# Energy meters

## iEM3400 / iEM3500 series

## User manual

**7EN02-0438-15**
**05/2026**




Schneider Electric

www.se.com

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# 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 manual 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 accompany this symbol to avoid injury or death.

**⚠⚠DANGER**

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

**Failure to follow these instructions 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 equipment. 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

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 the 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.

The user is cautioned that any changes or modifications not expressly approved by Schneider Electric could void the user’s authority to operate the equipment.

This digital apparatus complies with CAN ICES-3 (B) /NMB-3(B).

# About this manual

This manual discusses features of the iEM3400 / iEM3500 series energy meters and is intended for use by designers, system builders and maintenance technicians with an understanding of electrical distribution systems and monitoring devices.

## Document scope

Throughout the manual, the term “meter / device” refers to all models of the iEM3400 / iEM3500 series. All differences between the models, such as a feature specific to one model, are indicated with the appropriate model number or description.

This manual does not provide configuration information for advanced features where an expert user would perform advanced configuration. It also does not include instructions on how to incorporate meter data or perform meter configuration using energy management systems or software, other than ION Setup. ION Setup is a free configuration tool available for download from www.se.com.

## Validity note

| Document | Number |
|---|---|
| iEM3455 / iEM3465 / iEM3555 / iEM3565 instruction sheet | NHA61470 |
| iEM3455C1 / iEM3455C2 instruction sheet | QGH3793201 |

You can download these technical publications and other technical information from www.se.com.

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# Safety precautions

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

**⚠⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate Personal Protective Equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or other local standards.
- Turn off all power supplying this device and the equipment in which it is installed before working on or in the equipment.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Assume communications and I/O wiring are hazardous live until determined otherwise.
- Do not exceed the maximum ratings of this device.
- Do not short secondary terminals of Voltage Transformer (VT).
- Do not open secondary terminals of Current Transformer (CT).
- Ground secondary circuit of CTs.
- Do not use the data from the meter to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Do not install CTs or LPCTs in equipment where they exceed 75% of the wiring space of any cross-sectional area in the equipment.
- Do not install CTs or LPCTs in areas where ventilation openings may be blocked or in areas of breaker arc venting.
- Secure CT or LPCT secondary conductors to ensure they do not contact live circuits.
- Do not use water or any liquid material to clean the product. Use a cleaning cloth to remove dirt. If dirt cannot be removed, contact local Technical Support representative.
- The installer is responsible for co-ordinating the rating and the characteristics of the supply side over current protection devices with the maximum current rating.

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

**NOTE:** See IEC 60950-1, Annex W for more information on communications and I/O wiring connected to multiple devices.

**⚠WARNING**

**UNINTENDED OPERATION**

Do not use this device for critical control or protection of persons, animals, property or equipment.

**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 display or in software to determine if this device is functioning correctly or complying with all applicable standards.
- Do not use data displayed on the display 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.**

# Meter overview

## Overview of meter functions

The meters provide the essential measurement capabilities (for example, current, voltage, and energy) required to monitor a 1-phase or 3-phase electrical installation.

The key features of the meters are:

- Measurement of active and reactive energy
- Multi Tariffs (up to 4) controlled by internal clock, digital inputs or communication
- Pulse outputs
- Display (current, voltage, and energy measurements)
- Communications via Modbus or BACnet protocols

## Main characteristics

### LVCT / Rogowski Coil meters

| Function | | iEM3455 | iEM3465 | iEM3555 | iEM3565 |
|---|---|---|---|---|---|
| Measurement inputs through VTs | | √ | √ | √ | √ |
| Measurement input through LVCT | | √ | √ | — | — |
| Measurement input through Rogowski Coil | | — | — | √ | √ |
| Active Energy measurement accuracy class (total and partial kWh) | | 0.5% | 0.5% | 0.5% | 0.5% |
| Four Quadrant Energy measurements | | √ | √ | √ | √ |
| Electrical measurements (I, V, P, ...) | | √ | √ | √ | √ |
| Multi Tariff | Controlled by internal clock | 4 | 4 | 4 | 4 |
| | Controlled by digital input(s) | 2 | 2 | 2 | 2 |
| | Controlled by communications | 4 | 4 | 4 | 4 |
| Measurement display (number of lines) | | 3 | 3 | 3 | 3 |
| Digital inputs | Programmable (status, tariff control, or input monitoring) | 1 | 1 | 1 | 1 |
| Digital outputs | Programmable (energy pulsing or overload alarm) | 1 | 1 | 1 | 1 |
| Overload alarm | | √ | √ | √ | √ |
| Communications | Modbus | √ | — | √ | — |
| | BACnet | — | √ | — | √ |
| Width (18 mm module in DIN rail mounting) | | 5 | 5 | 5 | 5 |

# Functions

These meters can monitor energy consumption by usage, by zone or by feeder in the cabinet. They can be used to monitor feeders in a main switchboard or to monitor the main in a distribution cabinet.

## iEM3400 series

| Functions | Advantages |
|---|---|
| Split core or solid-core LVCT and VT connection | Can be used in low or medium voltage applications<br>LVCTs connect directly to the meter, eliminating the need for shorting blocks required with traditional 1A or 5A CTs<br>Quick, simple retrofit solution for existing equipment |
| Flexible configuration | Can be adapted to any distribution network with or without neutral |

## iEM3500 series

| Functions | Advantages |
|---|---|
| Rogowski Coil and VT connection | Can be used in low or medium voltage applications<br>Rogowski coils connect directly to the meter, eliminating the need for shorting blocks required with traditional 1A or 5A CTs<br>Quick, simple retrofit solution for existing equipment |
| Flexible configuration | Can be adapted to any distribution network with or without neutral |

## Typical applications

The following table presents some of the functions of the different meters, the advantages and main applications.

| Functions | Advantages | Applications | Meter |
|---|---|---|---|
| Total and partial energy counters | Energy usage monitoring | Sub-billing management<br>Metering applications | iEM3400 / iEM3500 series |
| Internal clock | Saves the date and time of last reset | Provides the timestamp of the last reset of the partial energy accumulation | iEM3400 / iEM3500 series |
| Manages up to four tariffs, controlled by the digital input(s), internal clock or communications (depending on meter model) | Categorize energy consumption into On Peak and Off Peak, working days and weekends, or by different electricity sources (for example, from the utility and an electrical generator) | Energy demand management<br>Sub-billing management<br>Identification of local energy consumption behavior by zone, by usage or by feeder | iEM3400 / iEM3500 series |
| Measures essential electrical parameters like current, average voltage and total power | Instantaneous measurements help you monitor the imbalance between phases<br>Total power allows you to monitor the feeder load level | Monitoring of feeders or any sub-cabinet | iEM3400 / iEM3500 series |
| Modbus communications | Communicate advanced parameters using Modbus protocol | Modbus network integration | iEM3455 / iEM3555 |
| BACnet communications | Communicate advanced parameters using BACnet MS/TP protocol | BACnet network integration | iEM3465 / iEM3565 |

| Functions | Advantages | Applications | Meter |
|---|---|---|---|
| Four quadrant calculation | Identification of imported and exported active and reactive energy allows you to monitor energy flow in both directions: delivered from the utility and produced on-site | Ideal for facilities with back-up generators or green power capabilities (for example, solar panels or wind turbines) | iEM3400 / iEM3500 series |
| Measurement of active and reactive energy | Allows you to monitor energy consumption and production | Manage energy consumption and make informed investment to reduce your energy bill or penalties (for example, installing capacitor banks) | |
| Programmable digital input | Can be programmed to:<br>• Count pulses from other meters (gas, water, etc.)<br>• Monitor an external status<br>• Reset the partial energy accumulation and start a new period of accumulation | This allows for monitoring of:<br>• WAGES<br>• Intrusion (for example, doors opening) or equipment status<br>• Energy usage | |
| Programmable digital output | Can be programmed to:<br>• Be an active energy (kWh) pulse output, with a configurable pulse weight<br>• Alarm on a power overload at a configurable pickup setpoint | This allows you to:<br>• Collect pulses from the meter with a Smartlink system, PLC or any basic acquisition system<br>• Monitor power levels at a detailed level and to help detect an overload before the circuit breaker trips | |

# Hardware and installation

## Safety precautions

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

**⚠⚠DANGER**

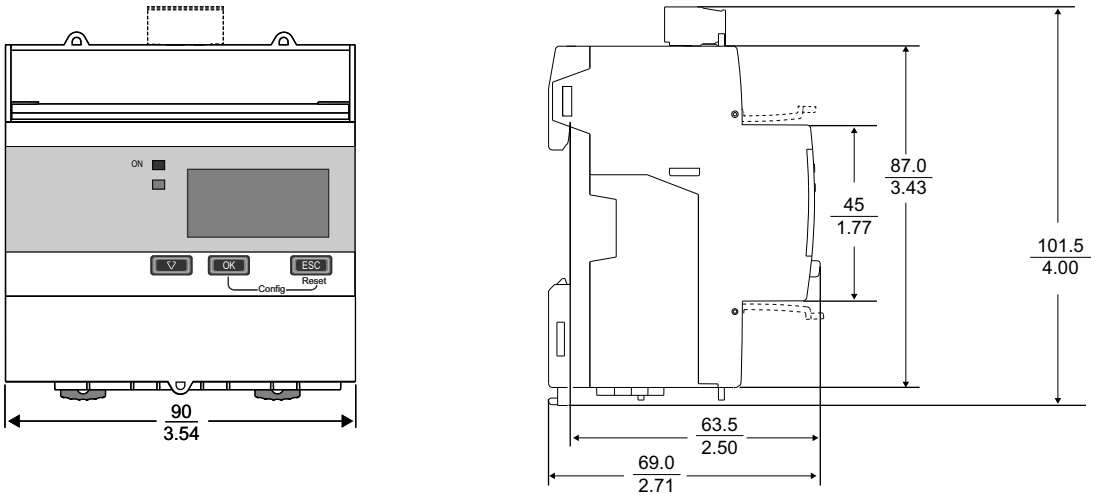
**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate Personal Protective Equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or other local standards.
- Turn off all power supplying this device and the equipment in which it is installed before working on or in the equipment.
- Use split-core or solid-core LVCT or Rogowski Coil current sensors which provide reinforced insulation rated for the nominal voltage of the system to be measured and measurement category CAT III or CAT IV.
- Use split-core or solid-core LVCT or Rogowski Coil current sensors which comply with the EN/ IEC/ UL/ CSA 61010-1 or EN/ IEC/ UL/ CSA 61010-2-032 standard.
- Always follow the current sensor installation instructions provided by the current sensor manufacturer.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Do not exceed the maximum ratings of this device.
- Do not touch the current terminal when the meter is energized.

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

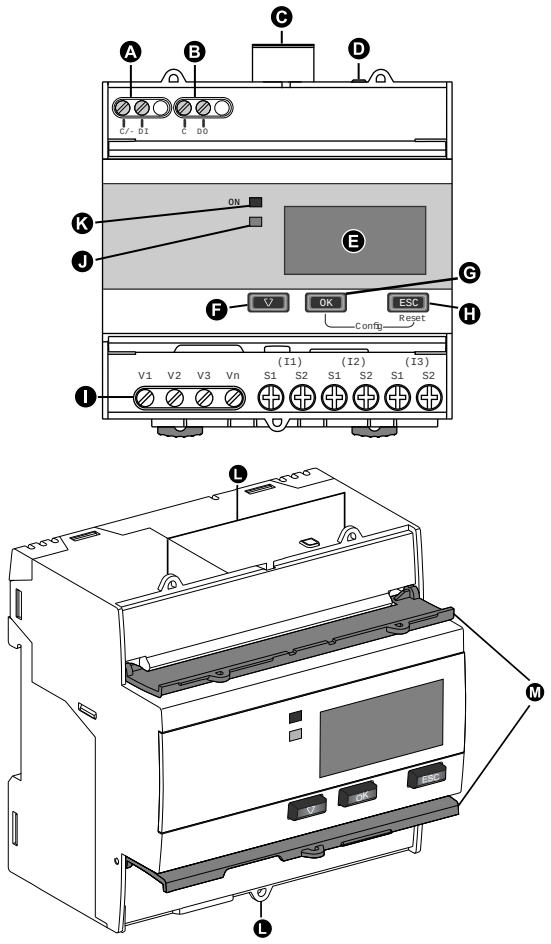
## Dimensions

**NOTE:** Dimensions are in mm/in.



# Meter description

## Meter overview




| | |
|---|---|
| A | Digital input |
| B | Digital output |
| C | Communication port |
| D | Communication LED |
| E | Display with white backlight for measurement and configuration |
| F | Scroll through screens or a list of options |
| G | Confirm entry or access more screens |
| H | Cancel and go back to previous screen |
| I | V1, V2, V3, Vn, I1, I2, I3 |
| J | Energy pulse LED<br>**NOTE:**<br>• Within 24000/x, x is the primary current for iEM3455 / iEM3465.<br>• The meter constant for iEM3555 / iEM3565 is 5.<br>• For iEM3455C1, x is 2 Wh/pulse.<br>• For iEM3455C2, x is 5 Wh/pulse. |
| K | Status LED: on / off / error |
| L | Sealing points (3) |
| M | Sealable covers (2) |

**NOTE:** The sealable covers must be installed and sealed to the sealing points with the steel cable. Use steel cable with 1.6 mm (1/16 in) diameter and 152.4 mm (6 in) adjustable length for sealing.

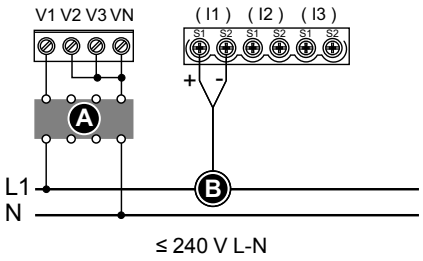
# Wiring

## Power system wiring

### iEM3455 / iEM3465 / iEM3555 / iEM3565

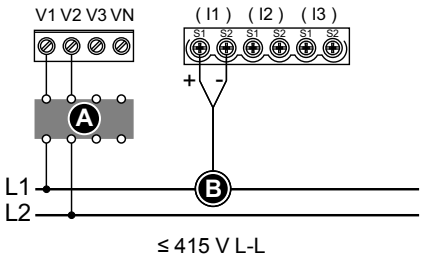
**1PH**

**1PH2W L-N**



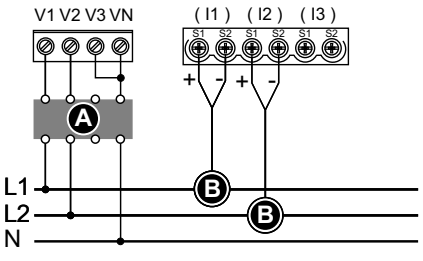

≤ 240 V L-N

**1PH2W L-L**



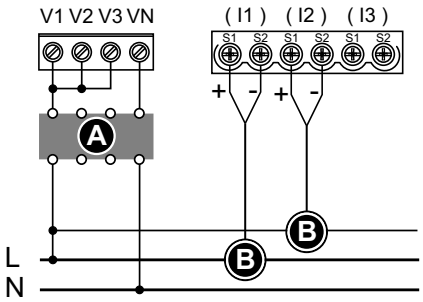

≤ 415 V L-L

**1PH3W L-L-N**



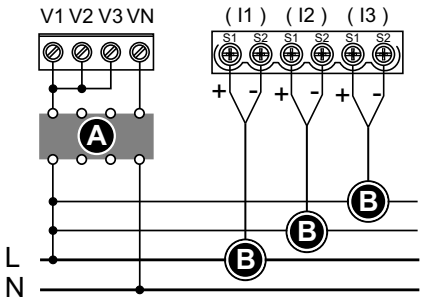

≤ 240 V L-N
≤ 480 V L-L

**1PH3W multi L-N 2LVCS**




≤ 240 V L-N

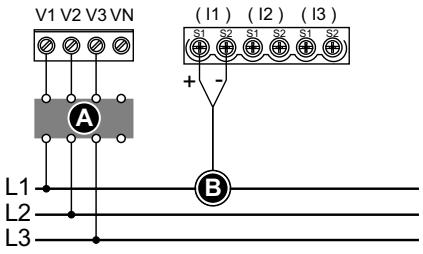
**1PH4W multi L-N 3LVCS**




≤ 240 V L-N

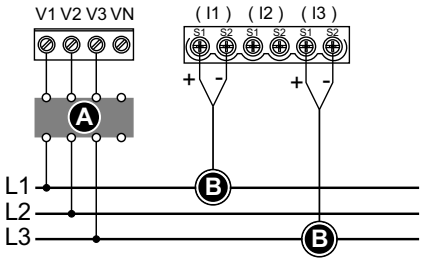
**3PH3W**

**1LVCS♦**



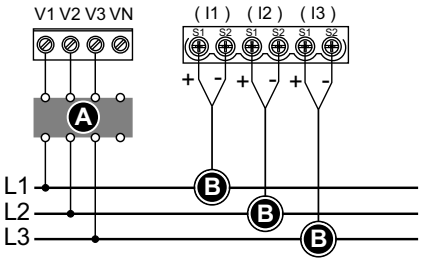

≤ 480 V L-L

**2LVCS**




≤ 480 V L-L

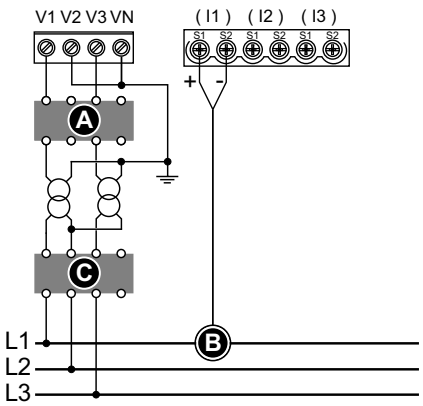
**3LVCS**



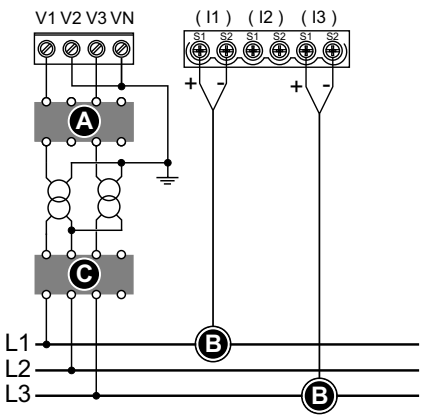

≤ 480 V L-L

**3PH3W**

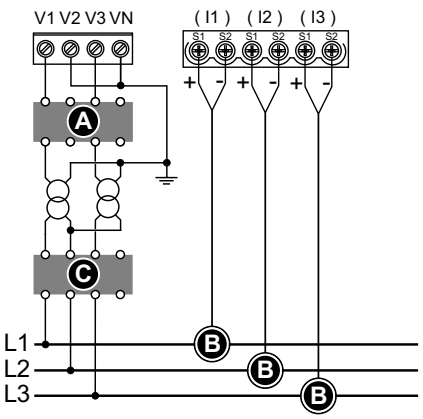
**2VT, 1LVCS♦**




**2VT, 2LVCS**

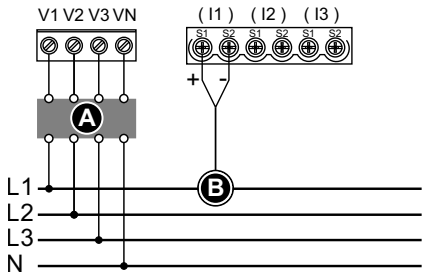



**2VT, 3LVCS**



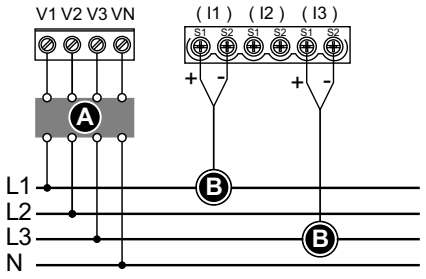

**3PH4W**

**1LVCS♦**



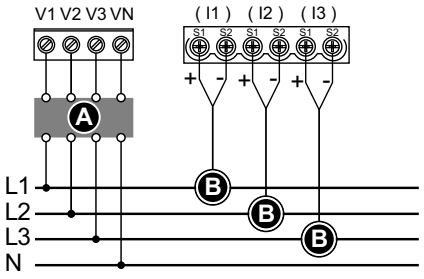

≤ 277 V L-N
≤ 480 V L-L

**2LVCS**




≤ 277 V L-N
≤ 480 V L-L

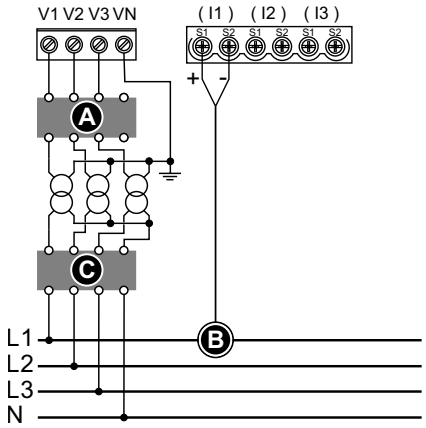
**3LVCS**



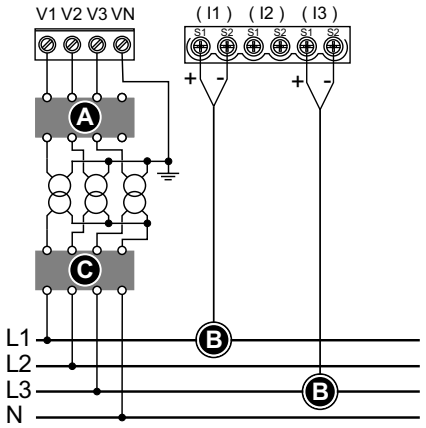

≤ 277 V L-N
≤ 480 V L-L

**3PH4W**

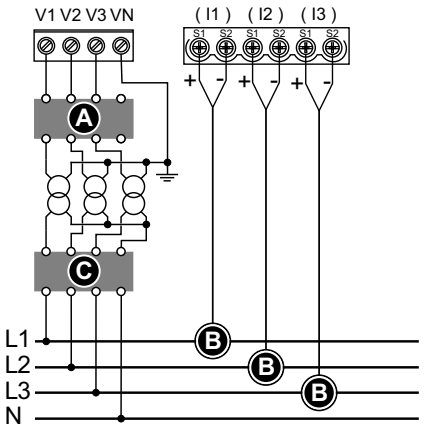
**3VT, 1LVCS♦**




**3VT, 2LVCS♦**




**3VT, 3LVCS**




**A 250 mA fuses and disconnect switch**

**B LVCS with insulation rated for the installation voltage and the installation/ measurement category**
**NOTE: LVCS refers to both LVCT and Rogowski coil.**

**C VT primary fuses and disconnect switch**

♦ indicates wiring for a balanced system

**+** indicates white wire

**-** indicates black wire

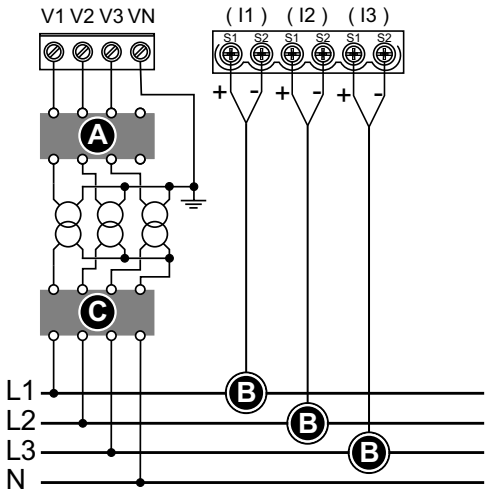
Clearly label the device's disconnect circuit mechanism and install it within easy reach of the operator.

Fuses / circuit breakers must be rated for the installation voltage and sized for the available fault current. Fuse for neutral is required if the source neutral is not grounded.

## iEM3455C1 / iEM3455C2

**3PH4W**

**3LVCT**




**A** **250 mA fuses and disconnect switch**

**B** **LVCT with insulation rated for the installation voltage and the installation/ measurement category**

**C** **VT primary fuses and disconnect switch**

**+** indicates white wire

**-** indicates black wire

Clearly label the device's disconnect circuit mechanism and install it within easy reach of the operator.

Fuses / circuit breakers must be rated for the installation voltage and sized for the available fault current. Fuse for neutral is required if the source neutral is not grounded.

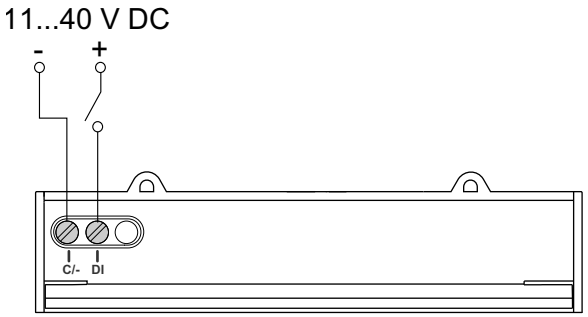
# Input, output and communications wiring considerations

The pulse output is compatible with S0 format, and the programmable digital output is compatible with S0 format when configured as a pulse output.

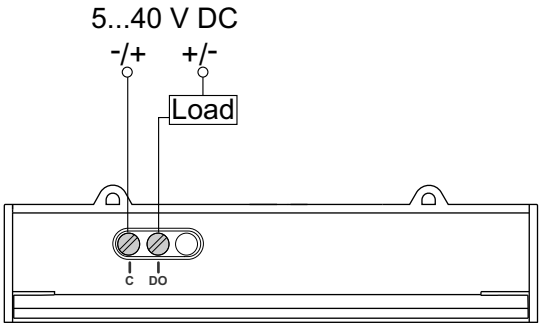
The digital input and output are electrically independent.

The digital output is polarity-independent.

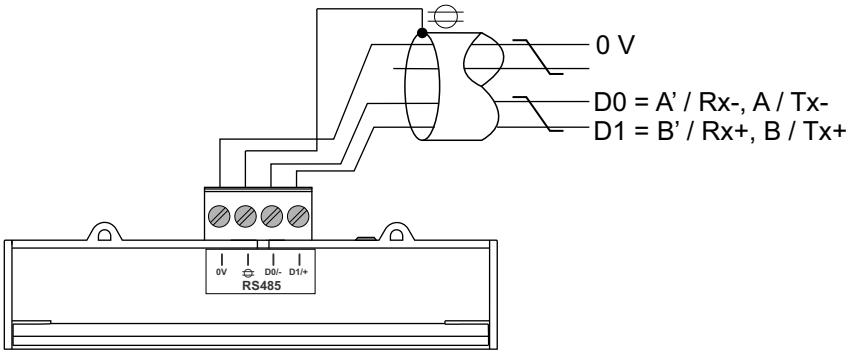
## Digital input



## Digital output




## Modbus / BACnet RS-485 wiring

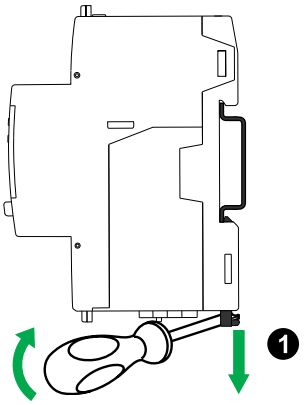



## Meter sealing points

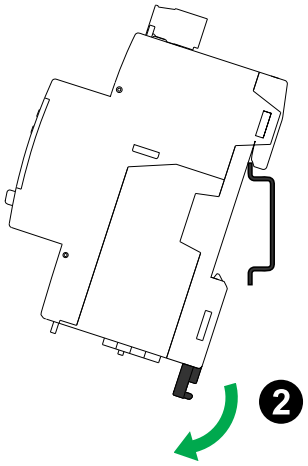
All meters have sealing covers and sealing points to help prevent access to inputs and outputs and current and voltage connections.

## Dismounting

1. Use a flat-tip screwdriver (≤ 6.5 mm / 0.25 in) to lower the locking mechanism and release the meter.



2. Lift the meter out and up to free it from the DIN rail.




# LVCT and Rogowski Coil recommendations

| Split-core LVCT | | | |
|---|---|---|---|
| **Part Number** | **Sensing Current** | **Frequency** | **Output** |
| LVCT00102S | 100 A | 50/60 Hz | 0 to 1/3 V |
| LVCT00202S | 200 A | 50/60 Hz | 0 to 1/3 V |
| LVCT00302S | 300 A | 50/60 Hz | 0 to 1/3 V |
| LVCT00403S | 400 A | 50/60 Hz | 0 to 1/3 V |
| LVCT00603S | 600 A | 50/60 Hz | 0 to 1/3 V |
| LVCT00803S | 800 A | 50/60 Hz | 0 to 1/3 V |
| LVCT00804S | 800 A | 50/60 Hz | 0 to 1/3 V |
| LVCT01004S | 1000 A | 50/60 Hz | 0 to 1/3 V |
| LVCT01204S | 1200 A | 50/60 Hz | 0 to 1/3 V |
| LVCT01604S | 1600 A | 50/60 Hz | 0 to 1/3 V |
| LVCT02004S | 2000 A | 50/60 Hz | 0 to 1/3 V |
| LVCT02404S | 2400 A | 50/60 Hz | 0 to 1/3 V |
| LVCT00050S | 50 A | 50/60 Hz | 0 to 1/3 V |
| LVCT00101S | 100 A | 50/60 Hz | 0 to 1/3 V |
| LVCT00201S | 200 A | 50/60 Hz | 0 to 1/3 V |

| Solid-core LVCT | | | |
|---|---|---|---|
| **Part Number** | **Sensing Current** | **Frequency** | **Output** |
| LVCT20050S | 50 A | 50/60 Hz | 0 to 1/3 V |
| LVCT20100S | 100 A | 50/60 Hz | 0 to 1/3 V |
| LVCT20202S | 200 A | 50/60 Hz | 0 to 1/3 V |
| LVCT20403S | 400 A | 50/60 Hz | 0 to 1/3 V |
| UCT-1250-100<br>(iEM3455C1 only) | 100 A | 50/60 Hz | 0 to 1/3 V |
| UCT-1250-200<br>(iEM3455C2 only) | 200 A | 50/60 Hz | 0 to 1/3 V |

| Rogowski Coil | | | | |
|---|---|---|---|---|
| **Part Number** | **Sensing Current** | **Frequency** | **Lead length (m)** | **Approximate Inside Diameter (mm)** |
| METSECTR25500 | 5000 A | 50/60 Hz | 2.35 | 80 |
| METSECTR30500 | 5000 A | 50/60 Hz | 2.35 | 96 |
| METSECTR46500 | 5000 A | 50/60 Hz | 2.35 | 146 |
| METSECTR60500 | 5000 A | 50/60 Hz | 2.35 | 191 |
| METSECTR90500 | 5000 A | 50/60 Hz | 2.35 | 287 |

# Front panel display and meter setup

## Overview

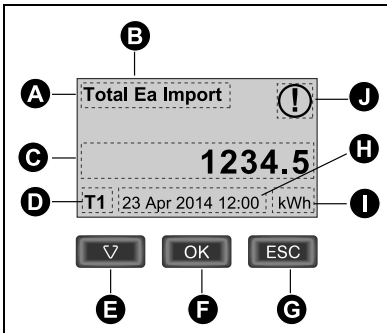
The meter features a front panel with signaling LEDs, a graphical display, and menu buttons that allow you to access the information required to operate the meter and modify parameter settings.

The front panel also allows you to display, configure and reset parameters.

Some meters have the Multi Tariff feature, which allows you to configure different tariffs.

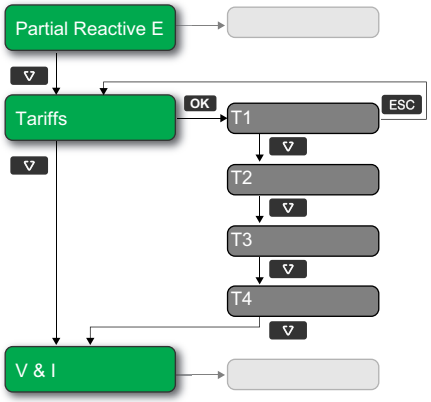
## Data display

### Data display screen overview




| | |
|---|---|
| A | Measurement |
| B | Ea / Er = active / reactive energy (if available) |
| C | Value |
| D | Active tariff (if applicable) |
| E | Scroll through the available screens |
| F | View more screens related to the measurement category (if available) |
| G | Go back to previous screen |
| H | Date and time (if applicable) |
| I | Unit |
| J | Icon indicating date / time are not set |

### Example: navigating the display screens




1. Press ▽ to scroll through the main display screens; then press ▽ to move from **Partial Reactive E** to **Tariffs** to **V & I**.
2. Press OK to access additional screens related to main screen (if available); then press OK to access screens for each of the available tariffs.
3. Press ▽ to scroll through these additional screens.

# Meter status information

Two LEDs on the front panel indicate the current status of the device: the green status LED and the yellow energy pulsing LED.

The icons in the table below indicate the LED state:

- = LED is off
- = LED is on
- = LED is flashing

| Status LED | Energy pulsing LED | Description |
|---|---|---|
| | | Off |
| | 1 s > | On, no pulse counting |
| | | On, with pulse counting |
| | | Error, pulse counting stopped |
| | | Abnormal, with pulse counting |

# Backlight and error / alert icon

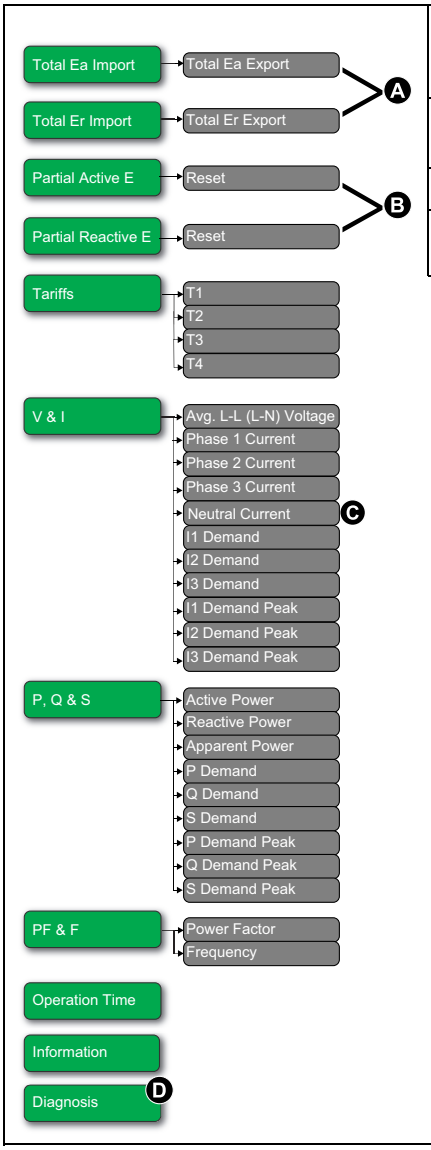
The backlight (display screen) and error / alert icon on the top right corner of the display screen indicate the meter status.

| Backlight | Error / Alert icon | Description |
|---|---|---|
| OFF | – | Device not powered ON or device is 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<br>ON / Dim | ON | Not active alarm. Logged alarms are not acknowledged by the user. |

# Data display screens

The following sections outline the data display screens available on the various meter models.

## Data display screens




| | |
|---|---|
| A | Import / export indicated for total active (Ea) and total reactive (Er) energy. Other energy measurements are import only |
| B | Resets all energy measurements except total active energy and total reactive energy |
| C | Available on iEM3555 |
| D | Diagnosis screen appears if there is a specific event |

# Demand readings

Demand readings and related features are available in the models from the below firmware versions. Models with older firmware versions cannot be upgraded.

- iEM3455 and iEM3465 – V1.2.003 and higher
- iEM3555 and iEM3565 – V1.1.001 and higher
- iEM3465 and iEM3565 – BACnet V2.4 and higher

| Characteristics | Description |
|---|---|
| Demand Values | |
| Current | Per phase and average (1) |
| Active, reactive, apparent power | Total |
| Peak Demand Values | |
| Current | Per phase 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.

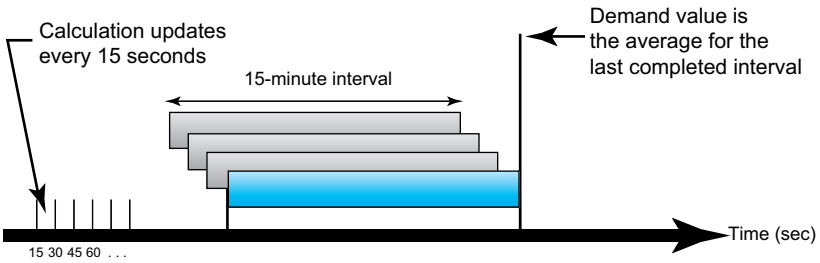
To be compatible with electric utility billing practices, the power meter provides block interval power/current demand calculations.

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:

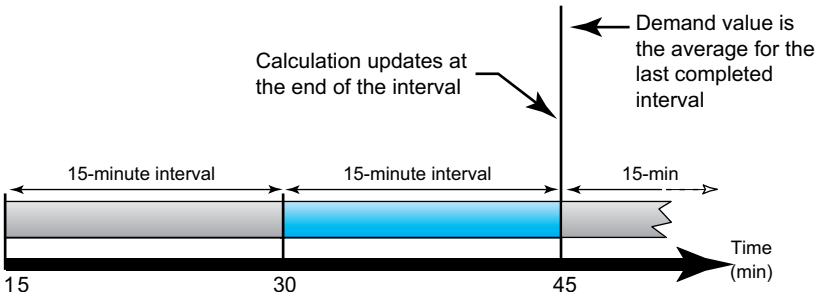
- Fixed block – Select an interval from 10, 15, 20, 30, 60 minutes. The power meter calculates and updates the demand at the end of each interval.
- Sliding block – Select an interval from 10, 15, 20, 30, 60 minutes. For demand intervals less than 15 minutes, the value is updated every 15 seconds. For 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 figures below 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.

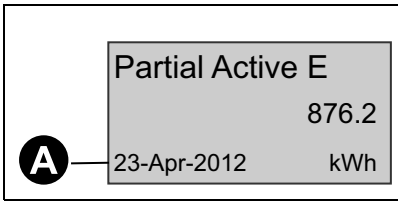
# Resets

The following resets are available:

| Reset | Description |
|---|---|
| Partial energy | Clears all active and reactive energy accumulated since the last reset.<br>This does not reset the total active and reactive energy accumulation. |
| Input metering | Clears all input metering energy data.<br>You can only reset the input metering accumulation using software. |

## Resetting accumulated energy using the display

1. Navigate to the **Partial Active E** or **Partial Reactive E** screen. The screen displays the date of the last reset. For example:



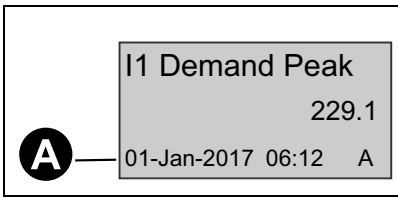

| | |
|---|---|
| A | Date of last reset |

2. Press and hold ESC. The **Reset** screen appears.
3. Press OK to confirm the reset and enter the meter password when prompted.

   **NOTE:** Regardless of the screen you use to access this reset, accumulations of both Partial Active Energy and the Partial Reactive Energy (if available) are cleared.

## Resetting peak demand using the display

1. Navigate to any of the below listed screens:
   - I1 Demand Peak
   - I2 Demand Peak
   - I3 Demand Peak
   - P Demand Peak
   - Q Demand Peak
   - S Demand Peak



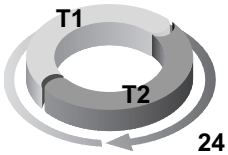
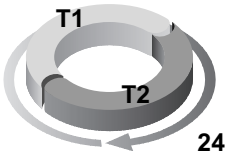
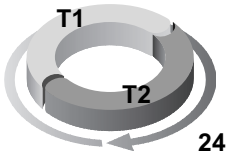
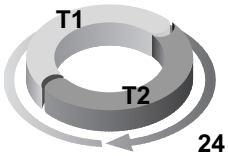
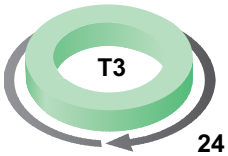
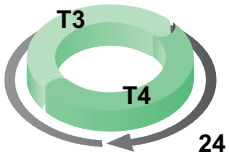

| | |
|---|---|
| A | Date and time of peak demand |

2. Press and hold ESC. The **Reset** screen appears.
3. Press OK to confirm the reset and enter the meter password.

   **NOTE:** Once the peak demand is reset, the date and time are not displayed till the next peak demand is captured.

# Multi Tariff feature

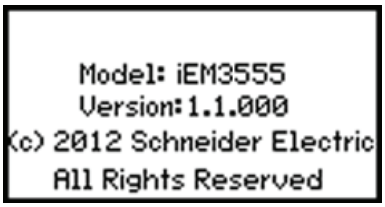
The table below illustrates how the tariffs operate according to the tariff selection (2, 3 or 4 tariffs). These tariffs are stored in 4 different registers: T1, T2, T3 and T4.

| | 2 tariffs | 3 tariffs | 4 tariffs |
|---|---|---|---|
| Weekday |  |  |  |
| Weekend |  |  |  |

**NOTE:** If the tariff Control Mode is set to by Internal Clock, the start time of the next tariff is the end time of the current tariff. For example, T2 start equals the end of T1.

# Meter information

Meter information (for example, model and firmware version) is available on the information screen. In display mode, press the down arrow until you reach the information screen:




# The device clock

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

## Clock behavior

You are prompted to set the date and time when the meter is powered up. Press ESC to skip this step if you do not want to set the clock (you can enter configuration mode and set the date and time later, if required).

When the power is interrupted, the device retains its date and time information for 3 days. If power is interrupted for longer than 3 days, the device automatically displays the screen to set **Date & Time** when power is restored.

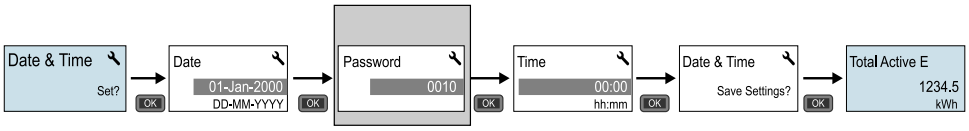
## Date/time format

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

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

## Setting the clock initially

The image below 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, refer to Device configuration, page 30.




**NOTE:** Password entry is only required for meters that support a password.

# Device configuration

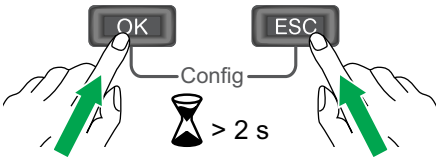
The default factory settings (as applicable based on your model) are listed in the table below:

| Menu | Factory settings |
|---|---|
| Wiring | iEM3400 series: 3PH4W; 3 LVCTs on I1, I2, and I3; Direct-No VT<br>iEM3500 series: 3PH4W; 3 Rogowski Coils on I1, I2, and I3; Direct-No VT |
| CT Ratio | Varies depending on meter model |
| CT & VT Ratio | Varies depending on meter model |
| Frequency | 50 Hz |
| Date | 1-Jan-2000 |
| Time | 00:00:00 |
| Multi Tariffs | Disable |
| Overload Alarm | Disable |
| Digital Output | Disable |
| Digital Input | Input Status |
| Pulse Output | 100 imp/kWh |
| Demand | Method = Sliding<br>Interval = 15 mins |
| Communication | Varies depending on protocol |
| Com.Protection | Enable |
| Contrast | 5 |
| Password | 0010 |

## Entering configuration mode

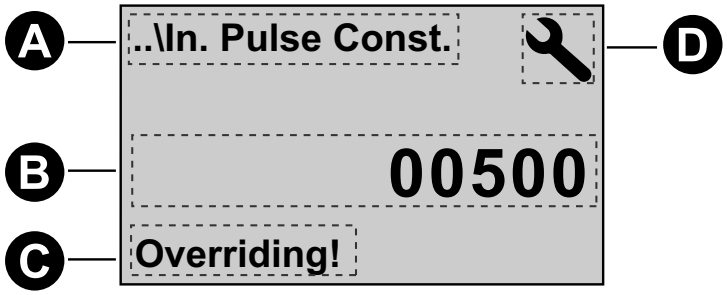
1. Press and hold OK and ESC at the same time for about 2 seconds.

2. Enter the meter password, if prompted. The **Access Counter** screen displays, indicating the number of times the configuration mode has been accessed.




## The front panel display in configuration mode

The image below illustrates the various elements of the display in configuration mode:




| | |
|---|---|
| A | Parameter |
| B | Setting |
| C | Indicates that the setting impacts the Multi Tariff feature |
| D | Configuration mode icon |

## Com. Protection setting

For meters with communications capabilities, you can enable or disable the Com. Protection setting. If this setting is enabled, you must use the display to configure certain settings (for example, wiring or frequency, etc.) and perform resets; you cannot use communications.

The protected settings and resets are:

- Power system settings (for example, wiring, frequency, CT ratios)
- Date and time settings
- Multi Tariff settings
- Communications settings
- Partial energy reset

# 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).

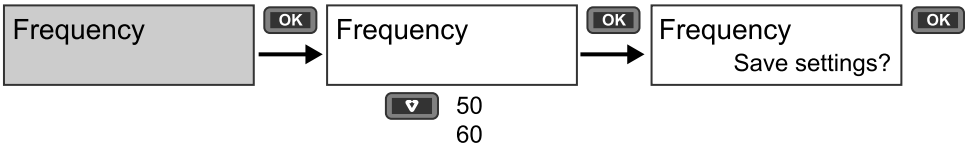
**NOTE:** Before you modify any parameters, ensure that you are familiar with the HMI functionality and navigation structure of your device in configuration mode.

## Selecting a value from a list

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

### Example: Configuring a list value

To set the nominal frequency of the meter:




1. Enter configuration mode and press the ▽ button until you reach **Frequency** then press OK to access the frequency configuration.
2. Press the ▽ button to select the frequency you want then click OK. Press OK again to save your changes.

## Modifying a 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 (if the parameter is available on your device):

- Date
- Time
- Pick Up Value for an overload alarm
- Voltage Transformer (VT) Primary
- Current Transformer (CT) Primary
- Password
- Address of the meter

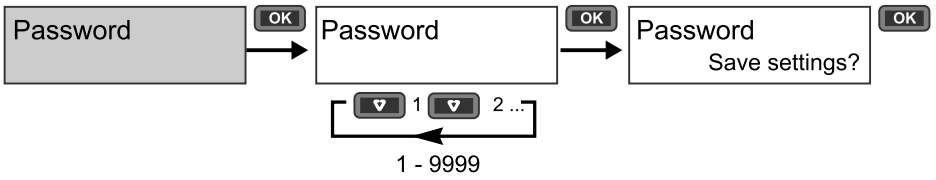
To modify a numerical value:

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

   If you enter an invalid setting for the parameter, when you press OK after setting the left-most number, the cursor shifts back to the right-most number so you can enter a valid value.

### Example: configuring a numeric value

To set the password:




1. Enter configuration mode and press the ▽ button until you reach **Password** then press OK to access the password configuration.
2. Press the ▽ button to increment the selected digit or press OK to move to the next digit to the left. When you reach the left-most digit, press OK to move to the next screen. Press OK again to save your changes.

## Cancelling an entry

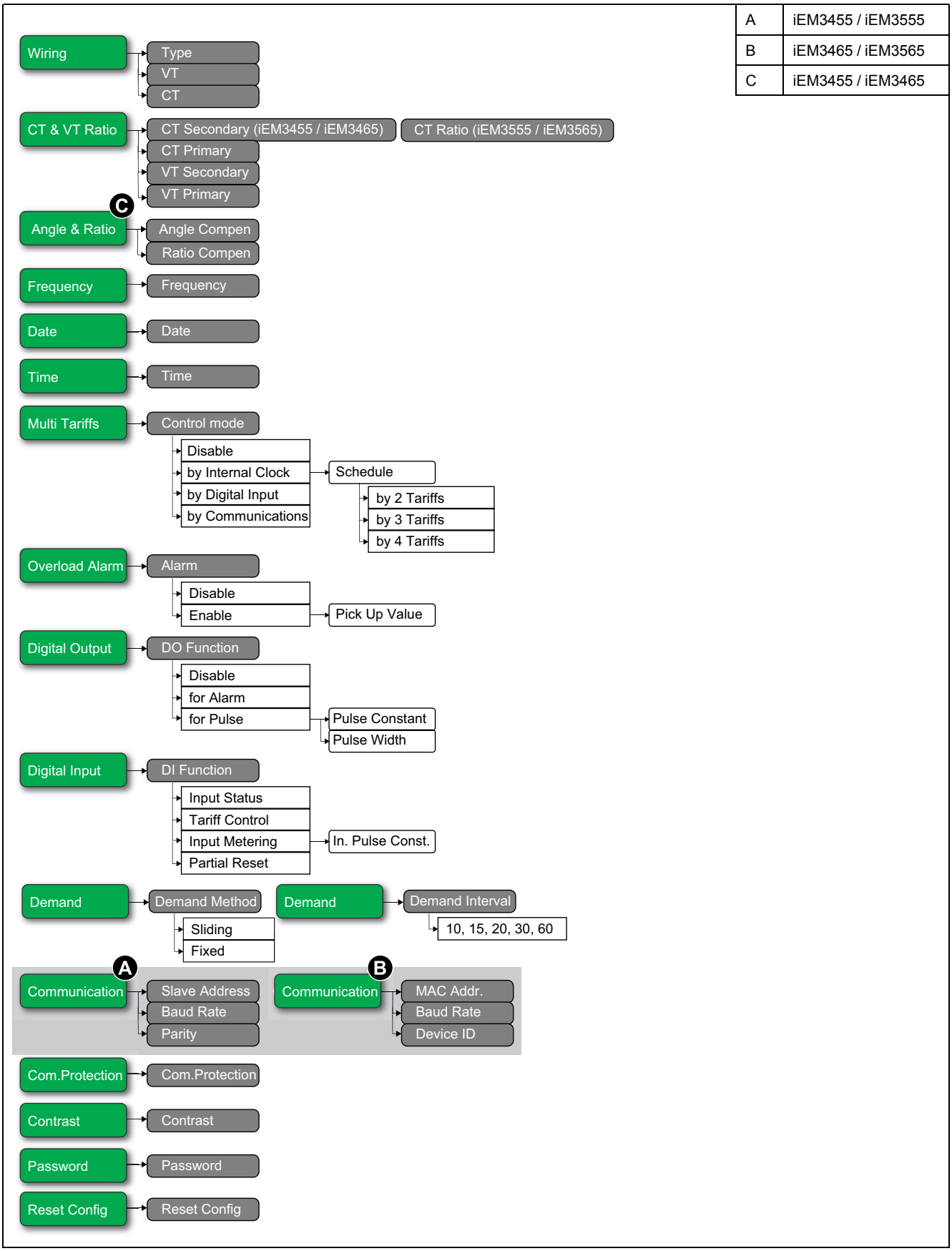
To cancel the current entry, press the ESC button. The change is cancelled and the screen reverts to the previous display.

# Configuration mode menus

The following images show the configuration navigation for each device.

# Configuration menu for iEM3400 series and iEM3500 series

| | |
|---|---|
| A | iEM3455 / iEM3555 |
| B | iEM3465 / iEM3565 |
| C | iEM3455 / iEM3465 |



| Section | Parameter | Options | Description |
|---|---|---|---|
| Wiring | Type | 3PH3W<br>3PH4W<br>1PH2W L-N<br>1PH2W L-L<br>1PH3W L-L-N<br>1PH4W Multi L-N | Select the power system type the meter is wired to. |
| | VT | Direct-NoVT<br>Wye (3VTs)<br>Delta (2VTs) | Select how many voltage transformers (VT) are connected to the electrical power system. |
| | CT | 3CTs on I1, I2, I3<br>1 CT on I1<br>2 CTs on I1, I3 | Define how many current transformers (CT) are connected to the meter and which terminals they are connected to. |
| CT & VT Ratio | CT Secondary | 0.333<br>1 | Select the size of the CT secondary, in Amps. |
| | CT Primary | 1 to 32767 | Enter the size of the CT primary, in Amps. |
| | VT Secondary | 100<br>110<br>115<br>120 | Select the size of the VT secondary, in Volts. |
| | VT Primary | 1 to 1000000 | Enter the size of the VT primary, in Volts. |
| Angle & Ratio (iEM3455 / iEM3465) | Angle Compen | 0 – 17000 | Enter the phase angle compensation, in rad (radian).<br>**For negative phase shift:**<br>Formula = 10000 - (Angle in rad*1000)<br>Example: For -30° negative phase shift, the value in rad is -0.524<br>Value to be entered = 10000 - (-0.524*1000), which is equal to 10524<br>**For positive phase shift:**<br>Formula = Angle in rad*1000<br>Example: For 30° positive phase shift, the value in rad is 0.524<br>Value to be entered = 0.524*1000, which is equal to 524 |
| | Ratio Compen | 0 – 2000 | Enter the ratio compensation.<br>Formula = Ratio value*1000 |
| Frequency | Frequency | 50<br>60 | Select the frequency of the electrical power system, in Hz. |
| Date | Date | DD-MMM-YYYY | Set the current date using the specified format. |
| Time | Time | hh:mm | Set the time using the 24-hour format. |
| Multi Tariffs | Control Mode | Disable<br>by Communication<br>by Digital Input<br>by Internal Clock | Select the tariff control mode:<br>• Disable: the Multi Tariff function is disabled.<br>• by Communication: the active tariff is control by communications. See the chapter for the applicable protocol for more information.<br>• by Digital Input: the digital input is associated with the Multi Tariff function. A signal to the digital input changes the active tariff.<br>• by Internal Clock: the device clock controls the active tariff. If you set the Control Mode to by Internal Clock, you must also configure the schedule. Set the time when each tariff period starts, using the 24 hour clock format (00:00 to 23:59). The start time of the next tariff is the end time of the current tariff. For example, T2 start equals the end of T1. |

| Section | Parameter | Options | Description |
|---|---|---|---|
| Overload Alarm | Alarm | Disable<br>Enable | Select whether or not the Overload Alarm is enabled:<br>• Disable: the alarm is disabled.<br>• Enable: the alarm is enabled. If you enabled the Overload Alarm, you must also configure the Pick Up Value in kW from 1 - 9999999. |
| Digital Output | DO Function | Disable<br>for Alarm<br>for Pulse (kWh) | Select how the digital output functions:<br>• Disable: the digital output is disabled.<br>• for Alarm: the digital output is associated with the overload alarm. In the event of trigger, the digital output remains in the ON state until the alarm drop out point is crossed.<br>• for Pulse (kWh): The digital output is associated with energy pulsing. When this mode is selected, you can select the energy parameter and set the Pulse Constant (imp/kWh) and the Pulse Width (ms). |
| Digital Input | DI Function | Input Status<br>Tariff Control<br>Input Metering<br>Partial Reset | Select how the digital input functions:<br>• Input status: the digital input records the status of the input, for example, OF, SD of a circuit breaker.<br>• Tariff Control: the digital input is associated with the Multi Tariff function. A signal to the digital input changes the active tariff.<br>• Input Metering: the digital input is associated with input metering. The meter counts and records the number of incoming pulses. If you set the DI Function to Input Metering, you must also configure In. Pulse Constant.<br>• Partial Reset: a signal to the digital input initiates a partial reset. |
| Demand | Demand Method | Sliding<br>Fixed | Select the method to use for demand calculation. |
| | Demand Interval | 10<br>15<br>20<br>30<br>60 | Select the demand calculation block interval in minutes. |
| Communication (iEM3455 / iEM3555) | Slave Address | 1 – 247 | Set the address for this device. The address must be unique for each device in a communications loop. |
| | Baud Rate | 19200<br>38400<br>9600 | Select the speed for data transmission. The baud rate must be the same for all devices in a communications loop. |
| | Parity | Even<br>Odd<br>None | Select None if the parity bit is not used. The parity setting must be the same for all devices in a communications loop.<br>**NOTE:** Number of stop bits = 1. |
| Communication (iEM3465 / iEM3565) | MAC Addr. | 1 – 127 | Set the address for this device. The address must be unique for each device in a communications loop. |
| | Baud Rate | 9600<br>19200<br>38400<br>57600<br>76800 | Select the speed for data transmission. The baud rate must be the same for all devices in a communications loop. |
| | Device ID | 0 – 4194303 | Set the Device ID for this device. Make sure the Device ID is unique in your BACnet network. |
| Com.Protection | Com.Protection | Enable<br>Disable | Protects selected settings and resets from configuration via communications. |
| Contrast | Contrast | 1 – 9 | Increase or decrease the value to increase or decrease the display contrast. |
| Password | Password | 0 – 9999 | Sets the password for accessing the meter configuration screens and resets. |
| Reset Config | Reset Config | — | Settings are reset to their defaults, except for Password. Meter restarts. |

# Communications using Modbus

## Modbus communication overview

**Modbus RTU protocol is available on iEM3455 / iEM3555 meter models.**

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.

There are three different ways of using Modbus communication:

- By sending commands using the command interface
- By reading the Modbus registers
- By reading Device Identification

## Modbus communications settings

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

| Settings | Possible values |
|---|---|
| Baud rate | 9600 Baud<br>19200 Baud<br>38400 Baud |
| Parity | Odd<br>Even<br>None<br>**NOTE:** Number of stop bits = 1 |
| Address | 1 – 247 |

## Communications LED indicator for Modbus devices

The yellow communications 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 established.<br>**NOTE:** If there is an error online, the LED also flashes. |
| The LED is off | There is no active communication between the master and the slave |

## Modbus functions

### Function list

The table below lists the supported Modbus functions:

| Function code | | Function name |
|---|---|---|
| Decimal | Hexadecimal | |
| 3 | 0x03 | Read Holding Registers |
| 16 | 0x10 | Write Multiple Registers |
| 43/14 | 0x2B/0x0E | Read Device Identification |

For example:

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

# Table format

Register tables have the following columns:

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

- ***Address***: A 16-bit register address in hexadecimal. The address is the data used in the Modbus frame.
- ***Register***: A 16-bit register number in decimal (register = address + 1).
- ***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 to 65535 |
| Int16 | 16 bit signed integer | -32768 to +32767 |
| UInt32 | 32 bit unsigned integer | 0 to 4 294 967 295 |
| Int64 | 64 bit unsigned integer | 0 to 18 446 744 073 709 551 615 |
| UTF8 | 8 bit field | Multi byte character encoding for Unicode |
| Float32 | 32 bit value | Standard representation IEEE for floating number (with single precision)) |
| Bitmap | — | — |
| DATETIME | See below table | — |

**DATETIME format:**

| Word | Bits | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 1 | Reserved | | | | | | | | 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) | | | | | |

**DATETIME format: (Continued)**

| Word | Bits | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 4 | Millisecond (0 – 59999) | | | | | | | | | | | | | | | |

| | |
|---|---|
| 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 – 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

## Command interface overview

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

## Command request

The table below describes a Modbus command request:

| Slave Number | Function Code | Command block | | CRC |
|---|---|---|---|---|
| | | Register Address | Command Description | |
| 1 – 247 | 16 | 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.<br>**NOTE:** All the reserved parameters can be considered as any value, e.g. 0. | Checking |

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

The table below describes the Command result:

| Register Address | Content | Size (Int16) | Data (example) |
|---|---|---|---|
| 5375 | Requested Command Number | 1 | 2008 (Set Tariff) |
| 5376 | Result<br>Command result codes:<br>• 0 = Valid Operation<br>• 3000 = Invalid Command<br>• 3001 = Invalid Parameter<br>• 3002 = Invalid Number of Parameters<br>• 3007 = Operation Not Performed | 1 | 0 (Valid Operation) |

# 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 | — | 1, 3 | Number of phases |
| | W | 1 | UInt16 | — | 2, 3, 4 | Number of wires |
| | W | 1 | UInt16 | — | 0, 1, 2, 3, 11,13 | Power System Configuration:<br>0 = 1PH2W L-N<br>1 = 1PH2W L-L<br>2 = 1PH3W L-L-N<br>3 = 3PH3W<br>11 = 3PH4W<br>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 | 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 to 32767 | CT Primary<br>**NOTE:** For iEM3455 |
| | | | | | 5000 | CT Primary<br>**NOTE:** For iEM3555 |
| | W | 1 | UInt16 | mV | 333, 1000 | CT Secondary<br>**NOTE:** For iEM3455 |
| | | | | µV/kA/ Hz | 1167 | CT Secondary<br>**NOTE:** For iEM3555 |
| | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | — | (Reserved) |

| Command Number | Action (R/W) | Size | Type | Unit | Range | Description |
|---|---|---|---|---|---|---|
| | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | — | (Reserved) |

## Set Demand

| 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:<br>1 = Timed interval sliding block<br>2 = Timed interval fixed block |
| | W | 1 | UInt16 | Minute | 10, 15, 20, 30, 60 | Demand Interval |
| | W | 1 | UInt16 | — | — | (Reserved) |

## Set Pulse Output

| Command Number | Action (R/W) | Size | Type | Unit | Range | Description |
|---|---|---|---|---|---|---|
| 2003 | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | kWh<br>kVARh | 3, 6 | Digital Output Control Mode Status:<br>3 = kWh<br>6 = kVARh |
| | W | 1 | UInt16 | — | 0, 1 | Pulse Output enable / disable:<br>0 = Disable<br>1 = Enable |
| | W | 2 | Float32 | pulse/kWh | 0.01, 0.1, 1, 10, 100, 500 | Pulse constant |
| | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 2 | Float32 | — | — | (Reserved) |
| | 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 | Pulse width |
| 2039 | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | imp/kWh<br>imp/KVARh | 0, 1 | LED energy pulse:<br>0 = kWh<br>1 = kVARh |

## Set Tariff

| Command Number | Action (R/W) | Size | Type | Unit | Range | Description |
|---|---|---|---|---|---|---|
| 2060 | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | 0, 1, 2, 4 | Multi Tariff Mode:<br>0 = Disable Multi Tariff<br>1 = Use COM as Tariff Control (maximum 4 tariffs)<br>2 = Use Digital Input as Tariff Control (2 tariffs)<br>4 = Use Internal Clock as Tariff Control (maximum 4 tariffs) |
| 2008 | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | 1 – 4 | Tariff:<br>1 = T1<br>2 = T2<br>3 = T3<br>4 = T4<br>**NOTE:** You can only set the tariff using this method if the Tariff Mode is set to by Communication. |

## Set Digital Input as Partial Energy Reset

| Command Number | Action (R/W) | Size | Type | Unit | Range | Description |
|---|---|---|---|---|---|---|
| 6017 | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | 0, 1 | Digital Input to Associate:<br>0 = Disable<br>1 = Enable |

## Input Metering Setup

| Command Number | Action (R/W) | Size | Type | Unit | Range | Description |
|---|---|---|---|---|---|---|
| 6014 | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | 1 | Input Metering Channel |
| | W | 20 | UTF8 | — | String size ≤ 40 | Label |
| | W | 2 | Float32 | — | 1 – 10000 | Pulse Weight |
| | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | 0, 1 | Digital Input Association:<br>0 = Disable<br>1 = Enable |

## Overload Alarm Setup

| Command Number | Action (R/W) | Size | Type | Unit | Range | Description |
|---|---|---|---|---|---|---|
| 7000 | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | 9 | Alarm ID |
| | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | — | (Reserved) |

| Command Number | Action (R/W) | Size | Type | Unit | Range | Description |
|---|---|---|---|---|---|---|
| | W | 1 | UInt16 | — | — | (Reserved) |
| | W | 1 | UInt16 | — | 0, 1 | 0 = Disable<br>1 = Enable |
| | W | 2 | Float32 | — | 0.0 – 1e10 | Pickup value |
| | 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 | — | — | (Reserved) |
| | W | 2 | UInt32 | — | — | (Reserved) |
| | W | 1 | Bitmap | — | 0, 1 | Digital Output to Associate:<br>0 = Unassociated<br>1 = Associated |
| 20001 | W | 1 | UInt16 | — | — | Acknowledge the Overload Alarm |

## 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:<br>0 = 9600<br>1 = 19200<br>2 = 38400 |
| | W | 1 | UInt16 | — | 0, 1, 2 | Parity:<br>0 = Even<br>1 = Odd<br>2 = None |
| | W | 1 | UInt16 | — | — | (Reserved) |

## Reset all Peak Demand

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

## Reset Partial Energy Counters

| Command Number | Action (R/W) | Size | Type | Unit | Range | Description |
|---|---|---|---|---|---|---|
| 2020 | W | 1 | UInt16 | — | — | (Reserved)<br>Partial Active / Reactive Energy, Energy by tariff and Phase Energy registers will be reset. |

## Reset Input Metering Counter

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

# Modbus register list

## System

| Address | Register | Action (R/W/ WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| 0x001D | 30 | R | 20 | UTF8 | — | Meter Name |
| 0x0031 | 50 | R | 20 | UTF8 | — | Meter Model |
| 0x0045 | 70 | R | 20 | UTF8 | — | Manufacturer |
| 0x0081 | 130 | R | 2 | UInt32 | — | Serial Number |
| 0x0083 | 132 | R | 4 | DATETIME | — | Date of Manufacture |
| 0x0087 | 136 | R | 5 | UTF8 | — | Hardware Revision |
| 0x0664 | 1637 | R | 1 | UInt16 | — | Present Firmware Version (DLF format): X.Y.ZTT |
| 0x0734 – 0x0737 | 1845 – 1848 | R/WC | 1 X 4 | UInt16 | — | Date/Time:<br>Reg. 1845: Year (b6:b0) 0 – 99 (year from 2000 to 2099)<br>Reg. 1846: Month (b11:b8), Weekday (b7:b5), Day (b4:b0)<br>Reg. 1847: Hour (b12:b8), Minute (b5:b0)<br>Reg. 1848: Millisecond |
| 0xAFC7 | 45000 | R | 1 | Bitmap | — | Diagnostics error status<br>0 = Inactive<br>1 = Active<br>Bit0 = Code 101<br>Bit1 = Code 102<br>Bit2 = Code 201<br>Bit3 = Code 202<br>Bit4 = Code 203<br>Bit5 = Code 204<br>Bit6 = Code 205<br>Bit7 = Code 206<br>Bit8 = Code 207 |

# Meter Setup and Status

| Address | Register | Action (R/W/WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| 0x07D3 | 2004 | R | 2 | UInt32 | Second | Meter Operation Timer |
| 0x07DD | 2014 | R | 1 | UInt16 | — | Number of Phases |
| 0x07DE | 2015 | R | 1 | UInt16 | — | Number of Wires |
| 0x07DF | 2016 | R/WC | 1 | UInt16 | — | Power System:<br>0 = 1PH2W L-N<br>1 = 1PH2W L-L<br>2 = 1PH3W L-L with N<br>3 = 3PH3W<br>11 = 3PH4W<br>13 = 1PH4W multi L with N |
| 0x07E0 | 2017 | R/WC | 1 | UInt16 | Hz | Nominal Frequency |
| 0x07E8 | 2025 | R | 1 | UInt16 | — | Number VTs |
| 0x07E9 | 2026 | R/WC | 2 | Float32 | V | VT Primary |
| 0x07EB | 2028 | R/WC | 1 | UInt16 | V | VT Secondary |
| 0x07EC | 2029 | R/WC | 1 | UInt16 | — | Number CTs |
| 0x07ED | 2030 | R/WC | 1 | UInt16 | A | CT Primary |
| 0x07EE | 2031 | R/WC | 1 | UInt16 | A | CT Secondary |
| 0x07F3 | 2036 | R/WC | 1 | UInt16 | — | VT Connection Type:<br>0 = Direct Connect<br>1 = 3PH3W (2 VTs)<br>2 = 3PH4W (3 VTs) |

# Energy Pulse Output Setup

| Address | Register | Action (R/W/WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| 0x0850 | 2129 | R/WC | 1 | UInt16 | Millisecond | Energy Pulse Duration |
| 0x0852 | 2131 | R/WC | 1 | UInt16 | — | Digital Output Association<br>0 = Disable<br>1 = DO1 enable for active energy pulse output |
| 0x0853 | 2132 | R/WC | 2 | Float32 | pulse/kWh | Pulse Weight |

# Command Interface

| Address | Register | Action (R/W/WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| 0x1481 | 5250 | R/W | 1 | UInt16 | — | Requested Command |
| 0x1483 | 5252 | R/W | 1 | UInt16 | — | Command Parameter 001 |
| 0x14FD | 5374 | R/W | 1 | UInt16 | — | Command Parameter 123 |
| 0x14FE | 5375 | R | 1 | UInt16 | — | Command Status |
| 0x14FF | 5376 | R | 1 | UInt16 | — | Command Result codes:<br>0 = Valid Operation<br>3000 = Invalid Command |

| Address | Register | Action (R/W/ WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| | | | | | | 3001 = Invalid Parameter<br>3002 = Invalid Number of Parameters<br>3007 = Operation Not Performed |
| 0x1500 | 5377 | R/W | 1 | UInt16 | — | Command Data 001 |
| 0x157A | 5499 | R | 1 | UInt16 | — | Command Data 123 |

## Communication

| Address | Register | Action (R/W/ WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| 0x1963 | 6500 | R | 1 | UInt16 | — | Protocol<br>0 = Modbus |
| 0x1964 | 6501 | R/WC | 1 | UInt16 | — | Address |
| 0x1965 | 6502 | R/WC | 1 | UInt16 | — | Baud Rate:<br>0 = 9600<br>1 = 19200<br>2 = 38400 |
| 0x1966 | 6503 | R/WC | 1 | UInt16 | — | Parity:<br>0 = Even<br>1 = Odd<br>2 = None<br>**NOTE:** Number of stop bits = 1 |

## Input Metering Setup

| Address | Register | Action (R/W/ WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| 0x1B77 | 7032 | R/WC | 20 | UTF8 | — | Label |
| 0x1B8B | 7052 | R/WC | 2 | Float32 | pulse/unit | Pulse Constant |
| 0x1B8E | 7055 | R/WC | 1 | UInt16 | — | Digital Input Association:<br>0 = Disable for input metering<br>1 = Enable for input metering |

## Digital Input

| Address | Register | Action (R/W/ WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| 0x1C69 | 7274 | R | 1 | UInt16 | — | Digital Input Control Mode:<br>0 = Normal (Input Status)<br>2 = Multi Tariff Control<br>3 = Input Metering<br>5 = All Energy Reset |
| 0x22C8 | 8906 | R | 2 | Bitmap | — | Digital Input Status (only Bit 1 is used):<br>Bit 1 = 0, relay open<br>Bit 1 = 1, relay closed |

# Digital Output

| Address | Register | Action (R/W/ WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| 0x25C8 | 9673 | R | 1 | UInt16 | — | Digital Output Control Mode Status:<br>2 = for Alarm<br>3 = for Pulse (kWh)<br>0xFFFF = Disable |

# Meter Data

## Current, voltage, power, power factor and frequency

| Address | Register | Action (R/W/ WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| **Current** | | | | | | |
| 0x0BB7 | 3000 | R | 2 | Float32 | A | I1: phase 1 current |
| 0x0BB9 | 3002 | R | 2 | Float32 | A | I2: phase 2 current |
| 0x0BBB | 3004 | R | 2 | Float32 | A | I3: phase 3 current |
| 0x0BBD | 3006 | R | 2 | Float32 | A | In: Neutral current (available on iEM3555) |
| 0x0BC1 | 3010 | R | 2 | Float32 | A | Current Avg |
| **Voltage** | | | | | | |
| 0x0BCB | 3020 | R | 2 | Float32 | V | Voltage L1-L2 |
| 0x0BCD | 3022 | R | 2 | Float32 | V | Voltage L2-L3 |
| 0x0BCF | 3024 | R | 2 | Float32 | V | Voltage L3-L1 |
| 0x0BD1 | 3026 | R | 2 | Float32 | V | Voltage L-L Avg |
| 0x0BD3 | 3028 | R | 2 | Float32 | V | Voltage L1-N |
| 0x0BD5 | 3030 | R | 2 | Float32 | V | Voltage L2-N |
| 0x0BD7 | 3032 | R | 2 | Float32 | V | Voltage L3-N |
| 0x0BDB | 3036 | R | 2 | Float32 | V | Voltage L-N Avg |
| **Power** | | | | | | |
| 0x0BED | 3054 | R | 2 | Float32 | kW | Active Power Phase 1 |
| 0x0BEF | 3056 | R | 2 | Float32 | kW | Active Power Phase 2 |
| 0x0BF1 | 3058 | R | 2 | Float32 | kW | Active Power Phase 3 |
| 0x0BF3 | 3060 | R | 2 | Float32 | kW | Total Active Power |
| 0x0BFB | 3068 | R | 2 | Float32 | kVAR | Total Reactive Power |
| 0x0C03 | 3076 | R | 2 | Float32 | kVA | Total Apparent Power |
| **Power Factor** | | | | | | |
| 0x0C0B | 3084 | R | 2 | Float32 | — | Total Power Factor:<br>-1 < PF < 0 = Quad 2, active power negative, capacitive<br>-2 < PF < -1 = Quad 3, active power negative, inductive<br>0 < PF < 1 = Quad 1, active power positive, inductive<br>1 < PF < 2 = Quad 4, active power positive, capacitive |

| Address | Register | Action (R/W/ WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| **Frequency** | | | | | | |
| 0x0C25 | 3110 | R | 2 | Float32 | Hz | Frequency |

## Energy, energy by tariff and input metering

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

The energy and energy by tariff measurements listed below are preserved through power failures.

| Energy reset and active tariff information | | | | | | |
|---|---|---|---|---|---|---|
| **Address** | **Register** | **Action (R/W/ WC)** | **Size** | **Type** | **Units** | **Description** |
| 0x0CB3 | 3252 | R | 4 | DATETIME | — | Energy Reset Date and Time |
| 0x0DE1 | 3554 | R | 4 | DATETIME | — | Input Metering Accumulation Reset Date and Time |
| 0x105E | 4191 | R/WC | 1 | UInt16 | — | Multi Tariffs Energy Active Rate:<br>0: Multi Tariff disabled<br>1 to 4: rate A to rate D<br>**NOTE:** You can only set the tariff using this method if the Tariff Mode is set to by Communication. |

| Energy values – 64-bit integer | | | | | | |
|---|---|---|---|---|---|---|
| **Address** | **Register** | **Action (R/W/ WC)** | **Size** | **Type** | **Units** | **Description** |
| **Total Energy (cannot be reset)** | | | | | | |
| 0x0C83 | 3204 | R | 4 | Int64 | Wh | Total Active Energy Import |
| 0x0C87 | 3208 | R | 4 | Int64 | Wh | Total Active Energy Export |
| 0x0C93 | 3220 | R | 4 | Int64 | VARh | Total Reactive Energy Import |
| 0x0C97 | 3224 | R | 4 | Int64 | VARh | Total Reactive Energy Export |
| **Partial Energy** | | | | | | |
| 0x0CB7 | 3256 | R | 4 | Int64 | Wh | Partial Active Energy Import |
| 0x0CC7 | 3272 | R | 4 | Int64 | VARh | Partial Reactive Energy Import |
| **Phase Energy** | | | | | | |
| 0x0DBD | 3518 | R | 4 | Int64 | Wh | Active Energy Import Phase 1 |
| 0x0DC1 | 3522 | R | 4 | Int64 | Wh | Active Energy Import Phase 2 |
| 0x0DC5 | 3526 | R | 4 | Int64 | Wh | Active Energy Import Phase 3 |
| **Input Metering Counter** | | | | | | |
| 0x0DE5 | 3558 | R | 4 | Int64 | Unit | Input Metering Accumulation |
| **Demand** | | | | | | |
| 0x0E74 | 3701 | R/WC | 1 | UInt16 | — | Demand method:<br>1 = Timed interval sliding block<br>2 = Timed interval fixed block |
| 0x0E75 | 3702 | R/WC | 1 | UInt16 | Minute | Demand Interval Duration |
| 0x0E79 | 3706 | R | 4 | DATETIME | — | Demand Peak Reset Date/Time |

| Energy values – 64-bit integer | | | | | | |
|---|---|---|---|---|---|---|
| **Address** | **Register** | **Action (R/W/ WC)** | **Size** | **Type** | **Units** | **Description** |
| 0x0EB5 | 3766 | R | 2 | Float32 | kW | Active Power Demand |
| 0x0EB9 | 3770 | R | 2 | Float32 | kW | Active Power Peak Demand |
| 0x0EBB | 3772 | R | 4 | DATETIME | — | Active Power Peak Demand Date Time |
| 0x0EC5 | 3782 | R | 2 | Float32 | kVAR | Reactive Power Demand |
| 0x0EC9 | 3786 | R | 2 | Float32 | kVAR | Reactive Power Peak Demand |
| 0x0ECB | 3788 | R | 4 | DATETIME | — | Reactive Power Peak Demand Date Time |
| 0x0ED5 | 3798 | R | 2 | Float32 | kVA | Apparent Power Demand |
| 0x0ED9 | 3802 | R | 2 | Float32 | kVA | Apparent Power Peak Demand |
| 0x0EDB | 3804 | R | 4 | DATETIME | — | Apparent Power Peak Demand Date Time |
| 0x0EE5 | 3814 | R | 2 | Float32 | A | Current I1 Demand |
| 0x0EE9 | 3818 | R | 2 | Float32 | A | Current I1 Peak Demand |
| 0x0EEB | 3820 | R | 4 | DATETIME | — | Current I1 Peak Demand Date Time |
| 0x0EF5 | 3830 | R | 2 | Float32 | A | Current I2 Demand |
| 0x0EF9 | 3834 | R | 2 | Float32 | A | Current I2 Peak Demand |
| 0x0EFB | 3836 | R | 4 | DATETIME | — | Current I2 Peak Demand Date Time |
| 0x0F05 | 3846 | R | 2 | Float32 | A | Current I3 Demand |
| 0x0F09 | 3850 | R | 2 | Float32 | A | Current I3 Peak Demand |
| 0x0F0B | 3852 | R | 4 | DATETIME | — | Current I3 Peak Demand Date Time |
| 0x0F25 | 3878 | R | 2 | Float32 | A | Current Avg Demand |
| 0x0F29 | 3882 | R | 2 | Float32 | A | Current Avg Peak Demand |
| 0x0F2B | 3884 | R | 4 | DATETIME | — | Current Avg Peak Demand Date Time |

| Energy values – 32-bit floating point | | | | | | |
|---|---|---|---|---|---|---|
| **Address** | **Register** | **Action (R/W/ WC)** | **Size** | **Type** | **Units** | **Description** |
| **Demand** | | | | | | |
| 0x9D08 | 40201 | R/WC | 1 | UInt16 | — | Demand method:<br>1 = Timed interval sliding block<br>2 = Timed interval fixed block |
| 0x9D09 | 40202 | R/WC | 1 | UInt16 | Minute | Demand Interval Duration |
| 0x9D0B | 40204 | R | 4 | DATETIME | — | Demand Peak Reset Date/Time |
| 0x9D0F | 40208 | R | 2 | Float32 | kW | Active Power Demand |
| 0x9D11 | 40210 | R | 2 | Float32 | kW | Active Power Peak Demand |
| 0x9D13 | 40212 | R | 4 | DATETIME | — | Active Power Peak Demand Date Time |
| 0x9D17 | 40216 | R | 2 | Float32 | kVAR | Reactive Power Demand |
| 0x9D19 | 40218 | R | 2 | Float32 | kVAR | Reactive Power Peak Demand |
| 0x9D1B | 40220 | R | 4 | DATETIME | — | Reactive Power Peak Demand Date Time |
| 0x9D1F | 40224 | R | 2 | Float32 | kVA | Apparent Power Demand |
| 0x9D21 | 40226 | R | 2 | Float32 | kVA | Apparent Power Peak Demand |
| 0x9D23 | 40228 | R | 4 | DATETIME | — | Apparent Power Peak Demand Date Time |
| 0x9D27 | 40232 | R | 2 | Float32 | A | Current I1 Demand |
| 0x9D29 | 40234 | R | 2 | Float32 | A | Current I1 Peak Demand |
| 0x9D2B | 40236 | R | 4 | DATETIME | — | Current I1 Peak Demand Date Time |
| 0x9D2F | 40240 | R | 2 | Float32 | A | Current I2 Demand |

| Energy values – 32-bit floating point | | | | | | |
|---|---|---|---|---|---|---|
| **Address** | **Register** | **Action (R/W/ WC)** | **Size** | **Type** | **Units** | **Description** |
| 0x9D31 | 40242 | R | 2 | Float32 | A | Current I2 Peak Demand |
| 0x9D33 | 40244 | R | 4 | DATETIME | — | Current I2 Peak Demand Date Time |
| 0x9D37 | 40248 | R | 2 | Float32 | A | Current I3 Demand |
| 0x9D39 | 40250 | R | 2 | Float32 | A | Current I3 Peak Demand |
| 0x9D3B | 40252 | R | 4 | DATETIME | — | Current I3 Peak Demand Date Time |
| 0x9D47 | 40264 | R | 2 | Float32 | A | Current Avg Demand |
| 0x9D49 | 40266 | R | 2 | Float32 | A | Current Avg Peak Demand |
| 0x9D4B | 40268 | R | 4 | DATETIME | — | Current Avg Peak Demand Date Time |
| **Total Energy (cannot be reset)** | | | | | | |
| 0xB02B | 45100 | R | 2 | Float32 | kWh | Total Active Energy Import |
| 0xB02D | 45102 | R | 2 | Float32 | kWh | Total Active Energy Export |
| 0xB02F | 45104 | R | 2 | Float32 | kVARh | Total Reactive Energy Import |
| 0xB031 | 45106 | R | 2 | Float32 | kVARh | Total Reactive Energy Export |
| **Partial Energy** | | | | | | |
| 0xB033 | 45108 | R | 2 | Float32 | kWh | Partial Active Energy Import |
| 0xB035 | 45110 | R | 2 | Float32 | kVARh | Partial Reactive Energy Import |
| **Phase Energy** | | | | | | |
| 0xB037 | 45112 | R | 2 | Float32 | kWh | Active Energy Import Phase 1 |
| 0xB039 | 45114 | R | 2 | Float32 | kWh | Active Energy Import Phase 2 |
| 0xB03B | 45116 | R | 2 | Float32 | kWh | Active Energy Import Phase 3 |
| **Input Metering Counter** | | | | | | |
| 0xB03D | 45118 | R | 2 | Float32 | Unit | Input Metering Accumulation |

# Overload Alarm

| **Address** | **Register** | **Action (R/W/ WC)** | **Size** | **Type** | **Units** | **Description** |
|---|---|---|---|---|---|---|
| 0xAFC8 | 45001 | R/WC | 1 | Bitmap | — | Overload Alarm Setup:<br>0x0000 = Disabled<br>0x0100 = Enabled |
| 0xAFC9 | 45002 | R/WC | 2 | Float32 | kW | Pickup Setpoint |
| 0xAFCB | 45004 | R/WC | 1 | Bitmap | — | Digital Output to Associate:<br>0x0000 = Digital Output unassociated to overload alarm<br>0x0100 = Digital Output associated to overload alarm |
| 0xAFCC | 45005 | R | 1 | Bitmap | — | Activated Status:<br>0x0000 = Alarm is inactive<br>0x0100 = Alarm is active |
| 0xAFCD | 45006 | R | 1 | Bitmap | — | Unacknowledged Status:<br>0x0000 = Historic alarm is acknowledged by the user<br>0x0100 = Historic alarm is unacknowledged by the user |

| Address | Register | Action (R/W/ WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| 0xAFCE | 45007 | R | 4 | DATETIME | — | Last Alarm - Time Stamp |
| 0xAFD2 | 45011 | R | 2 | Float32 | kW | Last Alarm - Value |

## LVCT Angle compensation and Ratio compensation

| Address | Register | Action (R/W/ WC) | Size | Type | Units | Description |
|---|---|---|---|---|---|---|
| 0xDEB6 | 57015 | R | 2 | Float32 | rad | Angle compensation<br>Range: -7 to 1 |
| 0xDEB8 | 57017 | R | 2 | Float32 | — | Ratio compensation<br>Range: 0 to 2 |

# Read Device Identification

The meters supports the Read Device Identification function with the mandatory objects Vendor Name, Product Code, Firmware Revision, Vendor URL, Product Range, Product Model and User Application Name.

| Object ID | Name / Description | Length | Value | Note |
|---|---|---|---|---|
| 0x00 | Vendor Name | 20 | Schneider Electric | — |
| 0x01 | Product Code | 20 | Commercial reference | The ProductCode value is identical to the catalog number of each device<br>Ex: A9MEM3x55 |
| 0x02 | Firmware Revision | 06 | XXX.YYY.ZZZ | — |
| 0x03 | Vendor URL | 20 | www.se.com | — |
| 0x04 | Product Range | 20 | iEM3000 | — |
| 0x05 | Product Model | 20 | Product Model | Ex: A9MEM3x55 |
| 0x06 | User Application Name | 20 | User configurable | Default = Product model |

The Read Device ID codes 01, 02 and 04 are supported:

- 01 = request to get basic device identification (stream access)
- 02 = request to get regular device identification (stream access)
- 04 = request to get one specific identification object (individual access)

The Modbus request and response are compliant with the Modbus Application Protocol Specification.

# Communications using BACnet

## BACnet communications overview

**Communications using BACnet MS/TP protocol is available on iEM3465 / iEM3565 meter models.**

The information in this section is intended for users with an advanced understanding of BACnet protocol, their communications network and their power system.

### Key terms

| Term | Definition |
|---|---|
| APDU | Application protocol data unit, that data portion of a BACnet message. |
| Confirmed message | A message for which the device expects an answer. |
| COV | Change of value, sets the amount by which a value has to change in order for the meter to send a subscription notification. |
| Device | A BACnet device is a unit that is designed to understand and use BACnet protocol (for example, a BACnet-enabled meter or software program). It contains information about the device and device data in objects and object properties. Your meter is a BACnet device. |
| MS/TP | Master-slave/token-passing over RS-485. |
| Object | Represents the device and device data. Each object has a type (for example, analog input or binary input) and has a number of properties. |
| Present value | The current value of an object. |
| Property | The smallest piece of information in BACnet communications, it consists of a name, data type and value. |
| Service | Messages from one BACnet device to another. |
| Subscription | Creates a relationship between the server and the meter, so that when the present value property of an object changes by more than the configured COV threshold (COV_Increment), a notification is sent. |
| Subscription notification | The message the meter sends to indicate a COV event has occurred. |
| Unconfirmed message | A message for which the device does not expect an answer. |

## BACnet protocol support

Go to www.se.com and search for your meter model to access the PICS (Protocol Implementation Conformance Statement) for your meter.

The meter supports the BACnet protocol as follows:

| BACnet component | Description |
|---|---|
| Protocol version | 1 |
| Protocol revision | 6 |
| Standardized device profile (Annex L) | BACnet Application Specific Controller (B-ASC) |
| BACNet Interoperability Building Blocks (Annex K) | DS-RP-B (Data Sharing - Read Property - B) |
| | DS-RPM-B (Data Sharing - Read Property Multiple - B) |
| | DS-WP-B (Data Sharing - Write Property - B) |
| | DS-COV-B (Data Sharing - COV - B) |
| | DM-DDB-B (Device Management - Dynamic Device Binding - B) |

| BACnet component | Description |
|---|---|
| | DM-DOB-B (Device Management - Dynamic Object Binding - B) |
| | DM-DCC-B (Device Management - Device Communication Control - B) |
| Data link layer options | MS/TP master (clause 9)<br>Baud rates 9600, 19200, 38400, 57600, 76800 |
| Character set | ANSI X3.4 |
| Supported services | subscribeCOV<br>readProperty<br>readPropertyMultiple<br>writeProperty<br>deviceCommunicationControl<br>who-HAS<br>who-Is<br>I-Am<br>I-Have<br>Confirmed COV notification<br>Unconfirmed COV notification |
| Segmentation | The meter does not support segmentation |
| Static device address binding | The meter does not support static device address binding |
| Networking options | None |

The following standard object types are supported:

| Object type | Optional properties supported | Writeable properties supported | Proprietary properties |
|---|---|---|---|
| Device Object | Max_Master<br>Max_Info_Frames<br>Description<br>Location<br>Local_Date<br>Local_Time<br>Active_COV_Subscriptions<br>Profile Name | Object_Name<br>Max_Master<br>Max_Info_Frames<br>Description<br>Location<br>APDU_Timeout<br>Number_Of_APDU_Retries | D_800<br>ID_801<br>ID_802 |
| Analog Input Object | COV_Increment | | — |
| Analog Value Object | — | | — |
| Binary Input Object | — | — | — |

# BACnet communications implementation

## Configuring basic communication parameters

Before communicating with the meter using BACnet protocol, use the front panel to configure the following settings:

| Setting | Possible values |
|---|---|
| Baud rate | 9600<br>19200<br>38400<br>57600<br>76800 |
| Mac Address | 1 – 127 |
| Device ID | 0 – 4194303 |

Make sure that the Mac Address is unique on the serial loop and the Device ID is unique in your BACnet network.

## Communications LED indicator for BACnet meters

The LED indicates the status of the meter's communications with the network.

| LED state | Description |
|---|---|
| The LED is off | Communication is not active. |
| The LED is flashing | Communication is active.<br>**NOTE:** The LED flashes even if there is a communications error. |

## Change of Value (COV) subscriptions

The meter supports up to 14 COV subscriptions. You can add COV subscriptions to Analog Input and Binary Input objects using your BACnet-compatible software.

# BACnet object and property information

The following sections outline the supported objects and properties available on the meter.

## Device object

The following table outlines the properties of the Device object, whether a property is read-only or read-write, and if the value of the property is stored in the meter's non-volatile onboard memory.

| Device object property | R/W | Stored | Possible values | Description |
|---|---|---|---|---|
| Object_Identifier | R | — | configurable | The unique device ID number for the meter, in the format of <device, #>.<br>**NOTE:** You must use the front panel to configure the device ID number. |
| Object_Name | R/W | √ | configurable | A configurable name for the meter.<br>The meter ships from the factory with a name of <model name>_<serial number> (for example, _0000000000). |
| Object_Type | R | — | Device | The object type for the meter. |
| System_Status | R | — | Operational | This value of this property is always Operational. |
| Vendor_Name | R | — | Schneider Electric | Meter manufacturer |
| Vendor_Identifier | R | — | 10 | The BACnet vendor identifier for Schneider Electric. |

| Device object property | R/W | Stored | Possible values | Description |
|---|---|---|---|---|
| Model_Name | R | — | iEM3X65 | Device model (for example, iEM3465) and serial number in the format <model name>_<serial number> (for example, iEM3465_0000000000). |
| Firmware_Revision | R | — | varies | BACnet firmware version, stored in an x.x.x format (for example, 1.7.2). |
| Application_Software_ Version | R | — | varies | Meter firmware version, stored in an x.x.xxx format (for example, 1.0.305). |
| Description | R/W | √ | configurable | Optional description of the meter, limited to 64 characters. |
| Location | R/W | √ | configurable | Optional description of the meter's location, limited to 64 characters. |
| Protocol_Version | R | — | varies | BACnet protocol version (for example, version 1) |
| Protocol_Revision | R | — | varies | BACnet protocol revision (for example, revision 6) |
| Protocol_Services_ Supported | R | — | 0000 0100<br>0000 1011<br>0100 0000<br>0000 0000<br>0110 0000 | The BACnet services supported by the meter: subscribeCOV, readProperty, readPropertyMultiple, writeProperty, deviceCommunicationControl, who- HAS, who-Is |
| Protocol_Object_Types_ Supported | R | — | 1011 0000<br>1000 0000<br>0000 0000<br>0000 0000 | The BACnet object types supported by the meter: analog input, binary input, multi-state input, device. |
| Object_list | R | — | varies | List of objects in the meter:<br>DE1, AI0 – AI55, AV0, BI0 – BI6 |
| Max_APDU_Length_ Accepted | R | — | 480 | The maximum packet size (or application protocol data unit) that the meter can accept, in bytes. |
| Segmentation_Supported | R | — | 0x03 | The meter does not support segmentation. |
| Local_Date | R | — | configurable | Date<br>**NOTE:** You must use the front panel to set the meter's date. |
| Local_Time | R | — | configurable | Time<br>**NOTE:** You must use the front panel to set the meter's date. |
| APDU_Timeout | R/W | √ | 1000 – 30000 | The amount of time (in milliseconds) before the meter tries to resend a confirmed message that has not been answered. |
| Number_Of_APDU_ Retries | R/W | √ | 1 – 10 | The number of times the meter tries to resend an unanswered confirmed request. |
| Max_Master | R/W | √ | 1 – 127 | The highest master address the meter will try to discover when the next node is unknown. |
| Max_Info_Frames | R/W | √ | 1 – 14 | Maximum number of messages the meter can send before it must pass the token. |
| Device_Address_Binding | R | — | — | Device address binding table is always blank because the meter does not initiate the who-Is service. |
| Database_Revision | R | √ | varies | A number that increments when the object database on the meter changes (for example, when an object is created or deleted or the ID of an object changes). |
| Active_COV_ Subscriptions | R | — | varies | List of COV subscriptions currently active on the meter. |
| Profile_Name | R | — | varies | Device identifier that records the meter manufacturer, the meter family and the specific meter model (for example, 10_iEM3000_ iEM3465). |

| Device object property | R/W | Stored | Possible values | Description |
|---|---|---|---|---|
| ID 800 | R | — | varies | Date and time of last energy reset |
| ID 801 | R | — | varies | Date and time of last input metering accumulation reset |
| ID 802 | R | — | varies | Date and time of the last alarm (DD/MM/YYYY hh:mm:ss) |

# Analog Input objects

The following tables list the Analog Input (AI) objects along with the units and default COV value for each AI object (if applicable).

**NOTE:** The Value Type for all AI objects is Real.

## Energy and energy by tariff measurements

The energy and energy by tariff measurements listed below are preserved through power failures.

| Object ID | Units | Default COV | Object name / description |
|---|---|---|---|
| 27 | Wh | 100 | AI27 - Total active energy import |
| 28 | Wh | 100 | AI28 - Total active energy export |
| 29 | Wh | 100 | AI29 - Total reactive energy import |
| 30 | Wh | 100 | AI30 - Total reactive energy export |
| 31 | Wh | 100 | AI31 - Partial active energy import |
| 32 | Wh | 100 | AI32 - Partial reactive energy import |
| 33 | Wh | 100 | AI33 - Active energy import phase 1 |
| 34 | Wh | 100 | AI34 - Active energy import phase 2 |
| 35 | Wh | 100 | AI35 - Active energy import phase 3 |
| 36 | — | 10 | AI36 - Accumulation<br>Input metering accumulation |
| 37 | — | 1 | AI37 - Tariff Energy Active Rate<br>Denotes the active tariff:<br>0 = Multi Tariff feature is disabled<br>1 = Rate A (tariff 1) active<br>2 = Rate B (tariff 2) active<br>3 = Rate C (tariff 3) active<br>4 = Rate D (tariff 4) active |
| 38 | Wh | 100 | AI38 - Rate A (Tariff 1) active energy import |
| 39 | Wh | 100 | AI39 - Rate B (Tariff 2) active energy import |
| 40 | Wh | 100 | AI40 - Rate C (Tariff 3) active energy import |
| 41 | Wh | 100 | AI41 - Rate D (Tariff 4) active energy import |

## Instantaneous (RMS) measurements

| Object ID | Units | Default COV | Object name / description |
|---|---|---|---|
| 7 | A | 50 | AI07 - Current Phase 1 |
| 8 | A | 50 | AI08 - Current Phase 2 |

| Object ID | Units | Default COV | Object name / description |
|---|---|---|---|
| 9 | A | 50 | AI09 - Current Phase 3 |
| 10 | A | 50 | AI10 - Current Average |
| 11 | V | 10 | AI11 - Voltage L1-L2 |
| 12 | V | 10 | AI12 - Voltage L2-L3 |
| 13 | V | 10 | AI13 - Voltage L3-L1 |
| 14 | V | 10 | AI14 - Voltage Average L-L |
| 15 | V | 10 | AI15 - Voltage L1-N |
| 16 | V | 10 | AI16 - Voltage L2-N |
| 17 | V | 10 | AI17 - Voltage L3-N |
| 18 | V | 10 | AI18 - Voltage Average L-N |
| 19 | kW | 10 | AI19 - Active Power Phase 1 |
| 20 | kW | 10 | AI20 - Active Power Phase 2 |
| 21 | kW | 10 | AI21 - Active Power Phase 3 |
| 22 | kW | 10 | AI22 - Active Power Total |
| 23 | kVAR | | AI23 - Reactive Power Total |
| 24 | kVA | 10 | AI24 - Apparent Power Total |
| 25 | — | 0.2 | AI25 - Power Factor Total |
| 26 | Hz | 10 | AI26 - Frequency |

## Demand measurements

| Object ID | Units | Default COV | Object name / description |
|---|---|---|---|
| 60 | kW | 1 | AI60 - Demand active power |
| 61 | kW | 1 | AI61 - Demand active power peak |
| 62 | kVAR | 1 | AI62 - Demand reactive power |
| 63 | kVAR | 1 | AI63 - Demand reactive power peak |
| 64 | kVA | 1 | AI64 - Demand apparent power |
| 65 | kVA | 1 | AI65 - Demand apparent power peak |
| 66 | A | 1 | AI66 - Demand current phase 1 |
| 67 | A | 1 | AI67 - Demand current phase 1 peak |
| 68 | A | 1 | AI68 - Demand current phase 2 |
| 69 | A | 1 | AI69 - Demand current phase 2 peak |
| 70 | A | 1 | AI70 - Demand current phase 3 |
| 71 | A | 1 | AI71 - Demand current phase 3 peak |

## Meter information

The following AI objects display information about the meter and its configuration.

**NOTE:** You can access the meter's configuration information over BACnet communications. However, you must use the front panel to configure the meter's settings.

| Object ID | Units | Default COV | Object name / description |
|---|---|---|---|
| 44 | Seconds | 10 | AI44 - Meter operation time<br>The time in seconds since the meter was last powered up |
| 45 | — | 1 | AI45 - Number of phases<br>1, 3 |
| 46 | — | 1 | AI46 - Number of wires<br>2, 3, 4 |
| 47 | — | 1 | AI47 - Power system type<br>0 = 1PH2W L-N<br>1 = 1PH2W L-L<br>2 = 1PH3W L-L with N<br>3 = 3PH3W<br>11 = 3PH4W<br>13 = 1PH4 wire multi L-N |
| 48 | Hz | 1 | AI48 - Nominal frequency<br>50, 60 |
| 49 | — | 1 | AI49 - Number of VTs<br>0 – 10 |
| 50 | V | 1 | AI50 - VT Primary |
| 51 | V | 1 | AI51 - VT Secondary |
| 52 | — | 1 | AI52 - Number of CTs<br>1, 2, 3 |
| 53 | A | 1 | AI53 - CT Primary |
| 54 | A | 1 | AI54 - CT Secondary |
| 55 | — | 1 | AI55 - VT connection type<br>0 = Direct connection, not VTs<br>1 = 3PH3W (2VTs)<br>2 = 3PH4W (3VTs) |

## Communications settings information

The following AI objects display information about the meter's communications settings.

**NOTE:** You can access the meter's communications configuration information over BACnet communications. However, you must use the front panel to configure the meter's settings.

| Object ID | Units | Default COV | Object name / description |
|---|---|---|---|
| 00 | — | 1 | AI00 - BACnet MAC Address |
| 01 | — | 1 | AI01 - BACnet Baud Rate |

## Digital input and output setting information

The following AI objects display information about the meter's I/O settings.

**NOTE:** You can access the meter's I/O configuration information over BACnet communications. However, you must use the front panel to configure the meter's settings.

| Object ID | Units | Default COV | Object name / description |
|---|---|---|---|
| 02 | ms | 1 | AI02 - Pulse Duration<br>The energy pulse duration (or pulse width), in milliseconds, of the digital output.<br>**NOTE:** This information only applies if the digital output mode is set to energy pulsing. |
| 03 | — | 1 | AI03 - Pulse Weight<br>The pulses/unit setting of the digital input when it is configured for input metering.<br>**NOTE:** This information only applies if the digital input mode is set to Input Metering. |
| 04 | — | 1 | AI04 - Pulse Constant<br>The pulses/kWh setting of the digital output.<br>**NOTE:** This information only applies if the digital output mode is set to energy pulsing. |
| 05 | — | 1 | AI05 - Digital Input Mode<br>0 = Normal (input status)<br>2 = Multi Tariff control<br>3 = Input metering<br>5 = All partial energy logs reset |
| 06 | — | 1 | AI06 - Digital Output Mode<br>2 = Alarm<br>3 = Energy<br>0xFFFF (65535 dec) = Disabled |
| 42 | kW | 10 | AI42 - Pickup Setpoint<br>Active power alarm pickup setpoint in kW |
| 43 | kW | 10 | AI43 - Last Alarm Value |

# Analog value object

There is one Analog Value (AV) object available on the meter, named AV00 - Command. The available commands are listed in the following table. Enter the number in the Present_Value column in the Present_Value property of the AV object to write the associated command to the meter.

| Command | Present_Value entry | Object name / description |
|---|---|---|
| Acknowledge Overload Alarm | 20001.00 | Acknowledge an overload alarm.<br>The alarm indicator disappears from the front panel display after you acknowledge the alarm; however, this does not address the state that caused the alarm. |
| Reset Partial Energy Counter | 2020.00 | Reset partial energy accumulation to 0.<br>Partial Active / Reactive Energy, Energy by Tariff and Phase Energy registers are reset. |
| Reset Input Metering Counter | 2023.00 | Resets input metering accumulation to 0. |

# Binary input objects

The following table lists the Binary Input (BI) objects available on the meter.

**NOTE:** The value type for all BI objects is Boolean.

| Object ID | Object name / description |
|---|---|
| 0 | BI00 - Digital Output Enable<br>Indicates whether or not the digital output functions as an energy pulse output:<br>0 = Digital output disabled<br>1 = Digital output is associated with active energy pulse output |
| 1 | BI01 - Digital Input Association Enable<br>Indicates whether or not the digital input is associated with input metering:<br>0 = Digital input is not associated with input metering<br>1 = Digital input is associated with input metering |
| 2 | BI02 - Digital Input Status<br>0 = relay open<br>1 = relay closed<br>**NOTE:** This information only applies if the digital input is set to Input Status. |
| 3 | BI03 - Alarm Enable<br>Indicates whether the overload alarm is enabled or disabled:<br>0 = disabled<br>1 = enabled |
| 4 | BI04 - Digital Output Association Enable<br>Indicates if the digital output is configured for alarming:<br>0 = digital output disabled<br>1 = for Alarm (digital output is associated with the overload alarm) |
| 5 | BI05 - Alarm Status<br>0 = Alarm is inactive<br>1 = Alarm is active |
| 6 | BI06 - Unacknowledged status<br>0 = historic alarm is acknowledged<br>1 = historic alarm is unacknowledged |

# Power, energy and power factor

## 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).

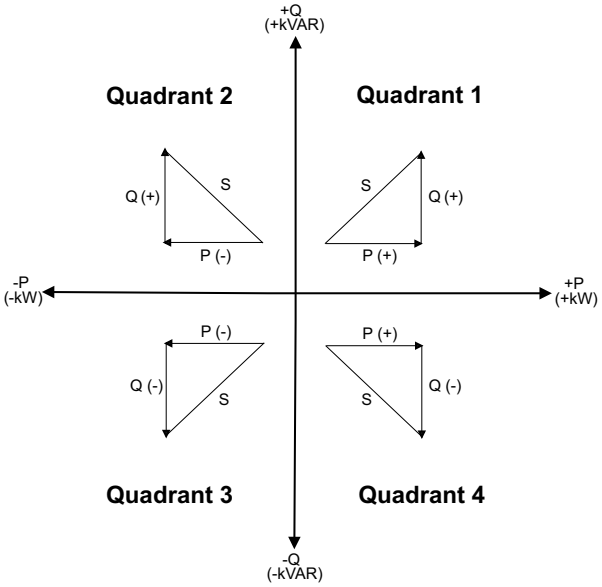
Apparent power (S) is the vector sum of real power (P) and reactive power (Q):

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

Real power is measured in watt (W or kW), reactive power is measured in var (VAR or kVAR) and apparent power is measured in volt-amp (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).

PF is provided as a number between -1 and 1 or as a percentage from -100% to 100%, where the sign is determined by the convention.

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

A purely resistive load has no reactive components, so its power factor is 1 (PF = 1, or unity power factor). Inductive or capacitive loads introduce a reactive power (Q) component to the circuit which causes the PF to become closer to zero.

## True PF

True power factor includes harmonic content.

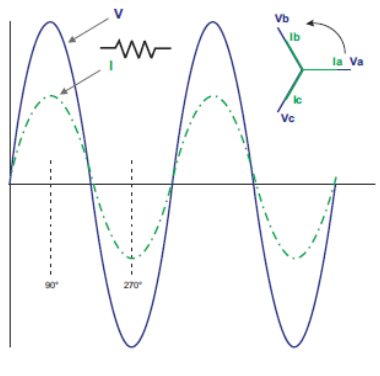
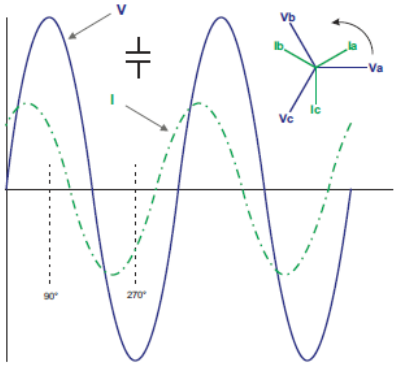
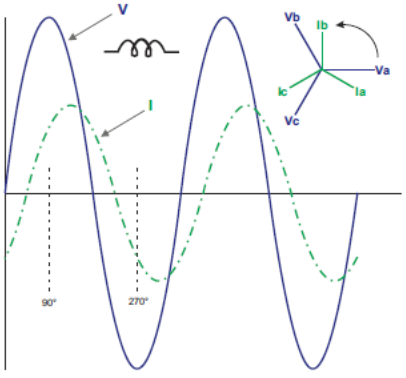
## PF lead / lag convention

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.

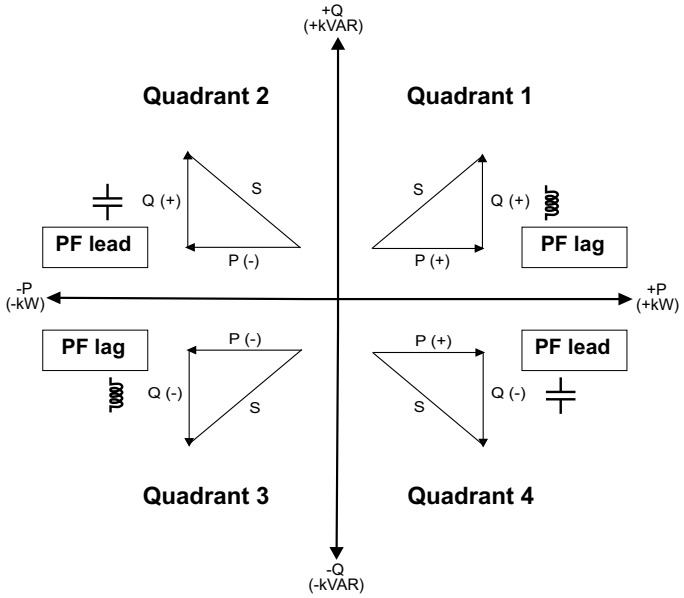
### Current phase shift from voltage

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

**NOTE:** The lagging or leading distinction does **NOT** equate to a positive or negative value. Rather, lagging corresponds to an inductive load, while leading corresponds to a capacitive load.

| Quadrant | Current phase shift | load type | |
|---|---|---|---|
| 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 |

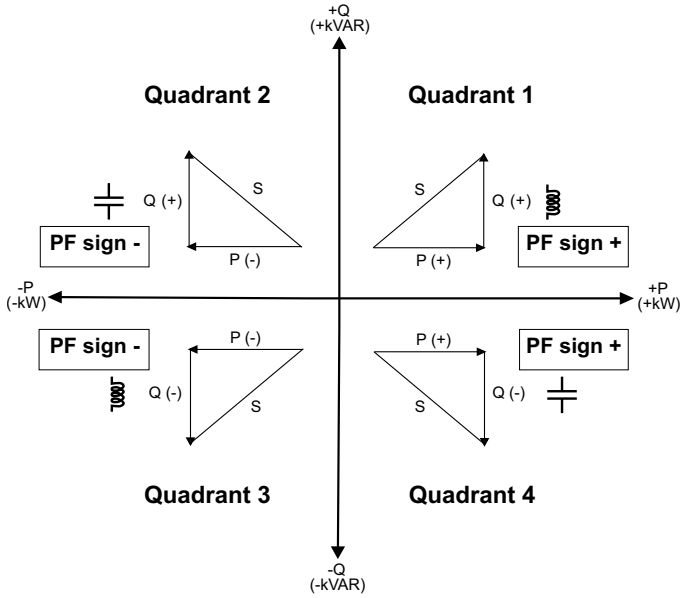
# PF sign convention

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

## PF sign in IEC

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

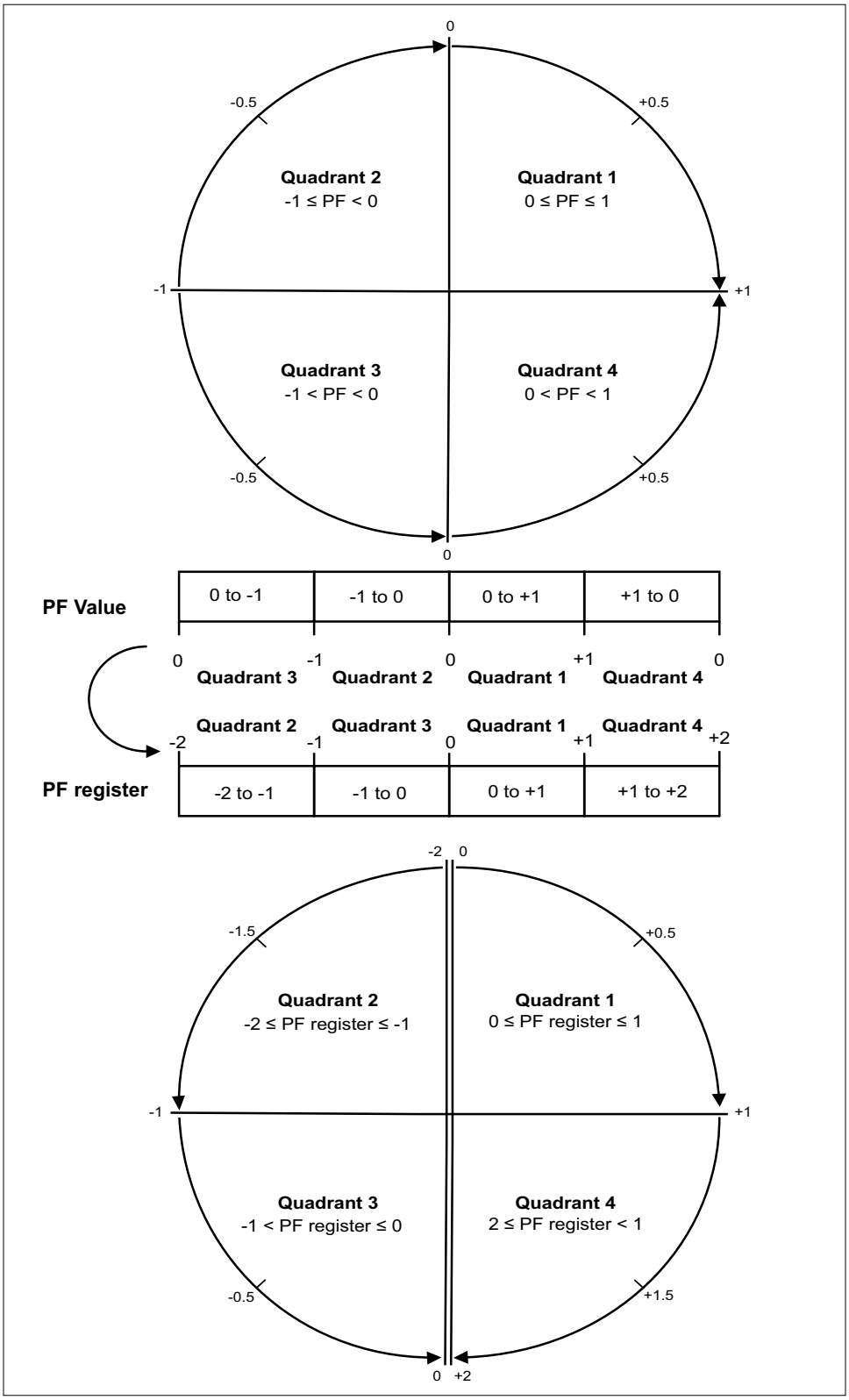
- For positive real power (+P), the PF sign is positive (+).
- For negative real power (-P), the PF sign is negative (-).




# Power factor register format

The meter performs a simple algorithm to the PF value then stores it in the PF register.

Each power factor value (PF value) occupies one floating point register for power factor (PF register). The meter and software interpret the PF register for all reporting or data entry fields according to the following diagram:




The PF value is calculated from the PF register value using the following formulae:

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

# Troubleshooting

## Overview

The meter does not contain any user-serviceable parts. If the meter requires service, contact your local Schneider Electric representative.

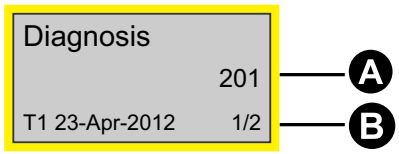
| NOTICE |
| --- |
| **RISK OF DAMAGE TO THE METER**<br>• Do not open the meter case.<br>• Do not attempt to repair any components of the meter.<br>**Failure to follow these instructions can result in equipment damage.** |

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

## Diagnosis screen

The Diagnosis screen lists any current diagnostic codes.

**NOTE:** The Diagnosis screen only appears if there is a specific event.




| | |
| --- | --- |
| A | Diagnostic code |
| B | Existing events |

1. Press the down button to scroll through the main display screens until you reach the **Diagnosis** screen.
2. Press the ▽ button to scroll through any existing events.

## Diagnostic codes

If the combination of the backlight and the error / alert icon indicates an error or an abnormal situation, navigate to the diagnostics screen and find the diagnostics code. If the problem persists after following the instructions in the table, please contact Technical Support.

| Diagnostic code (2) | Description | Possible solution |
| --- | --- | --- |
| — | LCD display is not visible. | Check and adjust LCD contrast. |
| — | Push buttons do not respond. | Restart the meter by powering off and powering on again. |
| 101 | Metering stops due to an EEPROM error.<br>Press **OK** to display total energy consumption. | Enter configuration mode and select **Reset Config**. |
| 102 | Metering stops due to a lack of a calibration table.<br>Press **OK** to display total energy consumption. | Enter configuration mode and select **Reset Config**. |
| 201 | Metering continues.<br>Mismatch between frequency settings and frequency measurements. | Correct the frequency settings according to the nominal frequency of the power system. |

(2) Not all diagnostic codes apply to all devices.

| Diagnostic code (3) | Description | Possible solution |
|---|---|---|
| 202 | Metering continues.<br>Mismatch between wiring settings and wiring inputs. | Correct the wiring settings according to wiring inputs. |
| 203 | Metering continues.<br>Phase sequence reversed. | Check the wire connections and correct the wiring settings if needed. |
| 204 | Metering continues.<br>Total active energy is negative due to incorrect voltage and current connections. | Check the wire connections and correct the wiring settings if needed. |
| 205 | Metering continues.<br>Date and Time have been reset due to a loss of power. | Set the Date and Time. |
| 206 | Metering continues.<br>Pulse is missing due to overload on energy pulse output. | Check the energy pulse output settings and correct if needed. |
| 207 | Metering continues.<br>Abnormal internal clock function. | Restart the meter by powering off and powering on again then reset the date and time. |

(3) Not all diagnostic codes apply to all devices.

# Specifications

## Electrical characteristics

### Power system inputs

| Characteristic | | Value |
|---|---|---|
| Voltage inputs | Measured voltage | Wye: 100...277 V L-N, 173...480 V L-L ±20%<br>Delta: 173...480 V L-L ±20% |
| | Overload | 332 V L-N or 575 V L-L |
| | Impedance | 3 MΩ |
| | Frequency | 50 / 60 Hz ±10% |
| | Impulse voltage (Uimp) | 6 kV for 1.2 µs |
| | Measurement category | III |
| | Minimum wire temperature rating required | 90 °C (194 °F) |
| | Burden | < 10 VA |
| | Wire | 2.5 $mm^2$ / 14 AWG<br>(Recommended: Copper wire) |
| | Wire strip length | 8 mm / 0.31 in |
| | Torque | 0.5 Nm / 4.4 in·lb |
| Current inputs | Split-core or solid-core LVCTs | 0.333 V or 1 V nominal |
| | Rogowski Coil | U018 Series of Rogowski Coils (up to 5000 A) |
| | Minimum wire temperature rating required | 90 °C (194 °F) |
| | Frequency | 50 / 60 Hz ±10% |
| | Wire | 6 $mm^2$ / 10 AWG<br>(Recommended: Copper wire) |
| | Wire strip length | 8 mm / 0.31 in |
| | Torque | 0.8 Nm / 7.0 in·lb |

### Inputs and outputs

| Characteristic | | Value |
|---|---|---|
| Programmable digital output | Number | 1 |
| | Type | Form A |
| | Load voltage | 5...40 V DC |
| | Maximum load current | 50 mA |
| | Output resistance | 0.1...50 Ω |
| | Isolation | 3.75 kV rms |
| | Wire | 1.5 $mm^2$ / 16 AWG |
| | Wire strip length | 6 mm / 0.23 in |
| | Torque | 0.5 Nm / 4.4 in·lb |
| Programmable digital input | Number | 1 |
| | Type | Type 1 (BS/ EN/ IEC 61131-2) |

| Characteristic | | | Value |
|---|---|---|---|
| | Maximum input | Voltage | 40 V DC |
| | | Current | 4 mA |
| | Voltage OFF | | 0...5 V DC |
| | Voltage ON | | 11...40 V DC |
| | Nominal voltage | | 24 V DC |
| | Isolation | | 3.75 kV rms |
| | Wire | | 1.5 $mm^2$ / 16 AWG |
| | Wire strip length | | 6 mm / 0.23 in |
| | Torque | | 0.5 Nm / 4.4 in·lb |

# Mechanical characteristics

| Characteristic | Value | | Meters |
|---|---|---|---|
| IP degree of protection | Front panel | IP40 | iEM3400 / iEM3500 series |
| | Meter body | IP20 | iEM3400 / iEM3500 series |
| Impact rating | IK08 | | iEM3400 / iEM3500 series |
| Active energy display range | In kWh or MWh up to 99999999 MWh | | iEM3400 / iEM3500 series |
| Energy pulsing LED (yellow (4)) | 24000/x imp/kWh | | iEM3400 series |
| | 5 imp/kWh | | iEM3500 series |

# Environmental characteristics

| Characteristic | Value |
|---|---|
| Operating temperature | -25 to 70 °C (-13 to 158 °F) |
| Storage temperature | -40 to 85 °C (-40 to 185 °F) |
| Pollution degree | 2 |
| Relative humidity | 5% to 95% RH non-condensing<br>Maximum dew point 36 °C (97 °F) |
| Altitude | < 3000 m (9842 ft) above sea level |
| Location | For indoor use in a stationary panel<br>Must be permanently connected and fixed |
| Product life | > 15 years, 45 °C (113 °F) 60% RH |

(4) The pulses / kWh of the energy pulsing LED cannot be changed.

# Safety, EMI/EMC and product standards

| | |
|---|---|
| Safety | BS/ EN/ IEC/ UL 61010-1: 2010 + A1: 2019 |
| Protective class | II<br>Double insulated for user accessible parts |
| Standard compliance | BS/ EN/ IEC 62053-22<br>BS/ EN/ IEC 61557-12 |

# Measurement accuracy

| Type of Measurement | Value |
|---|---|
| BS/ EN/ IEC 62053-22 | Class 0.5S |
| ANSI C12.20 | |

# Internal clock

| Characteristic | Value |
|---|---|
| Type | Quartz crystal based<br>Backup by super capacitor |
| Time error | < 2.5 s/day (30 ppm) at 25 °C (77 °F) |
| Backup time | 3 days at 25 °C (77 °F) |

# Modbus communications

| Characteristic | Value | Meters |
|---|---|---|
| Number of ports | 1 | iEM3455 / iEM3555 |
| Labels | 0V, D0/-, D1/+, ⏚ (shield) | |
| Parity | Even, Odd, None | |
| Baud rate | 9600, 19200, 38400 | |
| Isolation | 4.0 kV rms | |
| Wire | 2.5 $mm^2$ / 14 AWG shielded twisted pair | |
| Wire strip length | 7 mm / 0.28 in | |
| Torque | 0.5 Nm / 4.4 in·lb | |

# BACnet communications

| Characteristic | Value | Meters |
|---|---|---|
| Number of ports | 1 | iEM3465 / iEM3565 |
| Labels | 0V, D0/-, D1/+, ⏚ (shield) | |
| Baud rate | 9600, 19200, 38400, 57600, 76800 | |

| Characteristic | Value | Meters |
|---|---|---|
| Isolation | 4.0 kV rms | |
| Wire | 2.5 $mm^2$ / 14 AWG shielded twisted pair | |
| Wire strip length | 7 mm / 0.28 in | |
| Torque | 0.5 Nm / 4.4 in·lb | |

# China Standard Compliance

This product complies with the following standards in China:

| |
|---|
| BS/EN/IEC/UL 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements |

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