General Specification

## Model VZ20X Analog Sensing Unit

GS 77V01B01-01EN

■ Outline

The VZ20X Analog Sensing Unit can measure various analog signals at high speed, high accuracy and simultaneously. Isolation between input channels ensures excellent noise resistance. VZ20X measurement data can be acquired on a PC, PLC or other host device via Ethernet.

■ Features

● Reliable Sensing
A single unit can measure analog inputs on 8 channels at high accuracy and at a high-speed sampling (1ms).
Multiple channels (a maximum of 120 channels on 15 units) can be measured simultaneously.
(See "■ Communication Specifications")
Isolation is provided between input channels to make it less susceptible to noise in the installation environment.

● Smallest In Its Class In the Word, Compact and Savings in Wiring Used
Its compact size (external dimensions: 50 (width) x 78 (height) x 65 (depth)) ensures that it takes up a small footprint in manufacturing facilities.
Adoption of a push-in type connection allows the product to be mounted simply by inserting a ferrule terminal.

● Various Analog Sensors Supported
DC voltage, standard signal, resistance, thermocouple, and resistance temperature detector can be measured on a single unit.

■ System Configuration (example)
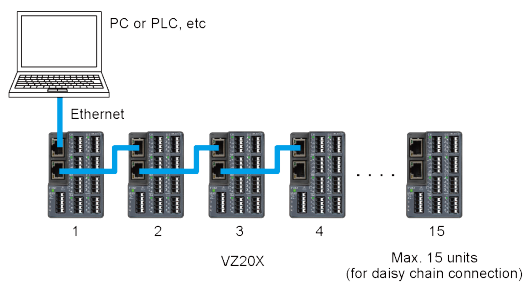
Time synchronization supported in this configuration (daisy chain connection, excluding when Connection type is "1 unit")
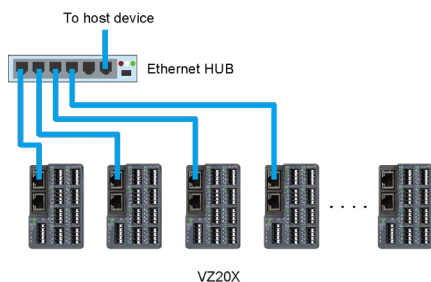

Time synchronization not supported in this configuration

■ Input Functions

• Data acquisition interval
Selectable from 1 ms, 10 ms, 50 ms, 100 ms
Settings common to all channels

• Power supply frequency noise removal filter
Can be switched ON/OFF for each individual channel
Filter selectable from 50 Hz, 60 Hz, Common
Filter time constant
50 Hz: Approx. 25 ms
60 Hz: Approx. 32 ms
Common: Approx. 63 ms

• Moving average filter
Can be switched ON/OFF for each individual channel
Moving average count selectable in range 2 to 100 times

• First-order lag filter
Can be switched ON/OFF for each individual channel
Filter time constant is data acquisition interval x N (where, N is selectable in range 1 to 100)

• Scale
Voltage, standard signal, and resistance signal input can be scaled
Settable on each individual channel

• Bias
Bias value to add to value after scaling can be set
Settable on each individual channel

● Input calculation processing
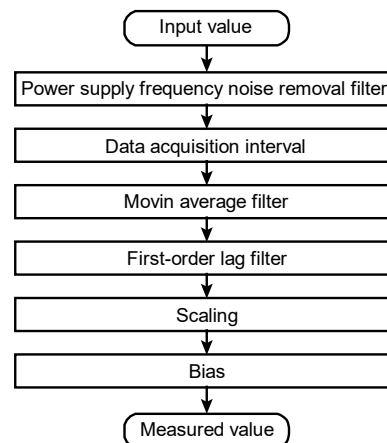
■ Time Synchronization Functions

With a daisy chain connection (up to 15 units), it is possible to perform measurement on a maximum of 120 channels at the same A/D conversion timing. However, the same data acquisition interval needs to be set for the channels.

- Clock: With date (western calendar)
  Clock setting is not backed up when the power is turned off. The date and time are acquired and set from the host device (GA10, PC, etc.) at startup.
  Accuracy: ±5 ppm
- Synchronization accuracy of input sampling (in daisy chain connection): Less than ±100 μs (across VZ20X channels and units)
- Time setting: Not backed up. The date and time are acquired from the host device (GA10, PC, etc.) at startup.
  When the host device is the GA10, the date and time are acquired only once when the VZ20X is connected from the GA10.
  When the host device is a PC or PLC, the date and time must be written to registers by Modbus/TCP. When the time is set, the time stamp is omitted or set in duplicate.
  If the date and time are not set, the default date and time (1970-01-01 00:00:00.000) of the internal clock are used.
- Date format: YYYY-MM-DD
- Time format: hh:mm:ss.nnn

■ LED Display

LEDs are located at the Ethernet connector, near the USB connector, near the main unit power supply and to the side of the analog input terminals.

Name	Description
Analog input status LED	Lights when the power is turned on, and indicates the operating status of analog inputs. Number of LEDs: 1 per channel LED display color: Green
Ethernet communication status LED	Lights (green) when an Ethernet link is established. Upper: Indicates the link/active status. Lower: Indicates the transmission speed (100 Mbps) status. Number of LEDs: 2 per port LED display color: Green, orange
Main unit status LED	Lights (green) when the power is turned on, and indicates the operating status of the VZ20X. Number of LEDs: 1 LED display color: Red, green, blue
USB connection status LED	Lights when the USB cable is connected to the PC, and indicates a USB connection status. Number of LEDs: 1 LED display color: Green

■ Communication Specifications

● Ethernet

Communication physical layer	IEEE802.3 (100BASE-TX)
Protocol	Modbus/TCP server GA10 dedicated protocol
Baud rate	100 Mbps
Maximum segment length	100 m
Recommended transmission cable	STP Category 5e or higher recommended
Max. number of daisy chain connections	15 units [1]

[1]: The number of connected devices may be limited depending on the performance and operating environment (OS, CPU, installation software, programming, etc.) of the PC (including GA10) and PLC.

- Modbus/TCP server:
  Can be read measurement data and read or write the date and time through register access (function code 03/16).

Data acquisition interval	Data update period
1 ms	10 ms
10 ms	10 ms
50 ms	50 ms
100 ms	100 ms

Can be acquired measurement data in batches of 8 channels at a time (1 unit) (function code 70/71).
  Acquire data by communication while data is still held on the VZ20X. The data retention time on the VZ20X differs according to the data acquisition interval. The following shows the relationship between the data acquisition interval and data retention time.

Data acquisition interval	Data retention time
1 ms	2s
10 ms	20 s
50 ms	100 s
100 ms	200 s

- GA10 dedicated protocol:
  Can be connected to GA10 and acquired measurement data without creating a program.
- Connection Permission Function:
  Can be permitted access from only registered IP addresses or MAC addresses.
- Ethernet Factory Defaults

Setting	Default
DHCP	ON
Ethernet Port IP address	192.168.1.1
Subnet mask	255.255.255.0
Default gateway	0.0.0.0

● USB

Perform setup by connecting the PLC to the PC by a USB cable.
   Connector type: Type-C
   Cable: 3 m or less, USB2.0 or higher
Power can also be supplied to the VZ20X from the USB port.
When the USB type on the power supply source is Type-C, Ethernet communication can be used.
When the USB type is other than Type-C, Ethernet communication cannot be used.

■ Hardware Specifications

● Analog Measurement Input Specifications

• Number of input points: 8
• Input format: Floating unbalanced input, isolation between input channels, simultaneous sampling
• Input sampling period: 1 msec
• Input type, measurement range and measurement accuracy: See Table 1
  The accuracy is that in the standard operating conditions: 23±2°C, 55±10% RH, warm-up time of 40 minutes or more
  With the filter (Power supply frequency noise removal, moving average, first-order lag) OFF, the effect of the measurement environment sometimes causes drift to increase.
• Measurement current:
  Resistance temperature detector. Approx. 0.4 mA
  Resistance: Approx. 0.4 mA (200 Ω range), approx. 0.05 mA (2000 Ω range)
• Allowable input voltage:
  ±60 VDC (DC voltage 2 V range or higher and standard signal)
  ±10 VDC (other than DC voltage 2 V range or higher and standard signal)
• Max. voltage between input chanels:
  300 VAC rms (50 Hz/60 Hz) or 300 VDC
• Max. common mode voltage:
  300 VAC rms (50/60 Hz) or 300 VDC (under Measurement Category II conditions)
• Input resistance:
  Approx. 1 MΩ (DC voltage 2 V range or higher and standard signal)
  10 MΩ or more (other than DC voltage 2 V range or higher and standard signal)
• Allowable signal source resistance:
  2 kΩ or less (DC voltage 2 V range or higher and standard signal)
  250 Ω or less (DC voltage 1 V range or lower and thermocouple)

• Effect of signal source resistance:
  Input burnout detection OFF
    5 μV/250 Ω or less (thermocouple, DC voltage 60 mV range or less)
    10 μV/250 Ω or less (200 mV range)
    30 μV/250 Ω or less (1 V range)
    0.25%/2kΩ or less (DC voltage 2 V range or higher and standard signal)
  Input burnout detection upscale or downscale
    30 μV/250 Ω or less (thermocouple)
• Allowable wiring resistance:
  Max. 10 Ω per line (thermocouple, resistance temperature detector)
  Conductor resistance between the three lines in a 3-wire connection shall be equal
• Effect of wiring resistance:
  Input burnout detection OFF
    Measurement accuracy specifications satisfied within allowable wiring resistance
  Input burnout detection UP or DOWN
    0.05 °C/10 Ω or less (resistance temperature detector)
• Input bias current:
  ±10 nA or less (input burnout detection OFF)
• Input burnout detection:
  UP or DOWN, or OFF selectable
  Functions at thermocouple and resistance temperature detector (RTD), and standard signal.
  For standard signal, 0.1 V or less is judged as a burnout.
• Reference junction compensation error (thermocouple):
· When temperature measurement is 0°C or higher, when ferrule terminal crimping is used, and when input terminal temperature is balanced
  (The reference junction compensation error range may be exceeded when single-wire or twisted-wire connection is used.)
  ±2 °C (ambient temperature 23±2 °C)
  ±3 °C (ambient temperature -10 to 55 °C, Type C 0 to 55 °C)
  For Type B, reference junction compensation is fixed to 0°C.
• Noise rejection ratio: 50 Hz/60 Hz±0.1 % rejection ratio
  In case Power supply frequency noise removal filter is enabled
    Normal mode: 40 dB or more
    Common mode: 120 dB or more
  In case Power supply frequency noise removal filter is disabled
    Common mode: 80 dB or more

Table 1 Measurement Accuracy

Input type			Measurement range			Measurement accuracy	
						Power supply frequency noise removal filter: ON	Power supply frequency noise removal filter: OFF
DC voltage		20 mV	-20.000	to	20.000 mV	±10 µV	±20 µV
		60 mV	-60.00	to	60.00 mV	±0.03 mV	±0.06 mV
		200 mV	-200.00	to	200.00 mV	±0.1 mV	±0.2 mV
		1 V	-1.0000	to	1.0000 V	±0.5 mV	±1 mV
		2 V	-2.0000	to	2.0000 V	±1 mV	±2 mV
		6 V	-6.000	to	6.000 V	±3 mV	±6 mV
		20 V	-20.000	to	20.000 V	±10 mV	±20 mV
		60 V	-60.00	to	60.00 V	±0.03V	±0.06V
Standard signal		0.4-2 V	0.4000	to	2.0000 V	±1 mV	±2 mV
		1-5 V	1.0000	to	5.0000 V	±3 mV	±6 mV
4-wire resistance		200	0.00	to	200.00 Ω	±0.1 Ω	±0.2 Ω
		2000Ω	0.0	to	2000.0 Ω	±1 Ω	±2 Ω
Thermocouple*		R	0.0	to	1760.0 °C	±1.5 °C	±3 °C
		S	0.0	to	1760.0 °C	±1.5 °C	±3 °C
		B	0.0	to	1820.0 °C	0 to 300 °C: Accuracy not guaranteed 300 to 400 °C: ±3 °C 400 to 800 °C: ±2 °C 800 to 1820 °C: ±1.5 °C	0 to 300 °C: Accuracy not guaranteed 300 to 400 °C: ±6 °C 400 to 800 °C: ±4 °C 800 to 1820 °C: ±3 °C
		K	-270.0	to	1370.0 °C	-270 to -200 °C: Accuracy not guaranteed -200 to 0 °C: ±0.8 °C 0 to 500 °C: ±0.4 °C 500 to 1370 °C: ±0.7 °C	-270 to -200 °C: Accuracy not guaranteed -200 to 0 °C: ±1.6 °C 0 to 500 °C: ±0.8 °C 500 to 1370 °C: ±1.4 °C
		E	-270.0	to	800.0 °C	-270 to -200 °C: Accuracy not guaranteed -200 to 0 °C: ±0.5 °C 0 to 800 °C: ±0.3 °C	-270 to -200 °C: Accuracy not guaranteed -200 to 0 °C: ±1 °C 0 to 800 °C: ±0.6 °C
		J	-200.0	to	1000.0 °C	-200 to 0 °C: ±0.6 °C 0 to 1000 °C: ±0.5 °C	-200 to 0 °C: ±1.2 °C 0 to 1000 °C: ±1 °C
		T	-270.0	to	400.0 °C	-270 to -200 °C: Accuracy not guaranteed -200 to 0 °C: ±0.6 °C 0 to 400 °C: ±0.2 °C	-270 to -200 °C: Accuracy not guaranteed -200 to 0 °C: ±1.2 °C 0 to 400 °C: ±0.4 °C
		N	-270.0	to	1300.0 °C	-270 to -200 °C: Accuracy not guaranteed -200 to 0 °C: ±1.2 °C 0 to 1300 °C: ±0.7 °C	-270 to -200 °C: Accuracy not guaranteed -200 to 0 °C: ±2.4 °C 0 to 1300 °C: ±1.4 °C
		C	0.0	to	2315.0 °C	0 to 1500 °C: ±1 °C 1500 to 2315 °C: ±2 °C	0 to 1500 °C: ±2 °C 1500 to 2315 °C: ±4 °C
Resistance temperature detector	Pt100 3-wire 4-wire	Pt100 3-wire Pt100 4-wire	-200.0	to	850.0 °C	-200 to 200 °C: ±0.3 °C 200 to 400 °C: ±0.4 °C 400 to 600 °C: ±0.5 °C 600 to 850 °C: ±0.6 °C	-200 to 200 °C: ±0.7 °C 200 to 400 °C: ±0.8 °C 400 to 600 °C: ±1.0 °C 600 to 850 °C: ±1.2 °C
		Pt100-H 3-wire Pt100-H 4-wire	-100.00	to	100.00 °C	±0.2°C	±0.5°C

* Excluding reference junction compensation error
Thermocouple: JIS C 1602-2015, IEC 60584-1:2013
Resistance temperature detector: JIS C 1604-2013, IEC 60751:2008

● Safety and EMC Standards

• Safety standards:
  Measurement category II. overvoltage category I,
  pollution degree 2
  IEC 61010-1, IEC 61010-2-030 compliant
  CE/Low voltage directives: EN 61010-1,
      EN 61010-2-030 compliant (*)
• EMC standards:
  CE/EMC directives:
      EN 61326-1 Class A Table 2 (For use in
      industrial locations) compliant (*)
      EN 55011 Class A Group1 compliant (*)
  KC marking: KS C9811, KS C9610-6-2 compliant
• CE/RoHS directives:
  EN IEC 63000 (*)

  *: Support for VZ20X style 2.01 and later.

● Power Supply Specifications

• Power supply:
  Rated voltage 24 VDC (+10 %/-15 %)
  USB power supply
• Power consumption:
  4.5 W or less

● Isolation

• Withstanding voltage:
  Between analog input channels, between analog
  inputs and internal circuit:
  3000 V RMS (50 Hz/60 Hz), for 1 minute
• Insulation resistance
  Between analog input channels, between analog
  inputs and internal circuit, between Ethernet
  terminal and internal circuit, between Ethernet port
  1 and Ethernet port 2 terminals
  20 MΩ or more, (500 VDC)
• Isolation

Analog input CH1		Ethernet Port terminal
Analog input CH2	Internal circuit	
Analog input CH3		Ethernet Port terminal
Analog input CH4		
Analog input CH5		USB
Analog input CH6		
Analog input CH7		Power supply
Analog input CH8		

---------------- Non-insulated

————————— Functional insulation

━━━━━━━━━ Reinforced insulation

● Environmental Conditions

Normal operating conditions:
• Ambient temperature: DIN rail mounting -10 to
  55 °C, desktop installation -10 to 50 °C
• Ambient humidity: 5 to 90 % RH (condensation not
  allowed)
• Operating environment: Sites not subjected to
  hydrogen sulfide and other corrosive gases, or
  dust, and sites not subjected to sea breeze or
  direct sunlight
• Warm-up time: 40 minutes or more after the power
  is turned on
• Installation altitude: 2,000 m or less above sea level
• Installation location: Indoors
• Continuous vibration[*2]: JIS C60068-2-6 compliant
  (at 5 to 8.4 Hz) half amplitude of 3.5 mm or less
  (at 8.4 to 150 Hz) 9.8 m/s^2 or less, 1 oct/min for 10
  cycles each in the three axis directions
• Impact[*2]: JIS C60068-2-27 compliant
  147 m/s^2 or less, 11 ms 3 times each in 6
  directions on the three axis directions
  *2: When mounting on a DIN rail, attach the fastening plate
  and mount the main unit firmly so that it does not move
  on the DIN rail.

Transportation and Storage Conditions:
• Temperature: -25 to 70 °C
• Humidity: 5 to 95 % RH (condensation not allowed)

Effect of Operating Conditions:
• Effect of ambient temperature:
  DC voltage 1 V range or less, resistance
      1x of measurement accuracy added to 10°C
      change
  Other than DC voltage 1 V range or less and resistance
      1.2x of measurement accuracy added to 10°C
      change
• Effect of power supply fluctuation: Measurement
  accuracy specifications satisfied within rated
  voltage range

■ Construction and Mounting
• Material: Case: Polycarbonate resin
• Case color: Black (charcoal gray, light)
• Weight: 200 g or less
• External dimensions (mm): 50 (width) x 78 (height)
  x 65 (depth) (not including protrusions)
• Mounting: DIN rail[*1] (in panel, on rack), desktop
  installation
  *1: Applicable DIN rails: TH35-7.5Al, TH35-7.5Fe (JIS C
  2812 compliant)
• Mounting position: Front and back horizontal, left
  and right horizontal *Stacking not allowed
• Wiring method: Main unit side: Push-in terminal
      Cable side: Ferrule termina, Solid wire,
      stranded wire

■ Terminal Layout

Power supply terminal

Terminal No.	Function
1	24 VDC power supply (+)
2	24 VDC power supply (-)
3	(Use forbidden)
4	(Use forbidden)
5	(Use forbidden)

Analog input terminal (CH1 to CH8)

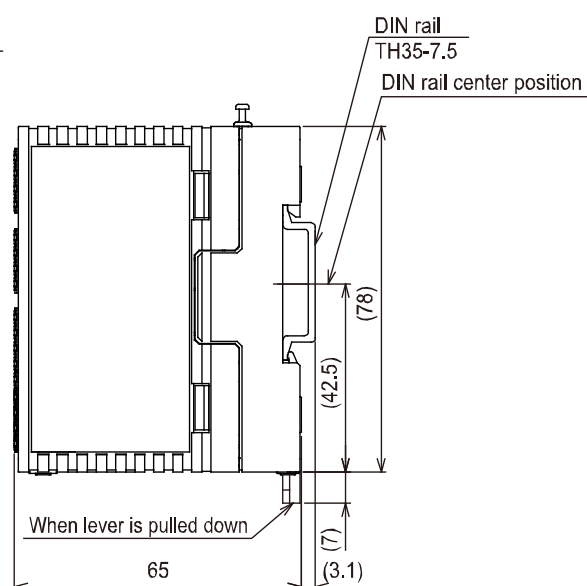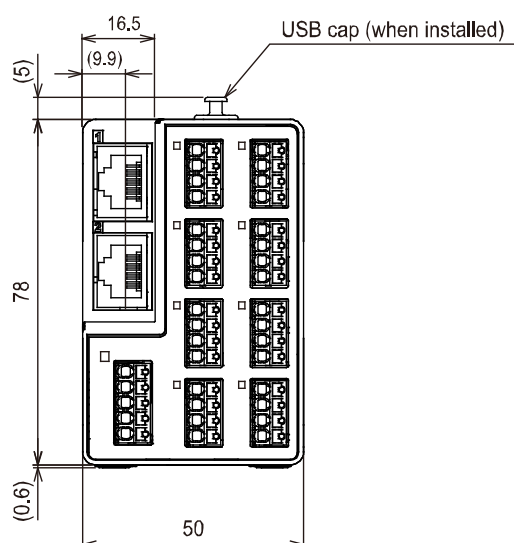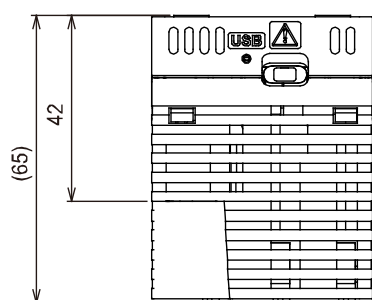| Terminal No.	DC voltage/standard signal	Thermocouple	3-wire resistance temperature detector	4-wire resistance temperature detector/ 4-wire resistance
1	(Use forbidden)	(Use forbidden)	(Use forbidden)	a
2	(Use forbidden)	(Use forbidden)	A	A
3	V-	V-	B	B
4	V+	V+	b	b

Ethernet port

No.	Function
1	Host communication (connection target: PC, PLC, VZ20X)
2	Slave communication (connection target: VZ20X)

■ External Dimensions

Unit: mm
Third angle projection
Normal tolerance = ± (value of JIS B 0401-2016 tolerance class IT18) / 2

USB cap (when installed)

DIN rail TH35-7.5
DIN rail center position
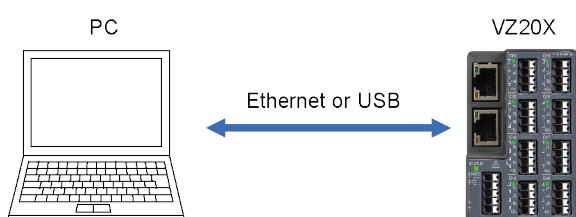
When lever is pulled down

■ VZ Configurator

Set up VZ20X parameters over Ethernet or USB using VZ Configurator.

● Functions
  ・ Parameter settings
  ・ Monitoring
  ・ Fault diagnostics
  ・ Input adjustment
  ・ Parameter initialization
  ・ Firmware update
  ・ File management

● Connection

Connect the main unit to the PC using an Ethernet or USB cable.

PC   Ethernet or USB   VZ20X

* A USB Type-C cable or Ethernet cable is required for making the connection.

● Operating environment (PC)

Item	Windows 11 *1 Japanese / English	Windows 10 *1 Japanese / English
Edition	Pro/Enterprise 64bit	Pro/Enterprise 64bit
Version *1	21H2 or later	20H2 or later
CPU	Intel processor that supports 64 bit and 1 GHz or faster with 2 or more cores	Intel processor that supports 64 bit and 2 GHz or faster speed (recommended)
Recommended main memory capacity	8 GB or more	8 GB or more
Recommended storage free capacity	32 GB or more	32 GB or more
Display	Display compatible with OS	Display compatible with OS
Communication port	USB port, Ethernet port (100Base-TX) For the details, refer to the communication specifications.	USB port, Ethernet port (100Base-TX) For the details, refer to the communication specifications.

*1   YOKOGAWA also has ended support for OS's that Microsoft Corporation no longer supports.

■ Model and Suffix Codes

Model VZ20X: Analog Sensing Unit

Model	Suffix Codes	Description
VZ20X	-1N1ND	• 8 Universal inputs (DC voltage, Standard signal, Resistance, Thermocouple (TC), Resistance Temperature Detector (RTD)) • Ethernet communication 2-port • 24 VDC power supply

■ Standard Accessories

Part Name	Q'ty
USB connector cap	1
Ethernet connector cap (attached to product)	1
TEST CERTIFICATE (QIC)	1
User's Manual (Precaution on the Use of This Product)	1

■ Special Order Items

● Application Software

Model	Name	GS No.
GA10	Data logging software	GS 04L65B01-01EN

When creating a single data file from data acquired or recorded from multiple units (VZ20X), or when monitoring the trend display on a single screen, specify the data merge function (option code /DM). For details, refer to the GA10 General Specifications (GS 04L65B01-01JA).

■ VZ20X Fuction List

Yes: Available, No: Not available

Application	Communication connection type	VZ20X Functions	Power supply source		
			Power Supply terminal	USB(PC side, Type-C)	USB(PC side, other than Type-C)
GA10, Modubs device (PC/PLC, etc)	Ethernet communication	Measurement + data acquisition	Yes	Yes	No
VZ Configurator	Ethernet communication	Parameter settings	Yes	Yes	No
		Monitoring	Yes	Yes	No
		Fault diagnostics	Yes	Yes	No
		Input adjustment	Yes	Yes	No
		Firmware update	Yes	Yes	No
		Parameter initialization	Yes	Yes	No
	USB communication	Parameter settings	Yes	Yes	Yes
		Monitoring	Yes	Yes	No
		Fault diagnostics	Yes	Yes	Yes
		Input adjustment	Yes	Yes	No
		Firmware update	Yes	Yes	No
		Parameter initialization	Yes	Yes	Yes

■ Basic Conditions and Individual Contracts at the Time of Purchase

The warranty for this product is defined in the basic conditions and individual contracts at the time of purchase. The individual conditions are as follows.

● Warranty period of firmware

The firmware warranty period is one year.
Please refer to the following URL for the procedure to update the firmware and the method to download the firmware.
https://partner.yokogawa.com/global/

● Handling of non-conforming products

If Yokogawa verifies a non-conformity of the product that is attributable to Yokogawa within the warranty period, we will deliver an equivalent product.
Yokogawa can not provide a free evaluation of non-conforming products.
The investigation of the non-conforming products will be performed at the expense of the customer.

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