

# 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)

DI/DO Modules: Connectable to DA100-1, DA100-2, DS400 and DS600  
 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 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, SQRT (square root), ABS (absolute value), LOG (common or natural logarithm), EXP (exponential), statistics processing (CLOG, TLLOG), 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.)

TLLOG: 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:  $\pm(0.05\%$  of reading + 2 digits)  
 (at 2-V range,  $23^{\circ} \pm 2^{\circ}\text{C}$  and  $55\% \pm 10\%$  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  $\Omega$ ) is pre-installed.  
 A/D resolution:  $\pm 20,000$   
 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:  $\pm 20$  mA (1  $\mu\text{A}$ )  
 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:  $\pm(0.5\%$  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- $\Omega$ resistance	Clamp	0.5 s
DU500-13	10*, with built-in 350- $\Omega$ 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  $\mu\text{e}$  (0.11  $\mu\text{e}$ ), 20,000  $\mu\text{e}$  (1  $\mu\text{e}$ ), 200,000  $\mu\text{e}$  (10  $\mu\text{e}$ )  
 Built-in bridge resistance: 120 $\Omega$ , 350 $\Omega$ , 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  $\Omega$   
 Full bridge: 100 to 1,000  $\Omega$   
 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  $\pm 10,000$   $\mu\text{e}$  (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:  $\pm 60$  V DC  
 Voltage-free contact input:  $\pm 10$  V DC

#### Alarm, DI/DO and Other Modules

##### 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 and 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.

#### Communications Modules

##### 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  
 Start-stop synchronization (synchronization by means of the start and stop bits)  
 Synchronization: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps  
 Baud rate: Maximum of 15 m  
 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

## 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)

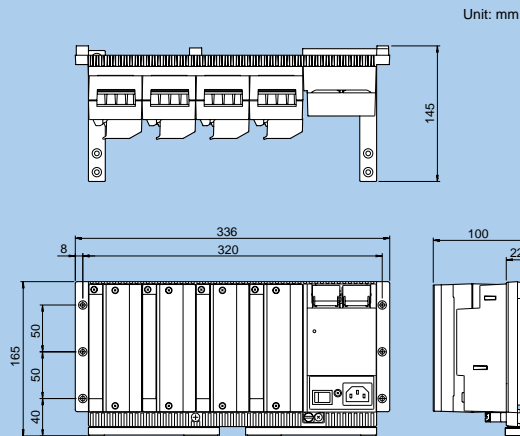
### Input Modules

Model	Description	Required 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

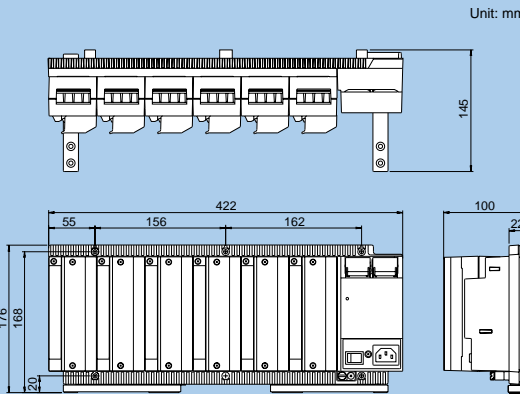
### I/O Terminal Modules

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

### DS400 (DA100-2)



### DS600 (DA100-1)



## Accessories

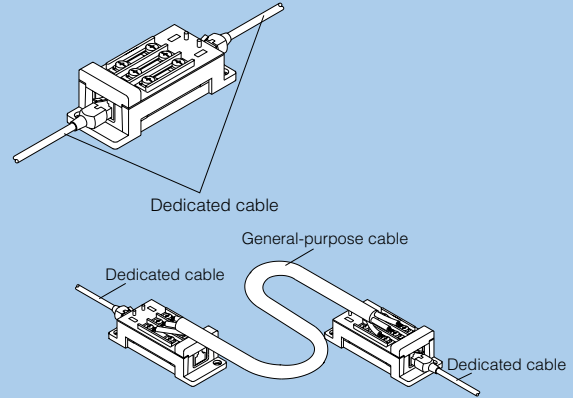
Model	Description
DV100-011	Extension module
DV100-012	Extension base unit
DV200-000	Extension cable (0.5 m)
DV200-001	Extension cable (1 m)
DV200-002	Extension cable (2 m)
DV200-005	Extension cable (5 m)
DV200-010	Extension cable (10 m)
DV200-020	Extension cable (20 m)
DV200-050	Extension cable (50 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 $\Omega$ , for screw
DV300-012	Shunt resistance, 10 $\Omega$ , for clamp
DV300-101	Shunt resistance, 100 $\Omega$ , for screw
DV300-102	Shunt resistance, 100 $\Omega$ , for clamp
DV300-251	Shunt resistance, 250 $\Omega$ , for screw
DV300-252	Shunt resistance, 250 $\Omega$ , 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.

## 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."

### DV250-001 Cable adapter



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.

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