User's Manual

2-CH, 1 MS/s Isolated Digitizer Module
WE7275

IM 707275-01E
2nd Edition

YOKOGAWA
Yokogawa Electric Corporation

IM 707275-01E
2nd Edition

Thank you for purchasing the 2-CH, 1 MS/s Isolated Digitizer Module WE7275 for the PC-based measurement instruments, WE7000.

This User's Manual contains useful information about the function, connection to the measuring station, and troubleshooting of the WE7275. This manual assumes that you will be using the WE7000 Control Software that is included with the measuring station.

For general information about the WE7000 (primarily the operations of the measuring station, the optical interface module, the optical interface card, and the WE7000 Control Software) see the following manual that is included with the measuring station.

Manual Title	Manual No.
WE7000 User's Manual	IM707001-01E

To ensure correct use, please read this manual thoroughly before operation. Keep this manual in a safe place for quick reference in the event a question arises.

Notes

- **The contents of this manual describe WE7000 Control Software Ver. 4.0.2.0 and module software Ver 3.05. If you are using another version of the software, the operating procedures or the figures given in this manual may differ from the actual software.**
- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
- Copying or reproducing any or all of the contents of this manual without YOKOGAWA's permission is strictly prohibited.

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Revisions

1st Edition: September 1999
2nd Edition: August 2000

Disk No. WE09
2nd Edition: August 2000 (YK)

Checking the Contents of the Package

Unpack the box and check the contents before operating the instrument. If the contents are not correct or missing or if there is physical damage, contact the dealer from which you purchased them.

Measurement Module

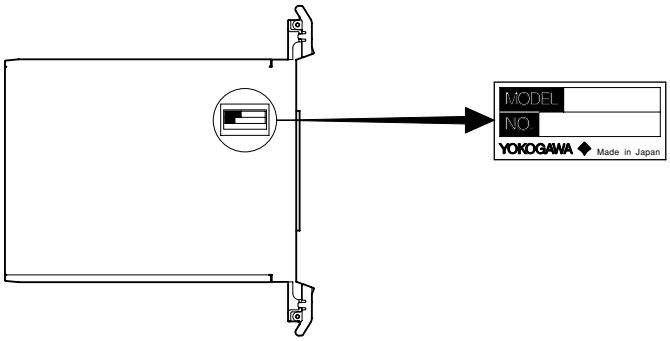
Check that the model name given on the name plate matches those on the order.

MODEL

Model	Description
707275	WE7275 2-CH, 1 MS/s Isolated Digitizer Module

NO.

When contacting the dealer from which you purchased the instrument, please quote the instrument No.

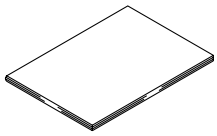


Standard Accessories

The following standard accessories are supplied with the instrument. Make sure that all items are present and undamaged.

Isolated BNC plug (2)
A1226JA

User's Manual (1)
IM707275-01E



Spare Parts (Sold Separately)

Name	Model	Description
Isolated BNC plug	A1226JA	Sold in units of 1 piece

How to Use This Manual

Structure of the Manual

This User's Manual consists of the following four chapters and an index.

Chapter	Title	Description
1	**Explanation of Functions**	Explains the system configuration and functions.
2	**Hardware Preparation**	Explains how to install the module into the measuring station and how to connect the input.
3	**Troubleshooting and Maintenance**	Explains the procedures for troubleshooting and self testing.
4	**Specifications**	Explains the specifications of the module.
Index		Index of contents.

Conventions Used in This Manual

Unit

k ..... Denotes 1000. Example: 100 kHz

K ..... Denotes 1024. Example: 720 KB

Displayed characters

Alphanumeric characters enclosed with [ ] usually refer to characters or settings that are displayed on the screen.

Symbols

The following symbol marks are used to attract the operator's attention.

Affixed to the instrument. Indicates danger to personnel or to the instrument. The operator must refer to the User's Manual. The symbol is used in the User's Manual to indicate the reference.

WARNING Describes precautions that should be observed to prevent injury or death to the user.

CAUTION Describes precautions that should be observed to prevent minor or moderate injury, or damage to the instrument.

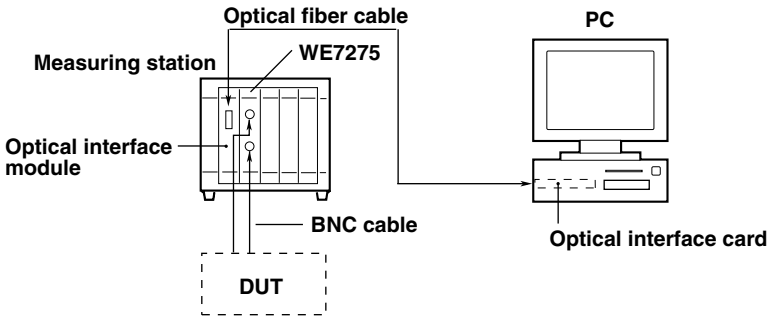
Note Provides information that is important for operating the instrument properly.

Contents

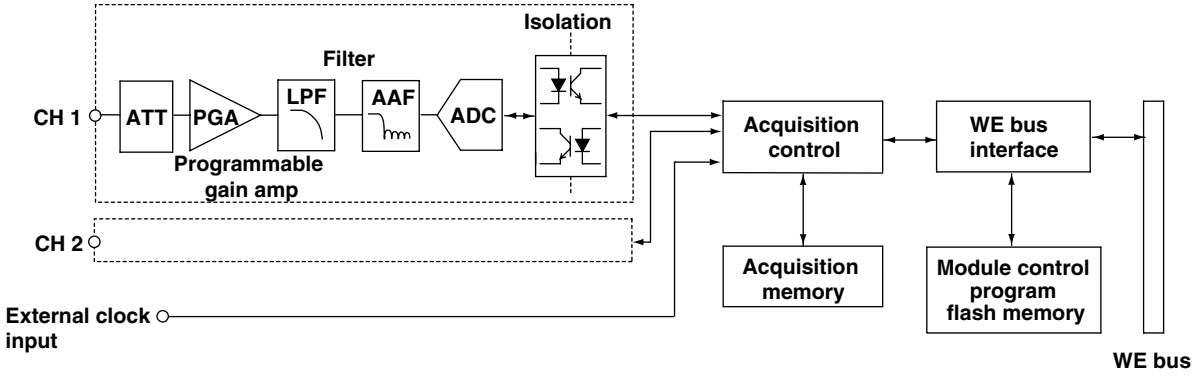
1.1 System Configuration and Block Diagram

System Configuration

The following is an example in which the 2-CH, 1 MS/s Isolated Digitizer Module WE7275 is installed into the measuring station and the measuring station is connected to the PC with the optical fiber cable.



Block Diagram



Description of operation

A signal input cable is connected to the input terminal (isolated BNC) of the digitizer module.

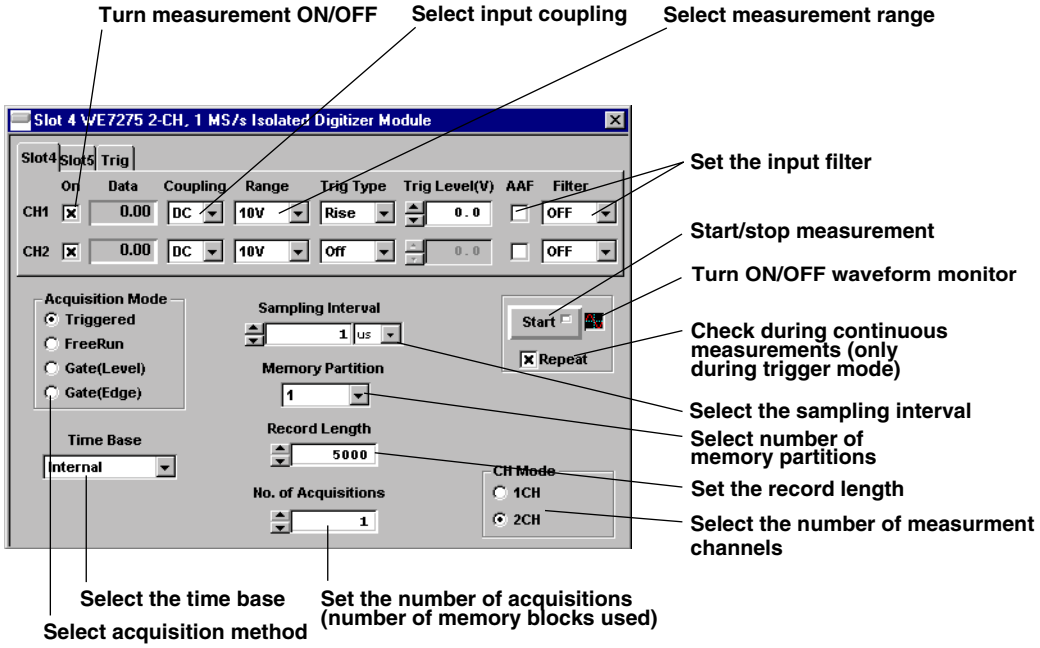
The signal applied to each channel's input terminal (CH1 and CH2) goes through the attenuator to the programmable gain amplifier where the voltage or the amplitude of the signal is adjusted. Then, the signal passes through the low-pass filter (LPF) and anti-aliasing filter (AAF) and enters the A/D converter. In the A/D converter, the input signal is sampled by synchronizing to the clock provided by the time base and converted to digital data. The digital data are then isolated by the photo coupler, and stored in the acquisition memory according to the sampling interval and the trigger condition settings.

The data in the acquisition memory can be read from a PC through the communication interface.

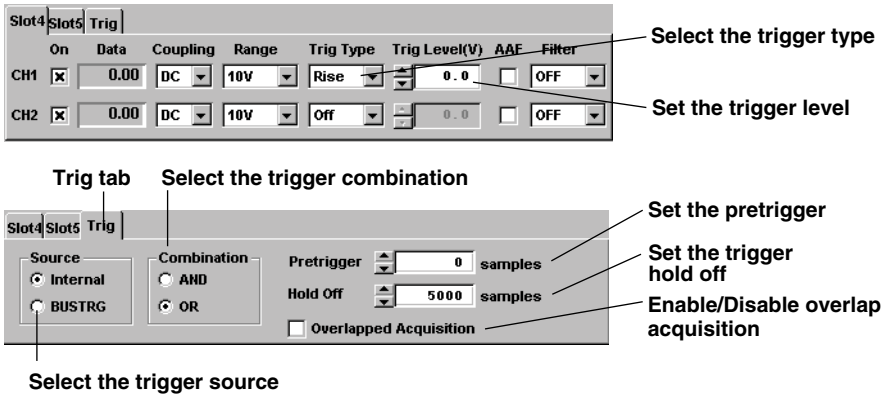
1.2 Operation Panel

The WE7000 Control Software that is installed in the PC is used to control the 2-CH, 1 MS/s Isolated Digitizer Module WE7275. The WE7000 Control Software displays operation panels similar to those shown in the figure below. This User's Manual does not explain the operations of the operation panel or waveform monitor. For the operations of these items, see the on-line help that is provided with the WE7000 Control Software.

Setting the conditions for acquiring the waveform



Setting the trigger



1.3 Setting the Conditions for Acquiring the Waveform

Turning ON/OFF the Measurement Channel

Measurement is made only on the channels that have the [On] check box selected. If [1CH] is selected in the section "Selecting the Number of Measurement Channels" as described later, only one channel can be checked.

Input Coupling

You can select from the following list of choices.

AC

The input signal is coupled to the analog input circuit's attenuator via a capacitor. This setting is used when you wish to observe only the amplitude of an AC signalor a signal riding on top of a certain DC voltage by removing the DC component.

DC

The input signal is coupled directly to the analog input circuit's attenuator. This setting is used when you wish to observe both the AC and DC components of the input signal.

Measurement Range (Range)

You can select from the following measurement ranges.

Setting	Measurable Range (Accuracy Guaranteed Measurement Range)	Display Range	Display Resolution
100 mV	–0.1 to 0.1 V	–0.1000 to 0.1000 V	0.1 mV
200 mV	–0.2 to 0.2 V	–0.2000 to 0.2000 V	0.1 mV
500 mV	–0.5 to 0.5 V	–0.5000 to 0.5000 V	0.1 mV
1 V	–1 to 1 V	–1.000 to 1.000 V	1 mV
2 V	–2 to 2 V	–2.000 to 2.000 V	1 mV
5 V	–5 to 5 V	–5.000 to 5.000 V	1 mV
10 V	–10 to 10 V	–10.00 to 10.00 V	10 mV
20 V	–20 to 20 V	–20.00 to 20.00 V	10 mV
50 V	–50 to 50 V	–50.00 to 50.00 V	10 mV
100 V	–100 to 100 V	–100.0 to 100.0 V	100 mV
200 V	–200 to 200 V	–200.0 to 200.0 V	100 mV
350 V	–350 to 350 V	–350.0 to 350.0 V	100 mV

Acquisition Method (Acquisition Mode)

Select the measurement data acquisition method from the following four modes.

Trigger mode (Triggered)

The measurement data are acquired to the acquisition memory according to the specified trigger condition (see section 1.4). After acquiring the specified record length of data, the operation stops. In this mode, the acquisition memory can be partitioned and the measured data can be acquired to these individual memory blocks each time triggering occurs. If the [Repeat] check box* is selected, the operation repeats until the next time the [Start] button is clicked.

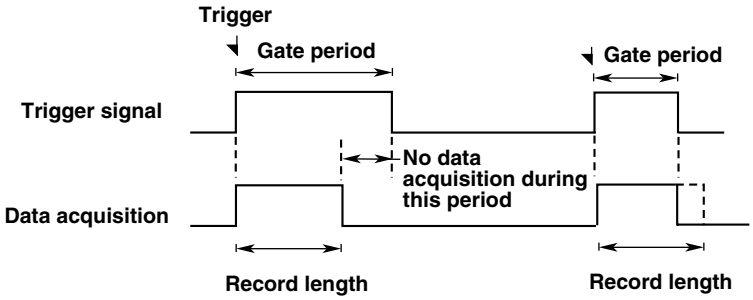
* [Repeat] check box appears only when the expression "optimal number of memory partitions ≥ 2 × number of measurements" is satisfied. The "optimal number of memory partitions" refers to the number of partitions that is used as a matter of convenience inside the module. In some cases, the memory can be partitioned into smaller sections depending on the record length and the number of channels. In such cases, the maximum possible number of partitions is determined, and this value is taken to be the "optimal number of memory paritions."
The optimal number of memory partitions is the largest value of 2^n which is smaller than "4,194,304/(the number of channels specified for the channel mode × the record length)." For example, if the channel mode is 2CH and the record length is 10000, the calculation is 4,194,304/(2 × 10000) which is approximately 210. In this case, the optimal number of partitions is 128. Thus, if the number of acquisitions is less than or equal to 64, the [Repeat] check box appears. If it is larger than 64, the check box does not appear. If the optimal value exceeds "256", the number of partitions is set to "256". Note that if the number of acquisitions [No. of Acquisitions] is set to "0," then the [Repeat] check box does not appear.

Free run mode (Free Run)

Acquisition of the measured data starts immediately upon starting the measurement. The acquisition stops when the measurement is stopped.

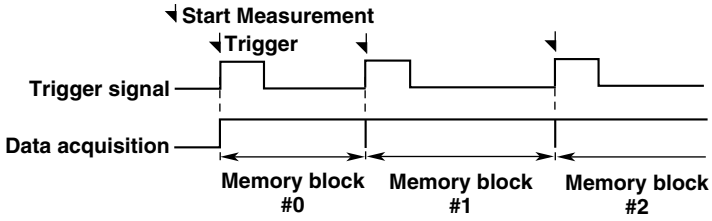
Gate (level) mode (Gate(Level))

The measurement data are acquired during the time when the specified trigger condition is satisfied (gate period). If the specified record length of data is acquired before the gate period ends, the acquisition stops at that point. The operation repeats the number of times specified by the number of acquisitions. If you stop the measurement before this number is reached, the acquisition stops immediately.



Gate (edge) mode (Gate(Edge))

Data acquisition starts when the specified trigger condition is satisfied and pauses when the trigger condition is no longer satisfied. When the trigger condition is satisfied again, data acquisition starts at a new memory block. The operation repeats the number of times specified by the number of acquisitions. If you stop the measurement before this number is reached, the acquisition stops immediately.



Sampling Interval

During trigger/gate mode

You can select the sampling interval in the range from from 1 μs to 1 s (in 1 μs steps).

During free run mode

You can select the sampling interval in the range from from 1 ms to 1 s (in 1 μs steps).

Memory Partition (Valid Only during Trigger Mode)

During the trigger mode, you can divide the acquisition memory into multiple blocks and acquire the data to the memory blocks in order every time the trigger occurs. You can divide the memory into 1/2/4/8/16/32/64/128/256 partitions.

Record Length (Valid Only during Trigger/Gate (Level) Mode)

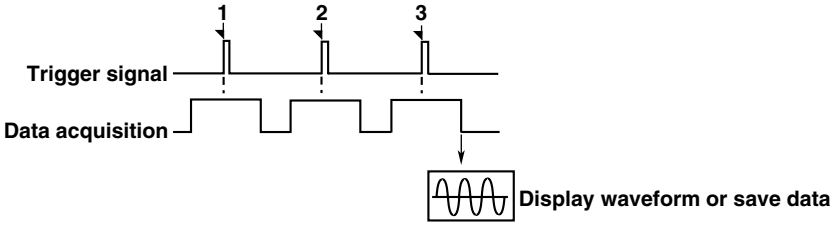
Enter the value in the [Record Length] entry box. The selectable range during the trigger mode is “2 to 4 M/the number of memory partitions” and “2 to 2 M/the number of memory partitions” when the number of measurement channels is 1 and 2, respectively. The record length is set to “Maximum selectable record length/the number of memory partitions” when “0” is specified in the trigger mode.

The selectable range during the gate (level) mode is “2 to the maximum record length.” The record length is set to the “Maximum record length” when “0” is specified in the gate (level) mode. In this case, the memory is partitioned according to the satisfied and unsatisfied conditions of the trigger. The maximum number of memory blocks that can be created in this way is 256.

For the selectable minimum record length, "the record length × sampling interval" cannot be less than 5 ms. When using the internal clock as the time base, the record length is set to the minimum selectable value when a value below this minimum value is specified. However, this restriction is not enforced when using the external clock as the time base. In this case, the value is set to the specified value, but proper measurements may be impeded.

Number of Acquisitions (No. of Acquisitions) (Valid Only during Trigger/Gate Mode)

You can specify the number of times to acquire the data when using the trigger or gate mode. The selectable range is from 1 to 32,768 times. However, for the gate mode, if the specified record length is greater than or equal to (the maximum record length/2), you can only specify one for the number of acquisitions. If you select "0", the acquisition of data continues until the measurement is stopped or the specified record length of data is acquired. After acquiring the number of acquisitions of data or if the acquisition is stopped, the waveform of the measured data is displayed. For example, if you set the number of acquisitions to "3" in the trigger mode, the module operates as follows.



If you set a number less than the number of memory partitions in the trigger mode, you will have to specify the number of memory blocks to use. If you set a number larger than the number of memory partitions, the data are acquired until the specified number is reached or until the specified record length is reached. In the gate mode, measured data are acquired by taking the specified record length to be one block. When the specified record length is equal to or less than "the maximum record length/256" and the number of acquisitions is set to 256 or less, all of the acquired data are saved. But, if the number of acquisition is set above 256, the acquired data beyond the 256th acquisition overwrites the previous data starting from the first acquisition. If the record length is set above "maximum record length/256" points, the data are overwritten when the number of acquisitions exceeds (maximum record length/specified record length).

Note

- If the number of acquisitions is greater than the number of memory partitions in the trigger mode, only the last "number of memory partitions" blocks of measured data are saved. In addition, you can only specify "1" for the number of acquisitions if the number of memory partitions is set to "1."
- If (number of acquisitions × record length × number of measurement channels) is "4M" points or less, and the number of acquisitions exceeds 256, then only the last 256 blocks of measured data are saved. If (number of acquisitions × record length × number of measurement channels) exceeds "4M" points, only the last "4M/(record length × number of measurement channels)" blocks of measured data are saved.
- If the specified record length is greater than or equal to (maximum record length/2) in the gate mode, you can only specify "1" for the number of acquisitions.

Time Base

The input signal can be sampled not only by using the clock signal that is generated within the module, but also by using external clock signals and signals generated by other modules. The external clock signal is input through the external clock input terminal of the module. When using a clock signal other than the internal clock signal, the sampling speed mode is selected according to the sampling interval setting. Select "Fast" when the sampling interval is 1 μs to 500 μs. Select "Slow" when the sampling interval exceeds 500 μs. For example, select [External(Slow)] in the [Time Base] list box when using an external clock that has a slow sampling interval.

Internal : Internal clock.
External : The input signal applied to "EXT. CLK" of the module's front panel.
BUSCLK : Input signal (CMNCLK) according to the trigger source/time base setting (see section 4.6, "Setting Trigger Source/Time Base Source/Arming" in the WE7000 User's Manual (IM707001-01E).

Note

If the sampling speed mode is set to [Fast] when using a clock other than the internal clock, the data collection operation stops when the period of the external sampling signal becomes longer than 500 μs.

Input Filter (Filter/AAF)

You can set either a low pass filter that eliminates high frequency noise from the input signal or the anti-aliasing filter* which prevents aliasing.

* When a signal is being sampled at a sampling frequency, fs, frequency components that do not actually exist appear if the signal frequency becomes larger than (fs/2). This phenomenon is referred to as aliasing. In order to prevent aliasing, the filter is set so that frequency components that exceed (fs/2) are cut.

When using the low pass filter, remove the check from the [AAF] box, and select the frequency from [400 Hz], [4 kHz], [40 kHz], and [100 kHz] in the [Filter] list box.
When using the anti-aliasing filter, check the [AAF] box, and select the frequency from [20 Hz], [40 Hz], [80 Hz], [200 Hz], [400 Hz], [800 Hz], [2 kHz], [4 kHz], [8 kHz], [20 kHz], and [40 kHz] in the [Filter] list box.
When not using either of the filters, select [OFF] in the [Filter] list box.

Number of Measurement Channels

Select the number of measurement channels with the [CH Mode] option button.
The maximum record length changes depending on the setting. The record length becomes 2 Mword for 2 channels and 4 Mword for 1 channel.

1.4 Setting the Trigger

Trigger Source (Source)

Select the signal for triggering. The choices are shown below.

Internal : Input signal (includes input signals from 2-CH, 1 MS/s Isolated Digitizer Modules that are linked)

BUSTRG : Bus signal (BUSTRG1/(BUSTRG2) of the WE bus

Trigger Type and Trigger slope (Trig Type)

When the trigger source is set to the input signal, you can select the trigger type from the following list of choices. Select [Off] if you do not want it to be a trigger source.

Rise/Fall/Both (Edge trigger)

With this setting, the trigger occurs when the input signal changes from below the trigger level to above the trigger level (Rise) or from above the trigger level to below the trigger level (Fall). You can have the trigger occur on the rise or fall or both.

High/Low (State trigger)

With this setting, the trigger occurs when the input signal is above the specified trigger level (high) or below the trigger (Low) or when it enters the high or low condition.

Trigger Level (Trig Level)

The procedure to set the trigger level differs depending on the trigger type that is selected. The selectable range of voltage is the measurable range determined by the measurement range. It is set for each channel. The resolution is 1 mV, 10 mV, 100 mV, and 1 V for measurement ranges of ±100/200/500 mV, ±1/2/5 V, ±10/20/50 V, and 100/200/350 V, respectively.

Trigger Combination (Combination)

Select one from the following list of choices.

OR trigger

The trigger occurs if any one of the trigger conditions specified for the input signal of each channel is satisfied.

AND trigger

The trigger occurs when all of the trigger conditions specified for the input signal of each channel are satisfied.

Pretrigger (Valid Only during Trigger Mode)

You can acquire the measured data before the trigger point into the acquisition memory. Set how many points before the trigger point to begin the acquisition in the range, “0 to (specified record length – 2).”

Trigger Hold Off (Valid Only during Trigger Mode) and Overlapped Acquisition

Select the trigger hold off period that is used to temporarily stop the detection of the next trigger once a trigger occurs. With the factory default setting, the next trigger detection does not occur until the record length of data is stored in the acquisition memory (overlapped detection disabled). Therefore, the hold off period is set in the range from “the record length to 4,194,304” (data points). If the overlapped acquisition is enabled, however, the hold off period can be set in the range from “1 to 4,194,304.”

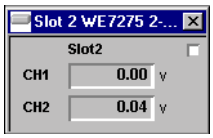
In some cases, the measurement stops when the trigger hold off is set to 1/255 of the record length or less. In this case, set the value above 1/255 of the record length.

1.5 Automatic Saving of the Waveform Data, File Conversion, and Other Settings

The following functions are functions of the WE7000 Control Software.
For the operations of the following functions, see the on-line help that is provided with the WE7000 control Software.

Switching between the Operation Panel and the Monitor Panel

If you do not need to change the settings, you can switch the display to a monitor panel that displays only the measured values (see below).



Displaying the Waveform

The waveform is displayed in the waveform monitor of the WE7000 Control Software.

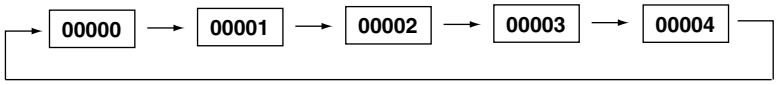
Automatic Saving of Waveform Data

Besides saving the data displayed on the waveform monitor, you can also have the waveform data automatically saved using a trigger or save the data continuously in free run mode.

During Trigger/Gate Mode

There are two methods of saving the data.

- Cyclic
  You specify the number of files and the data are saved in a cyclic pattern within the specified number of files until the measurement is stopped. The newest data is not the file with the largest file number, but the file to which the data were saved immediately before stopping the measurement.



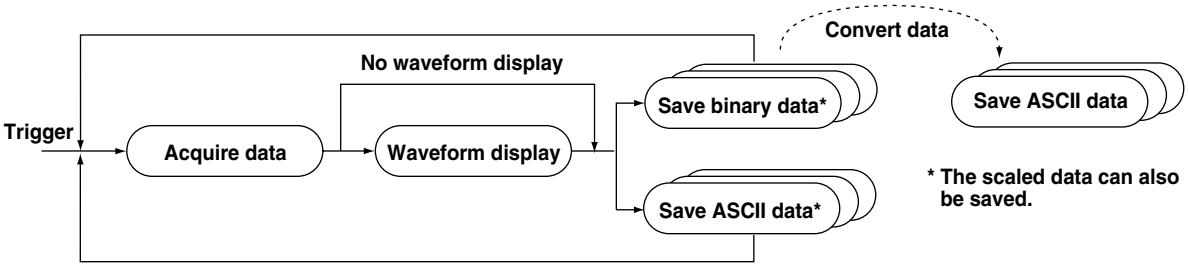
- File number limit
  You specify the number of files and the data are saved up to the specified number and then the operation stops.

During Free Run Mode

You can select to save the data to one file or to multiple files by specifying the number of data points.

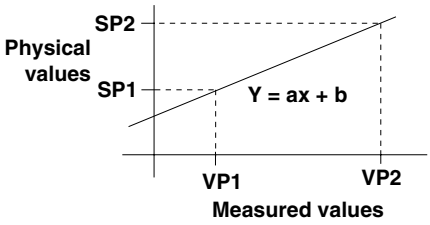
Converting the Waveform Data

Waveform data that are saved can be converted to ASCII data in CSV format (*.csv) or to a physical value in 32-bit floating point format (conforming to IEEE754-1985) (*.wvf).
This file conversion can also be performed on data saved with the waveform monitor.



Scaling the Measured Data

Set the measured values at any two points (VP1 and VP2) and their corresponding physical values (SP1 and SP2). The values at these four points define the scale conversion equation (Y = ax + b). The measured values are converted to physical values according to this equation, and the waveform display and saving operations are carried out.

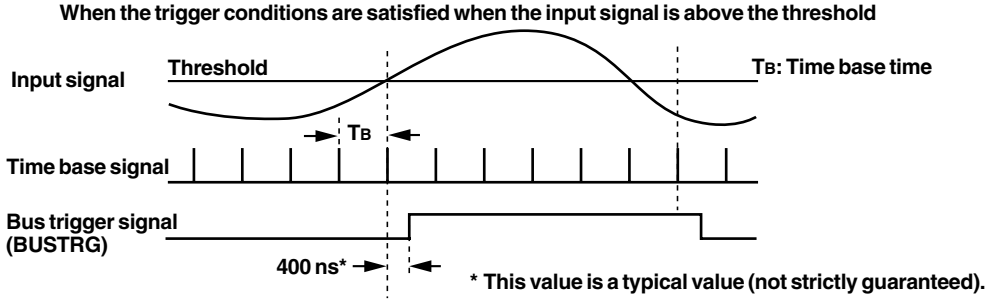


1.6 Synchronizing to Other Modules Using the Bus Trigger/Time Base Signal

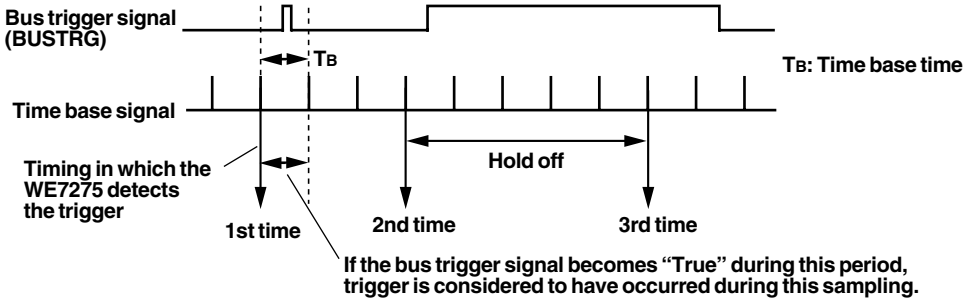
Input/Output of Bus Trigger Signals

The 2-CH, 1 MS/s Isolated Digitizer Module WE7275 can output bus trigger signals based on the results of comparing the input signal with the threshold (see 1.4, "Setting the Trigger" for details on how to set the trigger). Because the comparison between the input signal and the threshold is done in sync with the time base signal, the bus trigger signal changes in sync with the time base signal and "True" is output during the time the trigger conditions are satisfied.

When the trigger conditions are satisfied when the input signal is above the threshold



The WE7275 can also acquire data by following the bus trigger signal. If the bus trigger signal becomes "True" between the "False" to "True" edge and the "True" to "False" edge of the time base signal, then the trigger is considered to have been satisfied by the data sampled with the time base signal. Note the following when making multiple acquisitions in the trigger mode. Because the bus trigger signal is detected on the level of the signal, if the duration in which the bus trigger signal remains "True" is longer than the hold off period, the next acquisition starts after the hold off period.



In addition, the WE7275 can output a bus trigger signal upon detecting a trigger within the module, and receive the results of the AND/OR computation on the bus to trigger the actual trigger operation.

Input/Output of Time Base Signals

While the data acquisition is in progress, the time base signal generated by the internal clock of the WE7275 can be output to the time base signal bus (CMNCLK) in the measuring station. The time difference between the internal clock and the time base signal (CMNCLK) is approximately 100 ns (typical value*). Conversely, the WE7275 can input and synchronize to the time base signal (CMNCLK) on the bus in order to sample the input signal. If the period of the time base signal is shorter than the range setting of the sampling interval (see section 1.3, "Setting the Conditions for Acquiring the Waveform"), the time base signal is sometimes ignored and the sampling does not occur. The delay from the time the time base signal enters the WE7275 to the time the sampling starts is approximately 80 ns (typical value*).

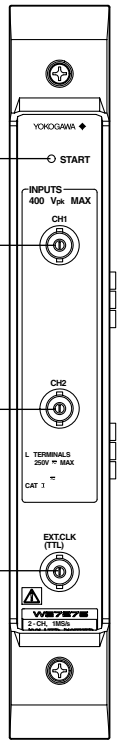
* Typical value represents a typical or average value. It is not strictly guaranteed.

Controlling the Timing of the Start of the Measurement (Arming)

When the arming signal bus (ARM) is connected to the measurement module in the trigger source/time base source setting dialog box, clicking the [Start] button on the operation panel causes the module to enter the arming signal wait state. The measurement starts when the arming signal becomes [True]. If [Repeat] check box of the [Start] button is selected, the module enters the arming signal wait state after each measurement. When the arming signal becomes [True] again, the module acquires the next waveform.

1.7 Names and Functions of Sections

Front Panel



START indicator
Turns ON when the data acquisition is started.

CH1 input terminal
Terminal used to input analog signals.

CH2 input terminal
Terminal used to input analog signals.

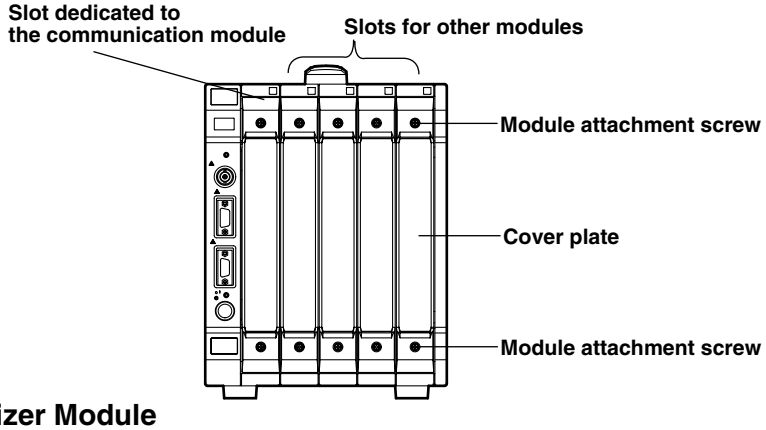
External clock input terminal
Terminal used to input external clock signals.

2.1 Installing the Module into the Measuring Station

Preparing to Install the Module

The measuring station comes with each slot covered with a cover plate as shown in the figure below. Verify that the power supply is not connected to the measuring station, then loosen the module attachment screws (2 locations) and remove the cover plate from the slot where the module is going to be installed. Please note that the slot on the left end is dedicated to the communication module and therefore this module cannot be installed there.

* The following figure shows an example of the measuring station WE400.



Installing the Digitizer Module

WARNING

- Make sure to fasten the top and bottom attachment screws. If you connect the input signal cable without fastening the attachment screws, the protective grounding of the Measurement module provided by the power cord is compromised and may cause electric shock.

CAUTION

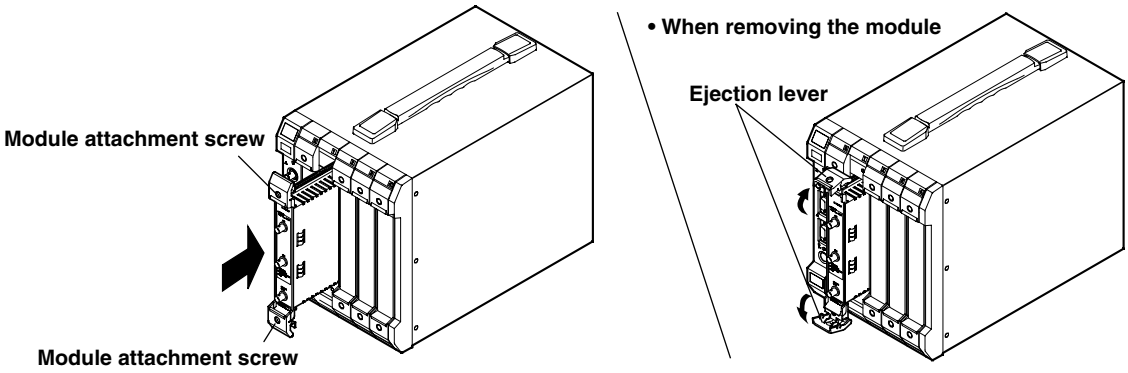
- To avoid damaging the instrument when installing modules, make sure to turn OFF the standby power switch of the measuring station.
- Be careful not to get your fingers caught in the ejection lever when inserting the module. In addition, do not put your hand inside the slot, because there are protrusions along the module guide that may injure your fingers.
- Do not remove the cover plates from unused slots. It can cause overheating and malfunction. The cover plates are also needed to minimize the influence of electromagnetic interference.

Insert the module along the guide rail of the slot from which you removed the cover plate. Insert the module until it clicks into the connector. Be careful not to get your fingers caught in the ejection lever while inserting the module.

When the module is securely inserted, fasten the module attachment screws (tightening torque: 0.6 to 0.7 N-m).

To remove the module, loosen the module attachment screws and pull the ejection lever from the inside to the outside. This will force the module out of the slot.

<There is an illustration on the next page.>



Note

When synchronizing multiple isolated digitizer modules for measurement (module linking), install them in adjacent slots.

2.2 Connecting the Input Cable

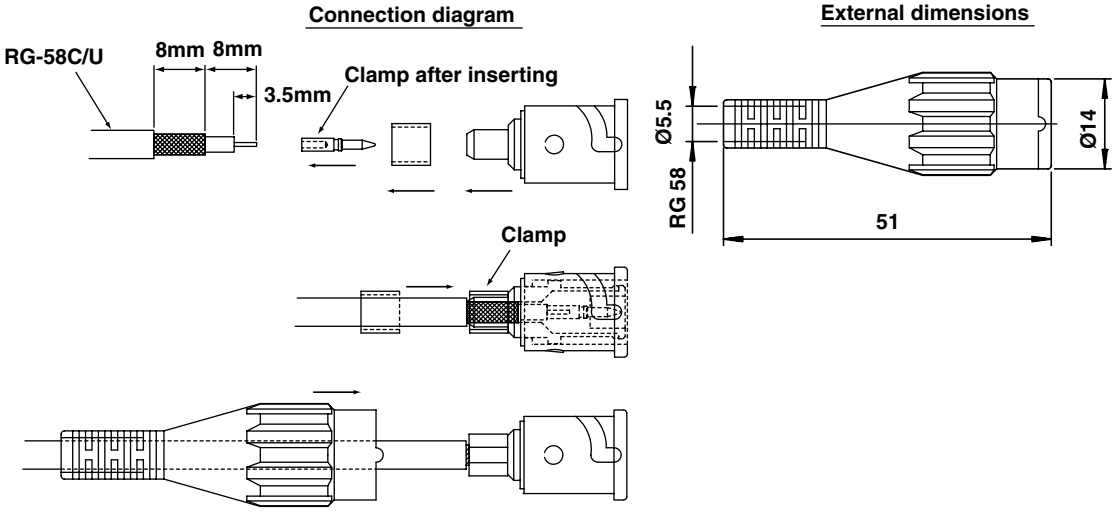
Connecting the Analog Input Cable

A BNC cable is used to input the analog signal that is to be measured. Connect the BNC cable to the input terminal (BNC terminal indicated as CH1 or CH2) on the front panel of the module. The input impedance is approximately 1 MΩ.

About the isolated BNC plug included in the package

The type of cable that can connect to the isolated BNC plug is RG-58C/U. However, if the maximum common mode voltage exceeds 150 VACrms or ±150 V, the isolation between the shield and the sheath of the RG-58C/U is insufficient to preserve safety. In this case, take measures such as covering the cable with an isolation tube.

When connecting the isolated BNC plug to a coaxial cable follow the procedure explained in below illustration.



WARNING

- If the maximum common voltage (between L terminal and ground) exceeds ±42.4 V(DC+ACpeak), always use the isolated BNC plug (see page 2) to connect the cable. Otherwise, it may cause electric shock.
- Be aware of the cable's voltage and withstand voltage specifications. If the cable is insufficient for the voltage that is to be applied, enhance the isolation by covering the cable with an isolation tube, for example.

CAUTION

- The maximum input voltage is ±400 V(DC+ACpeak). Applying a signal that exceeds this voltage can damage the input section.

Connecting the External Clock Input Cable

When using an external clock signal instead of the internal clock signal for sampling, connect an external clock input cable to the external clock input terminal (BNC terminal indicated as EXT. CLK) on the front panel of the module.

When operating multiple isolated digitizer modules in a link, apply the external clock to the left most digitizer module.

CAUTION

- Applying a voltage exceeding the allowable voltage range can damage the input section.

Apply an external clock signal with the following specifications.

Item	Specification
Input format	Non-isolated unbalanced (TTL)
H level input	2.2 V min.
L level input	0.5 V max.
Input resistance	10 kΩ (typical value*)
Input frequency	1.024 MHz max.
Input pulse width	400 ns or more

* Typical value represents a typical or average value. It is not strictly guaranteed.

3.1 Troubleshooting

- If servicing is necessary, or if the instrument is not operating correctly after performing the following corrective actions, contact your nearest YOKOGAWA dealer.
- To verify that the module is operating correctly, perform the self test as described on the next page.

Problem	Probable Cause/Corrective Action	Reference
Module does not operate.	Check to see that the module is installed correctly into the station. Also, install the module into another slot, and check whether it will operate there. If it operates in the other slot, the measuring station is likely to have malfunctioned. If the module is installed correctly and does not operate, the connector might be bad or the IC may have malfunctioned. In either case, contact your nearest YOKOGAWA dealer to have it repaired.	2-1, *
Waveform data cannot be acquired.	Check to see that the input cables are connected properly to the BNC terminals.	2-3, 2-4
Noise enters the input signal.	If the signal line and the AC power supply line are close to each other, move them apart. Also make sure that the signal line is away from the noise source. Change to a shielded signal wire if you are not already using one. If the frequency of the input signal is known, use a filter to cut the frequency bands above the frequency components of the input signal.	— 1-6
Measured values are not correct.	Check whether the ambient temperature and humidity are within the allowed ranges. If you did not allow a warm-up time of 30 minutes, try measuring again after the warm-up time has passed.	4-4
Triggering does not work.	Check whether the trigger setting is adequate for the input source in the trigger operation panel. If you are using the bus trigger signal, verify that the settings are correct in the trigger source/time base/arming setting dialog box of the WE7000 Control Software.	1-2, 1-7 *
The waveform monitor does not appear.	Check to see that the [Waveform monitor ON/OFF] button, located to the right of the [Start] button of the operation, is not set to OFF.	1-2

* See the WE7000 User's Manual (IM 707001-01E).

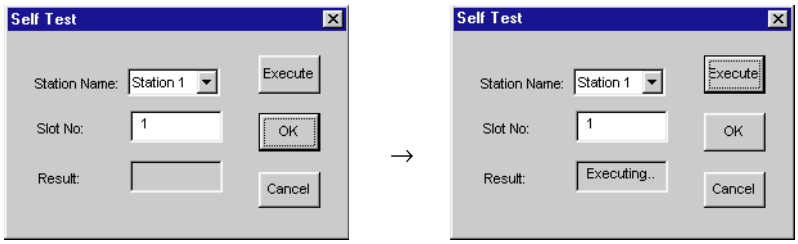
3.2 Self Test

If you believe that the module is not operating correctly, perform the self test according to the following steps.

Executing Self Test

1. Select [Self Test] from the [System] menu of the WE7000 Control Software.

2. In the [Self Test] dialog box that appears, select the station name and enter the slot number corresponding to the module, and click the [Execute] button.
   "Executing..." is displayed in the [Result] display box.



Verifying Test Results

If a value other than "0" is displayed in the "Result" display box of the "Self Test" dialog box, the module is probably malfunctioning. Please contact your nearest YOKOGAWA dealer.

3.3 Maintenance

Maintenance of Parts

There are no parts in this module that require periodic replacement.

Calibration

We recommend that you calibrate the measurement module once a year to assure its measurement accuracy. Please contact your nearest YOKOGAWA dealer to have the module calibrated.

4.1 Performance Specifications

Number of Input Channels

2

Input Format

Floating unbalanced input, isolation between channels and between the input and ground

Connector Type

Isolated BNC

Input Coupling

DC/AC

A/D Resolution

±100 mV to ±200 V range: Equivalent to 14 bits (includes the sign)

±350 V range: Equivalent to 13 bits (includes the sign)

Input Impedance

Approx. 1 MΩ

Maximum Source Resistance

100 Ω or less

Frequency Characteristics (–3 dB Attenuation Point, When Filter Is Turned OFF)

For DC coupling: DC to 500 kHz (Typical value*)

For AC coupling: 1 Hz to 500 kHz (Typical value*)

Measurement Range/Accuracy (Ambient Temperature: 23 ±5°C, Ambient Humidity: 50 ±10% RH, after the Warm-up Time Has Passed)

Range	Accuracy	Temperature coefficient (at 5-18°C or 28-40°C)
±100 mV	±(0.15% of rdg + 0.4 mV)	±(100 ppm of rdg + 30 μV)/°C
±200 mV	±(0.15% of rdg + 0.6 mV)	±(100 ppm of rdg + 40 μV)/°C
±500 mV	±(0.15% of rdg + 1 mV)	±(100 ppm of rdg + 60 μV)/°C
±1 V	±(0.15% of rdg + 1.7 mV)	±(100 ppm of rdg + 0.1 mV)/°C
±2 V	±(0.15% of rdg + 3.2 mV)	±(100 ppm of rdg + 0.2 mV)/°C
±5 V	±(0.15% of rdg + 8 mV)	±(100 ppm of rdg + 0.5 mV)/°C
±10 V	±(0.15% of rdg + 40 mV)	±(100 ppm of rdg + 3 mV)/°C
±20 V	±(0.15% of rdg + 60 mV)	±(100 ppm of rdg + 4 mV)/°C
±50 V	±(0.15% of rdg + 100 mV)	±(100 ppm of rdg + 6 mV)/°C
±100 V	±(0.15% of rdg + 170 mV)	±(100 ppm of rdg + 10 mV)/°C
±200 V	±(0.15% of rdg + 320 mV)	±(100 ppm of rdg + 20 mV)/°C
±350 V	±(0.15% of rdg + 800 mV)	±(100 ppm of rdg + 50 mV)/°C

Input Filter

Low-pass filter

Cut-off frequency: OFF, 100 kHz, 40 kHz, 4 kHz, 400 Hz (Typical value*)

Filter characteristics: 4th order Bessel characteristics (–24 dB/oct.)

Anti-aliasing filter

Cut-off frequency: OFF, 20 Hz to 40 kHz (in steps of 1, 2, 4 and their ten-fold multiples)

Pass-band characteristics: ±1dB at 5 to 100% of the cut-off frequency (Typical value*)

Attenuation characteristics: –80 dB at frequencies greater than or equal to 2.1 times the cut-off frequency (Typical value*)

Acquisition Method

Trigger, free run, gate (level), gate (edge)

Memory Length of Acquisition Memory

2 Mword/CH (when using 2CH) or 4 Mword/CH (when using 1CH)

Memory Partition (Partition Possible Only When Trigger Mode Is Selected)

Select from 1/2/4/8/16/32/64/128/256 partitions

Maximum Sampling Rate

1.024 MS/s

Time Base Source

Module's internal clock, external clock, or the time base signal (CMNCLK) of the measuring station (WE bus)

Internal Time Base

1 µs to 1 s

Trigger Source

Input signal (includes input signals of other isolated digitizer modules that are linked), or the bus trigger (BUSTRG1/BUSTRG1) signal of the measuring station

Bus Trigger Signal (BUSTRG1/BUSTRG2) Output Source

Able to output the trigger detected from the input signal

Trigger Level

Resolution

1 mV at ±100/200/500 mV range, 10 mV at ±1/2/5 V range, 0.1 V at ±10/20/50 V range, 1 V at ±100/200/350 V range

Hysteresis width

5% of (upper limit of range – lower limit of range) (Typical value*)

Setting accuracy

3% of ±(upper limit of range – lower limit of range)

Trigger Type

Edge trigger, state trigger, combination trigger (AND/OR of the input signals)

Pre-trigger Amount (Selectable Only When Trigger Mode Is Selected)

Set in the range from 0 to (the record length – 2)

External Clock Input

Input format

Non-isolated unbalanced (TTL)

H level input

2.2 V min.

L level input

0.5 V max.

Input resistance

10 kΩ (Typical value*)

Connector type

BNC

* Typical value represents a typical or average value. It is not strictly guaranteed.

4.2 Default Values (Factory Default Settings)

On (measurement ON/OFF): On (for both CH1 and CH2)
Coupling (input coupling): DC (for both CH1 and CH2)
Range (measurement range): 10 V (for both CH1 and CH2)
Acquisition Mode: Triggered
Sampling Interval: 1 μs
Memory Partition: 1
Record Length: 5000
No. of Acquisitions: 1
AAF (anti-aliasing filter): Off
Filter (input filter): Off
Time Base: Internal
CH Mode (Number of measurement channels): 2 channels
Trig Type: Rise (CH1), Off (CH2)
Trig Level: 0 V
Trig Source: Internal
Trig Combination: OR
Pretrigger: 0 samples
Hold Off: 1000 samples
Overlapped Acquisition: Off
Repeat (repetitive measurement): On

4.3 General Specifications

Safety Standards

Complies with CSA C22.2 No. 1010.1 and EN61010-1, conforms to JIS C1010-1

- Overvoltage Category CAT I and II[*1]
- Pollution Degree 1 and 2[*2]

EMC Standards

Emission

Complying Standard

EN55011 Group 1 Class A

This product is a Class A (for commercial environment) product. Operation of this product in a residential area may cause radio interference in which case the user is required to correct the interference.

Immunity

Complying Standard

EN50082-2

Influence in the immunity environment

Noise increase : ≤ ±500 mV

Testing Condition

1 μs, 0.1 V Range, input 3 m coaxial cable (3D-2W) with open terminated.

Warm-up Time

At least 30 minutes

Maximum Allowable Input Voltage

Analog input signal: ±400 V(DC + ACpeak)

External clock input: –1 V to +6 V

(Overvoltage Category: CAT I and II)

Maximum Common Mode Voltage (between the Analog Signal Input L Terminal and Ground)

±250 VDC or 250 VACrms (when using the isolated BNC plug included in the package)

Maximum Voltage across Channels (between Any Two Analog Signal L Terminals of Different Channels)

±250 VDC or 250 VACrms

Insulation Withstand Voltage

Between analog signal input L terminal and ground

1500 VAC (60 Hz) for one minute

Between analog signal input channel L terminals

2300 VAC (60 Hz) for one minute

Insulation Resistance (Between Analog Signal Input L Terminal and Ground and between Analog Input Channels)

500 VDC, 10 MΩ or more

Operating Conditions

Same as those of the measuring station

Storage Conditions

Temperature: –20 to 60°C

Humidity: 20 to 80%RH (no condensation)

Power Consumption

14 VA (typical value[*3] at 100 V/50 Hz)

Weight

Approx. 0.8 kg

External Dimensions

Approx. 33(W) × 243(H) × 232(D) mm (projections excluded)

Number of Used Slots

1

Standard Accessories

Isolated BNC plugs (2), User's Manual (1)

Optional Accessories

Isolated BNC plug (Model: A1226JA)

*1 Overvoltage Categories define transient overvoltage levels, including impulse withstand voltage levels.

Overvoltage Category I: Applies to equipment supplied with electricity from a circuit containing an overvoltage control device.

Overvoltage Category II: Applies to equipment supplied with electricity from fixed installations like a distribution board.

*2 Pollution Degree: Applies to the degree of adhesion of a solid, liquid, or gas which deteriorates withstand voltage or surface resistivity.

Pollution Degree 1: Applies to closed atmospheres (with no, or only dry, non-conductive pollution).

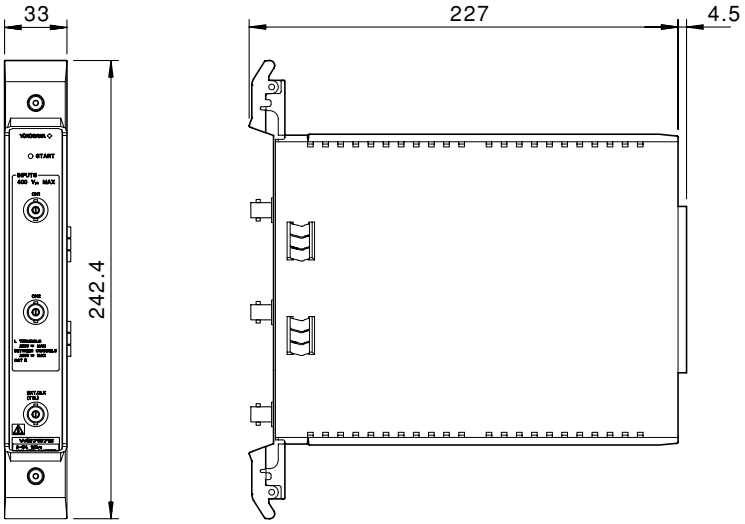
Pollution Degree 2: Applies to normal indoor atmospheres (with only non-conductive pollution).

*3 Typical value represents a typical or average value. It is not strictly guaranteed.

4.4 Dimensional Drawings

Unit: mm

2-CH, 1 MS/s Isolation Digitizer Module (WE7275)



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

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