

User's Manual (Hardware)

• Before using this unit, please read both this manual and Details carefully and pay full attention to safety to handle this unit correctly.
• Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

ABOUT MANUALS

The following manuals are also related to this unit.
Order each manual as needed, referring to the following list.

Manual name	Manual number (model code)
Energy Measuring Unit User's Manual (Details) QE81WH	IB63563 (19H851)

COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES

- For programmable controller system
To configure a system meeting the requirements of the EMC and Low Voltage Directives when incorporating the Mitsubishi programmable controller (EMC and Low Voltage Directives compliant) into other machinery or equipment, refer to Chapter 9 "EMC AND LOW VOLTAGE DIRECTIVES" of the QCPU User's Manual (Hardware Design, Maintenance and Inspection).
The CE mark, indicating compliance with the EMC and Low Voltage Directives, is printed on the rating plate of the programmable controller.
- For this unit
For the compliance of this unit with the EMC and Low Voltage Directives, refer to Section 6.1 Wiring.

1. Features

- This Energy Measuring Unit can measure various types of electric quantity just ONE unit.
This Energy Measuring Unit can measure electric energy, reactive energy, current, voltage, power, power factor, and frequency.
Both consumption and regeneration of the electric energy can be measured.
- Extensive monitoring functions
In addition to memorizing the maximum and minimum values, two types of alarm monitoring for upper and lower limit can be performed without a ladder.
- It also can measure the electric energy for a certain period.
It can measure the electric energy for the duration of time for which the output device is on.
This feature enables to acquire the electric energy needed during device operation or energy per fact.

2. Checking packaged contents

- The following items for this device are included in the package. Check that no items are missing.
- Energy Measuring Unit x 1
 - User's Manual (Hardware) x 1

3. Safety Precautions

3.1 Precautions for Operating Environment and Conditions

- Do not use this product in the places listed below. Failure to follow the instruction may cause malfunctions and a decrease of product.
- Places the Ambient temperature exceeds the range 0 – 55°C.
 - Places the Relative humidity exceeds the range 5 – 95% or places with dewfall.
 - Altitude exceeds 2000 m.
 - Places exposed to rain or water drop.
 - Dust, corrosive gas, saline and oil smoke exist.
 - Vibration and impact exceed the specifications.
 - Installed excluding the control panel.

3.4 Precautions for Start-up and Maintenance

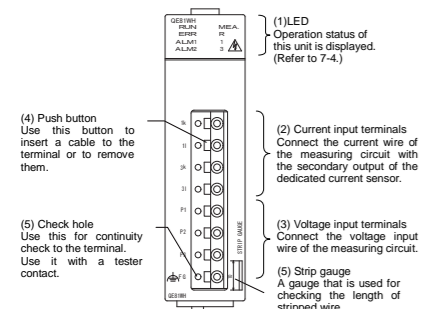
- Use the product within the ratings specified in this manual. If it is used outside the ratings, it may cause not only malfunction or failure but also fire or burnout.
• Before operating the product, check that active bare wire, etc. does not exist around the product. If any bare wire is found, stop the operation immediately, and take an appropriate action such as isolation protection.
• Do not disassemble or modify the unit. It may cause failure, malfunction, injury or fire.
• Attaching and detaching the unit must be performed after the power source is shut off for all outside phases. If all phases are not shut off, it may cause electric shock, failure or malfunction of the unit.
• Do not touch powered wires. It may cause malfunction.
• Tighten mounting screws and cleaning unit must be performed after the power source is shut off for all outside phases. If all phases are not shut off, it may cause electric shock, failure or malfunction of the unit.
• Use a soft dry cloth to clean off dirt of the unit surface.
• Do not let a chemical cloth remain on the surface for an extended period of time nor wipe the surface with thinner or benzene.
• Check for the following items to use this unit properly for long time.
-Daily maintenance->
(1) No damage on this unit (2) No abnormality with LED indicators (3) No abnormal noise, smell or heat.
-Periodical maintenance (Once every 6 months to 1 year) ->
(4) No looseness with installation, wire connection to terminal blocks, and connector connection. (Check these items under the electric outage condition.)

3.5 Disposal Precautions

- When disposing of this unit, treat it as industrial waste.

4. Name and function of each part

4.1 Names and functions of parts of QE81WH are provided below.



Terminal symbol	Name of terminal
1k	1-phase current input terminal (power source side)
1l	1-phase current input terminal (load side)
3k	3-phase current input terminal (power source side)
3l	3-phase current input terminal (load side)
P1	1-phase voltage input terminal
P2	2-phase voltage input terminal
P3	3-phase voltage input terminal
FG	Frame GND terminal

Supplementary

Check the stripping length using the strip gauge of QE81WH main unit.

3.2 Matters concerning the preparation before use

- Use the unit in the specified usage environment and conditions.
- The setting of this unit (phase system, primary voltage, primary current) is necessary before using it. ※Please refer to "User's Manual (Details)" about each setting method.

3.3 Installation and Wiring Precautions

Danger • Shut off the external power supply for the unit in all phases before installing or wiring. Failure to do so may cause an electric shock or damage of the unit.

Caution

- Any person who is involved in the installation and the wiring of this Sequencer should be fully competent to do the work.
- Use the programmable controller in an environment that meets the general specifications in the User's Manual for the CPU module used. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount the unit, while pressing the unit-mounting lever located in the lower part of the unit, fully insert the unit fixing projection(s) into the hole(s) in the base unit and press the unit until it snaps into place. Incorrect mounting may cause malfunction, failure or drop of the unit.
- When using the Sequencer in an environment of frequent vibrations, fix the unit with a screw.
- Tighten the screw within the specified torque range. Under tightening can cause drop of the screw, short circuit or malfunction. Over tightening can damage the screw and/or unit, resulting in drop, short circuit, or malfunction.
- Shut off the external power supply for the system in all phases before mounting or removing the unit. Failure to do so may result in damage to the product.
- Do not directly touch any conductive part of the unit. Doing so can cause malfunction or failure of the unit.
- FG terminal must be grounded according to the D-type ground (Type 3) dedicated for sequencer. Failure to do so may result in an electric shock or a malfunction.
- When using this product, make sure to use it in combination with the dedicated current sensor (EMU-CT series or EMU2-CT5).
- The dedicated current sensor (EMU-CT50/CT100/CT250/CT400/CT600) is used only for low voltage circuit. It cannot be used with a high voltage circuit. Also, EMU2-CT5 should be used with the secondary side (5 A) of transformer transfixed. In case directly using for the circuit, only the circuit up to 200V can be used. If it is connected with a high-voltage circuit by mistake, it may cause a burnout of the device and a fire. It is critically dangerous.
- The dedicated current sensor has a polarity (directionality). Be careful about it when installing the unit.
- Take care not entering any foreign objects such as ships and wire pieces into the unit. It may cause a fire, a failure or a malfunction.
- In order to prevent the unit from incoming foreign objects such as wire pieces during wiring work, a foreign-object preventive label is placed on the unit. While a wiring work is performed, keep the label on the unit. Before operating the system, peel off the label for heat release. If the foreign-object preventive label is not peeled and the system is in use, residual heat inside the unit may reduce the product life.
- The wires to be connected to the unit shall be placed in a duct or fixed together by clamping. If the electric wires are not placed in the duct or clamped together, loosen wires or their movement or careless stretch may cause a breakage of the unit or wire or a malfunction due to poor contact of electric wires.
- Use appropriate size of electric wires. If inappropriate size of electric wire is used, it may cause a fire due to generated heat.
- In case using stranded wire, take measures so that the filament should not vary by using a bar terminal or by processing the point twisted. Use the bar terminal appropriated for the size of electric wires. If inappropriate bar terminal is used, a wire breakage or a contact failure may occur, which may cause a device malfunction, a failure, a burnout, or a fire.
- After inserting the electric wire or a bar terminal, make sure that no missing insertion is existing. Missing insertion may cause a device malfunction, a fire, or an electric shock.
- If the wires connected to the unit are strongly pulled off, it may cause a malfunction or a breakage to the unit or the wire.
- Ensure the wiring to the unit properly, checking the rated voltage and current of the product and the terminal pin assignment. If the input voltage exceed the rated voltage or the wiring is improper, it may cause a fire or a breakage. (Tensile load: 22N or less)
- Do not exceed the specified voltage when doing an insulation resistance test and a commercial frequency withstand voltage test.

4.2 Names and functions of LEDs

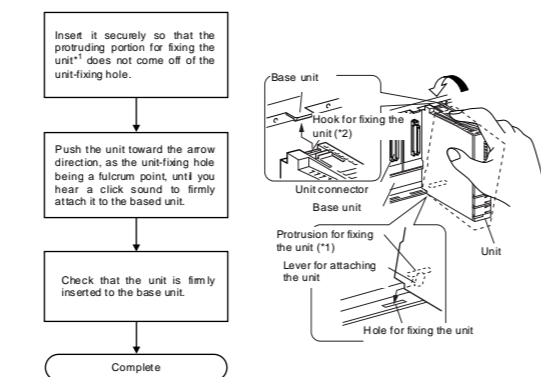
The following describes names and functions of LEDs.

Name	Color	Role	Indicator condition
RUN LED	Green	Displays the operation status of this unit.	ON: Normal operation OFF: 5V power discontinuity, watch dog timer error
ERR LED	Red	Displays errors and conditions of this unit.	ON: Error occurring (except out-of-range error) ¹⁾ Flashing: Out-of-range error ¹⁾ OFF: Normal operation
ALM1 LED	Red	Displays alarm 1 occurrence status.	Flashing: Alarm 1 occurring ON: Alarm 1 occurring ; Not occurring (In the case of alarm 1 reset method = self-retention) OFF: Alarm 1 not occurring
ALM2 LED	Red	Displays alarm 2 occurrence status.	Flashing: Alarm 2 occurring ON: Alarm 2 occurring ; Not occurring (In the case of alarm 2 reset method = self-retention) OFF: Alarm 2 not occurring
MEA LED	Green	Displays the status of measurement of this unit.	ON: Measurement existing OFF: Measurement not existing (no measurement)
R LED	Green	Displays the status of measurement (regeneration) of this unit.	ON: Measurement existing (regeneration) OFF: Other than the above
1 LED	Green	Displays the status of measurement (regeneration) at side 1 of this unit.	ON: Measurement at side 1 existing (regeneration) OFF: Other than the above
3 LED	Green	Displays the status of measurement (regeneration) at side 3 of this unit.	ON: Measurement at side 3 existing (regeneration) OFF: Other than the above

※1: For details, check with the list of error codes. (Refer to section 9.1)

5. Attaching and removing the unit

5.1 How to attach to the base unit



- When attaching the unit, make sure to insert the protruding portions for fixing the unit into the holes on the base unit. In doing so, insert it securely so that the protruding portion of the unit does not come off of the holes. Do not force to attach the unit; otherwise the unit may break.
- When installing the unit at a vibrating area with strong impact, tighten the unit to the base unit using screws.
Fixing-Unit screw (arranged by user): M3 x 12mm
Tightening torque of the fixing-unit screws: 0.36 – 0.48 N•m

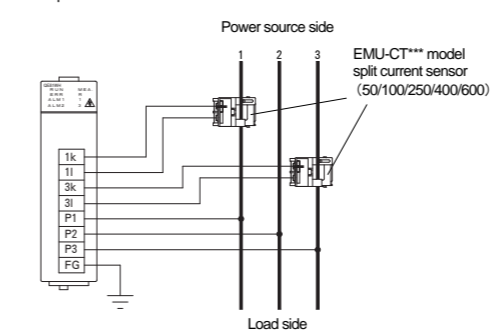
6. How to wire

6.1 Wiring

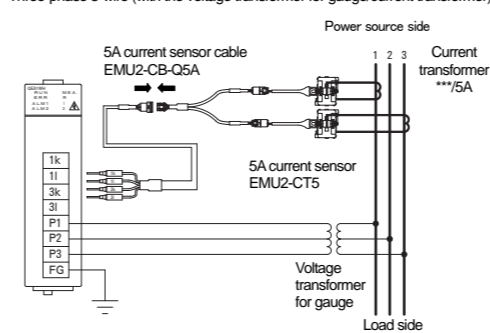
Follow the wiring diagram for external connection of QE81WH.

Current sensor (EMU-CT50/CT100/CT250/CT400/CT600, EMU2-CT5) is necessary for the connection of the current circuit. See the User's Manual (Details) of this unit, and the installation method and the detailed specifications of the current sensor.

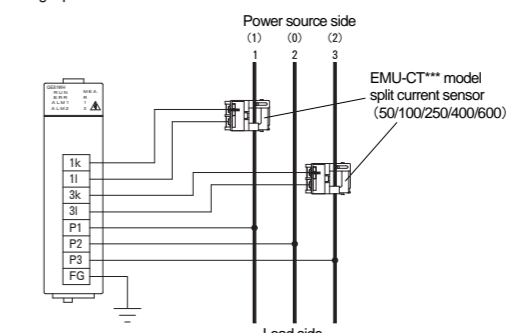
Three-phase 3-wire



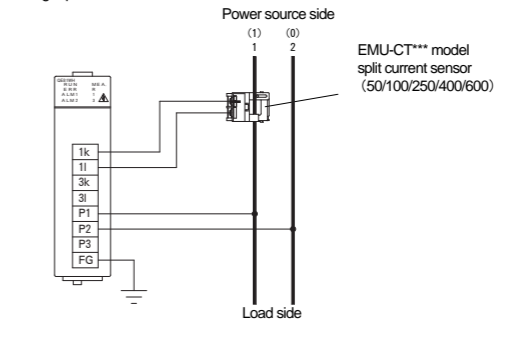
Three-phase 3-wire (with the voltage transformer for gauge/current transformer)



Single-phase 3-wire



Single-phase 2-wire



Caution

- Input signal wire shall not be bound together with or placed close to the main circuit and power line. Keep 300 mm or longer distance between them.
- The input wiring of the measurement circuit uses other signals cable and separate cables, and do not be affected by surge and the instruction of the interchange side.
- For the actual usage, connect the FG terminal to ground. (D-type ground: Type 3) Connect it directly to the ground terminal.
- Do not connect to FG terminal during the insulation resistance test and pressure test.

- Make sure that before connecting the cable, the orientation of the current sensor is correct for attachment. K to L is the correct direction. K: power source side, L: load side.
- If a 440 V or higher circuit is used, use a transformer.
- The available transformer ratio is 220/110 V to 6600/110 V. For connection to P1 to P3 terminals on QE81WH, connect the secondary of transformer. Make sure that terminal symbols are correct.

6.2 How to connect wires

- Use appropriate electric wires as described below.
- Stripping length of the used wire in use has to be 10 to 11mm. Check the stripping length using the strip gauge of QE81WH unit.
- When stranded wire is used, a bar terminal must be used.
- When attaching and detaching cables to/from the terminal, use the push button. Check that the wire is securely inserted.
- Insert a wire to the terminal all the way until it touches the end.

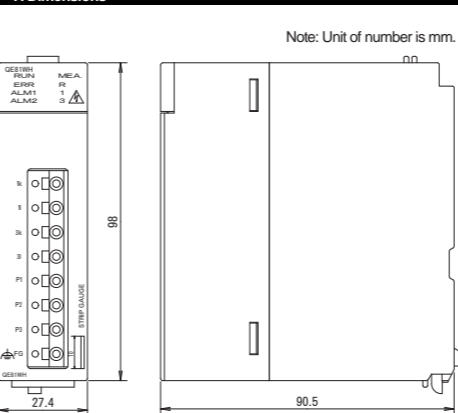
<Applicable wire(Usable electric wire)>

Single wire: φ1.2mm (φ0.5 – 1.2mm)
Stranded wire: 1.3mm² (0.5 – 1.3 mm²)

<Recommended bar terminal>

TGV TC-1.25-11T (NICHIFU TERMINAL INDUSTRIES CO.,LTD)

7. Dimensions



8. Specifications

Item	Specifications
Model	QE81WH
Phase-wire system	single-phase 2-wire / single-phase 3-wire / three-phase 3-wire
Voltage circuit	single-phase 2-wire, three-phase 3-wire
	110 V, 220 V AC
Rating	110V AC (b/w 1- and 2-side, 2- and 3-side)
	220 V (b/w 1- and 3-side)
Current circuit	50 A, 100 A, 250 A, 400 A, 600 A AC (The dedicated split type current sensor is used. Each value refers to the current at the primary side of the current sensor)
	5 AAC (The dedicated split type current sensor is used. 5 A current sensor is used together with the current transformer (CT), and the primary-side current is configurable up to 6000 A)
Frequency	50Hz-60Hz
Allowable tolerance of unit (excluding the current sensor)	Current : ±1.0% (0 – 100% range of the rating)
	Voltage : ±1.0% (0 – 136% range of the rating)
	Electric power : ±1.0% (0 – 120% range of the rating)
	Frequency : ±1.0% (45 – 65 Hz range of the rating)
	Power factor : ±3.0% (against the electric angle 90°)
Reactive energy	±2.0% (5 – 120% range of the rating, power factor = 1)
	±2.5% (10 – 120% range of the rating, power factor = 0)
Measurable circuit count	1 circuit
Operating temperature	0 – 55°C (Average daily temperature 35°C or below)
Operating humidity	5 – 95% RH (No condensation)
Storage temperature	-25 – +75°C
Operating altitude	2000 m or below
Commercial frequency withstand voltage	Between voltage/current input terminals - FG terminal: 2210 V AC3 sec
	Between voltage/current input terminals - sequencer power source and GND terminals: 2210 V AC3 sec
Installation area	Inside a control panel
Product life expectancy	10 years (used under the average daily temperature 35°C or less)

Caution

If an abnormal sound, bad-smelling smoke, fever break out from this unit, I switch it off promptly, and don't use it.

10. Customer Service

Please contact us at the following locations.

1 - 8 Midori-cho, Fukuyama-shi, Hiroshima, 720 - 8647, Japan

Phone (084) 926 - 8142

When exported from Japan, this manual does not require application to the Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.