100-2: a total of 30; DS400/600: a total of 300

### Standard Communication Functions

- Types of Computations
  - Difference between arbitrary channels, linear scaling, moving average and pulse integration

- Difference between arbitrary channels: For channels of the same range

- Ranges for which scaling can be done: DC voltage, thermocouple, RTD, contact

- Scaling range: –30,000 to +30,000

- Moving average: 2 to 64 scans

- Pulse integration: Effective when pulse input module is recognized.

- Up to 30 channels (stand-alone model)

- Up to 60 channels (expandable model)
Noise rejection: By means of integrating A/D, low-pass filter or moving average (at 2 s range, 2%±2°C and 55%±10% RH)

Measurement accuracy: ±(0.005% of reading + 2 digits)

Minimum measurement interval when the low-pass filter is working becomes 3 s (depends on the input modules).

Burnout: Detected within thermocouple-input range

### DC Current Input Modules

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Channels</th>
<th>Type of Terminal</th>
<th>Measurement Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU300-11</td>
<td>10</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU300-12</td>
<td>10</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
</tbody>
</table>

**General Specifications**

**Input method:** Floating imbalance input, and inter-channel isolation shunt resistor (100 Ω) is pre-installed.

**A/D resolution:** ±20,000

**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 and resolution:** ±20 mA (±1 μA)

**Noise rejection:** By means of integrating A/D, low-pass filter or moving average (Minimum measurement interval when the low-pass filter is working becomes 3 s (depends on the input modules)).

### Power Monitor Modules

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Channels</th>
<th>Type of Terminal</th>
<th>Measurement Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU400-11</td>
<td>Open close plus or to bridge active line to line</td>
<td>Clamp</td>
<td>2 s</td>
</tr>
<tr>
<td>DU400-22</td>
<td>Open close plus or to bridge active line to line</td>
<td>Clamp</td>
<td>2 s</td>
</tr>
</tbody>
</table>

**General Specifications**

**Input method:** Transformer isolation

**Measurable variables:** 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 selected 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)

**Crest factor:** Maximum of 3

**Power integration:** Calculated by M1 (computation functions) option. /M1 must be specified for the DA100.

### Strain Measurement Modules

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Channels</th>
<th>Type of Terminal</th>
<th>Measurement Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU500-12</td>
<td>10, with built-in 120Ω resistance</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU500-13</td>
<td>10, with built-in 350Ω resistance</td>
<td>Clamp</td>
<td>0.5 s</td>
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<tr>
<td>DU500-14</td>
<td>10, for external bridge module</td>
<td>NO8</td>
<td>0.5 s</td>
</tr>
</tbody>
</table>

*2 module width is required.

**General Specifications**

**Measurement range (resolution):**
- **Built-in bridge resistance:** 120Ω, 350Ω, or none (for an external bridge box)
- **Wiring:** 1/4 bridge, 1/2 bridge (neighbour), 1/2 bridge (opposite), full bridge

**Applicable gauge resistance:**
- 1/4 or 1/2 bridge: 120 or 350 Ω
- Full bridge: 100 to 1,000 Ω
- Bridge voltage: Fixed at 2 V
- Gauge factor: 2.00 (with scaling function)
- Strain balance: Electronic auto-balancing (can be turned on or off), within ±10,000 με (1/4 bridge)

### Pulse Measurement Module

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Channels</th>
<th>Type of Terminal</th>
<th>Measurement Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU609-11</td>
<td>10</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
</tbody>
</table>

* Rate of data update is fixed at one-second interval.

**General Specifications**

**Input method:** Transformer isolation (individual separated channels)

**Measurement range (resolution):**
- **Rate (count value instantaneous mode):** The number of pulses input during the most recent one-second period of measurement is output as the scale value.

**GATE (ON time instantaneous mode):**
- The ON (make) / OFF (break) state (ON = 1, OFF = 0) of the contact input during the most recent one-second period of measurement is output as the scale value. The computation function is used when integrating either the count value each second or the ON period.

**Pulse integration:**
- Calculation formula: TLOGPSUM (XXX)

### Digital Input Module

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Channels</th>
<th>Type of Terminal</th>
<th>Measurement Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU700-11</td>
<td>10</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
</tbody>
</table>

**General Specifications**

**Input method:** Unbalanced floating-point, with channel-to-channel isolation

**Measuring range:**
- **Voltage input:** 2.3 V or less
- **Current input:** 2.5 V or greater

**Maximum input voltage range:**
- Voltage input: ±60 V DC
- Voltage-free contact input: ±10 V DC

### Alarm, DI/DO and Other Modules

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Outputs</th>
<th>Contact Arrangement</th>
<th>Type of Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT700-11</td>
<td>4</td>
<td>M1</td>
<td>Screw</td>
</tr>
<tr>
<td>DT700-21</td>
<td>10</td>
<td>Make contact (NO-C)</td>
<td>Screw</td>
</tr>
</tbody>
</table>

**General Specifications**

**Output mode:**
- Selection between excitation and non-excitation, output hold and non-hold and AND and OR modes
- Re-breakdown re-alarm: maximum of 6 channels can be selected.

**Contact capacity:**
- 250 VDC/0.1 A (resistive load)
- 30 VDC/2 A (resistive load)
- 250 VAC/2 A (resistive load)

**Withstanding Voltage:**
- Between output terminal and ground: 1,500 VAC (50/60 Hz) for one minute

### DI/DO Modules

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Outputs</th>
<th>Contact Arrangement</th>
<th>Type of Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT700-11</td>
<td>4</td>
<td>M1</td>
<td>Screw</td>
</tr>
<tr>
<td>DT700-21</td>
<td>10</td>
<td>Make contact (NO-C)</td>
<td>Screw</td>
</tr>
</tbody>
</table>

**General Specifications**

**Output mode:**
- Non-voltage contact or open collector (TTL or transistor)

**Remote control function:**
- Starting, resetting and temporary hold of statistical computation

### Extension Modules (used with extension base units)

<table>
<thead>
<tr>
<th>Module</th>
<th>Module</th>
<th>Output Signal</th>
<th>Number of Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT500-11</td>
<td>Retransmission Module</td>
<td>1.5 V</td>
<td>15</td>
</tr>
<tr>
<td>DT500-21</td>
<td>Retransmission Module</td>
<td>4-20 mA</td>
<td>2</td>
</tr>
</tbody>
</table>

The DT500-11 and DT500-21 retransmission modules deal with data that are measured or computed by the DAWIN series, or set by a personal computer via a communication interface. The modules convert them to 1-5 V analog voltage or 4-20 mA analog current signals for output.

### Communications Modules

<table>
<thead>
<tr>
<th>Functions, Common Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outline of functions:</td>
</tr>
<tr>
<td>(1) Functions as a talker</td>
</tr>
<tr>
<td>Output of measured values, output of setting values</td>
</tr>
<tr>
<td>(2) Functions as a listener</td>
</tr>
<tr>
<td>Setup of measurement conditions, control of start/stop of measurement, etc.</td>
</tr>
<tr>
<td>Setting of communication parameters, start/stop of output, and terminal configuration</td>
</tr>
</tbody>
</table>

### GP-IB Modules

**Electrical and mechanical specifications:**
- Based on IEEE standard 488-1978
- Addressable: 0 to 15
- Baud rate: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps
- Transmission distance: Maximum of 15 m
- Connector: D-sub 25-pin connector

### GP-IB Modules

**Electrical and mechanical specifications:**
- Based on IEEE standard 488-1978
- Addressable: 0 to 15
- Baud rate: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps
- Transmission distance: Maximum of 15 m
- Connector: D-sub 25-pin connector

### GP-IB Modules

**Electrical and mechanical specifications:**
- Based on IEEE standard 488-1978
- Addressable: 0 to 15
- Baud rate: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps
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### GP-IB Modules

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- Addressable: 0 to 15
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- Connector: D-sub 25-pin connector

### GP-IB Modules

**Electrical and mechanical specifications:**
- Based on IEEE standard 488-1978
- Addressable: 0 to 15
- Baud rate: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps
- Transmission distance: Maximum of 15 m
- Connector: D-sub 25-pin connector
Models and Suffix Codes

DS400 (DA100-2)

Unit: mm

DA100 Main Unit

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA100</td>
<td>-1</td>
<td>Data acquisition unit DA100</td>
</tr>
<tr>
<td></td>
<td>-2</td>
<td>Expandable</td>
</tr>
</tbody>
</table>

Attached software: DA100 software

Supply voltage: 100 to 240 V AC

Power supply input socket, power cable:
- D: 3-pin input w/L, CSA cable
- F: 3-pin input w/DE cable
- H: 3-pin input w/GCC cable
- R: 3-pin input w/SA cable
- S: 3-pin input w/BS cable
- Y: Dedicated connector for DC power supply (w/o power cable)

Optional feature:
- MA: Calculation function
- MB: Record function
- MC: “F” display

Ethernet Modules

Network configuration: Ethernet (100Base-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

Input Modules

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Required slots</th>
<th>Terminal</th>
<th>Maximum measurement period</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU100-11</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>1</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-21</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>2</td>
<td>Screw</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-31</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>3</td>
<td>Screw</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-12</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>1</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-22</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-32</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>3</td>
<td>Clamp</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-13</td>
<td>10-ch mA input module</td>
<td>1</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-12</td>
<td>10-ch mA input module</td>
<td>1</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-22</td>
<td>10-ch mA input module</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-32</td>
<td>10-ch mA input module</td>
<td>3</td>
<td>Clamp</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-13</td>
<td>10-ch mA input module (100 psi)</td>
<td>1</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-13</td>
<td>10-ch strain input module (100 psi)</td>
<td>1</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-13</td>
<td>10-ch strain input module (100 psi)</td>
<td>2</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-14</td>
<td>10-ch strain input module (100 psi)</td>
<td>2</td>
<td>ND8</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-15</td>
<td>10-ch pulse input</td>
<td>1</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-11</td>
<td>10-ch digital input</td>
<td>1</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
</tbody>
</table>

I/O Terminal Modules

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT100-11</td>
<td>DI/DO module</td>
</tr>
<tr>
<td>DT100-21</td>
<td>Alarm output module 1 (10 main contacts)</td>
</tr>
<tr>
<td>DT100-21</td>
<td>Alarm output module 2 (10 main contacts)</td>
</tr>
<tr>
<td>DT100-13</td>
<td>GI/IB module</td>
</tr>
<tr>
<td>DT100-23</td>
<td>RS-232C module</td>
</tr>
<tr>
<td>DS400-13</td>
<td>RS-422/485 module (screw terminal)</td>
</tr>
<tr>
<td>DS400-11</td>
<td>Ethernet module</td>
</tr>
<tr>
<td>DS400-11</td>
<td>RS-422/485 module (screw terminal)</td>
</tr>
<tr>
<td>DS400-11</td>
<td>Ethernet module</td>
</tr>
<tr>
<td>DS400-11</td>
<td>1-5 V Retransmission module</td>
</tr>
<tr>
<td>DS400-11</td>
<td>4-20 mA Retransmission module</td>
</tr>
</tbody>
</table>

Ethernet Modules

Network configuration: Ethernet (100Base-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

Input Modules

<table>
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<tr>
<th>Model</th>
<th>Description</th>
<th>Required slots</th>
<th>Terminal</th>
<th>Maximum measurement period</th>
</tr>
</thead>
<tbody>
<tr>
<td>DU100-11</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>1</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-21</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>2</td>
<td>Screw</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-31</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>3</td>
<td>Screw</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-12</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>1</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-22</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-32</td>
<td>10-ch universal input (DCV, TC, DI and RTD)</td>
<td>3</td>
<td>Clamp</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-13</td>
<td>10-ch mA input module</td>
<td>1</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-12</td>
<td>10-ch mA input module</td>
<td>1</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-22</td>
<td>10-ch mA input module</td>
<td>2</td>
<td>Clamp</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-32</td>
<td>10-ch mA input module</td>
<td>3</td>
<td>Clamp</td>
<td>2 s</td>
</tr>
<tr>
<td>DU100-13</td>
<td>10-ch mA input module (100 psi)</td>
<td>1</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-13</td>
<td>10-ch strain input module (100 psi)</td>
<td>1</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-13</td>
<td>10-ch strain input module (100 psi)</td>
<td>2</td>
<td>Clamp</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-14</td>
<td>10-ch strain input module (100 psi)</td>
<td>2</td>
<td>ND8</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-15</td>
<td>10-ch pulse input</td>
<td>1</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
<tr>
<td>DU100-11</td>
<td>10-ch digital input</td>
<td>1</td>
<td>Screw</td>
<td>0.5 s</td>
</tr>
</tbody>
</table>
Accessories

<table>
<thead>
<tr>
<th>Model Code</th>
<th>Description</th>
<th>Applicable Operating System</th>
</tr>
</thead>
<tbody>
<tr>
<td>DV100-011</td>
<td>Extension module</td>
<td></td>
</tr>
<tr>
<td>DV100-012</td>
<td>Extension base unit</td>
<td></td>
</tr>
<tr>
<td>DV200-008</td>
<td>Extension cable (0.5 m)</td>
<td>Windows 98, Windows Me, Windows NT 4.0, Windows 2000, Windows XP</td>
</tr>
<tr>
<td>DV200-009</td>
<td>Extension cable (1 m)</td>
<td></td>
</tr>
<tr>
<td>DV200-010</td>
<td>Extension cable (2 m)</td>
<td></td>
</tr>
<tr>
<td>DV200-015</td>
<td>Extension cable (5 m)</td>
<td></td>
</tr>
<tr>
<td>DV200-020</td>
<td>Extension cable (10 m)</td>
<td></td>
</tr>
<tr>
<td>DV200-025</td>
<td>Extension cable (50 m)</td>
<td></td>
</tr>
<tr>
<td>DV200-100</td>
<td>Extension cable (100 m)</td>
<td></td>
</tr>
<tr>
<td>DV200-200</td>
<td>Extension cable (200 m)</td>
<td></td>
</tr>
<tr>
<td>DV200-300</td>
<td>Extension cable (300 m)</td>
<td></td>
</tr>
<tr>
<td>DV200-400</td>
<td>Extension cable (400 m)</td>
<td></td>
</tr>
<tr>
<td>DV200-500</td>
<td>Extension cable (500 m)</td>
<td></td>
</tr>
<tr>
<td>DV200-501</td>
<td>Cable adapter</td>
<td></td>
</tr>
<tr>
<td>DV203-011</td>
<td>Shunt resistance: 10 Ω, for screw</td>
<td></td>
</tr>
<tr>
<td>DV203-012</td>
<td>Shunt resistance: 10 Ω, for clamp</td>
<td></td>
</tr>
<tr>
<td>DV203-101</td>
<td>Shunt resistance: 100 Ω, for screw</td>
<td></td>
</tr>
<tr>
<td>DV203-102</td>
<td>Shunt resistance: 100 Ω, for clamp</td>
<td></td>
</tr>
<tr>
<td>DV203-251</td>
<td>Shunt resistance: 250 Ω, for screw</td>
<td></td>
</tr>
<tr>
<td>DV203-252</td>
<td>Shunt resistance: 250 Ω, for clamp</td>
<td></td>
</tr>
<tr>
<td>DV490-011</td>
<td>Rack mounting kits for DA100, DA500, DA5600</td>
<td></td>
</tr>
<tr>
<td>NW440-001</td>
<td>Sinker converter</td>
<td></td>
</tr>
<tr>
<td>PV050-001</td>
<td>AC adapter for DC power model WMA, CSA cable</td>
<td>Windows 98, Windows Me, Windows NT 4.0, Windows 2000, Windows XP</td>
</tr>
<tr>
<td>PV050-002</td>
<td>AC adapter for DC power model WMEU cable</td>
<td></td>
</tr>
<tr>
<td>PV050-003</td>
<td>AC adapter for DC power model WMA cable</td>
<td></td>
</tr>
<tr>
<td>PV050-004</td>
<td>AC adapter for DC power module WBS cable</td>
<td></td>
</tr>
<tr>
<td>PV050-005</td>
<td>AC adapter for DC power model MS/CC cable</td>
<td></td>
</tr>
</tbody>
</table>

As for the overview of these software, refer to the catalog (Bull 04L00L00-00E) of “Data Acquisition Software Suite DAQWORK.”

Software

<table>
<thead>
<tr>
<th>Model Code</th>
<th>Description</th>
<th>Applicable Operating System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Supports setup, simplified data logging and viewing, and diagnosis and calibration functions. One package of this software comes standard with the purchased DA100 data acquisition unit.)</td>
<td></td>
</tr>
<tr>
<td>WX102C011</td>
<td>DARWIN DAQJ399Plus Software</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Supports setup, data logging and viewing, diagnosis, calibration and tag setting functions.)</td>
<td></td>
</tr>
<tr>
<td>WX101C011</td>
<td>DAQLOGGER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAQLOGGER supports a wide variety of models from among YOKOGAWA’s family of data acquisition products.</td>
<td></td>
</tr>
</tbody>
</table>

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