YOKOGAWA ◆

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.

DARWIN
Data Acquisition and Recording Windows

Highly Configurable

Versatile configuration of your PC-based data acquisition environment

DARWIN

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

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.

Personal computer

General-purpose communications link

DA100
Stand-alone model

DA100 stand-alone model
Occupying little space, it is ideal for small-scale data logging, and can be carried about easily.
• Between 10 and 40 channels can be connected directly to the main unit
• Measurement interval: 500 ms/40 ch minimum

Personal computer

General-purpose communications link

DA100
Expandable model

Main unit

Dedicated cable

Subunit

Subunit
Up to six subunits can be connected.

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.
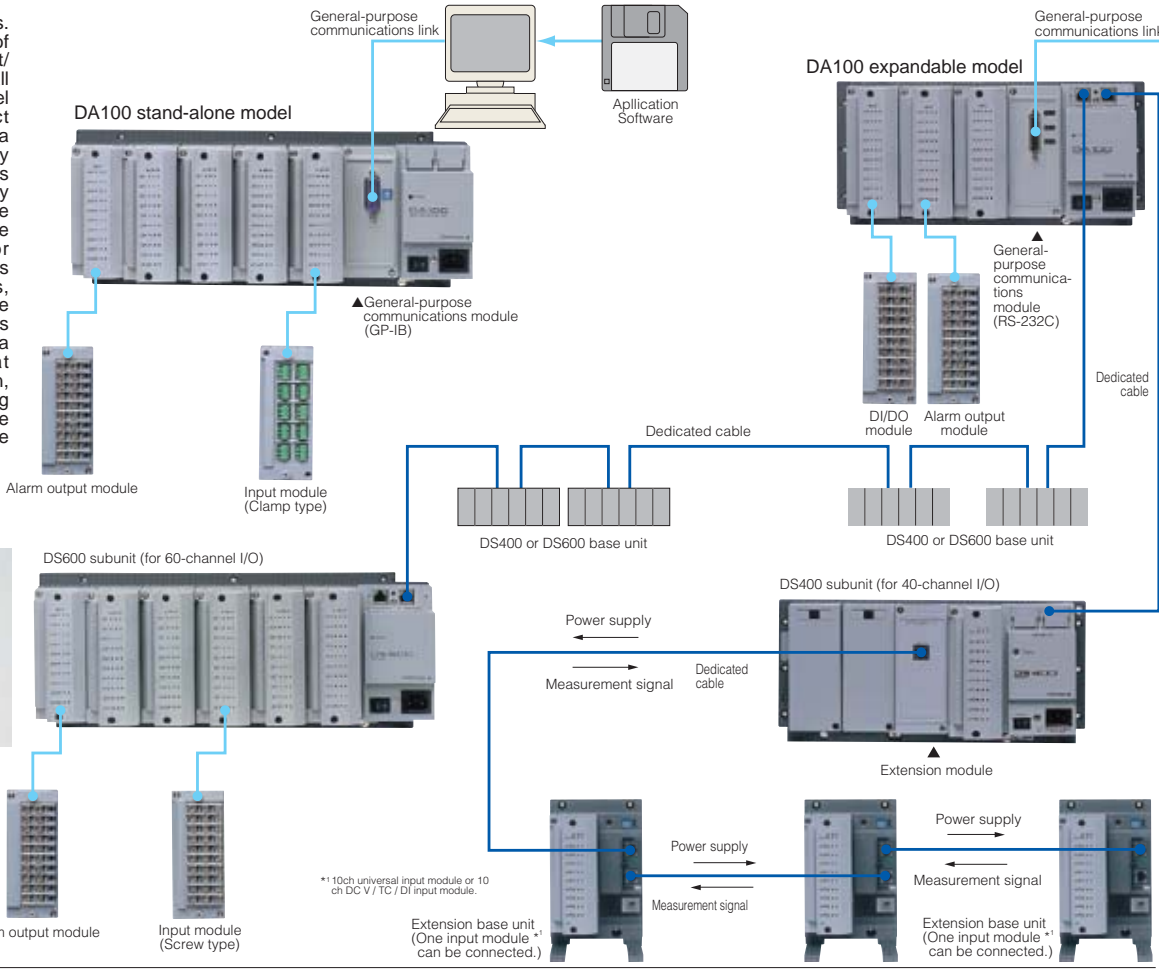• The number of input channels can be increased from 10 to 300 channels in 10-channel increments.
• Measurement interval: As fast as 500 ms
• Up to six subunits can be connected to one main unit, and up to six input and/or output modules can be connected to each subunit. Subunits can be separated from the main unit by up to 500 m total system cable length.

Flexible Architecture

Excellent expandability and economy provide you with an efficient data acquisition environment.

DARWIN

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

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.

General-purpose communications link

DA100 stand-alone model

Aplication Software

▲General-purpose communications module (GP-IB)

Alarm output module

Input module (Clamp type)

DS600 subunit (for 60-channel I/O)

Dedicated cable

Alarm output module

Input module (Screw type)

*¹10ch universal input module or 10 ch DC V / TC / DI input module.

DA100 expandable model

General-purpose communications link

Aplication Software

General-purpose communications module (RS-232C)

DI/DO module   Alarm output module

Dedicated cable

Dedicated cable

DS400 or DS600 base unit

DS400 or DS600 base unit

DS400 subunit (for 40-channel I/O)

Power supply

Measurement signal   Dedicated cable

▲ Extension module

Power supply

Measurement signal

Power supply

Measurement signal

Extension base unit (One input module *¹ can be connected.)

Extension base unit (One input module *¹ can be connected.)

Retransmission Module
Retransmission modules deal with data that are measured or computed by the DARWIN 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.

Input Module
The input module is a 10*-channel small remote multiplexer that A/D-converts the measured signals minimum every 500 ms. The input signals include not only DC voltage and temperature, but also contact, power, pulse, strain and direct current (mA) signals.
*Depends on module types

General-purpose Communications Module
You must connect a Ethernet, RS-422A/RS-485, RS-232C, or GP-IB general purpose commu-nications 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).

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 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.

Extension Module
Using an extension module, you can supply power directly from the main unit*¹ or a subunit for each input module mounted on an extension base unit. Also, connecting one extension module to the main unit*¹ or a subunit allows connection of up to three input modules*² as well as three extension base units, over a distance of up to 30 m.
*¹ :DA100 stand-alone model
*² :10-ch universal input module or 10-ch DCV/TC/DI input module

DA100 Stand-alone Model (DA100-1)
You can connect from 10 to 40 channels of input modules, as well as one general-purpose communication module and 10-channel alarm output modules, directly to the main unit. A combined total of up to five input and output modules can be connected. You cannot connect a stand-alone unit to a subunit. If expansion above 40 inputs could be necessary, consider the DA100 expandable model.
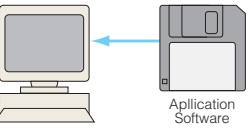
DA100 Expandable Model
The DA100 expandable model consists of the main unit, subunits and input modules. You can easily configure a multi-channel data acquisition environment by connecting the main unit to several subunits using dedicated cables. You can connect the main unit to subunits over a total 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 in realtime 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.

Comparison of Expandable and Stand-alone Models

Model	Data acquisition unit DA100	
	DA100 stand-alone model	DA100 expandable model
Features	Integrated construction up to 40 channels. Portable and suitable for small-scale data logging.	Expandable up to 300 channels By connecting subunits to the main unit, you can perform multi-channel measurement with a minimum amount of wiring.
Number of input channels Expansion, change	10 to 40 channels; Channels can be added in increments of 10 channels, and the types of modules are interchangeable.	10 to 300 channels; Channels can be added in increments of 10 channels, and the types of modules are interchangeable.
Input types	Voltage, temperature, contact, power, strain, pulse, direct current (mA)	
Main unit I/O connections	Input modules; Communications module; DI/DO module; Alarm output module	(Input module connected to the subunit); Communications module; DI/DO module; Alarm output module
Subunit connections, and remote measurement distance	Not applicable	Up to six subunits can be connected; 500 m max.
Subunit I/O connections	Not applicable	Input module; Alarm output module; DI/DO module
Extension module	Available	Available
Maximum scanning speed	0.5 s/all channels	0.5 s/all channels
Alarm contact output modules	Main unit: 10 to 30 points	Main unit: 10 to 30 points Subunits: 10 to 300 points
Mathematical operation channels	Max. 30 channels	Max. 60 channels

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.
* DA100 stand-alone model
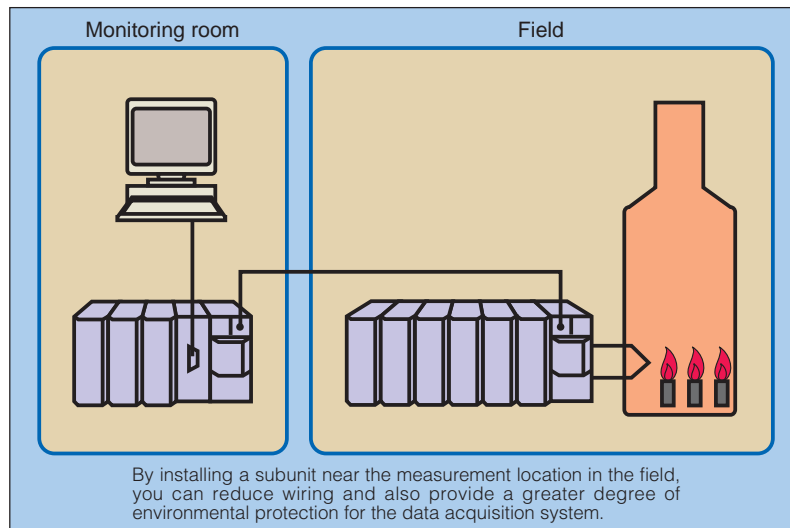
Superb Environmental Ruggedness

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° to 60°C. It can also withstand severe conditions encountered in the field.

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

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.

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.

YOKOGAWA's DA2500E remote scanner

Subunit DS600

*Compared to YOKOGAWA's DA2500E remote scanner plus a DS600 subunit in which six input modules are installed

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.

● 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.
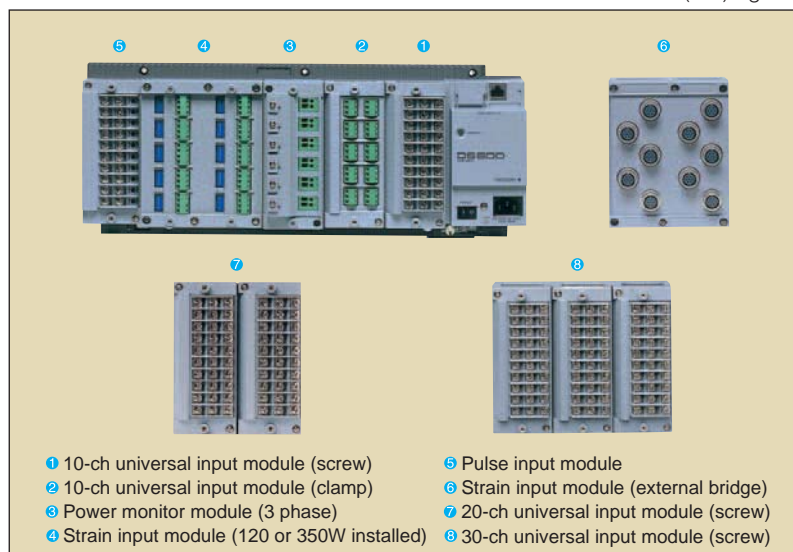
● Strain Measurement Module
The strain measurement module measures static strain, and comes in two types, one incorporates a 120 or 350 Ω bridge resistor, the other is for connecting an external bridge box. One module enables data in 10 channels to be measured; however, it requires two slots worth of space.
The minimum measurement interval (data update cycle) is 500 ms.

● Direct Current (mA) Module
The shunt resistor is pre-installed to measure the direct current (mA) signals.

❶ 10-ch universal input module (screw)
❷ 10-ch universal input module (clamp)
❸ Power monitor module (3 phase)
❹ Strain input module (120 or 350W installed)
❺ Pulse input module
❻ Strain input module (external bridge)
❼ 20-ch universal input module (screw)
❽ 30-ch universal input module (screw)

The highly flexible DA100 exhibits its true performance both in the field and laboratory

	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 s.)
	Low-pass filter	The low-pass filter can be used on signals that have large noise components. (When the filter is turned ON, the measurement interval becomes a minimum of 3 sec.)
	Scaling	The input signal can be displayed and/or recorded in an industrial or physical variable.
	Burnout	When the thermocouple input goes open, the signal moves to 100 or 0%.
Setting	Memory backup	The configuration data is protected by a lithium battery inside the unit.
	Alarm	Alarm refresh, hold of alarm indication and relay status, selection between energized or de-energized on alarm are available.
	Mounting	Rack mounting is available as well as panel mounting. (Rack mounting kits are required as an optional accessory.)

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 shortest computation period differs depending upon the kind of computation).

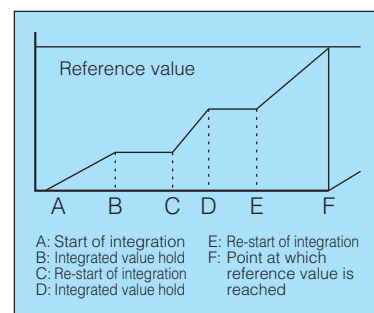### Standard computing functions
Linear scaling, moving average, differential calculation, pulse integration (when a pulse input module is recognized)

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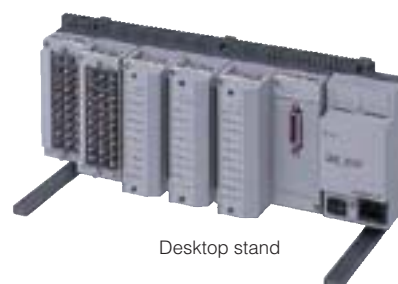
● Batch Integration
By using the DA100 in combination with the optional DI/DO module or alarm function, you can easily perform batch processing. (See illustration.)

A: Start of integration
B: Integrated value hold
C: Re-start of integration
D: Integrated value hold
E: Re-start of integration
F: Point at which reference value is reached

● Moving Average Function
This function renews 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.

Desktop stand

7

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.
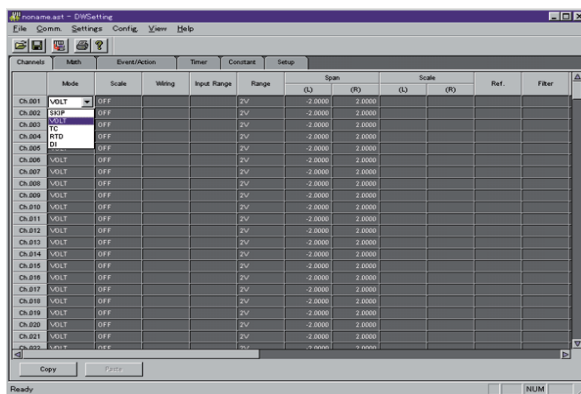

DARWIN parameter setting software

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.
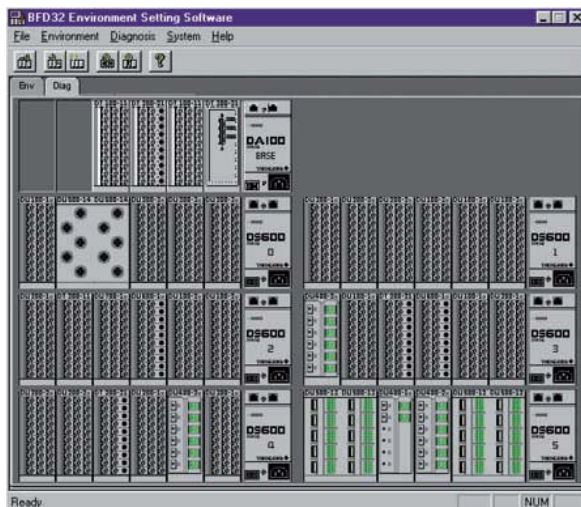
System setup, diagnosis, and calibration software

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).
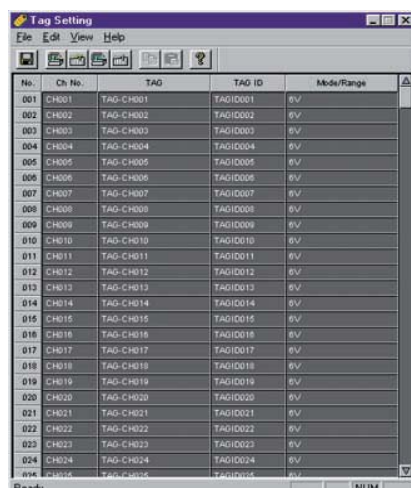

Tag setting software (DAQ32Plus)

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.
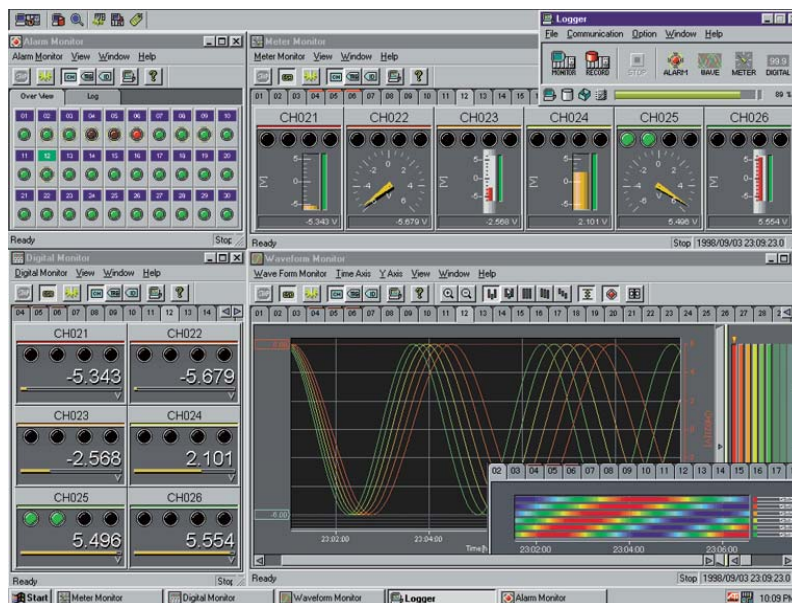
Data Logging Software

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.
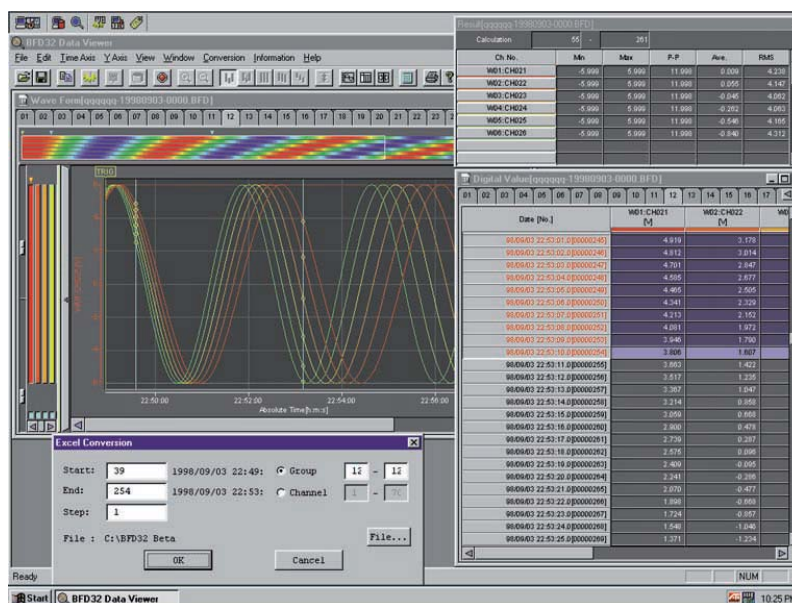
Data Viewer Software

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.
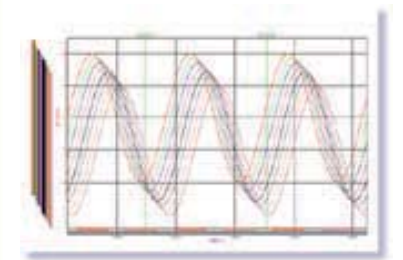
Image Printing (Analog Trend Waveforms)
The on-screen image can be output to a color printer.

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.

● 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

CSA	Obtained CSA22.2 No.1010.1, Installation category (Overvoltage category) : II, Degree of pollution : 2	
UL	Obtained UL3111-1 (CSA NRTL/C)	
CE	EMC directive	EN61326 EN61000-3-2 EN61000-3-3 EN55011 Class A Group 1
	Low voltage directive	EN61010-1 Measurement category : II, Degree of pollution : 2
C-Tick	AS/NZS 2064 Class A Group 1	

● 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.

Specifications

DA100 Main Unit

● Stand-alone model (DA100-1)
● Expandable model (DA100-2)

DA100 Subunit

● DS400
● DS600

General Specifications
● External Dimensions (when I/O modules are installed.)
DA100-1:	approximately 422 (W) × 176 (H) × 100 (D) mm
DA100-2:	approximately 336 (W) × 165 (H) × 100 (D) mm
DS400:	approximately 336 (W) × 165 (H) × 100 (D) mm
DS600:	approximately 422 (W) × 176 (H) × 100 (D) mm

● Weight (when I/O modules are installed)
DA100-1:	approximately 3.5 kg
DA100-2:	approximately 2.5 kg
DS400:	approximately 2.5 kg
DS600:	approximately 3.5 kg

● AC Power Supply
Rated supply voltage: 100 to 240 VAC
Usable supply voltage: 90 to 250 VAC
Rated supply frequency: 50/60 Hz
● DC power supply (Runs on a DC power supply only. Specify when ordering.)
Rated supply voltage: 12 to 28VDC
Usable supply voltage: 10 to 32 VDC
Terminal: Dedicated connector
Others: AC adapter(optional accessory)
● Insulation Resistance: At least 20 MΩ at 500 VDC between the power supply and ground, 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
● Normal Operating Conditions
Supply frequency: 50 Hz ±2% or 60 Hz ±2%
Ambient temperature: DA100: 0˚ to 50˚C
                         DS400, DS600: Panel mount –10 to 60˚C
                                       Desk-top –10 to 50˚C
                                       DC power model 0 to 50°C
Ambient humidity: 20 to 80% RH (between -10˚C and 40˚C)

● Others
Clock: With calendar function (Western calendar)
Clock accuracy: ±100 ppm (excluding a delay due to power-on/off)
Set value backup: approximately 10 years, excluding clock function

Connecting Modules and Subunits
● Standard Configuration Modules and Software
The following modules can be installed in a main unit or subunit to configure a data acquisition system.
Input Modules: 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
Communications Modules: GP-IB, RS-232C, RS-422A/485 and Ethernet. Connectable to DA100-1 and DA100-2
Alarm Contact Output Modules: 4 contacts (C contact: NO-C-NC) and 10 contacts (A contact: NO-C) Connectable to DA100-1, DA100-2, DS400 and DS600
DI/DO Modules: Two alarm output contacts (NO-C-NC) and fail output Connectable to DA100-1, DA100-2, DS400 and DS600 1 module/1 system
Extension Modules: Interfaces for remote power supply One extension module can be connected to each DA100-1, DS400 and DS600. (should be used with extension base units)
Software: DAQ 32 (Standard software) DAQ 32 Plus (Optional software)
● Types and Number of Modules That Can Be Connected
DA100-1:   Input modules, communications modules, alarm contact output modules, DI/DO module and extension modules A maximum of six modules can be connected, one of which must always be a communications module.
DA100-2:   Communications modules, alarm contact output modules, DI/DO module A maximum of four modules can be connected, one of which must always be a communications module. Input modules must not be connected to a subunit.
DS400/600:   Input modules, alarm contact output modules, DI/DO module and extension module Four or six modules can be connected.
● Connection of Subunits
DA100-1:   Cannot be connected.
DA100-2:   Up to 6 subunits can be connected.

Input Section

● Number of Input Channels
DA100-1:   10 to 40 channels. Expandable on a module basis.
DA100-2:   0 channel. Expandable up to 300 channels by connecting subunits.
● Types of Input Modules
Universal (DC voltage, thermocouple, RTD 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

DA100-2:   Minimum of 500 ms per 300 channels (including the subunit)
                         The measurement interval is dependent on the slowest input module if input modules of different measurement intervals are connected at the same time.
● 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)
(depends on the input modules)

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)
DA100-1: a total of 30; DA100-2: a total of 30; DS400/600: a total of 300

Standard Computation 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)

Optional Specifications

General-purpose Computation Functions (/M1)
● Number of Computation Channels
DA100-1:   Maximum of 30 channels
DA100-2:   Maximum of 60 channels
● Types
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
CLOG: Mathematical processing within a group of data that were measured at the same time (total, maximum, minimum, average, max. - min.)
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
Max., min., average, total values. Reporting result is transferred to the PC via a communication interface.
Report calculation channels: Up to 60 channels
Note: To be able to transfer the results to a personal computer, the DP380 report software is essential. Note that the DP380 software cannot be run simultaneously with the DAQ32 or DAQ32Plus software package.

Input Module

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 (except DU 500-14)
Between input terminal and ground: 1,500 VAC (50/60 Hz) for one minute

Universal Input Modules
DCV/TC/DI Input Modules

Module	Model	Number of Channels	Type of Terminal	Measurement Interval
Universal input	DU100-11	10	Screw	0.5 s
	DU100-12	10	Clamp	0.5 s
	DU100-21	20	Screw	2 s
	DU100-22	20	Clamp	2 s
	DU100-31	30	Screw	2 s
	DU100-32	30	Clamp	2 s
DCV/TC/DI input	DU200-11	10	Screw	0.5 s
	DU200-12	10	Clamp	0.5 s
	DU200-21	20	Screw	2 s
	DU200-22	20	Clamp	2 s
	DU200-31	30	Screw	2 s
	DU200-32	30	Clamp	2 s

● General Specifications
Input method:
    Floating unbalanced input, and inter-channel isolation
    RTD inputs are of the same potential within the same input module.
A/D resolution: ±20,000
A/D integration time: Manual selection or automatic switchover 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
Thermocouple: R, S, B, K, E, J, T, L, U, N, W, KP-Au7Fe
RTD: Pt100, JPt100, Ni100, Ni120, Cu10 and J263*B
Contact input: Non-voltage contact input or voltage input
Mixed input is allowed for DC voltage, thermocouple, RTD and contact inputs
(For an DCV/TC/DI input module, RTD input is not allowed.)
Measurement accuracy: ±(0.05% of reading + 2 digits)
(at 2-V range, 23˚ ±2˚C and 55% ±10% RH)
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).
Burnout: Detected within thermocouple-input range

DC Current Input Modules

Model	Number of Channels	Type of Terminal	Measurement Interval
DU300-11	10	Screw	0.5 s
DU300-12	10	Clamp	0.5 s

● 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 switchover 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

Model	Number of Channels	Type of Terminal	Measurement Interval
DU400-12	For single phase: one for voltage and the one for current	Clamp	2 s
DU400-22	For 3 phase : three for voltage and three for current	Clamp	2 s

● General Specifications
Input method: Transformer isolation
Measured 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)
Measurement accuracy: ±(0.5% of span when RMS value of voltage and current are measured)
Measured frequency: 45 to 65 Hz (all channels must have the same frequency)
Crest factor: Maximum of 3
Power integration: Calculated by /M1 (computation functions) option. /M1 must be specified for the DA100.

Strain Measurement Modules

Model	Number of Channels	Type of Terminal	Measurement Interval
DU500-12	10*, with built-in 120-Ω resistance	Clamp	0.5 s
DU500-13	10*, with built-in 350-Ω resistance	Clamp	0.5 s
DU500-14	10**, for external bridge box	NDIS	0.5 s

*: 2 module's width is required.
**: If connecting a strain gauge sensor, which does not comprise any line for sensing bridge voltage, to a DU500-14 strain input module with an NDIS connector, use a DV450-001 strain conversion cable together with the module.

● General Specifications
Measurement range (resolution):2,000 με (0.11 με) ,20,000 με (1 με) ,200,000 με (10 με)
Built-in bridge resistance: 120Ω, 350Ω, or none (for an external bridge box)
Wiring: 1/4 bridge 1/2 bridge (neighbor), 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

Model	Number of Channels	Type of Terminal	Measurement Interval
DU600-11	10	Screw	0.5 s*

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

● General Specifications
Input method: Shared common line within the same module
Type of input: Non-voltage contact or open collector (TTL or transistor)
Measurement modes
RATE (count value instantaneous mode):
The number of pulses input during the most recent one-second period of measurement is output as the scale set 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 set value.
Pulse integration: The computation function is used when integrating either the count value each second or the ON period.
Computation formula: TLOG.PSUM (XXX)

Number of computation channels:
Max. 30 channels for stand-alone model
Max. 60 channels for expandable model
Max. count value/ON period:99999999
(/M1 (computation option) need not be specified for the DA100 main unit. Pulse integration can be used automatically when a pulse module is recognized.)
Maximum input frequency: 6 kP/s (10 P/s for voltage-free contact)
Filter: For rejection of chattering up to 5 ms (can be turned on and off for every channel)

Digital Input Module

Model	Number of Channels	Type of Terminal	Measurement Interval
DU700-11	10	Screw	0.5 s

● General Specifications
Input method: Unbalanced floating-point, with channel-to-channel isolation (individually separated channels)
Measuring range: Voltage input 2.3 V or less 0
2.5 V or greater ... 1
Voltage-free contact input Off (open) 0
On (closed) 1
Maximum input voltage range:
Voltage input ±60 V DC
Voltage-free contact input ±10 V DC

Alarm Contact Output Modules

Model	Number of Outputs	Contact Arrangement	Type of Terminal
DT200-11	4	SPDT (NO-C-NC)	Screw
DT200-21	10	Make contact (NO-C)	Screw

● General Specifications
Output mode: Selection between excitation and non-excitation, output hold and non-hold and AND or OR modes
Re-breakdown re-alarm: maximum of 6 contacts 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
● Common Specifications
Model: DT100-11
Up to one module can be connected to one DA100 system.
● Alarm Contact Output
Number of outputs: 2
Contact mode: SPDT—NO-C-NO terminal
Contact capacity: 250 VDC/0.1 A (resistive load)
30 VDC/2 A (resistive load)
250 VAC/2 A (resistive load)
● Fail Output
Function: If an abnormality is found in the total system, the fail output terminal is de-energized.
Output mode: Make contact. Cannot be switched between excited and non-excited.
Contact capacity: 250 VDC/0.1 A (resistive load)
30 VDC/2 A (resistive load)
250 VAC/2 A (resistive load)
● Remote control function
Starting, resetting and temporary hold of statistical computation
Input signal: Non-voltage contact or open collector (TTL or transistor)

Extension Modules (used with extension base units)
Unit to connect with: DA100-1, DS400 or DS600 (one for each unit)
Extensible distance: Up to total length of 30 m
Connectable input module:10-ch universal input module
10-ch DCV/TC/DI input module

Retransmission Modules

Model	Module	Output Signal	Number of Channels
DT500-11	Retransmission Module	1-5 V	10
DT500-21		4-20 mA	2

The DT500-11 and DT500-21 Retransmission modules deal with data that are measured or computed by the DARWIN 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.

Functions, Common Specifications
Outline of functions:
(1) Functions as a talker
Output of measured values, output of setting values
(2) Functions as a listener
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

GP-IB Modules
Electrical and mechanical specifications:Based on IEEE standard 488-1978
Addresses: 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: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps
Transmission distance: Maximum of 15 m
Connector D-sub 25-pin connector

RS-422A/485 Modules

Electrical and mechanical specifications: 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, 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

DS400 (DA100-2)

Unit: mm

DS600 (DA100-1)

Unit: mm

■ Models and Suffix Codes

DA100 Main Unit

Model	Suffix code		Description
DA100			Data acquisition unit DA100
Type	-1		Stand-alone
	-2		Expandable
Attached software	3		DAQ32 software
Supply voltage	-1		100 to 240 V AC
	-2		12 to 28 V DC
Power supply inlet socket, power cable	D		3-pin inlet w/UL, CSA cable
	F		3-pin inlet w/VDE cable
	H		3-pin inlet w/CCC cable
	R		3-pin inlet w/SAA cable
	S		3-pin inlet w/BS cable
	W		3-pin inlet, with screw conversion terminal
	Y		Dedicated connector for DC power supply (w/o power cable)
Optional feature	/M1		Calculation function
	/M3		Report function
	/D2		°F display

(1) One of the general-purpose communication modules must be ordered separately.
(2) The extension cable must be ordered separately when the expandable model is specified.
(3) The subunit and input/output module must be ordered separately when the expandable model is specified.

DS400/DS600 Subunit

Model	Suffix code		Description
DS400			4-module connection subunit
DS600			6-module connection subunit
Type	-00		Always 00
Supply voltage	-1		100 V 240 V AC
	-2		12 to 28 V DC
Supply section inlet socket, power cable	D		3-pin inlet w/UL, CSA cable
	F		3-pin inlet w/VDE cable
	H		3-pin inlet w/CCC cable
	R		3-pin inlet w/SAA cable
	S		3-pin inlet w/BS cable
	W		3-pin inlet, with screw conversion terminal
	Y		Dedicated connector for DC power supply (w/o power cable)

Input Modules

Model	Description	Requred slots	Terminal	Maximum measurement period
DU100-11	10-ch universal input (DCV, TC, DI and RTD)	1	Screw	0.5 s
DU100-21	20-ch universal input (DCV, TC, DI and RTD)	2	Screw	2 s
DU100-31	30-ch universal input (DCV, TC, DI and RTD)	3	Screw	2 s
DU100-12	10-ch universal input (DCV, TC, DI and RTD)	1	Clamp	0.5 s
DU100-22	20-ch universal input (DCV, TC, DI and RTD)	2	Clamp	2 s
DU100-32	30-ch universal input (DCV, TC, DI and RTD)	3	Clamp	2 s
DU200-11	10-ch DCV/TC/DI input	1	Screw	0.5 s
DU200-21	20-ch DCV/TC/DI input	2	Screw	2 s
DU200-31	30-ch DCV/TC/DI input	3	Screw	2 s
DU200-12	10-ch DCV/TC/DI input	1	Clamp	0.5 s
DU200-22	20-ch DCV/TC/DI input	2	Clamp	2 s
DU200-32	30-ch DCV/TC/DI input	3	Clamp	2 s
DU300-11	10-ch mA input module	1	Screw	0.5 s
DU300-12	10-ch mA input module	1	Clamp	0.5 s
DU400-12	Power monitor module for single phase	1	Clamp	2 s
DU400-22	Power monitor module for 3 phase	1	Clamp	2 s
DU500-12	10-ch strain input module (120 Ω)	2	Clamp	0.5 s
DU500-13	10-ch strain input module (350 Ω)	2	Clamp	0.5 s
DU500-14	10-ch strain input module (External bridge box)	2	NDIS	0.5 s
DU600-11	10-ch pulse input	1	Screw	0.5 s
DU700-11	Digital input	1	Screw	0.5 s

I/O Terminal Modules

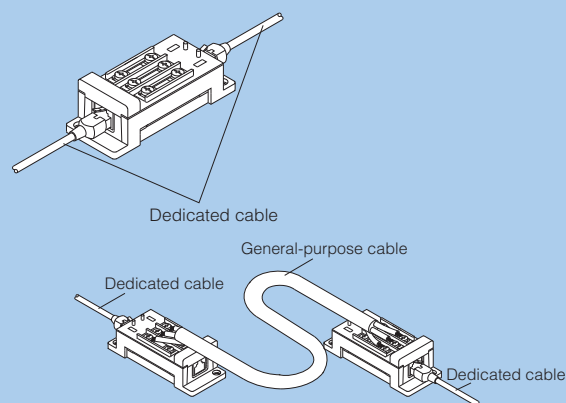| Model	Description
DT100-11	DI/DO module (2 alarm outputs, remote control signal input, fail/chart end output)
DT200-11	Alarm output module (4 transfer contacts)
DT200-21	Alarm output module (10 make contacts)
DT300-11	GP-IB module
DT300-21	RS-232C module
DT300-31	RS-422/485 module (screw terminal)
DT300-41	Ethernet module
DT500-11	1-5 V Retransmission module
DT500-21	4-20 mA Retransmission module
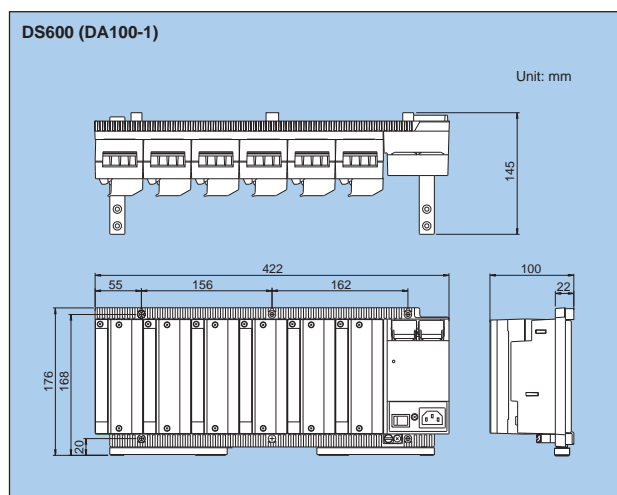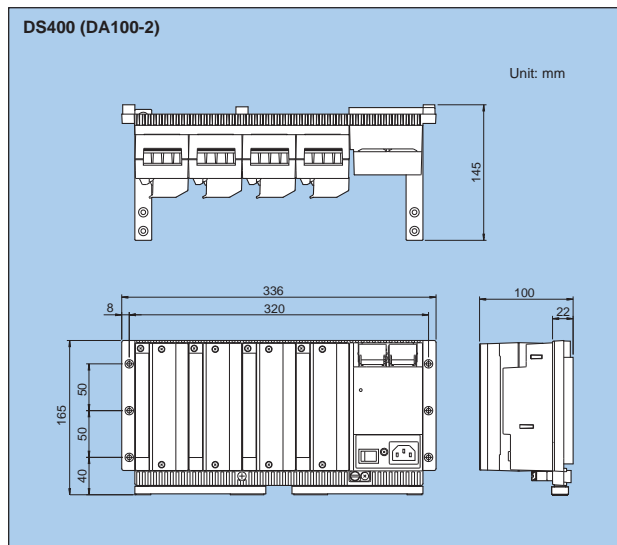
Accessories

Model	Description
DV100-011	Extension module
DV100-012	Extension base unit
DV200-000	Extension cable (0.5 m)
DV200-001	Extension cable (1 m)
DV200-002	Extension cable (2 m)
DV200-005	Extension cable (5 m)
DV200-010	Extension cable (10 m)
DV200-020	Extension cable (20 m)
DV200-050	Extension cable (50 m)
DV200-100	Extension cable (100 m)
DV200-200	Extension cable (200 m)
DV200-300	Extension cable (300 m)
DV200-400	Extension cable (400 m)
DV200-500	Extension cable (500 m)
DV250-001	Cable adapter
DV300-011	Shunt resistance, 10 Ω, for screw
DV300-012	Shunt resistance, 10 Ω, for clamp
DV300-101	Shunt resistance, 100 Ω, for screw
DV300-102	Shunt resistance, 100 Ω, for clamp
DV300-251	Shunt resistance, 250 Ω, for screw
DV300-252	Shunt resistance, 250 Ω, for clamp
DV400-011	Rack mounting kits for DA100, DS400/DS600
DV450-001	Strain converter
DV500-001	AC adapter for DC power model W/UL.CSA cable.
DV500-002	AC adapter for DC power model W/VDE cable.
DV500-003	AC adapter for DC power model W/SAA cable.
DV500-004	AC adapter for DC power model W/BS cable.
DV500-005	AC adapter for DC power model w/CCC cable.

DV250-001 Cable adapter

Dedicated cable

General-purpose cable

Dedicated cable

Dedicated cable

The DV250-001 cable extension adapter is used as a junction terminal for extending a dedicated cable that connects between DARWIN units or as an adapter for connecting the dedicated cable to a different cable.

Software

Model Code	Description	Applicable Operating System
DP120-13	DARWIN DAQ32 Software (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.)	Windows 98 Windows Me Windows NT4.0 Windows 2000 Windows XP
WX102/CD1	DARWIN DAQ32Plus Software (Supports setup, data logging and viewing, diagnosis, calibration and tag setting functions.)	
WX101/CD1	DAQLOGGER DAQLOGGER supports a wide variety of models from among YOKOGAWA's family of data acquisition products.	

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

YOKOGAWA ◆

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