General Specifications

PC-Based Data Acquisition Unit
MX100

GS 04M08B01-00E

■ Product Overview

The MX100 is a data acquisition unit designed to operate as a front end for PCs. Data measured by the MX100 is transferred to PCs in real-time.

Based on the concept of achieving higher performance and increased ease of use, the MX100 provides the following features:

High speed/multi-channel/high withstand voltage:
- Shortest measurement interval of 10 ms (High speed measurement of 24 channels/ 10 ms or 60 channels/100 ms are enabled. If a single unit consists of MX115-Dxx-H10 modules only, 60 channel/10 ms measurement is possible.)
- Possible to acquire data of up to 1,200 channels (when software developed by Yokogawa Electric Corporation is used)
- Reinforced insulation between the input terminal and the case when using the MX110-UNV-H04, MX110-UNV-M10, or MX110-V4R-M06
  3700 Vrms (one minute), 600 Vrms/VDC (continuous)

Multi-interval: Mixed use of three types of measurement intervals is enabled within the system (measurement intervals are set for each module).

Flexibility in building a system: A system can be flexibly built or changed between from 4 to 1,200 channels and the measurement intervals of 10 ms-60 s according to module configurations.

Variety of inputs/outputs:
The following signals can be input/output using combinations of the input/output modules.
- Types of input
  DCV (DC voltage), TC (thermocouple), 3-wire RTD (resistance temperature detector),
  4-wire RTD, DI (non-voltage contact , open collector, level), strain, resistance
- Types of output
  Contact, DC voltage, DC current, PWM (pulse width modulation)

Adaptability to any type of PC-based measurement environment:
Software developed by Yokogawa, API, and LabVIEW driver are available.

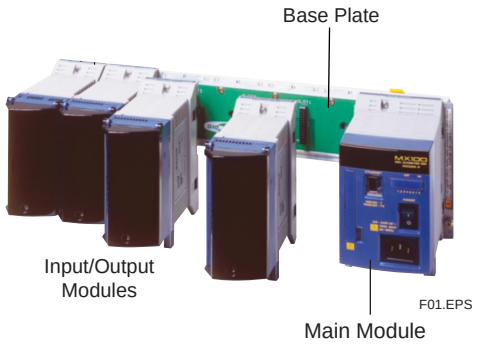
Easy to setup: PC software developed by Yokogawa strongly supports setting up the network with ease.

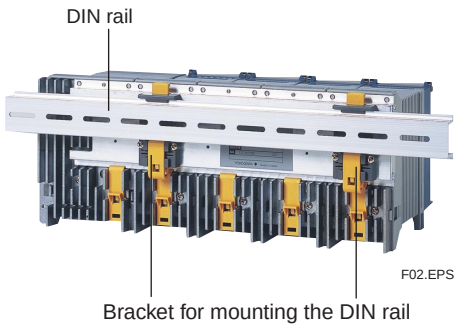
No re-wiring between measurements:
A removable terminal unit is available.

Inclusion of the CF card slot: Measured values are backed up automatically in case of a communication failure.

■ Equipment Configuration

MX is designed to enable desired measurement environments in a combination of three elements: main module, input/output module, and base plate. The assembled unit can be utilized for desktop use as it is (modules have legs on their bases). Note that DIN rails are used for the rack mount.





The DIN rail can be easily mounted using the dedicated brackets. Two brackets are provided as standard devices of the base plate (MX150).

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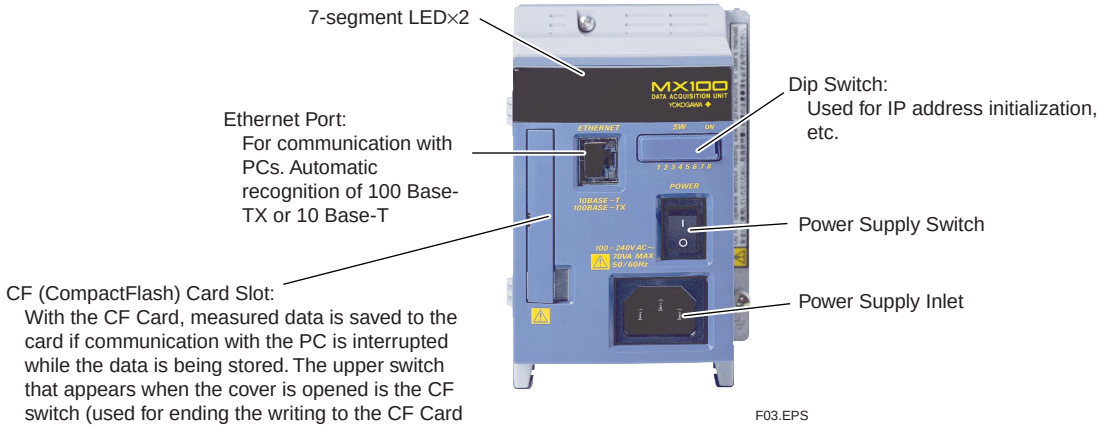
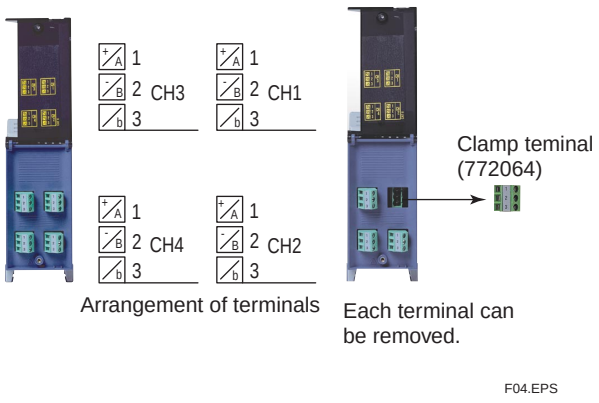
<Main Module> MX100

The main module is the engine to control data acquisition. It is equipped with a power supply, an Ethernet port, a CompactFlash card slot, etc. One main module has up to six input/output modules. As long as six or less modules are used, the user can choose their types and quantity arbitrarily.

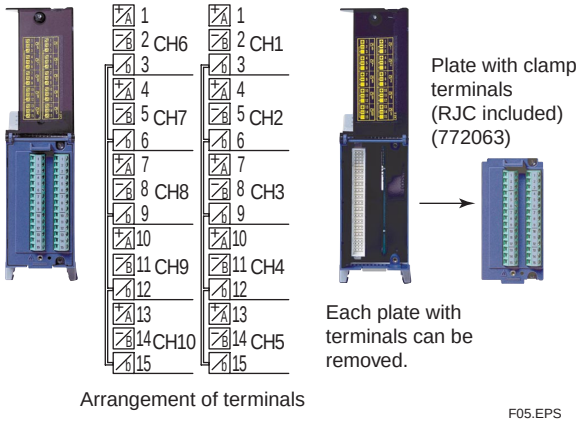


<Input/Output Module> MX110, MX112, MX115, MX120, MX125

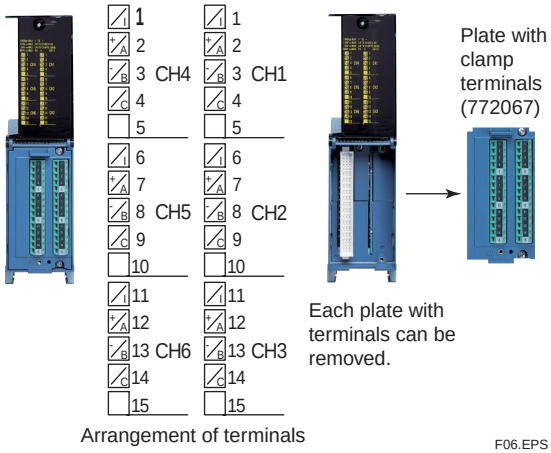
• Four-Channel High-Speed Universal Input Module (MX110-UNV-H04)



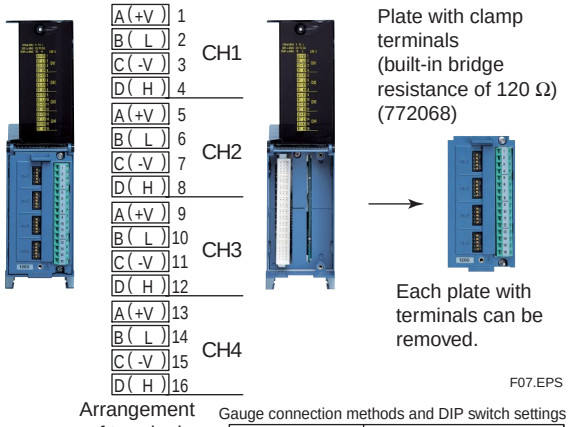
• Ten-Channel Medium-Speed Universal Input Module (MX110-UNV-M10)



• Six-Channel Medium-Speed 4-Wire RTD and Resistance Input Module (MX110-V4R-M06)



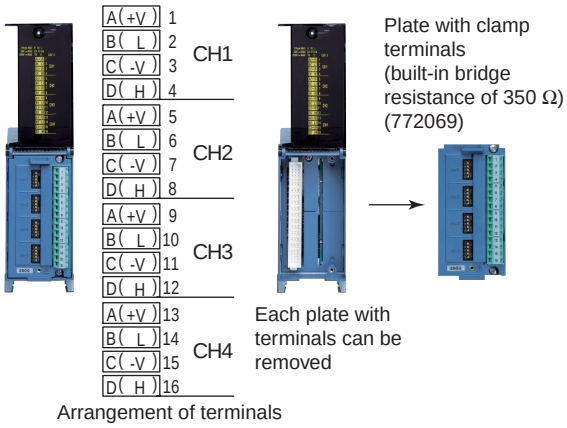
• Four-Channel Medium-Speed Strain Input Module (built-in bridge resistance of 120 Ω) (MX112-B12-M04)



Gauge connection methods and DIP switch settings

Gauge connection methods	Switch settings				
	No.1	No.2	No.3	No.4	No.5
Single-gauge (2-wire)	ON	ON	ON	OFF	OFF
Single-gauge (3-wire)	ON	ON	OFF	ON	OFF
Adjacent-side two-gauge	ON	ON	OFF	OFF	ON
Opposed-side two-gauge	ON	OFF	ON	OFF	ON
Four-gauge	OFF	OFF	OFF	OFF	ON

• **Four-Channel Medium-Speed Strain Input Module (built-in bridge resistance of 350 Ω) (MX112-B35-M04)**



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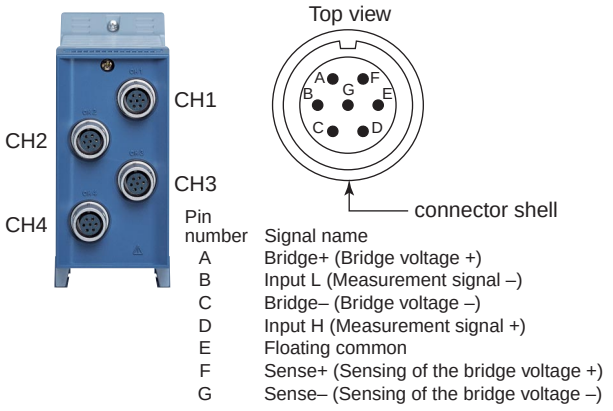
• **Four-Channel Medium-Speed Strain Input Module (For connection with an external bridge head and strain gauge type sensor, NDIS connector) (MX112-NDI-M04)**



Pin number	Signal name
A	Bridge+ (Bridge voltage +)
B	Input L (Measurement signal –)
C	Bridge– (Bridge voltage –)
D	Input H (Measurement signal +)
E	Floating common
F	Sense+ (Sensing of the bridge voltage +)
G	Sense– (Sensing of the bridge voltage –)

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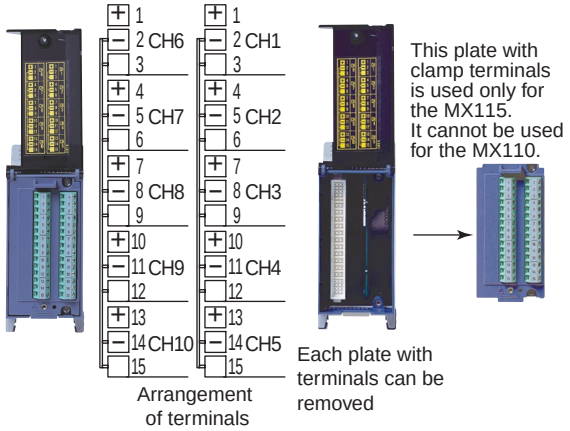
• **Ten-Channel High-Speed 5 V Digital Input Module (MX115-D05-H10)**



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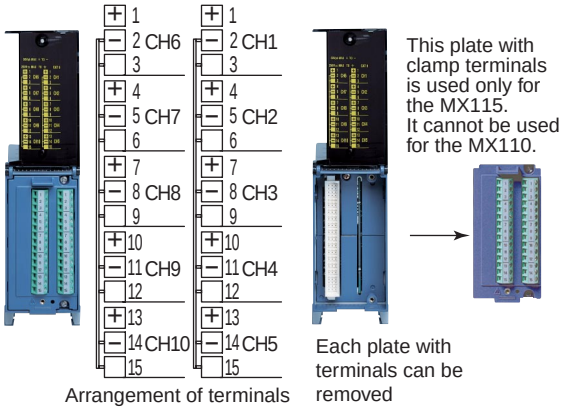
• **Ten-Channel High-Speed 24 V Digital Input Module (MX115-D24-H10)**



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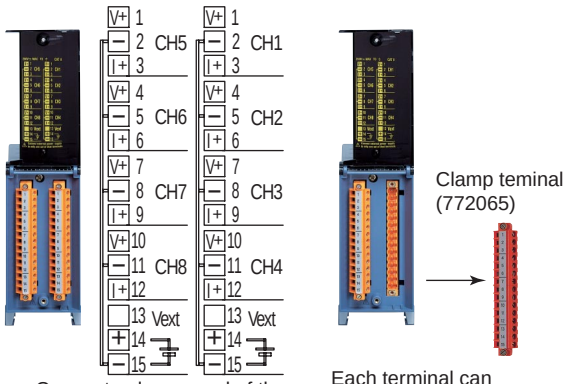
• **Eight-Channel Medium-Speed Analog Output Module (MX120-VAO-M08)**



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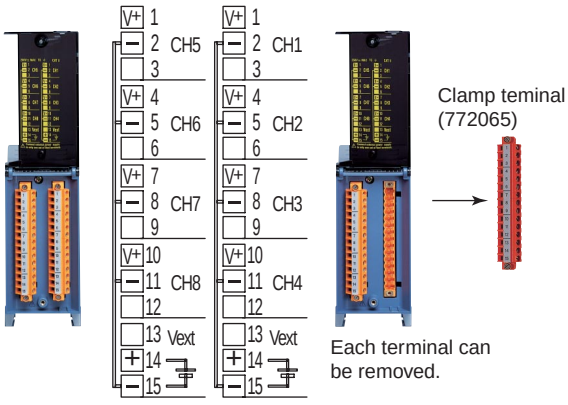
• **Eight-Channel Medium-Speed PWM Output Module (MX120-PWM-M08)**



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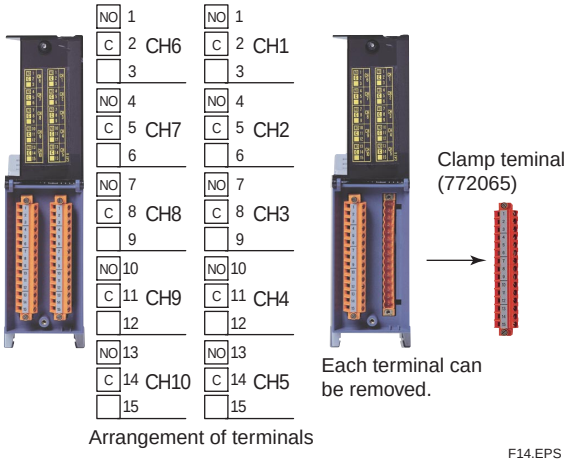
• **Ten-Channel Medium-Speed Digital Output Module (MX125-MKC-M10)**



Arrangement of terminals

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<Base Plate> MX150

The main module and input/output modules are connected using connectors on base plates. The following six types of base plates are available:

For mounting one main module and one input/output module

For mounting one main module and two input/output modules

For mounting one main module and three input/output modules

For mounting one main module and four input/output modules

For mounting one main module and five input/output modules

For mounting one main module and six input/output modules

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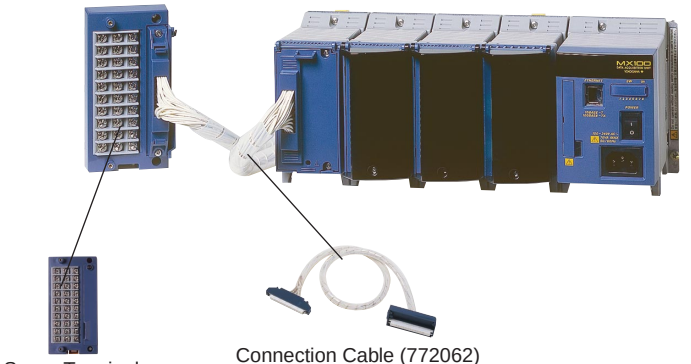
<Other Accessories>

• **Screw Terminal Block**

A separate screw terminal block (M4) is available for the Ten-Channel Medium-Speed Universal Input Module (MX110-UNV-M10) and Ten-Channel High-Speed Digital Input Module (MX115-Dxx-H10).



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Remove the plate with clamp terminals from the MX110-UNV-M10 or the MX115-Dxx-H10. Then, connect each module with the screw terminal block (772061) by means of the connection cable (772062).

Option code can be added to the MX110-UNV-M10 and the MX115-Dxx-H10 to indicate whether or not the plate with clamp terminals is included at the time of delivery. If the user requires only the screw terminal block and not the clamp terminals, specify either the MX110-UNV-M10/NC or the MX115-D05-H10/NC.

• **Connector Cover for Base Plate**

A connector cover is available for a vacant slot, into which a module is not inserted.

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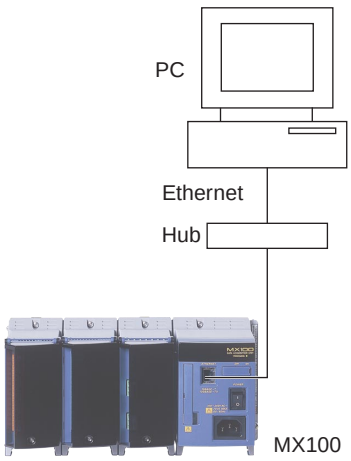
■ System Configuration

In order to build an actual measurement system, a personal computer and network devices (such as hubs and cables) are required in addition to the MX. These are to be provided by the user.

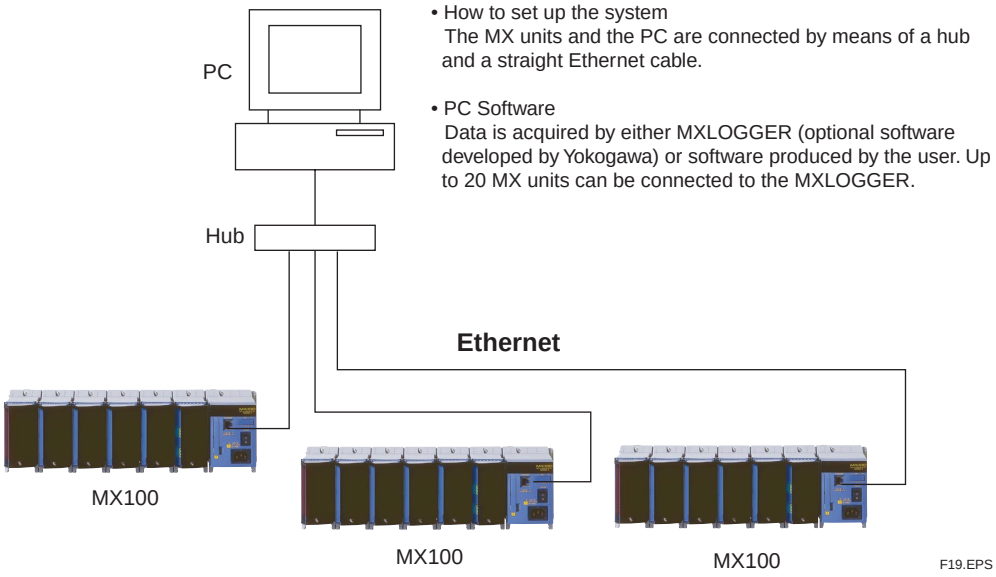
(1) Connection between the PC and a single MX unit

One MX Unit is a combination of a main module, input/output modules, and a base plate. This configuration centers on a single main module.



- How to set up the system
  The MX and PC are connected via a hub and a straight Ethernet cable.
- PC Software
  Data is acquired by the MX100 Standard Software (standard software developed by Yokogawa), MXLOGGER (optional software developed by Yokogawa), or software produced by the user.

(2) Connection between the PC and multiple MX units



- How to set up the system
  The MX units and the PC are connected by means of a hub and a straight Ethernet cable.
- PC Software
  Data is acquired by either MXLOGGER (optional software developed by Yokogawa) or software produced by the user. Up to 20 MX units can be connected to the MXLOGGER.

Connection of Multiple MX Units

The following conditions must be met when constructing a system with DAQMASTER and a PC.

The release number of PC software ≧ The style number of the main module ≧ The style number of the input/output module

- The style number of the main module must be the same or higher than the style number of each input/output module that will be connected to it.
- The release number of the PC software and related products must be the same or higher than the style number of the main module with which it will be connected.

Configuration Examples:

Correct: MX100 Standard Software R2.01, MX100 S1, and MX110-UNV-M10 S1.

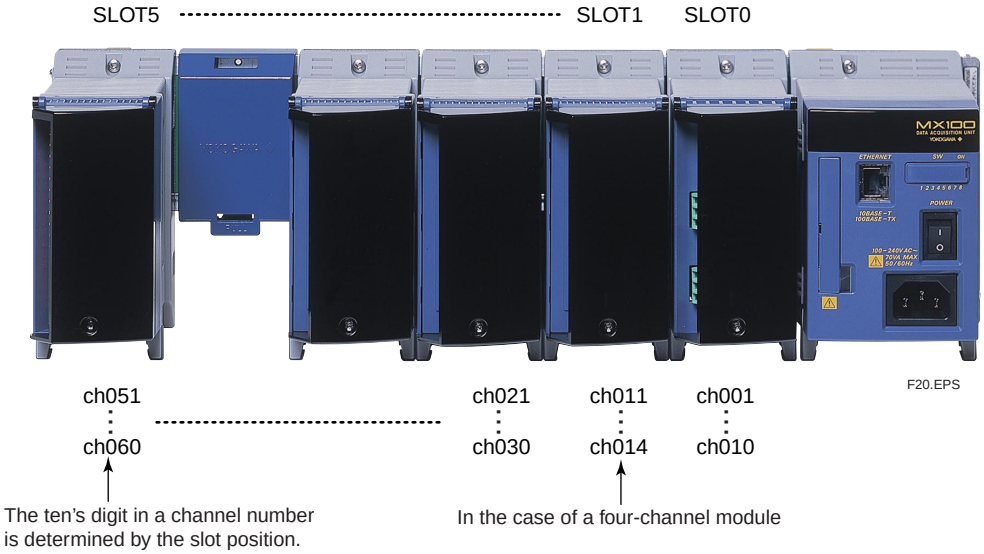
Correct: MXLOGGER R2.01, MX100 S2, and MX112-B12-M04 S2

Incorrect: MX100 Standard Software R2.01, MX100 S1, and MX112-B12-M04 S2.

Incorrect: MXLOGGER R1.03, MX100 S2, and MX112-B12-M04 S2

You can ascertain the style numbers of the main module and input/output module on the main name plate, and the release number of the PC software on the face of the CD or in the Help menu of the software program.

(3) Definitions of unit no., slot no. and channel no.



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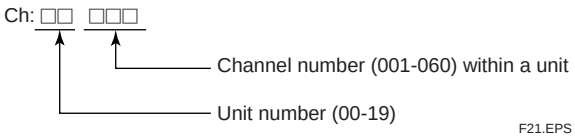
How to describe channel numbers:



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■ Functional Overview

Input types: DC voltage, temperature (TC, 3-wire RTD, 4-wire RTD), digital (non-voltage contact, open collector, level(5 V logic, 24 V logic)), strain, resistance
Output types: "A" contact (SPST), DC voltage, DC current, PWM (pulse width modulation)
Number of measurement points: Up to 60 channels per unit. Multiple units are integrated by PC software.
Number of output points: Up to 60 channels per unit. Multiple units are integrated by PC software.
Measurement interval: The shortest measurement interval is 10 ms. It depends on the types of modules and number of measurement points.
Multi-interval: Possible to set different measurement intervals per module and to set up to three types in a system
Computation: To be performed by PC software (some functions are performed in the main unit)
Display: To be performed by PC software
Settings: To be performed by PC software
Save: To the PC. If communication between the PC and the main unit is interrupted, data is saved to the CF card.
Interface: 100 Base-TX/10 Base-T Ethernet

An input module performs measurement according to specified measurement intervals. The main module acquires measured data every 100 ms at maximum speed. The main module transfers the data to the PC after the computations for compensation, physical volume conversions, etc. Also, if I/O occurs within a single unit regardless of the number of units to be connected to a single PC, contact output when the main module detects an alarm and retransmission of measured values can be performed by the module independently of the PC.

The PC software (in the case of software developed by Yokogawa) acquires data from the main module. It also performs computations, displays or saves data. If necessary, it generates output commands to produce digital outputs and analog outputs from output modules via the main module. (alarm and other output occurs across units.)

■ Hardware Specifications

Common Specifications

• Normal operating conditions

Operating temperature range: 0-50°C
Operating humidity range: 20-80% RH for 0-40°C
10-50% RH for 40-50°C
Rated power supply voltage: AC power supply, 100-240 VAC
Range of operating power supply voltage: AC power supply, 90-250 VAC
Power supply frequency: 50 Hz ±2%, 60 Hz ±2%
Power consumption: Up to approximately 70 VA when six modules are used
Vibration: 10-60 Hz, 0.2m/s^2 or less
Shock: Not tolerated
Magnetic filed: 400 A/m or less (50/60 Hz)
Attitude: To be used horizontally with legs extended downward
Location for use: Indoors
Altitude for use: 2,000 m or less
Overvoltage category: II (according to IEC61010-1)
Measurement category: II (according to IEC61010-1)
Degree of pollution: 2

• Conditions for transportation and storage

Environmental conditions for the transportation/storage of equipment from the time of delivery until the start of use, as well as for the transportation/storage when the use of equipment is temporarily suspended.
Ambient temperature during storage: –25-60°C
Ambient humidity during storage: 5-95%
Vibration: 10-60 Hz, 4.9 m/s^2 or less
Shock: 392 m/s^2 or less (in a packaged condition)

• Mechanical specifications

How to mount: Desktop/on the floor/
Panel mount with DIN rails
Material: Steel plate, aluminum die-cast, plastic mold resin

• Supported standards

CSA	Obtained CSA22.2 No.61010-1, Overvoltage category: II, Measurement category: II, Degree of pollution: 2	
UL	Obtained UL61010B-1 (CSA NRTL/C)	
CE	EMC directive	EN61326 EN61000-3-2 EN61000-3-3 EN55011 Class A Group 1
	Low voltage directive	EN61010-1 Overvoltage category: II, Measurement category: II, Degree of pollution: 2
C-Tick	AS/NZS CISPR11 Class A Group 1	

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Model-Specific Specifications

• Main module (MX100)

Style number: S2
Main functions: Control of the input/output modules, communication with the PC, storage of data on the CF card (during a communication failure), supply of power.
Number of maximum connectable input/output modules: 6 (arbitrary for six modules or less)
Measurement interval: Up to three types can be set to a system (multi-interval)
Types of measurement intervals are 10/50/100/200/500 ms, 1/2/5/10/20/30/60 sec.
Note that configurable measurement intervals differ depending on modules.
Transfer cycle of measured data to the PC: Minimum 100 ms
Synchronization between modules: Synchronized within the same measurement interval (within the same unit)
Synchronization between channels: Synchronized between channels in the same module for the Four-Channel High-Speed Universal Input Module (MX110-UNV-H04).
Not synchronized between channels for the Ten-Channel Medium-Speed Universal Input Module (MX110-UNV-M10), Six-Channel Medium-Speed 4-Wire RTD and Resistance Input Module (MX110-V4R-M06) and Four-Channel Medium-Speed Strain Input Module (MX112-xxx-M04), because it is a scanner-type module.
Time stamp for measured data: Both the time stamp of the main module and the time stamp sent from the PC are used.
Filter function: First-order lag filter. The function can be set for each channel. Time constant = measurement interval × N (where N is any number of the following: 5, 10, 20, 25, 40, 50, and 100). Choose a time constant corresponding to a measurement interval from the table on the next page:

List of Time Constants

Measurement interval (sec.)	Time Constant (sec.)						
	N=5	N=10	N=20	N=25	N=40	N=50	N=100
0.01	0.05	0.1	0.2	0.25	0.4	0.5	1
0.05	0.25	0.5	1	1.25	2	2.5	5
0.1	0.5	1	2	2.5	4	5	10
0.2	1	2	4	5	8	10	20
0.5	2.5	5	10	12.5	20	25	50
1	5	10	20	25	40	50	100
2	10	20	40	50	80	100	200
5	25	50	100	125	200	250	500
10	50	100	200	250	400	500	1000
20	100	200	400	500	800	1000	2000
30	150	300	600	750	1200	1500	3000
60	300	600	1200	1500	2400	3000	6000

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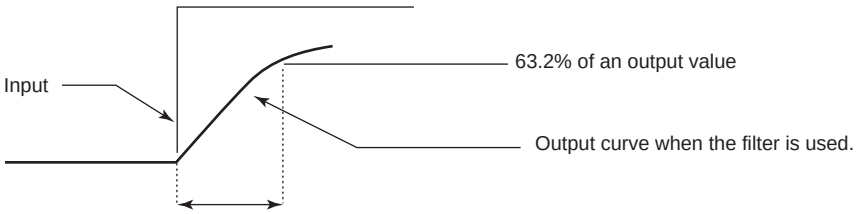

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• A time constant described in the above (List of Time Constants).
• Time required to achieve 63.2% of an output value.

Input computation function (computation function that can be executed in the main module)

Computation of differences between channels: differential computation between arbitrary channels (DCV, TC, RTD, strain, resistance, DI; also possible when the scaling is set)
Linear scaling computation
Possible range for scaling: DCV, TC, RTD, strain, resistance, DI
Possible scope for scaling: –30000-30000
Position of the decimal point: any digit (0-4)

Alarm (alarm function can be executed in the main module. This function is enabled even during a communication failure).

Alarm types: Upper limit, lower limit, differential upper limit, and differential lower limit
Number of settings: two items per channel
Possible range for alarm setting: DCV, TC, RTD, strain, resistance, DI, scaling
Hysteresis: Alarm “ON/OFF” values are set arbitrarily.
Number of alarm output points: 10-60 points according to the number of mounted “DO” modules
Output mode: Excitation/non-excitation, hold/non-hold

Output function: command output, retransmission output

Saving the data

Save function: Backup in case of a communication failure during data acquisitions by the PC.
Supported external media: CF Card (up to 2 GB) Type I, II × one slot
Save trigger: While the PC is storing data and also when timeout (60 s) is detected after a communication failure.
If communication is restored before a timeout, the Yokogawa's dedicated software (MX100 Standard Software or MXLOGGER) reads the data from the main module buffer that was acquired when the communication was cat, and stores it. In this case, data is not stored to the CF card.
Timeout time: Fixed at 60 s when using Yokogawa's dedicated software (MX100 Standard Software or MXLOGGER).
Setting of 60 s or higher are possible when using the API.
Save channel: A channel being monitored by the PC is saved.
Save cycle: Data is saved automatically (60 s)
Stopping the save function: If the PC’s data acquisition is recovered or if the CF Switch is pressed.
Data guarantee during a power failure: Guaranteed until data is written immediately before the MX is turned off (for example, power failure).
Without /DS option: The backup operation will not continue after the system recovers from a power failure.
With /DS option: The backup operation will continue after the system recovers from a power failure.
Data length: 4 bytes/channel
Data file: 5 Mbytes/file (data is saved automatically up to 5 Mbytes). Data files are created for the number of measurement intervals (number of multi-intervals). When the size of the files at the highest speed reaches 5 Mbytes, files of other measurement intervals are closed. Then, new files are created according to save cycle (60 s).
File calculation formulas: File size = header size + (data size × number of samples)
Calculation of header size (estimation): 420 bytes + 180 bytes × number of saved channels
Calculation of data size (estimation): 4 bytes × number of saved channels × number of samples
Write count =(5 Mbyte - header size)/(data size)
Format: Only the quick (logic) format is supported.
File system: FAT
File save folder: Route (Up to 512 files can be saved.)

Reference Information for Sampling Time by CF Card Size

Number of saved channels	Measurement interval	32M	64M	128M	256M	512M
10ch	10 ms	2 hours	4 hours	9 hours	18 hours	36 hours
	50 ms	10 hours	21 hours	45 hours	3 days	7 days
	100 ms	21 hours	43 hours	3.5 days	7 days	15 days
	200 ms	43 hours	3 days	7 days	15 days	30 days
	500 ms	4.5 days	9 days	18.5 days	38 days	75.5 days
	1 s	9 days	18 days	37 days	77 days	154 days
	2 s	18 days	36 days	75.5 days	154 days	303 days
24ch	10 ms	54 miniutes	100 miniutes	3.5 hours	7 hours	15 hours
	50 ms	4 hours	9 hours	18 hours	38 hours	77 hours
	100 ms	9 hours	18 hours	37 hours	77 hours	6 days
	200 ms	18 hours	36 hours	75 hours	6 days	12 days
	500 ms	45 hours	3 days	7.5 days	16 days	31.5 days
	1 s	3 days	7 days	15 days	32 days	64 days
	2 s	7.5 days	15 days	31.5 days	64 days	126 days
60ch	10 ms	18 miniutes	40 miniutes	75 miniutes	3 hours	5 hours
	50 ms	1 hour	3 hours	7 hours	15 hours	30 hours
	100 ms	3.5 hours	7 hours	15 hours	30 hours	2.5 days
	200 ms	7 hours	14 hours	30 hours	2 days	5 days
	500 ms	18 hours	36 hours	3 days	6 days	12.5 days
	1 s	36 hours	3 days	6 days	12 days	25 days
	2 s	3 days	6 days	12.5 days	25 days	50 days

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Note: Minutes/hours/days are approximate.

/DS Option Functions

The following three functions are available with the /DS option.

Operation mode automatic retention function: When the power is turned ON, the operation mode active when the power was cut is restored.

Switch control of measurement and CF recording (saving data without a PC): Start/stop of measurement and recording to the CF card can be performed by holding down the CF switch for five seconds.

Dual save function (simultaneous saving of data to the PC and to the CF card): When the shortest measurement interval is set to 100 ms or more, output of data to the PC via communications and saving of data to the CF card in the MX (CF recording) can be carried out simultaneously. CF recording is linked with start/stop commands from the PC (this function is not available if a measurement interval of 100 ms or more and 10 ms/50 ms is set at the same time).

Indication

LED: Indication of Ethernet status.
Orange: LINK, connected. Green: ACT, data being transmitted/received

7-segment indication: MX status indication by 7 segments in 2 digits (Unit No., operation status indication, indication of error occurrence, indication of messages concerning the CF Card, etc.)

Communication functions

Interface: 100 Base-TX/10 Base-T (automatic detection) Ethernet

Basic protocol: TCP, IP, UDP, ARP, ICMP

Transmission function: Transmission of measured values and setting values

Receiving function: Reception of setting values and command output values

Other functions

Accuracy of internal clock: ±100 ppm. The delay (one second or less) that occurs every time the power supply is turned on/off is not included.

Switch: 8-bit dip switch (for IP address initialization, etc.)

General specifications

Power consumption: Approximately 8W for main module only
Insulation resistance: 20 MΩ or more (500 VDC) between the power supply terminal and the ground terminal
Withstand voltage: 1500 VACrms (50/60 Hz) between the power supply terminal and the ground terminal, one minute
External dimension: Approximately 92 × 131 × 137 mm
Weight: Approximately 0.85 kg

• **Base Plate (MX150)**

Number of main modules that can be equipped: 1 (always equipped)
Number of I/O modules that can be equipped: 1-6 (to be specified according to the suffix codes)

• Four-Channel High-Speed Universal Input Module (MX110-UNV-H04)

Style number: S1
Types of measurement: DC voltage, thermocouple, 3-wire RTD, DI (non-voltage contact, level (5 V logic))
Number of measurement points: 4 channels (Each channel is equipped with an independent A/D converter. (for a total of four on a single module))
Input method: Floating unbalanced input, isolation between channels
A/D resolution: ±20000/±6000 (16-bit A/D is used)
Measurement interval and A/D integral time: A/D integral time is determined by measurement intervals

Measurement interval	Integral time	Noise rejection/remarks
10 ms(*1)	1.67 ms(*2)	600 Hz and its integer multiples
50 ms	16.67 ms	60 Hz and its integer multiples
	20 ms	50 Hz and its integer multiples
	Auto	Power supply frequency is automatically detected and is set to 16.67/20 ms automatically.
100 ms	36.67 ms	50/60 Hz, and the respective integer multiples
200 ms		
500 ms	100 ms	10 Hz and its integer multiples
1 s	200 ms	Fc = 5 Hz low pass filter
2, 5, 10, 20, 30, 60 s		

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(*1) Temperature measurements cannot be taken using MX100 Standard Software. However, temperature measurements are possible with MXLOGGER and programs using the API.
(*2) If thermocouple measurements are taken at an integral time of 1.67 ms, the measured values may be susceptible to inaccuracies due to power supply frequency noise. If this is the case, set the integral time to16.67 ms or longer (for a power supply frequency of 60 Hz), or 20 ms or longer (for a power supply frequency of 50 Hz). On this module, the power supply frequency noise can be rejected by selecting a measurement interval of 50ms or more. (on DAQMASTER, the integral time is automatically set when selecting the measurement interval.)

Measurement Ranges and Accuracies

The accuracy applies to standard operating conditions: ambient temp: 23 ±2°C, ambient humidity: 55 ±10% RH, supply voltage: 90 to 250 VAC, power frequency: 50/60 Hz ±1%, warm-up time: at least 30 minutes, without adverse conditions such as vibrations.

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	20 mV	−20.000 to 20.000 mV	±(0.05% of rdg. + 5 digits)	±(0.1% of rdg. + 25 digits)	1 µV
	60 mV	−60.00 to 60.00 mV	±(0.05% of rdg. + 2 digits)	±(0.1% of rdg. + 10 digits)	10 µV
	200 mV	−200.00 to 200.00 mV			10 µV
	2 V	−2.0000 to 2.0000 V	±(0.05% of rdg.+ 5 digits)		100 µV
	6 V	−6.000 to 6.000 V	±(0.05% of rdg.+ 2 digits)		1 mV
	20 V	−20.000 to 20.000 V			1 mV
	100 V	−100.00 to 100.00 V			10 mV
Thermocouple (excludes RJC accuracy, when burnout is OFF)	R *1	0.0 to 1760.0°C	±(0.05% of rdg. + 1°C) However, R, S: 0 to 100°C: ±3.7°C 100 to 300°C: ±1.5°C B: 400 to 600C: ±2°C Less than 400°C: accuracy not guaranteed	±(0.1% of rdg. + 4°C) *10 However, R,S: 0 to 100°C: ±10°C 100 to 300*C: ±5°C B: 400 to 600°C: ±7°C Less than 400°C: accuracy not guarantee	0.1°C
	S *1				
	B *1	0.0 to 1820.0°C			
	K *1	−200.0 to 1370.0°C	±(0.05% of rdg. + 0.7°C) However, −200 to −100°C: 0.05% of rdg. +1°C	±(0.1% of rdg. + 3.5°C) *10 However, −200 to −100°C: ±(0.1% of rdg. + 6°C)	
	E *1	−200.0 to 800.0°C	±(0.05% of rdg. + 0.5°C) However, J, L: −200 to −100°C: ±(0.05% of rdg. + 0.7°C)	±(0.1% of rdg. + 2.5°C) *10 However, −200 to −100°C: ±(0.1% of rdg. + 5°C)	
	J *1	−200.0 to 1100.0°C			
	T *1	−200.0 to 400.0°C			
	L *2	−200.0 to 900.0°C			
	U	−200.0 to 400.0°C			
	N *3	0.0 to 1300.0°C	±(0.05% of rdg. + 0.7°C)	±(0.1% of rdg. + 3.5°C) *10	
	W *4	0.0 to 2315.0°C	±(0.05% of rdg. + 1°C)	±(0.1% of rdg. + 7°C) *10	
	KpvsAu7Fe	0.0 to 300.0 K	±(0.05% of rdg. + 0.7 K)	±(0.1% of rdg. + 3.5 K) *10	0.1 K
3-wire RTD mesurement current (1 mA)	Pt100 *5	−200.0 to 600.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 1.5°C) *10	0.1°C
	JPt100 *5	−200.0 to 550.0°C			
	Pt100 (high resolution)	−140.00 to 150.00°C			0.01°C
	JPt100 (high resolution)	−140.00 to 150.00°C			
	Ni100SAMA *6	200.0 to 250.0°C			0.1°C
	Ni100 DIN *6	−60.0 to 180.0°C			
	Ni120 *7	−70.0 to 200.0°C			
3-wire RTD measurement current (2 mA)	Pt100 *5	−200.0 to 250.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 1.5°C) *10	0.1°C
	JPt100 *5	−200.0 to 250.0°C			
	Pt100 (high resolution)	−140.00 to 150.00°C			0.01°C
	JPt100 (high resolution)	−140.00 to 150.00°C			
	Pt50 *5	−200.0 to 550.0°C			0.1°C
	Cu10 GE *8	−200.0 to 300.0°C	±(0.1% of rdg. + 0.7°C)	±(0.2% of rdg. + 2.5°C) *10	
	Cu10 L&N *8	−200.0 to 300.0°C			
	Cu10 WEED *8	−200.0 to 300.0°C			
	Cu10 BAILEY *8	−200.0 to 300.0°C			
	J263B	0.0 to 300.0 K	±(0.05% of rdg. + 0.3 K)	±(0.1% of rdg. + 1.5K) *10	0.1 K
DI	Level	Vth = 2.4 V	Threshold level accuracy ±0.1 V		
	Non-voltage contact	100 Ω or less: ON, 10 kΩ or more: OFF *9			

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*1 R, S, B, K, E, J, T: ANSI, IEC 584, DIN IEC 584, JIS C 1602-1981
*2 L: Fe-CuNi, DIN43710/U: Cu-CuNi, DIN 43710
*3 N: Nicrosil-Nisil, IEC 584, DIN IEC 584
*4 W: W·5%RE-W·26%Re (Hoskins Mfg Co)
*5 Pt50: JIS C 1604-1981, JIS C 1606-1986/Pt100: JIS C 1604-1989, JIS C 1606-1989, IEC 751, DIN IEC 751/JPt100: JIS C 1604-1981, JIS C 1606-1989
*6 SAMA/DIN
*7 McGRAW EDISON COMPANY
*8 Guaranteed accuracy range Cu10 GE: –84.4 to 170.0°C/Cu 10 L&N: –75.0 to 150.0°C/Cu 10 WEED: –20.0 to 250.0°C/Cu 10 BAILEY: –20.0 to 250.0°C
*9 To be determined at the measurement current of 1 mA and within the range of 2 V. The threshold level is approximately 0.8 V.
*10 The measurement accuracy with MXLOGGER and programs using the API. Measurement not possible when using MX100 Standard Software.

Measurement Ranges and Accuracies (continued)

The ranges below can be used for MXLOGGER (optional software) or API.

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	60 mV (high resolution)	0.000 to 60.000 mV	±(0.05% of rdg.+ 20 digits)	±(0.1% of rdg.+100 digits)	1 μV
	1 V	−1.0000 to 1.0000 V	±(0.05% of rdg.+ 2 digits)	±(0.1% of rdg.+10 digits)	100 μV
	6 V (high resolution)	0.0000 to 6.0000 V	±(0.05% of rdg.+ 20 digits)	±(0.1% of rdg.+100 digits)	100 μV
Thermocouple (excludes RJC accuracy, when burnout is OFF)	PLATINEL	0.0 to 1400.0°C	±(0.05% of rdg.+ 1°C)	±(0.1% of rdg. + 4°C)	0.1°C
	PR40-20 *1	0.0 to 1900.0°C	±(0.05% of rdg. + 2.5°C) However, 300 to 700°C: ±6°C Less than 300°C: accuracy not guaranteed	±(0.1% of rdg. + 12°C) However, 300 to 700°C: ±25°C Less than 300°C: accuracy not guaranteed	
	NiNiMo	0.0 to 1310.0°C	±(0.05% of rdg. + 0.7°C)	±(0.1% of rdg. + 2.7°C)	
	WRe3-25	0.0 to 2400.0°C	±(0.05% of rdg. + 2°C) However, 0 to 200°C: ±2.5°C 2000°C or more: ±(0.05% of rdg. + 4°C)	±(0.1% of rdg. + 7°C) However, 0 to 200°C: ±12°C 2000°C or more: ±(0.1% of rdg. + 11°C)	
	W/WRe26	0.0 to 2400.0°C	±(0.05% of rdg. + 2°C) However, 100 to 300°C: ± 4°C Less than 100°C: accuracy not guaranteed	±(0.1% of rdg. + 8.5°C) However, 100 to 300°C: ±12°C Less than 100°C: accuracy not guaranteed	
	Type-N (AWG14)	0.0 to 1300.0°C	±(0.05% of rdg. + 0.7°C)	±(0.1% of rdg. + 3.5°C)	
3-wire RTD measurement current (1 mA)	Pt100 (high noise resistance)	−200.0 to 600.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 2.5°C)	0.1°C
	JPt100 (high noise resistance)	−200.0 to 550.0°C			
3-wire RTD measurement current (2 mA)	Cu10 at 20°C alpha=0.00392	−200.0 to 300.0°C	±(0.1% of rdg. + 0.7°C)	±(0.2% of rdg. + 2.5°C)	0.1°C
	Cu10 at 20°C alpha=0.00393	−200.0 to 300.0°C			
	Cu25 at 0°C alpha=0.00425	−200.0 to 300.0°C	±(0.1% of rdg. + 0.5°C)	±(0.2% of rdg. + 2°C)	0.1°C
	Cu53 at 0°C alpha=0.00426035	−50.0 to 150.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 1.5°C)	0.1°C
	Cu100 at 0°C alpha=0.00425	−50.0 to 150.0°C			
	Pt25(JPt100×1/4)	−200.0 to 550.0°C	±(0.1% of rdg. + 0.5°C)	±(0.2% of rdg. + 2°C)	0.1°C
	Cu10 GE *2 (high resolution)	−200.0 to 300.0°C	±(0.1% of rdg. + 0.7°C)	±(0.2% of rdg. + 2.5°C)	0.1°C
	Cu10 L&N *2 (high resolution)	−200.0 to 300.0°C			
	Cu10 WEED *2 (high resolution)	−200.0 to 300.0°C			
	Cu10 BAILEY *2 (high resolution)	−200.0 to 300.0°C			
	Pt100 (high noise resistance)	−200.0 to 250.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 1.5°C)	0.1°C
	JPt100 (high noise resistance)	−200.0 to 250.0°C			

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*1 PR40-20: PtRh20%-PtRh40% (John Matthey Plc)

*2 Guaranteed accuracy range Cu10 GE: –84.4 to 170.0°C/Cu 10 L&N: –75.0 to 150.0°C/Cu 10 WEED: –20.0 to 250.0°C/Cu 10 BAILEY: –20.0 to 250.0°C

Reference junction compensation:
External/internal switchover can be performed for each channel.
The Remote RJC function is available.
Reference junction compensation accuracy:
During the measurement of 0°C or more and during the input terminal temperature balance
Type R, S, W: ±1°C
Type K, J, E, T, N, L, U: ±0.5°C
Type N, PLATINEL, NiNiMo, WRe3-25, W/WRe26: ±1°C
Internal reference junction compensation for Type B and PR40-20 is fixed to 0°C.
Maximum input voltage:
1 VDC range or less, thermocouple, RTD, DI (contact only): ±10 VDC (continuous)
Other measurement ranges: ±120 VDC (continuous)
Normal mode voltage:
DCV, TC, DI (level): 1.2 times of rated range or less (50/60 Hz, peak values including signals)
RTD 100Ω system: 50 mV peak
RTD 10, 25, 50Ω systems: 10 mV peak
Normal mode rejection ratio (NMRR):
40 dB or more when the integral time is 16.67 ms or more (50/60 Hz ±0.1%)
50/60 Hz is not rejected when the integral time is 1.67 ms.
Common mode voltage:
600 VACrms (50/60 Hz), reinforced (double) insulation
Common mode rejection ratio (CMRR):
120 dB or more when the integral time is 16.67 ms or more
80 dB or more when the integral time is 1.67 ms
(50/60 Hz ±0.1%, 500 Ω imbalance, between the minus measurement terminal and ground)
Common mode between channels:
250 VACrms (50/60 Hz), reinforced (double) insulation
Noise rejection: Rejection by the integrating A/D and the use of low pass filters
Input resistance: 10 MΩ or more for the DC voltage of 1 V range or less and also for the thermocouple range
Approximately 1 MΩ if the DC voltage is 2 V range or more
Approximately 1 MΩ while the measurement operation is stopped
Insulation resistance:
20 MΩ or more between the input and ground (500 VDC)
Input bias current: 10 nA or less (except for the burn-out setting)
Withstand voltage:
2300 VACrms (50/60 Hz) between input terminals, one minute
3700 VACrms (50/60 Hz) between an input terminal and ground, one minute
Input signal source resistance:
2 kΩ or less for DC voltage and thermocouple
10Ω or less per cable for RTD 50 Ω or 100 Ω systems
1Ω or less per cable for RTD 10 Ω or 25 Ω systems
Thermocouple burn-out:
Superposed electric current system, detection within the thermocouple range (“ON/OFF” possible), the up/down setting possible, detection current at approximately 100 nA, 2 kΩ or less being normal, and 10 MΩ or more being disconnected.
Influence on measurement accuracy: ±15 μV or less (influence on signal source resistance is not included)
Parallel capacity during RTD: 0.01 μF or less
Power consumption: Approximately 3 W
External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
Weight: Approximately 0.5 kg
Terminal type: Clamp terminal. Attachable/detachable per channel.
Applicable cable size: 0.2-2.5 mm^2 (AWG24-12)

Influence of operating conditions (applicable if the integral time is 16.67 ms or more)

Warm-up time: 30 minutes or more after the power supply is turned on.

Influence of ambient temperature:

Influence on a change in ambient temperature of 10°C is within ±(0.05% of rdg. + 0.05% of range). However, during Cu10Ω : ±(0.2% of range + 1 digit)

Influence of power supply fluctuations:

Specifications of accuracy are satisfied at AC power 90-132 V or 180-250 V

Influence of external magnetic fields:

Fluctuations on external magnetic fields of alternate current (50/60 Hz) 400 A/m are ±(0.1% of rdg. + 10 digits) or less.

Influence of signal source resistance:

Influences on fluctuations of signal source resistance (1 kΩ) of voltage and thermocouple are:

Voltage: 1 V range or less
±10 μV or less
2 V range or more
±0.15% of rdg. or less

Thermocouple: ±10 μV or less. However, ±150 μV or less when the burn-out is set

RTD: Fluctuation (one common resistance value for three cables) on a change of 10 Ω per cable for 100 Ω systems is ±0.1°C or less (±1.0°C or less for other systems).
Fluctuation on the difference of 40 mΩ in resistance values among conductors (maximum difference among three cables) shall be approximately 0.1°C (for Pt100)

Influence of attitude:

Basically, the system shall be used in a horizontal position with its legs extended downward.

Influence of vibrations:

Fluctuations when sine wave vibrations in the frequency of 10-60 Hz and at an acceleration of 0.2 m/s^2 are applied for two hours respectively in three axis directions shall be ±(0.1% of rdg. + 1 digit) or less.

• Ten-Channel Medium-Speed Universal Input Module (MX110-UNV-M10)

Style number: S1
Types of measurement: DC voltage, thermocouple, 3-wire RTD, DI (non-voltage contact, level (±5 V logic))
Number of measurement points: 10 (scanning of 10 channels with one A/D)
Input method: Floating unbalanced input, isolation between channels (Note that RTD is common among “b” terminals.)
A/D resolution: ±20000/±6000 (16-bit A/D is used)
Measurement interval and A/D integral time: A/D integral time is determined by measurement intervals.

Measurement interval	Integral time	B.O. detection cycle	Noise rejection /remarks
100 ms	1.67 ms(*2)	1 s (*1)	600 Hz and its integer multiples
200 ms		Measurement interval	
500 ms	16.67 ms		60 Hz and its integer multiples
	20 ms		50 Hz and its integer multiples
	Auto		Power supply frequency is automatically detected and is set to 16.67/20 ms
1 s	36.67 ms		50/60 Hz and the respective integer multiples
2 s	100 ms		10 Hz and its integer multiples
5 s	200 ms		Fc = 5 Hz low pass filter
10, 20, 30, 60 s			

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(*1) This is because the burn-out cannot be detected until up to 10 measurements have occurred (about one second) if measurement is started in the burn-out state. (If a measurement interval is 100 ms, the burn-out detection executed in one measurement interval is for one channel only.)

(*2) If thermocouple measurements are taken at an integral time of 1.67 ms, the measured values may be susceptible to inaccuracies due to power supply frequency noise. If this is the case, set the integral time to16.67 ms or longer (for a power supply frequency of 60 Hz), or 20 ms or longer (for a power supply frequency of 50 Hz). On this module, the power supply frequency noise can be rejected by selecting a measurement interval of 500ms or more. (on DAQMASTER, the integral time is automatically set when selecting the measurement interval.)

Measurement Ranges and Accuracies

The accuracy applies to standard operating conditions: ambient temp: 23 ±2°C, ambient humidity: 55 ±10% RH, supply voltage: 90 to 250 VAC, power frequency: 50/60 Hz ±1%, warm-up time: at least 30 minutes, without adverse conditions such as vibrations.

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	20 mV	−20.000 to 20.000 mV	±(0.05% of rdg. + 5 digits)	±(0.1% of rdg. + 25 digits)	1 µV
	60 mV	−60.00 to 60.00 mV	±(0.05% of rdg. + 2 digits)	±(0.1% of rdg. + 10 digits)	10 µV
	200 mV	−200.00 to 200.00 mV			10 µV
	2 V	−2.0000 to 2.0000 V	±(0.05% of rdg. + 5 digits)		100 µV
	6 V	−6.000 to 6.000 V	±(0.05% of rdg. + 2 digits)		1 mV
	20 V	−20.000 to 20.000 V			1 mV
	100 V	−100.00 to 100.00 V			10 mV
Thermocouple RJC accuracy not included	R *1	0.0 to 1760.0°C	±(0.05% of rdg. + 1°C) However, R, S: 0 to 100°C: ±3.7°C 100 to 300°C: ±1.5°C B: 400 to 600°C: ±2°C Less than 400°C: accuracy not guaranteed	±(0.1% of rdg. + 4°C) However, R, S: 0 to 100°C: ±10°C 100 to 300°C: ±5°C B: 400 to 600°C: ±7°C Less than 400°C: accuracy not guaranteed	0.1°C
	S *1				
	B *1	0.0 to 1820.0°C			
	K *1	−200.0 to 1370.0°C	±(0.05% of rdg. + 0.7°C) However, −200 to −100°C: ±(0.05% of rdg. + 1°C)	±(0.1% of rdg. + 3.5°C) However, −200 to −100°C: 0.1% of rdg. + 6°C	
	E *1	−200.0 to 800.0°C	±(0.05% of rdg. + 0.5°C) However, J, L: −200 to −100°C: ±(0.05% of rdg. + 0.7°C)	±(0.1% of rdg. + 2.5°C) However, −200 to −100°C: ±(0.1% of rdg. + 5°C)	
	J *1	−200.0 to 1100.0°C			
	T *1	−200.0 to 400.0°C			
	L *2	−200.0 to 900.0°C			
	U	−200.0 to 400.0°C			
	N *3	0.0 to 1300.0°C	±(0.05% of rdg. + 0.7°C)	±(0.1% of rdg. + 3.5°C)	
	W *4	0.0 to 2315.0°C	±(0.05% of rdg. + 1°C)	±(0.1% of rdg. + 7°C)	
	KpvsAu7Fe	0.0 to 300.0 K	±(0.05% of rdg. + 0.7 K)	±(0.1% of rdg. + 3.5 K)	0.1 K
3-wire RTD Measurement current (1 mA)	Pt100 *5	−200.0 to 600.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 1.5°C)	0.1°C
	JPt100 *5	−200.0 to 550.0°C			
	Pt100 (high resolution)	−140.00 to 150.00°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 1.5°C)	0.01°C
	JPt100 (high resolution)	−140.00 to 150.00°C			
	Ni100SAMA *6	−200.0 to 250.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. +1.5°C)	0.1°C
	Ni100 DIN *6	−60.0 to 180.0°C			
	Ni120 *7	−70.0 to 200.0°C			
	Pt50 *5	−200.0 to 550.0°C			
	Cu10 GE *8	−200.0 to 300.0°C	±(0.1% of rdg. + 2°C)	±(0.2% of rdg. + 5°C)	
	Cu10 L&N *8	−200.0 to 300.0°C			
	Cu10 WEED *8	−200.0 to 300.0°C			
	Cu10 BAILEY *8	−200.0 to 300.0°C			
	J263B	0.0 to 300.0 K	±(0.05% of rdg. + 0.3 K)	±(0.1% of rdg. + 1.5 K)	0.1 K
DI	Level	Vth = 2.4 V	Threshold level accuracy ±0.1 V		
	Non-voltage contact	1 kΩ or less: ON, 100 kΩ or more: OFF (parallel capacity is 0.01 µF or less) *9			

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*1 R, S, B, K, E, J, T: ANSI, IEC 584, DIN IEC 584, JIS C 1602-1981
*2 L: Fe-CuNi, DIN43710/U: Cu-CuNi, DIN 43710
*3 N: Nicrosil-Nisil, IEC 584, DIN IEC 584
*4 W: W·5%RE-W·26%Re (Hoskins Mfg Co)
*5 Pt50: JIS C 1604-1981, JIS C 1606-1986/Pt100: JIS C 1604-1989, JIS C 1606-1989, IEC 751, DIN IEC 751/JPt100: JIS C 1604-1981, JIS C 1606-1989
*6 SAMA/DIN
*7 McGRAW EDISON COMPANY
*8 Guaranteed accuracy range Cu10 GE: –84.4 to 170.0°C/Cu 10 L&N: –75.0 to 150.0°C/Cu 10 WEED: –20.0 to 250.0°C/Cu 10 BAILEY: –20.0 to 250.0°C
*9 To be determined at the measurement current of approximately 10 µA and within the range of 200 mV. The threshold level is 0.1 V.

Measurement Ranges and Accuracies (continued)

The range below can be used for MXLOGGER (optional software) or API.

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	60 mV (high resolution)	0.000 to 60.000 mV	±(0.05% of rdg. + 20 digits)	±(0.1% of rdg. + 100 digits)	1 µV
	1 V	−1.0000 to 1.0000 V	±(0.05% of rdg. + 2 digits)	±(0.1% of rdg. + 10 digits)	100 µV
	60 mV (high resolution)	0.0000 to 6.0000 V	±(0.05% of rdg. + 20 digits)	±(0.1% of rdg. + 100 digits)	100 µV
Option Thermocouple RJC accuracy not included	PLATINEL	0.0 to 1400.0°C	±(0.05% of rdg. + 1°C)	±(0.1% of rdg. + 4°C)	0.1°C
	PR40-20 *1	0.0 to 1900.0°C	±(0.05% of rdg. + 2.5°C) However, 300 to 700°C: ±6°C Less than 300°C: accuracy not guaranteed	±(0.1% of rdg. + 12°C) However, 300 to 700°C: ±25°C Less than 300°C: accuracy not guaranteed	
	NiNiMo	0.0 to 1310.0°C	±(0.05% of rdg. + 0.7°C)	±(0.1% of rdg. + 2.7°C)	
	WRe3-25	0.0 to 2400.0°C	±(0.05% of rdg. + 2°C) However, 0 to 200°C: ±2.5°C 2000°C or more: ±(0.05% of rdg. + 4°C)	±(0.1% of rdg. + 7°C) However, 0 to 200°C: ±12°C 2000°C or more: ±(0.1% of rdg. + 11°C)	
	W/WRe26	0.0 to 2400.0°C	±(0.05% of rdg. + 2°C) However, 100 to 300°C: ±4°C Less than 100°C: accuracy not guaranteed	±(0.1% of rdg. + 8.5°C) However, 100 to 300°C: ±12°C Less than 100°C: accuracy not guaranteed	
	Type-N (AWG14)	0.0 to 1300.0°C	±(0.05% of rdg. + 0.7°C)	±(0.1% of rdg. + 3.5°C)	
3-wire RTD measurement current (1 mA)	Cu10 at 20°C alpha=0.00392	−200.0 to 300.0°C	±(0.1% of rdg. + 2°C)	±(0.2% of rdg. + 5°C)	0.1°C
	Cu10 at 20°C alpha=0.00393	−200.0 to 300.0°C			
	Cu25 at 0°C alpha=0.00425	−200.0 to 300.0°C	±(0.1% of rdg. + 0.5°C)	±(0.2% of rdg. + 2°C)	0.1°C
	Cu53 at 0°C alpha=0.00426035	−50.0 to 150.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 1.5°C)	0.1°C
	Cu100 at 0°C alpha=0.00425	−50.0 to 150.0°C			
	Pt25(JPt100×1/4)	−200.0 to 550.0°C	±(0.1% of rdg. + 0.5°C)	±(0.2% of rdg. + 2°C)	0.1°C
	Cu10 GE *2 (high resolution)	−200.0 to 300.0°C	±(0.1% of rdg. + 2°C)	±(0.2% of rdg. + 5°C)	0.1°C
	Cu10 L&N *2 (high resolution)	−200.0 to 300.0°C			
	Cu10 WEED *2 (high resolution)	−200.0 to 300.0°C			
	Cu10 BAILEY *2 (high resolution)	−200.0 to 300.0°C			

T09.EPS

*1 PR40-20: PtRh20%-PtRh40% (John Matthey Plc)

*2 Guaranteed accuracy range Cu10 GE: –84.4 to 170.0°C/Cu 10 L&N: –75.0 to 150.0°C/Cu 10 WEED: –20.0 to 250.0°C/Cu 10 BAILEY: –20.0 to 250.0°C

Reference junction compensation:
External/internal switchover can be performed for each channel.
The Remote RJC function is available.
Reference junction compensation accuracy:
During the measurement of 0°C or more and during the input terminal temperature balance
Type R, S, W: ±1°C
Type K, J, E, T, N, L, U: ±0.5°C
PLATINEL, NiNiMo, WRe3-25, W/WRe26, N (AWG14): ±1°C
Internal reference junction compensation for Type B and PR40-20 is fixed to 0°C.
Maximum input voltage:
1 VDC range or less, thermocouple, RTD, DI (contact): ±10 VDC
Other measurement ranges: ±120 VDC
Normal mode voltage:
DCV, TC, DI (level): 1.2 times of the rated range or less (50/60 Hz, peak values including signals)
RTD 100 Ω system: 50 mV peak
RTD 10, 25, 50 Ω systems: 10 mV peak
Normal mode rejection ratio (NMRR):
40 dB or more when the integral time is 16.67 ms or more (50/60 Hz ±0.1%)
50/60 Hz is not rejected when the integral time is 1.67 ms.
Common mode voltage:
600 VACrms (50/60 Hz), reinforced (double) insulation
Common mode rejection ratio (CMRR):
120 dB or more when the integral time is 16.67 ms or more
80 dB or more when the integral time is 1.67 ms
(50/60 Hz ±0.1%, 500 Ω imbalance, between the minus measurement terminal and ground)
Common mode voltage between channels:
120 VACrms (50/60 Hz)
Noise rejection:
Rejection by an integrating A/D and the use of low pass filters
Input resistance:
10 MΩ or more for the DC voltage of 1 V range or less and also for the thermocouple range
Approximately 1 MΩ if the DC voltage is in the 2 V range or more
Insulation resistance:
20 MΩ or more between the input and ground (500 VDC)
Input bias current:
10 nA or less (except when burn-out has been set)
Withstand voltage:
1000 VACrms (50/60 Hz) between input terminals, one minute
3700 VACrms (50/60 Hz) between an input terminal and ground, one minute
Input signal source resistance:
2 kΩ or less for DC voltage and thermocouple
10 Ω or less per cable for RTD 50 Ω or 100 Ω systems
1 Ω or less per cable for RTD 10 Ω or 25 Ω systems
Thermocouple burn-out:
Checking of the burn-out at a detection cycle specified for each measurement interval, the up/down setting possible, 2 kΩ or less being normal, 200 kΩ or more being disconnected. Detection current shall be approximately 10 μA. Detection time shall be approximately 2 ms. Parallel capacity shall be 0.01 μF or less.
Parallel capacity during RTD: 0.01 μF or less
Power consumption: Approximately 1.2 W
External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
Weight: Approximately 0.5 kg
Terminal type: Clamp terminal. The plate with clamp terminals can be attached/detached.
Applicable cable size: 0.14-1.5 mm^2 (AWG26-16)

Influence of operating conditions (applicable if the integral time is 16.67 ms or more)

Warm-up time: 30 minutes or more after the power supply is turned on.

Influence of ambient temperature:

Influence on a change in ambient temperature of 10°C is within ±(0.05% of rdg. + 0.05% of range).
However, Cu10Ω: ±(0.2% of range + 1 digit)

Influence of power supply fluctuations:

Specifications of accuracy are satisfied at AC power 90-132 V or 180-250 V.

Influence of external magnetic fields:

Fluctuations of external magnetic fields of alternate current (50/60 Hz) 400 A/m is ±(0.1% of rdg. + 10 digits) or less.

Influence of signal source resistance:

Influences on fluctuations of signal source resistance (1 kΩ) of voltage and thermocouple are:

Voltage: 1 V range or less
±10 μV or less
2 V range or more
±0.15% of rdg. or less

Thermocouple: ±10 μV or less

RTD: Fluctuation (one common resistance value for three cables) on a change of 10 Ω per cable for 100 Ω systems is ±0.1°C or less (±1.0°C or less for other systems).

Fluctuation on the difference of 40 mΩ in resistance values among conductors (maximum difference among three cables) shall be approximately 0.1°C (for Pt100).

Influence of attitude:

Basically, the system shall be used in a horizontal position with its legs extended downward.

Influence of vibrations:

Fluctuations when sine wave vibrations in the frequency of 10-60 Hz and at an acceleration of 0.2 m/s^2 are applied for two hours respectively in three axis directions shall be ±(0.1% of rdg. + 1 digit) or less.

• Six-Channel Medium-Speed 4-Wire RTD and Resistance Input Module (MX110-V4R-M06)

Style number: S2
Types of measurement: DC voltage, 4-wire RTD, 4-wire resistance, DI (non-voltage contact, LEVEL (5 V logic))
Number of measurement points: 6 (scanning of 6 channels with one A/D)
Input method: Floating unbalanced input, isolation between channels
A/D resolution: ±20000/±6000 (16-bit A/D is used)
Measurement interval and A/D integral time: A/D integral time is determined by measurement interval.

Measurement interval	Integral time	Noise rejection /remarks
100 ms	1.67 ms(*1)	600 Hz and its integer multiples
200 ms		
500 ms	16.67 ms	60 Hz and its integer multiples
	20 ms	50 Hz and its integer multiples
	Auto	Power supply frequency is automatically detected and is set to 16.67/20 ms
1 s	36.67 ms	50/60 Hz and the respective integer multiples
2 s	100 ms	10 Hz and its integer multiples
5 s	200 ms	Fc = 5 Hz low pass filter
10, 20, 30, 60 s		

T10.EPS

(*1) If resistance measurements are taken at an integral time of 1.67 ms, the measured values may be susceptible to inaccuracies due to power supply frequency noise. If this is the case, set the integral time to 16.67 ms or longer (for a power supply frequency of 60 Hz), or 20 ms or longer (for a power supply frequency of 50 Hz). On this module, the power supply frequency noise can be rejected by selecting a measurement interval of 500ms or more. (on DAQMASTER, the integral time is automatically set when selecting the measurement interval.)

Measurement Ranges and Accuracies

The accuracy applies to standard operating conditions: ambient temp: 23±2°C, ambient humidity: 55±10% RH, supply voltage: 90 to 250 VAC, power frequency: 50/60 Hz ± 1%, warm-up time: at least 30 minutes, without adverse conditions such as vibrations.

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	20 mV	−20.000 to 20.000 mV	±(0.05% of rdg. + 5 digits)	±(0.1% of rdg. + 25 digits)	1 μV
	60 mV	−60.00 to 60.00 mV	±(0.05% of rdg. + 2 digits)	±(0.1% of rdg. + 10 digits)	10 μV
	200 mV	−200.00 to 200.00 mV			
	2 V	−2.0000 to 2.0000 V	±(0.05% of rdg. + 5 digits)		100 μV
	6 V	−6.000 to 6.000 V	±(0.05% of rdg. + 2 digits)		1 mV
	20 V	−20.000 to 20.000 V			
	100 V	−100.00 to 100.00 V			10 mV
DI	Level	Vth = 2.4 V	Threshold level accuracy ±0.1 V		
	Non-voltage contact	1 kΩ or less: ON, 100 kΩ or more: OFF (parallel capacity is 0.01 μF or less) *1			
4-wire RTD Measurement current (1 mA)	Pt100 *2	−200.0 to 600.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 1.5°C)	0.1°C
	JPt100 *2	−200.0 to 550.0°C			
	Pt100 (high resolution)	−140.00 to 150.00°C			0.01°C
	JPt100 (high resolution)	−140.00 to 150.00°C			
	Ni100 SAMA *3	−200.0 to 250.0°C			0.1°C
	Ni100 DIN *3	−60.0 to 180.0°C			
	Ni120 *4	−70.0 to 200.0°C			
	Pt50 *2	−200.0 to 550.0°C			
	Cu10 GE *5	−200.0 to 300.0°C	±(0.1% of rdg. + 2°C)	±(0.2% of rdg. + 5°C)	0.1°C
	Cu10 L&N *5	−200.0 to 300.0°C			
	Cu10 WEED *5	−200.0 to 300.0°C			
	Cu10 BAILEY *5	−200.0 to 300.0°C			
	J263B	0.0 to 300.0 K	±(0.05% of rdg. + 0.3 K)	±(0.1% of rdg. + 1.5 K)	0.1 K
4-wire RTD Measurement current (0.25mA)	Pt500 *6	−200.0 to 600.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 1.5°C)	0.1°C
	Pt1000 *6	−200.0 to 600.0°C			
4-wire resistance	20 Ω (measuement cuent: 1mA)	0.000 to 20.000 Ω	±(0.05% of rdg. + 7 digits)	±(0.1% of rdg. + 25 digits)	0.001 Ω
	200 Ω (measuement cuent: 1mA)	0.00 to 200.00 Ω	±(0.05% of rdg. + 3 digits)	±(0.1% of rdg. + 15 digits)	0.01 Ω
	2 kΩ (measuement cuent: 0.25mA)	0.0 to 2000.0 Ω	±(0.05% of rdg. + 3 digits)	±(0.1% of rdg. + 10 digits)	0.1 Ω

T11.EPS

*1 To be determined at the measurement current of approximately 10 μA and within the range of 200 mV. The threshold level is 0.1 V.
*2 Pt50: JIS C 1604-1981, JIS C 1606-1986/Pt100: JIS C 1604-1989, JIS C 1606-1989, IEC 751, DIN IEC 751/JPt100: JIS C 1604-1981, JIS C 1606-1989
*3 SAMA/DIN
*4 McGRAW EDISON COMPANY
*5 Guaranteed accuracy range Cu10 GE: –84.4 to 170.0°C/Cu 10 L&N: –75.0 to 150.0°C/Cu 10 WEED: –20.0 to 250.0°C/Cu 10 BAILEY: –20.0 to 250.0°C
*6 The Pt500 resistance table is Pt100 × 5, and the Pt1000 resistance table is Pt100 × 10.

Measurement Ranges and Accuracies (continued)

The range below can be used for MXLOGGER (optional software) or API.

Input	Type	Rated measurement range	Measurement accuracy integral time 16.67 ms or more	Measurement accuracy integral time 1.67 ms	Maximum resolution (1 digit)
Voltage	60 mV (high resolution)	0.000 to 60.000 mV	±(0.05% of rdg. + 20 digits)	±(0.1% of rdg. + 100 digits)	1 μV
	1 V	−1.0000 to 1.0000 V	±(0.05% of rdg. + 2 digits)	±(0.1% of rdg. + 10 digits)	100 μV
	60 V (high resolution)	0.0000 to 6.0000 V	±(0.05% of rdg. + 20 digits)	±(0.1% of rdg. + 100 digits)	100 μV
4-wire RTD measurement current (1 mA)	Cu10 at 20°C alpha=0.00392	−200.0 to 300.0°C	±(0.1% of rdg. + 2°C)	±(0.2% of rdg. + 5°C)	0.1°C
	Cu10 at 20°C alpha=0.00393	−200.0 to 300.0°C			
	Cu25 at 0°C alpha=0.00425	−200.0 to 300.0°C	±(0.1% of rdg. + 0.5°C)	±(0.2% of rdg. + 2°C)	0.1°C
	Cu53 at 0°C alpha=0.00426035	−50.0 to 150.0°C	±(0.05% of rdg. + 0.3°C)	±(0.1% of rdg. + 1.5°C)	0.1°C
	Cu100 at 0°C alpha=0.00425	−50.0 to 150.0°C			
	Pt25(JPt100×1/4)	−200.0 to 550.0°C	±(0.1% of rdg. + 0.5°C)	±(0.2% of rdg. + 2°C)	0.1°C
	Cu10 GE *1 (high resolution)	−200.0 to 300.0°C	±(0.1% of rdg. + 2°C)	±(0.2% of rdg. + 5°C)	0.1°C
	Cu10 L&N *1 (high resolution)	−200.0 to 300.0°C			
	Cu10 WEED *1 (high resolution)	−200.0 to 300.0°C			
	Cu10 BAILEY *1 (high resolution)	−200.0 to 300.0°C			

T12.EPS

*1 Guaranteed accuracy range Cu10 GE: –84.4 to 170.0°C/Cu 10 L&N: –75.0 to 150.0°C/Cu 10 WEED: –20.0 to 250.0°C/Cu 10 BAILEY: –20.0 to 250.0°C

Maximum input voltage: 1 VDC range or less/RTD/resistance/DI (contact): ±10 VDC (continuous)
Other measurement ranges: ±120 VDC (continuous)

Normal mode voltage:
VDC, DI (LEVEL): 1.2 times the rated range or less (50/60 Hz, peak values including signals)
2 kΩ resistance, RTD 100/500/1000 Ω systems: 50 mV peak
200 Ω resistance, RTD 10/25/50 Ω systems: 10 mV peak
20 Ω resistance: 4 mV peak

Normal-mode rejection ratio (NMRR):
40 dB or more (50/60 Hz ±0.1%) when the integral time is 16.67 ms or more.
50/60 Hz is not rejected when the integral time is 1.67 ms.

Commn mode voltage: 600 VACrms (50/60Hz), reinforced (double) insulation

Common-mode rejection ratio (CMRR):
120 dB or more when the integral time is 16.67 ms or more. 80 dB or more when the integral time is 1.67 ms. 50/60 Hz ±0.1%, 500 Ω imbalance (for voltage), between the minus measurement terminal and ground, (In the RTD and resistance ranges, CMRR is caluculated by the voltage conversion values while the measured current is applied).

Common mode voltage between channels: 120 VACrms (50/60 Hz) for DCV/DI
50 VACrms (50/60 Hz) for RTD/resistance

Noise rejection: Rejection by the integrating A/D and the use of low pass filters.

Input resistance: 10 MΩ or more at the 1 VDC range or lower.
Approximately 1 MΩ at the 2 VDC range or higher.

Insulation resistance: 20 MΩ or more between an input terminal and ground (500 VDC)

Input bias current: 10 nA or less

Withstanding voltage:
Between input terminals (DCV or DI range), 1000 VACrms (50/60 Hz) for one minute
Between input terminals (RTD or resistance range), 620 VACrms (50/60 Hz) for one minute

Between an input terminal and ground, 3700 VACrms (50/60 Hz) for one minute
Input signal source resistance:
2 kΩ or less for DCV range
10 Ω or less per cable for the resistance and RTD ranges (common for all ranges)
Allowable parallel capacity: 0.01 μF or less (when using the resistance or RTD range)
Power consumption: Approximately 1.2 W
External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
Weight: Approximately 0.5 kg
Terminal type: Clamp terminal. The plate with clamp terminals can be attached/detached.
Applicable cable size: 0.14-1.5 mm^2 (AWG26-16)

Influence of operating conditions (applicable if the integral time is 16.67 ms or more)
Warm-up time: 30 minutes or more after the power supply is turned on.
Influence of ambient temperature: Influence on a change in ambient temperature of 10°C is within ±(0.05% of rdg. + 0.05% of range). However, Cu10 Ω: ±(0.2% of range + 1 digit)
Influence of power supply fluctuations: Specifications of accuracy are satisfied at AC power 90-132 V or 180-250 V.
Influence of external magnetic fields: Fluctuations of external magnetic fields of alternate current (50/60 Hz) 400A/m is ±(0.1% of rdg. + 10 digits) or less
Influence of signal source resistance:
Influences on fluctuations of signal source resistance (1 kΩ) of voltage are:
1 V range or lower: ±10 μV or less
2 V range or more: ±0.15% of rdg. or less
Fluctuations on a change of 10 Ω per resistance temperature detector cable are:
1000 Ω, or 100 Ω systems: ±0.1°C or less
Other systems: ±1.0°C or less
Fluctuations on a change of 10 Ω per resistance cable are within ±1 digit.
Influence of attitude:
Basically, the system shall be used in a horizontal position with its legs extended downward.
Influence of vibration:
Fluctuations when sine wave vibrations in the frequency of 10-60 Hz and at an acceleration of 0.2 m/s^2 are applied for two hours respectively in three axis directions shall be ±(0.1% of rdg. + 1 digit) or less.

• Four-Channel Medium-Speed Strain Input Module (MX112-xxx-M04)

Style number: S2
Types of measurement: Strain gauge or strain gauge sensor (static strain)
Number of measurement points: 4 (scanning of 4 channels with one A/D)
Input method: Floating balanced input
A/D resolution: ±20000 (16-bit A/D is used), except for an integral time of 1.67ms
Measurement interval and A/D integral time: A/D integral time is determined by measurement interval.

Measurement interval	Integral time	Noise rejection /remarks
100 ms	1.67 ms(*1)	600 Hz and its integer multiples
200 ms	16.67 ms	60 Hz and its integer multiples
	20 ms	50 Hz and its integer multiples
	Auto	Power supply frequency is automatically detected and is set to 16.67/20 ms
500 ms	36.67 ms	50/60 Hz and the respective integer multiples
1 s	100 ms	10 Hz and its integer multiples
2 s	200 ms	Fc = 5 Hz low pass filter
5, 10, 20, 30, 60 s		

T13.EPS

(*1) If strain measurements are taken at an integral time of 1.67 ms, the measured values may be susceptible to inaccuracies due to power supply frequency noise. If this is the case, set the integral time to 16.67 ms or longer (for a power supply frequency of 60 Hz), or 20 ms or longer (for a power supply frequency of 50 Hz). On this module, the power supply frequency noise can be rejected by selecting a measurement interval of 200ms or more. (on DAQMASTER, the integral time is automatically set when selecting the measurement interval.)

Gauge connection method:
Single-gauge (2 or 3 wire), opposed-side two-gauge, adjacent-side two-gauge or four-gauge.
In the case of -B12 and -B35, set the connection method using the DIP switch on the module. -B12 and -B35 allow DIP switch setting by channel.
Applicable gauge resistance:
100 to 1000Ω.
Built-in resistance of 120 Ω for -B12, and 350 Ω for -B35
Bridge voltage: 2 VDC fixed (accurate to ±5 %)
Applicable gauge factor: 2.0 fixed, gauge factor correction possible with scaling function
Balance adjustment: Automatic (digital computation method)
Balance adjustment range: ±10,000 μ strain (for single-gauge method)
Balance adjustment accuracy: Less than or equal to the measurement accuracy
Measurement ranges and accuracies (single-gauge method conversion, other gauge methods use conversion by scaling):
The accuracy applies to standard operating conditions: ambient temp: 23±2°C, ambient humidity: 55±10% RH, supply voltage: 90 to 250 VAC, power frequency: 50/60 Hz ± 1%, warm-up time: at least 30 minutes, without adverse conditions such as vibrations.

Measurement range	Measuring range	Integral time 16.67 ms or more		Integral time 16.67 ms	
		Measurement accuracy	Resolution	Measurement accuracy	Resolution
2000 μ strain	± 2000 μ strain	± 0.5% of range	0.1 μ strain	2% of range	1 μ strain
20000 μ strain	± 20000 μ strain	± 0.3% of range	1 μ strain	1% of range	2 μ strain
200000 μ strain	± 200000 μ strain	± 0.3% of range	10 μ strain	1% of range	10 μ strain

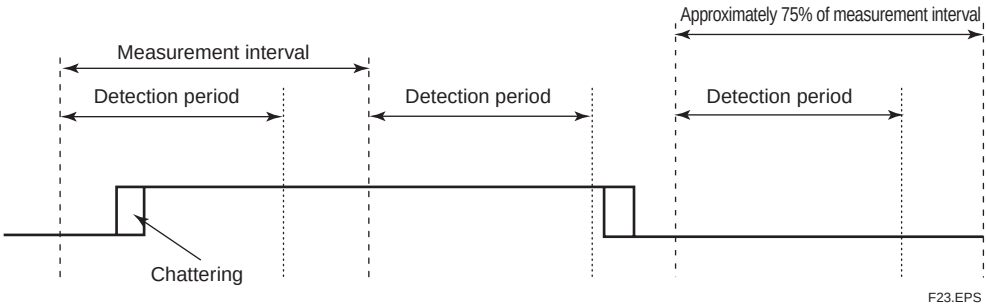
T14.EPS

Bridge resistance accuracy (-B12, -B35): ±0.01% ±5ppm/°C
Input resistance: 1 MΩ or more
Allowable wiring resistance: 100 Ω or less
Influence of wiring resistance:
For -B12 and -B35, the wiring resistance component is not corrected.
Depends on the gauge resistance.
For -NDI, 50 ppm of rdg./Ω (when using remote sense wires)
Temperature coefficient: ±100 ppm of range/°C

Allowable input voltage: ±10 VDC (between H-L) continuous
Common mode voltage:
-B12, -B35: Between channels: 30 VACrms (50/60 Hz)
Between an input terminal and ground: 250 VACrms (50/60 Hz)
-NDI: Between channels: 30 VACrms (50/60 Hz)
Between an input terminal and ground: 30 VACrms (50/60 Hz)
(the connector shell is connected to earth potential.)
Common-mode rejection ratio (CMRR), (-NDI is not applicable.):
120 dB or more when the integral time is 16.67 ms or more. (50/60 Hz ±0.1%)
80 dB or more when the integral time is 1.67 ms. (50/60 Hz ±0.1%)
(voltage conversion value given a bridge voltage of 2 V)
Normal-mode rejection ratio (NMRR):
40 dB or more (50/60 Hz ±0.1%) when the integral time is 16.67 ms or more.
50/60 Hz is not rejected when the integral time is 1.67 ms.
(voltage conversion value given a bridge voltage of 2 V).
Influence of external magnetic fields: Fluctuations of external magnetic fields of alternate current (50/60 Hz) 400A/m is ±2% of range or less (measurement interval of 200 ms or more).
Insulation resistance (-NDI is not applicable.):
Between an input terminal and ground, 20 MΩ or more (500 VDC)
Withstanding voltage (-NDI is not applicable.):
Between an input terminal and ground, 2300 VACrms (50/60 Hz) for one minute
Between channels, 50 V peak or less
Terminal type:
-B12, -B35: Clamp terminal (the plate with clamp terminals can be attached/detached.)
-NDI: NDIS connector
Applicable cable size (-B12, -B35): 0.14-1.5 mm^2 (AWG26-16)
Power consumption: Approximately 3 W
External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
Weight: Approximately 0.5 kg
Calculations related to strain measurement (performed on the main module):
Initial balance: The initial balance value is measured and set as the 0 point.
Initialization of the initial balance value: Returns the initial balance value to 0.
Reloading of the initial balance value: Reloads the saved initial balance value.
When using Yokogawa's dedicated software (MX100 Standard Software or MXLOGGER), the initial balance value is stored in the PC software project file. Reloading is performed by reading the project file.

• Ten-Channel High-Speed 5 V Digital Input Module (MX115-D05-H10)

Style number: S1
Input type: Non-voltage contact, level (5 V logic), open collector
Number of channels: 10
Input format: Pull-up at approximately 5 V/approximately 5 kΩ. No isolation between channels
Measurement interval: 10/50/100/200/500 ms, 1/2/5/10/20/30/60 s
Filter: To be determined by majority for the period corresponding to approximately 75% of a measurement interval if the measurement interval is 5 seconds or less
To be determined by majority for approximately 4.5 seconds if the measurement interval is 5 seconds or more

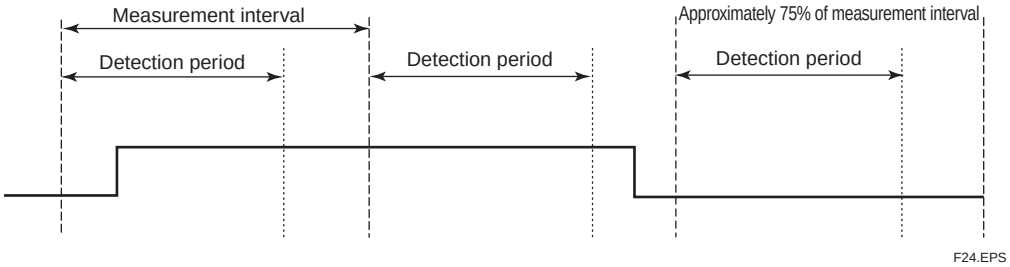


If a measurement interval is set to four times or more of the chattering continuation time, measurement can be performed without being influenced by chattering. (Reference information: The chattering of the general relays is approximately 20 ms.)

Minimum detection pulse width: two times or more of a measurement interval
Input threshold level:
Non-voltage contact, open collector: “On” for 100 Ω or less, “Off” for 100 kΩ or more
Level (5 V logic): “Off” for 1 V or less, “On” for 3 V or more
Hysteresis width: Approximately 0.1 V
Contact, rated transistor:
Rated contact with 15 VDC or more and 30 mA or more
Rated transistor with Vce > 15 Vdc and Ic > 30 mA
Maximum input voltage: 10 VDC
Commn mode voltage: 250 VACrms (50/60Hz) between an input terminal and ground
Insulation resistance:
20 MΩ or more (500 VDC) between an input terminal and ground
Withstand voltage: 2300 VACrms (50/60Hz) between an input terminal and ground, one minute
Power consumption: Approximately 1.5 W
External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
Weight: Approximately 0.5 kg
Terminal type: Clamp terminal. The plate with clamp terminals can be attached/detached.
Applicable cable size: 0.14-1.5 mm^2 (AWG26-16)

• Ten-Channel High-Speed 24 V Digital Input Module (MX115-D24-H10)

Style number: S2
Input type: Level (24 V logic), No isolation between channels
Number of channels: 10
Measurement interval: 10/ 50/100/200/500 ms, 1/2/5/10/20/30/60 s
Filter: To be determined by majority for the period corresponding to approximately 75% of a measurement interval if the measurement interval is 5 seconds or less
To be determined by majority for approximately 4.5 seconds if the measurement interval is 5 seconds or more

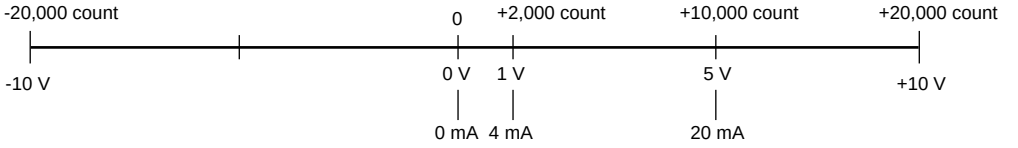


Input resistance: Approximately 200 kΩ (between + and - terminals)
Maximum input voltage: 50 VDC
Minimum detection pulse width: two times the measurement interval or more
Input threshold level: “Off” for 6 V or less, “ON” for 16 V or more
Hysteresis width: Approximately 1.5 V
Commn mode voltage: 250 VACrms (50/60Hz) between an input terminal and ground
Insulation resistance: 20 MΩ or more between an input terminal and ground (500 VDC)
Withstand voltage: 2300 VACrms (50/60Hz) between an input terminal and ground, one minute
Power consumption: Approximately 1.5 W
External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
Weight: Approximately 0.5 kg
Terminal type: Clamp terminal. The plate with clamp terminals can be attached/detached.
Applicable cable size: 0.14-1.5 mm^2 (AWG26-16)

• Eight-Channel Medium-Speed Analog Output Module (MX120-VAO-M08)

Style number: S2
Number of output points: 8
Output types: DC voltage, DC current (allows mixed voltage and current output)
Output data:
Command output, manual output: Output of set and calculated values, and retransmission of measured values across units are carried out by commands from the PC.
Retransmission output: Scales values measured on input modules in the same unit and outputs them. Output is continuous even when communications are cut as the operation is performed inside the main module.
Other Output:
Output during power cycle:
Outputs from the time the power is turned ON until measurement starts or a command is received. Previous values (values active at the time the power was last turned OFF), or preset values can be selected for output.
Output during abnormalities (errors):
Outputs when input values for transmission output are erroneous, communications are cut, the CPU is down, or other errors occur. Previous values (values active just prior to the abnormality), or preset values can be selected for output.
Output during ± over
Output occurs at ±5% of the output setting span when the input values for transmission output are ± over. (However, the available output range is -11 V - + 11 V (voltage) and 0 - 20 mA (current)).
Note 1) Preset values: Specified values can be set one per channel. However, preset values during power cycle or abnormality (error) are the same.
Note 2) Preset and previous values are stored in the module. The preset and previous values are initialized to 0 when the instrument is re-configured.
Output update cycle: 100 ms
Rated output range: Voltage: –10 to 10 V, current: 0 to 20 mA, sourcing (4 to 20 mA is output at 1 to 5 V output)
Maximum allowable output range: Voltage: –11 to +11 V, current: 0 to 22 mA
Load resistance: Voltage: 5 kΩ or more, current: 600 Ω or less
Accuracy (at rated output): ±0.2% of F.S. (F.S.= 10 V or 20 mA). However, for current output, accuracy is met at 1 mA or more. The accuracy applies to standard operating conditions: ambient temp: 23±2°C, ambient humidity: 55±10% RH, supply voltage: 90 to 250 VAC, power frequency: 50/60 Hz ± 1%, warm-up time: at least 30 minutes, without adverse conditions such as vibrations.
Output resolution: 12 bit of F.S. or more

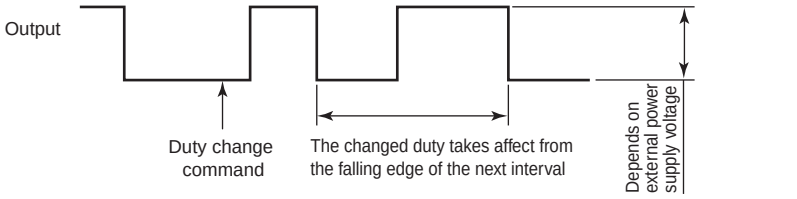
The relationship between the output voltage/current value and the internal count value (designed center value)



The setting resolution is as follows.
Yokogawa's dedicated PC software (MX100 Standard Software or MXLOGGER):
–10.000 V to 10.000 V (1 mV resolution)
0.000 mA to 20.000 mA (1 μA resolution)
Influence of ambient temperature: Per 1°C, ±(50 ppm of setting + 50 ppm of F.S.) or less (F.S. = 10 V or 20 mA)
External power supply (used for current output): 24 V ±10% and current capacity of 250 mA or more.
(Use of external power supplies is not necessary with only voltage output)
Common mode voltage: Between an output terminal and ground, 250 VACrms (50/60 Hz)
Insulation resistance:
Between an output terminal and ground, 20 MΩ or more (500 VDC)
Between output terminals, non-isolated (minus terminals share common potential)
Withstanding voltage:
Between an output terminal and ground, 2300 VACrms (50/60 Hz) for one minute
Between output terminals, non-isolated (minus terminals share common potential)
Power consumption: Approximately 2.5 W (excluding power consumption of external voltage sources)
External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
Weight: Approximately 0.5 kg
Terminal type: Clamp terminal (detachable every 4 channels)
Applicable cable size: 0.08-2.5 mm^2 (AWG28-12)
Note: The RJC accuracy of an universal input module may be influenced if placed to the left-side of this module.

• Eight-Channel Medium-Speed PWM Output Module (MX120-PWM-M08)

Style number: S2
Number of output points: 8
Pulse (output) interval: 1 ms to 30 s (1 ms interval setting range, set in 1 ms units per channel)
10 ms to 300 s (10 ms interval setting range, set in 10 ms units per channel)
Pulse interval accuracy: ±100 ppm of setting value
Output update cycle: 100 ms
Update timing: Duty is updated from the falling edge of the next cycle after receiving the update command.



F25.EPS

Duty resolution: 1 ms interval setting range: 1/12000, 10 ms interval setting range: 1/60000
The setting resolution is as follows. However, output is at the hardware resolution above.
Yokogawa's dedicated PC software (MX100 Standard Software or MXLOGGER):
0-100.000% (0.001% resolution)
API/MX100 unit: 0-100% set at 0-100,000 count
Duty accuracy (at load resistance of 100 Ω or less):
For 1 ms interval setting range, ±0.017% or ±2 μ sec whichever is longer.
For 10 ms interval setting range, ±0.0035% or ±2 μ sec whichever is longer.
When the load resistance is higher than 100 Ω, the output Duty may vary from the specification.
Output data:
Command output, manual output: Output of set and calculated values, and retransmission of measured values across units are carried out by commands from the PC.
Retransmission output: Scales values measured on input modules in the same unit and outputs them. Output is continuous even when communications are cut as the operation is performed inside the main module.
Other Output:
Output during power cycle:
Outputs from the time the power is turned ON until measurement starts or a command is received. Previous values (values active at the time the power was last turned OFF), or preset values can be selected for output.
Output during abnormalities (errors):
Outputs when input values for transmission output are erroneous, communications are cut, the CPU is down, or other errors occur. Previous values (values active just prior to the abnormality), or preset values can be selected for output.
Output during ± over
Output occurs at ±5% of the output setting span when the input values for transmission output are ± over. (However, the lower limit is 0% and the upper limit is 100%)
Note 1) Preset values: Specified values can be set one per channel. However, preset values during power cycle or abnormality (error) are the same.
Note 2) Preset and previous values are stored in the module. The preset and previous values are initialized to 0 when the instrument is re-configured.
Output format: External power supply sourcing
ON resistance: 2 Ω or less (when the output current is 200 mA or more)
External power supply: 4 V to 28 V
Output capacity: Max 1 A/ch, however, the total of one module is 4 A or less (approximately 1 A current limit circuit built-in)
(Note 1) A current limit circuit of approximately 1 A is built in to the output circuit. Once the current limit circuit turns ON, the limit circuit continues to operate unless the external power supply is turned OFF (holds the output OFF condition). Once the external power supply is turned OFF, check the load condition before restarting it again.
(Note 2) This module has a built-in fuse. The built-in fuse protects the instrument from fires or abnormal emission of heat during load shortages or other abnormalities, but does not prevent damage to the internal circuit element.
Commn mode voltage: 250 VACrms (50/60Hz) between an output terminal and ground
Insulation resistance: Between an output terminal and ground, 20 MΩ or more (500 VDC)
Between output terminals, non-isolated
Withstanding voltage:
Between an output terminal and ground, 2300 VACrms (50/60 Hz) for one minute
Between output terminals, non-isolated

Power consumption: Approximately 2.5 W (excluding power consumption of external voltage sources)
External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
Weight: Approximately 0.5 kg
Terminal type: Clamp terminal (detachable every 4 channels)
Applicable cable size: 0.08-2.5 mm^2 (AWG28-12)
Note: The RJC accuracy of an universal input module may be influenced if placed to the left-side of this module.

• Ten-Channel Medium-Speed Digital Output Module (MX125-MKC-M10)

Style number: S1
Output types: Alarm output, PC command output (manual output), failure output, error output
Number of output points: 10
Contact mode: “A” contact (SPST)
Output update cycle: output per 100 ms (not synchronized with measurement intervals)
Contact capacity: 250 VDC/ 0.1 A, 250 VAC/2 A, 30 VDC / 2 A (resistance load)
Contact lifespan: Approximately 100000 times at the rated load. Approximately 20000000 times with no load. The contact life depends on load and operating conditions.
Commn mode voltage: 250 VACrms (50/60Hz) between an output terminal and ground
Insulation resistance:
20 MΩ or more (500 VDC) between an output terminal and ground
20 MΩ or more (500 VDC) between output terminals
Withstand voltage: 2300 VACrms (50/60Hz) between an output terminal and ground, one minute
2300 VACrms (50/60Hz) between output terminals, one minute
Power consumption: Approximately 2 W (when all relays are turned on)
External dimension: Approximately 57 × 131 × 150 mm (including the terminal cover)
Weight: Approximately 0.5 kg
Terminal type: Clamp terminal (detachable every 5 channels)
Applicable cable size: 0.08-2.5 mm^2 (AWG28-12)
Others: The excitation/non-excitation switchover and the hold/non-hold switchover are available.

PC software specifications

- **MX100 standard software (attached to the main module of MX100): for connection with a single MX unit**
- **Release number:** R2.01 or later
- **Integrated Monitor (main functions):**
  Setting of the basic connection, setting of various conditions (range, measurement interval, computation, tag), monitor display (digital, trend), 32 channels in one group, 10 groups, logging, computation function (60 channels), alarm output, retransmission output, manual digital output, manual analog/PWM output, etc.
- **Viewer (main functions):**
  Re-display of saved data files, 32 channels in one group, 50 groups, data synchronization processing, file merge display (limited to files that can be merged), multi-interval supported (If channels with different intervals are assigned to the same group, windows are split (up to four splits) and displayed.), graph, digital display/print, cursor value display, interval arithmetic, alarm display, mark display, alarm/mark search, file information display, tag, tag comment, channel display switchover, data formatting conversion (conversion to ASCII, Excel, or Lotus format), etc.
- **Calibration software (main function): calibration function**
- **Operating environment**
  CPU: Intel Pentium II 400 MHz or more (recommended: Pentium III and 1 GHz or more)
  Memory: 256 MB or more (recommended: 512 MB or more)
  OS: Windows NT 4.0/2000/XP (recommended)
  Hard disk capacity: Free space of 50 MB or more (recommended: Hard disk with free space of 1 GB or more that operates at maximum speed)
  Communication interface: Ethernet that can be used for Windows (recommended: 100 Base-TX supported)
  CD-ROM drive: CD-ROM drive that can be used for Windows
  Printer: printer that can be used for Windows (to be used for printing)

- **MXLOGGER (optional)**

  This is used to connect multiple MX units. Up to 20 units can be connected.
- **Release number:** R2.01 or later
- **Integrated Monitor (main functions):**
  Setting of the basic connection, setting of various conditions (range/alarm, measurement interval, computation), project functions (project switchover, copy, deletion), logging, computation function (240 channels, computation across units possible), alarm output, file split save function, retransmission output, manual digital output, manual analog/PWM output, activation of various types of software, display-related settings, 32 channels in one group, 50 groups, monitor displays (trend, digital, meter, alarm), multi-interval supported (If channels with different intervals are assigned to the same group in trend graphs, windows are split (up to four splits) and displayed.), All-channel trend display, temporary suspension, tag, tag comment, channel display switchover, marking function, event processor (automatic conversion, ftp, mail), Automatic start function, etc.
- **Viewer (main functions):**
  Re-display of saved data files, data synchronization processing, file merge display (limited to files that can be merged), 32 channels in one group, 50 groups, multi-interval supported (If channels with different intervals are assigned to the same group in trend graphs, windows are split (up to four splits) and displayed.), graph, digital display/print, cursor value display, interval arithmetic, alarm display, mark display, alarm/mark seach, file information display, tag, tag comment, channel display switchover, embedding of backup file data , data formatting conversion (conversion to ASCII, Excel, or Lotus format), etc.
- **Monitor Server (main functions):**
  Retention of 1,800-point data/channels, connection with DAQLOGGER/AddObserver/AddMulti possible, acquisition of instantaneous values on all channels, etc.
- **DDE server**
- **Operating environment:**
  CPU: Intel Pentium III 800 MHz or more (recommended: Pentium 4, 1.6 GHz or more)
  Memory: 512 MB or more (recommended: 1 GB or more)
  OS: Windows NT 4.0/2000/XP (recommended)
  Hard disk capacity: Free space of 100 MB or more (recommended: Hard disk with free space of 2 GB or more that operates at maximum speed)
  Communication interface: Ethernet that can be used for Windows (recommended: 100 Base-TX supported)
  CD-ROM drive: CD-ROM drive that can be used for Windows (to be used for installation)
  Printer: printer that can be used for Windows (to be used for printing)

- **API for MX100/DARWIN (optional): a suite of functions for creating PC software**

- **Release number:** R2.01 or later
  Supported models: MX100/DARWIN series
  Supported OS: Widows 98/NT 4.0 SP3 or later/2000/XP
  Communication system: TCP/IP (Ethernet)
  User development environment: MS Visual Studio 6.0 SP5 or later
  Supported language: Visual C, Visual C++, Visual Basic, Visual Basic.NET, C#

■ Model Name

Main Module

Model	Suffix Code		Option Code	Description
MX100				Main module (with MX100 Standard Software)
IM Language	-E			With English instruction manual
Power supply voltage	-1			100 VAC-240 VAC
Power supply inlet, power supply cord		D		3-pin power inlet with UL, CSA cable
		F		3-pin power inlet with VDE cable
		R		3-pin power inlet with SAA cable
		Q		3-pin power inlet with BS cable
		H		3-pin power inlet with CCC (China standard) cable
		W		Screw terminal without power cord
Option			/DS	Dual Save function

T15.EPS

Input/Output Module

Model	Suffix Code		Option Code	Description
MX110				Analog input module for MX
Input type	-UNV			DCV/TC/DI/3-wire RTD *1
	-V4R			DCV/DI/4-wire RTD/4-wire resistance *1
Measurement interval, number of channels		-H04		4 channels, high speed (shortest measurement interval: 10 ms)
		-M06		6 channels, medium speed (shortest measurement interval: 100 ms) *1
		-M10		10 channels, medium speed (shortest measurement interval: 100 ms) *2
Option			/NC	The plate with clamp terminals is not attached. *2

T16.EPS

*1: "-M06" must be specified when "-V4R" is specified.
"-M06" can not be specified when "-UNV" is specified.
*2: "/NC" can be speciffied only when "-M10" is speciffied.

Model	Suffix Code		Description
MX112			Strain input module
Input type	-B12		Built-in bridge resistance: 120 Ω
	-B35		Built-in bridge resistance: 350 Ω
	-NDI		For connection to external bridge head and strain gauge type sensor (NDIS connector)
Measurement interval, number of channels		-M04	4ch, Medium speed (Shortest measurement interval: 100ms)

T17.EPS

Model	Suffix Code		Option Code	Description
MX115				Digital input module for MX
Input type	-D05			Non-voltage contact, 5 V logic, open collector
	-D24			24 V logic
Measurement interval, number of channels		-H10		10 channels, high speed (shortest measurement interval: 10 ms)
Option			/NC	The plate with clamp terminals is not attached.

T18.EPS

Model	Suffix Code	Description
MX120		Analog output module
Output type	-VAO	Voltage/Current output (allows mixed voltage and current output)
	-PWM	Pulse width modulation output
Measurement interval, number of channels	-M08	8ch, output update cycle: 100ms

T19.EPS

Model	Suffix Code	Description
MX125		Digital output module for MX
Output type	-MKC	“A” contact (SPST)
Output update cycle, number of channels	-M10	10 channels, shortest output update cycle: 100 ms

T20.EPS

Model	Suffix Code	Description
MX150		Base plate for MX
Base type	-1	For connection with one main module and one input/output module
	-2	For connection with one main module and two input/output module
	-3	For connection with one main module and three input/output modules
	-4	For connection with one main module and four input/output modules
	-5	For connection with one main module and five input/output modules
	-6	For connection with one main module and six input/output modules

T21.EPS

Accessories

Model	Suffix Code	Description
772050		MX100 version up kit
	-01	Upgrade to the most recent style

T22.EPS

Note: The 772050-01 is only available for the standard, non-customized MX100. Also, the /DS option cannot be added with this kit.

Model	Description
772061	Ten-Channel Screw (M4) Terminal Block (RJC included)

T23.EPS

Note: The 772061 model is applicable only to the MX110-UNV-M10 (Ten-Channel Medium-Speed Universal Input Module), the MX115-D05-H10 (Ten-Channel High-Speed 5 V Digital Input Module) or the MX115-D24-H10 (Ten-Channel High-Speed 24 V Digital Input Module).

Model	Suffix Code	Description
772062		Cable for connection between the input module and the screw terminal block
Cable length	-050	50 cm cable
	-100	100 cm cable

T24.EPS

Note: The 772062 model is applicable only between the MX110-UNV-M10 (Ten-Channel Medium-Speed Universal Input Module) and the Screw Terminal Block (772061), between the MX115-D05-H10 (Ten-Channel High-Speed 5 V Digital Input Module) and the Screw Terminal Block (772061) or between the MX115-D24-H10 (Ten-Channel High-Speed 24 V Digital Input Module) and the Screw Terminal Block (772061).

Model	Description
772063	Plate with clamp terminals (RJC included)

T25.EPS

Note: The 772063 model is applicable only to the MX110-UNV-M10 (Ten-Channel Medium-Speed Universal Input Module), the MX115-D05-H10 (Ten-Channel High-Speed 5 V Digital Input Module) or the MX115-D24-H10 (Ten-Channel High-Speed 24 V Digital Input Module).

Model	Description
772064	Clamp terminals

T26.EPS

Note: The 772064 model is applicable only to the MX110-UNV-H04 (Four-Channel High-Speed Universal Input Module).

Model	Description
772065	Clamp terminals

T27.EPS

Note: The 772065 model is applicable only to the MX120-VAO-M08 (Eight-Channel Medium-Speed Analog Output Module), the MX120-PWM-M08 (Eight-Channel Medium-Speed PWM Output Module) or the MX125-MKC-M10 (Ten-Channel Medium-Speed Digital output Module).

Model	Description
772066	Connector cover for base plate

T28.EPS

Model	Description
772067	Plate with clamp terminals

T29.EPS

Note: The 772067 model is applicable only to the MX110-V4R-M06 (Six-Channel Medium-Speed 4-Wire RTD and Resistance Input Module).

Model	Description
772068	Plate with clamp terminals (Built-in bridge resistance of 120 Ω)

T30.EPS

Note: The 772068 is applicable only to the MX112-B12-M04 (Four-Channel Medium Speed Strain Input Module, 120 Ω), or the MX112-B35-M04 (Four-Channel Medium Speed Strain Input Module, 350 Ω).

Model	Description
772069	Plate with clamp terminals (Built-in bridge resistance of 350 Ω)

T31.EPS

Note: The 772069 is applicable only to the MX112-B35-M04 (Four-Channel Medium Speed Strain Input Module, 350 Ω), or the MX112-B12-M04 (Four-Channel Medium Speed Strain Input Module, 120 Ω).

Accessories (avairable separately)

Name	Model (Part No.)	Specifications
Shunt Resistance (for clamp terminals)	438920	250Ω ± 0.1%
	438921	100Ω ± 0.1%
	438922	10Ω ± 0.1%
Shunt Resistance (for screw terminals)	415920	250Ω ± 0.1%
	415921	100Ω ± 0.1%
	415922	10Ω ± 0.1%

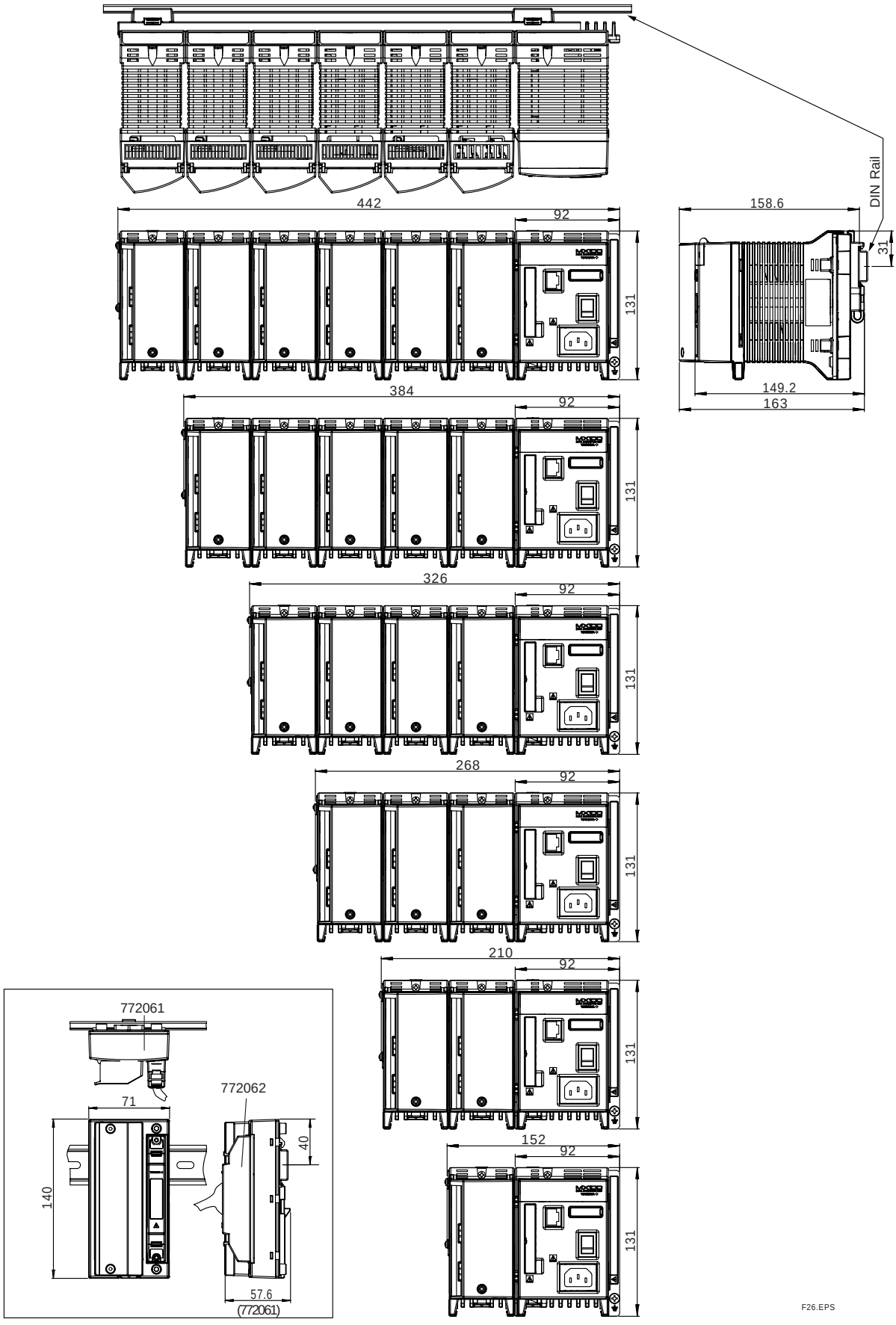
T32.EPS

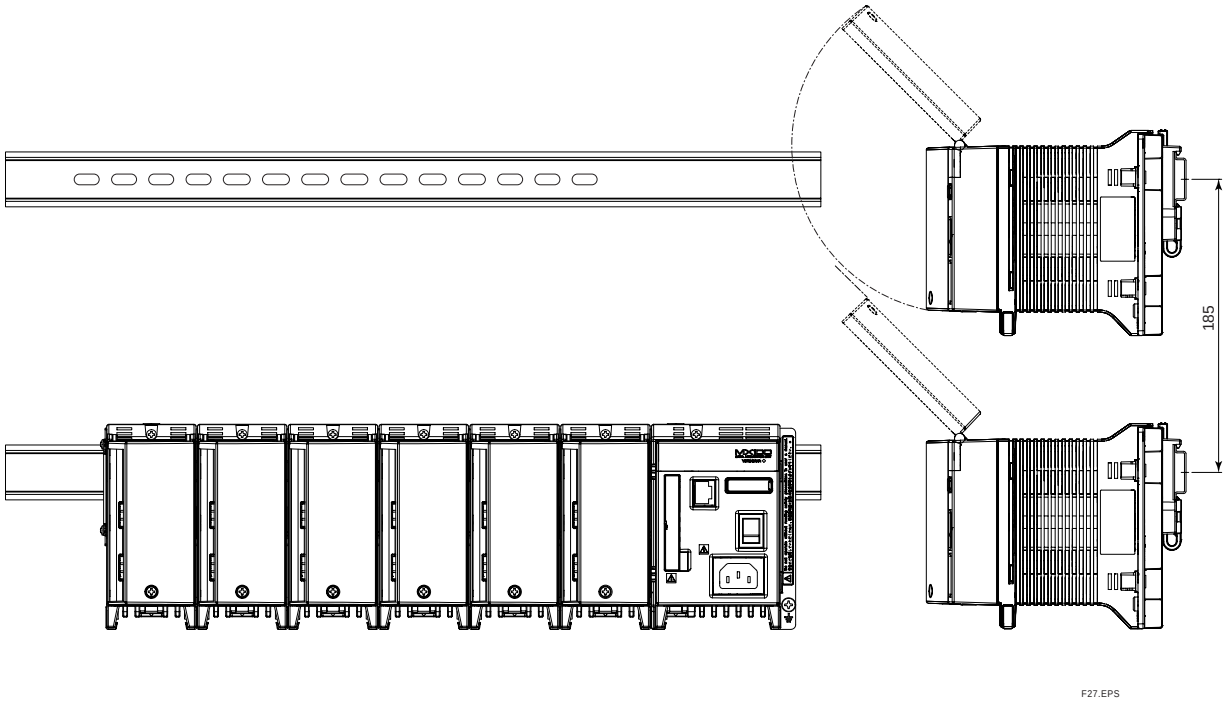
Application Software

Model	Description
MX180	MX100 Standard Software (For connection with one MX unit)
WX103/CD1	MXLOGGER (For connection with multiple MX units. Up to 20 units)
MX190	API for MX100/DARWIN (Suite of functions for creating programs)

T33.EPS

External Drawing





Dimension for installation in upper and lower directions using the DIN rail.

Caution when mounting the DIN rail:

Be sure to fix the DIN rail (such as by screws) at three or more points including both ends of the equipment and the center. If it is fixed at two points or less, the equipment may bend.