

GS 04L31A01-01E

### OVERVIEW

This general specifications (GS) describes the specifications of the CX1000 control and measurement station.

The CX1000 comes standard with a variety of screens, including control and tuning screens, and is therefore designed for monitoring closed loop control applications. The CX1000 can connect to and acquire control data from up to four external Green series controllers via RS422 MODBUS RTU serial communications. In addition, it allows controller parameters to be manipulated and set as necessary. Using the Ethernet interface equipped as a standard feature, it is possible to send e-mails, monitor the site remotely on the Web, and make an FTP-based file transfer.



### DISPLAY SPECIFICATIONS

- Display unit: 5.5-inch TFT color LCD (320 × 240 pixels)
- Display color: Selectable from 12 options for trend/bar graphs
- Background color: Selectable from white or black

#### Display

- Control group display
  - Number of loops covered: 4
  - Number of displays: 4 (4 groups)
  - Display style: Controller, faceplate and hybrid style
- Tuning display: Capable of assigning up to 21 parameters
- Trend screen
  - Direction of view: Vertical or horizontal
  - Number of channels covered: 6 max./screen (group)
  - Number of trend views on all channels: 36 max.
  - Number of displays: 6 (6 groups)
  - Line width: Selectable from 1, 2 and 3 pixels
  - Screen update interval: Selectable from 1 min, 2 min, 5 min, 10 min, 20 min, 30 min, 1 hr, 2 hr, 4 hr, and 10 hr/div
- Program operation status display: Simultaneously shows the program operation status and current PV readings.
  - Number of loops covered: 2
  - Number of displays: 1 (1 group)
  - Display update interval: Digital readings = 1 sec  
Program readings = Same as the trend update interval

Number of display loops/channels

Input Type	Number of Control Loops	Number of Channels Covered
Internal	2	6 (Two loops x PV, SP and OUT readings)
Green series communication (option)	4	12 (Four loops x PV, SP and OUT readings)
Number of channels covered for measurement	—	6
Number of channels covered for computation (option)	—	12

- Bar graph display:
  - Direction of view: Vertical or horizontal
  - Number of channels covered: 6 channels max./display (group)
  - Number of displays: 6 (6 groups)
  - Scale: Configurable within a range from 4 to 12  
Reference position = Edge or midpoint
  - Update interval: 1 sec
- Digital display:
  - Number of channels covered: 6 channels max./display (group)
  - Number of displays: 6 (6 groups)
  - Update interval: 1 sec
- Overview display:
  - 6 loops max. for control
  - 18 channels max. for measurement
  - Shows measured values and alarms for all channels.
- Information display:
  - Jumps to the trend view of a data item selected by the cursor.
- Alarm summary display: Shows the history of alarms.
- Event summary display: Shows a summary of events that have occurred during program operation.

**Control operation summary screen:**

Shows a summary of control operation statuses.

**Message summary display:**

Shows the time stamps and contents of messages.

**Memory summary display:**

Shows a list of files stored in internal memory.

**Tag display:** Tag names for measurement channels (up to 16 alphanumeric characters)

Tag names for control loops (up to 8 alphanumeric characters)

Tag comments for control loops (up to 8 alphanumeric characters)

**Other on-display elements:**

Memory status, scale values (0%, 100% – can be turned on/off), scales (10 scales max.), grid (selectable from a range of 4 to 12 divisions) with hour:min indications, date and time (year/month/day and hour:minute:second indications), trip line (selectable from 1-, 2- and 3-pixel thickness options), messages (of up to 16 characters and 8 types), and alarm marks

**Data reference function:**

Display the retrieved data.

Display format: Bisectional or full-screen view

Time axis: Can be upscaled, downscaled, and scrolled.

**Automatic screen switching**

Switching interval

5 sec, 10 sec, 20 sec, 30 sec, or 1 min

**LCD back light saver function**

Timer setpoint: 1, 2, 5, 10, 20 or 60 min

**CONTROL FUNCTIONS**

**Control mode**

Select from three control modes, i.e., singleloop, cascade control, and loop control with PV switching, for every two loops.

Note) The control mode is fixed to singleloop control for loops 5 and 6.

**Control computation functions**

Continuous PID control, Relay on/off control, time proportional PID control

**PID Control**

PID Control mode	Operation mode	Operating status	PID control method	Bump of control output
Standard PID control mode	Fixed point control operation	Local and cascade control except cascade secondary loop control	PV derivative type PID	Yes
		Remote or secondary cascade loop control	Deviation derivative type PID	Yes
	Programmed control operation	Local and cascade control except secondary cascade loop control, hold or soak	PV derivative type PID	Yes
		During programmed operation (without status of hold or soak) or secondary cascade loop control	Deviation derivative type PID	Yes
Fixed point Control Mode	Fixed point control operation	Local and cascade control except cascade secondary loop control	PV derivative type PID	Yes
		Remote or cascade secondary cascade loop control	PV derivative type PID	Yes
	Programmed control operation	Local, hold and soak	PV derivative type PID	No
		Programmed operation (without status of hold) or secondary cascade loop control	PV derivative type PID	Yes

\*The secondary cascade loop is secondary loop of cascade control that is selected from the cascade mode (auto, manual, cascade)

PID parameter: 8 sets/loop for each control mode

Points of zone PID switching: 6 max.

“Super” function (overshoot prevention)

Tracking functions: SP tracking PV tracking

Anti-reset windup function

(over-integration prevention function)

Control interval: 250, 500 or 1000 ms

**Operation mode switching**

- Switching among remote, local, and program modes
- Switching among manual, auto, and cascade modes
- Run/stop mode switching
  - Stop mode: Outputs the preset output value.
- Switching between Execute/Stop options of auto-tuning
  - Principle of auto-tuning: Limit cycle method

**Setting ranges of control parameters**

Proportional band: 0.1 to 999.9%

Integral time: 1 to 6000 sec, or off (for manual reset)

Derivative time: 1 to 6000 sec, or off

On-off control hysteresis width:

0.0 to 100.0% of measurement range

Preset output value: -5.0 to 105.0% of output

(Provided in case of control computation being stopped, PV input being in a burnout state, or instrument input being abnormal)

Output limiter:

Setting range: -5.0 to 105.0% for both high/low limits

Shutdown function:

Can provide a manipulated output of up to 0 mA when in manual mode operation with 4–20 mA output (shuts down the output for values smaller than -5.0%).

Output rate-of-change limiter:

Off, or a value from 0.1 to 100.0%/sec

## ■ ALARM FUNCTIONS

### ● Control Alarm

Types of control alarm:

PV high limit, PV low limit, high limit of deviation, low limit of deviation, deviation high and low limits, deviation within high and low limits, SP high limit, SP low limit, OUT high limit, and OUT low limit

Other alarm type:

Fault diagnosis, fail output

Stand-by action:

Turns off PV/SP alarm from starting control until steady condition

Alarm output:

6 points/ 2 loops (transistor output 4 points, relay output 2 points)

Alarm setting:

4 types/ loop

Hysteresis: Can set each alarm setting

Display: The status is shown in the digital display in case of alarm. A common alarm indication is also displayed. The alarm behavior: non-hold or hold-type can be selectable for common to all channels

### ● Measurement Alarm

Types of alarm:

High limit, low limit, differential high limit, differential low limit, high limit of rate-of-change, low limits of rate-of-change, high limit of delay, and low limits of delay (alarm delay)

Alarm delay time:

1 to 3600 sec (1 hr)

Time interval of rate-of-change alarm:

Measuring interval × 1 to 15

Alarm output:

6 points (option) \*alarm output can be assigned to control output

Number of setting:

Max. 4/ each channel

Hysteresis: ON (0.5% of span)/ OFF selectable

(common to all channels and all levels)

Display: The status is shown in the digital display in case of alarm. A common alarm indication is also displayed. The alarm behavior: non-hold or hold-type can be selectable or common to all channels

## ■ INPUT SECTION

### ● Specifications Common to Control and Measurement Inputs

Thermocouple burnout:

Switchable between ON/OFF options of detection on a channel basis.

Switchable between burnout upscale/ downscale options

Integral time of A/D converter:

Select from the options of 20 ms (50 Hz), 16.7 ms (60 Hz) 100 ms (50/60 Hz) and AUTO (automatic switching between 20 ms and 16.7 ms depending on the power supply frequency).

### ● Control Input

Number of inputs: 5

Input interval:

250, 500 or 1000 ms, synchronized with the control period

Input type: DC voltage (DCV), thermocouple (TC), resistance temperature detector (RTD), DC current (DCA) with external shunt resistor

Linear scaling:

Input ranges capable of scaling: Thermocouple (TC), resistance temperature detector (RTD), and DC voltage (DCV)

Available range of scaling:

-30000 to 30000, with a span smaller than 30000

Decimal point position:

Selectable by user

Unit: Can be set by user, using up to 6 characters.

### Configuration of input/output signal

Measurement input computation:

Input processing, square root extraction (0.0 to 5.0% low level cutoff), 10-segment linearizer, and 10-segment linearizer biasing, and bias addition (from -100.0 to 100.0% of measuring range), first order lag filter (time constant = 1 to 120 sec, or off)

Auxiliary computation input:

Input processing, square root extraction (0.0 to 5.0% low level cutoff), bias addition (from -100.0 to 100.0% of measuring range), ratio multiplication (0.001 to 9.999), and first order lag filter (time constant = 1 to 120 sec, or off)

Table of Control Input Specifications

Input type	Range	Measuring range
DCV - applicable to linear scaling only	20 mV	-20.00 to 20.00 mV
	60 mV	-60.00 to 60.00 mV
	200 mV	-200.0 to 200.0 mV
	2 V	-2.000 to 2.000 V
	6 V	-6.000 to 6.000 V
	20 V	-20.00 to 20.00 V
TC	R <sup>*1</sup>	0.0 to 1760°C
	S <sup>*1</sup>	0.0 to 1760°C
	B <sup>*1</sup>	0.0 to 1820°C
	K <sup>*1</sup>	-200.0 to 1370°C
	E <sup>*1</sup>	-200.0 to 800°C
	J <sup>*1</sup>	-200.0 to 1100°C
	T <sup>*1</sup>	-200.0 to 400°C
	N <sup>*1</sup>	0.0 to 1300°C
	W <sup>*2</sup>	0.0 to 2315°C
	L <sup>*3</sup>	-200.0 to 900°C
	U <sup>*3</sup>	-200.0 to 400°C
	PLATINEL	0.0 to 1400.0°C
	PR40-20	0.0 to 1900.0°C
	W3Re/W25Re	0.0 to 2400.0°C
RTD <sup>*5</sup>	Pt100 <sup>*4</sup>	-200.0 to 600.0°C
	JPt100 <sup>*4</sup>	-200.0 to 550.0°C
Standardized signal	1 to 5 V	1.000 to 5.000 V

\*1: R, S, B, K, E, J, T, N : IEC584-1 (1995), DIN IEC584, JIS C1602-1995

\*2: W : W-5% Rd/W-26% Rd (Hoskins Mfg. Co.), ASTM E988

\*3: L : Fe-CuNi, DIN43710, U : Cu-CuNi - DIN43710

\*4: Pt100 : JIS C1604-1997, IEC751-1995, DIN IEC751-1996  
JPt100 : JIS C1604-1989, JIS C1606-1989

\*5: Measuring current : i = 1 mA

**Measurement input**

Number of inputs: 6

Measuring interval:

1 or 2 sec (2 sec, if the integral time of A/D converter is 100 ms)

Input type: DC voltage (DCV), thermocouple (TC), resistance temperature detector (RTD), Operation log (DI), DC current (DCA) with external shunt resistor

**Measurement Input Ranges and Measuring Ranges**

Input type	Input Range	Measuring Range
DCV	20 mV	-20.00 to 20.00 mV
	60 mV	-60.00 to 60.00 mV
	200 mV	-200.0 to 200.0 mV
	2 V	-2.000 to 2.000 V
	6 V	-6.000 to 6.000 V
	20 V	-20.00 to 20.00 V
TC	50 V	-50.00 to 50.00 V
	R <sup>*1</sup>	0.0 to 1760.0°C
	S <sup>*1</sup>	0.0 to 1760.0°C
	B <sup>*1</sup>	0.0 to 1820.0°C
	K <sup>*1</sup>	-200.0 to 1370.0°C
	E <sup>*1</sup>	-200.0 to 800.0°C
	J <sup>*1</sup>	-200.0 to 1100.0°C
	T <sup>*1</sup>	-200.0 to 400.0°C
	N <sup>*1</sup>	0.0 to 1300.0°C
	W <sup>*1</sup>	0.0 to 2315.0°C
	L <sup>*3</sup>	-200.0 to 900.0°C
	U <sup>*3</sup>	-200.0 to 400.0°C
	PLATINEL	0.0 to 1400.0°C
	PR40-20	0.0 to 1900.0°C
	W3Re/W25Re	0.0 to 2400.0°C
RTD <sup>*5</sup>	Pt100 <sup>*4</sup>	-200.0 to 600.0°C
	JPt100 <sup>*4</sup>	-200.0 to 550.0°C
DI	DCV input	OFF: lower than 2.4 V ON: 2.4 V or higher
	Contact input	ON/OFF states

\*1: R, S, B, K, E, J, T, N : IEC584-1 (1995), DIN IEC584, JIS C1602-1995

\*2: W : W-5% Rd/W-26% Rd (Hoskins Mfg. Co.), ASTM E988

\*3: L : Fe-CuNi, DIN43710, U : Cu-CuNi - DIN43710

\*4: Pt100 : JIS C1604-1997, IEC751-1995, DIN IEC751-1996  
JPt100 : JIS C1604-1989, JIS C1606-1989

\*5: Measuring current : i = 1 mA

Filter function:

Switchable between ON/OFF options of moving average on a channel basis; selectable from 2 to 16 times for the frequency of moving average calculation

Computation

Difference computation:

Allows for calculation of difference between any two channels.

Input ranges capable of difference computation:

DCV, TC and RTD

Linear scaling:

Input ranges capable of scaling: DCV, TC, RTD

Available range of scaling: -30000 to 30000

Decimal point position: Selectable by user

Engineering unit:

Can be set by user, using up to 6 characters.

Square root scaling:

Input ranges capable of scaling: DCV

Available range of scaling: -30000 to 30000

Decimal point position: Selectable by user

Engineering unit:

Can be set by user, using up to 6 characters.

**■ STORAGE FUNCTIONS**

External storage medium:

Select from the following options when ordering.

- 3.5" floppy disk (2HD)
- PCMCIA ATA flash memory card
- Zip disk

Storage functions:

Store internal control loops' data (PV, SP and OUT of internal loops), Green series communication loops' data (PV, SP and OUT of connected Green series communication), measured data, and computed data.

PV, SP and OUT of internal loops: assigned from 101 to 106 CH

PV, SP and OUT of Green series communication channels: assigned from 201 to 212 CH

Data on 18 channels among the above-noted channels, as well as 6 measurement channels and 12 computation channels, are stored as data files.

**Types of Recorded Data**

Data Type	Channel/Loop/System Included in Recording	Data Item
Display data (i.e., data for graphical screen views)	Measurement channels/computation channels/internal control loops/Green series communication	Minimum/maximum values during time-out period
Event data	Measurement channels/computation channels/internal control loops/Green series communication	Measured values for each sampling period
TLOG data	Measured/computed data	TLOG data values at TLOG time-out
Report data	Measurement channels/computation channels	Values of channels on an hourly/daily/weekly/monthly basis
Manual sampling data	Measurement channels/computation channels/internal control loops/Green series communication loops	ASCII-format data input with keys or remotely
Alarm summary data	Measurement channels/computation channels/internal control loops/Green series communication loops	Information on the occurrence/cancellation of alarms on channels being recorded
Event summary data	Events caused for the system	Occurrence/cancellation of time/PV events
Control mode summary data	System (program operation), or each internal control loop or green series communication loops for all other cases	Run/stop, local/remote, and manual/auto/cascade modes switching, hold/cancellation of hold of programs, wait/cancellation of wait

Method of saving data

Manual saving:

Saves the data when an external storage medium is inserted.

Auto-saving:

Data can be saved by key operation during sampling continuously.

Saving of display data or event data:

Measuring interval:

10 min to 31 days (when in free-trigger mode)

Data is saved at the end of sampling (when trigger is specified)

Interval of data saving

Display data: Synchronized with the waveform update

Event file: Specify the sampling interval.

Sampling interval for event files:

Select from 1 and 2 sec.

Measurement data files:

(1) Event file

Instantaneous values are saved at a specified sampling interval.

(2) Display data file

The maximum and minimum values found during the display update interval are saved.

Combination of files to be created

(1) Event file (triggers only) and display data file

(2) Display data file only

(3) Event file only

Data format: Binary

Data size per channel:

Display data: Control data = 4 bytes/data item  
Measurement data = 4 bytes/data item  
Computation data = 8 bytes/data item

Event data: Control data = 2 bytes/data item  
Measurement data = 2 bytes/data item  
Computation data = 4 bytes/data item

Sampling time:

- Tested for manual saving on a floppy disk.

When creating a display data file only:

Test conditions:

4 control loops, 6 measurement channels, 8 computation channels, 30 min/div display update interval (data save interval of 60 sec)

Number of data items per channel = 1,200,000 bytes / (4 × 4 bytes + 6 × 4 bytes + 8 × 8 bytes) = approx. 11,538\*

\* Specified as 100,000 data items maximum.

Sampling time per file = 11,538 × 60 sec = 692,307 sec = approx. 8 days

When creating an event file only:

Test conditions:

8 measurement channels, 8 computation channels, 1-sec data save interval

Number of data items per channel = 1,200,000 bytes / (4 × 2 bytes + 6 × 2 bytes + 8 × 4 bytes) = approx. 23,076\*

\* Specified as 120,000 data items maximum.

Sampling time per file = 23,076 ( 1 sec = 23,076 sec = approx. 6 hours

When creating both a display data file and an event file:

Display data file size = 900,000 bytes, where a maximum number of data items is 75,000

Event data file size = 300,000 bytes, where a maximum number of data items is 30,000

Note that the number of files created varies depending on the capacity of storage medium if a Zip drive or an ATA memory card is used.

Examples of sampling time

Test conditions:

2 control loops, 6 measurement channels, and no computation channels

Display Data File Only

Display Update Interval (Min/Div)	1	5	20	30	60	240
Data save interval (sec)	2	10	40	60	120	480
Sampling time (Approx.)	13 hrs	69 hrs	11 days	17 days	34 days	138 days

Event Data File Only

Data save interval (sec)	1	5	30	120
Sampling time (Approx.)	13 hrs	69 hrs	17 days	69 days

Display Data File and Event Data File

Display Data File

Display Update Interval (Min/Div)	1	5	20	30	60	240
Data save interval (sec)	2	10	40	60	120	480
Sampling time (Approx.)	10 hrs	2 days	8 days	13 days	26 days	104 days

Event Data File Only

Data save interval (sec)	1	5	30	120
Sampling time (Approx.)	3 hrs	17 hrs	4 days	17 days

Test conditions:

4 control loops, 6 measurement channels, and no computation channels

Display Data File Only

Display Update Interval (Min/Div)	1	5	20	30	60	240
Data save interval (sec)	2	10	40	60	120	480
Sampling time (Approx.)	9 hrs	46 hrs	7 days	11 days	23 days	92 days

Event Data File Only

Data save interval (sec)	1	5	30	120
Sampling time (Approx.)	9 hrs	46 hrs	11 days	46 days

Display Data File and Event Data File

Display Data File

Display Update Interval (Min/Div)	1	5	20	30	60	240
Data save interval (sec)	2	10	40	60	120	480
Sampling time (Approx.)	6 hrs	34 hrs	5 days	8 days	17 days	69 days

Event Data File Only

Data save interval (sec)	1	5	30	120
Sampling time (Approx.)	2 hrs	11 hrs	69 hrs	17 days



Manually sampled data  
 Storage trigger: Key input or contact input  
 Data format: ASCII  
 Maximum number of data items stored: 50  
 TLOG data (only when equipped with computation option)  
 Storage trigger: Data at the moment TLOG timeout is saved.  
 Report data (only when equipped with report option)  
 Report type: Hourly report, daily report, a combination of daily and weekly reports, and a combination of daily and monthly reports  
 Data format: ASCII  
 Trigger functions:  
 Event file: Select the mode from FREE, TRIG and ROTATE options.  
 Display data and event files:  
 Select the mode from TRIG and ROTATE options.  
 Display copy functions:  
 Copying method:  
 By means of key operation  
 Data format: PNG  
 Output destination:  
 External storage medium or communication output

## ■ HARDWARE

### ● Construction

Angle of mounting:  
 Backward tilt of up to 30°; no tilt is allowed on either side, however.  
 Thickness of mounting panel:  
 2 to 26 mm  
 Material: Case = Steel plate  
 Bezel = Polycarbonate  
 Color of coating:  
 Case = Pale cobalt blue (equivalent to Munsell 2.0B5.0/1.7)  
 Bezel = Light charcoal gray (equivalent to Munsell 10B3.6/0.3)  
 Front panel:  
 Dust- and drip-proof (compliant to IEC529-IP65, NEMA No. 250 Type 4 [except for icing tests])  
 External dimensions:  
 144 mm (W) × 144 mm (H) × 218 (D) mm  
 Weight: Approx. 3.0 kg

### ● I/O Signal Specifications

#### Control Output

Current output  
 Number of outputs: 2/2 loops  
 Output signal: 4–20 mA DC or 0–20 mA DC  
 Load resistance: 600 Ω max.  
 Output accuracy: ±0.1% of span (1 mA or greater)  
 Ripple current content:  
 0.05% p-p of span (1.2 kHz)  
 Temperature drift: ±200 ppm/°C (tested for output section)

#### Voltage pulse output

Number of outputs: 2/2 loop  
 Output signal: On-state voltage = 12 V DC  
 Load resistance: 600 Ω min.  
 Resolution: 0.1%

Relay contact output  
 Number of outputs: 2/2 loops  
 Output signal: NC, NO, COM  
 Contact rating: 250 V AC/30 A or 30 V DC/3 A (resistive load)

#### Contact input

Number of inputs:  
 6/2 loops  
 Input signal: Voltage-free contact or open collector (TTL or transistor)  
 Input condition:  
 On-state voltage:  
 0.5 V max. (30 mA DC)  
 Off input leakage current:  
 0.25 mA max.  
 Input configuration:  
 Photocoupler-isolated (two-point common)

#### Contact output

Number of relay outputs:  
 2/2 loops  
 Relay contact rating:  
 250 V AC/1 A or 30 V DC/1 A (resistive load)  
 Number of transistor outputs:  
 4/2 loops  
 Transistor contact rating:  
 24 V DC/50 mA

#### Analog input section

Number of control inputs: 5 (isolated)  
 Input interval: 250, 500 or 1000 ms  
 Number of monitor inputs:  
 6 (DCV, TC and DI inputs are isolated)  
 Input interval: 1 or 2 sec

### ● Installation Environment Standards

Normal operating conditions:  
 Ambient temperature:  
 0 to 50°C (5 to 40°C, if a floppy disk or Zip drive is in operation)  
 Ambient humidity:  
 20 to 80% RH (at 5 to 40°C)  
 Vibration: 10 to 60 Hz, 0.2 m/s<sup>2</sup>  
 Mechanical shock:  
 Not allowed.  
 Transport and storage conditions:  
 Ambient temperature:  
 -25 to 60°C  
 Ambient humidity:  
 5 to 95% RH (non-condensing)  
 Vibration: 10 to 60 Hz, 4.9 m/s<sup>2</sup>  
 Mechanical shock:  
 392 m/s<sup>2</sup> max. (when housed in a package)

### Safety and EMC Standards

Safety standards:  
 Certified as conforming to CSA22.2 No. 1010.1; compliant to EN61010-1  
 Installation category (overvoltage category) II\*1, pollution degree 2\*2  
 \*1: Installation category (overvoltage category):  
 Refers to a numerical index for defining transient overvoltage levels. (This standard also includes the standard of impulse withstanding voltage and applies to electrical equipment powered by stationary equipment such as a switchboard.)

\*2: Pollution degree:  
Refers to the degree of deposition of a solid, liquid or gas substance that degrades withstanding voltage or surface resistivity. (This standard only applies to normal indoor atmospheres – nonconductive pollution.)

EMC standard:  
Compliant to EN61326-1

**Power Supply Section**

Supply voltage:  
100 to 110 V AC  $\pm 10\%$  or 200 to 220 V AC  $\pm 10\%$   
Supply frequency:  
50 Hz  $\pm 2\%$  or 60 Hz  $\pm 2\%$   
Power consumption:

Supply Voltage	When LCD Saver Is On	When in Normal Operation	Maximum
100 V AC	Approx. 30 VA	Approx. 32 VA	45 VA
240 V AC	Approx. 42 VA	Approx. 47 VA	62 VA

**Isolation**

Insulation resistance:  
20 M $\Omega$  min. between each terminal and ground (at 500 V DC)  
Withstanding voltage:  
Between power supply terminal and ground:  
1500 V AC (50/60 Hz), 1 min  
Between relay contact output terminal and ground:  
1500 V AC (50/60 Hz), 1 min  
Between measurement input terminal and ground:  
1500 V AC (50/60 Hz), 1 min

Between measurement input terminals:  
1000 V AC (50/60 Hz), 1 min  
Between contact input terminal and ground:  
500 V AC (50/60 Hz), 1 min  
Between current output terminal and ground:  
500 V AC (50/60 Hz), 1 min  
Between voltage pulse output terminal and ground:  
500 V AC (50/60 Hz), 1 min  
Between transistor contact output terminal and ground:  
500 V AC (50/60 Hz), 1 min  
Grounding: JIS Class D  
Noise:  
Normal mode noise (50/60 Hz):  
DC current (DCA):  
The peak value including a signal component is less than 1.2 times the measuring range.  
Thermocouple (TC):  
The peak value including a signal component is less than 1.2 times the thermal electromotive force.  
Resistance temperature detector (RTD):  
50 mV max.  
Common mode noise voltage (50/60 Hz):  
250 V AC rms max. for all ranges  
Inter-channel maximum noise voltage (50/60 Hz):  
250 V AC rms max.  
Warm-up time:  
30 min minimum after power-on

**● Standard Performance Data**

Input Type	Range	Measurement Accuracy (Digital Readings)	Max. resolution of digital display
DC voltage (DCV)	20 mV	$\pm(0.1\% \text{ of rdg} + 2 \text{ digits})$	10 $\mu$ V
	60 mV		10 $\mu$ V
	200 mV		100 $\mu$ V
	2 V		1 mV
	6 V		1 mV
	20 V		10 mV
	50 V		$\pm(0.1\% \text{ of rdg} + 3 \text{ digits})$
Thermocouple (TC) - excluding the accuracy of reference junction compensation	R	$\pm(0.15\% \text{ of rdg} + 1^\circ\text{C})$ , where R and S = $\pm 3.7^\circ\text{C}$ over 0 to 100°C and $\pm 1.5^\circ\text{C}$ over 100 to 300°C; B = $\pm 2^\circ\text{C}$ over 400 to 600°C, and is not guaranteed for temperatures below 400°C.	0.1°C
	S		
	B		
	K	$\pm(0.15\% \text{ of rdg} + 0.7^\circ\text{C})$ , where the accuracy is $\pm(0.15\% \text{ of rdg} + 1^\circ\text{C})$ over -200 to -100°C.	
	E	$\pm(0.15\% \text{ of rdg} + 0.5^\circ\text{C})$	
	J	$\pm(0.15\% \text{ of rdg} + 0.5^\circ\text{C})$ , where the accuracy is $\pm(0.15\% \text{ of rdg} + 0.7^\circ\text{C})$ over -200 to -100°C.	
	T		
	N	$\pm(0.15\% \text{ of rdg} + 0.7^\circ\text{C})$	
	W	$\pm(0.15\% \text{ of rdg} + 1^\circ\text{C})$	
	L	$\pm(0.15\% \text{ of rdg} + 0.5^\circ\text{C})$ , where the accuracy is $\pm(0.15\% \text{ of rdg} + 0.7^\circ\text{C})$ over -200 to 100°C.	
U			
PLATINEL	0.0 to 1400.0°C		
PR40-20	PR40-20	Not guaranteed over 0 to 450°C $\pm(0.9\% \text{ of rdg} + 16.0^\circ\text{C})$ over 450 to 750°C $\pm(0.9\% \text{ of rdg} + 6.0^\circ\text{C})$ over 750 to 1100°C $\pm(0.9\% \text{ of rdg} + 2.0^\circ\text{C})$ over 1100 to 1900°C	
		W3Re/W25Re	$\pm(0.3\% \text{ of rdg} + 2.8^\circ\text{C})$
Resistance temperature detector (RTD)	Pt100	$\pm(0.15\% \text{ of rdg} + 0.3^\circ\text{C})$	
	JPt100		

**Measurement/reading accuracy:**

Tested under the following conditions:

Standard operating conditions:

23 ±2°C, 55 ±10% RH

Supply voltage range:

90 to 132 V AC; 180 to 250 V AC

Supply frequency range:

50/60 Hz ±1% max.

Note: The accuracy performance is tested after a warm-up time of at least 30 min and in a location free from such adverse effects on the instrument's operation as mechanical vibration.

**Measurement accuracy during scaling:**

Measurement accuracy during scaling (digits) = measurement accuracy (digits) + 2 digits where the value is rounded up to the nearest whole number.

**Reference junction compensation:**

Switchable between INT (internal) and EXT (external) options (common to all channels).

**Reference junction compensation accuracy:**

±1.0°C for types R, S, B, W, PR40-20 and W3Re/W25Re

±0.5°C for types K, J, E, T, N, L, U and PLATINEL only (during measuring temperature that is no lower than 0°C)

**Maximum input voltage:**

±10 V DC (continuous) for 2 V DC or lower voltage ranges and TC input

±30 V DC (continuous) for 6 and 20 V DC voltage ranges

**Input resistance:**

10 MΩ min. for 2 V DC or lower voltage ranges and TC input

Approx. 1 MΩ for 6 and 20 V DC voltage ranges

**External input resistance:**

2 kΩ max. for DCV and TC inputs

10 Ω max. per wire for RTD input (all three wires must have the same resistance)

**Input bias current: 10 nA max.****Interference between channels:**

120 dB (when external input resistance is 500 Ω and the level of input to other channels is 30 V)

**Common mode rejection ratio:**

120 dB (50/60 Hz ±0.1%, unbalanced 500 Ω input resistance; tested between negative input terminal and ground)

**Normal mode rejection ratio:**

40 dB (50/60 Hz ±0.1%)

**● Other Specification**

**Clock:** Provided with calendar function; can be synchronized by means of external contact

**Clock accuracy:**

±100 ppm, excluding a time lag (less than 1 sec) at the time of power-on

**Key lock function:**

Can be turned on or off; a password can be set for the function.

**Login function:**

The station can be logged in to by entering a user name, user ID and password. The station can be locked with a password.

**■ COMMUNICATION FUNCTIONS****● Ethernet Communication**

Medium: Ethernet (10BASE-T)

Basis protocol:

SMTP, HTTP1.0, FTP, TCP, UDP, IP, ARP and ICMP

E-mail function:

Recipient address:

2 address groups (two or more addresses can be specified for each group using no more than 150 characters)

Types of message:

The following pieces of information can be sent via e-mail; for each address group, a selection can be made as to whether or not to send the information.

Alarms, appointed time, and reports

Web server function:

Shows screen images, alarms, instantaneous values and other information using Browser software (Internet Explorer 5.0).

FTP client function:

Transfers files automatically.

FTP server function:

Acquires or deletes files, or manipulates directories from the host computer, and provides information on the remaining size of memory.

FTP server function:

Manipulates directories in an external storage medium, outputs or deletes files from the medium, and provides information on the remaining size of memory.

Real-time monitor function:

Provided.

**● Serial Communication**

This type of communication is used for ladder communication, digital indicating controller communication, and modbus communication.

Medium: EIA RS-232 (CX1xx06-x-1-x)

EIA RS-422A/485 (CX1xx06-x-2-x)

Protocol: Dedicated protocol or Modbus protocol

Synchronization:

Start-stop synchronization

Communication method (RS-422A/485):

Four-wire, half-duplex multi-drop connection (1:N, where N = 1 to 31)

Transfer rate:

1200, 2400, 4800, 9600, 19200, or 38400 bps

Data length: 7 or 8 bits

Number of stop bits: 1

Parity: ODD, EVEN or NONE

Overall communication distance (RS-422A/485):

1.2 km

Communication mode:

ASCII for input/output of control and setting data

ASCII or binary for output of measured data

Modbus communication:

Operating mode:

RTU MASTER or RTU SLAVE



**RTU MASTER:**

Provides up to 8 start-of-readout addresses. (Continuous readout is allowed.)

**RTU SLAVE:**

Outputs measured/computed data, alarm statuses, and so on.

## ■ OPTIONS

### ● Program Setting Functions (/PG1, /PG2)

#### Program setting functions

Number of program patterns: 4 (/PG1), 30 (/PG2)

Number of segments per program pattern: 99 max.

Number of program segments:  
300 max. (as the sum of segments for all program patterns)

Number of program events: 800 max.

Number of program repetitions: 999 max. or infinite

Segment time:  
0 min:1 sec to 99 hr:59 min:59 sec

Start/stop of program pattern:

A program pattern can be started(RUN), stopped(RESET), held(Hold) or advanced by means of contact input or instrument operation.

Switching among program patterns:

A program pattern can be switched to another by means of contact input or instrument operation.

Wait function:

Wait time: Off, or 0 min:1 sec to 99 min:59 sec

Wait zone: 0 to 10% of the span of measurement input range

#### PID parameters switching

Segment PID selection:

PID-parameter numbers being used can be selected on a segment basis

Zone PID selection:

PID parameter sets are switched depending on the value of the applied PV input

#### Time event:

The progress status of a program pattern is provided by means of contact output.

Number of events set:

16 max. per segment

Output: Provided after the lapse of a specified time from the moment of segment switchover.

Range of time lapse:

0 to 99 hr:59 min:59 sec

#### PV event:

Alarm function for measured values/deviations within a program pattern

Number of events set:

16 max.

Event type: PV high limit, PV low limit, high limit of deviation, low limit of deviation, deviation within high and low limits, SP high limit, SP low limit, Out high limit, Out low limit

#### Control mode switching

RESET/RUN switching for program

operation: Run/stop status of program operation

Hold/non-Hold options:

The progress of program operation can be placed in a Hold state or non-Hold state while in the Run status of a program.

### ● Measurement Alarm Output Relay(/A6, /A6R, /A4F, /A4FR)

Number of outputs: 6 (/A6, /A6R, /A4F, /A4FR)

Number of inputs: 8 (for /A6R, /A4FR option only)

Relay contact rating: 250 V DC/0.1 A (resistive load) or 250 V AC (50/60 Hz)/3 A

Output configuration: NO-C-NC (switchable between Enable/Disable options, between AND/OR options and between Retain/Don't Retain options)

Remote Control (/A6R, /A4FR)

The following types of control are possible by means of contact input (configurable for up to 8 types):

- Start/stop of memory (signal level)
- External trigger input for event files (trigger of 250 ms or longer)
- Synchronization (adjusts the clock to an appointed time by means of contact input; trigger of 250 ms or longer)
- Start/stop of computation (signal level)
- Resetting of computed data (250 ms or longer trigger)
- Manual sampling (250 ms or longer trigger)
- Message writing (configurable for up to 8 messages; 250 ms or longer trigger)
- Load setting (configurable for up to 3 loads; 250 ms or longer trigger)
- Alarm acknowledgment (of 250 ms or longer trigger)

FAIL output/end-of-memory output (/A4F, /A4FR)

Provided as a relay output from the backside of the station in case of system failure, prior to the specified time (selectable from 1, 2, 5, 10, 20, 50, and 100 hr) of overwriting a data file for screen views.

### ● Mathematical Functions (/M1)

With the "M1" option, it is possible to show and record trend graphs/digital readings for the following types of computation on computation channels.

Number of computation channels: 12

Types of computation:

Standard computations:

Four fundamental arithmetic operations, square roots, absolute values, common logarithm, exponents, powers, relational operations (<, ≤, >, ≥, =, ≠), logical operations (AND, OR, NOT, XOR)

Statistical computations:

Average, maximum, minimum, and total values of time-series data

Moving average computation:

A moving average calculation is performed on the results of computation.

Constants: Up to 30 constants can be set as necessary.

Communication-based digital input:

This input can be applied to computational expressions other than statistical ones.

Number of communication-based digital data values: 30

Remote input:

A remote status (0/1) can be used in a computational expression.

Number of remote-input data values: 8

Report functions:

Report type:

Hourly report, daily report, a combination of daily and weekly reports, and a combination of daily and monthly reports

Type of computation:

Average, maximum, minimum, total

Data format: ASCII

● **Three-legs Isolated RTD Input (/N2)**

The "/N2" option is an RTD input, the RTD of which has electrically isolated A, B and b terminals.

● **24 V DC/AC Power Supply (/P1)**

Specifications of the "/P1" option are as follows:

Rated supply voltage:

24 V DC/AC

Operating supply voltage range:

21.6 to 26.4 V DC/AC

Withstanding voltage:

500 V AC between power supply terminal and ground

Power consumption:

Supply voltage	When LCD Saver Is On	When in Normal Operation	Maximum
24 V AC	Approx. 17 VA	Approx. 19 VA	30 VA
24 V AC (50/60 Hz)	Approx. 28 VA	Approx. 32 VA	45 VA

● **Green Series Communication (/CM1)**

The "/CM1" option provides the function for communicating with GREEN series digital indicating controller. Supported controller models are UT3x0, UT4x0, UT5x0, UT750, and other specific models (UT and UP series with heating/cooling control are classified as "other specific models").

● **Ladder Communication (/CM2)**

Ladder communication is a communication protocol used to communicate between an FA-M3 ladder communication module and a programmable controller from another manufacturer.

■ **APPLICATION SOFTWARE**

● **DAQSTANDARD**

System requirements:

OS: Windows 98/Me/NT4.0/2000

Processor: MMX Pentium/166 MHz or superior (Pentium II/266 MHz or any other superior processor is recommended.)

Memory: 32 MB min. (64 MB or larger memory is recommended)

Disk device:

CD-ROM drive compatible with Windows 98/Me/NT4.0/2000

Hard disk capacity:

Free space of at least 10 MB (100 MB or larger free space is recommended)

Display unit:

A model provided with a display module compatible with Windows 98/Me/NT4.0/2000 and capable of handling at least 32000 colors (a display module capable of handling at least 64000 colors is recommended)

Printer: Compatible with Windows 95/98/Me/NT4.0/2000; the printer driver must also be compatible with the OS.

Main functions (as a package):

Configuration software:

External storage medium:

Configures the medium or sets it in set mode.

Configuration via communication:

Configures the station, excluding the communication setting (IP address), or sets it in set mode.

Data viewer:

Number of channels covered for display: 32 per group; 30 groups max.

Display functions:

Waveform views, digital readings, circular graphics, lists, TLOG views, report views, etc.

File connection display:

This function concatenates files created separately during continuous data acquisition because of auto-saving or power failure, and shows the concatenated file on the display (can concatenate files of up to 1,000,000 data items).

Section computation:

Maximum, minimum, average, rms value, p-p value

Data conversion:

This function converts the data format to ASCII, Lotus 1-2-3, or Excel.

Printout:

The data viewer prints replayed data.

**MODELS AND SUFFIX CODES**

Model	Suffix Code	Option Code	Remarks
CX1006			DAQSTATION CX1000 internal loop : 0 loop, measurement channel : 6 ch <sup>*1</sup>
CX1206			DAQSTATION CX1000 internal loop : 2 loops, measurement channel : 6 ch
External storage medium	-1		3.5 in. floppy disk drive
	-2		Zip disk drive provided with medium
	-3		ATA flash memory card provided with medium
Communication port	-0		Ethernet only
	-1		RS-232C communication interface
	-2		RS-422A/485 communication interface
Language		-2	English
Option		/A6	Measurement Alarm (DO 6) <sup>*2</sup>
		/A6R	Measurement Alarm (DO 6, DI 8) <sup>*2</sup>
		/A4F	Measurement Alarm (DO 4, FAIL/Memory end detection and output) <sup>*2</sup>
		/A4FR	Measurement Alarm (DO 4, DI 8, FAIL/Memory end detection and output) <sup>*2</sup>
		/CM1	Green series communication <sup>*3</sup>
		/CM2	Ladder communication <sup>*3</sup>
		/M1	Computation functions (including report functions)
		/N2	3 legs isolated RTD
		/P1	24 V DC/AC power supply
		/PG1	Program control (number of program patterns : 4) <sup>*4</sup>
	/PG2	Program control (number of program patterns : 30) <sup>*4</sup>	

- \*1: Select both the suffix code for RS-232 or RS-422/485 communication port and the /CM1 option code at the same time.
- \*2: CX1006 must be specified. /A6, /A6R, /A4F, /A4FR can not be specified together.
- \*3: Be sure to select the suffix code for RS-232 or RS-422/485 communication port. Only an alternative choice is allowed.
- \*4: Effective only for the model with internal loops Only an alternative choice from the options /PG1 and /PG2 is allowed.

**Application Software**

Model	Description	OS
DXA200-02	DAQEXPLORER	Windows 98/Me/NT4.0/2000
DXA200-02/XF1	DAQEXPLORER with auto file conversion function	
DXA310-011	DAQ-PharmBio	
DXA410-02	DAQOPC	Windows NT4.0
VA510-01-2	DAQLOGGER (400 channels)	Windows 95/98/NT4.0/2000
VA510-02-2	DAQLOGGER (1000 channels)	
VA510-03-2	DAQLOGGER (1600 channels)	
VA520-01-2	DAQLOGGER Client (1600 channels)	

**Standard Accessories**

Product	Quantity
Mounting brackets	2
Terminal screws	5
User's manual	1
Zip disk (100 MB)	1
ATA flash memory card (20 MB)	1

**Optional Accessories**

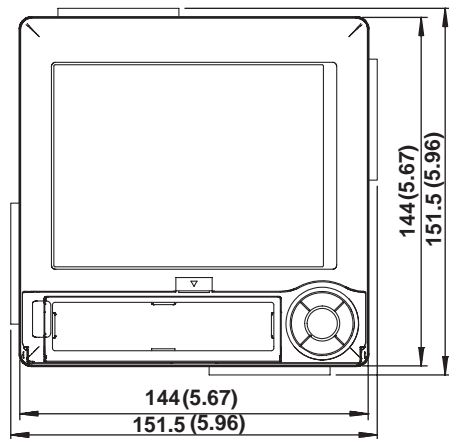
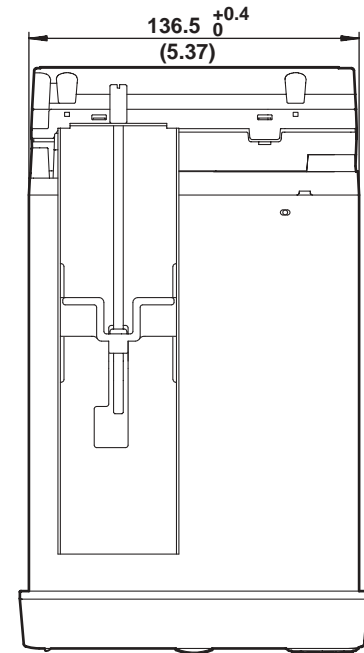
Product	Model (part) number	Specification
Shunt resistor (for screw input terminals)	415920	250 Ω ±0.1%
	415921	100 Ω ±0.1%
	415922	10 Ω ±0.1%
3.5-inch floppy disk	705900	2HD (10 units)
Zip disk	A1053MP	100 MB
ATA flash memory card	A1134UN	20 MB
Mounting bracket	B9900CW	—

● Spare Parts

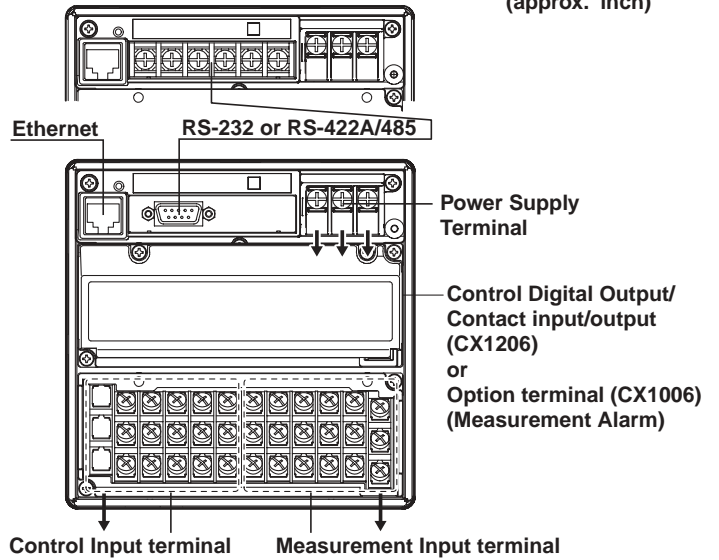
Control output module	CXA900-01	
	CXA900-02	
	CXA900-03	
Control extension DIO module	CXA900-11	

■ DIMENSIONS

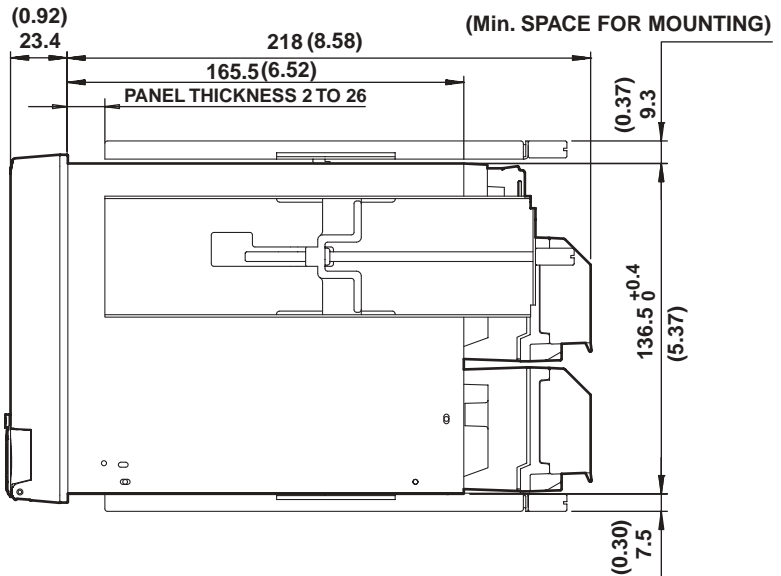
Dimensions



Rear View



Unit : mm  
(approx. inch)

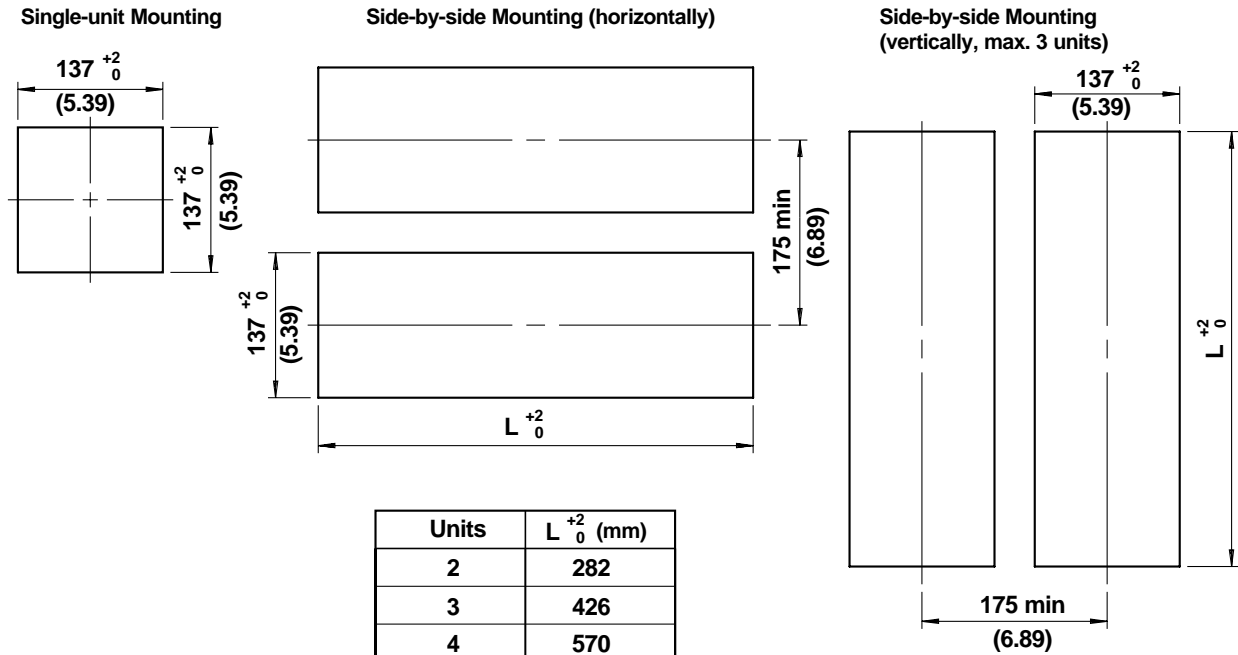


Note : If not specified, the tolerance is  $\pm 3\%$ .  
However, for dimensions less than 10 mm, the tolerance is  $\pm 0.3$  mm.

(DIMENSIONS AFTER MOUNTING)

**Panel cutout**

Unit : mm  
(approx. inch)

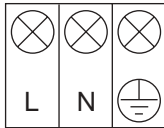


Units	$L^{+2}_0$ (mm)
2	282
3	426
4	570
5	714
6	858
7	1002
8	1146
9	1290
10	1434
n	$(144 \times n) - 6$

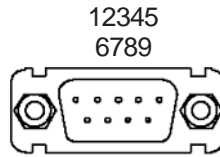
Note : If not specified, the tolerance is  $\pm 3\%$ . However, for dimensions less than 10 mm, the tolerance is  $\pm 0.3$  mm.



### Power Supply Terminal



### RS-232 Terminal



1	N.C.
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	N.C.

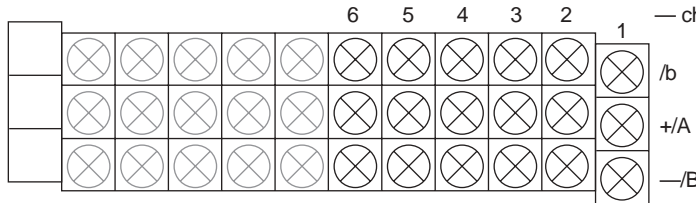
### RS-422-A/485 Terminal



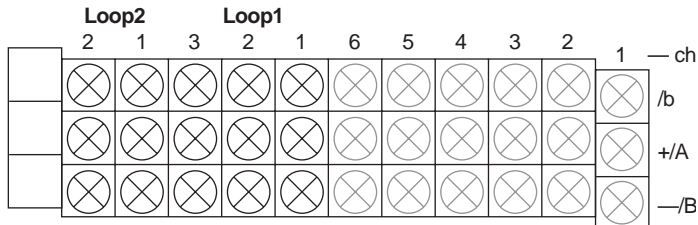
### FOUNDATION Fieldbus Terminal



### Measurement Input Terminals

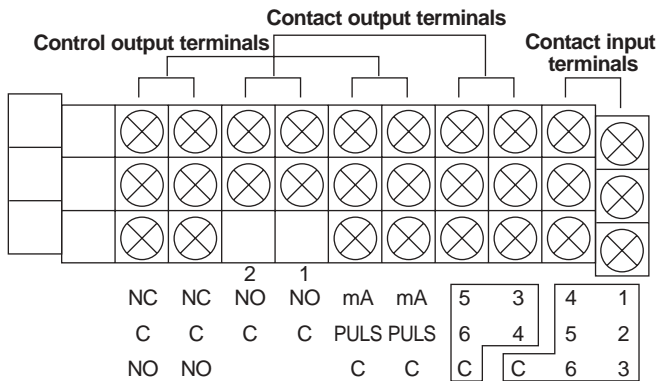


### Control input terminals



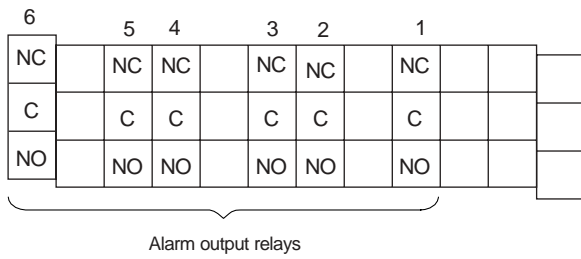
(RSP) PV (RSP) PV  
 PV (RSP) PV  
 PV2 PV1 (RSP) PV2 PV1

### Control output and contact I/O terminals

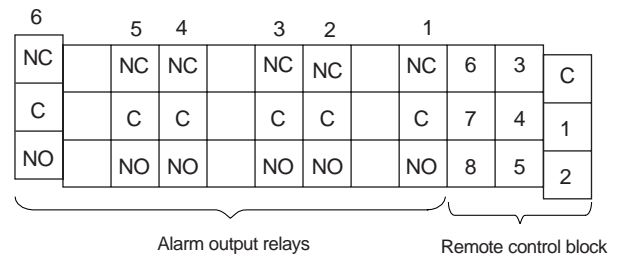


### Option Terminals (CX1006)

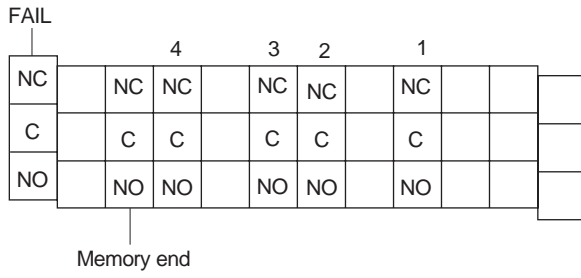
**/A6**



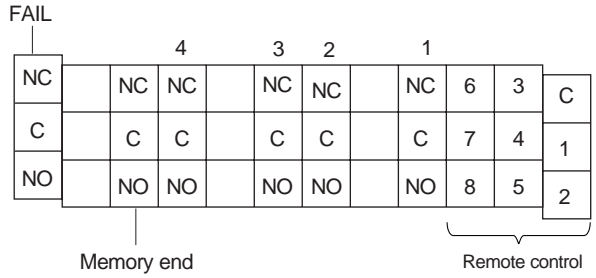
**/A6R**



**/A4F**



**/A4FR**



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