HIOKI

INSTRUCTION MANUAL

2300

SMART SITE

HIOKI E. E. CORPORATION

Contents

Introduction

Thank you for purchasing the HIOKI “2300 Smart Site”. To obtain maximum performance from the instrument, please read this manual first, and keep it handy for future reference.

When you receive the instrument, inspect it carefully to ensure that no damage occurred during shipping. In particular, check the accessories, panel switches, and connectors. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

Safety Notes

DANGER

This instrument is designed to comply with IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the instrument. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from instrument defects.

This manual contains information and warnings essential for safe operation of the instrument and for maintaining it in safe operating condition. Before using it, be sure to carefully read the following safety precautions.

Safety Symbols

⚠	In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the instrument. The ⚠ symbol printed on the instrument indicates that the user should refer to a corresponding topic in the manual (marked with the ⚠ symbol) before using the relevant function.
⏚	Indicates a grounding terminal.
⏚	Indicates a protective conductor terminal.
⎓	Indicates DC (Direct Current).
~	Indicates AC (Alternating Current).
I	Indicates the ON side of the power switch.
O	Indicates the OFF side of the power switch.

The following symbols in this manual indicate the relative importance of cautions and warnings.

DANGER	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
WARNING	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
CAUTION	Indicates that incorrect operation presents a possibility of injury to the user or damage to the instrument.
NOTE	Indicates advisory items related to performance or correct operation of the instrument.

Other Symbols

	Indicates the prohibited action.
❖	Indicates the reference.

Accuracy

We define measurement tolerances in terms of f.s. (full scale), rdg. (reading) and dgt. (digit) values, with the following meanings:

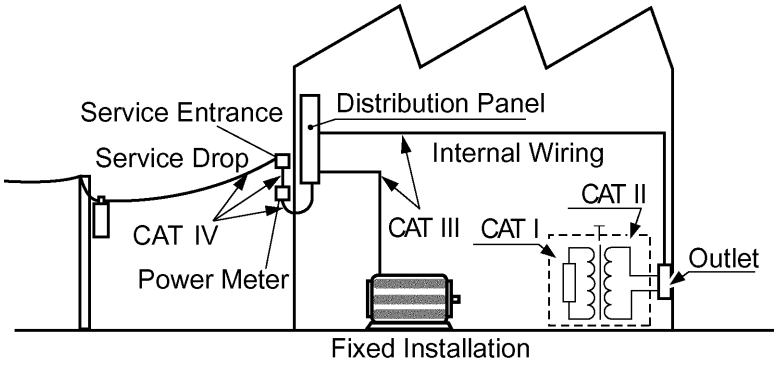
f.s. (maximum display value or scale length)	The maximum displayable value or scale length. This is usually the name of the currently selected range.
rdg. (reading or displayed value)	The value currently being measured and indicated on the measuring instrument.
dgt. (resolution)	The smallest displayable unit on a digital measuring instrument, i.e., the input value that causes the digital display to show a "1" as the least-significant digit.

Measurement categories (Overvoltage categories)

Model 2301-20, 2302-20, 2303-20, 2304-20, 2304-21 and 2305-20 comply with CAT I safety requirements.
Model 2331-20 and 2332-20 comply with CAT III safety requirements.
To ensure safe operation of measurement instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT I to CAT IV, and called measurement categories. These are defined as follows.

CAT I	Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar instrument.
CAT II	Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.)
CAT III	Primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets.
CAT IV	The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection instrument (distribution panel).

Higher-numbered categories correspond to electrical environments with greater momentary energy. So a measurement instrument designed for CAT III environments can endure greater momentary energy than a instrument designed for CAT II.
Using a measurement instrument in an environment designated with a higher-numbered category than that for which the instrument is rated could result in a severe accident, and must be carefully avoided.
Never use a CAT I measuring instrument in CAT II, III, or IV environments.
The measurement categories comply with the Overvoltage Categories of the IEC60664 Standards.



Notes on Use

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

Instrument Installation

Operating temperature and humidity: 0 to 50°C (32 to 122°F), 80% RH (non-condensating)

Avoid the following locations that could cause an accident or damage to the instrument.

Exposed to direct sunlight
Exposed to high temperature

In the presence of corrosive or explosive gases

Exposed to liquids
Exposed to high humidity or condensation

Exposed to strong electromagnetic fields
Near electromagnetic radiators

Exposed to high levels of particulate dust
When the module is used in a dusty environment, place it in a dustproof case and take measures to ensure heat dissipation.

Subject to vibration

⚠CAUTION

Do not allow the instrument to get wet, and do not take measurements with wet hands.
The instrument may be damaged.

To avoid damage to the instrument, protect it from physical shock when transporting and handling.
Be especially careful to avoid physical shock from dropping.

Do not obstruct the ventilation holes.
Ventilation holes for heat radiation are provided on the top and rear panels of the instrument. Leave sufficient space around the ventilation holes and install the instrument with the holes unobstructed. Installation of the instrument with the ventilation holes obstructed may cause a malfunction or fire.

When using the instrument in the case, drill ventilation holes.
Drill ventilation holes or install a ventilation fan to prevent heat buildup.

⚠CAUTION

Only use sensors dedicated to the type of module.
To avoid damaging the instrument, do not connect any other sensors than those dedicated to the instrument to its input terminals. Further, do not connect any other signal sources to the terminals, as such signals may lead to module damage due to excessive voltage or current.

Wiring

⚠WARNING

- **A qualified electrician shall perform the wiring to prevent electric shock.**
- **Avoid live-line electrical work to prevent electric shock and accidents due to short-circuiting.**
- **Ensure that the power supply, input, and output are correctly wired according to the wiring diagram. (See the section on "Preparations" for each module.) This will prevent fire, malfunction, and errors.**
  Connect the module to a power source that matches the rating in order to prevent fire.
- **Do not work on live lines. Such work may result in electric shock or short-circuiting.**
- **Use cables of the proper sizes for the rated current. This will prevent entire system errors and fire resulting from broken wire.**
- **Use crimp connectors suitable for the cable sizes. This will prevent module errors and fire due to broken wires.**
- **When tightening the screws, confirm that all screws are securely tightened. A loose screw may result in module errors, fire, or electric shock.**
- **Tighten the screws within the specified torque. Excessive torque may damage the terminals. Inadequate torque may result in module errors, fire, or electric shock.**
- **Ensure that the power supply module and input are OFF until all wiring work is finished. This will prevent module trouble and electric shock.**
- **Ensure that the power supply module and input are OFF when connecting or disconnecting the module to the system. This will prevent electric shock, errors, and malfunction.**
- **Avoid using an unused terminal for relaying or any other purpose to prevent electric shock, errors, and malfunction.**

⚠CAUTION

- If power supply noise poses a problem, use of a noise filter is recommended.
- When the power and signal lines may be subject to a lightning-induced surge, install a lightning arrester between another instrument or module connected to this module and line to protect the system.
- Avoid stepping on or pinching cables, which could damage the cable insulation.
- Keep the cables well away from heat sources, as bare conductors could be exposed if the insulation melts.

Preliminary Checks

⚠WARNING

Before using the instrument, make sure that the insulation on the cables is undamaged and that no bare conductors are improperly exposed. Using the product in such conditions could cause an electric shock, so contact your dealer or Hioki representative for repair.

Before using the instrument the first time, verify that it operates normally to ensure that the no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.

Service

Cleaning

To clean the instrument, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.

Service

⚠WARNING

Never modify the instrument. Only Hioki service engineers should disassemble or repair the instrument. Failure to observe these precautions may result in fire, electric shock, or injury.

- If the instrument seems to be malfunctioning, confirm that the cables are not open circuited before contacting your dealer or Hioki representative.
- When sending the instrument for repair, pack carefully to prevent damage in transit. Include cushioning material so the instrument cannot move within the package. Be sure to include details of the problem. Hioki cannot be responsible for damage that occurs during shipment.
- When transporting the module or a 2300 Smart Site, tape the front of the module or take similar measures to avoid losing internal components.
- The instrument contains a built-in backup lithium battery, which offers a service life of about five years. If the date and time deviate substantially when the instrument is switched on, it is the time to replace that battery. Contact your dealer or Hioki representative.

8 Service

2301-20 HUMIDITY MODULE 1

1.1 Overview

1.1.1 Product Overview

- The 2301-20 is a measurement module of Hioki "Smart Site" (remote measurement system).
- This module measures and records temperature and humidity at regular intervals.
- The 2301-20 is used with the power supply module, communications module, and module base.

Number of measurement channels	Temperature 1 CH + Humidity 1 CH
Measuremen range	-40.0 to 85.0°C, 0.0 to100.0%RH

(Conceptual image)

1.1.2 Major Features

- **The recording interval is selectable from 1 second to 60 minutes.**
- **The maximum, minimum, and average measurements during the recording interval can be recorded (with sampling once a second).**
- **The module has an alarm output terminal.**

The capacitive humidity sensor for this module has the following features relating to humidity measurement:

- Stable characteristics
- Wide measurement range
- Long service life
- Quick response
- Resistance to condensation

Rough Estimate of Storable Data Quantity and Time

Action at memory full: Continue recording (Endless)

	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value + MAX/MIN/AVE
Quantity of storable data	26000	13000	10000
Recording interval			
1 sec.	7.5 hours	3.5 hours	2.5 hours
2 sec.	14.5 hours	7 hours	5.5 hours
5 sec.	1.5 days	18 hours	14.5 hours
10 sec.	3 days	1.5 days	1 day
15 sec.	4.5 days	2 days	1.5 days
20 sec.	6 days	3 days	2 days
30 sec.	9 days	4.5 days	3.5 days
1 min.	18 days	9 days	7 days
2 min.	36 days	18 days	14 days
5 min.	92 days	46 days	36 days
10 min.	184 days	92 days	73 days
15 min.	277 days	138 days	110 days
20 min.	369 days	184 days	147 days
30 min.	554 days	277 days	221 days
60 min.	1109 days	554 days	443 days

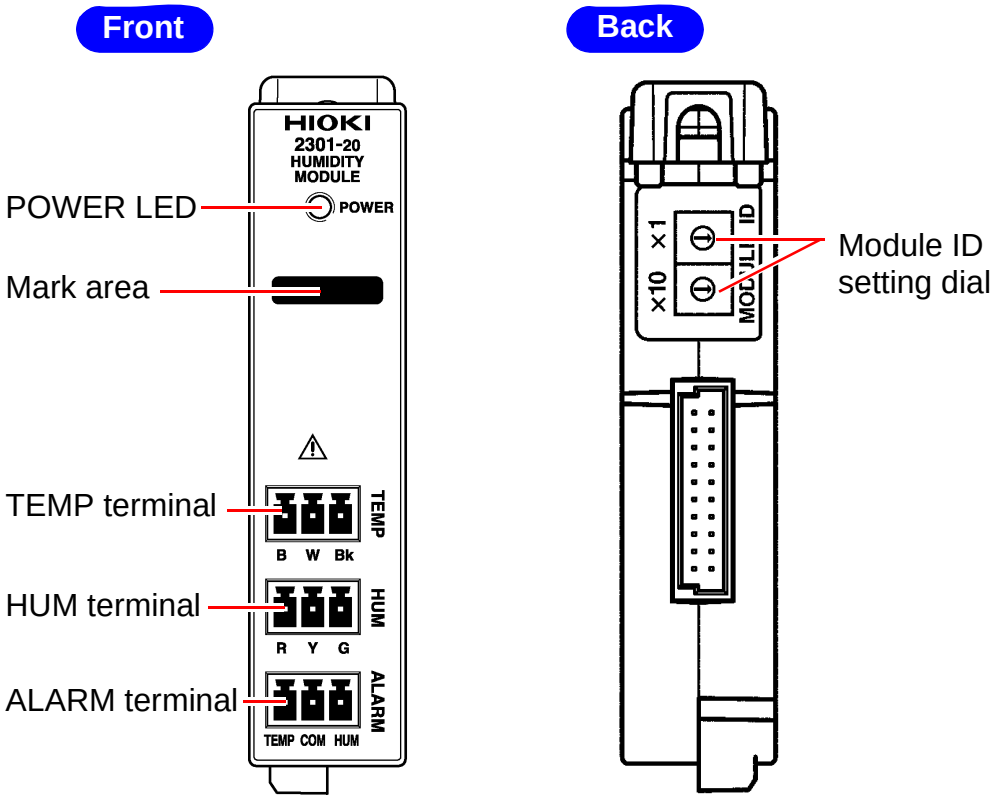
NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1 of the data per alarm)

Action at memory full: Stop recording (Memory full stop)

	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value + MAX/MIN/AVE
Quantity of storable data	30000	15000	12000
Recording interval			
1 sec.	8.5 hours	4 hours	3 hours
2 sec.	17 hours	8.5 hours	6.5 hours
5 sec.	1.5 days	21 hours	17 hours
10 sec.	3.5 days	1.5 days	1.5 days
15 sec.	5 days	2.5 days	2 days
20 sec.	7 days	3.5 days	2.5 days
30 sec.	10 days	5 days	4 days
1 min.	21 days	10 days	8 days
2 min.	42 days	21 days	17 days
5 min.	106 days	53 days	42 days
10 min.	213 days	106 days	85 days
15 min.	319 days	159 days	127 days
20 min.	426 days	213 days	170 days
30 min.	639 days	319 days	255 days
60 min.	1279 days	639 days	511 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1 of the data per alarm)

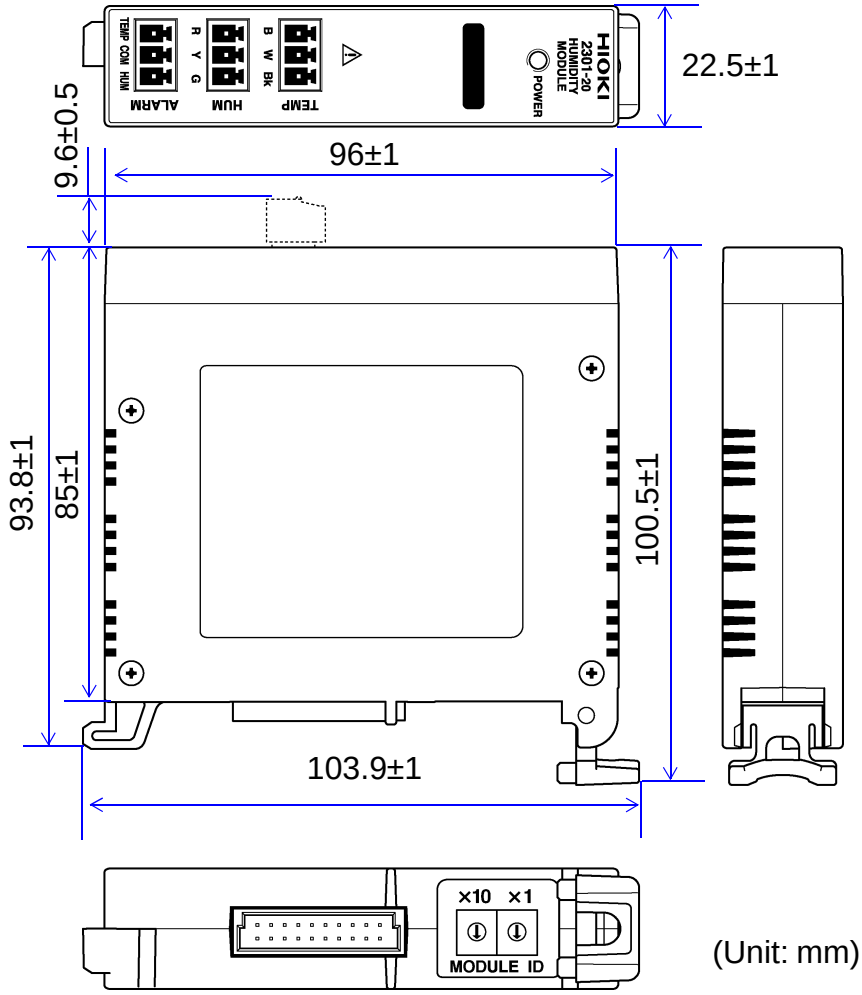
1.1.3 Name and Function of the Parts



POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Data being recorded. Flashing in green : Standing by. Lit in yellow : Alarm output. Flashing in yellow: Overrange detected. Lit in red : Non-recoverable error occurred.*1 Flashing in red : Recoverable error occurred.*2
Mark area	Use this area to make a note of the object to measure or the module ID. Use an ink pen, since pencil lead may rub off.
TEMP terminal	Connect the temperature sensor to this terminal.
HUM terminal	Connect the humidity sensor to this terminal.
ALARM terminal	Connect the alarm output cable to this terminal.
Module ID setting dial	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your dealer or Hioki representative.
*2: The same module ID may be used by another module.

1.1.4 Dimension Diagrams



(Unit: mm)

1.1.5 Accessory and Option

Accessories

Ferrite clamp 1
Terminal block 3

Option

9764-50 HUMIDITY SENSOR

1.2 Settings

1.2.1 Setting the Module ID

You can connect up to 63 measurement modules to one communications module.

Setting Procedure

Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID are not related and can be set independently.

1.3 Preparations

1.3.1 Installing the Module

(1) Installing the Module Base

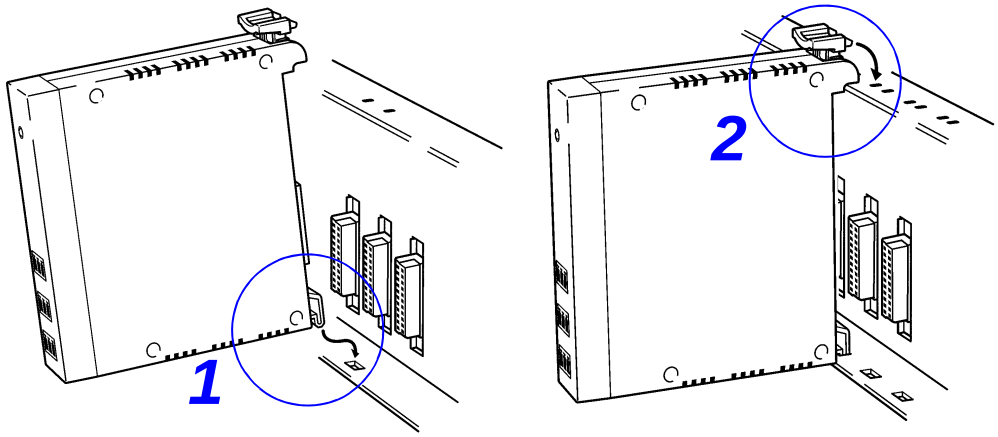
CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(2) Mounting a Module on the Module Base

Mount a module on the module base as shown below. Ensure that the lever clicks.



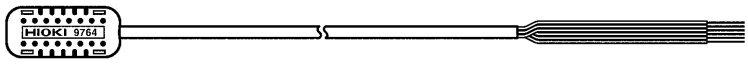
1.3.2 Connecting Input/Output Cables

(1) Connecting Sensor Cables to the Terminal Block

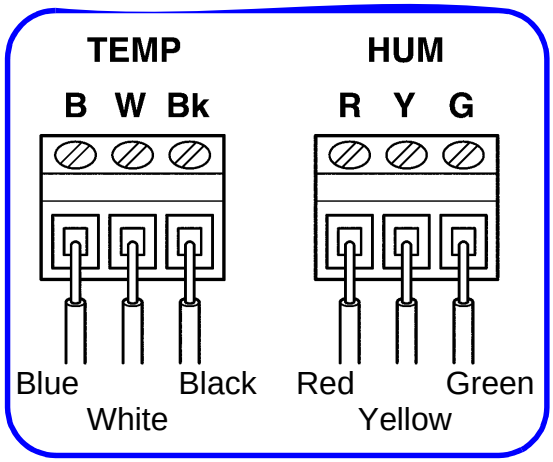
⚠CAUTION

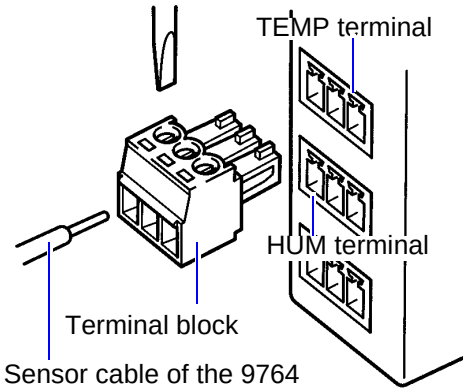
- The TEMP terminal and HUM terminal are not insulated from each other. Avoid short-circuiting.
- Be sure to connect the cables to matching connectors to prevent damage to the module or sensor.

Connect the 9764 HUMIDIDTY SENSOR to the module by following the procedure below.



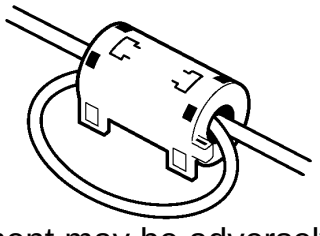
1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert a cable into the terminal block, then tighten the screws (at a tightening torque of 0.25 N•m).
3. Connect the terminal block to the TEMP terminal, and HUM terminal.





NOTE

- In case of external noise, wind the cable around the ferrite clamp supplied as an accessory as shown below.



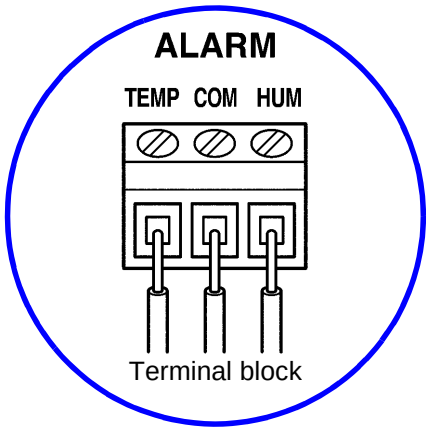
- Note that measurement may be adversely affected by external noise or the electromagnetic environment when using a cable longer than 3 meters.

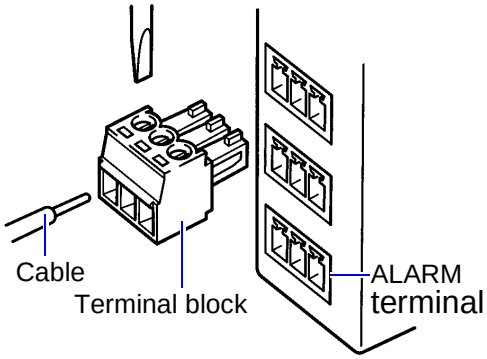
(2) Connecting Cables to the ALARM Terminal (Alarm output)

Recommended Cable

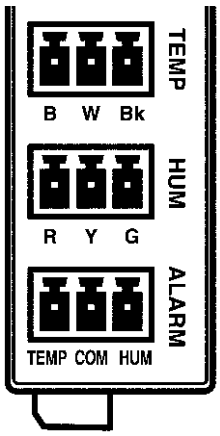
Single-wire	: 0.14 to 1.5 mm^2
Stranded-wire	: 0.14 to 1.0 mm^2
AWG	: 26 to 16
Cable strip length	: 5 mm (0.2")

1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert a cable for alarm output into the terminal block, then tighten the screws (at a tightening torque of 0.25 N•m).
3. Connect the terminal block to the ALARM terminal.





(3) The Location of the Input/Output Cable



TEMP terminal (Input)	**B**	**W**	**Bk**
	Blue	White	Black
HUM terminal (Input)	**R**	**Y**	**G**
	Red	Yellow	Green
ALARM terminal (output)	**TEMP**	**COM**	**HUM**
	Alarm output	Common	Alarm output

NOTE The TEMP and HUM terminals are used to connect the optional 9764 HUMIDIDTY SENSOR.

9764 HUMIDIDTY SENSOR

⚠CAUTION

- To avoid damaging the 2301-20, only connect the 9764 HUMIDIDTY SENSOR to the TEMP and HUM terminals. Moreover, do not input other signals to these terminals.
- If the sensor is used or stored outside the operating or storage ranges, sensor accuracy may be adversely affected and you may not get accurate measurements even within the one-year guaranteed period of accuracy.
- Hioki is not liable for any problems caused by sensor use or storage outside the operating or storage ranges.
- When not using the 9764 HUMIDIDTY SENSOR, seal it in a plastic bag and store it in a cool, dark place.
- Be careful to avoid condensation on the sensor. If condensation occurs, you may not get accurate measurements. Condensation is likely to occur when the sensor is subject to rapid changes in temperature.

1.4 Others

1.4.1 Alarm output

WARNING

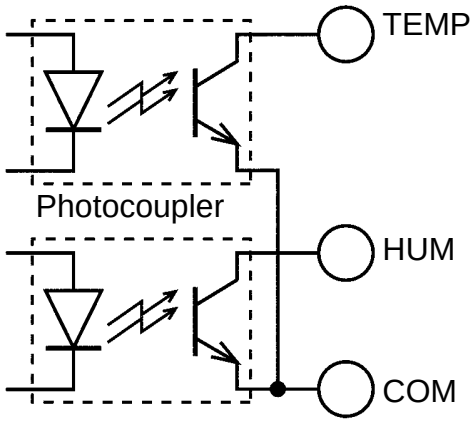
Ensure that the input does not exceed the maximum input voltage or current to avoid module damage, short-circuiting and electric shock resulting from heat building.

Output method	Open collector
Maximum input voltage / current	30 V, 20 mA max.
Signal logic	Enabled: ON Disabled: OFF

(1) Internal Circuit

The alarm output circuit is configured as shown below.

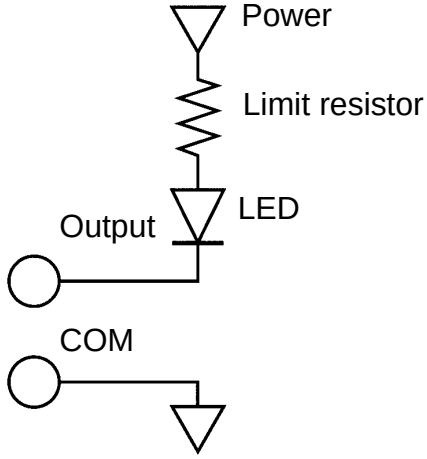
<Internal circuit>



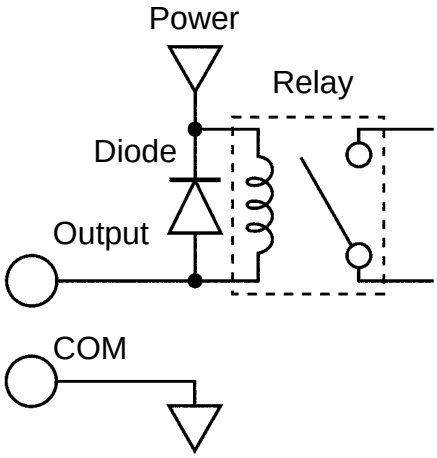
NOTE

- Signal logic indicates the signal state in which a signal's function is enabled.
- The output transistor works as a switch between signal output and ground in the module. When output becomes enabled, the switch is turned on and current flows from the output signal to COM in the module. Therefore, a relay or LED lamp can be connected directly to the output terminal (P.20).

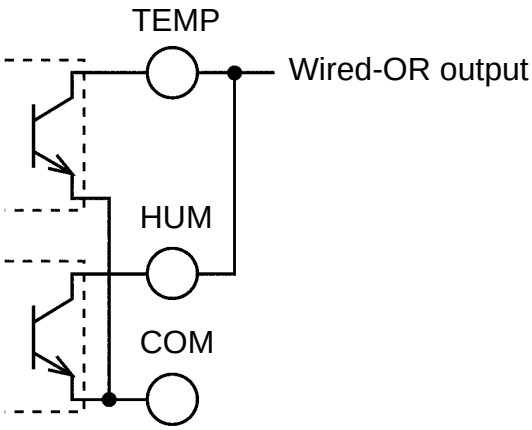
<Circuit diagram>



Connecting LED



Connecting relay



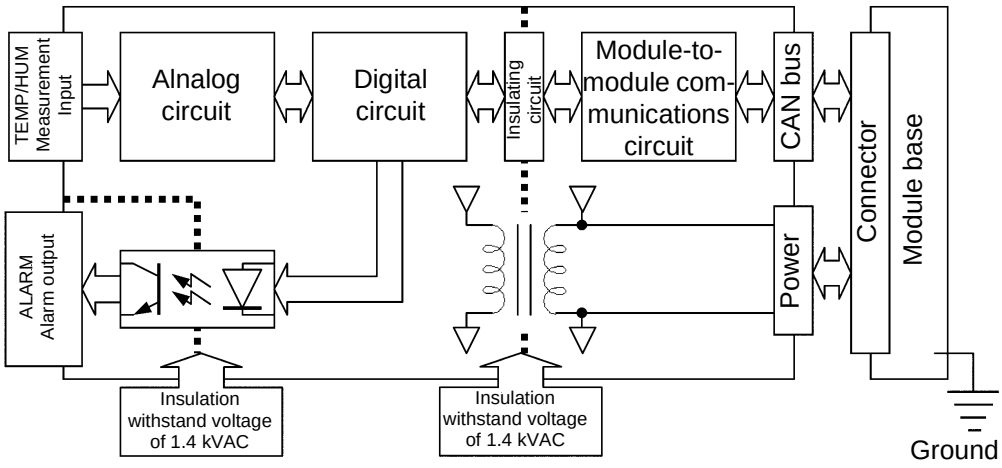
Using on Wired-OR Logic

NOTE

- When connecting a relay or LED lamp, ensure that the relay or lamp operates at up to 30 V and 20 mA. When connecting a relay, be sure to use a diode to absorb counterelectromotive force.
- Open collector output operates on wired-OR logic by short-circuiting TEMP and HUM. Moreover, it enables the signal if an alarm occurs in either channel.

1.4.2 Insulation of Internal Circuit

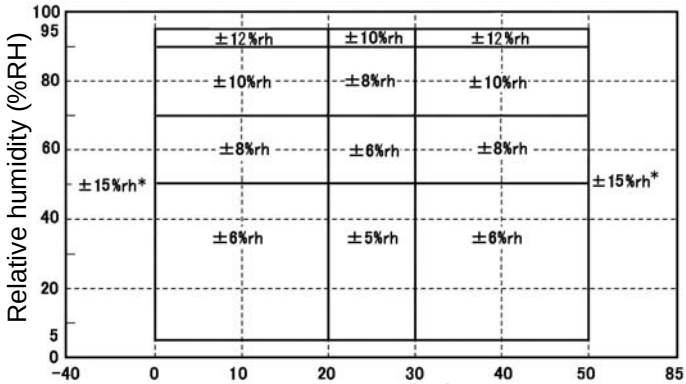
In the 2301-20, the input circuit and alarm output are insulated from the CAN bus as shown in the block diagram below. (Withstand voltage: 1.4 kVAC, 50/60 Hz, Response current: 5 mA, 1 minute)



NOTE The COM terminal of the alarm output terminal is used for both TEMP and HUM.

1.5 Specifications

1.5.1 Basic Specifications

Sensor type	9764-50 HUMIDITY SENSOR
Number of inputs	Temperature 1 CH + Humidity 1 CH
Measurement range	-40.0 to 85.0°C Resolution: 0.1°C, 0.0 to 100.0%RH Resolution: 0.1%RH (Display range: -10.0 to 110.0%RH)
Measurement accuracy	Temperature -40.0 to -0.1°C ±1.0°C 0.0 to 35.0°C ±0.5°C 35.1 to 70.0°C ±1.0°C 70.1 to 85.0°C ±2.0°C Humidity  *Accuracy not guaranteed (reference values)
Period of guaranteed accuracy	1 year
Sampling	1 time / sec.
Input terminal	3 Input terminal block × 2

1.5.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current measured values (instantaneous values).

Measured value recording function

Measurements are recorded at a set recording interval.	
Real-time management	This is automatically set from the PC application at the start of recording.
Recording start	Immediate start/Reserved-time start
Recording end	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.

Recording mode	• Instantaneous value • MAX/MIN/AVE • Instantaneous value + MAX/MIN/AVE Total 3 modes ♦Set the mode before the start of recording.
Recorded data	One data set contains time and temperature/humidity information (One channel each). ♦Data is scaled if scaling is ON.
Recording capacity	512 k bytes Flash memory
Quantity of recorded data	• Instantaneous value recording mode: 30,000 data × 2 CH • MAX/MIN/AVE recording mode: 15,000 data × 2 CH • Instantaneous value + MAX/MIN/AVE recording mode: 12,000 data × 2 CH
Power outage protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

Alarm judgment and recording function

Alarm judgment is made at every sampling, and the history will be recorded in flash memory if the measured value recording function remains active.	
Judgment method	Criterion threshold can be set to either Hi or Lo. The instantaneous value at every sampling is judged (effective in any measurement mode).
Recorded data	One data set contains time, generation/reversion , CH and judgment threshold.
Alarm output	Alarm output × 2 CH ♦Output is turned ON when an alarm (Hi or Lo) occurs. Whether to hold the alarm output can be selected. The reset switch or a command can be used to reset alarms.

1.5.3 General Specifications

Clock accuracy	±100 ppm (Reference value at temperature from 0 to 50°C (32 to 122°F) without the communications module)
Backup	Recorded data (saved in flash memory) ♦Data loss for up to 2 minutes before and after a power outage may occur.
Communication interface	CAN bus
Maximum rated voltage to earth	33 Vrms, 70 VDC
Alarm output	Open collector:30 VDC/20 mA MAX.
Rated supply voltage	5 V±0.3 VDC
Maximum rated Power	1.4 W
Withstand voltage	1.4 kVAC Between input and alarm output, Input/Output and CAN bus (50/60 Hz, Response current 5 mA, one minutes
Dimensions	Approx. 22.5W × 96H × 85D mm (0.89"W × 3.78"H × 3.35"D) (excluding projections)
Mass	Approx. 120 g (4.2 oz.)
Accessories	Ferrite clamp..... 1 Terminal block..... 3
Option	9764-50 HUMIDITY SENSOR
Operational ranges for temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)
Temperature and humidity ranges for storage	-10 to 50°C (14 to 122°F), 80%RH or less (with no condensation)
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)
Standards applying	Safety EN61010-1:2001, Pollution degree 2, Measurement Category I (anticipated transient overvoltage 330 V) EMC EN61326:1997+A1:1998+A2:2001+A3:2003, CLASS A

1.5.4 9764 HUMIDIDTY SENSOR Specifications

Operational ranges for temperature and humidity	-40 to 85°C (-40 to 185°F), 0.0 to 100.0%RH (with no condensation)
Temperature and humidity ranges for storage	-40 to 85°C (-40 to 185°F), 0.0 to 100.0%RH (with no condensation)
Response time	Temperature: Approx. 100 sec., Humidity: Approx.300 sec.
Temperature sensor	Thermistor
Humidity sensor	High polymer film (volume)
Cord length	Approx. 3 m
Dimensions	Sensor, Approx. 30W × 13H × 8D mm (1.18"W × 0.51"H × 0.31"D)
Long time stability	±1%RH (5 years at 25°C (77°F), 50%RH, reference value)

The 2301-20 may indicate a humidity measurement below zero or above 100%RH. These values indicate a change in low or high humidity levels, and do not indicate actual humidity (since values over 100% and lower than 0% are impossible).

2302-20 Pt MODULE 2

2.1 Overview

2.1.1 Product Overview

- The 2302-20 is a measurement module of Hioki "Smart Site" (remote measurement system).
- This module measures and records temperature at regular intervals.
- The 2302-20 is used with the power supply module, communications module, and module base.

Usable Temperature sensor	Platinum resistance thermometer sensor (Selectable between Pt100 and JPt100)
Number of measurement channels	Temperature 2 CH
Measurement range	-100.0 to 300.0°C

(Conceptual image)

2.1.2 Major Features

- **The recording interval is selectable from 1 second to 60 minutes.**
- **The maximum, minimum, and average measurements during the recording interval can be recorded (with sampling once a second).**
- **The module has an alarm output terminal.**

Rough Estimate of Storable Data Quantity and Time

Action at memory full: Continue recording (Endless)

	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value + MAX/MIN/AVE
Quantity of storable data	26000	13000	10000
Recording interval			
1 sec.	7.5 hours	3.5 hours	2.5 hours
2 sec.	14.5 hours	7 hours	5.5 hours
5 sec.	1.5 days	18 hours	14.5 hours
10 sec.	3 days	1.5 days	1 day
15 sec.	4.5 days	2 days	1.5 days
20 sec.	6 days	3 days	2 days
30 sec.	9 days	4.5 days	3.5 days
1 min.	18 days	9 days	7 days
2 min.	36 days	18 days	14 days
5 min.	92 days	46 days	36 days
10 min.	184 days	92 days	73 days
15 min.	277 days	138 days	110 days
20 min.	369 days	184 days	147 days
30 min.	554 days	277 days	221 days
60 min.	1109 days	554 days	443 days

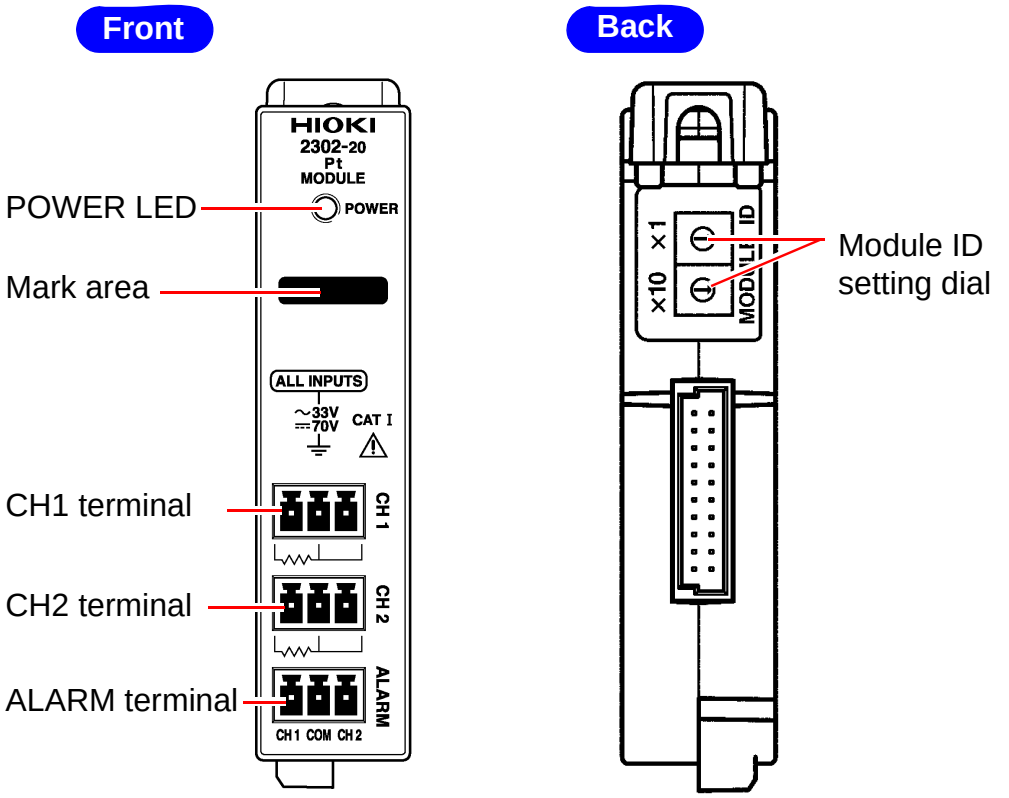
NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1 of the data per alarm)

Action at memory full: Stop recording (Memory full stop)

	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value + MAX/MIN/AVE
Quantity of storable data	30000	15000	12000
Recording interval			
1 sec.	8.5 hours	4 hours	3 hours
2 sec.	17 hours	8.5 hours	6.5 hours
5 sec.	1.5 days	21 hours	17 hours
10 sec.	3.5 days	1.5 days	1.5 days
15 sec.	5 days	2.5 days	2 days
20 sec.	7 days	3.5 days	2.5 days
30 sec.	10 days	5 days	4 days
1 min.	21 days	10 days	8 days
2 min.	42 days	21 days	17 days
5 min.	106 days	53 days	42 days
10 min.	213 days	106 days	85 days
15 min.	319 days	159 days	127 days
20 min.	426 days	213 days	170 days
30 min.	639 days	319 days	255 days
60 min.	1279 days	639 days	511 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1 of the data per alarm)

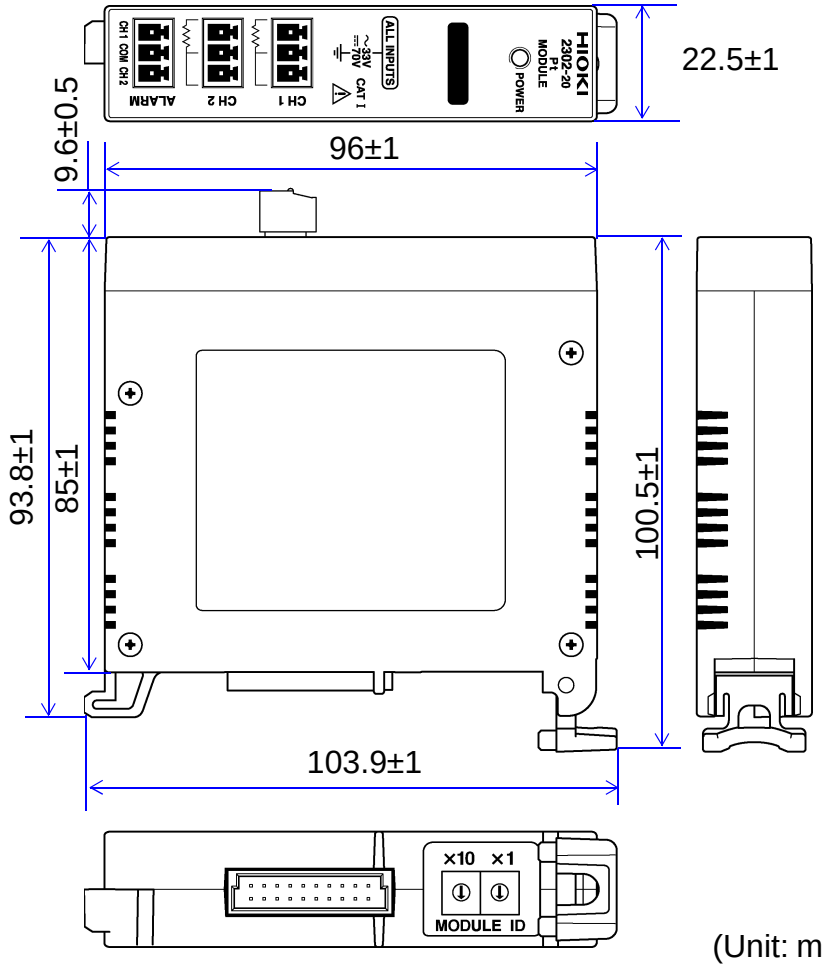
2.1.3 Name and Function of the Parts



POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Data being recorded. Flashing in green : Standing by. Lit in yellow : Alarm output. Flashing in yellow: Overrange detected. Lit in red : Non-recoverable error occurred. *1 Flashing in red: Recoverable error occurred. *2
Mark area	Use this area to make a note of the object to measure or the module ID. Use an ink pen, since pencil lead may rub off.
CH1 terminal	Connect the platinum resistance thermometer sensor to this terminal. (Channel 1)
CH2 terminal	Connect the platinum resistance thermometer sensor to this terminal. (Channel 2)
ALARM terminal	Connect the alarm output cable to this terminal. This terminal is electrically insulated from the CH1 and CH2 terminals.
Module ID setting dial	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your dealer or Hioki representative.
*2: The same module ID may be used by another module.

2.1.4 Dimension Diagrams



(Unit: mm)

2.1.5 Accessory and Option

Accessories

Option

None

2.2 Settings

2.2.1 Setting the Module ID

You can connect up to 63 measurement modules to one communications module.

Setting Procedure

Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID are not related and can be set independently.

2.3 Preparations

2.3.1 Installing the Module

(1) Installing the Module Base

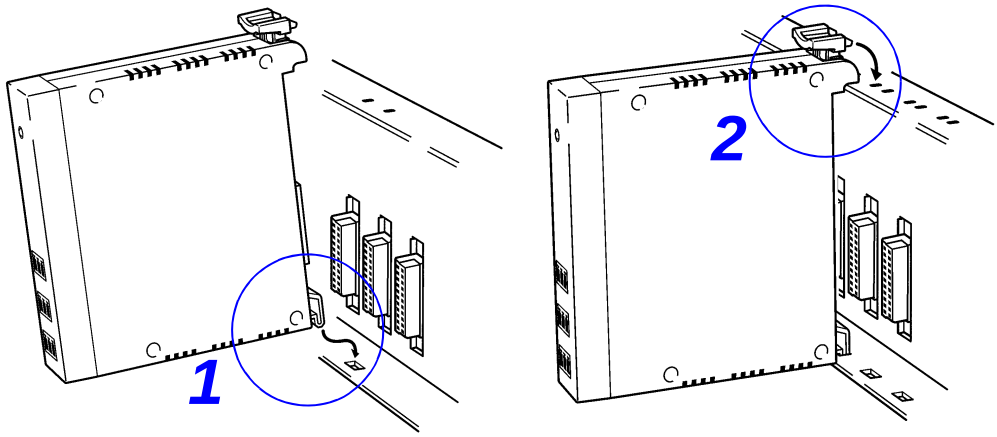
CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(2) Mounting a Module on the Module Base

Mount a module on the module base as shown below. Ensure that the lever clicks.



2.3.2 Connecting Input/Output Cables

Recommended Cable

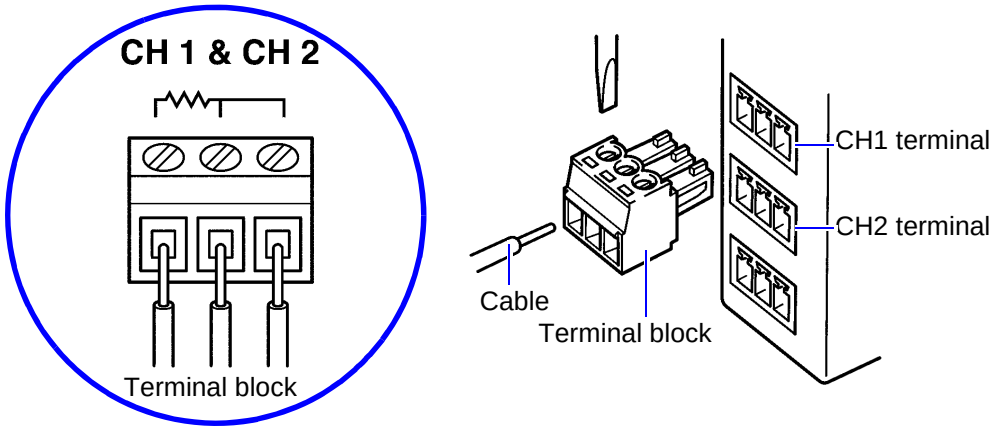
Single-wire	: 0.14 to 1.5 mm^2
Stranded-wire	: 0.14 to 1.0 mm^2
AWG	: 26 to 16
Cable strip length	: 5 mm (0.2")

(1) Connecting Cables to the CH1 and CH2 Terminals (Temperature Sensor Signal Input)

CAUTION

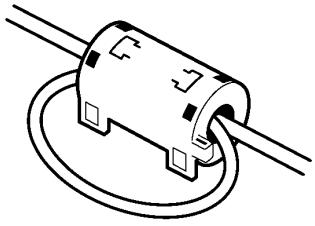
The CH1 and CH2 terminals are not insulated from each other. Avoid short-circuiting.

1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert a cable for input temperature sensor signal into the terminal block, then tighten the screws (at a tightening torque of 0.25 N•m).
3. Connect the terminal block to the CH1 or CH2 terminal.



NOTE

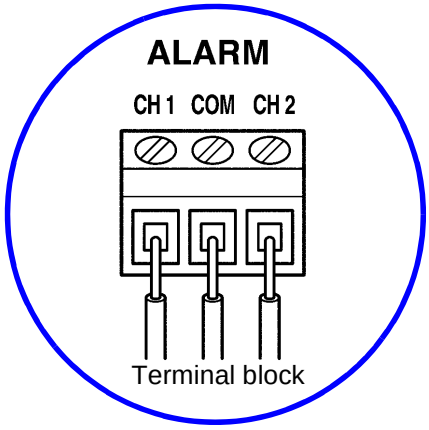
- The CH1 and CH2 terminals are not insulated from each other. When measuring two measurement points having a potential difference, use an electrically insulated sensor or another Pt module, since measurements may be adversely affected.
- In case of external noise, wind the cable around the ferrite clamp supplied as an accessory as shown below.

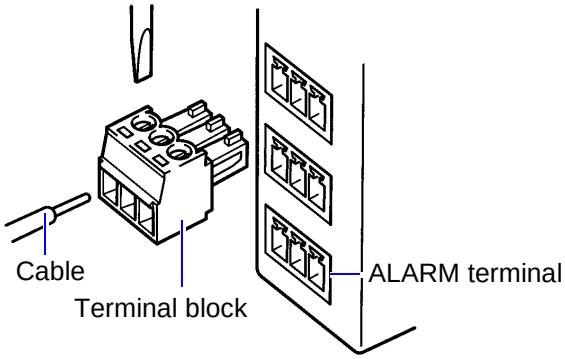


- Note that measurement may be adversely affected by external noise or the electromagnetic environment when using a cable longer than 3 meters.

(2) Connecting Cables to the ALARM Terminal (Alarm output)

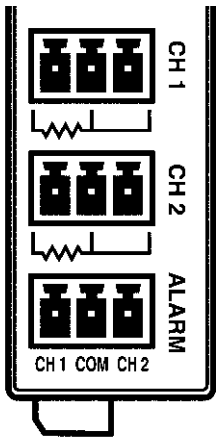
1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert a cable for alarm output into the terminal block, then tighten the screws (at a tightening torque of 0.25 N•m).
3. Connect the terminal block to the ALARM terminal.





Connect the cable for CH1 output to CH1 and COM; and connect the cable for CH2 output to CH2 and COM.

(3) The Location of the Input/Output Cable



CH1 terminal (Input)	**Left**	**Center**	**Right**
	Resistance thermometer sensor input (A)	Resistance thermometer sensor input (B)	Conductor input (B)
CH2 terminal (Input)	**Left**	**Center**	**Right**
	Resistance thermometer sensor input (A)	Resistance thermometer sensor input (B)	Conductor input (B)
ALARM terminal (output)	**CH1**	**COM**	**CH2**
	Alarm output	Common	Alarm output

Temperature Sensor

⚠CAUTION

Only connect the Pt100 or JPt100 sensor to the CH1 and CH2 terminals to avoid damaging the 2302-20. Moreover, do not input other signals to these terminals.

2.4 Others

2.4.1 Alarm output

(1) Output Rating

WARNING

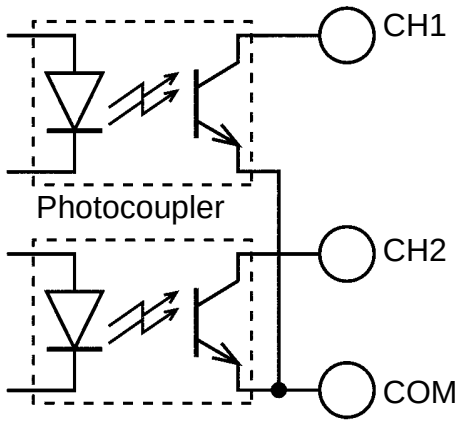
Ensure that the input does not exceed the maximum input voltage or current to avoid module damage, short-circuiting and electric shock resulting from heat building.

Output method	Open collector
Maximum input voltage / current	30 V, 20 mA max.
Signal logic	Enabled: ON Disabled: OFF

(1) Internal Circuit

The alarm output circuit is configured as shown below.

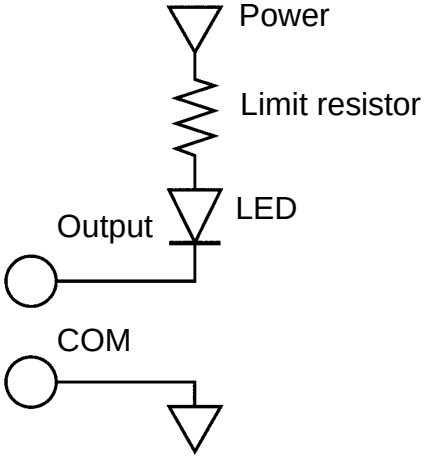
<Internal circuit>



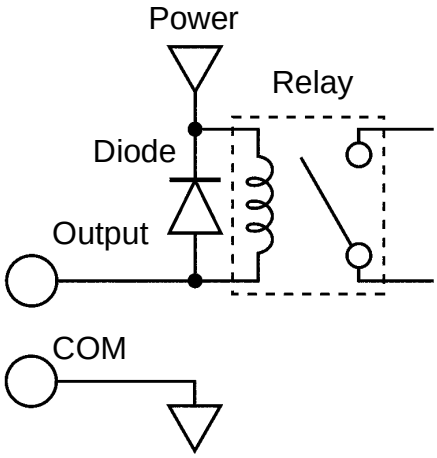
NOTE

- Signal logic indicates the signal state in which a signal's function is enabled.
- The output transistor works as a switch between signal output and ground in the module. When output becomes enabled, the switch is turned on and current flows from the output signal to COM in the module. Therefore, a relay or LED lamp can be connected directly to the output terminal (P.35).

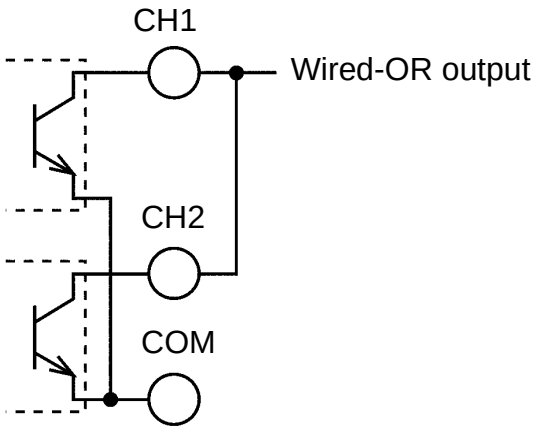
<Circuit diagram>



Connecting LED



Connecting relay



Using on Wired-OR Logic

NOTE

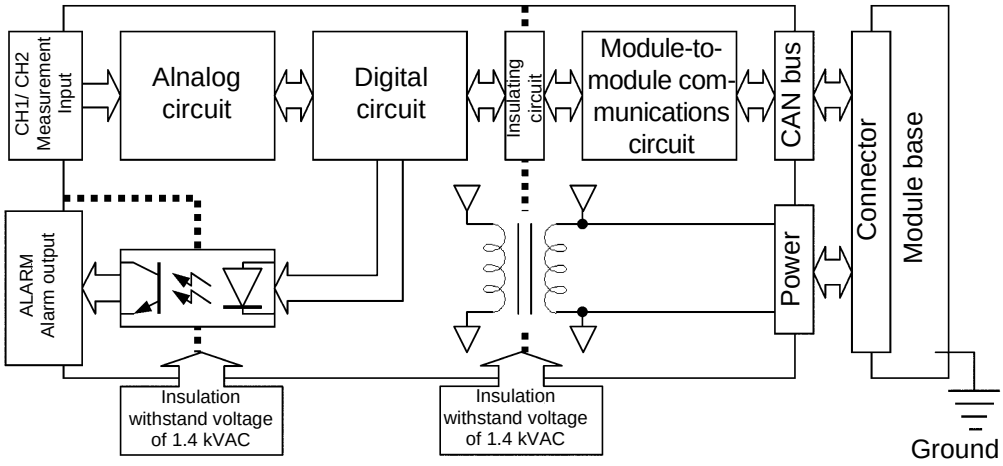
- When connecting a relay or LED lamp, ensure that the relay or lamp operates at up to 30 V and 20 mA. When connecting a relay, be sure to use a diode to absorb counterelectromotive force.
- Open collector output operates on wired-OR logic by short-circuiting CH1 and CH2. Moreover, it enables the signal if an alarm occurs in either channel.

2.4.2 Insulation of Internal Circuit

⚠CAUTION

The CH1 and CH2 terminals are not insulated from each other.
When connecting signals different in potential to these terminals, use an additional measurement module or insulate the signals externally before connection to the terminals. This will prevent module errors and malfunction.

In the 2302-20, the input circuit and alarm output are insulated from the CAN bus as shown in the block diagram below. (Withstand voltage: 1.4 kVAC, 50/60 Hz, Response current: 5 mA, 1 minute)



NOTE The COM terminal of the alarm output terminal is used for both CH1 and CH2.

2.5 Specifications

2.5.1 Basic Specifications

Sensor type	Platinum resistance thermometer sensor Pt100 (3-wire sensor) / JPt100 (3-wire sensor, JIS C 1604-1997)
Number of inputs	2 CH
Measurement current	0.5 mA
Measurement range	-100.0 to 300.0°C, Resolution: 0.1°C
Measurement accuracy	±0.1%rdg.±0.4°C
Influence of radiated radio-frequency electromagnetic field	±2°C at 10 V/m
Period of guaranteed accuracy	One year
Sampling	1 time / sec.
Input terminal	3 Input terminal block × 2

2.5.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current measured values (instantaneous values).	

Measured value recording function

Measurements are recorded at a set recording interval.	
Real-time management	This is automatically set from the PC application at the start of recording.
Recording Start	Immediate start/Reserved-time start
Recording End	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.
Recording mode	• Instantaneous value • MAX/MIN/AVE • Instantaneous value + MAX/MIN/AVE Total 3 modes ♦Set the mode before the start of recording.
Recorded data	One data set contains time and temperature/humidity information (Two channel each). ♦Data is scaled if scaling is ON.
Recording capacity	512 k bytes Flash memory
Quantity of recorded data	• Instantaneous value recording mode: 30,000 data × 2 CH • MAX/MIN/AVE recording mode: 15,000 data × 2 CH • Instantaneous value + MAX/MIN/AVE recording mode: 12,000 data × 2 CH
Power outage protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

Alarm judgment and recording function

Alarm judgment is made at every sampling, and the history will be recorded in flash memory if the measured value recording function remains active.	
Judgment method	Criterion threshold can be set to either Hi or Lo. The instantaneous value at every sampling is judged (effective in any measurement mode).
Recorded data	One data set contains time, generation/reversion , CH and judgment threshold information.
Alarm output	Alarm output × 2 CH ♦Output is turned ON when an alarm (Hi or Lo) occurs. Whether to hold the alarm output can be selected. The reset switch or a command can be used to reset alarms.

2.5.3 General Specifications

Clock accuracy	±100 ppm (Reference value at temperature from 0 to 50°C (32 to 122°F) without the communications module)
Backup	Recorded data (saved in flash memory) ♦Data loss for up to 2 minutes before and after a power outage may occur.
Communication interface	CAN bus
Maximum rated voltage to earth	33 Vrms, 70 VDC
Alarm output	Open collector:30 VDC/20 mA MAX.
Rated supply voltage	5 V±0.3 VDC
Maximum rated power	1.4 W
Withstanding voltage	1.4 kVAC Between input and alarm output, Input/Output and CAN bus (50/60 Hz, Response current 5 mA, one minutes
Dimensions	Approx. 22.5W × 96H × 85D mm (0.89"W × 3.78"H × 3.35"D) (excluding projections)
Mass	Approx. 120 g (4.2 oz.)
Accessories	Ferrite clamp.....2 Terminal block.....3
Operational ranges for temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)
Temperature and humidity ranges for storage	-10 to 50°C (14 to 122°F), 80%RH or less (with no condensation)
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)
Standards applying	Safety EN61010-1:2001, Pollution Degree 2, Measurement Category I, (anticipated transient overvoltage 330 V), EMC EN61326:1997+A1:1998+A2:2001+A3:2003, CLASS A

2303-20 TC MODULE 3

3.1 Overview

3.1.1 Product Overview

- The 2303-20 is a measurement module of Hioki "Smart Site" (remote measurement system).
- This module measures and records temperature at regular intervals.
- One module can be used for measurement at two locations.
- The 2303-20 is used with the power supply module, communications module, and module base.

Usable Temperature sensor	Thermocouple (Selectable between K, E, J, T and R)
Number of measurement channels	Temperature 2 CH
Measurement range	-100.0 to 1000.0°C

(Conceptual image)

3.1.2 Major Features

- **The recording interval is selectable from 1 second to 60 minutes.**
- **The maximum, minimum, and average measurements during the recording interval can be recorded (with sampling once a second).**
- **The module has an alarm output terminal.**

Rough Estimate of Storable Data Quantity and Time

Action at memory full: Continue recording (Endless)

	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value + MAX/MIN/AVE
Quantity of storable data	26000	13000	10000
Recording interval			
1 sec.	7.5 hours	3.5 hours	2.5 hours
2 sec.	14.5 hours	7 hours	5.5 hours
5 sec.	1.5 days	18 hours	14.5 hours
10 sec.	3 days	1.5 days	1 day
15 sec.	4.5 days	2 days	1.5 days
20 sec.	6 days	3 days	2 days
30 sec.	9 days	4.5 days	3.5 days
1 min.	18 days	9 days	7 days
2 min.	36 days	18 days	14 days
5 min.	92 days	46 days	36 days
10 min.	184 days	92 days	73 days
15 min.	277 days	138 days	110 days
20 min.	369 days	184 days	147 days
30 min.	554 days	277 days	221 days
60 min.	1109 days	554 days	443 days

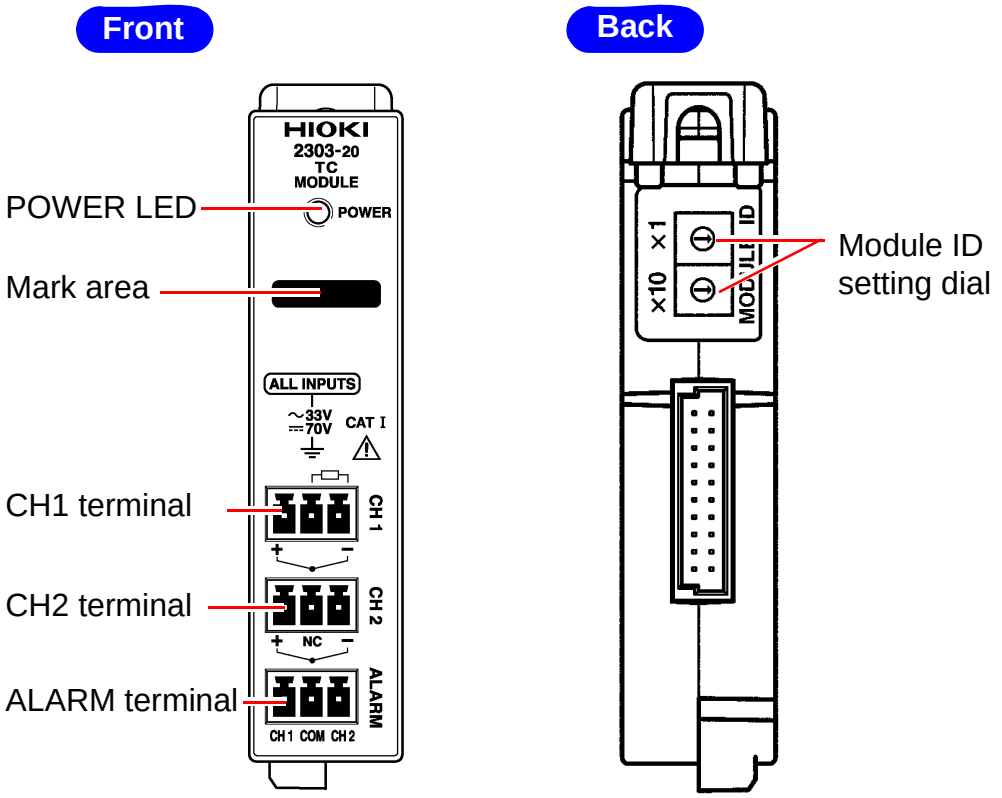
NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1 of the data per alarm)

Action at memory full: Stop recording (Memory full stop)

	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value + MAX/MIN/AVE
Quantity of storable data	30000	15000	12000
Recording interval			
1 sec.	8.5 hours	4 hours	3 hours
2 sec.	17 hours	8.5 hours	6.5 hours
5 sec.	1.5 days	21 hours	17 hours
10 sec.	3.5 days	1.5 days	1.5 days
15 sec.	5 days	2.5 days	2 days
20 sec.	7 days	3.5 days	2.5 days
30 sec.	10 days	5 days	4 days
1 min.	21 days	10 days	8 days
2 min.	42 days	21 days	17 days
5 min.	106 days	53 days	42 days
10 min.	213 days	106 days	85 days
15 min.	319 days	159 days	127 days
20 min.	426 days	213 days	170 days
30 min.	639 days	319 days	255 days
60 min.	1279 days	639 days	511 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1 of the data per alarm)

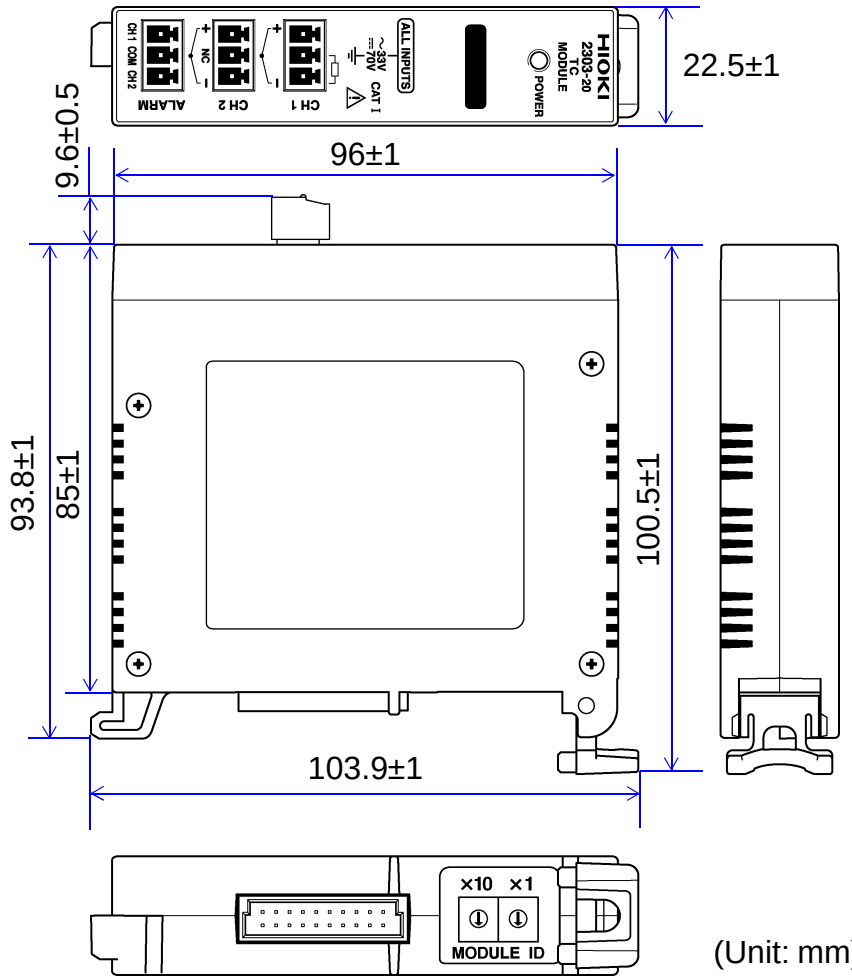
3.1.3 Name and Function of the Parts



POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Data being recorded. Flashing in green : Standing by. Lit in yellow : Alarm output. Flashing in yellow: Overrange detected. Lit in red : Non-recoverable error occurred. *1 Flashing in red : Recoverable error occurred. *2
Mark area	Use this area to make a note of the object to measure or the module ID. Use an ink pen, since pencil lead may rub off.
CH1 terminal	Connect a thermocouple and external RJC (reference junction compensation) sensor to this terminal (channel 1).
CH2 terminal	Connect a thermocouple to this terminal (channel 2).
ALARM terminal	Connect the alarm output cable to this terminal. This terminal is electrically insulated from the CH1 and CH2 terminals.
Module ID setting dial	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your dealer or Hioki representative.
*2: The same module ID may be used by another module.

3.1.4 Dimension Diagrams



(Unit: mm)

3.1.5 Accessory and Option

Accessories

External RJC (reference junction compensation) sensor 1
Ferrite clamp 2
Terminal block 3

Option

None

3.2 Settings

3.2.1 Setting the Module ID

You can connect up to 63 measurement modules to one communications module.

Setting Procedure

Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID are not related and can be set independently.

3.3 Preparations

3.3.1 Installing the Module

(1) Installing the Module Base

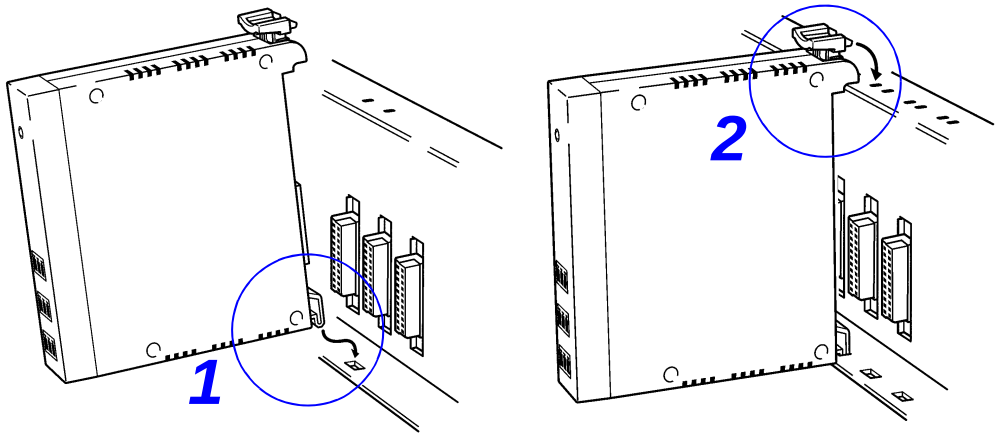
CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(2) Mounting a Module on the Module Base

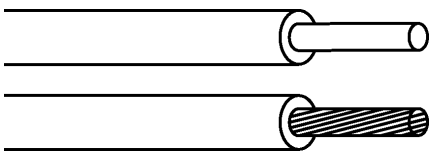
Mount a module on the module base as shown below. Ensure that the lever clicks.



3.3.2 Connecting Input/Output Cables

Recommended Cable

Single-wire	: 0.14 to 1.5 mm^2
Stranded-wire	: 0.14 to 1.0 mm^2
AWG	: 26 to 16
Cable strip length	: 5 mm (0.2")

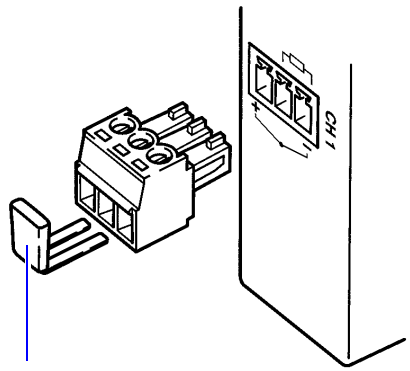


(1) Connecting Cables to the CH1 and CH2 Terminals (Thermocouple Signal Input)

⚠CAUTION

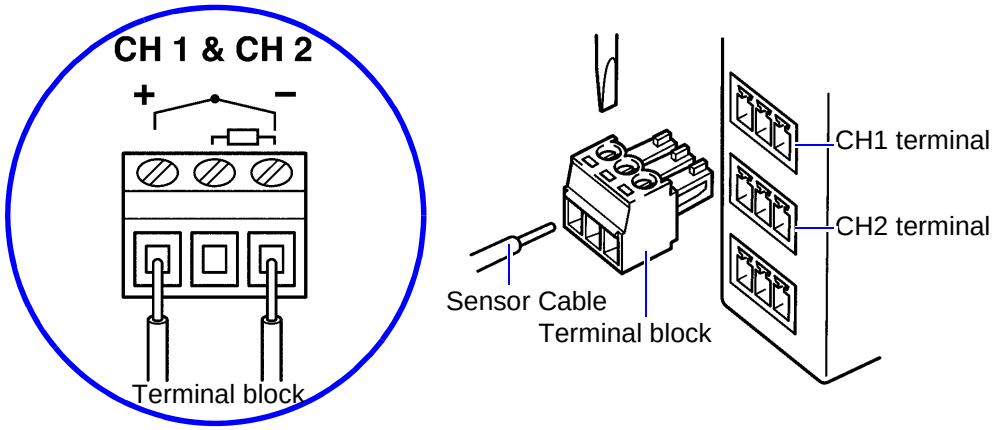
- The CH1 and CH2 terminals are not insulated from each other. Avoid short-circuiting.
- Do not add power to external RJC (reference junction compensation) sensor. It becomes impossible to do a correct measurement by the sensor's breaking.

1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert an external RJC (reference junction compensation) sensor into the CH1 terminal.



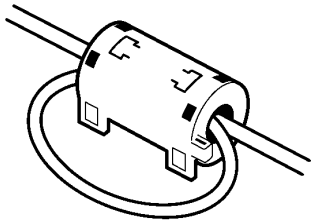
External RJC (reference junction compensation) sensor

3. Insert a sensor cable into the terminal block, then tighten the screws (at a tightening torque of 0.25 N•m).
4. Connect the terminal block to the CH1 or CH2 terminal.



NOTE

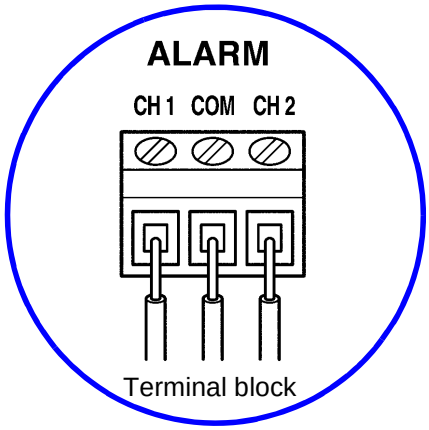
- The CH1 and CH2 terminals are not insulated from each other. Use an electrically insulated sensor or another TC module, since measurements may be adversely affected.
- In case of external noise, wind the cable around the ferrite clamp supplied as an accessory as shown below.

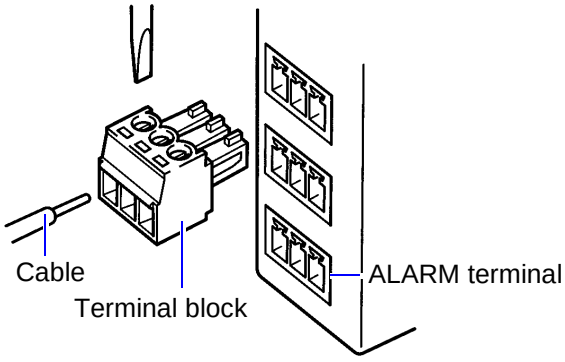


- Note that measurement may be adversely affected by external noise or the electromagnetic environment when using a cable longer than 3 meters.

(2) Connecting Cables to the ALARM Terminal (Alarm output)

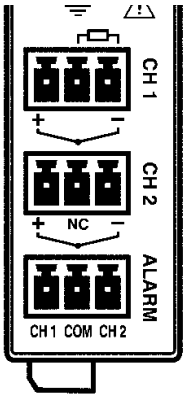
1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert a cable for alarm output into the terminal block, then tighten the screws (at a tightening torque of 0.25 N•m).
3. Connect the terminal block to the ALARM terminal.





Connect the cable for CH1 output to CH1 and COM; and connect the cable for CH2 output to CH2 and COM.

(3) The Location of the Input/Output Cable



CH 1 terminal (Input)	**+**		**-**
	Thermocouple input (+)	External RJC sensor	Thermocouple input (-), External RJC sensor
CH 2 terminal (Input)	**+**	**NC**	**-**
	Thermocouple input (+)	-	Thermocouple input (-)
ALARM terminal (output)	**CH1**	**COM**	**CH2**
	Alarm output	Common	Alarm output

Temperature Sensor

⚠CAUTION

Only connect the K, E, J, T or R thermocouple sensor, or the sensor supplied for external RJC (reference junction compensation) sensor to the CH1 and CH2 terminals to avoid damaging the 2303-20. Moreover, do not input other signals to these terminals.

3.4 Others

3.4.1 Alarm output

(1) Output Rating

WARNING

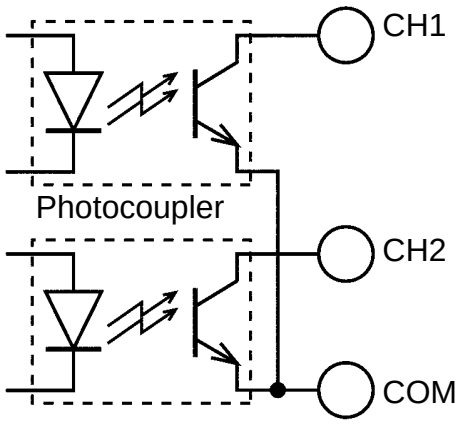
Ensure that the input does not exceed the maximum input voltage or current to avoid module damage, short-circuiting and electric shock resulting from heat building.

Output method	Open collector
Maximum input voltage / current	30 V, 20 mA max.
Signal logic	Enabled: ON Disabled: OFF

(2) Internal Circuit

The alarm output circuit is configured as shown below.

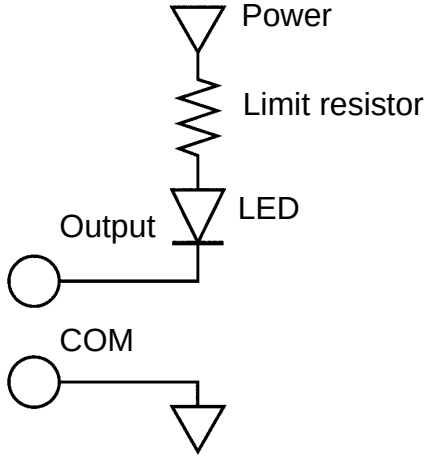
<Internal circuit>



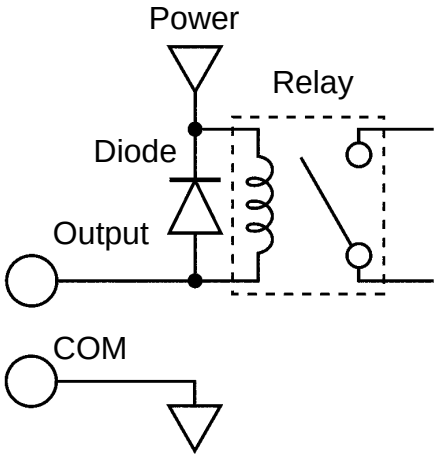
NOTE

- Signal logic indicates the signal state in which a signal's function is enabled.
- The output transistor works as a switch between signal output and ground in the module. When output becomes enabled, the switch is turned on and current flows from the output signal to COM in the module. Therefore, a relay or LED lamp can be connected directly to the output terminal (P.50).

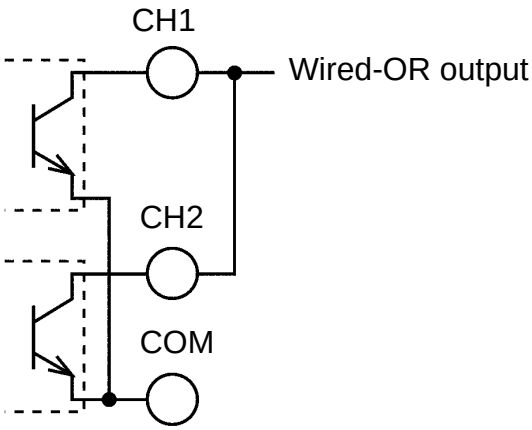
<Circuit diagram>



Connecting LED



Connecting relay



Using on Wired-OR Logic

NOTE

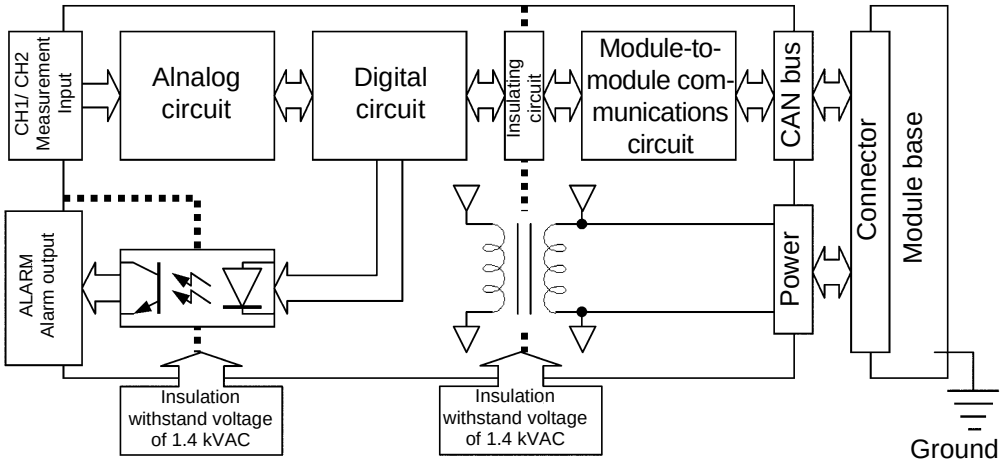
- When connecting a relay or LED lamp, ensure that the relay or lamp operates at up to 30 V and 20 mA. When connecting a relay, be sure to use a diode to absorb counterelectromotive force.
- Open collector output operates on wired-OR logic by short-circuiting CH1 and CH2. Moreover, it enables the signal if an alarm occurs in either channel.

3.4.2 Insulation of Internal Circuit

CAUTION

The CH1 and CH2 terminals are not insulated from each other.
When connecting signals different in potential to these terminals, use an additional measurement module or insulate the signals externally before connection to the terminals. This will prevent module errors and malfunction.

In the 2303-20, the input circuit and alarm output are insulated from the CAN bus as shown in the block diagram below. (Withstand voltage: 1.4 kVAC, 50/60 Hz, Response current: 5 mA, 1 minute)



NOTE

The COM terminal of the alarm output terminal is used for both CH1 and CH2.

3.5 Specifications

3.5.1 Basic Specifications

Sensor type	Thermocouple (K, E, J, T, R)
Number of inputs	2 CH
Reference junction compensation accuracy	±2.0°C (Reference junction compensation range: 0 to 50°C (32 to 122°F) Pt allowance:±0.2%rdg. (including ±0.5°C)
Temperature of guaranteed accuracy	23±5°C (73±8.5°F) (Module temperature)
Warm-up time	1 hour
Period of guaranteed accuracy	One year
Sampling	1 time / sec.
Input terminal	3 Input terminal block × 2

Others measurement function

Thermocouple type	K, E, J	T	R
Measurement range(°C)	-100.0 to 1000.0°C	-100.0 to 400.0°C	0.0 to 1600.0°C
Measuremen resolution(°C)	0.1°C		0.3°C (to 100) 0.2°C (to 1000) 0.1°C (to 1600)
Measurement accuracy(°C)	±0.1%f.s.±2.0°C		±6°C (to 100) ±4°C (to 1000) ±2.5°C (to 1600)
Temperature coefficient(°C/°C)	±0.05°C		±0.3°C
Influence of radiated radio-frequency electromagnetic field(°C)	±10°C		±60°C

- Module measurement accuracy is including RJC accuracy.
- This applies when inserting an external RJC into pins 2 and 3 of CH1.
- Temperature coefficient is added from 0 to 18°C, 28 to 50°C (32 to 64°F, 82 to 122°F) to the measurement accuracy.
- Influence of radiated radio-frequency electromagnetic field shows the amount of the influence in 10 V/m.

3.5.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current measured values (instantaneous values).

Measured value recording function

Measurements are recorded at a set recording interval.	
Real-time management	This is automatically set from the PC application at the start of recording.
Recording start	Immediate start/Reserved-time start
Recording end	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.
Recording mode	• Instantaneous value • MAX/MIN/AVE • Instantaneous value + MAX/MIN/AVE Total 3 modes ♦Set the mode before the start of recording.
Recorded data	One data set contains time and temperature/humidity information (2 channel each). ♦Data is scaled if scaling is ON.
Recording capacity	512 k bytes Flash memory
Quantity of recorded data	• Instantaneous value recording mode: 30,000 data × 2 CH • MAX/MIN/AVE recording mode: 15,000 data × 2 CH • Instantaneous value + MAX/MIN/AVE recording mode: 12,000 data × 2 CH
Power outage protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

Alarm judgment and recording function

Alarm judgment is made at every sampling, and the history will be recorded in flash memory if the measured value recording function remains active.	
Judgment method	Criterion threshold can be set to either Hi or Lo. The instantaneous value at every sampling is judged (effective in any measurement mode).
Recorded data	One data set contains time, generation/reversion , CH and judgment threshold information.

3.5.3 General Specifications

Clock accuracy	±100 ppm (Reference value at temperature from 0 to 50°C (32 to 122°F) without the communications module)
Backup	Recorded data (saved in flash memory) ♦Data loss for up to 2 minutes before and after a power outage may occur.
Communication interface	CAN bus
Maximum rated voltage to earth	33 Vrms, 70 VDC (Total of input voltage)
Alarm output	Open collector:30 VDC/20 mA MAX.
Rated supply voltage	5 V±0.3 VDC
Maximum rated power	1.4 W
Withstanding voltage	1.4 kVAC Between input and alarm output, Input/Output and CAN bus (50/60 Hz, Response current 5 mA, one minutes).

Dimensions	Approx. 22.5W × 96H × 85D mm (0.89"W × 3.78"H × 3.35"D) (excluding projections)
Mass	Approx. 120 g (4.2 oz.)
Accessories	Ferrite clamp.....2 External RJC (reference junction compensation) sensor .....1 Terminal block.....3
Operational ranges for temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)
Temperature and humidity ranges for storage	-10 to 50°C (14 to 122°F), 80%RH or less (with no condensation)
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)
Standards applying	Safety EN61010-1:2001, Pollution Degree 2, Measurement Category I, (anticipated transient overvoltage 330 V) EMC EN61326:1997+A1:1998+A2:2001+A3:2003, CLASS A

2304-20 PULSE MODULE 4

4.1 Overview

4.1.1 Product Overview

- The 2304-20 is a measurement module of the Hioki "Smart Site" (remote measurement system).
- This module measures and records current pulses, voltage pulses and no-voltage contact output at regular intervals. For example, the 2304-20 can be used to measure pulse output from a watthour meter or flowmeter.
- The 2304-20 is used with the power supply module, communications module, and module base.

Usable current sensor	9766 CLAMP ON SENSOR
Number of measurement channels	1channel for voltage/contact pulse+1channel for current pulse
Measurement range	16,000 k pulse/interval
Input pulse	4 kHz max. (voltage/contact) 40 Hz max. (current)

(Conceptual image)

4.1.2 Major Features

- **The recording interval is selectable from 1 second to 60 minutes.**
- **The totals of measurements made during a recording interval can be recorded (with sampling once a second).**
- **The module has an alarm output terminal.**
- **The specified clamp sensor also makes it possible to count the current pulses output from the watt-hour meter without disconnecting the cables.**

Rough Estimate of Storable Data Quantity and Time

Action at memory full: Continue recording (Endless)

	Recording Mode
	Instantaneous Value
Quantity of storable data	26000
Recording interval	
1 sec.	7.5 hours
2 sec.	14.5 hours
5 sec.	1.5 days
10 sec.	3 days
15 sec.	4.5 days
20 sec.	6 days
30 sec.	9 days
1 min.	18 days
2 min.	36 days
5 min.	92 days
10 min.	184 days
15 min.	277 days
20 min.	369 days
30 min.	554 days
60 min.	1109 days

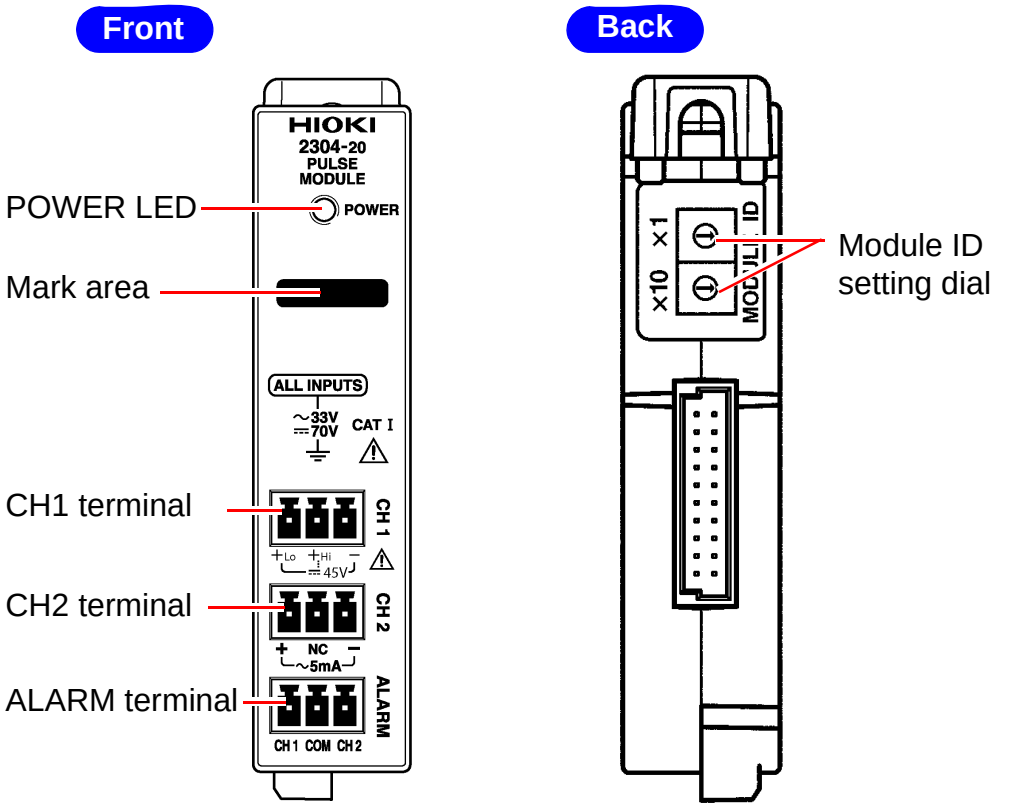
NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period.

Action at memory full: Stop recording (Memory full stop)

	Recording Mode
	Instantaneous Value
Quantity of storable data	30000
Recording interval	
1 sec.	8.5 hours
2 sec.	17 hours
5 sec.	1.5 days
10 sec.	3.5 days
15 sec.	5 days
20 sec.	7 days
30 sec.	10 days
1 min.	21 days
2 min.	42 days
5 min.	106 days
10 min.	213 days
15 min.	319 days
20 min.	426 days
30 min.	639 days
60 min.	1279 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period.

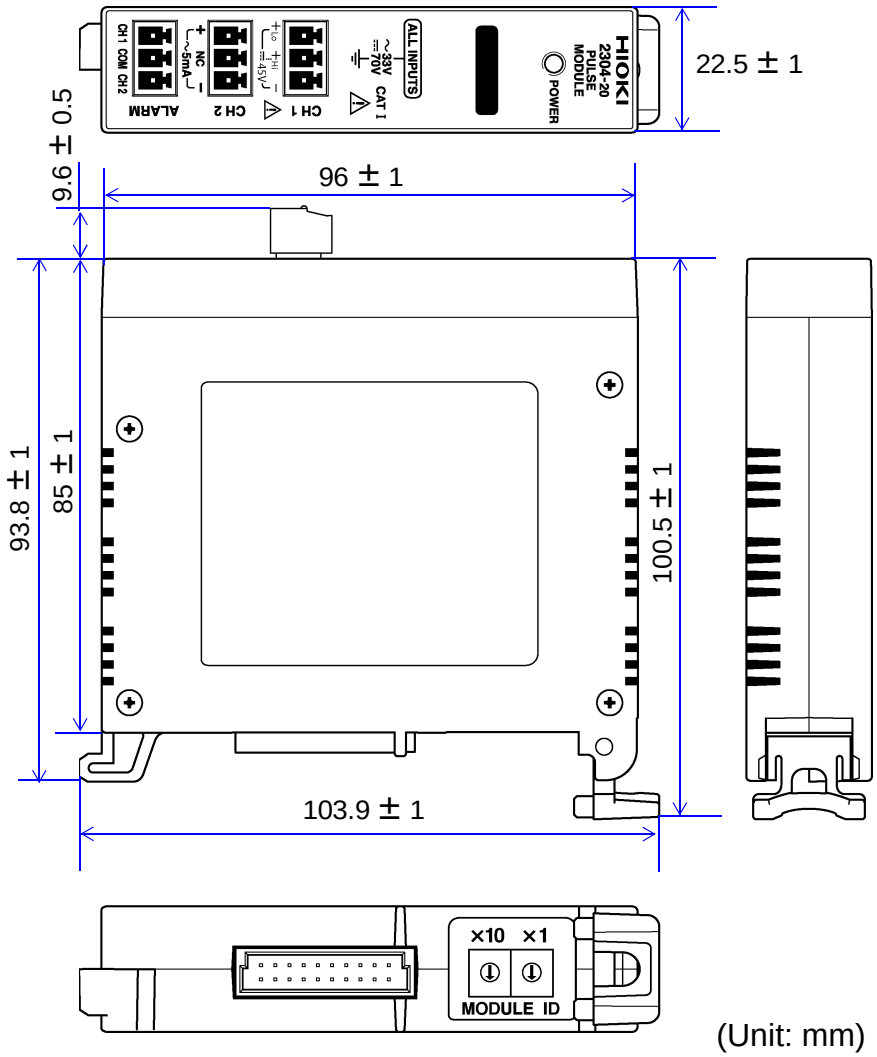
4.1.3 Name and Function of the Parts



POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Data being recorded. Flashing in green : Standing by. Lit in yellow : Alarm output. Lit in red : Non-recoverable error occurred. *1 Flashing in red: Recoverable error occurred. *2
Mark area	Use this area to make a note of the object to measure or the module ID. Use an ink pen, since pencil lead may rub off.
CH1 terminal	Connect the voltage pulse signal or contact pulse signal to this terminal (channel 1).
CH2 terminal	Connect the current sensor for current pulse signal input (9766 CLAMP ON SENSOR) to this terminal (channel 2).
ALARM terminal	Connect the alarm output cable to this terminal. This terminal is electrically insulated from the CH1 and CH2 terminals.
Module ID setting dial	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your dealer or Hioki representative.
*2: The same module ID may be used by another module.

4.1.4 Dimension Diagrams



(Unit: mm)

4.1.5 Accessory and Option

Accessories

Option

9766 CLAMP ON SENSOR (For current pulse detection)

4.2 Settings

4.2.1 Setting the Module ID

You can connect up to 63 measurement modules to one communications module.

Setting Procedure

Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID are not related and can be set independently.

4.3 Preparations

4.3.1 Installing the Module

(1) Installing the Module Base

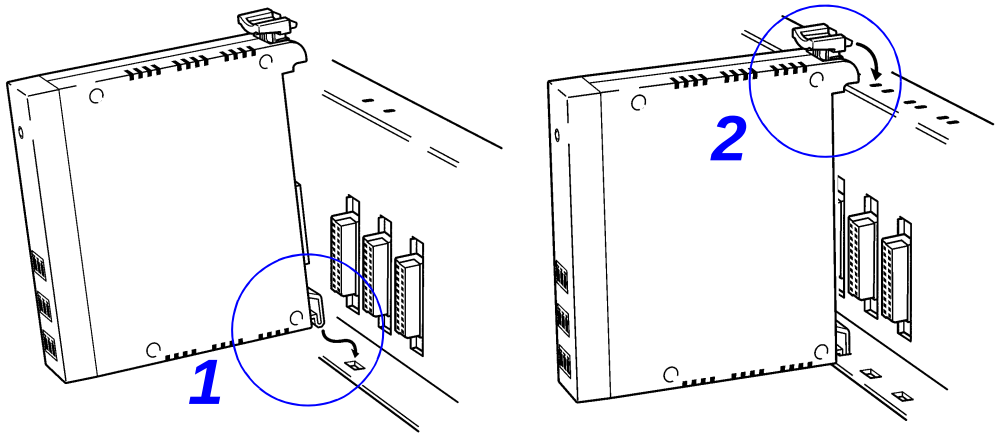
CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(2) Mounting a Module on the Module Base

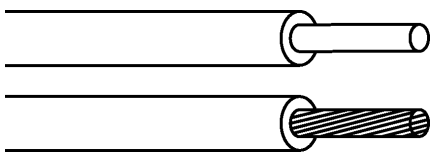
Mount a module on the module base as shown below. Ensure that the lever clicks.



4.3.2 Connecting Input/Output Cables

Recommended Cable

Single-wire	: 0.14 to 1.5 mm^2
Stranded-wire	: 0.14 to 1.0 mm^2
AWG	: 26 to 16
Cable strip length	: 5 mm (0.2")

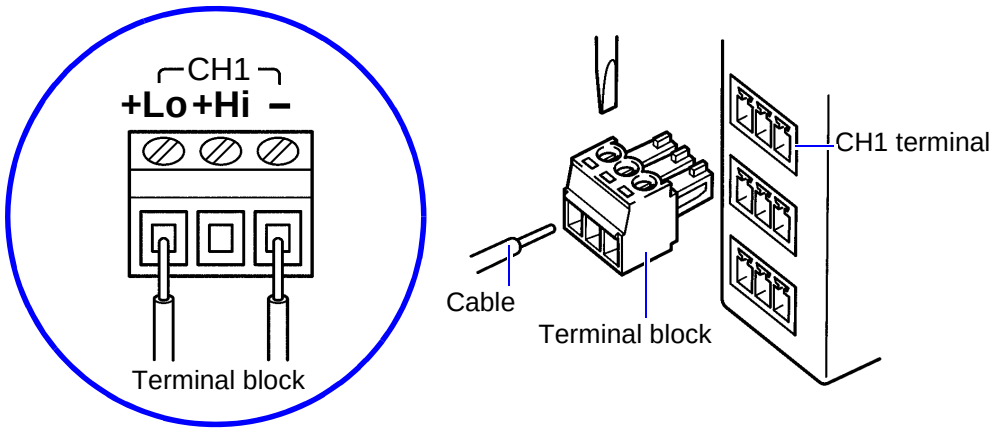


(1) Connecting to CH1 Terminal (voltage/ contact pulse signals input)

CAUTION

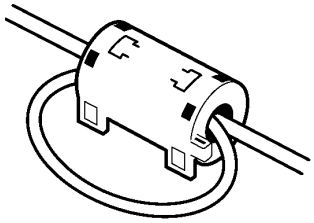
- The CH1 and CH2 terminals are not insulated from each other. Avoid short-circuiting.
- Note that the instrument may be damaged if the applied voltage exceeds the measurement range.

1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert the cable for voltage or contact pulse signal input into the terminal block, then tighten the screws into the terminal block (at tightening torque of 0.25 N•m).
   For most cases, voltage or contact pulse signals can be detected when the module is operated with the positive terminal connected to +Lo.
   To connect the positive terminal of a voltage pulse signal, select either +Lo or +Hi according to the threshold voltage.
   Always connect the positive terminal of a no-voltage contact to +Lo.
   ❖ **(4) "Connection Locations of Input/output Cables"(P.65)**
3. Connect the terminal block to the CH1 terminal.



NOTE

- In case of external noise, wind the cable around the ferrite clamp supplied as an accessory as shown below.



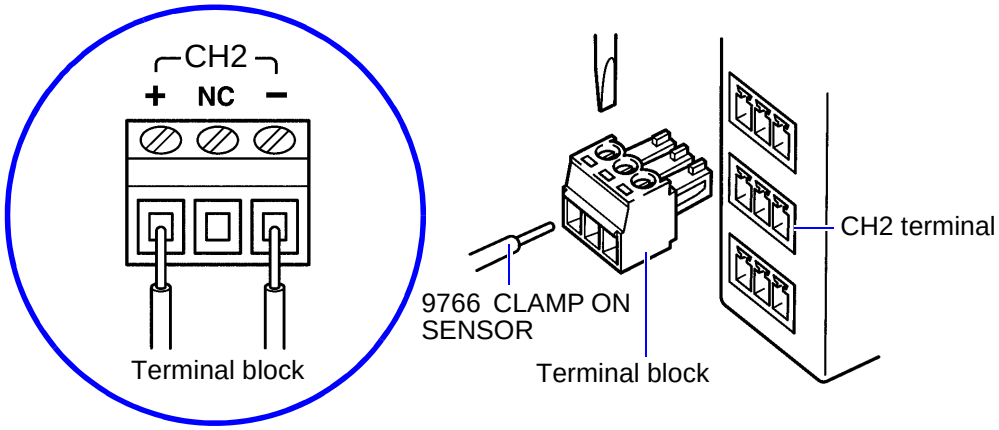
- Note that measurement may be adversely affected by external noise or the electromagnetic environment when using a cable longer than 3 meters.

(2) Connecting to CH2 Terminal (9766 CLAMP ON SENSOR)

⚠CAUTION

- If power supply noise poses a problem, use of a noise filter is recommended.
- The core end of the clamp sensor is not insulated. To prevent injury, avoid short-circuiting a charged part of the object to be measured with the core.
- When the power and signal lines may be subject to a lightning-induced surge, install a lightning arrester between another device or module connected to this module and line to protect the system.
- Use the specified clamp sensor for this module only. Do not connect any other current sensor directly to the module. Use of other sensors may result in excessive input and damage the module.
- Be careful to avoid dropping the clamps or otherwise subjecting them to mechanical shock, which could damage the mating surfaces of the core and adversely affect measurement.
- Measurements are degraded by dirt on the mating surfaces of the clamp-on sensor, so keep the surfaces clean by gently wiping with a soft cloth.

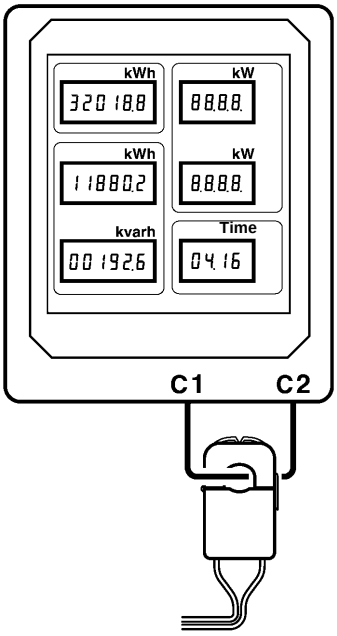
1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert the 9766 CLAMP ON SENSOR into the terminal block, then tighten the screws into the terminal block (at tightening torque of 0.25 N•m).
3. Connect the terminal block to the CH2 terminal.



NOTE

- Use only the 9766 CLAMP ON SENSOR for current pulse input.
- The clamp sensor connection is irrespective of polarity.
- Attach the clamp around only one conductor. Single-phase (2-wire) cables clamped together will not produce any reading.

Connecting the Energy Meter and 9766



9766 CLAMP ON SENSOR

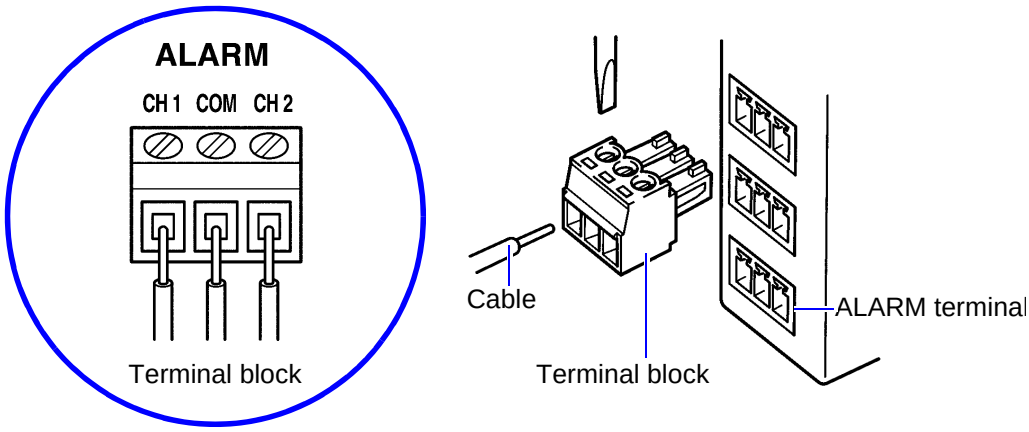
1. Connect the supplied connection cables to the C1 and C2 terminals of the energy meter. For more information on the cable connection, see the operating manual for the composite power utility meter.
2. Connect the extension cable to the 9766.
3. Connect the other end of the extension cable to this module.
4. Open the clamp core of the 9766 and clamp the connection cable. Be sure to lock the clamp. The clamp does not have a spring.
5. Make sure the clamp core end is closed tightly.

NOTE

This module detects very small pulse currents. Excessive static electricity near the measuring terminal or the 9766 CLAMP ON SENSOR or use of the module in a strong magnetic field may result in pulse detection errors.

(3) Connecting Cables to the ALARM Terminal (Alarm output)

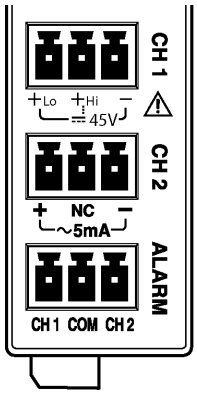
1. Use a flat head screwdriver to loosen the screws on the supplied terminal block.
2. Insert the cable for alarm output into the terminal block, then tighten the screws (at tightening torque of 0.25 N•m).
3. Connect the terminal block to the ALARM terminal.
   For the output of CH1, connect the cables to CH1 and COM, and for the output of CH 2, connect the cables to CH2 and COM.



Connect the cable for CH1 output to CH1 and COM; connect the cable for CH2 output to CH2 and COM.

❖ **(1) "Connecting to CH1 Terminal (voltage/ contact pulse signals input)"(P.62)**

(4) Connection Locations of Input/output Cables



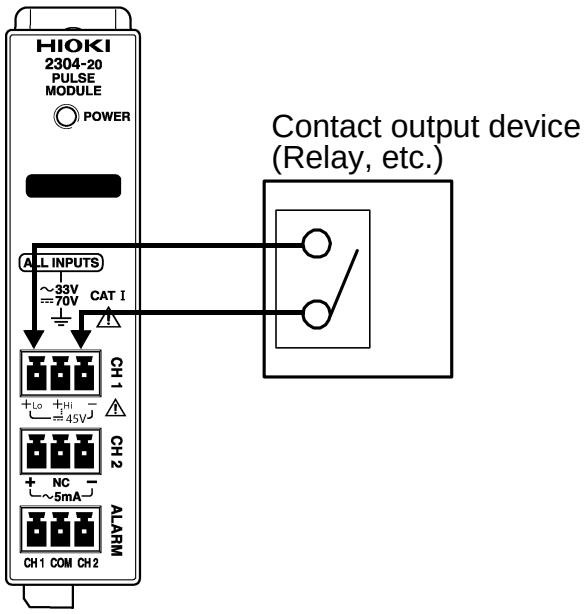
CH1 terminal (input)	**+ Lo**	**+ Hi**	**-**
	Voltage/ contact input (+) L:0 V to 0.2 V H:1.5 V to 45 V	Voltage input (+) L:0 V to 4 V H:10 V to 45 V	Voltage/ contact input (-)
CH2 terminal (input)	**+ Lo**	**NC**	**-**
	9766 input (+)	Not in use	9766 input (-)
ALARM terminal (output)	**CH1**	**COM**	**CH2**
	Alarm output	Common	Alarm output

4.4 Others

4.4.1 Examples of Voltage/Contact Output Device Connection

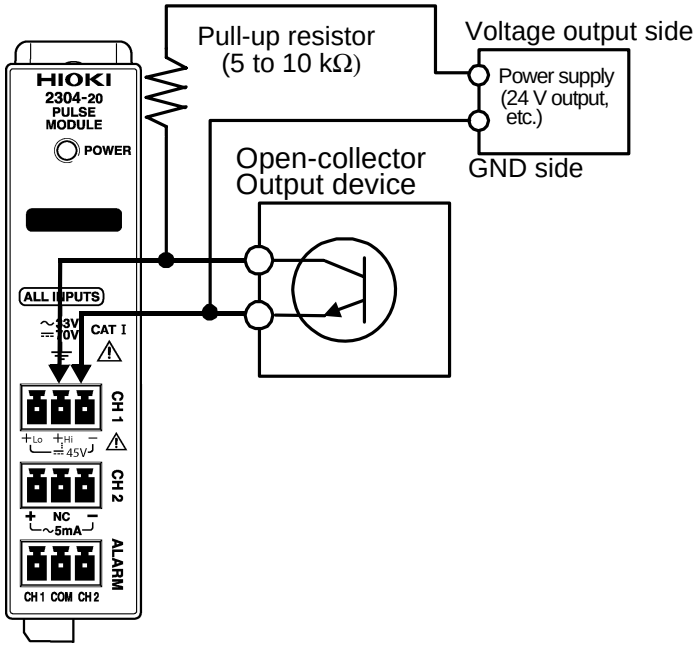
(1) Contact Output Devices (Relays, Open-Collector Output, Etc.)

Connect a contact output device to "+Lo" and "-" of CH1.



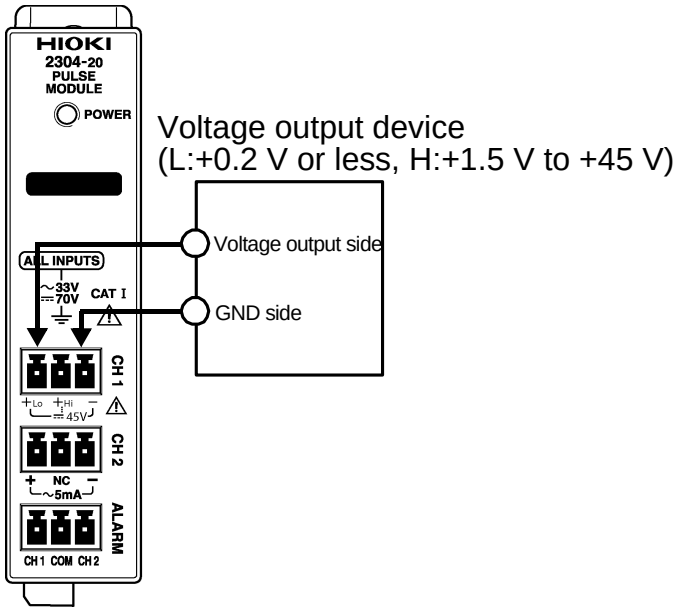
(2) Open-Collector Device (When ON Resistance Is Large)

Some open-collector devices may have such a high ON resistance that pulse signals cannot be detected by the method of (1). To couple the module to such devices, prepare a power supply of 10 to 45 V and a resistor, make pull-up as illustrated below, and connect cables to +Hi and - of CH1.



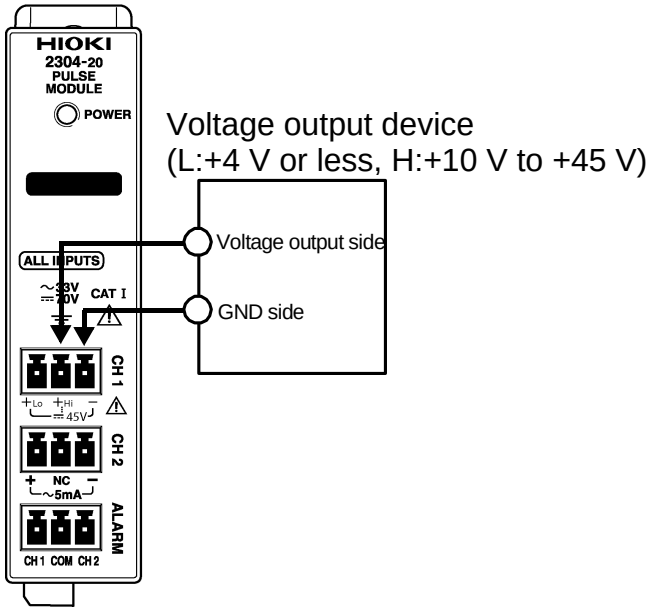
(3) Voltage Output Device (L: +0.2 V or Less, H: +1.5 to +45 V)

A device that outputs a voltage within the threshold ranges indicated above should be coupled to +Lo and - of CH1.



(4) Voltage Output Device (L: +4 V or Less, H: +10 to +45 V)

A device that outputs a voltage within the threshold ranges indicated above should be coupled to +Hi and - of CH1.



4.4.2 Alarm output

(1) Output Rating

WARNING

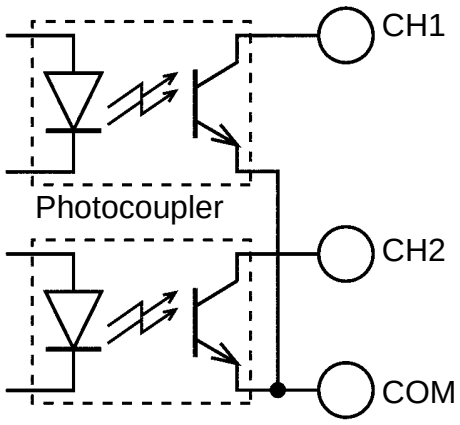
Ensure that the input does not exceed the maximum input voltage or current to avoid module damage, short-circuiting and electric shock resulting from heat building.

Output method	Open collector
Maximum input voltage / current	30 V, 20 mA max.
Signal logic	Enabled: ON Disabled: OFF

(1) Internal Circuit

The alarm output circuit is configured as shown below.

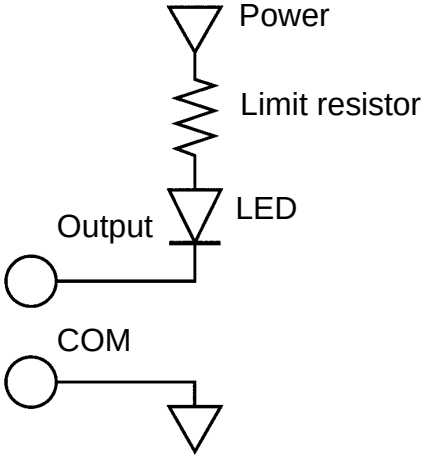
<Internal circuit>



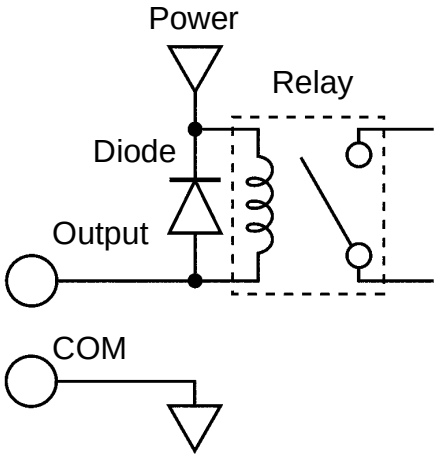
NOTE

- Signal logic indicates the signal state in which a signal's function is enabled.
- The output transistor works as a switch between signal output and ground in the module. When output becomes enabled, the switch is turned on and current flows from the output signal to COM in the module. Therefore, a relay or LED lamp can be connected directly to the output terminal (P.69).

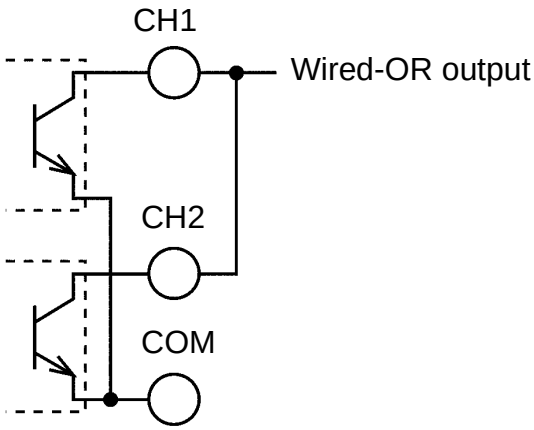
<Circuit diagram>



Connecting LED



Connecting relay



Using on Wired-OR Logic

NOTE

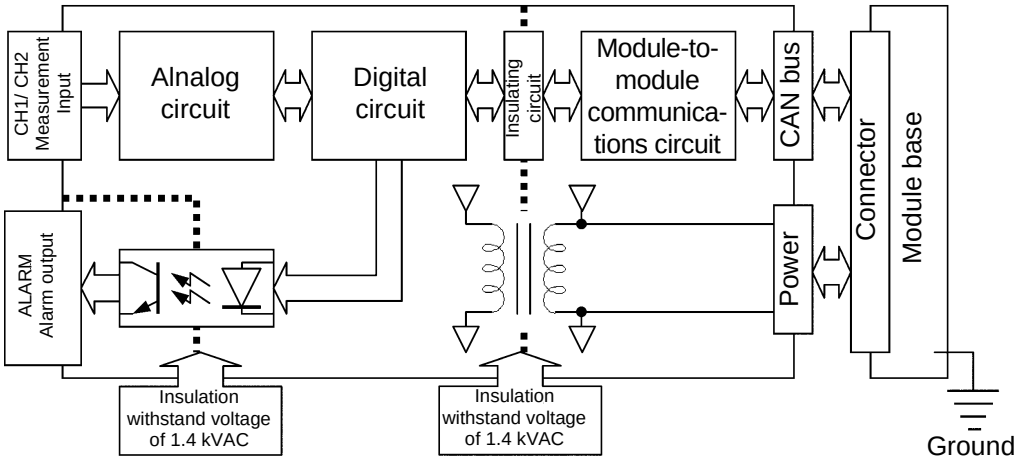
- When connecting a relay or LED lamp, ensure that the relay or lamp operates at up to 30 V and 20 mA. When connecting a relay, be sure to use a diode to absorb counterelectromotive force.
- Open collector output operates on wired-OR logic by short-circuiting CH1 and CH2. Moreover, it enables the signal if an alarm occurs in either channel.

4.4.3 Insulation of Internal Circuit

⚠CAUTION

The CH1 and CH2 terminals are not insulated from each other.
When measuring two measurement points having a potential difference, equalize the ground level potential of these two points, or use another 2304-20 Module, since measurements may be adversely affected.

In the 2304-20, the input circuit and alarm output are insulated from the CAN bus as shown in the block diagram below. (Withstand voltage: 1.4 kVAC, 50/60 Hz, Response current: 5 mA, 1 minute)



NOTE The COM terminal of the alarm output terminal is used for both CH1 and CH2.

4.5 Specifications

4.5.1 Basic Specifications

Number of inputs	Voltage or no-voltage contact pulse input × 1 channel Clamp-type current pulse input × 1CH (Detected using externally connected 9766 CLAMP ON SENSOR.) ♦Simultaneous detection on 2 channels is also possible.
Measurement range	Voltage/no-voltage contact pulse up to 4 kHz (Input terminals set by commands) • Lo range, no-voltage contact terminals Voltage pulse A pulse is counted when the voltage level changes from L to H. L: +0.0 to +0.2 V H: +1.5 to +45 V (Logic in the range from +0.2 to +1.5 V is indefinite.) No-voltage contact pulse: A pulse is counted when the circuit between the terminals changes from a short circuit to an open circuit. Contact Detection Level: short circuit of 500 Ω or less open circuit of 500 kΩ or more • High range, terminals Voltage pulse A pulse is counted when the voltage level changes from L to H. L: +0.0 to +4.0 V H: +10.0 to +45 V (Logic in the range from +4.0 to +10.0V is indefinite.) • Current pulse Detected current range 10 to 20 mAp-p Pulse width 12.5 ms or more Pulse interval 25 ms or more, 40 Hz max. Rise/fall speed 0.8 ms or less ♦With the 9766 CLAMP ON SENSOR, in a magnetic field of 50 A/m AC or less
Filter	Effective for voltage/no-voltage contact pulse input (set by a command). • For mechanical contact Pulse width: 20 ms or more Pulse separation: 40 ms or more (Frequency: 25 Hz or less) ♦No filter for current pulse input
Measurement accuracy	±100 ppm rdg. ±1 dgt., Recording interval accuracy: ±2 ms Display range: Total of each channel at every interval (16,000,000 max.)
Guaranteed accuracy period	1 year
Sampling	1 time / sec.
Input terminal	3 Input terminal block × 2

4.5.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current measured values (instantaneous values).

Measured value recording function

Measurements are recorded at a set recording interval.	
Real-time management	This is automatically set from the PC application at the start of recording.
Recording start	Immediate start/Reserved-time start
Recording end	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.
Recording mode	Instantaneous value recording mode (Total during the interval)
Recorded data	One data set contains time, recording data (for 2 channels).
Recording capacity	512 k bytes Flash memory
Quantity of recorded data	Instantaneous value recording mode: 30,000 data × 2 CH
Power outage protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

Alarm judgment and recording function

Alarm judgment is made at every sampling, and the history will be recorded in flash memory if the measured value recording function remains active.	
Judgment method	Criterion threshold can be set to either Hi or Lo. Hi: The total at every sampling is judged within the interval. Lo: The total is judged at every interval.
Recorded data	One data set contains time, generation/reversion , CH and judgment threshold.
Alarm output	Alarm output × 2 CH ♦Output is turned ON when an alarm (Hi or Lo) occurs. Whether to hold the alarm output can be selected. The reset switch or a command can be used to reset alarms.

4.5.3 General Specifications

Clock accuracy	±100 ppm (Reference value at temperature from 0 to 50°C without the communications module)
Backup	Recorded data (saved in flash memory) ♦Data loss for up to 2 minutes before and after a power outage may occur.
Communication interface	CAN bus
Maximum rated voltage to earth	33 Vrms, 70 VDC
Maximum input voltage	Voltage/contact side 45 VDC
Alarm output	Open collector:30 VDC/20 mA MAX.
Rated supply voltage	5 VDC±0.3 V
Maximum rated power	1.4 W

Dielectric strength	1.4 kVAC (Between input and alarm output, Input/Output and CAN bus) (50/60 Hz, Response current 5 mA, one minutes)
Dimensions	Approx.22.5W × 96H × 85D mm (0.89"W × 3.78"H × 3.35"D)(excluding projections)
Mass	Approx.120 g (4.2 oz.)
Accessories	Ferrite clamp..... 2 Terminal block 3
Option	9766 CLAMP ON SENSOR (For current pulse detection)
Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (non-condensating)
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (non-condensating)
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)
Applicable standards	Safety EN61010-1:2001, Pollution degree 2, Measurement Category I, (anticipated transient overvoltage 330 V)

2304-21 PULSE MODULE 5

5.1 Overview

5.1.1 Product Overview

- The 2304-21 is a measurement module of the Hioki "Smart Site" (remote measurement system).
- This module measures and records voltage pulses and no-voltage contact output at regular intervals. For example, the 2304-21 can be used to measure pulse output from a watthour meter or flowmeter.
- The 2304-21 is used with the power supply module, communications module, and module base.

Number of measurement channels	2 channels for voltage/contact pulse
Measurement range	16,000 k pulse/interval
Input pulse	4 kHz max. (voltage/contact)

(Conceptual image)

5.1.2 Major Features

- **The recording interval is selectable from 1 second to 60 minutes.**
- **The totals of measurements made during a recording interval can be recorded (with sampling once a second).**
- **The module has an alarm output terminal.**

Rough Estimate of Storable Data Quantity and Time

Action at memory full: Continue recording (Endless)

	Recording Mode
	Instantaneous Value
Quantity of storable data	26000
Recording interval	
1 sec.	7.5 hours
2 sec.	14.5 hours
5 sec.	1.5 days
10 sec.	3 days
15 sec.	4.5 days
20 sec.	6 days
30 sec.	9 days
1 min.	18 days
2 min.	36 days
5 min.	92 days
10 min.	184 days
15 min.	277 days
20 min.	369 days
30 min.	554 days
60 min.	1109 days

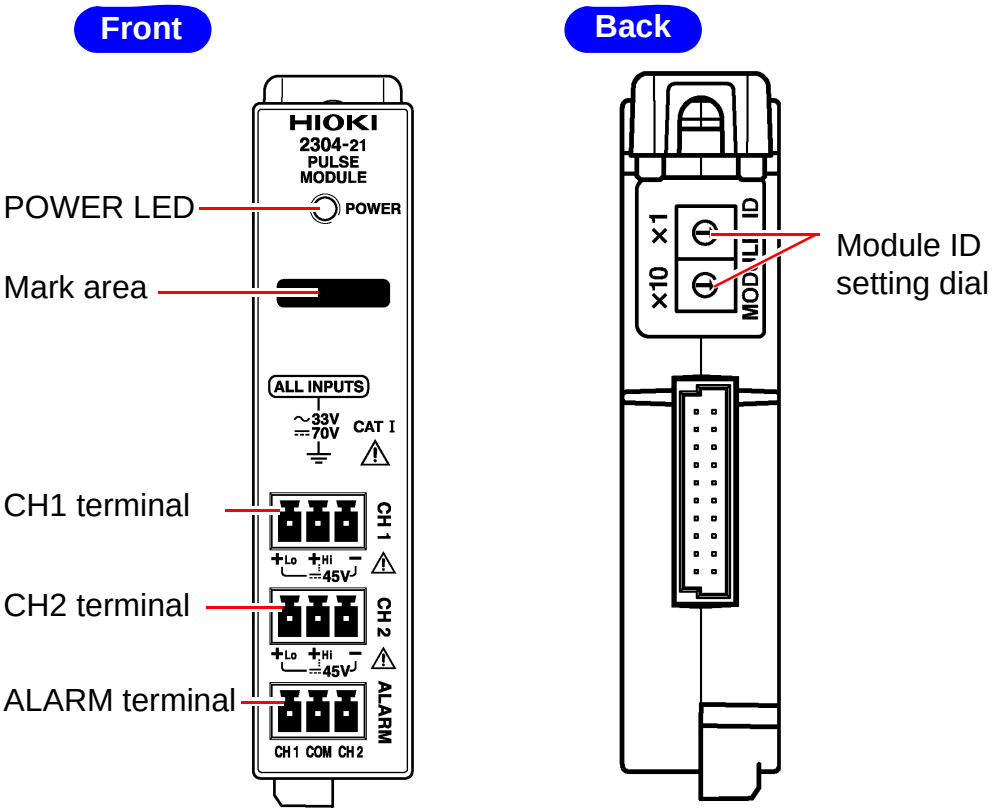
NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period.

Action at memory full: Stop recording (Memory full stop)

	Recording Mode
	Instantaneous Value
Quantity of storable data	30000
Recording interval	
1 sec.	8.5 hours
2 sec.	17 hours
5 sec.	1.5 days
10 sec.	3.5 days
15 sec.	5 days
20 sec.	7 days
30 sec.	10 days
1 min.	21 days
2 min.	42 days
5 min.	106 days
10 min.	213 days
15 min.	319 days
20 min.	426 days
30 min.	639 days
60 min.	1279 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period.

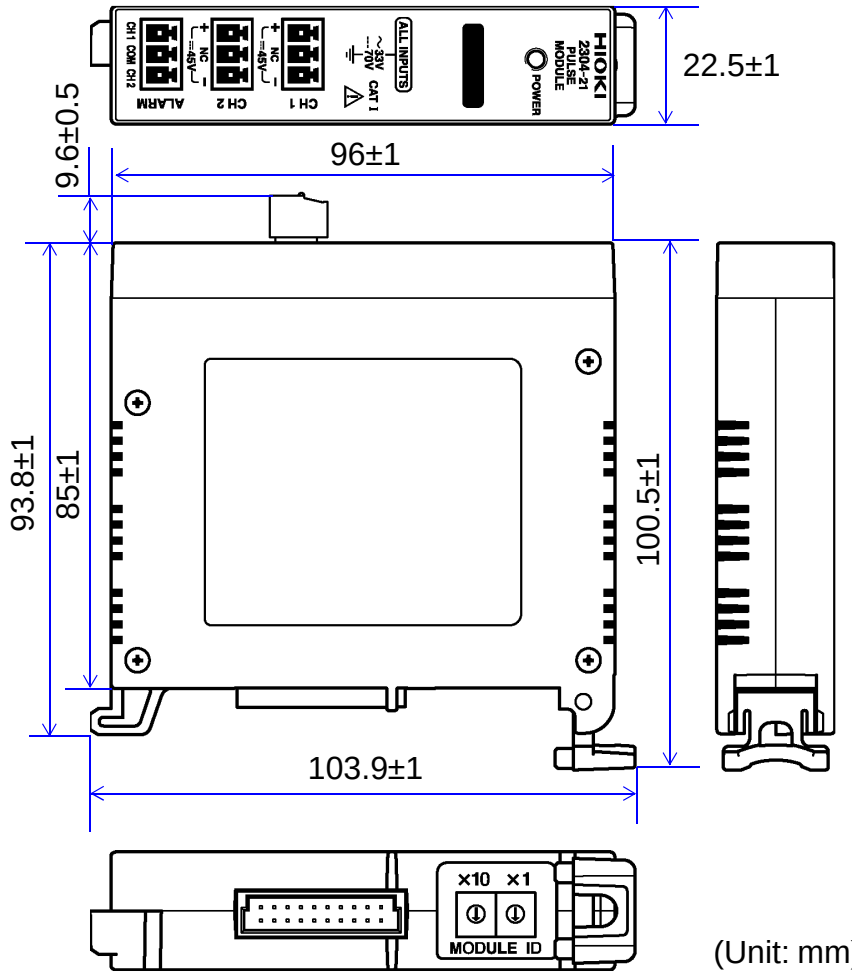
5.1.3 Name and Function of the Parts



POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Data being recorded. Flashing in green : Standing by. Lit in yellow : Alarm output. Lit in red : Non-recoverable error occurred. *1 Flashing in red: Recoverable error occurred. *2
Mark area	Use this area to make a note of the object to measure or the module ID. Use an ink pen, since pencil lead may rub off.
CH1 terminal	Connect the voltage pulse signal or contact pulse signal to this terminal (channel 1).
CH2 terminal	Connect the voltage pulse signal or contact pulse signal to this terminal (channel 2).
ALARM terminal	Connect the alarm output cable to this terminal. This terminal is electrically insulated from the CH1 and CH2 terminals.
Module ID setting dial	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your dealer or Hioki representative.
*2: The same module ID may be used by another module.

5.1.4 Dimension Diagrams



(Unit: mm)

5.1.5 Accessory and Option

Accessories

Terminal block 3
Ferrite clamp 2

Option

None

5.2 Settings

5.2.1 Setting the Module ID

You can connect up to 63 measurement modules to one communications module.

Setting Procedure

Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID are not related and can be set independently.

5.3 Preparations

5.3.1 Installing the Module

(1) Installing the Module Base

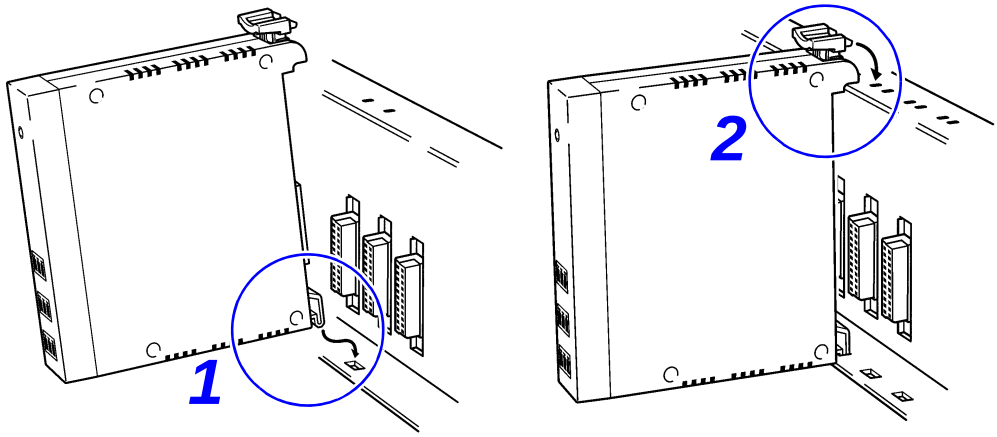
CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(2) Mounting a Module on the Module Base

Mount a module on the module base as shown below. Ensure that the lever clicks.



5.3.2 Connecting Input/Output Cables

Recommended Cable

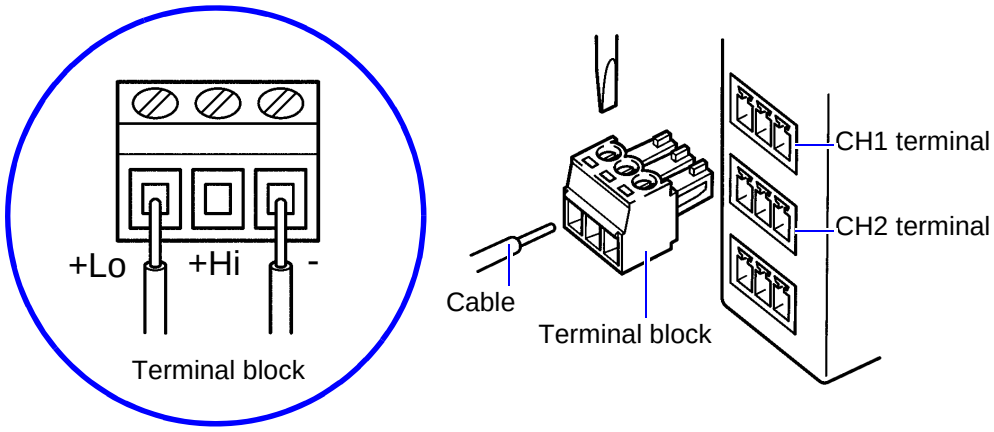
Single-wire	: 0.14 to 1.5 mm^2
Stranded-wire	: 0.14 to 1.0 mm^2
AWG	: 26 to 16
Cable strip length	: 5 mm (0.2")

(1) Connecting to CH1 and CH2 Terminals (voltage/contact pulse signals input)

⚠CAUTION

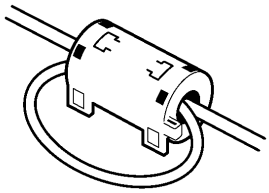
- The CH1 and CH2 terminals are not insulated from each other. Avoid short-circuiting.
- Note that the instrument may be damaged if the applied voltage exceeds the measurement range.

1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert the cable for voltage or contact pulse signal input into the terminal block, then tighten the screws into the terminal block (at tightening torque of 0.25 N•m).
   For most cases, voltage or contact pulse signals can be detected when the module is operated with the positive terminal connected to +Lo.
   To connect the positive terminal of a voltage pulse signal, select either +Lo or +Hi according to the threshold voltage.
   Always connect the positive terminal of a no-voltage contact to +Lo
3. Connect the terminal block to the CH1 or CH2 terminal.



NOTE

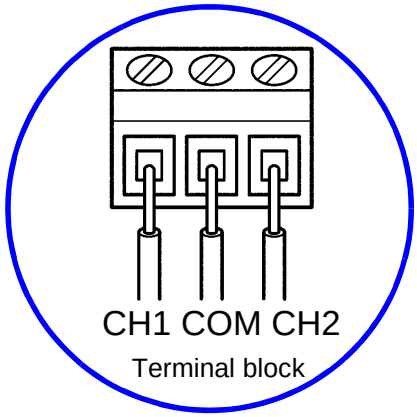
- There is no insulation between terminals CH1 and CH2. When measurement is conducted for two points with a difference in potential, the measured value may be affected. To avoid this, use electrically insulated sensors, or a further instrument.
- In case of external noise, wind the cable around the ferrite clamp supplied as an accessory as shown below.

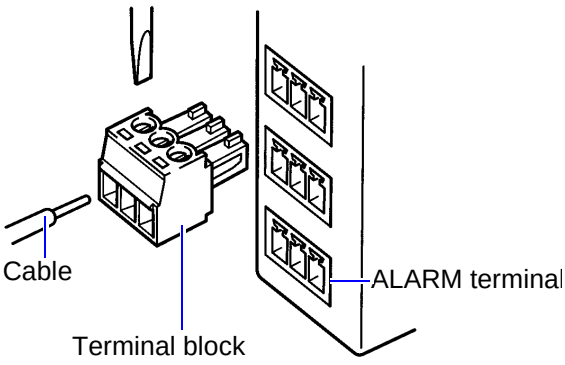


- Note that measurement may be adversely affected by external noise or the electromagnetic environment when using a cable longer than 3 meters.

(2) Connecting Cables to the ALARM Terminal (Alarm output)

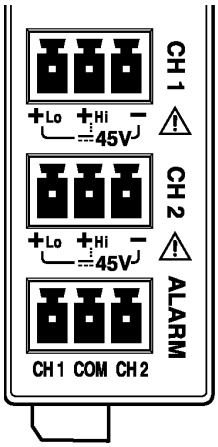
1. Use a flat head screwdriver to loosen the screws on the supplied terminal block.
2. Insert the cable for alarm output into the terminal block, then tighten the screws (at tightening torque of 0.25 N•m).
3. Connect the terminal block to the ALARM terminal.





Connect the cable for CH1 output to CH1 and COM; connect the cable for CH2 output to CH2 and COM.

(3) Connection Locations of Input/output Cables



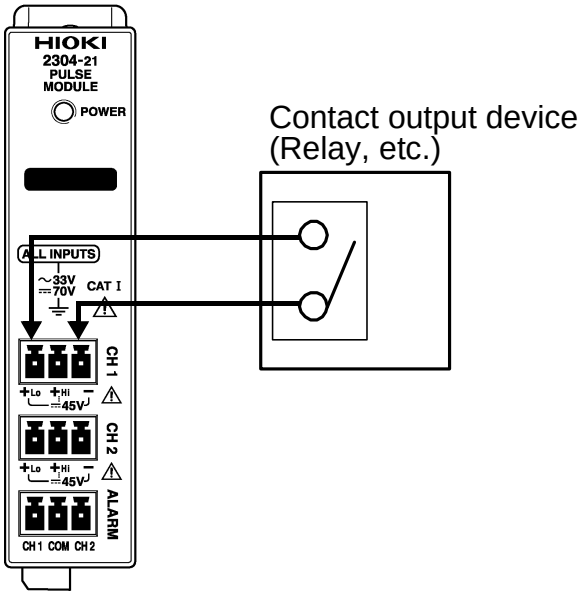
CH1 terminal (input)	+ Lo	+ Hi	–
	Voltage/ contact input (+) L:0 V to 0.2 V H:1.5 V to 45 V	Voltage input(+) L:0 V to 4 V H:10 V to 45 V	Voltage/ contact input (–)
CH2 terminal (input)	+ Lo	+ Hi	–
	Voltage/ contact input (+) L:0 V to 0.2 V H:1.5 V to 45 V	Voltage input(+) L:0 V to 4 V H:10 V to 45 V	Voltage/ contact input (–)
ALARM terminal (output)	CH1	COM	CH2
	Alarm output	Common	Alarm output

5.4 Others

5.4.1 Examples of Connections According to Type of Device Coupled

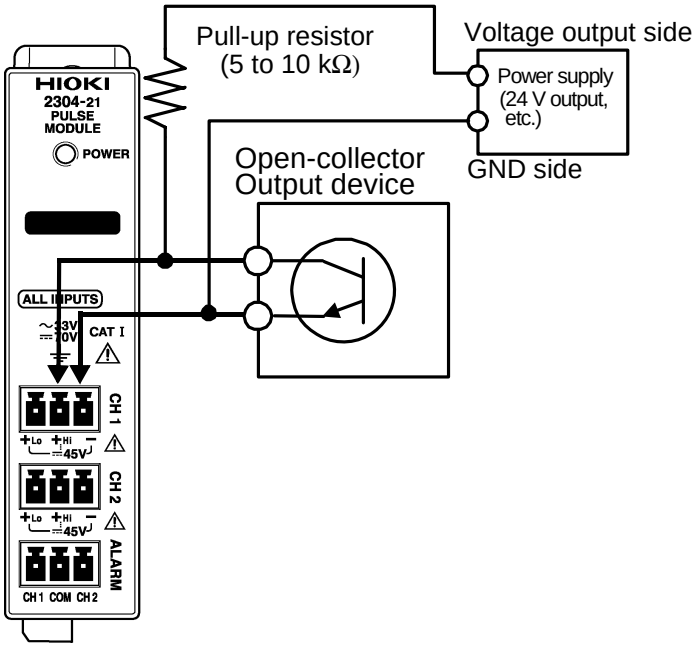
(1) Contact Output Devices (Relays, Open-Collector Output, Etc.)

Connect a contact output device to "+Lo" and "-" of CH1.



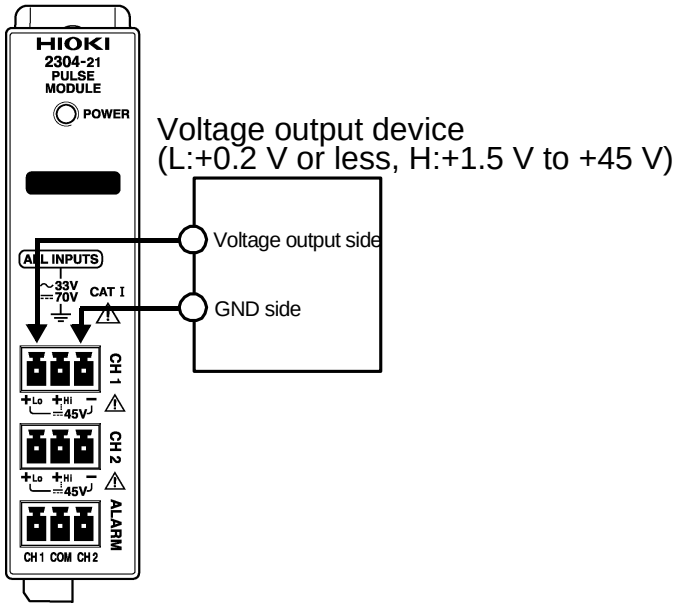
(2) Open-Collector Device (When ON Resistance Is Large)

Some open-collector devices may have such a high ON resistance that pulse signals cannot be detected by the method of (1). To couple the module to such devices, prepare a power supply of 10 to 45 V and a resistor, make pull-up as illustrated below, and connect cables to +Hi and - of CH1.



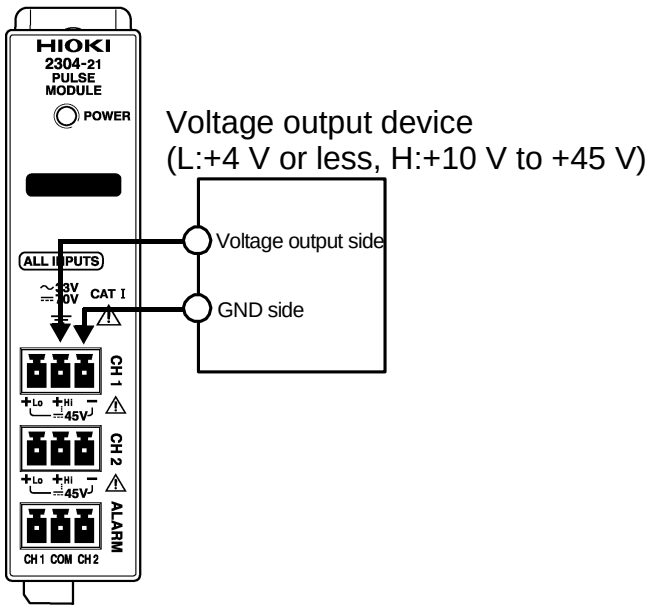
(3) Voltage Output Device (L: +0.2 V or Less, H: +1.5 to +45 V)

A device that outputs a voltage within the threshold ranges indicated above should be coupled to +Lo and - of CH1.



(4) Voltage Output Device (L: +4 V or Less, H: +10 to +45 V)

A device that outputs a voltage within the threshold ranges indicated above should be coupled to +Hi and - of CH1.



5.4.2 Alarm output

(1) Output Rating

WARNING

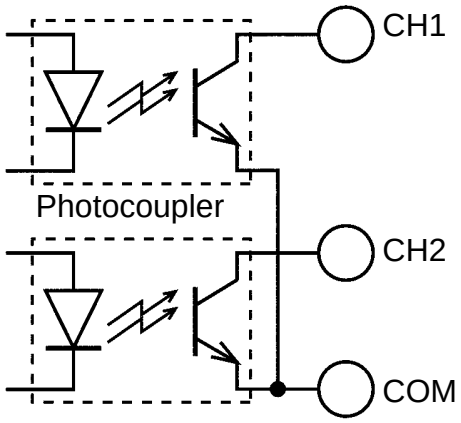
Ensure that the input does not exceed the maximum input voltage or current to avoid module damage, short-circuiting and electric shock resulting from heat building.

Output method	Open collector
Maximum input voltage / current	30 V, 20 mA max.
Signal logic	Enabled: ON Disabled: OFF

(1) Internal Circuit

The alarm output circuit is configured as shown below.

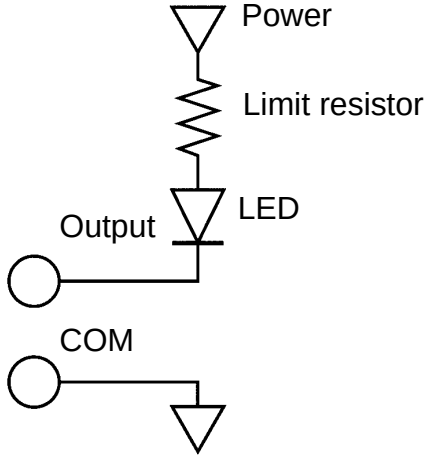
<Internal circuit>



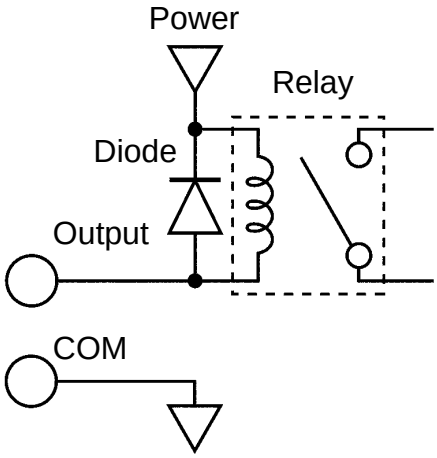
NOTE

- Signal logic indicates the signal state in which a signal's function is enabled.
- The output transistor works as a switch between signal output and ground in the module. When output becomes enabled, the switch is turned on and current flows from the output signal to COM in the module. Therefore, a relay or LED lamp can be connected directly to the output terminal (P.88).

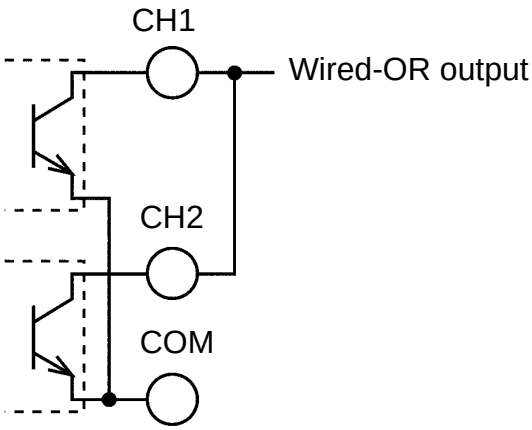
<Circuit diagram>



Connecting LED



Connecting relay



Using on Wired-OR Logic

NOTE

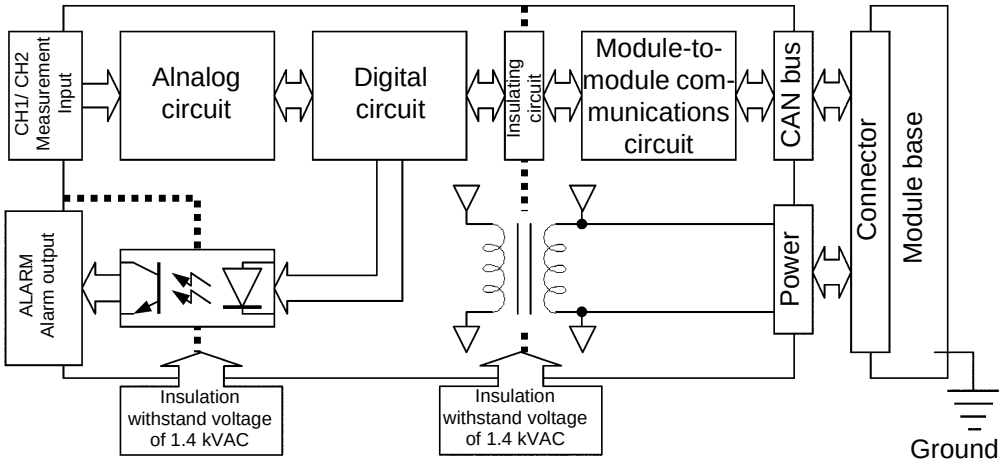
- When connecting a relay or LED lamp, ensure that the relay or lamp operates at up to 30 V and 20 mA. When connecting a relay, be sure to use a diode to absorb counterelectromotive force.
- Open collector output operates on wired-OR logic by short-circuiting CH1 and CH2. Moreover, it enables the signal if an alarm occurs in either channel.

5.4.3 Insulation of Internal Circuit

CAUTION

The CH1 and CH2 terminals are not insulated from each other.
When measuring two measurement points having a potential difference, equalize the ground level potential of these two points, or use another 2304-21 Module, since measurements may be adversely affected.

In the 2304-21, the input circuit and alarm output are insulated from the CAN bus as shown in the block diagram below. (Withstand voltage: 1.4 kVAC, 50/60 Hz, Response current: 5 mA, 1 minute)



NOTE

The COM terminal of the alarm output terminal is used for both CH1 and CH2.

5.5 Specifications

5.5.1 Basic Specifications

Number of inputs	Voltage or no-voltage contact pulse input x 2 channels
Measurement range	Voltage/no-voltage contact pulse up to 4 kHz (Input terminals set by commands) • Lo range, no-voltage contact terminals Voltage pulse A pulse is counted when the voltage level changes from L to H. L: +0.0 to +0.2 V H: +1.5 to +45 V (Logic in the range from +0.2 to +1.5V is indefinite.) No-voltage contact pulse: A pulse is counted when the circuit between the terminals changes from a short circuit to an open circuit. Contact Detection Level: short circuit of 500 Ω or less open circuit of 500 kΩ or more • High range, terminals Voltage pulse A pulse is counted when the voltage level changes from L to H. L: +0.0 to +4.0 V H: +10.0 to +45 V (Logic in the range from +4.0 to +10.0V is indefinite.)
Filter	Effective for voltage/no-voltage contact pulse input (set by a command). • For mechanical contact Pulse width: 20 ms or more Pulse separation: 40 ms or more (Frequency: 25 Hz or less)
Measurement accuracy	±1 dgt. Recording interval accuracy: ±2 ms Display range: Total of each channel at every interval (16,000,000 max.)
Clock accuracy	±100 ppm (Reference value at temperature from 0 to 50°C without the communications module)
Guaranteed accuracy period	1 year
Sampling	1 time / sec.
Input terminal	3 Input terminal block × 2

5.5.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current measured values (instantaneous values).

Measured value recording function

Measurements are recorded at a set recording interval.	
Real-time management	This is automatically set from the PC application at the start of recording.
Recording start	Immediate start/Reserved-time start
Recording end	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.

Recording mode	Instantaneous value recording mode (Total during the interval)
Recorded data	One data set contains time, recording data (for 2 channels).
Recording capacity	512 k bytes Flash memory
Quantity of recorded data	Instantaneous value recording mode: 30,000 data × 2 CH
Power outage protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

Alarm judgment and recording function

Alarm judgment is made at every sampling, and the history will be recorded in flash memory if the measured value recording function remains active.	
Judgment method	Criterion threshold can be set to either Hi or Lo. Hi: The total at every sampling is judged within the interval. Lo: The total is judged at every interval.
Recorded data	One data set contains time, generation/reversion , CH and judgment threshold.
Alarm output	Alarm output × 2 CH ♦Output is turned ON when an alarm (Hi or Lo) occurs. Whether to hold the alarm output can be selected. The reset switch or a command can be used to reset alarms.

5.5.3 General Specifications

Backup	Recorded data (saved in flash memory) ♦Data loss for up to 2 minutes before and after a power outage may occur.
Communication interface	CAN bus
Maximum rated voltage to earth	33 Vrms, 70 VDC
Maximum input voltage	45 VDC
Alarm output	Open collector:30 VDC/20 mA MAX.
Rated supply voltage	5 VDC±0.3 V
Maximum rated power	1.4 W
Dielectric strength	1.4 kVAC (Between input and alarm output, Input/Output and CAN bus) (50/60 Hz, Response current 5 mA, one minutes)
Dimensions	Approx.22.5W × 96H × 85D mm (0.89"W × 3.78"H × 3.35"D)(excluding projections)
Mass	Approx.120 g (4.2 oz.)
Accessories	Terminal block ..... 3 Ferrite clamp 2
Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (non-condensating)
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (non-condensating)
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)
Applicable standards	Safety EN61010-1:2001, Pollution degree 2, Measurement Category I, (anticipated transient overvoltage 330 V) EMC EN61326:1997+A1:1998+A2:2001+A3:2003, Class A

2305-20 INSTRUMENTATION MODULE 6

6.1 Overview

6.1.1 Product Overview

- The 2304-21 is a measurement module of Hioki "Smart Site" (remote measurement system).
- This module measures and records DC analog signal at regular intervals.
- This module measures up to ± 50 VDC and 100 mADC (including 1 V to 5 VDC and 4 mA to 20 mADC) used for instrumentation.
- One module can be used for measurement at two locations.
- The 2304-21 is used with the power supply module, communications module, and module base.

Number ofmeasurement channels	(Voltage / Current) 2 CH
Measurement range	±50 mV / 500 mV / 5 V / 50 V, -2 mA to +110 mA

(Conceptual image)

6.1.2 Major Features

- **The recording interval is selectable from 1 second to 60 minutes.**
- **The maximum, minimum, and average measurements during the recording interval can be recorded (with sampling once a second).**
- **The module has an alarm output terminal.**

Rough Estimate of Storable Data Quantity and Time

Action at memory full: Continue recording (Endless)

	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value +MAX/MIN/AVE
Quantity of storable data	26000	13000	10000
Recording interval			
1 sec.	7.5 hours	3.5 hours	2.5 hours
2 sec.	14.5 hours	7 hours	5.5 hours
5 sec.	1.5 days	18 hours	14.5 hours
10 sec.	3 days	1.5 days	1 day
15 sec.	4.5 days	2 days	1.5 days
20 sec.	6 days	3 days	2 days
30 sec.	9 days	4.5 days	3.5 days
1 min.	18 days	9 days	7 days
2 min.	36 days	18 days	14 days
5 min.	92 days	46 days	36 days
10 min.	184 days	92 days	73 days
15 min.	277 days	138 days	110 days
20 min.	369 days	184 days	147 days
30 min.	554 days	277 days	221 days
60 min.	1109 days	554 days	443 days

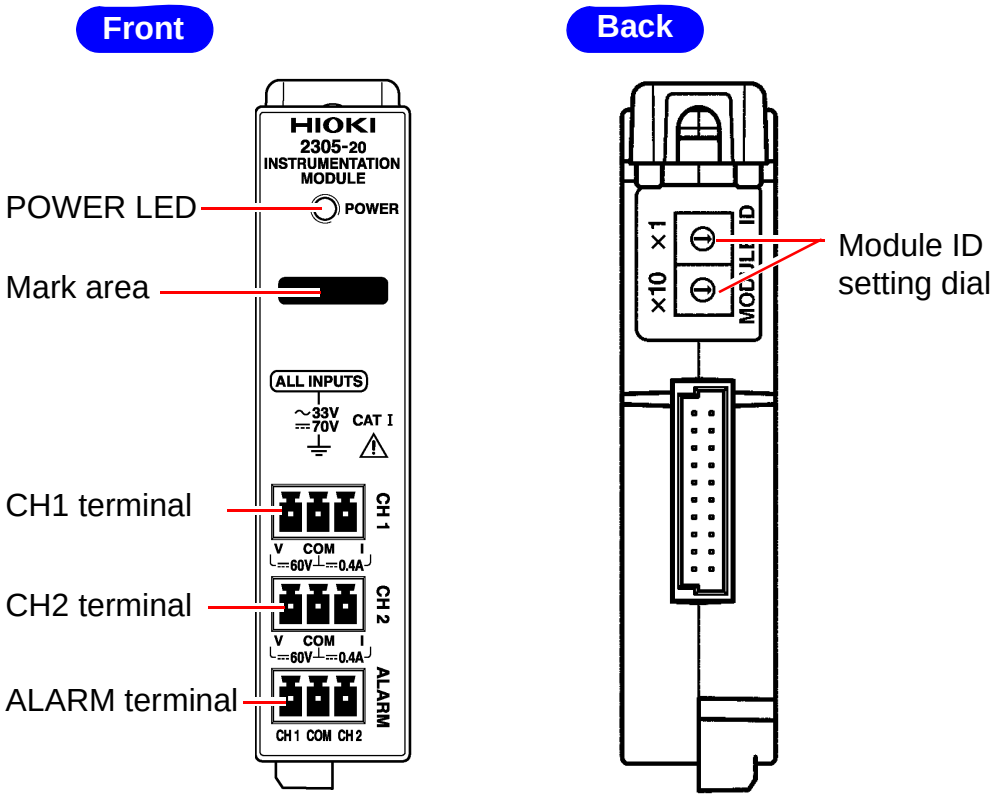
NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1 of the data per alarm)

Action at memory full: Stop recording (Memory full stop)

	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value +MAX/MIN/AVE
Quantity of storable data	30000	15000	12000
Recording interval			
1 sec.	8.5 hours	4 hours	3 hours
2 sec.	17 hours	8.5 hours	6.5 hours
5 sec.	1.5 days	21 hours	17 hours
10 sec.	3.5 days	1.5 days	1.5 days
15 sec.	5 days	2.5 days	2 days
20 sec.	7 days	3.5 days	2.5 days
30 sec.	10 days	5 days	4 days
1 min.	21 days	10 days	8 days
2 min.	42 days	21 days	17 days
5 min.	106 days	53 days	42 days
10 min.	213 days	106 days	85 days
15 min.	319 days	159 days	127 days
20 min.	426 days	213 days	170 days
30 min.	639 days	319 days	255 days
60 min.	1279 days	639 days	511 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1 of the data per alarm)

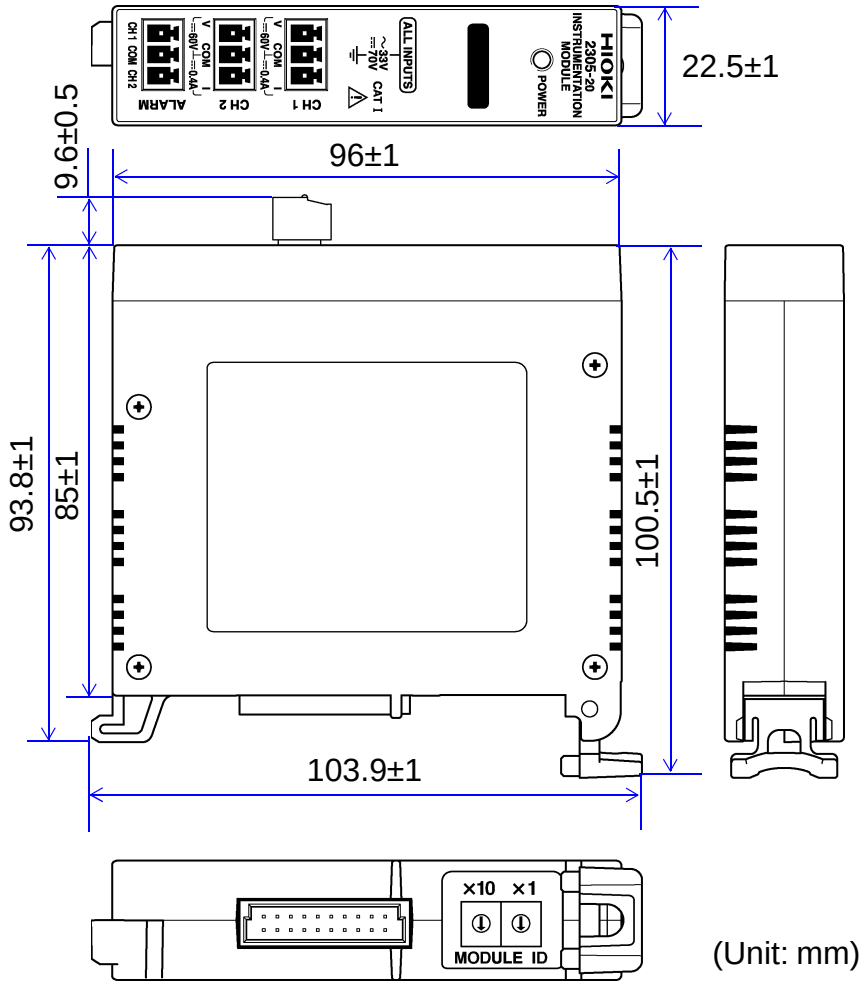
6.1.3 Name and Function of the Parts



POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Data being recorded. Flashing in green : Standing by. Lit in yellow : Alarm output. Flashing in yellow: Overrange detected. Lit in red : Non-recoverable error occurred. *1 Flashing in red : Recoverable error occurred. *2
Mark area	Use this area to make a note of the object to measure or the module ID. Use an ink pen, since pencil lead may rub off.
CH1 terminal	Connect a DC voltage signal or DC current signal to this terminal (channel 1).
CH2 terminal	Connect a DC voltage signal or DC current signal to this terminal (channel 2).
ALARM terminal	Connect the alarm output cable to this terminal. This terminal is electrically insulated from the CH1 and CH2 terminals.
Module ID setting dial	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your dealer or Hioki representative.
*2: The same module ID may be used by another module.

6.1.4 Dimension Diagrams



(Unit: mm)

6.1.5 Accessory and Option

Accessories

Option

None

6.2 Settings

6.2.1 Setting the Module ID

You can connect up to 63 measurement modules to one communications module.

Setting Procedure

Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID are not related and can be set independently.

6.3 Preparations

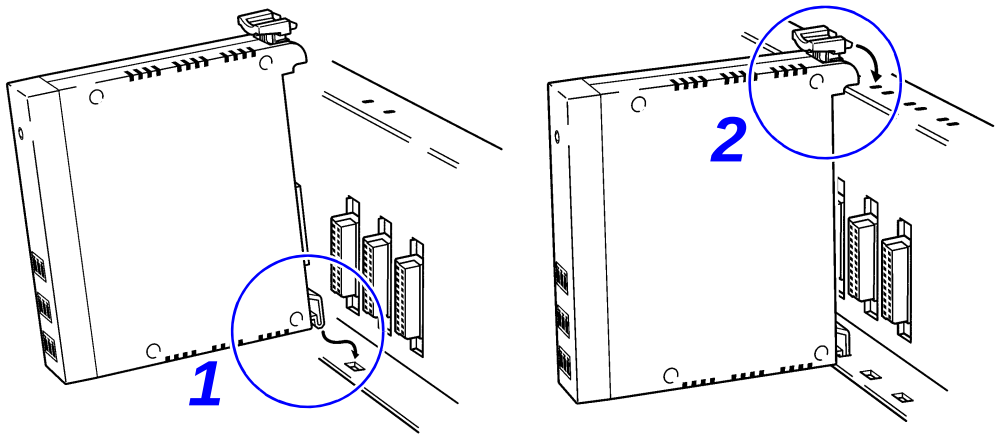
6.3.1 Installing the Module

⚠CAUTION Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(1) Mounting a Module on the Module Base

Mount a module on the module base as shown below. Ensure that the lever clicks.



6.3.2 Connecting Input/Output Cables

Recommended Cable

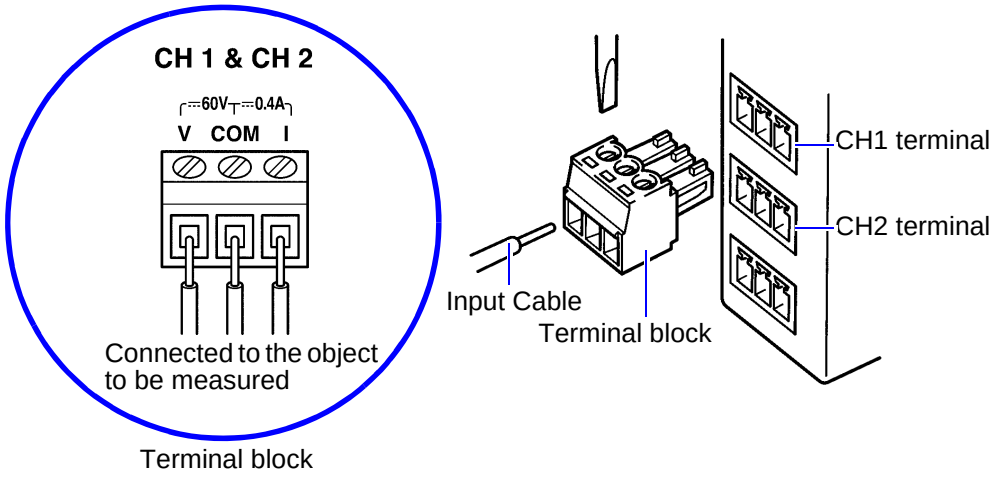
Single-wire	: 0.14 to 1.5 mm^2
Stranded-wire	: 0.14 to 1.0 mm^2
AWG	: 26 to 16
Cable strip length	: 5 mm (0.2")

(1) Connecting Cables to the CH1, CH2 Terminals (DC Current / Voltage Signal Input)

WARNING

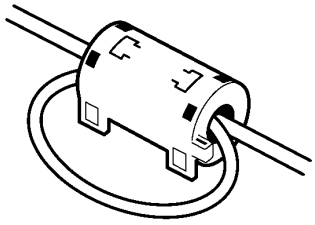
Maximum input voltage and current is ±60 V / ±0.4 A.Ensure that the input does not exceed the maximum input voltage or current to avoid module damage, short-circuiting and electric shock resulting from heat building.

1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert a cable for DC voltage or DC current signal input into the terminal block, then tighten the screws (at a tightening torque of 0.25 N•m).
3. Connect the terminal block to the CH 1 or CH 2 terminal.



NOTE

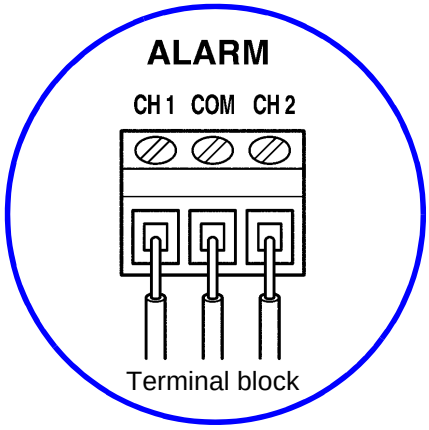
- One channel is used for measuring current or voltage.
- The CH1 and CH2 terminals are not insulated from each other. When measuring two measurement points having a potential difference, equalize the ground level potential of these two points, or use another 2305-20, since measurements may be adversely affected.
- In case of external noise, wind the cable around the ferrite clamp supplied as an accessory as shown below.

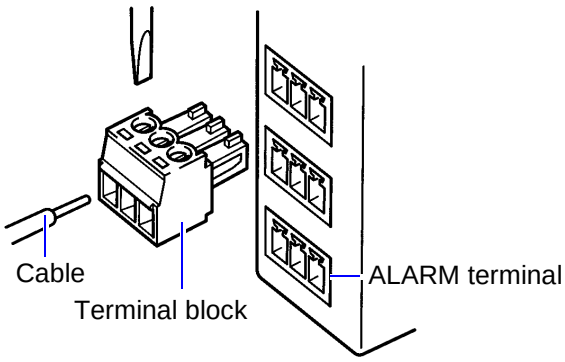


- Note that measurement may be adversely affected by external noise or the electromagnetic environment when using a cable longer than 3 meters.

(2) Connecting Cables to the ALARM Terminal (Alarm output)

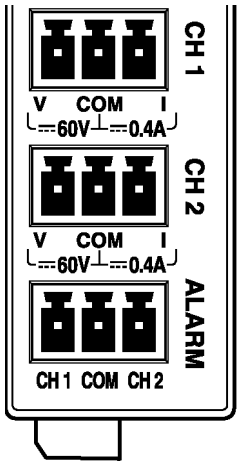
1. Use a flat blade screwdriver to loosen the screws on the terminal block.
2. Insert a cable for alarm output into the terminal block, then tighten the screws (at a tightening torque of 0.25 N•m).
3. Connect the terminal block to the ALARM terminal.





Connect the cable for CH1 output to CH1 and COM; and connect the cable for CH2 output to CH2 and COM.

(3) The Location of the Input/Output Cable



CH 1 terminal (Input)	**V**	**COM**	**I**
	DC voltage input	Common	DC current input
CH 2 terminal (Input)	**V**	**COM**	**I**
	DC voltage input	Common	DC current input
ALARM terminal (output)	**CH1**	**COM**	**CH2**
	Alarm output	Common	Alarm output

6.4 Ohters

6.4.1 Alarm Output

(1) Output Rating

WARNING

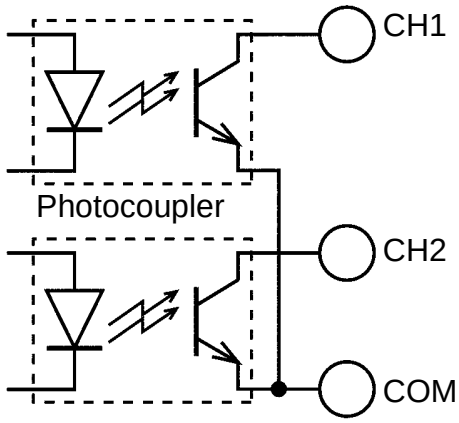
Ensure that the input does not exceed the maximum input voltage or current to avoid module damage, short-circuiting and electric shock resulting from heat building.

Output method	Open collector
Maximum input voltage / current	30 V, 20 mA max.
Signal logic	Enabled: ON Disabled: OFF

(2) Internal Circuit

The alarm output circuit is configured as shown below.

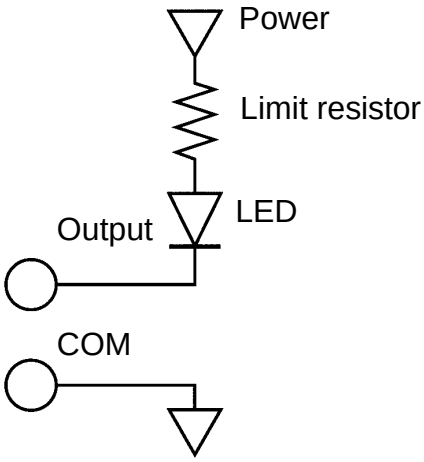
<Internal circuit>



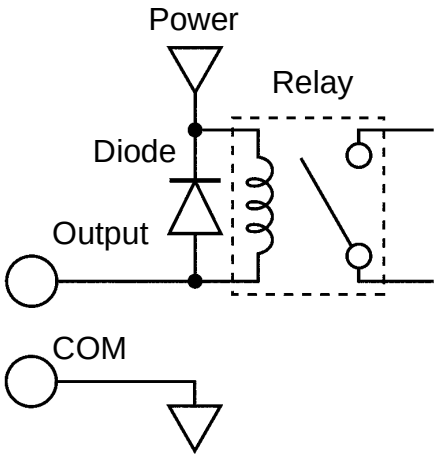
NOTE

- Signal logic indicates the signal state in which a signal's function is enabled.
- The output transistor works as a switch between signal output and ground in the module. When output becomes enabled, the switch is turned on and current flows from the output signal to COM in the module. Therefore, a relay or LED lamp can be connected directly to the output terminal (P.103).

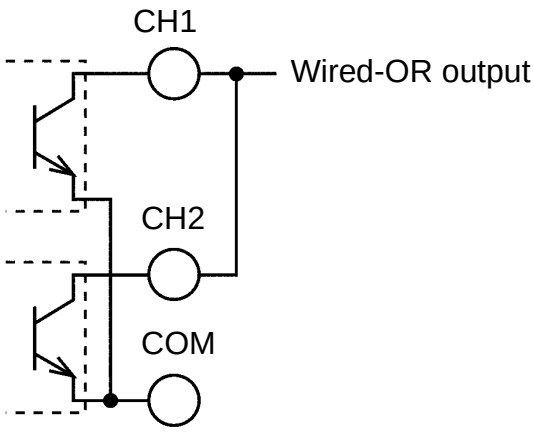
<Circuit diagram>



Connecting LED



Connecting relay



Using on Wired-OR Logic

NOTE

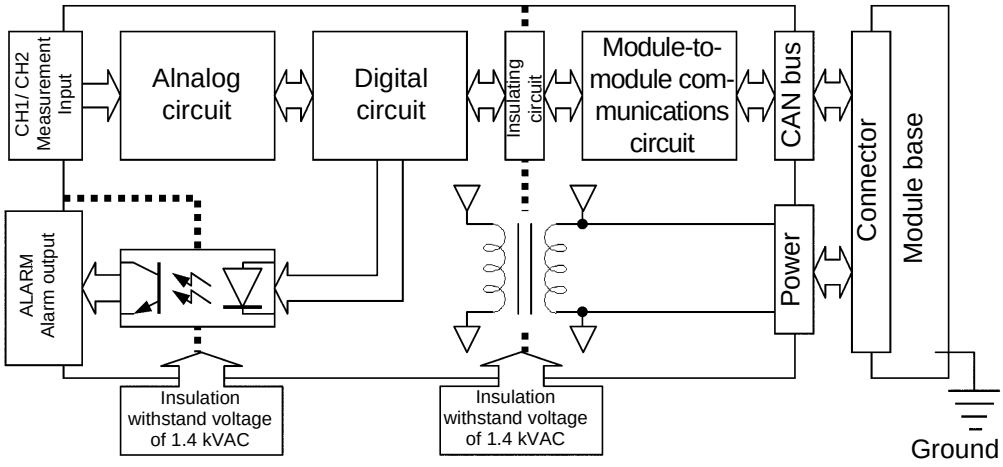
- When connecting a relay or LED lamp, ensure that the relay or lamp operates at up to 30 V and 20 mA. When connecting a relay, be sure to use a diode to absorb counterelectromotive force.
- Open collector output operates on wired-OR logic by short-circuiting CH 1 and CH 2. Moreover, it enables the signal if an alarm occurs in either channel.

6.4.2 Insulation of Internal Circuit

⚠CAUTION

The CH1 and CH2 terminals are not insulated from each other.
When connecting signals different in potential to these terminals, use an additional measurement module or insulate the signals externally before connection to the terminals. This will prevent module errors and malfunction.

In the 2305-20, the input circuit and alarm output are insulated from the CAN bus as shown in the block diagram below. (Withstand voltage: 1.4 kVAC, 50/60 Hz, Response current: 5 mA, 1 minute)



NOTE The COM terminal of the alarm output terminal is used for both CH1 and CH2.

6.5 Specifications

6.5.1 Basic Specifications

Number of inputs	(Current or voltage) × 2 CH
Measurement range	Voltage: ±50 mV / ±500 mV / ±5 V / ±50 V Current: -2 mA to 110 mA ♦3½ digits resolution, set the measurement functions (including the range) before the start of recording.
Measurement accuracy	±0.3%rdg. ±5 dgt.
Period of guaranteed accuracy	One year
Influence of radiated radio-frequency electromagnetic field	±30dgt. at 10 V/m
Sampling	1 time / sec.
Input terminal	3 Input terminal block × 2
Warm-up time	1 hour

6.5.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current measured values (instantaneous values).

Measured value recording function

Measurements are recorded at a set recording interval.	
Real-time management	This is automatically set from the PC application at the start of recording.
Recording start	Immediate start/Reserved-time start
Recording end	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.
Recording mode	• Instantaneous value • MAX/MIN/AVE • Instantaneous value + MAX/MIN/AVE Total 3 modes ♦Set the mode before the start of recording.
Recorded data	One data set contains time and temperature/humidity information (2 channel each). ♦Data is scaled if scaling is ON.
Recording capacity	512 k bytes Flash memory
Quantity of recorded data	• Instantaneous value recording mode: 30,000 data × 2 CH • MAX/MIN/AVE recording mode: 15,000 data × 2 CH • Instantaneous value + MAX/MIN/AVE recording mode: 12,000 data × 2 CH
Power outage protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

Alarm judgment and recording function

Alarm judgment is made at every sampling, and the history will be recorded in flash memory if the measured value recording function remains active.	
Judgment method	Criterion threshold can be set to either Hi or Lo. The instantaneous value at every sampling is judged (effective in any measurement mode.).
Recorded data	One data set contains time, generation/reversion , CH and judgment threshold.
Alarm output	Alarm output × 2 CH ♦Output is turned ON when an alarm (Hi or Lo) occurs. Whether to hold the alarm output can be selected. The reset switch or a command can be used to reset alarms.

6.5.3 General Specifications

Clock accuracy	±100 ppm (Reference value at temperature from 0 to 50°C (32 to 122°F) without the communications module)
Backup	Recorded data (saved in flash memory) ♦Data loss for up to 2 minutes before and after a power outage may occur.
Communication interface	CAN bus
Input resistance	Voltage input: 960 kΩ±5% (5 V, 50 V range), 10 MΩ min. (50 mV, 500 mV range) Current input: 10 Ω±5%
Maximum input voltage / current	Voltage input: ±60 VDC Current input: ±0.4 ADC
Maximum rated voltage to earth	33 Vrms, 70 VDC (Total with input voltage)
Alarm output	Open collector:30 VDC/20 mA MAX.
Rated supply voltage	5 V±0.3 VDC
Maximum rated power	1.4 W
Withstanding voltage	1.4 kVAC Between input and alarm output, Input/Output and CAN bus (50/60 Hz, Response current 5 mA, one minutes
Dimensions	Approx. 22.5W × 96H × 85D mm, (0.89"W × 3.78"H × 3.35"D) (excluding projections)
Mass	Approx. 120 g (4.2 oz.)
Accessories	Ferrite clamp.....2 Terminal block.....3
Operational ranges for temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)
Temperature and humidity ranges for storage	-10 to 50°C (14 to 122°F), 80%RH or less (with no condensation)
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)
Standards applying	Safety EN61010-1:2001, Pollution Degree 2, Measurement Category I, (anticipated transient overvoltage 330 V) EMC EN61326:1997+A1:1998+A2:2001+A3:2003, CLASS A

2331-20 POWER METER MODULE 7

7.1 Overview

7.1.1 Product Overview

- The 2331-20 is a measurement module of the Hioki "Smart Site" (remote measurement system).
- This module measures and records power at regular intervals.
- And the voltage, current, active power, power factor, active energy within an interval, and frequency are also can be measured.
- The 2331-20 is used with the power supply module, communications module, and module base.

Number of measurement circuits	(1P2W/1P3W/3P3W/3P4W) 1 circuit
Voltage input	100 V (70 to 130 VAC)/ 200 V (140 to 260 VAC) line
Current Input	Clamp sensor

(Conceptual image)

NOTE Do not use this module as a wattmeter or watt-hour meter for business transactions.

7.1.2 Major Features

- **This is a clamp-type wattmeter is used for a 100/200 VAC single-phase line to a 3-phase, 4-wire line.**
- **The recording interval is selectable from 1 second to 60 minutes.**
- **The maximum, minimum, and average measurements during the recording interval can be recorded (with sampling once a second).**
- **The module has an alarm output terminal.**

Rough Estimate of Storable Data Quantity and Time

Action at memory full: Continue recording (Endless)

1P2W			
	Recording Mode		
	Instantaneou Value	MAX/MIN/AVE	Instantaneous Value + MAX/MIN/AVE
Quantity of storable data	13000	5900	4600
Recording interval			
1 sec.	3.5 hours	1.5 hours	1 hour
2 sec.	7 hours	3 hours	2.5 hours
5 sec.	18 hours	8 hours	6 hours
10 sec.	1.5 days	16 hours	12.5 hours
15 sec.	2 days	1 day	19 hours
20 sec.	3 days	1 day	1 day
30 sec.	4.5 days	2 days	1.5 days
1 min	9 days	4 days	3 days
2 min.	18 days	8 days	6 days
5 min.	46 days	20 days	16 days
10 min.	92 days	41 days	32 days
15 min.	138 days	61 days	48 days
20 min.	184 days	82 days	64 days
30 min.	277 days	123 days	96 days
60 min.	554 days	246 days	192 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1/2 of the data per alarm)

Action at memory full: Continue recording (Endless)

1P3W/3P3W			
	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value + MAX/MIN/AVE
Quantity of storable data	10000	4400	3400
Recording interval			
1 sec.	2.5 hours	1 hour	0.5 hours
2 sec.	5.5 hours	2 hours	1.5 hours
5 sec.	14.5 hours	6 hours	4.5 hours
10 sec.	1 day	12 hours	9.5 hours
15 sec.	1.5 days	18 hours	14 hours
20 sec.	2 days	1 day	19 hours
30 sec.	3.5 days	1.5 days	1 day
1 min	7 days	3 days	2 days
2 min.	14 days	6 days	4.5 days
5 min.	36 days	15 days	11 days
10 min.	73 days	30 days	23 days
15 min.	110 days	46 days	35 days
20 min.	147 days	61 days	47 days
30 min.	221 days	92 days	71 days
60 min.	443 days	184 days	143 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1/2 of the data per alarm)

Action at memory full: Continue recording (Endless)

3P4W			
	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value +MAX/MIN/AVE
Quantity of storable data	8800	3500	2700
Recording interval			
1 sec.	2 hours	0.5 hours	0.5 hours
2 sec.	4.5 hours	1.5 hours	1.5 hours
5 sec.	12 hours	4.5 hours	3.5 hours
10 sec.	1 day	9.5 hours	7.5 hours
15 sec.	1.5 days	14.5 hours	11 hours
20 sec.	2 days	19.5 hours	15 hours
30 sec.	3 days	1.5 days	22.5 hours
1 min	6 days	2 days	1.5 days
2 min.	12 days	4 days	3.5 days
5 min.	30 days	12 days	9 days
10 min.	61 days	24 days	18 days
15 min.	92 days	36 days	28 days
20 min.	123 days	49 days	37 days
30 min.	184 days	73 days	56 days
60 min.	369 days	147 days	113 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1/2 of the data per alarm)

Action at memory full: Stop recording (Memory full stop)

1P2W			
	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value +MAX/MIN/AVE
Quantity of storable data	15000	6800	5300
Recording interval			
1 sec.	4 hours	1.5 hours	1 hour
2 sec.	8.5 hours	3.5 hours	1.5 hours
5 sec.	21 hours	9 hours	7 hours
10 sec.	1.5 days	18.5 hours	14.5 hours
15 sec.	2.5 days	1 day	22 hours
20 sec.	3.5 days	1.5 days	1 day
30 sec.	5 days	2 days	1.5 days
1 min.	10 days	4.5 days	3.5 days
2 min.	21 days	9 days	7 days
5 min.	53 days	23 days	18 days
10 min.	106 days	47 days	37 days
15 min.	159 days	71 days	55 days
20 min.	213 days	94 days	74 days
30 min.	319 days	142 days	111 days
60 min.	639 days	284 days	222 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1/2 of the data per alarm)

Action at memory full: Stop recording (Memory full stop)

1P3W/3P3W			
	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value +MAX/MIN/AVE
Quantity of storable data	12000	5100	3900
Recording interval			
1 sec.	3 hours	1 hour	1 hour
2 sec.	6.5 hours	2.5 hours	2 hours
5 sec.	17 hours	7 hours	5.5 hours
10 sec.	1 day	14 hours	11 hours
15 sec.	2 days	21 hours	16.5 hours
20 sec.	2.5 days	1 day	22 hours
30 sec.	4 days	1.5 days	1 day
1 min.	8 days	3.5 days	2.5 days
2 min.	17 days	7 days	5 days
5 min.	42 days	17 days	13 days
10 min.	85 days	35 days	27 days
15 min.	127 days	53 days	41 days
20 min.	170 days	71 days	55 days
30 min.	255 days	106 days	82 days
60 min.	511 days	213 days	165 days

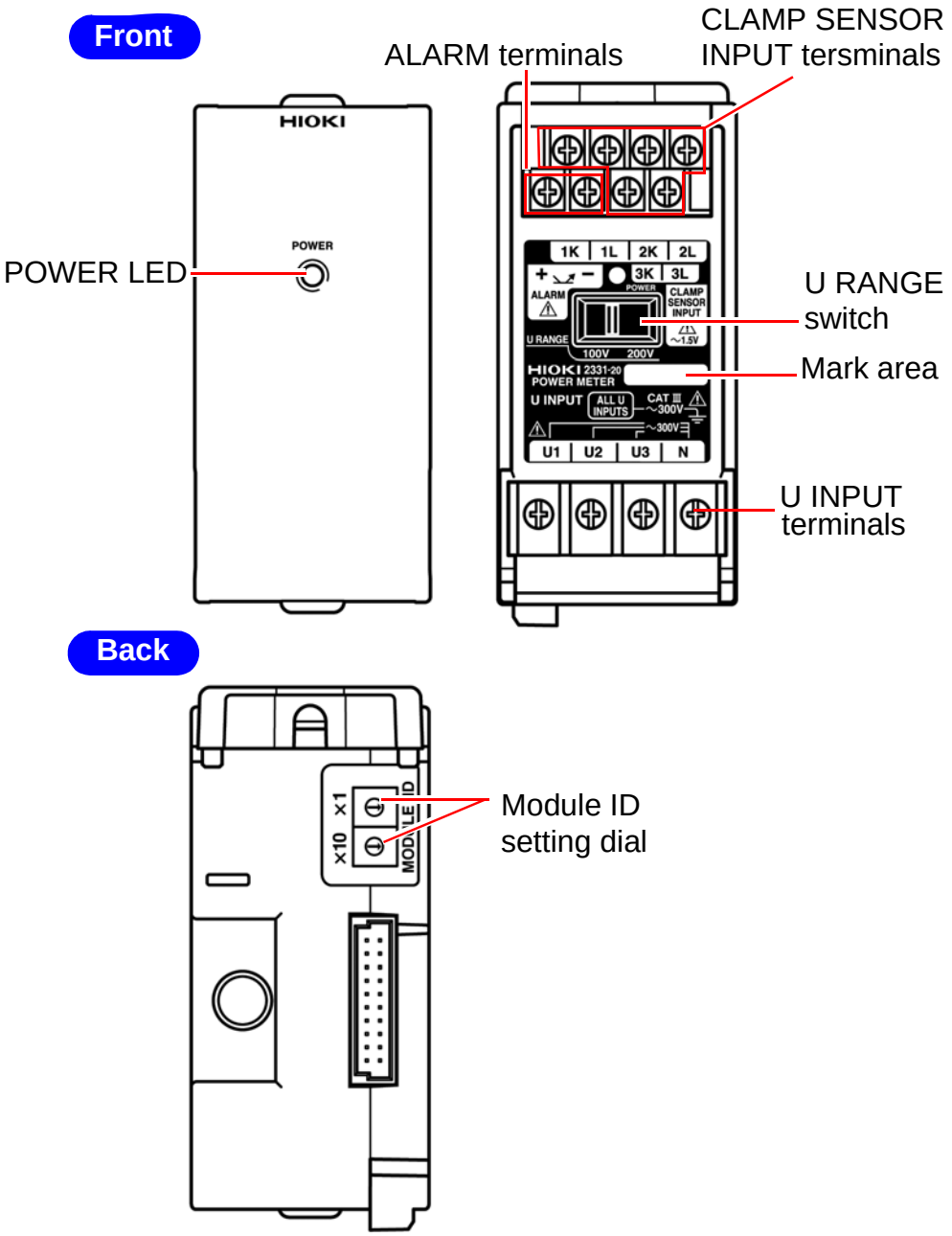
NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1/2 of the data per alarm)

Action at memory full: Stop recording (Memory full stop)

3P4W			
	Recording Mode		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous Value +MAX/MIN/AVE
Quantity of storable data	10000	4000	3100
Recording interval			
1 sec.	2.5 hours	1 hour	0.5 hours
2 sec.	5.5 hours	2 hours	1.5 hours
5 sec.	14 hours	5.5 hours	4 hours
10 sec.	1 day	11 hours	8.5 hours
15 sec.	1.5 days	17 hours	13 hours
20 sec.	2 days	22.5 hours	17.5 hours
30 sec.	3.5 days	1 day	1 day
1 min.	7 days	2.5 days	2 days
2 min.	14 days	5 days	4 days
5 min.	35 days	14 days	10 days
10 min.	71 days	28 days	21 days
15 min.	106 days	42 days	32 days
20 min.	142 days	56 days	43 days
30 min.	213 days	85 days	65 days
60 min.	426 days	170 days	131 days

NOTE When the alarm log is ON, the higher the number of alarms generated, the smaller the recording period. (Approx. 1/2 of the data per alarm)

7.1.3 Name and Function of the Parts



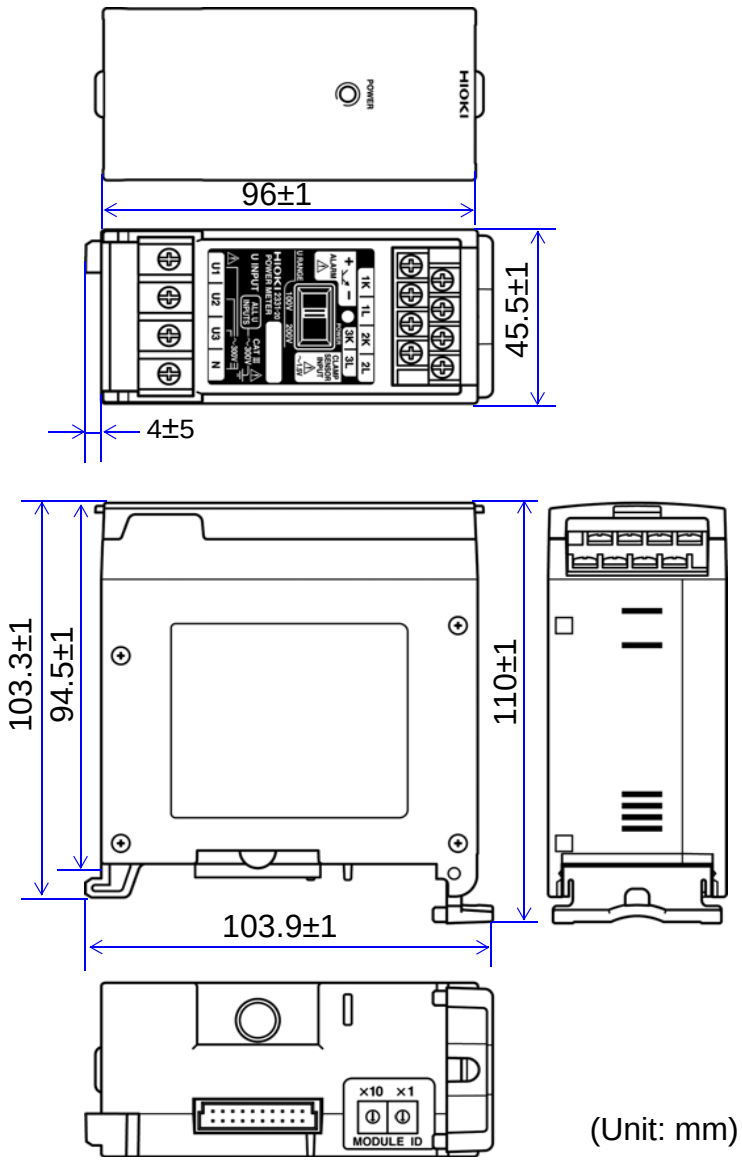
POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Data being recorded. Flashing in green : Standing by. Lit in yellow : Alarm output. Flashing in yellow: It indicates one of the following: • The voltage is outside the effective measurement range. • The current is out of range. • The active power is a negative value. Lit in red : Non-recoverable error occurred. *1 Flashing in red : Recoverable error occurred. *2

*1: The module needs repair. Contact your vendor (agent) or nearest Hioki office.
*2: The same module ID may be used by another module.

Mark area	Use this area to make a note of the object to measure or the module ID. Use an ink pen, since pencil lead may rub off.
CLAMP SENSOR INPUT terminals	Connect the output of clamp sensors to these terminals (for 3 channels).
U INPUT terminals	Connect voltages to be measured to these terminals.
ALARM terminals	Connect the alarm output cable to these terminals. These terminals are electrically insulated from the input terminals.
U RANGE switch	Select a voltage range of 100 V (70 to 130 VAC) or 200 V (140 to 260 VAC).
Module ID setting dial	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your vendor (agent) or nearest Hioki office.
*2: The same module ID may be used by another module.

7.1.4 Dimension Diagrams



(Unit: mm)

7.1.5 Accessory and Option

Accessories
None

Option
9695-02 CLAMP ON SENSOR (50 Arms)
9695-03 CLAMP ON SENSOR (100 Arms)
9661-01 CLAMP ON SENSOR (500 Arms)
9765* CLAMP ON SENSOR (5 Arms, For CT secondary side)

* Not complied with the CE marking.

When using Model 9765

- **To avoid short circuits and potentially life-threatening hazards, never attach the product to a circuit that operates at more than 30 VAC, or over bare conductors.**
- **This product should only be connected to the secondary side of a breaker, so the breaker can prevent an accident if a short circuit occurs. Connections should never be made to the primary side of a breaker, because unrestricted current flow could cause a serious accident if a short circuit occurs.**

7.2 Settings

7.2.1 Setting the Module ID

You can connect up to 63 measurement modules to one communications module.

Setting Procedure

Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID are not related and can be set independently.

7.3 Preparations

DANGER

- **Note the following maximum input voltage .**
  U INPUT:AC300 Vrms, 424.3 V Peak
  CLAMP SENSOR INPUT: AC 1.5 Vrms, 2.2 V Peak
  ALARM:DC 30 V
  Attempting to measure voltage in excess of the maximum input could destroy the instrument and result in personal injury or death.
- **The maximum rated voltage between input terminals and ground is 300 VrmsAC. Attempting to measure voltages exceeding 300 VrmsAC. with respect to ground could damage the instrument and result in personal injury.**

CAUTION

- Do not connect to the instrument any current sensor other than the clamp sensor dedicated to the instrument. Other sensors could lead to instrument damage due to excessive input power.
- Avoid dropping the clamp or subjecting it to other impact, since this could damage the mating surface of the core and adversely affect measurement.
- Measurements are degraded by dirt on the mating surfaces of the clamp-on sensor, so keep the surfaces clean by gently wiping with a soft cloth.
- If the power supply produces noise, it is recommended to use a noise filter.
- If the power supply line or signaling line is likely to induce surges during electrical storms, etc., insert a dedicated lightning arrester between each line and the installed device to protect the module.

7.3.1 Installing the Module

(1) Installing the Module Base

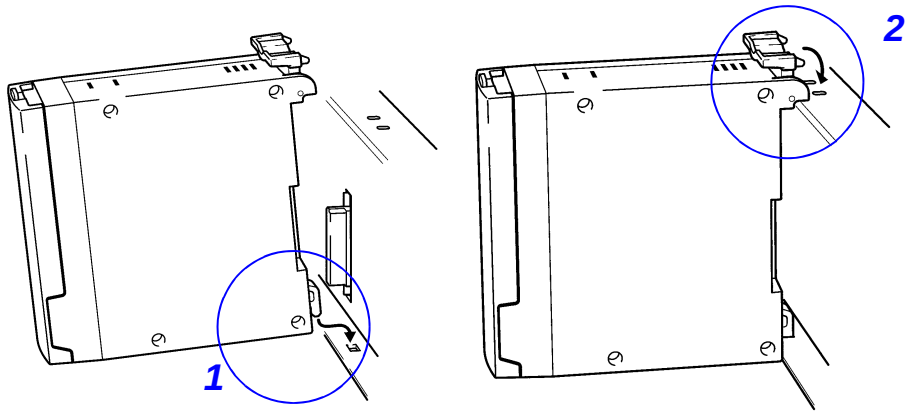
CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

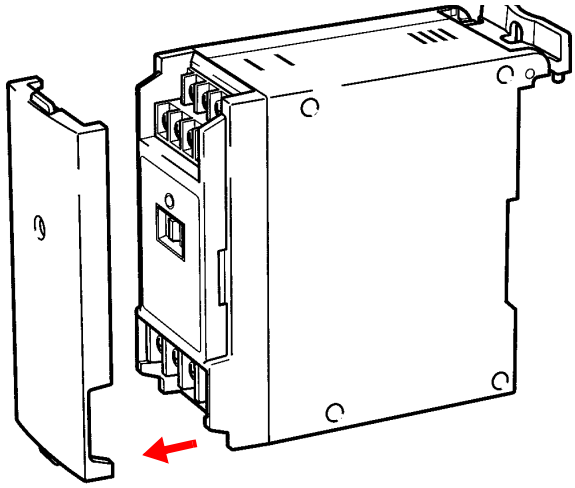
(2) Mounting a Module on the Module Base

Mount a module on the module base as shown below. Ensure that the lever clicks.



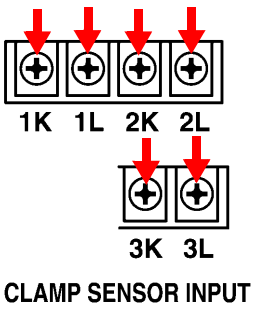
7.3.2 Connecting the Clamp Sensor to Module

1. Remove the cover from the module.



2. Connect the clamp sensor cables to the module's CLAMP SENSOR INPUT terminals (at a tightening torque of 0.5 N•m).

❖ **"Connection diagram"(P.124)**



Clamp Sensors:
9695-02 (50 A), 9695-03 (100 A), 9661-01 (500 A), 9765 (5 A, For CT secondary side)

Terminals
M3.0 screws are used for the terminal blocks for this module and the clamp sensors. For connection, a round crimp connector (RAV 1.25-3) is recommended.

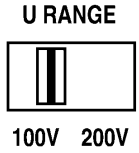
Cables
The 9695-02 and 9695-03 use terminal blocks. Therefore, various types of cables may be usable.

Cables equivalent to or better than 600 V vinyl-insulated 0.9 mm^2 or 300 V vinyl-insulated 0.75 mm^2 are recommended.
The 9238 CLAMP SENSOR CABLE (3 m) is optionally available.

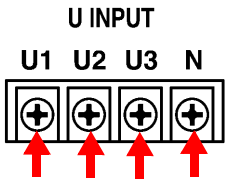
NOTE Note that measurement may be adversely affected by external noise or the electromagnetic environment when using cable longer than 3 meters.

7.3.3 Connecting the Voltage Cable to the Module

1. Use the U RANGE switch to select 100 V (70 to 130 VAC) or 200 V (140 to 260 VAC).



2. Connect voltage cables to the U INPUT terminals (at a tightening torque of 0.8 N•m).
❖ "Connection diagram"(P.124)



The terminal blocks use M3.5 screws. For connection, a round crimp connector (RAV 1.25-3.5) is recommended.
For wiring, cables equivalent to or better than 600 V vinyl-insulated 0.9 mm^2 is recommened.

7.3.4 Connecting Alarm Output

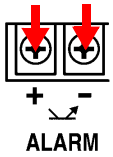
DANGER

Design the wiring to prevent short-circuiting of the ALARM and CLAMP SENSOR INPUT terminals, thus avoiding electric shock and accidents due to short-circuiting.

The terminal blocks use M3.0 screws (at a tightening torque of 0.5 N•m). We recommend that you use a round crimp connector (RAV 1.25-3) for connection.
Open collector output (Rating: 30 VDC, 20 mA max.)

NOTE

- The ALARM terminals are electrically insulated from the U INPUT terminals and CLAMP SENSOR INPUT terminals.
- To avoid the effects of external noise, design the wiring so that cables connected to the ALARM terminals are separated from those for measurement, as well as cables connected to the CLAMP SENSOR INPUT terminals and voltage cables.



7.3.5 Connecting to the Measured Line

DANGER

- **In order to prevent electric shock and short-circuit accidents, shut off the power to the line to be measured before connecting the clamp sensors and voltage cords.**
- **U INPUT terminals 1 to 3 share the N terminal; inputs to these terminals are not insulated from each other. Be careful to avoid electric shock and short-circuiting.**
- **The CLAMP SENSOR INPUT terminals are not insulated from the U INPUT terminals. Be careful to avoid electric shock and short-circuiting when using the U INPUT terminals.**
- **To avoid short circuits and potentially life-threatening hazards, never attach the clamp sensor to a circuit that operates at more than the maximum rated voltage, or over bare conductors.**
- **Clamp sensor should only be connected to the secondary side of a breaker, so the breaker can prevent an accident if a short circuit occurs. Connections should never be made to the primary side of a breaker, because unrestricted current flow could cause a serious accident if a short circuit occurs.**
- **If the secondary circuit is opened while electricity is being sent through the CT, very high and dangerous voltage may be generated at the secondary side terminal.**
- **Be sure to cover the measured line when live to avoid electric shock and short-circuiting.**

WARNING

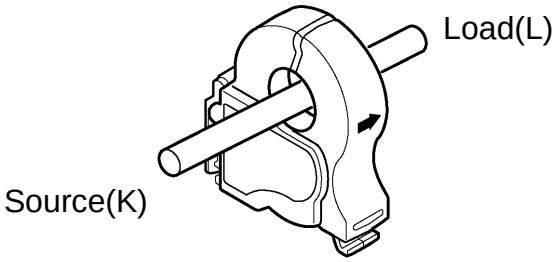
When the clamp sensor is opened, do not allow the metal part of the clamp to touch any exposed metal, or to short between two lines, and do not use over bare conductors.

CAUTION

- Avoid stepping on or pinching cables, which could damage the cable insulation.
- Do not input voltage or current to the U INPUT terminals and CLAMP SENSOR INPUT terminals when module power is OFF. This will avoid damaging the module.

Connect the sensors and cables to the measured line according to the connection diagram.

1. Connect the clamp sensors to the line.
2. Connect the voltage cables to the line.



❖ **"Connection diagram"(P.124)**
❖ **Instruction manuals of the clamp sensors**

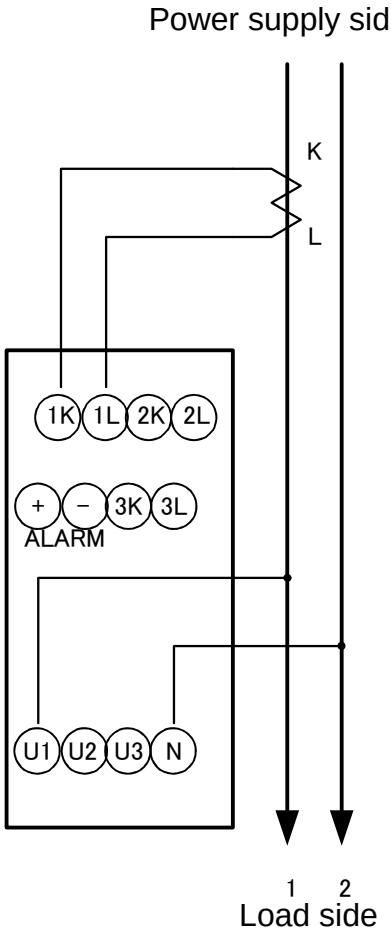
NOTE

- Ensure that the measured line is correctly set and connection correctly made to ensure accurate measurement.
- Clamp the cladding of the wire by placing the clamp with the arrow on it facing the load side.
- This module can be used for a single-phase, 2-wire line to a 3-phase, 4-wire line. Each channel is not independent, however, and thus the module cannot be used as two single-phase watt-meters.
- When measuring a 3-phase line, be sure to align the phase sequence of the measured line with the order of measurement channels of the module.

Completing Measurement

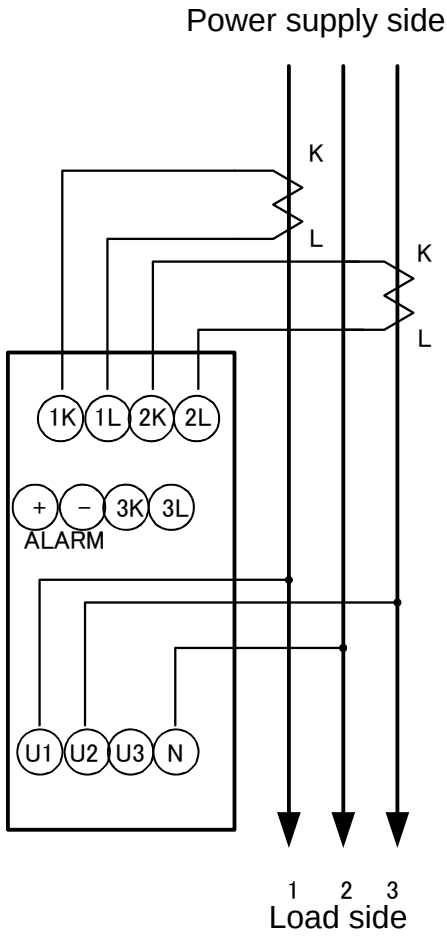
1. Remove the voltage cables.
2. Remove the clamp sensors.

Connection diagram



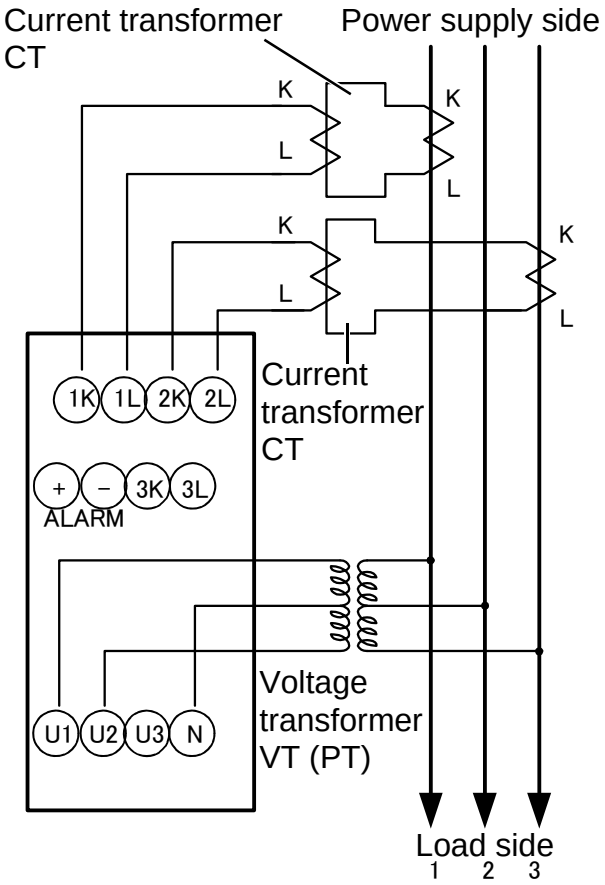
INPUT : 1PHASE 2WIRE

Measurement of single-phase, 2-wire line



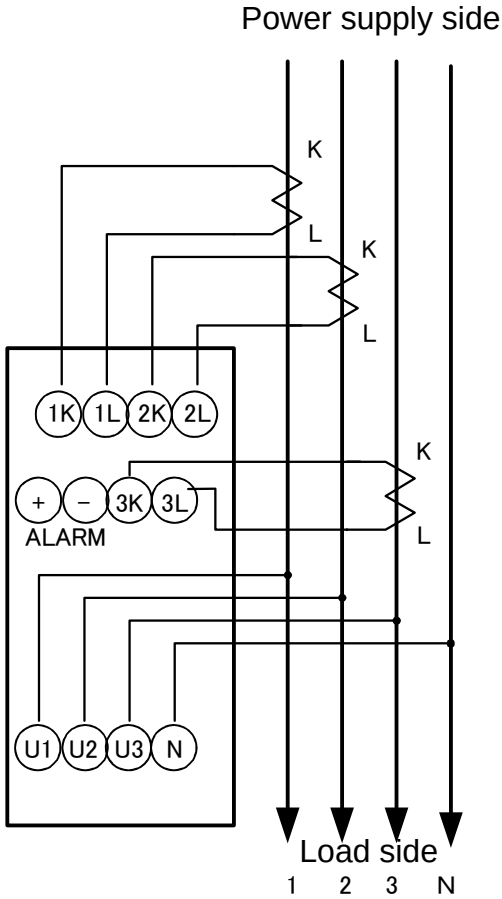
INPUT : 1PHASE 3WIRE
3PHASE 3WIRE

Measurement of singe-phase, 3-wire line or 3-phase, 3-wire line



INPUT : 1PHASE 3WIRE
3PHASE 3WIRE

Measurement of singe-phase, 3-wire line or 3-phase, 3-wire line using CT and VT (PT)



INPUT : 3PHASE 4WIRE

Measurement of 3-phase, 4-wire line

7.4 Others

7.4.1 Alarm Output

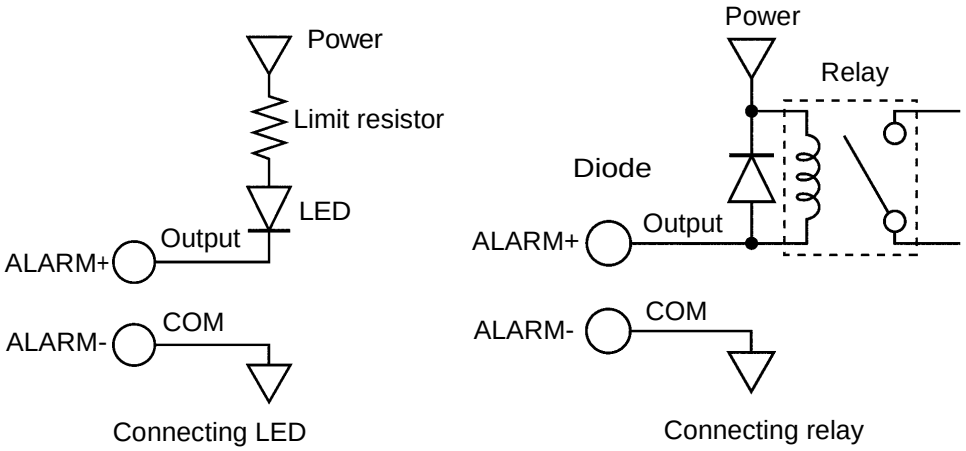
(1) Output Rating

WARNING

Ensure that the input does not exceed the maximum input voltage or current to avoid module damage, short-circuiting and electric shock resulting from heat building.

Output method	Open collector
Maximum input voltage / current	30 V, 20 mA max.
Signal logic	Enabled: ON Disabled: OFF

Circuit diagram

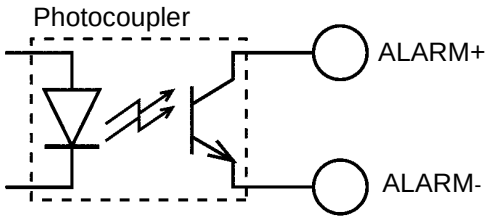


NOTE

- When connecting a relay or LED lamp, ensure that the relay or lamp operates at up to 30 V and 20 mA. When connecting a relay, be sure to use a diode to absorb counterelectromotive force.

(2) Target of Alarm Monitoring

One measurement item is judged whether high or low.

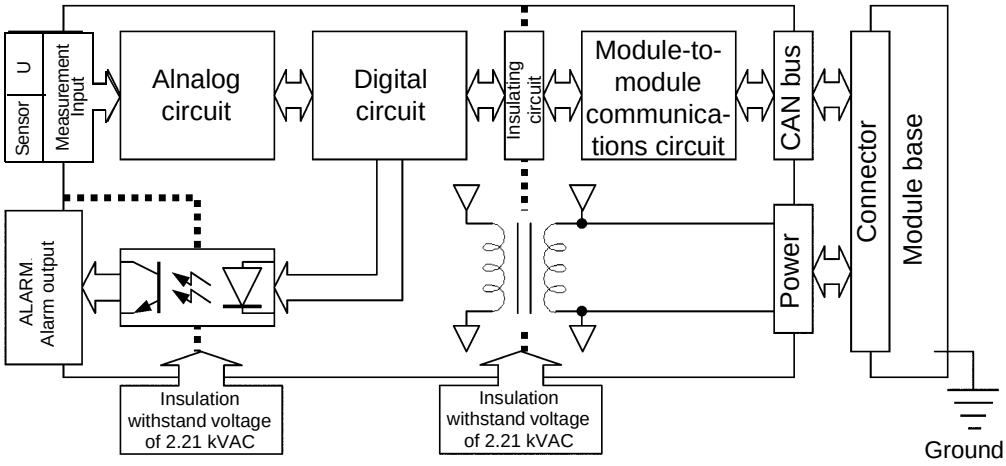


7.4.2 Insulation of Internal Circuit

DANGER

Insulation is not provided between the measurement input terminals or between the CLAMP SENSOR INPUT terminals and U INPUT terminals. Beware of electric shock and short-circuiting. Moreover, be sure to cover the measured line when live.

In the 2331-20, the input circuit and alarm output are insulated from the CAN bus as shown in the block diagram below. (With-stand voltage: 2.21 kVAC, 50/60 Hz, Response current: 5 mA, 1 minute)



7.5 Specifications

7.5.1 Basic Specifications

Condition of guaranteed accuracy

Condition of guaranteed accuracy	10-minute warming-up time, Sine wave input, Power factor =1, Maximum rated voltage to earth=0 V
Period of guaranteed accuracy	One year
Effective measurement range	Voltage: 70%f.s. to 130%f.s. Current: 2%f.s. to 130%f.s.
Effective power	2%f.s. to 130%f.s.
The range of operating temperature and humidity for guaranteed accuracy	23°C±5°C (73°F±8.5°F), 80%RH or less The ranges above apply unless otherwise specified in each specification.
fundamental frequency range	45 to 66Hz

Measurement items and accuracy specifications

Measurement lines	single-phase 2-wire line, single-phase 3-wire line, three-phase 3-wire line, three-phase 4-wire line
Measurement items	Voltage, current, active power, power factor, active energy within an interval, and frequency

Voltage / Current measurement

Measurement range	Voltage: U1,U2,U3 100 V,200 V (Switched using the SW.) Current: I1,I2,I3 1 A,5 A,50 A,100 A,200 A,500 A,1000 A (Depends on the clamp sensor used.)
Measurement accuracy	Voltage: ±1.0%f.s. Current: ±1.0%f.s. + Clamp sensor accuracy

Current range

Clamp Sensor and Its Current Range	2331-20 Current Range (Selectable using the PC application)
1 A (100 mV/A)	1 A
9765 5 A (20 mV/A)	5 A
9695-02 50 A (10 mV/A)	5 A
	50 A
9695-03 100 A (1 mV/A)	100 A
9661-01 500 A (1 mV/A)	100 A
	500 A
1000 A (0.5 mV/A)	200 A
	1000 A

Power range

Voltage /Wiring	Current	1.000 A	5.000 A	50.00 A	100.0 A	200.0 A	500.0 A	1.000 kA
100.0 V	1P2W	100.0 W	500.0 W	5.000 kW	10.00 kW	20.00 kW	50.00 kW	100.0 kW
	1P3W 3P3W	200.0 kW	1.000 kW	10.00 kW	20.00 kW	40.00 kW	100.0 kW	200.0 kW
	3P4W	300.0 W	1.500 kW	15.00 kW	30.00 kW	60.00 kW	150.0 kW	300.0 kW
200.0 V	1P2W	200.0 W	1.000 kW	10.00 kW	20.00 kW	40.00 kW	100.0 kW	200.0 kW
	1P3W 3P3W	400.0 W	2.000 kW	20.00 kW	40.00 kW	80.00 kW	200.0 kW	400.0 kW
	3P4W	600.0 W	3.000 kW	30.00 kW	60.00 kW	120.0 kW	300.0 kW	600.0 kW

- The range table lists the full scales of voltage and current measurement ranges.
- When the VT (PT) ratio and CT ratio are set, the ranges will be multiplied by (VT (PT) ratio × CT ratio).
- The number of digits of a measurement to display depends on the PC application used.

Active Power Measurement

Measurement range	Effective Power P Voltage range × Current range
Measurement accuracy	±1.5%f.s.+Clamp sensor accuracy
Polarity	Consumption: No sign Regeneration: "-"

Active Energy Measurement

Measurement range	Active energy within interval Wh + consumed component only
Totalization accuracy	±1.6% f.s. ± clamp sensor accuracy (Note that f.s. is voltage range × current range.)

Power Factor

Measurement range	Power factor PF 0 to 1
Measurement accuracy	±5%rdg. (At full-scale input with power factor of 1)

Frequency measurement

Measurement range	Frequency FREQ 40Hz to 70Hz
Measurement accuracy	±0.5%rdg. (When input is 70% to 130% f.s. of voltage range)
Object to be measured	Voltage U1

Operation Method for Totalization

Start of totalization	The PC application starts measurement.
End of totaliztion	The PC application ends measurement (depending on recording end conditions). For details, refer to specifications of the PC application.

Other Characteristics

Temperature	Within ±0.05 f.s./°C
Effect of maximum rated voltage to earth	Within±0.5%f.s. (Maximum rated voltage to earth 50Hz/60Hz)
Actual time accuracy	±100 ppm (Reference value at temperature from 0 to 50°C (32 to 122°F) without using communications module)
Effect of electromagnetic field	Within ±2% f.s. (in field of 400 Vrms/m and 50/60Hz)
Zero suppression	Voltage : Less than 0.5% f.s. Current : Less than 0.5% f.s. (less than 0.9% f.s. when using the 9695-02 with 5A range selected) Power : When voltage or current is 0

7.5.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current measured values (instantaneous values).

Measured value recording function

Measurements are recorded at a set recording interval.	
Real-time management	This is automatically set from the PC application at the start of recording.
Recording start	Immediate start/Reserved-time start
Recording end	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.
Recording mode	Instantaneous value MAX/MIN/AVE Instantaneous value + MAX/MIN/AVE Total 3 modes Set the mode before the start of recording. The types of values for recorded measurement items vary depending on the recording mode. Instantaneous value mode: instantaneous value MAX/MIN/AVE recording mode: maximum value, minimum value, and average value Instantaneous value + MAX/MIN/AVE recording mode: instantaneous value, maximum value, minimum value, and average value
Recorded data	One data set contains time, voltage, current, effective power, power factor, Active energy within an interval, frequency Instantaneous recording mode 1P2WU1, I1, P, PF, Wh+, FREQ 1P3W/3P3WU1, U2, I1, I2, P, PF, Wh+, FREQ 3P4WU1, U2, U3, I1, I2, I3, P, PF, Wh+, FREQ MAX/MIN/AVE recording mode 1P2WMaximum/Minimum/Average of U1, I1, P, PF, FREQ, Wh+ 1P3W/3P3WMaximum/Minimum/Average of U1, U2, I1, I2, P, PF, FREQ, Wh+ 3P4WMaximum/Minimum/Average of U1, U2, U3, I1, I2, I3, P, PF, FREQ,Wh+ Instantaneous value + MAX/MIN/AVE recording mode 1P2WInstantaneous value/Maximum/Minimum/Average of U1, I1, P, PF, FREQ, Wh+ 1P3W/3P3WInstantaneous value/Maximum/Minimum/Average ofU1, U2, I1, I2, P, PF, FREQ, Wh+ 3P4WInstantaneous value/Maximum/Minimum/Average ofU1, U2, U3, I1, I2, I3, P, PF, FREQ, Wh+ ♦Data is scaled if scaling is ON.

Power outage protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

Alarm judgment and recording function

Alarm judgment is made at every sampling, and the history will be recorded in flash memory if the measured value recording function remains active.	
Judgment method	Criterion threshold can be set to either Hi or Lo. The instantaneous value at every sampling is judged (effective in any measurement mode.).
Recorded data	One data set contains time, generation/reversion , CH and judgment threshold.
Alarm output	Alarm output × 1 CH ♦Output is turned ON when an alarm (Hi or Lo) occurs. Whether to hold the alarm output can be selected. The reset switch or a command can be used to reset alarms.

7.5.3 General Specifications

Input method	U INPUT: Insulated input (Not insulated from current measurement circuit) CLAMP SENSOR INPUT: Input insulated by a clamp sensor
Input resistance (50/60 Hz)	U INPUT: 1.6 MΩ ± 10% (Difference input) CLAMP SENSOR INPUT: 200 kΩ ± 10%
Measurement method	Digital sampling
Internal memory	512 k bytes Flash memory
Backup	Recorded data (saved in flash memory) ♦Data loss for up to 2 minutes before and after a power outage may occur.
Clock function	The real time clock (year, month, day, hour, minute, and second) of the communications module is used.
LED display	Used for monitoring and warning
Communication interface	CAN bus
Maximum input voltage	U INPUT: 300 Vrms, 424.3 V peak ALARM: 30 VDC CLAMP SENSOR INPUT: 1.5 Vrms, 2.2 V peak value
Maximum rated voltage to earth	Voltage input (U INPUT) terminal 300 Vrms, 50/60 Hz
Alarm output	Open collector; 30 VDC, 20 mA max.
Rated supply voltage	+5 V±0.3 VDC
Maximum rated power	2.5 W
Withstanding voltage	3.536 kVACBetween U INPUT terminals and Case (excluding terminal section) 2.210 kVACBetween U INPUT terminals and ALARM terminals, interface terminals CLAMP SENSOR INPUT terminals and ALARM terminals, Interface terminals (50/60 Hz, Response current 5 mA, one minutes
Dimensions	Approx. 45.5W × 96H × 94.5D mm (1.79"W × 3.78"H × 3.72"D) (including cover, excluding projections)
Mass	Approx. 240 g (8.5 oz.) (including cover)

Option	9695-02 CLAMP ON SENSOR (50 Arms) 9695-03 CLAMP ON SENSOR (100 Arms) 9661-01 CLAMP ON SENSOR (500 Arms) 9765* CLAMP ON SENSOR (5 Arms) (See "When using Model 9765 " (p.116)) 9238 CLAMP SENSOR CABLE ♦All sensors are the voltage-output type. * Not complied with the CE marking.	
Operational ranges for temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)	
Temperature and humidity ranges for storage	-10 to 50°C (14 to 122°F), 80%RH or less (with no condensation)	
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)	
Standards applying	Safety	EN61010-1:2001 EN61010-031:2002 Pollution Degree 2 Measurement Category III, (anticipated transient overvoltage 4000 V)
	EMC	EN61326:1997+A1:1998+A2:2001+A3:2003 CLASS A

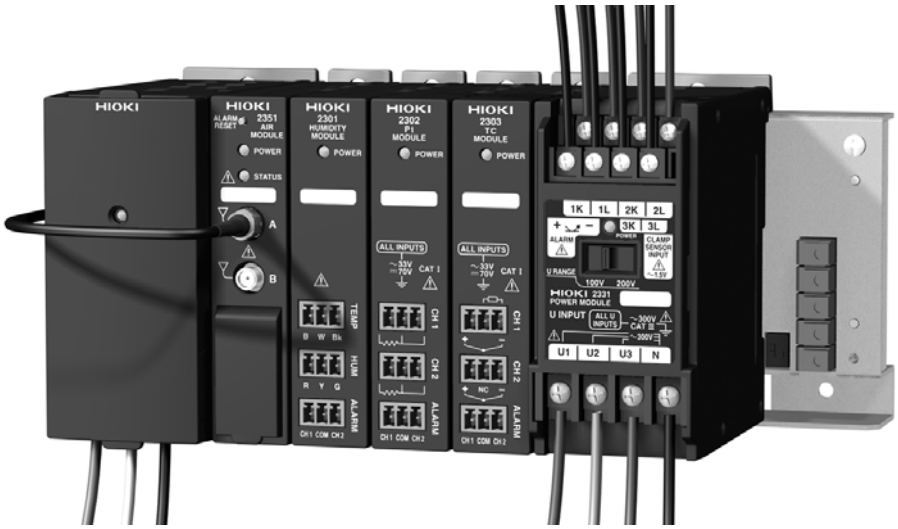
2332-20 POWER METER MODULE 8

8.1 Overview

8.1.1 Product Overview

The 2332-20 is a measurement module of the Hioki "Smart Site" (remote measurement system).
This module measures and records power at regular intervals.
And the voltage, current, active power, reactive power, power factor, active energy within an interval, and frequency are also can be measured.
The 2332-20 is used with the power supply module, communications module, and module base.

Number of measurement circuits	1P2W: 1 to 6 circuits 1P3W, 3P3W: 1 to 3 circuits
Voltage input	200 V range
Current Input	Clamp sensor



(Conceptual image)

NOTE

- Do not use this module as a wattmeter or watt-hour meter for business transactions.

8.1.2 Major Features

- **This is a clamp-type wattmeter used for a 70 to 260 VAC single-phase line to a 3-phase, 3-wire line.**
- **One module measures a common voltage on up to six single-phase/2-wire circuits, three single-phase/3-wire circuits, or three 3-phase/3-wire circuits.**
- **The recording interval is selectable from 1 second to 60 minutes.**
- **The maximum, minimum, and average measurements during the recording interval can be recorded (with sampling once a second).**
- **The module is equipped with an alarm assessment function**

Rough Estimate of Storable Data Quantity and Time

The amount of data that can be stored and duration of storage vary depending on the circuits to be measured, selected measurement end condition (memory full stop or endless), and recording mode. Use the table below as a guide.

Wiring	Measurement circuit	Reference page
1P2W	Six circuits	page 135
	Five circuits	page 135
	Four circuits	page 136
	Three circuits	page 136
	Two circuits	page 137
	One circuit	page 137
1P3W/3P3W	Three circuits	page 138
	Two circuits	page 138
	One circuit	page 139

NOTE

- When the alarm log is ON, the frequency of occurrence of alarms increases, and the recording period will be shortened.
- The measurement items to be recorded can be selected. For example, if half the number of measuring items are selected, the available storage time will be doubled.
- In MAX/MIN/AVE recording mode or instantaneous value + MAX/MIN/AVE recording mode, you can select measurement items. For example, the duration of storage is about 1.5 times longer when you select MAX/MIN in MAX/MIN/AVE mode, and 3 times longer when you only select MAX.
- The duration of storage under "endless" is the minimum duration of storage.

1P2W Measurement of six circuits

	Memory full stop			Endless		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE
Quantity of storable data	3510	1410	1080	3042	1222	936
Recording interval						
1sec.	50min.	20min.	15min.	50min.	20min.	15min.
2sec.	1.5hours	40min.	30min.	1.5hours	40min.	30min.
5sec.	4.5hours	1.5hours	1.5hours	4hours	1.5hours	1hour
10sec.	9.5hours	3.5hours	3hours	8hours	3hours	2.5hours
15sec.	14.5hours	5.5hours	4.5hours	12.5hours	5hours	3.5hours
20sec.	19.5hours	7.5hours	6hours	16.5hours	6.5hours	5hours
30sec.	1day	11.5hours	9hours	1day	10hours	7.5hours
1min.	2days	23.5hours	18hours	2days	20hours	15.5hours
2min.	4.5days	1.5days	1.5days	4days	1.5days	1day
5min.	12days	4.5days	3.5days	10.5days	4days	3days
10min.	24days	9.5days	7.5days	21days	8days	6.5days
15min.	37days	14.5days	11days	32days	12.5days	9.5days
20min.	49days	19.5days	15days	42days	16.5days	13days
30min.	73days	29days	22.5days	63days	25days	19.5days
60min.	146days	59days	45days	127days	51days	39days

1P2W Measurement of five circuits

	Memory full stop			Endless		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE
Quantity of storable data	4095	1657	1275	3549	1436	1105
Recording interval						
1sec.	1hour	20min.	20min.	50min.	20min.	15min.
2sec.	2hours	50min.	40min.	1.5hours	40min.	30min.
5sec.	5.5hours	2hours	1.5hours	4.5hours	1.5hours	1.5hours
10sec.	11hours	4.5hours	3.5hours	9.5hours	3.5hours	3hours
15sec.	17hours	6.5hours	5hours	14.5hours	5.5hours	4.5hours
20sec.	22.5hours	9hours	7hours	19.5hours	7.5hours	6hours
30sec.	1day	13.5hours	10.5hours	1day	11.5hours	9hours
1min.	2.5days	1day	21hours	2days	23.5hours	18hours
2min.	5.5days	2days	1.5days	4.5days	1.5days	1.5days
5min.	14days	5.5days	4days	12days	4.5days	3.5days
10min.	28days	11.5days	8.5days	24.5days	9.5days	7.5days
15min.	43days	17days	13days	37days	14.5days	11.5days
20min.	57days	23days	17.5days	49days	19.5days	15days
30min.	85days	35days	26.5days	74days	29.5days	23days
60min.	171days	69days	53days	148days	60days	46days

1P2W Measurement of four circuits

	Memory full stop			Endless		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE
Quantity of storable data	4912	2010	1552	4257	1742	1345
Recording interval						
1sec.	1hour	30min.	20min.	1hour	20min.	20min.
2sec.	2.5hours	1hour	50min.	2hours	50min.	40min.
5sec.	6.5hours	2.5hours	2hours	5.5hours	2hours	1.5hours
10sec.	13.5hours	5.5hours	4hours	11.5hours	4.5hours	3.5hours
15sec.	20hours	8hours	6hours	17.5hours	7hours	5.5hours
20sec.	1day	11hours	8.5hours	23.5hours	9.5hours	7hours
30sec.	1.5days	16.5hours	12.5hours	1day	14.5hours	11hours
1min.	3days	1day	1day	2.5days	1day	22hours
2min.	6.5days	2.5days	2days	5.5days	2days	1.5days
5min.	17days	6.5days	5days	14.5days	6days	4.5days
10min.	34days	13.5days	10.5days	29.5days	12days	9days
15min.	51days	20.5days	16days	44days	18days	14days
20min.	68days	27.5days	21.5days	59days	24days	18days
30min.	102days	42days	32days	89days	36days	28days
60min.	205days	84days	65days	177days	73days	56days

1P2W Measurement of three circuits

	Memory full stop			Endless		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE
Quantity of storable data	6142	2557	1980	5323	2216	1716
Recording interval						
1sec.	1.5hours	40min.	30min.	1hour	30min.	20min.
2sec.	3hours	1hour	1hour	2.5hours	1hour	50min.
5sec.	8.5hours	3.5hours	2.5hours	7hours	3hours	2hours
10sec.	17hours	7hours	5.5hours	14.5hours	6hours	4.5hours
15sec.	1day	10.5hours	8hours	22hours	9hours	7hours
20sec.	1day	14hours	11hours	1day	12hours	9.5hours
30sec.	2days	21hours	16.5hours	1.5days	18hours	14hours
1min.	4days	1.5days	1day	3.5days	1.5days	1day
2min.	8.5days	3.5days	2.5days	7days	3days	2days
5min.	21days	8.5days	6.5days	18days	7.5days	5.5days
10min.	43days	17.5days	13.5days	37days	15days	11.5days
15min.	64days	26.5days	20.5days	55days	23days	17.5days
20min.	85days	36days	27.5days	74days	30.5days	23.5days
30min.	128days	53days	41days	111days	46days	36days
60min.	256days	107days	83days	222days	92days	72days

1P2W Measurement of two circuits

	Memory full stop			Endless		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE
Quantity of storable data	8190	3510	2730	7098	3042	2366
Recording interval						
1sec.	2hours	50min.	40min.	1.5hours	50min.	30min.
2sec.	4.5hours	1.5hours	1.5hours	3.5hours	1.5hours	1hour
5sec.	11hours	4.5hours	3.5hours	9.5hours	4hours	3hours
10sec.	22.5hours	9.5hours	7.5hours	19.5hours	8hours	6.5hours
15sec.	1day	14.5hours	11hours	1day	12.5hours	9.5hours
20sec.	1.5days	19.5hours	15hours	1.5days	16.5hours	13hours
30sec.	2.5days	1day	22.5hours	2days	1day	19.5hours
1min.	5.5days	2days	1.5days	4.5days	2days	1.5days
2min.	11days	4.5days	3.5days	9.5days	4days	3days
5min.	28days	12days	9days	24.5days	10.5days	8days
10min.	57days	24days	18.5days	49days	21days	16days
15min.	85days	37days	28days	74days	32days	24.5days
20min.	114days	49days	38days	99days	42days	33days
30min.	171days	73days	57days	148days	63days	49days
60min.	341days	146days	114days	296days	127days	99days

1P2W Measurement of a circuit

	Memory full stop			Endless		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE
Quantity of storable data	12285	5580	4387	10647	4836	3802
Recording interval						
1sec.	3hours	1.5hours	1hour	2.5hours	1hour	1hour
2sec.	6.5hours	3hours	2hours	5.5hours	2.5hours	2hours
5sec.	17hours	7.5hours	6hours	14.5hours	6.5hours	5hours
10sec.	1day	15.5hours	12hours	1day	13hours	10.5hours
15sec.	2days	23hours	18hours	1.5days	20hours	15.5hours
20sec.	2.5days	1day	1day	2days	1day	21hours
30sec.	4days	1.5days	1.5days	3.5days	1.5days	1day
1min.	8.5days	3.5days	3days	7days	3days	2.5hours
2min.	17days	7.5days	6days	14.5days	6.5days	5days
5min.	43days	19days	15days	37days	16.5days	13days
10min.	85days	39days	30days	74days	34days	26days
15min.	128days	58days	46days	111days	50days	40days
20min.	171days	78days	61days	148days	67days	53days
30min.	256days	116days	91days	222days	101days	79days
60min.	512days	233days	183days	444days	202days	158days

1P3W/ 3P3W Measurement of three circuits

	Memory full stop			Endless		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE
Quantity of storable data	5115	2047	1575	4433	1774	1365
Recording interval						
1sec.	1hour	30min.	20min.	1hour	20min.	20min.
2sec.	2.5hours	1hour	50min.	2hours	50min.	40min.
5sec.	7hours	2.5hours	2hours	6hours	2hours	1.5hours
10sec.	14hours	5.5hours	4hours	12hours	4.5hours	3.5hours
15sec.	21hours	8.5hours	6.5hours	18hours	7hours	5.5hours
20sec.	1day	11hours	8.5hours	1day	9.5hours	7.5hours
30sec.	1.5days	17hours	13hours	1.5days	14.5hours	11hours
1min.	3.5days	1day	1day	3days	1day	22.5hours
2min.	7days	2.5days	2days	6days	2days	1.5days
5min.	17.5days	7days	5days	15days	6days	4.5days
10min.	36days	14days	10.5days	30.5days	12days	9days
15min.	53days	21days	16days	46days	18days	14days
20min.	71days	28days	21.5days	62days	24.5days	18.5days
30min.	107days	43days	33days	92days	37days	28days
60min.	213days	85days	66days	185days	74days	57days

1P3W/ 3P3W Measurement of two circuits

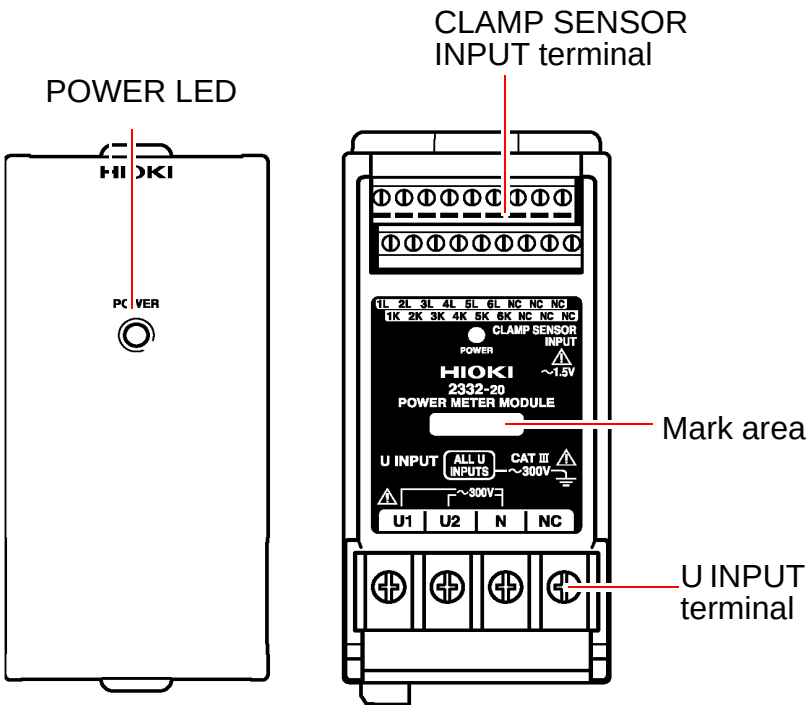
	Memory full stop			Endless		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE
Quantity of storable data	6825	2790	2152	5915	2418	1865
Recording interval						
1sec.	1.5hours	40min.	30min.	1.5hours	40min.	30min.
2sec.	3.5hours	1.5hours	1hour	3hours	1hour	1hour
5sec.	9hours	3.5hours	2.5hours	8hours	3hours	2.5hours
10sec.	18.5hours	7.5hours	5.5hours	16hours	6.5hours	5hours
15sec.	1day	11.5hours	8.5hours	1day	10hours	7.5hours
20sec.	1.5days	15.5hours	11.5hours	1day	13hours	10hours
30sec.	2days	23hours	17.5hours	2days	20hours	15.5hours
1min.	4.5days	1.5days	1day	4days	1.5days	1day
2min.	9days	3.5days	2.5days	8days	3days	2.5days
5min.	23.5days	9.5days	7days	20.5days	8days	6days
10min.	47days	19days	14.5days	41days	16.5days	12.5days
15min.	71days	29days	22days	62days	25days	19days
20min.	95days	39days	29.5days	82days	34days	25.5days
30min.	142days	58days	45days	123days	50days	39days
60min.	284days	116days	90days	246days	101days	78days

1P3W/ 3P3W Measurement of a circuit

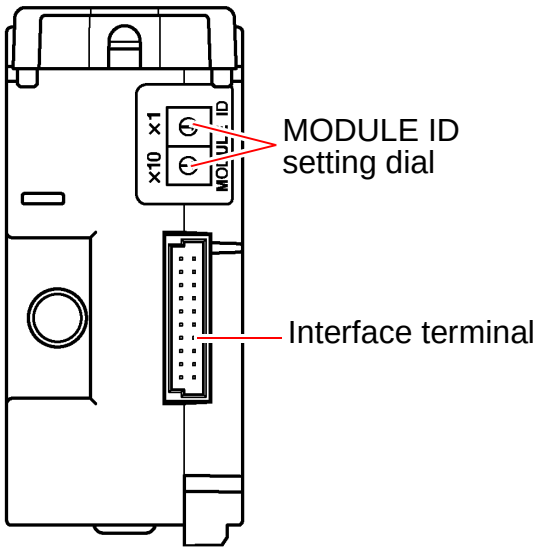
	Memory full stop			Endless		
	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE	Instantaneous Value	MAX/MIN/AVE	Instantaneous value + MAX/MIN/AVE
Quantity of storable data	10237	4387	3412	8872	3802	2957
Recording interval						
1sec.	2.5hours	1hour	50min.	2hours	1hour	40min.
2sec.	5.5hours	2hours	1.5hours	4.5hours	2hours	1.5hours
5sec.	14hours	6hours	4.5hours	12hours	5hours	4hours
10sec.	1day	12hours	9hours	1day	10.5hours	8hours
15sec.	1.5days	18hours	14hours	1.5days	15.5hours	12hours
20sec.	2days	1day	18.5hours	2days	21hours	16hours
30sec.	3.5days	1.5days	1day	3days	1day	1day
1min.	7days	3days	2days	6days	2.5days	2days
2min.	14days	6days	4.5days	12days	5days	4days
5min.	36days	15days	11.5days	30.5days	13days	10days
10min.	71days	30days	23.5days	62days	26days	20.5days
15min.	107days	46days	36days	92days	40days	30.5days
20min.	142days	61days	47days	123days	53days	41days
30min.	213days	91days	71days	185days	79days	62days
60min.	427days	183days	142days	370days	158days	123days

8.1.3 Name and Function of the Parts

Front



Back



POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Monitoring and warning display Lit in green : Data being recorded. Flashing in green : Standing by. Lit in yellow : Alarm output. Flashing in yellow: one of the following*1 The voltage is outside the effective input range. The current is out of range. The active power is a negative value. Lit in red: Non-recoverable error occurred. *2 Flashing in red : Recoverable error occurred. *3
Mark area	Use this area to make a note of the object to measure or the module ID. Use an ink pen, since pencil lead may rub off.
CLAMP SENSOR INPUT terminal	Connect the output of clamp sensors to these terminals (for 6 channels).
U INPUT terminal	Connect voltages to be measured to these terminals.
MODULE ID setting dial	Use the dial to set the module's identification No.

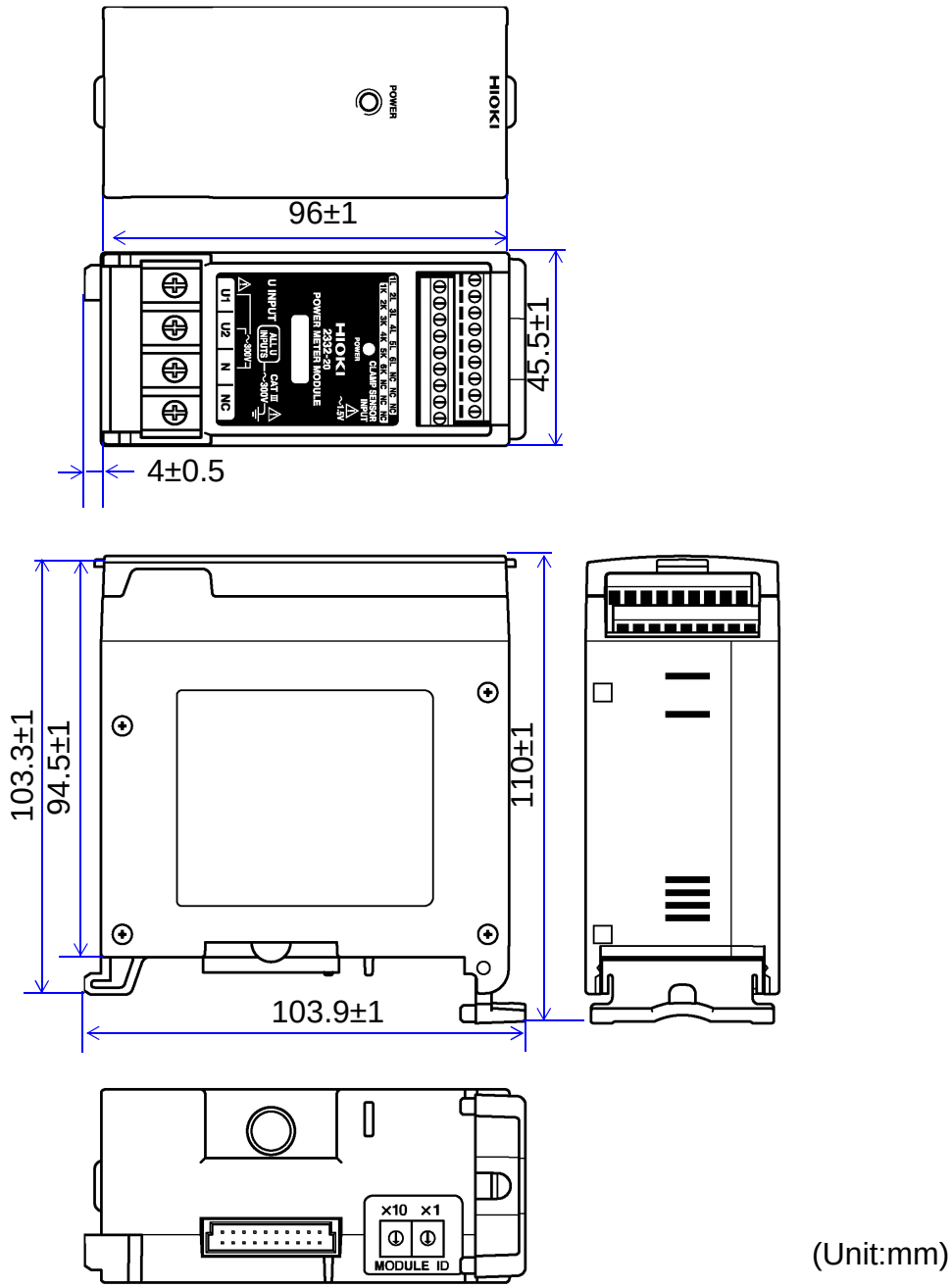
*1: You can select a POWER LED monitoring mode on the PC applications software. Use the current monitoring mode to only measure electric current (without voltage input). Otherwise, use voltage/current/power monitoring mode.

- Voltage/Current/Power Monitoring Mode
  The LED will start flashing in yellow when any of the following events occurs:
  Flashing in yellow indicates one of the following:
  The voltage is outside the effective input range.
  The current is out of range.
  The active power is a negative value.
- Current Monitoring Mode
  The LED will start flashing in yellow in case of the following event:
  The current is out of range.

*2: The module needs repair.
Contact your dealer or Hioki representative.

*3: The same module ID may be used by another module.

8.1.4 Dimension Diagrams



(Unit:mm)

8.1.5 Accessory and Option

Accessories

None

Option

9695-02 CLAMP ON SENSOR (50 Arms)
9695-03 CLAMP ON SENSOR (100 Arms)
9661-01 CLAMP ON SENSOR (500 Arms)
9765* CLAMP ON SENSOR (5 Arms, For CT secondary side)

9238 CLAMP SENSOR CABLE
* Not complied with the CE marking.

When using Model 9765

- **To avoid short circuits and potentially life-threatening hazards, never attach the product to a circuit that operates at more than 30 VAC, or over bare conductors.**
- **This product should only be connected to the secondary side of a breaker, so the breaker can prevent an accident if a short circuit occurs. Connections should never be made to the primary side of a breaker, because unrestricted current flow could cause a serious accident if a short circuit occurs.**

8.2 Settings

8.2.1 Setting the Module ID

You can connect up to 63 measurement modules to one communications module.

Setting Procedure

Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID (communications module ID) are not related and can be set independently.

8.3 Preparations

DANGER

- **Note the following maximum input voltage .**
  U INPUT:AC300 Vrms, 424.3 V Peak
  CLAMP SENSOR INPUT: AC 1.5 Vrms, 2.2V Peak
  ALARM:DC 30 V
  Attempting to measure voltage in excess of the maximum input could destroy the instrument and result in personal injury or death.
- **The maximum rated voltage between input terminals and ground is 300 VrmsAC. Attempting to measure voltages exceeding 300 VrmsAC. with respect to ground could damage the instrument and result in personal injury.**

CAUTION

- Do not connect to the instrument any current sensor other than the clamp sensor dedicated to the instrument.Other sensors could lead to instrument damage due to excessive input power.
- *Avoid dropping the clamp or subjecting it to other impact, since this could damage the mating surface of the core and adversely affect measurement.
- *If the mating surface of the core is soiled, wipe it gently with a soft cloth, since a soiled mating surface could affect measurement.
- *If the power supply produces noise, it is recommended to use a noise filter.
- *If the power supply line or signaling line is likely to induce surges during electrical storms, etc., insert a dedicated lightning arrester between each line and the installed device to protect the module.

8.3.1 Installing the Module

(1) Installing the Module Base

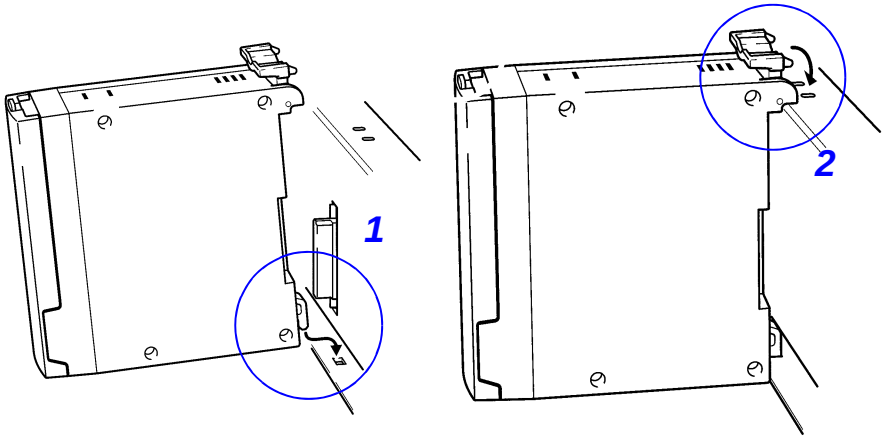
CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

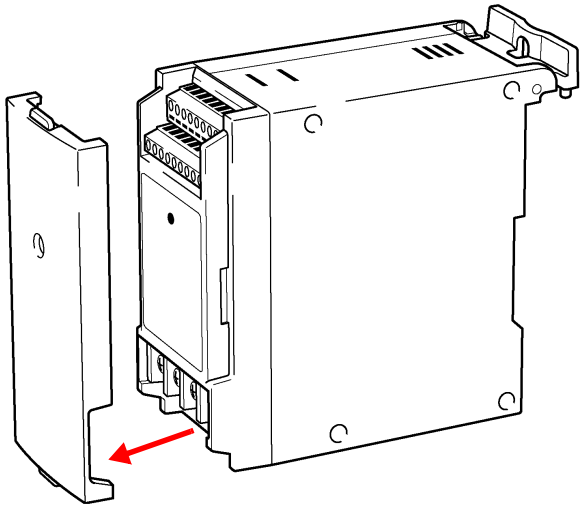
(2) Mounting a Module on the Module Base

Mount a module on the module base as shown below. Ensure that the lever clicks.



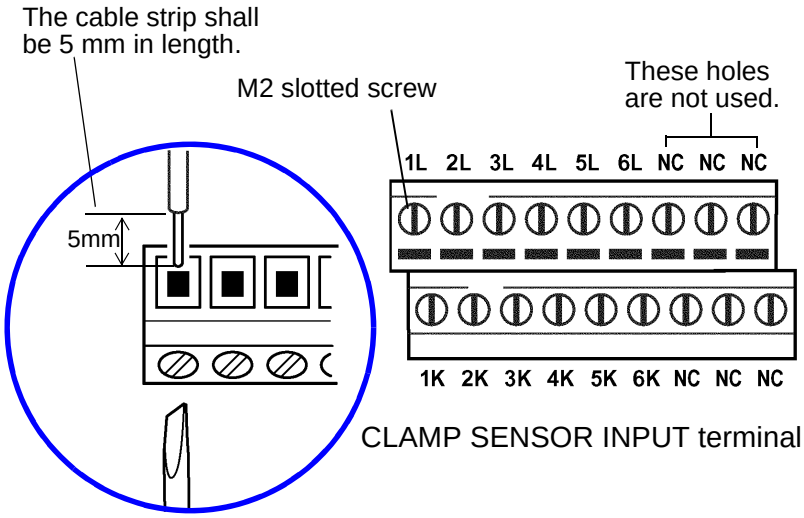
8.3.2 Connecting the Clamp Sensor to Module

1. Remove the cover from the module.



2. Use a flathead screwdriver to loosen the screw on the CLAMP SENSOR INPUT terminal.

3. Insert the cable of the clamp sensor into the square hole on the CLAMP SENSOR INPUT terminal, then tighten the screw (to a tightening torque of 0.25 N•m).



❖ **"Connection diagram"(P.151)**

Clamp Sensors

- 9695-02 (50 A)
- 9695-03 (100 A)
- 9661-01 (500 A)
- 9765 (5 A, For CT secondary side)

Cables

- The 9695-02/03 Clamp-on Sensors have a terminal-block structure.
- You can use various types of cables.

Cables (Recommended)

- 600 V vinyl-insulated 0.9 mm^2 cable or equivalent
- 300 V vinyl-insulated 0.75 mm^2 cable or equivalent

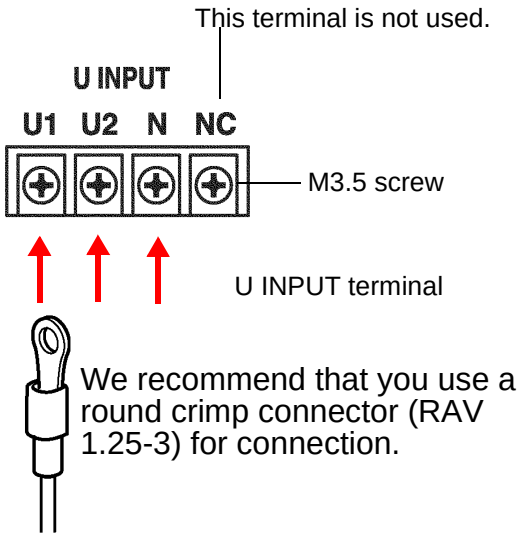
The cable strip shall be 5 mm in length.

The 9238 CLAMP SENSOR CABLE (3 m) is optionally available.

NOTE Note that measurement may be adversely affected by external noise or the electromagnetic environment when using cable longer than 3 meters.

8.3.3 Connecting the Voltage Cable to the Module

Connect voltage cables to the U INPUT terminals (at a tightening torque of 0.8 N•m).



❖ **"Connection diagram"(P.151)**

Cables (Recommended)

600 V vinyl-insulated 0.9 mm^2 cable or equivalent

8.3.4 Connecting to the Measured Line

DANGER

- **In order to prevent electric shock and short-circuit accidents, shut off the power to the line to be measured before connecting the clamp sensors and voltage cords.**
- **U INPUT terminals (U1 and U2) share the N terminal; inputs to these terminals are not insulated from each other. Be careful to avoid electric shock and short-circuiting.**
- **The CLAMP SENSOR INPUT terminals are not insulated from the U INPUT terminals. Be careful to avoid electric shock and short-circuiting when using the U INPUT terminals.**
- **To avoid short circuits and potentially life-threatening hazards, never attach the clamp sensor to a circuit that operates at more than the maximum rated voltage, or over bare conductors.**
- **Clamp sensor should only be connected to the secondary side of a breaker, so the breaker can prevent an accident if a short circuit occurs. Connections should never be made to the primary side of a breaker, because unrestricted current flow could cause a serious accident if a short circuit occurs.**
- **If the secondary circuit is opened while electricity is being sent through the CT, very high and dangerous voltage may be generated at the secondary side terminal.**
- **Be sure to cover the measured line when live to avoid electric shock and short-circuiting.**

DANGER

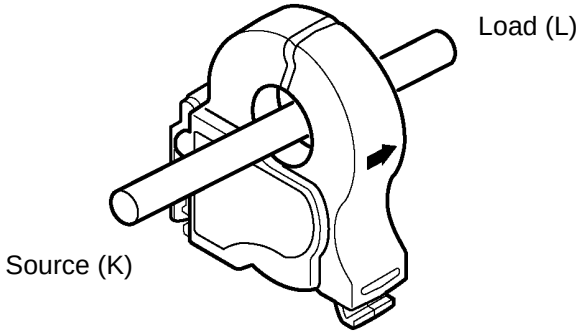
When the clamp sensor is opened, do not allow the metal part of the clamp to touch any exposed metal, or to short between two lines, and do not use over bare conductors.

CAUTION

- Avoid stepping on or pinching cables, which could damage the cable insulation.
- Do not input voltage or current to the U INPUT terminals and CLAMP SENSOR INPUT terminals when module power is OFF. This will avoid damaging the module.

Connect the sensors and cables to the measured line according to the connection diagram.

1. Connect the clamp sensors to the line.
2. Connect the voltage cables to the line.



❖ **See the "Connection diagram"(P.151) and refer to the instruction manual for the clamp sensor being used.**

NOTE

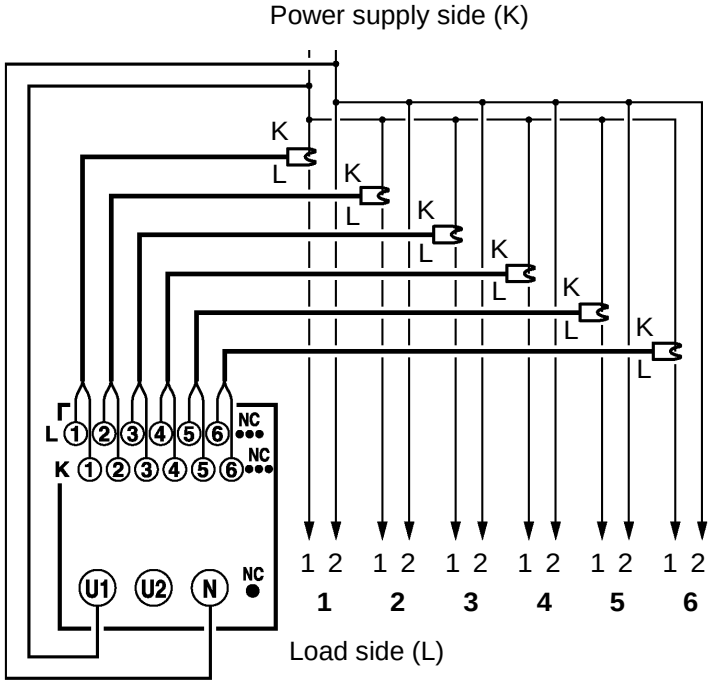
- Ensure that the measured line is correctly set and connection correctly made to ensure accurate measurement.
- If a range exceeding three times the one set at the CLAMP SENSOR INPUT terminal is entered, values measured through other channels may be affected. Do not exceed the stated range.
- Clamp the cladding of the wire by placing the clamp with the arrow on it facing the load side.
- One module measures a common voltage from single-phase/2-wire lines to 3-phase/3-wire lines (up to six single-phase/2-wire circuits, three single-phase/3-wire circuits, or three 3-phase/3-wire circuits).
- When measuring a 3-phase line, be sure to align the phase sequence of the measured line with the order of measurement channels of the module.

Completing Measurement

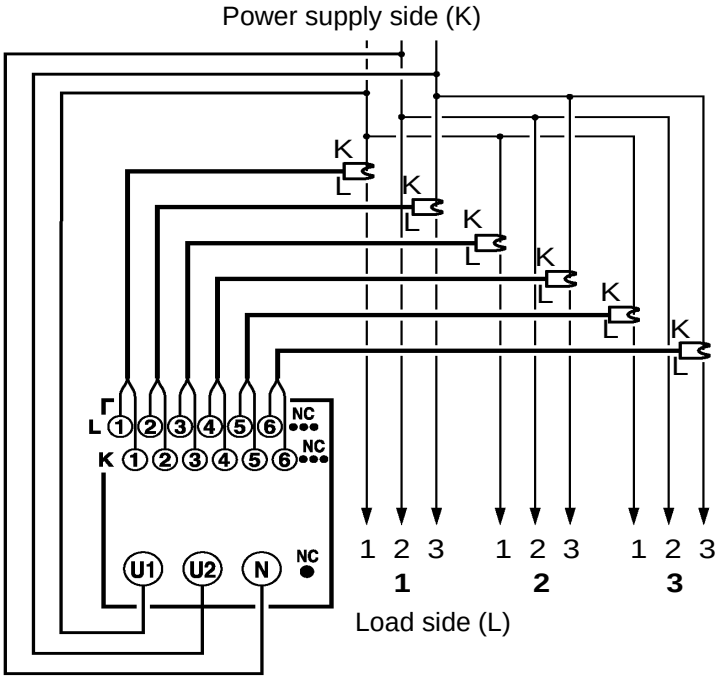
1. Remove the voltage cables.
2. Remove the clamp sensors.

Connection diagram

Single-phase, 2-wire line (1P2W)

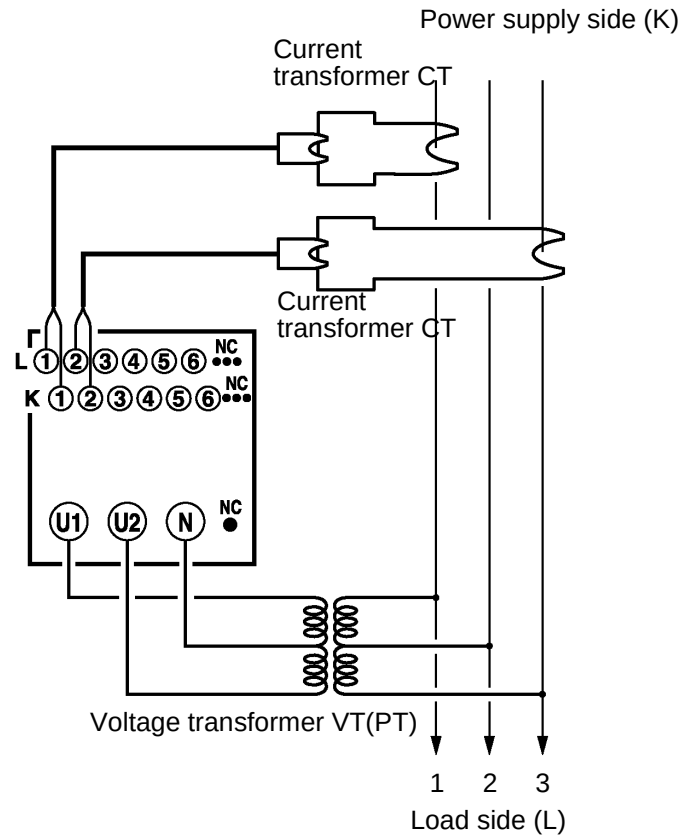


Singe-phase, 3-wire line (1P3W)
3-phase, 3-wire line (3P3W)



Singe-phase, 3-wire line (1P3W)
3-phase, 3-wire line (3P3W)

Using CT and VT (PT) for Single Circuit Measurement



8.4 Others

8.4.1 Alarm Assessment

You can select a measurement item and set the threshold for Hi/Lo assessment.
Measurement item

- Voltage
- Current
- Active power
- Reactive power
- Power factor
- Active energy within an interval
- Frequency

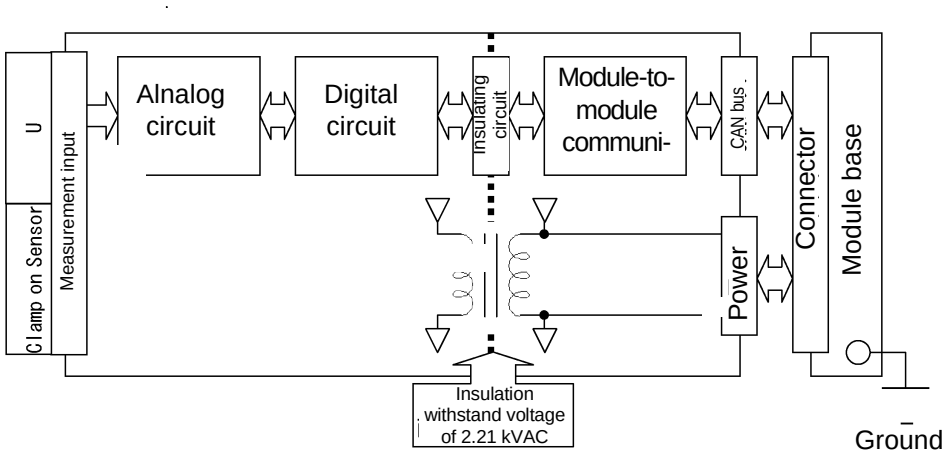
If measurement exceeds the threshold, the POWER LED will light in yellow.
External I/O control is available when using the 2341-20 INPUT MODULE and 2342-20 OUTPUT MODULE.

8.4.2 Insulation of Internal Circuit

⚠CAUTION

Insulation is not provided between the measurement input terminals or between the CLAMP SENSOR INPUT terminals and U INPUT terminals. Beware of electric shock and short- circuiting. Moreover, be sure to cover the measured line when live.

In the 2331-20, the input circuit and alarm output are insulated from the CAN bus as shown in the block diagram below. (Withstand voltage: 2.21 kVAC, 50/60 Hz, Response current: 5 mA, 1 minute)



8.5 Specifications

8.5.1 Basic Specifications

Condition of guaranteed accuracy

Condition of guaranteed accuracy	10-minute warming-up time, Sine wave input, Power factor =1, Maximum rated voltage to earth=0 V
Temperature and humidity for guaranteed accuracy	23±5°C(73±9°F), 80%RH or less The ranges above apply unless otherwise specified in each specification.
Guaranteed accuracy period	1 year
Effective measurement range	Voltage: 35%f.s. to 130%f.s. Current: 2%f.s. to 130%f.s. Effective power: 2%f.s. to 130%f.s.
Fundamental frequency range	45 to 66Hz

Measurement items and accuracy specifications

Measurement lines	Single-phase 2-wire line (1 to 6 circuits) Single-phase 3-wire line (1 to 3 circuits) Three-phase 3-wire line (1 to 3 circuits) Measurement circuits are at a common voltage.
Measurement items	Voltage, current, active power, reactive power, power factor, active energy within an interval, and frequency

Measurement item	Single-phase 3-wire line (1 to 6 circuits)	Single-phase 3-wire line, three-phase 3-wire line (1 to 3 circuits)
Voltage	U1	U1, U2
Current	I1, I2, I3, I4, I5, I6	I1, I2, I3, I4, I5, I6
Active power	P1, P2, P3, P4, P5, P6	P1, P2, P3
Reactive power	Q1, Q2, Q3, Q4, Q5, Q6	Q1, Q2, Q3
Power factor	PF1, PF2, PF3, PF4, PF5, PF6	PF1, PF2, PF3
Active energy within an interval	WP+1, WP+2, WP+3, WP+4, WP+5, WP+6	WP+1, WP+2, WP+3
Frequency	FREQ	FREQ

Voltage / Current measurement

Measurement range	Voltage (U1, U2): 200 V Current:(I1,I2,I3, I4, I5, I6) 1A,5A,50A,100A,200A,500A,1000A (Depends on the clamp sensor used.) Current range is set for every two channels. (I1, I2)/ (I3, I4)/ (I5, I6) The VT (PT) ratio cannot be set separately for U1 and U2. The CT ratio is set for every two channels. (I1, I2)/ (I3, I4)/ (I5, I6)
Measurement accuracy	Voltage: ±1.0%f.s. Current: ±1.0%f.s. + Clamp sensor accuracy

Current range

Clamp Sensor and Its Current Range	2331-20Current Range (Selectable using the PC application)
1 A (100 mV/A)	1 A
9765 5 A (20 mV/A)	5 A
9695-02 50 A (10 mV/A)	5 A
	50 A
9695-03 100 A (1 mV/A)	100 A
9661-01 500 A (1 mV/A)	100 A
	500 A
1000 A (0.5 mV/A)	200 A
	1000 A

Power range unit: [W]

Current Volrage/Wiring		1.000A	5.000A	50.00A	100.0A	200.0A	500.0A	1.000kA
200.0 V	1P2W	200.0	1.000 k	10.00 k	20.00 k	40.00 k	100.0 k	200.0 k
	1P3W 3P3W	400.0	2.000 k	20.00 k	40.00 k	80.00 k	200.0 k	400.0 k

- The range table lists the full scales of voltage and current measurement ranges.
- When the VT (PT) ratio and CT ratio are set, the ranges will be multiplied by (VT (PT) ratio × CT ratio).
- The number of digits of a measurement to display depends on the PC application used.

Active Power Measurement

Measurement range	Effective Power P Voltage range × Current range (see power range table, page 155)
Measurement accuracy	±1.5%f.s.+Clamp sensor accuracy
Polarity	Consumption: No sign Regeneration: "-"

Reactive Power Measurement

Measurement range	Effective Power Q Voltage range × Current range (see power range table, page 155)
Measurement accuracy	±5%f.s.+Clamp sensor accuracy
Polarity	No sign

Active Energy Measurement

Measurement range	Active energy within interval WP + consumed component only
Totalization accuracy	±1.6% f.s. ± clamp sensor accuracy (Note that f.s. is voltage range × current range.)

Power Factor

Measurement range	Power factor PF 0 to 1 (f.s. = 1)
Measurement accuracy	±5%rdg. (At full-scale input of voltage/current with power factor of 1 to 0.5)

Frequency measurement

Measurement range	Frequency FREQ 40 to 70 Hz

Measurement accuracy	±0.5%rdg. (When input is 35% to 130% f.s. of voltage range)
Object to be measured	Voltage U1

Operation Method for Totalization

Start of totalization	The PC application starts measurement.
End of totaliztion	The PC application ends measurement (depending on recording end conditions). For details, refer to specifications of the PC application.

Other Characteristics

Temperature	Within ±0.05 f.s./°C
Effect of maximum rated voltage to earth	Within±0.5%f.s. (Maximum rated voltage to earth 50Hz/60Hz)
Actual time accuracy	±100 ppm (Reference value at temperature from 0 to 50°C without using communications module)
Effect of electromagnetic field	Within ±2.5% f.s. (in field of AC400 Arms/m and 50/60Hz)
Zero suppression	Voltage: Less than 0.5% f.s. Current: Less than 0.5% f.s (less than 0.9% f.s. when using the 9695-02 with 5A range selected) Active power: When voltage or current is 0

8.5.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current measured values (instantaneous values).

Measured value recording function

Measurements are recorded at a set recording interval.	
Real-time management	This is automatically set from the PC application at the start of recording.
Recording start	Immediate start/Reserved-time start
Recording end	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording method	Interval recording (Total number of pulse are recorded at a set recording interval.)
Recorded data	One data set contains time, voltage, current, effective power, reactive power, power factor, active energy within an interval, frequency

Recording item	Single-phase 3-wire line (1 to 6 circuits)	Single-phase 3-wire line, three-phase 3-wire line (1 to 3 circuits)
Voltage	U1	U1, U2
Current	I1, I2, I3, I4, I5, I6	I1, I2, I3, I4, I5, I6
Active power	P1, P2, P3, P4, P5, P6	P1, P2, P3
Reactive power	Q1, Q2, Q3, Q4, Q5, Q6	Q1, Q2, Q3
Power factor	PF1, PF2, PF3, PF4, PF5, PF6	PF1, PF2, PF3
Active energy within an interval	WP+1, WP+2, WP+3, WP+4, WP+5, WP+6	WP+1, WP+2, WP+3
Frequency	FREQ	FREQ

♦Data is scaled if scaling is ON

Recording mode	Instantaneous value MAX/MIN/AVE Instantaneous value + MAX/MIN/AVE Total 3 modes Set the mode before the start of recording. The types of values for recorded measurement items vary depending on the recording mode. Instantaneous value mode: instantaneous value MAX/MIN/AVE recording mode: maximum value, minimum value, and average value Instantaneous value + MAX/MIN/AVE recording mode: instantaneous value, maximum value, minimum value, and average value
Recording end condition	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.
Power Outage Protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

Alarm judgment and recording function

Alarm judgment is made at every sampling, and the history will be recorded in flash memory if the measured value recording function remains active.	
Judgment method	Criterion threshold can be set to either Hi or Lo. The instantaneous value at every sampling is judged (effective in any measurement mode.).
Recorded data	One data set contains time, generation/reversion , CH and judgment threshold.
Alarm output	No output ♦Output is turned ON when an alarm (Hi or Lo) occurs. Whether to hold the alarm output can be selected. The reset switch or a command can be used to reset alarms.

8.5.3 General Specifications

Input method	U INPUT: Insulated input (Not insulated from current measurement circuit) CLAMP SENSOR INPUT: Input insulated by a clamp sensor
Input resistance (50/60 Hz)	U INPUT: 3.62 MΩ ± 10% (Difference input) CLAMP SENSOR INPUT: 200 kΩ ± 10%
Measurement method	Digital sampling
Internal memory	512 KB Flash memory
Backup	Recorded data (saved in flash memory) Data loss for up to 2 minutes before and after a power outage may occur.
Clock function	The real time clock (year, month, day, hour, minute, and second) of the communications module is used.
Communication interface	CAN bus
Maximum input voltage	U INPUT: 300 Vrms, 424.3 V peak CLAMP SENSOR INPUT: 1.5 Vrms, 2.2 V peak value
Maximum rated voltage to earth	Voltage input (U INPUT) terminal 300 Vrms, 50/60 Hz
Rated supply voltage	+5V±0.3VDC
Maximum rated power	2.5 W

LED display	Used for monitoring and warning Lit in green: Data being recorded. Flashing in green: Standing by. Lit in yellow: Alarm output. Flashing in yellow: one of the following[*1] The voltage is outside the effective measurement range. The current is out of range. The active power is a negative value. Lit in red: Non-recoverable error occurred. [*2] Flashing in red: Recoverable error occurred.[*3] *1: You can select a POWER LED monitoring mode on the PC applications software. Use the current monitoring mode to only measure electric current (without voltage input). Otherwise, use voltage/current/power monitoring mode. Voltage/Current/Power Monitoring Mode The LED will start flashing in yellow when any of the following events occurs: Flashing in yellow indicates one of the following: The voltage is outside the effective input range. The current is out of range. The active power is a negative value. Current Monitoring Mode The LED will start flashing in yellow in case of the following event: The current is out of range. *2: The module needs repair. Contact your dealer or Hioki representative. *3: The same module ID may be used by another module.	
Dielectric strength	3.536 kVAC Between U INPUT terminal and Case (excluding terminal section) 2.210 kVAC Between U INPUT terminal and interface terminal CLAMP SENSOR INPUT terminal and Interface terminal (50/60 Hz, response current 5 mA, one minutes	
Dimensions	Approx. 45.5W × 96H × 94.5D mm (1.79"W × 3.78"H × 3.72"D) (including cover, sans protrusions)	
Mass	Approx. 250 g (8.8 oz.) (including cover)	
Option	9695-02 CLAMP ON SENSOR (50 Arms) 9695-03 CLAMP ON SENSOR (100 Arms) 9661-01 CLAMP ON SENSOR (500 Arms) 9765* CLAMP ON SENSOR (5 Arms) (See "When using Model 9765 " (p.143)) * Not complied with the CE marking. All sensors are the voltage-output type. 9238 CLAMP SENSOR CABLE	
Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)	
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (with no condensation)	
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)	
Applicable standards	Safety	EN61010-1:2001 EN61010-031:2002 Pollution degree 2 Measurement Category III, (anticipated transient overvoltage 4000 V)
	EMC	EN61326:1997+A1:1998+A2:2001+A3:2003 Class A

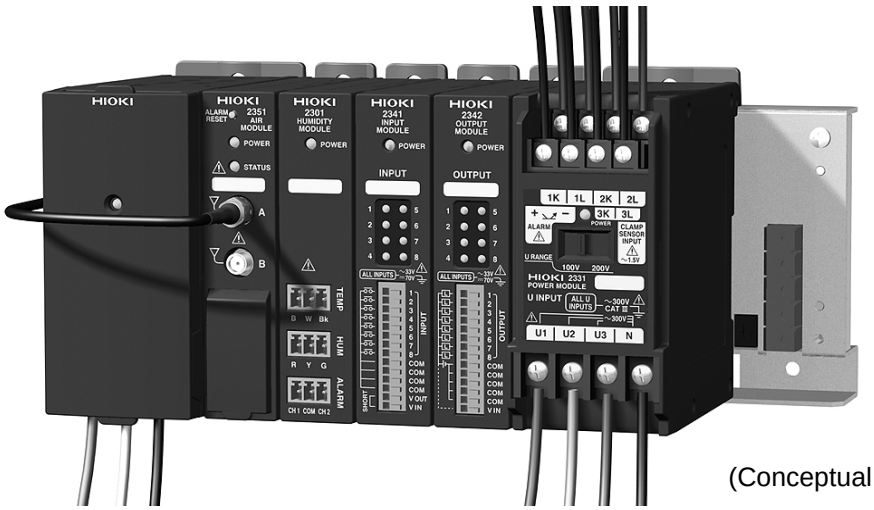
2341-20 INPUT MODULE 9

9.1 Overview

9.1.1 Product Overview

The 2341-20 is a logic signal input module for the Hioki Smart Site (remote measurement system). The module monitors contact or voltage signals from external devices second by second. If the module detects any changes in status, it writes the data to a log held in memory.
The logic state of the input signal can also be recorded at the specified interval.
It is used with a power supply module, a communications module, and a module base.

Number of input channels	8 channels
Input signal	contact signal/voltage signal (active Low)



(Conceptual image)

9.1.2 Major Features

- **The module records changes in the status of input signals along with time information (30,000 records).**
- **The recording interval is selectable from 1 second to 60 minutes.**

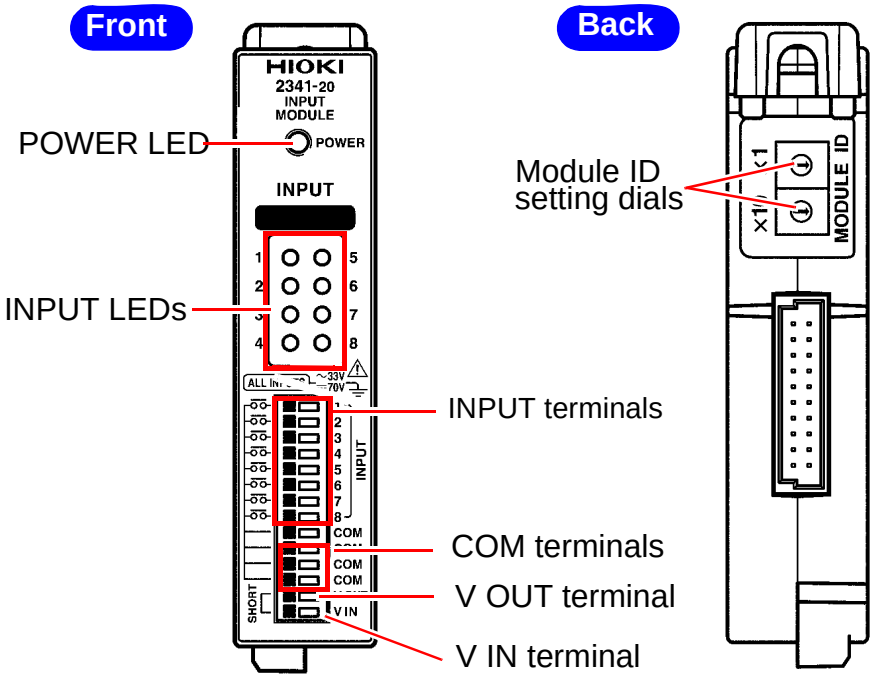
- **A reference voltage can be input to set a High level criterion voltage for input signals between 4.5 and 30 VDC.**

9.1.3 Name and Function of the Parts

CAUTION

To avoid damage to the internal and connected circuitry, observe the following precautions:

- Limit the input voltage to the INPUT terminal to below the input voltage of the V IN terminal.
- V IN may appear at the INPUT terminal. Set V IN to a value lower than the rated value of the circuit to be connected to the INPUT terminal.

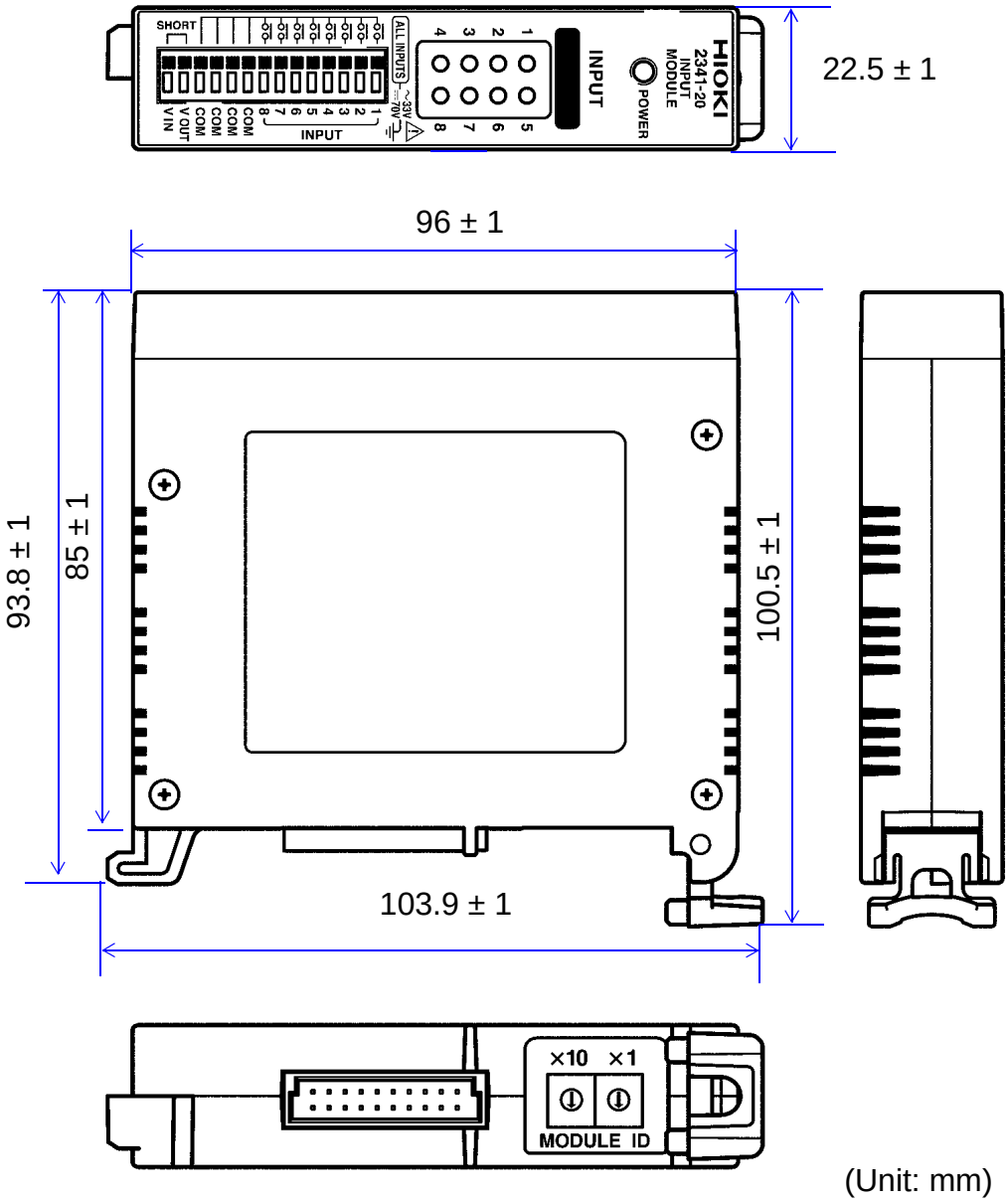


POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Data being recorded. Flashing in green : Standing by. Lit in red : Non-recoverable error occurred. *1 Flashing in red : Recoverable error occurred. *2
INPUT LED	Indicates the status of the input signal. Lights up in green when the contact signal is ON or the voltage signal is at LOW level.

INPUT terminals	Connect input signals to these terminals. Up to 8-channel contact signals or voltage signals (active Low) can be detected. Contact signals and voltage signals may be mixed on these terminals. Criterion threshold Contact signal: ON : 500 Ω or less, OFF : 500 kΩ or higher Voltage signal: LOW : 0 to 1.0 (V), HIGH : V IN - 1.0 to V IN (V)
COM terminals	This is a low-potential terminal shared by the INPUT, V IN and V OUT terminals.
V OUT terminal	Outputs a voltage (5 ± 0.5 VDC, 20 mA Max.) between V OUT and COM.
V IN terminal	The contact detection voltage and the High level value voltage for the voltage signal are input to this terminal (input range: 4.5 to 30 VDC). If the V IN terminal is short-circuited with V OUT, the threshold is set to approximately 5 VDC.
Module ID setting dials	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your dealer or Hioki representative.
*2: The same module ID may be used by another module.

9.1.4 Dimension Diagrams



(Unit: mm)

9.1.5 Accessory and Option

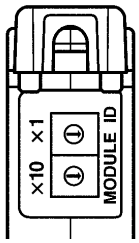
Accessory
None
Option
None

9.2 Settings

Setting the Module ID

You can connect up to 63 modules (measurement, input/output, and link) to one communications module.

Setting Procedure



Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID are not related and can be set independently.
- For COM ID, see the instruction manual for the communications module.

9.3 Preparations

9.3.1 Installing the Module

(1) Installing the Module Base

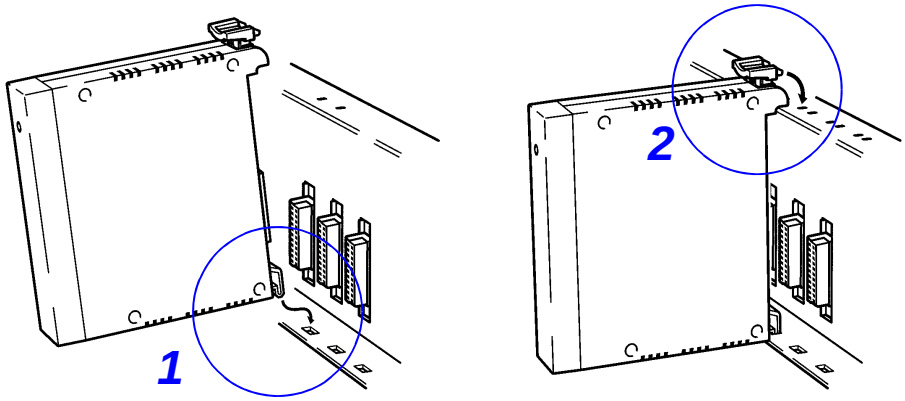
CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(2) Mounting a Module on the Module Base

Mount a module on the module base as shown below. Ensure that the lever clicks.



9.3.2 Connecting Input/Output Cables

⚠CAUTION

The channels are not insulated from each other. Take care to avoid short circuits. When measuring two measurement points having a potential difference, equalize the ground level potential of the object to be measuredwith that of the module, or use another 2341-20 module. This prevents unreliable measurements.

Recommended Cable

Single-wire : 0.32 to 0.65 mm
(Recommended: 0.65 mm)

Stranded-wire : 0.08 to 0.32 mm^2
Strand diameter: 0.125 or more
(Recommended: 0.32 mm^2
Strand diameter: 0.18 or more)

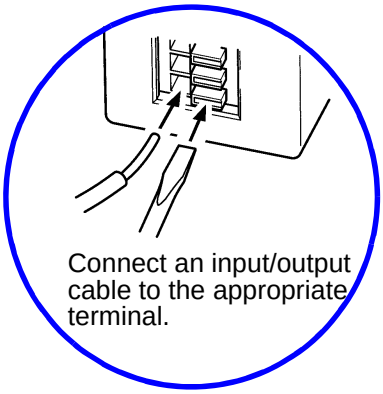
AWG : 22 to 28
(Recommended: AWG22)

Cable strip length : 9 to 10 mm

(1) Connecting the Input/Output Terminal block

⚠WARNING

The maximum input voltage is INPUT ≦ V IN ≦ +30 V. Ensure that the input does not exceed the maximum input voltage to avoid instrument damage, short-circuiting and electric shock resulting from heat building.



Connect an input/output cable to the appropriate terminal.

1. Hold down the button of the terminal using a flat-blade screwdriver or similar tool.
2. While holding down the button, insert an input/output cable into the lead connection hole.
3. Release the button to lock the cable.

NOTE

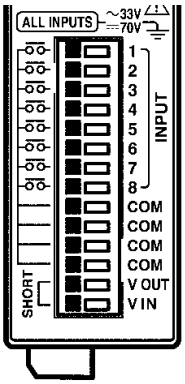
Make sure the cable length does not exceed 30 m (98 feet). If the cable is longer than 30 m, measurement may be affected by external noise or other electromagnetic environment.

(2) The Location of the Input/Output Cable

CAUTION

Follow the instructions below to avoid damaging internal and connected circuits.

- Make sure the input voltage to the INPUT terminal does not exceed the input voltage to the V IN terminal.
- V IN (VDC) may appear at the INPUT terminals. Make sure that the V IN does not exceed rating of the circuit connected to the INPUT terminal.
- Take care regarding the polarities of the INPUT terminal and V IN terminal.



Terminal	Function
INPUT terminal (Input)	Logic signal input (Between INPUT1 to 8 and COM)
V OUT terminal (5 VDC output)	Connected to V IN Set V IN = 5 VDC.
V IN terminal (Input)	Sets contact detection voltage/High level voltage for voltage signal. (Between V IN and COM)

NOTE

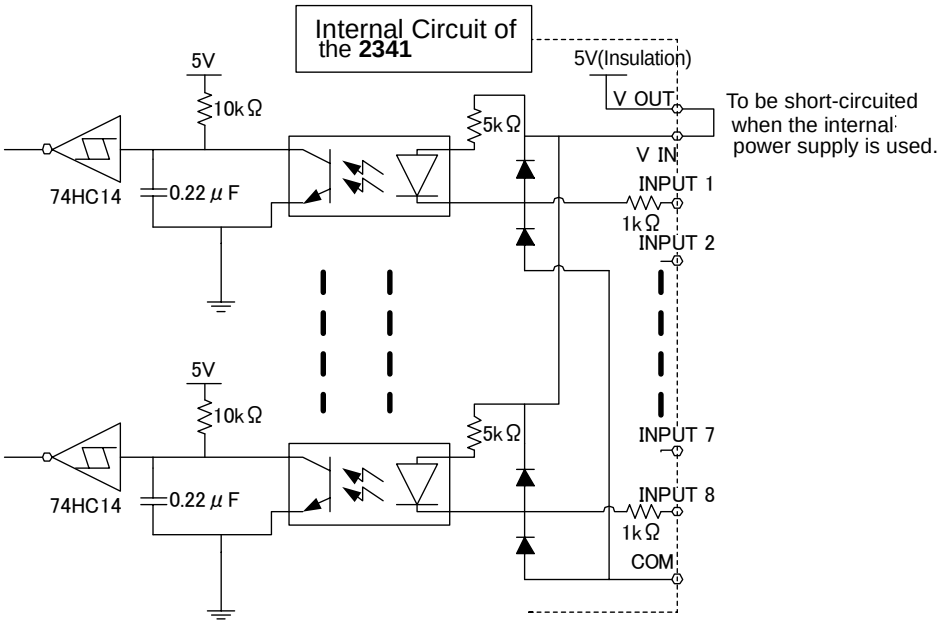
To detect signals, make sure a voltage is applied to the V IN terminal from the V OUT terminal or from an external source.

❖ **9.4.2 "Examples of Connections According to Type of Device Coupled"(P.168)**

9.4 Others

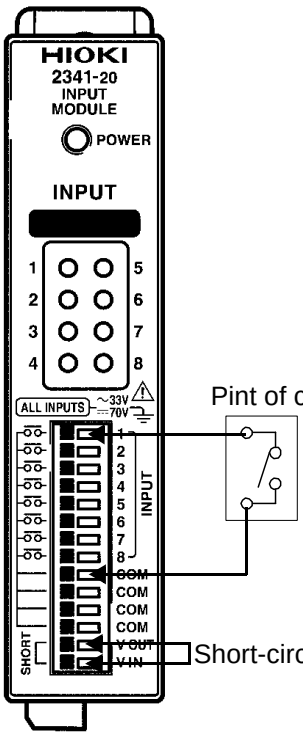
9.4.1 Internal Circuit

The diagram below shows the internal circuit of an input/output terminal. Use the diagram as a guide for terminal connections.



9.4.2 Examples of Connections According to Type of Device Coupled

(1) Contact Output Devices (Relays, Etc.)



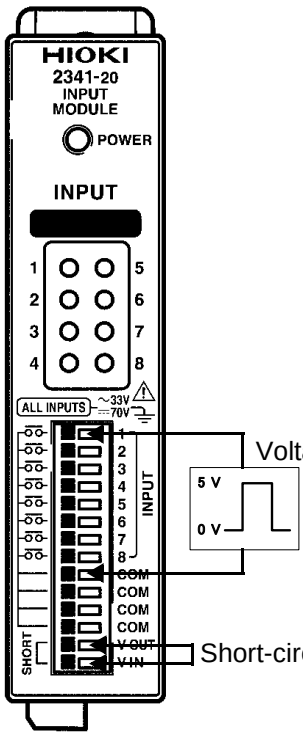
Pint of contact

Connect a cable between INPUT and COM.

Short-circuit

Leave V IN and V OUT short-circuited.

(2) Voltage Output Devices (When High Level Is +4 to 5 V)



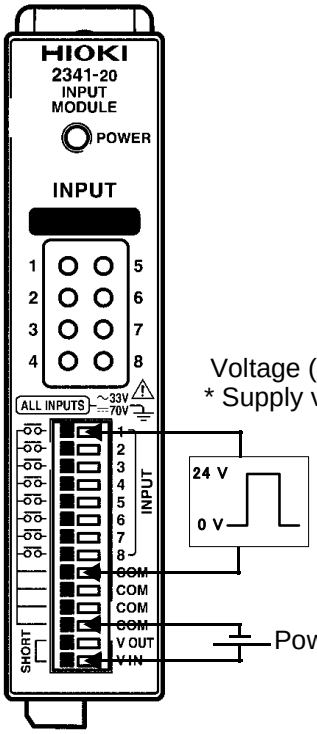
Voltage(0 to 5 V, input only)

Connect a cable between INPUT and COM.
(0 VDC ≦ INPUT ≦ +5 V)

Short-circuit

Leave V IN and V OUT short-circuited.

(3) Voltage Output Devices (When High Level Needs to Be Set)



Voltage (Example of 0-24 V input)
* Supply voltage to be made equal to the input High level.

Connect a cable between INPUT and COM.
(0 VDC ≦ INPUT ≦ V IN)

Power (24 V)

Apply a High-Level judgment voltage in a range from +4.5 to +30 V across V IN and COM

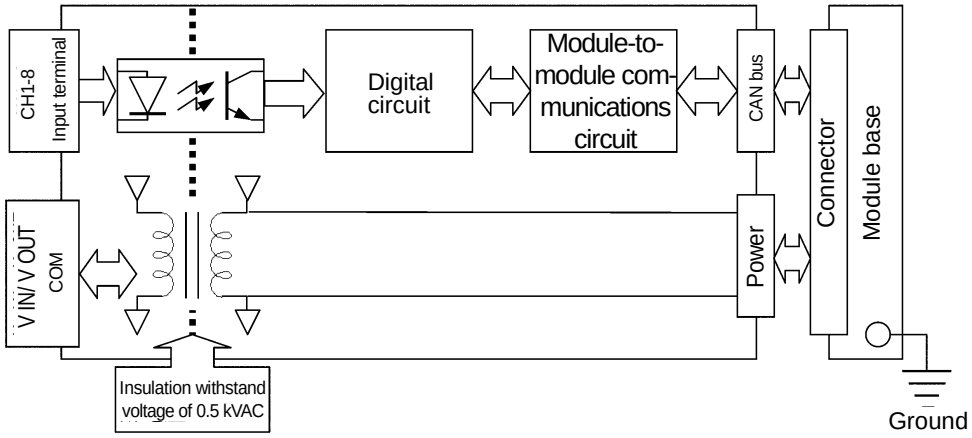
Reference:
The voltage range for level judgment is as follows:
H: V IN -1.0 to V IN (V)
L: 0 to +1.0

9.4.3 Insulation of Internal Circuit

⚠CAUTION

The channels in the measurement input section are not insulated from each other. When connecting signals different in potential to these terminals, use an additional module, or insulate the signals externally, then connect to the terminals. This will prevent errors and module malfunctions.

In the instrument, the input circuit is insulated from the CAN bus as shown in the block diagram below. (Withstand voltage: 0.5 kVAC, 50/60 Hz,
Response current: 5 mA, 1 minute)



9.5 Specifications

9.5.1 Basic Specifications

Operation	Receives contact signals from an external device and monitors the status of the signals.
Number of inputs	8 channels
Input signal	Contact/Voltage input (Photocoupler insulation)
Signal level	High: V IN - 1.0 to V IN (V) Low: 0 V to 1.0 V
Contact detection level	ON: Resistance of 500 Ω or less OFF: Resistance of 500 kΩ or more
Internal insulation power supply	5 ± 0.5 VDC, 20 mA Max. Between V OUT and COM.
External input power supply	4.5 to 30 VDC Between V IN and COM
Input status indication	Contact ON, LOW level
Input terminal	Terminal block
Low-pass filter	Time constant of 2.2 ms
Sampling	Once per second

9.5.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current status of the output terminal (hereinafter called "measured value").

Measured value recording function

Measurements are recorded at a set recording interval.	
Real-time management	This is automatically set from the PC application at the start of recording.
Recording start	Immediate start/Reserved-time start
Recording end	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.
Recording mode	Instantaneous value
Recorded data	One data set contains time and measured values (for the 8 channels.).
Recording capacity	512 k bytes Flash memory
Quantity of recorded data	Instantaneous value recording mode: 30,000 data × 8 CH
Power outage protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

Alarm judgment and recording function

At every sampling, the function makes alarm judgment as to whether the input is active or not, and records the change history in flash memory if the measured value recording function of the system is active.	
Judgment method	Active Hi/Lo (Active ON/OFF) can be set selectively. Judges instantaneous values at every sampling.
Recording method	Instantaneous value (A log event is recorded only when the recording is started or stopped, or when changes in status are detected.)
Recorded data	One data set contains time, event, measured values of all channels (Judgment).

9.5.3 General Specifications

Clock accuracy	±100 ppm (Reference value at temperature from 0 to 50°C (32 to 122°F) without the communications module)	
Backup	Recorded data (saved in flash memory) * Data loss for up to 2 minutes before and after a power outage may occur.	
Communication interface	CAN bus (500 kps)	
Maximum rated voltage to earth	33 Vrms, 70 VDC (Sum with input voltage)	
Rated supply voltage	5 ± 0.25 VDC	
Maximum rated power	1.4 W	
Withstand voltage	500 VAC Between input terminal and CAN bus (50/60 Hz, Response current 5 mA, one minutes	
Dimensions	Approx. 22.5W X 96H X 85D mm (0.89"W X 3.78"H X 3.35"D) (excluding projections)	
Mass	Approx. 120 g (4.2 oz.)	
Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)	
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (with no condensation)	
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)	
Standards applying	Safety	EN61010-1:2001 Pollution degree 2
	EMC	EN61326:1997+A1:1998+A2:2001+A3:2003 Class A

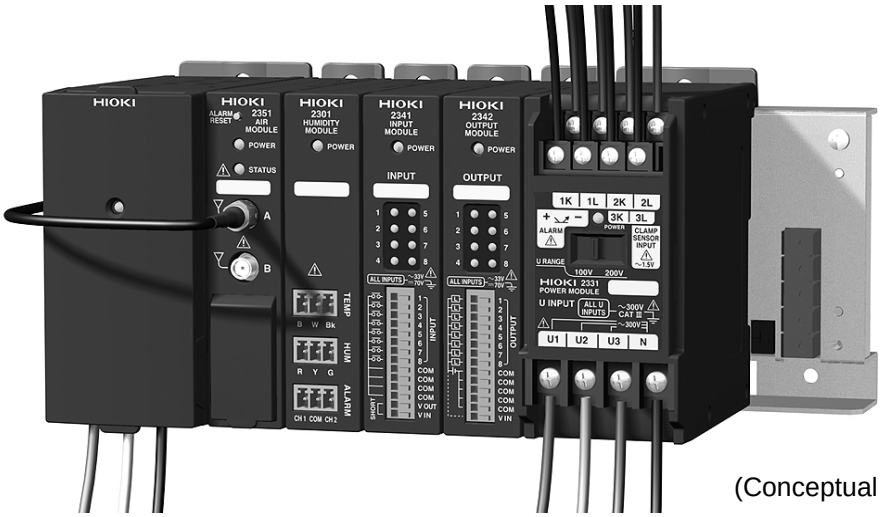
2342-20 OUTPUT MODULE 10

10.1 Overview

10.1.1 Product Overview

The 2342-20 is a control signal output module for the Hioki Smart Site (remote measurement system). The module outputs control signals, monitors commands from the host, and records data on measurement modules and input modules connected to this communications module. If the module detects any changes in status, It writes this data to a log held in memory. Further, if a change occurs in the judgment result, this history will be recorded in the module.
It is used with a power supply module, a communications module, and a module base.

Number of output channels	8 channels
Output signal	Open collector output



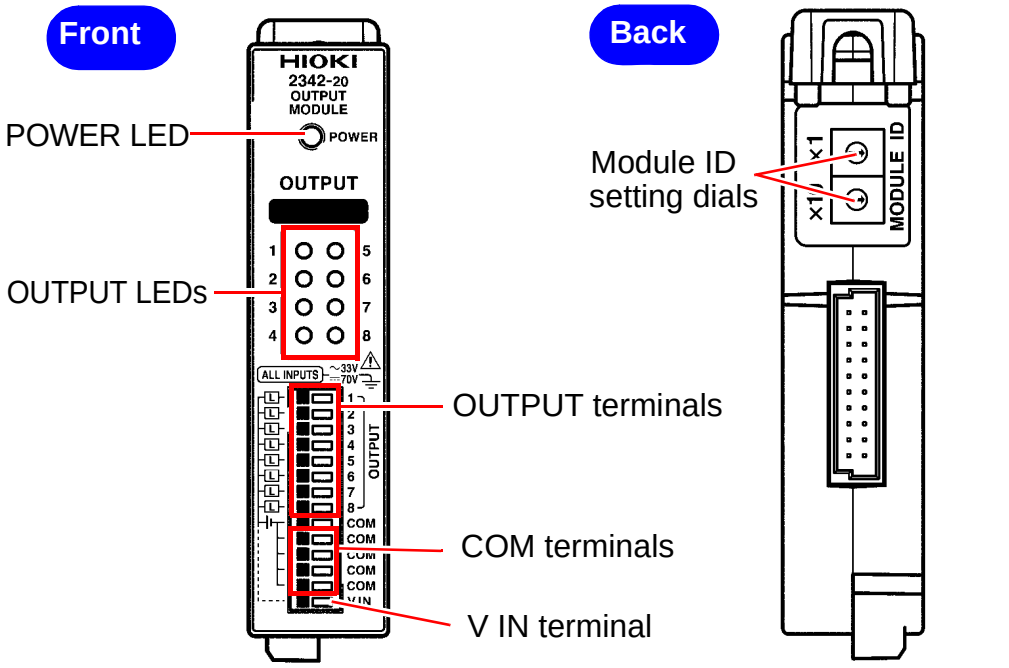
(Conceptual image)

10.1.2 Major Features

- **The module records changes in the status of output signals along with time information (30,000 records).**
- **The instrument is provided with a function to control the output signal from a personal computer and a function to monitor, judge and output the values measured by the measuring module. Either of these functions can be selected.**

- **The instrument includes a "Logic output function" that performs logic operations (AND, OR) on the input to each channel and outputs the results during the monitoring and judgment of the input module.**
- **The module has a filter function that outputs the judgment result, which is held for a certain period of time.**
- **The module has a channel-linking function that groups several channels and prioritizes their output.**

10.1.3 Name and Function of the Parts



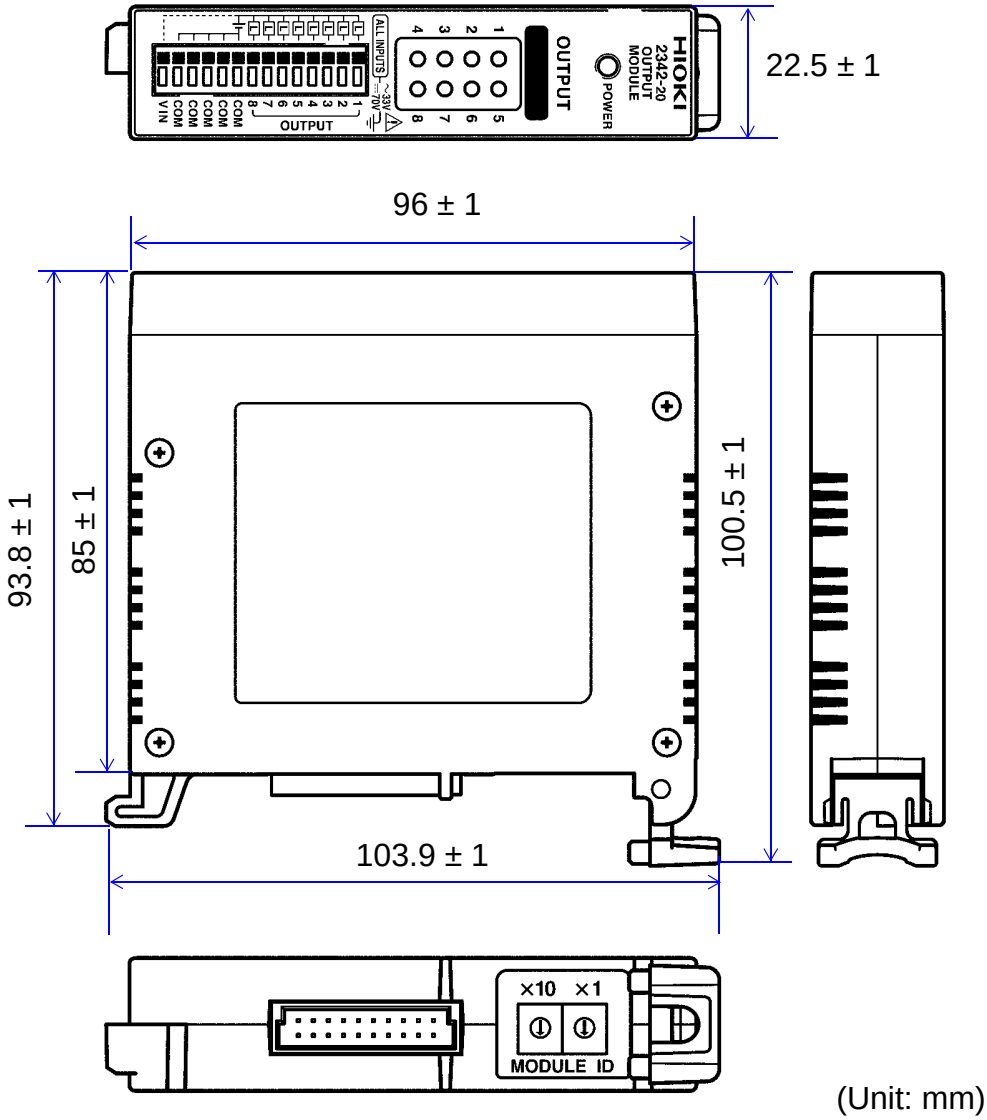
POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Data being recorded. Flashing in green : Standing by. Flashing in yellow: Setting error *1 Lit in red : Non-recoverable error occurred. *2 Flashing in red : Recoverable error occurred. *3
OUTPUT LEDs	Lights up in green when the output transistor is ON (open collector output).
COUTPUT terminals	These are the output signal terminals (open collector output). Up to 8 output channels are available.
COM terminals	Connect a DC voltage signal or DC current signal to this terminal (channel 2).

*1: No module has an ID registered as a module to be monitored.
*2: The module needs repair. Contact your dealer or Hioki representative.
*3: The same module ID may be used by another module.
*4: When using the V IN terminal, make sure the input voltages to the OUTPUT terminals do not exceed the input voltage to the V IN terminal. If you do not use the V IN terminal, these channels may be connected to power supplies with different voltage levels.

V IN terminal	Connect the power supply for the relay drive circuit to this terminal (with protective diode, Input range: 30 VDC max.). *4
Module ID setting dials	Use the dial to set the module's identification No.

*1: No module has an ID registered as a module to be monitored.
*2: The module needs repair. Contact your dealer or Hioki representative.
*3: The same module ID may be used by another module.
*4: When using the V IN terminal, make sure the input voltages to the OUTPUT terminals do not exceed the input voltage to the V IN terminal. If you do not use the V IN terminal, these channels may be connected to power supplies with different voltage levels.

10.1.4 Dimension Diagrams



(Unit: mm)

10.1.5 Accessory and Option

Accessories
None

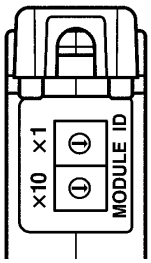
Option
None

10.2 Settings

Setting the Module ID

You can connect up to 63 modules (measurement, input/output, and link) to one communications module.

Setting Procedure



Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- For COM ID, see the instruction manual for the communications module.

10.3 Preparations

10.3.1 Installing the Module

(1) Installing the Module Base

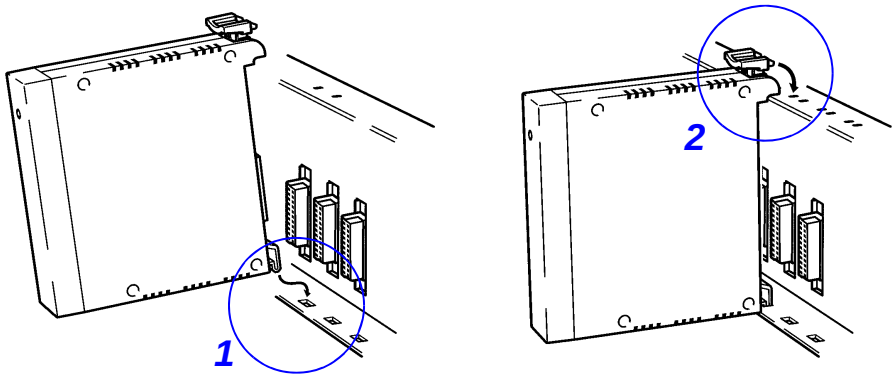
CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(2) Mounting a Module on the Module Base

Mount a module on the module base as shown below. Ensure that the lever clicks.



10.3.2 Connecting Input/Output Cables

CAUTION

The channels are not insulated from each other. Take care to avoid short circuits. A short-circuit may result in errors or module malfunctions.

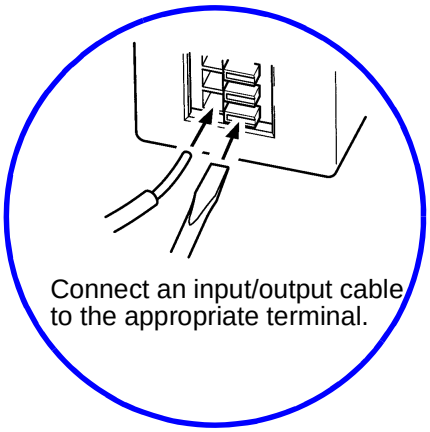
Recommended Cable

Single-wire : 0.32 to 0.65 mm (Recommended: 0.65 mm)
Stranded-wire : 0.08 to 0.32 mm^2 Strand diameter: 0.125 or more (Recommended: 0.32 mm^2 Strand diameter: 0.18 or more)
AWG : 22 to 28 (Recommended: AWG22)
Cable strip length: 9 to 10 mm

(1) Connecting the Input/Output Terminal block

WARNING

The maximum input voltage and current is 30 VDC, 250 mA/ 1 channel. Ensure that the input does not exceed the maximum input voltage to avoid instrument damage, short-circuiting and electric shock resulting from heat building.



Connect an input/output cable to the appropriate terminal.

1. Hold down the button of the terminal using a flat-blade screwdriver or similar tool.
2. While holding down the button, insert an input/output cable into the lead connection hole.
3. Release the button to lock the cable.

NOTE

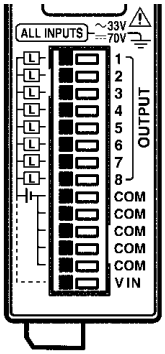
Make sure the cable length does not exceed 30 m (98 feet). If the cable is longer than 30 m, measurement may be affected by external noise or other electromagnetic environment.

(2) The Location of the Input/Output Cable

CAUTION

Follow the instructions below to avoid damaging internal and connected circuits.

- Make sure the input voltage to the OUTPUT terminal does not exceed the input voltage to the V IN terminal..
- Take care regarding the polarities of the OUTPUT terminal and V IN terminal.



Terminal	Function
OUTPUT terminal (Output)	Open collector output (Between OUTPUT1 to 8 and COM)
V IN terminal (Input)	Input of power supply for the relay drive circuit (Between V IN and COM, 30 VDC Max., with protective diode)

10.4 Others

10.4.1 Output Circuit

(1) Output Rating

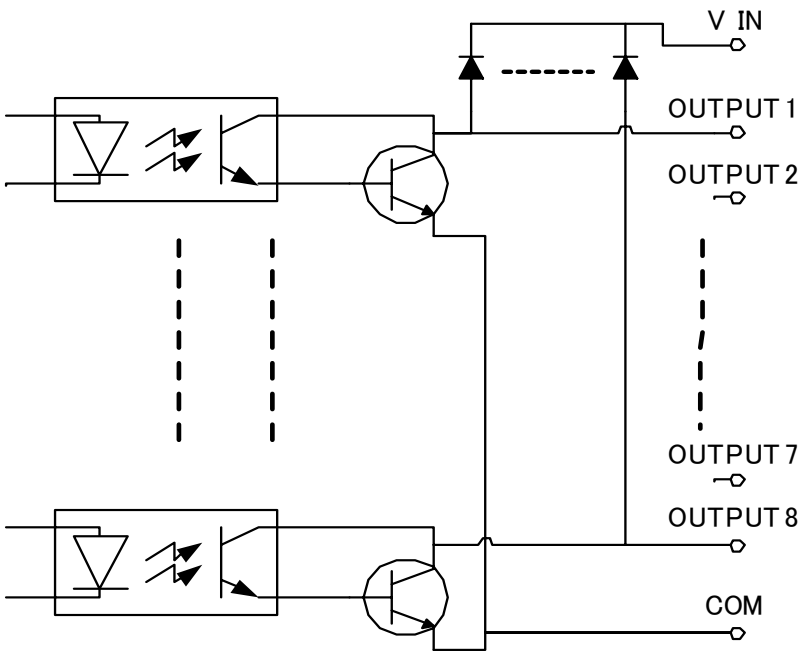
WARNING

Ensure that the input does not exceed the maximum input voltage or current to avoid instrument damage, short-circuiting and electric shock resulting from heat building.

Output Method	Open collector
Maximum input voltage/current	30 V, input current of 250 mA/ 1 channel

(2) Internal Circuit

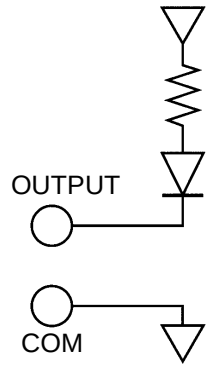
The output circuit is configured as shown below.



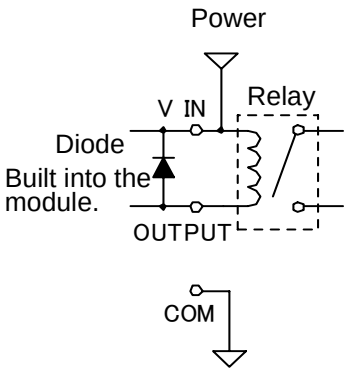
NOTE

The output transistor works as a switch between signal output and ground in the module. When output becomes enabled, the switch is turned on and current flows from the output signal to COM in the module. Therefore, a relay or LED lamp can be connected directly to the output terminal (page 180).

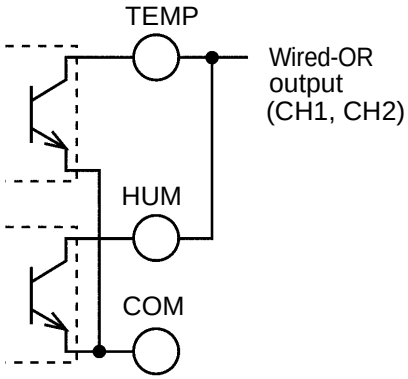
Circuit diagram



Connecting LED



Connecting relay



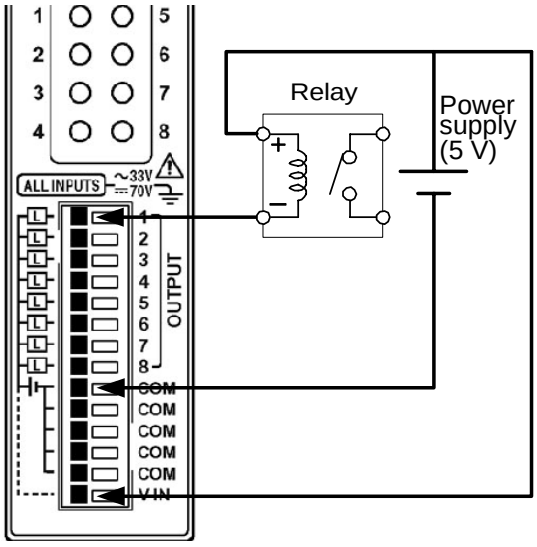
Using on Wired-OR Logic

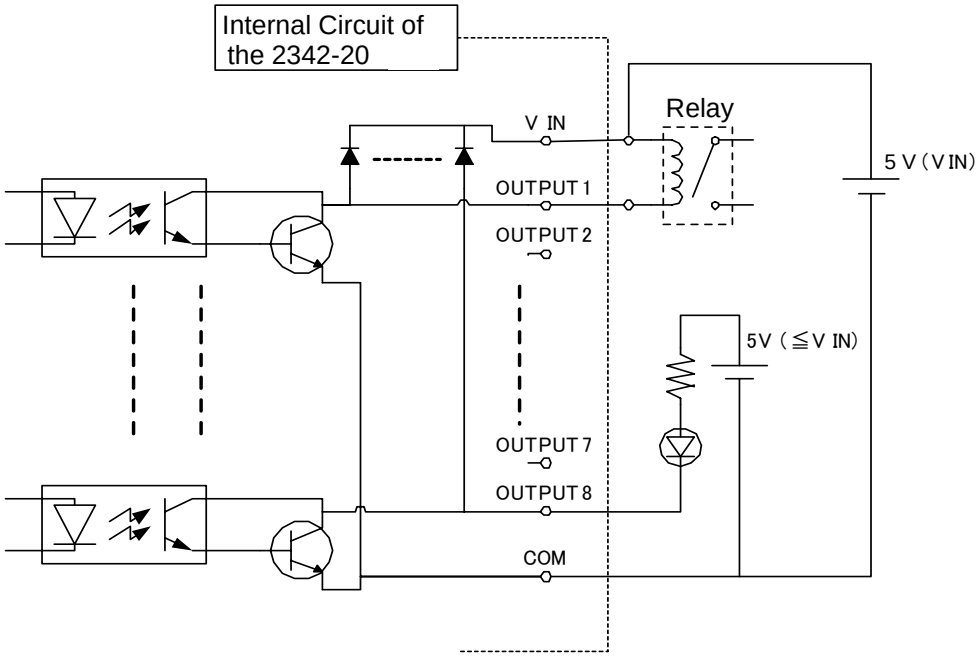
NOTE

- The LED lamps and relays connected to this module must operate at currents lower than 30 V and 250 mA (When using V IN with relay is 100 mV.). The module is equipped with a built-in diode to absorb counter-electromotive force if a relay is connected.
  (Electric specification of protective diode for drive a relay built into this module: Average rectification rated current Io=100 [mA], Reverse rated Voltage V_R=80 [V])
- The open collector output operates on wired OR logic, choosing channels from CH1 to CH8 and connecting them to each other. If an alarm is issued on one of the channels, an alarm signal is issued.

10.4.2 Take care not to reverse the polarities of the terminals.

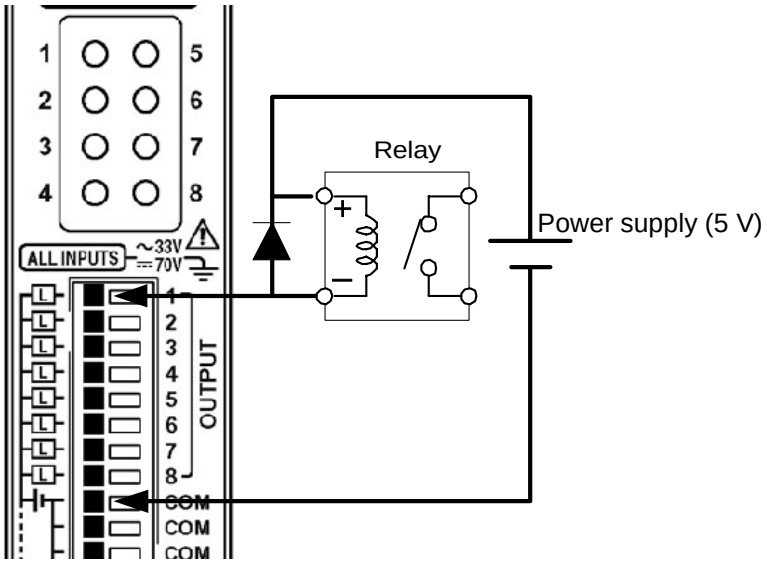
(1) To drive a relay (When using V IN)

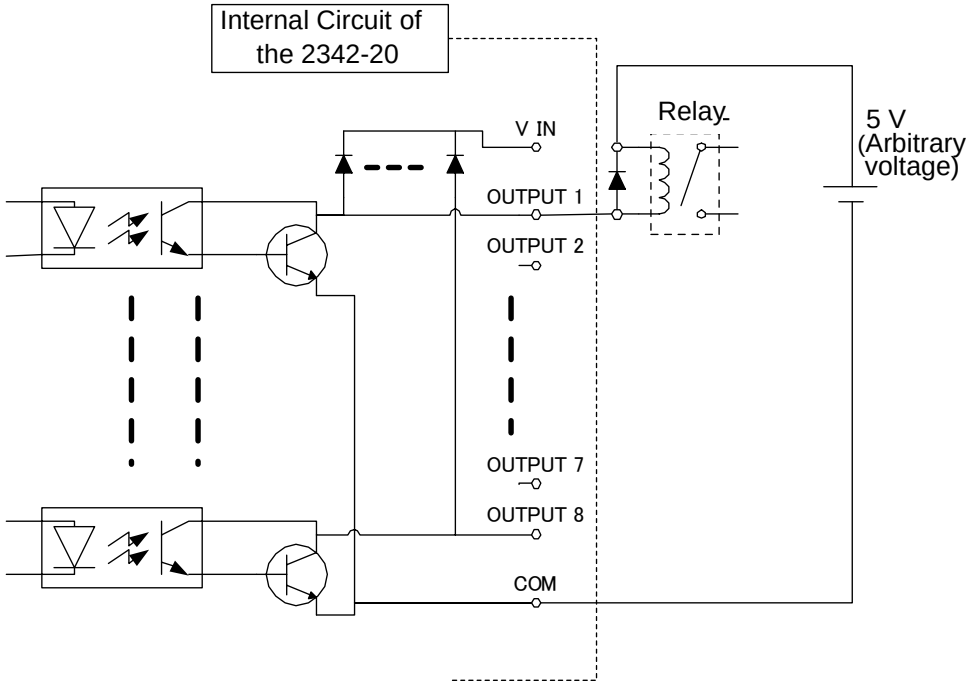




NOTE A built-in diode of the instrument prevents a counterelectromotive force. (The maximum input current is 100 mA/channel.)
Set the OUTPUT terminal to the range of input voltage ≦ V IN ≦ +30 V.

(2) To drive a relay (When not using V IN)

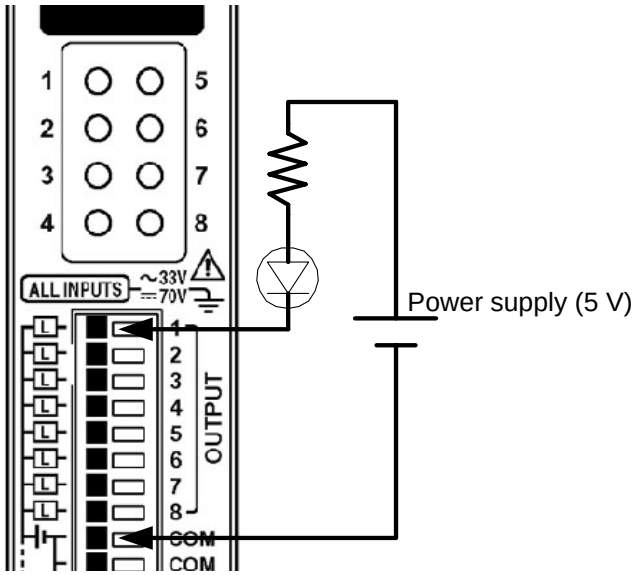


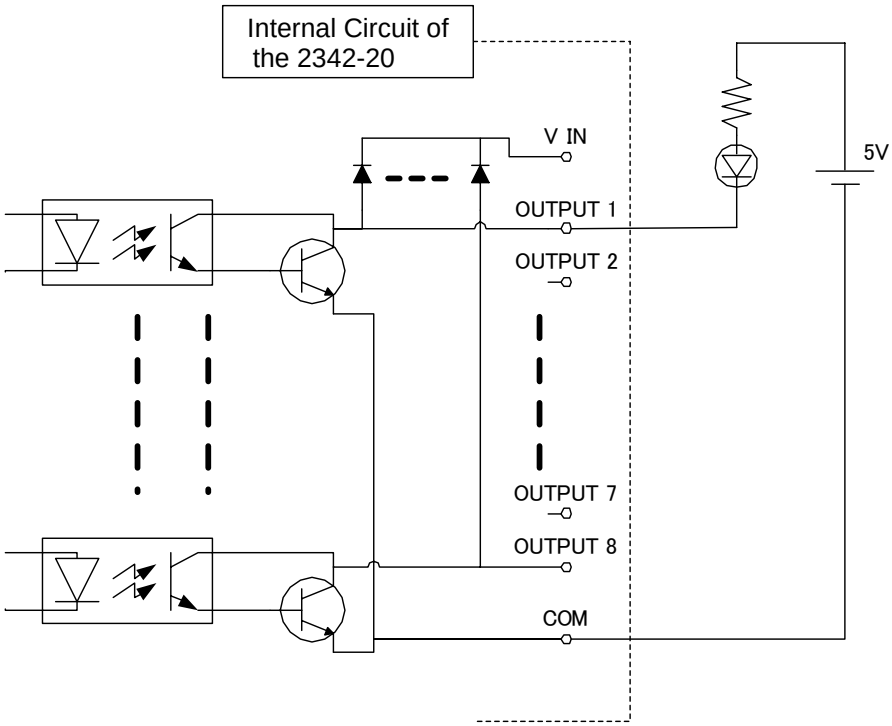


NOTE

An add-on diode is required due to the presence of the counter-electromotive force of the relay.
The OUTPUT terminal can be set to a different input voltage value for each channel.
(Maximum input voltage/current are 30 VDC and 250 mA/ 1 channel.)

(3) To light an LED (5 V drive)

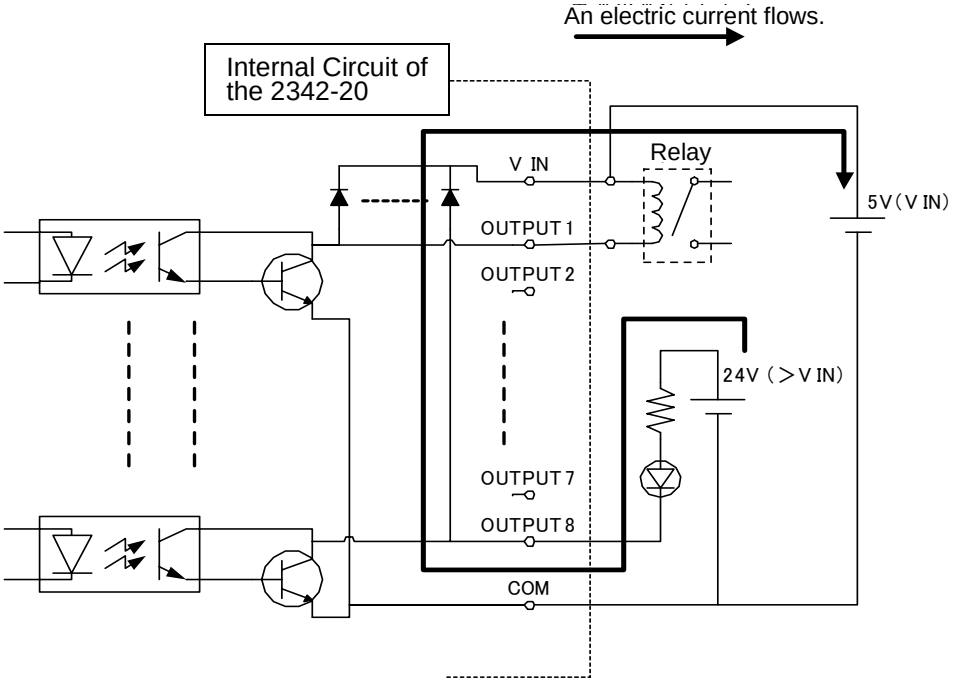




NOTE

Use a current-limiting resistor.
(The maximum input current is 250 mA/channel.)

(4) Incorrect usage of V IN terminal



NOTE

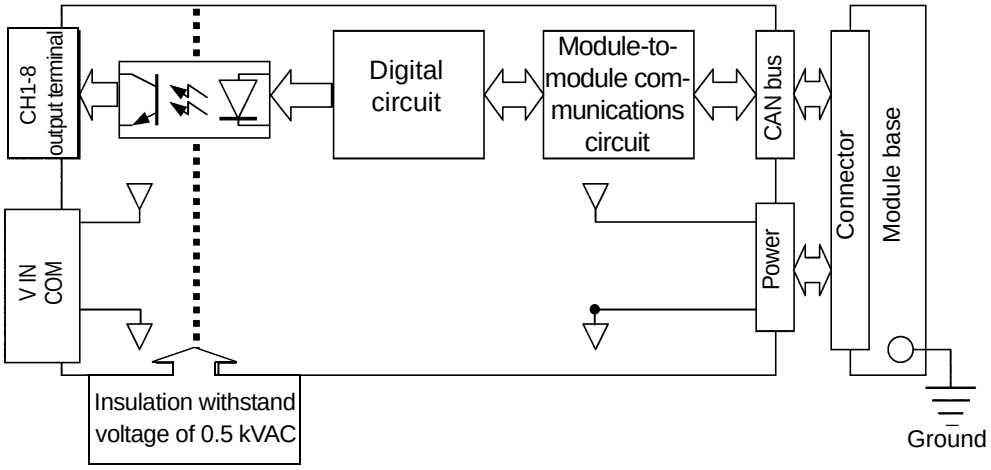
Set the OUTPUT terminal to the range of input voltage ≦ V IN ≦ +30 V.
Improper use of the V IN terminal may result in the flow of an electric current as shown above, generating heat and potentially damaging internal and connected circuits.

10.4.3 Insulation of Internal Circuit

⚠CAUTION

The output terminals are not insulated from each other. When connecting signals with different potentials to these terminals, use an additional module, or insulate the signals externally before connecting them to the terminals. This will prevent errors and module malfunctions.

In the instrument, the input circuit and output are insulated from the CAN bus as shown in the block diagram below. (Withstand voltage: 0.5 kVAC, 50/60 Hz, Response current: 5 mA, 1 minute)



10.5 Specifications

10.5.1 Basic Specifications

Operation	Outputs control signals based on commands from the host or measurement module data.
Number of outputs	8 channels
Output signal	Open collector output (photocoupler insulation)
Internal insulation power supply	N/A
External input power supply	Between V IN and COM 30 VDC Max.
Maximum sink current	250 mA/ 1 channel
Maximum input voltage	30 VDC
Output status indication	Green LED lights up when output transistor is ON (each channel).
Output terminal	Terminal block

10.5.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current status of the output terminal (hereinafter called "measured value").

Alarm judgment and recording function

At every sampling, the function makes alarm judgment as to whether the input is active or not, and records the change history in flash memory if the measured value recording function of the system is active.	
Judgment method	Active Hi/Lo (Active ON/OFF) can be set selectively. Judges instantaneous values at every sampling.
Recording mode	Instantaneous value recording (A log event is recorded only when the recording is started or stopped, or when changes in status are detected.)
Recorded data	One data set contains time, event, measured values of all channels (Judgment values).
Real-time management	This is automatically set from the PC application at the start of recording.
Recording start	Immediate start/Reserved-time start
Recording end	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording capacity	512 k bytes Flash memory
Quantity of recorded data	Instantaneous value recording mode: 30,000 data × 8 CH
Power outage protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

10.5.3 Each Channel Output Function

Host Command

Output state	Held * Released via the reset switch or by a command.

Module Monitoring

Sampling	Once/second
Threshold	High and low limits may be set.
Logic output function	Outputs the result of Boolean logic calculations for the channels of an 8-channel input module. * Selects "Logic output function" or "module measurement judgment function" (for each channel).
Judgment parameter	The instantaneous value is determined each second.
Output hold	Selects Hold or Not Hold. Released via the reset switch or by a command.
Filter function	If the judgment results during the specified time are the same, the result is output.

Output Relating Function

Related channel	The channels do not issue output while the high-priority channel is doing likewise.

10.5.4 General Specifications

Clock accuracy	±100 ppm (Reference value at temperature from 0 to 50°C (32 to 122°F) without the communications module)	
Backup	Recorded data (saved in flash memory) * Data loss for up to 2 minutes before and after a power outage may occur.	
Communication interface	CAN bus (500 kps)	
Maximum rated voltage to earth	33 Vrms, 70 VDC (Sum with input voltage)	
Maximum rated voltage to earth	5 ± 0.25 VDC	
Maximum rated power	1.4 W	
Withstand voltage	500 VAC Between output terminal and CAN bus (50/60 Hz, Response current 5 mA, one minutes	
Dimensions	Approx. 22.5W × 96H × 85D mm (0.89"W × 3.78"H × 3.35"D) (excluding projections)	
Mass	Approx. 120 g (4.2 oz.)	
Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)	
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (with no condensation)	
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)	
Standards applying	Safety	EN61010-1:2001 Pollution degree 2
	EMC	EN61326:1997+A1:1998+A2:2001+A3:2003 Class A

2343-20 RS LINK MODULE 11

11.1 Overview

11.1.1 Product Overview

he 2343-20 is a measurement module for the Hioki "Smart Site" (remote measurement system). The module transmits commands to the device connected to the RS-232C terminal at regular intervals and stores the returned values from the device in memory.
It is used with a power supply module, a communications module, and a module base.

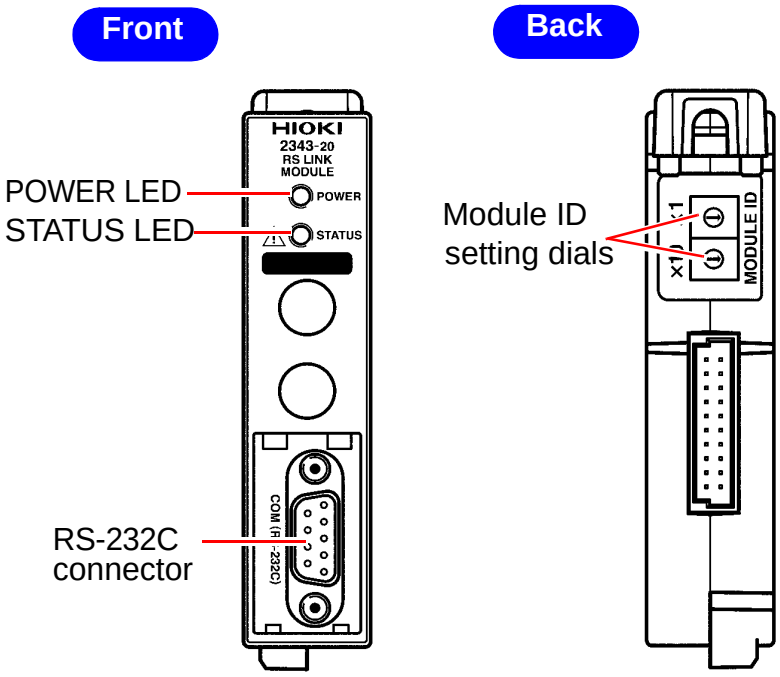
Standard connectable RS-232C device	3331, 3332, MELSEC
Number of connectable devices	1 unit

(Conceptual image)

11.1.2 Major Features

- **The recording interval can be set between 1 second and 60 minutes.**
- **Devices with RS-232C terminals can be connected to this module and incorporated into the Hioki remote measurement system.**

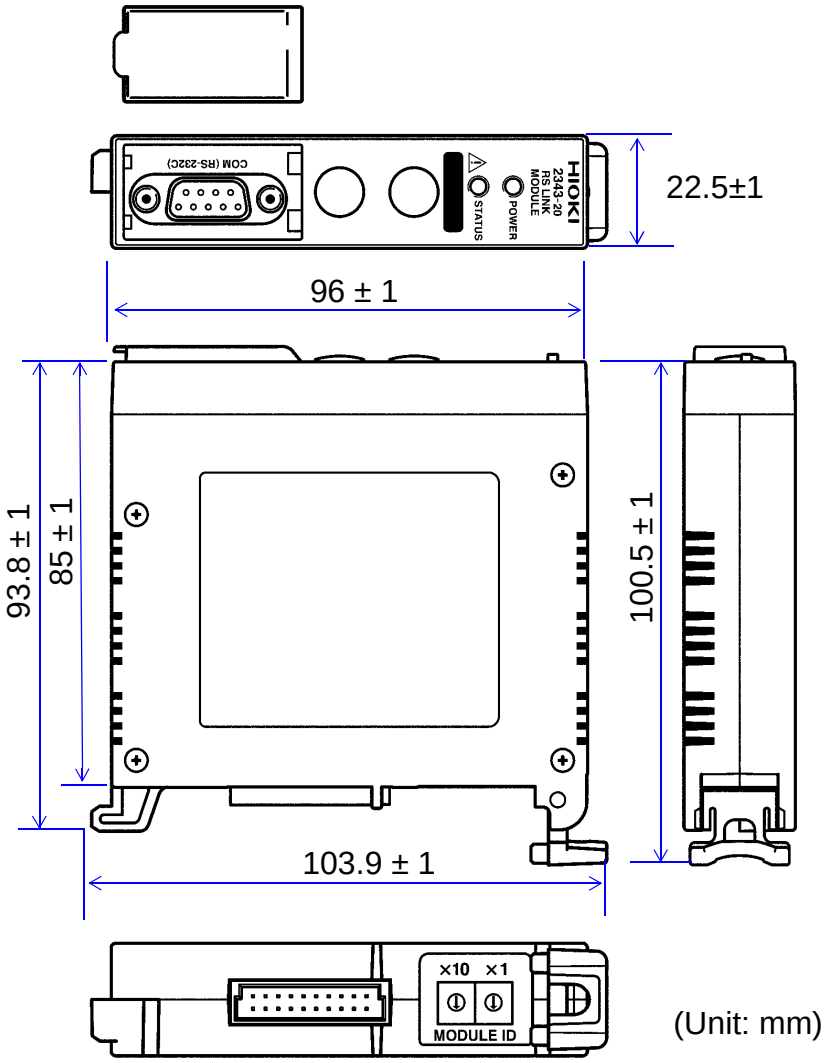
11.1.3 Name and Function of the Parts



POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Data being recorded. Flashing in green : Standing by. Flashing in yellow:RS232C communications down Lit in red : Non-recoverable error occurred. *1 Flashing in red : Recoverable error occurred. *2
STATUS LED	Stays ON, begins flashing or changes color depending on the operating status of the module. Lit in green : Communicating via RS-232C.
RS-232Cconnector	Connect an RS-232C cable (optional) to this terminal.
Module ID setting dial	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your dealer or Hioki representative.
*2: The same module ID may be used by another module.

11.1.4 Dimension Diagrams



(Unit: mm)

11.1.5 Accessory and Option

Accessories

None

Option

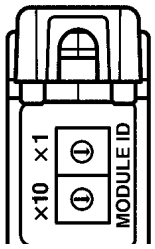
9612 RS-232C CABLE 1
9637 RS-232C CABLE 1

11.2 Settings

11.2.1 Setting the Module ID

You can connect up to 63 modules (measurement, input/output, and link) to one communications module.

Setting Procedure



Use the module ID setting dial to set the ID No. of the module to a number from 01 and to 63. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used for any other module connected to the same communications module.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID are not related and can be set independently.
- For COM ID, see the instruction manual for the communications module.

11.3 Preparations

11.3.1 Installing the Module

(1) Installing the Module Base

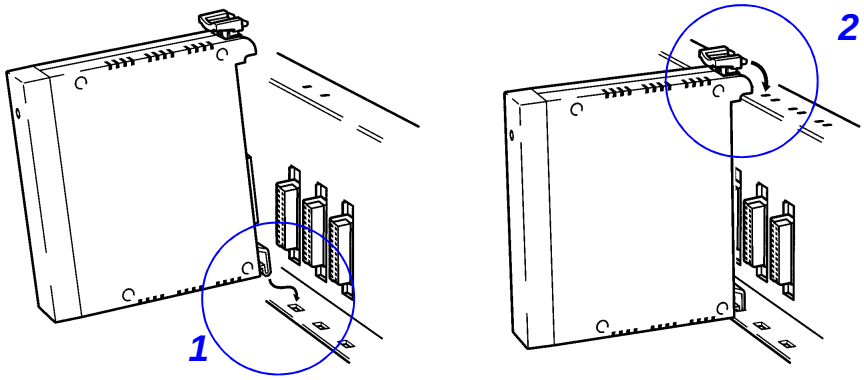
⚠CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

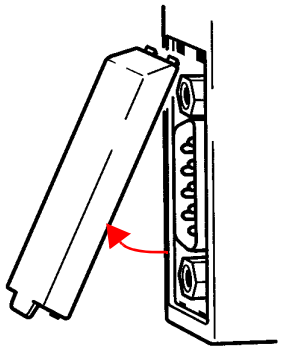
(2) Mounting a Module on the Module Base

Mount a module on the module base as shown below. Ensure that the lever clicks.



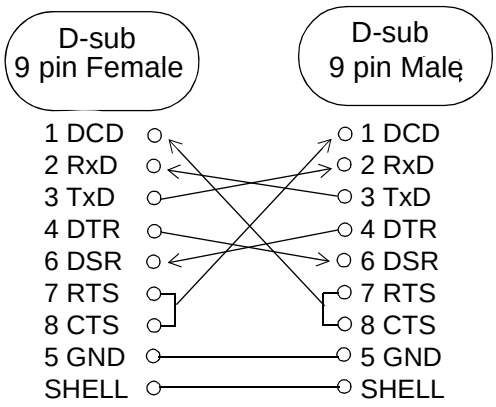
11.3.2 Connecting RS-232C Cable to the Module

1. Remove the cover from the RS-232C terminal on this module.
2. Connect the RS-232C cable to the module.
3. Connect the RS-232C cable to the external device.



Compatible Cables

- The 9637 RS-232C CABLE (1.8 m/ 5.9 feet)
- When using a commercially available cable, use one with the following wiring configuration:



NOTE When connecting with the 3168, use the 9612 RS-232C cable.

11.4 Specifications

11.4.1 Basic Specifications

Operations	Communicates with an external RS-232C device and obtains the status of or controls the device.
External communications interface	RS-232C Connector : D-SUB 9-pin Transmission rate : 2400/4800/9600/19200/38400/57600 bps Parity : None/Odd/Even Bit length : 7 bits/ 8 bits Stop bit : 1 bit/ 2 bits Handshake : None
Internal communications interface	CAN (for communications with the communications module at a rate of 500 kbps)
Standard connectable device	3331, 3332, 3193 (On special order), MELSEC

11.4.2 Function Specifications

Execute the functions from the PC application via communications.

Monitoring function

This function outputs the current status of the output terminal (hereinafter called "measured value").

Measured value recording function

This function sends commands to external RS devices at every preset recording interval, and records the values returned (measured values).	
Command value format	ASCII/Binary format, selectable ♦ When setting an arbitrary device
Return value format	ASCII/(Comma/character-delimited)/Binary (Fixed length), selectable ♦ When setting an arbitrary device
Real-time management	This is automatically set from the PC application at the start of recording.
Recording start	Immediate start/Reserved-time start
Recording end	Manual end/Reserved-time end
Operation when memory is full	Memory full stop /Endless ♦Set the condition before the start of recording.
Recording interval	1/2/5/10/15/20/30 sec., 1/2/5/10/15/20/30/60 min.
Recording mode	• Instantaneous value • MAX/MIN/AVE • Instantaneous value + MAX/MIN/AVE Total 3 modes ♦Set the mode before the start of recording.
Recorded data	One data set: Time + value returned from an external device.
Quantity of recorded data	It depends ondconnectable device.
Recording capacity	512 k bytes Flash memory
Power outage protection	After recovering from a power outage, the instrument automatically returns to the state held before the outage.

Alarm judgment and recording function

At every sampling, the function makes alarm judgment as to whether the input is active or not, and records the change history in flash memory if the measured value recording function of the system is active.	
Judgment method	Active Hi/Lo (Active ON/OFF) can be set selectively. Judges instantaneous values at every sampling.
Recording date	One data set contains time, generation/reversion , CH and judgment threshold.
Alarm output	Alarm output × 1 CH ♦Output is turned ON when an alarm (Hi or Lo) occurs. Whether to hold the alarm output can be selected. The reset switch or a command can be used to reset alarms.

11.4.3 General Specifications

Clock accuracy	±100 ppm (Reference value at temperature from 0 to 50°C (32 to 122°F) without the communications module)	
Backup	Recorded data (saved in flash memory) * Data loss for up to 2 minutes before and after a power outage may occur.	
Rated supply voltage	5 ± 0.3 VDC	
Maximum rated power	1.4 W	
Dimensions	Approx. 22.5W × 96H × 85D mm (0.89"W × 3.78"H × 3.35"D) (excluding projections)	
Mass	Approx. 150 g (5.3 oz.)	
Options	9637 RS-232C CABLE .....1 9612 RS-232C CABLE 1	
Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)	
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (with no condensation)	
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)	
Standards applying	Safety	EN61010-1:2001 Pollution degree 2
	EMC	EN61326:1997+A1:1998+A2:2001+A3:2003 Class A

2351 AIR MODULE
2352-20 WIRE MODULE
12

12.1 Overview

In this manual, the 2351-20 and 2351-21 are indicated as 2351, except when the full model number is specified.

12.1.1 Product Overview

- The 2351 and 2352-20 are the communications module of Hioki "Smart Site" (remote measurement system).
- The 2351 and 2352-20 are used with the power supply module, measurement module, and module base.
- This module links the measurement modules with a PC, server, and communications infrastructure, and transfers data.
- The transmission speed is 51.9 kbps for wireless communications and 57.6 kbps for RS-232C communications.

Number of communications modules connectable to one host	Up to 88 units (2351)
Number of measurement modules connectable to one wireless module	Up to 63 units (2351, 2352-20)

(Conceptual image)

Conformity for regulations on wireless communication.
2351-20 can be used in the EU and Korea only.
Contains already Notified and Certified Transmitter
Module:
R&TTE: NB No.; 0682 Registration No.; E812974O-CC
MIC: Type ID; LARN8-IO2F2402/2479TR0.006F1D783
Certification No.; FUT-FRH-SD07TB
Date of Cirtification; 01(Month) 11(Date) 2006(Year)
Model No. of Equipment;FRH-SD07TB
Manufacturer/Applicant; FUTABA CORPORATION, Japan

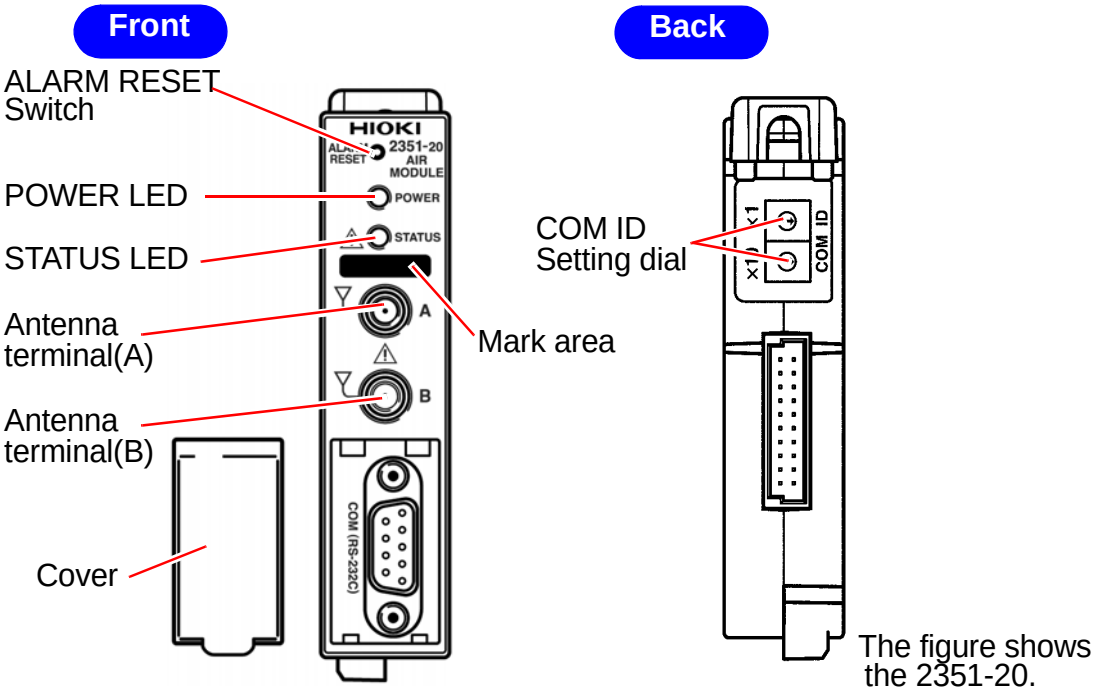
2351-21 can be used in the U.S.A. and Canada only.
Contains FCC ID: AZP-FRH-SD07TU
IC: 5829A-235121
Operation is subject to the following two conditions:
(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device.
The following notices are for Canada only:
This device has been designed to operate with an antenna having a maximum gain of 2.14 dB.
Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The Required antenna impedance is 50 ohms.
To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.
The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada ' s website www.hc-sc.gc.ca/rpb.

12.1.2 Major Features

2351 AIR MODULE
- This communications module employs SS wireless technology, which is one feature of this system. It requires no communications cables, which reduces cost and installation time, and simplifies configuration of a measurement system.
- The module has two antenna terminals and supports diversity reception. (Only one terminal is used for sending.)
- When used in combination with the 2353 LAN Module, the instrument can be connected to a LAN.

2352-20 WIRE MODULE
- This communications module sends and receives data via the RS-232C.
- This module is designed to be incorporated into the customer's equipment or used for a small system consisting of one 2300 Module.

12.1.3 Name and Function of the Parts



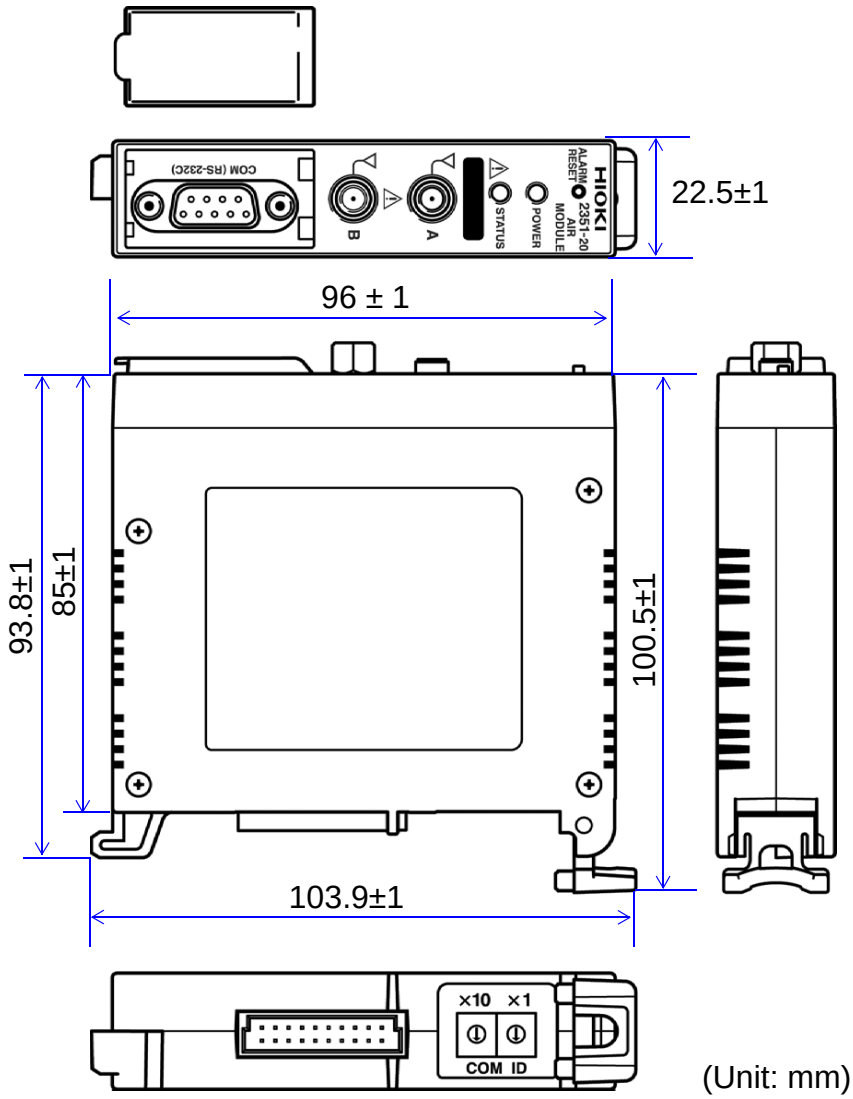
POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Operating normally Lit in yellow : Alarm output. Lit in red : Non-recoverable error occurred.*1 Flashing in red : Recoverable error occurred. *2
STATUS LED	Remains on, flashes, or changes to another color according to the state of the module. STATUS LED indication Lit in green :Communicating
Mark area	Use this area to make a note of the object to measure or the COM ID. Use an ink pen, since pencil lead may rub off.
RS-232C terminal	Connect the RS-232C cable to this terminal. Use the 9637 RS-232C CABLE (option).
Antenna terminal (A) (2351 only)	Connect the sending/receiving antenna to this terminal. Antenna terminal (B) has no transmission function. When using only one antenna, connect it to this terminal.
Antenna terminal (B) (2351 only)	This terminal is for the receiving antenna only. To perform diversity reception, connect the receiving antenna to this terminal.
ALARM RESET switch	This switch cancels alarm output. Hold down the switch for at least one second to cancel the alarm.
COM ID setting dial	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your vendor (agent) or nearest Hioki office.
*2: The cause of an error may be the connection of two or more communication modules. If a wireless module and LAN module are to be used, set the COM ID of the LAN module to "00."

NOTE

- Antenna terminal (B) is for receiving only and has no transmission function.

12.1.4 Dimension Diagrams



12.1.5 Accessory and Option

Accessories

None

Option

9760	ANTENNA (With antenna base)*
9760-01	ANTENNA (Weatherproof with antenna base)*
9760-02	ANTENNA (Pencil-shaped with L-angle)*
9760-03	ANTENNA (Patch type, Single reception, With antenna base)
9760-04	ANTENNA (Patch type, Diversity reception, With antenna base)
9761	ANTENNA CABLE (1 m)*
9761-01	ANTENNA CABLE (2 m)*
9761-02	ANTENNA CABLE (5 m)*
9637	RS-232C CABLE

*For 2351 only

12.2 Settings

12.2.1 Setting the COM ID

You can connect up to 89 communications modules to a PC or server.

Setting Procedure

Use the COM ID setting dial to set the ID No. of the module from 01 to 89. (You cannot set it to a number other than indicated above.)

NOTE

- When the instrument is connected to a server or PC through a LAN, if to be used as the host wireless unit, set COM ID of the 2353 LAN module to "00."

❖ **13.2.1 "Setting the COM ID"(P.210)**

- Ensure that the set ID is not used by any other communications module on the system controlled by the same PC or server.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID and COM ID are not related and can be set independently.

12.3 Preparations

12.3.1 Installing the Module

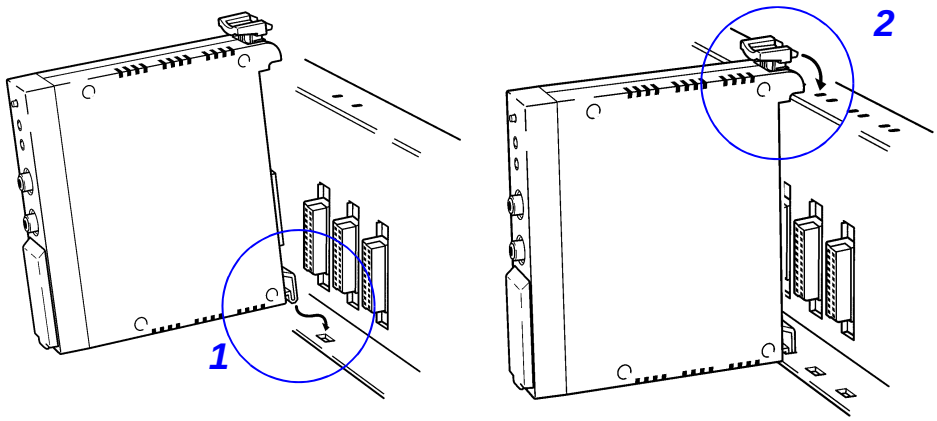
(1) Installing the Module Base

⚠CAUTION Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

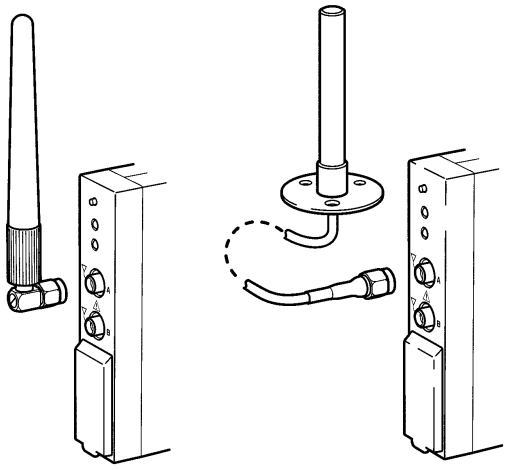
(2) Mounting a Module on the Module Base

Install this module next to the power module.
Insert the levers of the module into the module-mounting slots to mount the module as shown below. Ensure that the levers click into position.



12.3.2 Connecting Sending/Receiving Antenna to Module (2351 Only)

1. Insert the antenna into the module.
2. Tighten the SMA nut on the antenna side by hand.
3. Then use an 8-mm spanner to securely tighten the nut.



NOTE

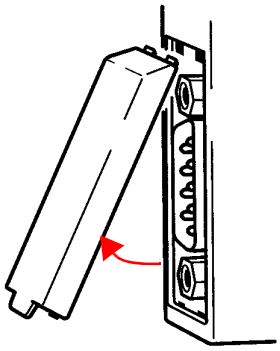
- Antenna terminal (A) can transmit and receive signals. Use this terminal when using only one antenna for communications.
- Antenna terminal (B) is for receiving only and has no transmission function. To perform diversity reception, connect the receiving antenna to this terminal.

Compatible Antennas and Extension Cables:

9760	ANTENNA (With antenna base)
9760-01	ANTENNA (Weatherproof with antenna base)
9760-02	ANTENNA (Pencil-shaped with L-angle)
9760-03	ANTENNA (Patch type, Single reception, With antenna base)
9760-04	ANTENNA (Patch type, Diversity reception, With antenna base)
9761	ANTENNA CABLE (1 m)
9761-01	ANTENNA CABLE (2 m)
9761-02	ANTENNA CABLE (5 m)

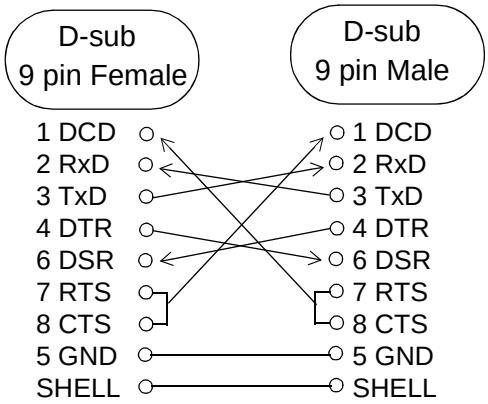
12.3.3 Connecting RS-232C Cable to Module

- Connect an RS-232C cable to the RS-232C terminal for communicating with a PC or server via RS-232C.
- Remove the cover from the RS-232C terminal and connect an RS-232C cable to it.



Compatible Cables

- The 9637 RS-232C CABLE (1.8 m) for PC/AT compatible PC
- When using a commercially available cable, use one with the following wiring configuration:



12.4 Specifications

12.4.1 Basic Specifications

Operation	Enables communications between a PC and the measurement modules when positioned between both. Also relays communications between wireless modules (2351 only).
External communications interface	SS wireless* (SMA connector for connecting antenna × 2, transmission speed of 51.9 kbps for diversity reception, 2351 only) RS-232C (D-sub 9-pin, used for setting parameters, transmission speed of 57.6 kbps)
Internal communications interface	CAN (Connecting communications modules to measurement modules, transmission speed of 500 kbps)

* Frequency Assignments

1.Frequency Band

The 2351 has 48 individual frequencies between 2426 MHz and 2473 MHz with 1 MHz separation in each frequency. One band consists of 24 frequencies in the 48 frequencies for select/ operate. See the table below for the exact frequency assignments.

2. Frequency Allocation

24 Frequency are assigned each frequency band (01,and 02) with 1 MHz separation. If 1 MHz adjacent frequency separation is utilized in a same area, the possibility of adjacent channel interference exists because the difference of reception signal level between the desired signal and undesired leakage from the adjacent channel. Therefore, more than 2 MHz separation operation is recommended.

Frequency Table

Freq. No.	Freq. (MHz)	
	01 Band	02 Band*
0	2426	2450
1	2427	2451
2	2428	2452
3	2429	2453
4	2430	2454
5	2431	2455
6	2432	2456
7	2433	2457
8	2434	2458
9	2435	2459
10	2436	2460
11	2437	2461
12	2438	2462
13	2439	2463
14	2440	2464
15	2441	2465
16	2442	2466
17	2443	2467
18	2444	2468
19	2445	2469
20	2446	2470
21	2447	2471
22	2448	2472
23	2449	2473

*Both France and Spain are band limited, please use 02 Band for operation.

12.4.2 Function Specifications

Clock function	RTC is built in (year, month, day, hour, minute, and second). Corrects the internal clock of each measurement module at irregular intervals.
Alarm clear	Clears alarm output of a measurement module, controlled by key operation or communications.
Number of modules to connect	External communications: up to 89 units (Assign a COM ID to each communications module.) Internal communications: up to 63 units (Assign a MODULE ID to each measurement module.)

12.4.3 General Specifications

Clock accuracy	±30 ppm (Reference value at temperature from 0 to 50°C (32 to 122°F))
Backup	Clock (uses a lithium battery) ♦Battery life: approx. 5 years (Reference value at temperature 25°C (77°F)
Rated supply voltage	5 V±0.3 VDC
Maximum rated power	1.4 W
Dimensions	Approx. 22.5W × 96H × 85D mm (0.89"W × 3.78"H × 3.35"D) (excluding projections)
Mass	2351: Approx. 150 g (5.3 oz.) 2352-20: Approx. 125 g (4.4 oz.)
Options	9760 ANTENNA (With antenna base)* 9760-01 ANTENNA (Weatherproof with antenna base)* 9760-02 ANTENNA (Pencil-shaped with L-angle)* 9760-03 ANTENNA (Patch type, Single reception, With antenna base) 9760-04 ANTENNA (Patch type, Diversity reception, With antenna base) 9761 ANTENNA CABLE (1 m)* 9761-01 ANTENNA CABLE (2 m)* 9761-02 ANTENNA CABLE (5 m)* 9637 RS-232C CABLE (1.8 m) *For 2351 only
Operational ranges for temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)
Temperature and humidity ranges for storage	-10 to 50°C (32 to 122°F), 80%RH or less (with no condensation)
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)
Standards applying	Safety*1 : EN61010-1:2001 Pollution Degree 2 EMC*1 : EN61326:1997+A1:1998+A2:2001+A3:2003 CLASS A R&TTE*1 : EN300 440-2 V1.1.1:2001 (Registration No.: E812974O-CC) MIC*1 :Type ID:LARN8-IO2F2402/2479TRO.006F1D78 (Certification No.:FUT-FRH-SD07TB) FCC*2 : Part 15.247 (FCC IDENTIFIER: AZP-FRH-SD07TU) IC*2 : RSS210 (IC IDENTIFIER: 5829A-235121) *1: For 2351-20 only *2: For 2351-21 only

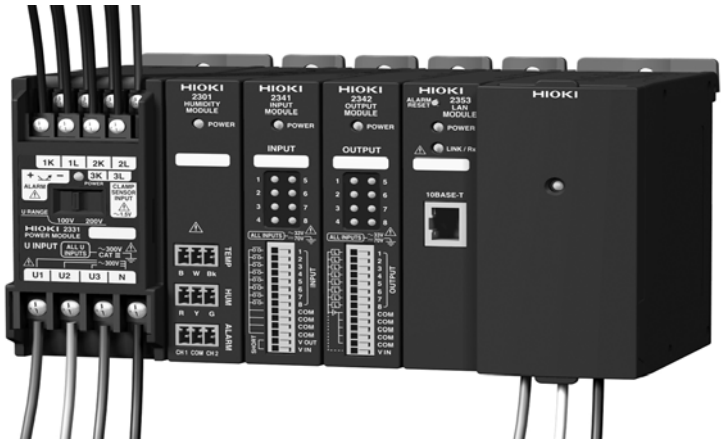
2353-20 LAN MODULE 13

13.1 Overview

13.1.1 Product Overview

The 2301-20 is the communications module of Hioki "Smart Site" (remote measurement system).
This module is used with the power supply module, measurement module, and module base.
This module links the measurement modules with a PC, server, and communications infrastructure, and transfers data.
10BASE-T supports LAN communication.

Number of communications modules connectable to one FA server or a PC	Up to 89 units
Number of measurement modules connectable to one communications module	Up to 63 units

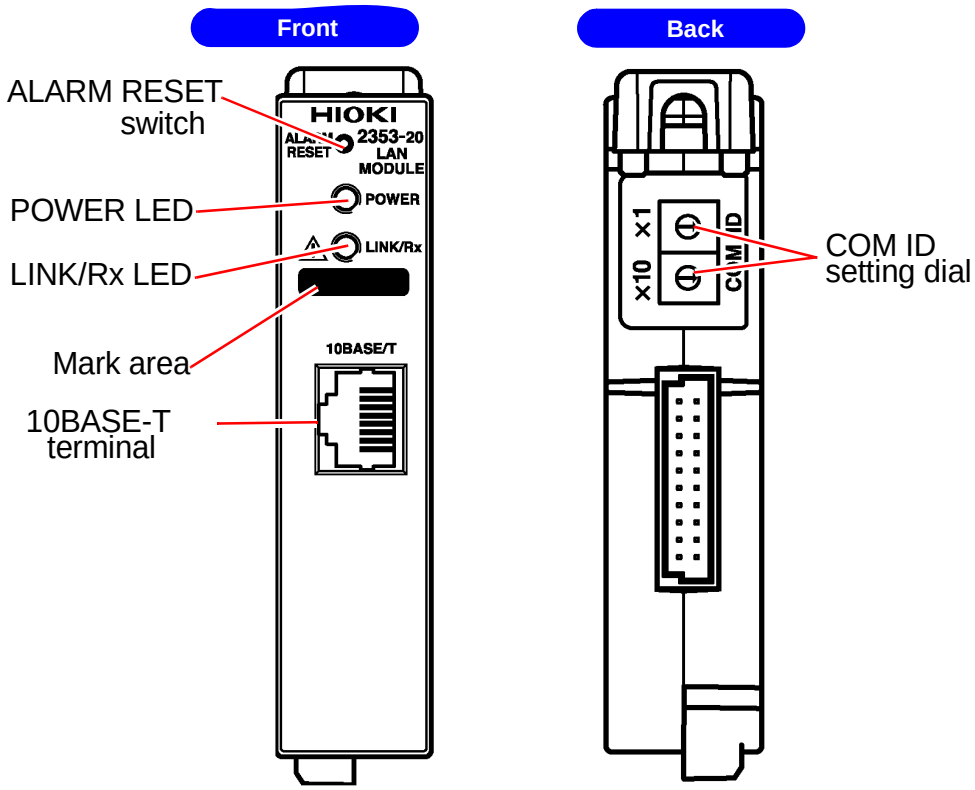


(Conceptual image)

13.1.2 Major Features

- **The communication interface supports 10BASE-T. The module lets you record data via LAN communication.**
- **The host unit of a 2351 air module can be connected to a LAN.**

13.1.3 Name and Function of the Parts



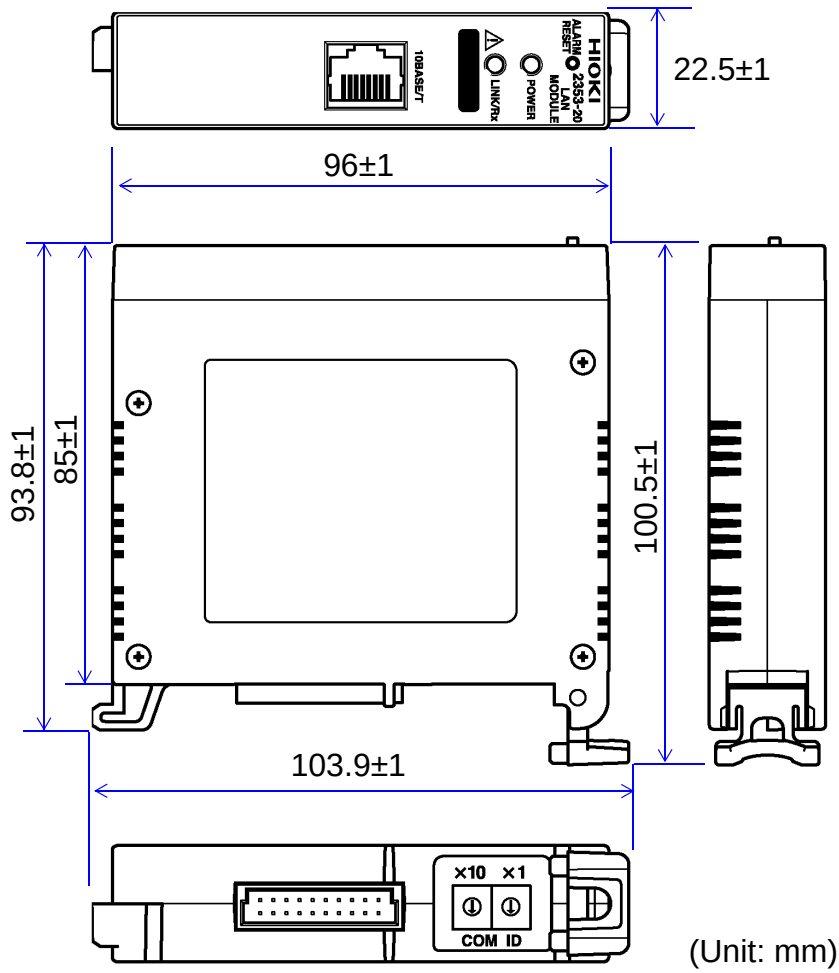
POWER LED	Goes on or flashes when power is supplied to the module. Remains on, flashes, or changes to another color according to the state of the module. **POWER LED indication** Lit in green : Operating normally Lit in yellow : Alarm output. Lit in red : Non-recoverable error occurred. *1 Flashing in red : Recoverable error occurred.*2
LINK/Rx LED LED	Remains on, flashes, or changes to another color according to the state of the module. Lit in green: Linking in progress. (The LAN cable is properly connected.) Flashing in yellow:Communicating
Mark area	Use this area to make a note of the object to measure or the com ID. Use an ink pen, since pencil lead may rub off.
10BASE-T terminal	The 9642 LAN cable connects the terminal and a PC.
ALARM RESET switch	This switch cancels alarm output. Hold down the switch for at least one second to cancel the alarm.
COM ID setting dial	Use the dial to set the module's identification No.

*1: The module needs repair. Contact your dealer or Hioki representative.

*2: The cause of an error may be the connection of two or more communication modules. If a wireless module and LAN module are to be used, set the COM ID of the LAN module to "00."

NOTE The LED starts flashing in yellow when power is turned on. If it does not stop flashing after 20 seconds, check the setting of the CAN termination switch on the 2391 or 2392 series MODULE BASE [**TERMINATION ON/OFF**]. (The switch should normally be set ON. When using the CAN bus, be sure to turn off the switch of the corresponding terminal No.) If the setting is not correct, turn off the power, then correct the setting. For details, see the 2391 or 2392 series MODULE BASE instruction manual.

13.1.4 Dimension Diagrams



(Unit: mm)

13.1.5 Accessory and Option

Accessories

None

Option

9642 LAN CABLE (Straight/cross conversion connector provided, 5 m)

13.2 Settings

13.2.1 Setting the COM ID

(1) 2351 AIR MODULE + 2353 LAN MODULE are used in combination

When the host wireless unit is connected to the server or PC through a LAN, the 2351 air module and 2353 LAN module are used in combination.
You can connect up to 89 communications modules to one server or a PC.
(A set of air modules + LAN module is counted as one unit.)

Setting Procedure

Set the ID numbers of the communication modules using the COM ID setting dial, as shown below:
(You cannot set a number other than the above.)

LAN modules	COM ID: 00
Air modules	COM ID: 01 to 89

(2) Use of the Instrument Solely with the 2353LAN Module

Connect the measuring module to a server or PC through a LAN.
You can connect up to 89 communications modules to one server unit or a PC.

Setting Procedure

Use the COM ID setting dial to set the ID No. of the module to a number from 01 and to 89. (You cannot set a number other than the above.)

NOTE

- Ensure that the set ID is not used by any other communications module on the system controlled by the same server or PC.
- The ID numbers of modules need not be consecutive.
- Setting the ID to 99, then turning on the power resets all internal settings to the defaults.
- The module ID, COM ID, and IP address are not related and can be set independently.

13.3 Preparations

13.3.1 Installing the Module

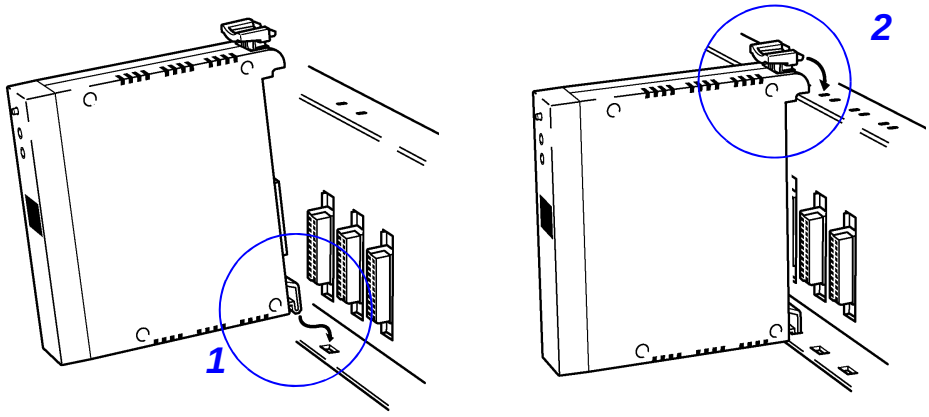
(1) Installing the Module Base

⚠CAUTION Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(2) Mounting a Module on the Module Base

Insert the levers of the module into the module-mounting slots to mount the module as shown below. Ensure that the levers click into position.



13.3.2 Connecting the LAN Cable

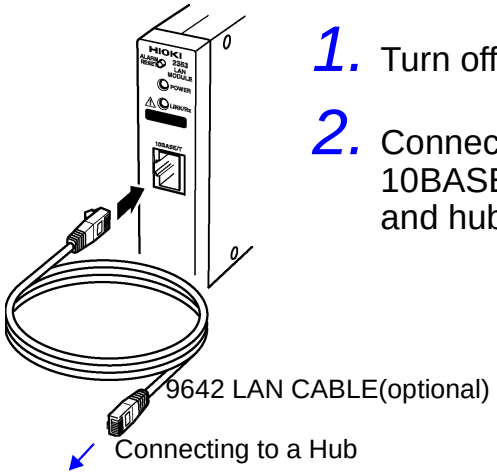
CAUTION

• Before connecting this server to a hub or PC, make sure that said devices are powered off to prevent internal damage.

Connecting the 2353-20 to a Hub

(When using a 2353-20 module connected to a network)

Use the 9642 LAN CABLE (optional) to connect the 2353-20 to the hub.

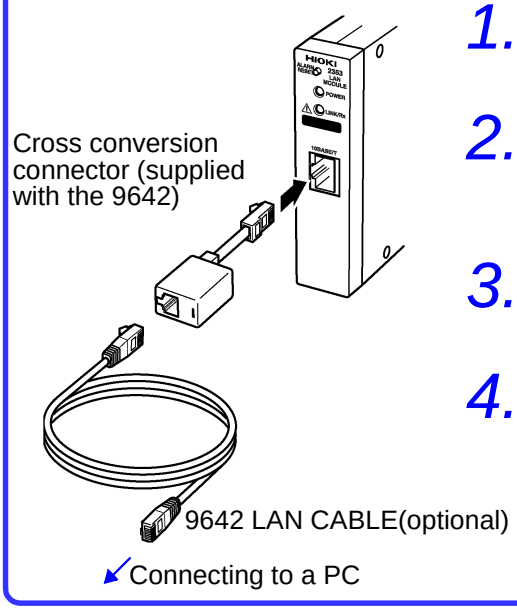


1. Turn off power of the system and hub.
2. Connect the 9642 LAN CABLE to 10BASE-T connectors of the 2353-20 and hub.

Connecting the 2353-20 to a PC

(To directly connect the 2353-20 to a PC)

Use the 9642 LAN CABLE (optional) to connect the 2353-20 to a PC.



1. Turn off power of the system and PC.
2. Connect the 9642 LAN CABLE to the cross conversion connector supplied.
3. Connect the 9642 LAN CABLE to the 10BASE-T connector of the PC.
4. Connect the 9642 LAN CABLE to the 10BASE-T connector of the PC.

13.3.3 Setting the IP Address

The following software is required for setting the IP address.
For details, contacting your dealer or Hioki representative.

- 9768 Smart Site Utility Pro

Refer to the software manual for how to configure the IP address.

NOTE Contact your network administrator for the setting value of the IP address.

13.4 Specifications

13.4.1 Basic Specifications

Operation	Enables communications (data acquisition, setting) between a PC and the measurement modules when positioned between both. When used in combination with the 2351 wireless module, this module functions as an RS-232C-LAN converter.
External communications interface	LAN IEEE802.3 Ethernet 10BASE-T Connector: RJ-45
Internal communications interface	CAN (Connecting LAN modules to measurement modules) transmission speed of 500 kbps

13.4.2 Function Specifications

Modbus Communication function	Data is output after receiving communication commands from Modbus/TCP-compatible external devices.
E-mail send function	Upon monitoring slave measurement modules for alarm signals, an e-mail will be sent via the mail server when an anomaly or its reset occurs. Maximum number of e-mail addresses that can be saved: 20 (per one LAN module) Maximum number of e-mail address per transmission: 4 (per one monitoring channel)
Clock function	RTC is built in (year, month, day, hour, minute, and second). Corrects the internal clock of each measurement module at irregular intervals.
Alarm clear	Clears alarm output of a measurement module, controlled by key operation or communications.
Number of modules to connect	External communications: up to 89 units (Assign a COM ID to each communications module.) Internal communications: up to 63 units (Assign a MODULE ID to each measurement module.)

13.4.3 General Specifications

Clock accuracy	±30 ppm (Reference value at temperature from 0 to 50°C)	
Backup	Clock (uses a lithium battery) Battery life: approx. 5 years (Reference value at temperature 25°C (77°F)	
Rated supply voltage	5 VDC±0.3 V	
Maximum rated power	1.4 W	
Dimensions	Approx.22.5W × 96H × 85D mm (0.89"W × 3.78"H × 3.35"D) (excluding projections)	
Mass	Approx.120 g (4.2 oz.)	
Option	9642 LAN CABLE (Straight/cross conversion connector provided, 5 m)	
Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (non-condensating)	
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (non-condensating)	
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)	
Applicable standards	Safety	EN61010-1:2001 Pollution degree 2
	EMC	EN61326:1997+A1:1998+A2:2001+A3:2003 Class A

2361-20 AC POWER MODULE 14

14.1 Overview

14.1.1 Product Overview

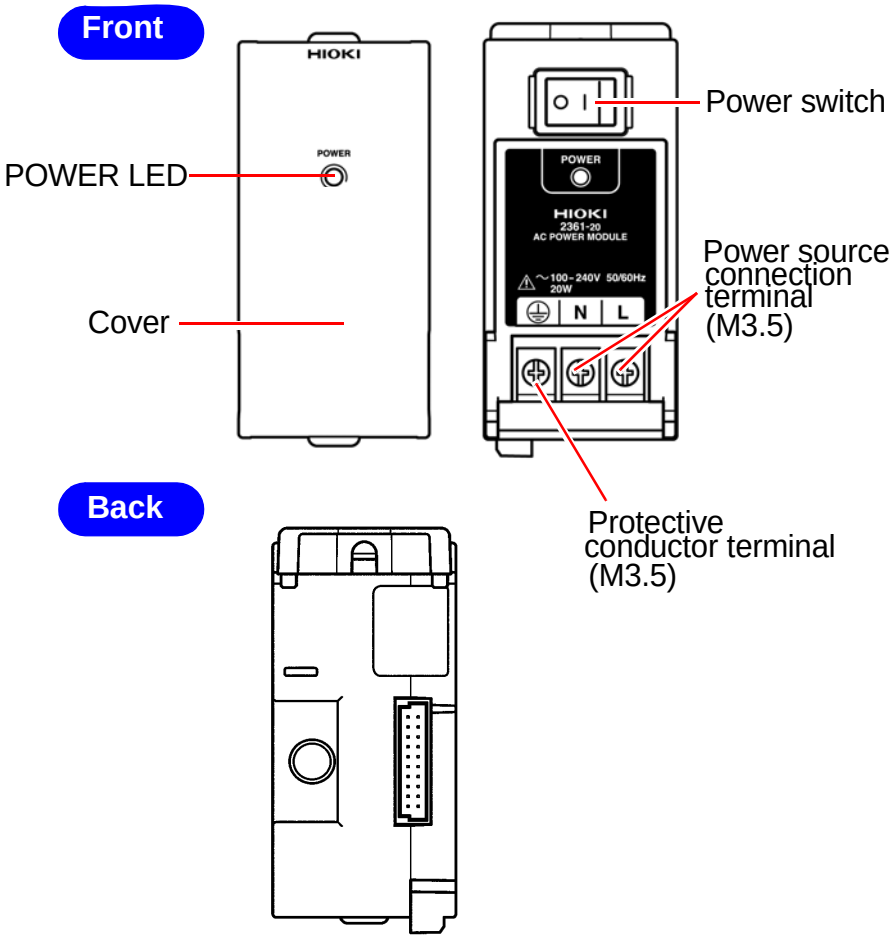
- The 2361-20 is a power module of the Hioki "Smart Site" (remote measurement system).
- The 2361-20 is used with the communications module, meausrement module, and module base.
- The power supply module supplies power to one communications module and 10 measurement modules (or five power meter modules)

(Conceptual image)

14.1.2 Major Features

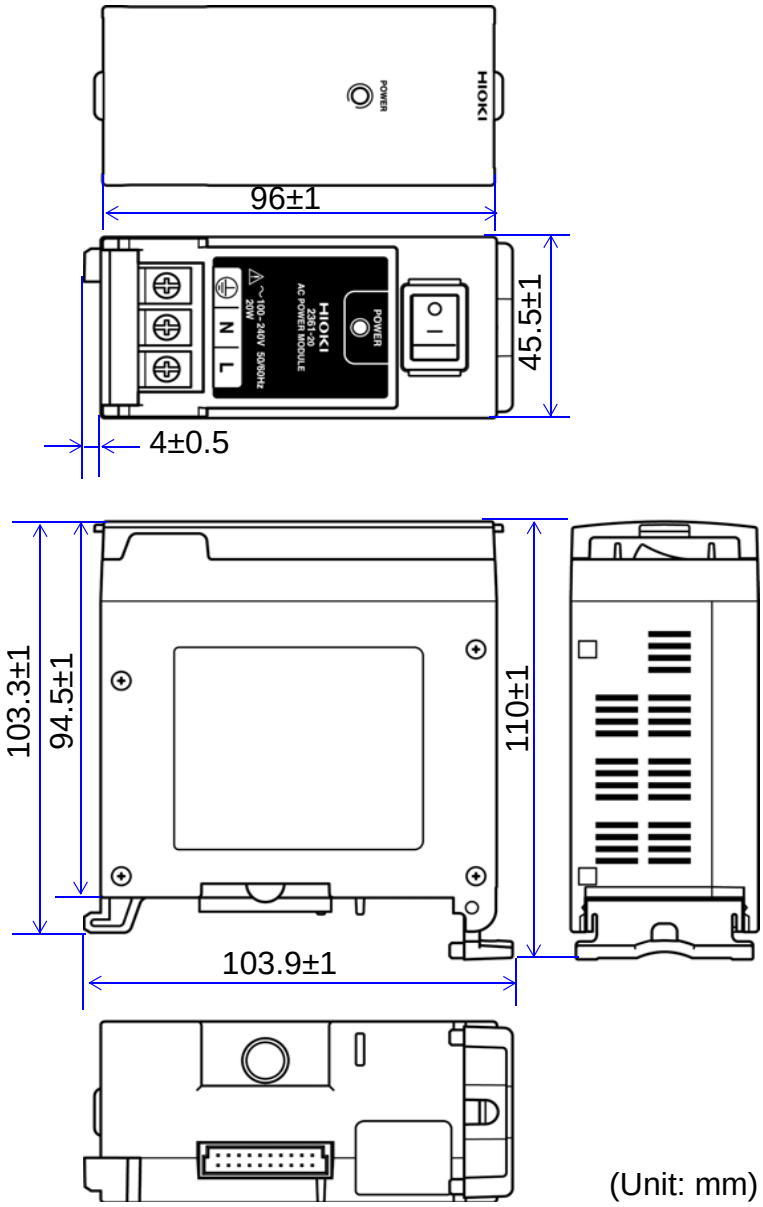
The module supplies the rated supply voltage, ranging from 100 to 240 VAC (50/60Hz), without any manual switching.

14.1.3 Name and Function of the Parts



Power switch	Turns power ON/OFF. ❙ side : Power ON, ○side: Power OFF
POWER LED	Remains green while the module is in operation. **POWER LED indication** Lit in green: Power ON
Power source connection terminal N (-), L (+)	Connect the power cord.
Protective conductor terminal	This is an protective earthing terminal. Be sure to ground the terminal.

14.1.4 Dimension Diagrams



(Unit: mm)

14.1.5 Accessory and Option

Accessories

Ferrite clamp 1

Option

9239-20 POWER CORD (for USA, with round crimp connector)
9239-21 POWER CORD (for CE, with round crimp connector)

14.2 Preparations

14.2.1 Installing the Module

(1) Installing the Module Base

⚠CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(2) Mounting a Module on the Module Base

⚠WARNING

We make every effort to ensure the quality of this system. However, should the system emit a strange odor or smoke, turn off power immediately.
Moreover, to ensure that you can turn power off easily, do not lay cables in front of this module.

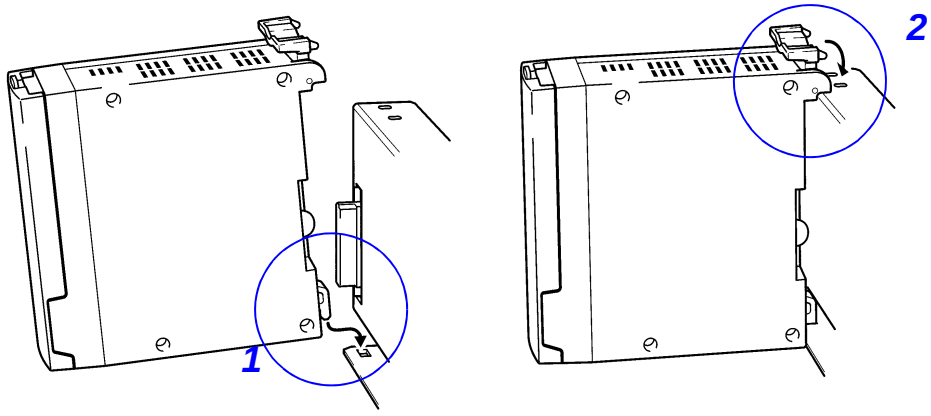
⚠CAUTION

This module does not support parallel operation. Mount only one power supply module on a module base. Mounting two or more modules on a module base may damage the modules.

NOTE

Mount the module in the slots for the power supply module on the left edge of the module base.

Mount a module on the module base as shown below. Ensure that the lever clicks.



14.2.2 Connecting Power Cable

DANGER

- **This device should only be connected to the secondary side of a breaker, so the breaker can prevent an accident if a short circuit occurs.**
- **Connections should never be made to the primary side of a breaker, because unrestricted current flow could cause a serious accident if a short circuit occurs.**
- **Ensure that the 9239 series POWER CORD is not plugged into an AC outlet when connecting it to the module. This will prevent electric shock and short-circuiting.**
- **Ensure that the power switch of the module is OFF when connecting the power cable to the power line. If the switch is ON sparks may be generated and ignite a battery, organic solvent, or any other nearby volatile substance.**
- **Be sure to put the cover on the 2361-20 when the power line is live to avoid electric shock and short-circuiting.**
- **Be sure to connect the earthing terminal to ground to avoid electric shock. Connect the earthing terminal to ground before connecting any other cable.**

WARNING

- **Before turning the device on, make sure the supply voltage matches that indicated on the its power connector. Connection to an improper supply voltage may damage the device and present an electrical hazard.**

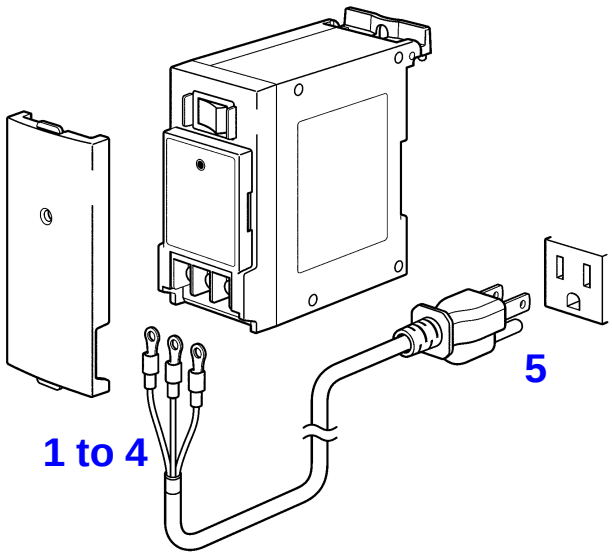
NOTE

The functions of this system may be interfered by external noise or an electromagnetic environment when connecting a cable more than 3 meters long.

1. Remove the cover.

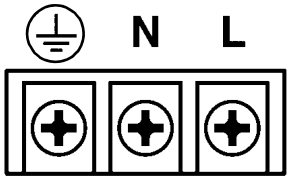
2. Select a power cable of sufficient current-carrying capacity and withstand voltage, considering the power consumption and supply voltage.
Power consumption: 20 W (50 VA)
Available from 100 to 240 VAC (50/60 Hz) without manual switching

   Example:
   300 V vinyl cabtire cable
   3-core, 0.75 mm^2 (AWG18) or more
   The 9239 series POWER CORD (with round crimp connector) is optionally available.

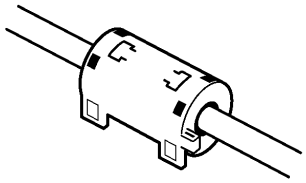


3. Connect the cable leads as shown below (at tightening torque of 0.8 N•m).
We recommend that you use M3.5 round crimp connectors.

Example: RAV 1.25-3.5
When using the optional 9239-20 POWER CORD, connect leads E, N, and L in this order from the left, while referring to the marker tubes.



4. Connect the power cable to the power source (AC outlet or panel-board).
In case of external noise,
mount the ferrite core supplied as an accessory as shown below.



5. Turn on the POWER switch (push it to the "I" side).

6. Secure the cover back in place.

⚠CAUTION

When the power cord is plugged into the power source (power outlet, distribution board, etc.), the terminal block of the instrument bears live power. Take care not to touch it when attaching/removing the cover, or on other occasions, as electric shock or short-circuit may result.

14.3 Specifications

14.3.1 Basic Specifications

Operation	Supplies power to measurement/communications modules and the FA server.
Rated output voltage	5.0 VDC
Maximum output current	2.4 A
Maximum output power	12.0 VA
Output voltage accuracy	±5.0% (Within operating temperature and humidity ranges)

14.3.2 Function Specifications

Overcurrent protection	Min. 105% (Output current limiting and automatic reset)
Overvoltage protection	Min. 110% (Zener diode clamp)
Input surge current	Up to 20 A at 100 VAC or 40 A at 200 VAC
Parallel operation	Not available

14.3.3 General Specifications

Communication interface	Not available
Input terminal	Terminal block (Front panel)
Output terminal	Internal bus connector
Power switch	ON/OFF of output voltage
Rated supply voltage	100 to 240 VAC (50/60 Hz) (Voltage fluctuations of ±10% from the rated supply voltage are taken into account.)
Maximum rated power	20 W
Withstand voltage	3.0 kVAC (Between Input L, N and output) Response current 20 mA 2.0 kVAC (Between Input L, N and FG) Response current 20 mA
Fuse	2.5 A Built-in time-lag fuse (on the live side)
Dimensions	Approx. 45.5W × 96H × 94.5D mm (1.79"W × 3.78"H × 3.72"D) (Including cover, excluding projections)
Mass	Approx. 275 g (9.7 oz.) (Including cover)
Accessories	Ferrite clamp..... 1
Options	9239-20 POWER CORD (for USA, with round crimp connector) 9239-21 POWER CORD (for CE, with round crimp connector)

Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (non-condensating)	
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (non-condensating)	
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)	
Applicable standards	Safety	EN61010-1:2001 Pollution degree 2
	EMC	EN61326:1997+A1:1998+A2:2001+A3:2003 CLASS A EN61000-3-2:2000 EN61000-3-3:1995+A1:2001

2362-20 DC POWER MODULE 15

15.1 Overview

15.1.1 Product Overview

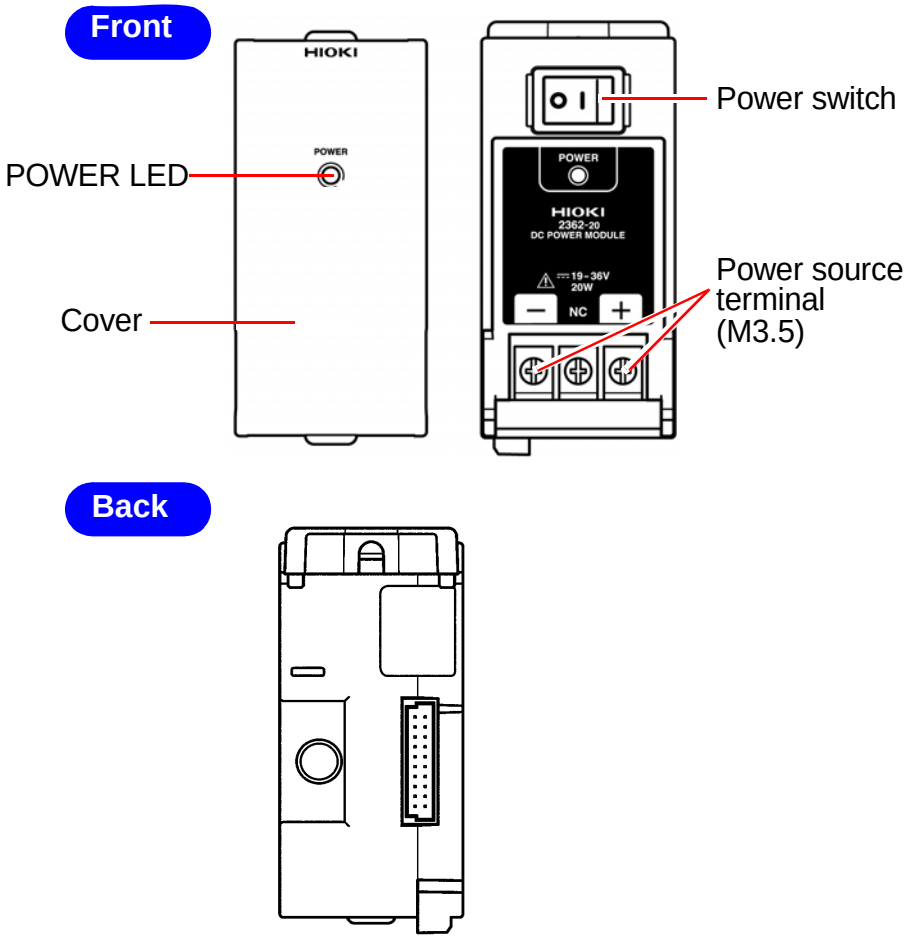
- The 2362-20 is a power module of the Hioki "Smart Site" (remote measurement system).
- The 2362-20 is used with the communications module, meausrement module, and module base.
- The power supply module supplies power to one communications module and 10 measurement modules (or five power meter modules)

(Conceptual image)

15.1.2 Major Features

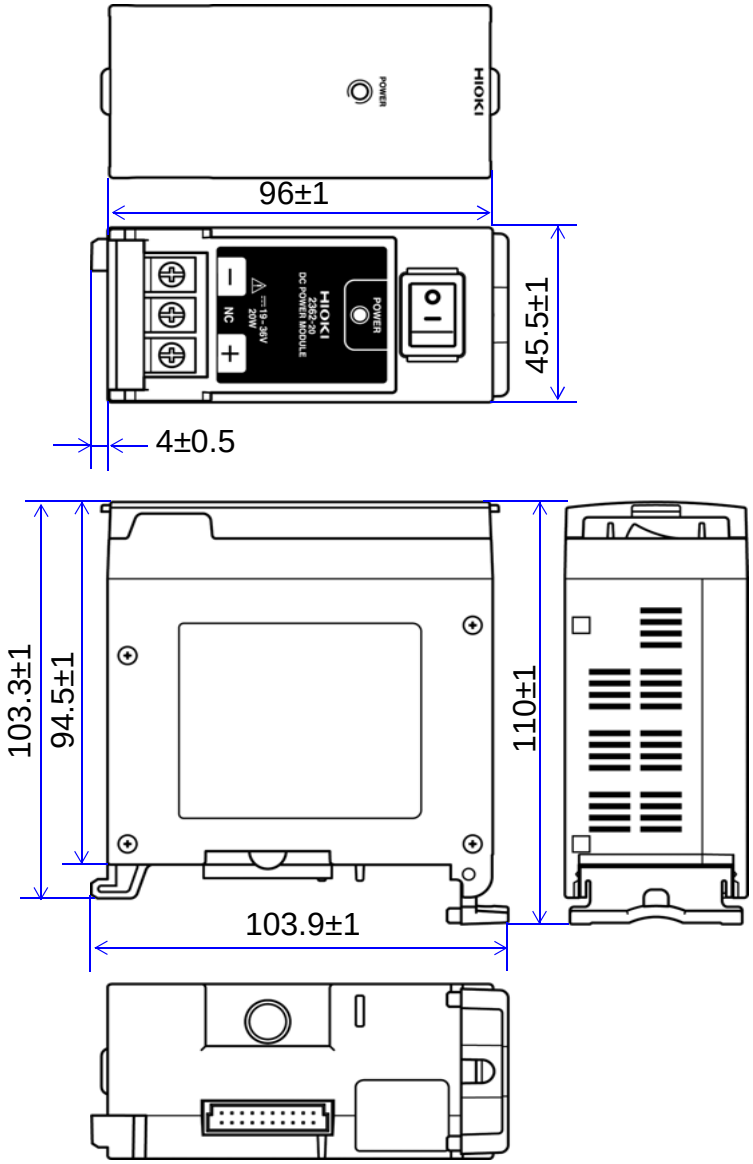
The module supplies the rated supply voltage ranging from 19 to 36 VDC.

15.1.3 Name and Function of the Parts



Power switch	Turns power ON/OFF. ❙ side : Power ON ○side: Power OFF
POWER LED	Remains green while the module is in operation. POWER LED indication Lit in green: Power ON
Power source terminal	Connect the power cord. The terminal connectors are for "-," "NC" (non-connection), and "+" from the left.

15.1.4 Dimension Diagrams



(Unit: mm)

15.1.5 Accessory and Option

Accessories

Ferrite clamp 1

Option

None

15.2 Preparations

15.2.1 Installing the Module

(1) Installing the Module Base

⚠CAUTION

Do not mount the module base on the ceiling where it may fall off.

Fasten the module base to a DIN rail or the wall according to the procedure described in the 2391 or 2392 series MODULE BASE instruction manual.

(2) Mounting a Module on the Module Base

⚠WARNING

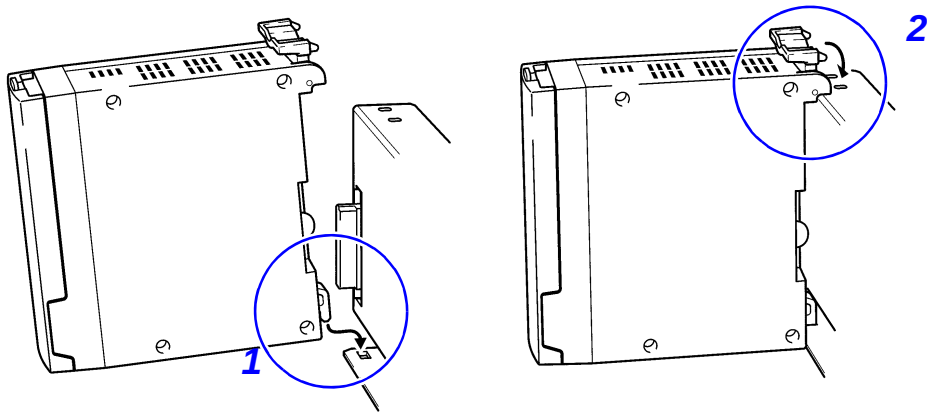
We make every effort to ensure the quality of this system. However, should the system emit a strange odor or smoke, turn off power immediately.
Moreover, to ensure that you can turn power off easily, do not lay cables in front of this module.

⚠CAUTION

This module does not support parallel operation. Mount only one power supply module on a module base. Mounting two or more modules on a module base may damage the modules.

NOTE

Mount the module in the slots for the power supply module on the left edge of the module base.



15.2.2 Connecting Power Cable

WARNING

- **Before turning the instrument on, make sure the supply voltage matches that indicated on the its power connector. Connection to an improper supply voltage may damage the instrument and present an electrical hazard.**
- **Ensure that the power switch of the module is OFF when connecting the power cable to the module. If the switch is ON when you connect the power cable, sparks may be generated and ignite a battery, organic solvent, or any other nearby volatile substance.**
- **Ensure that the cable is not live when connecting it. This will prevent short-circuiting.**
- **Ensure that the power switch of the module is OFF when connecting the power cable to the power line. If the switch is ON sparks may be generated and ignite a battery, organic solvent, or any other nearby volatile substance.**

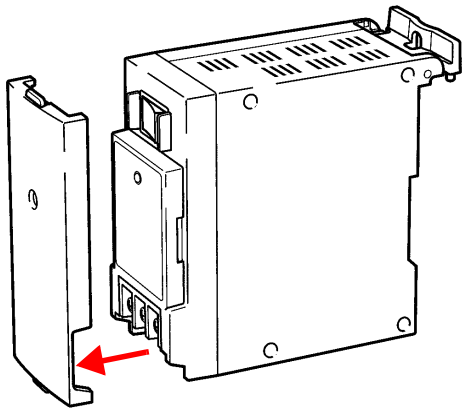
CAUTION

Be careful to avoid connecting voltage improperly, as the internal circuit may be destroyed.

NOTE

The functions of this system may be interfered by external noise or an electromagnetic environment when connecting a cable more than 3 meters long.

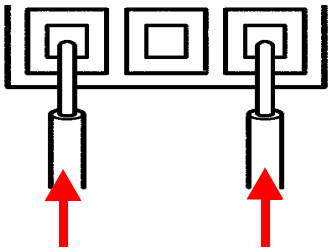
1. Remove the cover



2. Select a power cable of sufficient current-carrying capacity and withstand voltage, considering the power consumption and supply voltage.
Power consumption: 20 VA (20 W)
Available from 19 to 36 VDC.

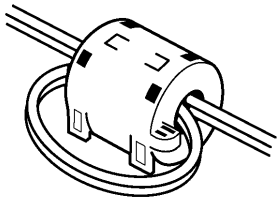
Example:
300 V vinyl cabtire cable
2-core, 0.75 mm^2 (AWG18) or more

3. Connect the cable leads as shown below (at tightening torque of 0.8 N•m).
We recommend that you use M3.5 round crimp connectors.
Example:RAV 1.25-3.5



4. Connect the power cable to the power source.

When using the module as a CE-mark compliant product, mount the ferrite core supplied as an accessory (as shown below).



5. Turn on the POWER switch (push it to the "I" side).

6. Secure the cover back in place.

15.3 Specifications

15.3.1 Basic Specifications

Operation	Supplies power to measurement/communications modules and the FA server.
Rated output voltage	5.0 VDC
Maximum output current	2.4 A
Maximum output power	12.0 VA
Output voltage accuracy	±5.0% (Within operating temperature and humidity ranges)

15.3.2 Function Specifications

Overcurrent protection	Min. 105% (Constant current/constant voltage pendent and automatic rest)
Overvoltage protection	110 to 140% (Output shutdown and manual reset)
Input surge current	80 A max at 36 VDC.
Parallel operation	Not available

15.3.3 General Specifications

Communication interface	Not available	
Input terminal	Terminal block (Front panel)	
Output terminal	Internal bus connector	
Power switch	ON/OFF of output voltage	
Rated supply voltage	19 to 36 VDC	
Maximum rated power	20 W	
Withstand voltage	0.5 kVAC (Between input and output) Response current 5 mA	
Fuse	The polyswitch is built in (on the + side with trip current of 3.7A).	
Dimensions	Approx. 45.5W × 96H × 94.5D mm (1.79"W × 3.78"H × 3.72"D) (Including cover, excluding projections)	
Mass	Approx. 250 g (8.8 oz.) (Including cover)	
Accessories	Ferrite clamp..... 1	
Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (non-condensating)	
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (non-condensating)	
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)	
Applicable standards	Safety	EN61010-1:2001 Pollution degree 2
	EMC	EN61326:1997+A1:1998+A2:2001+A3:2003 CLASS A

2391-01, 2391-02, 2391-03 MODULE BASE 16

16.1 Overview

16.1.1 Product Overview

- The 2391-01, 2391-02, 2391-03 MODULE BASE is a module base of Hioki "Smart Site" (remote measurement system).
- It houses the communications module, measurement module, and power supply module.
- The module base has module-to-module communications and power supply functions.

Number of Connectable Modules

Model	2361, 2362 Power Module	2351, 2352 Communications Module	2301 to 2332 Measurement Module
2391-01*1	1 iunit	1unit	0 unit
2391-02	1 iunit	1 unit	5 units*2
2391-03	1 iunit	1unit	10 units*3

*1: Module base for relay and host modules. This module base can supply power to the 2371 FA SERVER from its terminal.
*2: For the 2331 and 2332 POWER MODULE, one or two units can be connected.
*3: For the 2331 and 2332 POWER MODULE, up to five units can be connected.

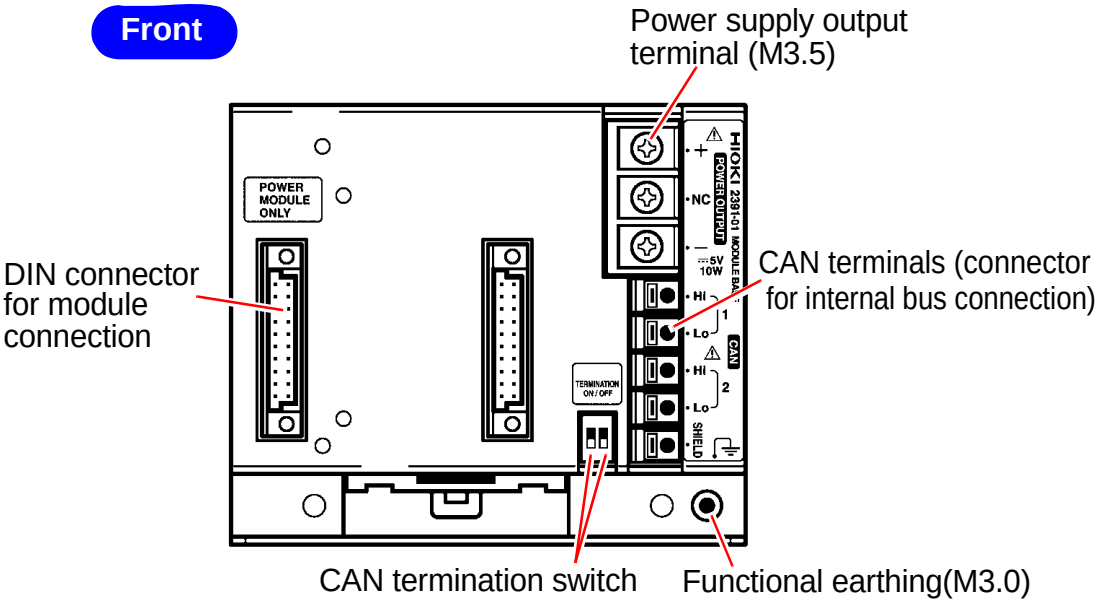
(Conceptual image)

16.1.2 Major Features

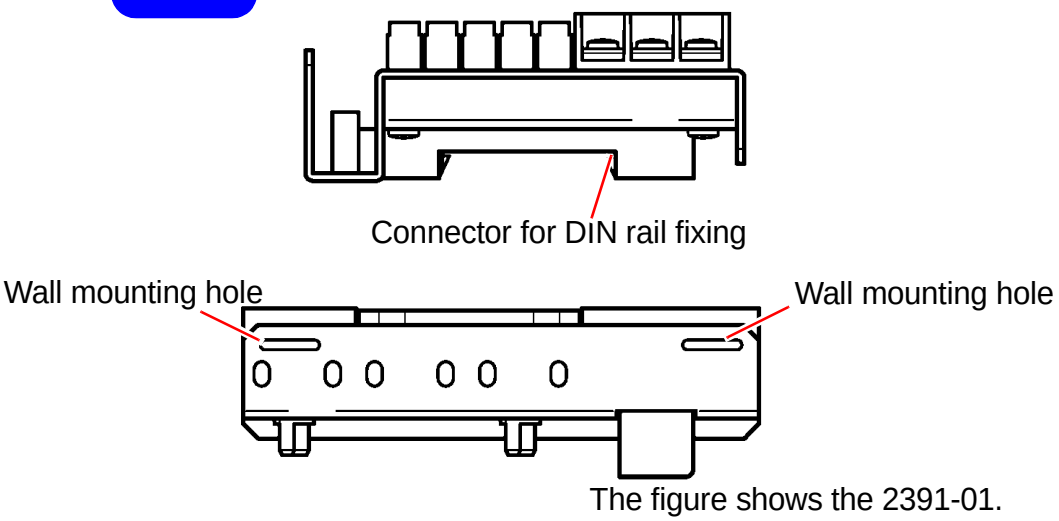
- **The internal buses can be connected using the CAN terminals and up to 63 measurement modules can be connected to one communications module. Please note that each module base must have a power supply module (all models 2391-01 to 2391-03).**

16.1.3 Name and Function of the Parts

Front



Back

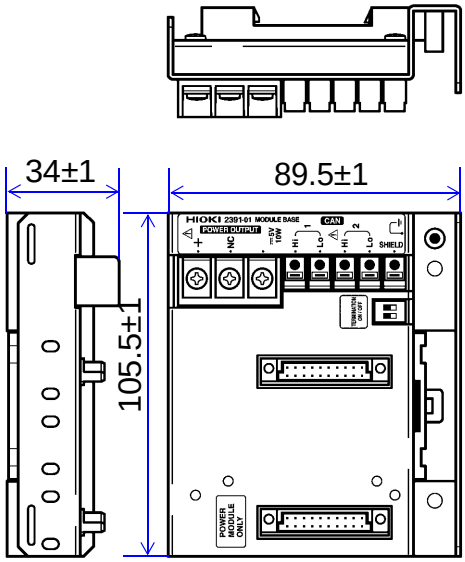


The figure shows the 2391-01.

Power supply output terminal	Supplies power to the 2371 FA SERVER. (Under development)
CAN terminals (connector for Internal bus connection)	Used to extend the internal bus. Connect terminal 1 to the module base near the communications module (upstream); connect terminal 2 to the module base far from the communications module (downstream). Use the communications cable for the CAN bus (CAN cable). Also be sure to connect the shielded wire.
CAN termination switch (TERMINATION ON/OFF)	Usually leave this switch ON. When using a CAN terminal, turn off the switch of the number corresponding to the terminal used to turn it off. ❖ **16.2.3 "Connecting the CAN Cable"(P.241)**
Functional earthing terminal	This is a functional earthing terminal. Be sure to ground this terminal.
DIN connector for module connection	These connectors are used to mount the power supply, communications, and measurement modules on the module base. The leftmost slot is used exclusively for the power supply module.
Connector for DIN rail fixing	This connector is used for mounting the module base on a DIN rail (35 mm wide).
Wall mounting hole	Used to mount the module base on a wall.

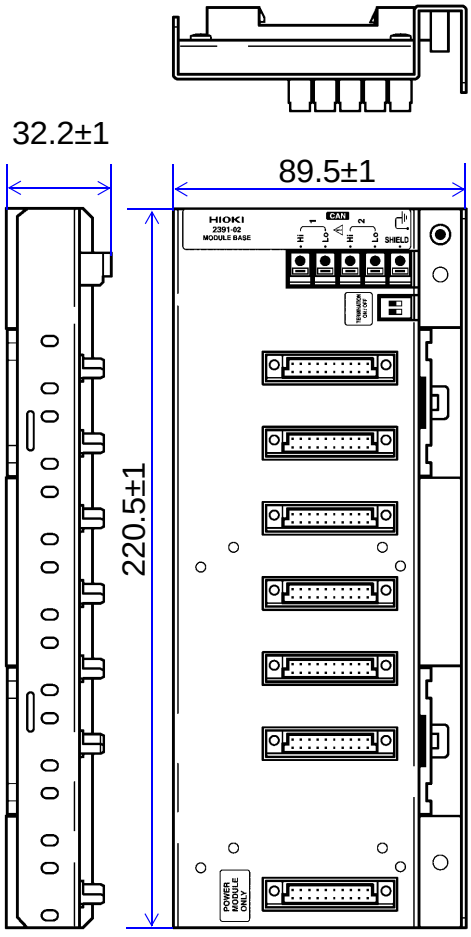
16.1.4 Dimension Diagrams

2391-01



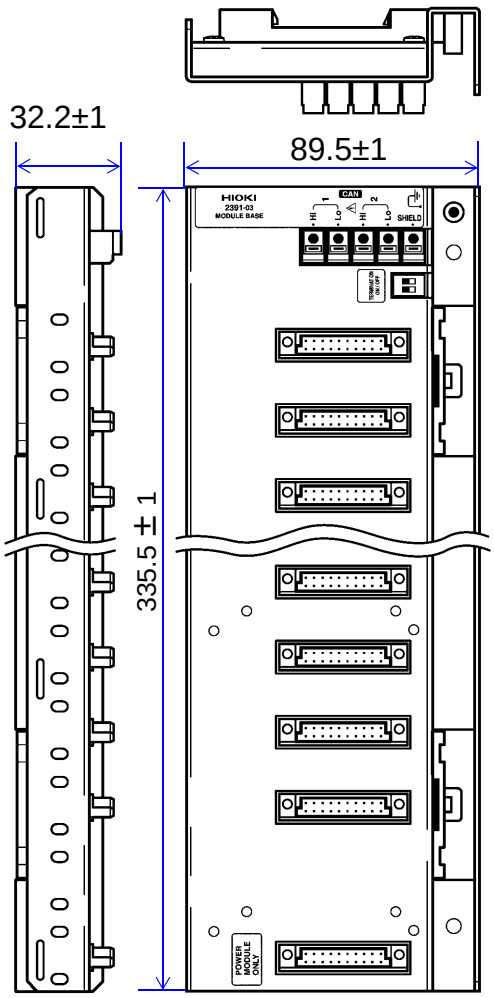
(Unit: mm)

2391-02



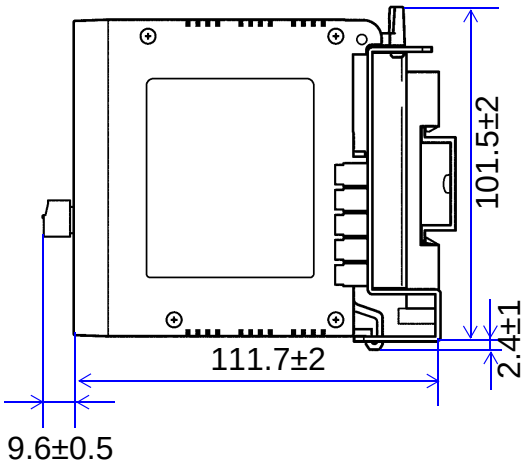
(Unit: mm)

2391-03



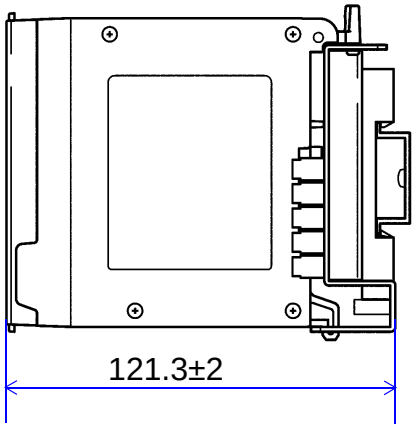
(Unit: mm)

2301 to 2305



(Unit: mm)

2331, 2361, 2362



(Unit: mm)

16.1.5 Accessory and Option

Accessories

Wall-mounting fixture (Supplied with 2391-01 and 2391-02) 1
Wall-mounting fixture (Supplied with 2391-03).....2

Option

None

16.2 Preparations

16.2.1 Installing the Module

(1) Installing the Module Base

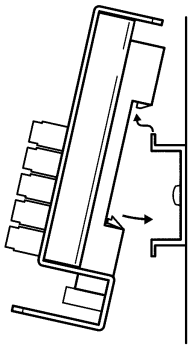
⚠CAUTION

- Do not mount the module base on the ceiling where it may fall off.
- The module base shall be fastened using the proper means.
  If the module base slides right and left due to tolerances of the DIN rail dimensions, modules may fall off, wires may be short-circuited, or circuits broken.

Fasten the module base securely using either method below.

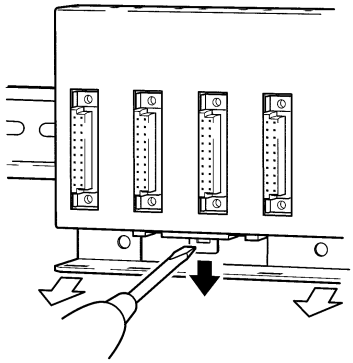
Mounting the Module Base on a DIN Rail

Use the DIN rail mount connector on the rear of the base to mount the module base on a DIN rail (35 mm wide).
The side of the module base with square holes is the bottom.
Hang the top hook of the DIN rail mount connector on the DIN rail, then push down the bottom of the server.



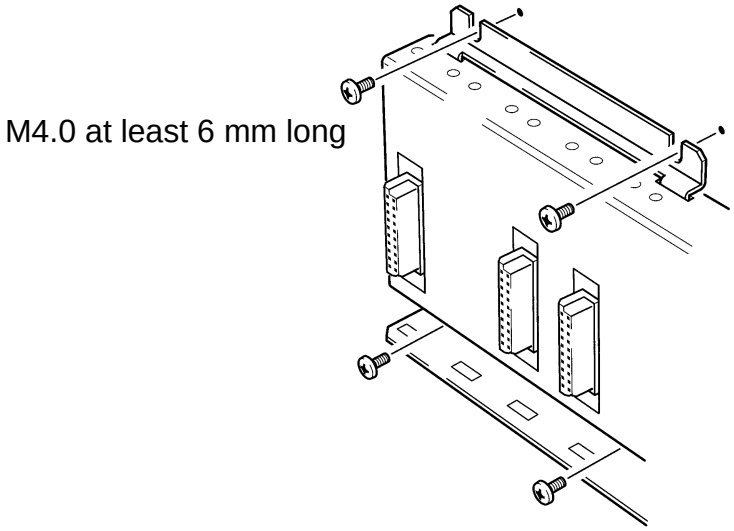
Removing the Module Base

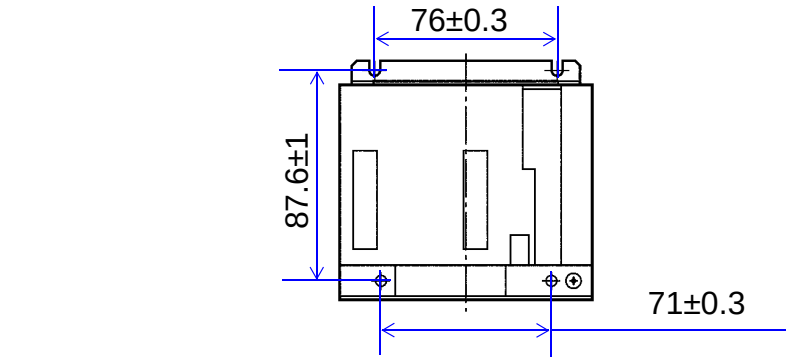
Remove the module base from the DIN rail, while using a flat blade screwdriver to push down the orange lever at the bottom of the connector.
Use the module base for screwdriver leverage.

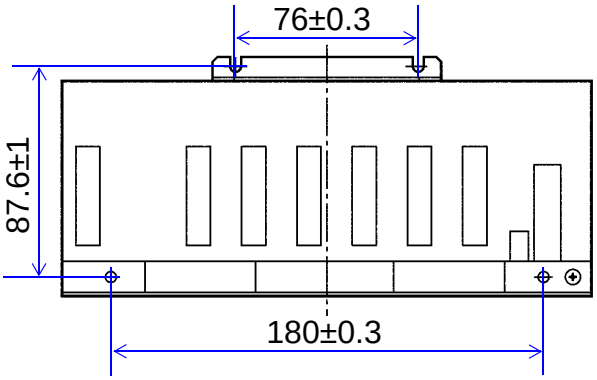


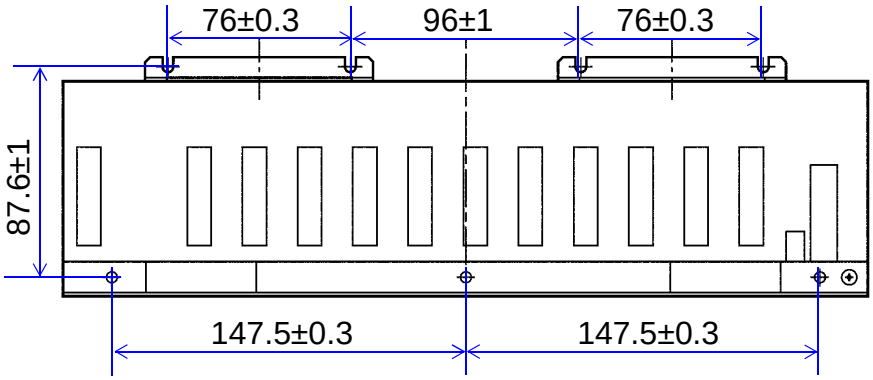
Mounting the Module Base on a Wall

Mount the module base on a wall by using the wall mounting holes. Ensure that the wall is sufficiently strong. Insert and tighten the screws where shown below.









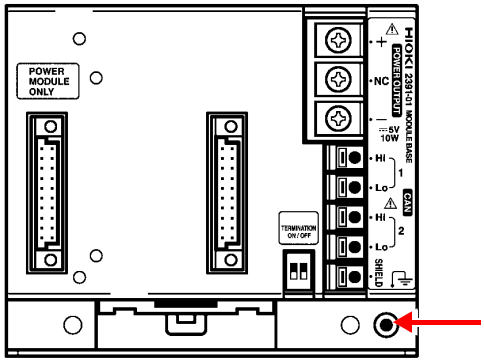
(Unit: mm)

Positions of Wall Mounting Holes

(2) Connecting the Functional Earthing Terminal

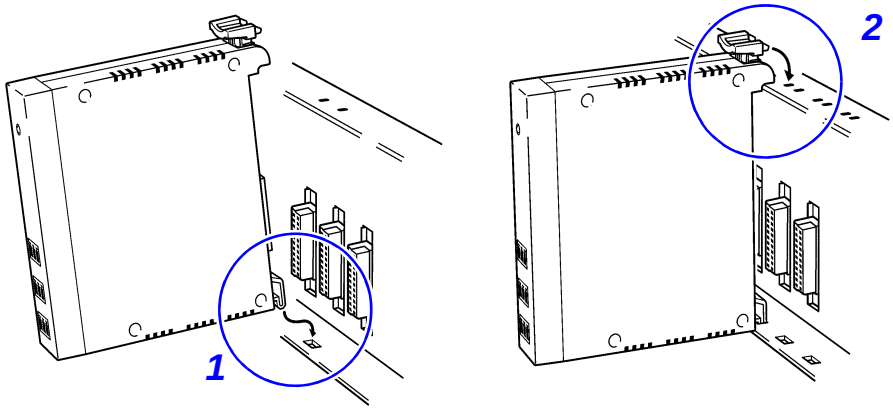
Ground the functional earthing terminal.
We recommend that you use a cable with a conductor cross section of 0.75 mm^2 or more and a round solderless terminal (tightening torque: 0.5 Nom).

Example:
RAV1.25-3



(3) Mounting a Module on the Module Base

Connect a module to the connector of the module base as shown below. Ensure that the levers make a clicking sound.



16.2.2 Connecting Power Supply Output Cord (2391-01 only)

WARNING

- **Before turning the instrument on, make sure the supply voltage matches that indicated on the its power connector. Connection to an improper supply voltage may damage the instrument and present an electrical hazard.**
- **Ensure that module base power is OFF when connecting the power supply output cable. If the switch is ON when connecting the power cable, sparks may be generated and ignite a battery, organic solvent, or any other nearby volatile substance.**
- **Ensure that the cable is not live when connecting it. This will prevent short-circuiting.**
- **Ensure that the power switch of the module is OFF when connecting the power cable to the power line. If the switch is ON sparks may be generated and ignite a battery, organic solvent, or any other nearby volatile substance.**

CAUTION

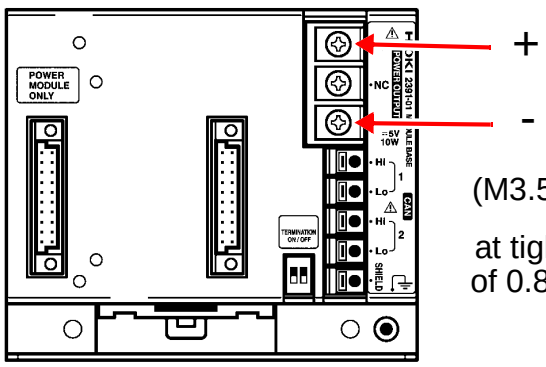
- Be careful to avoid connecting voltage improperly, as the internal circuitry may be destroyed.
- Ensure that the cable is not live when connecting it. This will prevent short-circuiting.

NOTE

A cable more than 3 meters long may be affected by external noise or the electromagnetic environment, and instruments may malfunction due to a drop in supply voltage.

To supply power (5 VDC, 13W) to the 2371 FA SERVER, use the power supply output cable to connect the power supply output terminal to the 2371 FA SERVER.

❖ **16.1.3 Name and Function of the Parts**



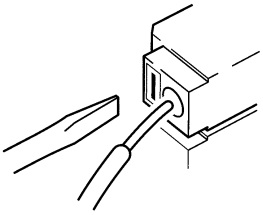
For the power supply output cable, use a cable with a conductor cross section of 0.75 mm^2 (AWG18) or more and length of up to 1 meter.

Example:

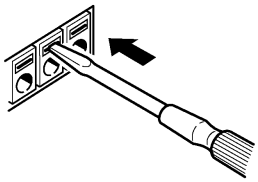
UL1007 AWG18/AWG16 (equivalent to 0.75 mm^2/1.25 mm^2) or equivalent
300V vinyl-cabtire cable

VCTF 2-core, 1.0 mm^2 or more
The cable length shall not exceed 1 meter.

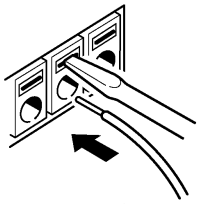
16.2.3 Connecting the CAN Cable



You can extend the internal bus by connecting a CAN cable to the CAN terminal.

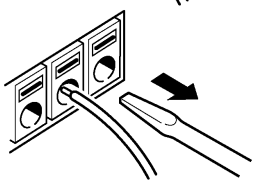


1. Use a flat blade screwdriver or similar tool to hold down the button of the terminal.



2. While holding down the button, insert a lead into the lead connection hole.

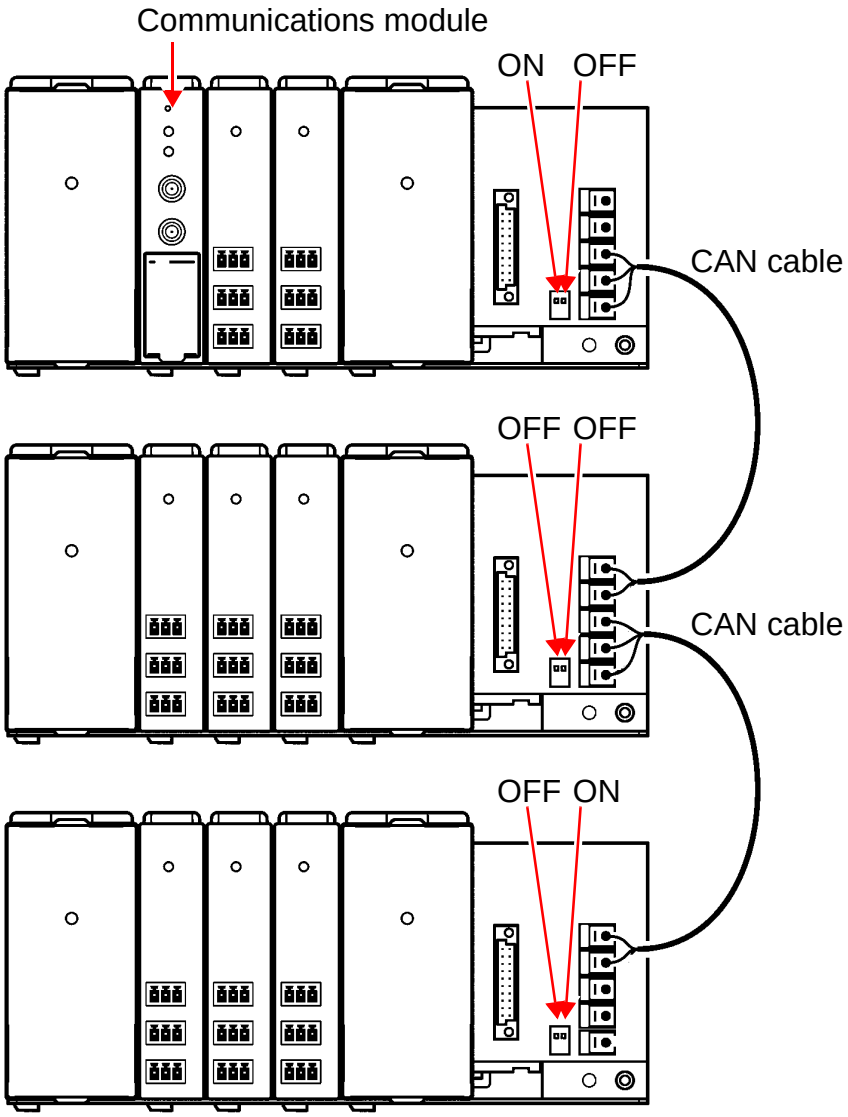
3. Release the button to lock the lead in place.



4. Turn OFF the termination switch of the number corresponding to the CAN terminal used to turn it off.

NOTE

- The cable length shall not exceed 100 meters.
- Connect terminal 1 to the module base near the communications module (upstream); connect terminal 2 to the module base far from the communications module (downstream).
- Be sure to connect the shielded wire.



Connect Hi to Hi and Lo to Lo of the module bases.
Only the CAN termination switch located on either side (a total of two) should be turned on. After all connections have been completed, check to make sure that the resistance between Hi and Lo is approx. 60 Ω.

NOTE

- Connect the shielding wire on one side (one end) only.
- Use caution to prevent a potential difference from appearing between the functional grounding terminals of each module base, as this could disrupt CAN communications.

16.3 Specifications

16.3.1 Basic Specifications

Basic functions	Sends signals and supply power to remote measurement system modules connected thereto via the built-in internal bus (CAN bus). Also supplies power to the FA server (2391-01 only).

2391-01

Number of module connection connectors	3 connectors (All connectors are used for a power supply module and communications module.)
Interface	Connector for internal bus extension 5 terminals × 1 Hi1 : No. 1 Lo1 : No. 2 Hi2 : No. 3 Lo2 : No. 4 Shield : No. 5 Power supply terminal for FA server 3 terminals × 1 VCC : No. 1 GND : No. 2 FG : No. 3

2391-02

Number of module connection connectors	8 connectors (3 connectors are used for a power supply module and communications module.)
Interface	Connector for internal bus extension 5 terminals × 1 Hi1 : No. 1 Lo1 : No. 2 Hi2 : No. 3 Lo2 : No. 4 Shield : No. 5

2391-03

Number of module connection connectors	13 connectors (3 connectors are used for a power supply module and communications module.)
Interface	Connector for internal bus extension 5 terminals × 1 Hi1 : No. 1 Lo1 : No. 2 Hi2 : No. 3 Lo2 : No. 4 Shield : No. 5

16.3.2 Function Specifications

Internal bus termination	Terminates the internal bus with a termination switch.

16.3.3 General Specifications

Rated supply voltage	DC5 V	
Maximum supplying power	15 W	
Withstand voltage	0.5 kVAC (Between frame GND and internal bus) Response current 5 mA	
Dimensions	2391-01: Approx. 105.5W × 89.5H × 26.5D mm (4.15"W × 3.52"H × 1.04"D) 2391-02: Approx. 220.5W × 89.5H × 26.5D mm (8.68"W × 3.52"H × 1.04"D) 2391-03: Approx. 335.5W × 89.5H × 26.5D mm (13.21"W× 3.52"H × 1.04"D) (excluding projections)	
Mass	2391-01: Approx. 165 g (5.8 oz.) 2391-02: Approx. 315 g (11.1 oz.) 2391-03: Approx. 460 g (16.2 oz.)	
Accessories	Wall-mounting fixture (Supplied with 2391-01 and 2391-02).....1 Wall-mounting fixture (Supplied with 2391-03).....2	
Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (non-condensating)	
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (non-condensating)	
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)	
Applicable standards	Safety	EN61010-1:2001 Pollution degree II
	EMC	EN61326:1997+A1:1998+A2:2001+A3:2003 CLASS A

2392-01/02 MODULE BASE 17

17.1 Overview

17.1.1 Product Overview

The 2392-01/02 is a module base for the Hioki "Smart Site" (remote measurement system). It houses a communications module, a measurement module, and a power supply module. The module base has a module-to-module communications function and an independent power supply.

Number of Connectable Modules

Model No.	2361-20, 2362-20 Power supply module	2351-20, 2352-20, and 2353-20 Communications module	2301-20 to 2343-20 Each module
2392-01	1 unit	--	
2392-02	--	2 units (In the case of power meter module, one unit can be connected.)	

(Conceptual image)

17.1.2 Major Features

- **The 2392-01 is a base for the power supply module only. The module has CAN terminals for internal bus connections and can provide power to the 2371 FA server*.**
- **The 2392-02 is a base for communications, measurement, and input/output modules. Power is supplied from the 2392-01.**

The internal buses can be connected using CAN terminals. Up to 63 measurement modules can be connected to a single communications module.

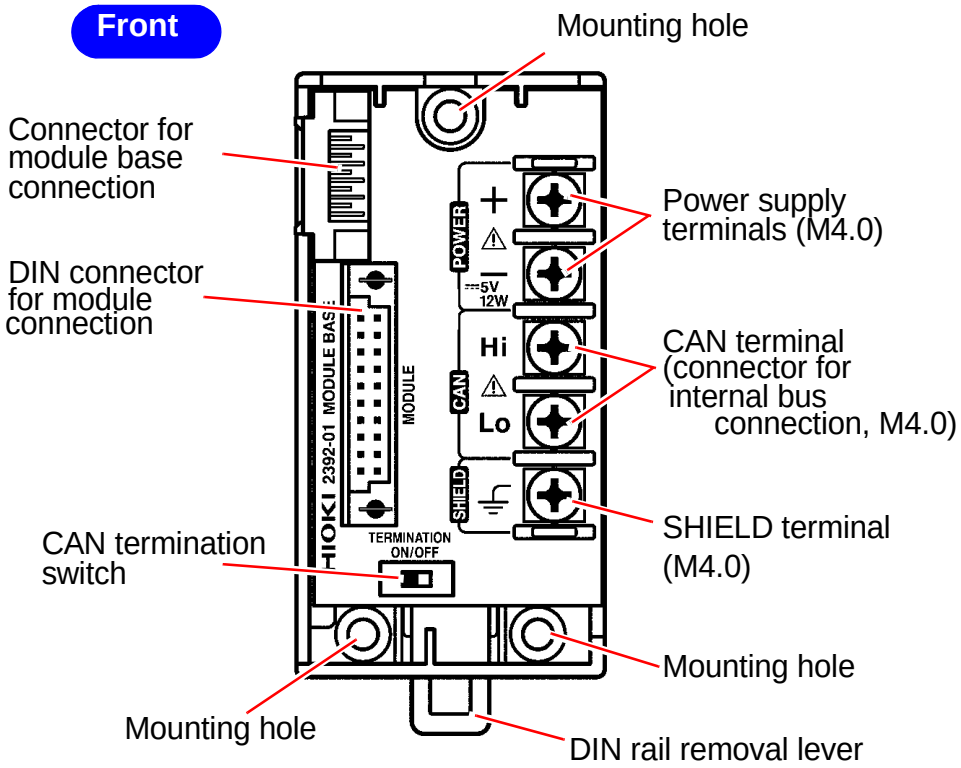
NOTE

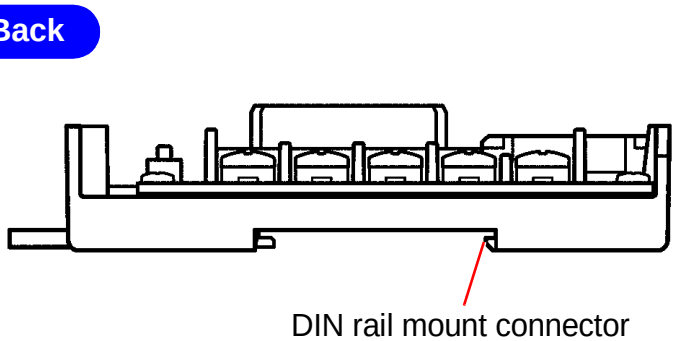
CAN cables should not be extended beyond 100 m (328 feet). Due to the capacity of the power supply module, the number of the 2392-02 MODULE BASEs connected to the 2392-01 is limited to five.
(Only one 2392-02 is connectable when the 2392-01 supplies power to the 2371 FA server*.)

* The 2371 is currently under development.

17.1.3 Name and Function of the Parts

2392-01





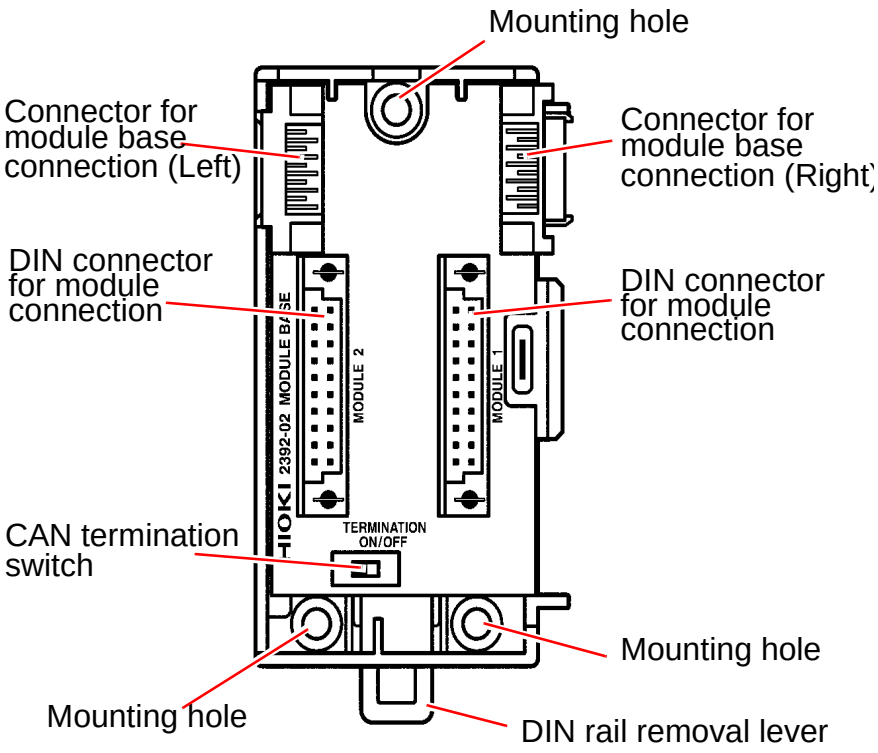
⚠CAUTION

Do not supply power to the power terminal from an external source. Doing so may damage the module base or the internal circuits of modules.

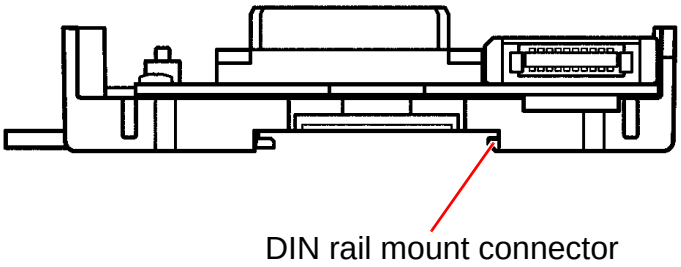
Connector for module base connection	Connect the 2392-02 to this connector.
DIN connector for module connection	This connector is used to connect a power supply module to the module base.
CAN termination switch (Termination ON/OFF)	Turned on/off according to the module base configuration and whether or not CAN cables are employed. ❖ **17.2.3 "Connecting the CAN Cable"(P.255)**
Mounting hole	Used to mount the module base to the wall.
Power supply terminals (M4.0)	Used to supply power to the 2371 FA SERVER or other modules (supply capacity: 5 V, 12 W).
CAN terminals (connector for internal bus connection, M4.0)	Used to extend the internal bus. Use the communications cable for the CAN bus (CAN cable). Be sure to connect the shielding wire.
SHIELD terminal	This is a functional ground terminal. Be sure to ground this terminal. Connect the shielding wire for the CAN cable to this terminal.
DIN rail removal lever	Used to dismount this module base from a DIN rail.
DIN rail mount connector	This connector is used to mount the module base on a DIN rail (35 mm/1.38" wide).

2392-02

Front



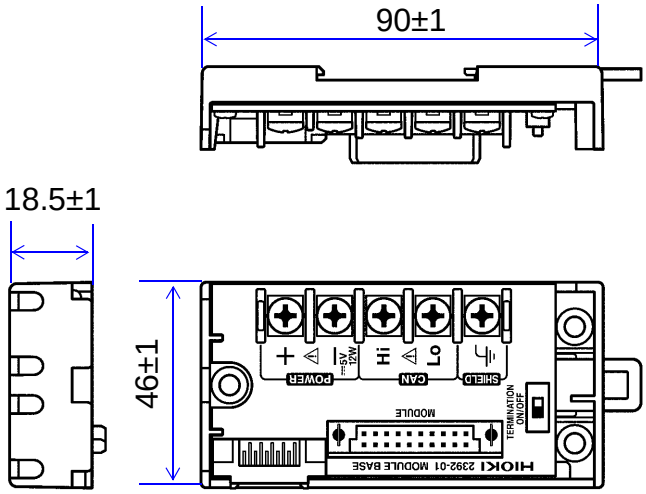
Back



CAN termination switch (Termination ON/OFF)	When transporting (moving) the instrument or an apparatus incorporating the instrument, take appropriate measures to prevent the instrument protruding (by taping the front, for example). ❖ **17.2.3 "Connecting the CAN Cable"(P.255)**
Connector for module base connection	Left : Connect the 2392-02 to this connector. Right : Connect the 2392-01 or the 2392-02 to this connector.
DIN connector for module connection	These connectors are used to mount the communications, and measurement modules on the module base.
Mounting hole	Used to mount the module base on a wall.
DIN rail removal lever	Used to dismount this module base from a DIN rail.
DIN rail mount connector	This connector is used for mounting the module base on a DIN rail (35 mm/1.38" wide).

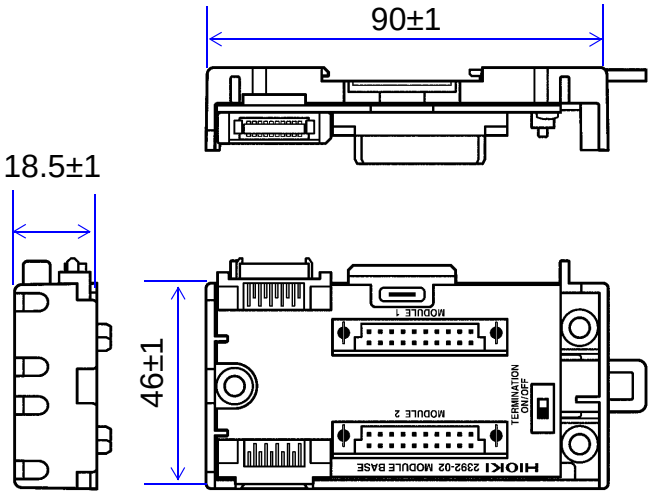
17.1.4 Dimension Diagrams

2392-01



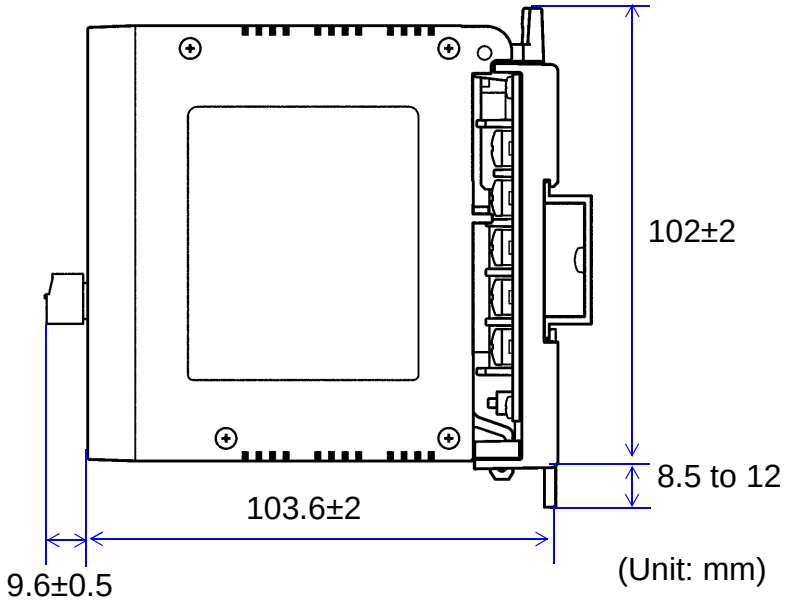
(Unit: mm)

2392-02

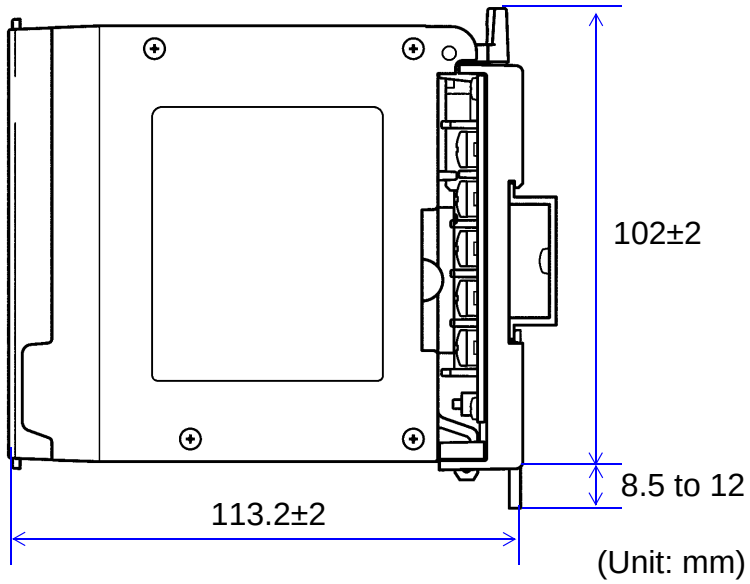


(Unit: mm)

2301 to 2305(Common to 2392-01 and -02)



2331, 2361, 2362(Common to 2392-01 and -02)



17.1.5 Accessory and Option

Accessories
None

Option
None

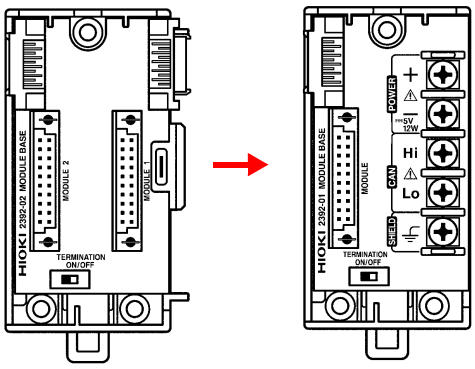
17.2 Preparations

17.2.1 Installing the Module

(1) Connecting Module Bases

When using several 2392 MODULE BASE series connect them by the procedure given below.

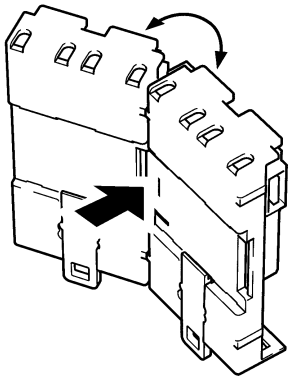
1. Place the 2392-02 on the left and the 2392-01 on the right.
2. Press the module bases together to connect their connectors for the module bases. Make sure the connectors are connected securely.
3. When using 3 or more module bases, connect the second 2392-02 to the left of the first 2392-02 in the same way.
4. Pull on the module bases to confirm that they are securely connected.



NOTE When using the 2392 MODULE BASE series , one unit of the 2392-01 must always be used.

Disconnecting Module Bases

Push the connected joint from behind to apply a lever action to the joint and disconnect the module bases.



(2) Installing the Module Base

⚠CAUTION

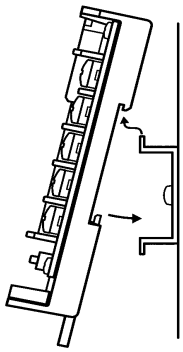
- Do not mount the module base on the ceiling where it may fall off.
- The module base shall be fastened using the proper means. If the module base slides right and left due to tolerances of the DIN rail dimensions, modules may fall off, wires may be short-circuited, or circuits broken.

Fasten the module base securely using either method below.

Mounting the Module Base on a DIN Rail

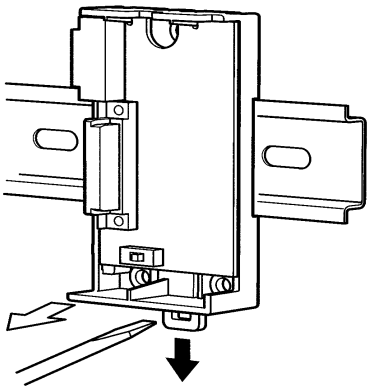
Use the DIN rail mount connector on the rear of the base to mount the module base on a DIN rail (35 mm/1.38" wide).

1. Pull down the DIN rail mount lever.
2. Hang the top hook of the DIN rail mount connector on the DIN rail and push in the bottom of the module.
3. Push up the DIN rail mount lever until it clicks into place.



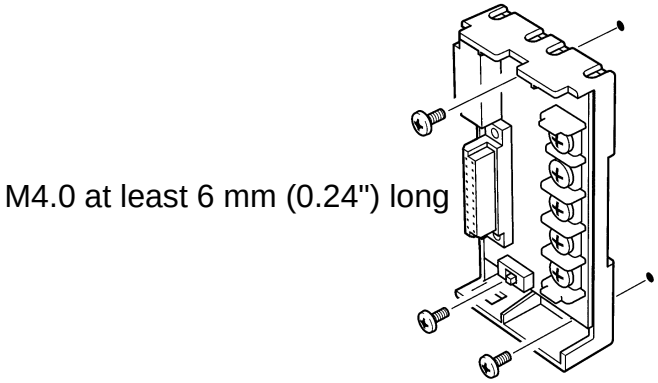
Dismounting the Module Base from the DIN Rail

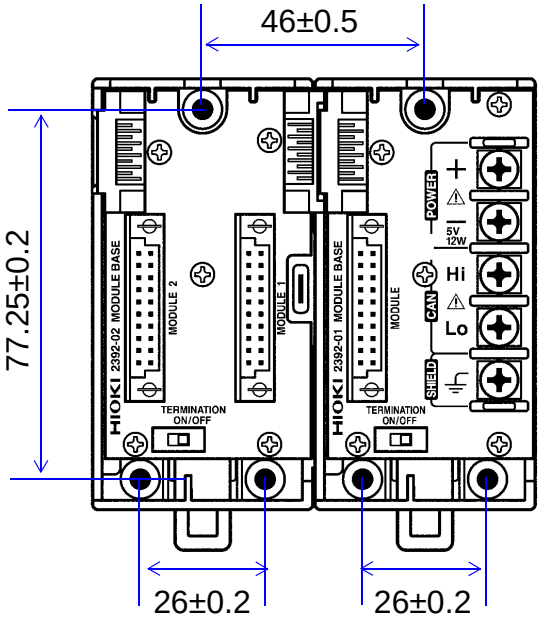
Pull down the DIN rail dismount lever using a flat blade screwdriver and remove the module base from the DIN rail. Use the module as the fulcrum for the screwdriver.



Dismounting the Module Base from the DIN Rail

Pull down the DIN rail dismount lever using a flat blade screwdriver and remove the module base from the DIN rail. Use the module as the fulcrum for the screwdriver.



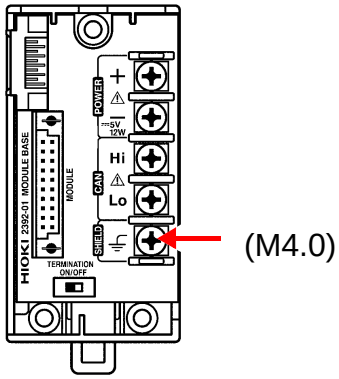


(Unit: mm)

Positions of Wall Mounting Holes

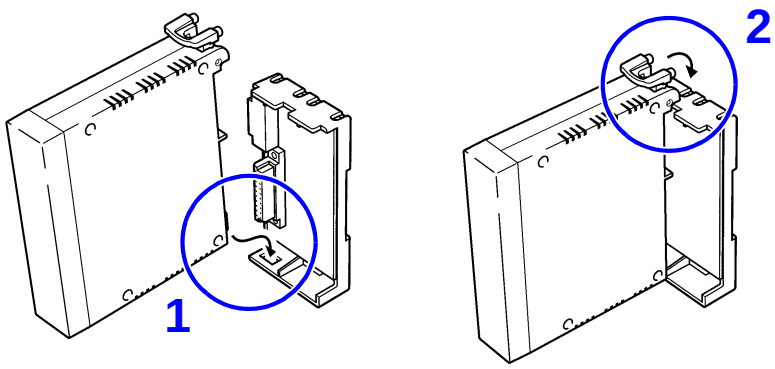
(3) Connecting the Functional Earthing Terminal

Ground the functional earthing terminal.
We recommend that you use a cable with a conductor cross section of 0.75 mm^2 (AWG18) or more and a round solderless terminal (tightening torque: 1.2 N·m).
Example: RAV1.25-4, BT1.25-F4



(4) Mounting a Module on the Module Base

Connect a module to the connector of the module base as shown below. Ensure that the levers make a clicking sound.



17.2.2 Connecting Power Supply Output Cord (2392-01 only)

⚠CAUTION

- **Before turning the instrument on, make sure the supply voltage matches that indicated on the its power connector.**
- **Be careful to avoid connecting voltage improperly, as the internal circuitry may be destroyed.**
- **Ensure that the cable is not live when connecting it. This will prevent short-circuiting.**
- **Ensure that module base power is OFF when connecting the power supply output cable. If the switch is ON when connecting the power cable, sparks may be generated and ignite a battery, organic solvent, or any other nearby volatile substance.**

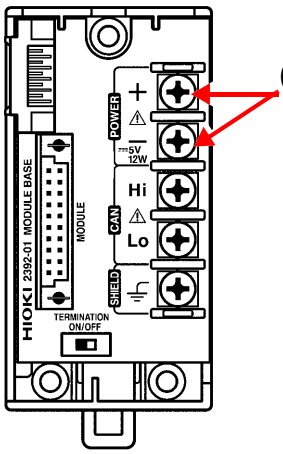
NOTE

- A cable more than 1 meter (3.28 feet) long may be affected by external noise or the electromagnetic environment, and instruments may malfunction due to a drop in supply voltage.
- When the 2392-01 supplies power to the 2371 FA SERVER*, only one 2392-02 base is connectable to the 2392-01.)

* The 2371 is currently under development.

To supply power (5 VDC, 10 W) to the 2371 FA SERVER*, use the power supply output cable to connect the power supply output terminal to the 2371 FA SERVER*.

❖ **17.1.3 "Name and Function of the Parts"(P.246)**



For the power supply output cable, use a cable with a conductor cross section of 1.0 mm^2 or more and length of up to 1 meter (3.28 feet).

Example:

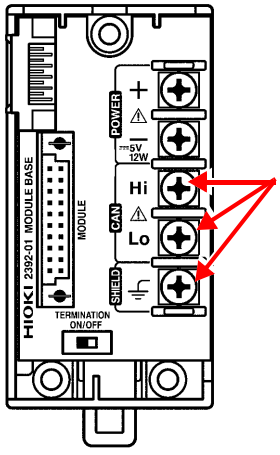
UL1007 AWG18/AWG16 (equivalent to 0.75 mm^2/1.25 mm^2) or equivalent

300 V vinyl-cabtire cable 2-core, 1.0 mm^2 or more
The cable length shall not exceed 1 meter.

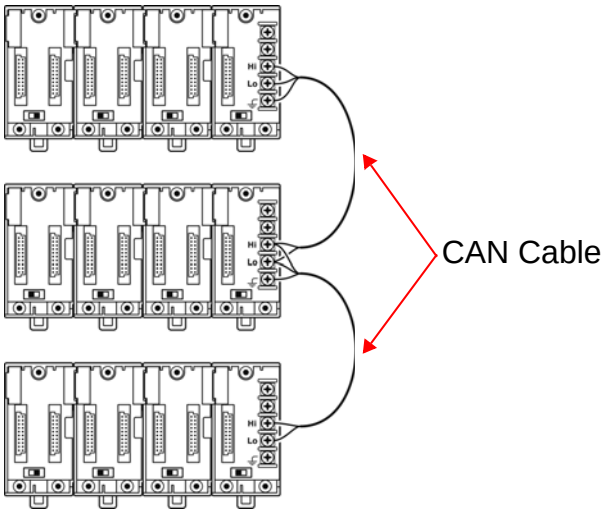
We recommend using a round solderless terminal for the connection.
Example:
RAV1.25-4, BT1.25-F4

17.2.3 Connecting the CAN Cable

Extending the internal bus by connecting CAN cables to the CAN terminals allows up to 63 measurement modules to be connected to a single communications module.



Use a CAN cable that complies with ISO 11898.



Connect Hi to Hi and Lo to Lo of the module bases.
Only the CAN termination switch located on either side (a total of two) should be turned on. After all connections have been completed, check to make sure that the resistance between Hi and Lo is approx. 60 Ω.

NOTE

- The cable length shall not exceed 100 meters (328 feet).
- Connect the shielding wire on one side (one end) only.
- Use caution to prevent a potential difference from appearing between the functional grounding terminals of each module base, as this could disrupt CAN communications.

17.3 Specifications

17.3.1 Basic Specifications

Basic functions	Sends signals and supply power to remote measurement system modules connected thereto via the built-in internal bus (CAN bus). Also supplies power to the FA server (2392-01 only).

2392-01

Number of module connection connectors	1 connector (All connectors are used for a power supply module.)
Interface	Connector for internal bus extension 3 terminals × 1 Hi Lo Shield Power supply terminal 2 terminals × 1 VCC GND Connector for module base connection (For connection with the 2392-02)

2392-02

Number of module connection connectors	2 connectors
Interface	Connector for module base connection (left, For connection with the 2392-02) Connector for module base connection (right, For connection with the 2392-01/02)

17.3.2 Function Specifications

Internal bus termination	Terminates the internal bus with a termination switch.

17.3.3 General Specifications

Dimensions	2391-01: Approx. 46W X 90H X 18.5D mm 2392-02: Approx. 46W X 90H X 18.5D mm (1.81"W × 3.54"H × 0.73"D) (excluding projections)	
Mass	2392-01: Approx. 50 g (1.8 oz.) 2392-02: Approx. 45 g (1.6 oz.)	
Operating temperature and humidity	0 to 50°C (32 to 122°F), 80%RH or less (with no condensation)	
Storage temperature and humidity	-10 to 50°C (14 to 122°F), 80%RH or less (with no condensation)	
Operating environment	Indoors, altitude up to 2000 m (6562-ft.)	
Standards applying	Safety EMC	EN61010-1:2001 Pollution degree 2 EN61326:1997+A1:1998+A2:2001+A3:2003 Class A

Maintenance and Service 18

18.1 Cleaning

To clean the instrument, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.

18.2 Servicing

⚠CAUTION

Never modify the instrument. Only Hioki service engineers should disassemble or repair the instrument. Failure to observe these precautions may result in fire, electric shock, or injury.

- If the instrument seems to be malfunctioning, confirm that the cables are not open circuited before contacting your dealer or Hioki representative.
- When sending the instrument for repair, remove the batteries and pack carefully to prevent damage in transit. Include cushioning material so the instrument cannot move within the package. Be sure to include details of the problem. Hioki cannot be responsible for damage that occurs during shipment.
- When transporting (moving) the instrument or an apparatus incorporating the instrument, take appropriate measures to prevent the instrument protruding (by taping the front, for example).
- The instrument contains a built-in backup lithium battery, which offers a service life of about five years. If the date and time deviate substantially when the instrument is switched on, it is the time to replace that battery. Contact your dealer or Hioki representative.

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: HUMIDITY MODULE

Model Number: 2301-20

Option: 9764-50 HUMIDITY SENSOR

The above mentioned products comform to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2301A999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: Pt MODULE

Model Number: 2302-20

The above mentioned product comforms to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2302A999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: TC MODULE

Model Number: 2303-20

The above mentioned product comforms to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

Tatsuyoshi Yoshiike

President

2303A999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: PULSE MODULE

Model Number: 2304-21

The above mentioned product comforms to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2304B999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: INSTRUMENTATION MODULE

Model Number: 2305-20

The above mentioned product comforms to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2305A999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: POWER METER MODULE

Model Number: 2331-20

Options: 9019-02 VOLTAGE CORD
9019-03 VOLTAGE CORD
9019-04 VOLTAGE CORD
9238 CLAMP SENSOR CABLE

The above mentioned products comform to the following product specifications:

Safety: EN61010-1:2001

EN61010-031:2002

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2331A999-02

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: POWER METER MODULE

Model Number: 2332-20

Options: 9019-02 VOLTAGE CORD
9019-03 VOLTAGE CORD
9238 CLAMP SENSOR CABLE

The above mentioned products conform to the following product specifications:

Safety: EN61010-1:2001
EN61010-031:2002

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2332A999-02

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: INPUT MODULE

Model Number: 2341-20

The above mentioned product comforms to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2341A999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: OUTPUT MODULE

Model Number: 2342-20

The above mentioned product comforms to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2342A999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: RS LINK MODULE

Model Number: 2343-20

The above mentioned products comform to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2343A999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: AIR MODULE

Model Number: 2351-20

Options: 9760 ANTENNA
9760-01 ANTENNA
9760-02 ANTENNA
9761 ANTENNA CABLE
9761-01 ANTENNA CABLE
9761-02 ANTENNA CABLE

The above mentioned products conform to the following product specifications:

Safety:	EN61010-1:2001
EMC:	EN61326:1997+A1:1998+A2:2001+A3:2003 Class A equipment Equipment intended for use in industrial location
R&TTE:	EN300 440-2 V1.1.1:2001

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC, the EMC Directive 89/336/EEC, and the R&TTE Directive 1999/5/EC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2351A999-02

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: WIRE MODULE

Model Number: 2352-20

The above mentioned products comform to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2352A999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: LAN MODULE

Model Number: 2353-20

The above mentioned products conform to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2353A999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: AC POWER MODULE

Model Number: 2361-20

Option: 9239-20 POWER CORD

The above mentioned products conform to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location
EN61000-3-2:2000
EN61000-3-3:1995+A1:2001

Supplementary Information:

The products herewith comply with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

Ttsuyoshi Yoshiike

President

2361A999-02

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: DC POWER MODULE

Model Number: 2362-20

The above mentioned product comforms to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2362A999-01

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: MODULE BASE

Model Number: 2391-01, 2391-02, 2391-03
2392-01, 2392-02

The above mentioned products comform to the following product specifications:

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
Class A equipment
Equipment intended for use in industrial location

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

HIOKI E.E. CORPORATION

6 April 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

2391A999-01

HIOKI 2300 SMART SITE

Instruction Manual

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