PM3200 series

User manual

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Schneider Electric

Contents

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

Safety information

Important information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please note

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Notices

FCC Part 15 notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAN ICES-3 (B) /NMB-3(B)

About the book

Document scope

This manual is intended for use by designers, system builders and maintenance technicians with an understanding of electrical distribution systems and monitoring devices.

Validity note

The PM3200 series power meters are used to measure electrical parameters of an installation or a part of an installation.

This function meets the requirements for:

- installation monitoring,
- alarming on consumption drifts,
- consumption monitoring,
- evaluation of energy items (cost, accounting, and so on),
- logging of historical consumption,
- identifying harmonic disturbances.

This function also satisfies the power-saving incentives implemented by many countries.

Related documents

Title of documentation	Reference number
Power Meters Installation sheet: PM3200 / PM3210 (Chinese, English, French, German, Italian, Portuguese, Russian, Spanish)	S1B46605

Power Meters Installation sheet: PM3200 / PM3210 (Czech, Danish, Dutch, Finnish, Hungarian, Norwegian, Polish, Swedish)	S1B62913
Power Meters Installation sheet: PM3250 / PM3255 (Chinese, English, French, German, Italian, Portuguese, Russian, Spanish)	S1B46607
Power Meters Installation sheet: PM3250 / PM3255 (Czech, Danish, Dutch, Finnish, Hungarian, Norwegian, Polish, Swedish)	S1B62914

You can download these technical publications and other technical information from www.schneider-electric.com.

Chapter 1 Safety precautions

Installation, wiring, testing and service must be performed in accordance with all local and national electrical codes.

Carefully read and follow the safety precautions outlined below.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E in the USA, CSA Z462 or applicable local standards.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this device and the equipment in which it is installed before working on the device or equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested and tagged. Pay particular attention to the design of the power system. Consider all power supply sources, particularly the potential for backfeed.
- Do not exceed the device's ratings for maximum limits.
- Replace all devices, doors and covers before turning on power to this equipment.
- Never short the secondary of a voltage transformer (VT).
- Never open circuit a current transformer (CT).
- Always use grounded external CTs for current inputs.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED OPERATION

Do not use the meter for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.

Failure to follow these instructions can result in death, serious injury or equipment damage.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not rely solely on data displayed on the front panel or in software to determine if the device is functioning correctly or meeting all applicable standards and compliances.
- Do not use data displayed on the front panel or in software as a substitute for proper workplace practices or equipment maintenance.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Chapter 2 Overview

Meter overview

The PM3200 series power meters provide accurate 3-phase electrical parameters monitoring.

The offer is composed of 4 commercial references described below.

Functions

The product functions of power meters provide the various measurement capabilities required to monitor an electrical installation such as current, voltage, power, power factor, frequency, and energy.

The key features are:

- electrical parameters monitoring such as I, In, U, V, PQS, E, PF, Hz
- power/current demand, peak demand
- time-stamped alarms
- minimum/maximum values for many parameters
- management of up to 4 tariffs
- up to 2 digital inputs and 2 digital outputs
- Modbus communication

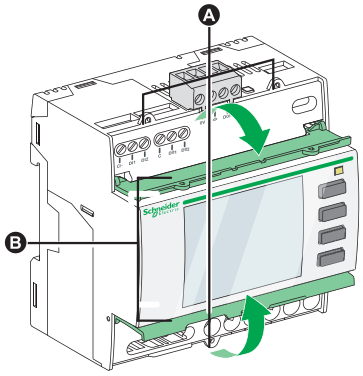
Main Characteristics

Function	PM3200	PM3210	PM3250	PM3255
Measurement inputs through CTs (1 A, 5 A)	√	√	√	√
Measurement inputs through VTs	√	√	√	√
Four quadrant energy measurements	√	√	√	√
Electrical measurements (I, In, V, PQS, PF, Hz)	√	√	√	√
THD current and voltage	–	√	√	√
Current, power demand, present	√	√	√	√
Current, power demand, peak	–	√	√	√
Minimum/maximum of instantaneous values	√	√	√	√
Power demand logs	–	–	–	√
Energy consumption log (day, week, month)	–	–	–	√
Multi-tariff (internal clock)	4	4	4	4
Multi-tariff (external control by DI)	–	–	–	4
Multi-tariff (external control by communication)	–	–	4	4
Measurement display	√	√	√	√
Digital inputs/Digital outputs	–	0/1	–	2/2
Alarms with time stamping	–	5	5	15
Modbus communication	–	–	√	√
Width (18 mm module in DIN Rail mounting)	5	5	5	5

Physical Description

All meters: meter sealing points

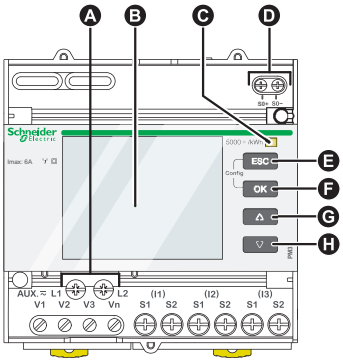
All meters have sealing covers and three sealing points to help prevent access to inputs, outputs, current, and voltage connections.



A	Sealing points (three)
B	Sealable covers

PM3200 / PM3210

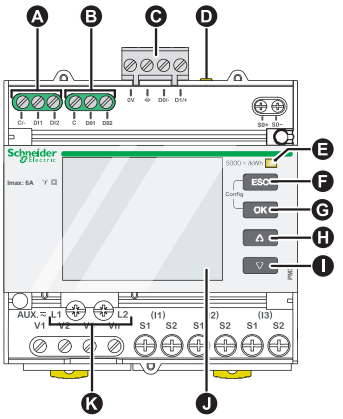
The various features of the listed power meters are shown in the diagram below:



A	Control power input
B	Display
C	Energy pulsing LED (for checking accuracy)
D	Pulse output for remote transfer (PM3210)
E	Cancellation
F	Confirmation
G	Up
H	Down

PM3250 / PM3255

The various features of the listed power meters are shown in the diagram below:



A	Digital inputs x 2 (PM3255)
B	Digital outputs x 2 (PM3255)
C	Communication port
D	Communications LED (for communication diagnosis)
E	Energy pulsing LED (for checking accuracy)
F	Cancellation
G	Confirmation
H	Up
I	Down
J	Display
K	Control power input

Chapter 3 Installation

Safety Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

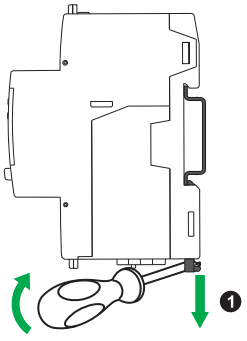
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E in the USA, CSA Z462 or applicable local standards.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this device and the equipment in which it is installed before working on the device or equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- Do not exceed the device's ratings for maximum limits.
- Never short the secondary of a voltage transformer (VT).
- Never open circuit a current transformer (CT).
- Always use grounded external CTs for current inputs.

Failure to follow these instructions will result in death or serious injury.

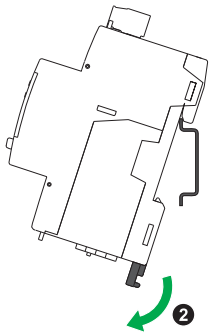
1. Turn off all power supplying this device and the equipment in which it is installed before working on it.
2. Always use a properly rated voltage sensing device to confirm that all power is off.

Removing from a DIN rail

1. Using a flat screwdriver (≤ 6.5 mm / 0.25 in), lower the locking clip to release the device.



2. Lift the device up to free it from the DIN rail.



Input, output and communications wiring

⚠ WARNING

HAZARD OF UNINTENDED OPERATION

- Do not use the meter for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.
- Be aware that an unexpected change of state of the digital outputs may result when the supply power to the meter is interrupted.

Failure to follow these instructions can result in death, serious injury or equipment damage.

PM3255 digital input and output considerations

- The digital outputs of PM3255 are polarity independent.
- The digital inputs and outputs of PM3255 are electrically independent.

Chapter 4 Functions

Power Meter Characteristics

The power meter measures currents and voltages and reports real-time RMS values for all 3-phases and neutral. In addition, the power meter calculates power factor, real power, reactive power, and more.

The following sections list the metering characteristics of the power meter.

Real-Time Measuring

The following table lists the metering characteristics of the power meter for the real-time measurement:

Characteristics	Description
Current	Per phase, neutral, and average of 3 phases
Voltage	L-L, L-N, and average of 3 phases
Frequency	40...70 Hz
Active power	Total and per phase (signed)
Reactive power	Total and per phase (signed)
Apparent power	Total and per phase
Power factor (True)	Total and per phase 0.000 to 1 (signed) by display 0.000 to 2 (signed) by communications
Tangent phi (Reactive factor)	Total
Current unbalance	Per phase, most unbalanced of 3 phases
Voltage unbalance	L-L, most unbalanced of 3 phases L-N, most unbalanced of 3 phases

Minimum/Maximum Values

When any one-second real-time reading reaches its highest or lowest value, the power meter saves the minimum and maximum values in its nonvolatile memory.

From the power meter display, you can:

- view all min./max. values since the last reset and the reset date and time.
- reset min./max. values.

All running min./max. values are arithmetic minimum and maximum values. For example, the minimum phase A-N voltage is the lowest value in the range from 0 to 1 MV that has occurred since last reset of the min./max. values.

The power meter provides time stamping for 6 minimum/maximum values.

The following table lists the minimum and maximum values stored in the power meter:

Characteristics	Description
Current	Per phase, neutral, and average[1] Minimum: lowest of 3 phases[2] Maximum: highest of 3 phases[2]
Voltage	L-L and L-N per phase and average
Frequency	–
Active power	Per phase[1] and total

Characteristics	Description
Reactive power	Per phase[1] and total
Apparent power	Per phase[1] and total
Power factor	Per phase[1] and total
Tangent phi (Reactive factor)	Total[1]
THD current (PM3210, PM3250, and PM3255)	Maximum: Per phase, neutral, and highest of 3 phase[2] Minimum: Per phase[1] and neutral[1]
THD voltage (PM3210, PM3250, and PM3255)	L-L and L-N per phase[1] Maximum: Highest of 3 phases[2] Minimum: Lowest of 3 phases[2]

1 Available only by communications
2 Available only on the display

Demand Readings

The power meter provides the following demand readings.

Characteristics	Description
Current	Per phase, neutral, and average[1]
Active, reactive, apparent power	Total
Peak Demand Values (PM3210, PM3250, and PM3255)	
Current	Per phase, neutral, and average[1]
Active, reactive, apparent power	Total

1 Available only by communications

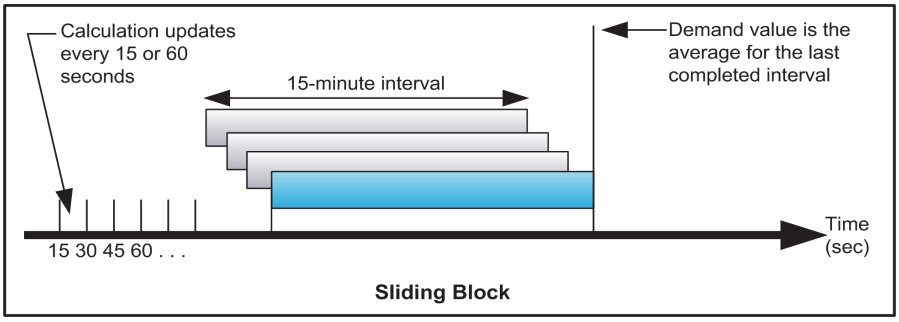
Demand Calculation Methods

Power demand is the energy accumulated during a specified period divided by the length of the period. Current demand is calculated using arithmetical integration of the current RMS values during a time period, divided by the length of the period. How the power meter performs this calculation depends on the selected method. To be compatible with electric utility billing practices, the power meter provides block interval power/current demand calculations.

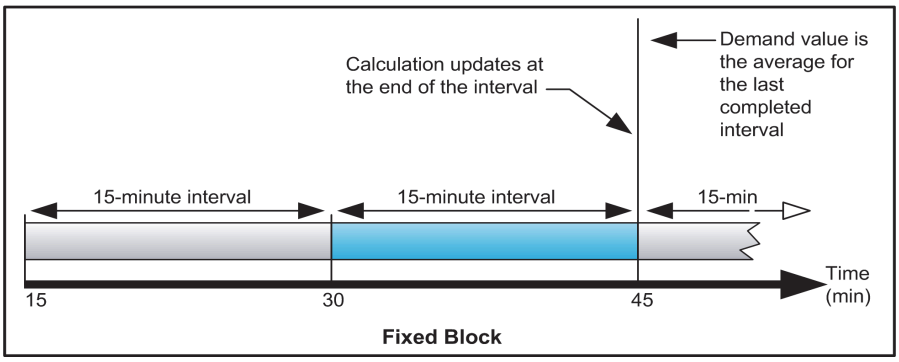
For block interval demand calculations, you select a block of time (interval) that the power meter uses for the demand calculation and the mode the meter uses to handle the interval. 2 different modes are possible:

- Fixed block - Select an interval from 1 to 60 minutes (in 1 minute increments). The power meter calculates and updates the demand at the end of each interval.
- Sliding block - Select an interval from 1 to 60 minutes (in 1 minute increments). For demand intervals less than 15 minutes, the value is updated every 15 seconds. For demand intervals of 15 minutes and greater, the demand value is updated every 60 seconds. The power meter displays the demand value for the last completed interval.

The following figures illustrate the 2 ways to calculate demand power using the block method. For illustration purposes, the interval is set to 15 minutes.



Sliding Block



Fixed Block

Peak Demand

In nonvolatile memory, the power meter maintains a maximum operating demand value called peak demand. The peak is the highest value (absolute value) for each of these readings since the last reset.

You can reset peak demand values from the power meter display. You should reset peak demand after changes to basic power meter setup such as CT ratio or power system configuration.

Energy Readings

The power meter calculates and stores total and partial energy values for active, reactive, and apparent energy.

You can view energy values from the display. The resolution of the energy value automatically changes from kWh to MWh (kVAh to MVARh).

The energy values automatically resets to 0 when it reaches the limit of 1 x 10^6 MWh, 1 x 10^6 MVAh, or 1 x 10^6 MVARh. Manual reset of total energy is not allowed. You can reset the partial energy values including partial energy import, energy by tariff, and phase energy manually using the display.

Energy values can be reported over communications as 64-bit signed integers. The units are always Wh, VARh, or VAh.

The following table lists the energy readings from the power meter:

Characteristics	Description
Energy values (import)	
Active energy	Total and per phase, partial, by tariff 0 to 1 x 10^{12} Wh Auto reset to 0 in case of over limit
Reactive energy	Total and per phase, partial 0 to 1 x 10^{12} VARh Auto reset to 0 in case of over limit
Apparent energy	Total and per phase, partial 0 to 1 x 10^{12} VAh Auto reset to 0 in case of over limit
Energy values (export)	
Active energy	Total 0 to 1 x 10^{12} Wh Auto reset to 0 in case of over limit
Reactive energy	Total 0 to 1 x 10^{12} VARh Auto reset to 0 in case of over limit
Apparent energy	Total 0 to 1 x 10^{12} VAh Auto reset to 0 in case of over limit

Power Quality Analysis Values

The power quality analysis values use the following abbreviations:

- HC (Harmonic Content) = $\sqrt{(H_2^2+H_3^2+H_4^2+\bullet\bullet\bullet)}$
- H1 = Fundamental Content
- THD (Total Harmonic Distortion) = HC/H1 X 100%

THD provides a measure of the total distortion present in a waveform. THD is the ratio of harmonic content to the fundamental and provides a general indication of the quality of a waveform. THD is calculated for both voltage and current.

The following table lists the power quality values of the power meter:

Power quality values (PM3210, PM3250, and PM3255)	
Characteristics	**Description**
THD	Per phase current and per phase voltage (L-L and L-N) Most distorted of 3 phases Average of 3 phases[1]

[1] Available only by communications

Other Characteristics

The following table lists other characteristics of the power meter:

Characteristics	Description
Reset	
Epart	Per phase, partial, by tariff energy values
Minimum and maximum values	—
Peak demand values	—
Local or remote setup	
Distribution system type	– Three-phase 3-wire or 4-wire with 1, 2, or 3 CTs, – Single-phase 2-wire or 3-wire with 1 or 2 CTs, with or without VTs
Current transformers rating	Primary 5 to 32,767 A Secondary 5 A, 1 A
Voltage transformers rating	Primary 1,000,000 Vmax Secondary 100, 110, 115, 120
Current demand calculation method	1 to 60 minutes
Power demand calculation method	1 to 60 minutes

Alarms

Overview

The power meter provides setpoint-driven alarms. The alarms include:

Alarms	PM3210, PM3250	PM3255
Standard alarms		
Over Current, Phase	√	√
Under Current, Phase	–	√
Over Voltage, L-L	–	√
Under Voltage, L-L	√	√
Over Voltage, L-N	–	√
Under Voltage, L-N	√	√
Over Power, Total Active	√	√
Over Power, Total Reactive	–	√
Over Power, Total Apparent	√	√
Leading Power Factor, Total	–	√
Lagging Power Factor, Total	–	√
Over Demand, Total Active Power, Present	–	√
Over Demand, Total Apparent Power, Present	–	√
Over THD-U, Phase	–	√
Under Power, Total Active	√	√
Over THD-I, Phase	–	√
Over THD-V, Phase	–	√
Customized Alarms		
Over Energy, Total Active	–	√

Alarms Configuration

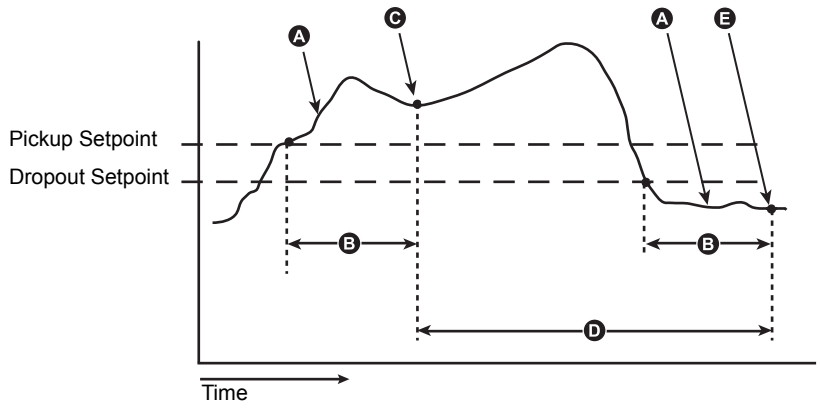
For the standard alarms, you must configure the following features by using the display or communication:

- Pickup setpoint

- Trigger delay (Pickup/Dropout delay)
- Dropout setpoint (Deviation percentage from pickup setpoint)

Among the standard alarms, dropout setpoint and trigger delay are common features of all the alarms. Pickup setpoint is identical for each alarm.

For more information on how the meter handles the setpoint-driven alarms, refer to the figure below.



A	The value of the variable monitored by the alarm.
B	Trigger Delay (Pickup or Dropout Delay) **Note:**The time delay is satisfied only if during the delay, the actual value does not fall between the pickup setpoint and dropout setpoint.
C	An alarm is active. The power meter records the date, time, and value when the pickup setpoint and time delay are satisfied. The power meter performs any tasks assigned to the event such as: switching on a digital output, and flashing the backlight or the alarm symbol.
D	Alarm period
E	An alarm is inactive when both the dropout setpoint and the time delay are satisfied. The power meter performs any tasks assigned to the event such as: switching off a digital output, and ceasing to flash the backlight and the alarm symbol.

For the Over Energy alarm, you also need to configure the method, which refers to the energy accumulation and detection period.

The 3 options are:

- Day method: the energy accumulation starts at 8:03 A.M. every day and clears up at 8:03 A.M. the next day.
- Week method: the energy accumulation starts at 8:03 A.M. every Sunday and clears up at 8:03 A.M. the next Sunday.
- Month method: the energy accumulation starts at 8:03 A.M. on the first day of the month and clears up at 8:03 A.M. on the first day of the next month.

When the accumulated energy pickup setpoint and time delay are satisfied, the alarm is active. When the accumulated energy dropout setpoint and time delay are satisfied, the alarm is inactive.

View Alarm Status on the display

The alarm status summary page includes the following items:

- Tot Enable: displays total number of the alarms enabled by the user in the alarm configuration.

- Tot Active: displays total number of the active alarms. One active alarm with several entries is considered as one. For example, over current at phase 1 creates the first entry, over current at phase 2 creates the second entry, but the total number of the active alarms is one.
- Output: refers to the association with digital output (DO).

The alarm level 2 page lists the number of entries of the active and logged alarms.

The logged alarm entries include the active alarms and the historic alarms. One alarm that has occurred several times can create several active or logged entries.

The alarm level 3 page lists the detailed information of each active/log entry.

NOTE: When an active alarm is not present and you enter the log entry list, the meter considers this to mean that you have acknowledged all the logged alarms.

Alarm Activity and History

The active alarm list holds 20 entries at a time. The list works as a circular buffer, replacing the oldest entries with the newest entries. The information in the active alarm list is volatile. When the power meter resets, this list is reinitialized.

The alarm history log holds 20 entries of alarms that have disappeared. The log also works as a circular buffer. This information is nonvolatile.

Using an Alarm to Control a Digital Output

You can associate a digital output with an alarm. See “Input/output capabilities” on page 21 for more information.

Input/output capabilities

⚠ WARNING

HAZARD OF UNINTENDED OPERATION

- Do not use the meter for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.
- Be aware that an unexpected change of state of the digital outputs may result when the supply power to the meter is interrupted.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Digital Inputs (PM3255)

The power meter can accept 2 digital inputs designated as DI1 and DI2.

The digital inputs have 4 operating modes:

- Normal Input Status: use for simple ON/OFF digital inputs. The digital inputs can be OF or SD signals of a circuit breaker.
- Multi-tariff Control: you can control the tariff either through communications, the internal clock or by 1 or 2 tariff inputs. Tariff control through the tariff inputs is performed by applying a proper combination of ON or OFF signal to the inputs. Each combination of ON or OFF signal results in the power meter registering the energy in a particular tariff register. Refer to the table below for input coding.
- Input Metering: you can configure the meter in input metering modes to collect the pulses for WAGES application. To activate this function, set the input metering pulse

frequency (pulse/unit). The meter counts the number of pulses and calculates the number of units. Pulse width or pulse stop less than 10 milliseconds is invalid for pulse counting.

- Energy Reset: energy reset function resets partial energy, energy by tariff, and energy by phase. Reset is activated by an ON signal lasting for over 10 milliseconds.

The following table describes the input coding in binary format:

Input voltage	Active tariff
Meter with 4 tariffs:	
DI1/DI2 = OFF/OFF	Tariff 1 active
DI1/DI2 = OFF/ON	Tariff 2 active
DI1/DI2 = ON/OFF	Tariff 3 active
DI1/DI2 = ON/ON	Tariff 4 active
Meter with 2 tariffs: (always associated with DI1, and DI2 can be left floating or configured as other mode)	
DI1 = OFF	Tariff 1 active
DI1 = ON	Tariff 2 active

Pulse Output (PM3210)

Pulse output is used for active energy pulse output only. You can configure the pulse frequency (pulse/kWh) and the pulse width. The minimum pulse width is 50 ms. The pulse stop is equal or longer than the pulse width. The pulse output indicates the primary energy consumption considering transformer ratios. You should set a proper value of pulse frequency and pulse width to avoid pulse missing due to over-counting.

Digital Outputs (PM3255)

The power meter has 2 solid-state relay outputs (DO1 and DO2). The relay outputs have 4 operation modes:

- Alarm: the output is controlled by the power meter in response to an alarm condition. The output turns On (relay closed) when at least one alarm is active. The output turns Off (relay open) when the alarm is deactivated.
- Energy Output: you can use DO1 only for active energy pulse output and DO2 only for reactive energy pulse output. You can configure the pulse frequency (pulse/kWh or pulse/kVARh) and the pulse width.
- Disable: the digital output function is disabled.
- External: the output is controlled by the power meter in response to a command 21000.

Multi-tariff

The power meter provides multi-tariff energy accumulation. It supports up to 4 tariffs.

The tariff switching has the following 3 kinds of control modes:

- Digital input
- Communication
- Internal real-time clock (RTC)

You can configure the control mode by using the display (all the 3 modes) or by using communication (not for RTC).

Command number 2060 is used to configure the control mode by communication. See “Communication via Modbus” on page 39 for more details.

The following table presents the rules to change multi-tariff control mode by Modbus command:

From	To
Disable	– Communication – Digital input
RTC	Communication
Communication	Disable

DI Control Mode (PM3255)

In the DI control mode, the tariff switching is triggered by the change in input status of DI. See “Digital Inputs (PM3255)” on page 21 for more details.

NOTE: If you change DI mode to other operation modes (normal input status, input metering, or energy reset) while multi-tariff control mode is in DI control mode, the multi-tariff function is automatically disabled.

NOTE: If you change multi-tariff control mode to other control modes (communication or internal RTC) while DI is configured for multi-tariff function, the DI operation mode automatically changes to normal input status.

Communication Control Mode (PM3250, PM3255)

In the communication control mode, the tariff switching is triggered by command number 2008. See “Communication via Modbus” on page 39 for more details.

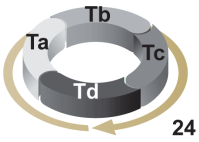
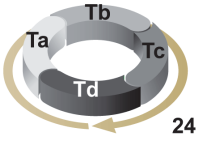
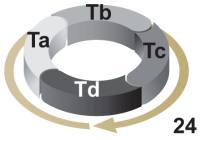
Real-time clock (RTC) Control Mode

In RTC control mode, the tariff switching is triggered by the real-time clock.

You can configure RTC control mode by using the display. The configuration includes the selection of schedule mode and the setup of 1 or 2 schedulers depending on the schedule modes.

The 2 schedule modes for RTC trigger are:

- Day mode: weekdays and weekend share the same peak and peak-off duration and only 1 scheduler should be set.
- Week mode: the tariff management of weekdays and weekends are controlled separately, and 2 schedulers should be set.

<table>
<tr><th></th><th>Weekdays</th><th>Weekend</th></tr>
<tr><td>Day mode</td><td colspan="2"> 
</td></tr>
<tr><td>Week mode</td><td> 
</td><td> 
</td></tr>
</table>

A scheduler supports a maximum of 4 time segments (Ta, Tb, Tc, and Td) for maximum 4 tariffs (T1, T2, T3, and T4). You can assign Ta, Tb, Tc, or Td to any tariff if any

adjacent time segment has a different tariff. A valid scheduler always starts from Ta segment, and skipping time segments is not allowed.

In the setup of a schedule, you should define the tariff switching time for each target tariff. In the application, when the set switching time is reached, the tariff switches automatically.

Data Logging (PM3255)

The power meter provides energy logs. Energy day log can be read as a log file. The 3 types of energy log can be read as registers.

The following table lists the maximum number of entries of each log:

Log Type	Max. Entries Stored
Energy log (daily)	45
Energy log (weekly)	30
Energy log (monthly)	13

Energy Log

The meter has the log for accumulated active energy.

The energy log entry structure is shown in the following table:

Log Entry	Log date / time 4 registers	Energy value 4 registers

The 3 log types are:

- Day: the log interval is 1 day. The logging occurs at 8:03 A.M. every day and the accumulated active energy for the previous 24 hours is logged.
- Week: the log interval is 1 week. The logging occurs at 8:03 A.M. every Sunday and the accumulated active energy for the previous week is logged.
- Month: the log interval is 1 month. The logging occurs at 8:03 A.M. on the first day of each month and the accumulated active energy for the previous month is logged.

You must use the display to configure the energy log. The day log, week log, and month log are enabled or disabled together during the configuration. However, the energy accumulation always starts from the fixed log time instead of the time of log enabled.

You can access day log, week log, and month log by reading the registers.

Special Notes for Energy Log

- If the date/time is not set by the user after the date/time resets due to previous power interruption, energy keeps accumulating. After the date/time is set and the log time is reached, all the accumulated energy is written into the log.
- If you reset the date, the log entries with log date after the reset date are not erased.
- When the log time is reached, the meter checks the enable/disable status of the energy log. The meter logs the accumulated energy if the status is enabled and discards if the status is disabled. The accumulated energy resets to 0.
- The energy log is circular. If the number of the log entries exceeds the maximum, the oldest log entries are overwritten.

Chapter 5 Meter operation

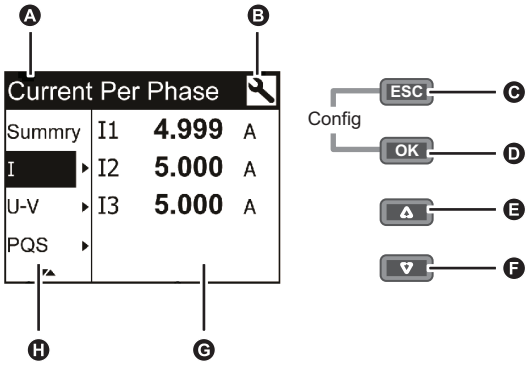
Introduction

The power meter features a front panel with signaling LEDs, a graphic display, and contextual menu buttons for accessing the information required to operate the power meter and modify parameter settings.

The Navigation menu allows you to display, configure, and reset parameters.

General display

The general display of the power meters is shown in the following picture:



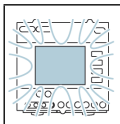
A	Main Title
B	Configuration Mode
C	Cancellation
D	Confirmation
E	Up
F	Down
G	Values Parameters
H	Sub menu

Status information

The display and the LED on the power meters indicate the device current status.

LED Indicator	Description
5000 flashes / kWh	
OFF	Off/ no counting
Flashing	On, with counting
ON	Over counting due to wrong configuration or overload

The backlight and diagnosis/alarm icon indicate the device status.

 **Backlight**	 **Diagnosis/Alarm**	**Description**
OFF	–	Off
ON/Dim	OFF	LCD is in power saving mode
ON/Normal	OFF	Normal working status
Flashing	Flashing	Alarm/Diagnosis is active.
ON/Dim	Flashing	Alarm/Diagnosis is active for 3 hours and LCD is in power saving mode.
ON/Normal ON/Dim	ON	Not active alarm. Logged alarms are not acknowledged by the user.

Configuration mode

Settings for all power meters

The following settings can be configured in configuration mode:

Function	PM3200	PM3210	PM3250	PM3255
Wiring	√	√	√	√
CT and VT Ratio	√	√	√	√
Nominal frequency	√	√	√	√
Date/Time	√	√	√	√
Multi-tariffs	√	√	√	√
Demand	√	√	√	√
Log	–	–	–	√
Digital Outputs	–	–	–	√
Digital Inputs	–	–	–	√
Pulse Output	–	√	–	–
Communication	–	–	√	√
Password (High and Low)	√	√	√	√
Alarms	–	√	√	√
Front panel display	√	√	√	√
Language	√	√	√	√

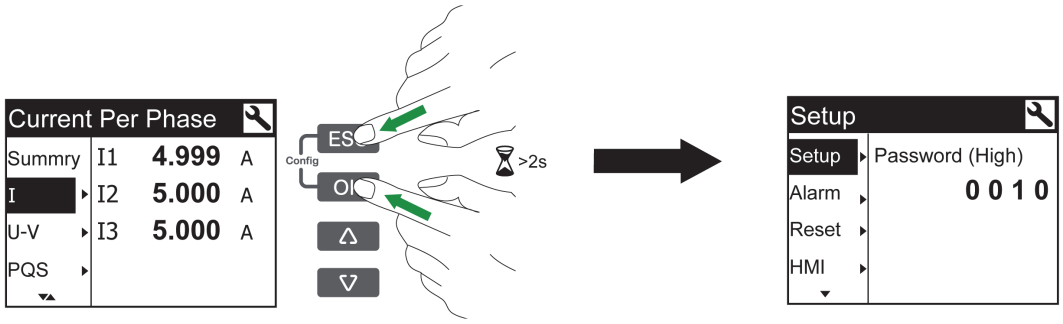
The default factory settings are listed in the following table:

Function	Factory settings
Wiring	3PH4W; VT Direction connection; 3 CTs on I1, I2, and I3
CT Ratio	CT Secondary = 5 A; CT Primary = 5 A
VT Ratio	NA
Nominal frequency	50 Hz
Nominal phase order	A-B-C
Date/Time	1-Jan-2000/00:00:00
Multi-tariffs	Disable
Demand	Method: sliding block; Interval: 15 minutes
Power demand log	Disable
Energy log	Disable
Digital outputs	Disable

Function	Factory settings
Digital inputs	Input status
Pulse output	100 pulse/kWh, pulse width: 100 millisecond
Communication	Baud Rate = 19 200; Parity = EVEN; Address = 1
Password	High: 0010; Low: 0000
Alarms	Disable
Front panel display LCD	Backlight: 4; Contrast: 5
Front panel display mode	Full screen: Enable; Auto scroll: Disable
Language	English

Enter the configuration mode

The diagram below illustrates the various elements for operating the power meters:



▲ or ▼ Selection button to change or select parameter values

OK Confirmation button

ESC Cancellation button

To enter the configuration mode, hold OK and ESC for 2 seconds.

The following figures describe in details the configuration navigation, see “Modifying parameters” on page 27 to change the default selection.

Modifying parameters

There are two methods for modifying a parameter, depending on the type of parameter:

- selecting a value in a list (for example, selecting 1PH2W L-N from a list of available power systems), or
- modifying a numerical value, digit by digit (for example, entering a value for the date, time or VT primary).

NOTE: Before you modify any parameters, ensure that you are familiar with the display functionality and navigation structure of your device in configuration mode.

Selecting the value in a list

To select a value in a list:

1. Use the ▼ or ▲ button to scroll through the parameter values until you reach the desired value.
2. Press OK to confirm the new parameter value.

Modifying the numerical value

When you modify a numerical value, the digit on the far right side is selected by default (except for Date/Time). The parameters listed below are the only ones for which you set a numerical value:

- Date
- Time
- Voltage Transformer (VT) Primary
- Current Transformer (CT) Primary
- Password
- Modbus address of the power meter
- Pickup Setpoint
- Dropout Setpoint
- Time delay/Interval duration

To modify a numerical value:

1. Use the ▽ or △ button to modify the selected digit.
2. Press OK to confirm the new parameter value and to shift to the next digit. Modify the next digit, if needed, or press OK.
3. Continue to move through the digits until you reach the last digit then press OK again to confirm the new parameter value.

   NOTE: If you enter an invalid setting and press OK, the cursor stays in the field for that parameter until you enter a valid value.

Canceling an entry

To cancel the current parameter entry, press the ESC button. The screen reverts to the previous display.

Clock setting

You must reset the time to account for any time change (for example, to switch the time from standard time to daylight savings time).

The power meter retains the date and time settings before the interruption.

Setting

To set the date and time, see “Modifying the numerical value” on page 28.

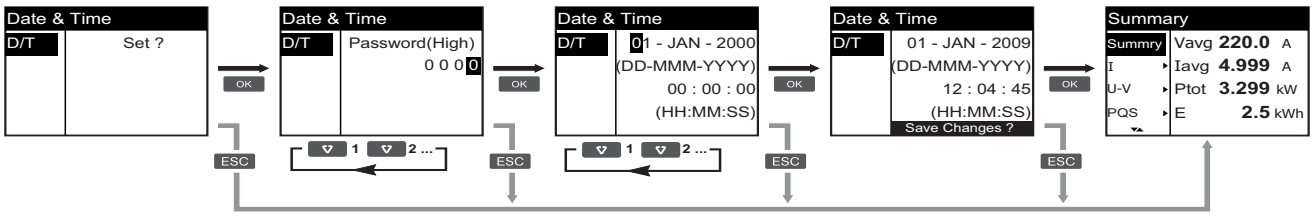
Date/time format

The date is displayed in the format: DD-MMM-YYYY.

The time is displayed using the 24-hour clock in the format: hh:mm:ss.

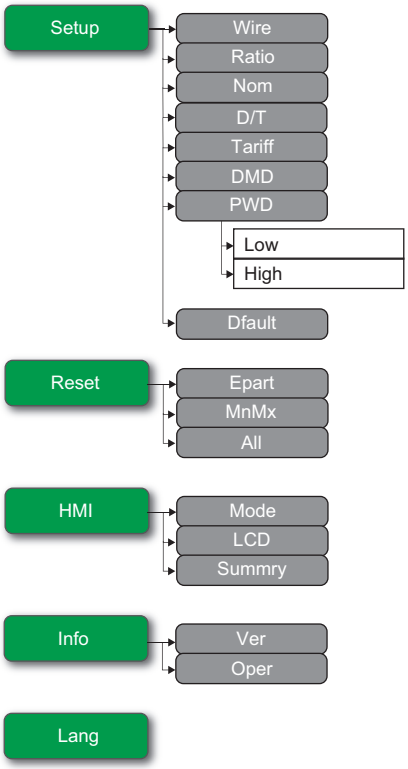
Clock setting menu

The following diagram illustrates how to set the clock when you initially power up the device or after a power failure. To set the clock during normal operation, see the configuration mode menu tree for your device.

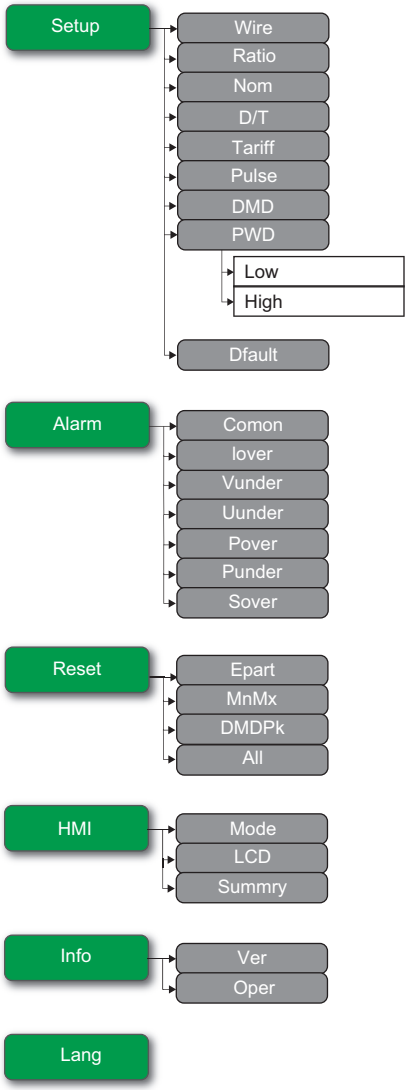


Configuration mode menu trees

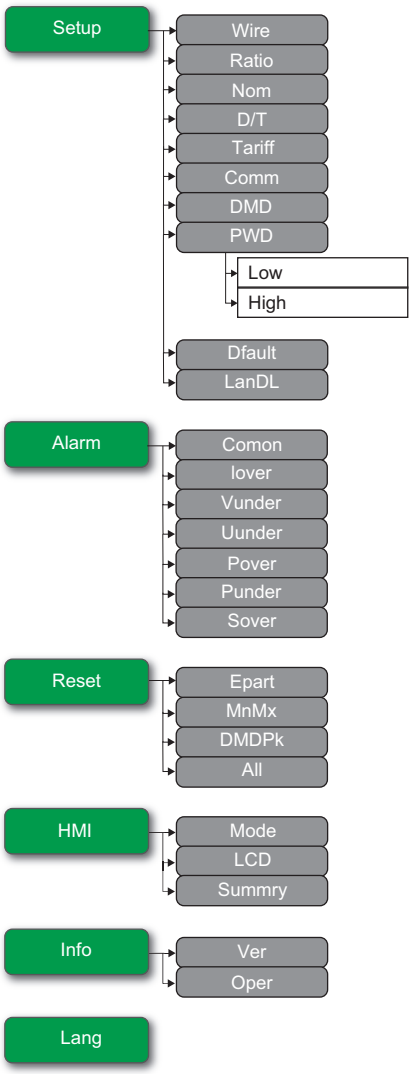
Configuration mode menu tree for PM3200



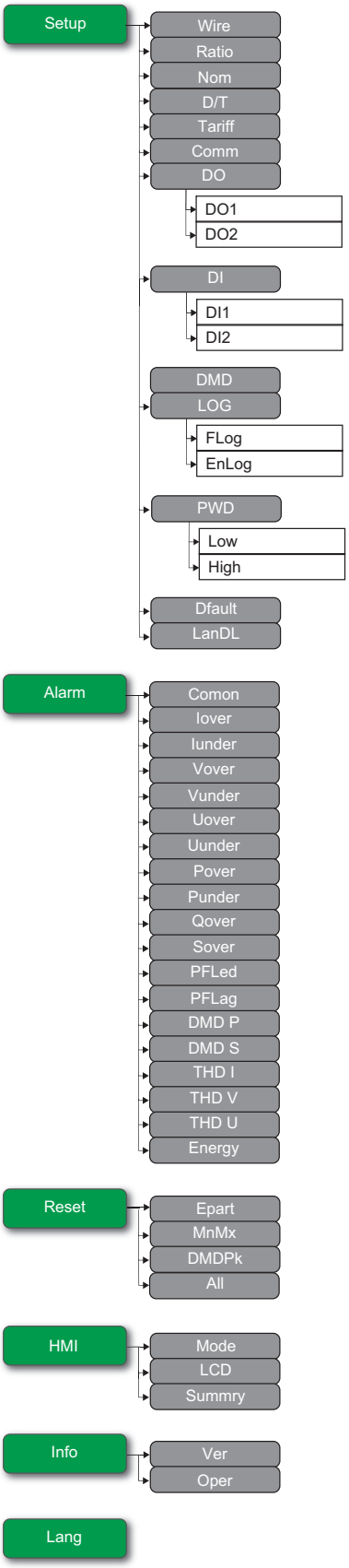
Configuration mode menu tree for PM3210



Configuration mode menu tree for PM3250



Configuration mode menu tree for PM3255



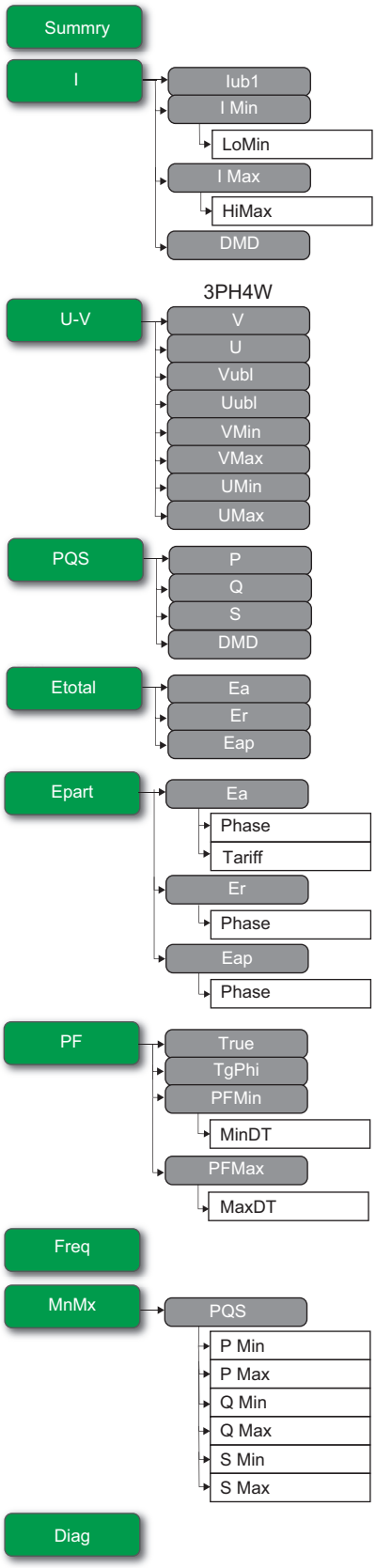
Display mode

Enter the display mode

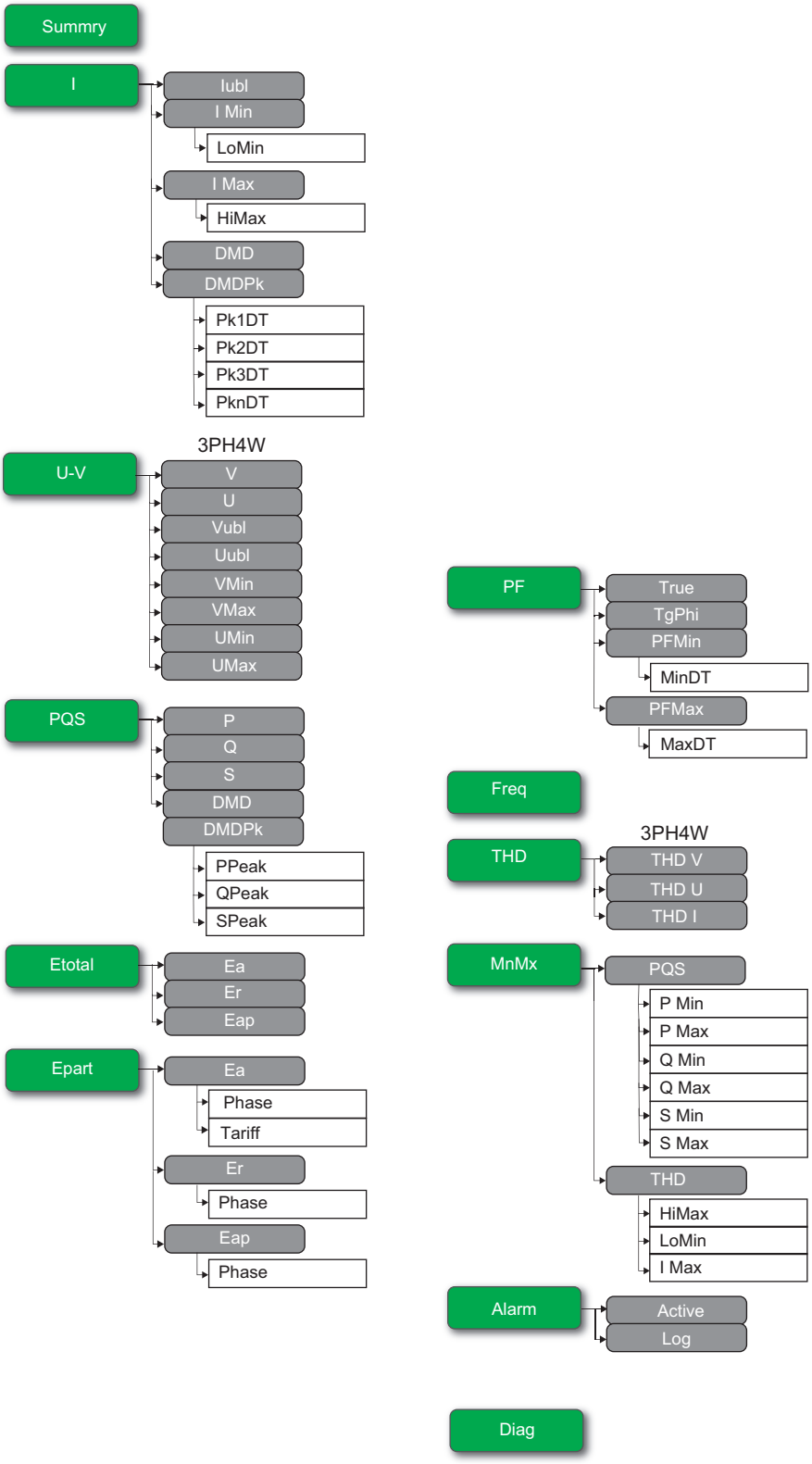
If Full Screen mode is enabled, press any key to switch from Full Screen mode to Display mode.

If Full Screen mode is disabled, press ESC to switch from Configuration mode (Setup page) to Display mode.

Display mode menu tree for PM3200



Display mode menu tree for PM3210/ PM3250/ PM3255



Full Screen mode

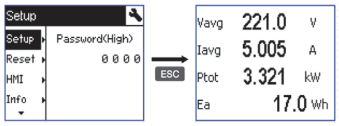
The main title and the sub menu in full screen mode are hidden and the values are expanded to full screen. The following screen illustrates an example of full screen page:

Full screen mode is enabled by default. You can modify full screen enable/disable information, auto scroll enable/disable, and auto scroll interval.

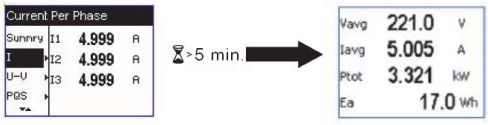
Full Screen	Auto Scroll	Auto Scroll Interval	Description
Enable	Disable	Any value	Fixed summary page at full screen mode.
Enable	Enable	Any value	Auto scrolling pages at full screen mode. The interval between any 2 scrolling pages is the value specified.
Disable	–	–	Full screen mode disabled.

Enter the Full Screen mode

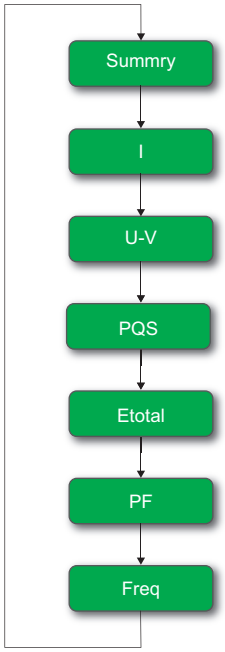
If Full Screen mode is enabled, press ESC to switch from Configuration mode (Setup page) to Full Screen mode.



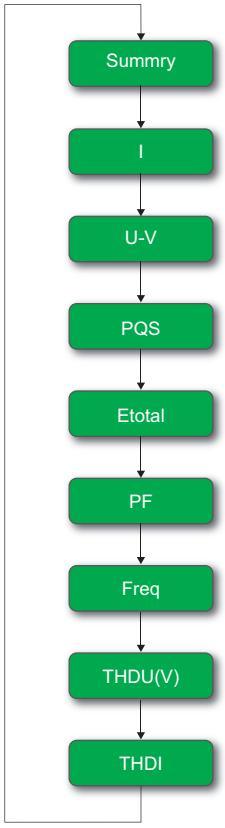
Display mode automatically switches to full screen mode if five minutes passes without a key press.



Full Screen mode menu tree for PM3200



Full Screen mode menu tree for PM3210/ PM3250/ PM3255



Chapter 6 Communication via Modbus

Modbus communications overview

Modbus RTU protocol is available on the PM3250 and PM3255. The information in this section assumes that you have an advanced understanding of Modbus communications, your communications network and the power system that your meter is connected to.

Modbus communications settings

Before communicating with the device using Modbus protocol, use the HMI to configure the following settings:

Parameters	Authorized Values	Default Value
Baud rate	– 9600 Baud – 19 200 Baud – 38 400 Baud	19 200 Baud
Parity	– Odd – Even – None number of stop bits = 1	Even
Address	1–247	1

Signaling of Communication Activity

The yellow communication LED indicates the status of communication between the meter and the master as follows:

If...	Then...
the LED is flashing	communication with the device has been correctly established.
the LED is off	there is no active communication between the master and the slave.

Modbus Functions

Function List

Introduction

There are 3 different ways of using the Modbus communication:

- by sending commands using the command interface (see “Command Interface” on page 41).
- by reading the Modbus registers (see “Modbus Register Table” on page 46).
- by reading the Device Identification (see “Read Device Identification” on page 61).

Description

The table below describes the three supported Modbus functions:

Function Code		Function Name
Decimal	Hexadecimal	
3	0x03	Read Holding Registers
16	0x10	Write Multiple Registers

Function Code		Function Name
Decimal	Hexadecimal	
43/14	0x2B/0x0E	Read Device Identification

For example:

- To read different parameters from the power meter, use the function 3 (Read).
- To change the tariff, use the function 16 (Write) to send a command to the power meter.

Table Format

Register tables have the following columns:

Register Address	Action (R/W/WC)	Size	Type	Units	Range	Description

- **Register Address**: Modbus address of register encoded in the Modbus frame, in decimal (dec)
- **Action**: The read/write/write by command property of the register
- **Size**: The data size in Int16
- **Type**: The encoding data type
- **Units**: The unit of the register value
- **Range**: The permitted values for this variable, usually a subset of what the format allows
- **Description**: Provides information about the register and the values that apply

Unit Table

The following data types appear in the Modbus register list:

Type	Description	Range
UInt16	16-bit unsigned integer	0–65535
Int16	16-bit signed integer	-32768–+32767
UInt32	32-bit unsigned integer	0–4 294 967 295
Int64	64 bit unsigned integer	0–18 446 744 073 709 551 615
UTF8	8-bit field	multibyte character encoding for Unicode
Float32	32-bit value	Standard representation IEEE for floating number (with single precision)
Bitmap	–	–
DATETIME	See below	–

DATETIME format:

Word	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	Reserved (0)								R4 (0)	Year (0–127)						
2	0				Month (1–12)				WD (0)			Day (1–31)				
3	SU (0)	0		Hour (0–23)					iV	0	Minute (0–59)					
4	Millisecond (0–59999)															

Word	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
R4 :						Reserved Bit										
Year :						7 bits: (year from 2000)										
Month :						4 bits										
Day :						5 bits										
Hour :						5 bits										
Minute :						6 bits										
Millisecond :						2 octets										
WD (day of the week) :						1-7: Sunday to Saturday										
SU (summer time) :						Bit to 0 if this parameter is not used.										
iV (validity of received data) :						Bit to 0 if this parameter is not valid or not used.										

Command Interface

Description

The command interface allows you to configure the power meter by sending specific command requests using Modbus function 16.

Command Request

The following table describes a Modbus command request:

Slave Number	Function Code	Command block		CRC
		Register Address	Command Description	
1–247	16 (W)	5250 (up to 5374)	The command is made of a command number and a set of parameters. See the detailed description of each command in the command list. **NOTE:** All the reserved parameters can be considered as any value, e.g. 0.	Checking

The following table describes a command block:

Register Address	Content	Size (Int16)	Data (example)
5250	Command Number	1	2008 (Set Tariff)
5251	(Reserved)	1	0
5252–5374	Parameter	n	4 (Tariff=4) **NOTE:** Command number 2008 supports only one parameter with the size of 1.

Command Result

The command result can be obtained by reading registers 5375 and 5376.

The following table describes the command result:

Register Address	Content	Size (Int16)	Data (example)
5375	Requested Command Number	1	2008 (Set Tariff)
5376	Result[1]	1	0 (Valid Operation)

[1] List of Command Result codes:

– 0 = Valid Operation

– 3000 = Invalid Command

– 3001 = Invalid Parameter

– 3002 = Invalid Number of Parameters
– 3007 = Operation Not Performed

Command List

Set Date/Time

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
1003	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	2000–2099	Year
	W	1	UInt16	–	1–12	Month
	W	1	UInt16	–	1–31	Day
	W	1	UInt16	–	0–23	Hour
	W	1	UInt16	–	0–59	Minute
	W	1	UInt16	–	0–59	Second
	W	1	UInt16	–	–	(Reserved)

Set Wiring

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
2000	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	0, 1, 2, 3, 11, 13	Power System Configuration 0 = 1PH2W L-N 1 = 1PH2W L-L 2 = 1PH3W L-L-N 3 = 3PH3W 11 = 3PH4W 13 = 1PH4W L-N
	W	1	UInt16	Hz	50, 60	Nominal Frequency
	W	2	Float32	–	–	(Reserved)
	W	2	Float32	–	–	(Reserved)
	W	2	Float32	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	2	Float32	V	VT Secondary–1000000.0	VT Primary
	W	1	UInt16	V	100, 110, 115, 120	VT Secondary
	W	1	UInt16	–	1, 2, 3	Number of CTs
	W	1	UInt16	A	1–32767	CT Primary
	W	1	UInt16	A	1, 5	CT Secondary
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	0, 1, 2	VT Connection type: 0 = Direct Connect 1 = Delta (2 VTs) 2 = Wye (3 VTs)

Demand System Setup

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
2002	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	1, 2	Demand method: 1 = Timed interval sliding block 2 = Timed interval fixed block
	W	1	UInt16	min	10, 15, 20, 30, 60	Demand interval duration
	W	1	UInt16	–	–	(Reserved)

Set Pulse Output (PM3255)

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
2003	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	0, 1	Pulse Output 0 = DO1 Disable 1 = DO1 Enable
	W	2	Float32	pulse/kWh	0.01, 0.1, 1, 10, 100, 500	Active Energy Pulse Frequency
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	0, 2	0 = DO2 Disable 2 = DO2 Enable
	W	2	Float32	pulse/kVARh	0.01, 0.1, 1, 10, 100, 500	Reactive Energy Pulse Frequency
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	2	Float32	–	–	(Reserved)
2038	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	ms	50, 100, 200, 300	Energy Pulse Duration

Set Tariff

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
2060	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	0–3	Multi-tariff mode: 0 = Disable Multi-tariff 1 = Use COM as Tariff Control (maximum 4 tariffs) 2 = Use DI1 as Tariff Control (2 tariffs) 3 = Use 2 Digital inputs as Tariff Control (4 tariffs) 4 = Use RTC as Tariff Control (maximum 4 tariffs)
2008	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	1–4	Tariff[1] 1 = T1 2 = T2 3 = T3 4 = T4

[1] Only if Multi-Tariff is controlled by communications.

Reset All Minimum/Maximum

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
2009	W	1	UInt16	–	–	(Reserved)

Reset All Peak Demands

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
2015	W	1	UInt16	–	–	(Reserved)

Set Digital Input as Partial Energy Reset (PM3255)

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
6017	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	0, 1, 2, 3	Digital Input to Associate: 0 = None 1 = DI1 2 = DI2 3 = DI1 and DI2

Input Metering Setup (PM3255)

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
6014	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	1, 2	Input Metering Channel
	W	20	UTF8	–	string size ≤ 40	Label
	W	2	Float32	–	1–10000	Pulse Weight
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	Input Metering Channel 1: 0, 1 Input Metering Channel 2: 0, 2	Digital Input Association: 0 = None 1 = DI1 2 = DI2

Alarm Setup

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
7000	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	(1) (2)	Alarm ID
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	0, 1	0 = Disable 1 = Enable
	W	2	Float32	–	(3) (4) (5) (6) (7)	Pickup Setpoint
	W	2	UInt32	–	–	(Reserved)
	W	2	Float32	–	–	(Reserved)
	W	2	UInt32	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	4	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
20000	W	1	UInt16	–	–	(Reserved)
	W	2	Float32	–	0.0–99.0	Dropout Setpoint
	W	2	UInt32	–	0–999999	Trip Time Delay
	W	1	Bitmap	–	0, 1, 2, 3	PM3250: Reserved PM3255: Digital Output to Associate: 0 = None 1 = DO1 2 = DO2 3 = DO1 and DO2
20001	W	1	UInt16	–	–	(Reserved)

NOTE:

(1) PM3250: 1, 6, 8, 9, 11, 30

(2) PM3255: 1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 19, 28, 30, 31, 32, 41

(3) Alarm ID 1, 2, 5, 6, 7, 8, 11, 19: 0.0–9999999.0

(4) Alarm ID 9, 10, 16, 30: –9999999.0–9999999.0

(5) Alarm ID 12, 13: –2.0–2.0

(6) Alarm ID 28, 31, 32: 0.0–1000.0

(7) Alarm ID 41: 0–999999999

Communications Setup

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
5000	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	1–247	Address
	W	1	UInt16	–	0, 1, 2	Baud Rate 0 = 9600 1 = 19 200 2 = 38 400
	W	1	UInt16	–	0, 1, 2	Parity 0 = Even 1 = Odd 2 = None
	W	1	UInt16	–	–	(Reserved)

Reset Partial Energy Counters

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
2020	W	1	UInt16	–	–	(Reserved)

Reset Input Metering Counter (PM3255)

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
2023	W	1	UInt16	–	–	(Reserved)

Set External Control from Digital Output (PM3255)

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
21000	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	1, 2	Digital Output ID 1 = DO1 2 = DO2
	W	1	UInt16	–	0, 1	Digital Output Status 0 = Open 1 = Close

Modbus Register Table

Register List

System

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
30	R	R	20	UTF8	–	Meter Name
50	R	R	20	UTF8	–	Meter Model

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
70	R	R	20	UTF8	–	Manufacturer
130	R	R	2	UInt32	–	Serial Number
132	R	R	4	Date/Time	–	Date of Manufacture
136	R	R	5	UTF8	–	Hardware Revision
1637	R	R	1	UInt16	–	Present Firmware Version (DLF format): X.Y.ZTT
1701	R	R	1	UInt16	–	Present Language Version (DLF format): X.Y.ZTT
1845–1848	R/WC	R/WC	1 X 4	UInt16	–	Date/Time Reg. 1845: Year 0-99 (year from 2000 to 2099) Reg. 1846: Month (b11:b8), Weekday (b7:b5), Day (b4:b0) Reg. 1847: Hour (b12:b8) and Minute (b5:b0) Reg. 1848: Millisecond

Meter Setup and Status

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
2004	R	R	2	UInt32	Second	Meter Operation Timer Status
2014	R	R	1	UInt16	–	Number of Phases
2015	R	R	1	UInt16	–	Number of Wires
2016	R/WC	R/WC	1	UInt16	–	Power System Configuration: 0 = 1PH2W L–N 1 = 1PH2W L–L 2 = 1PH3W L–L with N 3 = 3PH3W 11 = 3PH4W 13 = 1PH4W multi-L with N
2017	R/WC	R/WC	1	UInt16	Hz	Nominal Frequency
2024	R/WC	R/WC	1	UInt16	–	Nominal Phase Order: 0 = A-B-C 1 = C-B-A
2025	R	R	1	UInt16	–	Number VTs
2026	R/WC	R/WC	2	Float32	V	VT Primary
2028	R/WC	R/WC	1	UInt16	V	VT Secondary
2029	R/WC	R/WC	1	UInt16	–	Number CTs
2030	R/WC	R/WC	1	UInt16	A	CT Primary
2031	R/WC	R/WC	1	UInt16	A	CT Secondary
2036	R/WC	R/WC	1	UInt16	–	VT Connection Type: 0 = Direct Connect 1 = 3PH3W (2 VTs) 2 = 3PH4W (3 VTs)

Energy Pulse Output Setup

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Energy Output Pulses (Global Settings)						
2129	–	R/WC	1	UInt16	Millisecond	Energy Pulse Duration
Active Energy Pulse Output Channel						

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
2131	–	R/WC	1	UInt16	–	Digital Output Association: 0 = Disable 1 = DO1 enable for active energy pulse output
2132	–	R/WC	2	Float32	pulse/kWh	Active Energy Pulse Frequency
Reactive Energy Pulse Output Channel						
2135	–	R/WC	1	UInt16	–	Digital Output Association: 0 = Disable 1 = DO2 enable for reactive energy pulse output
2136	–	R/WC	2	Float32	pulse/kVARh	Reactive Energy Pulse Frequency

Command Interface

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
5250	R/W	R/W	1	UInt16	–	Requested Command
5252	R/W	R/W	1	UInt16	–	Command Parameter 001
5374	R/W	R/W	1	UInt16	–	Command Parameter 123
5375	R	R	1	UInt16	–	Command Status
5376	R	R	1	UInt16	–	Command Result codes: 0 = Valid Operation 3000 = Invalid Command 3001 = Invalid Parameter 3002 = Invalid Number of Parameters 3007 = Operation Not Performed
5377	R	R	1	UInt16	–	Command Data 001
5499	R	R	1	UInt16	–	Command Data 123

Communications

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
6500	R	R	1	UInt16	–	Protocol 0 = Modbus
6501	R/WC	R/WC	1	UInt16	–	Address
6502	R/WC	R/WC	1	UInt16	–	Baud Rate: 0 = 9600 1 = 19 200 2 = 38 400
6503	R/WC	R/WC	1	UInt16	–	Parity: 0 = Even 1 = Odd 2 = None

Input Metering Setup

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Input Metering Channel 01						
7032	–	R/WC	20	UTF8	–	Label
7052	–	R/WC	2	Float32	pulse/unit	Pulse Frequency
7055	–	R/WC	1	UInt16	–	Digital Input Association: 0 = DI1 disable for input metering 1 = DI1 enable for input metering
Input Metering Channel 02						
7056	–	R/WC	20	UTF8	–	Label
7076	–	R/WC	2	Float32	pulse/unit	Pulse Frequency
7079	–	R/WC	1	UInt16	–	Digital Input Association: 0 = DI2 disable for input metering 2 = DI2 enable for input metering

Digital Inputs

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
7274	–	R	1	UInt16	–	Digital Input 1 Control Mode: 0 = Normal (Input Status) 2 = Multi-tariff Control 3 = Input Metering 5 = Energy Reset (Partial Energy, Energy by Tariff, Phase Energy)
7298	–	R	1	UInt16	–	Digital Input 2 Control Mode
8905	–	R	2	Bitmap	–	Digital Input Status: 0 = Relay-Open 1 = Relay-Closed Bit 1 = DI1 status Bit 2 = DI2 status

Digital Outputs

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
9673	–	R	1	UInt16	–	Digital Output 1 Control Mode Status: 2 = Alarm 3 = Energy 0xFFFF = Disable
9681	–	R	1	UInt16	–	Digital Output 2 Control Mode Status
9667	–	R	1	Bitmap	–	Digital Output Status: 0 = Relay-Open 1 = Relay-Closed Bit 1 = DO1 status Bit 2 = DO2 status

Basic Meter Data

Current, voltage, power, power factor and frequency

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Current						
3000	R	R	2	Float32	A	I1: phase 1 current
3002	R	R	2	Float32	A	I2: phase 2 current
3004	R	R	2	Float32	A	I3: phase 3 current
3006	R	R	2	Float32	A	In: Neutral current
3010	R	R	2	Float32	A	Current Avg
Voltage						
3020	R	R	2	Float32	V	Voltage L1-L2
3022	R	R	2	Float32	V	Voltage L2-L3
3024	R	R	2	Float32	V	Voltage L3-L1
3026	R	R	2	Float32	V	Voltage L-L Avg
3028	R	R	2	Float32	V	Voltage L1-N
3030	R	R	2	Float32	V	Voltage L2-N
3032	R	R	2	Float32	V	Voltage L3-N
3036	R	R	2	Float32	V	Voltage L-N Avg
Power						
3054	R	R	2	Float32	kW	Active Power Phase 1
3056	R	R	2	Float32	kW	Active Power Phase 2
3058	R	R	2	Float32	kW	Active Power Phase 3
3060	R	R	2	Float32	kW	Total Active Power
3062	R	R	2	Float32	kVAR	Reactive Power Phase 1
3064	R	R	2	Float32	kVAR	Reactive Power Phase 2
3066	R	R	2	Float32	kVAR	Reactive Power Phase 3
3068	R	R	2	Float32	kVAR	Total Reactive Power
3070	R	R	2	Float32	kVA	Apparent Power Phase 1
3072	R	R	2	Float32	kVA	Apparent Power Phase 2
3074	R	R	2	Float32	kVA	Apparent Power Phase 3
3076	R	R	2	Float32	kVA	Total Apparent Power
Power Factor						
3078	R	R	2	Float32	–	Power Factor Phase 1 (Complex format)
3080	R	R	2	Float32	–	Power Factor Phase 2 (Complex format)
3082	R	R	2	Float32	–	Power Factor Phase 3 (Complex format)
3084	R	R	2	Float32	–	Power Factor Total: -2<PF<-1: Quad 2, active power negative, capacitive -1<PF<0: Quad 3, active power negative, inductive 0<PF<1: Quad 1, active power positive, inductive 1<PF<2: Quad 4, active power positive, capacitive
Current Unbalance						
3012	R	R	2	Float32	%	Current Unbalance I1
3014	R	R	2	Float32	%	Current Unbalance I2
3016	R	R	2	Float32	%	Current Unbalance I3
3018	R	R	2	Float32	%	Current Unbalance Worst
Voltage Unbalance						
3038	R	R	2	Float32	%	Voltage Unbalance L1-L2
3040	R	R	2	Float32	%	Voltage Unbalance L2-L3
3042	R	R	2	Float32	%	Voltage Unbalance L3-L1

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
3044	R	R	2	Float32	%	Voltage Unbalance L-L Worst
3046	R	R	2	Float32	%	Voltage Unbalance L1-N
3048	R	R	2	Float32	%	Voltage Unbalance L2-N
3050	R	R	2	Float32	%	Voltage Unbalance L3-N
3052	R	R	2	Float32	%	Voltage Unbalance L-N Worst
Tangent Phi (Reactive Factor)						
3108	R	R	2	Float32	–	Tangent Phi, Total
Frequency						
3110	R	R	2	Float32	Hz	Frequency
Temperature						
3132	R	R	2	Float32	°C	Temperature

Energy, energy by tariff and input metering

Most energy values are available in both signed 64-bit integer and 32-bit floating point format.

Resets and active tariff information						
Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Energy Reset (Partial Energy, Energy by Tariff, Phase Energy)						
3252	R	R	4	Date/Time	–	Energy Reset Date/Time
Energy by Tariff Import						
4191	R/WC	R/WC	1	UInt16	–	Active Tariff (Only modifiable in case of COM Control Mode Enabled): 0 = multi-tariff disabled 1-4 = rate 1 to rate 4
Input Metering						
3554	–	R	4	Date/Time	–	Input Metering Accumulation Reset Date/Time

Energy values – 64-bit integer						
Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Total Energy						
3204	R	R	4	Int64	Wh	Total Active Energy Import
3208	R	R	4	Int64	Wh	Total Active Energy Export
3220	R	R	4	Int64	VARh	Total Reactive Energy Import
3224	R	R	4	Int64	VARh	Total Reactive Energy Export
3236	R	R	4	Int64	VAh	Total Apparent Energy Import
3240	R	R	4	Int64	VAh	Total Apparent Energy Export
Energy Reset (Partial Energy, Energy by Tariff, Phase Energy)						
3252	R	R	4	Date/Time	–	Energy Reset Date/Time
Partial Energy Import						
3256	R	R	4	Int64	Wh	Partial Active Energy Import
3272	R	R	4	Int64	VARh	Partial Reactive Energy Import
3288	R	R	4	Int64	VAh	Partial Apparent Energy Import
Phase Energy Import						
3518	R	R	4	Int64	Wh	Active Energy Import Phase 1

Energy values – 64-bit integer						
Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
3522	R	R	4	Int64	Wh	Active Energy Import Phase 2
3526	R	R	4	Int64	Wh	Active Energy Import Phase 3
3530	R	R	4	Int64	VARh	Reactive Energy Import Phase 1
3534	R	R	4	Int64	VARh	Reactive Energy Import Phase 2
3538	R	R	4	Int64	VARh	Reactive Energy Import Phase 3
3542	R	R	4	Int64	VAh	Apparent Energy Import Phase 1
3546	R	R	4	Int64	VAh	Apparent Energy Import Phase 2
3550	R	R	4	Int64	VAh	Apparent Energy Import Phase 3
Energy by Tariff Import						
4196	R	R	4	Int64	Wh	Rate 1 Active Energy Import
4200	R	R	4	Int64	Wh	Rate 2 Active Energy Import
4204	R	R	4	Int64	Wh	Rate 3 Active Energy Import
4208	R	R	4	Int64	Wh	Rate 4 Active Energy Import
Input Metering						
3554	–	R	4	Date/Time	–	Input Metering Accumulation Reset Date/Time
3558	–	R	4	Int64	Unit	Input Metering Accumulation Channel 01
3562	–	R	4	Int64	Unit	Input Metering Accumulation Channel 02

Energy values – 32-bit floating point						
Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Total Energy						
45166	R	R	2	Float32	Wh	Total Active Energy Import
45168	R	R	2	Float32	Wh	Total Active Energy Export
45170	R	R	2	Float32	VARh	Total Reactive Energy Import
45172	R	R	2	Float32	VARh	Total Reactive Energy Export
45174	R	R	2	Float32	VAh	Total Apparent Energy Import
45176	R	R	2	Float32	VAh	Total Apparent Energy Export
Partial Energy Import						
45178	R	R	2	Float32	Wh	Partial Active Energy Import
45180	R	R	2	Float32	VARh	Partial Reactive Energy Import
45182	R	R	2	Float32	VAh	Partial Apparent Energy Import
Phase Energy Import						
45184	R	R	2	Float32	Wh	Active Energy Import Phase 1
45186	R	R	2	Float32	Wh	Active Energy Import Phase 2
45188	R	R	2	Float32	Wh	Active Energy Import Phase 3
45190	R	R	2	Float32	VARh	Reactive Energy Import Phase 1
45192	R	R	2	Float32	VARh	Reactive Energy Import Phase 2
45194	R	R	2	Float32	VARh	Reactive Energy Import Phase 3
45196	R	R	2	Float32	VAh	Apparent Energy Import Phase 1
45198	R	R	2	Float32	VAh	Apparent Energy Import Phase 2
45200	R	R	2	Float32	VAh	Apparent Energy Import Phase 3
Energy by Tariff Import						
45206	R	R	2	Float32	Wh	Rate 1 Active Energy Import
45208	R	R	2	Float32	Wh	Rate 2 Active Energy Import
45210	R	R	2	Float32	Wh	Rate 3 Active Energy Import
45212	R	R	2	Float32	Wh	Rate 4 Active Energy Import
Input Metering						

Energy values – 32-bit floating point						
Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
45202	–	R	2	Float32	Unit	Input Metering Accumulation Channel 01
45204	–	R	2	Float32	Unit	Input Metering Accumulation Channel 02

Demand

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Demand System (Global)						
3701	R/WC	R/WC	1	UInt16	–	Demand Method: 1 = Timed Interval Sliding Block 2 = Timed Interval Fixed Block
3702	R/WC	R/WC	1	UInt16	Minute	Demand Interval Duration
3706	R	R	4	Date/Time	–	Demand Peak Reset Date/Time
Power/Current Demand						
3766	R	R	2	Float32	kW	Active Power Present Demand
3770	R	R	2	Float32	kW	Active Power Peak Demand
3772	R	R	4	Date/Time	–	Active Power Peak Demand Date/Time
3782	R	R	2	Float32	kVAR	Reactive Power Present Demand
3786	R	R	2	Float32	kVAR	Reactive Power Peak Demand
3788	R	R	4	Date/Time	–	Reactive Power Peak Demand Date/Time
3798	R	R	2	Float32	kVA	Apparent Power Present Demand
3802	R	R	2	Float32	kVA	Apparent Power Peak Demand
3804	R	R	4	Date/Time	–	Apparent Power Peak Demand Date/Time
3814	R	R	2	Float32	A	Current I1 Present Demand
3818	R	R	2	Float32	A	Current I1 Peak Demand
3820	R	R	4	Date/Time	–	Current I1 Peak Demand Date/Time
3830	R	R	2	Float32	A	Current I2 Present Demand
3834	R	R	2	Float32	A	Current I2 Peak Demand
3836	R	R	4	Date/Time	–	Current I2 Peak Demand Date/Time
3846	R	R	2	Float32	A	Current I3 Present Demand
3850	R	R	2	Float32	A	Current I3 Peak Demand
3852	R	R	4	Date/Time	–	Current I3 Peak Demand Date/Time
3862	R	R	2	Float32	A	Current In Present Demand
3866	R	R	2	Float32	A	Current In Peak Demand
3868	R	R	4	Date/Time	–	Current In Peak Demand Date/Time
3878	R	R	2	Float32	A	Current Avg Present Demand
3882	R	R	2	Float32	A	Current Avg Peak Demand
3884	R	R	4	Date/Time	–	Current Avg Peak Demand Date/Time

MinMax Reset

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
27214	R	R	4	Date/Time	–	Minimum/Maximum Reset Date/Time

Minimum Values

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Current						
27218	R	R	2	Float32	A	Minimum Current I1
27220	R	R	2	Float32	A	Minimum Current I2
27222	R	R	2	Float32	A	Minimum Current I3
27224	R	R	2	Float32	A	Minimum Current N
27228	R	R	2	Float32	A	Minimum Current Avg
Voltage						
27238	R	R	2	Float32	V	Minimum Voltage L1-L2
27240	R	R	2	Float32	V	Minimum Voltage L2-L3
27242	R	R	2	Float32	V	Minimum Voltage L3-L1
27244	R	R	2	Float32	V	Minimum Voltage L-L Avg
27246	R	R	2	Float32	V	Minimum Voltage L1-N
27248	R	R	2	Float32	V	Minimum Voltage L2-N
27250	R	R	2	Float32	V	Minimum Voltage L3-N
27254	R	R	2	Float32	V	Minimum Voltage L-N Avg
Power						
27272	R	R	2	Float32	kW	Minimum Active Power Phase 1
27274	R	R	2	Float32	kW	Minimum Active Power Phase 2
27276	R	R	2	Float32	kW	Minimum Active Power Phase 3
27278	R	R	2	Float32	kW	Minimum Active Power Total
27280	R	R	2	Float32	kVAR	Minimum Reactive Power Phase 1
27282	R	R	2	Float32	kVAR	Minimum Reactive Power Phase 2
27284	R	R	2	Float32	kVAR	Minimum Reactive Power Phase 3
27286	R	R	2	Float32	kVAR	Minimum Reactive Power Total
27288	R	R	2	Float32	kVA	Minimum Apparent Power Phase 1
27290	R	R	2	Float32	kVA	Minimum Apparent Power Phase 2
27292	R	R	2	Float32	kVA	Minimum Apparent Power Phase 3
27294	R	R	2	Float32	kVA	Minimum Apparent Power Total
Power Factor						
27306	R	R	2	4Q FP PF	–	Minimum Power Factor Phase 1
27308	R	R	2	4Q FP PF	–	Minimum Power Factor Phase 2
27310	R	R	2	4Q FP PF	–	Minimum Power Factor Phase 3
27312	R	R	2	4Q FP PF	–	Minimum Power Factor Total
Tangent Phi (Reactive Factor)						
27336	R	R	2	Float32	–	Minimum Tangent Phi, Total
Total Harmonic Distortion, Current						
27338	R	R	2	Float32	%	Minimum THD Current I1
27340	R	R	2	Float32	%	Minimum THD Current I2
27342	R	R	2	Float32	%	Minimum THD Current I3
27344	R	R	2	Float32	%	Minimum THD Current N
Total Harmonic Distortion, Voltage						
27360	R	R	2	Float32	%	Minimum THD Voltage L1-L2
27362	R	R	2	Float32	%	Minimum THD Voltage L2-L3
27364	R	R	2	Float32	%	Minimum THD Voltage L3-L1
27366	R	R	2	Float32	%	Minimum THD Voltage L-L Avg
27368	R	R	2	Float32	%	Minimum THD Voltage L1-N
27370	R	R	2	Float32	%	Minimum THD Voltage L2-N
27372	R	R	2	Float32	%	Minimum THD Voltage L3-N

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
27376	R	R	2	Float32	%	Minimum THD Voltage L-N Avg
Frequency						
27616	R	R	2	Float32	Hz	Minimum Frequency

Maximum Values

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Current						
27694	R	R	2	Float32	A	Maximum Current I1
27696	R	R	2	Float32	A	Maximum Current I2
27698	R	R	2	Float32	A	Maximum Current I3
27700	R	R	2	Float32	A	Maximum Current N
27704	R	R	2	Float32	A	Maximum Current Avg
Voltage						
27714	R	R	2	Float32	V	Maximum Voltage L1-L2
27716	R	R	2	Float32	V	Maximum Voltage L2-L3
27718	R	R	2	Float32	V	Maximum Voltage L3-L1
27720	R	R	2	Float32	V	Maximum Voltage L-L Avg
27722	R	R	2	Float32	V	Maximum Voltage L1-N
27724	R	R	2	Float32	V	Maximum Voltage L2-N
27726	R	R	2	Float32	V	Maximum Voltage L3-N
27730	R	R	2	Float32	V	Maximum Voltage L-N Avg
Power						
27748	R	R	2	Float32	kW	Maximum Active Power Phase 1
27750	R	R	2	Float32	kW	Maximum Active Power Phase 2
27752	R	R	2	Float32	kW	Maximum Active Power Phase 3
27754	R	R	2	Float32	kW	Maximum Active Power Total
27756	R	R	2	Float32	kVAR	Maximum Reactive Power Phase 1
27758	R	R	2	Float32	kVAR	Maximum Reactive Power Phase 2
27760	R	R	2	Float32	kVAR	Maximum Reactive Power Phase 3
27762	R	R	2	Float32	kVAR	Maximum Reactive Power Total
27764	R	R	2	Float32	kVA	Maximum Apparent Power Phase 1
27766	R	R	2	Float32	kVA	Maximum Apparent Power Phase 2
27768	R	R	2	Float32	kVA	Maximum Apparent Power Phase 3
27770	R	R	2	Float32	kVA	Maximum Apparent Power Total
Power Factor						
27782	R	R	2	4Q FP PF	–	Maximum Power Factor Phase 1
27784	R	R	2	4Q FP PF	–	Maximum Power Factor Phase 2
27786	R	R	2	4Q FP PF	–	Maximum Power Factor Phase 3
27788	R	R	2	4Q FP PF	–	Maximum Power Factor Total
Tangent Phi (Reactive Factor)						
27812	R	R	2	Float32	–	Maximum Tangent Phi, Total
Total Harmonic Distortion, Current						
27814	R	R	2	Float32	%	Maximum THD Current I1
27816	R	R	2	Float32	%	Maximum THD Current I2
27818	R	R	2	Float32	%	Maximum THD Current I3
27820	R	R	2	Float32	%	Maximum THD Current N
Total Harmonic Distortion, Voltage						

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
27836	R	R	2	Float32	%	Maximum THD Voltage L1-L2
27838	R	R	2	Float32	%	Maximum THD Voltage L2-L3
27840	R	R	2	Float32	%	Maximum THD Voltage L3-L1
27842	R	R	2	Float32	%	Maximum THD Voltage L-L
27844	R	R	2	Float32	%	Maximum THD Voltage L1-N
27846	R	R	2	Float32	%	Maximum THD Voltage L2-N
27848	R	R	2	Float32	%	Maximum THD Voltage L3-N
27852	R	R	2	Float32	%	Maximum THD Voltage L-N
Frequency						
28092	R	R	2	Float32	Hz	Maximum Frequency

MinMax with Time Stamp

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
45130	R	R	4	Date/Time	–	Minimum Current of I1,I2,I3 - Date/Time
45134	R	R	2	Float32	A	Minimum Current of I1,I2,I3 - Value
45136	R	R	4	Date/Time	–	Minimum Power Factor Total - Date/Time
45140	R	R	2	Float32	–	Minimum Power Factor Total - Value
45142	R	R	4	Date/Time	–	Maximum Current of I1,I2,I3 - Date/Time
45146	R	R	2	Float32	A	Maximum Current of I1,I2,I3 - Value
45148	R	R	4	Date/Time	–	Maximum Active Power Total - Date/Time
45152	R	R	2	Float32	kW	Maximum Active Power Total - Value
45154	R	R	4	Date/Time	–	Maximum Apparent Power Total - Date/Time
45158	R	R	2	Float32	kVA	Maximum Apparent Power Total - Value
45160	R	R	4	Date/Time	–	Maximum Power Factor Total - Date/Time
45164	R	R	2	Float32	–	Maximum Power Factor Total - Value

Power Quality

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
45100	R	R	2	Float32	%	THD Current I1
45102	R	R	2	Float32	%	THD Current I2
45104	R	R	2	Float32	%	THD Current I3
45106	R	R	2	Float32	%	THD Current Neutral
45108	R	R	2	Float32	%	THD Phase Current Worst
45110	R	R	2	Float32	%	THD Voltage L1-L2
45112	R	R	2	Float32	%	THD Voltage L2-L3
45114	R	R	2	Float32	%	THD Voltage L3-L1
45116	R	R	2	Float32	%	THD Voltage L-L Avg
45118	R	R	2	Float32	%	THD Voltage L-L Worst
45120	R	R	2	Float32	%	THD Voltage L1-N
45122	R	R	2	Float32	%	THD Voltage L2-N
45124	R	R	2	Float32	%	THD Voltage L3-N
45126	R	R	2	Float32	%	THD Voltage L-N Avg
45128	R	R	2	Float32	%	THD Voltage L-N Worst

Alarms

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Alarm Status						
Activated Alarm Bitmaps						
11021	R	R	1	Bitmap	–	0 = Alarm is inactive 1 = Alarm is active BitN = Alarm ID N (1-16)
11022	R	R	1	Bitmap	–	BitN = Alarm ID N (17-32)
11023	R	R	1	Bitmap	–	BitN = Alarm ID N (33-40) BitN fixed to 0
11024	R	R	1	Bitmap	–	BitN = Alarm ID N (41-56) BitN fixed to 0 for PM3250
Enabled Alarm Bitmaps						
11040	R	R	1	Bitmap	–	0 = Alarm is disabled 1 = Alarm is enabled BitN = Alarm ID N (1-16)
11041	R	R	1	Bitmap	–	BitN = Alarm ID N (17-32)
11042	R	R	1	Bitmap	–	BitN = Alarm ID N (33-40) BitN fixed to 0
11043	R	R	1	Bitmap	–	BitN = Alarm ID N (41-56) BitN fixed to 0 for PM3250
Unacknowledged Alarm Bitmaps						
11078	R	R	1	Bitmap	–	0 = Historic alarms are acknowledged by the user 1 = Historic alarms are unacknowledged by the user BitN = Alarm ID N (1-16)
11079	R	R	1	Bitmap	–	BitN = Alarm ID N (17-32)
11080	R	R	1	Bitmap	–	BitN = Alarm ID N (33-40) BitN fixed to 0
11081	R	R	1	Bitmap	–	BitN = Alarm ID N (41-56) BitN fixed to 0 for PM3250
Alarm Event Queue						
11113	R	R	1	UInt16	–	Size of Event Queue: fixed as 20
11114	R	R	1	UInt16	–	Number of entries in Event Queue
11115	R	R	1	UInt16	–	Entry number of Most Recent Event
Entry 001						
11116	R	R	1	UInt16	–	Entry Number
11117	R	R	4	Date/Time	–	Date/Time
11121	R	R	1	UInt16	–	Record Type: 0xFF10 = UInt16 0xFF40 = Float32
11122	R	R	1	UInt16	–	Register Number or Event Code: Primary Event: Modbus Address of the Unit Secondary Event: Event Code
11123	R	R	4	UInt16	–	Value: Primary Event: Alarm Attributes Register Address. Secondary Event: Worst value of source registers.
11127	R	R	1	UInt16	–	Sequence Number
Entry 020						
11344	R	R	1	UInt16	–	Entry Number

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
11345	R	R	4	Date/Time	–	Date/Time
11349	R	R	1	UInt16	–	Record Type
11350	R	R	1	UInt16	–	Register Number or Event Code
11351	R	R	4	UInt16	–	Value
11355	R	R	1	UInt16	–	Sequence Number
Alarm History Log						
12316	R	R	1	UInt16	–	Size of History Log
12317	R	R	1	UInt16	–	Number of entries in History Log
12318	R	R	1	UInt16	–	Entry number of most Recent Event
Entry 001						
12319	R	R	1	UInt16	–	Entry Number
12320	R	R	4	Date/Time	–	Date/Time
12324	R	R	1	UInt16	–	Record Type: 0xFF10 = UInt16 0xFF40 = Float32
12325	R	R	1	UInt16	–	Register Number or Event Code: Primary Event: Modbus Address of the Unit Secondary Event: Event Code
12326	R	R	4	UInt16	–	Value: Primary Event: Alarm Attributes Register Address Secondary Event: Worst value of source registers
12330	R	R	1	UInt16	–	Sequence Number
Entry 020						
12547	R	R	1	UInt16	–	Entry Number
12548	R	R	4	Date/Time	–	Date/Time
12552	R	R	1	UInt16	–	Record Type
12553	R	R	1	UInt16	–	Register Number or Event Code
12554	R	R	4	UInt16	–	Value
12558	R	R	1	UInt16	–	Sequence Number
1- Second Alarms - Standard						
Over Current, Phase						Alarm ID = 1
14005	R/WC	R/WC	2	Float32	A	Pickup Setpoint
14007	R/WC	R/WC	2	UInt32	Second	Pickup Time Delay
14009	R/WC	R/WC	2	Float32	%	Dropout Setpoint Deviation percentage from pickup setpoint
14011	R/WC	R/WC	2	UInt32	Second	Dropout Time Delay Same as pickup time delay
14013	R/WC	R/WC	1	Bitmap	–	Digital Outputs to Associate: 0 = Unassociated 1 = Associated Bit0 = DO1 association Bit1 = DO2 association
Under Current, Phase						Alarm ID = 2
14025	–	R/WC	2	Float32	A	Pickup Setpoint
14027	–	R/WC	2	UInt32	Second	Pickup Time Delay
14029	–	R/WC	2	Float32	%	Dropout Setpoint
14031	–	R/WC	2	UInt32	Second	Dropout Time Delay
14033	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
Over Voltage, L-L						Alarm ID = 5
14085	–	R/WC	2	Float32	V	Pickup Setpoint

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
14087	–	R/WC	2	UInt32	Second	Pickup Time Delay
14089	–	R/WC	2	Float32	%	Dropout Setpoint
14091	–	R/WC	2	UInt32	Second	Dropout Time Delay
14093	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
Under Voltage, L-L						Alarm ID = 6
14105	R/WC	R/WC	2	Float32	V	Pickup Setpoint
14107	R/WC	R/WC	2	UInt32	Second	Pickup Time Delay
14109	R/WC	R/WC	2	Float32	%	Dropout Setpoint
14111	R/WC	R/WC	2	UInt32	Second	Dropout Time Delay
14113	R/WC	R/WC	1	Bitmap	–	Digital Outputs to Associate
Over Voltage, L-N						Alarm ID = 7
14125	–	R/WC	2	Float32	V	Pickup Setpoint
14127	–	R/WC	2	UInt32	Second	Pickup Time Delay
14129	–	R/WC	2	Float32	%	Dropout Setpoint
14131	–	R/WC	2	UInt32	Second	Dropout Time Delay
14133	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
Under Voltage, L-N						Alarm ID = 8
14145	R/WC	R/WC	2	Float32	V	Pickup Setpoint
14147	R/WC	R/WC	2	UInt32	Second	Pickup Time Delay
14149	R/WC	R/WC	2	Float32	%	Dropout Setpoint
14151	R/WC	R/WC	2	UInt32	Second	Dropout Time Delay
14153	R/WC	R/WC	1	Bitmap	–	Digital Outputs to Associate
Over Power, Total Active						Alarm ID = 9
14165	R/WC	R/WC	2	Float32	kW	Pickup Setpoint
14167	R/WC	R/WC	2	UInt32	Second	Pickup Time Delay
14169	R/WC	R/WC	2	Float32	%	Dropout Setpoint
14171	R/WC	R/WC	2	UInt32	Second	Dropout Time Delay
14173	R/WC	R/WC	1	Bitmap	–	Digital Outputs to Associate
Over Power, Total Reactive						Alarm ID = 10
14185	–	R/WC	2	Float32	kVAR	Pickup Setpoint
14187	–	R/WC	2	UInt32	Second	Pickup Time Delay
14189	–	R/WC	2	Float32	%	Dropout Setpoint
14191	–	R/WC	2	UInt32	Second	Dropout Time Delay
14193	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
Over Power, Total Apparent						Alarm ID = 11
14205	R/WC	R/WC	2	Float32	kVA	Pickup Setpoint
14207	R/WC	R/WC	2	UInt32	Second	Pickup Time Delay
14209	R/WC	R/WC	2	Float32	%	Dropout Setpoint
14211	R/WC	R/WC	2	UInt32	Second	Dropout Time Delay
14213	R/WC	R/WC	1	Bitmap	–	Digital Outputs to Associate
Leading Power Factor, Total						Alarm ID = 12
14225	–	R/WC	2	Float32	–	Pickup Setpoint
14227	–	R/WC	2	UInt32	Second	Pickup Time Delay
14229	–	R/WC	2	Float32	%	Dropout Setpoint
14231	–	R/WC	2	UInt32	Second	Dropout Time Delay
14233	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
Lagging Power Factor, Total						Alarm ID = 13
14245	–	R/WC	2	Float32	–	Pickup Setpoint
14247	–	R/WC	2	UInt32	Second	Pickup Time Delay
14249	–	R/WC	2	Float32	%	Dropout Setpoint

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
14251	–	R/WC	2	UInt32	Second	Dropout Time Delay
14253	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
Over Demand, Total Active Power, Present						Alarm ID = 16
14305	–	R/WC	2	Float32	kW	Pickup Setpoint
14307	–	R/WC	2	UInt32	Second	Pickup Time Delay
14309	–	R/WC	2	Float32	%	Dropout Setpoint
14311	–	R/WC	2	UInt32	Second	Dropout Time Delay
14313	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
Over Demand, Total Apparent Power, Present						Alarm ID = 22
14425	–	R/WC	2	Float32	kVA	Pickup Setpoint
14427	–	R/WC	2	UInt32	Second	Pickup Time Delay
14429	–	R/WC	2	Float32	%	Dropout Setpoint
14431	–	R/WC	2	UInt32	Second	Dropout Time Delay
14433	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
Over THD-U, Phase						Alarm ID = 28
14545	–	R/WC	2	Float32	%	Pickup Setpoint
14547	–	R/WC	2	UInt32	Second	Pickup Time Delay
14549	–	R/WC	2	Float32	%	Dropout Setpoint
14551	–	R/WC	2	UInt32	Second	Dropout Time Delay
14553	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
Under Power, Total Active						Alarm ID = 30
14825	R/WC	R/WC	2	Float32	kW	Pickup Setpoint
14827	R/WC	R/WC	2	UInt32	Second	Pickup Time Delay
14829	R/WC	R/WC	2	Float32	%	Dropout Setpoint
14831	R/WC	R/WC	2	UInt32	Second	Dropout Time Delay
14833	R/WC	R/WC	1	Bitmap	–	Digital Outputs to Associate
Over THD-I, Phase						Alarm ID = 31
14865	–	–	2	Float32	%	Pickup Setpoint
14867	–	R/WC	2	UInt32	Second	Pickup Time Delay
14869	–	R/WC	2	Float32	%	Dropout Setpoint
14871	–	R/WC	2	UInt32	Second	Dropout Time Delay
14873	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
Over THD-V, Phase						Alarm ID = 32
14905	–	R/WC	2	Float32	%	Pickup Setpoint
14907	–	R/WC	2	UInt32	Second	Pickup Time Delay
14909	–	R/WC	2	Float32	%	Dropout Setpoint
14911	–	R/WC	2	UInt32	Second	Dropout Time Delay
14913	–	R/WC	1	Bitmap	–	Digital Outputs to Associate
1-Second Alarms - Custom						
Over Energy, Total Active						Alarm ID = 41
14942	–	R/WC	2	UInt16	–	Source Register: ENERGY_LOG_DAY_REALTIME_VALUE: 41504 ENERGY_LOG_WEEK_REALTIME_VALUE: 41874 ENERGY_LOG_MONTH_REALTIME_VALUE: 42043
14945	–	R/WC	2	Float32	Wh	Pickup Setpoint
14947	–	R/WC	2	UInt32	Second	Pickup Time Delay
14949	–	R/WC	2	Float32	%	Dropout Setpoint
14951	–	R/WC	2	UInt32	Second	Dropout Time Delay
14953	–	R/WC	1	Bitmap	–	Digital Outputs to Associate

Energy Log

Register Address	Action (R/W/WC)		Size	Type	Units	Description
	PM3250	PM3255				
Energy Log - Day						
45600	–	R	1	UInt16	–	Enable/Disable: 0x0000 = Disable 0xFFFF = Enable
45601	–	R	1	UInt16	–	Maximum Entry Number
45602	–	R	1	UInt16	–	Current Entry Number
45603	–	R	1	UInt16	–	Latest Entry ID
45604	–	R	1	UInt16	–	Oldest Entry ID
45605	–	R	4	Int64	Wh	Real-time Value of Current Day
45609	–	R	4	Date/Time	–	Entry 001 Date/Time
45613	–	R	4	Int64	Wh	Entry 001 Value
45961	–	R	4	Date/Time	–	Entry 045 Date/Time
45965	–	R	4	Int64	Wh	Entry 045 Value
Energy Log - Week						
45969	–	R	1	UInt16	–	Enable/Disable: 0x0000 = Disable 0xFFFF = Enable
45970	–	R	1	UInt16	–	Maximum Entry Number
45971	–	R	1	UInt16	–	Current Entry Number
45972	–	R	1	UInt16	–	Latest Entry ID
45973	–	R	1	UInt16	–	Oldest Entry ID
45974	–	R	4	Int64	Wh	Real-time Value of Current Day
45978	–	R	4	Date/Time	–	Entry 001 Date/Time
45982	–	R	4	Int64	Wh	Entry 001 Value
46130	–	R	4	Date/Time	–	Entry 020 Date/Time
46134	–	R	4	Int64	Wh	Entry 020 Value
Energy Log - Month						
46138	–	R	1	UInt16	–	Enable/Disable: 0x0000 = Disable 0xFFFF = Enable
46139	–	R	1	UInt16	–	Maximum Entry Number
46140	–	R	1	UInt16	–	Current Entry Number
46141	–	R	1	UInt16	–	Latest Entry ID
46142	–	R	1	UInt16	–	Oldest Entry ID
46143	–	R	4	Int64	Wh	Real-time Value of Current Day
46147	–	R	4	Date/Time	–	Entry 001 Date/Time
46151	–	R	4	Int64	Wh	Entry 001 Value
46243	–	R	4	Date/Time	–	Entry 013 Date/Time
46247	–	R	4	Int64	Wh	Entry 013 Value

Read Device Identification

Register List

Read Device Identification

The power meter supports the Basic Device Identification with the mandatory objects:

- VendorName

- ProductCode
- Revision Number

ObjectID	Object Name/Description	Object Length	Object Value	Note
0x00	VendorName	16	SchneiderElectric	–
0x01	ProductCode	11	METSEPM3200 METSEPM3210 METSEPM3250 METSEPM3255	The ProductCode is identical to the catalog number of each reference
0x02	MajorMinorRevision	04	V1.0	Equivalent to X.Y in register 1637

The Read Device ID code 01 and 04 are supported:

- 01 = request to get the basic device identification (stream access)
- 04 = request to get one specific identification objective (individual access)

The Modbus request and response are compliant with “Chapter 6.20 43 / 14 (0x2B / 0x0E) Read Device Identification” of Modbus Application Protocol Specification.

Chapter 7 Specifications

Electrical characteristics

Measurement accuracy	IEC61557-12	x/5 A CTs: PMD/Sx/K55/0.5 x/1 A CTs: IEC61557-12 PMD/Sx/K55/1
	Current	x/5 A CTs: ±0.3%, 0.5 – 6 A x/1 A CTs: ±0.5%, 0.1 – 1.2 A
	Voltage	±0.3%, 50 – 330 V L-N or 80 – 570 V L-L
	Power factor	x/5 A CTs: ±0.005, 0.5 A – 6 A x/1A CTs: 0.1 – 1.2 A 0.5 L – 0.8 C
	Active/Apparent power	x/5 A CTs: Class 0.5 x/1 A CTs: Class 1
	Reactive power	Class 2
	Frequency	45 – 65 Hz ±0.05%
	Active energy	x/5 A CTs: IEC62053-22 Class 0.5s x/1 A CTs: IEC62053-21 Class 1
	Reactive energy	IEC62053-23 Class 2
Voltage inputs	Measured voltage	Wye: 60 – 277 V L-N, 100 – 480 V L-L ± 20% Delta: 100 – 480 V L-L ± 20%
	Overload	332 V L-N or 575 V L-L
	Frequency	50 / 60 Hz ±10%
	Minimum wire temperature rating required	90 °C (194 °F)
	Impedance	3 MΩ
	Burden	0.2 VA
	Measurement category	III
	Wire	2.5 mm^2 (14 AWG)
	Wire strip length	8 mm (0.31 in)
	Torque	0.5 N·m (4.4 in·lb)
Current inputs	Nominal current	1 A or 5 A Requires x/5A or x/1A current transformers
	Measured current	20 mA – 6 A
	Withstand	10 A continuous, 20 A at 10 sec/hr
	Impedance	< 1 mΩ
	Burden	< 0.036 VA at 6 A
	Minimum wire temperature rating required	90 °C (194 °F)
	Wire	6 mm^2 (10 AWG)
	Wire strip length	8 mm (0.31 in)
	Torque	0.8 N·m (7.0 in·lb)
Control power	Operating range	AC: 100 – 277 V L-N, 173 – 480 V L-L ±20% DC: 100 – 300 V
	Frequency	45 – 65 Hz
	Burden	AC: 5 VA DC: 3 W
	Wire	6 mm^2 (10 AWG)
	Wire strip length	8 mm (0.31 in)
	Torque	0.8 N·m (7.0 in·lb)
	Installation category	III

Digital output (PM3255)	Number	2
	Type	Solid-state relay
	Load voltage	5 – 40 V DC
	Maximum load current	50 mA
	Output resistance	50 Ω maximum
	Isolation	3.75 kV
	Wire	1.5 mm^2 (16 AWG)
	Wire strip length	6 mm (0.23 in)
	Torque	0.5 N·m (4.4 in·lb)
Pulse output (PM3210)	Number	1
	Type	Opto-coupler output for remote transfer IEC62053-31 compatible (S0 format output)
	Pulses / kWh	Configurable
	Voltage	5 – 30 V DC
	Current	1 – 15 mA
	Pulse width	Configurable, 50 ms minimum
	Isolation	3.75 kV
	Wire	2.5 mm^2 (14 AWG)
	Wire strip length	6 mm (0.23 in)
	Torque	0.5 N·m (4.4 in·lb)
Digital input (PM3255)	Number	2
	Type	Type 1 opto-coupler inputs IEC 61131-2 compatible
	Maximum input	Voltage: 40 V DC Current: 4 mA
	OFF state	0 – 5 V DC
	ON state	11 – 40 V DC
	Nominal voltage	24 V DC
	Isolation	3.75 kV
	Wire	1.5 mm^2 (16 AWG)
	Wire strip length	6 mm (0.23 in)
	Torque	0.5 N·m (4.4 in·lb)

Mechanical characteristics

Weight		0.26 kg (0.57 lb)
IP degree of protection	Front panel	IP40
	Meter body	IP20
Display dimensions		43 x 34.6 mm (1.7 x 1.3 in)
Display resolution		128 x 96
Display data update rate		1 second
Energy pulsing LED		5000 flashes / kWh without consideration of transformer ratios

Environmental characteristics

Operating temperature	-25 to +55 °C (-13 to +131 °F) (K55)
Storage temperature	-40 to +85 °C (-40 to +185 °F) (K55)
Humidity rating	5 to 95% RH non-condensing at 50 °C (122 °F)
Pollution degree	2
Altitude	< 2000 m (6561 ft)
Location	Not suitable for wet locations Indoor use only

EMC (electromagnetic compatibility)

Electrostatic discharge	Level IV (IEC61000-4-2)
Immunity to radiated fields	Level III (IEC61000-4-3)
Immunity to fast transients	Level IV (IEC61000-4-4)
Immunity to surge	Level IV (IEC61000-4-5)
Conducted immunity	Level III (IEC61000-4-6)
Immunity to power frequency magnetic fields	0.5 mT (IEC61000-4-8)
Conducted and radiated emissions	Class B (EN55022)

Safety and standards

Safety	CE as per IEC61010-1
Protective class	II Double insulated for user accessible parts
Standard compliance	IEC61557-12, EN61557-12 IEC61010-1, UL61010-1 IEC62053-11, IEC62053-21, IEC62053-22, IEC62053-23 EN50470-1, EN50470-3

Modbus RS-485 communications

Modbus RS-485 (PM3250 / PM3255)	Number of ports	1
	Parity	Even, Odd, None
	Baud rate	9600, 19200, 38400
	Number of stop bits	1
	Isolation	4 kV, double insulation
	Wire	2.5 mm^2 (14 AWG)
	Wire strip length	7 mm (0.28 in)
	Torque	0.5 N·m (4.4 in·lb)

Real-time clock

Type	Quartz crystal based
Clock drift	< 2.5 s/day (30 ppm) at 25 °C (77 °F)

Chapter 8 Maintenance and Troubleshooting

Password Recovery

If you forget your password, contact Technical Support.

Language Download

You can download new language files onto the power meter over communications using DLF3000 software. Both DLF software and language pack firmware files are available as free downloads from www.schneider-electric.com.

Enabling language download on the meter

You must use the meter display to enable the download of new language files before you download the files to your meter.

1.Navigate to **Setup** > **LanDL** and click **OK**.

2.Click **OK** to confirm.

Troubleshooting

This meter does not contain any user-serviceable parts. If the meter requires service, contact your local sales representative.

NOTICE

RISK OF DAMAGE TO THE ENERGY METER

- Do not open the energy meter case.
- Do not attempt to repair any components of the energy meter.

Failure to follow these instructions can result in equipment damage.

Do not open the power meter. Opening the power meter voids the warranty.

The combination of the backlight and the symbol ! helps you to troubleshoot the power meter. Refer to “Status information” on page 25 for more details.

If the combination of the backlight and the symbol ! indicates an active diagnosis, refer to “Meter operation” on page 25 to get the diagnostic code. If the diagnostic code persists after following the instructions below, please contact Technical Support.

Diagnostic Code	PM3200	PM3210	PM3250	PM3255	Description	Possible Solution
–	√	√	√	√	LCD display is not visible.	Check and adjust LCD contrast/backlight settings.
–	√	√	√	√	Push buttons do not function.	Restart the power meter by power off and power on again.
101, 102	√	√	√	√	Metering stops due to internal error. Total energy consumption is displayed.	Enter the Configuration mode and implement **Reset Config**.

Diagnostic Code	PM3200	PM3210	PM3250	PM3255	Description	Possible Solution
201	√	√	√	√	Metering continues. Mismatch between frequency settings and frequency measurements.	Correct frequency settings according to the nominal frequency of the network.
202	√	√	√	√	Metering continues. Mismatch between wiring settings and wiring inputs.	Correct wiring settings according to wiring inputs.
203	√	√	√	√	Metering continues. Phase sequence reverses.	Check wire connections or correct wiring settings.
205	√	√	√	√	Metering continues. Date and time have been reset due to loss of power.	Set Date and Time.
206	–	√	–	√	Metering continues. Pulse is missing due to overload on energy pulse output.	Check the energy pulse output settings and correct if needed.
207	√	√	√	√	Metering continues. Abnormal internal clock function.	Restart the power meter by power off and power on again.

Chapter 9 Power, energy and power factor

NOTE: The descriptions in this section assume that you are an electrical energy consumer, not a supplier.

Power (PQS)

A typical AC electrical system load has both resistive and reactive (inductive or capacitive) components. Resistive loads consume real power (P) and reactive loads consume reactive power (Q).

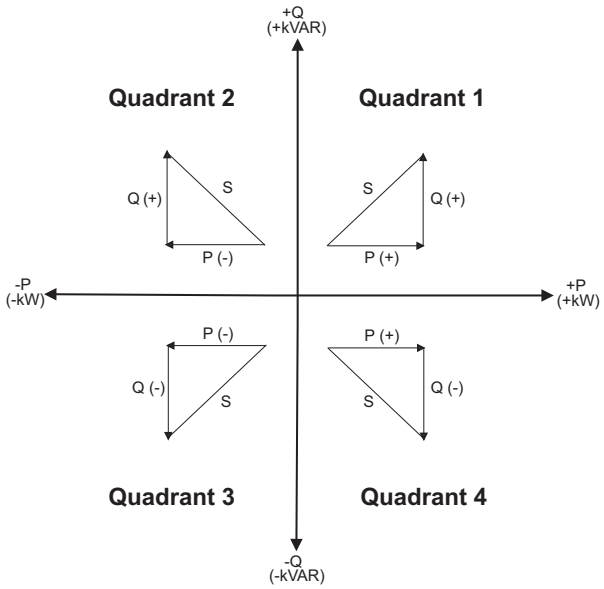
Apparent power (S) is the vector sum of real power (P) and reactive power (Q):

$$S = \sqrt{P^2 + Q^2}$$

Real power is measured in watts (W or kW), reactive power is measured in vars (VAR or kVAR) and apparent power is measured in volt-amps (VA or kVA).

Power and the PQ coordinate system

The meter uses the values of real power (P) and reactive power (Q) on the PQ coordinate system to calculate apparent power.



Power flow

Positive power flow P(+) and Q(+) means power is flowing from the power source towards the load. Negative power flow P(-) and Q(-) means power is flowing from the load towards the power source.

Energy delivered (imported) / energy received (exported)

The meter interprets energy delivered (imported) or received (exported) according to the direction of real power (P) flow.

Energy delivered (imported) means positive real power flow (+P) and energy received (exported) means negative real power flow (-P).

Quadrant	Real (P) power flow	Energy delivered (imported) or received (exported)
Quadrant 1	Positive (+)	Energy delivered (imported)
Quadrant 2	Negative (-)	Energy received (exported)
Quadrant 3	Negative (-)	Energy received (exported)
Quadrant 4	Positive (+)	Energy delivered (imported)

Power factor (PF)

Power factor (PF) is the ratio of real power (P) to apparent power (S), and is a number between 0 and 1.

$$PF = \frac{P}{S}$$

An ideal, purely resistive load has no reactive components, so its power factor is one (PF = 1, or unity power factor). A purely inductive or capacitive load no resistive components, so its power factor is zero (PF = 0).

True PF and displacement PF

The meter supports true power factor and displacement power factor values:

- True power factor includes harmonic content.
- Displacement power factor only considers the fundamental frequency.

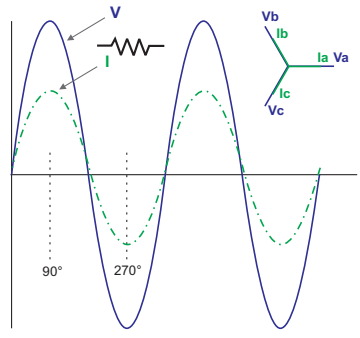
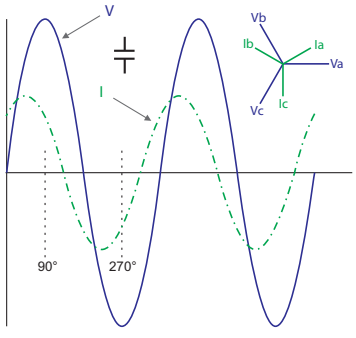
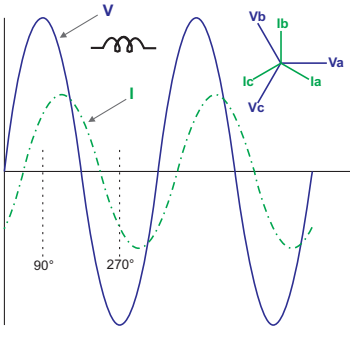
PF lead / lag convention

The meter correlates leading power factor (PF lead) or lagging power factor (PF lag) with whether the current waveform is leading or lagging the voltage waveform.

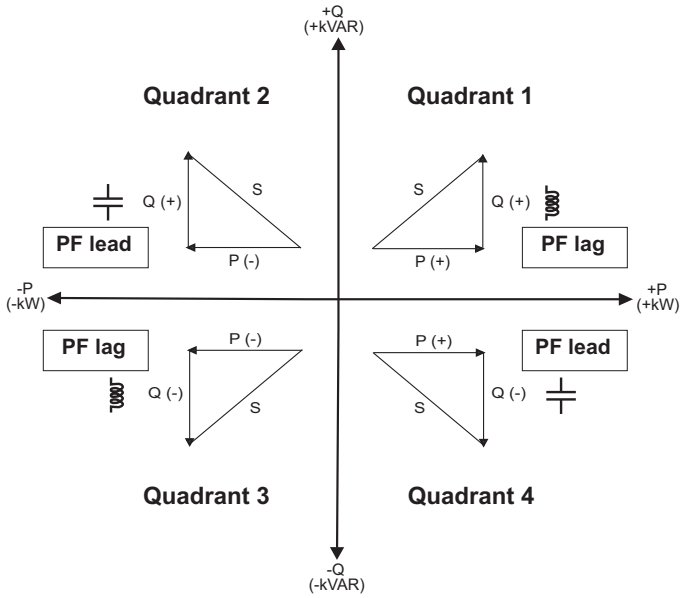
Current phase shift from voltage

For purely resistive loads the current waveform is in phase with the voltage waveform. For capacitive loads, current leads voltage. For inductive loads, current lags voltage.

Current lead / lag and load type

Current and voltage in phase (resistive)	Current leads voltage (capacitive)	Current lags voltage (inductive)
		

Power and PF lead / lag



PF lead / lag summary

Quadrant	Current phase shift	Load type	PF lead / lag
Quadrant 1	Current lags voltage	Inductive	PF lag
Quadrant 2	Current leads voltage	Capacitive	PF lead
Quadrant 3	Current lags voltage	Inductive	PF lag
Quadrant 4	Current leads voltage	Capacitive	PF lead

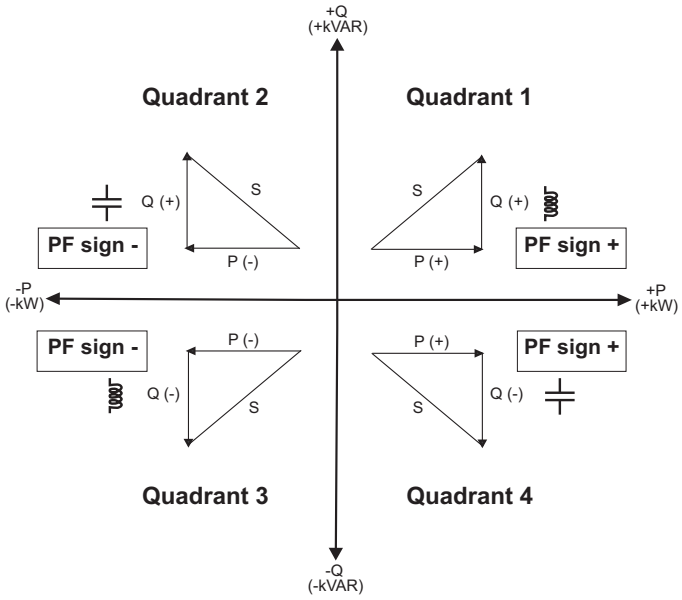
PF sign convention

The meter shows positive or negative power factor according to IEC standards.

PF sign in IEC mode

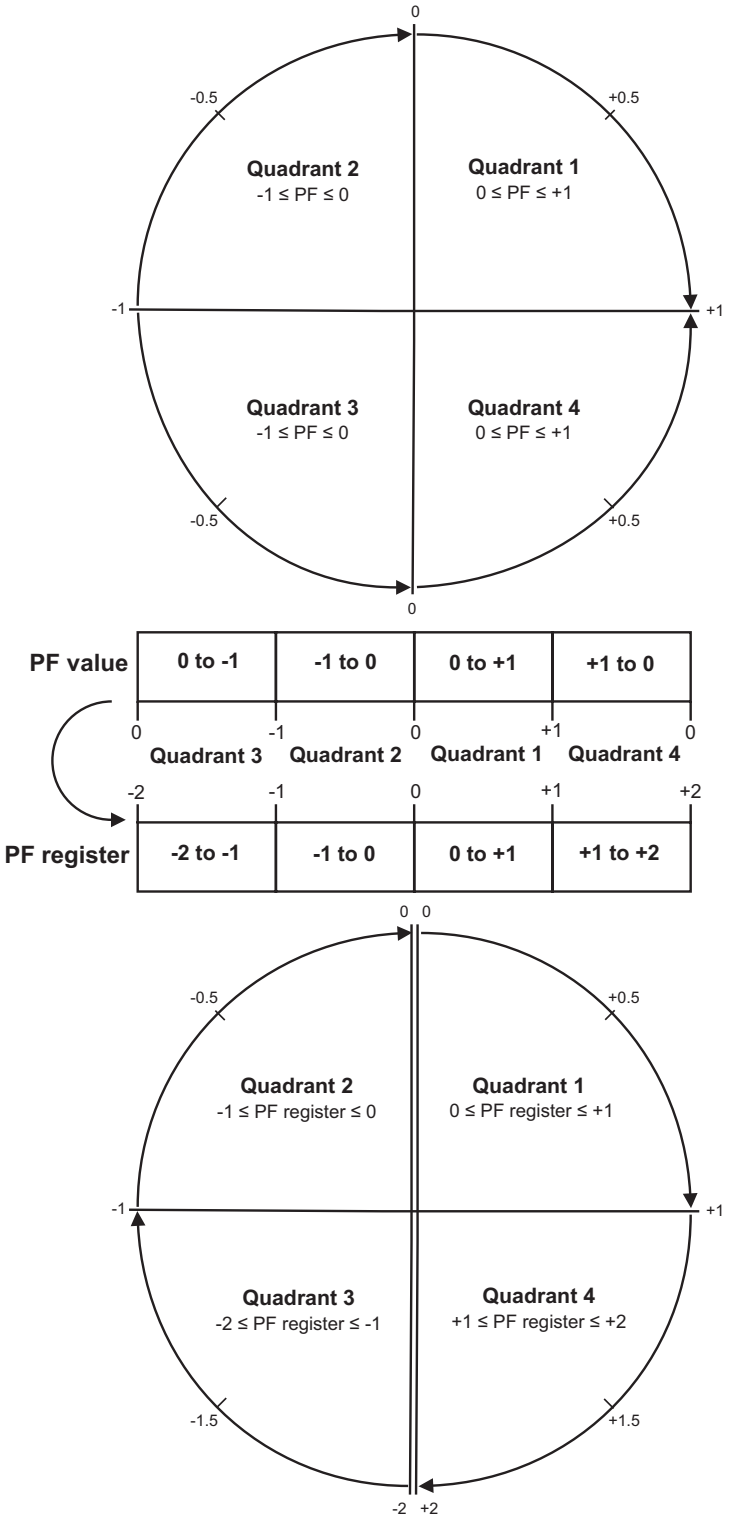
The meter correlates power factor sign (PF sign) with the direction of real power (P) flow.

- For positive real power (+P), the PF sign is positive (+).
- For negative real power (-P), the PF sign is negative (-).



Power factor register format

Each power factor value (PF value) occupies one floating point register for power factor (PF register). The meter performs a simple algorithm to the PF value then stores it in the PF register. The meter and software interpret the PF register for all reporting or data entry fields according to the following diagram:



PF value is calculated from the PF register value using the following formulas:

Quadrant	PF range	PF register range	PF formula
Quadrant 1	0 to +1	0 to +1	PF value = PF register value
Quadrant 2	-1 to 0	-1 to 0	PF value = PF register value
Quadrant 3	0 to -1	-2 to -1	PF value = (-2) - (PF register value)
Quadrant 4	+1 to 0	+1 to +2	PF value = (+2) - (PF register value)

Related topics

- See “Communication via Modbus” on page 39 for information on the meter’s Modbus registers.

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