General Specifications

Data Acquisition Unit DA100
Hybrid Recorder DR230/DR240
Data Collector DC100
Standard Connection Modules
Cable Adapter DV250

D∧RWIN

GS 04M01E01-11E

## Refer to the following cautionary notes before you configure your system.

DARWIN is a system comprising a number of data-acquisition equipment components.

In the course of system growth, new models, software, various input/output modules and optional features are added to the family to enhance the systems expandability and flexibility. You can check the versions of your equipment and software by referring to the style number:Sn* shown on the nameplate of the main unit.

When configuring a system, you must confirm that the style number of each component unit and software meets the following requirements:

*release number in the case of software:Rn

(1) The style number of each input/output module must be the same as or lower than that of the main unit or sub-unit to which the module is connected.

(2) The release number of a dedicated software package must be the same as or higher than the style number of the main unit or sub-unit where the package is installed and where it performs control.

Any equipment/software not meeting these requirements is incompatible with your system configuration.

For information on how to upgrade to compatible equipment/software, consult our sales personnel.

■ Universal Input Module
DC V/TC/DI Input Module
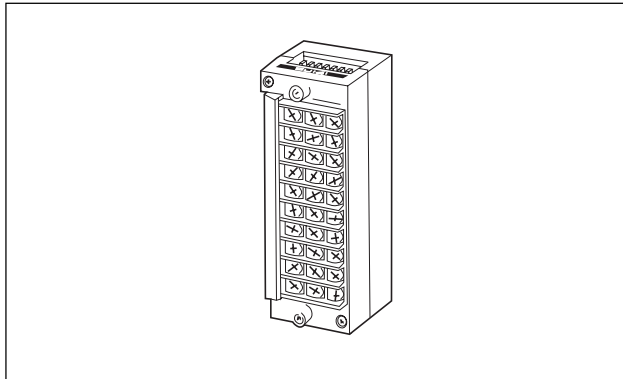
Outline

These input modules permit measurement of voltage signals, temperature signals(from a thermocouple and RTD), and contact signals. Modules may have 10, 20, or 30 channels, and two types of terminal: a screw type or a clamp type.

Type, Number of Channels, Terminal Shape, and Minimum Measurement Interval:

Kind	Model and suffix code	Style number	Number of channels	Terminal shape	Minimum measurement interval
Universal Input Module	DU100-11	S1	10ch	screw	0.5 sec
	DU100-12	S1	10ch	clamp	0.5 sec
	DU100-21	S1	20ch	screw	2 sec
	DU100-22	S1	20ch	clamp	2 sec
	DU100-31	S1	30ch	screw	2 sec
	DU100-32	S1	30ch	clamp	2 sec
DC V/TC /DI *1 Input Module	DU200-11	S1	10ch	screw	0.5 sec
	DU200-12	S1	10ch	clamp	0.5 sec
	DU200-21	S1	20ch	screw	2 sec
	DU200-22	S1	20ch	clamp	2 sec
	DU200-31	S1	30ch	screw	2 sec
	DU200-32	S1	30ch	clamp	2 sec

*1 : For an DC V/TC/DI input module, RTD input is not allowed.

General Specifications
Input method:
Floating unbalanced input, each channel mutually isolated(channel independent)
The RTD range has a common potential (terminal b).
A/D resolution:
±20000
A/D integration time:
Selectable from 20 ms (50 Hz), 16.7 ms (60 Hz), 100 ms (10 Hz), and auto switching.
Auto switching is unavailable if the power supply of the main or sub unit installing the modules is DC.
Minimum measurement interval:

Filter ON/OFF Channels	Low-Pass Filter OFF		Low-Pass Filter ON	
	20msec(50Hz) 16.7msec(60Hz)	100msec(10Hz)	20msec(50Hz) 16.7msec(60Hz)	100msec(10Hz)
10ch Module	0.5 sec	4 sec	3 sec	12 sec
20ch Module	2 sec	5 sec	4 sec	15 sec
30ch Module	2 sec	6 sec	4 sec	20 sec

Normal operating temperature/relative humidity:
–10 to 60°C

Temperature	Humidity
–10 to 40°C	20 to 80%RH
40 to 50°C	10 to 50%RH
50 to 60°C	5 to 30%RH

* no ice formation

Measurement range, accuracy, Resolution:
Refer to the measurement range and accuracy table.
The standard operating conditions are:
23±2°C, 55 ±10%RH, warming-up time 30 minutes or more, vibration and others not affecting instrument operation.

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

Compensation accuracy for the reference junction:
(measured at 0 °C, used for a bundle line of thermocouple at Ø0.5 or less.when the input terminals are balanced Frontwards:0˚ Backwards:0˚ horizontal)
Type R, S, B, W: ±1 °C
Type K, J, E, T, N, L, U: ± 0.5 °C

Maximum allowable input voltage:
2 VDC range or lower, thermocouple, RTD, DI (CONT): ± 10 VDC
6 VDC range or greater, DI (LEVEL): ± 60 VDC Normal mode voltage:
voltage, thermocouple: 1.2 times or less (at peak value, including 50 or 60 Hz signal component)
RTD: 50 mV or lower (at peak value)

Normal mode rejection ratio:
40 dB or greater (50/60 Hz ±0.1%)

Common mode noise voltage:
250 VAC rms (50/60 Hz)

Common mode rejection ratio:
120 dB or greater (50/60 Hz ±0.1%, 500 Ω unbalanced, between the negative measurement terminal and ground)

Maximum noise between channels:
150 VAC rms (50/60 Hz)
(except for RTD)

Noise rejection:
Rejection by integration type A/D, lowpass filter, or moving averaging.

lowpassfilter:
50/60/10 Hz

Input resistance:
Min. 10 MΩ at 2 VDC or lower, thermocouple range
Approx. 1 MΩ at 6 VDC or higher
Power off: 100 MΩ or more

Insulation resistance:
Min. 20 MΩ at 500 VDC between the input terminal and ground

Input bias current:
Max.:10 nA

Dielectric strength:
1000 VAC (50/60 Hz) for 1 minute:between input terminals, (except for RTD)
1500 VAC (50/60 Hz) for 1 minute:between an input terminal and ground

Input source resistance:
DCV, thermocouple: 2 kΩ or lower
RTD: 10 Ω or lower per line (Pt100 Ω)
              5 Ω or lower per line (Pt50 Ω)
              1 Ω or lower per line (Cu10 Ω)
The same resistance including 3-line.

Temperature coefficient:
zero: 0.01% of range/°C
full span: 0.01% of range/°C
              (0.02% of span/°C for Cu10 Ω)

Thermocouple burn out:
Detected in a thermocouple range (On/Off enabled), current of 4 µA, detectable pulse width of approx. 5 ms.
2 kΩ or lower is considered to be 'Normal'.
100 kΩ or greater is considered to be 'Disconnected'.

Detection interval and detection timing for thermocouple burn out:
The minimum interval of the burn out detection becomes 2s when the measurement interval of the 10ch universal input module is set at 0.5 s.
Except that, the burn out condition is detected at each measurement interval.
2.5 sec. in a measurement period of 0.5 sec.
2 sec. in a measurement period of 2 sec.

Power consumption:
Included in the main unit or the subunit to which the module is to be installed.

Outside dimensions & Weight:

Model and suffix code	Outside dimensions (W) × (H) × (D)	Weight (kg) (approx.)
DU100-11	Approx :57 × 137 × 88	0.5
DU100-12	Approx :57 × 137 × 88	0.5
DU100-21	Approx :114 × 137 × 88	1.0
DU100-22	Approx :114 × 137 × 88	1.0
DU100-31	Approx :171 × 137 × 88	1.5
DU100-32	Approx :171 × 137 × 88	1.5
DU200-11	Approx :57 × 137 × 88	0.5
DU200-12	Approx :57 × 137 × 88	0.5
DU200-21	Approx :114 × 137 × 88	1.0
DU200-22	Approx :114 × 137 × 88	1.0
DU200-31	Approx :171 × 137 × 88	1.5
DU200-32	Approx :171 × 137 × 88	1.5

Measurment range and accuracy

The standard operating conditions:
23±2 °C, 55± 10%RH, power supply voltage 90 to 250 VAC, power supply frequency 50/60 Hz within ±1%, warming-up time 30 minutes or more, vibration and others not affecting instrument operation.

*1:R,S,B,K,E,J,T:ANSI,IEC 584,DIN IEC584,JIS C 1602-1981
*2:L:Fe-CuNi,DIN43710, U; Cu-CuNi,DIN 43710
*3:N:Nicrosil-Nisil,IEC 584, DIN IEC 584
*4:W:W·5%RE -W·26%Re(Hoskins Mfg Co)
*5:Pt50:JIS C 1604-1981,JIS C 1606-1986,Pt100:JIS C 1604-1989,JIS C 1606-1989,IEC 751,DIN IEC 751, IEC751,JPt100:JIS C 1604-1989,JIS C 1606-1989
*6:SAMA/DIN
*7:McGRAW EDISON
*8:Span of guarantee the accuracy

Input	Type	Measuring (digital display)		Maximum resolution
		Measurement range	Measurement accuracy	
DC Voltage	20mV	– 20.000 to 20.000mV	±(0.05% of rdg + 5digits)	1µV
	60mV	– 60.00 to 60.00mV	±(0.05% of rdg + 2digits)	10µV
	200mV	– 200.00 to 200.00mV	±(0.05% of rdg + 2digits)	10µV
	2V	– 2.0000 to 2.0000V	±(0.05% of rdg + 2digits)	100µV
	6V	– 6.000 to 6.000V	±(0.05% of rdg + 2digits)	1mV
	20V	– 20.000 to 20.000V	±(0.05% of rdg + 2digits)	1mV
	50V	– 50.00 to 50.00V	±(0.05% of rdg + 2digits)	10mV
TC (Note that Accuracy of reference junction compensation is not considered).	R[*1]	0.0 to 1760.0°C	±(0.05% of rdg + 1°C) However, R,S : 0 to 100°C, ± 3.7°C 100 to 300°C, ± 1.5°C B : 400 to 600°C, ± 2°C accuracy less than 400°C is not specified.	0.1°C
	S[*1]	0.0 to 1760.0°C		
	B[*1]	0.0 to 1820.0°C		
	K[*1]	– 200.0 to 1370.0°C	±(0.05% of rdg + 0.7°C) However, K attains an accuracy of ±(0.05% of rdg. + 1°C) within the range between – 200 and – 100°C.	
	E[*1]	– 200.0 to 800.0°C	±(0.05% of rdg + 0.5°C) However, J and L attain an accuracy of ±(0.05% of rdg. + 0.7°C) within the range between – 200 and – 100°C.	
	J[*1]	– 200.0 to 1100.0°C		
	T[*1]	– 200.0 to 400.0°C		
	L[*2]	– 200.0 to 900.0°C		
	U[*2]	– 200.0 to 400.0°C		
	N[*3]	0.0 to 1300.0°C	±(0.05% of rdg. + 0.7°C)	
	W[*4]	0.0 to 2315.0°C	±(0.05% of rdg. + 1°C)	
	KPvsAu7Fe	0.0 to 300.0K	±(0.05% of rdg. + 0.7°C)	0.1K
RTD	Pt100(1mA)[*5]	– 200.0 to 600.0°C	±(0.05% of rdg. + 0.3°C)	0.1°C
	Pt100(2mA)[*5]	– 200.0 to 250.0°C		
	JPt100(1mA)[*5]	– 200.0 to 550.0°C		
	JPt100(2mA)[*5]	– 200.0 to 250.0°C		
	Pt50(2mA)[*6]	– 200.0 to 250.0°C	±(0.05% of rdg. + 0.3°C)	
	Ni100(1mA)[*6] SAMA	– 200.0 to 550.0°C	±(0.05% of rdg. + 0.3°C)	
	Ni100(1mA)DIN[*6]	– 60.0 to 180.0°C	±(0.05% of rdg. + 0.3°C)	
	Ni120(1mA)[*7]	– 70.0 to 200.0°C		
	J263*B	0.0 to 300.0K	±(0.05% of rdg. + 0.3°C)	0.1K
	Cu10 GE	– 200.0 to 300.0°C – 84.4 to 170.0°C[*8]	±(0.2% of rdg. + 0.7°C)	0.1°C
	Cu10 L&N	– 75.0 to 150.0°C[*8]		
	Cu10 WEED	– 20.0 to 250.0°C[*8]		
	Cu10 BAILEY	– 20.0 to 250.0°C[*8]		
High resolition RTD	Pt100(1mA)[*5]	– 140.00 to 150.00°C	±(0.05% of rdg. + 0.3°C)	0.01°C
	Pt100(2mA)[*5]	– 70.00 to 70.00°C	±(0.05% of rdg. + 0.3°C)	
	JPt100(1mA)[*5]	– 140.00 to 150.00°C	±(0.05% of rdg. + 0.3°C)	
	JPt100(2mA)[*5]	– 70.00 to 70.00°C	±(0.05% of rdg. + 0.3°C)	
Contact	Voltage input	Off for a voltage of less than 2.4V. On for a voltage of 2.4V or more. (TTL)	Off for a voltage of less than 2.4V. On for a voltage of 2.4V or more. (TTL)	
	Contact input	On/off of contact	On/off of contact	

■ mA Input Module
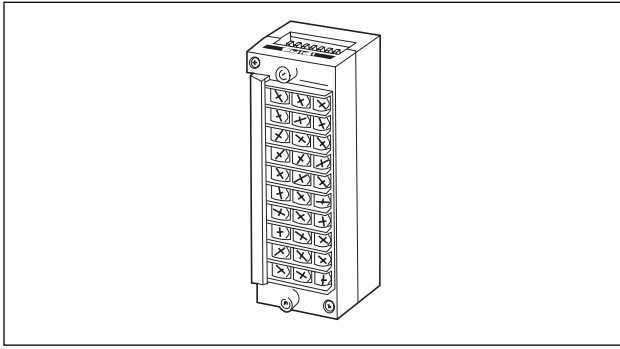
Outline

This module contains a shunt resistor to enable a unified signal of 4 to 20 mA to be input directly.

Model and suffix code, number of channels, shape of terminals, and minimum measurement interval

Model and suffix code	Style number	Number of channels	Terminal shape	Minimum measurement interval
DU300-11	S5	10 ch	screw	0.5 sec
DU300-12	S5	10 ch	clamp	0.5 sec

General specifications

Input method:
Floating unbalanced input, inter-channel isolation

A/D resolution:
±20000

A/D integral time:
Selectable from 20 ms (50 Hz), 16.7 ms (60 Hz), 100 ms (10 Hz), and auto switching.
Auto switching is unavailable if the power supply of the main or sub unit installing the modules is DC.

A/D integral time, measurement interval due to filter ON/OFF:

	Low-pass filter OFF	Low-pass filter ON
20ms (50Hz) 16.7ms (60Hz)	0.5 sec	3 sec
100ms (10Hz)	4 sec	12 sec

Normal operating temperature/humidity range:
–10 to 60°C

Temperature	Humidity
–10 to 40°C	20 to 80%RH
40 to 50°C	10 to 50%RH
50 to 60°C	5 to 30%RH

* no ice formation

Internal resistance:
100 Ω

Max input voltage:
5 VDC

Maximum normal mode noise current:
24 mA (at peak value, including 50 or 60 Hz signal component)
Equivalent to 2.4 V

Normal mode rejection ratio:
40 dB min (50/60 Hz ±0.1%)

Maximum common mode noise voltage:
250 VACrms (50/60 Hz)

Common mode rejection ratio:
120 dB min (50/60 Hz ±0.1%)

Max inter-channel noise:
150 VACrms (50/60 Hz)

Filter:
Utilizes low-pass filter or moving average function

Low-pass filter cutoff frequency:
50/60/10 Hz

Input resistance:
100 Ω

Insulation resistance:
Between input and ground 20 MΩ min (500 VDC)

Withstand voltage:
Between input terminals: 1000 VAC (50/60 Hz) 1 minute
Between each input terminal and ground:
1500 VA (50/60 Hz) 1 minute

Input signal source resistance:
Temperature coefficient: 0.01% of range/°C

Power consumption:
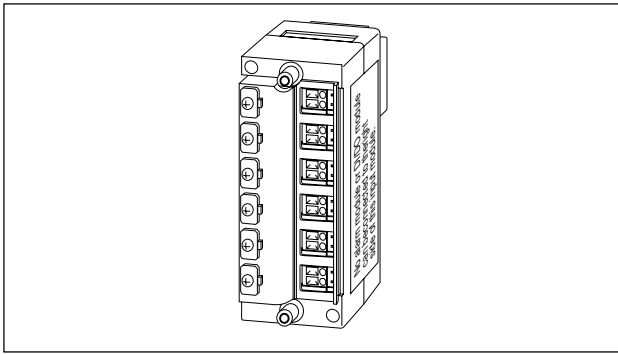Included in the value for the installed main unit or subunit.

External dimensions (W) × (H) × (D):
Approx. 57 × 137× 88

Weight:
Approx. 0.5 kg

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■ Power Monitor Module

Outline
This module accepts AC voltage and current signals, and measures RMS values, active power, frequency, and so on. It is available as a single phase (DU400-12) version and also as a 3-phase (DU400-22) version.

Model and suffix code, number of channels, terminal shape, and minimum measurement interval

Model and suffix code	Style number	Application (input channel)	Terminal shape	Minimum measurement interval
DU400-12	S5	Single-phase version (Voltage 1 ch, Current 1 ch)[*1]	clamp[*1]	2 sec
DU400-22	S5	3-phase version (Voltage 3 ch, Current 3 ch)	clamp[*1*2]	2 sec

*1 : 4-terminal push-in type
*2 : Can be used as 3 single-phase inputs when the main or sub unit installing the module is S8 or later. Note that each phase must synchronize with each other, and the voltage and current ranges for each wire must be equal.

General specifications
Input format:
Transformer-isolated input

Measurement range
Voltage range: 25 Vrms or 250 Vrms
Current range: 0.5 A or 5 A
For 3-phase measurement or single-phase 3-wire measurement, the voltage and current ranges for each phase and each wire must be equal.

Measurement requirements
- Measurement ranges for voltage and current inputs
  10% of measuring range < voltage and current inputs ≤ 100% of measuring range
- Measures frequency on V1 channel.
- As measurement is based on the frequency of V1 channel, if the input to V1 channel is outside the ranges above, the measurement accuracy may not be achieved.

Measurement accuracy and resolution

Measurement item	Measurement accuracy		Resolution
RMS voltage	±(0.5% of span)		0.01 Vrms (25 V range)
			0.1 Vrms (250 V range)
RMS current	±(0.5% of span)		0.0001 Arms (0.5 A range)
			0.001 Arms (5 A range)
Active power	±(1% of span)	f = 0	0.01 W (span:12.5 W/25 W/37.5 W)
	±(2.5% of span)	$0 < \lvert \phi \rvert \le 30$	0.1 W (span:125 W/250 W/375 W)
	±(5% of span)	$30 < \lvert \phi \rvert \le 80$	1 W (span:1250 W/2500 W/3750 W)
Apparent power	±(1% of span)	$0 \le \lvert \phi \rvert \le 80$	0.01 VA (span:12.5 VA/25 VA/37.5 VA)
			0.1 VA (span:125 VA/250 VA/375 VA)
			1 VA (span:1250 VA/2500 VA/3750 VA)
Reactive power	±(5% of span)	$0 \le \lvert \phi \rvert < 60$	0.01 Var(span:12.5 Var/25 Var/37.5 Var)
	±(2.5% of span)	$60 \le \lvert \phi \rvert \le 80$	0.1 Var (span:125 Var/250 Var/375 Var)
			1 Var (span:1250 Var/2500 Var/3750 Var)
Frequency	±0.1Hz		0.01 Hz
Power factor	±(2% of span)	$0 \le \lvert \phi \rvert \le 80$	0.01
Phase angle	±5 deg	$0 \le \lvert \phi \rvert \le 80$	0.1 deg

span: equal to the maximum value of the measuring span describing in setting items and measuring span table.

- If the apparent power input falls to 10% of span, the phase and power factor cannot be measured (underflow).
- Up to 2-scanning data become invalid immediately after changing the measurement range or wiring.

Measurement frequency:
45 to 65 Hz

Connection methods
DU400-12:   Single-phase 2-wire method
DU400-22:   Single-phase 2-wire method, single-phase 3-wire method, 3-phase 3-wire (2 voltages, 2 currents) method, 3-phase, 3-wire (3 voltages, 3 currents) method, and 3-phase 4-wire method

Measurement item:
Up to six items per module can be selected from RMS voltage, RMS current, active power, apparent power, reactive power, frequency, power factor and phase angle. The selected measurement items are assigned to measurement channels xx1 to xx6, displayed and recorded. Note that the combination of measurement items depends upon the input wiring method used (see the Measurement Item Combination Table).

Input resistance
ACV: 300 kΩ min
ACI: 1 Ω max

Filter:
Utilizes the moving average function.

Power factor integration:
Utilizes the /M1 computation function.

Insulation resistance:
Between input and ground 20 MΩ min (500 VDC)

Withstand voltage:
Between input terminals: 1500 VAC (50/60 Hz) 1 minute
Between each input terminal and ground:
                            2300 VAC (50/60 Hz) 1 minute

Working temperature/humidity range:
0 to 50°C, 20 to 80% RH (Between 40 and 50°C, the humidity range must be between 10 and 50% RH.)

External dimensions and weight

Model and suffix code	Outside dimensions(W) × (H) × (D)	Weight(kg) (approx.)
DU400-12	Approx :57 × 137 × 68	0.5
DU400-22	Approx :57 × 137 × 68	0.35

Caution when mounting:
The RJC accuracy of an universal input module or a DCV/TC/DI input module mounted next to the power monitor module should be changed as described below:
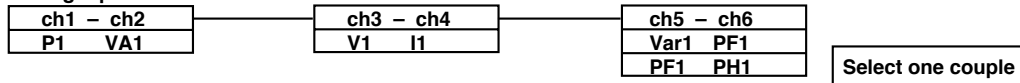**RJC accuracy:within(standard RJC accuracy ±1.0°C)**

Note

Pleae set up main unit of DARWIN to 3-phase 4-wire method, when you want to measure 3-different phase with single-phase 2-wire method, with same frequency setting for (p1, p2, p3).

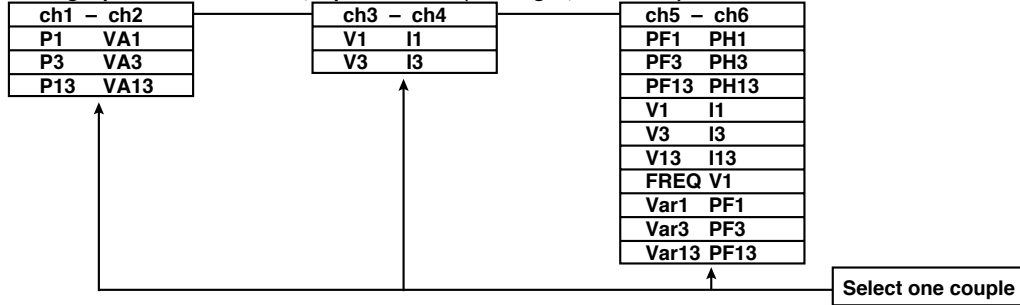GS 04M01E01-11E

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■ Measurement item combination table

Combinations of measurement items that can be selected every two channels (channels 1 & 2, channels 3 & 4, channels 5 & 6, and so on) are fixed.

Select combination pairs from these measurement items, and assign them to each channel (2-channel group).

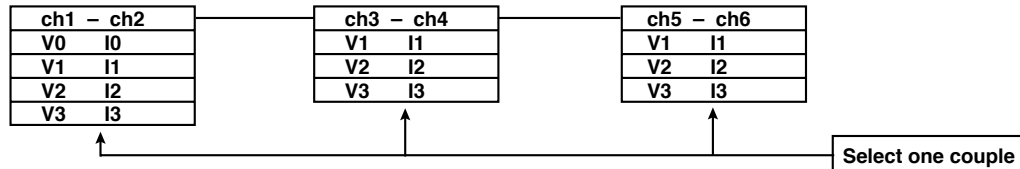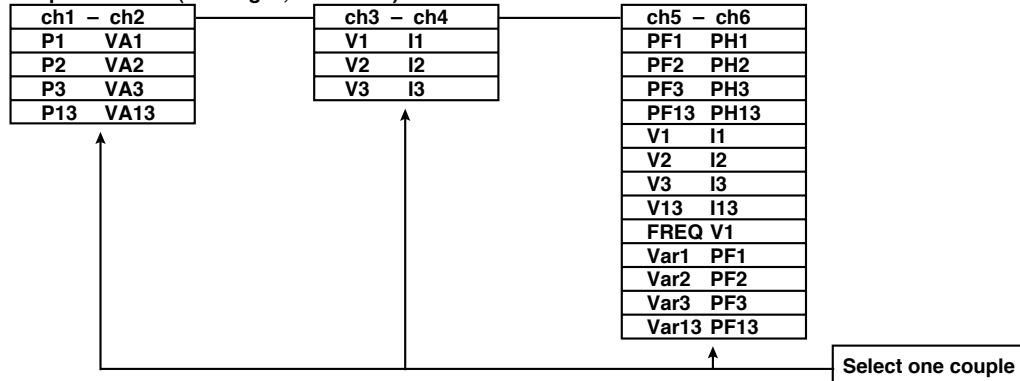Shown below is a list of combinations that can be selected.
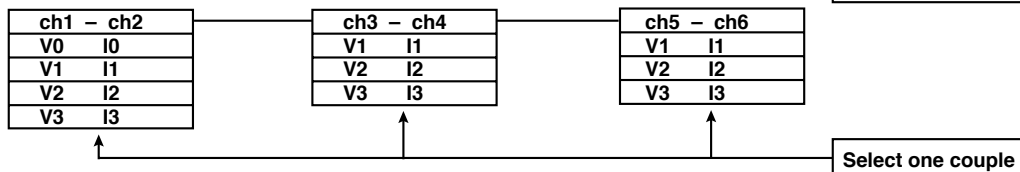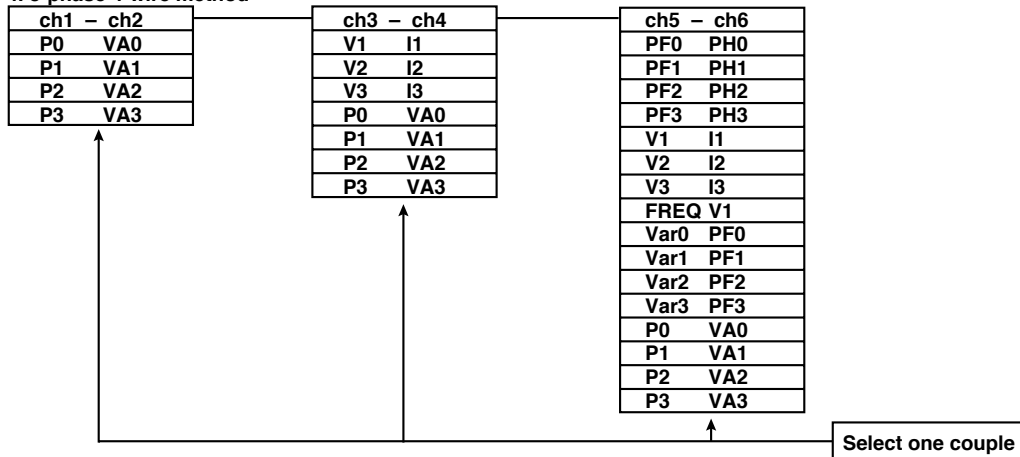
1. Single-phase 2-wire method

ch1 – ch2	
P1	VA1

ch3 – ch4	
V1	I1

ch5 – ch6	
Var1	PF1
PF1	PH1

Select one couple

2. Single-phase 3-wire method, 3-phase 3-wire (2 voltages, 2 currents) method

ch1 – ch2	
P1	VA1
P3	VA3
P13	VA13

ch3 – ch4	
V1	I1
V3	I3

ch5 – ch6	
PF1	PH1
PF3	PH3
PF13	PH13
V1	I1
V3	I3
V13	I13
FREQ	V1
Var1	PF1
Var3	PF3
Var13	PF13

Select one couple

Select one couple

3. 3-phase 3-wire (3 voltages, 3 currents) method

ch1 – ch2	
P1	VA1
P2	VA2
P3	VA3
P13	VA13

ch3 – ch4	
V1	I1
V2	I2
V3	I3

ch5 – ch6	
PF1	PH1
PF2	PH2
PF3	PH3
PF13	PH13
V1	I1
V2	I2
V3	I3
V13	I13
FREQ	V1
Var1	PF1
Var2	PF2
Var3	PF3
Var13	PF13

Select one couple

ch1 – ch2	
V0	I0
V1	I1
V2	I2
V3	I3

ch3 – ch4	
V1	I1
V2	I2
V3	I3

ch5 – ch6	
V1	I1
V2	I2
V3	I3

Select one couple

4. 3-phase 4-wire method

ch1 – ch2	
P0	VA0
P1	VA1
P2	VA2
P3	VA3

ch3 – ch4	
V1	I1
V2	I2
V3	I3
P0	VA0
P1	VA1
P2	VA2
P3	VA3

ch5 – ch6	
PF0	PH0
PF1	PH1
PF2	PH2
PF3	PH3
V1	I1
V2	I2
V3	I3
FREQ	V1
Var0	PF0
Var1	PF1
Var2	PF2
Var3	PF3
P0	VA0
P1	VA1
P2	VA2
P3	VA3

Select one couple

ch1 – ch2	
V0	I0
V1	I1
V2	I2
V3	I3

ch3 – ch4	
V1	I1
V2	I2
V3	I3

ch5 – ch6	
V1	I1
V2	I2
V3	I3

Select one couple

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■ **Setting items and measuring span table**

Setting items	Measuring span	Display span
Effective voltage(RMS value)	0.00 to 25.00V	0.00 to 26.25V
	0.00 to 25.00V	0.00 to 26.25V
	0.0 to 250.0V	0.0 to 262.5V
V1, V2, V3, V0, V13	0.0 to 250.0V	0.0 to 262.5V
Effective current(RMS value)	0.0000 to 0.5000A	0.0000 to 0.5250A
	0.000 to 5.000A	0.000 to 5.250A
	0.0000 to 0.5000A	0.0000 to 0.5250A
I1, I2, I3, I0, I13	0.000 to 5.000A	0.000 to 5.250A
Active power	-12.50 to 12.50W	-13.75 to 13.75W
	-125.0 to 125.0W	-137.5 to 137.5W
	-125.0 to 125.0W	-137.5 to 137.5W
P1, P2, P3	- 1250 to 1250W	-1375 to 1375W
Active power	-25.00 to 25.00W	-27.50 to 27.50W
(single-phase 3-wire/3-phase 3-wire)	-250.0 to 250.0W	-275.0 to 275.0W
	-250.0 to 250.0W	-275.0 to 275.0W
P13	-2500 to 2500W	-2750 to 2750W
Active power	-37.50 to 37.50W	-41.25 to 41.25W
(3-phase 4-wire)	-375.0 to 375.0W	-412.5 to 412.5W
	-375.0 to 375.0W	-412.5 to 412.5W
P0	-3750 to 3750W	-4125 to 4125W
Apparent power	0.00 to 12.50VA	0.00 to 13.75VA
	0.0 to 125.0VA	0.0 to 137.5VA
	0.0 to 125.0VA	0.0 to 137.5VA
VA1, VA2, VA3	0 to 1250VA	0 to 1375VA
Apparent power	0.00 to 25.00VA	0.00 to 27.50VA
(single-phase 3-wire/3-phase 3-wire)	0.0 to 250.0VA	0.0 to 275.0VA
	0.0 to 250.0VA	0.0 to 275.0VA
VA13	0 to 2500VA	0 to 2750VA
Apparent power	0.00 to 37.50VA	0.00 to 41.25VA
(3-phase 4-wire)	0.0 to 375.0VA	0.0 to 412.5VA
	0.0 to 375.0VA	0.0 to 412.5VA
VA0	0 to 3750VA	0 to 4125VA
Reactive power	0.00 to 12.50Var	0.00 to 13.75Var
	0.0 to 125.0Var	0.0 to 137.5Var
	0.0 to 125.0Var	0.0 to 137.5Var
Var1, Var2, Var3	0 to 1250Var	0 to 1375Var
Reactive power	0.00 to 25.00Var	0.00 to 27.50Var
(single-phase 3-wire/3-phase 3-wire)	0.0 to 250.0Var	0.0 to 275.0Var
	0.0 to 250.0Var	0.0 to 275.0Var
Var13	0 to 2500Var	0 to 2750Var
Reactive power	0.00 to 37.50Var	0.00 to 41.25Var
(3-phase 4-wire)	0.0 to 375.0Var	0.0 to 412.5Var
	0.0 to 375.0Var	0.0 to 412.5Var
Var0	0 to 3750Var	0 to 4125Var
Power factor PF1, PF2, PF3, PF0, PF13	-1.00 to 1.00	-1.00 to 1.00
Phase angle PH1, PH2, PH3, PH0, PH13	-80.0 to 80.0deg	89.0 to 89.0deg
Freguency FREQ	45.00 to 65.00Hz	41.00 to 69.00Hz

Each value described left is corresponding to the current value described below, from upper to lower.
25 V - 0.5 A range
25 V - 5 A range
250 V - 0.5 A range
25 0V - 5 A range

■ Strain Input Module

DU500-14
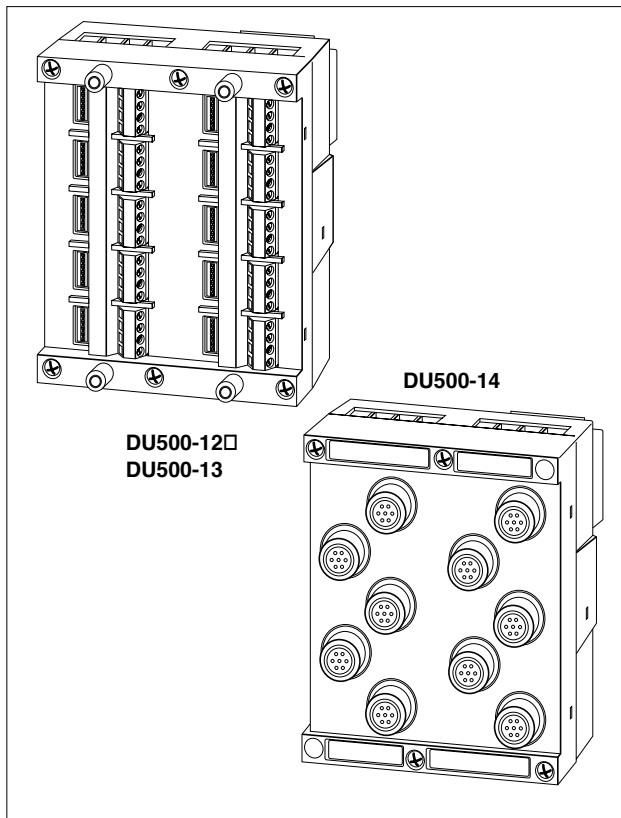
DU500-12
DU500-13

Outline

This module is intended to be connected directly to a strain gauge or a strain gauge type sensor in order to measure static strain due to stress, and so on. It contains a 120 Ω or 350 Ω bridge resistor. There are models (DU500-12 and DU500-13) that can be connected directly to a strain gauge, and a model (DU500-14) that has NDIS type terminals to enable an external bridge box to be connected. One module enables data in 10 channels to be measured, however it requires two slots' worth of space (same width as a 20-channel module).

Model and suffix code, number of channels, shape of terminals, bridge resistor, and minimum measurement interval

Model and suffix code	Style number	Number of channels	Shape of terminals	Bridge resistor	Minimum measurement intervall
DU500-12	S5	10ch[*1]	clamp[*2]	Contains a 120 Ω resistor	0.5s
DU500-13	S5	10ch[*1]	clamp[*2]	Contains a 350 Ω resistor	0.5s
DU500-14	S5	10ch[*1]	NDIS[*3]	Requires an external bridge box[*4]	0.5s

*1 : Requires space equivalent to the width of two slots (20 ch module).

*2 : 4-terminal push-in type

*3 : Terminal recommended by the Japan Non-destructive Testing Association

*4 : Recommended bridge box model and suffix code 319300 (120 Ω)

General specifications

Input type:
Floating balanced input, inter-channel isolation
(except DU500-14)

A/D integral time:
Selection or automatic switchover between 20 msec (50 Hz), 16.7 msec (60 Hz), and 100 msec (10 Hz)

Input type:
Strain gauge or strain gauge type sensor output

Connection methods:
1-gauge method, 2-gauge method (gauges diagonally opposite or on both sides), 4-gauge method
(In the case of the DU500-12 and -13, set the connection method using the DIP switch on the module.)

Applicable gauge resistance:
100 to 1000 Ω (Note that the DU500-12 contains a 120 Ω resistor, and the DU500-13 contains a 350 Ω resistor.)

Gauge factor:
2.00 fixed (can be scaled.)

Bridge voltage:
2 VDC fixed (accuracy ±5%, with correction function)

Balance adjustment:
Automatic (specify the range of channels over which the balance is to be adjusted.)

Balance adjustment range:
Equivalent to ±10000 με (for 1-gauge method)

Measurement range:
1-gauge method: −2000 to 2000 −20000 to 20000 −200000 to 200000 με

2-gauge* method: −1000 to 1000 −10000 to 10000 −100000 to 100000 με

4-gauge* method: −500 to 500 −5000 to 5000 −50000 to 50000 με
*:Scaling function must be utilized to show proper measuring values.

Display resolution and accuracy (except internal resistor of DU400-12, -13 and ON resistor of Dip switch)
2000 με range or below: 0.1 με, 0.5% of range
−20000 to 20000 με: 1 με, 0.3% of range
−200000 to 200000 με: 10 με, 0.5% of range

Bridge resistor accuracy:
±0.01%, ±5 ppm/°C (except ON resistor of Dip switch)

Dip switch ON resistor:
100 mΩ

Input resistance:
More than 10 MΩ

Filter:
Tertiary sinc filter, moving average

Withstand voltage:
Between channels: 50 VDC (excluding DU500-14)
Between input and case:1500 VAC 1 minute (excluding DU500-14)

Normal operating temperature/humidity range:
0 to 50°C, 20 to 80%RH (40 to 50°C: 10 to 50% RH)
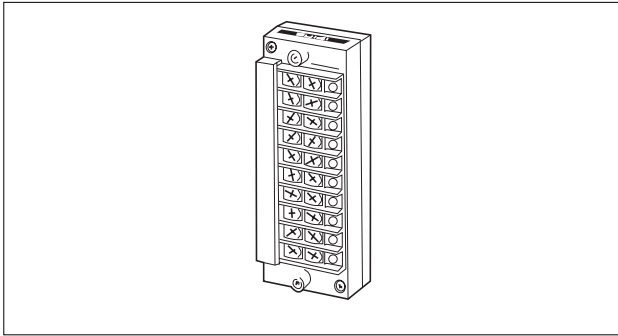
Power consumption:
Included in the value for the installed main unit or subunit.

External dimensions and weight:

Model and suffix code	Outside dimensions(W) × (H) × (D)	Weight(kg) (approx.)
DU500-12	Approx :114 × 137 × 88	0.5
DU500-13	Approx :114 × 137 × 88	0.5
DU500-14	Approx :114 × 137 × 77	1.0

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■ Pulse Input Module

Outline

This is an input module for measuring the pulse signal. Integrating thecount number or the ON time of the pulse signal is possible using this module.

Model and suffix code	Style number	Number of channels	Terminal shape	Minimum measurement interval
DU600-11	S4	10 ch	screw	0.5 sec

Specifications of the pulse input module

Number of input channels:
10 ch

Terminal type:
screw

Minimum measurement interval:
0.5 s (data update interval is fixed to 1 s)

Input method:
Common potential within same module

Input types:
No voltage contact, open collector (TTL or transistor)

Measurement mode

RATE(momentary pulse count mode):
Outputs the scaled value of the pulse count which was inputted during the most recent 1 s interval during measurement

GATE(contact ON/OFF detection mode):
Outputs the scaled value of the ON (make)/OFF (break) status (ON=1, OFF=0) of the contact input during the most recent 1 s interval during measurement

Pulse integration:
Use the math function to integrate the count number for every 1 s or the ON time
Math operator: TLOG.PSUM(XXX)
Number of channels for calculation:
Max. 30 ch for stand-alone model
Max. 60 ch for extended model

Max. count number / ON time: 99999999
(Math option /M1 need not be specified in DA100 or DR recorder main unit for pulse integration. Pulse integration automatically becomes available when the pulse module is recognized.)

Input range:
0 to 6 k pps, except for no-voltage contact input: 0 to 10 pps (When filter is ON)

Make-to-break ratio:
35 to 65% at max. frequency
(Make-to-break ratio = ON time / (ON time + OFF time) × 100)

Min. input pulse width:
60 μs (for both ON time and OFF time)

Measurement Accuracy

Count number:
± 1 pulse(However, during integration at start time: ± (1 scan + 1 s), at stop time: ± (1 scan + 1.5 s)

ON time:
Determination accuracy for 1 s duration is +/- 100 ppm. During integration at start time: ± (1 s + 1 scan), at stop time: ± (100 ppm of rdg + 1.5 s + 1 scan)

Error between modules:
± (3 s + 1 pulse) for the count number, ± (200 ppm + 3 s) for ON time.

* At the time when the power is turned ON, or the measurement mode is changed, or the filter ON/OFF setting is changed, maximum of 2 s is necessary for the correct measurement to begin. Until then, a value representing "no data" (binary: 8005H, ASCII: abnormal value for the communication output) is generated.

Filter:
Reduce input signal pulse chattering noises down to 5 ms (ON/OFF possible for each channel).

Input signal level:
When contact is closed: 200 Ω or less
When contact is opened: 100 kΩ or more

Normal operating temperature and humidity range:
0 to 50°C
20 to 80% RH when the ambient temperature is 0 to 40°C
10 to 50% RH when the ambient temperature is 40 to 50°C
(No condensation allowed in either case)

Normal operating magnetic field:
400 A/m or less

Max. input voltage:
5 VDC

Rated signal source:
15 VDC, 30 mA or more.

Insulation resistance:
Between input terminal and ground 20 MΩ or more. (500 VDC)

Withstand voltage:
Between output terminal and ground 500 VDC for 1 min. (No isolation between channels)

Power consumption:
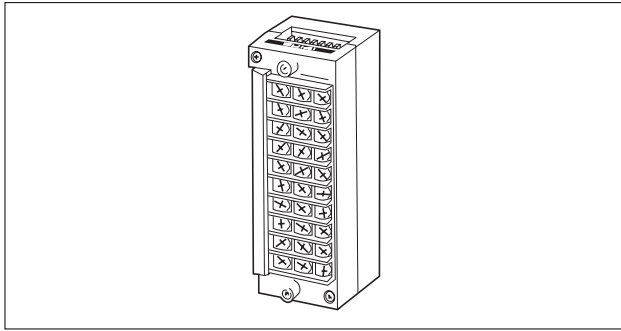Included in the value specified for the main unit or the sub unit to which it is attached.

External dimensions:
Approx. 57 (W) × 137 (H) × 68 (D) mm

Weight:
Approx. 0.35 kg

■ DI Input Module

Outline

This input modules permit measurement of contact signals.
This Modules have 10 channels and screw type terminal.

Model and suffix code, number of channels, terminal shape, and minimum measurement interval

Model and suffix code	Style number	Number of channels	Terminal shape	Minimum measurement interval
DU700-11	S8	10 ch	screw	0.5 sec

General Specifications

Input method:

Floating unbalanced input, each channel mutually isolated(channel independent)

The RTD range has a common potential (terminal b).

A/D integration time:

Selectable from 20 ms (50 Hz), 16.7 ms (60 Hz), 100 ms (10 Hz), and auto switching.

Auto switching is unavailable if the power supply of the main or sub unit installing the modules is DC.

Filter ON/OFF / Channels	Low-Pass Filter OFF		Low-Pass Filter ON	
Remove freq.	20msec(50Hz) 16.7msec(60Hz)	100msec(10Hz)	20msec(50Hz) 16.7msec(60Hz)	100msec(10Hz)
10ch Module	0.5 sec	4 sec	3 sec	12 sec

Normal operating temperature/relative humidity:

−10°C to 60°C

Ambient temperature	Ambient humidity
−10 to 40°C	20 to 80% RH
40 to 50°C	10 to 50% RH
50 to 60°C	5 to 30% RH

* no ice formation

Maximum allowable input voltage:

DI (CONT): ± 10VDC

DI (LEVEL): ± 60 VDC

Common mode noise voltage:

250 V ACrms (50/60 Hz)

Maximum inter-channel noise:

150 V ACrms (50/60 Hz)

Measurement operation:

At normal operating temperature/relative humidity:

Voltage input: Off ≤ 2.3 V, On ≥2.5 V

No-voltage contact input: contact On/Off*

*: Contact resistance: On ≤ 2 kΩ, Off ≥ 100 kΩ

Noise rejection:

Rejection by integration type A/D or lowpass filter (collective setting).

Cut-off frequency:

50/60/10 Hz

Input resistance:

CONT (no-voltage contact): 10 MΩ min.

LEVEL (voltage): approx. 1 MΩ

Insulation resistance:

Min. 20 MΩ at 500 VDC between the input terminal and ground

Input bias current:

Max.10 nA

Dielectric strength:

1000 VAC (50/60 Hz) for 1 minute:between input terminals,(except for RTD)

1500 VAC (50/60 Hz) for 1 minute:between an input terminal and ground

Outside dimensions & Weight:

Model and suffix code	Outside dimensions(W) × (H) × (D)	Weight(kg) (approx.)
DU700-11	Approx :57 × 137 × 88	0.5

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■ Alarm Contact Output Module

Outline

This module outputs information as a 'contact' on alarms detected by the DA100 or the DR recorder.There are two models, one having a 4-point output (transfer contact) and the other having a 10-point output (make contact).The module is connected to the DA100 main unit or the DA/DR subunit.

Type, Number of outputs, Contact mode, Terminal shape

Model and suffix code	Number of outputs	Style number	Contact mode	Terminal shape
DT200-11	4	S1	Transfer contact (NO-C-NC)	screw
DT200-21	10	S1	Make contact (NO-C)	screw

General Specifications

Number of outputs:
See the above table

Connecting unit:
DA100 main unit
DA/DR subunit
Specify the DR stand alone type by a typecode when ordering. (10-point make contact)

Normal operating temperature/humidity:
0 to 50˚C

Temperature	Humidity
0 to 40°C	20 to 80%RH
40 to 50°C	10 to 50%RH

* no ice formation

The alarm output module must be connected on the left side of the input modules.

Output refresh rate:
Every measurement interval

Contact mode:
Make contact: normal open/common contact type
Transfer contact: normal open/common/normal close type

Excitation/non-excitation switchable: available

Hold/non-hold switchable: available

Recurrence of fault alarm:
Up to 6 contacts can be specified.

Contact capacity:
250 VDC/0.1 A(with a resistor load)
250 VAC/2 A(with a resistor load)
30 VDC/2 A(with a resistor load)

Dielectric strength
Between the output terminal and ground: 2300 VAC (50/60 Hz) for one minute

Power consumption:
intalled

Outside dimensions & Weight:

Model and suffix code	Outside dimensions (W) × (H) × (D)	Weight (kg) (approx.)
DT200-11	Approx :57 × 137 × 70	0.3
DT200-21	Approx :57 × 137 × 70	0.35

■ DI/DO Module
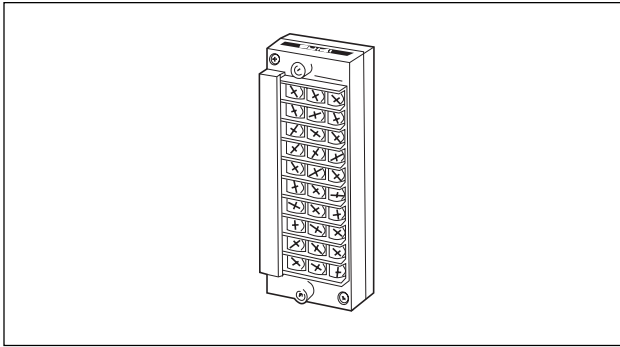
Outline

This is a combined module, which consists of an alarm contact output (two points) module, a remote control signal input terminal, a failure output upon detecting a system error, and a detection signal output for end of the recording paper (chart end) or a file alarm output of DC100 data collector. Only one module can be connected in the entire system.

Type

Model and suffix code	Style number	Terminal shape
DT100-11	S1	screw

General Specifications

Common to all functions:

Connecting unit: DA100/DC100 main unit, DR230/240 expandable type main unit and sub unit.

The number of DI/DO modules must be no greater than one.

Specify the DR stand alone type by a typecode when ordering.

Power consumption:

Included in the consumption of the main unit or subunit in which this module is installed.

Normal operating temperature/humidity:

0 to 50°C

Temperature	Humidity
0 to 40°C	20 to 80%RH
40 to 50°C	10 to 50%RH

* no ice formation

Alarm contact output

Number of outputs:

Two

Output refresh rate:

Every measurement interval

Contact mode:

Transfer contact (NO-C-NC)

Excitation/non excitation switchable: available (for each relay)

Hold/non-hold switchable: available (system-collectively)

Re-alarm on recurrence of failure can be set: available

Contact capacity:

250 VDC/0.1A(with a resistor load)

250 VAC/2A(with a resistor load)

30 VDC/2A   (with a resistor load)

Dielectric strength:

Between an output terminal and ground: 2300 VAC(50/60 Hz) for one minute

Command DO output

Number of outputs: One

Output method:

The terminal puts out an output signal when it send command.

Remote control for the recorder functions

Functions:

Function control by contact-input is enabled

• to start and stop analogue recording (DR)

• to activate 'manual print' (DR)

• to activate digital recording of measurements (DR)

• to activate 'message print' and 'header print' (DR)

• to change the recording paper speed (DR)

• to change the interval of digital recording (DR)

• to reset the interval of digital recording (DR)

• to start and reset computation (when with /M1 option)

• temporary hold of computation result (when with /M1 option)

• to reset the 'hold' state of an alarm contact (DR, DC)

• to activate saving measured data (writing onto memory) (DR, DC)

• to load setting data (DR, DC)

• to start and stop report computation (DR, DC when with /M3 option)

Input signal:

12 remote inputs (which use the same COM terminal).

No voltage contact, open-collector driven by a TTL or transistor

Duration of input signal:

One second or longer

Dielectric strength:

Between an input terminal and ground: 2,300 VAC(50/60 Hz) for one minute

Failure output

Functions:

The output terminal for a failure becomes non-excited when an error is detected in the system of the DA100 main unit or the DA/DR subunit which is connected to the module.

Contact mode:

Transter contact (normal open/common terminal/normal close) switching from 'excitation' to 'non-excitation', or vice versa is disabled.

Contact capacity:

250 VDC/0.1 A   (with a resistor load)

250 VAC/2 A   (with a resistor load)

30 VDC/2 A   (with a resistor load)

Dielectric strength:

Between an output terminal and ground: 1500 VAC (50/60 Hz) for one minute

Output of 'Chart End' (File Alarm for DC100)

Functions:

The 'Chart End' output becomes excited when the end of recording paper is detected or a file alarm is detected on DC100.

Contact mode:

Transfer contact (normal open/common terminal/normal close) switching from 'excitation' to 'non-excitation', or vice versa is disabled.

Contact capacity:

250 VDC/0.1 A(with a resistor load)

250 VAC/2 A(with a resistor load)

30 VDC/2 A   (with a resistor load)

Dielectric strength:

Between an output terminal and ground: 2300 VAC (50/60 Hz) for one minute.

Outside dimensions & Weight:

Model and suffix code	Outside dimensions (W) × (H) × (D)	Weight (kg) (approx.)
DT100-11	Approx :57 × 137 × 70	0.35

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■ Communication Module

Outline

This module is used to transfer the data measured with the DA100 or the DR recorder to a personal computer, and to set up the measurement conditions from the personal computer.

Type

Model and suffix code	Style number	Contents
DT300-11	S4	GP-IB module
DT300-21	S8	RS-232-C module
DT300-31	S8	RS-422-A/RS-485 module
DT300-41	S8	Ethernet module

Common Specifications

Connecting unit:
DA100/DC100 main unit,
DR expandable main unit,
Specify the DR stand alone type by a type code when ordering.

Power consumption:
Included in the consumption of the main unit or subunit in which this module is installed.

Normal operating temperature/humidity:
0 to 50°C

Temperature	Humidity
0 to 40°C	20 to 80%RH
40 to 50°C	10 to 50%RH

* no ice formation

GP-IB Module
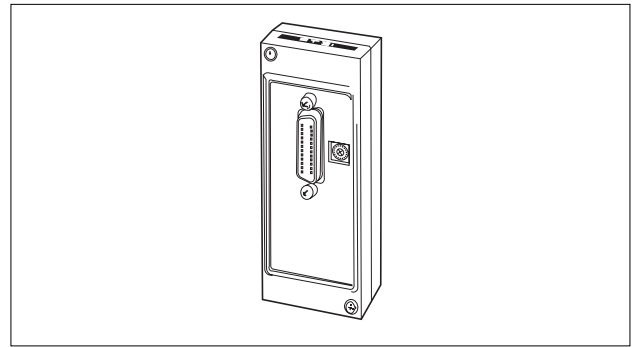
Electrical and mechanical specifications:
Conform to IEEE Standard 488-1978

Code:
ISO (ASCII)code

Address:
0 to 15

Functions:
Talker functions
Addressable:
output of measurement values (ASCII, binary)
output of setting values (ASCII)
Listener functions
setting of measurements conditions, control of starting and stopping measurement, specifying causes of interrupts
(excluding setting and control of power on/off)

Causes of interrupts:
Syntax error, chart end, completion of A/D conversion, operations of interval timer, completion of saving in memory devices

Outside dimensions & Weight:

Model and suffix code	Outside dimensions (W) × (H) × (D)	Weight (kg) (approx.)
DT300-11	Approx :57 × 137 × 54	0.25

RS-232-C Module
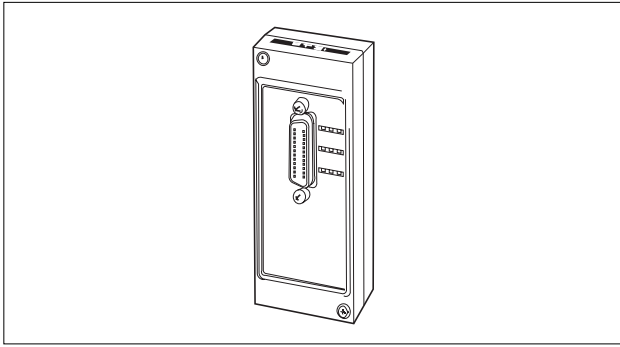
Electrical and mechanical specifications:
    Conform to standard EIA RS-232-C
Connection method:
    Point-to-point
Communication method:
    Half duplex
Synchronization mode:
    Synchronous mode (synchronized by a start and a stop bit)
Baud rate:
    150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps
Start bit:
    Fixed at 1 bit
Data length:
    7 or 8 bits, selectable
Parity bit:
    EVEN, ODD, or none, selectable
Stop bit:
    1 or 2, selectable
Transfer distance:
    Max. 15 m
Connector:
    D-sub 25pin
Handshaking:
    Hardware: transmission and reception control by 'DTR', 'RTS', 'CTS' signal enabled
    Software: transmission control by 'XON' and 'XOFF' enabled
Capacity of a receiving buffer:
    200 bytes
ESC sequence:
    Can be used for reception only
    Talker functions:
        Output of measurement data (ASCII, binary) and setting values (ASCII)
    Listener functions:
        Setting of measurement conditions, control of measurement start and stop, specifying causes of 'ESC S' (output of a status byte).
   (excludes the setting and control of power on/off)
Contents of 'Status':
    Syntax error, chart end, completion of A/D conversion, operations of interval timer, completion of saving in memory devices
Outside dimensions & Weight:

Model and suffix code	Outside dimensions (W) × (H) × (D)	Weight (kg) (approx.)
DT300-21	Approx :57 × 137 × 54	0.25

RS-422-A/RS-485 Module
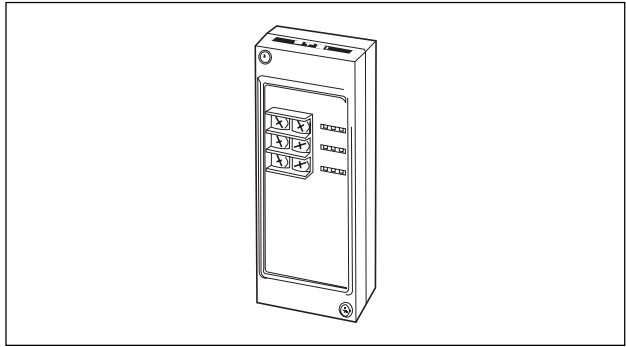
Electrical and mechanical specifications:
    Conform to standards EIA RS-422-A, EIA RS-485
Connection method:
    Multi-drop 1:n (n=1 to 31)
Communication method:
    Half duplex, 4 wire or 2 wire
Synchronization mode:
    Synchronous mode (synchronized by a start and a stop bit)
Baud rate:
    300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps
Response speed:
    0, 10, 20, 50, 100 msec
    (effective for 2 wire communication)
Start bit:
    Fixed at 1 bit
Data length:
    7 or 8 bits, selectable
Parity bit:
    EVEN, ODD, or none, selectable
Stop bit:
    1 or 2, selectable
Transfer distance:
    Max. 1200 m
Connector:
    6 screws
Capacity of receiving buffer:
    250 bytes
ESC sequence:
    Can be used for reception only
    Talker functions:
        Output of measurement data (ASCII, binary) and setting values (ASCII)

    NOTE

    Binary output is not available in 2 wires and multi-drop application.

    Listener functions
        Setting of measurement conditions, control of measurement start and stop, specifying causes of 'ESC S'(output of a status byte)
        (excludes the setting and control of power on/off)
Contents of 'Status':
    Syntax error, chart end, completion of A/D conversion, operation of interval timer, completion of saving in memory devices
Outside dimensions & Weight:

Model and suffix code	Outside dimensions (W) × (H) × (D)	Weight (kg) (approx.)
DT300-31	Approx :57 × 137 × 54	0.25

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Ethernet Module
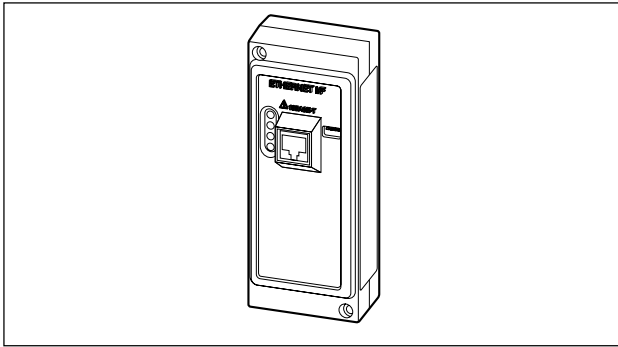
Electrical and mechanical specifications:
 Conform to standard IEEE802.3
Number of communication port:
 1
Connection method:
 Ethernet
Transfer specification:
 10 Base-T (CSMA/CD, 10Mbps, Base band)
Transfer speed:
 10 Mbps
Communication protocol
 TCP, UDP, IP, ARP, ICMP
PC number that is able to gain access to 1 Darwin unit:
 Max. 4 units
 Physical Connector 1
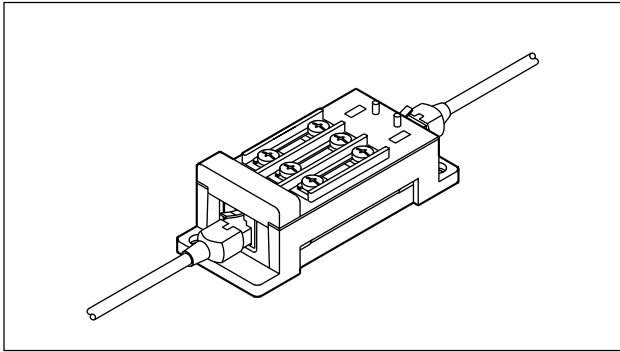 Logical Connection TCP34150:1, TCP34151:4
Input data:
 ASCII <A RS-232-C module (DT300-21) Of the supports of all the
 commands>
Output data:
 ASCII, Binary
Outside dimensions & weight:

Model and suffix code	Outside dimensions (W) × (H) × (D)	Weight (kg) (approx.)
DT300-41	Approx :57 × 137 × 54	0.3

Cable Adapter DV250-001

Outline

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. In addition, this adapter allows you to separate a shield potential from the system, thus rejecting noise.

General Specifications

Model:
DV250-001

Operating Temperature Range:
-10°C to 60°C

Operating Humidity Range:
20 to 80% RH from -10°C to 40°C
10 to 50% RH from 40°C to 50°C
5 to 30% RH from 50°C to 60°C
No condensation is allowed.

Internal Wiring:
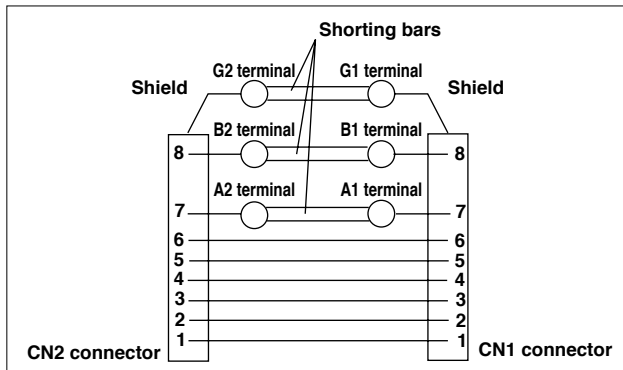
External Dimensions:
approximately 101 (W) × 41 (D) × 32.6 (H) (mm)

Weight:
approximately 80 g

External Views:
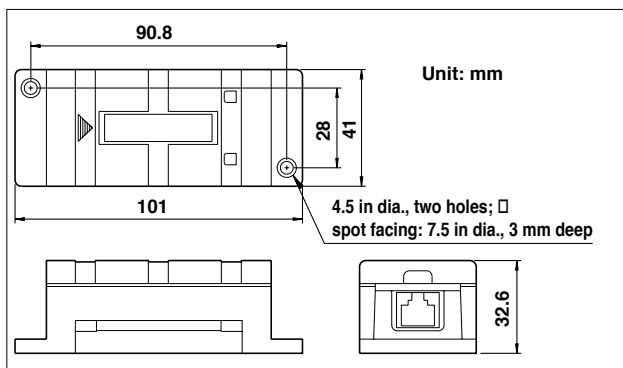
Connecting Other Than a Dedicated Cable (General-purpose Cable)

The adapter can connect a dedicated cable to a different type of cable. In this application, use two DV250-001 adapters.
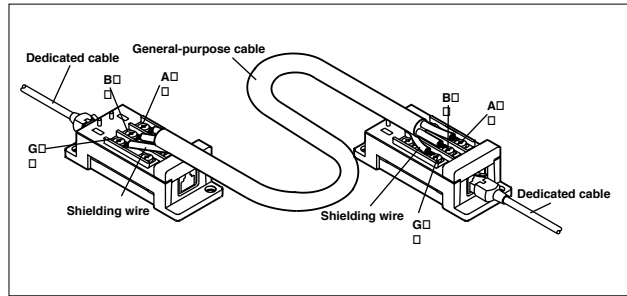
Specifications of Cables That Have Almost the Same Communication Distance As a Dedicated Cable Shielded multicore cables with no less than a pair of conducting wires

Conductor diameter:
0.5 mm minimum (AWG24 or thicker)

Conductor resistance:
93.8 Ω/km maximum (at 20°C)

Insulation resistance:
1000 MΩ-km minimum (at 20°C)

Static capacitance:
75 pF/m maximum (1 kHz)

Characteristic impedance:
105 Ω ±15% (256 kHz)
100 Ω ±15% (10 MHz)

Attenuation:
13.1 dB/km maximum (256 kHz)
80 dB/km maximum (10 MHz)

Recommended cable:
Sumitomo Electric Industries' DT-PXV-SB insulated multicore cable (either AWG24 wire × 1 pair, × 2 pairs or × 4 pairs) with an integrally braided shielding wire, conforming to UL2789 (60°C, 30 V)
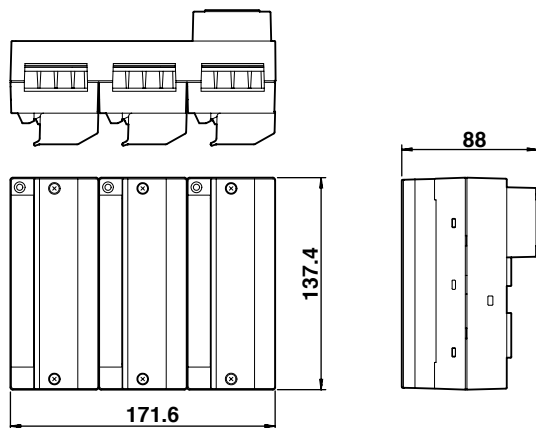
■ Dimensions

10ch Universal input module/ 10ch DC V/TC/DI / 10ch DI input module

Unit:mm

88

137.4

57
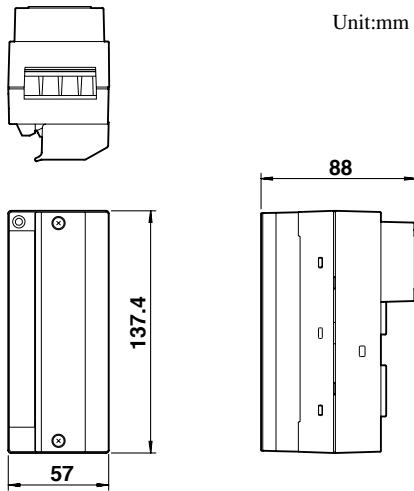
20ch Universal input module/ 20ch DC V/TC/DI input module
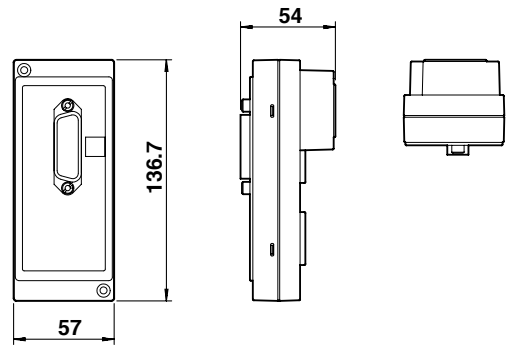
88

137.4

114.3
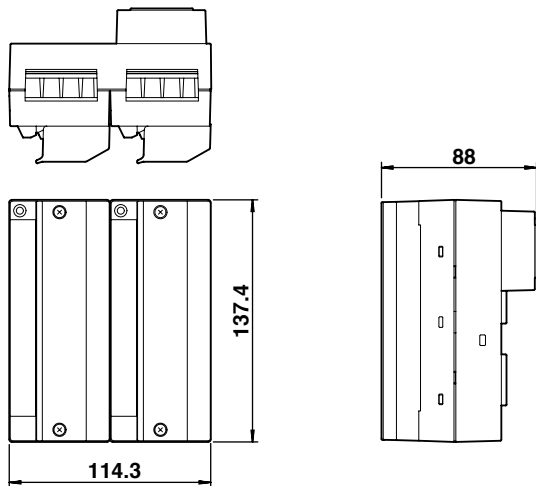
30ch Universal input module/ 30ch DC V/TC/DI input module

88

137.4

171.6

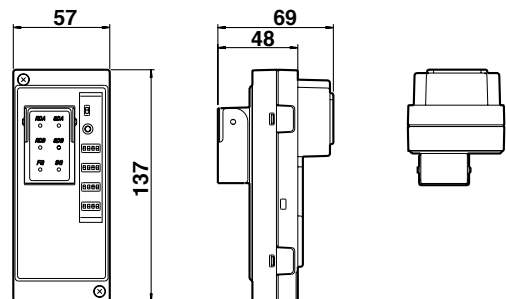**If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm**
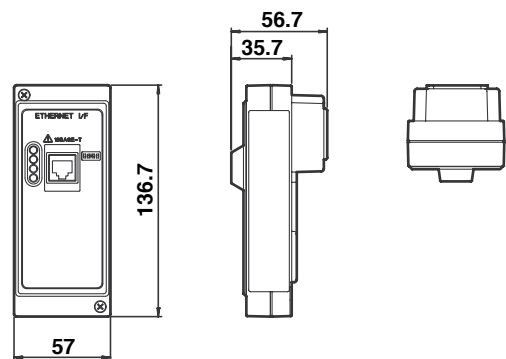
GP-IB module
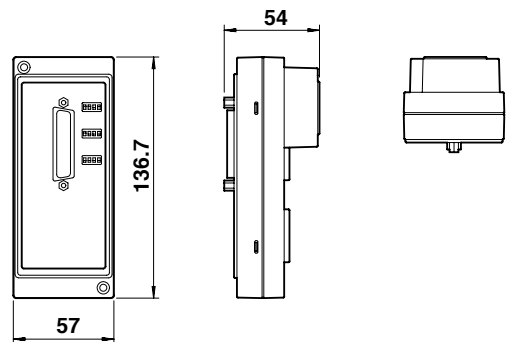
54

136.7

57

RS-232C module

54

136.7

57

RS-422-A/RS-485 module

57

69

48

137

Ethernet module

56.7

35.7

136.7

57

mA input module

Unit:mm

88
68
137
57

Pulse input module

Unit:mm

68
48
137
57

Power monitor module

AC V/AC A IN

57
99
78
137
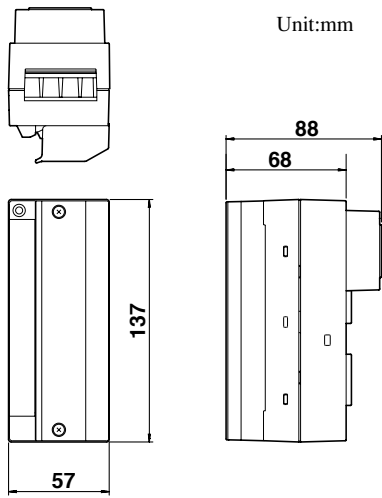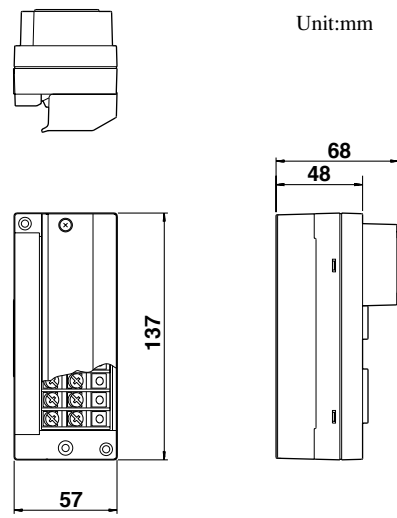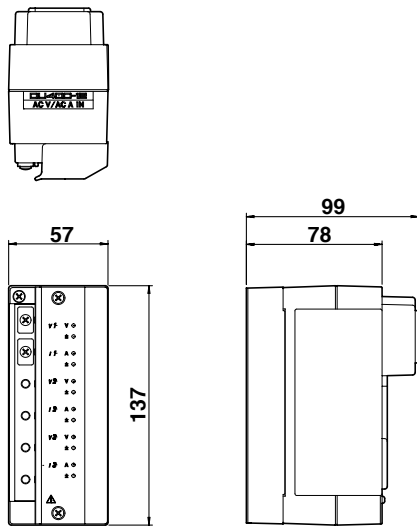
DI/DO module/ alarm output module

68
136.7
57

Strain input module

88
68
114.3
137

77
57
114.3
137

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