

# Installation Guide

IM 04L24B01-01EN

**YOKOGAWA**  
Yokogawa Electric Corporation

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## Introduction

Thank you for purchasing the FW1000 (FW). This manual describes the safe precautions and installation and wiring procedures of the FW1000. Download the software (DAQSTANDARD) and electronic manuals from the YOKOGAWA website. (See IM 04L24B01-66EN.)

Except for the following specifications, the FW1000 is equivalent to the FX1000. For details on how to handle the FW1000, see the relevant FX1000 manuals. When you read these manuals, read "FX1000" as "FW1000."

For FW1000 topics such as the package contents, safety precautions, and detailed handling procedures, see the electronic manuals.

## Specifications Different from the FX1000

- The following options are not available.

Optional code	Description
/A1	Alarm output 2 points (C-contact)
/A2	Alarm output 4 points (C-contact)
/A3	Alarm output 6 points (C-contact)
/A4A	Alarm output 12 points (A-contact)
/C3	RS-422A/485 interface
/P1	24 VDC/AC power supply
/TPS2	24VDC transmitter power supply (2 loops)
/TPS4	24VDC transmitter power supply (4 loops)
/PWR1	Power monitor (including Mathematical functions)*

- This product is exempt from CE marking.
- Specifications for Power Monitor (/PWR5 option)

Rated Current	Current Range	Allowable Input Current	CrestFactor
5A	5A	6A	2

Wiring System	Input (AC)	Rated Power	Input Measuring Range
Single-phase two-wire system	120V/5A	500W	-600 to 600W
	240V/5A	1000W	-1200 to 1200W
Single-phase three-wire system	200V/5A	1000W	-1200 to 1200W
Three-phase three-wire system	120V/5A	1000W	-1200 to 1200W
	240V/5A	2000W	-2400 to 2400W

Measurement element	Measurement accuracy
Active power	± 0.5% of Range
voltage	± 0.5% of Range
current	± 0.5% of Range

## 1. Safety Precautions

The following safety symbols are used on the product and in this manual.

**WARNING** Calls attention to actions or conditions that could cause serious or fatal injury to the user, and indicates precautions that should be taken to prevent such occurrences.

**CAUTION** Calls attention to actions or conditions that could cause injury to the user or damage to the instrument or property and indicates precautions that should be taken to prevent such occurrences.

"Handle with care." To avoid injury and damage to the instrument, the operator must refer to the explanation in the manual.

Protective ground terminal Alternating current ON(power)

Functional ground terminal Direct current OFF(power)

### Note

Identifies important information required to operate the instrument.

## Safety Precautions

- This instrument conforms to IEC safety class I (provided with terminal for protective grounding), Installation Category II, and EN61326-1 (EMC standard), Measurement Category II (CAT II)\*.
  - \* Measurement category II (CAT II) applies to measuring circuits connected to low voltage installation, and electrical instruments supplied with power from fixed equipment such as electric switchboards.
- This instrument is an EN61326-1 (EMC standard) class A instrument (for use in commercial, industrial, or business environments).
- The general safety precautions described here must be observed during all phases of operation. If the FW is used in a manner not described in this manual, the FW safety features may be impaired. Yokogawa Electric Corporation assumes no liability for the customer's failure to comply with these requirements.
- The FW is designed for indoor use.

## About This Manual

- Please pass this manual to the end user. We also ask you to store this manual in a safe place.
- Read this manual thoroughly and have a clear understanding of the product before operation.
- This manual explains the functions of the product. It does not guarantee that the product will suit a particular purpose of the user.

## Precautions Related to the Protection, Safety, and Alteration of the Product

- For the protection and safe use of the product and the system in which this product is incorporated, be sure to follow the instructions and precautions on safety that are stated in this manual whenever you handle the product. Take special note that if you handle the product in a manner that violates these instructions, the protection functionality of the product may be damaged or impaired. In such cases, YOKOGAWA does not guarantee the quality, performance, function, and safety of product.
- When installing protection and/or safety circuits such as lightning protection devices and equipment for the product and control system or designing or installing separate protection and/or safety circuits for fool-proof design and fail-safe design of the processes and lines that use the product and the control system, the user should implement these using additional devices and equipment.
- If you are replacing parts or consumable items of the product, make sure to use parts specified by YOKOGAWA.
- This product is not designed or manufactured to be used in critical applications that directly affect or threaten human lives. Such applications include nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, air navigation facilities, aviation facilities, and medical equipment. If so used, it is the user's responsibility to include in the system additional equipment and devices that ensure personnel safety.
- Do not modify this product.



**WARNING**

- Use the Correct Power Supply**  
Ensure that the source voltage matches the voltage of the power supply before turning ON the power.
- Use the Correct Power Cord and Plug**  
To prevent electric shock or fire, be sure to use the power cord supplied by Yokogawa. The main power plug must be plugged into an outlet with a protective earth terminal. Do not disable this protection by using an extension cord without protective earth grounding. The power cord is designed for use with this instrument. Do not use the power cord with other instruments.
- Connect the Protective Grounding Terminal**  
Make sure to connect the protective grounding to prevent electric shock before turning ON the power. The provided power cord are three prong type power cord. Connect the power cord to a properly grounded three-prong outlet.
- Do Not Impair the Protective Grounding**  
Never cut off the internal or external protective grounding wire. Doing so invalidates the protective functions of the instrument and poses a potential shock hazard.
- Do Not Operate with Defective Protective Grounding**  
Do not operate the instrument if the protective grounding might be defective. Also, make sure to check them before operation.
- Do Not Operate in an Explosive Atmosphere**  
Do not operate the instrument in the presence of flammable liquids or vapors. Operation in such an environment constitutes a safety hazard. Prolonged use in a highly dense corrosive gas (H<sub>2</sub>S, SO<sub>x</sub>, etc.) will cause a malfunction.
- Do Not Remove Covers**  
The cover should be removed by YOKOGAWA's qualified personnel only. Opening the cover is dangerous, because some areas inside the instrument have high voltages.
- Ground the Instrument before Making External Connections**  
Connect the protective grounding before connecting to the item under measurement or control unit.
- Damage to the Protection**  
Operating the instrument in a manner not described in this manual may damage the instrument's protection.



**CAUTION**

This instrument is a Class A product. Operation of this instrument in a residential area may cause radio interference, in which case the user is required to take appropriate measures to correct the interference.

## Exemption from Responsibility

- YOKOGAWA makes no warranties regarding the product except those stated in the WARRANTY that is provided separately.
- YOKOGAWA assumes no liability to any party for any loss or damage, direct or indirect, caused by the user or any unpredictable defect of the product.

## Model and Suffix Codes

Model code	Suffix code	Optional code	Description
FW1002			2ch, Shortest measurement interval: 125ms
FW1004			4ch, Shortest measurement interval: 125ms
FW1006			6ch, Shortest measurement interval: 1s
FW1012			12ch, Shortest measurement interval: 1s
External storage medium slot	-0		Without CF card/SD card slot and medium (Note)
	-4		With CF card slot and medium (512MB)
	-7		With SD card slot and medium (1GB)
Language			English/Japanese/German/French/Chinese/Italian/Spanish/Portuguese/Russian/Korean deg F and DST
	-2		
Withstanding voltage between measuring input terminals	-H		1000 VAC (50/60 Hz), 1 min
	-L		400 VAC (50/60 Hz), 1 min
Power cord	-D		Power cord UL/CSA standard
	-F		Power cord VDE standard
	-H		Power cord GB standard
	-N		Power cord NBR standard
	-Q		Power cord BS standard
	-R		Power cord AS standard
Options	/C2		RS-232 interface
	/C7		Ethernet interface
	/F1		FAIL/Status output
	/M1		Mathematical functions (including Report functions)
	/N2		3 leg isolated RTD*1
	/N3F		Extended input type (without Pt1000)
	/R1		Remote control 8 points*2
	/USB1		USB interface (1 port)
	/PM1		Pulse input 3 points, Remote control 5 points (including Mathematical functions)*3
	/CC1		Calibration correction function
	/LG1		Log scale
/PWR5		Power monitor (including Mathematical functions)*4	

Note: To load data, the FW must be equipped with a communication interface (/C2 or /C7 option) or the USB interface (/USB1 option.)

- \*1 /N2 cannot be specified for FW1002 or FW1004.
- \*2 If /R1 is specified, /PM1 or /PWR5 cannot be specified.
- \*3 If /PM1 is specified, /M1, /R1, or /PWR5 cannot be specified.
- \*4 If /PWR5 is specified, /F1, /R1, /PM1, or /M1 cannot be specified.

## 2. Installation

### Installation Location

Install the FW indoors in an environment that meets the following conditions:

- Well-Ventilated Location**  
To prevent overheating, install the FW in a well-ventilated location.
- Minimal Mechanical Vibrations**  
Install the FW in a location that has minimal mechanical vibrations. Installing the FW in a location that is subject to large levels of mechanical vibration will not only put added stress on its components, it may also impede ordinary measurement.
- Level Location**  
Install the FW in a level location so that it is not slanted to the left or the right.

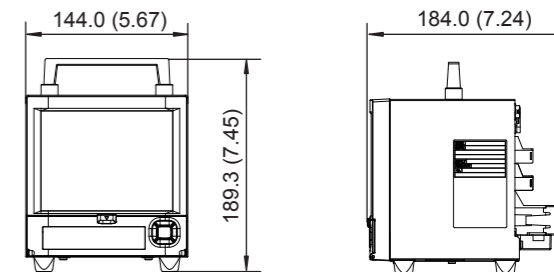
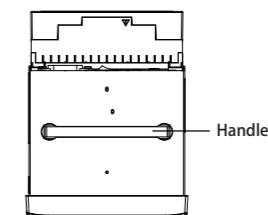
### Note

Condensation may form when moving the FW from an environment whose temperature or humidity is low to an environment whose temperature or humidity is high, or when there is a sudden change in temperature. Temperature or humidity changes may also result in thermocouple measurement errors. In these kinds of circumstances, let the FW adjust to the new environment for at least an hour before using it.

Do not install the FW in the following places.

- Outdoors**
- In Direct Sunlight or Near Heat Sources**  
Install the FW in a place that is near room temperature (23°C) and that is not subject to large temperature fluctuations. Placing the FW in direct sunlight or near heat sources can cause adverse effects on the internal circuitry.
- Where an Excessive Amount of Soot, Steam, Moisture, Dust, or Corrosive Gases Are Present**  
Soot, steam, moisture, dust, and corrosive gases will adversely affect the FW. Avoid installing the FW in such locations.
- Near Strong Magnetic Field Sources**  
Do not bring magnets or instruments that produce electromagnetic fields close to the FW. Operating the FW near strong magnetic fields can cause measurement errors.
- Where the Display is Difficult to See**  
The FW uses an LCD screen, so it is difficult to view the display from an extreme angle. Install the FW so that the user can view the display directly from the front.

## External Dimensions



Unit: mm (approx. inch)  
If not specified, the tolerance is ±3%.  
However, in cases of less than 10mm, the tolerance is ±0.3 mm.

## 3. Wiring

### Input Signal Wiring



**WARNING**

To prevent electric shock while wiring, make sure that the power supply is turned off.



**CAUTION**

- Applying a strong tension to the input and output signal cables connected to the FW may damage the cables or the FW terminals. To avoid applying tension directly to the terminals.
- To prevent fire, use signal cables with a temperature rating of 80°C or more.
- Do not apply voltages that exceed the following values to the input terminals. Doing so may damage the FW.
  - Maximum input voltage: ±60 VDC
  - Maximum common mode voltage: ±60 VDC (under measurement category II conditions)
- The FW is an installation category II product.

### Precautions to Be Taken While Wiring

- Take the following precautions when wiring the input signal cables. When using a screw terminal, we recommend that you use a crimp-on lug with an insulation sleeve (designed for 3 mm screws).
- Take measures to prevent noise from entering the measurement circuit.
  - Move the measurement circuit away from the power cable (power circuit) and ground circuit.
  - Ideally, the object being measured should not generate noise. However, if this is unavoidable, isolate the measurement circuit from the object. Also, ground the object being measured.
- Shielded wires should be used to minimize the noise caused by electrostatic induction. Connect the shield to the ground terminal of the FW as necessary (make sure you are not grounding at two points).
- To minimize noise caused by electromagnetic induction, twist the measurement circuit wires at short, equal intervals.
- Make sure to earth ground the protective ground terminal through minimum resistance (less than 100 Ω).
- When using internal reference junction compensation on the thermocouple input, take measures to stabilize the temperature at the input terminal.
  - Always use the terminal cover.
  - Do not use thick wires which may cause large heat dissipation (we recommend a cross sectional area of 0.5 mm<sup>2</sup> or less).
- Make sure that the ambient temperature remains reasonably stable. Large temperature fluctuations can occur if a nearby fan turns on or off. Connecting the input wires in parallel with other devices can cause signal degradation, affecting all connected devices. If you need to make a parallel connection, consider the following points.
  - Turn the burnout detection function off.
  - Ground the instruments to the same point.
  - Do not turn other instruments on or off during operation. This can have adverse effects on the other instruments.
  - RTDs cannot be wired in parallel.

