



Control and Measurement Station

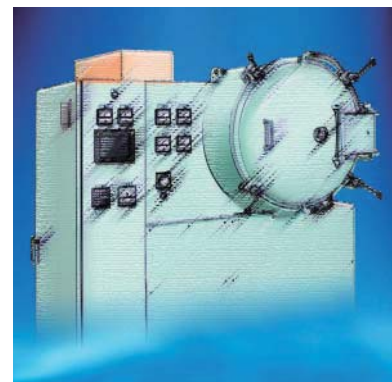
CX1000/CX2000

CX defines the next generation in process control by fusing recording, control and networking into a single, compact product.

CX delivers "Out of the box, ready to go" real-time and historical process monitoring.

CX controls your process using internal PID loops and/or external controllers.

CXs link your process to the networked world with a built-in 10 Base-T Ethernet and web server, E-mail and FTP functions.



Flexible control functions

STYLE

S3

new functions

- Independent program operation
- PV Math/SP Math
- Logic Math
- DIO control & monitor screens
- Analog retransmission

The following product was discontinued as of Feb. 28, 2014.
 Discontinued products: CX1000, CX1006, CX1200, CX1206

All-in-One Controller That Integrates Monitoring and Recording Functions



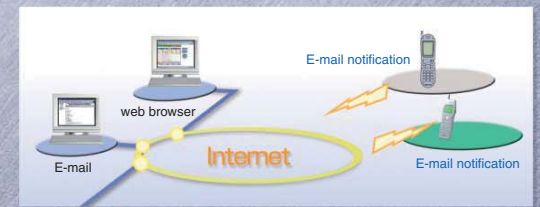
Measurement input
TC
RTD
DCV
DI

Control input
TC
RTD
DCV
1-5V
4-20mA

Control output
Current
Voltage pulse
Relay

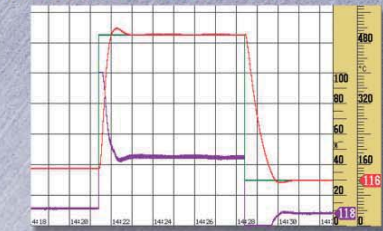
Built in Network Functions

- Alarm and instantaneous value notification by E-mail
- Remote process monitoring with Web browser



Measure/Record

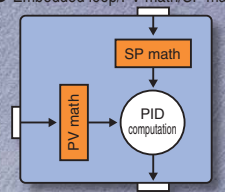
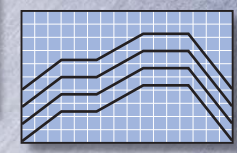
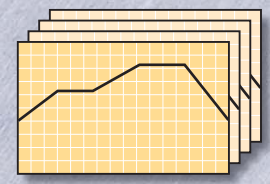
Easy setup of data acquisition/recording



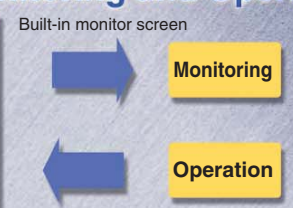
Independent Ramp/Soak Programs

Powerful and flexible control functions

- Independent/synchronous program control
- Embedded loop/PV math/SP math



Onsite and Remote Monitoring and Operation



*A model with the program control option

	CX1206	CX2620
Measurement ch	6 ch	20 ch
Embedded control	2 loops	6 loops
	Control interval: 250 msec	
Program control (option)	No. of patterns: 4 or 30 No. of segments: Max. 99/pattern Total number of segments: Max. 300	

Standard Quick-Start Monitoring Screens

Screens for Control Monitoring



Controller type display screen

This is a control loop monitoring screen. The large digital display makes it easy to monitor PV.



Faceplate screen

This screen can be used for graphical monitoring of control loops.



Hybrid type display screen

This screen can be used for graphical monitoring of control loops.



Tuning screen

Various control loop parameters can be set on this screen. As many as 21 parameters can be displayed and set.



Program operation screen

Program pattern and measured value displays can be displayed one on top of the other during measurement.



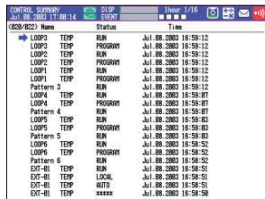
Control overview screen

All control loops, measurement channels, external loops, and DIO status can be monitored. It can be useful to monitor alarm status of all loops/channels and DIO status.



DI/DO status display

This screen can be used to monitor contact / O ON/OFF statuses. It is useful for purposes such as checking cables.



Control operation summary

This screen displays recordings of control operations, such as control RUN/STOP, and switching between AUTO and MAN.



DIO operation monitor screen

DI/DO status is monitored and operated with control loops, measurement channels, and external loops on the control screen.

Easy to Switch Display Screens



Trend display screen

Measurement channels and control group PV, SP, OUT trends are displayed/recorded.



Display mode menu



Control screen

Control loop monitor screen. SP can be changed.

Flexible Control for a Variety of Applications

Multi loop control recording/monitoring best suited to small systems

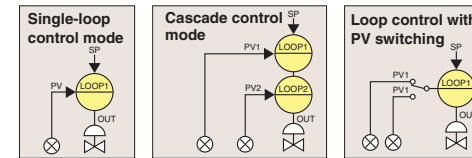
CX2620: 6 embedded control loops, 20 measurement channels

Compact control/measurement best suited to install into device

CX1206: 2 embedded control loops, 6 measurement channels

Control modes

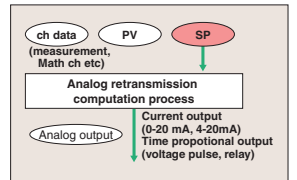
Up to six control loops are available (CX2000). Three different control modes can be set: single loop mode, two-input switching mode, and cascade mode.



Analog retransmission

Data (measurement channel data, control loop data etc) is used in Math expression. The math result is transmitted from CX control output terminal.

Note: As control output terminal is used as transmission output, the loop is not available for PID control



PV Math/ SP Math can be applied for a variety of purposes.

PV math/ SP math can be used in PID computation. PID-computed result are used as PV or SP. By using the PV or SP that is evolved from original know-how, CX can control accurately in variety of applications.

PV Math/SP Math

Operands in equations

- Embedded control data
- External control data
- Measurement channel data
- Math channel data
- DIO data, control input channel data
- Constant*, internal switch
- *It can be set by user.
- It can be changed during operation

Operator types

*Four arithmetic operations, square root, absolute value, common logarithm, exponential, power, relational operations (>, <, <=, >=), logic operations (AND, OR, NOT, XOR), statistical operations (CLOG.AVE, CLOG.MAX, CLOG.MIN, CLOG.P-P), conditional operations (expression 1 ? expression 2 : expression 3)

PV math example for furnace application

The average of 3 measurement ch is used as PV.
 $PV = CLOG.AVE(01-03)$

01-03CH
 PV math → PID → OUT

Logic Math

In combination with control, simple actions such as interlock, switch ON/OFF are available

Functional Program Operation

Synchronous or independent program operation up to 6 embedded loops

As program operation is available for each loop, the CX can be applied for a variety of applications. Up to 30 program patterns can be set.

Independent multi-program pattern operation

Up to 6 program patterns can be controlled independently
Example: Independent program operation for 6 furnaces using the CX2620

Synchronous multi-program pattern operation

Up to 6 program patterns can be controlled in the same time period
Example: Synchronous program operation for a furnace using the CX2620

Simultaneous use of program operation and fixed-point control mode

Example: Synchronous program operation for 3 loops, fixed-point control mode on one loop using the CX2420

Distinguished display of program pattern process

Program pattern and PV can be displayed one on top of the other during program control

Program pattern and program events can be displayed simultaneously

(Group display) (All display)

- Time events and PV events can be set at any position in the pattern.
- 16 time events and 16 PV events can be displayed in program control display (all display).
- Any 5 selected events can be displayed (group display).

Target setpoint (TSP) change: During program control TSP can be changed easily

During program operation, the operation can be held and the segment TSP can be changed. Also, pattern change is available during program control.

<TSP change during soak>

<TSP change during ramp>

Wait function: Flexible response to process change

<Wait action in segment switching>

<Wait action within segment>

Standard DI/DO for variety purposes- DI/DO expansion with DIO option (CX2000/CST1)

DI 6points	DI 6 points control output module for 1-2 loop	6points	DO 6 points (Relay output 2 points, transistor output 4 points)
DI 6points	DI 6 points control output module for 3-4 loop	6points	DO 6 points (Relay output 2 points, transistor output 4 points)
DI 6points	DI 6 points control output module for 5-6 loop	6points	DO 6 points (Relay output 2 points, transistor output 4 points)
DI 12points	Control Purpose extension DIO (option)	12points	DO 12 points (Transistor output 12Points)

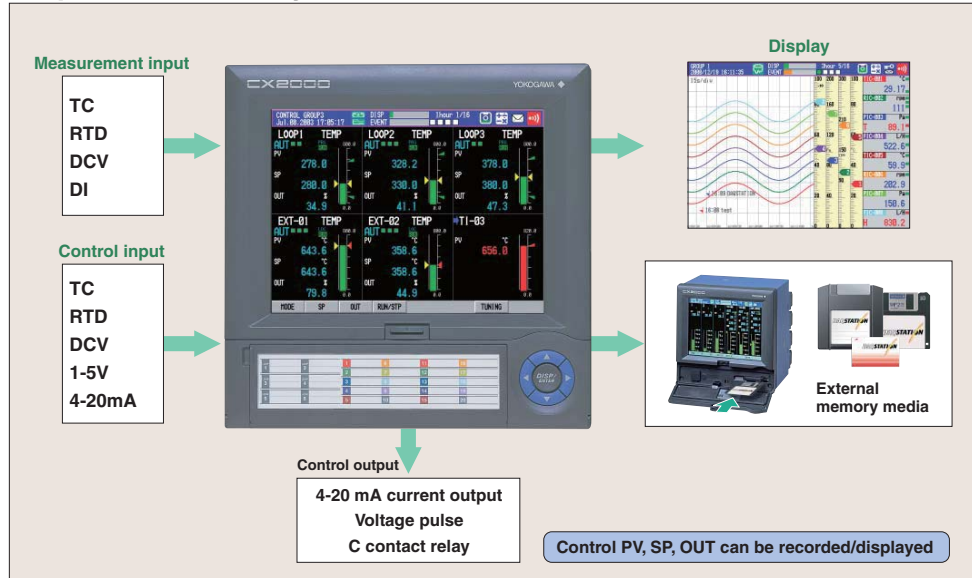
Contact input (DI) function	
Action for recording/measurement	Record start/stop, trigger, alarm ACK, time set, math start/stop, math reset, manual sample setting load, message, snap shot
Control action	All loops control operation start/stop, SP switching, auto operation, man operation, loop control with PV switching, control start/stop, remote/Local, cascade switching, pattern selection
Program operation action	Program operation start/stop, hold/advance

Contact output (DO) function	
Measurement/control action	Measurement alarm, control alarm, FAIL*, self-daagnosis, memory end relay**
Program operation action	PV event, time event, pattern end

*1: /A4F or /A4FR option must be specified
Note: No DI/DO for 0 loop model

(*) Program control is an option (specify /PG1 or /PG2)

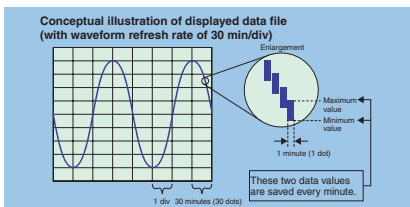
Versatile and Flexible Recording Functions to Increase Data Acquisition Efficiency in the Field



Measurement data

Display data—for extended-period trend recording

The display data format is used to save data displayed as waveforms. Each time the waveform display is updated, two data values (maximum and minimum values) measured since the previous update are saved.



File structure

The two data formats can be used in combinations such as the following:

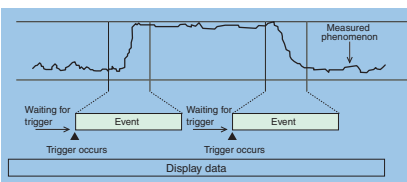
- 1 Display data only
- 2 Event data only
- 3 Display data and event data in combination

Display data, event data, and a trigger function can be used in combination. With this approach, display data with a slow sample rate can be used for continuous extended-period recording, and event data with a faster sample rate can be used to record short-term details.

Event data—for detailed analysis

The event data format is used to save all data in a specified data saving interval. Event data can be used in combination with the trigger functions to detect and analyze abnormal data.

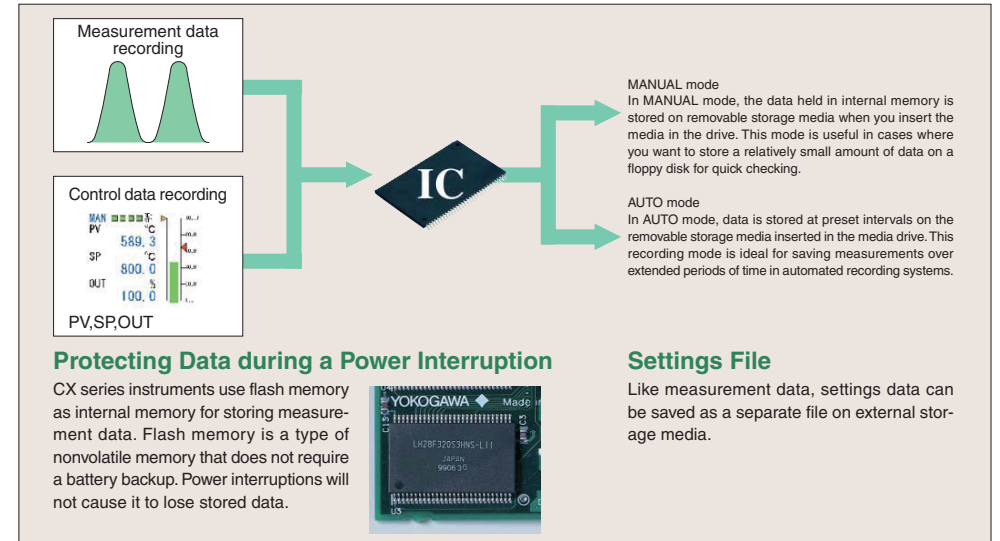
A pretrigger can also be set, making it possible to analyze data before and after the trigger.



Memory Function

DAQSTATION provides a variety of recording options that go far beyond the capabilities of conventional recorders. These features let you efficiently record just the data you need, saved to your choice of removable PC storage media.

Optional Compact flash memory card or Zip disks allow data recording over extended periods of time in automated recording systems.



Memory Capacity

CX1000/CX2000: Saving data to internal memory

CX2000 display data file	Model	Display update interval			
		1 min.	2 min.	5 min.	30 min.
		Saving interval			
		2 s	4 s	10 s	1 min.
Maximum Saving time	CX2220	6.4 hours	12.8 hours	1.3 days	8 days
	CX2620	4.3 hours	8.7 hours	21.9 hours	5.4 hours

(Approximately)

CX2000 event data file	Model	Saving interval			
		2 s	4 s	10 s	1 min.
		Maximum Saving time			
		12.8 hours	25.6 hours	2.6 days	16 days
	CX2620	8.7 hours	17.5 hours	1.8 days	10.9 days

(Approximately)

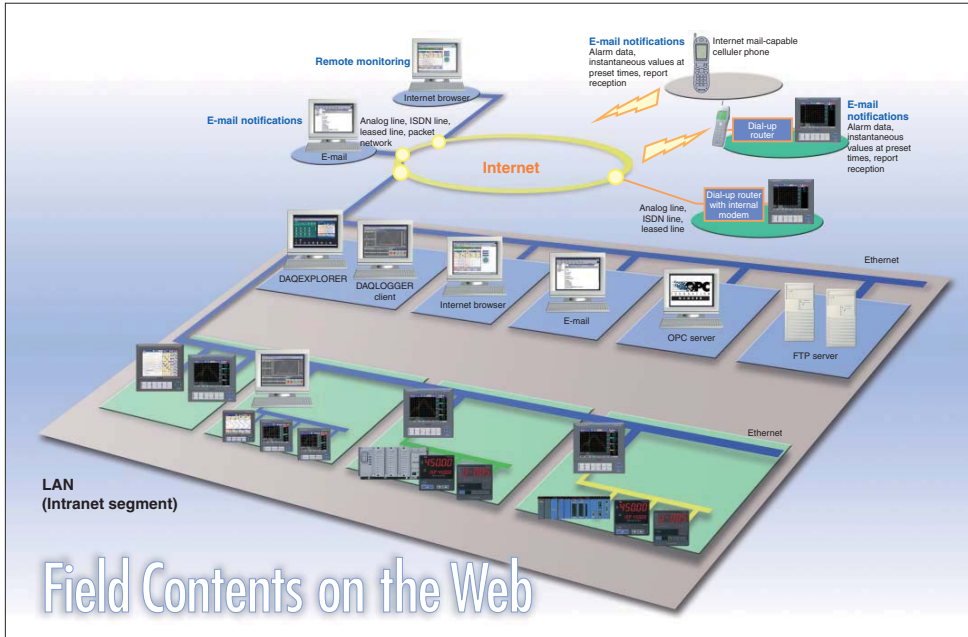
Note: No computation channel and no external channel.

Other data

In addition to measurement data, the CX1000/CX2000 can also save the following types of data:

- Manual sampling data: Instantaneous values (the 50 most recent measurements) occurring at each contact input or key input are saved in ASCII format.
- Time-series (TLOG) calculation data: Maximum value, minimum value, integrated (totalized) value, etc. during a fixed interval (with the calculation option)
- Report data: Hourly reports, daily reports, weekly reports, monthly reports (with the calculation option)
- Settings data: Settings for set mode and setup mode
- Alarm summary data: Information on the occurrence/cancellation of alarms on channels being recorded
- Occurrence/cancellation of time/PV event
- Control mode summary data: Run/stop, local/remote and manual/auto/cascade mode switching, hold/cancellation of programs hold, wait/cancellation of wait

Control and Measurement Data Acquisition/Monitoring via Internet



Web monitoring

CX screen data can be displayed on a web browser. The user can also change the CX screen display type (trend display, digital display, bar graph display, historical trend display, etc.) and display groups, and enter messages through the browser. The CX Web server function makes it easy to set up a remote monitoring environment with little or no startup costs.

Displaying the CX screen on a web browser

Example address <http://192.168.0.10/operator.htm>

The screen display type and display groups can be changed here

Messages can be input remotely

Message input function
Messages can be input to the CX screen from a browser screen

Trend display

Alarm information display
Displays the most recent 120 events

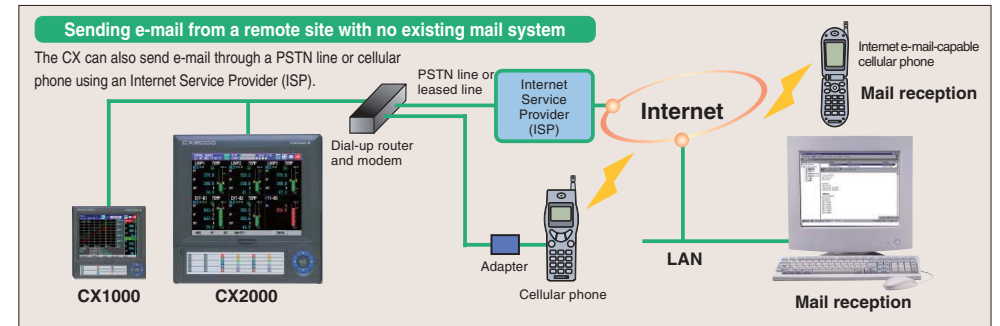
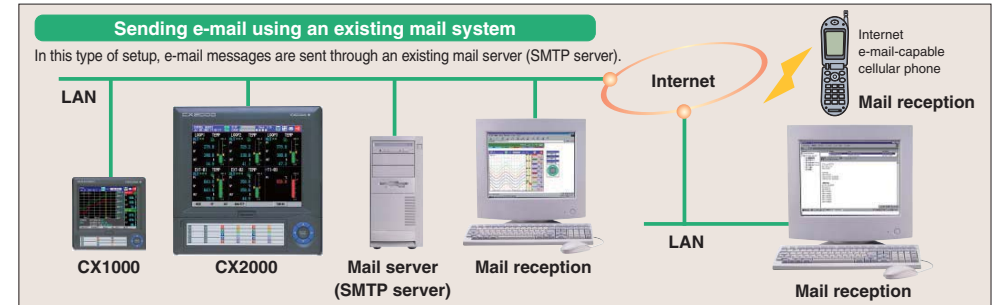
Control channels display
Displays instantaneous values and alarm statuses for all channels

Measurement math channels display
Display instantaneous value and alarm statuses for all channels

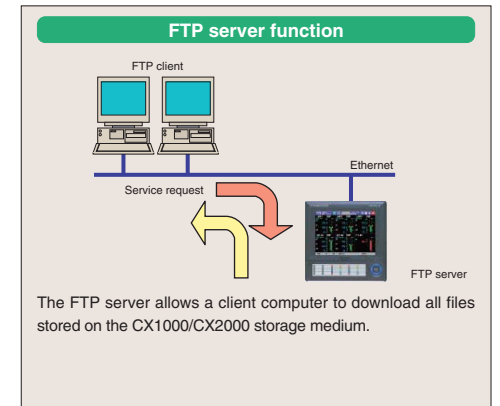
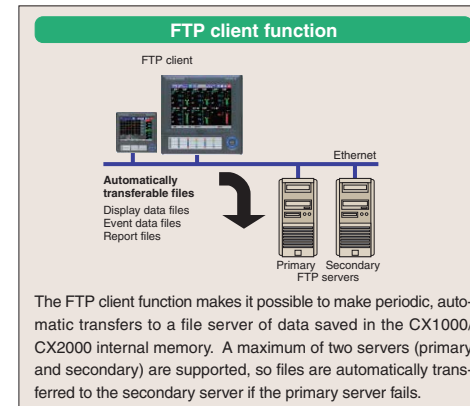
E-mail function

The CX can transmit the following data via e-mail: alarm notification messages, power-restoration messages following an outage, memory full messages, storage media full messages, periodic instantaneous values, report data, and other information. Multiple recipients can be registered.

When connected to the Internet, CX can send e-mail anywhere in the world. An e-mail-capable cellular phone can be used to receive instantaneous remote notification of alarms.



FTP function



Application Software

The application software options that let you open and work with data recorded on CX series instruments and easily use CX network functions are an integral part of DAQSTATION recorders. They will help you integrate your CX series instruments with your PCs and network.

DAQSTANDARD (Standard Software Compatible with Windows 98/Me/NT4.0/2000/XP)

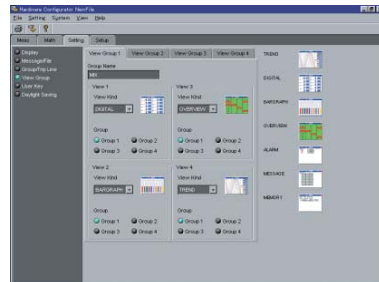
DAQSTANDARD is a software package included with all CX series instruments. It can be used to print or redisplay data files saved by the CX unit or transferred through FTP.

• Setup Module

The Setup module is used to send the CX data such as settings relating to measurement channels, calculation channels, or the screen display. It can also receive settings from the CX and save them to a PC hard disk or other storage device.



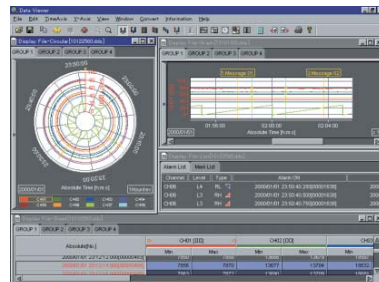
Measurement channel settings



Display settings

• Data Viewer

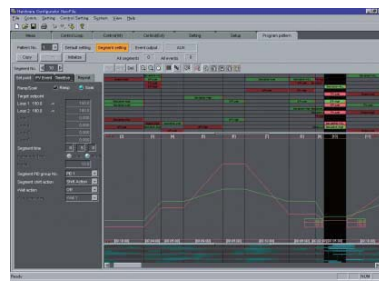
The Data Viewer module can be used to display and print data in files generated by the CX. Data can be displayed as trend displays, digital displays, circular displays, and lists. In addition, the cursor can be used to read numerical values in displayed data, or to make interval calculations. Data can be converted to ASCII, or to file formats that can be opened in Excel or Lotus 1-2-3.



Data Viewer

• Linked File Display

Data files generated by breaking up contiguous data into multiple files as a result of auto-saving or a power interruption during continuous data acquisition by the CX unit can be displayed as linked files. You can save the file linking conditions, so it is easy to redisplay linked files. Using the linked file display, you can also convert data to ASCII or file formats that can be opened with Excel and Lotus 1-2-3.



Program pattern settings

• Program Pattern Setting

DAQSTATION CX embedded control loop program operation patterns can be created and set through a graphical interface.

DAQEXPLORER (Compatible with Windows98/Me/NT4.0/2000/XP)

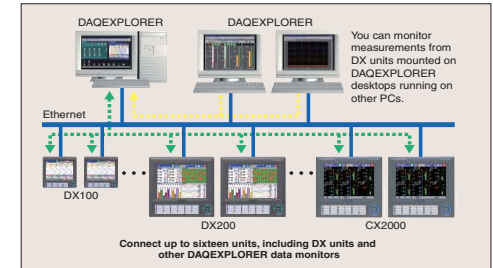
DAQEXPLORER is a software package that supplements the DAQSTANDARD features with functions such as Desktop and Data Monitor. DAQEXPLORER lets you take full advantage of network functions through the CXs' Ethernet connection.

■ Measurement Data File Transfer

DAQEXPLORER makes it possible to transfer measurement data files from a CX to a PC

■ Measured Data Monitoring

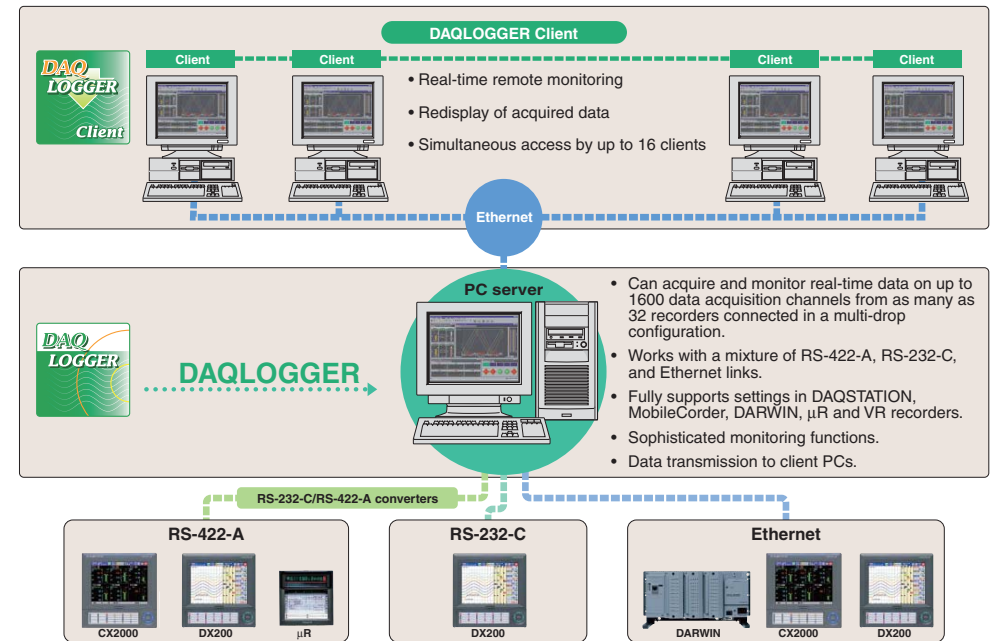
- Data Monitor module monitors CX measurements over the network.
- An optional auto-file-conversion function improves the efficiency of data processing tasks through automatic conversion of data files.



DAQLOGGER (Compatible with Windows 98/NT4.0/2000/XP)

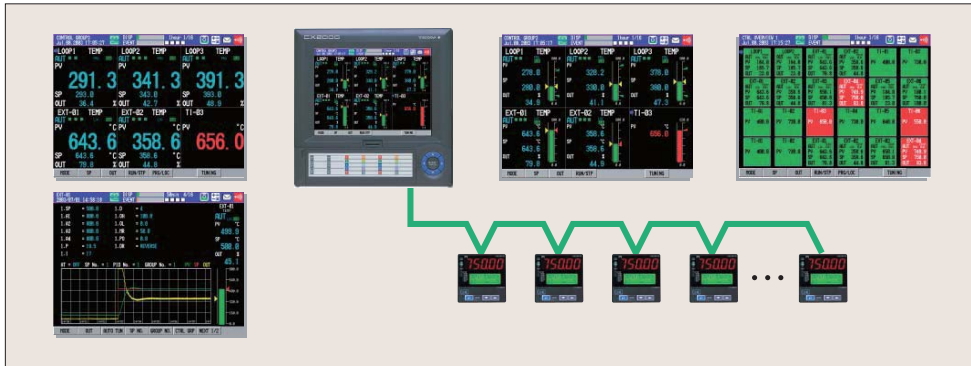
Multi-Channel Real-Time Data Logging Software

DAQLOGGER integrates up to 1600 data acquisition channels from as many as 32 recorders connected in a multi-drop configuration through Ethernet and serial links (RS-232-C/RS-422-A). The configuration may include a mixture of DAQSTATION CX/DX series units, MobileCorder MV series units, μ R and VR recorders, and DARWIN data acquisition units. DAQLOGGER also supports internet applications. It lets you send e-mail messages (which can include binary file attachments) and transfer binary files (FTP client) to specified addresses at a set time or when an event occurs such as an alarm or when a file is created. Remote site monitoring is available via PC.



Green Series Communication

DAQSTATION CX's monitoring and recording functions are not limited to embedded control loops. A DAQSTATION CX lets you control external Green series controllers with the same ease as DAQSTATION CX's embedded controls. This expands DAQSTATION CX's scope and provides a broader range of applications.



● Using DAQSTATION CX as a Control Terminal

DAQSTATION CX lets you control, monitor, and collect data from controllers in various locations. The screens needed for controller operation and monitoring are included as standard features. The user-friendly display function lets you set operation parameters for Green series units.

● Using DAQSTATION CX as a Data Collector

DAQSTATION CX can record controller measurements, settings, and control outputs. Control statuses and operation statuses are easy to record. In addition, it is easy to collect data for quality control and creating reports.

● Fewer Cables

Measurements from Green series units are transmitted to a DAQSTATION CX through an RS-485 interface. As all Green series units do not have to wire to CX, it can eliminate the need for individual twisted pair input wiring from controller to CX.

● Network-Based Monitoring

DAQSTATION CX can be set to transmit an E-mail when a controller outputs an alarm. This lets you monitor for alarms even if you are not on site. In addition, the DAQSTATION CX screen can be displayed on any PC Web browser.

	CX1000	CX2000
Connectable models	UT320, UT350, UT351, UT420, UT450, UT520, UT550, UT750 (MODBUS protocol support required)	
Maximum number of connected loops*	4	16

* Two-loop controllers count as two loops each.



Modbus Communications

DAQSTATION supports the Modbus protocol (RTU master/slave), for easy installation on systems built using Modbus.

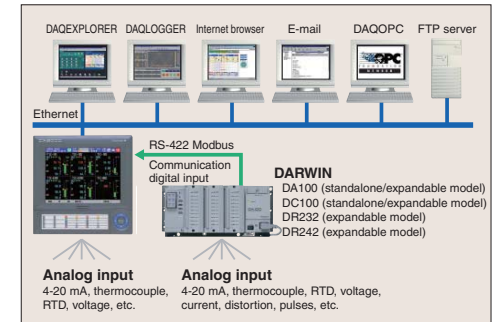
Modbus Master Function

The Modbus master function lets the CX unit read, display, and record digital data from slave devices.

● Increase CX Inputs

A Modbus connection lets you input measurements and calculations from a DARWIN series* data acquisition unit as digital data to CX unit computation channels. This capability makes it possible to increase the number of CX unit inputs by simultaneously using DARWIN series measurement/computation channels.

* Communication module DT300-31/S6 is required. See the general specifications for DT300-31/S6 for further details.

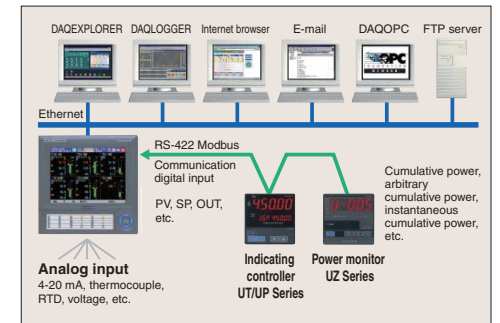


● Data Display/Record of Indicating Controller/Power Monitor

Data from Modbus-compatible devices can be input to CX unit computation channels as digital data for displaying and recording. For example, the CX unit can produce trend displays and save data such as power monitor cumulative power, indicator regulator SP, PV, and OUT.

In addition, data from these devices can be used by CX unit network functions and network applications.

For information on the operating requirements of individual Modbus slave devices, see the specifications for the particular slave device.

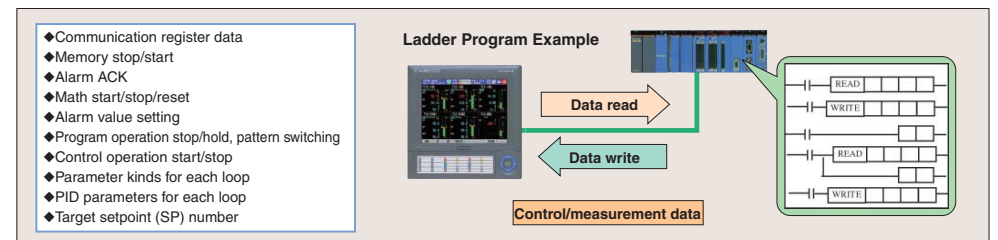


Modbus Slave Function

A master device can read CX unit register values. In addition, data written to the register by the host system can be displayed and recorded on the CX unit.

PLC Communication

The PLC has the ability to read the CX's control/measurement data and to send commands to the CX from PLC



Reliable Hardware

In the half-century since introducing the ER electron-tube automatic balancing recorder (Japan's first) in 1951, YOKOGAWA has shipped more than one million industrial recorders to users around the world. The DX Series DAQSTATION incorporates the highly reliable technology that YOKOGAWA has developed through its many years of expertise as a recorder manufacturer.

Dust-Proof and Water-Proof Front Panel (IP65, NEMA No.250 TYPE4* Compliant)

YOKOGAWA designed CX series instruments to be used under harsh environmental conditions. The front panel has a dust-proof, water-proof design which is compliant with the IEC529-IP65 and NEMA No. 250 TYPE4* standard. This structure provides good protection for the recorder's internal components and the removable storage media drive mechanism. Compliance with IP65 means that the front panel has met stringent requirements such as complete protection (of internal components) against dust, and protection against functional errors even when the recorder is sprayed with a jet stream. The ability of CX series instruments to endure such environmental conditions has been proven through stringent evaluation tests.

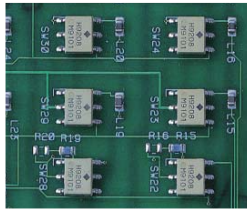
*Except external icing test.



Quality Components

High-Breakdown-Voltage Solid-State Relays

CX series instruments use high-breakdown-voltage solid-state relays developed by YOKOGAWA as scanners for switching input signals. These relays consist of MOSFETs capable of withstanding high voltage (1500 V DC) with low leakage current (3 nA), and power-output photocouplers. They provide high-speed scanning while increasing scanner life and eliminating noise.

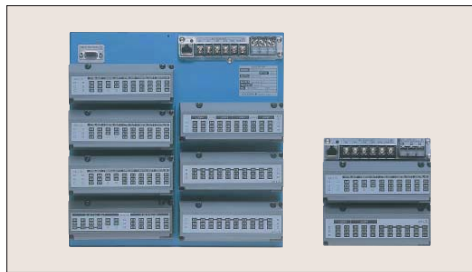


Isolated Channel Inputs

DC voltage and thermocouple inputs in all CX series models are channel-isolated. (Channel isolation for RTD inputs is optional on some models.) The high common mode noise characteristic enabled by isolated channel inputs ensures stable measurements in a wide range of fields.

M4 Screw Input Terminals

Input terminals are the "entryways" through which all measurements enter a recorder. Their reliability is critical to stable data collection. Rugged M4 screw input terminals are used in all CX series recorders.

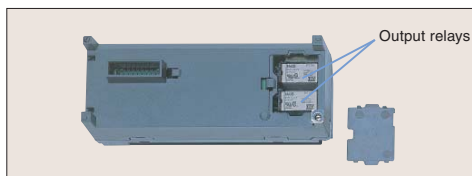


Compliance with Safety Standards and EMC Standards

Another indication of the reliability of CX series instruments is their compliance with the stringent specifications of the international safety and electromagnetic compatibility (EMC) standards. Of course, CX series instruments have also met CE standards.

Replacing Output Relays

Control output relays wear out over time, so the DAQSTATION CX is designed to make it easy to remove and attach the relays from the output module. This makes maintenance work and field replacements easier.



General Specifications

	CX1000	CX2000
Display	5.5-inch TFT color LCD	10.4-inch TFT color LCD
Control modes	Single loop control, cascade control, two-input switching control	
Control calculation functions	Continuous PID control, relay ON/OFF control, time-proportional PID control, overshoot control function (Super)	
PID control (embedded)	Control interval: 250, 500, 1000 ms Controlled points: 0, 2	0, 2, 4, 6
Monitoring	Measurement interval: 1 second, 2 seconds Measurement channels: 6 channels, 10 channels, 20 channels	
Control I/O specifications	Universal output: Select from the following: 4-20 mA current output / Voltage pulse / Transfer contact relay. DI: Contact input: 6 points/2 loops DO: Open collector transistor output: 4 points/2 loops Make contact relay output: 2 points/2 loops	
Communication interface	Ethernet: Standard feature RS422A/485 RS232: Optional (one only)	
External storage media	Floppy disks, ZIP disks, CompactFlash memory card	
Optional functions	Program setting function: Program patterns: 4 max (PG1) or 30 max (PG2) Segments: Max 99 per pattern, Total segments: 300 max Measurement alarm: /A6: 6 alarms only /A4F: 4 alarms, with fail output /A6R: 6 alarms, with remote /A4FR: 4 alarms, with fail output and remote Mathematical function: 12 channels /30 channels DIO expanded module: Contact inputs: 12 /30 channels VGA output: Can be specified /Can be specified 3-wire isolated RTD input: Can be specified /Can be specified 24 V DC/AC power supply: Can be specified /Can be specified 24 V DC transmitter power output: - /Can be specified Batch header: Can be specified /Can be specified	

Standard Specifications

- 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 DIC 16 edition 102)
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])
- CONTROL FUNCTIONS**
 - Control mode: Select from three control modes, i.e., single loop, cascade control, and loop control with PV switching.
(Note) The control mode is fixed to single loop control for loops 5 and 6.
 - Control computation functions: Continuous PID control, relay on/off control, time proportional PID control
- Setting Ranges of Control Parameters**
 - Proportional band: 0.1 to 999.9%
 - Integral time: 0 to 6000 sec
 - Derivative time: 0 to 6000 sec
 - 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 -5.1%).
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 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 x 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) and AUTO (automatic switching between 20 ms and 16.7 ms depending on the power supply frequency).
 - Control Input**
 - 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: -3000 to 30000, with a span smaller than 30000
Computation 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), and bias addition (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		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
TC		20 V	-20.00 to 20.00 V
		50 V	-50.00 to 50.00 V
		R ¹	0.0 to 1760.0°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
		E ¹	-200.0 to 800.0°C
		J ¹	-200.0 to 1100.0°C
		T ¹	-200.0 to 400.0°C
		N ¹	0.0 to 1300.0°C
RTD ⁵		W ¹	0.0 to 2315.0°C
		L ¹	-200.0 to 900.0°C
		U ¹	-200.0 to 400.0°C
		PLATINEL	0.0 to 1400.0°C
		PR40-20	0.0 to 1900.0°C
		W3ReW25Re	0.0 to 2400.0°C
		PH100 ⁴	-200.0 to 600.0°C
		JPH100 ⁴	-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% Re/W-26% Re (Hoskins Mfg. Co.), ASTM E988
³ L: Fe-CuNi, DIN43710, U: Cu-CuNi - DIN43710
⁴ PH100: JIS C1604-1987, IEC751-1995, DIN IEC751-1996
JPH100: JIS C1604-1989, JIS C1606-1989
⁵ Measuring current: I = 1 mA

Measurement Input
Measuring interval: 1 or 2 sec (2 sec, if the integral time of A/D converter is 100 ms)
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
TC		20 V	-20.00 to 20.00 V
		50 V	-50.00 to 50.00 V
		R ¹	0.0 to 1760.0°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
		E ¹	-200.0 to 800.0°C
		J ¹	-200.0 to 1100.0°C
		T ¹	-200.0 to 400.0°C
		N ¹	0.0 to 1300.0°C
RTD ⁵		W ¹	0.0 to 2315.0°C
		L ¹	-200.0 to 900.0°C
		U ¹	-200.0 to 400.0°C
		PLATINEL	0.0 to 1400.0°C
		PR40-20	0.0 to 1900.0°C
		W3ReW25Re	0.0 to 2400.0°C
		PH100 ⁴	-200.0 to 600.0°C
		JPH100 ⁴	-200.0 to 550.0°C
		DCV input	OFF: lower than 2.4 V ON: 2.4 V or higher
DI	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% Re/W-26% Re (Hoskins Mfg. Co.), ASTM E988
³ L: Fe-CuNi, DIN43710, U: Cu-CuNi - DIN43710
⁴ PH100: JIS C1604-1987, IEC751-1995, DIN IEC751-1996
JPH100: 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: -3000 to 30000
Square root scaling: Input ranges capable of scaling: DCV
Available range of scaling: -3000 to 30000
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.

SPECIFICATION

Style S3 Function

■ PV Math/SP Math Function

Math expression can be assigned to PV and SP of each loop
Type of computation:

Four arithmetic operations, square root, absolute value, common logarithm, exponential, power, relational operations (<, ≤, >, ≥, =, ≠), logic operations (AND, OR, NOT, XOR), statistical operations (average, Max. Min. Max.-Min.) conditional operations ([expression 1] ? expression 2 ? expression 3)
Note: conditional operators can be used with the other operands together

Available operands for arithmetic operations:

Measurement data, measurement math data, embedded/external control data, communication input data, constant W01-W36, control input data, control output DIO, expansion module DIO, measurement remote input, internal switch

Operation limitation: within 120 characters

Available operands in an expression: less than 35

In error case: Over/Under selection

Over: upper limit of PV/SP value
Under: lower limit of PV/SP value

■ Logic Math

Available number of operations: CX1000: up to 12
CX2000: up to 30

Operation type: Relational operations (<, ≤, >, ≥, =, ≠), logic operations (AND, OR, NOT, XOR), conditional operations([expression 1] ? expression 2 ? expression 3)

Note: conditional operators can be used with the other operands together Available operands in an expression: same as PV math/SP math operands

■ Internal SW

Number of available internal SW: CX1000: 18
CX2000: 36

Non-hold type only

■ Analog Retransmission

Output type: Current output (4-20 mA, 0-20 mA, 20-4 mA, 20-0 mA), time proportional voltage pulse output, time proportional relay output
Display/record: Data is recorded/displayed as out value
Note: The loop of analog retransmission mode is not available for PID control.

Available math operation: Same as PV math/SP math

Available operands: Same as PV math/SP math

■ Communication Function

CX PC-UT gateway function:
By using CX as gateway, UT parameters can be set from PC.

■ Program Control Function (PG1, PG2)

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

Switching among program patterns: A program pattern can be switched to another by means of contact input or CX operation.

Advance function: Forcibly moves the program to the next segment

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

Wait zone: 0.0 to 100.0% 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.

(ON/OFF)

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. per segment

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

Program event display

Group display: Up to 5 events and its name display

All display: All events display

All time events display: All time events and the some events name display

All PV event display: All PV events and the some events name display

Hardware

■ 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)
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/3 A or 30 V DC/3 A (resistive load)

■ Contact Input

Number of inputs: 6/2 loops
Voltage-free contact or open collector (TTL or transistor)
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

Input interval: 250, 500 or 1000 ms

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/s²

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/s²

Mechanical shock: 392 m/s² max. (when housed in a package)

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

■ Safety and EMC Standards

CSA: CSA22.2 No 1010-1 installation category II, pollution degree 2

UL: UL61010B-1 (CSA NRTL/C)

CE: EMC directive: EN61326 compliance (Emission: Class A, Immunity: Annex A)

EN61000-3-2 compliant

EN61000-3-3 compliant

EN55011 compliant, Class A Group 1

Low voltage directive: EN61010-1 compliant, measurement category II, pollution degree 2

C-Tick: AS/NZS 2064 compliant, Class A Group 1

■ Power Supply Section

Supply voltage: 100 to 110 V AC ±10% or 200 to 220 V AC ±10%

Supply frequency: 50 Hz ±2% or 60 Hz ±2%

Power consumption:	Supply Voltage	When LCD Saver Is On	When in Normal Operation	Maximum
CX2000	100 V AC	Approx. 43 VA	Approx. 45 VA	75 VA
	240 V AC	Approx. 62 VA	Approx. 65 VA	106 VA
CX1000	100 V AC	Approx. 20 VA	Approx. 23 VA	39 VA
	240 V AC	Approx. 29 VA	Approx. 32 VA	51 VA

■ Isolation

Insulation resistance: 20 MΩ 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 DC (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 DC (50/60 Hz), 1 min

Between transistor contact output terminal and ground: 500 V DC (50/60 Hz), 1 min

Grounding: JIS Class D

Standard Performance Data

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.

See the CX1000/CX2000 General Specifications documents (GS 04L31A01-02E) for complete product specifications.

Input Type	Range	Measurement Accuracy (Digital Readings)	Max. resolution of digital display
DC voltage (DCV)	20 mV	±(0.1% of rdg + 2 digits)	10 μV
	60 mV		10 μV
	200 mV		100 μV
	2 V		1 mV
	6 V		1 mV
	20 V		10 mV
Thermocouple (TC), excluding the accuracy of reference junction compensation	50 V	±(0.1% of rdg + 3 digits)	10 mV
	R	±(0.15% of rdg + 1°C), where R and S = ±3.7°C over 0 to 100°C and ±1.5°C over 100 to 300°C; B = ±2°C over 400 to 600°C, and is not guaranteed for temperatures below 400°C.	0.1°C
	S		
	K	±(0.15% of rdg + 0.7°C), where the accuracy is ±(0.15% of rdg + 1°C) over -200 to -100°C.	
	E	±(0.15% of rdg + 0.5°C)	
	J	±(0.15% of rdg + 0.5°C), where the accuracy is ±(0.15% of rdg + 0.7°C) over -200 to -100°C.	
Resistance temperature detector (RTD)	T	±(0.15% of rdg + 0.7°C)	
	N	±(0.15% of rdg + 1°C)	
	L	±(0.15% of rdg + 0.5°C), where the accuracy is ±(0.15% of rdg + 0.7°C) over -200 to 100°C.	
	U	±(0.15% of rdg + 2.5°C)	
	PLATINEL	0.0 to 1400.0°C	
	PR40-20	Not guaranteed over 0 to 450°C ±(0.9% of rdg + 16.0°C) over 450 to 750°C ±(0.9% of rdg + 6.0°C) over 750 to 1100°C ±(0.9% of rdg + 2.0°C) over 1100 to 1900°C	
W3ReW25Re	±(0.3% of rdg + 2.5°C)		
	P1100	±(0.15% of rdg + 0.3°C)	
	JPT100		

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°C for types R, S, B, W, PR40-20 and W3ReW25Re
±0.5°C for types K, J, E, T, N, L, U and PLATINEL (when measuring temperatures 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 5 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, 20 V, and 50 V DC voltage ranges

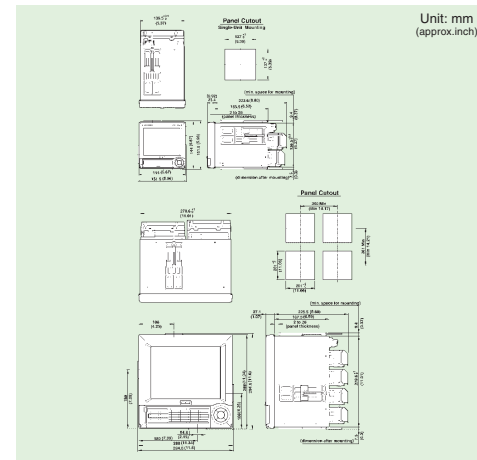
External input resistance: 2 kΩ max. for DCV and TC inputs
10 Ω max. per wire for RTD input (all three wires must have the same resistance)

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%)

Dimensions



The CX1000/CX2000 requires two brackets for panel mounting. Use them to mount the CX at two points: upper and lower or right and left ends. See "GS 04L31A01-01E" for the dimensions of the panel cutouts when the instruments are horizontally/vertically mounted without space between them. The tolerance is ± 3% (± 0.3 mm for less than 10 mm) unless otherwise specified. Weight: CX1000: 2.6 kg, CX1006: 3.0 kg, CX1200: 3.0 kg, CX1206: 3.1 kg, CX2000: 6.3 kg, (approximate) CX2010: 6.6 kg, CX2020: 7.0 kg, CX2200: 6.7 kg, CX2210: 6.9 kg, CX2220: 7.2 kg, CX2410: 7.1 kg, CX2420: 7.5 kg, CX2610: 7.4 kg, CX2620: 7.7 kg

Models and Suffix Codes

Model	Suffix Code	Option Code	Remarks
CX2000			
CX2000			DAQSTATION CX2000 (Embedded loop: 0 loop, Measurement channel: 0 ch)
CX2010			DAQSTATION CX2000 (Embedded loop: 0 loops, Measurement channel: 10 ch)
CX2020			DAQSTATION CX2000 (Embedded loop: 0 loops, Measurement channel: 20 ch)
CX2200			DAQSTATION CX2000 (Embedded loop: 2 loops, Measurement channel: 0 ch)
CX2210			DAQSTATION CX2000 (Embedded loop: 2 loops, Measurement channel: 10 ch)
CX2220			DAQSTATION CX2000 (Embedded loop: 2 loops, Measurement channel: 20 ch)
CX2410			DAQSTATION CX2000 (Embedded loop: 4 loops, Measurement channel: 10 ch)
CX2420			DAQSTATION CX2000 (Embedded loop: 4 loops, Measurement channel: 20 ch)
CX2610			DAQSTATION CX2000 (Embedded loop: 6 loops, Measurement channel: 10 ch)
CX2620			DAQSTATION CX2000 (Embedded loop: 6 loops, Measurement channel: 20 ch)
External storage medium	-1		3.5 in. floppy disk drive
	-3		CompactFlash memory card (CF + Adapter)
	-5		250 MB Zip disk drive provided with medium
Communication port	-0		Ethernet only
	-1		Ethernet, RS-232C communication interface
	-2		Ethernet, RS-422A/485 communication interface
Language		-2	English/Germany/French/deg summer/winter time
Option	/A6		Measurement alarm (6 DO) *
	/A6F		Measurement alarm (6 DO, 6 DI) *
	/A4F		Measurement alarm (4 DO, FAIL/Memory end detection and output) *
	/A4FR		Measurement alarm (4 DO, 8 DI, FAIL/Memory end detection and output) *
	/BT1		Batch header function
	/CST1		Control-purpose extension DIO (12 DI, 12 DO terminals) *
	/D5		VGA output
	/M1		Computation functions (including report functions)
	/N2		Three legs isolated RTD *
	/P1		24 V DC/AC power supply
	/TPS4		24 V DC transmitter power supply (4 loops) *
	/PG1		Program control (number of program patterns: 4) *
	/PG2		Program control (number of program patterns: 30) *

CX1000

Model	Suffix Code	Option Code	Remarks
CX1000			DAQSTATION CX1000 (Embedded loops: 0 loop, Measurement channels: 0ch)
CX1006			DAQSTATION CX1000 (Embedded loops: 0 loop, Measurement channels: 6ch)
CX1200			DAQSTATION CX1000 (Embedded loops: 2 loops, Measurement channels: 6ch)
CX1206			DAQSTATION CX1000 (Embedded loops: 2 loops, Measurement channels: 6ch)
External storage medium	-1		3.5 in. floppy disk drive
	-3		CompactFlash memory card (CF + Adapter)
	-5		250 MB Zip disk drive provided with medium
Communication port	-0		Ethernet only
	-1		Ethernet, RS-232C communication interface
	-2		Ethernet, RS-422A/485 communication interface
Language		-2	English
Option	/A6		Measurement alarm (DO 6) *
	/A6F		Measurement alarm (DO 6, DI 8) *
	/A4F		Measurement alarm (DO 4, FAIL/Memory end detection and output) *
	/A4FR		Measurement alarm (DO 4, DI 8, FAIL/Memory end detection and output) *
	/BT1		Batch header function
	/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) *
	/PG2		Program control (number of program patterns: 30) *

* There is limitation to specify these options; please refer General specification for the detail.

Accessories

Optional Accessories

Product	Model (Part No.)	Specification
Shunt resistor for standard screw terminals	415920	250Ω±0.1%
	415921	100Ω±0.1%
	415922	10Ω±0.1%
3.5-inch floppy disk	705900	2 HD(10 units)
Zip disk	A1056MP	250 MB
CompactFlash memory card (CF + Adapter)	B9968NL	32 MB or more
Mounting bracket	B9900BX	-

Related Products

Green Series Digital Indicating Controllers

Includes the "Super" overshoot control function and "Super 2" hunting control function.

- ◆ UT550 includes eight controller modes, such as cascade control.
- ◆ UT750 also provides two-loop control and custom calculations.



UT550

UT750

DAQSTATION DX100/DX200

The data acquisition and recording stations have state-of-the-art networking functions.



- ◆ 10Base-T Ethernet support is a standard feature.
- ◆ A wide-viewing-angle, high-resolution TFT color LCD panel
- ◆ Storage medium (floppy discs, ZIP, Compact flash memory card (CF + Adapter))
- ◆ IEC529-IP65 standard to keep out dust, grit and water spray

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NOTICE

- Before operating the product, read the instruction manual thoroughly for proper and safe operation.
- If this product is for use with a system requiring safeguards that directly involve personnel safety, please contact the Yokogawa sales offices.

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