# Model 53U / 54U / 54UL / 54UC Multi Power Monitor

# Model R7LWTU / R7CWTU / R7MWTU / R7EWTU Multi Power Module

# Model R9LWTU / R9CWTU / R9MWTU / R9EWTU Multi Power Unit

# Model L53U Multi Power Transducer

# Model M5XWTU Multi Power Transmitter

# PC CONFIGURATOR SOFTWARE
# Model: PMCFG Ver. 1.12

# Users Manual

**MSYSTEM**
**M-SYSTEM CO., LTD.**

# CONTENTS

# 1. INTRODUCTION

## 1.1 GENERAL DESCRIPTION

M-System PMCFG is used to program parameters for the models 53U, 54U, 54UL or 54UC Multi Power Monitor, R7CWTU, R7MWTU, or R7EWTU Multi Power Modules, R9MWTU, R9CWTU or R9EWTU Multi Power Units, L53U Multi Power Transducer, and M5XWTU Multi Power Transmitter (referred hereunder as 'device'). The following major functions are available:

- Edit parameters
- Download parameters to the device, upload parameters from the device
- Save parameters as files, read parameters from files
- Compare parameters edited on the screen with the ones stored in the device
- Monitoring measured values
- Loop test (only for R7xWTU, R9xWTU and M5XWTU)

Note: For R7LWTU and R9LWTU, only "monitoring measured values" and "loop test" functions are selectable.

## 1.2 PC REQUIREMENTS

The following PC performance is required for adequate operation of the software program.

| | |
|---|---|
| PC | IBM PC compatible |
| OS | Windows 10 (32-bit/64-bit)<br>The software may not function adequately in certain conditions. |
| CPU | Must meet the relevant Windows OS' requirements. |
| Memory | Must meet the relevant Windows OS' requirements. |
| Communication port | At least one COM port (COM1 through COM16) or LAN port is required. |

For connecting the devices to a PC, the M-system's products detailed in the table below are required.

| DEVICES | NETWORK | REQUIRED PRODUCTS |
|---|---|---|
| 53U<br>R7LWTU<br>R7CWTU<br>R7MWTU<br>R7EWTU<br>R9LWTU<br>R9CWTU<br>R9MWTU<br>R9EWTU<br>L53U<br>M5XWTU | RS-232-C | PC configurator cable (model: MCN-CON or COP-US) |
| 53U (with Modbus)<br>54U (with Modbus)<br>R7MWTU<br>R9MWTU<br>L53U (with Modbus)<br>M5XWTU | RS-485 | RS-232-C/RS-485 converter (model: R2K-1)<br>or Transmission level converter (model: LK-1) |
| 53U (with Modbus)<br>54U (with Modbus)<br>R7MWTU<br>R7EWTU<br>R9MWTU<br>R9EWTU<br>L53U (with Modbus)<br>M5XWTU | Ethernet | Ethernet communication adaptor<br>(model: GR8-EM, 72EM-M4 or 72EM2-M4)<br>(R7EWTU, R9EWTU do not require Communication Adaptor) |
| 54U<br>54UL<br>54UC | Infrared | Infrared communication adaptor (model: COP-IRU) |

## CONNECTING THE DEVICE TO THE PC

The RS-232-C/RS-485 Converter (model: R2K-1 or LK1) or the Communication Adaptor (model: 72EM-M4 or 72EM2-M4) is used to interface the device on the Modbus network to the PC.

In order to locally program the device, the non-isolated PC Configurator Cable (model: MCN-CON or COP-US) is required to connect it to the PC. The RS-485 cable must be removed when the device is connected with the PC Configurator Cable.

The 54U, 54UC and 54UL can be connected to the PC via the infrared port using the Infrared Communication Adaptor (model: COP-IRU).

### ■ LOCAL CONNECTION

PC Configurator Cable
(model: MCN-CON or COP-US)

Multi Power Monitor
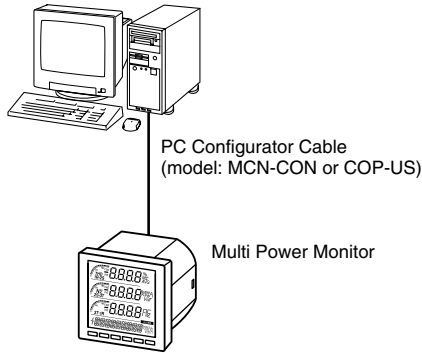
Remove RS-485 cable (Modbus) from 53U and/or L53U when connected to PC Configurator Cable.
The RS-485 and PC Configurator Cable cannot operate at once.
When communicating with 53U with analog output by using configurator cable, it is required to press and hold the 'IU→' button to switch to the communication mode.
After communication is completed, pressing and holding the 'IU→' button ebable to return to the measurement view.
For L53U without option code '/A', it is required to turn on the mode selector.
Analog output level is fixed while in the communication mode.

### ■ NETWORK CONNECTION (RS-485)
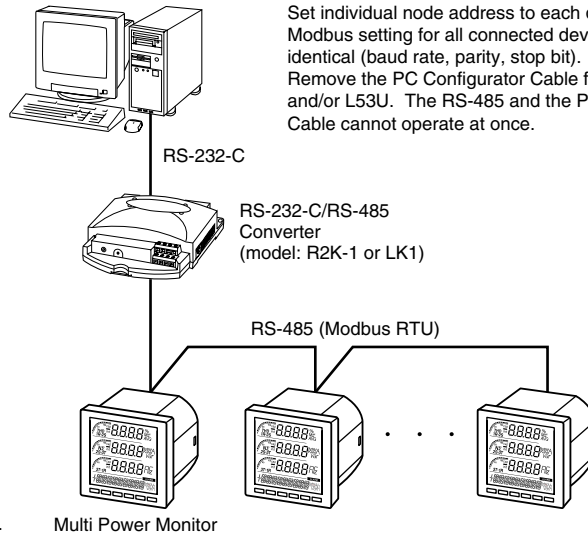
Set individual node address to each device.
Modbus setting for all connected devices must be identical (baud rate, parity, stop bit).
Remove the PC Configurator Cable from 53U and/or L53U. The RS-485 and the PC Configurator Cable cannot operate at once.

RS-232-C

RS-232-C/RS-485
Converter
(model: R2K-1 or LK1)

RS-485 (Modbus RTU)

Multi Power Monitor

### ■ NETWORK CONNECTION (Ethernet)

Ethernet

Communication Adaptor
(model: 72EM-M4 or 72EM2-M4)

RS-485 (Modbus RTU)

Multi Power Monitor
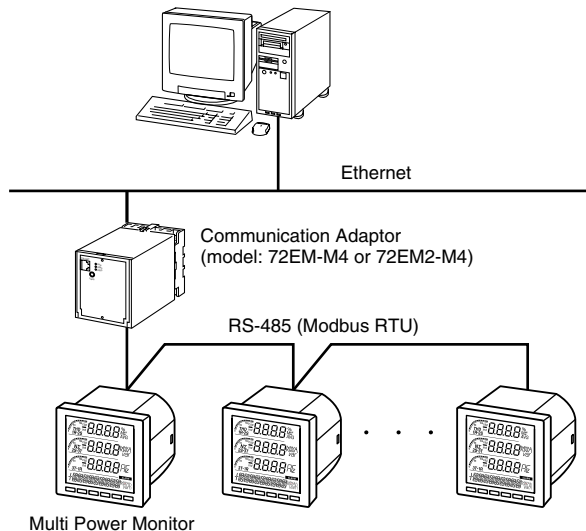
Setting multiple master stations (PCs) is possible with Ethernet (Modbus/TCP) configuration, however, only one (1) PC is allowed to communicate to the devices when programming with the PMCFG.
Accessing the devices from multiple stations may cause unexpected effects.

Set Modbus parameters for the devices as follows:
   Node address: Individual number
   Baud rate: 19200 bps or 38400 bps
      identical to the 72EM-M4 or 72EM2-M4 settting
   Parity: Odd
   Stop bit: 1 bit

Set the 72EM-M4 or 72EM2-M4 as follows:
   RS-485 baud rate: See above
   Read timeout: 500
   Write timeout: 2000

### ■ LOCAL CONNECTION (infrared)

Multi Power Monitor

PC

COP-IRU

Infrared
Communication
(max. 1 meter)
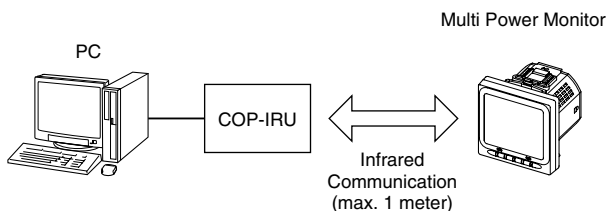
When using infrared communication, press and hold the 'IU→' button of 54U, 54UL or 54UC to switch to infrared communication mode. After communication is completed, pressing and holding the 'IU→' button ebable to return to the measurement view.

DO NOT set multiple devices to the infrared communication mode at once.
Interference may cause unexpected results.

## 1.3 INSTALLING & DELETING THE PROGRAM

### INSTALL

The program is provided as compressed archive.  Decompress the archive and execute 'setup.exe' to start up the PMCFG installer program.  Follow instructions on the Windows.

For Windows 7, log on as administrator but you still need to clarify your administrative right before proceeding.  When User Account Control window appears, choose 'Continue' or 'Yes'.
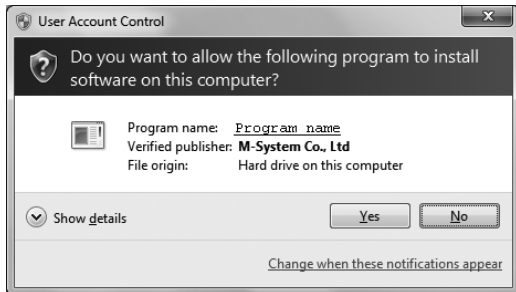


'PMCFG' is shown instead of 'Program name'.

### DELETE

Uninstall a program, or Uninstall or change a program.  Select the PMCFG X.X (X.X refers version number) from the program list and click Uninstall button.

# 2. BASIC OPERATIONS

## 2.1 STARTING THE PMCFG

Open Program > M-System > Configurator > PMCFG to start up it on a Windows PC. The following window appears on the screen.

## 2.2 MODIFYING PARAMETERS

In order to modify parameters stored in the device, first (1) upload the device parameters, (2) modifying a part of or all of them on the screen, and then (3) download the new parameters to the device.

### 2.2.1 READING PARAMETERS FROM DEVICE (UPLOAD)

Clicking [Upload] opens the Connect dialog box.

In order to connect to the 53U with analog output type via the PC configuration cable, hold down [ IU ▶] button to switch the device to the communication mode before starting uploading. The analog output are held, separated from the actual input signals while in this mode.

When L53U without option code '/A' communicates with PC by using PC Configurator Cable, set Mode Selector of the L53U to ON and click 'Connect' button.

Note: The analog output is fixed during L53U is in communication mode, regardless of variation of input.

In order to connect to the 54U, 54UC or 54UL via the Infrared Communication Adaptor, hold down [ IU ▶] button to switch the device to the infrared communication mode before starting uploading.

**Modbus-RTU (RS-485 or local)**
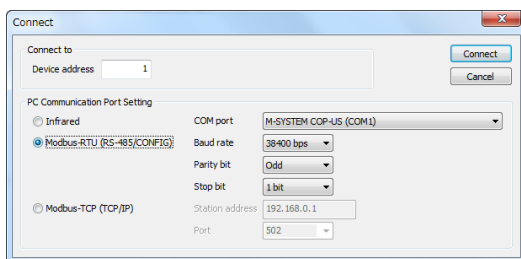


Specify the relevant device address. Specify also the COM port and Modbus communication parameters depending upon the network configuration and the device's communication parameters.

Reference. 53U / 54U factory default setting.

| Device address | 1 |
|---|---|
| Baud rate | 38400 |
| Parity bit | Odd |
| Stop bit | 1 bit |

Note: For the R7LWTU, R7CWTU, R7MWTU, R7EWTU, R9M, WTU, R9CWTU, R9LWTU, R9EWTU, L53U and M5X-WTU, the prameters are fixed as the table above.

**Modbus-TCP (Ethernet)**
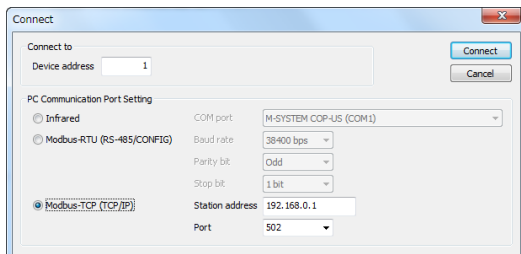


Specify the IP address (Station address) and Service port (Standard Modbus TCP port number is '502').

**Infrared**
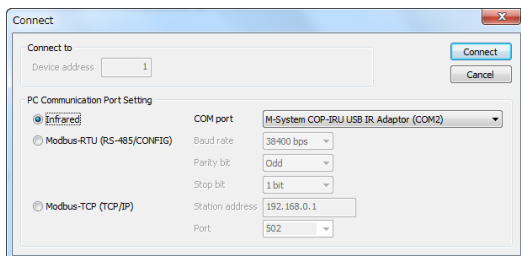


Specify the COM port.

Once all parameters confirmed, click [Connect] to start reading parameters stored in the connected device to show them on the screen.

If an error message appears, confirm the hardware connection and network configuration and its parameters to retry.

### 2.2.2 MODIFYING PARAMETERS ON THE SCREEN

The initial window shows only basic parameters on the screen. Buttons such as [Alarm], [Energy] and [Advanced] are used to go into more detailed settings for respective categories.

In the example shown below, the device input has been changed to: 3-phase/4-wire, unbalanced load, VT ratio 6600/110V, CT ratio 100/5A.
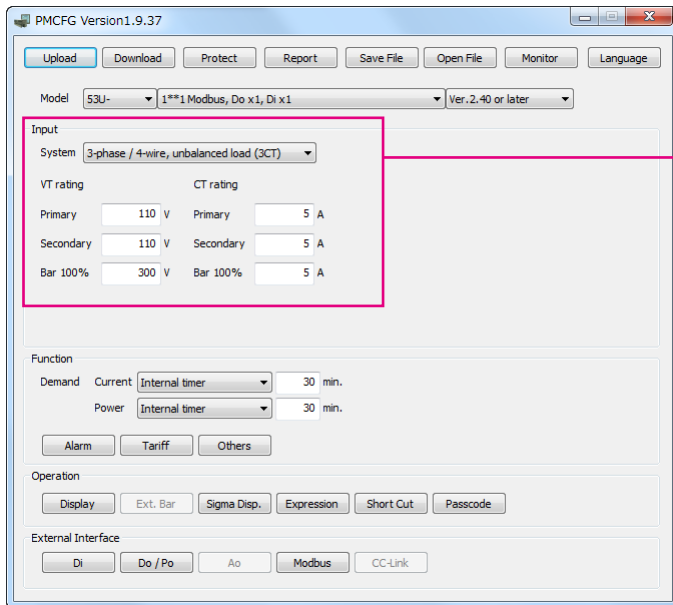


Choose from the menu options or enter appropriate values.

Detailed description on each parameter and control button are given in the later pages of this manual.

### 2.2.3 WRITING PARAMETERS TO DEVICE (DOWNLOAD)

Clicking [Download] opens the Connect dialog box just as [Upload] button did. Specify the relevant device address.

Specify also the COM port and Modbus communication parameters depending upon the network configuration and the device's communication parameters.

Click [Connect] to start downloading new parameters.

When the Modbus register writing protection is activated, a dialog box requesting Modbus passcode entry will appear on the screen.
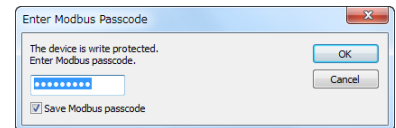


Once downloading begins, a bargraph appears on the screen to indicate progress. When it disappears without any error messages, the new setting becomes valid.

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**Caution !**

Modbus parameters are not enabled by downloading. The device must be restarted (power supply turned off and on).

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## 2.3   PROTECTING PARAMETERS

This function is usable with Firmware Version 1.01 or later of the 53U, all available versions of the 54U, 54UL, 54UC, R7xWTU, R9xWTU and L53U.

In order to protect parameter changes by the front keys of the 54U, 53U, 54UC and 54UL, Passcode (4-digit number) is used.  It is also possible to lock local key operations to go to Setting mode.

In order to protect parameter changes via Modbus (CONFIG port or RS-485), Modbus Register Writing Protection Passcode is used.  The code consists of 9-digit number.

Clicking [Protection] opens the Connect dialog box just as [Upload] button did.  Specify the relevant device address.

Specify also the COM port and Modbus communication parameters depending upon the network configuration and the device's communication parameters.

Click [Connect] to open Protect Setting dialog box.

Modbus passcode is selectable between 1 and 999 999 999.  In order to change, enter the current passcode and new passcode (twice).  If there is no passcode setting or if you do not want to activate the protection, leave relevant field blank.  Click [OK].

---
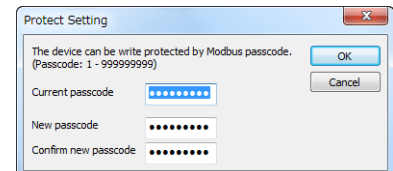
**Caution !**

Once a passcode is set, no parameter changes via Modbus are available unless the correct passcode is entered.  BE SURE NOT TO FORGET the passcode.

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## 2.4   SAVING FILES

Parameter set on the screen can be saved as a file on the hard disk.  A file can be called up on the screen.  You can store backup setting data by utilizing these functions in combination with [Upload] [Download] functions.

### 2.4.1   READING PARAMETERS SAVED AS FILE

Clicking [Open File] calls up the Windows-standard Open dialog box.  Select a parameter file to show a stored parameter setting.
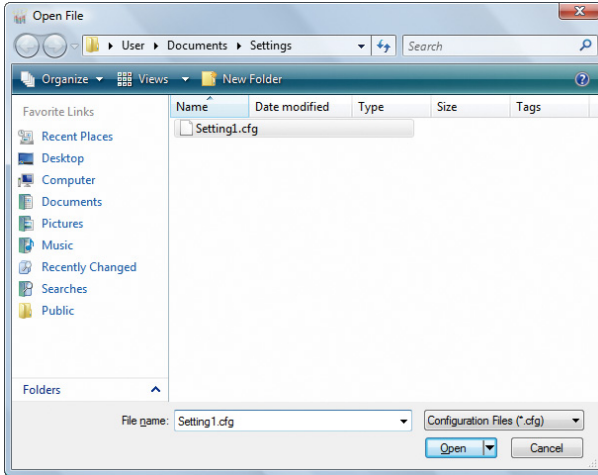


### 2.4.2   SAVING PARAMETERS IN A FILE

Clicking [Save File] calls up the Windows-standard Save As dialog box.  Enter a desired file name to File Name field and click [Save] to store a parameter setting.
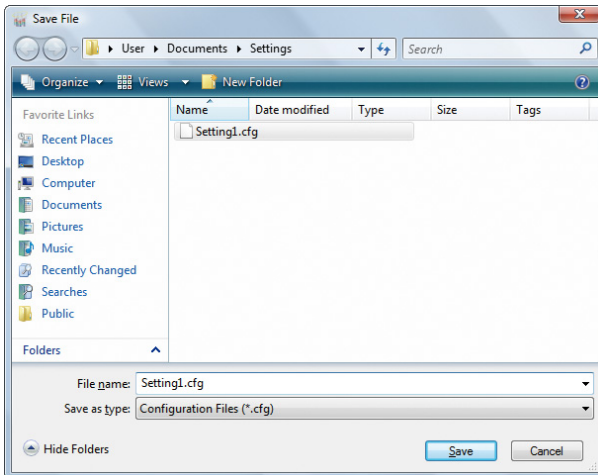
## 2.5    REPORT

### 2.5.1    DISPLAYING PARAMETERS

Clicking [Report] opens Parameter Report window showing all parameters presently edited on the screen.
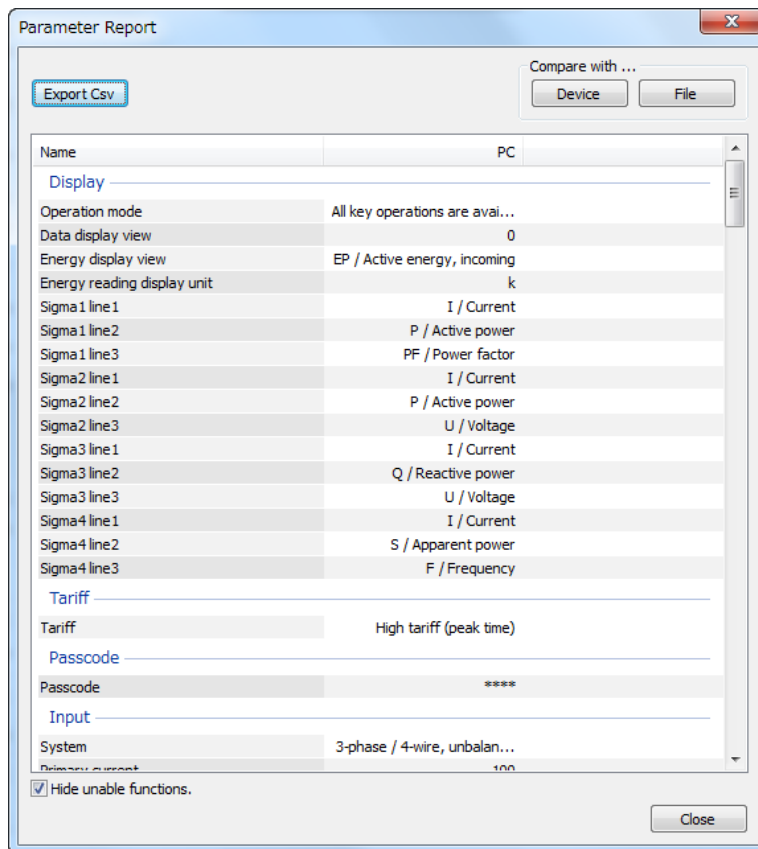


### 2.5.2    COMPARING PARAMETERS

Parameters presently edited on the screen and those stored in the connected device or in a file can be compared side by side.

Click [Device] in order to upload the parameters in the device, or [File] to upload those in a file.  Parameters are compared and listed on the screen side by side.

The rows showing differences between two sets of parameters are highlighted in red background.  Cells for matching parameters are filled in white, or light gray.  Gray characters shows parameters not supported by the other one.

The total number of non-matching cases is mentioned in the bottom of the window frame.

### 2.5.3    CSV FILE

The parameter list can be exported as a CSV text format file for use in another application software such as Microsoft Excel.

Click [Export Csv] button at the top left of the screen and go through standard Windows Save As procedure.

Input the file name and click [Save] button then the CSV file with the name is created.  The CSV file format is in the following:

- Each row for one parameter

- Each row (parameter) consists of 3 or 4 separated data

- Data is arranged in order of 'Parameter group,' 'Parameter identification,' 'Parameter edited' and 'Parameter to compare.'

If you have not uploaded a parameter set for comparing, 'Parameter to compare' is not exported.

[Example]

```
"Display" , "Operation mode" , "All key operations are available"
"Display" , "Data display view" , "0"
"Display" , "Energy display view" , "EP / Active energy, incoming"
```

## 2.6 MONITORING MEASURED VALUES

All the measured values of a particular device can be displayed on the PC screen.

Clicking [Monitor] opens the Connect dialog box (See Figure in Section 2.2.3).  Specify the relevant device address, COM port and Modbus communication parameters and click [Connect].

### 2.6.1 For 53U, L53U, 54U, 54UC, 54UL, R7MWTU, R7CWTU, R7LWTU, R7EWTU and M5XWTU



Once the PC has started communicating with the connected device, display values are updated in approx. 0.5 seconds intervals.

### DEVICE INFORMATION

| Tag No. | Tag number |
|---|---|
| Modbus passcode | Modbus register writing protection status<br>Protection enabled : Modbus registers are write-protected.<br>Protection disabled : Modbus registers are not protected.<br>Not supported : This function is not supported. |
| Model | Model number |
| Serial | Serial number |
| Firmware version | Firmware version number |
| Support information | M-System's support information |

### INSTANTANEOUS & DEMAND VALUES

[Real time], [Max] and [Min] tabs are selectable to switch the view between the instantaneous values, the maximum values and the minimum values respectively.

### ENERGY AND COUNTER VALUES

Display the counter values.  Clicking on TAB, the energy's high tariff (peak time) and low tariff (off-peak time) and the pulse counter value are sequentially displayed.

### HARMONIC DISTORTION VALUES

The left-bottom table shows the total harmonic distortion (THD) for each measurand.  Clicking on a row in this table switches the measurand displayed in the right-bottom table, where the detailed harmonic distortion values from 1st to 31st are shown.

### VECTOR CHART

The left chart shows the vector chart for input voltage and current.

**UTILITY**

By clicking [Utility] button at left top, the following window appears. The buttons in the window reset counters, edit Tag Number or execute a Network loop test. For detail, refer to the following.
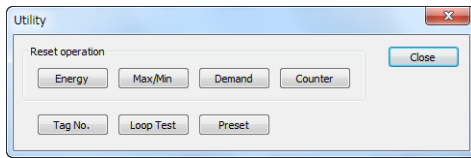


| Energy | Reset all the energy counts to zero. |
|---|---|
| Max/Min | Reset all the maximum and minimum values to the present values. |
| Demand | Reset all the demand values to zero. |
| Counter | Resets all counters to 0. Only for R7LWTU, R7CWTU, R7EWTU and R7MWTU. |
| Tag No. | Open Tag Number Setting dialog box. Max. 16 characters. |
| Loop test | Executes a network (LONWORKS, CC-Link, Modbus) loop test with arbitrarily changed measurand. Only for R7LWTU, R7CWTU, R7MWTU, R7EWTU and M5XWTU. |

## 2.6.2  For R9MWTU, R9CWTU, R9LWTU and R9EWTU



**ENERGY**

Energy per hour for maximum past 24 hours is displayed. When resetting, data for 24 hours and latest value are set to '0'. [Basic Module] and [Extension Module] tabs are selectable to switch the view. When extension unit is R9WTU-ED16, both red-boxed area show counter value.

**MOMENTARY VALUE**

Power, current and power factor are shown. Also, active energy and reactive energy are shown, when resetting these energies are set to '0'.

By clicking [Device Info] button at top, the following window appears. In this window, the device information is shown and TAG No. can be changed.

| Device Information | | |
|---|---|---|
| Tag No. | 8967452367452301 | Close |
| Modbus passcode | Protection disabled | |
| Model | R9 | |
| Serial | 2F018370 | |
| Firmware version | 1.40 | |
| Support information | 0 | Tag |
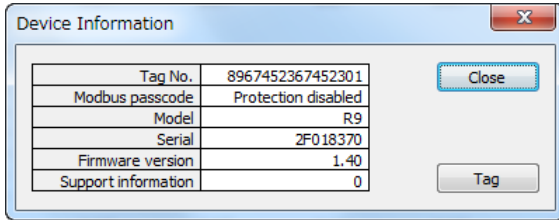
By clicking […] button at right top, the following window appears. In this window, date/time can be set.

**Set Date and Time**

If you re-set the time during operation, note the following.

If a past time before HH o'clock 00 minute is set,
- Two records for each hour will be stored into the SD memory card in that period.
- The energy count per hour for the previous 24 hours in the device will be cleared.

If a future time later than HH o'clock 00 minute is set,
- The data scheduled to be stored in that period will be canceled.

PC's Time          2015/07/07 11:34:17          Sync PC

Device's Time      2015/07/07 11:33:56 (Processing now...)

2015 / 07 / 07      11 : 33 : 50          Set

Close

By clicking [Detail] button at bottom, the following window appears. In this window, momentary value, maximum/minimum value, average value and harmonic distortion are displayed. Clicking button enables resetting of maximum/minimum value.

**Channel Detail (1ch)**

● Communicating

Trend | Max | Min

Instantaneous

| | Voltage | Current | Active power | React. power | App. power | Power factor | Reset max / min |
|---|---|---|---|---|---|---|---|
| Sigma | 0.00 | 0.000 | 0 | 0 | 0 | 1.0000 | Voltage |
| 1-N | 0.00 | 0.000 | 0 | 0 | 0 | 1.0000 | Current |
| 2-N | 0.00 | 0.000 | 0 | 0 | 0 | 1.0000 | Power |
| 3-N | 0.00 | 0.000 | 0 | 0 | 0 | 1.0000 | Power Factor |
| 1-2 | 0.00 | | | | | | Power Factor |
| 2-3 | 0.00 | N. current | Frequency | | | | Frequency |
| 3-1 | 0.00 | 0.000 | 0.00 | | | | |

Demand

| | Latest | Reset demand |
|---|---|---|
| Current | 0.000 | Current |
| Current 1 | 0.000 | Power |
| Current 2 | 0.000 | |
| Current 3 | 0.000 | Reset max / min |
| N. current | 0.000 | Current |
| Active power | 0 | Power |
| React.power | 0 | |
| App. power | 0 | |

Harmonics

| | Latest | Max | Reset max |
|---|---|---|---|
| Current 1 | 0.0 | 182.9 | THD Current |
| Current 2 | 0.0 | 182.9 | THD Voltage |
| Current 3 | 0.0 | 183.1 | |
| N. current | 0.0 | 0.0 | |
| Voltage 1-2 | 0.0 | 327.8 | |
| Voltage 2-3 | 0.0 | 353.5 | |
| Voltage 3-1 | 0.0 | 314.6 | |
| Voltage 1 | 0.0 | 179.2 | |
| Voltage 2 | 0.0 | 181.9 | |
| Voltage 3 | 0.0 | 192.1 | |

Note: Notice that resetting of maximum/minimum value affects display of other channels because voltage and voltage THD are common measurement items among each channel.

## 2.7 NETWORK LOOP TEST

For R9xWTU in the monitor view, for R7xWTU and M5XWTU in the utility view, clicking Loop Test button enables to execute network loop test. With network loop test it is available to set some measured value by device to any given value. Also, it is available to confirm the communication of open network by checking to read set value at communication destination of open network such as LONWORKS, CC-Link and Modbus.



R7xWTU and M5XWTU



R9xWTU

Above figure shows loop test views. By clicking Loop Test button, the current channel become loop test mode, clicking measured value enables to change to any given value. Clicking Normal enables to exit loop test mode and show measured value corresponding to the input of the device of current channel. This function is available only for all R7xWTU and Ver. 1.40 or later of R9xWTU and M5XWTU.

## 2.8 PRESET

For R9xWTU in the monitor view, for R7xWTU in the utility view, clicking preset button enables to preset accumulated value (energy and counter value) to any given value.



R7xWTU and M5XWTU



R9xWTU

Above figure shows preset views. Clicking accumulated value enables to change to any given value. This function is available only for all 53U, 54U, 54UC, 54UL, L53U, R7xWTU and M5XWTU and Ver.1.30 or later of R9xWTU.

## 2.9 ANALOG OUTPUT LOOP TEST

For L53U in the monitor view, clicking Loop Test enables to change analog output value to any given value.



By clicking Loop Test button in the loop test views, the device status become analog fixed output mode, clicking analog output value enables to change to any given value. Clicking Normal enables to exit analog fixed output mode. This function is available only for Ver.2.00 or later of L53U.

## 2.10 SWITCHING LANGUAGE

Click [Language] to switch the display language between English and Japanese.

The program starts up in English mode as initial state when the OS is other than Japanese version. You can switch to Japanese only when the OS supports Japanese language.

# 3. PARAMETER LIST

Supported parameters depend upon model types.  Supported ones are marked with 'X' in the following tables.

| | | 53U-1xx1 (Ver.1.02 or earlier) | 53U-1xx1 (Ver.2.00 to 2.31) | 53U-1xx1 (Ver.2.40 or later) | 53U-1xx2 (Ver.2.31 or earlier) | 53U-1xx2 (Ver.2.40 or later) | 53U-1xx3 (Ver.2.31 or earlier) | 53U-1xx3 (Ver.2.40 or later) | 53U-1xx4 (Ver.2.31 or earlier) | 53U-1xx4 (Ver.2.40 or later) | 53U-1xx5 (Ver.2.31 or earlier) | 53U-1xx5 (Ver.2.40 or later) | 53U-1xx6 (Ver.2.31 or earlier) | 53U-1xx6 (Ver.2.40 or later) | 53U-1xx7 (Ver.2.31 or earlier) | 53U-1xx7 (Ver.2.40 or later) | 53U-1xx8 (Ver.2.31 or earlier) | 53U-1xx8 (Ver.2.40 or later) | 53U-1xx9 (Ver.2.31 or earlier) | 53U-1xx9 (Ver.2.40 or later) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic Parameters | System | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | VT ratio primary / secondary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | VT bar 100% | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | CT ratio primary / secondary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | CT bar 100% | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Demand update interval, current | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Demand update interval, power | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Alarm | Power ON delay time | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Latching | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Current alarm I1...I3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Neutral current alarm IN | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Delta voltage alarm U12...U31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase voltage alarm U1N...U3N | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Active power alarm P | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power alarm Q | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power alarm S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor alarm PF | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency alarm F | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average current alarm I1...I3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average neutral current alarm IN AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average active power alarm P AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average reactive power alarm Q AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average apparent power alarm S AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Current THD alarm THDI1...THD13 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Neutral current THD alarm THDIN | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Delta voltage THD alarm THDU12...THDU31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase voltage THD alarm THDU1N...THDU3N | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase angle between voltages alarm UT12...UT31 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Tariff | Tariff | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Display | Backlight operating mode | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Backlight OFF timer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Backlight brightness | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Update rate | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Data display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Energy display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Key operation lock | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default data display view | *1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default energy display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default, use preset timer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Other | Low-end cutout voltage | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Low-end cutout current | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency input | ✓ | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 | *2 |
| | Energy tariff function | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor PF sign | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power Q sign | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase reactive power Qn | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Measurement mode, Power factor at simplified measurement | | | | | | | | | | | | | | | | | | | |

*1. -1 setting (cyclic) not selectable.

*2. Frequency can be set to 50Hz or 60Hz fixed with the firmware version 2.40 or later.

*3. Limit patterns are available.

*4. Clear alarm and Tariff switching are not available.

| | | 53U-1xx1 (Ver.1.02 or earlier) | 53U-1xx1 (Ver.2.00 to 2.31) / (Ver.2.40 or later) | 53U-1xx2 (Ver.2.31 or earlier) / (Ver.2.40 or later) | 53U-1xx3 (Ver.2.31 or earlier) / (Ver.2.40 or later) | 53U-1xx4 (Ver.2.31 or earlier) / (Ver.2.40 or later) | 53U-1xx5 (Ver.2.31 or earlier) / (Ver.2.40 or later) | 53U-1xx6 (Ver.2.31 or earlier) / (Ver.2.40 or later) | 53U-1xx7 (Ver.2.31 or earlier) / (Ver.2.40 or later) | 53U-1xx8 (Ver.2.31 or earlier) / (Ver.2.40 or later) | 53U-1xx9 (Ver.2.31 or earlier) / (Ver.2.40 or later) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Extension Bar** | Current bar | | | | | | | | | | |
| | Voltage bar | | | | | | | | | | |
| | Active power bar | | | | | | | | | | |
| | Reactive power bar | | | | | | | | | | |
| | Apparent power bar | | | | | | | | | | |
| | Power factor bar | | | | | | | | | | |
| | Frequency bar | | | | | | | | | | |
| | Total harmonic distortion bar | | | | | | | | | | |
| | Phase angle between voltages bar | | | | | | | | | | |
| **Σ View** | Σ1, Line 1...3 | | *3 | *3 | *3 | *3 | *3 | *3 | *3 | *3 | *3 |
| | Σ1, Line 4 | | | | | | | | | | |
| | Σ2, Line 1...3 | | *3 | *3 | *3 | *3 | *3 | *3 | *3 | *3 | *3 |
| | Σ2, Line 4 | | | | | | | | | | |
| | Σ3, Line 1...3 | | *3 | *3 | *3 | *3 | *3 | *3 | *3 | *3 | *3 |
| | Σ3, Line 4 | | | | | | | | | | |
| | Σ4, Line 1...3 | | *3 | *3 | *3 | *3 | *3 | *3 | *3 | *3 | *3 |
| | Σ4, Line 4 | | | | | | | | | | |
| | Σ5, Line 1...4 | | | | | | | | | | |
| | Σ6, Line 1...4 | | | | | | | | | | |
| **Expression** | Input line indication | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase direction indication | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power format | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Di** | Di function | *4 | ✓ | | | ✓ | ✓ | | | | |
| | Di contact type | ✓ | ✓ | | | ✓ | ✓ | | | | |
| **Do** | Do 1 function, contact type, energy detail | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Do 2 function, contact type, energy detail | | | | | | | ✓ | ✓ | ✓ | ✓ |
| | Do 3 function, contact type, energy detail | | | | | | | | | ✓ | ✓ |
| | Do 4 function, contact type, energy detail | | | | | | | | | | ✓ |
| **Ao** | Ao 1 function, zero/span, linearization, I/O 0%/100%, table | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| | Ao 2 function, zero/span, linearization, I/O 0%/100%, table | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| | Ao 3 function, zero/span, linearization, I/O 0%/100%, table | | | ✓ | ✓ | | | | | | |
| | Ao 4 function, zero/span, linearization, I/O 0%/100%, table | | | ✓ | ✓ | | | | | | |
| **Modbus** | Device address | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Baud rate | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Parity bit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Stop bit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Mode | | | | | | | | | | |
| | RUN LED Time out | | | | | | | | | | |
| | Long register | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Protocol operation timer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **CC-Link** | Node address | | | | | | | | | | |
| | Transfer rate | | | | | | | | | | |
| **Shortcut** | Clear alarm | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*1. -1 setting (cyclic) not selectable.

*2. Frequency can be set to 50Hz or 60Hz fixed with the firmware version 2.40 or later.

*3. Limit patterns are available.

*4. Clear alarm and Tariff switching are not available.

| | | 54U-1xx1 (Ver.1.03 or earlier) | 54U-1xx2 (Ver.1.03 or earlier) | 54U-1xx3 (Ver.1.03 or earlier) | 54U-1xx1 (Ver.2.00 to 2.20) | 54U-1xx2/7 (Ver.2.00 to 2.20) | 54U-1xx3/8 (Ver.2.00 to 2.20) | 54U-1xx1 (Ver.3.00 or later) | 54U-1xx2/7 (Ver.3.00 or later) | 54U-1xx3/8 (Ver.3.00 or later) | 54U-1xx4 (Ver.2.00 to 2.20) | 54U-1xx5/9 (Ver.2.00 to 2.20) | 54U-1xx6/A (Ver.2.00 to 2.20) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic Parameters | System | *4 | *4 | *4 | *4 | *4 | *4 | *4 | *4 | *4 | *4 | *4 | *4 |
| | VT ratio primary / secondary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | VT bar 100% | | | | | | | | | | | | |
| | CT ratio primary / secondary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | CT bar 100% | | | | | | | | | | | | |
| | Demand update interval, current | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Demand update interval, power | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Alarm | Power ON delay time | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Latching | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Current alarm I1...I3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Neutral current alarm IN | | | | | | | ✓ | ✓ | ✓ | | | |
| | Delta voltage alarm U12...U31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase voltage alarm U1N...U3N | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Active power alarm P | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power alarm Q | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power alarm S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor alarm PF | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency alarm F | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average current alarm I1...I3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average neutral current alarm IN AVG | | | | | | | ✓ | ✓ | ✓ | | | |
| | Average active power alarm P AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average reactive power alarm Q AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average apparent power alarm S AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Current THD alarm THDI1...THD13 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Neutral current THD alarm THDIN | | | | | | | ✓ | ✓ | ✓ | | | |
| | Delta voltage THD alarm THDU12...THDU31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase voltage THD alarm THDU1N...THDU3N | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase angle between voltages alarm UT12...UT31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Tariff | Tariff | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Display | Backlight operating mode | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Backlight OFF timer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Backlight brightness | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Update rate | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Data display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Energy display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Key operation lock | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default data display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default energy display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default, use preset timer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Other | Low-end cutout voltage | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Low-end cutout current | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency input | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Energy tariff function | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor PF sign | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power Q sign | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase reactive power Qn | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Measurement mode, Power factor at simplified measurement | | | | | | | | | | | | |

*3. Clear alarm and Tariff switching are not available.

*4. 3-phase / 4-wire not selectable.

| | | 54U-1xx1 (Ver.1.03 or earlier) | 54U-1xx2 (Ver.1.03 or earlier) | 54U-1xx3 (Ver.1.03 or earlier) | 54U-1xx1 (Ver.2.00 to 2.20) | 54U-1xx2/7 (Ver.2.00 to 2.20) | 54U-1xx3/8 (Ver.2.00 to 2.20) | 54U-1xx1 (Ver.3.00 or later) | 54U-1xx2/7 (Ver.3.00 or later) | 54U-1xx3/8 (Ver.3.00 or later) | 54U-1xx4 (Ver.2.00 to 2.20) | 54U-1xx5/9 (Ver.2.00 to 2.20) | 54U-1xx6/A (Ver.2.00 to 2.20) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extension Bar | Current bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Voltage bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Active power bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Total harmonic distortion bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase angle between voltages bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Σ View | Σ1, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ1, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ2, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ2, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ3, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ3, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ4, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ4, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ5, Line 1...4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ6, Line 1...4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Expression | Input line indication | | | | | | | | | | | | |
| | Phase direction indication | | | | | | | | | | | | |
| | Power format | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Di | Di function | *3 | *3 | *3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | Di contact type | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| Do | Do 1 function, contact type, energy detail | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Do 2 function, contact type, energy detail | | | | | | | | | | ✓ | ✓ | ✓ |
| | Do 3 function, contact type, energy detail | | | | | | | | | | | | |
| | Do 4 function, contact type, energy detail | | | | | | | | | | | | |
| Ao | Ao 1 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| | Ao 2 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| | Ao 3 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| | Ao 4 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| Modbus | Device address | ✓ | | | ✓ | | | ✓ | | | ✓ | | |
| | Baud rate | ✓ | | | ✓ | | | ✓ | | | ✓ | | |
| | Parity bit | ✓ | | | ✓ | | | ✓ | | | ✓ | | |
| | Stop bit | ✓ | | | ✓ | | | ✓ | | | ✓ | | |
| | Mode | | | | | | | | | | | | |
| | RUN LED Time out | | | | | | | | | | | | |
| | Long register | ✓ | | | ✓ | | | ✓ | | | ✓ | | |
| | Protocol operation timer | ✓ | | | ✓ | | | ✓ | | | ✓ | | |
| CC-Link | Node address | | | | | | | | | | | | |
| | Transfer rate | | | | | | | | | | | | |
| Shortcut | Clear alarm | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*3. Clear alarm and Tariff switching are not available.
*4. 3-phase / 4-wire not selectable.

| | | 54U-1xx4 (Ver.3.00 or later) | 54U-1xx5/9 (Ver.3.00 or later) | 54U-1xx6/A (Ver.3.00 or later) | 54U-2xx1 | 54U-2xx2/7 | 54U-2xx3/8 | 54U-2xx4 | 54U-2xx5/9 | 54U-2xx6/A |
|---|---|---|---|---|---|---|---|---|---|---|
| Basic Parameters | System | *4 | *4 | *4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | VT ratio primary / secondary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | VT bar 100% | | | | | | | | | |
| | CT ratio primary / secondary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | CT bar 100% | | | | | | | | | |
| | Demand update interval, current | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Demand update interval, power | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Alarm | Power ON delay time | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Latching | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Current alarm I1...I3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Neutral current alarm IN | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Delta voltage alarm U12...U31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase voltage alarm U1N...U3N | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Active power alarm P | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power alarm Q | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power alarm S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor alarm PF | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency alarm F | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average current alarm I1...I3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average neutral current alarm IN AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average active power alarm P AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average reactive power alarm Q AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average apparent power alarm S AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Current THD alarm THDI1...THD13 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Neutral current THD alarm THDIN | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Delta voltage THD alarm THDU12...THDU31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase voltage THD alarm THDU1N...THDU3N | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase angle between voltages alarm UT12...UT31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Tariff | Tariff | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Display | Backlight operating mode | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Backlight OFF timer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Backlight brightness | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Update rate | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Data display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Energy display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Key operation lock | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default data display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default energy display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default, use preset timer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Other | Low-end cutout voltage | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Low-end cutout current | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency input | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Energy tariff function | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor PF sign | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power Q sign | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase reactive power Qn | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Measurement mode, Power factor at simplified measurement | | | | | | | | | |

*4. 3-phase / 4-wire not selectable.

| | | 54U-1xx4 (Ver.3.00 or later) | 54U-1xx5/9 (Ver.3.00 or later) | 54U-1xx6/A (Ver.3.00 or later) | 54U-2xx1 | 54U-2xx2/7 | 54U-2xx3/8 | 54U-2xx4 | 54U-2xx5/9 | 54U-2xx6/A |
|---|---|---|---|---|---|---|---|---|---|---|
| Extension Bar | Current bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Voltage bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Active power bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Total harmonic distortion bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase angle between voltages bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Σ View | Σ1, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ1, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ2, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ2, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ3, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ3, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ4, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ4, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ5, Line 1...4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ6, Line 1...4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Expression | Input line indication | | | | | | | | | |
| | Phase direction indication | | | | | | | | | |
| | Power format | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Di | Di function | | | | ✓ | ✓ | ✓ | | | |
| | Di contact type | | | | ✓ | ✓ | ✓ | | | |
| Do | Do 1 function, contact type, energy detail | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Do 2 function, contact type, energy detail | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ |
| | Do 3 function, contact type, energy detail | | | | | | | | | |
| | Do 4 function, contact type, energy detail | | | | | | | | | |
| Ao | Ao 1 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| | Ao 2 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| | Ao 3 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| | Ao 4 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| Modbus | Device address | ✓ | | | ✓ | | | ✓ | | |
| | Baud rate | ✓ | | | ✓ | | | ✓ | | |
| | Parity bit | ✓ | | | ✓ | | | ✓ | | |
| | Stop bit | ✓ | | | ✓ | | | ✓ | | |
| | Mode | | | | | | | | | |
| | RUN LED time out | | | | | | | | | |
| | Long register | ✓ | | | ✓ | | | ✓ | | |
| | Protocol operation timer | ✓ | | | ✓ | | | ✓ | | |
| CC-Link | Node address | | | | | | | | | |
| | Transfer rate | | | | | | | | | |
| Shortcut | Clear alarm | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*4. 3-phase / 4-wire not selectable.

| | | 54UL-1xx1 (Ver.1.02 or earlier) | 54UL-1xx2 (Ver.1.02 or earlier) | 54UL-1xx1 (Ver.3.00 or later) | 54UL-1xx2 (Ver.300 or later) | 54UL-2xx1 | 54UL-2xx2 | 54UC-1xx1 (Ver.1.00 or earlier) | 54UC-1xx2 (Ver.1.00 or earlier) | 54UC-1xx1 (Ver.3.00 or later) | 54UC-1xx2 (Ver.300 or later) | 54UC-2xx1 | 54UC-2xx2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic Parameters | System | *4 | *4 | *4 | *4 | ✓ | ✓ | *4 | *4 | *4 | *4 | ✓ | ✓ |
| | VT ratio primary / secondary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | VT bar 100% | | | | | | | | | | | | |
| | CT ratio primary / secondary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | CT bar 100% | | | | | | | | | | | | |
| | Demand update interval, current | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Demand update interval, power | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Alarm | Power ON delay time | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Latching | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Current alarm I1...I3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Neutral current alarm IN | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| | Delta voltage alarm U12...U31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase voltage alarm U1N...U3N | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Active power alarm P | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power alarm Q | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power alarm S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor alarm PF | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency alarm F | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average current alarm I1...I3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average neutral current alarm IN AVG | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| | Average active power alarm P AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average reactive power alarm Q AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Average apparent power alarm S AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Current THD alarm THDI1...THD13 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Neutral current THD alarm THDIN | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| | Delta voltage THD alarm THDU12...THDU31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase voltage THD alarm THDU1N...THDU3N | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase angle between voltages alarm UT12...UT31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Tariff | Tariff | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Display | Backlight operating mode | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Backlight OFF timer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Backlight brightness | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Update rate | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Data display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Energy display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Key operation lock | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default data display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default energy display view | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | My default, use preset timer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Other | Low-end cutout voltage | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Low-end cutout current | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency input | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Energy tariff function | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor PF sign | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power Q sign | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase reactive power Qn | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Measurement mode, Power factor at simplified measurement | | | | | | | | | | | | |

*4. 3-phase / 4-wire not selectable.

| | | 54UL-1xx1 (Ver.1.02 or earlier) | 54UL-1xx2 (Ver.1.02 or earlier) | 54UL-1xx1 (Ver.3.00 or later) | 54UL-1xx2 (Ver.300 or later) | 54UL-2xx1 | 54UL-2xx2 | 54UC-1xx1 (Ver.1.00 or earlier) | 54UC-1xx2 (Ver.1.00 or earlier) | 54UC-1xx1 (Ver.3.00 or later) | 54UC-1xx2 (Ver.300 or later) | 54UC-2xx1 | 54UC-2xx2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Extension Bar | Current bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Voltage bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Active power bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Apparent power bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Power factor bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Total harmonic distortion bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase angle between voltages bar | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Σ View | Σ1, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ1, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ2, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ2, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ3, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ3, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ4, Line 1...3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ4, Line 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ5, Line 1...4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Σ6, Line 1...4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Expression | Input line indication | | | | | | | | | | | | |
| | Phase direction indication | | | | | | | | | | | | |
| | Power format | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Di | Di function | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | |
| | Di contact type | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | |
| Do | Do 1 function, contact type, energy detail | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Do 2 function, contact type, energy detail | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ | | ✓ |
| | Do 3 function, contact type, energy detail | | | | | | | | | | | | |
| | Do 4 function, contact type, energy detail | | | | | | | | | | | | |
| Ao | Ao 1 function, zero/span, linearization, I/O 0%/100%, table | | | | | | | | | | | | |
| | Ao 2 function, zero/span, linearization, I/O 0%/100%, table | | | | | | | | | | | | |
| | Ao 3 function, zero/span, linearization, I/O 0%/100%, table | | | | | | | | | | | | |
| | Ao 4 function, zero/span, linearization, I/O 0%/100%, table | | | | | | | | | | | | |
| Modbus | Device address | | | | | | | | | | | | |
| | Baud rate | | | | | | | | | | | | |
| | Parity bit | | | | | | | | | | | | |
| | Stop bit | | | | | | | | | | | | |
| | Mode | | | | | | | | | | | | |
| | RUN LED time out | | | | | | | | | | | | |
| | Long register | | | | | | | | | | | | |
| | Protocol operation timer | | | | | | | | | | | | |
| CC-Link | Node address | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Transfer rate | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Shortcut | Clear alarm | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*4. 3-phase / 4-wire not selectable.

| | | R7LWTU | R7CWTU | R7MWTU | R7EWTU | R9LWTU | R9CWTU | R9MWTU | R9EWTU |
|---|---|---|---|---|---|---|---|---|---|
| Basic Parameters | System | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | VT ratio primary / secondary | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | VT bar 100% | | | | | | | | |
| | CT ratio primary / secondary | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | CT bar 100% | | | | | | | | |
| | Demand update interval, current | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | Demand update interval, power | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| Alarm | Power ON delay time | | | | | | | | |
| | Latching | | | | | | | | |
| | Current alarm I1...I3 | | | | | | | | |
| | Neutral current alarm IN | | | | | | | | |
| | Delta voltage alarm U12...U31 | | | | | | | | |
| | Phase voltage alarm U1N...U3N | | | | | | | | |
| | Active power alarm P | | | | | | | | |
| | Reactive power alarm Q | | | | | | | | |
| | Apparent power alarm S | | | | | | | | |
| | Power factor alarm PF | | | | | | | | |
| | Frequency alarm F | | | | | | | | |
| | Average current alarm I1...I3 | | | | | | | | |
| | Average neutral current alarm IN AVG | | | | | | | | |
| | Average active power alarm P AVG | | | | | | | | |
| | Average reactive power alarm Q AVG | | | | | | | | |
| | Average apparent power alarm S AVG | | | | | | | | |
| | Current THD alarm THDI1...THD13 | | | | | | | | |
| | Neutral current THD alarm THDIN | | | | | | | | |
| | Delta voltage THD alarm THDU12...THDU31 | | | | | | | | |
| | Phase voltage THD alarm THDU1N...THDU3N | | | | | | | | |
| | Phase angle between voltages alarm UT12...UT31 | | | | | | | | |
| Tariff | Tariff | | ✓ | ✓ | ✓ | | | | |
| Display | Backlight operating mode | | | | | | | | |
| | Backlight OFF timer | | | | | | | | |
| | Backlight brightness | | | | | | | | |
| | Backlight update rate | | | | | | | | |
| | Data display view | | | | | | | | |
| | Energy display view | | | | | | | | |
| | Key operation lock | | | | | | | | |
| | My default data display view | | | | | | | | |
| | My default energy display view | | | | | | | | |
| | My default, use preset timer | | | | | | | | |
| Other | Low-end cutout voltage | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | Low-end cutout current | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | Frequency input | | ✓ | ✓ | ✓ | | | | |
| | Energy tariff function | | | | | | | | |
| | Power factor PF sign | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | Reactive power Q sign | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | Phase reactive power Qn | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | Apparent power S | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | Measurement mode, Power factor at simplified measurement | | | | | | | | |

Configure the R7LWTU and R9LWTU with LONWORKS Management Tool (e.g LonMaker)

| | | R7LWTU | R7CWTU | R7MWTU | R7EWTU | R9LWTU | R9CWTU | R9MWTU | R9EWTU |
|---|---|---|---|---|---|---|---|---|---|
| Extension Bar | Current bar | | | | | | | | |
| | Voltage bar | | | | | | | | |
| | Active power bar | | | | | | | | |
| | Reactive power bar | | | | | | | | |
| | Apparent power bar | | | | | | | | |
| | Power factor bar | | | | | | | | |
| | Frequency bar | | | | | | | | |
| | Total harmonic distortion bar | | | | | | | | |
| | Phase angle between voltages bar | | | | | | | | |
| Σ View | Σ1, Line 1...3 | | | | | | | | |
| | Σ1, Line 4 | | | | | | | | |
| | Σ2, Line 1...3 | | | | | | | | |
| | Σ2, Line 4 | | | | | | | | |
| | Σ3, Line 1...3 | | | | | | | | |
| | Σ3, Line 4 | | | | | | | | |
| | Σ4, Line 1...3 | | | | | | | | |
| | Σ4, Line 4 | | | | | | | | |
| | Σ5, Line 1...4 | | | | | | | | |
| | Σ6, Line 1...4 | | | | | | | | |
| Expression | Input line indication | | | | | | | | |
| | Phase direction indication | | | | | | | | |
| | Power format | | | | | | | | |
| Di | Di function | | | | | | | | |
| | Di contact type | | | | | | | | |
| Do | Do 1 function, contact type, energy detail | | | | | | | | |
| | Do 2 function, contact type, energy detail | | | | | | | | |
| | Do 3 function, contact type, energy detail | | | | | | | | |
| | Do 4 function, contact type, energy detail | | | | | | | | |
| Ao | Ao 1 function, zero/span, linearization, I/O 0%/100%, table | | | | | | | | |
| | Ao 2 function, zero/span, linearization, I/O 0%/100%, table | | | | | | | | |
| | Ao 3 function, zero/span, linearization, I/O 0%/100%, table | | | | | | | | |
| | Ao 4 function, zero/span, linearization, I/O 0%/100%, table | | | | | | | | |
| Modbus | Device address | | | | | | | | |
| | Baud rate | | | | | | | | |
| | Parity bit | | | ✓ | | | | ✓ | |
| | Stop bit | | | ✓ | | | | ✓ | |
| | Mode | | | ✓ | | | | ✓ | |
| | IP address | | | | ✓ | | | | ✓ |
| | Subnet mask | | | | ✓ | | | | ✓ |
| | Default gateway | | | | ✓ | | | | ✓ |
| | Port | | | | ✓ | | | | ✓ |
| | Connection timeout | | | | ✓ | | | | ✓ |
| | RUN LED time out | | | ✓ | ✓ | | | ✓ | ✓ |
| | Long register | | | | | | | | |
| | Protocol operation timer | | | | | | | | |
| CC-Link | Node address | | | | | | | | |
| | Transfer rate | | | | | | | | |
| Shortcut | Clear alarm | | | | | | | | |

Configure the R7LWTU and R9LWTU with LONWORKS Management Tool (e.g LonMaker)

| | | L53U-1xx1 | L53U-1xx2 | L53U-1xx3 | L53U-1xx4 | L53U-1xx5 | L53U-1xx6 | L53U-1xx7 | M5XWTU-1x3 |
|---|---|---|---|---|---|---|---|---|---|
| Basic Parameters | System | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | VT ratio primary / secondary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | VT bar 100% | | | | | | | | |
| | CT ratio primary / secondary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | CT bar 100% | | | | | | | | |
| | Demand update interval, current | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Demand update interval, power | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Alarm | Power ON delay time | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Latching | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Current alarm I1...I3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Neutral current alarm IN | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Delta voltage alarm U12...U31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Phase voltage alarm U1N...U3N | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Active power alarm P | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Reactive power alarm Q | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Apparent power alarm S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Power factor alarm PF | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Frequency alarm F | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Average current alarm I1...I3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Average neutral current alarm IN AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Average active power alarm P AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Average reactive power alarm Q AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Average apparent power alarm S AVG | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Current THD alarm THDI1...THD13 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Neutral current THD alarm THDIN | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Delta voltage THD alarm THDU12...THDU31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Phase voltage THD alarm THDU1N...THDU3N | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Phase angle between voltages alarm UT12...UT31 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Tariff | Tariff | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Display | Backlight operating mode | | | | | | | | |
| | Backlight OFF timer | | | | | | | | |
| | Backlight brightness | | | | | | | | |
| | Backlight update rate | | | | | | | | |
| | Data display view | | | | | | | | |
| | Energy display view | | | | | | | | |
| | Key operation lock | | | | | | | | |
| | My default data display view | | | | | | | | |
| | My default energy display view | | | | | | | | |
| | My default, use preset timer | | | | | | | | |
| Other | Low-end cutout voltage | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Low-end cutout current | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Frequency input | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Energy tariff function | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Power factor PF sign | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Reactive power Q sign | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Phase reactive power Qn | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Apparent power S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Measurement mode, Power factor at simplified measurement | | | | | | | | ✓ |

| | | L53U-1xx1 | L53U-1xx2 | L53U-1xx3 | L53U-1xx4 | L53U-1xx5 | L53U-1xx6 | L53U-1xx7 | M5XWTU-1x3 |
|---|---|---|---|---|---|---|---|---|---|
| Extension Bar | Current bar | | | | | | | | |
| | Voltage bar | | | | | | | | |
| | Active power bar | | | | | | | | |
| | Reactive power bar | | | | | | | | |
| | Apparent power bar | | | | | | | | |
| | Power factor bar | | | | | | | | |
| | Frequency bar | | | | | | | | |
| | Total harmonic distortion bar | | | | | | | | |
| | Phase angle between voltages bar | | | | | | | | |
| Σ View | Σ1, Line 1...3 | | | | | | | | |
| | Σ1, Line 4 | | | | | | | | |
| | Σ2, Line 1...3 | | | | | | | | |
| | Σ2, Line 4 | | | | | | | | |
| | Σ3, Line 1...3 | | | | | | | | |
| | Σ3, Line 4 | | | | | | | | |
| | Σ4, Line 1...3 | | | | | | | | |
| | Σ4, Line 4 | | | | | | | | |
| | Σ5, Line 1...4 | | | | | | | | |
| | Σ6, Line 1...4 | | | | | | | | |
| Expression | Input line indication | | | | | | | | |
| | Phase direction indication | | | | | | | | |
| | Power format | | | | | | | | |
| Di | Di function | ✓ | | | ✓ | ✓ | | | |
| | Di contact type | ✓ | | | ✓ | ✓ | | | |
| Do | Do 1 function, contact type, energy detail | ✓ | | | ✓ | ✓ | ✓ | ✓ | |
| | Do 2 function, contact type, energy detail | | | | | | ✓ | ✓ | |
| | Do 3 function, contact type, energy detail | | | | | | | | |
| | Do 4 function, contact type, energy detail | | | | | | | | |
| Ao | Ao 1 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Ao 2 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Ao 3 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | | | | | |
| | Ao 4 function, zero/span, linearization, I/O 0%/100%, table | | ✓ | ✓ | | | | | |
| Modbus | Device address | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Baud rate | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Parity bit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Stop bit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Mode | | | | | | | | |
| | RUN LED time out | | | | | | | | |
| | Long register | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Protocol operation timer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| CC-Link | Node address | | | | | | | | |
| | Transfer rate | | | | | | | | |
| Shortcut | Clear alarm | | | | | | | | |

# 4. BASIC PARAMETERS

The initial window when you start up the PMCFG contains basic parameters as described below.

## 4.1 MODEL

Choose an appropriate device type to be configured on the PMCFG.

Selection

| | | | |
|---|---|---|---|
| 53U- | 1xx1 | Modbus, Do x1, Di x1 | Ver.1.02 or earlier |
| | | | Ver.2.00 to 2.31 |
| | | | Ver.2.40 or later |
| | 1xx2 | Ao 4-20mA x4 | Ver.2.31 or earlier |
| | | | Ver.2.40 or later |
| | 1xx3 | Ao 1-5V x4 | Ver.2.31 or earlier |
| | | | Ver.2.40 or later |
| | 1xx4 | Ao 4-20mA x2, Do x1, Di x1 | Ver.2.31 or earlier |
| | | | Ver.2.40 or later |
| | 1xx5 | Ao 1-5V x2, Do x1, Di x1 | Ver.2.31 or earlier |
| | | | Ver.2.40 or later |
| | 1xx6 | Ao 4-20mA x2, Do x2 | Ver.2.31 or earlier |
| | | | Ver.2.40 or later |
| | 1xx7 | Do 1-5V x2, Do x2 | Ver.2.31 or earlier |
| | | | Ver.2.40 or later |
| | 1xx8 | Modbus, Do x3 | Ver.2.31 or earlier |
| | | | Ver.2.40 or later |
| | 1xx9 | Do x4 | Ver.2.31 or earlier |
| | | | Ver.2.40 or later |
| 54U- | 1xx1 | Modbus, Do x1, Di x1 | Ver.1.03 or earlier |
| | | | Ver.2.00 to 2.20 |
| | | | Ver.3.00 or later |
| | 1xx2/7 | Ao 4-20mA x4, Do1 x1, Di x1 | Ver.1.03 or earlier |
| | | | Ver.2.00 to 2.20 |
| | | | Ver.3.00 or later |
| | 1xx3/8 | Ao 1-5V x4, Do x1, Di x1 | Ver.1.03 or earlier |
| | | | Ver.2.00 to 2.20 |
| | | | Ver.3.00 or later |
| | 1xx4 | Modbus, Do x2 | Ver.2.00 to 2.20 |
| | | | Ver.3.00 or later |
| | 1xx5/9 | Ao 4-20mA x4, Do x2 | Ver.2.00 to 2.20 |
| | | | Ver.3.00 or later |
| | 1xx6/A | Ao 1-5V x4, Do x2 | Ver.2.00 to 2.20 |
| | | | Ver.3.00 or later |
| | 2xx1 | 3P4W, Modbus, Do x1, Di x1 | |
| | 2xx2/7 | 3P4W, Ao 4-20mA x4, Do x1, Di x1 | |
| | 2xx3/8 | 3P4W, Ao 1-5V x4, Do x1, Di x1 | |
| | 2xx4 | 3P4W, Modbus, Do x2 | |
| | 2xx5/9 | 3P4W, Ao 4-20mA x4, Do x2 | |
| | 2xx6/A | 3P4W, Ao 1-5V x4, Do x2 | |

| | | | |
|---|---|---|---|
| 54UL- | 1xx1 | LonWorks, Do x1, Di x1 | Ver.1.02 or earlier |
| | | | Ver.3.00 or later |
| | 1xx2 | LonWorks, Do x2 | Ver.1.02 or earlier |
| | | | Ver.3.00 or later |
| | 2xx1 | 3P4W, LonWorks, Do x1, Di x1 | |
| | 2xx2 | 3P4W, LonWorks, Do x2 | |
| 54UC- | 1xx1 | CC-Link, Do x1, Di x1 | Ver.1.00 or earlier |
| | | | Ver.3.00 or later |
| | 1xx2 | CC-Link, Do x2 | Ver.1.00 or earlier |
| | | | Ver.3.00 or later |
| | 2xx1 | 3P4W, CC-Link, Do x1, Di x1 | |
| | 2xx2 | 3P4W, CC-Link, Do x2 | |
| R7CWTU- | 21x | 3P4W, CC-Link, Counter x4 | |
| | 22x | 3P4W, CC-Link, Input x2 | |
| R7MWTU- | 21x | 3P4W, Modbus, Counter x4 | |
| | 22x | 3P4W, Modbus, Input x2 | |
| R7EWTU- | 21x | 3P4W, Modbus-TCP, Counter x4 | |
| | 22x | 3P4W, Modbus-TCP, Input x2 | |
| L53U- | 1xx1 | Modbus, Do x1, Di x1 | |
| | 1xx2 | Ao 4 – 20mA x4 | |
| | 1xx3 | Ao 1 – 5V x4 | |
| | 1xx4 | Ao 4 – 20mA x2, Do x1, Di x1 | |
| | 1xx5 | Ao 1 – 5V x2, Do x1, Di x1 | |
| | 1xx6 | Ao 4 – 20mA x2, Do x2 | |
| | 1xx7 | Ao 1 – 5V x2, Do x2 | |
| R9CWTU- | 2xxx | CC-Link, Input x8 | |
| | 2xxx | CC-Link, Input x8 + R9WTU-EP8 (Input x8) | |
| R9MWTU- | 2xxx | Modbus, Input x8 | |
| | 2xxx | Modbus, Input x8 + R9WTU-EP8 (Input x8) | |
| R9EWTU- | 2xxx | Modbus-TCP, Input x8 | |
| | 2xxx | Modbus-TCP, Input x8 + R9WTU-EP8 (Input x8) | |
| M5XWTU | 1x3 | Modbus | |

Note: For models with 'External interface' code 2 or 7, select the same device type.  Do the same for models with code 3 or 8, 5 or 9, and 6 or A.

## 4.2 INPUT

### SYSTEM

Choose an input wiring configuration from the following:

| Selection / Range | |
|---|---|
| System | Single-phase / 2-wire (1CT) |
| | Single-phase / 3-wire (2CT) |
| | 3-phase / 3-wire, balanced load (1CT) *3 |
| | 3-phase / 3-wire, unbalanced load (2CT) |
| | 3-phase / 4-wire, balanced load (1CT) *1 |
| | 3-phase / 4-wire, unbalanced load (3CT) *1 |
| | 3-phase / 3-wire, unbalanced load (3CT) *2 |

*1. Selectable for the 53U, L53U, 54U-2, 54UL-2, 54UC-2, R7CWTU, R7MWTU and R7EWTU.

*2. Selectable for the 54U-2, 54UL-2 and 54UC-2

*3. The M5XWTU is not selectable.

### VOLTAGE

Enter VT's primary and secondary and secondary ratings when an external voltage transformer (VT) is used. The maximum selectable ratio is 400kV/50V, but both CT and VT ratios must be considered to satisfy the maximum measurable power value of 2GVA.

The secondary can be set up to 500V. However, this does not mean the unit accepts 500V for input. Do not use with the condition exceeding input rating written in the specification sheet of the unit.

'Bar 100%' value is applied as the full-scale bargraph range indicated on the left end of the LCD display and the full-scale vector chart range indicated on the monitor view. The 54U, 54UL and 54UC do not support this function. Use 'Bar Setting.'

| Selection / Range | |
|---|---|
| Primary voltage | 50 to 400000V |
| Secondary voltage | 50 to 500V |
| Bar 100% voltage | 50 to 400000V |

### CURRENT

Enter CT's primary and secondary and secondary ratings when an external current transformer (CT) is used. The maximum selectable ratio is 20kA/1A, but both CT and VT ratios must be considered to satisfy the maximum measurable power value of 2GVA.

'Bar 100%' value is applied as the full-scale bargraph range indicated on the left end of the LCD display and the full-scale vector chart range indicated on the monitor view. The 54U, 54UL and 54UC do not support this function. Use 'Bar Setting.'

| Selection / Range | |
|---|---|
| Primary current | 1 to 20000A |
| Secondary current | 1 to 5A |
| Bar 100% current | 1 to 20000A |

The sensors used for CT current input are the followings:
CLSE-R5
CLSE-05
CLSE-10
CLSE-20
CLSE-40
CLSE-60

Primary current setting is necessary when choosing CLSE-R5. Set the CLSE-R5 to "5" at connection on the available measurements line, for other items, set primary current of the CT connected to CLSE-R5.

# 5. FUNCTION PARAMETERS

When you click various control buttons under 'Function' on the initial window of the PMCFG, you can go to detailed setting.

## 5.1 DEMAND UPDATE INTERVAL

**CURRENT & POWER**

Choose how you want to update demand (average) values for the current and the power signals.

| Selection / Range | |
| --- | --- |
| Internal timer | Demand values are calculated automatically by the internal timer (clock).  Specify in minutes. |
| Discrete input | Demand values are calculated when a contact input is supplied to the device's discrete input terminals. |

**Caution !**

With 'Discrete input' setting, demand values are automatically updated if there is no contact input for 100 minutes. Be sure to set also 'Update demand value' for 'Discrete input function' as explained in Section 3.3.

## 5.2  ALARM

19 groups of measurands are available for alarm.  Each alarm can have High and Low setpoints, enabled or disabled respectively.
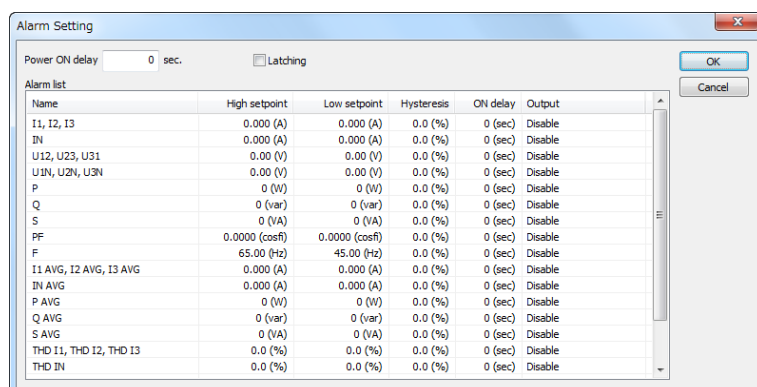


■ **ALARM OUTPUT SETTING**

| ID | DEFINITION | LOW SETPOINT | HIGH SETPOINT | UNIT | DEVICE*1 |
|---|---|---|---|---|---|
| I1-3 | Current, Line 1 thr. Line 3 | 0.000 | 20 000.000 | A | |
| IN | Neutral current | 0.000 | 20 000.000 | A | 53U, L53U, 54U, 54UL, 54UC*5 |
| U12-31 | Delta voltage, Line 1 – 2, 2 – 3, 3 – 1 | 0.00 | 400 000.00 | V | |
| U1N-3N | Phase voltage, Phase 1 thr. Phase 3 | 0.00 | 400 000.00 | V | |
| P | Active power | -2 000 000 000 | 2 000 000 000 | W | |
| Q | Reactive power | -2 000 000 000 | 2 000 000 000 | var | |
| S | Apparent power | 0 | 2 000 000 000 | VA | |
| PF | Power factor | -1.0000 | 1.0000 | cos ø *2 | |
| F | Frequency | 45.00 | 65.00 | Hz | |
| I1-3 AVG | Average current, Line 1 thr. Line 3 (demand) | 0.000 | 20 000.000 | A | |
| IN AVG | Average neutral current (demand) | 0.000 | 20 000.000 | A | 53U, L53U, 54U, 54UL, 54UC*5 |
| P AVG | Average active power (demand) | -2 000 000 000 | 2 000 000 000 | W | |
| Q AVG | Average reactive power (demand) | -2 000 000 000 | 2 000 000 000 | var | |
| S AVG | Average apparent power (demand) | 0 | 2 000 000 000 | VA | |
| THDI1-3 | THD, Current, Line 1 thr. Line 3 | 0.0 | 999.9 | % | |
| THDIN | THD, Neutral current | 0.0 | 999.9 | % | 53U, L53U, 54U, 54UL, 54UC*5 |
| THDU12-31 | THD, Delta voltage, Line 1 – 2, 2 – 3, 3 – 1 | 0.0 | 999.9 | % | |
| THDU1N-3N | THD, Phase voltage, Phase 1 thr. Phase 3 | 0.0 | 999.9 | % | |
| UT12-31 | Phase angle between voltages, Phase 1 – 2, 2 – 3, 3 – 1 | -180 | 180 | °*4 | 53U*3, L53U, 54U, 54UL, 54UC |

*1. Function available for specific models.

*2. Indicated PF on the 53U

*3. Firmware Ver.2.00 or later

*4. No unit indication on the module

*5. Only for the models to which 3-phase/4-wire is applicable, or 54U, 54UL and 54UC whose firmware version is 3.00 or later.

### POWER ON DELAY TIME

Specify a time delay for the alarm to start functioning after the power is turned on.  The time is counted up from the moment when the device starts measuring in approx. 2 seconds after all display segments are turned on at the startup.

| Selection / Range | |
|---|---|
| Power ON delay time | 0 to 999 seconds |

## LATCHING

Check 'Latching' if you do not want to automatically reset an alarm once the measured value is out of the alarm range. In order to reset, (1) reset through network by Modbus command, (2) Remove the 'Check' mark of this setting, or (3) turn off the power supply to the device.

## HIGH SETPOINT / LOW SETPOINT

Refer to the above table for the selectable ranges for respective measurand. High alarm is triggered when the measured value goes above the High setpoint, while Low alarm is triggered when it goes below the Low setpoint.

## HYSTERESIS (DEADBAND)

Hysteresis is selectable for each alarm from 0.0 to 99.9%. Relationships between the set value in % and actual process value are indicated in the table below. 0% hysteresis equals to 0 in engineering unit unless otherwise mentioned.

| ID | DEFINITION | HYSTERESIS AT 100% | UNIT |
|---|---|---|---|
| I1-3 | Current, Line 1 thr. Line 3 | CT primary rating | A |
| IN | Neutral current | CT primary rating | A |
| U12-31 | Delta voltage, Line 1 – 2, 2 – 3, 3 – 1 | VT primary rating | V |
| U1N-3N | Phase voltage, Phase 1 thr. Phase 3 | VT primary rating | V |
| P | Active power | CT primary rating x VT primary rating | W |
| Q | Reactive power | CT primary rating x VT primary rating | var |
| S | Apparent power | CT primary rating x VT primary rating | VA |
| PF | Power factor | 1.0000 | cos φ |
| F | Frequency | 65.00 (45.00 at 0%) | Hz |
| I1-3 AVG | Average current, Line 1 thr. Line 3 (demand) | CT primary rating | A |
| IN AVG | Average neutral current (demand) | CT primary rating | A |
| P AVG | Average active power (demand) | CT primary rating x VT primary rating | W |
| Q AVG | Average reactive power (demand) | CT primary rating x VT primary rating | var |
| S AVG | Average apparent power (demand) | CT primary rating x VT primary rating | VA |
| THDI1-3 | THD, Current, Line 1 thr. Line 3 | 100.0 | % |
| THDIN | THD, Neutral current | 100.0 | % |
| THDU12-31 | THD, Delta voltage, Line 1 – 2, 2 – 3, 3 – 1 | 100.0 | % |
| THDU1N-3N | THD, Phase voltage, Phase 1 thr. Phase 3 | 100.0 | % |
| UT12-31 | Phase angle between voltages, Phase 1 – 2, 2 – 3, 3 – 1 | 360 | ° |

## ON DELAY

Specify a time delay for the alarm to be triggered after the measured value is out of the normal range.

| Selection / Range | |
|---|---|
| ON delay time | 0 to 999 seconds |

## OUTPUT

Specify where you want to output each alarm.

**[ Except L53U ]**

| Selection | |
|---|---|
| Disable | No alarm output is provided. |
| Display | ALARM indicator is activated but no discrete signal output is provided. |
| Display + Do 1...Do 4 | ALARM indicator is activated plus a discrete signal output is provided. |

**[ L53U ]**

| Selection | |
|---|---|
| Disable | No alarm output is provided. |
| Communication | ALARM is activated only via communication but no discrete signal output is provided. |
| Communication + Do 1...Do 2 | ALARM is activated via communication plus a discrete signal output is provided. |

---

**Caution !**

With 'Display + Do x' 'Communication + Do x' setting, be sure to set also 'Alarm status' for 'Discrete output function' as explained in Section 3.4. Otherwise no contact output is actually provided.

## 5.3 TARIFF

Choose one of the two energy counters. This setting is valid only when 'Tariff function' under 'Other' setting (See Section 5.5) is set to 'Enable.' When that is set to 'Disable,' this setting is invalid, and then the High tariff (peak time) counter is always used.
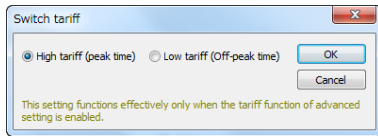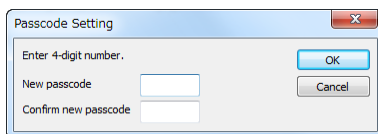


Selection

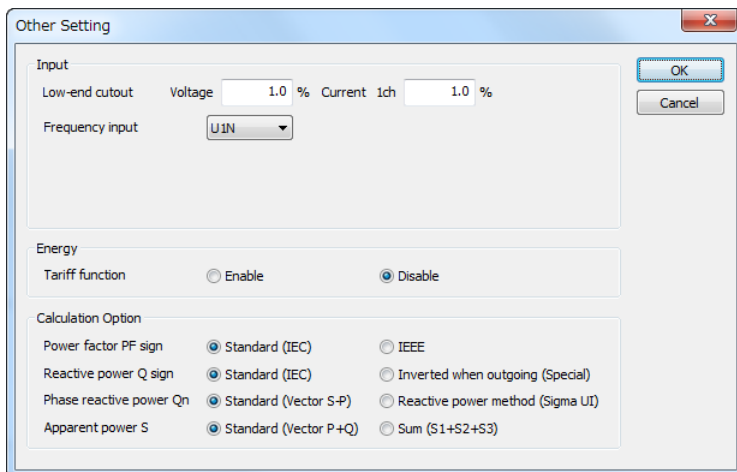| Tariff | High tariff (peak time) |
| | Low tariff (off-peak time) |

## 5.4 PASSCODE

4-digit passcode is needed to enter the programming mode when you use the front keys. Type in 4-digit number once and twice for confirmation and click OK.



Selection / Range

| Passcode | 0000 to 9999 |

## 5.5 OTHER SETTINGS



### 5.5.1 INPUT

**LOW-END CUTOUT (VOLTAGE & CURRENT)**

Specify voltage/current low-end cutout values in %. Actual cutout voltage/current are calculated from the CT/VT's primary rating by the following equations:

Low-end cutout current = Setting in % x CT's primary rating
Low-end cutout voltage = Setting in % x VT's primary rating

When the input signal goes below the calculated values, '0' is supplied as the input, discarding the actual input signal. For the voltage, the setting is applied to Phase voltage (line-to-neutral) except for 3-phase/3-wire system, to Delta voltage (line-to-line).

## FREQUENCY INPUT

Specify either voltage or current to monitor AC frequency.
As 50Hz fixed and 60Hz fixed are used for special purpose, do not use under normal conditions.

| Selection | |
|---|---|
| I1 | I1 current[2] |
| U1N | U1 voltage |
| 50Hz fixed | AC frequency is fixed to 50Hz.[1] |
| 60Hz fixed | AC frequency is fixed to 60Hz.[1] |

[1]. Selectable with M5XWTU and firmware version 2.40 or later of 53U.
[2]. M5XWTU is not selectable.

## 5.5.2 ENERGY

### ENABLE / DISABLE TARIFF FUNCTION

Specify to enable or disable the tariff switching function. When enabled, two energy counters are switcheable at any specific timing.

This setting is not available for R7CWTU, R7MWTU and R7EWTU. Tariff function is enabled.

| Selection | |
|---|---|
| Tariff function | Disable |
| | Enable |

## 5.5.3 CALCULATION METHOD

### POWER FACTOR PF SIGN

| Selection | |
|---|---|
| Standard (IEC) | Positive in incoming active power, Negative in outgoing active power. |
| IEEE | Positive in LAG (inductive), Negative in LEAD (capacitive) |

### REACTIVE POWER Q SIGN

| Selection | |
|---|---|
| Standard (IEC) | Positive from [PF = 1.0] to 180° in LAG direction; Negative for the other direction. |
| Inverted when outgoing (Special) | Identical to IEC method in incoming power; Positive-negative inverted in outgoing power. |

### PHASE REACTIVE POWER Qn

| Selection | |
|---|---|
| Standard (Vector S-P) | $Qn = \sqrt{Sn^2 - Pn^2}$ |
| Reactive power method (Sigma UI) | $Qn = \dfrac{1}{Nsmp} \sum\limits_{i=1}^{Nsmp} (Un_i - Nu_i)\, I_{i+(Nsmp/4)}$ |

### APPARENT POWER S

| Selection | |
|---|---|
| Standard (Vector P+Q) | $S = \sqrt{P^2 + Q^2}$ |
| Sum (S1+S2+S3) | $S = S1 + S2 + S3$ |

**MEASUREMENT MODE, POWER FACTOR AT SIMPLIFIED MEASUREMENT**

| Selection | |
|---|---|
| Standard measurement | Performs standard measurement |
| Simplified measurement | S = S1 + S2 + S3 |

| Selection | |
|---|---|
| Standard measurement | Performs standard measurement |
| Simplified measurement | Only DC current sensor measuring, calculates active power and active energy |

When simplified measurement mode is selected, power factor at simplified measurement is selectable from 0.0000 to 1.0000.

When simplified measurement mode is selected, calculates active power based on power factor at simplified measurement.

When simplified measurement mode is selected, voltage is not measured but is calculated assuming the value set by the VT's primary rating.

# 6. OPTION PARAMETERS

When you click various control buttons under 'Option' on the initial window of the PMCFG, you can go to detailed setting.

## 6.1 DISPLAY
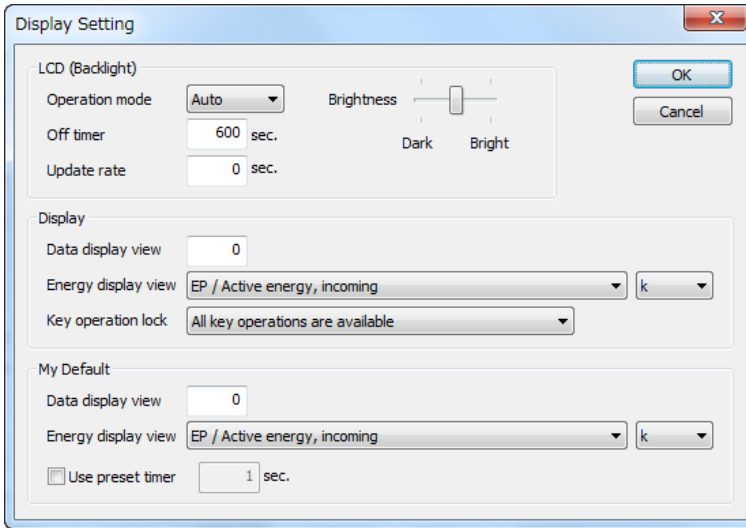


### 6.1.1 LCD BACKLIGHT

**OPERATION MODE**

Specify when you want to maintain the backlight continuously on or not.

| Selection | |
|---|---|
| Auto | Backlight turns on when keys are touched, when an alarm is triggered, or in a system error status. After the device is operated, it automatically turns off after 'Off timer' time has been elapsed. |
| On | Continuously on. |
| Off | Continuously off except when an alarm is triggered or in a system error status. |

**OFF TIMER**

Specify the time duration to maintain the backlight turned on after the device is operated.

| Selection / Range | |
|---|---|
| Off timer | 1 to 999 seconds |

**UPDATE RATE**

Specify the time rate in which measurands are updated on the display. With '0,' the display is updated in the maximum possible rate.

This setting is irrelevant for the display's flashing in case of alarms.

| Selection / Range | |
|---|---|
| Update rate | 0 to 60 seconds |

**BRIGHTNESS**

Three levels of brightness can be selected using the sliding bar on the screen.

| Selection | |
|---|---|
| Left | Dark |
| Center | Normal |
| Right | Bright |

### 6.1.2 DISPLAY

**DATA DISPLAY VIEW**

Specify which measuring variable you want to show on the 1st to 3rd line data displays. Enter the view number described in the flowchart in the 53U instruction manual (EM-6485-B).

**ENERGY DISPLAY VIEW**

Specify which energy variable you want to show on the 4th line energy display.

| Selection | |
|---|---|
| Energy display view | EP / Active energy, incoming |
| | EQ / Reactive energy, lag |
| | ES / Apparent energy |
| | EP– / Active energy, outgoing |
| | EQ– / Reactive energy, lead |
| | EQ+LAG / Reactive energy, lag, incoming |
| | EQ+ LEAD / Reactive energy, lead, incoming |
| | EQ–LAG / Reactive energy, lag, outgoing |
| | EQ–LEAD / Reactive energy, lead, outgoing |
| | EQ+P / Reactive energy, incoming [1] |
| | EQ–P / Reactive energy, outgoing [1] |
| | EPA / Active energy, (incoming – outgoing) [1] |
| | EQA / Reactive energy, (incoming + outgoing) [1] |
| | TIMER / Energy count time |
| | L-EP / Active energy, incoming, off-peak (low tariff) |
| | L-EQ / Reactive energy, lag, off-peak (low tariff) |
| | L-ES / Apparent energy, off-peak (low tariff) |
| | L-EP– / Active energy, outgoing, off-peak (low tariff) |
| | L-EQ– / Reactive energy, lead, off-peak (low tariff) |
| | L-EQ+LAG / Reactive energy, lag, incoming, off-peak (low tariff) |
| | L-EQ+LEAD / Reactive energy, lead, incoming, off-peak (low tariff) |
| | L-EQ–LAG / Reactive energy, lag, outgoing, off-peak (low tariff) |
| | L-EQ–LEAD / Reactive energy, lead, outgoing, off-peak (low tariff) |
| | L-EQ+P / Reactive energy, incoming (low tariff) [1] |
| | L-EQ–P / Reactive energy, outgoing (low tariff) [1] |
| | L-EPA / Active energy, (incoming – outgoing) (low tariff) [1] |
| | L-EQA / Reactive energy, (incoming + outgoing) (low tariff) [1] |
| | L-TIMER / Energy count time, off-peak (low tariff) |

[1]. Available for the 53U and 54U Firmware Ver.2.00 or later, and all versions of the 54UL and 54UC

Choose 'k' if you want to add 'k' to the engineering unit indication. When the energy count time is specified, the unit is fixed at 'h.'

**KEY OPERATION LOCK**

You can prohibit the device from unwanted operating and/or unauthorized programming changes.

| Selection | |
|---|---|
| All key operations are available. | |
| All key operations are locked. | All keys locked except the operation to go to the infrared communication mode with the 54U, 54UL and 54UC. |
| Lock the key operation to go to Setting mode only | Key function to enter the programming mode (keep pressing E PRG key) is disabled. All other key operations to switch display views are available. |

### 6.1.3 MY DEFAULT

You can choose a specific view to which the display always returns after a specified time while keys are untouched, or with single button control (hold down ∑ button).

The ∑ display automatically switches every 10 seconds from ∑1 through ∑4 (53U) or through ∑6 (54U, 54UL, and 54UC) when this is set to '-1.' (Available for the 53U Firmware Ver.2.00 or later, all versions of the 54U, 54UL and 54UC)

#### DATA DISPLAY VIEW & ENERGY DISPLAY VIEW

Specify the display view No. and the energy display type you want to return to.

#### USE PRESET TIMER

When you choose this selection, you can specify the time to return to My Default view if key are untouched.

| Selection / Range | |
|---|---|
| Use preset timer | 1 to 999 seconds |

## 6.2 EXTENSION BAR
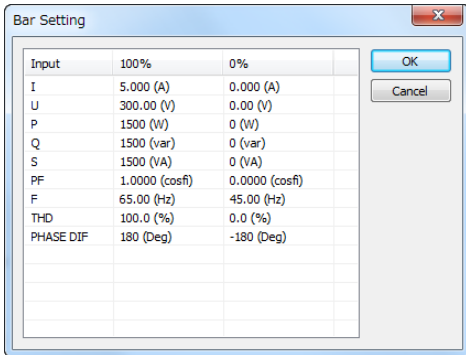


This option is available for the 54U, 54UL and 54UC.

The measurand on the first line of the display is also on the bargraph. The following nine (9) parameters are selectable.

■ EXTENSION BAR SETTING

| ID | DEFINITION | 100% RANGE VALUE | | 0% RANGE VALUE | | UNIT |
|---|---|---|---|---|---|---|
| | | MINIMUM | MAXIMUM | MINIMUM | MAXIMUM | |
| I | Current | 0.000 | 20 000.000 | 0.000 | 20 000.000 | A |
| U | Voltage | 0.00 | 400 000.00 | 0.00 | 400 000.00 | V |
| P | Active power | 0 | 2 000 000 000 | -2 000 000 000 | 2 000 000 000 | W |
| Q | Reactive power | 0 | 2 000 000 000 | -2 000 000 000 | 2 000 000 000 | var |
| S | Apparent power | 0 | 2 000 000 000 | 0 | 2 000 000 000 | VA |
| PF | Power factor | 0.0000 | 1.0000 | -1.0000 | 1.0000 | cos ø |
| F | Frequency | 45.00 | 65.00 | 45.00 | 65.00 | Hz |
| THD | Total harmonic distortion | 0.0 | 999.9 | 0.0 | 999.9 | % |
| PHASE DIF | Phase angle between voltages | 0 | 180 | -180 | 180 | °* |

*No unit indication on the module

## 6.3   Σ DISPLAY
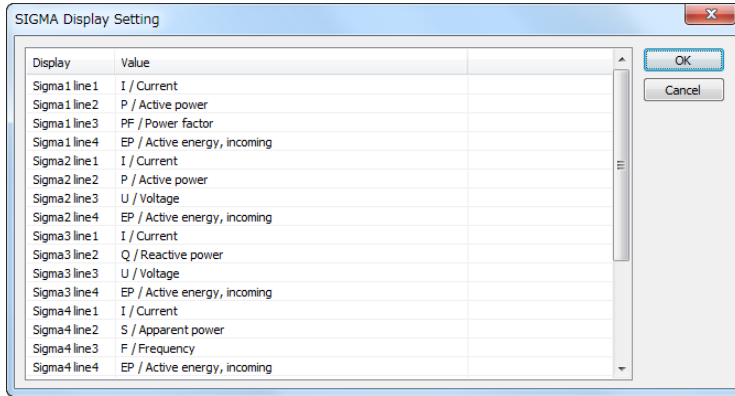


This option is available for the 53U Firmware Ver.2.00 or later, and all versions of the 54U, 54UL and 54UC.

**53U**

Four (4) Σ views are available. The following options are selectable for Line 1 through Line 3 of each view.

■ **53U : Σ VIEW MEASURANDS & SELECTABLE POSITIONS (lines, X = selectable)**

| ID | PARAMETER | UNIT | LINE 1 | LINE 2 | LINE 3 |
|----|-----------|------|--------|--------|--------|
| NULL | Undefined | ---- | X | X | X |
| I | Current | A | X | | |
| U | Voltage | V | | | X |
| P | Active power | W | | X | |
| Q | Reactive power | var | | X | |
| S | Apparent power | VA | | X | |
| PF | Power factor | PF | | | X |
| F | Frequency | Hz | | | X |

**54U, 54UL and 54UC**

Six (6) Σ views are available. The following options are freely selectable for Line 1 through Line 3 of each view. Energy and Count Time is selectable for only Line 4.

## ■ 54U, 54UL and 54UC : Σ VIEW MEASURANDS

| ID | PARAMETER |
|---|---|
| NULL | Undefined |
| I | Current |
| U | Voltage |
| P | Active power |
| Q | Reactive power |
| S | Apparent power |
| PF | Power factor |
| F | Frequency |
| I1<br>I2<br>I3 | Current, Line 1<br>Current, Line 2<br>Current, Line 3 |
| IN | Current, Neutral [1] |
| U12<br>U23<br>U31 | Delta voltage, 1 – 2<br>Delta voltage, 2 – 3<br>Delta voltage, 3 – 1 |
| U1N<br>U2N<br>U3N | Phase voltage, Phase 1<br>Phase voltage, Phase 2<br>Phase voltage, Phase 3 |
| P1<br>P2<br>P3 | Active power, Phase 1<br>Active power, Phase 2<br>Active power, Phase 3 |
| Q1<br>Q2<br>Q3 | Reactive power, Phase 1<br>Reactive power, Phase 2<br>Reactive power, Phase 3 |
| S1<br>S2<br>S3 | Apparent power, Phase 1<br>Apparent power, Phase 2<br>Apparent power, Phase 3 |
| PF1<br>PF2<br>PF3 | Power factor, Phase 1<br>Power factor, Phase 2<br>Power factor, Phase 3 |
| THDI1<br>THDI2<br>THDI3 | Current total harmonic distortion, Line 1<br>Current total harmonic distortion, Line 2<br>Current total harmonic distortion, Line 3 |
| THDIN | Total harmonic distortion, Neutral [1] |
| THDU12<br>THDU23<br>THDU31 | Delta voltage total harmonic distortion, 1 – 2<br>Delta voltage total harmonic distortion, 2 – 3<br>Delta voltage total harmonic distortion, 3 – 1 |
| THDU1N<br>THDU2N<br>THDU3N | Phase voltage total harmonic distortion, Phase 1<br>Phase voltage total harmonic distortion, Phase 2<br>Phase voltage total harmonic distortion, Phase 3 |
| UT12<br>UT23<br>UT31 | Phase angle between Phase 1 – 2 voltages<br>Phase angle between Phase 2 – 3 voltages<br>Phase angle between Phase 3 – 1 voltages |
| EP | Active energy, high tariff, incoming |
| EQ | Reactive energy, high tariff, LAG |
| ES | Apparent energy, high tariff |
| EP– | Active energy, high tariff, outgoing |
| EQ– | Reactive energy, high tariff, LEAD |
| EQ+LAG<br>EQ+LEAD | Reactive energy, high tariff, incoming, LAG<br>Reactive energy, high tariff, incoming, LEAD |
| EQ–LAG<br>EQ–LEAD | Reactive energy, high tariff, outgoing, LAG<br>Reactive energy, high tariff, outgoing, LEAD |
| TIMER | Energy count time, high tariff |
| L-EP | Active energy, low tariff, incoming |
| L-EQ | Reactive energy, low tariff, LAG |
| L-ES | Apparent energy, low tariff |
| L-EP– | Active energy, low tariff, outgoing |
| L-EQ– | Reactive energy, low tariff, LEAD |
| L-EQ+LAG<br>L-EQ+LEAD | Reactive energy, low tariff, incoming, LAG<br>Reactive energy, low tariff, incoming, LEAD |
| L-EQ–LAG<br>L-EQ–LEAD | Reactive energy, low tariff, outgoing, LAG<br>Reactive energy, low tariff, outgoing, LEAD |
| L-TIMER | Energy count time, low tariff |
| EQ+P<br>EQ–P | Reactive energy, high tariff, incoming [2]<br>Reactive energy, high tariff, ongoing [2] |

| ID | PARAMETER |
|---|---|
| EPA<br>EQA | Active energy, high tariff, (incoming – outgoing) *2<br>Reactive energy, high tariff, (incoming + outgoing) *2 |
| L-EQ+P<br>L-EQ–P | Reactive energy, low tariff, incoming *2<br>Reactive energy, low tariff, outgoing *2 |
| L-EPA<br>L-EQA | Active energy, low tariff, (incoming – outgoing) *2<br>Reactive energy, low tariff, (incoming + outgoing) *2 |

*1. Available for the 54U-2, 54UL-2 and 54UC-2
*2. Available for the 54U Firmware Ver.2.00 or later, and all versions of the 54UL and 54UC

## 6.4  DISPLAY EXPRESSION
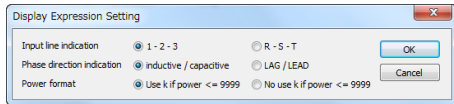


### INPUT LINE INDICATION

| Selection | |
|---|---|
| 1 - 2 - 3 |  |
| R - S - T |  |

### PHASE DIRECTION INDICATION

| Selection | |
|---|---|
| inductive / capacitive |  |
| LAG / LEAD |  |

### POWER FORMAT

| Selection | |
|---|---|
| Use k if power <= 9999 | 0.0000k ... 9.999k |
| No use k if power <= 9999 | 0 ... 9999 (10.00k at 10 000) |

## 6.5  SHORT CUT

Specify either you want to use the shortcut command to reset alarm
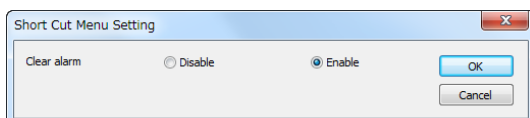
# 7. EXTERNAL INTERFACE PARAMETERS

External interface parameters specify the settings of the external interface installed on the device.

## 7.1 DISCRETE INPUT
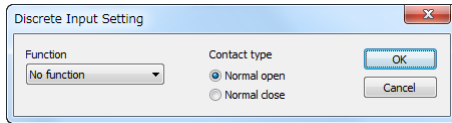


### FUNCTION

Specify which function you want to assign for the device's discrete input terminals.

| Selection | |
|---|---|
| No function | Undefined |
| Update demand value | |
| Reset energy count | |
| Reset alarm | |
| Switch tariff | |

### CONTACT TYPE

| Selection |
|---|
| Normal open |
| Normal closed |

## 7.2 DISCRETE OUTPUT
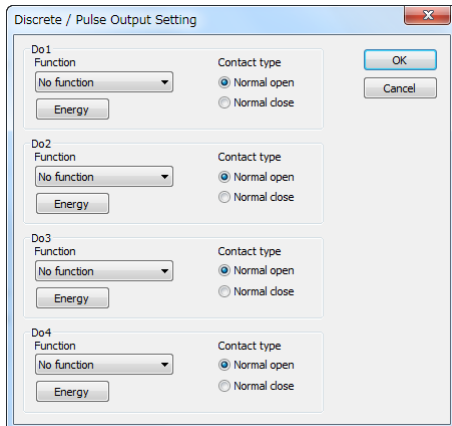


### FUNCTION

Specify which function you want to assign for the device's discrete output terminals Do 1 ... Do 4. You cannot assign those which are not provided as hardware.

| Selection | |
|---|---|
| No function | Undefined |
| Energy count | |
| Alarm status | |

### CONTACT TYPE

| Selection |
|---|
| Normal open |
| Normal closed |

### ENERGY DETAIL

Clicking [Energy] button opens detailed energy setting window. (See Section 7.3)

## 7.3  ENERGY
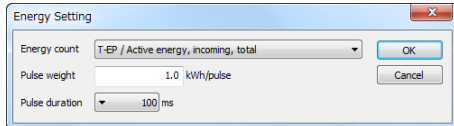


Define energy count parameters for pulse output.  In order to have an energy count output, be sure to set 'Discrete output function' to 'Energy count' as explained in Section 7.2.

### ENERGY COUNT
Specify which energy parameter you want to supply to the pulse count output.  Choose from the tables below and in the following page.

### PULSE WEIGHT
Specify how much energy value corresponds to one pulse.

| Selection / Range | |
|---|---|
| Pulse weight | 0.1 to 10000.0 k (Wh/varh/VAh) |

### PULSE DURATION
Specify the output pulse width appropriate for a receiving instrument.

| Selection / Range | |
|---|---|
| Pulse duration | 100 to 2000 milliseconds (in 100 msec. increments) |

■ 53U Firmware Ver.1.02 or earlier & 54U Firmware Ver.1.03 or earlier : ENERGY COUNT

| ID | PARAMETER |
|---|---|
| EP | Active energy, incoming |
| EQ | Reactive energy, LAG |
| ES | Apparent energy |
| EP– | Active energy, outgoing |
| EQ– | Reactive energy, LEAD |
| EQ+LAG<br>EQ+LEAD | Reactive energy, incoming, LAG<br>Reactive energy, incoming, LEAD |
| EQ–LAG<br>EQ–LEAD | Reactive energy, outgoing, LAG<br>Reactive energy, outgoing, LEAD |

■ 53U Firmware Ver.2.00 or later, 54U Firmware Ver.2.00 or later, and all versions of 54UL, 54UC and L53U : ENERGY COUNT

| ID | PARAMETER |
|---|---|
| T-EP | Active energy, incoming |
| T-EQ | Reactive energy, LAG |
| T-ES | Apparent energy |
| T-EP– | Active energy, outgoing |
| T-EQ– | Reactive energy, LEAD |
| T-EQ+LAG<br>T-EQ+LEAD | Reactive energy, incoming, LAG<br>Reactive energy, incoming, LEAD |
| T-EQ–LAG<br>T-EQ–LEAD | Reactive energy, outgoing, LAG<br>Reactive energy, outgoing, LEAD |
| T-EQ+P<br>T-EQ–P | Reactive energy, incoming<br>Reactive energy, outgoing |
| T-EQA | Reactive energy, (incoming + outgoing) |
| EP | Active energy, high tariff, incoming |
| EQ | Reactive energy, high tariff, LAG |
| ES | Apparent energy, high tariff |
| EP– | Active energy, high tariff, outgoing |
| EQ– | Reactive energy, high tariff, LEAD |
| EQ+LAG<br>EQ+LEAD | Reactive energy, high tariff, incoming, LAG<br>Reactive energy, high tariff, incoming, LEAD |
| EQ–LAG<br>EQ–LEAD | Reactive energy, high tariff, outgoing, LAG<br>Reactive energy, high tariff, outgoing, LEAD |

| ID | PARAMETER |
| --- | --- |
| EQ+P<br>EQ–P | Reactive energy, high tariff, incoming<br>Reactive energy, high tariff, outgoing |
| EQA | Reactive energy, high tariff, (incoming + outgoing) |
| L-EP | Active energy, low tariff, incoming |



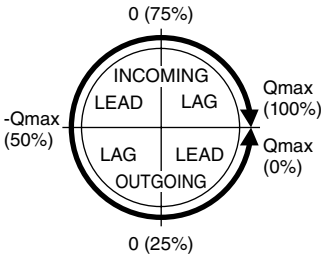| ID | PARAMETER |
| --- | --- |
| L-EQ | Reactive energy, low tariff, LAG |
| L-ES | Apparent energy, low tariff |
| L-EP– | Active energy, low tariff, outgoing |
| L-EQ– | Reactive energy, low tariff, LEAD |
| L-EQ+LAG<br>L-EQ+LEAD | Reactive energy, low tariff, incoming, LAG<br>Reactive energy, low tariff, incoming, LEAD |
| L-EQ–LAG<br>L-EQ–LEAD | Reactive energy, low tariff, outgoing, LAG<br>Reactive energy, low tariff, outgoing, LEAD |
| L-EQ+P<br>L-EQ–P | Reactive energy, low tariff, incoming<br>Reactive energy, low tariff, outgoing |
| L-EQA | Reactive energy, low tariff, (incoming + outgoing) |
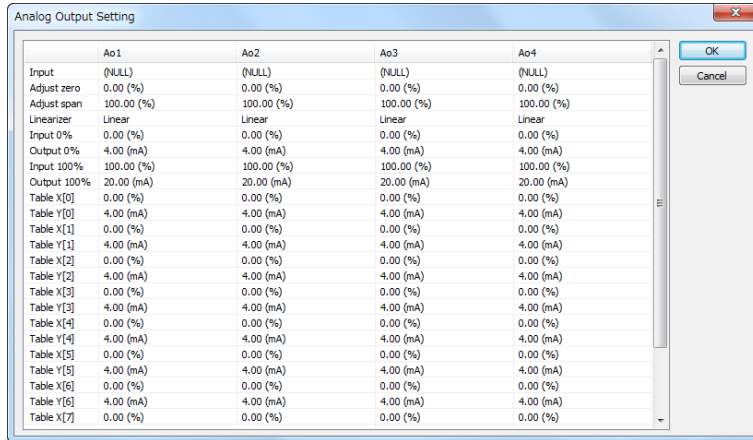
## 7.4 ANALOG OUTPUT

Specify which function you want to assign for the device's analog output terminals Ao 1 ... Ao 4. You cannot assign those which are not provided as hardware.

You can conduct fine adjustments, set scaling and linearization table for each assigned output.

### INPUT

Choose measurand from the table below.

■ PARAMETERS TO BE ASSIGNED TO ANALOG OUTPUTS

| ID | DEFINITION | RANGE (0 to 100%) |
|---|---|---|
| NULL | Not assigned [2] | |
| I | Current | 0 to CT primary rating |
| U | Voltage | 0 to VT primary rating |
| P | Active power | $\pm$ (VT primary rating $\times$ CT primary rating $\times$ n) [1] |
| Q | Reactive power | $\pm$ (VT primary rating $\times$ CT primary rating $\times$ n) [1] |
| S | Apparent power | 0 to (VT primary rating $\times$ CT primary rating $\times$ n) [1] |
| PF | Power factor | -1.0000 to + 1.0000 |
| F | Frequency | 45.00 to 65.00 |
| I1<br>I2<br>I3 | Current, Line 1<br>Current, Line 2<br>Current, Line 3 | 0 to CT primary rating<br>0 to CT primary rating<br>0 to CT primary rating |
| IN [3] | Neutral current | 0 to CT primary rating |
| U12<br>U23<br>U31 | Delta voltage, Line 1 – 2<br>Delta voltage, Line 2 – 3<br>Delta voltage, Line 3 – 1 | 0 to VT primary rating<br>0 to VT primary rating<br>0 to VT primary rating |
| U1N<br>U2N<br>U3N | Phase voltage, Phase 1<br>Phase voltage, Phase 2<br>Phase voltage, Phase 3 | 0 to VT primary rating<br>0 to VT primary rating<br>0 to VT primary rating |
| P1<br>P2<br>P3 | Active power, Phase 1<br>Active power, Phase 2<br>Active power, Phase 3 | $\pm$ (VT primary rating $\times$ CT primary rating $\times$ n) [1]<br>$\pm$ (VT primary rating $\times$ CT primary rating $\times$ n) [1]<br>$\pm$ (VT primary rating $\times$ CT primary rating $\times$ n) [1] |
| Q1<br>Q2<br>Q3 | Reactive power, Phase 1<br>Reactive power, Phase 2<br>Reactive power, Phase 3 | $\pm$ (VT primary rating $\times$ CT primary rating $\times$ n) [1]<br>$\pm$ (VT primary rating $\times$ CT primary rating $\times$ n) [1]<br>$\pm$ (VT primary rating $\times$ CT primary rating $\times$ n) [1] |
| S1<br>S2<br>S3 | Apparent power, Phase 1<br>Apparent power, Phase 2<br>Apparent power, Phase 3 | 0 to (VT primary rating $\times$ CT primary rating $\times$ n) [1]<br>0 to (VT primary rating $\times$ CT primary rating $\times$ n) [1]<br>0 to (VT primary rating $\times$ CT primary rating $\times$ n) [1] |
| PF1<br>PF2<br>PF3 | Power factor, Phase 1<br>Power factor, Phase 2<br>Power factor, Phase 3 | -1.0000 to + 1.0000<br>-1.0000 to + 1.0000<br>-1.0000 to + 1.0000 |
| THDI1<br>THDI2<br>THDI3 | THD, Current, Line 1<br>THD, Current, Line 2<br>THD, Current, Line 3 | 0.0 to 100.0<br>0.0 to 100.0<br>0.0 to 100.0 |
| THDIN [3] | THD, Neutral current | 0.0 to 100.0 |
| THDU12<br>THDU23<br>THDU31 | THD, Delta voltage, Line 1 – 2<br>THD, Delta voltage, Line 2 – 3<br>THD, Delta voltage, Line 3 – 1 | 0.0 to 100.0<br>0.0 to 100.0<br>0.0 to 100.0 |
| THDU1N<br>THDU2N<br>THDU3N | THD, Phase voltage, Phase 1<br>THD, Phase voltage, Phase 2<br>THD, Phase voltage, Phase 3 | 0.0 to 100.0<br>0.0 to 100.0<br>0.0 to 100.0 |
| T-Q | Reactive power for bidirectional current | $Q_{max}$ = (CT primary rating) $\times$ (VT primary rating) $\times$ n[*]<br> |

| ID | DEFINITION | RANGE (0 to 100%) |
|---|---|---|
| T-PF | Power factor for bidirectional current | 1.0000 (75%) <br> INCOMING LEAD / LAG <br> 0.0000 (50%) · 0.0000 (100%) <br> LAG / LEAD OUTGOING · 0.0000 (0%) <br> -1.0000 (25%) |

*1. Single-phase/2-wire: n = 1, Single-phase/3-wire: n = 2, Three-phase/3-wire: $n = 3/\sqrt{3}$, Three-phase/4-wire: n = 3

*2. When an output is re-assigned to 'Not Assigned' during measuring, the output value is held until the power supply is turned off.

*3. Available for the 53U and L53U, the 54U, 54UC and 54UL with firmware version 3.00 or later, and all versions of 54U, 54UL and 54UC with 3-phase/4-wire input.

## ADJUST ZERO / ADJUST SPAN

Analog output can be finely calibrated using Adjust Zero and Adjust Span by the following equation:

Analog Output
= (Output Value – Analog 0%) x Adjust Fine + Analog 0% + [ Adjust Zero x (Analog 100% – Analog 0%)]

Where
Analog 0% = 4mA or 1V
Analog 100% = 20mA or 5V

Adjust Zero, Adjust Span 100.00% = 1.0000

Zero is adjustable within ±5%, while Span is adjustable from 95.00 to 105.00%.

## LINEARIZER

Specify whether the output is proportional to the input or to be linearized.  When 'Table' is selected, the segment data is specified with Table X[0] ... Table X[9] and Table Y[0] ... Table Y[9].

| Selection / Range | |
|---|---|
| Linear | Proportional to the input |
| Table | Linearized output |

### INPUT 0% / OUTPUT 0% / INPUT 100% / OUTPUT 100%

When 'Linear' is selected with 'Linearizer,'  the output range is scaled using these parameters.

$$\text{Output} = \frac{\text{Input} - \text{Input } 0\%}{\text{Input } 100\% - \text{Input } 0\%} \times (\text{Output } 100\% - \text{Output } 0\%) + \text{Output } 0\%$$

[Note] Input value in engineering unit is first converted into percentage of the full-scale range before provided to the above equation.

Input 0% and Input 100% are selectable from -15.00 to 140.00%.

Output 0% and Output 100% is selectable from 1.60 to 22.40mA (4 to 20 mA range), or from 0.400 to 5.600V (1 to 5V range).

### TABLE X[0] ... TABLE X[9] / TABLE Y[0] ... TABLE Y[9]

When 'Table' is selected with 'Linearizer,' the segment data table must be set.

Table consists of ten (10) pairs of X (input) and Y (output) values.  When the input is equal to X[n], Y[n] is provided as output.

When the input is between X[n–1] and X[n], the output is provided by the following equation.

$$\text{Output} = \frac{\text{Input} - \text{Table X}[n-1]}{\text{Table X}[n] - \text{Table X}[n-1]} \times (\text{Table Y}[n] - \text{Table Y}[n-1]) + \text{Table Y}[n-1]$$

[Note] Input value in engineering unit is first converted into percentage of the full-scale range before provided to the above equation.

Segment data must be arranged in ascending order, i.e. X[n] must be greater than X[n–1].  For example, if you have set X[7] smaller than X[6], Table X[7] and later values are not used.  Linearization is complete with data from X[0] to X[6].

When the input value is lower than X[0], the output equals Y[0]. When the input is higher than X[max], the output equals Y[max].

## 7.5 MODBUS



For 53U, 54U, L53U and M5XWTU     For R7MWTU, R9MWTU     For R7EWTU, R9EWTU

Modbus communication parameters are applied only when the device is restarted (power is turned off and on). Only 'downloading' modified parameters does not affect the device operation. Advanced settings are not available for the M5XWTU.

### DEVICE ADDRESS

| Selection / Range | |
|---|---|
| Device address | 1 to 247 |

### TRANSFER RATE

| Selection / Range | |
|---|---|
| Transfer rate | 1200 bps |
| | 2400 bps |
| | 4800 bps |
| | 9600 bps |
| | 19200 bps |
| | 38400 bps |

### PARITY BIT

| Selection / Range | |
|---|---|
| Parity bit | None |
| | Odd |
| | Even |

### STOP BIT

| Selection / Range | |
|---|---|
| Stop bit | 1 bit |
| | 2 bit |

### MODE

Modbus transmission mode is selectable with the items detailed below.

| RTU (7bit) |
|---|
| ASCII (8bit) |

### IP ADDRESS, SUBNET MASK, DEFAULT GATEWAY
Specify IP address, subnet mask, default gateway for Modbus/TCP.

### PORT NO.
Specify the TCP port number for Modbus/TCP. The setting range is 0 to 65535.

### CONNECTION TIME OUT
Modbus/TCP connection is severed if no communication is established for the specified time period. The setting range is 0.0 to 3200.0 sec.

### RUN LED TIMEOUT
RUN LED turns off to inform an error when there is an interruption of reading query from the master Modbus module and the specified time passes. The setting range is 0.0 to 3200.0 sec.

Click [Advanced] button to go to 'Advanced Modbus Setting' (See 7.6).

## 7.6 ADVANCED MODBUS SETTING
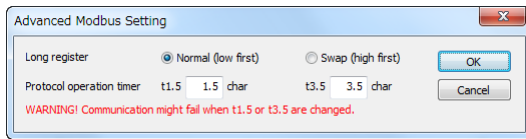


### LONG REGISTER (32-bit words assignments)
Specify the order of lower digits and higher digits in sending a 32-bit word data.

| Selection | |
|---|---|
| Normal (low first) | Lower digit word assigned to the lower address |
| Swap (high first) | Higher digit word assigned to the lower address |

### PROTOCOL OPERATION TIMER
Specify the character length for t1.5 and t3.5 timers.  Modbus defines t1.5 timer as 1.5 character, and t3.5 timer as 3.5 character.  These settings should not be changed in normal circumstances.  Change these settings only upon M-System customer support's suggestion.
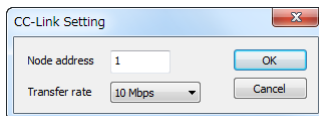
| Selection / Range | |
|---|---|
| t1.5 | 0.1 to 6.0 characters |
| t3.5 | 0.1 to 6.0 characters |

### Caution !
Modbus communication parameters are applied only when the device is restarted (power is turned off and on).  Only 'downloading' modified parameters does not affect the device operation.

## 7.7 CC-Link



CC-Link communication parameters are applied only when the device is restarted (power is turned off and on).  Only 'downloading' modified parameters does not affect the device operation.

### NODE ADDRESS

| Selection / Range | |
|---|---|
| Node address | 1 to 64 |

### TRANSFER RATE

| Selection / Range | |
|---|---|
| Transfer rate | 156 kbps |
| | 625 kbps |
| | 2.5  Mbps |
| | 5  Mbps |
| | 10  Mbps |