

OMRON

model KM-N3-FLK

On-Panel Power Monitor

INSTRUCTION MANUAL

Thank you for purchasing the On-panel Power Monitor, model KM-N3-FLK (referred to as model KM-N3 in this manual). This manual describes the functions, performance, and application methods needed for optimum use of model KM-N3. Please observe the following when using model KM-N3.

- This product is designed for use by qualified personnel with a knowledge of electrical systems.
Before using the product, thoroughly read and understand this manual to ensure correct use.
Keep this manual in a safe location so that it is available for reference whenever required.

TRACEABILITY INFORMATION:

Importer in EU: Omron Europe B.V.
Manufacturer: Omron Corporation,
Wegalaan 67-69, 2132 JD Hoofddorp, The Netherlands

The following notice applies only to products that carry the CE mark: This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference

OMRON Corporation

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For detailed instructions, download "Model KM-N3-FLK User's Manual" (catalog no. N214-E1-01) from our website.

PRECAUTIONS ON SAFETY

Key to Warning Symbols

CAUTION Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or there may be property damage.

Table with 2 columns: Warning symbol and description. Includes symbols for CAUTION, explosion, electric shock, and fire.

* CT: Current Transformer

PRECAUTIONS FOR SAFE USE

- Observe the following to ensure safe use of model KM-N3.
Do not use or store the product in any of the following locations.
Locations subject to shock or vibration
Unstable locations where the user might fall/tumble down
Locations subject to temperatures or humidity outside rated ranges
Locations subject to condensation as the result of severe changes in temperature
Outside or otherwise exposed to direct sunlight and weather
Locations subject to static electricity or other forms of noise
Locations exposed to electromagnetic fields
Locations subject to exposure to water or oil
Locations subject to exposure to salt water spray.
Locations subject to corrosive gases (in particular, sulfide gas and ammonia gas).
Locations subject to dust (including iron dust).
Locations subject to exposure to solvents
Be sure to wire properly with the terminals with correct symbols.
Use AWG20 to 16 (with a cross-section of 0.5 to 1.5mm²) to wire the power supply terminals.
Use AWG18 to 14 (with a cross-section of 0.75 to 2.0mm²) to wire the CT and measurement voltage terminals.
Use twisted or solid wire AWG24 to 16 (with a cross-section of 0.25 to 1.5mm²) to wire communication terminals.
Before using or maintaining the product, thoroughly read and understand this manual.
Understand the user manual before setting the device.
Do not pull cables.
For compliance with standards and safety, in order that the worker may turn OFF the power immediately, install a branch circuit breaker conforming to the voltage at which the device is used and the appropriate standards of the country where the device is used.
Do not place the product wiring from high-voltage or high-current power lines to prevent inductive noise.
Do not place the product wiring parallel to or in the same ducts or conduits as power lines.
This is a "class A" product. In residential areas it may cause radio interference.
Use the product by incorporating it in a panel 1 to 8 mm thick.

PRECAUTIONS FOR CORRECT USE

- This product is not categorized as "a specified measuring instrument" officially approved by an organization specified in relevant measurement acts.
Set the parameters of the product so that they are suitable for the system being measured.
Use varistors between the outer power and voltage measuring input wires when this product is installed in an overvoltage category III environment.
This product cannot be used to measure the inverter's secondary side.
Ensure that the rated voltage is reached within 2 seconds of turning the power on.
When cleaning the unit, make sure the power is off and wipe the surface of the unit with a soft dry cloth. Do not use chemicals including solvents such as thinners, benzine, or alcohol.
You cannot use the CT dedicated for use with the Omron KM series (model series KM20-CTF, model series KM-NCT).
The data for active energy is saved at 5 minute intervals.
Dispose of this product appropriately as industrial refuse in accordance with local and national regulations.

Features

This product is an electric energy monitor mounted on the panel of the control board. It complies with the international IEC accuracy standards and can be connected using general-purpose CTs. One unit can measure a maximum of four circuits. The unit can measure the power of each point accurately.

Main unit specifications

Table with 2 columns: Item and Content. Includes specifications for input voltage, frequency, power consumption, ambient temperature, humidity, storage conditions, insulation resistance, vibration, shock, electromagnetic environment, and standards.

Measurement specifications

Table with 2 columns: Item and Content. Includes Active power (0.5%), Reactive power (2%), Measurement frequency (80ms), and Functions (Conversion).

*IEC62053 is an international standard dealing with electricity metering.
*This does not include the measuring error margin of the generic CT.

Measurement input specifications

Table with 2 columns: Item and Content. Includes Applicable circuit type, Number of measuring circuits, Rated input voltage, Connectable CTs, Rated current for CT secondary side, and Maximum current for CT secondary side.

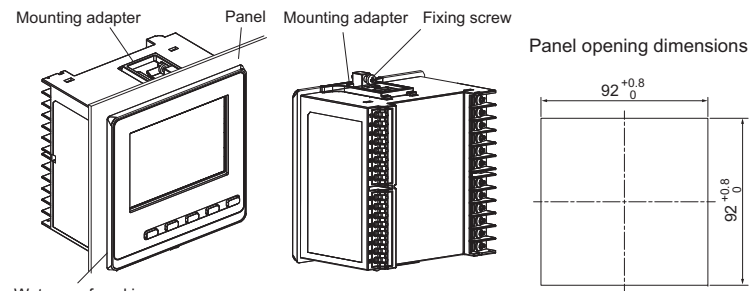
*You cannot use the CT dedicated for use with the Omron KM series (model series KM20-CTF, model series KM-NCT).
Use a CT with a rated load of 1.0 VA or more.

Output specifications

Table with 2 columns: Item and Content. Includes Pulse output (Active energy) and RS-485 (Protocol, Sync method, Communication speed, Maximum transmission distance, Maximum number of devices connected).

Attaching the body of the unit

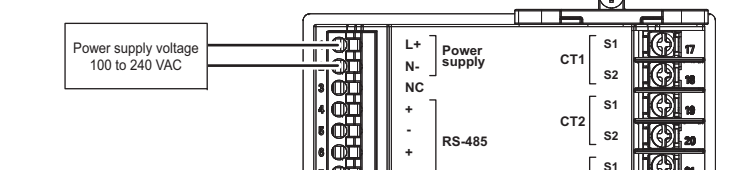
- Create an opening on the panel according to the panel machining dimensions.
In order to make the unit waterproof, with the accessory waterproof packing on the front of the panel, insert the unit into the panel opening.
Fit the attached mounting adapter into the fixing grooves on the top and bottom faces of the rear case.
Push in the mounting adapter from the terminal side until it contacts the panel to fix the main unit tentatively.
Fasten the fixing screws of the top and bottom mounting adapter alternately as keeping balance little by little.



Wiring of power supply, CT, and measurement voltage input

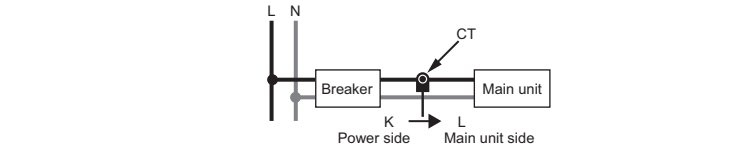
Wiring the power supply

- For safety purposes, turn off the mains power and the breaker to ensure there is no power supply while you are working.
The terminal is the push-in type.
To wire with the power supply terminal, use AWG20-16 wire (with a cross-section of 0.5 to 1.5 mm²).
Peel the wire-coating by 10 mm when using a ferrule terminal and by 8 mm when not using it.
Use a ferrule terminal with a conductor portion 8mm long.



Wiring the CTs

- For safety purposes, turn off the mains power and the breaker to ensure there is no power supply while you are working.
You will need 3 CTs to measure 3-phase 4-wire, 2 CTs to measure 1-phase 3-wire or 3-phase 3-wire, and 1 CT to measure 1-phase 2-wire.
CTs have polarity, so confirm the current directions at the power supply side (K) and load side (L) before wiring the CTs.



- To wire the CT input terminals, use AWG18-14 wire (with a cross-section of 0.75 to 2.0 mm²) and crimping terminals of the round shape or Y-shape (5.8mm wide or less) compatible with the M3 screw.
The recommended torque for screwing the 3mm screws onto the terminal panel is 0.5 to 0.58 N·m.
The recommended fastening torque of the M3 terminal screw is 0.5 to 0.58 N·m.

Wiring the measurement voltage input

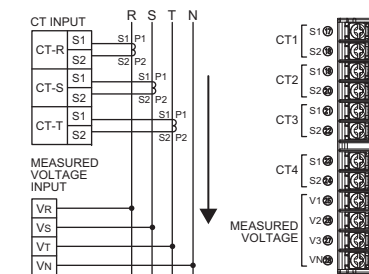
- For safety purposes, turn off the mains power and the breaker to ensure there is no power supply while you are working.
Wire correctly so the phase sequence is correct.
To wire with the measurement voltage input terminal, use AWG18-14 electric wire (with a cross-section of 0.75-2.0mm²) and crimping terminals of the round shape or Y-shape (5.8mm wide or less) compatible with the M3 screw.
The recommended fastening torque of the M3 terminal screw is 0.5 to 0.58 N·m.

Wiring diagrams

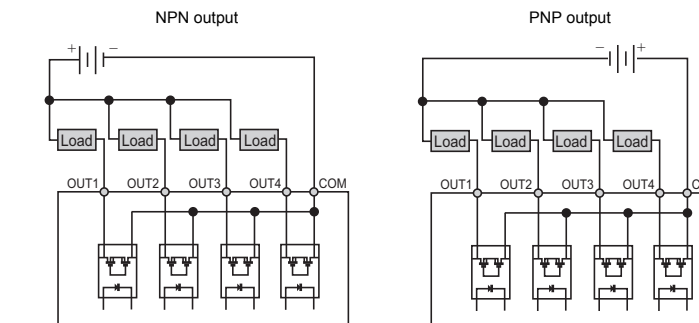
- The below table shows the wiring of voltage input terminals and CT input terminals with each phase and wire type (3-phase 4-wire, 1-phase 2-wire, 1-phase 3-wire, and 3-phase 3-wire) using only one circuit (circuit A). Wire the device according to the phase and wire type.

Table showing wiring connections for different phase and wire types. Columns include VR, VS, VT, VN, CT-R, CT-S, CT-T.

(wiring example for 3-phase 4-wire)
P1/P2: Primary
S1/S2: Secondary



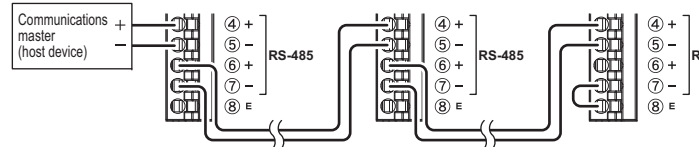
Pulse output wiring



- This unit is equipped with 4 pulse output terminals. The common terminal is used commonly.
The terminal is the push-in type.
Do not directly connect an external power source to OUT or COM.
To wire with the pulse output terminal, use AWG24-16 twisted or solid wire (with a cross-section of 0.25 to 1.5 mm²).
Peel the wire-coating by 10 mm when using a ferrule terminal and by 8 mm when not using it.
Use a ferrule terminal with a conductor portion 8mm long.
To avoid the influence of noise, use separate wiring for the signals and for the power.
Output for circuit A is allocated to OUT1, circuit B to OUT2, circuit C to OUT3, and circuit D to OUT4, and these allocations are fixed.

RS-485 wiring

- The configuration of the connection should be either 1:1 or 1:N. If the 1:N connection is Modbus, up to 99 KM-N3 can be connected.
The terminal is the push-in type.



- There is no FG terminal on KM-N3.
Use twisted pair cables.
To wire with the RS-485 terminal, use twisted or solid wire of AWG24-16 (with a cross-section of 0.25 to 1.5 mm²).
Peel the wire-coating by 10 mm when using a ferrule terminal and by 8 mm when not using it.
Use a ferrule terminal with a conductor portion 8mm long.
To avoid the influence of noise, use separate wiring for the RS-485 communications and for the power.
The maximum transmission distance is 1200m.
Irrespective of the transmission distance and number of units connected, perform communications checks with the actual units.

Termination settings

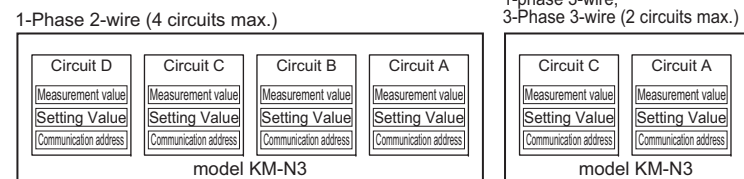
- This unit is equipped with a terminating resistor inside the main unit.
If the host device you are using does not have its own built in terminating resistor, connect a terminating resistor to the host device.
Do not wire in a terminating resistor terminal on KM-N3 that are along the transmission path.

Safety standard compatibility

Table with 2 columns: Warning symbol and description. Includes text about equipment protection, overvoltage limits, and meaning of warning symbols.

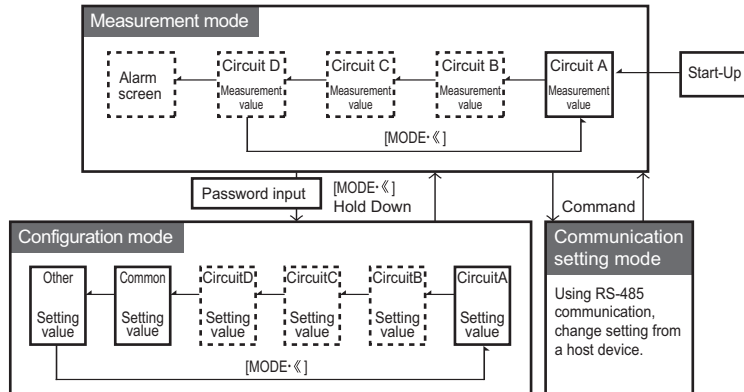
Multi-address system

This unit makes it possible to have a maximum of 4 measuring circuits in one unit. The measuring circuits act as independent power monitors, each able to measure, each having different settings, and each allocated different communication addresses. You can easily change the number of circuits by enabling or disabling the measuring circuits.



Mode configuration

This model has three modes: measuring mode, setting mode, and communication setting mode. Measuring mode: The measured values or alarm details of each circuit are displayed. Setting mode: By operating keys on the body of the unit you can change settings for each of the circuits, and make common settings for communications, output, the display, etc. Communication setting mode: Make settings on the units using RS-485 communication.



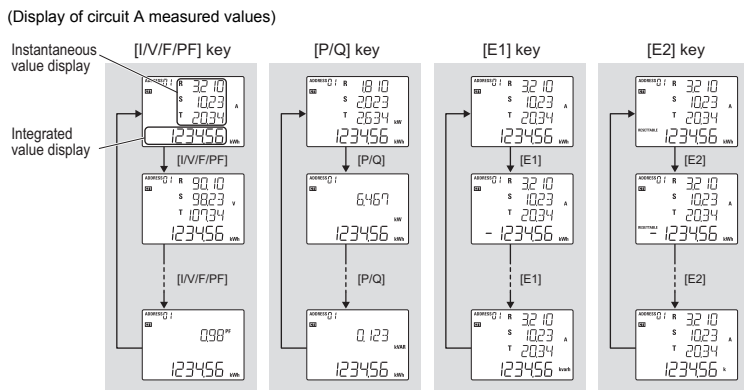
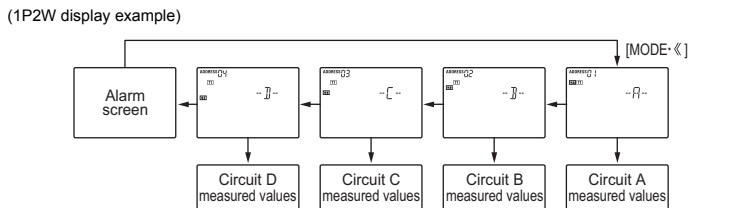
- In the measuring mode and setting mode, the circuit B to D items are displayed by switch the enable/disable settings for each of the circuits to "ON" (enabled). (The circuits indicated inside the dotted lines are "OFF" (disabled) in the default state.)
- The alarm screen is displayed when an alarm has occurred.

Switching between the measuring mode and the setting mode
Switch between the measuring mode and setting mode by pressing and holding the [MODE-⟨] key. "Press and hold" means pressing the key for 1 or more seconds.

How to enter the password
When moving from the measuring mode to the setting mode, you need to enter the password that has been set. The default password is "0001". You can set a password of 4 numerals between 0000 and 9999. Change the password as necessary. You will be unable to reset the password if you forget it. Take care to note the password carefully when changing it. There is no functionality to disable the password setting. If you forget the password, contact the place of purchase or the manufacturer.

Measuring mode

Measurement display
When the [MODE-⟨] key is pressed, the measuring items are displayed after the screen for showing the destination circuit. By pressing the [I/V/F/PF], [P/Q], [E1], or [E2] key, the measuring items are switched. When an alarm has occurred, the screen transits to not only the screen displaying the measured values but also the screen displaying the alarm details.



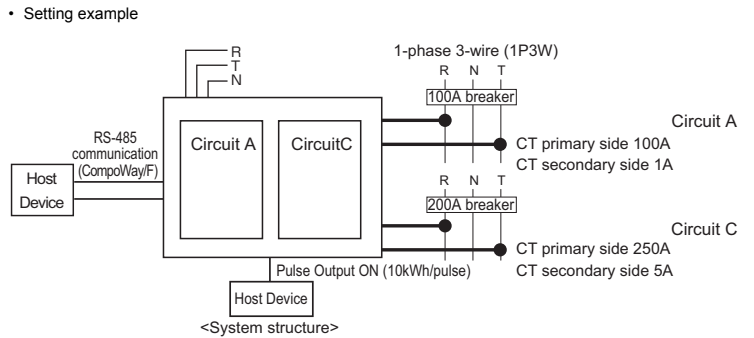
- By pressing the [I/V/F/PF] or [P/Q] key, the instantaneous value display is switched.
- By pressing the [E1] or [E2] key, the integrated value display is switched.

key	Item	Instantaneous value display	Integrated value display	units
1	Current	0.000 to 9999	----	A
I/V/F/PF	Voltage A *1	0.000 to 9999	----	V/kV
	Voltage B *2	0.000 to 9999	----	V/kV
	Frequency	45.0 to 65.0	----	Hz
	Power factor	-1.00 to 1.00	----	PF
P/Q	Active power (each phase)	-9999 to 9999	----	kW/MW
	Active power (total)	-9999 to 9999	----	kW/MW
	Reactive power (each phase)	-9999 to 9999	----	kvar/Mvar
	Reactive power (total)	-9999 to 9999	----	kvar/Mvar
E1	Active energy (import)	----	0 to 999999	kWh/MWh
	Active energy (export)	----	0 to 999999	kWh/MWh ("—" is lit)
	Cumulative total reactive power	----	0 to 999999	kvarh/Mvarh ("Total Q" is lit)
	Reactive energy (import)	----	0 to 999999	kvarh/Mvarh ("—" is lit)
	Reactive energy (export)	----	0 to 999999	kvarh/Mvarh
	T1 active energy (import)	----	0 to 999999	kWh/MWh
	T2 active energy (import)	----	0 to 999999	kWh/MWh
	T3 active energy (import)	----	0 to 999999	kWh/MWh
	T4 active energy (import)	----	0 to 999999	kWh/MWh
	Active energy (import) (resettable)	----	0 to 999999	kWh/MWh ("RESETTABLE" is lit)
	Active energy (export) (resettable)	----	0 to 999999	kWh/MWh ("RESETTABLE" is lit)
	Cumulative total reactive power (resettable)	----	0 to 999999	kvarh/Mvarh ("Total Q" is lit)
	Reactive energy (import) (resettable)	----	0 to 999999	kvarh/Mvarh ("RESETTABLE" is lit)
	Reactive energy (export) (resettable)	----	0 to 999999	kvarh/Mvarh ("RESETTABLE" is lit)
E2	T1 active energy (import) (resettable)	----	0 to 999999	kWh/MWh ("RESETTABLE" is lit)
	T2 active energy (import) (resettable)	----	0 to 999999	kWh/MWh ("RESETTABLE" is lit)
	T3 active energy (import) (resettable)	----	0 to 999999	kWh/MWh ("RESETTABLE" is lit)
	T4 active energy (import) (resettable)	----	0 to 999999	kWh/MWh ("RESETTABLE" is lit)
9	Conversion value	----	0 to 999999	N/A

- * The unit such as k or M is switched automatically.
- * Although the indication value of the model KM-N3 main unit is returned to zero when the integrated value has reached the maximum, the unit continues to integrate the measured value. Correct values can be obtained by using the communication function.
- *1 Voltage A: The phase voltage and line voltage of the each phase and wire type are displayed.
- *2 Voltage B: The line voltage is displayed only for the three-phase four-wire type.

Setting mode

MENU No.	Setting Item	Main display Display of options and input values	Default Value
Circuit A	A1	Phase and wire type	3P4W / 1P2W / 1P3W / 3P3W / 1P2W2 / 1P3W2
	A2	Communication address	Modbus : --, 01 to 99 CompoWay/F : -- 00 to 99
	A3	Current on the CT secondary side	1A / 5A
	A4	Current on the CT primary side	1 to 9999
	A5	Voltage assignment	V_R / V_T / V_R-T
	A6	Pulse output ON/OFF	ON / OFF
	A7	Active energy reset	----
B0	Circuit B ON/OFF	ON / OFF	
Circuit B	B1	Phase and wire type	The phase and wire type set by menu No. A1 is displayed.
	B2	Communication address	Modbus : --, 01 to 99 CompoWay/F : -- 00 to 99
	B3	Current on the CT secondary side	1A / 5A
	B4	Current on the CT primary side	1 to 9999
	B5	Voltage assignment	V_R / V_T / V_R-T
	B6	Pulse output ON/OFF	ON / OFF
	B7	Active energy reset	----
C0	Circuit B ON/OFF	ON / OFF	
Circuit C	C1	Phase and wire type	The phase and wire type set by menu No. A1 is displayed.
	C2	Communication address	Modbus : --, 01 to 99 CompoWay/F : -- 00 to 99
	C3	Current on the CT secondary side	1A / 5A
	C4	Current on the CT primary side	1 to 9999
	C5	Voltage assignment	V_R / V_T / V_R-T
	C6	Pulse output ON/OFF	ON / OFF
	C7	Active energy reset	----
D0	Circuit B ON/OFF	ON / OFF	
Circuit D	D1	Phase and wire type	The phase and wire type set by menu No. A1 is displayed.
	D2	Communication address	Modbus : --, 01 to 99 CompoWay/F : -- 00 to 99
	D3	Current on the CT secondary side	1A / 5A
	D4	Current on the CT primary side	1 to 9999
	D5	Voltage assignment	V_R / V_T / V_R-T
	D6	Pulse output ON/OFF	ON / OFF
	D7	Active energy reset	----
Common CMMN	00	Protocol	MODBUS / COMPF
	01	Communication speed	1.2K / 2.4K / 4.8K 9.6K / 19.2K / 38.4K(bps)
	02	Data length	7 / 8
	03	Stop bit	1 / 2
	04	Parity	NONE / ODD / EVEN
	05	Transmission wait time	00 to 99
	06	VT ratio	1.00 to 999.99
	07	Conversion rate	0.000 to 99.999
	08	Pulse output units	1 / 10 / 100 / 1K / 5K 10K / 50K / 100K (Wh)
	09	Automatic LCD off	OFF / 1.0 / 5.0 / 10.0 (minutes)
Others ETC	0A	Alarm display with negative effective power value ON/OFF	ON / OFF
	0B	Tariff ON/OFF	ON / OFF
	0C	Change password	0000 to 9999
	90	Software version display	V.1.0.0
91	All active energy reset	----	
92	Initialize	----	
93	Restart	----	



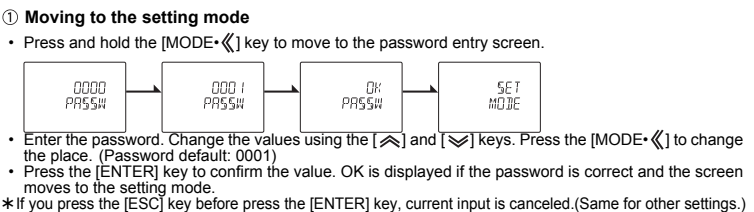
To measure, you first need to make settings in the settings mode for the circuits and communications. Example settings are shown for the following conditions.

Circuit A	Circuit C
Phase and wire type : 1P3W	Circuit C ON/OFF : ON
Current on the CT secondary side : 1A	Phase and wire type : 1P3W
Current on the CT primary side : 100A	Current on the CT secondary side : 5A
Communication address : 15	Current on the CT primary side : 250A
Pulse output ON/OFF : ON (automatically allocated to OUT1)	Communication address : 16 (numbered starting from circuit A)
	Pulse output ON/OFF : ON (automatically allocated to OUT3)

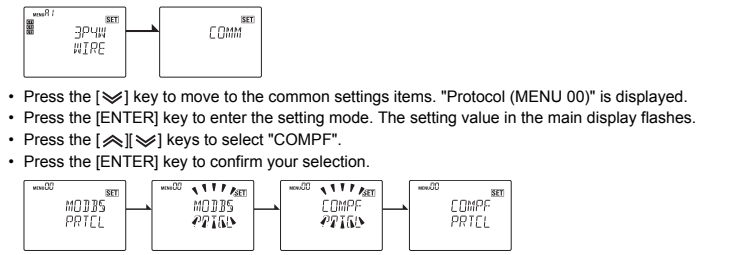
Items that have a minimum setting are as follows:

Circuit A settings	Circuit C settings
Phase and wire type : MENU A1	Circuit C ON/OFF : MENU C0
Address number : MENU A2	Current on the CT primary side : MENU C4
Current on the CT secondary side : MENU A3	Pulse output ON/OFF : MENU C6
Current on the CT primary side : MENU A4	* The secondary current for CTs (MENU C3) does not need to be changed.
Pulse output ON/OFF : MENU A6	

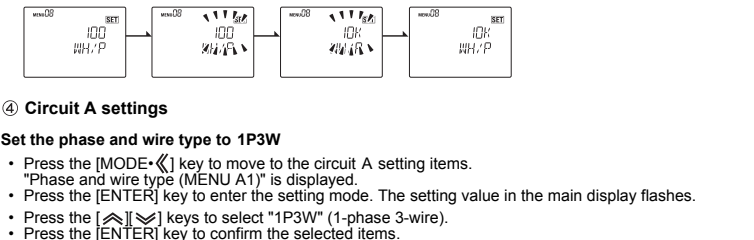
RS-485 communication settings	Pulse output settings
Protocol : MENU 00	Pulse output units : MENU 08
Communication speed : MENU 01	
Data length : MENU 02	
Stop bit : MENU 03	
Parity : MENU 04	
Transmission wait time : MENU 05	



② Communications protocol settings (common settings)
Set to CompoWay/F
Press the [MODE-⟨] key to move to the common settings "CMMN" screen.



③ Pulse output units settings (common settings)
Set to 10kWh/pulse
Press the [MODE-⟨] key to move to the common settings "CMMN" category display screen. From the common setting items, press the [MODE-⟨] keys to move to "Pulse output units (MENU 08)". Press the [ENTER] key to enter the setting mode. The setting value in the main display flashes. Press the [MODE-⟨] keys to select "10K". Press the [ENTER] key to confirm your selection.



④ Circuit A settings
Set the phase and wire type to 1P3W
Press the [MODE-⟨] key to move to the circuit A setting items. "Phase and wire type (MENU A1)" is displayed. Press the [ENTER] key to enter the setting mode. The setting value in the main display flashes. Press the [MODE-⟨] keys to select "1P3W" (1-phase 3-wire). Press the [ENTER] key to confirm the selected items.

Set communication address of circuit A to 15
On the setup items of circuit A, press the [MODE-⟨] or [MODE-⟨] key to move to the "Communication address (MENU A2)". Press the [ENTER] key to enter the setup mode. The ones place of the main display blinks. Press the [MODE-⟨] or [MODE-⟨] key to change the numerical value to "15".
By pressing the [MODE-⟨] key, the cursor moves left by one digit.
By pressing the [MODE-⟨] key at the leftmost digit, the cursor moves to the rightmost digit.
Press the [ENTER] key to determine the settings.

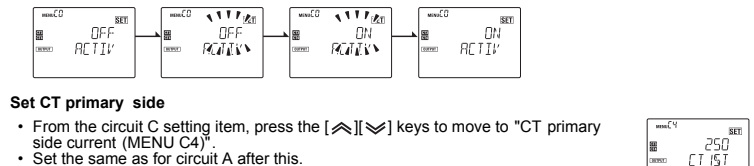
	Circuit A	Circuit B	Circuit C	Circuit D
3-phase 4-wire	Setting value	---	---	---
1-phase 2-wire, 1-phase 2-wire voltage selected	Setting value	Setting value +1	Setting value +2	Setting value +3
1-phase 3-wire, 3-phase 3-wire	Setting value	---	Setting value +1	---
1-phase 3-wire composite	Setting value	---	Setting value +1	Setting value +2

Set the CT secondary side current to 1A
From the circuit A setting item, press the [MODE-⟨] or [MODE-⟨] keys to move to "CT secondary side current (MENU A3)". Press the [ENTER] key to enter the setting mode. The setting value in the main display flashes. Press the [MODE-⟨] or [MODE-⟨] keys to select "1A". Press the [ENTER] key to confirm the selected items.

Set the CT primary side current to 100A
From the circuit A setting item, press the [MODE-⟨] or [MODE-⟨] keys to move to "CT primary side current (MENU A4)". Press the [ENTER] key to enter the setting mode. The digit in the ones place on the main display flashes. Press the [MODE-⟨] or [MODE-⟨] keys to change the value to "100". Press the [MODE-⟨] key to move one place to the left. If you press the [MODE-⟨] key on the end at the left, the cursor moves to the right end. Press the [ENTER] key to confirm your change.

Set pulse output to ON
From the circuit A setting item, press the [MODE-⟨] or [MODE-⟨] keys to move to "Pulse output ON/OFF (MENU A6)". Press the [ENTER] key to enter the setting mode. Press the [MODE-⟨] or [MODE-⟨] keys to select "ON". Press the [ENTER] key to confirm the selected items.

⑤ Circuit C settings
Enables circuit C
Press the [MODE-⟨] key to move to the settings screen for circuit C. Press the [MODE-⟨] key to move to the circuit C setting item. "Circuit C ON/OFF (MENU C0)" is displayed. Press the [ENTER] key to enter the setting mode. The setting value in the main display flashes. Press the [MODE-⟨] or [MODE-⟨] keys to select "ON". Press the [ENTER] key to confirm the selected items.



Set CT primary side
From the circuit C setting item, press the [MODE-⟨] or [MODE-⟨] keys to move to "CT primary side current (MENU C4)". Set the same as for circuit A after this.

Setting pulse output ON or OFF
From the circuit C setting item, press the [MODE-⟨] or [MODE-⟨] keys to move to "Pulse output ON/OFF (MENU C6)". Set the same as for circuit A after this.

⑥ Reflecting the settings
Press and hold the [MODE-⟨] key to finish the settings and restart. *When the settings have been changed, the changes are saved when moving to the measurement mode and the unit restarts. Settings are not saved if the unit is turned off while still in the setting mode.

General agreement regarding use

Omron Products are designed and manufactured as general-purpose products for use in general industrial products. They are not intended to be used in the applications described below, therefore if you use Omron products in these applications, Omron provides no warranty for Omron products. However, this excepts cases where Omron has specified that it agrees to provide a warranty, even when used in the following applications:
(a) Applications with stringent safety requirements (For example, nuclear power control equipment, combustion equipment, aerospace equipment, railway equipment, elevator and lift equipment, amusement equipment, medical equipment, safety equipment, and other applications that could cause physical injury or result in the loss of life.)
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