General Specifications

FX100

GS 04L20A01-00E

■ OVERVIEW

FX100 displays real-time measurement data on TFT color LCD and saves the data in external media (3.5" FD or Flash memory card) or FTP server. It comes with a three, six or twelve-channel. As the input signal, a DC voltage, thermocouple, resistance temperature detector, or contact signal can be set to each channel.

■ Standard Specifications

Construction

Dimensions: 144(W) × 144(H) × 234(D) mm
Weight: FX1xx–0: approx. 2.2 kg
FX1xx–1: approx. 2.5 kg
FX1xx–4: approx. 2.3 kg
Front panel: Water and dust-proof (based on IEC529-IP65)

Inputs

Number of inputs:
FX103: 3 channels
FX106: 6 channels
FX112: 12 channels
Measurement interval:
FX103: 250 ms
FX106, FX112: 1 s/2 s
Inputs: VDC (DC voltage), TC (thermocouple), RTD (resistance temperature detector), DI (digital input for event recording), DCA (DC current with external shunt resistor attached)

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	
	50 V	–50.00 to 50.00 V	
TC	R *1	0.0 to 1760.0°C	32 to 3200.0°F
	S *1	0.0 to 1760.0°C	32 to 3200.0°F
	B *1	0.0 to 1820.0°C	32 to 3308.0°F
	K *1	–200.0 to 1370.0°C	–328 to 2498.0°F
	E *1	–200.0 to 800.0°C	–328.0 to 1472.0°F
	J *1	–200.0 to 1100.0°C	–328.0 to 2012.0°F
	T *1	–200.0 to 400.0°C	–328.0 to 752.0°F
	N *1	0.0 to 1300.0°C	32 to 2372.0°F
	W *2	0.0 to 2315.0°C	–328.0 to 4199.0°F
	L *3	–200.0 to 900.0°C	–328.0 to 1652.0°F
	U *3	–200.0 to 400.0°C	–328.0 to 752.0°F
	WRe*4	0.0 to 2400.0°C	32 to 4352.0°F
RTD	Pt100 *5	–200.0 to 600.0°C	–328.0 to 1112.0°F
	JPt100 *5	–200.0 to 550.0°C	–328.0 to 1022.0°F
	Pt1000 (Option)*6	–200.0 to 600.0°C	–328.0 to 1112.0°F
DI	DCV Input	OFF: Less than 2.4 V, ON: More than 2.4 V	
	Contact Inputs	Contact Input ON/OFF	

*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: WRe: W–3% Re/W–25% Re (Hoskins Mfg. Co.)
*5: Pt100: JIS C1604-1997, IEC751-1995, DIN IEC751-1996, JPt100: JIS C1604-1989, JIS C1606-1989, Measuring current: i=1 mA
*6: Measuring current: i=0.16 mA

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Inputs terminal: Clamp terminals (clamp connector), detachable terminal connector
Allowable wire size: 0.2 to 2.5 mm2 (AWG24-12)
Integral time of A/D converter:
20 ms (50 Hz), 16.7 ms (60 Hz), 100 ms (50/60 Hz, for FX106 and FX112)
AUTO selectable (automatic selection by detection of power supply frequency from 20 ms, 16.7 ms)
Themoccouple Burnout:
Burnout upscale/downscale function can be switched on/off (for each channel).
Burnout upscale/downscale selectable
Burnout condition:
Normal: less than 2 kΩ
Burnout: more than 100 kΩ
(parallel capacity: less than or equal to 0.1μF)
Current: Approximately 10μA
Filter function:
FX103: On/off selectable for each channel
Time constant: selectable from 2, 5, and10 seconds
FX106, FX112: Moving average on/off selectable for each channel, moving average cycles 2 to 16 selectable
Calculation: Differential computation, linear scaling, square root

Display

Display unit: 5.5-inch TFT color LCD (320 × 240 pixels)
Waveform span rate:
FX103: 15, 30 sec., 1, 2, 5, 10, 15, 20, 30 min., 1, 2, 4, 10 hours/div selectable
FX106, FX112:
1, 2, 5, 10, 15, 20, 30 min., 1, 2, 4, 10 hours/div selectable
LCD back light saver function:
Automatically dims or light out if no key is touched for a certain preset time
Timer setpoint:
1, 2, 5, 10, 30 or 60 min
Temperature unit:
°C or °F selectable
Language: English, French and German selectable

Data Saving Function

Internal memory:
Flash memory (1.2M)
External storage medium:
Selectable from: 1) None
2) 3.5-inch floppy disk (2HD, 1.44 MB)
3) Compact flash memory card (32 to 512 MB)
Saving method: Manual or automatic selectable
Measurement data files:
Display data and event data
Data saving period:
Display data file:
Linked with the waveform span rate
Event file: Linked with the specified sampling period
Event File sampling period:
FX103: Selectable from 250, 500 ms, and 1, 2, 5, 10, 30, 60, 120, 300, 600 s
FX106, FX112:
Selectable from 1, 2, 5, 10, 30, 60, 120, 300, and 600 s

Alarm Function

Number of alarm levels:
Up to four levels for each channel
Alarm types: High and low limits, differential high and low limits, high and low rate-of-change limits and delay high and low
Interval time of rate-of-change alarms:
The measurement interval times 1 to 15
Display: The alarm status (type) is displayed in the digital value display area upon occurrence of an alarm. A common alarm indication is also displayed.
The alarming behavior:
Non-hold or hold-type can be selectable for common to all channels.
Hysteresis: On (0.5% of display span) /off selectable (common to all channels and alarm levels)
Outputs: Number of points: 2, 4, or 6 points (optional)
Relay action: Energized/deenergized and hold/non-hold selectable.
Memory: The times of alarm occurrences/recoveries, alarm types, etc. are stored in the memory. (Up to 120 latest alarm events are stored.)

Normal Operating Conditions

Ambient temperature:
0 to 50°C (when using FDD: 0 to 40°C)
Ambient humidity:
20% to 80% RH (at 0 to 40°C)
10% to 50 % RH (at 40 to 50°C)
Vibration: 10 to 60 Hz, 0.2 m/s^2 or less
Shock: Not acceptable
Magnetic field: 400 AT/m or less (DC and 50/60 Hz)
Noise:
Normal mode (50/60 Hz):
VDC: The peak value including the signal must be less than 1.2 times the measuring range.
TC: The peak value including the signal must be less than 1.2 times the measuring thermal electromotive force.
RTD: 100 mV or less
Common mode noise voltage (50/60 Hz):
250 V AC rms or less for all ranges
Maximum noise voltage between channels (50/60 Hz):
250 V AC rms or less
Warm-up time: At least 30 min after power on

Transport and Storage Conditions

Ambient temperature:
–25°C to 60°C
Humidity: 5% to 95% RH (No condensation is allowed)
Vibration: 10 to 60 Hz, 4.9 m/s^2 maximum
Shock: 392 m/s^2 maximum (while being packed)

Safety and EMC Standards

CSA: CSA22.2 No1010.1 installation category II*1, pollution degree 2*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
EN55011compliant, Class A Group 1

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Low voltage directive:
EN61010-1 compliant, measurement category II*3, pollution degree 2*2
C-Tick: AS/NZS 2064 compliant, Class A Group 1

*1: Installation Category (Overvoltage Category) II
Describes a number which defines a transient overvoltage condition. It implies the regulation for impulse withstand voltage. “II” applies to electrical equipment which is supplied from fixed installations like distribution boards.

*2: Pollution Degree
Describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. “2” applies to normal indoor atmosphere. Normally, only non-conductive pollution occurs.

*3: Measurement Category II
Applies to measuring circuits connected to low voltage installation, and electrical instruments supplied with power from fixed equipment such as electric switchboards.

Power Supply

Rated power supply:
100 to 240 VAC (automatic switching)
Allowable power supply voltage range:
90 to 132 or 180 to 264 VAC
Rated power supply frequency:
50/60 Hz (automatic switching)
Power consumption:

Supply voltage	LCD save mode	Normal	Max.
100 VAC	10 VA	14 VA	25 VA
240 VAC	18 VA	22 VA	35 VA

Insulation resistance:
Each terminal to ground terminal:
20 MΩ or greater (at 500 VDC)
Dielectric strength:
Power supply to ground terminal:
2300 VAC (50/60 Hz), 1 min
Contact output terminal to ground terminal:
1600 VAC (50/60 Hz), 1 min
Measuring input terminal to ground terminal:
1500 VAC (50/60 Hz), 1 min
Between measuring input terminals:
1000 VAC (50/60 Hz), 1 min (except for b terminal of RTD input of non-isolated)
Between remote control terminal to ground terminal:
1000 VDC, 1 min
Pulse input terminal to ground terminal:
1000 VDC, 1 min

Standard Performance

Measuring and Recording Accuracy:
The following specifications apply to operation of the recorder under standard operation conditions.
Temperature: 23±2°C, Humidity : 55% ±10% RH, Power supply voltage : 90 to 132 or 180 to 250 VAC,
Power supply frequency:
50/60 Hz ±1%, Warm-up time : At least 30 min.
Other ambient conditions such as vibration should not adversely affect recorder operation.

Input Type	Range	Measurement accuracy (digital display)	Max. resolution of digital display
DC voltage (DCV)	20 mV	± (0.1% of rdg + 2digits)	10µV
	60 mV		10µV
	200 mV		100µV
	2 V		1 mV
	6 V		1 mV
	20 V		10 mV
	50V	± (0.1% of rdg + 3digits)	10 mV
Thermocouple (TC)- Excluding the reference junction compensation accuracy)	R	±(0.15% of rdg + 1°C)	0.1°C
	S	However, R, S: ±3.7°C at 0 to 100°C, ±1.5°C at 100 to 300°C	
	B	B: ±2°C at 400 to 600°C (Accuracy at less than 400°C is not guaranteed.)	
	K	±(0.15% of rdg + 0.7°C) However, ±(0.15% of rdg + 1°C) at –200 to –100°C	
	E	±(0.15% of rdg + 0.5°C) However, ±(0.15% of rdg + 0.7°C) at -200 to -100°C	
	J		
	T		
	N	±(0.15% of rdg + 0.7°C)	
	W	±(0.15% of rdg + 1°C)	
	L	±(0.15% of rdg + 0.5°C) However, ±(0.15% of rdg + 0.7°C) at –200 to –100°C	
	U		
	WRe	±(0.2% of rdg + 1.0°C)	
RTD	Pt100	±(0.15% of rdg + 0.3°C)	
	JPt100		
	Pt1000 (option)	±(0.2% of rdg + 0.4°C)	

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Measurement accuracy in case of scaling (digits):
= measurement accuracy (digits) × scaling span (digits)/measurement span (digits) + 2 digits
Decimals are rounded off to the next highest number.
Reference junction compensation:
INT (internal)/EXT (external) selectable (common for all channels)
Reference junction compensation accuracy
(above 0°C, in balance of input terminal temperature: more than 60 minutes after application of power):
Types R, S, B, W, WRe: ±1.0°C
Types K, J, E, T, N, L, U: ±0.5°C
Note: Internal reference junction compensation accuracy for type B is fixed to 0 °C

Maximum allowable input voltage:
±10 VDC (continuous) for less than 200mVDC ranges and TC, RTD, DI ranges
±60 VDC (continuous) for except above ranges
Input resistance:
Approximately 10 MΩ or more for DCV ranges of 200 mVDC or less and TC
Approximately 1 MΩ for more than 2 VDC ranges
Input source resistance:
VDC, TC: 2 kΩ or less
RTD: 10 Ω or less per wire (The resistance of all three wires must be equal.)
RTD parallel capacity:
0.01 µF or less
Input bias current:
10 nA or less
Maximum common mode voltage:
±60VDC (under measurement category II)
However, maximum common mode voltage that meets the rejection ratio is 250 VrmsAC (50/60Hz)
Maximum common mode voltage between channels:
250 VAC rms (50/60 Hz)
Interference between channels:
120 dB (the input source resistance: 500 Ω the inputs to other channels: 30 V)
Common mode rejection ratio:
120 dB (50/60 Hz ± 0.1%, 500 Ω imbalance between the minus terminal and ground)
Normal mode rejection ratio:
40 dB (50/60 Hz ± 0.1%)

Effects on Operating Conditions

Ambient temperature: With temperature variation of 10°C
For VDC and TC range:
±(0.1% of rdg + 1 digit) or less
For RTD inputs:
±(0.1% of rdg + 2 digits) or less
Power supply: With variation within 90 to 132 V and 180 to 250 VAC (50/60 Hz):
±1 digit or less
With variation of ±2 Hz from rated power frequency (at 100 VAC): ±(0.1% of rdg + 1 digit) or less
Magnetic field: AC (50/60 Hz) and DC 400 A/m fields:
±(0.1% of rdg + 10 digits) or less
Input source resistance: With variation of +1 kΩ
(1) VDC range:
Ranges of 200 mV or less: within ±10 µV
Ranges of 2 V or greater:
approximately ±0.1% of rdg
(2) TC range: Within ±10 µV (±100 µV when the burnout upscale/downscale function is switched on)
(3) RTD range (Pt100):
With variation of 10 Ω per wire (resistance of all three wires must be equal): ±(0.1% of rdg + 1 digit)
With maximum difference of 40 mΩ between wires:
Approximately 0.1°C

Other Specifications

Clock: With calendar function (year of grace)
The time can be adjusted by a remote contact (with the remote option).
Summer/winter time:
Summer and wintertime can be set.
Accuracy of clock:
±100 ppm, excluding a delay (of 1 second, maximum) caused each time the power is turned on.
Memory backup:
A built-in lithium battery backs up the setup parameters (battery life: approximately ten years at room temperature).
Key lock function:
ON/OFF and password can be set.
Log in function:
Power on with log out mode and all key operations are not permitted.
“User name”, “User ID” and “password” are required to enter the operation mode.
And key lock by password can be set to prevent to change settings.

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■ SPECIFICATIONS OF OPTIONAL FUNCTIONS

Alarm Output Relays (/A1, /A2, /A3):

Outputs: Number of outputs: 2, 4, 6 points
An alarm signal is output from the rear panel as a relay contact signal.
Relay contact rating:
250 VDC/0.1 A (for resistance load) 250 VAC (50/60 Hz)/3 A
Terminal configuration:
SPDT (NO-C-NC). Energized-at-alarm/ deenergized-at-alarm, AND/OR, and hold/ non-hold actions are selectable.

Serial Communication Interface (/C2, /C3):

Allows the host computer to control and make settings for the recorder as well as receive data from the recorder.
Connection: EIA RS-232 (/C2) or RS-422-A/485 (/C3)
Protocols: YOKOGAWA private protocol, Modbus protocol
Synchronization method:
Start-stop asynchronous transmission
Connection method (RS-422-A/485):
4-wire half-duplex multi-drop connection (1: N where N = 1 to 32)
Transmission speed:
1200, 2400, 4800, 9600, 19200 or 38400 bps
Data length: 7 or 8 bits
Stop bit: 1 bit
Parity: Odd, even, or none
Communication distance (RS-422-A/485):
Up to 1.2 km
Communication mode:
ASCII for input/output for control and setting
ASCII or binary for output of measured data
Modbus communication:
Operation mode: RTU MASTER or RTU SLAVE

Ethernet Communication (/C7)

Connection: Ethernet (10BASE-T)
Protocols: SMTP, HTTP1.0, FTP, TCP, UDP, IP, ARP, ICMP
E-mail inform function:
Kinds of inform:
The following information can be informed by E-mail, selectable from inform/misinform for each group
Alarm inform:
Informs in occurring alarm/canceling alarm
System inform:
Informs in recovering power failure/informs the time of recovering, informs the rest of time before rewriting on Inside memory (manual save mode) informs the rest of amount in reaching 90% of media volume and media error (auto save mode)
Schedule time inform: Inform the moment value at a certain time or interval
Report inform: Inform report data in report timeup
Web server function:
Displays an image, alarm information, and moment values of FX screen by browser soft.
Enables message input from browser screen.
FTP client function:
File auto-transfer from FX (display data file, event file, report file, and snapshot)
FTP server function:
Manual-transfer of file in the outside media from host computer, directory operation, information of file elimination and of rest of amount of memory in media
Real time monitoring function:
Real time monitoring FX data by communication (Yokogawa private protocol)

Fail/Memory End Output (/F1):

The relay contact output in following cases
System Error: Relay output in occurrence of system alarm
Manual save mode:
Relay output before the specified time of overwriting inside memory
Selectable from 1, 2, 5, 10, 20, 50, or 100 hours
Auto save mode:
Relay output when the amount of memory media reaches 90%
Relay contact rating:
250 VDC/0.1 A (for resistance load) 250 VAC (50/60 Hz)/3 A

Mathematical Functions (/M1):

Displays and records computed data assigned to channels
Number of computed data assignable channels:
Up to 12 channels
Type of computation:
General arithmetic operations:
Four arithmetic operations, square root, absolute, common logarithm, exponential, power, relational operations ($<$, $\leqq$, $>$, $\geqq$, $=$, $\neq$), logic operations (AND, OR, NOT, XOR)
Statistical operations:
Average, maximum, minimum and summation
Long tern rolling average computation:
is performed on the results of computation
Constant: Available (Up to 30 constants)
Digital data input via communication:
Digital data via communication can be used in mathematical expression (Up to 12 data)
Remote status input:
Remote input status (0/1) can be used in mathematical expression (Up to 8 inputs)
Report functions:
Report type: Hourly, daily, hourly + daily, daily + weekly and daily + monthly
Type of computation:
Average, maximum, minimum and summation
Data format: ASCII

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3 legs Isolated RTD Input (/N2):

A, B, b legs are of isolated input type.
/N2 can be specified only for FX106 and FX112.
A, B, b legs of FX103 is isolated as standard.

Pt1000 input (/N3):

Measuring ranges, measurement accuracy, and resolution of digital display:
See table of Input and standard performance.

24 VDC/AC Power Supply (/P1):

Rated power supply:
24 VDC or 24VAC (50/60 Hz)
Allowable power supply voltage range:
24 VDC: 21.6 - 26.4 VDC
24 VAC: 21.6 - 26.4 VAC
Power consumption:

Supply voltage	Backlight saving mode	Normal	Max.
24 VDC	7 VA	11 VA	17 VA
24 VAC (50/60 Hz)	13 VA	19 VA	30 VA

Insulation resistance:
Power supply to ground terminal 20MΩ or more (500 VDC)
Dielectric strength:
Power supply to ground terminal 500 VAC (50/60 Hz) for one minute.
Others: Fixed to 20 ms on /P1 models that use the 24 VDC power supply.

Pulse input mathematic function (/PM1)

Number of inputs:
3 points (8 points are available in case of using remote inputs)
Max. sampling pulse period:
Max.100 Hz
Minimum pulse length:
5 ms
Allowed input voltage:
30 VDC
Pulse measuring accuracy:
±1pulse (for instantaneous mode)
Measuring mode:
Instantaneous mode setting:
Pulse count during measuring period
Summation mode setting:
Pulse count summation by mathematical function (TLOG.SUM)

Remote Control (/R1):

Number of remote inputs: 8 points
Input format:Photocoupler isolation
Isolated power supply for input terminals shared common
This option allows the following eight functions to be controlled remotely by a contact input:
- Start/stop of memory (level)
- Trigger for event file (trigger, 250 ms or longer)
- Time adjustment (adjusting the time to a preset time upon contact signal, trigger, 250 ms or longer)
- Start/stop of computation (level)
- Reset of computation data (trigger, 250 ms or longer)
- Manual data sample (trigger, 250 ms or longer)
- Message display (Up to 8 different messages can be set, trigger, 250 ms or longer)
- Load of setting parameters *(Up to 3 settings can be set, trigger, and 250 ms or longer except for non-media model)
- Alarm acknowledgement (trigger, 250 ms or longer)
- Snapshot (trigger, 250 ms or longer)

*: Load of setting parameters is not be available for non-media model.

■ APPLICATION SOFTWARE

DAQSTANDARD

Operating environment
OS: Microsoft Windows 2000/XP/Vista*
*Home Premium and Business (except for 64 bits version)
Processor:Pentium III 600 MHz or higher (Windows 2000/XP)
Pentium 4 3 GHz or higher (Windows Vista)
Memory: 32 MB or more (Windows 2000/XP)
2 GB or more (Windows Vista)
Hard disk: Free area of at least 100 MB
Display card:
Compatible with Windows 2000/XP/Vista
Configuration software:
Setting mode:
Configuration of setting mode and basic setting mode
Configuration via communication:
Configuration of setting mode and basic setting mode without communication configuration (ex. IP address)
Data viewer software:
Number of display channels:
32 channels per group, 50 groups maximum
Viewer function
Waveform display, digital display, circular display, list display, report display etc.
Data conversion:
File conversion to ASCII, Lotus 1-2-3 or MS-Excel format

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■ Model Code

Model	Suffix code		Optioncode	Description
FX103				FX100 (3ch)
FX106				FX100 (6ch)
FX112				FX100 (12ch)
External memory	**–0**			None
	–1			FDD (3.5 inch, 1.44MB)
	–4			Compact flash memory card (128MB)
Display Language		**–2**		English (German/French)
Option			**/A1**	Alarm output 2 points *1
			/A2	Alarm output 4 points *1
			/A3	Alarm output 6 points *1
			/C2	RS-232 communication interface (including Modbus master/slave protocol function) *2*3
			/C3	RS-422-A/485 communication interface (including Modbus master/slave protocol function) *2*3
			/C7	Ethernet (10BASE-T) communication interface
			/F1	FAIL/memory end output *4
			/M1	Mathematical function (with report function)
			/N2	3 legs isolated RTD
			/N3	Pt1000Ω input
			/P1	24 VDC/AC Power Supply
			/PM1	Pulse input 3 points, control input 5 points (including Mathematical function) *5
			/R1	Remote control 8 points

*1: /A1, /A2, /A3 cannot be specified together.
*2: /C2, /C3 cannot be specified together.
*3: In case that Modbus master function is utilized, /M1 or /PM1 must be specified.
*4: If /F1 is specified, /A3 cannot be specified.
*5: If /PM1 is specified, each /A3, /R1, /M1 cannot be specified.
If /PM1 is specified, /A2 and /F1 cannot be specified together.

■ Application Software

Model code	Description	OS
FXA100-02	DAQSTANDARD	Windows 2000/XP/Vista

■ Standard Accessories

Product	Quantity
Mounting brackets	2
Terminal screw	3
Operation Manual	1
User's Manual, CD-ROM	1
DAQSTANDARD, CD-ROM	1 *1
CF card, 128 MB	1 *2

*1: For a model with no communication port and no external memory, DAQSTANDARD is not attatched.
*2: Only for FX1xx-4 model

■ Optional Accessories

Product	Model	Specification
Shunt resister (Clamp module)	4389 20	250Ω ± 0.1%
	4389 21	100Ω ± 0.1%
	4389 22	10Ω ± 0.1%
CF card	772091	128 MB
	772092	256 MB
	772093	512 MB
	772094	1GB
Mounting bracket	B9900BX	–

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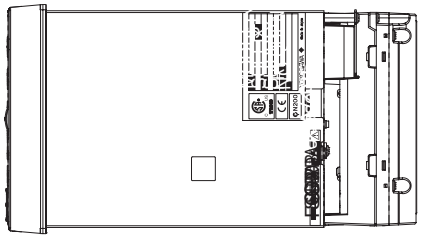
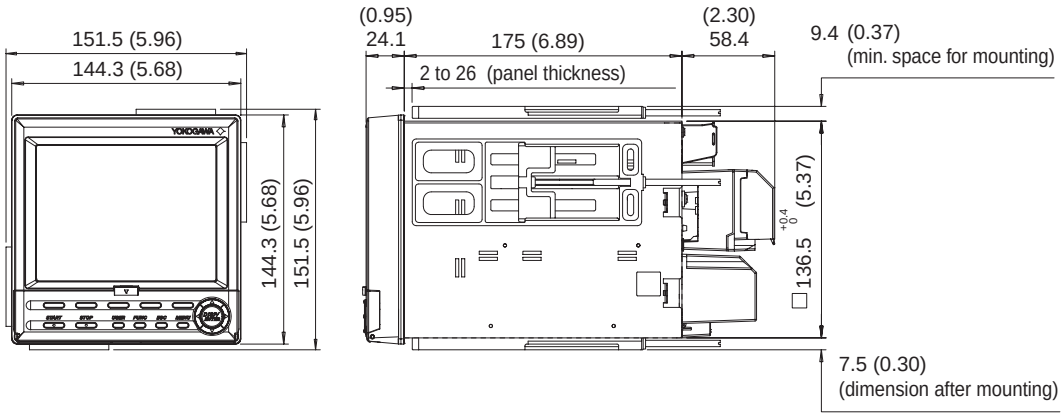
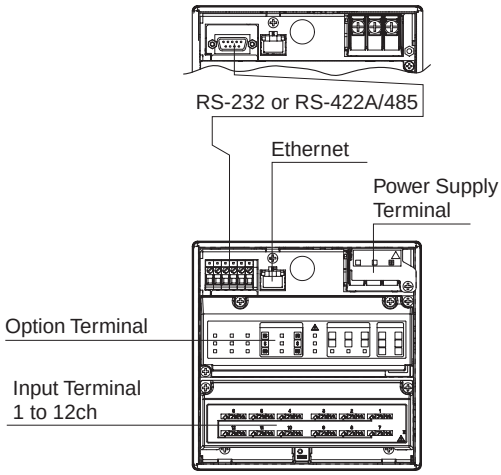
■ Dimensions

Unit : mm
(approx. inch)







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