User's Manual

Model UPM100
Universal Power Monitor
<Installation>

IM 77C01H01-43EN

This manual describes the operating precautions, mounting procedures, wiring procedures and other information regarding the UPM100 Universal Power Monitor. In this manual and related user's manuals, illustrations related to the mounting procedures and other descriptions of user operations show the UPM100 which has display function.

YOKOGAWA
Yokogawa Electric Corporation

IM 77C01H01-43EN
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Yokogawa Electric Corporation
2-9-32, Naka-cho Musashino-shi, Tokyo 180-8750 Japan

You can download the latest manuals from the following website:

http://www.yokogawa.com/ns/powercert/im/

Introduction

Thank you for purchasing our UPM100 Universal Power Monitor. The user's manuals listed below are supplied with the UPM100. Read the manuals thoroughly before using the UPM100 to ensure correct and safe use. After reading the manuals, always keep them in an easily accessible convenient place for later reference.

Related User's Manuals and Main Information Included in Manuals

Product user's manuals can be downloaded or viewed at the following URL. To view the user's manual, you need to use Adobe Reader 7 or later by Adobe Systems.
URL: http://www.yokogawa.com/ns/powercert/im/

Title	Description	Document Number
Installation	This manual describes operating precautions, mounting procedures, and external wiring procedures. It also presents the main UPM100 specifications (including optional specifications).	IM 77C01H01-43EN
Initial Setup Operations	This manual describes the setting procedures and setting ranges for various parameters (VT ratio, CT ratio, etc.), which pertain primarily to UPM100 which has display function.	
Measured Value Display Operations	This manual describes the display procedures and measuring ranges for various measured values (active energy, etc.), which pertain primarily to UPM100 which has display function. It also provides information on various error messages and procedures for handling errors.	
Parameter Maps	This manual provides illustrations showing the flow of measured value display and parameter setting display. It also presents lists of the measuring ranges and parameter setting ranges.	
Wireless communication	This manual describes the 920 MHz wireless communication notice and antenna mounting method etc.	

Other related products and user's manuals.

Models CTW10/CTW20/CTW100/ CTW130 Clamp-on Current Transformers	This manual provides information on how to operate and install the CTW series of clamp-on current transformers, as well as their main specifications.	IM 77C01W02-01E
Models CTW15/CTW35 Clamp-on Current Transformers	This manual provides information on how to operate and install the CTW series of clamp-on current transformers, as well as their main specifications.	IM 77C01W03-01E

QR Code

The product has a QR Code pasted for efficient plant maintenance work and asset information management. It enables confirming the specifications of purchased products and user's manuals.
For more details, please refer to the following URL.
https://www.yokogawa.com/qr-code
QR Code is a registered trademark of DENSO WAVE INCORPORATED.

1. For Safe Use

The following symbols are indicated on the product to ensure safe use.

This symbol on the product indicates that the operator must refer to an explanation in the user's manual in order to avoid the risk of injury or death of personnel or damage to the instrument. The manual describes how the operator should exercise special care to avoid electric shock or other dangers that may result in injury or loss of life.

This label denotes that a protective ground terminal is necessary. Be sure to ground this terminal before operating the instrument.

The following symbols are used in the user's manuals.

CAUTION

**Indicates that operating the hardware or software in a particular manner may damage it or result in a system failure.
Draws attention to information that is essential for understanding the operations and/or features of the product.**

CAUTION

**This instrument is an EMC class A product. In a domestic environment this product may cause radio interference in which case the user needs to take adequate measures.
이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.**

2. Product Specifications and the Package Contents

2.1 Model and Specifications Check

Make sure the model and suffix codes shown on the name plate attached to the UPM100 match your order.

Model	Suffix Code							Description
UPM100	-x	x	x	x	x	-2	0	Universal Power Monitor
Phase and Wire Type	-1							Single-phase 2-wire
	-2							Single-phase 3-wire
	-3							Three-phase 3-wire
	-4							Three-phase 4-wire
Rated Input Voltage and Current		3						220V/1A AC (phase voltage 127V AC for three-phase 4-wire) [1]
		4						220V/5A AC (phase voltage 127V AC for three-phase 4-wire) [1]
		5						440V/1A AC (phase voltage 277V AC for three-phase 4-wire)
		6						440V/5A AC (phase voltage 277V AC for three-phase 4-wire)
Output Function			0					Without display function, without pulse output
			1					With display function, without pulse output
			2					Without display function, with pulse output
			3					With display function, with pulse output
Optional Communication Function				0				None (RS-485 is provided as standard)
				C				Wireless communication (with serial gateway function) <For the Republic of Korea>
Optional Measuring Function					0			Integral resolution kWh
					1			Integral resolution kWh / power factor
					2			Integral resolution kWh [2] / reactive power, integrated reactive power
					3			Integral resolution kWh [2] / Power factor, reactive power, integrated reactive power
					4			Integral resolution Wh
					5			Integral resolution Wh / power factor
					6			Integral resolution Wh [2] / reactive power, integrated reactive power
					7			Integral resolution Wh [2] / power factor, reactive power, integrated reactive power
Power Supply						-2		85 to 264V AC 50/60Hz
Always "0"							0	Always "0"

1; 200V (100V + 100V) for single-phase 3-wire.
2: The unit is "kvarh" or "varh" when reactive power is selected.

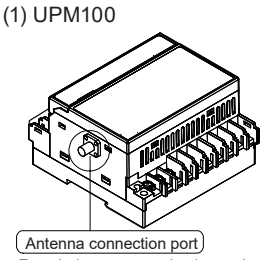
2.2 UPM100 Rated Power (Secondary-side Rated Power)

Rated Power	Rated Input Voltage/Current				
Phase and Wiring	Suffix Code	3	4	5	6
	1	200W	1000W	400W	2000W
	2	200W	1000W		
	3	400W	2000W	800W	4000W
	4	400W	2000W	800W	4000W

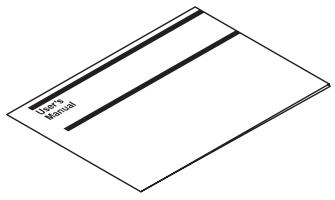
2.3 Checking the Package Contents

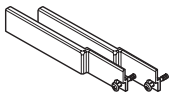
The UPM100 is carefully inspected before shipping. When you receive your UPM100, check its exterior to see if there is any damage. Also make sure a complete set of the following items is included in the package.

(1) UPM100



(2) User's Manual
(Precautions on the Use of the Power Monitor Series)





(3)Terminal Covers
They are attached to the UPM100 when shipped.

(1) UPM100 (main unit): 1
(2) User's Manuals: 1 set

Name	Document Number
Precautions on the Use of the Power Monitor Series	IM 77C01H01-91Z1

(3) Terminal covers: 2 (with M3 screws)
(The covers are attached to the UPM100 when shipped.)

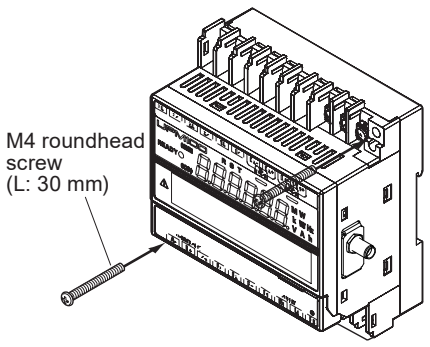
3. Installation Procedures

CAUTION

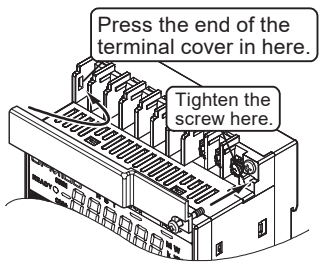
- **The UPM100 is designed to be used indoors. It should not be installed outside under any circumstances. Doing so would allow rainwater and dust to penetrate the housing, resulting in an equipment failure.**
- **Avoid installing the UPM100 in locations subject to the following: sudden jarring, vibrations, corrosive gas, dust, water, oil, solvents, direct sunlight, radiation, strong electric fields, strong magnetic fields.**

3.1 Wall Mounting

Follow the procedure illustrated below to mount the UPM100 on a wall using two M4 roundhead screws (length: 30 mm). The recommended tightening torque for the mounting screws is 1.2 N·m.

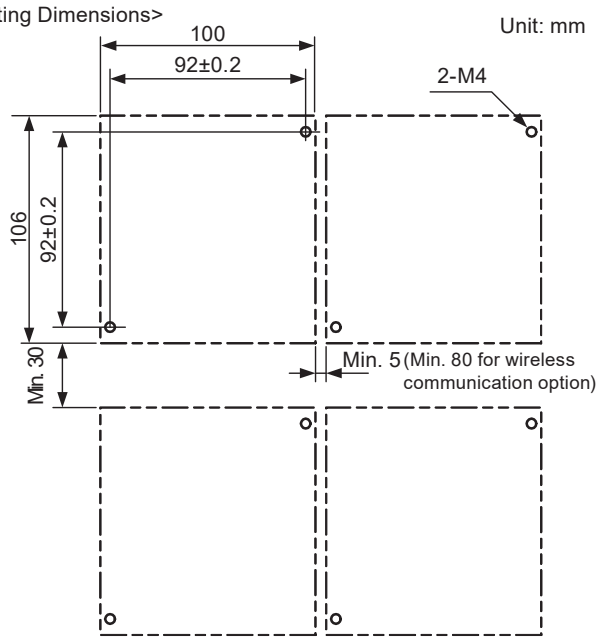


<Attach the Terminal Covers>



<Mounting Dimensions>

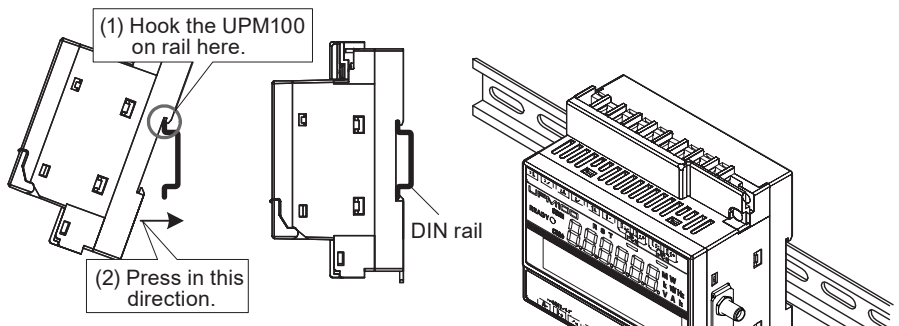
Unit: mm



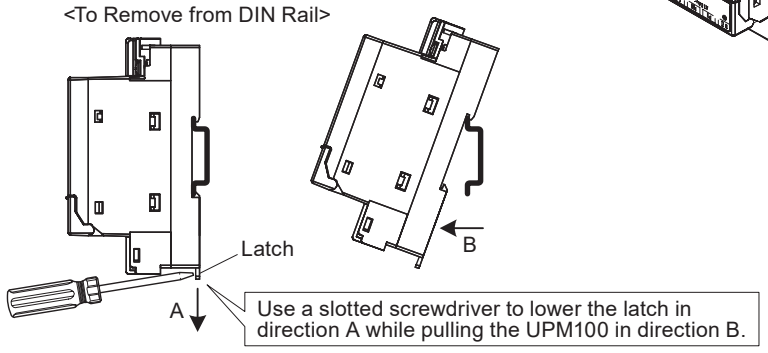
3.2 DIN Rail Mounting

The UPM100 can be mounted on and removed from a DIN rail as shown below.

<To Mount on DIN Rail>



<To Remove from DIN Rail>



4. External Wiring

WARNING

- **Turn off the power supply and use a tester or similar device to make sure that the connecting cable is not live before connecting any wires in order to avoid electric shock.**
- **If the UPM100 and its connected equipment are operated outside its specified conditions, excessive heat and/or equipment damage may result. Check the following before turning on the power:**
  - **a. Whether or not the power supply and the input signal values satisfy the UPM100 specifications.**
  - **b. Whether or not the external wiring is connected to the terminal locations as per the specifications.**
- **Do not operate the UPM100 in locations where flammable gas, explosive gas or steam is present. It is extremely dangerous to operate the UPM100 in such environments.**

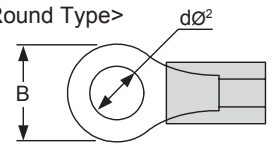
CAUTION

- **Do not use an unused terminal as a relay terminal for another wiring.**
- **Do not cut the protective ground wire inside or outside the UPM100, or disconnect the protective ground terminal connection. It is extremely dangerous to use the UPM100 in such conditions.**
- **Do not operate the UPM100 if there is any possibility of problem with protective functions such as the protective ground. In addition, make sure there is no fault in the protective ground before operating the UPM100.**

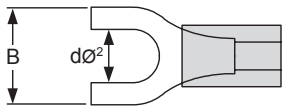
Recommended Crimp-on Terminals

We recommend round crimp-on terminals for use in connecting to the input and power supply terminals.

<Round Type>



<Open-end Type>



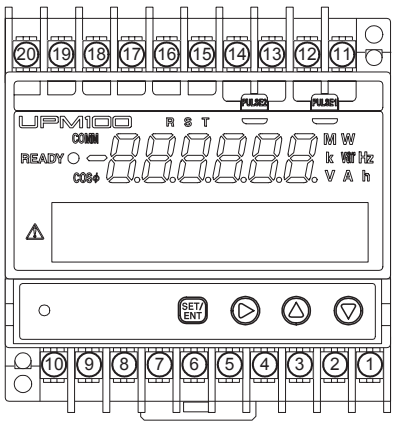
<Round Type>

Specification	Size (dØ²)	Size (B)	Recommended Tightening Torque	Applicable Wire Size
M3.5	3.8	6.6	0.8N·m	1.04 to 2.63 mm²
	3.7	6.6		

<Open-end Type>

Specification	Size (dØ²)	Size (B)	Recommended Tightening Torque	Applicable Wire Size
M3.5	3.7	6.3	0.8N·m	1.04 to 2.63 mm²
	3.7	6.4		

4.1 Terminal Layout



Single-phase 2-wire

No.	Terminal Symbol	Signal Name	No.	Terminal Symbol	Signal Name
1	PE	Protective ground	11	D1+	Pulse output-1 of electric energy (+)
2	L1	Power supply	12	D1-	Pulse output-1 of electric energy (-)
3	N1	Power supply	13	D2+	Pulse output-2 of electric energy (+)
4	P1	Voltage input	14	D2-	Pulse output-2 of electric energy (-)
5	P2	Voltage input	15	1S	Current input
6	NC	Unused terminal	16	1L	Current input
7	NC	Unused terminal	17	NC	Unused terminal
8	SG	RS-485 signal ground	18	NC	Unused terminal
9	B+	RS-485 (+)	19	NC	Unused terminal
10	A-	RS-485 (-)	20	NC	Unused terminal

Single-phase 3-wire

No.	Terminal Symbol	Signal Name	No.	Terminal Symbol	Signal Name
1	PE	Protective ground	11	D1+	Pulse output-1 of electric energy (+)
2	L1	Power supply	12	D1-	Pulse output-1 of electric energy (-)
3	N1	Power supply	13	D2+	Pulse output-2 of electric energy (+)
4	P1	Voltage input	14	D2-	Pulse output-2 of electric energy (-)
5	P0	Voltage input	15	1S	Current input
6	P2	Voltage input	16	1L	Current input
7	NC	Unused terminal	17	2S	Current input
8	SG	RS-485 signal ground	18	2L	Current input
9	B+	RS-485 (+)	19	NC	Unused terminal
10	A-	RS-485 (-)	20	NC	Unused terminal

Three-phase 3-wire

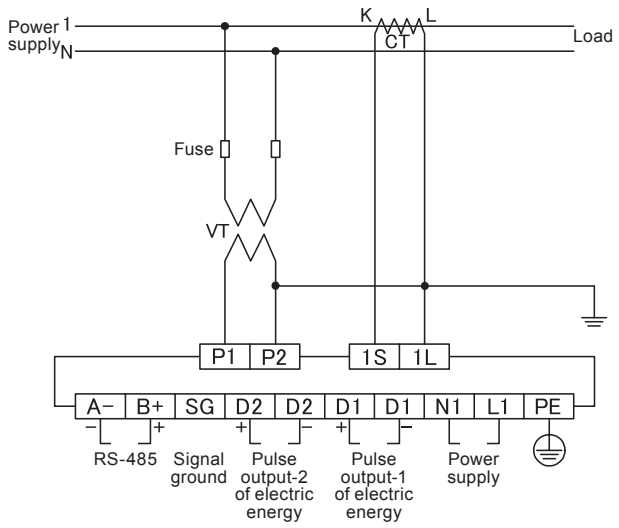
No.	Terminal Symbol	Signal Name	No.	Terminal Symbol	Signal Name
1	PE	Protective ground	11	D1+	Pulse output-1 of electric energy (+)
2	L1	Power supply	12	D1-	Pulse output-1 of electric energy (-)
3	N1	Power supply	13	D2+	Pulse output-2 of electric energy (+)
4	P1	Voltage input	14	D2-	Pulse output-2 of electric energy (-)
5	P2	Voltage input	15	1S	Current input
6	P3	Voltage input	16	1L	Current input
7	NC	Unused terminal	17	3S	Current input
8	SG	RS-485 signal ground	18	3L	Current input
9	B+	RS-485 (+)	19	NC	Unused terminal
10	A-	RS-485 (-)	20	NC	Unused terminal

Three-phase 4-wire

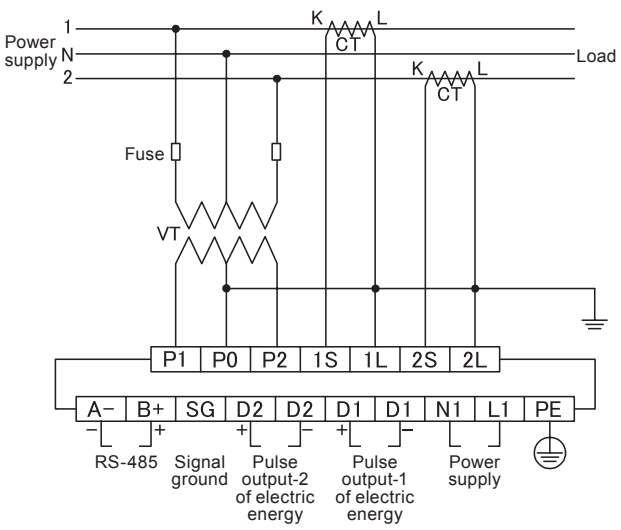
No.	Terminal Symbol	Signal Name	No.	Terminal Symbol	Signal Name
1	PE	Protective ground	11	D1+	Pulse output-1 of electric energy (+)
2	L1	Power supply	12	D1-	Pulse output-1 of electric energy (-)
3	N1	Power supply	13	D2+	Pulse output-2 of electric energy (+)
4	P1	Voltage input	14	D2-	Pulse output-2 of electric energy (-)
5	P0	Voltage input	15	1S	Current input
6	P2	Voltage input	16	1L	Current input
7	P3	Voltage input	17	2S	Current input
8	SG	RS-485 signal ground	18	2L	Current input
9	B+	RS-485 (+)	19	3S	Current input
10	A-	RS-485 (-)	20	3L	Current input

4.2 Wiring Diagrams

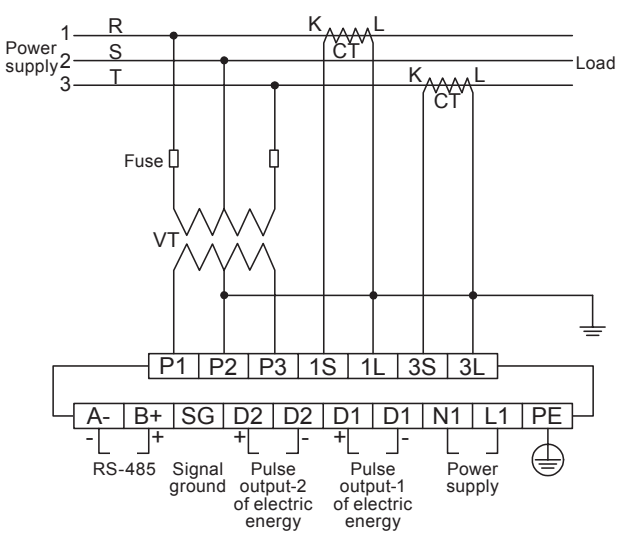
Single-phase 2-wire



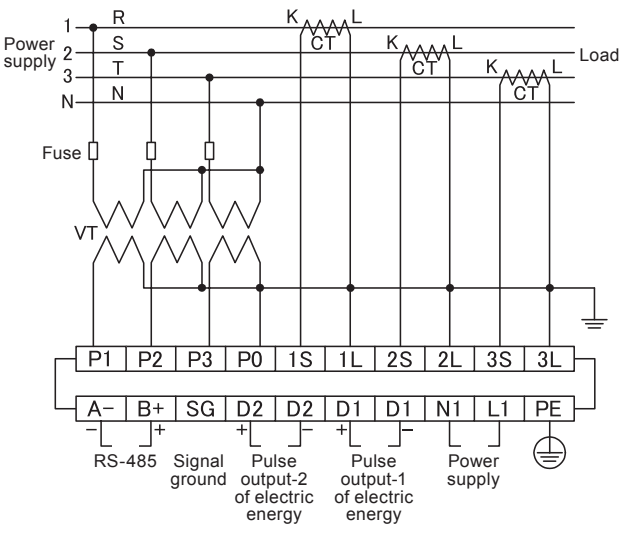
Single-phase 3-wire



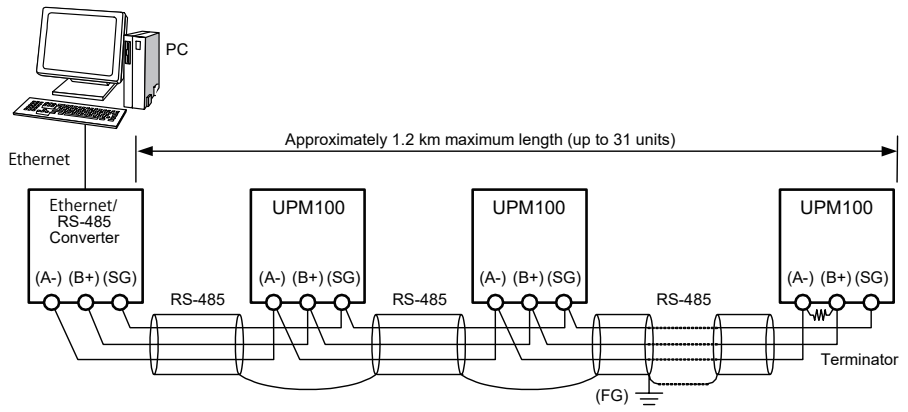
Three-phase 3-wire



Three-phase 4-wire



4.3 Connections for RS-485 Communication



CAUTION

- **RS-485 communication with the UPM100 is based on a 2-wire system. Note the following:**
  (1) The SG terminal (SG) is connected to match the signal level of the RS-485 communication line. Connect the SG terminal without grounding it.
  (2) Connect all shield lines (FG) to provide noise protection on the RS-485 communication line, and ground them in one location.
  (3) When using shielded twisted-pair cable, use the shield line as FG without connecting the SG terminal.

5. UPM100 Main Specifications

5.1 Measuring Functions

- Instantaneous apparent power, apparent energy and regenerative energy
- Instantaneous active power, active energy and optional electric energy
- Instantaneous reactive power and reactive energy (for UPM100 with optional measuring function) LEAD and LAG are integrated. If the pulse output is included, either LEAD or LAG is output as pulse output.
- Instantaneous rms voltage and maximum/minimum rms voltages of each phase
- Instantaneous rms current and maximum rms current of each phase
- Instantaneous power factor (for UPM100 with optional measuring function)
- Frequency

5.2 Input / Output Specifications

Phase and Wiring Type: Single-phase 2-wire, single-phase 3-wire, three-phase 3-wire and three-phase 4-wire
Input Frequency: 45 to 65 Hz
Rated Input Voltage: 220V AC (200V AC [100V + 100V] for single-phase 3-wire)
440V AC (127V AC, 277V AC for three-phase 4-wire)
Input Voltage Range: 0 to 264V AC for 220V AC input; 0 to 520V AC for 440V AC input
Allowable Input Voltage: 1.2 times rated voltage (continuous) or 1.5 times (for 10 seconds)
Rated Input Current: 1A AC, 5A AC
Allowable Input Current: 1.2 times rated current (continuous) or 2 times (for 10 seconds)
Approximate Consumed VA: Voltage input 0.4VA/phase, current input 0.2VA/phase
Pulse Output of Electric Energy (option)*: 2 open collectors
Output capacity: 30V DC, 200mA
When output is ON: Within range of 10 to 1270 ms
Pulse unit: Within range of 10 to 500000 (Wh/pulse, varh/pulse) (set on primary-side rated power before VT and CT); however, 1 to 50000 (Wh/pulse, varh/pulse) when "Integral resolution Wh" is specified.
Maximum output frequency: 3Hz

*: Pulse output-1: Active energy only
Pulse output-2: Either "LAG (lag) reactive energy", "LEAD (lead) reactive energy" or "regenerative energy" when the reactive power option is included. Only "regenerative energy" when the reactive power option is not included.

Communication output: RS-485 x 1

5.3 Standard Performance

Accuracy Rating:
Active power: ±1.0% FS (equivalent to JIS C1111 grade 1.0)
rms voltage for each phase: ±1.0% FS (equivalent to JIS C1111 grade 1.0)
rms current for each phase: ±1.0% FS (equivalent to JIS C1111 grade 1.0)
Apparent energy: ±1% of rdg (with rated input)
Active energy: ±1% of rdg (with rated input) (integration not performed on minus "-" side)
Reactive energy: ±1% of rdg (with rated input) (for UPM100 with optional measuring function)
Regenerative energy: ±1% of rdg (with rated input)
Optional electric energy: ±1% of rdg (with rated input)
Frequency: ±1Hz

Note: If the input is a distortion wave input, the UPM100 will differ from instruments that are based on different measurement principles (including Yokogawa's PR201, UZ005, UPM01, UPM02, and UPM03).

Computing Accuracy: Reactive power, instantaneous power factor, apparent power
45 to 65Hz: ±1dgt (value calculated from measured value)
Backup at Power Interruption: The final integrated values obtained prior to the power interruption are kept for active/reactive/apparent/regenerative energy.
Insulation Resistance: 100 MΩ or more at 500V DC between any two points of current input, voltage input, power supply, ground, communication output and pulse output
Withstand Voltage: 2000V AC for one minute between any two points of current input, voltage input, power supply, ground, communication output and pulse output
Integral Low-cut Power: 0.05 to 20.00% of rated power
Operating Temperature and Humidity Ranges: 0 to 50°C / 5 to 90% RH (no condensation allowed)
Effect of Supply Voltage Fluctuation: ±0.5% FS (instantaneous value) /85 to 264V AC
Effect of Input Frequency: ±0.5% FS (instantaneous value) /45 to 65Hz
Effect of Ambient Temperature: ±1% FS (instantaneous value) /10°C
Power Supply: 85 to 264V AC
Consumed Power: Maximum 5VA (without display function)
Maximum 7VA (with display function)

5.4 Communication Specifications (RS-485 Communication)

Communication Specifications: RS-485 interface
Communication Protocols: PC link (with SUM, without SUM), MODBUS (ASCII, RTU), UPM01 protocol (effective only when "Integral resolution Wh" is specified)
Transmission Distance: Approx. 1.2 km max. (Using twisted-pair cable with 24 AWG shield)
Maximum Number of Connected Units: 31 (units that can be connected to PC or other device in multi-drop connection)
Connection Type: Conforming to RS-485
Cable: A-, B+, SG: Balanced twisted-pair cable
Terminating resistor: 120 Ω (sold separately; L3035RK)
Transmission Type: Half-duplex communication
Synchronization Type: Start-stop synchronization
Baud Rate: 2400, 9600 or 19200 bps
Data Format:
Start bit: 1 bit
Data length: 7 or 8 bits
Parity: None, even or odd
Stop bit: 1 or 2 bits
Error Detection: Checksum (1 byte, simple addition), CRC-16, LRC (no protocol-based flow control)
End Character Specification: Yes (CR)
Address (Station Number) Setting: Set in range from 1 to 99 (1 to 31 recommended)
Reset Switch: 1 contact

5.5 EMC Standards

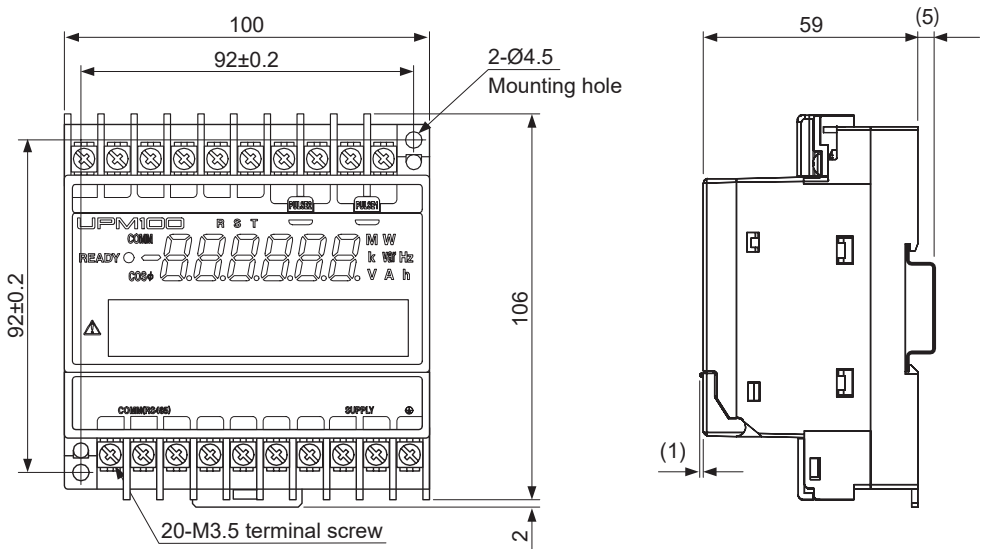
- KC mark conformity: KN301 489-1/-3, KN11, KN61000-6-2

5.6 Power Elements

Function	Formula
Active energy (Wh)	$\int Pdt$
Reactive energy(varh)	$\int Qdt$
Apparent energy (VAh)	$\int VAdt$
Regenerative energy (Wh)	$\int Pdt$
rms voltage (Vrms), rms current (Arms)	$\overline{v(t)}$, $\overline{i(t)}$
Apparent power (VA)	$Vrms \cdot Arms$
Active power (P)	$v(t) \cdot i(t)$
Reactive power (Q)	$\sqrt{(VA)^2 - P^2}$
Instantaneous power factor	P / VA

5.7 External Dimensions

Unit: mm



5.8 Related Products

Product	Model	Description
Clamp-on Current Transformers	CTW130	800A/5A, adaptive line diameter less than Ø36 mm
	CTW100	500A/5A, adaptive line diameter less than Ø36 mm
	CTW35	300A/1A, adaptive line diameter less than Ø36 mm
	CTW20	200A/1A, adaptive line diameter less than Ø24 mm
	CTW15	100A/1A, adaptive line diameter less than Ø24 mm
	CTW10	100A/1A, adaptive line diameter less than Ø24 mm
Separate Type Transformers	CTU100	500A/5A, adaptive line diameter less than Ø30 mm
	CTU20	200A/1A, adaptive line diameter less than Ø20 mm
	CTU10	100A/1A, adaptive line diameter less than Ø20 mm
Communication Terminator	L3035RK	120 Ω terminating resistor for RS-485

User's Manual

Model UPM100
Universal Power Monitor
<Initial Setup Operations>

This manual describes the parameter setting procedures, measured value display procedures and measuring ranges. The explanations of user operations in this manual assume the UPM100 has display function. Parameter settings on UPM100 without display function are made through RS-485 communication.

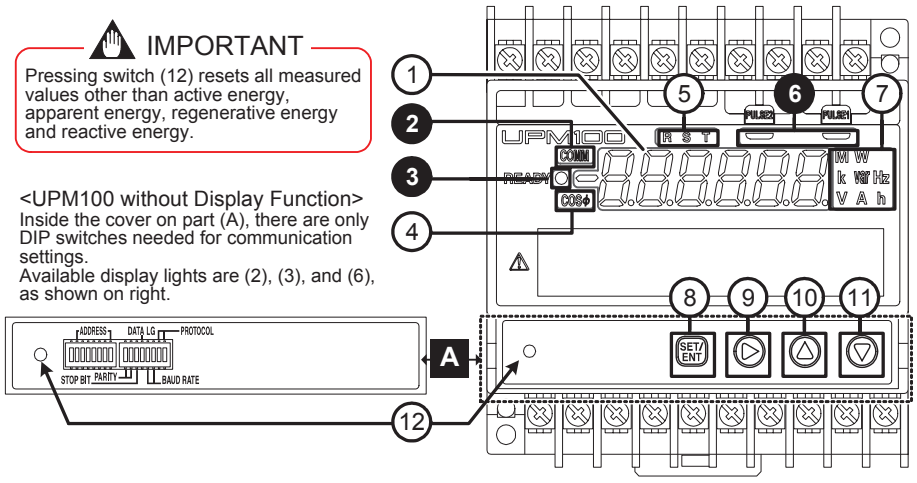
YOKOGAWA
Yokogawa Electric Corporation

1. Front Panel and Its Functions

In the diagram below, the switch cover, which is attached to part A, is opened so that operation keys (8) through (12) can be seen.

IMPORTANT
Pressing switch (12) resets all measured values other than active energy, apparent energy, regenerative energy and reactive energy.

<UPM100 without Display Function>
Inside the cover on part (A), there are only DIP switches needed for communication settings.
Available display lights are (2), (3), and (6), as shown on right.



(1) Measured value display: During operations, measured values are displayed in this area. During parameter settings, parameters and their settings are displayed here. When an error occurs, the display shows the error message. (See "4. Troubleshooting" in the Measured Value Display Operations User's Manual.)
(2) Communication light: This light (green LED) turns on while communication is in progress.
(3) Power light: This light (green LED) turns on while the power is on. If a communication error occurs, this power light flashes (four times per second) until normal status is restored.
(4) COS φ light: This light turns on while the instantaneous power factor (optional measuring function) is displayed.
(5) RST light: This light (red LED) turns on while voltage and/or current values are displayed. For example, the "S" light turns on while the S phase voltage value is displayed with a three-phase 4-wire setup.
(6) Integrated pulse light: This light (green LED) flashes to match the pulse output when integrated pulses of each power are being output.
(7) Unit light: This light turns on as the unit corresponding to the measured value. For example, if the measured value is **** kW, then "k" and "W" lights turn on.
(8) SET/ENT key: This key is used to switch displays and enter parameter settings.
(9) Move key: This key is used to change a phase when measured value is displayed or to move the digit position (decimal point position) when setting a parameter.
(10) Up key: This key is used to change the set value when setting a parameter. Pressing this key increases the numeric value.
(11) Down key: This key is used to change the set value when setting a parameter. Pressing this key decreases the numeric value.
(12) Reset switch: This switch restarts the UPM100. Pressing this switch resets all measured values other than active energy, apparent energy, regenerative energy and reactive energy.

2. Conventions Used in This Manual and Basic User Operations

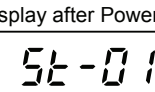
2.1 Conventions Used in This Manual

The following operation keys appear in this manual:

SET/ENT is the <SET/ENT> key. ▶ is the <Move> key. ▲ is the <Up> key. ▼ is the <Down> key.

2.2 Basic Operations

Display after Power-on



After the UPM100 is turned on, the station number (initial setting: 01) appears for about 5 seconds and then the display is changed to the measured value display.

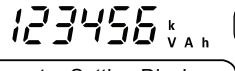
Measured Value Display

<To change measured value display>

SET/ENT

Each time you press the <SET/ENT> key on the measured value display, the measured value display changes in a set sequence. After the final measured value is displayed, the first measured value (active energy) is displayed again.

<To change to the parameter setting display>



SET/ENT

Hold the <SET/ENT> key down for about 3 seconds on the measured value display to change to the parameter setting display.

Parameter Setting Display

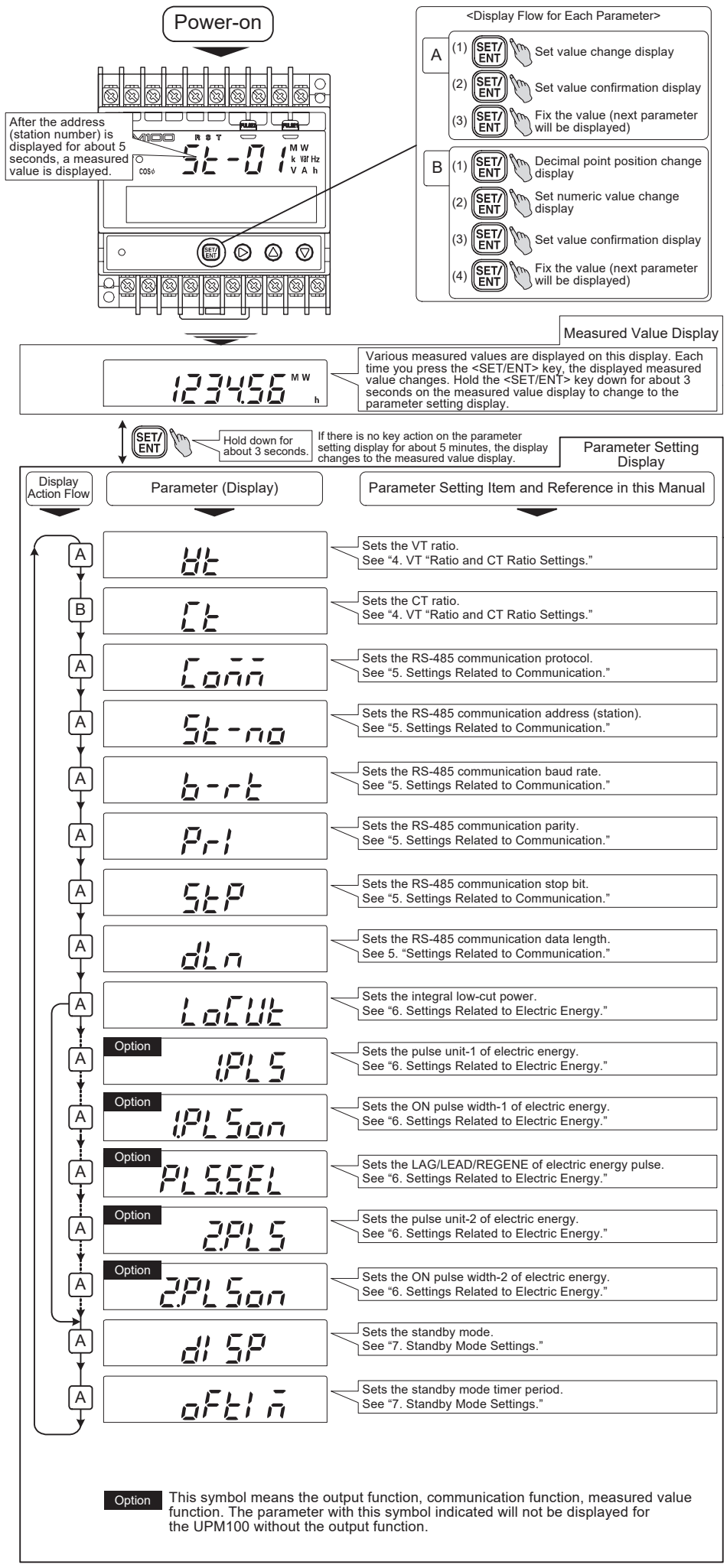
SET/ENT Press the <SET/ENT> key once on the parameter setting display to display the "set value" for the parameter.

SET/ENT Press the <SET/ENT> key in the set value display to display the "confirmation display" for the set value.

SET/ENT Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter.

SET/ENT The display changes to the measured value display if you hold the <SET/ENT> key down for about 3 seconds on the parameter setting display or do not press any key for about 5 minutes.

3. Action Flow on Parameter Setting Display



Option This symbol means the output function, communication function, measured value function. The parameter with this symbol indicated will not be displayed for the UPM100 without the output function.

4. VT Ratio and CT Ratio Settings

This chapter describes how to set the VT and CT ratios.

Parameter Symbol	Parameter Name	Setting Range	Initial Setting
Ht	VT ratio (VT)	1 to 6000 <Variable numeric parameter>	1
Ct	CT ratio (CT)	0.05 to 32000 <Variable numeric parameter/ the decimal point position can be changed> (with 5 significant digits; can be set to the second place of a decimal point.)	1.00

The following example explains how to set VT ratio “4” for 440V/110V and CT ratio “10” for 50A/5A.

Display	Key Operation	Description
Display after Power-on St-01		After the power is turned on, the station number (initial setting: 01) is displayed for about 5 seconds on the UPM100 display and then the measured value display is displayed.
Measured Value Display 123456 kWh Parameter Setting Display	Hold SET/ENT down for about 3 seconds.	Hold the <SET/ENT> key down for about 3 seconds on the measured value display to change to the parameter setting display.
VT Ratio Setting (1) Ht	Press SET/ENT once.	Press the <SET/ENT> key once to display the set value for the parameter.
Set value (2) 0001	Press ▲ three times.	The digit which can be set flashes. Press the <UP> key to display “4.”
Numeric value change 0004	Press SET/ENT once.	After the value is set, press the <SET/ENT> key once. All digits will flash (confirmation display).
Confirmation display (3) 0004	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter “CT.”
CT Ratio Setting (4) Ct	Press SET/ENT once.	Press the <SET/ENT> key once to display the set value for the parameter. (Since the decimal point position for the CTratio can be changed, it flashes first.)
Set value 00.100 Decimal point flashes	Press SET/ENT once.	The decimal point position is not changed here, so press the <SET/ENT> key once here to move the set value change display. (To move the decimal point, press the <Move> key to change the decimal point position.)
(5) 00.100	Press ▶ twice.	The digit which can be set flashes. Press the <Move> key until the digit you want to set flashes.
Numeric value change 00.100	Press ▲ once.	Press the <Up> key to display “1.”
01.100	Press ▶ once.	Press the <Move> key until the digit you want to set flashes.
01.100	Press ▼ once.	Press the <Down> key to display “0.”
Numeric value change 0 10.000	Press SET/ENT once.	After the value is set, press the <SET/ENT> key once. All digits will flash (confirmation display).
Confirmation display (6) 0 10.000	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter “COMM.”
	Hold the <SET/ENT> key down for about 3 seconds to return to the measured value display.	

<Common Operation for All Variable Numeric Parameters>
If there is an error in the set value on the set value confirmation display (with all digits flashing), you should perform the following operation.

Confirmation display 0040 Ht Return to parameter (VT) display	Press ▶ once.	Press the <Move> key on the set value confirmation display (with all digits flashing) to return to the parameter’s initial status. When this is done, the set value is not updated, and the previous set value is kept.

CAUTION

Set the VT ratio and CT ratio so that the product of the ratio does not exceed 9999 (MW) by calculated by secondary-side rated power × VT ratio × CT ratio.

CAUTION

The set value will not be entered if you hold the <SET/ENT> key down for about 3 seconds on the parameter set value confirmation display. To move from the parameter setting display to the measured value display, conduct the display change operation while the parameters (VT, etc.) are being displayed.

5. Settings Related to Communication

This chapter describes settings related to RS-485 communication.

Parameter Symbol	Parameter Name	Setting Range	Initial Setting
CoMM	RS-485 communication protocol (COMM)	PC link (without SUM) PCLK1 (PCLK1) PC link (with SUM) PCLK2 (PCLK2) MODBUS (ASCII) M ASC (M ASC) MODBUS (RTU) M rtU (M RTU) UPM01 Protocol UPM01 (UPM01) <Selective parameter>	PCLK2
St-no	RS-485 station number (ST-NO)	1 to 99 (1 to 31 recommended) <Variable numeric parameter>	1
b-rt	RS-485 communication baud rate (B-RT)	2400, 9600, 19200 (bps) <Selective parameter>	9600 (bps)
Pri	Parity (PRI)	None: nonE (NONE) Even: EvEn (EVEN) Odd: odd (ODD) <Selective parameter>	NONE
StP	Stop bit (STP)	1 or 2 bits <Selective parameter>	1
dLn	Data length (DLN)	7 or 8 bits <Selective parameter>	8

5.1 Settings for UPM100 with Display Function

The procedure shown below should be employed after turning the UPM100 power on, changing from the measured value display to the parameter setting display, and displaying the “COMM” parameter (communication protocol).

Display	Key Operation	Description
Communication Protocol Setting (1) CoMM	Press SET/ENT once.	Press the <SET/ENT> key once to display the set value (selected parameter).
Set value (2) PCLK1	Press ▲ or ▼.	Press the <Up> key or <Down> key to display the parameter (protocol) you want to set.
Parameter change M ASC	Press SET/ENT once.	After setting the parameter, press the <SET/ENT> key once. The set value flashes (confirmation display).
Confirmation display (3) M ASC	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter "ST-NO."
Address (Station Number) Setting (4) St-no	Press SET/ENT once.	Press the <SET/ENT> key once to display the set value. The digit which can be set flashes.
Set value (5) 01	▶ ▲ ▼	Press the <Move> key to change the digit to be set. Use the <Up> key or <Down> key to change the numeric value.
Numeric value change 18	Press SET/ENT once.	Press the <SET/ENT> key once to make the set value flash (confirmation display).
Confirmation display (6) 18	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter "B-RT."
	Hold the <SET/ENT> key down for about 3 seconds to return to the measured value display.	

Perform steps (1) through (3) to set the baud rate, parity, stop bit and data length.

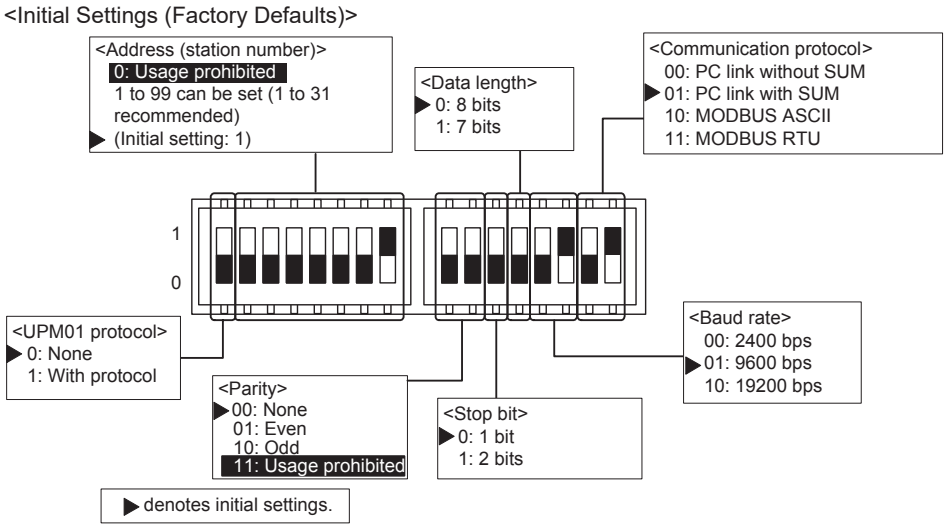
<Common Operation for All Selective Numeric Parameters>
If there is an error in the set value on the set value confirmation display (with all digits flashing), you should perform the following operation.

Confirmation display M rtU CoMM Return to parameter (COMM) display	▶ ▲ ▼ Press one of above once.	Press the <Move> key, <Up> key, or <Down> key on the set value confirmation display (with all digits flashing) to return to the parameter’s initial status. When this is done, the set value is not updated, and the previous set value is kept.

5.2 Settings for UPM100 without Display Function

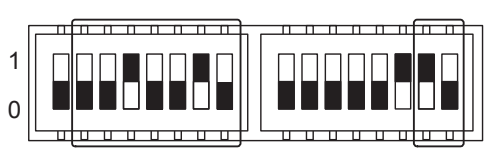
Use the DIP switches to enter the settings on UPM100 without display function.
Referring to the diagram below, set the binary values, with the first bit on the left.

<Initial Settings (Factory Defaults)>



* For 920 MHz wireless communication, baud rate: 19200 bps, communication protocol: MODBUS RTU is the initial value. Please use the above initial value setting except for the address. If you change them, communication will fail to work properly.

<Example Settings for Station Number “18” (0010010) and Communication Protocol “MODBUS ASCII” (10)>



<Binary Number Quick Reference Chart>
The following table is a binary number quick reference chart for use in setting addresses (station numbers) with DIP switches.

1	0000001	21	0010101	41	0101001	61	0111101	81	1010001
2	0000010	22	0010110	42	0101010	62	0111110	82	1010010
3	0000011	23	0010111	43	0101011	63	0111111	83	1010011
4	0000100	24	0011000	44	0101100	64	1000000	84	1010100
5	0000101	25	0011001	45	0101101	65	1000001	85	1010101
6	0000110	26	0011010	46	0101110	66	1000010	86	1010110
7	0000111	27	0011011	47	0101111	67	1000011	87	1010111
8	0001000	28	0011100	48	0110000	68	1000100	88	1011000
9	0001001	29	0011101	49	0110001	69	1000101	89	1011001
10	0001010	30	0011110	50	0110010	70	1000110	90	1011010
11	0001011	31	0011111	51	0110011	71	1000111	91	1011011
12	0001100	32	0100000	52	0110100	72	1001000	92	1011100
13	0001101	33	0100001	53	0110101	73	1001001	93	1011101
14	0001110	34	0100010	54	0110110	74	1001010	94	1011110
15	0001111	35	0100011	55	0110111	75	1001011	95	1011111
16	0010000	36	0100100	56	0111000	76	1001100	96	1100000
17	0010001	37	0100101	57	0111001	77	1001101	97	1100001
18	0010010	38	0100110	58	0111010	78	1001110	98	1100010
19	0010011	39	0100111	59	0111011	79	1001111	99	1100011
20	0010100	40	0101000	60	0111100	80	1010000		

6. Settings Related to Electric Energy

This chapter describes settings related to electric energy.

Parameter Symbol	Parameter Name	Setting Range	Initial Setting
LoCUt	Integral low-cut power (LOCUT)	0.05 to 20.00 (%) (percent of rated power) <Variable numeric parameter>	0.05 (%)
1PLS	Pulse unit -1 of electric energy (1.PLS)	Increments of 10 Wh/pulse in range of 10 to 500000 (Wh/pulse) (Display: 000.01 to 500.00 kWh/pulse) <Variable numeric parameter> *: 1 to 50000 Wh/pulse when “Integral resolution Wh” is specified.	1.00 kWh/pulse
1PLSon	ON pulse width-1 of electric energy (1.PLSON)	Increments of 10 ms in range of 10 to 1270 ms <Variable numeric parameter>	50 (ms)
PLS.SEL	Pulse of electric energy LAG/LEAD/ REGEN E (PLS.SEL)	Reactive energy LAG, LEAD or regenerative energy <Selective parameter>	REGENE or LAG * * For reactive power option
2PLS	Pulse unit -2 of electric energy (2.PLS)	Increments of 10 Wh/pulse or varh/pulse in range of 10 to 500000 (Wh/pulse, varh/pulse)* (Display: 000.01 to 500.00 kvarh/pulse) <Variable numeric parameter> *: 1 to 50000 Wh/pulse or 1 to 50000 varh/pulse when “Integral resolution Wh” is specified.	1.00 kWh/pulse or 1.00 kvarh/pulse* * For reactive power option
2PLSon	ON pulse width-2 of electric energy (2.PLSON)	Increments of 10 ms in range of 10 to 1270 ms <Variable numeric parameter>	50 (ms)

6.1 Integral Low-cut Power Setting

Integral low-cut power serves to prevent the instantaneous values for active power, apparent power, and reactive power (optional) from being integrated if they are below the integral low-cut power setting. Integral low-cut power is set as a percentage of the rated power value. In the example presented here, integral low-cut power is set to “0.1%.” The procedure shown below should be employed after turning the UPM100 power on, changing from the measured value display to the parameter setting display, and displaying the “LOCUT” parameter (integral low-cut power).

Display	Key Operation	Description
Integral Low-cut Power Setting		
(1) LoCUt	Press SET/ENT once.	Press the <SET/ENT> key once to display the parameter's set value.
Set value 00.05	Press ▼ five times.	The digit which can be set flashes. Press the <Down> key to display "0."
(2) 00.00	Press ▶ three times.	Next, press the <Move> key to make the first digit flash.
00.00	Press ▲ once.	Press the <Up> key to display "1."
00.10	Press SET/ENT once.	After setting the parameter, press the <SET/ENT> key once. All digits flash (confirmation display).
(3) 00.10	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter.
	Hold the <SET/ENT> key down for about 3 seconds to return to the measured value display.	

6.2 Settings Related to Integrated Pulse Output

If your UPM100 has integrated pulse output, the pulse unit and ON pulse width must be set. Set the ON pulse width so that the maximum ON pulse width as calculated in the following equation is not exceeded.
Pulse width (ms) = Pulse unit × 3600 × 1000² / Secondary-side rated power × VT ratio × CT ratio × 1.2 × 2 (The pulse unit is kWh or kvarh.)

In the example presented here, the pulse unit-1 of electric energy is set to “500 Wh/pulse”, ON pulse width-1 of electric energy is set to “100 ms”, electric energy pulse LAG/LEAD/REGENE* is set to “LEAD”, pulse unit-2 of electric energy is set to “500 Wh/pulse”, and ON pulse width-2 of electric energy is set to “100 ms.”

*: If “reactive power option” is specified at ordering, either the reactive energy LAG side, LEAD side or regenerative energy is output as the pulse output-2 of electric energy. Select “LAG,” “LEAD” or “REGENE” in the parameter “PLS.SEL”.

The procedure shown below should be employed after turning the UPM100 power on, changing from the measured value display to the parameter setting display, and displaying the “1.PLS” parameter (pulse unit-1 of electric energy).

Display	Key Operation	Description
Pulse Unit-1 of Electric Energy Setting (1) 1.PLS	Press SET/ENT once.	Press the <SET/ENT> key once to display the set value of parameter.
Set value 00.100 k (Unit light) Numeric value change 00000 k (2) 00000 k Numeric value change 00050 k	Press ▼ once. Press ▶ once. Pess ▲ five times. Press SET/ENT once.	The digit which can be set flashes. Enter the setting in "kW" unit. (The "k" unit light is on.) Press the <Down> key to display "0." Press the <Move> key to make the digit you want to set flash. Press the <Up> key to display "5." After setting the parameter, press the <SET/ENT> key once. All digits flash (confirmation display).
Confirmation display (3) 00050 k	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter “1.PLSON.”
ON Pulse Width-1 of Electric Energy Setting (4) 1.PLSon	Press SET/ENT once.	Press the <SET/ENT> key once to display the parameter set value.
Set value 0050 Numeric value change 0000 (5) 0000 Numeric value change 0.100	Pess ▼ five times. Press ▶ twice. Press ▲ once. Press SET/ENT once.	The digit which can be set flashes. Press the <Down> key to display “0.” Press the <Move> key to make the digit you want to set flash. Press the <Up> key to display "1." After setting the parameter, press the <SET/ENT> key once. All digits flash (confirmation display).
Confirmation display (6) 0.100	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter “PLS.SEL.”
Pulse Output-2 of Electric Energy LAG/LEAD/REGENE Setting (7) PLS.SEL	Press SET/ENT once.	Press the <SET/ENT> key once to display the parameter set value.
Set value (8) LAG / LEAd / rEGEnE	Press ▲ or ▼. Press SET/ENT once.	Press the <Up> key or <Down> key to display “LEAD.” After setting the parameter, press the <SET/ENT> key once. All digits flash (confirmation display).
Confirmation display (9) LEAd	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter "2.PLS" (pulse unit-2 of electric energy).
Pulse Unit-2 of Electric Energy Setting (10) 2.PLS	Press SET/ENT once.	Press the <SET/ENT> key once to display the parameter set value.
Set value 00.100 k (Unit light) Numeric value change 00000. k (11) 00000 k Numeric value change 00050 k	Press ▼ once. Press ▶ once. Pess ▲ five times. Press SET/ENT once.	The digit which can be set flashes. Enter the setting in "kvar" unit. (The "k" unit light is on.) Press the <Down> key to display "0." Press the <Move> key to make the digit you want to set flash. Press the <Up> key to display "5." After setting the parameter, press the <SET/ENT> key once. All digits flash (confirmation display).
Confirmation display (12) 00050 k	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter “2.PLSON.”
ON Pulse Width-2 of Electric Energy Setting (13) 2.PLSon	Press SET/ENT once.	Press the <SET/ENT> key once to display the parameter set value.
Set value 0050 Numeric value change 0000 (14) 0000 Numeric value change 0.100	Pess ▼ five times. Press ▶ twice. Press ▲ once. Press SET/ENT once.	The digit which can be set flashes. Press the <Down> key to display "0." Press the <Move> key to make the digit you want to set flash. Press the <Up> key to display "1." After setting the parameter, press the <SET/ENT> key once. All digits flash (confirmation display).
Confirmation display (15) 0.100	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter "DISP."
	Hold the <SET/ENT> key down for about 3 seconds to return to the measured value display.	

7. Standby Mode Settings

This chapter describes the standby mode settings. Standby mode is a function which turns off the LED display if there is no key action within the previously determined time period while measured values are displayed. If there is no key action while the parameter setting display is displayed, the display will change to the measured value display after about 5 minutes. The LEDs then turn off after the previously determined time (standby mode timer) elapses.
To display measured values (i.e., turn on the LEDs) while in the standby mode, press any operation key once.

Parameter Symbol	Parameter Name	Setting Range	Initial Setting
diSP	Standby mode (DISP)	ON or OFF <Selective parameter>	ON
oFtIm	Standby mode timer (OFTIM)	1 to 60 minutes <Variable numeric parameter>	10 (min)

Display	Key Operation	Description
Standby Mode Setting (1) diSP	Press SET/ENT once.	Press the <SET/ENT> key once to display the parameter set value.
Set value (2) on / oFF	Press ▲ or ▼. Press SET/ENT once.	Press the <Up> key or <Down> key to display "ON" or "OFF." After setting the parameter, press the <SET/ENT> key once. All digits flash (confirmation display).
Confirmation display (3) on	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter "OFTIM" (standby mode timer).
Standby Mode Timer Setting (4) oFtIm	Press SET/ENT once.	Press the <SET/ENT> key once to display the parameter set value.
Set value (5) 10 / 15	▶ ▲ ▼ Press SET/ENT once.	Press the <Move> key to change the digit to be set. Use the <Up> key or <Down> key to change the numeric value. After setting the parameter, press the <SET/ENT> key once. All digits flash (confirmation display).
Confirmation display (6) 15	Press SET/ENT once.	Press the <SET/ENT> key on the confirmation display to enter the set value and display the next parameter.
	Hold the <SET/ENT> key down for about 3 seconds to return to the measured value display.	

User's Manual

Model UPM100
Universal Power Monitor
< Measured Value Display Operations >

This manual describes the measured value display procedures and measuring ranges for the UPM100 which has display function.

YOKOGAWA
Yokogawa Electric Corporation

1. Action Flow on Measured Value Display

Display	Key Operation	Description
Display after Power-on 5t-01		After the UPM100 is turned on, the address (station number) (initial setting:01) is displayed for about 5 seconds and then the measured value display is displayed.
Active Energy 123456 MWh	Press SET/ENT once. The next measured value is displayed.	The active energy is displayed. For details, see "2. Measured Value Display."
Regenerative Energy -123456 MWh	Press SET/ENT once. The next measured value is displayed.	The regenerative energy is displayed. For details, see "2. Measured Value Display."
LAG Reactive Energy **Option** 12345 Mvarh	Press SET/ENT once. The next measured value is displayed.	The LAG reactive energy is displayed. For details, see "2. Measured Value Display."
LEAD Reactive Energy **Option** -12345 Mvarh	Press SET/ENT once. The next measured value is displayed.	The LEAD reactive energy is displayed. For details, see "2. Measured Value Display."
Apparent Energy 123456 MVAh	Press SET/ENT once. The next measured value is displayed.	The apparent energy is displayed. For details, see "2. Measured Value Display."
Optional Electric Energy 123456 Wh	Press SET/ENT once. The next measured value is displayed.	The active energy during any given time period is displayed. For details, see "2. Measured Value Display."
Instantaneous Active Power 12.34 kW	Press SET/ENT once. The next measured value is displayed.	The instantaneous active power or instantaneous regenerative power is displayed. For details, see "2. Measured Value Display." A minus sign (-) is always displayed for regenerative power measurement.
Instantaneous Reactive Power **Option** 12.34 kvar	Press SET/ENT once. The next measured value is displayed.	The instantaneous reactive power is displayed. For details, see "2. Measured Value Display."
Instantaneous Apparent Power 12.34 kVA	Press SET/ENT once. The next measured value is displayed.	The instantaneous apparent power is displayed. For details, see "2. Measured Value Display."
Instantaneous Voltage Maximum value / Minimum value 1234 V	Press SET/ENT once. The next measured value is displayed.	The instantaneous voltage is displayed. For details, see "2. Measured Value Display."
Instantaneous Current Maximum value 12.34 kA	Press SET/ENT once. The next measured value is displayed.	The instantaneous current is displayed. For details, see "2. Measured Value Display."
Instantaneous Power Factor **Option** COSφ d0.123 LEAD display COSφ C0.123 LAG display	Press SET/ENT once. The next measured value is displayed.	The instantaneous power factor is displayed. LEAD is displayed as the numerical value after "d", and LAG is displayed after "G". For details, see "2. Measured Value Display."
Frequency 45.6 Hz	Press SET/ENT once. The active energy is dispayed.	The frequency is displayed. For details, see "2. Measured Value Display."

Without reactive power option / Without power factor option / Return to beginning

To go to the parameter setting display, hold the <SET/ENT> key down for about 3 seconds.

Option This symbol means the optional measuring function. The parameter with this symbol indicated will not be measured and displayed for the UPM100 without the optional measuring function.

2. Measured Value Display

This chapter describes display procedures, display ranges and other information for UPM100 with display function. For UPM100 without display function, see the communication function User's Manual (IM 77C01H01-10E).

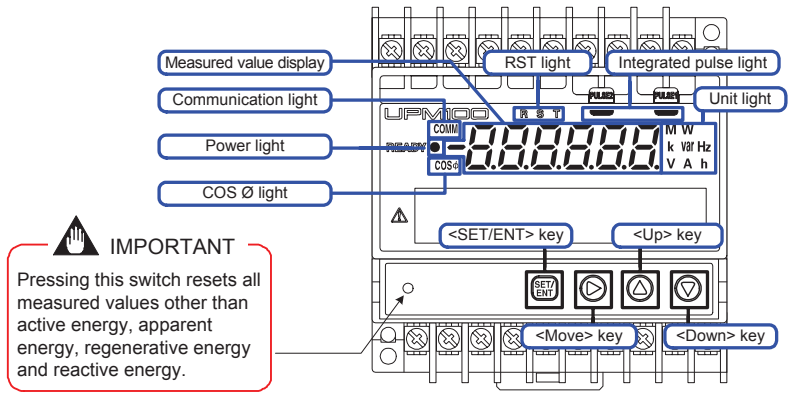
2.1 Active Energy, Apparent Energy and Regenerative Energy

The active energy and regenerative energy up to the present moment is indicated in "kWh" or "MWh" unit (it is output in kWh unit during communication). The apparent energy is indicated in "kVAh" or "MVAh" unit (it is output in "kVAh" unit during communication). However, if the instantaneous active power or instantaneous apparent power is less than the previously determined "integral low-cut power," then it is not integrated. Active energy, apparent energy and regenerative energy is recorded even during a power interruption.
Individual electric energy is displayed as shown in the table below, in accordance with the measurement conditions.
For apparent energy, the unit is "VA" instead of "W." For regenerative energy, a minus sign (-) is always displayed. When "Integral resolution Wh" is specified at ordering, Type (3) in the table is applied without the condition of "Secondary-side rated power x VT ratio x CT ratio" and the display unit is "kWh" or "kVAh" only.
For Types (2) and (3), you can press the <Down> key to display as many as three digits following the decimal point. (See the example display operations.)

Type	Secondary-side Rated Power x VT ratio x CT ratio	Integral Display Range				Remarks
(1)	Less than 1 MW	0	to	999999	kWh *1	Six digits, without decimal point
(2)	1 MW or greater, but less than 10 MW	0.00	to	9999.99	MWh *1	Six digits, with decimal point
(3)	10 MW or greater	0.0	to	99999.9	MWh *1*2	Six digits, with decimal point

*1: The unit is "kVAh" or "MVAh" for apparent energy. A minus sign (-) is displayed for regenerative energy.
*2: The unit is "kWh" or "kVAh" for "Integral resolution Wh," and "MWh" or "MVAh" for "Integral resolution kWh."

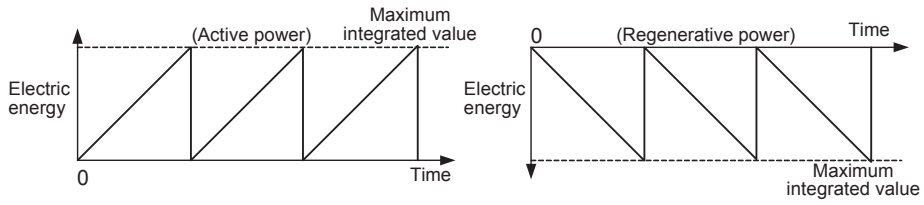
<Part Names>



<Example of Display Operation>

Type	Measured Value Display	Key Operation	Description
(1)	345678 kWh		• Decimal point cannot be moved through key operations • Display unit: kWh or kVAh
(2)	345.67 MWh 345.678 MWh	Press ▼ once. Press ▼ once.	The numbers in the rectangular box left are the measured value to be displayed. Press the <Down> key once to display three digits after the decimal point. Press the <Down> key once again to return to the initial measured value display. • Display unit: MWh or MVAh
(3)	12345.678 MWh 2345.6781 MWh 12345.6781 MWh	Press ▼ once. Press ▼ once. Press ▼ once.	The numbers in the rectangular box left are the measured value to be displayed. Press the <Down> key once to display two digits after the decimal point. Press it again to display three digits after the decimal point. With three digits after the decimal point displayed, press the <Down> key to return to the initial measured value display. • Display unit: MWh (kWh or kVAh when "Integral resolution Wh" is specified.

• Electric energy (active power, regenerative power, reactive power and apparent power) are set to "0" as shown below if they exceed the maximum integral value.



2.2 Reactive Energy (Optional Measuring Function)

The reactive energy up to the present moment is indicated in "kvarh" or "Mvarh" unit (it is output in "kvarh" unit during communication). LAG (+) and LEAD (–) are separately integrated and displayed. (A plus sign (+) is not displayed for LAG (+).) However, if the instantaneous reactive power is less than the previously determined "integral low-cut power," then it is not integrated. Reactive energy is recorded even during a power interruption.
Reactive energy is displayed as shown in the table below, in accordance with the measurement conditions.
When "Integral resolution Wh" is specified at ordering, Type (3) in the table is applied without the condition of "Secondary-side rated power x VT ratio x CT ratio."
For Types (2) and (3), you can press the <Down> key to display as many as three digits following the decimal point. (Display operations can be performed in the same manner as in the example display operations in "2.1 Active Energy, Apparent Energy and Regenerative Energy."

Type	Secondary-side Rated Power x VT ratio x CT ratio	Integral Display Range				Remarks
(1)	Less than ±1 Mvar	±0	to	±99999	kvarh	Five digits, without decimal point
(2)	±1 Mvar or greater, but less than ±10 Mvar	±0.00	to	±999.99	Mvarh	Five digits, with decimal point
(3)	±10 Mvar or greater	±0.0	to	±9999.9	Mvarh	Five digits, with decimal point

2.3 Optional Electric Energy

While optional integration is running, the active energy is displayed (and output through communication) in "Wh" unit. However, if the instantaneous active power is less than the previously determined "integral low-cut power," then it is not integrated.
Optional integration is started/stopped through RS-485 communication. (Optional integration start [D0062]/optional integration stop [D0063]) Please see the communication user's manual (IM 77C01H01-10E).
- Integration is not performed while optional integration is stopped. Instead, the immediately preceding optional electric energy is displayed.
- When optional integration is reactivated, the optional electric energy is reset and integration starts.

• Maximum integration display: 999999 Wh

2. Instantaneous Active/Regenerative Power, Instantaneous Apparent Power and Instantaneous Reactive Power

- Instantaneous active/regenerative power is an active/regenerative power at a given point of time displayed in "W", "kW", or "MW" unit, with a minus sign (-) if it is a negative value. (It is output in "W" unit during communication.) (A minus sign (-) is always displayed for regenerative power measurement.)
- Instantaneous apparent power is an apparent power at a given point of time displayed in "VA", "kVA", or "MVA" unit, with a minus sign (-) if it is a negative value. (It is output in "VA" unit during communication.)
- Instantaneous reactive power is a reactive power at a given point of time displayed in "var", "kvar", or "Mvar" unit, with a minus sign (-) if it is a negative value. (It is output in "var" unit during communication.)

The table below shows the measured value display ranges for instantaneous active power. The same ranges apply for instantaneous apparent power and instantaneous reactive power, except the unit is "VA" instead of "W" for instantaneous apparent power, and "var" instead of "W" for instantaneous reactive power.

Secondary-side Rated Power × 1.2 × VT Ratio × CT Ratio	Measuring Range				Remarks
6 W or greater, but less than 100 W	0.00	to	99.99	W	
100 W or greater, but less than 1 kW	0.0	to	999.9	W	
1 kW or greater, but less than 10 kW	0	to	9999	W	
10 kW or greater, but less than 100 kW	0.00	to	99.99	kW	
100 kW or greater, but less than 1 MW	0.0	to	999.9	kW	
1 MW or greater, but less than 10 MW	0	to	9999	kW	
10 MW or greater, but less than 100 MW	0.00	to	99.99	MW	
100 MW or greater, but less than 1 GW	0.0	to	999.9	MW	
1 GW or greater	0	to	9999	MW	

2.4 Instantaneous Voltage and Current

- Instantaneous voltage is a voltage rms value at a given point of time displayed in “V” or “kV” unit. (It is output in “V” unit during communication.) Instantaneous voltage, maximum and minimum values for each phase and between individual pairs of wires can be measured and displayed.
  Single-phase 2-wire → V1
  Single-phase 3-wire → V1, V2
  Three-phase 3-wire → V1: across R-S, V3: across S-T
  Three-phase 4-wire → V1: R phase, V2: S phase, V3: T phase

Secondary-side Rated Voltage x 1.2 x VT ratio	Measuring Range				Remarks
100 V or greater, but less than 1 kV	0.0	to	999.9	V	
1 kV or greater, but less than 10 kV	0	to	9999	V	
10 kV or greater, but less than 100 kV	0.00	to	99.99	kV	
100 kV or greater, but less than 1 MV	0.0	to	999.9	kV	
1 MV or greater	0	to	9999	kV	

- Instantaneous current is a current rms value at a given point of time displayed in “A” or “kA” unit. (It is output in “A” unit during communication.) Instantaneous current, maximum value for each phase can be measured and displayed.
  Single-phase 2-wire → I1
  Single-phase 3-wire → I1, I2
  Three-phase 3-wire → I1: R phase, I2: T phase
  Three-phase 4-wire → I1: R phase, I2: S phase, I3: T phase

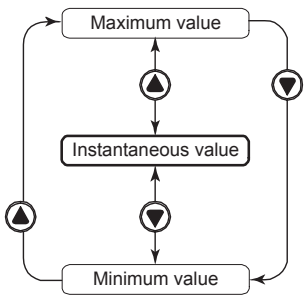
Secondary-Side Rated Current × 1.2 × CT Ratio	Measuring Range				Remarks
0.06 A or greater, but less than 10 A	0.000	to	9.999	A	
10 A or greater, but less than 100 A	0.00	to	99.99	A	
100 A or greater, but less than 1 kA	0.0	to	999.9	A	
1 kA or greater, but less than 10 kA	0	to	9999	A	
10 kA or greater, but less than 100 kA	0.00	to	99.99	kA	
100 kA or greater	0.0	to	999.9	kA	

2.4.1 Display Switching Procedure between Instantaneous Voltage and Current

The following procedure is used to switch between instantaneous voltage, maximum value and minimum value displays, and to switch to individual phases. The instantaneous current display can be switched in the same operation, except the current minimum value cannot be displayed.

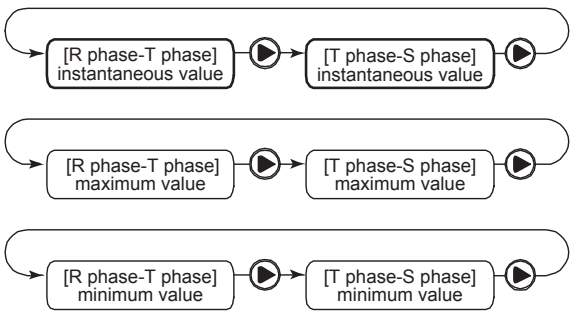
Switching between Instantaneous Value, Maximum Value, and Minimum Value Displays in Each Phase

- Press the <Up> key to display the maximum value.
- Press the <Down> key to display the minimum value.
- To switch to the instantaneous value display, press the <Up> key while the maximum value is displayed, or press the <Down> key while the minimum value is displayed.

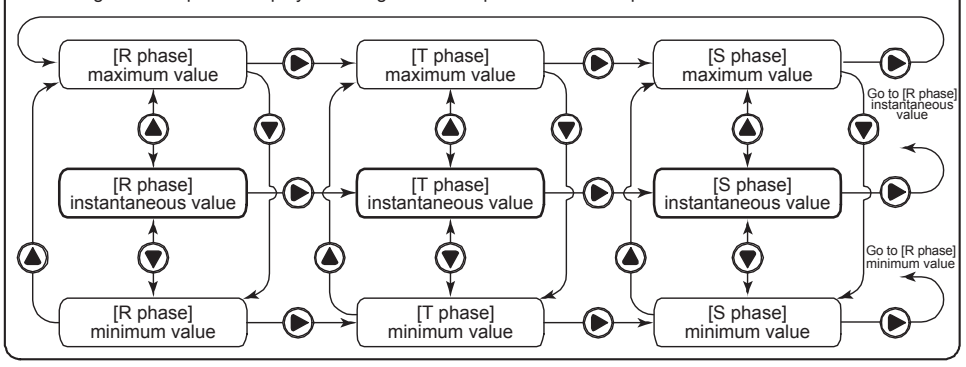


Switching the Displayed Phase for Each Measured Value (Instantaneous Value, Maximum Value and Minimum Value)

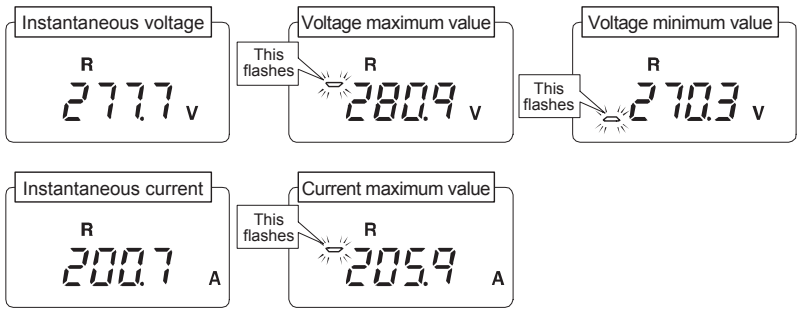
- Press the <Move> key to switch the displayed phase in sequence.
  - Single-phase 3-wire
    V1 (R and S lights on), V2 (T and S lights on)
  - Three-phase 3-wire
    V1 (R and S lights on), V3 (T and S lights on)
  - Three-phase 4-wire
    V1 (R light on), V2 (S light on), V3 (T light on)



Following are examples of display switching for a three-phase 4-wire setup.



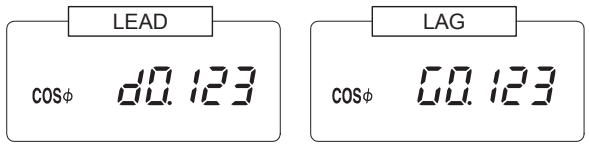
<Example Displays for Various Measured Values>



2.5 Instantaneous Power Factor

The instantaneous power factor at a given point of time is displayed. (The power factor value is the rms power factor.)
LEAD: –, LAG: +
Measuring Range: -0.500 to 1.00 to +0.500
Minimum Resolution: 0.001

<Example Displays for Instantaneous Power Factor >



2.6 Frequency

The frequency (Hz) of the voltage line input to V1 is displayed and output.
Measuring Range: 45.0 to 65.0Hz
Minimum Resolution: 0.1Hz

3. Measured Value Resetting Procedures

This chapter describes the procedures for resetting measured values of voltage maximum/minimum values, current maximum value, active energy, regenerative energy, reactive energy (LEAD/LAG) and apparent energy.

3.1 Resetting Voltage Maximum/Minimum Values and Current Maximum Value

The following procedure simultaneously resets voltage maximum value, voltage minimum value, and current maximum value.

Display	Key Operation	Description
Measured Value Display 	Hold SET/ENT and ▼ down for 5 seconds or longer.	Any measured value is displayed on the measured value display. Holding down the <SET/ENT> and <Down> keys simultaneously for 5 seconds or longer resets the measured value after about one second.

3.2 Resetting Electric Energy

This section describes the procedure for resetting active energy, LAG reactive energy, LEAD reactive energy, apparent energy and regenerative energy.
The procedure shown below is used to reset the active energy. Other electric energy can be reset in the same operation. The displayed electric energy is reset.

Display	Key Operation	Description
Active Energy 	Hold SET/ENT and ▲ down for 5 seconds or longer.	The active energy is displayed on the measured value display. Holding down the <SET/ENT> and <Up> keys simultaneously for 5 seconds or longer resets the measured value after about one second.

4. Troubleshooting

4.1 Errors at Power-on

The following errors may occur at power-on.

Error Indications: Measured value display	Error Indications: Power light	Error Indications: Communi-cation light	Error Indications: Integrated pulse light	Type of Error	Status: Power computation	Status: Communi-cation	Status: Pulse output	Remedy
E000	Undeter-mined	Lights off	Lights off	RAM error	Stopped	Stopped	Stopped	**This is an equipment failure.** Have the equipment repaired.
E001				ROM error				
E002	Lights off	Normal operations	Lights off	System data error		Operates in Error Status 1		
E003				Calibration data error		Operates in Error Status 2		
E004				Parameter error				
E005				Backup data error				

Communication Parameter	Communication Protocol	Address	Baud Rate	Parity	Stop Bit	Data Length
Error Status 1	PC link with SUM	FF	9600 bps	None	1 bit	8 bits
Error Status 2						

In Error Status 2 on a UPM100 without display function, the UPM100 operates according to the communication parameters set by the DIP switches.

4.2 Errors during Operation

The following errors may occur during operations.

Error Indications: Measured value display	Error Indications: Power light	Error Indications: Communi-cation light	Error Indications: Integrated pulse light	Type of Error	Status: Power computation	Status: Communi-cation	Status: Pulse output	Remedy
E006	Lights off	Normal operations	Normal operations	EEPROM error	Normal operations	Normal operations	Normal operations	**This is an equipment failure.** Have the equipment repaired.
E007			Lights off	ADC error	Stopped		Stopped	
r-oUt Flashes [1]	Lights on		Normal operations	Excessive input Insufficient input [1]	Normal operations		Normal operations	Check the input.
	Flashes at 125-ms intervals			Communication error				The unit is restored when a normal frame is received.

1: The following are the details of excessive and insufficient inputs.

- When the power, current, or voltage which is 120% or greater of the primary-side ratings is input, r-oUt and the measured value will flash alternately.
  Remedy: Reduce the input to less than 120%.
- When voltage which is less than 10% of the primary-side rating is input, r-oUt and the measured value flash alternately.
  Remedy: Increase the input to 10% or more.
- When power factor is outside measuring range, r-oUt and C0.500 or d0.500 flash alternately.
  Remedy: Set the power factor within the range.
- When the frequency is outside measuring range, r-oUt and 45.0 flash alternately.
  Remedy: Set the frequency within the range.
- When the instantaneous reactive power is outside measuring range, r-oUt and measured value flash alternately.
  Remedy: Set the input of 5% or more of primary-side rated current.

4.3 Errors during Parameter Setting Procedures

The following errors may occur while setting parameters.

Error Indications: Measured value display	Error Indications: Power light	Error Indications: Communi-cation light	Error Indications: Integrated pulse light	Type of Error	Status: Power computation	Status: Communi-cation	Status: Pulse output	Remedy
r-oUt and the immediately preceding set value flash alternately.	Lights on	Normal operations	Normal operations	Setting is outside the range.	Normal operations	Normal operations	Normal operations [2]	Press the <Move> key to go back to the parameter. Pressing the <SET/ENT> key cancels the setting and restores the previous set value.

2: If the integrated ON pulse width setting is outside the range due to the VT ratio and CT ratio settings, pulse output will be stopped.

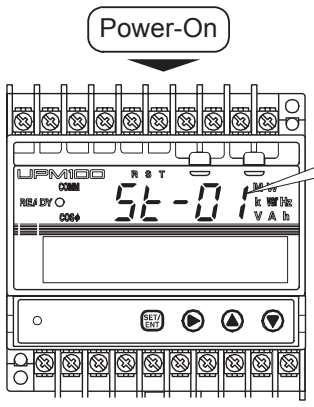
User's Manual

Model UPM100
Universal Power Monitor
<Parameter Maps>

This manual describes the parameter maps showing the flow of measured value displays and parameter displays. It also provides a summary of the measuring ranges and parameter setting ranges for reference purposes.

YOKOGAWA
Yokogawa Electric Corporation

1. Basic Key Operations and Parameter Maps



Basic Key Operations

<On the Measured Value Display>

- SET/ENT: This key can be used to change measured value displays. When you hold it down for about 3 seconds, the display changes to the parameter setting display.
- ▲: When you press this key while a instantaneous voltage/current is displayed, the maximum value is displayed.
- ▼: When you press this key while electric energy is displayed, three digits after the decimal point can be displayed depending on the measurement conditions. When you press this key while an instantaneous voltage is displayed, the minimum value is displayed.

<On the Parameter Setting Display>

- SET/ENT: This key is used to display and enter settings. Press it three times (four times for CT ratio) to display the next parameter without changing the setting
- ▶: This key is used to change the numeric value digit and to move the decimal point position.
- ▲ ▼: These keys are used to increase/decrease a set numeric value and to change a selection.

SET/ENT Hold down for about 3 seconds.

Measured Value Display

Active Energy — 123456 MWh — ▼ 234567 MWh
At maximum, three digits after the decimal point can be displayed depending on the measurement conditions.

Regenerative Energy — -123456 MWh — ▼ -234567 MWh
At maximum, three digits after the decimal point can be displayed depending on the measurement conditions.

LAG Reactive Energy — 123.45 Mvarh — ▼ 23456 Mvarh
At maximum, three digits after the decimal point can be displayed depending on the measurement conditions.

LEAD Reactive Energy — -123.45 kvarh — ▼ -23456 Mvarh
At maximum, three digits after the decimal point can be displayed depending on the measurement conditions.

Apparent Energy — 123456 MVAh — ▼ 234567 MVAh
At maximum, three digits after the decimal point can be displayed depending on the measurement conditions.

Optional Electric Energy — 123456 Wh

Instantaneous Active/Regenerative Power — -12.34 kW
A minus sign (-) is always displayed for regenerative power measurement.

Instantaneous Reactive Power — 12.34 kvar

Instantaneous Apparent Power — 12.34 kVA

Instantaneous Voltage — 100.5 V — ▲ Maximum Voltage 106.7 V — ▼ Minimum Voltage 98.7 V
The following can be displayed for each phase depending on the specifications.
- Instantaneous voltage
- Maximum voltage
- Minimum voltage

Instantaneous Current — 50.12 A — ▼ Maximum Current 51.0 A
The following can be displayed for each phase depending on the specifications.
- Instantaneous current
- Maximum current

Instantaneous Power Factor — cosφ d0.123

Frequency — 56.7 Hz

Without optional measuring function

If there is no key action for about 5 minutes, the display automatically returns to the measured value display.

Parameter Setting Display

VT Ratio — Ut — SET/ENT A
CT Ratio — Ct — SET/ENT B
RS-485 Communication Protocol — Conn — SET/ENT A
RS-485 Communication Address (Station) — St-no — SET/ENT A
RS-485 Communication Baud Rate — b-rt — SET/ENT A
RS-485 Communication Parity — Pri — SET/ENT A
RS-485 Communication Stop Bit — StP — SET/ENT A
RS-485 Communication Data Length — dLn — SET/ENT A
Integral Low-cut Power — LoCUt — SET/ENT A
Standby Mode — diSP — SET/ENT A
Standby Mode Timer — oFtIn — SET/ENT A

<Display Flow for Individual Parameters>

A
(1) SET/ENT: Set value change display
(2) SET/ENT: Set value confirmation display
(3) SET/ENT: Enter the value (and display the next parameter)

B
(1) SET/ENT: Decimal point position change display
(2) SET/ENT: Set numeric value change display
(3) SET/ENT: Set value confirmation display
(4) SET/ENT: Enter the value (and display the next parameter)

With integrated pulse output

Pulse Unit-1 of Electric Energy — 1PLS — SET/ENT A
ON Pulse Width-1 of Electric Energy — 1PLSon — SET/ENT A
Electric Energy LAG/LEAD/REGENE — PLSSEL — SET/ENT A
Pulse Unit-2 of Electric Energy — 2PLS — SET/ENT A
ON Pulse Width-2 of Electric Energy — 2PLSon — SET/ENT A

Without reactive power measuring function

2. Display Ranges for Measured Values

2.1 Active Energy

Type	Secondary-side Rated Power × VT Ratio × CT Ratio	Integration Display Range	Remarks
(1)	Less than 1 MW	0 to 999999 kWh	Six digits, without decimal point
(2)	1 MW or greater, but less than 10 MW	0.00 to 9999.99 MWh	Six digits, with decimal point
(3)	10 MW or greater	0.0 to 99999.9 MWh [1]	Six digits, with decimal point

1: When “Integral resolution Wh” is specified, the type (3) is applied for the integration display range. The unit is kWh. Optional Electric Energy: 0 to 999999 Wh

2.2 Regenerative Energy

Type	Secondary-side Rated Power × VT Ratio × CT Ratio	Integration Display Range	Remarks
(1)	Less than 1 MW	0 to - 999999 kWh	Six digits, without decimal point
(2)	1 MW or greater, but less than 10 MW	0.00 to - 9999.99 MWh	Six digits, with decimal point
(3)	10 MW or greater	0.0 to - 99999.9 MWh [2]	Six digits, with decimal point

2: When “Integral resolution Wh” is specified, the type (3) is applied for the integration display range. The unit is kWh.

2.3 Reactive Energy

Type	Secondary-side Rated Power × VT Ratio × CT Ratio	Integration Display Range	Remarks
(1)	Less than ±1 Mvar	±0 to ±99999 kvarh	Five digits, without decimal point
(2)	±1 Mvar or greater, but less than ±10 Mvar	±0.00 to ± 999.99 Mvarh	Five digits, with decimal point
(3)	±10 Mvar or greater	±0.0 to ± 9999.9 Mvarh [3]	Five digits, with decimal point

3: When “Integral resolution Wh” is specified, the type (3) is applied for the integration display range. The unit is kvarh.

2.4 Apparent Energy

Type	Secondary-side Rated Power × VT Ratio × CT Ratio	Integration Display Range	Remarks
(1)	Less than 1 MVA	0 to 999999 kVAh	Six digits, without decimal point
(2)	1 MVA or greater, but less than 10 MVA	0.00 to 9999.99 MVAh	Six digits, with decimal point
(3)	10 MVA or greater	0.0 to 99999.9 MVAh [4]	Six digits, with decimal point

4: When “Integral resolution Wh” is specified, the type (3) is applied for the integration display range. The unit is kVAh.

2.5 Instantaneous Active Power

Secondary-side Rated Power × 1.2 × VT Ratio × CT Ratio	Measuring Range	Remarks
6W or greater, but less than 100W	0.00 to 99.99 W	
100W or greater, but less than 1kW	0.0 to 999.9 W	
1kW or greater, but less than 10kW	0 to 9999 W	
10kW or greater, but less than 100kW	0.00 to 99.99 kW	
100kW or greater, but less than 1MW	0.0 to 999.9 kW	
1MW or greater, but less than 10MW	0 to 9999 kW	
10MW or greater, but less than 100MW	0.00 to 99.99 MW	
100MW or greater, but less than 1GW	0.0 to 999.9 MW	
1GW or greater	0 to 9999 MW	

2.6 Instantaneous Reactive Power

Secondary-side Rated Power × 1.2 × VT Ratio × CT Ratio	Measuring Range	Remarks
6var or greater, but less than 100var	0.00 to 99.99 var	
100var or greater, but less than 1kvar	0.0 to 999.9 var	
1kvar or greater, but less than 10kvar	0 to 9999 var	
10kvar or greater, but less than 100kvar	0.00 to 99.99 kvar	
100kvar or greater, but less than 1Mvar	0.0 to 999.9 kvar	
1Mvar or greater, but less than 10Mvar	0 to 9999 kvar	
10Mvar or greater, but less than 100Mvar	0.00 to 99.99 Mvar	
100Mvar or greater, but less than 1Gvar	0.0 to 999.9 Mvar	
1Gvar or greater	0 to 9999 Mvar	

2.7 Instantaneous Apparent Power

Secondary-side Rated Power × 1.2 × VT Ratio × CT Ratio	Measuring Range	Remarks
6VA or greater, but less than 100VA	0.00 to 99.99 VA	
100VA or greater, but less than 1kVA	0.0 to 999.9 VA	
1kVA or greater, but less than 10kVA	0 to 9999 VA	
10kVA or greater, but less than 100kVA	0.00 to 99.99 kVA	
100kVA or greater, but less than 1MVA	0.0 to 999.9 kVA	
1MVA or greater, but less than 10MVA	0 to 9999 kVA	
10MVA or greater, but less than 100MVA	0.00 to 99.99 MVA	
100MVA or greater, but less than 1GVA	0.0 to 999.9 MVA	
1GVA or greater	0 to 9999 MVA	

2.8 Instantaneous Voltage

Secondary-side Rated Voltage × 1.2 × VT Ratio × CT Ratio	Measuring Range	Remarks
100V or greater, but less than 1kV	0.0 to 999.9 V	
1kV or greater, but less than 10kV	0 to 9999 V	
10kV or greater, but less than 100kV	0.00 to 99.99 kV	
100kV or greater, but less than 1MV	0.0 to 999.9 kV	
1MV or greater	0 to 9999 kV	

2.9 Instantaneous Current

Secondary-side Rated Current × 1.2 × VT Ratio × CT Ratio	Measuring Range	Remarks
0.06A or greater, but less than 10A	0.000 to 9.999 A	
10A or greater, but less than 100A	0.00 to 99.99 A	
100A or greater, but less than 1kA	0.0 to 999.9 A	
1kA or greater, but less than 10kA	0 to 9999 A	
10kA or greater, but less than 100kA	0.00 to 99.99 kA	
100kA or greater	0.0 to 999.9 kA	

2.10 Instantaneous Power Factor

LEAD: -, LAG: +
Measuring Range: -0.500 to 1.00 to +0.500
Minimum Resolution: 0.001

2.11 Frequency

Measuring Range: 45.0 to 65.0Hz
Minimum Resolution: 0.1Hz

3. Setting Ranges for Parameters

Parameter Symbol	Parameter Name	Setting Range	Initial Setting
Pt	VT ratio (VT)	1 to 6000 <Variable numeric parameter>	1
Ct	CT ratio (CT)	0.05 to 32000 <Variable numeric parameter (decimal point can be moved)> (with 5 significant digits; can be set to the second place of a decimal point.)	1.00
Comm	RS-485 communication protocol (COMM)	PC link (without SUM) PCLK1 (PCLK1) PC link (with SUM) PCLK2 (PCLK2) MODBUS (ASCII) M ASC (M ASC) MODBUS (RTU) M RTU (M RTU) UPM01 protocol UPM01 <Selective parameter>	PCLK2
St-no	RS-485 station number (ST-NO)	1 to 99 (1 to 31 recommended) <Variable numeric parameter>	1
b-rt	RS-485 communication baud rate (B-RT)	2400, 9600, 19200 (bps) <Selective parameter>	9600 (bps)
Pri	Parity (PRI)	None: NONE (NONE) Even: EVEN (EVEN) Odd: ODD (ODD) <Selective parameter>	NONE
Stp	Stop bit (STP)	1 or 2 bits <Selective parameter>	1
dLn	Data length (DLN)	7 or 8 bits <Selective parameter>	8
LoCut	Integral low-cut power (LOCUT)	0.05 to 20.00 (%) (percent of rated power) <Variable numeric parameter>	0.05 (%)
1PLS	Pulse unit-1 of electric energy (1.PLS)	Increments of 10 Wh/pulse in range from 10 to 500000 (Wh/pulse) * (display: 000.01 to 500.00 kWh/pulse) <Variable numeric parameter> *:1 to 50000 Wh/pulse for Integral resolution Wh	1.00 kWh/pulse
1PLSon	ON pulse width-1 of electric energy (1.PLSON)	Increments of 10 ms in range from 10 to 1270 ms <Variable numeric parameter>	50 (ms)
PLSSEL	Electric energy pulse LAG/LEAD/ REGENE (PLS.SEL)	Select either reactive energy LAG, LEAD or regenerative energy <Selective parameter>	REGENE (regenerative energy) or LAG* *: When reactive power option is specified.
2PLS	Pulse unit-2 of electric energy (2.PLS)	Increments of 10 Wh/pulse or varh/pulse in range from 10 to 500000 (Wh/pulse or varh/pulse) * (display: 000.01 to 500.00 kvarh/pulse) <Variable numeric parameter> *: 1 to 50000 Wh/pulse or 1 to 50000 varh/pulse for Integral resolution Wh	1.00 kWh/pulse or 1.00 kvarh/pulse * *: When reactive power option is specified.
2PLSon	ON pulse width-2 of electric energy (2.PLSON)	Increments of 10 ms in range from 10 to 1270 ms <Variable numeric parameter>	50 (ms)
diSP	Standby mode (DISP)	ON or OFF <Selective parameter>	ON
oFtim	Standby mode timer (OFTIM)	1 to 60 minutes <Variable numeric parameter>	10 (min)

User's Manual

Model UPM100
Universal Power Monitor
<Wireless Communication>

This manual describes the installing, wirings, and setup flow related to the wireless communicaiton function of the UPM100. For configuring the 920 MHz wireless communication and descriptions not covered in this manual, see the 920 MHz Wireless Communication User's Manual (IM 04L51B01-41EN), provided as an electronic manual.

YOKOGAWA
Yokogawa Electric Corporation

1. Notes on 920 MHz Wireless Communication

- 920 MHz wireless communication can be used only in the Republic of Korea.
- This product has obtained KC marking. As such, the following acts may be punishable by law.
  - Disassembling or altering the product
  - Removing the certification label
  - Using an antenna other than the specified option
- Communication may not be possible in the following locations due to radio signal reflection.
  - Where strong magnetic field, static electricity, or radio interference occurs
  - Rooms with metallic walls (including concrete containing metal reinforcement material), inside cabinets, etc.
- If another wireless device using the same radio frequency band as this product is present in the communication area of this product, data rate degradation or communication errors may occur, preventing normal communication.
- Because this product uses radio signals, bear in mind that communication may be intercepted by third parties.
- Communication errors can occur when wireless communication is temporarily interrupted due to environmental factors such as radio interference.

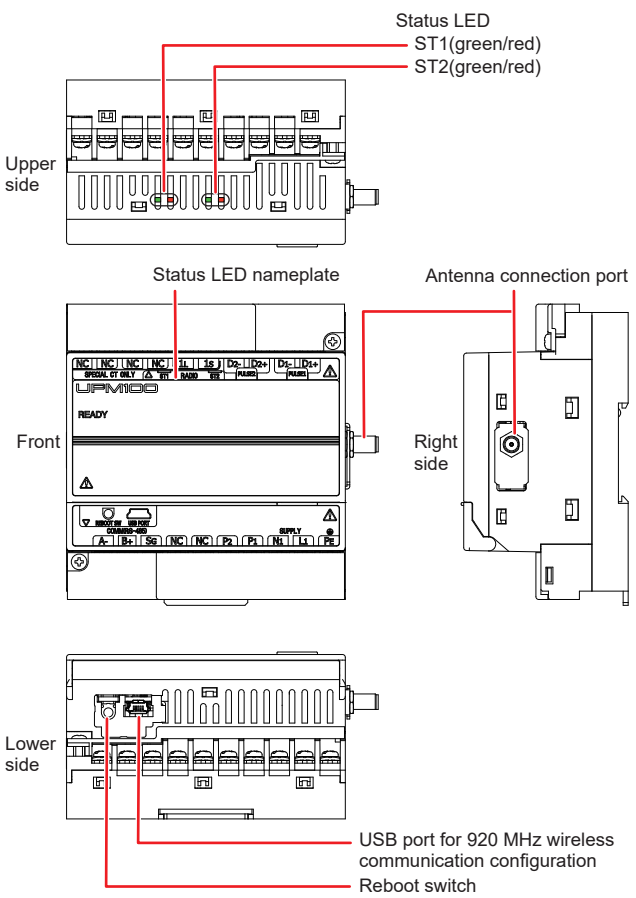
WARNING

Using 920 MHz wireless communication

- **Do not install or use inside aircrafts or hospitals or in areas where the use of wireless devices is prohibited.**
- **Do not install or use near automatic doors, fire alarms, and other automatically controlled equipment. The radio signals from this product may affect the equipment and may cause a malfunction.**
- **Do not install or use near cardiac pacemakers or electronic devices that involve highly accurate control or minute signals. Doing so may cause them to malfunction.**
- **Do not use the product in medical equipment or other applications that require high level of safety or in systems (e.g., trunk line communication equipment, computer systems) that require extremely high reliability. Malfunction or failure may cause life-threatening accidents or great social disruption.**

2. 920 MHz Wireless Communication

2.1 Component Names of UPM100 (with 920 MHz wireless communication)



2.2 Preparation, Configuration, and Operation Check

To configure (Modbus settings, wireless communication settings) of the UPM100 and check the operation of the UPM100, follow the procedure below.

1. Modbus communication (serial communication) configuration
   Configure Modbus communication settings by referring to this manual, UPM100 User's Manual, and 920 MHz Wireless Communication User's Manual (IM 04L51B01-41EN).
   The UPM100 communication parameter settings are shown below.
   The settings of the equipment connected to the RS - 485 terminal are also the same.
   Protocol: Modbus (RTU)
   Baud rate: 19200 bps
   Parity: None
   Stop bits: 1 bit
   Data length: 8 bits

2. Maintenance console preparation
   Download the maintenance console from the following URL, and install it.
   http://www.smartdacplus.com/software/smart920/en/
   * The maintenance console is an application made by Oki Electric Industry Co., Ltd.

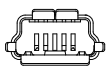
3. Configuration file preparation
   Using the maintenance console, create a configuration file consisting of basic settings, protocols, communication settings, and other wireless network settings according to your wireless network configuration. Do not change the wireless serial settings from their default values. If you change them, communication will fail to work properly.
   Bit rate: 115200 bps
   Bit length: 8 bits
   Stop bits: 1 bit
   Parity: None
   For details on the wireless communication settings, see the 920 MHz Wireless Communication User's Manual (IM 04L51B01-41EN).

4. Wireless communication configuration (network configuration)
   Connect the UPM100 wireless communication configuration (network configuration) maintenance PC to the UPM100's wireless communication configuration port with a mini USB cable. Then, write the configuration file into the wireless module. After writing, press the reboot switch on the UPM100 or remove the mini USB cable to restart the system and apply the settings. (Hold down the reboot switch for several seconds until the status LED turns off.)

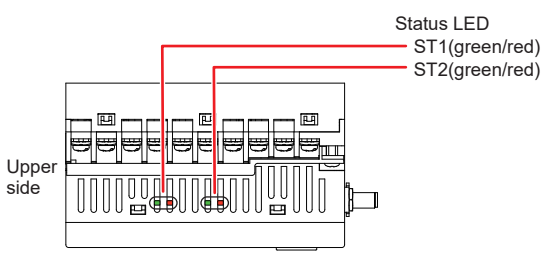
5. Network join confirmation
   When the UPM100 joins a network*, the green status ST1 LED blinks slowly, and the green ST2 turns on.
   * Turn the routers (UPM100) on after starting the coordinator (GM10/CM2, GX20/CM2, or the like). This will make network connection authentication quicker.

2. Connection to the USB Port for 920 MHz Wireless Communication Configuration

A USB2.0 port (mini B type) is available.
It is for configuring the 920 MHz wireless communication.



Status LED Indication (*1)



Name	LED display		Status	Notes
	Green	Red		
ST1	Blinking in sync at 1 second intervals		Updating firmware	Transferring files
	On	On	Opening files	
	Blinking at 0.2 second intervals	Off	Normal	Not joined the network
	Blinking at 1 second intervals	Off	Normal	After IP is established upon joining network
	Off	Blinking at 1 second intervals	Failure	
	Alternate blinking of green and simultaneous green and red at 1 second intervals		Radio transmission time exceeded	
ST2	On	Off	Network join authentication success/normal	
	Off	Blinking at 1 second intervals	Network join authentication failure*2	
	Blinking in sync at 1 second intervals		No detour route*2	
	Alternate blinking at 1 second intervals		Wireless stopped	
	Blinking	Off	Transmitting/receiving serial communication	
	Off	Off	Not joined the network or disconnected from network	

*1 The above table does not apply when determining the radio condition using the maintenance console software.
*2 System error status. Using the maintenance console, correct the installation environment (such as the antenna direction) to an appropriate condition.

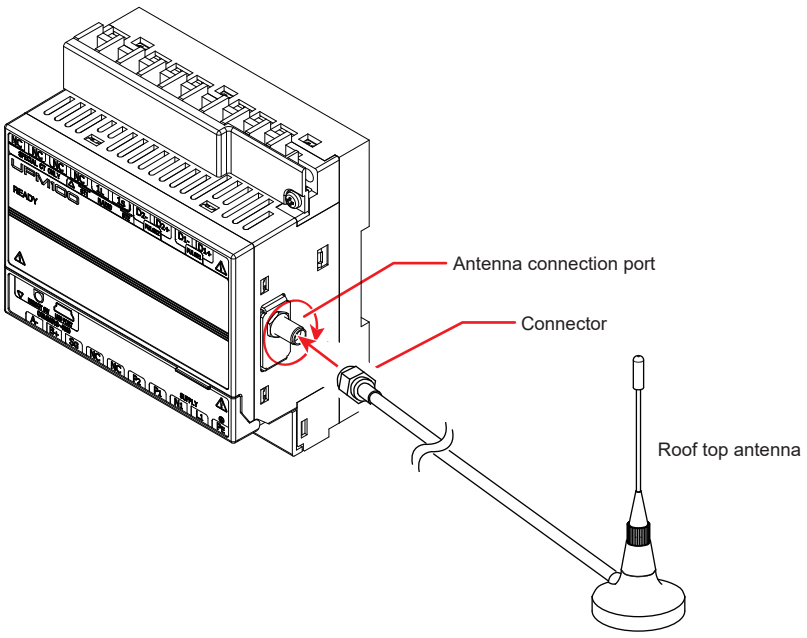
2.3 Connecting an Antenna to the UPM100

Roof top antenna
Roof top antennas (waterproof) are used when you want to install only the antenna in a remote location.
There is a magnet on the bottom side, so they can be attached to metal boxes and the like.

CAUTION

- **To bring out the full performance of the roof top antenna, install it on top of a metal rectangle board that is at least 10 × 20 cm long.**
- **Install antennas as far as possible from metal objects and other obstacles. The communication quality may deteriorate if they are close.**
- **When installing the antenna, make sure no foreign matter gets caught between the bottom side of the antenna and the installation plane.**
- **Do not bend the antenna cable more than the allowable bend radius of 3 cm.**
- **When installing the antenna in an area subject to lightning, be sure to install the antenna at a position safe from lightning and at a position lower than the height of other cases.**

While turning the antenna connector to the right, attach the antenna to the antenna connection port.
* Use a torque wrench (wrench width 5/16 inches, tightening torque 0.56 to 0.90 N•m).



3. Specification

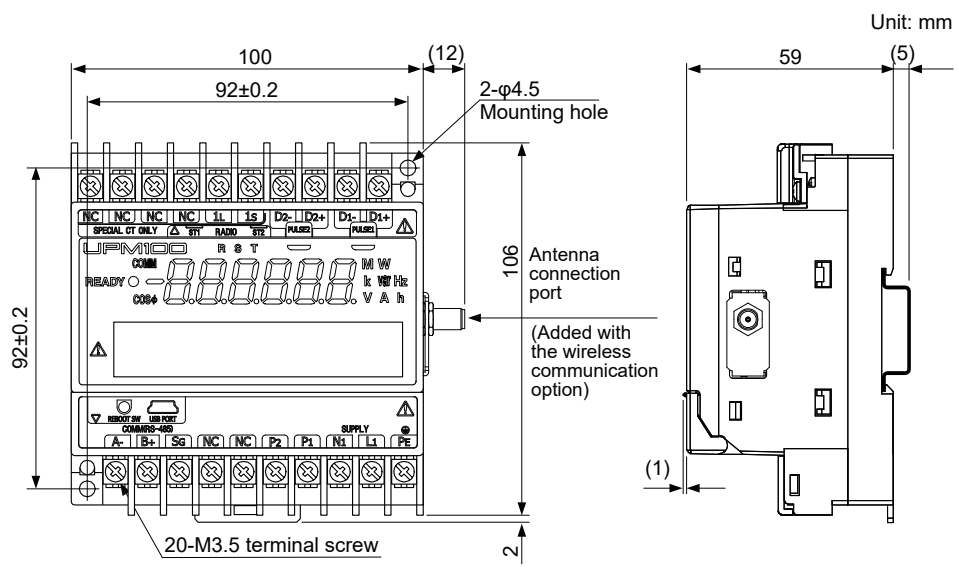
3.1 920 MHz Wireless Communication Specifications

This function can also be used as a repeater to extend the communication distance.

- KC mark conformity: KN301 489-1/-3, KN11, KN61000-6-2
- Wireless communication standard: IEEE 802.15.4g compliant
- Carrier frequency band: 920.6 to 923.4 MHz
- Wireless channel bandwidth: 200 kHz
- Number of wireless channels: 14
- Maximum transmission output:
  10 mW EIRP (920.6 to 922.0 MHz)*
  25 mW EIRP (922.0 to 923.4 MHz)*
  * Equivalent Isotropic Radiated Power: Radiated power including the antenna
- Modulation method: GFSK
- Antenna: External antenna (sold separately), SMA-P(reverse) connector
- Data rate: 100 kbps max.
- Communication distance[1 2] (line-of-sight distance):700 m max. (depends on the operating environment)
  1 Communication errors can occur when wireless communication is temporarily interrupted due to environmental factors such as radio interference.
  2 At an antenna height of 1.5 m or more off the ground. Communication distance varies depending on the installation location and environment.
- Communication format: Mesh/multi-hop* (maximum number of hops: 16)
  * A function that automatically selects the best communication path according to the communication quality between units. It can be used to extend the communication distance and improve the radio quality.
- LED display: Displays the wireless status using ST1 (green/red) and ST2 (green/red)
- Security function: AES 128 bit encryption
- Implemented protocol: Modbus (slave) protocol
- Modbus slave function: Data can be written and read from Modbus master devices.
- With 920 MHz wireless communication, the initial setting for baud rate is fixed 19200 bps. (Gateway function)
- Configuration/measurement communication: The following functions are available using the dedicated software*.
  Wireless communication configuration
  Wireless communication status monitoring
  * MH920 Console International, a console software application made by Oki Electric Industry Co., Ltd.
- Wireless communication configuration interface: USB 2.0 mini-B type)
  Usage: Only for maintenance purposes such as changing wireless communication parameters
- Reboot switch: For rebooting the system after changing wireless settings

3.2 External Dimensions

Unit: mm



4. Dedicated External Antenna (Sold separately) *1 *2 *3 *4

Item	Roof top antenna
Part number	A1062ER
Installation environment	Indoors and outdoors
Cable length	2.5m
Normal	After IP is established upon joining network
Antenna type	Monopole
Maximum gain	2 dBi or less
Directivity	No directivity
Connector	SMA-P(reverse)
Operating temperature range	-20 to 65°C
Waterproof property	Water resistant (IPX6)
Dimensions	83 mm (including the base stand)
	

*1: Only dedicated antennas can be used.
*2: When using an external antenna, we recommend aligning the direction of the antenna of the peer device and the direction of the antenna of this device to maintain communication quality.
*3: To bring out the full performance of the roof top antenna, install it on top of a metal rectangle board that is at least 10 x 20 cm long.
*4: Install antennas as far as possible from metal objects and other obstacles. The communication quality may deteriorate if they are close.