

# iEM3100 series / iEM3200 series

## Energy Meters User Manual

04/2012



---

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

No part of this document may be reproduced in any form or by any means, electronic or mechanical, including photocopying, without express written permission of Schneider Electric.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

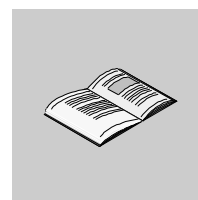
Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

© 2012 Schneider Electric. All rights reserved.

---

# Table of Contents

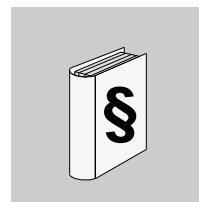


	<b>Safety Information</b> .....	<b>5</b>
	<b>About the Book</b> .....	<b>7</b>
<b>Chapter 1</b>	<b>Presentation</b> .....	<b>9</b>
	Presentation .....	10
	Physical Description .....	11
<b>Chapter 2</b>	<b>Installation</b> .....	<b>15</b>
	Safety Measures .....	16
	Dimensions .....	17
	DIN Rail Mounting and Dismantling .....	18
	Connection .....	20
	Typical Applications .....	29
<b>Chapter 3</b>	<b>Use</b> .....	<b>31</b>
	Presentation .....	32
	Settings for all Energy Meters .....	34
	Modifying Parameters .....	35
	Clock Setting .....	36
	Configuration .....	37
	HMI Display .....	50
<b>Chapter 4</b>	<b>Communication via Modbus RS-485</b> .....	<b>53</b>
4.1	Modbus Configuration .....	54
	Configuration of RS-485 Communication Port .....	54
4.2	Modbus Functions .....	55
	Function List .....	56
	Table Format .....	57
4.3	Command Interface .....	58
	Presentation .....	59
	Command List .....	60
4.4	Modbus Register Table .....	65
	Register List .....	65
4.5	Read Device Identification .....	70
	Register List .....	70
<b>Chapter 5</b>	<b>Technical Characteristics</b> .....	<b>71</b>
	Specifications .....	71
<b>Chapter 6</b>	<b>Maintenance and Troubleshooting</b> .....	<b>73</b>
	Safety Precautions .....	74
	Troubleshooting .....	75



---

## Safety Information



---

### Important Information

#### NOTICE

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



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



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

#### **DANGER**

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

#### **WARNING**

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

#### **CAUTION**

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

#### **NOTICE**

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

#### PLEASE NOTE

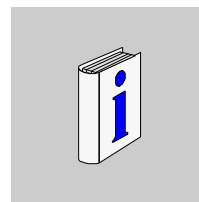
Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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



---

## About the Book



---

### At a Glance

#### Document Scope

This manual is intended for use by designers, system builders and maintenance technicians who are concerned with electrical distribution systems featuring monitoring devices.

#### Validity Note

The energy meters are used to measure the amount of active energy consumed by an installation or a part of an installation.

This function meets the requirements for:

- consumption monitoring,
- evaluation of energy items (cost, accounting, etc.).

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

#### Related Documents

Title of Documentation	Reference Number
Instruction sheet: iEM3100 / iEM3110 / iEM3115	S1B46581 / S1B62907
Instruction sheet: iEM3150 / iEM3155	S1B46583 / S1B62908
Instruction sheet: iEM3200 / iEM3210 / iEM3215	S1B46598 / S1B62910
Instruction sheet: iEM3250 / iEM3255	S1B46602 / S1B62911

You can download these technical publications and other technical information from our website at [www.schneider-electric.com](http://www.schneider-electric.com).

#### User Comments

We welcome your comments about this document. You can reach us by e-mail at [techcomm@schneider-electric.com](mailto:techcomm@schneider-electric.com).





---

# Presentation

# 1

---

## What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Presentation	10
Physical Description	11

## Presentation

### Use of Energy Meters to Measure Electrical Systems

The energy meters provide combine accurate 3-phase energy measurement.

The offer is composed of 10 commercial references described below.

### Functions of Energy Meters

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

The key features of energy meters are:

- measurements of active and reactive energies,
- multi-tariffs (up to 4) controlled by internal clock, digital inputs or communication
- MID compliant for many references,
- pulse outputs,
- display (currents, voltage, energies),
- Modbus communication.

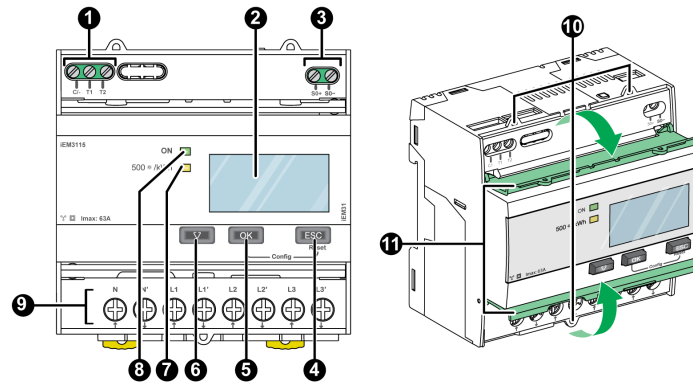
### Main Characteristics




Function	iEM3100	iEM3110	iEM3115	iEM3150	iEM3155	iEM3200	iEM3210	iEM3215	iEM3250	iEM3255
Direct measurement (up to 63 A)	√	√	√	√	√	–	–	–	–	–
Measurement inputs through CTs (1 A, 5 A)	–	–	–	–	–	√	√	√	√	√
Measurement inputs through VTs	–	–	–	–	–	–	–	–	√	√
Active Energy measurements	√	√	√	√	√	√	√	√	√	√
Four Quadrant Energy measurements	–	–	–	–	√	–	–	–	–	√
Electrical measurements (I, V, P, ...)	–	–	–	√	√	–	–	–	√	√
Multi-tariff (internal clock)	–	–	4	–	4	–	–	4	–	4
Multi-tariff (controlled by digital inputs)	–	–	4	–	2	–	–	4	–	2
Measurement display	√	√	√	√	√	√	√	√	√	√
Digital inputs	–	–	2	–	1	–	–	2	–	1
Programmable digital outputs	–	–	–	–	1	–	–	–	–	1
Pulse output	–	√	–	–	–	–	√	–	–	–
Overload alarm	–	–	–	–	√	–	–	–	–	√
Modbus communication	–	–	–	√	√	–	–	–	√	√
MID (legal metrology certification)	–	√	√	–	√	–	√	√	–	√
Width (18 mm module in DIN Rail mounting)	5	5	5	5	5	5	5	5	5	5

## Physical Description

### iEM3100 / iEM3110 / iEM3115 - Direct Measurement up to 63 A

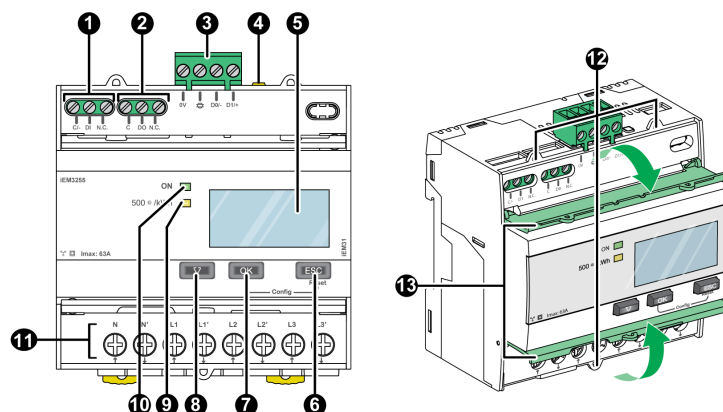
The various features of the listed energy meters (direct measurement up to 63 A) are shown in the diagram below:






- 1 2 digital inputs for tariff control (iEM3115)
- 2 Display for measurement and configuration
- 3 Pulse out for remote transfer (iEM3110)
- 4  Cancellation
- 5  Confirmation
- 6  Selection
- 7 Flashing yellow meter indicator (used to check the accuracy)
- 8 Green indicator: on/off, error
- 9 Current and voltage inputs (direct measurement up to 63 A)
- 10 Sealing points (three)
- 11 Sealable covers

**iEM3150 / iEM3155 - Direct Measurement up to 63 A and Modbus Communication**

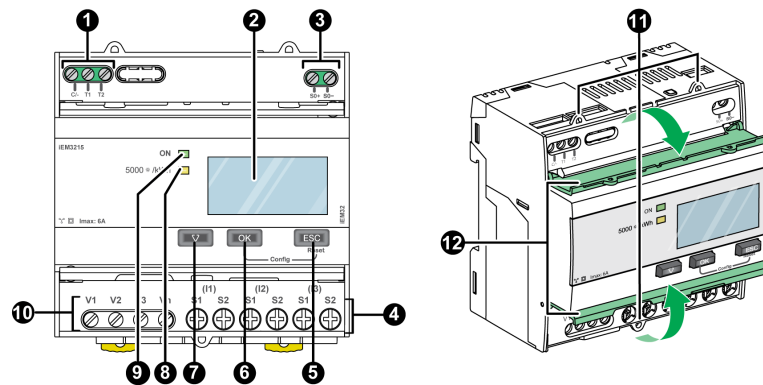
The various features of the listed energy meters (direct measurement up to 63 A with Modbus communication) are shown in the diagram below:






- 1 Digital input (iEM3155)
- 2 Digital output (iEM3155)
- 3 Communication port
- 4 Flashing yellow indicator for active communication
- 5 Display for measurement and configuration
- 6  Cancellation
- 7  Confirmation
- 8  Selection
- 9 Flashing yellow meter indicator (used to check the accuracy)
- 10 Green indicator: on/off, error
- 11 Current and voltage inputs (direct measurement up to 63 A)
- 12 Sealing points (three)
- 13 Sealable covers

**iEM3200 / iEM3210 / iEM3215 - Measurement With CTs**

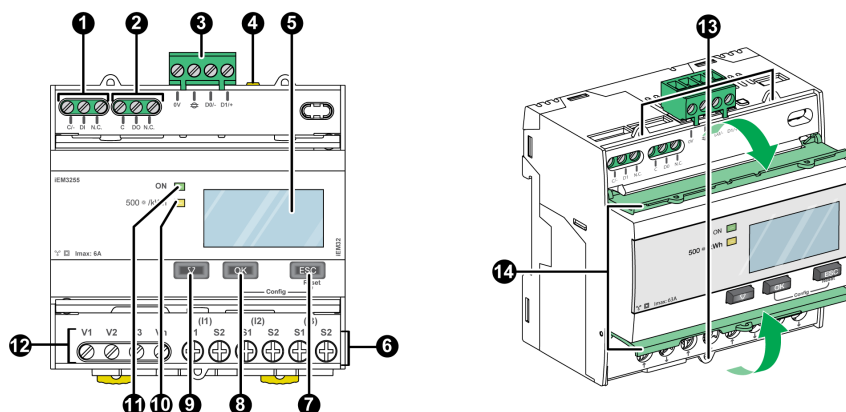
The various features of the listed energy meters (CTs 1 A or 5 A with Modbus communication) are shown in the diagram below:






- 1 2 digital inputs for tariff control (iEM3215)
- 2 Display for measurement and configuration
- 3 Pulse out for remote transfer (iEM3210)
- 4 Current inputs (CTs 1 A or 5 A)
- 5  Cancellation
- 6  Confirmation
- 7  Selection
- 8 Flashing yellow meter indicator (used to check the accuracy)
- 9 Green indicator: on/off, error
- 10 Voltage inputs
- 11 Sealing points (three)
- 12 Sealable covers

**iEM3250 / iEM3255 - Measurement With CTs and Modbus Communication**

The various features of the listed energy meters (CTs 1 A or 5 A with Modbus communication) are shown in the diagram below:



- 1 2 digital inputs for tariff control (iEM3255)
- 2 Digital output (iEM3255)
- 3 Communication port
- 4 Yellow indicator for communication diagnosis
- 5 Display for measurement and configuration
- 6 Current inputs (CTs 1 A and 5 A)
- 7  Cancellation
- 8  Confirmation
- 9  Selection
- 10 Flashing yellow meter indicator (used to check the accuracy)
- 11 Green indicator: on/off, error
- 12 Voltage inputs
- 13 Sealing points (three)
- 14 Sealable covers

---

## What Is in This Chapter?

This chapter contains the following topics:


Topic	Page
Safety Measures	16
Dimensions	17
DIN Rail Mounting and Dismantling	18
Connection	20
Typical Applications	29

## Safety Measures

### Specific Hazard Associated with Energy Meters


In the case of almost all electric and electronic devices, the device's power supply is the root cause of electrical hazards. The hazard can be eliminated by disconnecting the power supply.

Consequently, this connection must be broken before carrying out any kind of work on the product.

<p style="text-align: center;"> <b>DANGER</b></p> <p><b>RISK OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH</b></p> <ul style="list-style-type: none"><li>• Before carrying out work of any kind, disconnect connection wires. Disconnect all the power supplies running to the energy meter and the equipment on which it is installed.</li><li>• Always use a correctly calibrated voltage tester to check that the power supply has been properly disconnected.</li></ul> <p><b>Failure to follow these instructions will result in death or serious injury.</b></p>
--

### Other Safety Measures

Carefully read through the safety measures described below. You are always required to implement them fully before attempting to install, repair, or service electrical equipment.

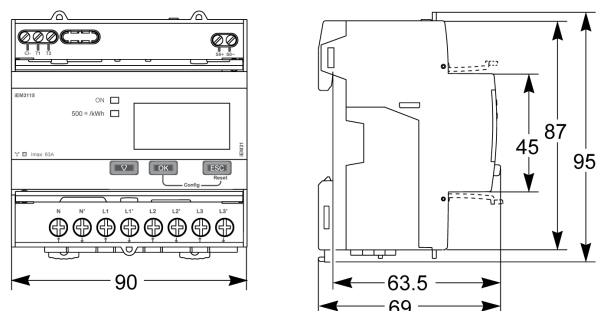
<p style="text-align: center;"> <b>DANGER</b></p> <p><b>RISK OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH</b></p> <ul style="list-style-type: none"><li>• Wear suitable personal protective equipment and follow the currently applicable electrical safety instructions.</li><li>• This equipment may only be installed by qualified electricians who have read all the relevant information.</li><li>• NEVER work alone.</li><li>• Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested and tagged. Pay particular attention to the design of the power system. Consider all power supply sources, particularly the potential for backfeed.</li><li>• Before closing protective covers and doors, carefully inspect the work area to ensure that no tools or objects have been left inside the equipment.</li><li>• Take care when removing or replacing panels. Take special care to ensure that they do not come into contact with live busbars. To minimize the risk of injuries, do not tamper with the panels.</li><li>• The successful operation of this equipment depends upon proper handling, installation, and operation. Failure to follow basic installation procedures can lead to personal injury as well as damage to electrical equipment or other property.</li><li>• NEVER shunt an external fuse/circuit breaker.</li><li>• The energy meters must be installed in a suitable electrical cabinet.</li></ul> <p><b>Failure to follow these instructions will result in death or serious injury.</b></p>
---



## Dimensions

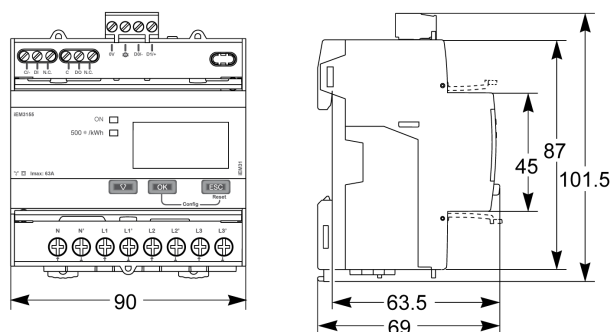
### Dimensions of iEM3100 / iEM3110 / iEM3115 / iEM3200 / iEM3210 / iEM3215

mm



### Dimensions of iEM3150 / iEM3155 / iEM3250 / iEM3255

mm



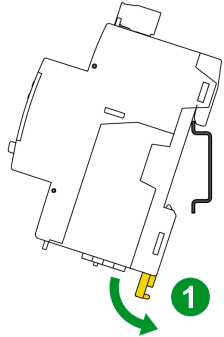
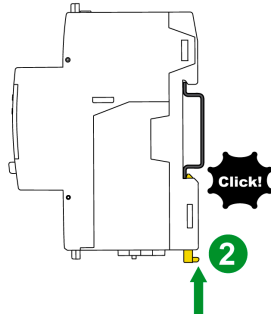
## DIN Rail Mounting and Dismantling

### Presentation

You can install the energy meter on a DIN rail. The device must not be tilted following installation.  
When mounting the device on, or dismantling it from, a DIN rail, you can keep the terminals wired up.

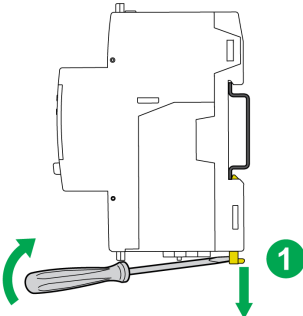
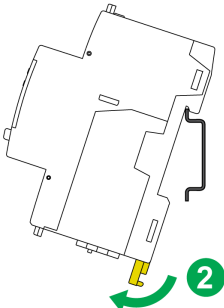
### DIN Rail Mounting

To install the energy meter on a DIN rail, proceed as follows:

Step	Action
1	Position the 2 upper slots on the rear of the energy meter on the DIN rail. 
2	Press the device against the DIN rail until the locking mechanism engages. The device is now attached to the rail. 

**Removal from a DIN rail**

To remove the energy meter from a DIN rail, proceed as follows:

Step	Action
1	Using a flat screwdriver ( $\leq 6.5$ mm), lower the locking mechanism to release the device. 
2	Lift the device up to free it from the DIN rail. 

## Connection

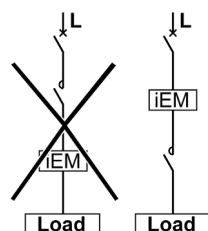
### Overview

The diagrams below illustrate how to connect the energy meters to a single-phase or three-phase 3- or 4-wire power system.

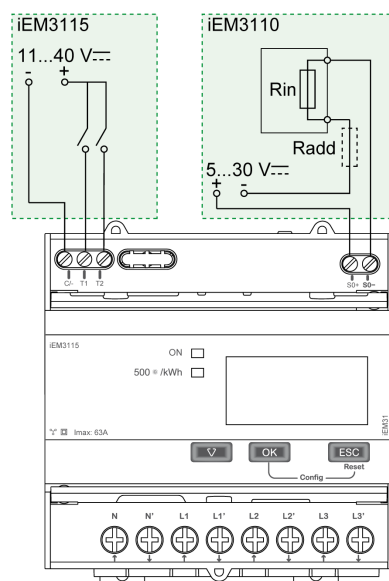
#### iEM31•• Associated With a Contactor

Connection requirements for iEM3100 / iEM3110 / iEM3115 / iEM3150 / iEM3155:

- When the energy meter is associated with a contactor, connect the energy meter upstream of the contactor.
- The energy meter must be protected by a circuit breaker.



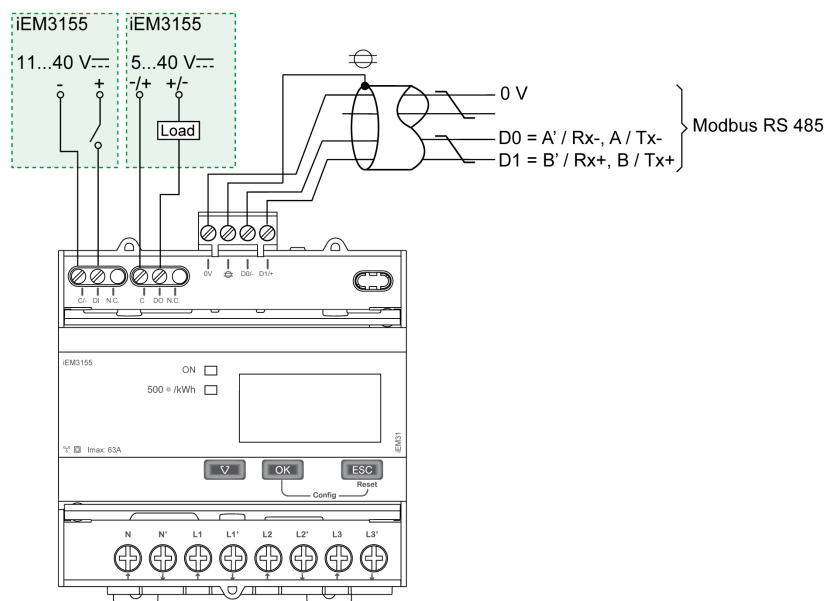
#### Connection Diagram of iEM3100 / iEM3110 / iEM3115



**NOTE:** The electrical wiring is explained in the table below.

- The pulse output is compatible with S0 format.
- The pulse output on the iEM3110 can be directly connected to a 24 V DC (< 30 V DC) input on a Zelio or Twido PLC.
- For other concentrators, if  $V_{DC}/R_{in} > 15 \text{ mA}$ , add a resistor  $R_{add} = (V_{DC}/0.01) - R_{in} \Omega$

## Connection Diagram of iEM3150 / iEM3155



**NOTE:** The electrical wiring is explained in the table below.

- The pulse output is compatible with S0 format.
- The digital output of iEM3155 is polarity-independent.
- The digital input and output are electrically independent.

## Wiring on Single Phase Systems for Direct Measurement

Power System	Energy Meter	Energy Meter Wiring
1PH2W L-N	<ul style="list-style-type: none"> <li>• iEM3100</li> <li>• iEM3110</li> <li>• iEM3115</li> <li>• iEM3150</li> <li>• iEM3155</li> </ul>	
1PH2W L-L	<ul style="list-style-type: none"> <li>• iEM3100</li> <li>• iEM3110</li> <li>• iEM3115</li> <li>• iEM3150</li> <li>• iEM3155</li> </ul>	
1PH3W L-L-N	<ul style="list-style-type: none"> <li>• iEM3100</li> <li>• iEM3110</li> <li>• iEM3115</li> <li>• iEM3150</li> <li>• iEM3155</li> </ul>	
1PH4W multi L with N	<ul style="list-style-type: none"> <li>• iEM3150</li> <li>• iEM3155</li> </ul>	

**NOTICE****RISK OF DAMAGE TO THE ENERGY METER**

For 1PH4W multi L with N:

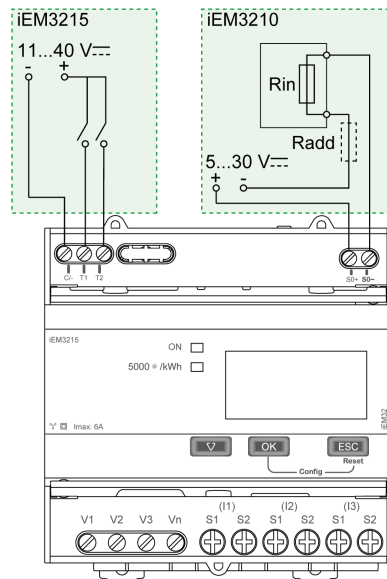
- N' must not be connected to the load.
- The current must not flow through the iEM315• products. Otherwise if  $I_n > 63$  A, the energy meter can blow up.

**Failure to follow these instructions can result in equipment damage.**

## Wiring on Three-Phase Systems for Direct Measurement

Power System	Energy Meter	Energy Meter Wiring
3PH3W	<ul style="list-style-type: none"> <li>• iEM3100</li> <li>• iEM3110</li> <li>• iEM3115</li> <li>• iEM3150</li> <li>• iEM3155</li> </ul>	
3PH4W	<ul style="list-style-type: none"> <li>• iEM3100</li> <li>• iEM3110</li> <li>• iEM3115</li> <li>• iEM3150</li> <li>• iEM3155</li> </ul>	

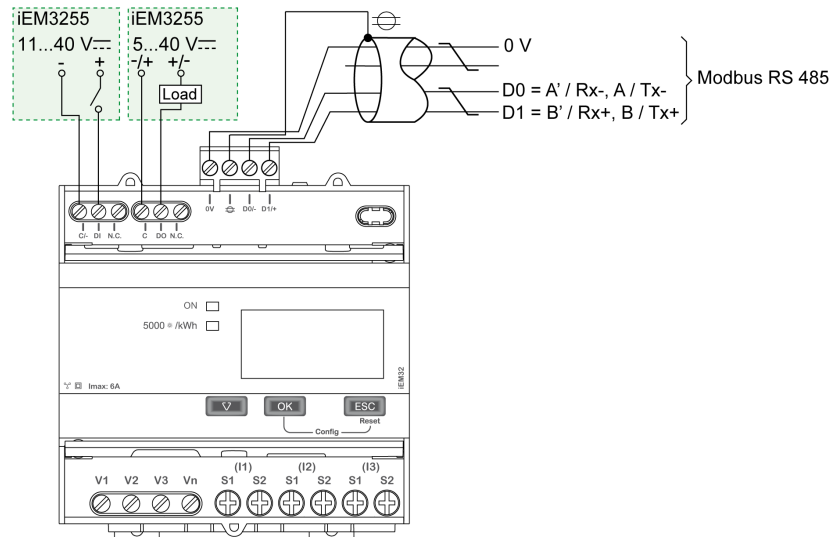
## Connection Diagram of iEM3200 / iEM3210 / iEM3215



**NOTE:** The electrical wiring is explained in the table below.

- The pulse output is compatible with S0 format.
- The pulse output on the iEM3210 indicates the primary consumption with consideration of transformer ratios.
- The pulse output on the iEM3210 can be directly connected to a 24 V DC (< 30 V DC) input on a Zelio or Twido PLC.
- For other concentrators, if  $V \text{ DC} / R_{in} > 15 \text{ mA}$ , add a resistor  $R_{add} = (V \text{ DC} / 0.01) - R_{in} \Omega$

## Connection Diagram of iEM3250 / iEM3255



**NOTE:** The electrical wiring is explained in the table below.

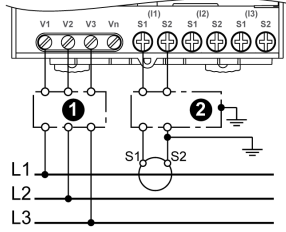
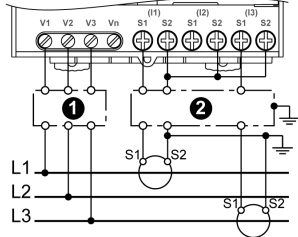
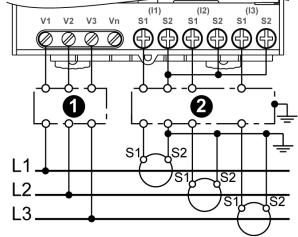
- The pulse output is compatible with S0 format.
- The digital output of iEM3255 is polarity-independent.
- The digital input and output are electrically independent.

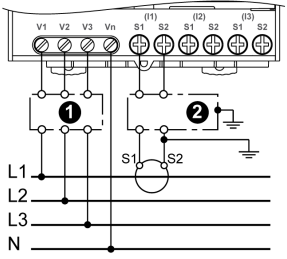
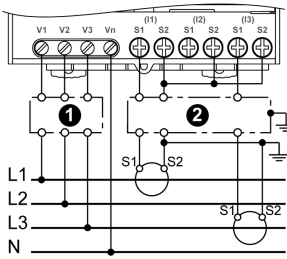
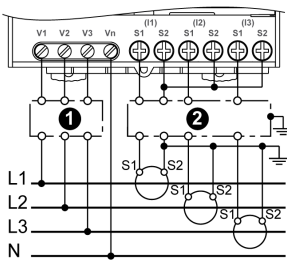
## Wiring on Single Phase Systems with CTs

Power System	Energy Meter	Energy Meter Wiring
1PH2W L-N	<ul style="list-style-type: none"> <li>• iEM3200</li> <li>• iEM3210</li> <li>• iEM3215</li> <li>• iEM3250</li> <li>• iEM3255</li> </ul>	
1PH2W L-L	<ul style="list-style-type: none"> <li>• iEM3200</li> <li>• iEM3210</li> <li>• iEM3215</li> <li>• iEM3250</li> <li>• iEM3255</li> </ul>	
1PH3W L-L-N	<ul style="list-style-type: none"> <li>• iEM3200</li> <li>• iEM3210</li> <li>• iEM3215</li> <li>• iEM3250</li> <li>• iEM3255</li> </ul>	
1PH4W multi L with N	<ul style="list-style-type: none"> <li>• iEM3250</li> <li>• iEM3255</li> </ul>	<div> <p>2 CTs</p> </div> <div> <p>3 CTs</p> </div>

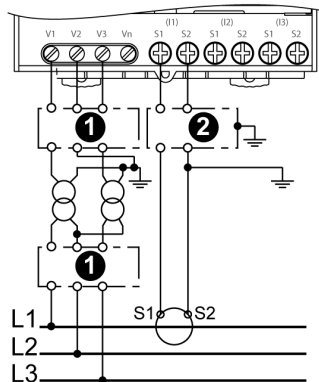
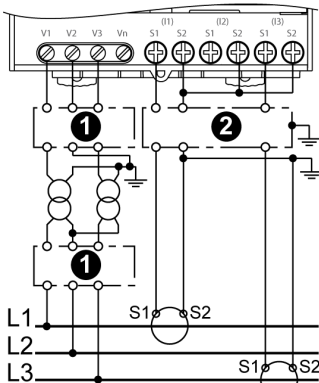
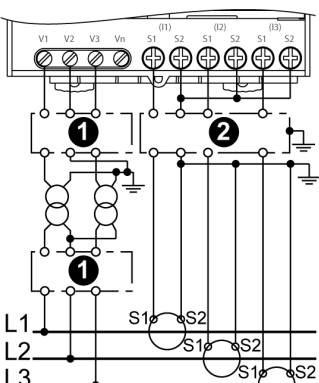


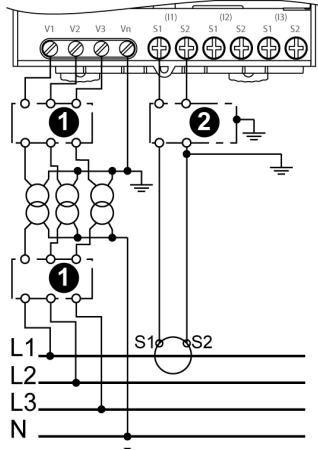
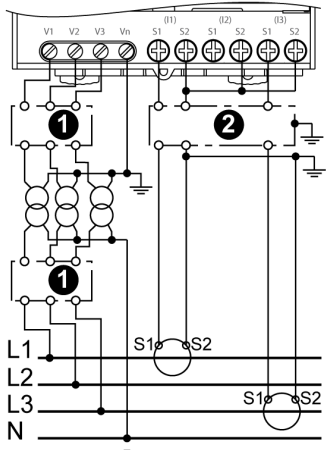
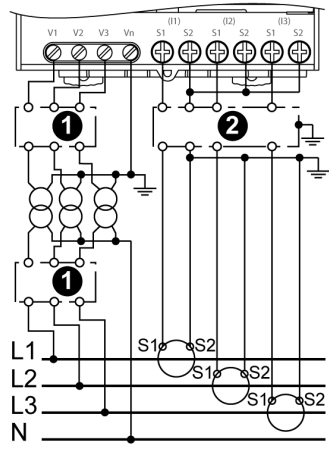
## Wiring on Three-Phase Systems with CTs

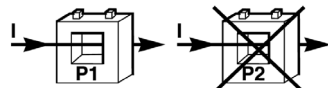
Power System	Energy Meter	Energy Meter Wiring
3PH3W	<ul style="list-style-type: none"> <li>• iEM3200</li> <li>• iEM3210</li> <li>• iEM3215</li> <li>• iEM3250</li> <li>• iEM3255</li> </ul>	 <p>1 CT (balanced)</p>  <p>2 CTs</p>  <p>3 CTs</p>

Power System	Energy Meter	Energy Meter Wiring
3PH4W	<ul style="list-style-type: none"><li>• iEM3200</li><li>• iEM3210</li><li>• iEM3215</li><li>• iEM3250</li><li>• iEM3255</li></ul>	 <p>1 CT (balanced)</p>
		 <p>2 CTs (for balanced 3-wire load)</p>
		 <p>3 CTs</p>

## Wiring on Three-Phase Systems with CTs and VTs

Power System	Energy Meter	Energy Meter Wiring
3PH3W	<ul style="list-style-type: none"> <li>iEM3250</li> <li>iEM3255</li> </ul>	 <p>2 VTs, 1 CT, (balanced)</p>  <p>2 VTs, 2 CTs</p>  <p>2 VTs, 3 CTs</p>

Power System	Energy Meter	Energy Meter Wiring
3PH4W	<ul style="list-style-type: none"> <li>iEM3250</li> <li>iEM3255</li> </ul>	 <p>3 VTs, 1 CTs, (balanced)</p>  <p>3 VTs, 2 CTs, (for balanced 3-wire load)</p>  <p>3 VTs, 3 CTs</p>



- 1 Protection (to be adapted to suit the short-circuit current at the connection)
- 2 Shunting switch unit

## Typical Applications

### iEM31•• series

This range is a cost effective solution to monitor more feeders. It is ideal to monitor energy consumption by usage, by zone or by feeder in the cabinet. It could be used to monitor feeders in main switchboard or to monitor the main in distribution cabinet.

Functions	Advantages
Energies monitoring up to 63 A feeders. Embedded current transformers.	Installation time saving and space saving in the cabinet. No wiring to manage Clear distribution network
iEM31•• are adapted to be installed with iC60 circuit breakers.	Three phases support with or without neutral.
iEM31•• can be used also for single phase multi-circuit monitoring.	3 single feeders can be monitored with a unique product.

### iEM32•• series

This range allows to cover a large choice of applications.

Functions	Advantages
CTs and VTs connections support.	Adapted to LV or MV applications.
Flexible configuration	Can be adapted with any distribution network with or without neutral.

## Typical applications

The following table presents some functions of the different iEM3\*\*\* series devices, their advantages and their main applications.

Series	Functions	Advantages	Applications
iEM3•00	Total and partial counter.	Measurement campaign	Sub-billing management Metering applications
iEM3•10	Pulse output with pulse weight calibration up to 1 pulse per 1 Wh.	Accurate monitoring	Remote monitoring of energy consumption.
	Pulse output collecting by Smartlink system, PLC or any basic acquisition system.	Reducing the number of communication addresses.	Monitoring of high number of meters.
	Internal clock	Save date and time of last reset.	Knowledge of the period of the partial counter
iEM3•15	Management of up to four energy registers. By digital inputs and internal clock, user can split his consumption on four periods at his convenience.	Differentiation of Peak and Off Peak consumptions, Working days and week-ends, or double source energies (from utilities or Genset).	Accurate sub-billing management  Identification of local energy consumption behavior. It could be done by zone, by usage or by feeder.
iEM3•50	Modbus communication on a RS485 port.	A four connector pluggable terminal (+, -, Shield, Ground) helps to reach high distance communication.  Advanced parameters are available by communication.	Modbus network with daisy chain applications.
	Providing of essential electrical parameters like current, average voltage and total power.	Currents help monitoring the unbalance between phases.  Power allows monitoring the feeder load level.	Critical feeders or any sub-cabinet monitoring.
iEM3•55	All iEM3•50 functions and iEM3•15 functions.	See above	See above
	Four quadrant calculation	Identification and addition of In and Out energies, active and reactive energies.	Green power applications
	Four tariff rates are managed in the product.	Measurement of active, reactive and apparent energy.	Control energy consumption and make adapted investment at right place when necessary (i.e. Capacitor banks) to reduce energy bill or penalties.
	Digital Input (DI) with value saving.	Pulse collecting from other meters (gas, water, etc.)  External status collecting like door opening, circuit breaker status, etc.  The DI can be used to reset remotely the partial counters to start a measurement campaign.	Intrusion preventing  Measurement campaign
	Power overload alarm	Detecting a critical load before the circuit breaker trips.	User can reduce the consumption or prepare an extension.

---

## What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Presentation	32
Settings for all Energy Meters	34
Modifying Parameters	35
Clock Setting	36
Configuration	37
HMI Display	50

## Presentation

### Introduction

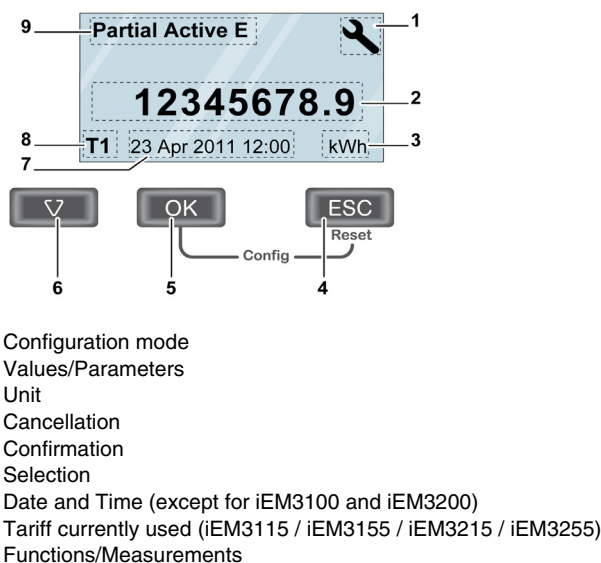
The energy meter features a sophisticated and intuitive human machine interface (HMI) with signaling LEDs, a graphic display, and contextual menu buttons for accessing the information required to operate the energy meter and modify parameter settings.

The navigation menu allows to display, configure and reset parameters.

For some energy meters, Multi-Tariffs allows to select different tariffs mode and to configure them as illustrated in the table below.

### General Display

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



- 1 Configuration mode
- 2 Values/Parameters
- 3 Unit
- 4 Cancellation
- 5 Confirmation
- 6 Selection
- 7 Date and Time (except for iEM3100 and iEM3200)
- 8 Tariff currently used (iEM3115 / iEM3155 / iEM3215 / iEM3255)
- 9 Functions/Measurements

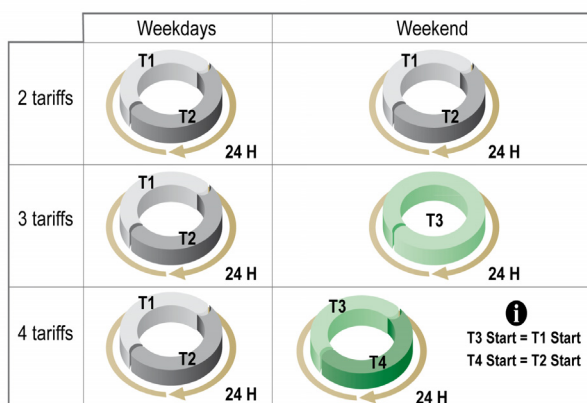
### Multi-Tariffs

Multi-Tariffs only applies to the following devices:

- iEM3115,
- iEM3155,
- iEM3215,
- iEM3255.

The following table describes the tariff repartition during the week according to the tariff selection (2, 3 or 4 tariffs).














These tariffs are stored in 4 different registers : T1, T2, T3 and T4.





## Status Information

The display and the 2 two-color LEDs on the energy meters indicate the device's current status.

LEDs		Description
ON 	500 or 5000 flashes / kWh 	
 OFF	 OFF	Off
 ON	 ON (1s) then  OFF	On, no counting
 ON	 Flashing	On, with counting
 OFF	 ON	Error, stop counting
 Flashing	 Flashing	Abnormal, with counting

## Settings for all Energy Meters

The following settings have to be configured in configuration mode:

Function	iEM3100	iEM3110	iEM3115	iEM3150	iEM3155	iEM3200	iEM3210	iEM3215	iEM3250	iEM3255
Wiring	√	√	√	√	√	√	√	√	√	√
CT Ratio	—	—	—	—	—	√	√	√	—	—
CT & VT Ratio	—	—	—	—	—	—	—	—	√	√
Frequency	√	√	√	√	√	√	√	√	√	√
Date	—	√	√	√	√	—	√	√	√	√
Time	—	√	√	√	√	—	√	√	√	√
Multi Tariffs	—	—	√	—	√	—	—	√	—	√
Overload Alarm	—	—	—	—	√	—	—	—	—	√
Digital Output	—	—	—	—	√	—	—	—	—	√
Digital Input	—	—	—	—	√	—	—	—	—	√
Pulse Output	—	√	—	—	—	—	√	—	—	—
Communication	—	—	—	√	√	—	—	—	√	√
Contrast	√	√	√	√	√	√	√	√	√	√
Password	—	√	√	—	√	—	√	√	—	√
Reset Config	√	√	√	√	√	√	√	√	√	√

The default factory settings are listed in the following table:

Function	Factory settings
Wiring	iEM31••: 3PH4W iEM32••: 3PH4W; 3 CTs on I1, I2, and I3; Direct-No VT
CT Ratio	CT Secondary = 5 A; CT Primary = 5 A
CT & VT Ratio	CT Secondary = 5 A; CT Primary = 5 A VT Secondary = 100 V; VT Primary = 100 V (by communication) VT Secondary and Primary are not available on HMI.
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
Communication	Baud Rate = 19 200; Parity = EVEN; Address = 1
Contrast	5
Password	0010

## Modifying Parameters

### Presentation

To modify any of the values, you must be thoroughly familiar with how the interface menus are structured and the general navigation principles. For more information about how the menus are structured, refer to the section that relates specifically to your energy meter model (*see page 34*).

To modify the value of a parameter, follow either of the 2 methods described below:



- selecting an item in a list,
- modifying a numerical value, digit by digit.

The parameters listed below are the only ones which the numerical value can be modified:

- Date
- Time
- Pick Up Value
- Voltage Transformer (VT) Primary
- Current Transformer (CT) Primary
- Password
- Modbus address of the energy meter

### Selecting the Value in a List



The following table explains how to select a value in a list:

Step	Action
1	Use the  contextual menu button to scroll through the parameter values until you reach the desired value
2	Press  to confirm the new parameter value

### Modifying the Numerical Value

The numerical value of a parameter is made up of digits. The digit on the far right side is selected by default (except for Date/Time).

To modify a numerical value, use the contextual menu buttons as described below:

Step	Action
1	Use the  button to modify the selected digit
2	Press  to shift to next digit or to confirm the new parameter value

### Aborting an Entry

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

## Clock Setting

### Description

The clock setting only applies to the following devices:

- iEM3110,
- iEM3115,
- iEM3150,
- iEM3155,
- iEM3210,
- iEM3215,
- iEM3250,
- iEM3255.

The time must be set when switching from winter to summer time.

As soon as the power is interrupted, the product iEM3110, iEM3150, iEM3210, and iEM3250 automatically display the screen to set **Date and Time** because the date and time are reset.

The products iEM3115, iEM3155, iEM3215, and iEM3255 automatically display the screen to set **Date and Time** in case of loss of date and time when the power is interrupted for longer than 3 days.

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

### Setting

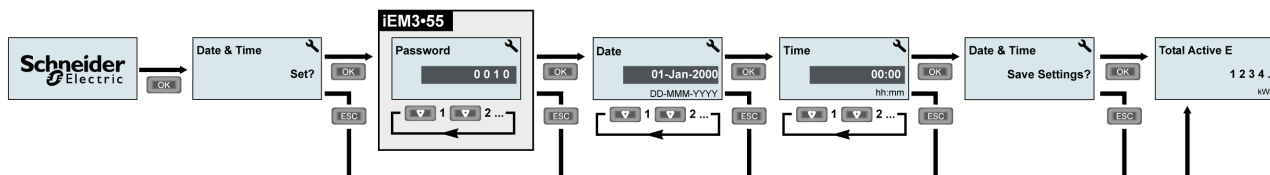
To set the date and time, please refer to the procedure for modifying a numerical value (*see page 35*).

### Date/Time Format

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

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

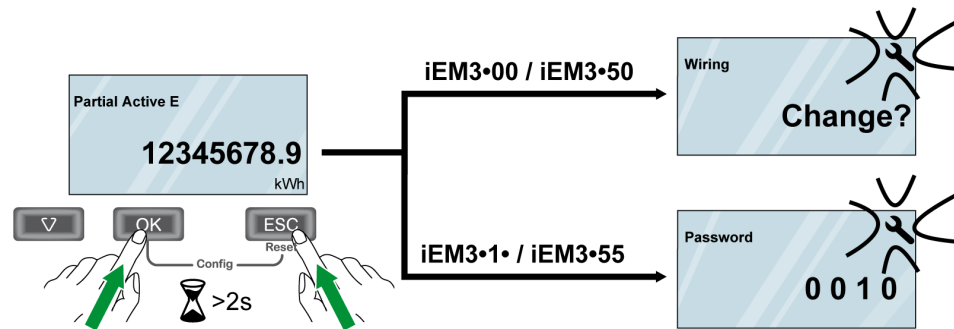
### Clock Setting Menu




## Configuration


### Enter the Configuration Mode



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



 Selection button to change or select parameter values

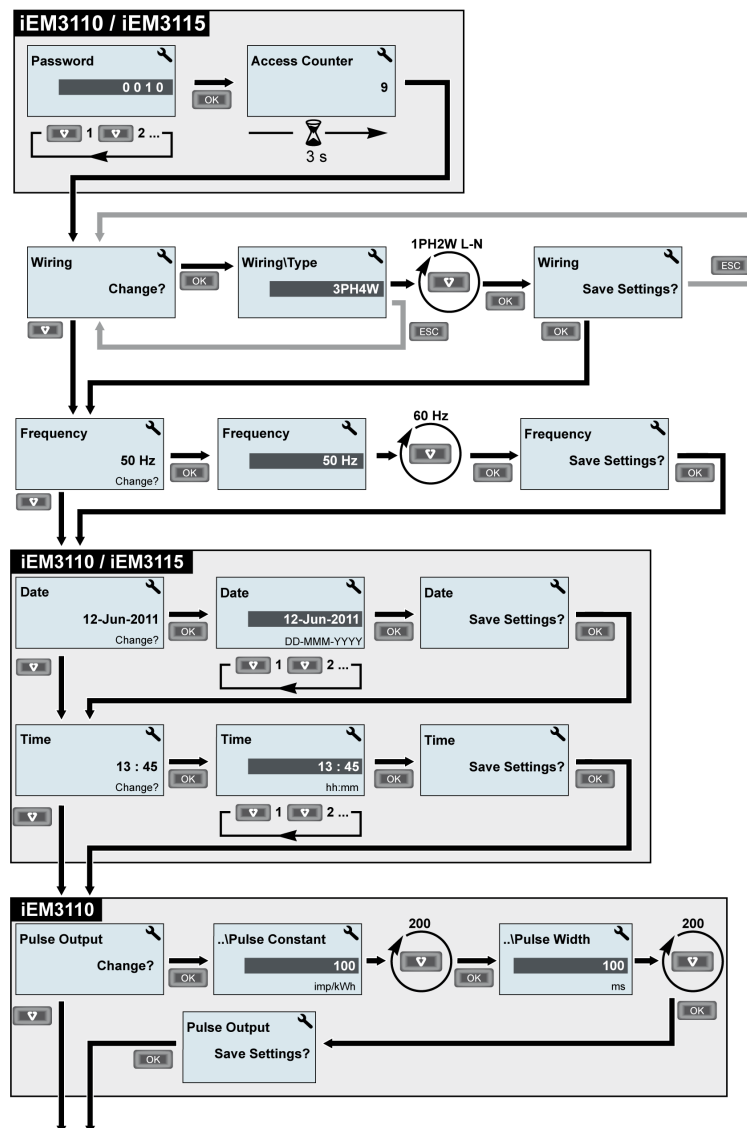
 Confirmation button

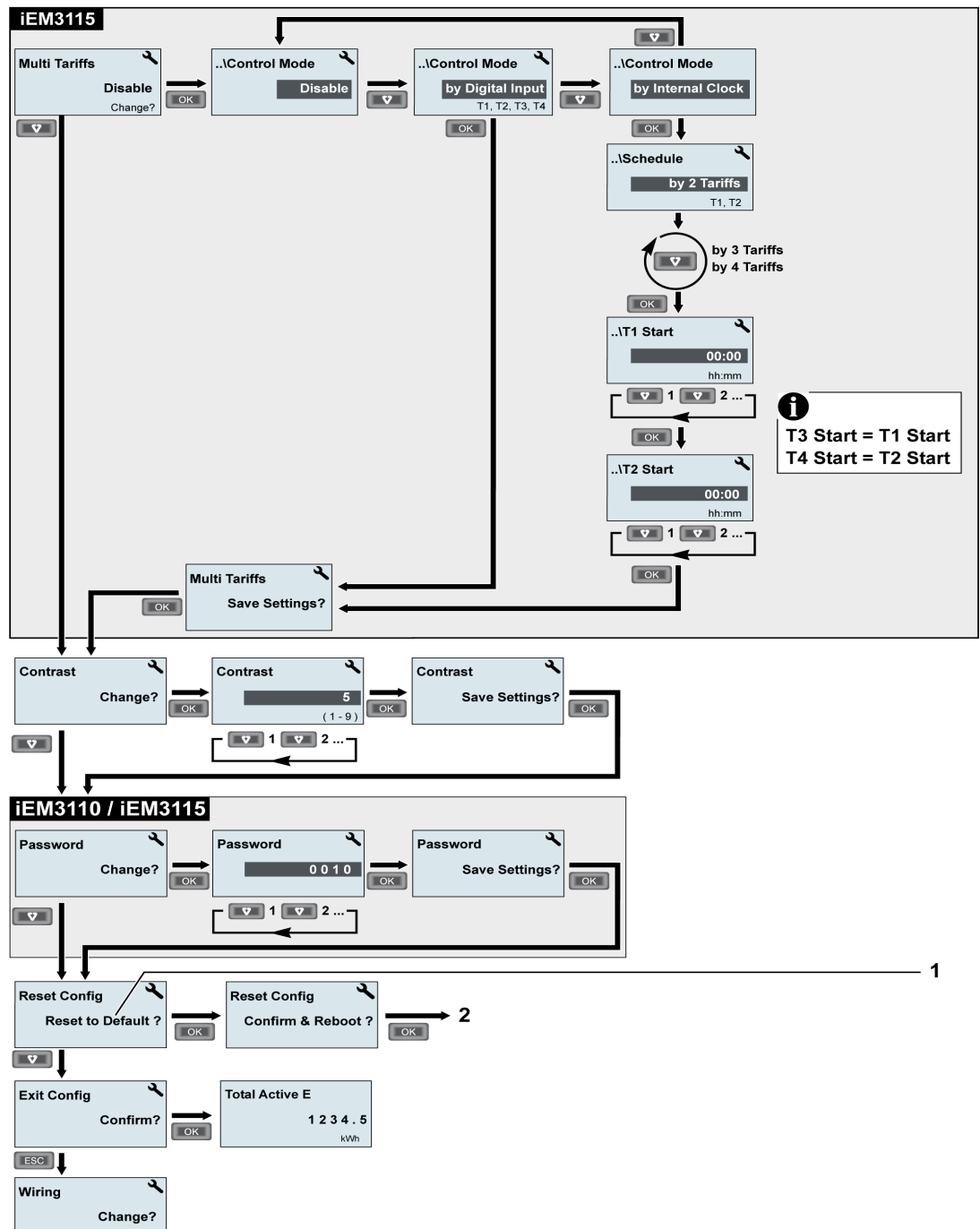
 Cancellation button

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

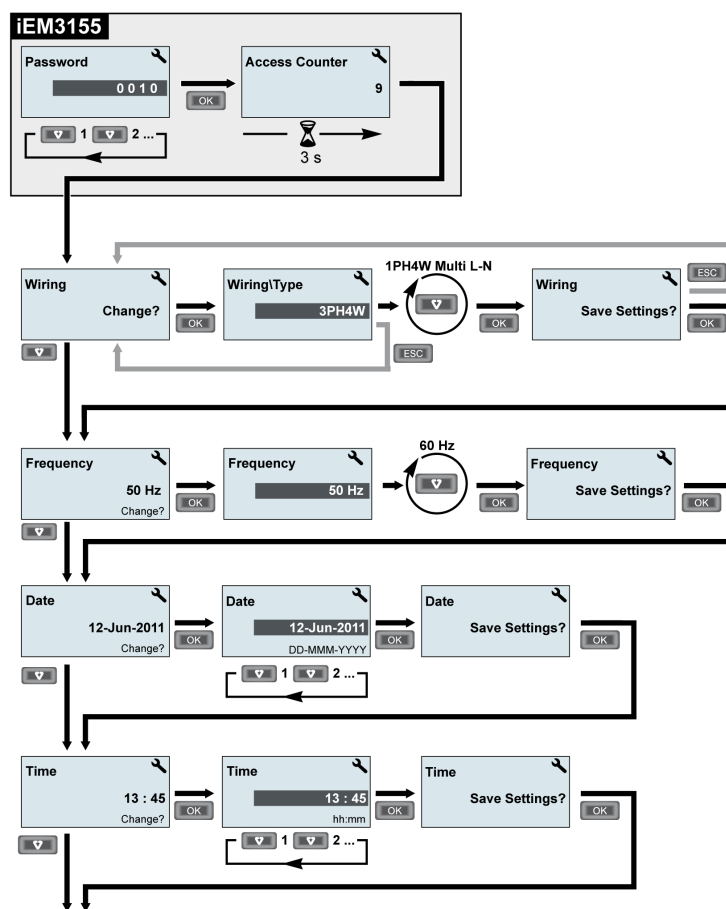
The pictures below describe in details the configuration navigation, refer to Modifying Parameters (see page 35) to change the default selection.

## Configuration Menu for iEM3100 / iEM3110 / iEM3115

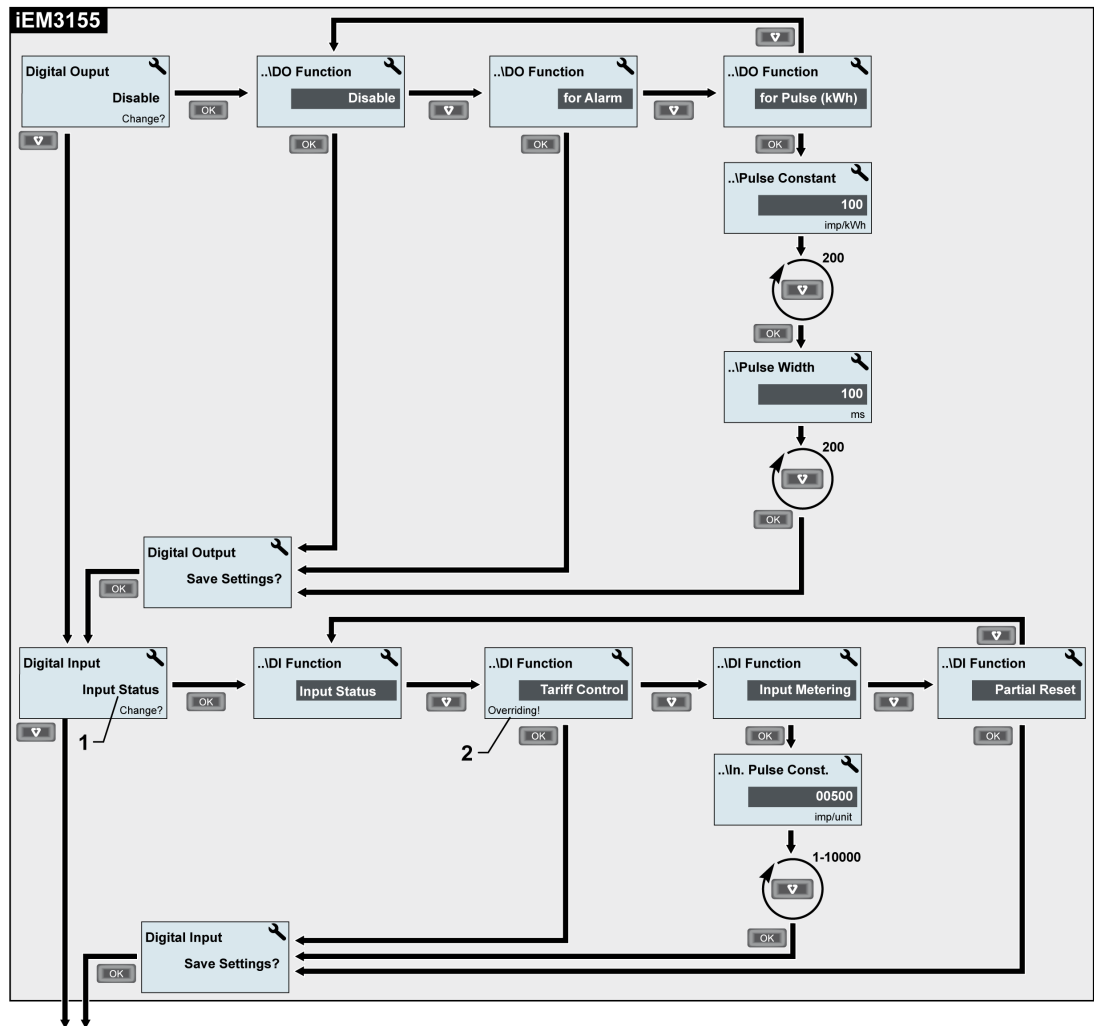




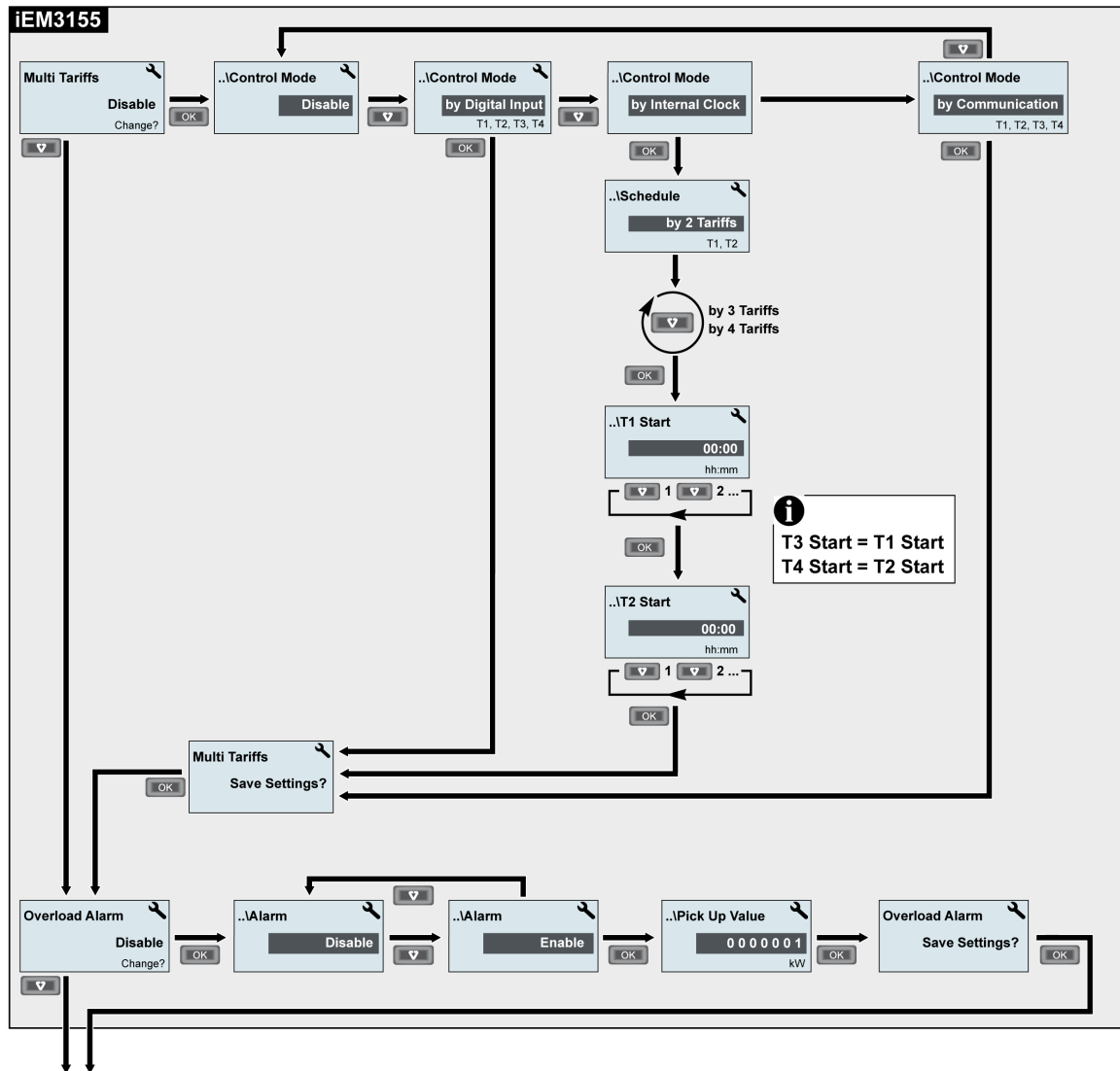
## Configuration Menu for iEM3150 / iEM3155

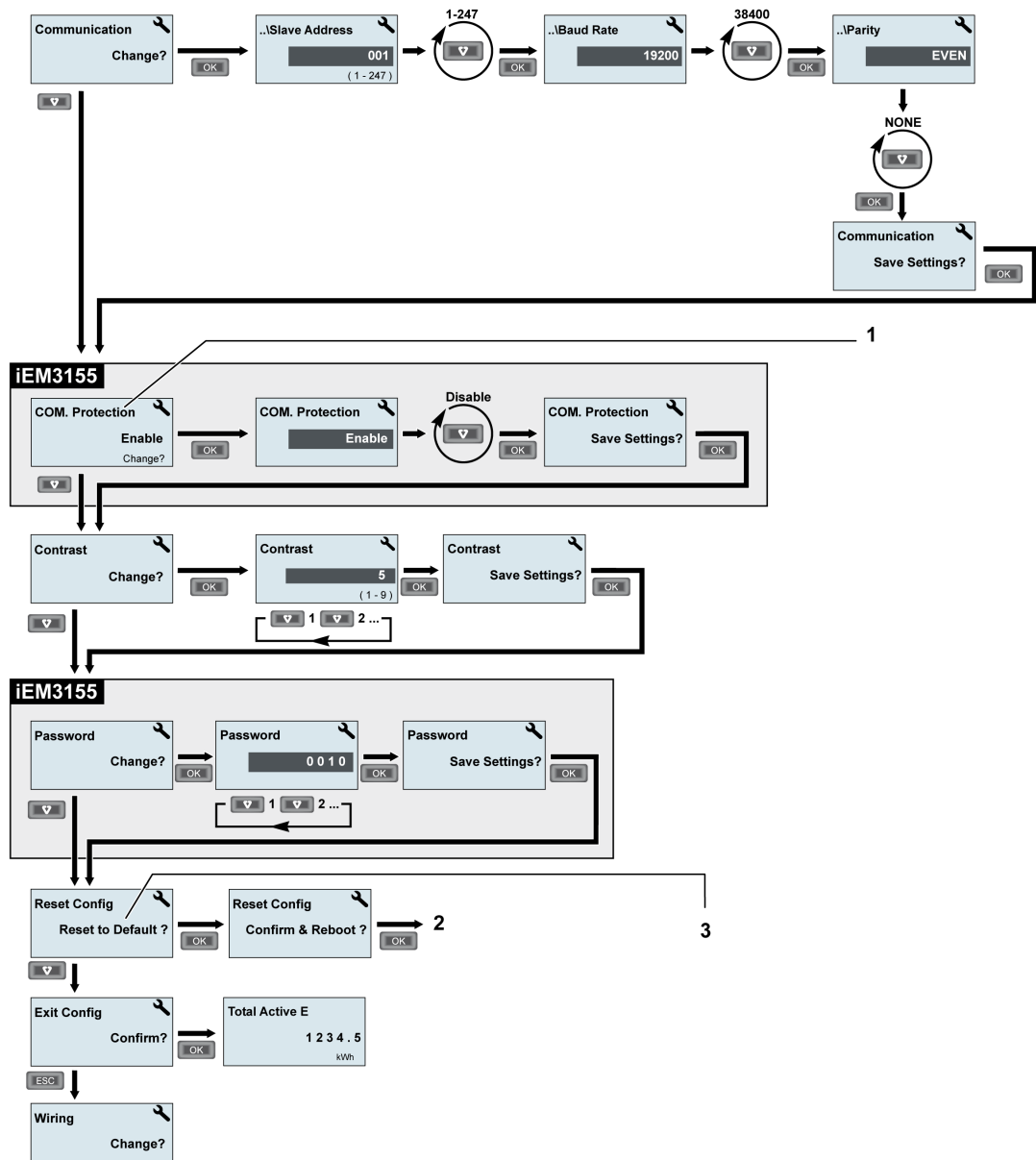






- 1 Input Status e.g. OF, SD of a circuit breaker
- 2 **Overriding!** appears when current selection impacts multi tariffs setting.





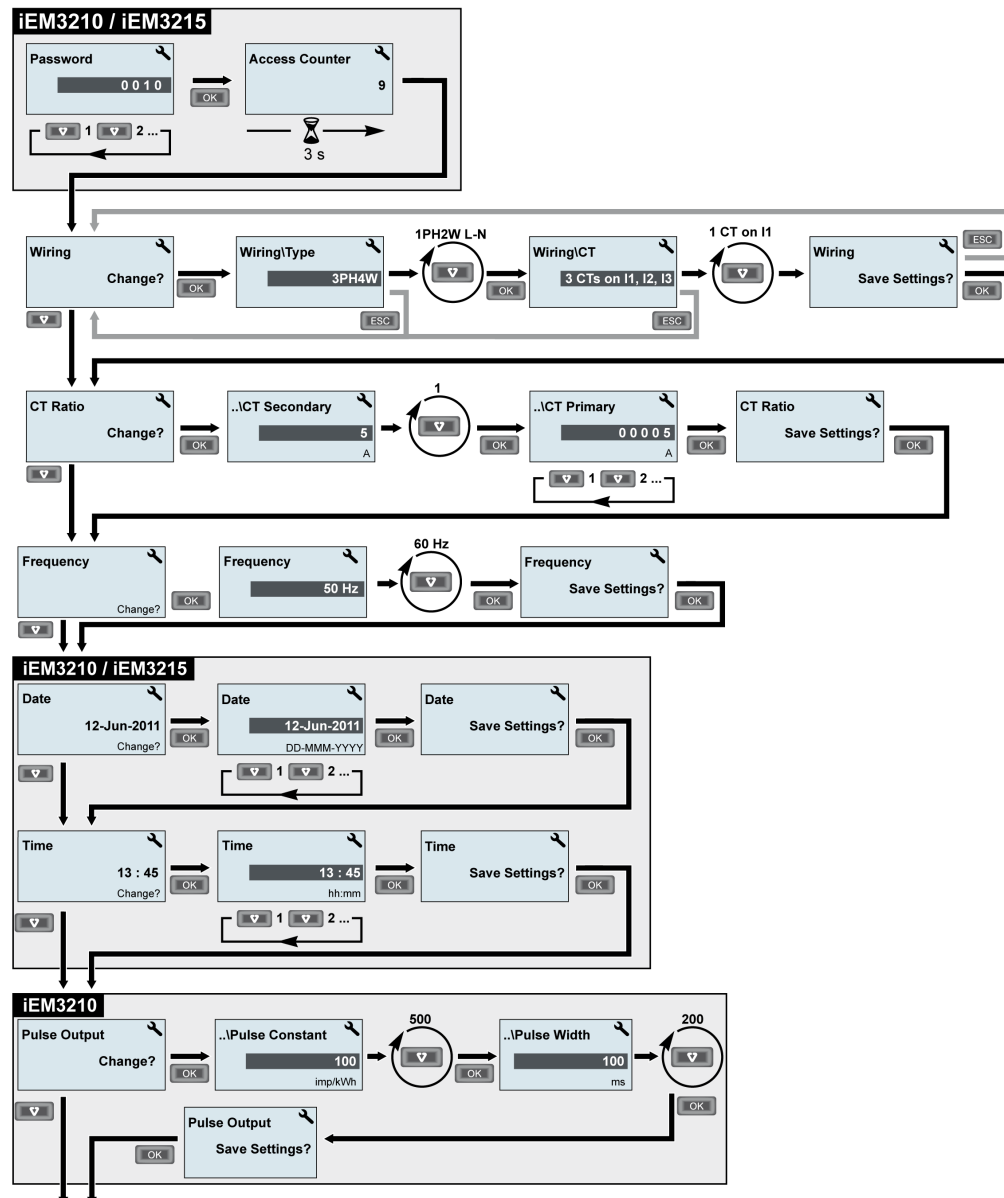
1 If **COM. Protection** is enable, any configuration related to energy measurement, such as wiring, frequency, etc., can not be changed through communication.

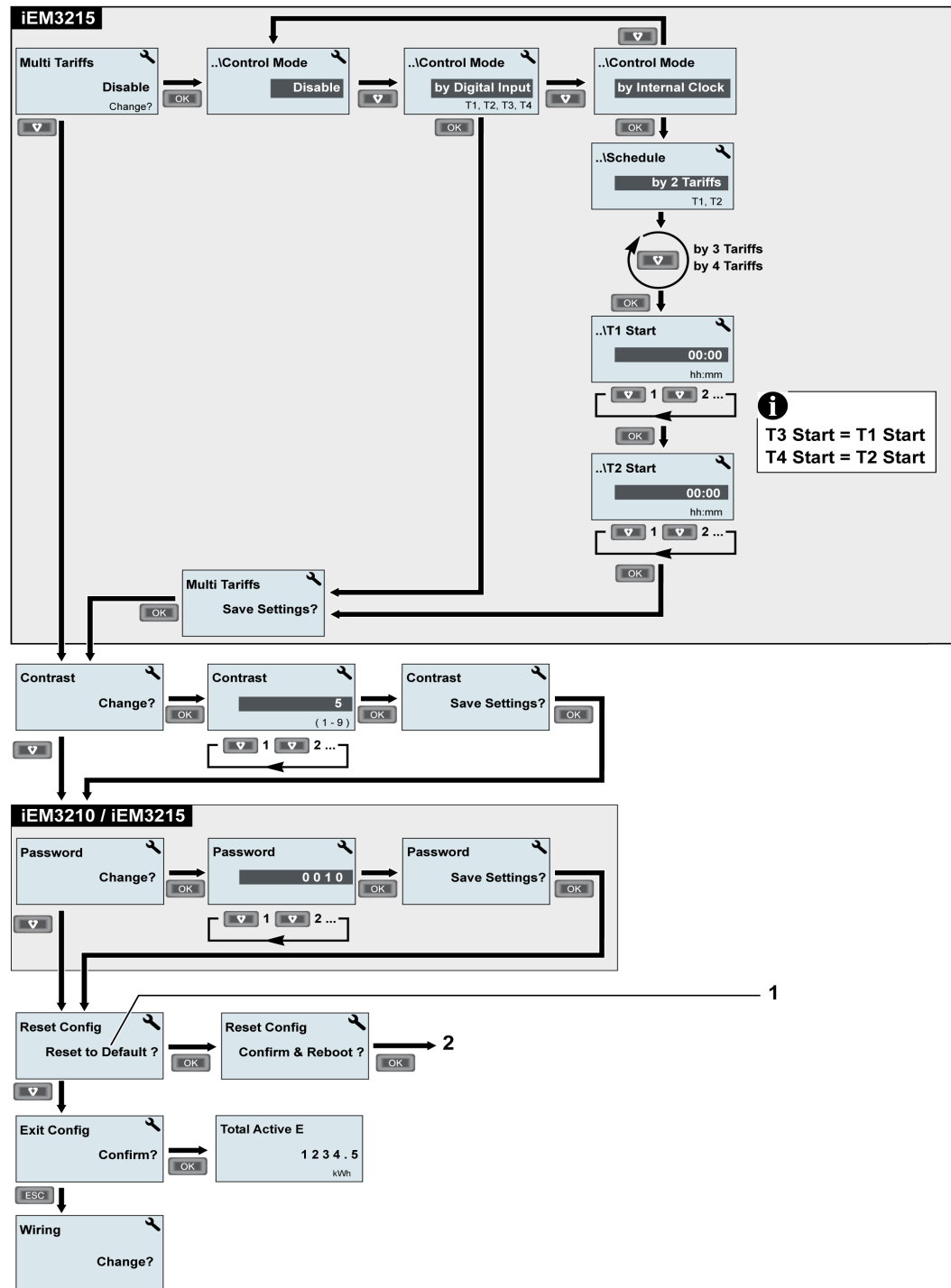
2 Meter restarts.

3 Password will not be reset.

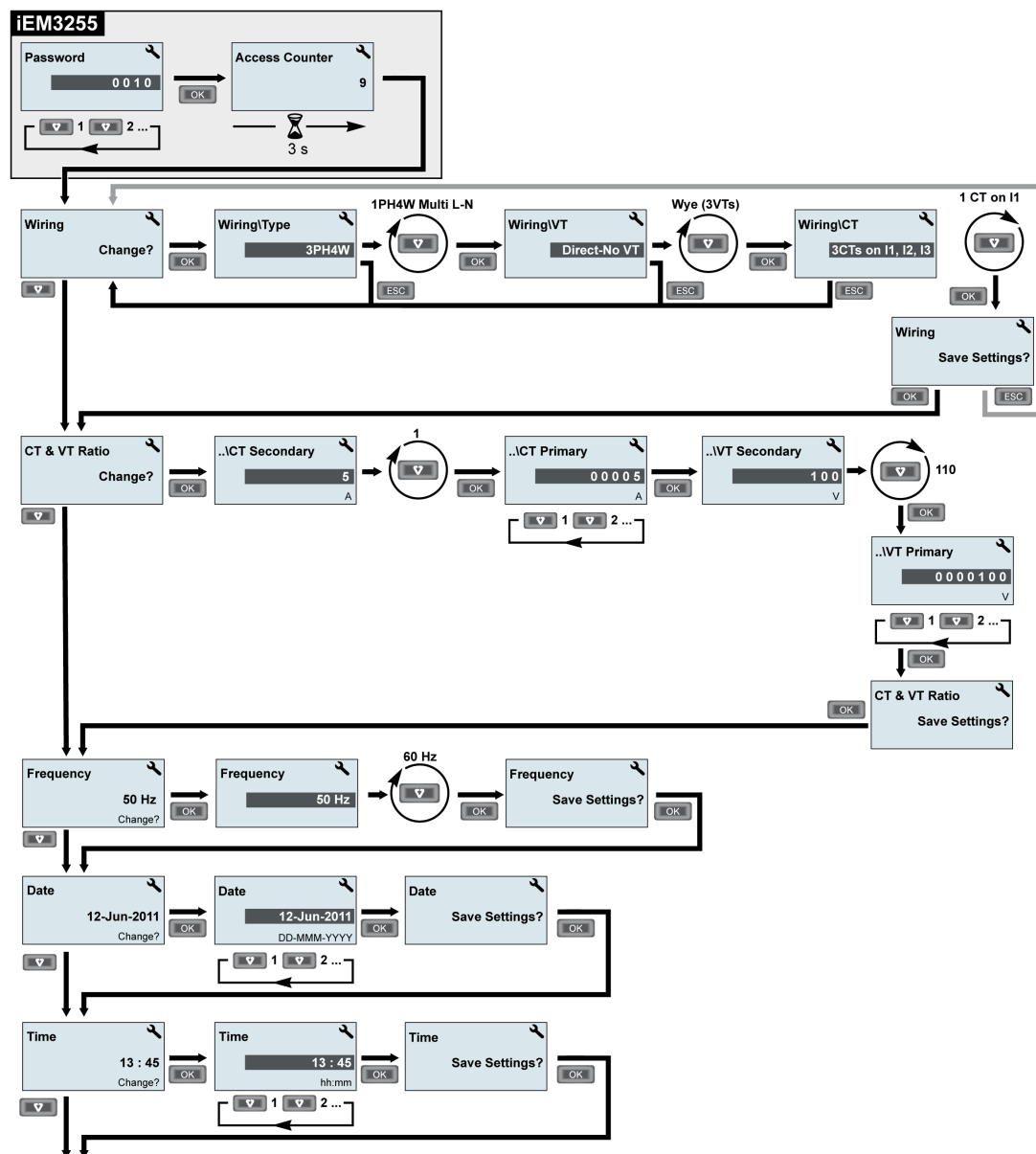
**NOTE:** number of stop bits = 1

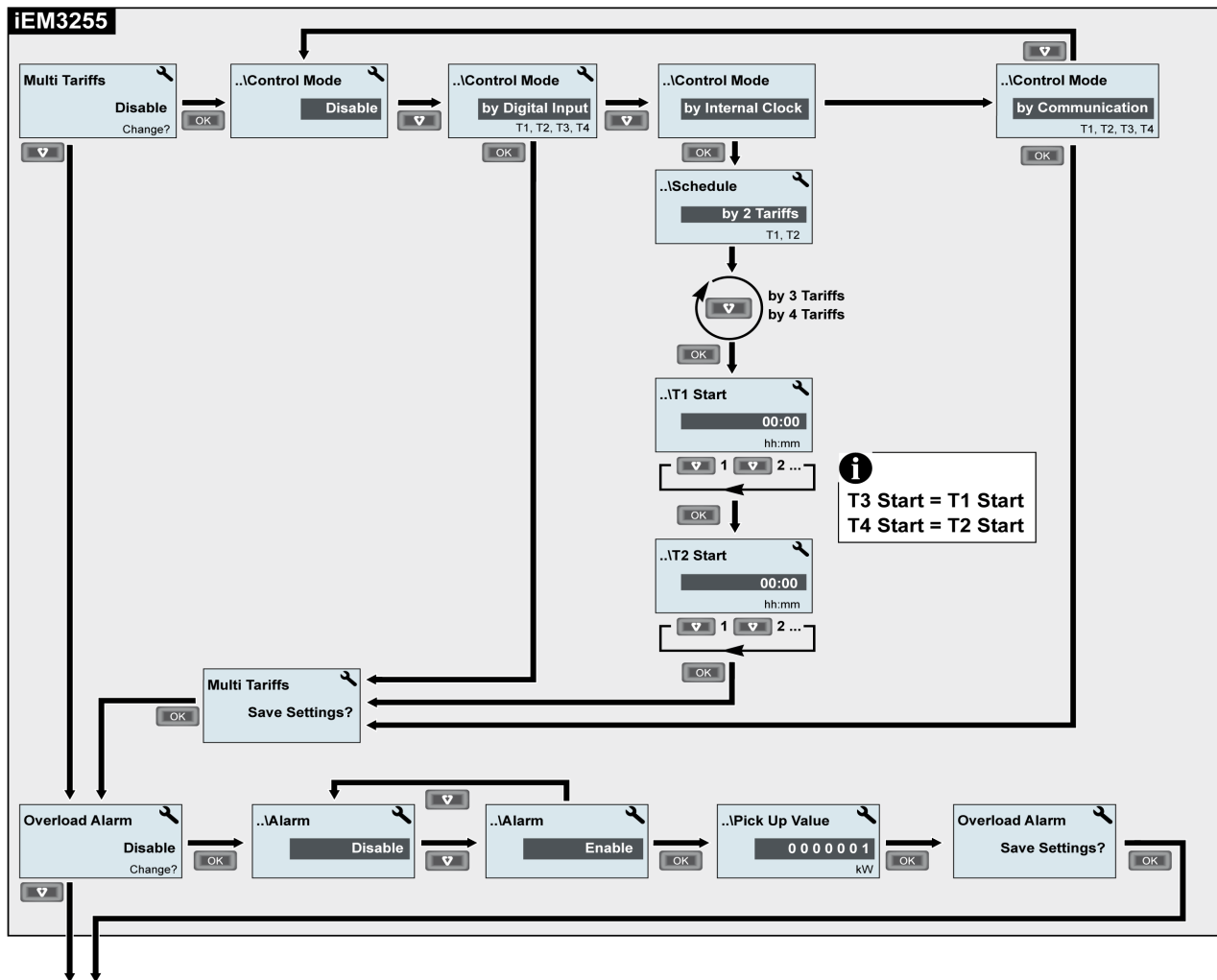
## Configuration Menu for iEM3200 / iEM3210 / iEM3215

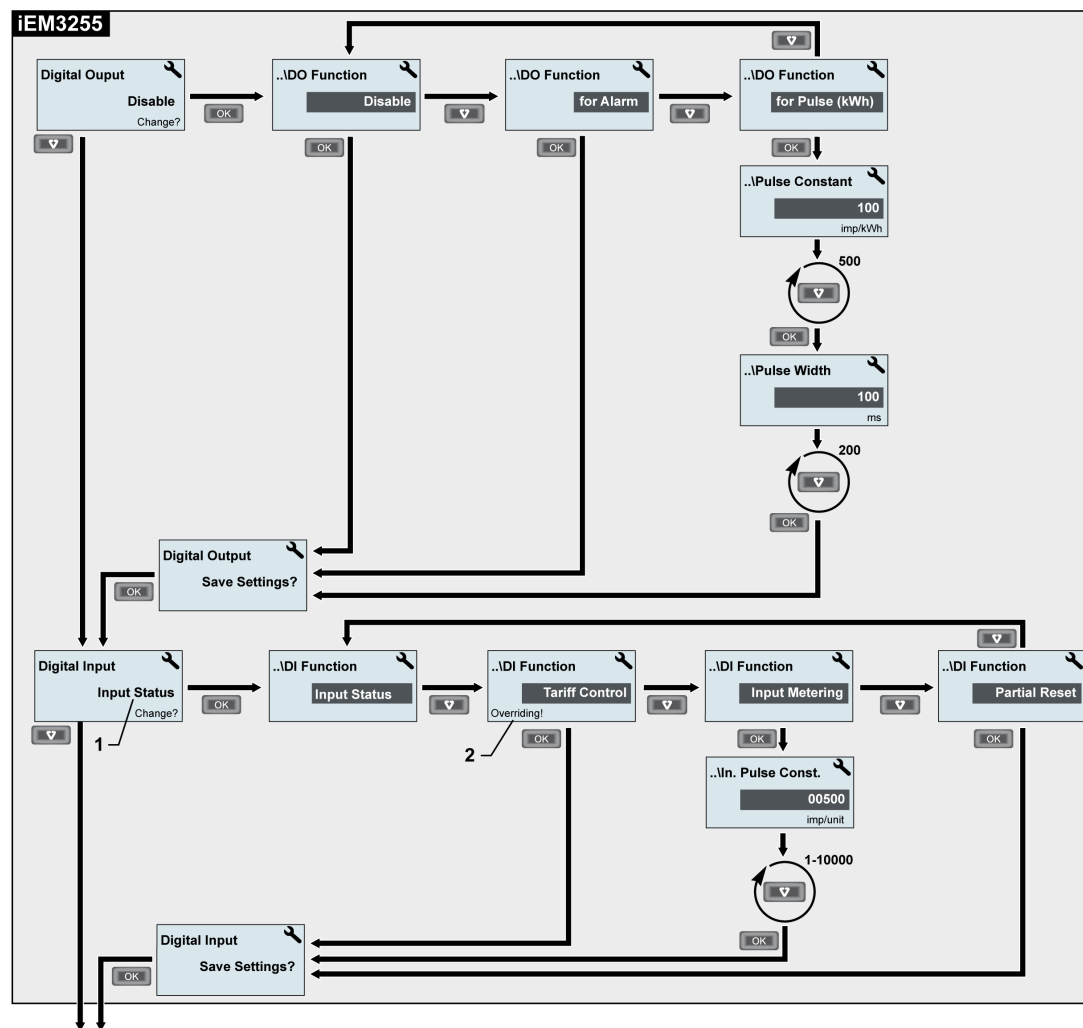




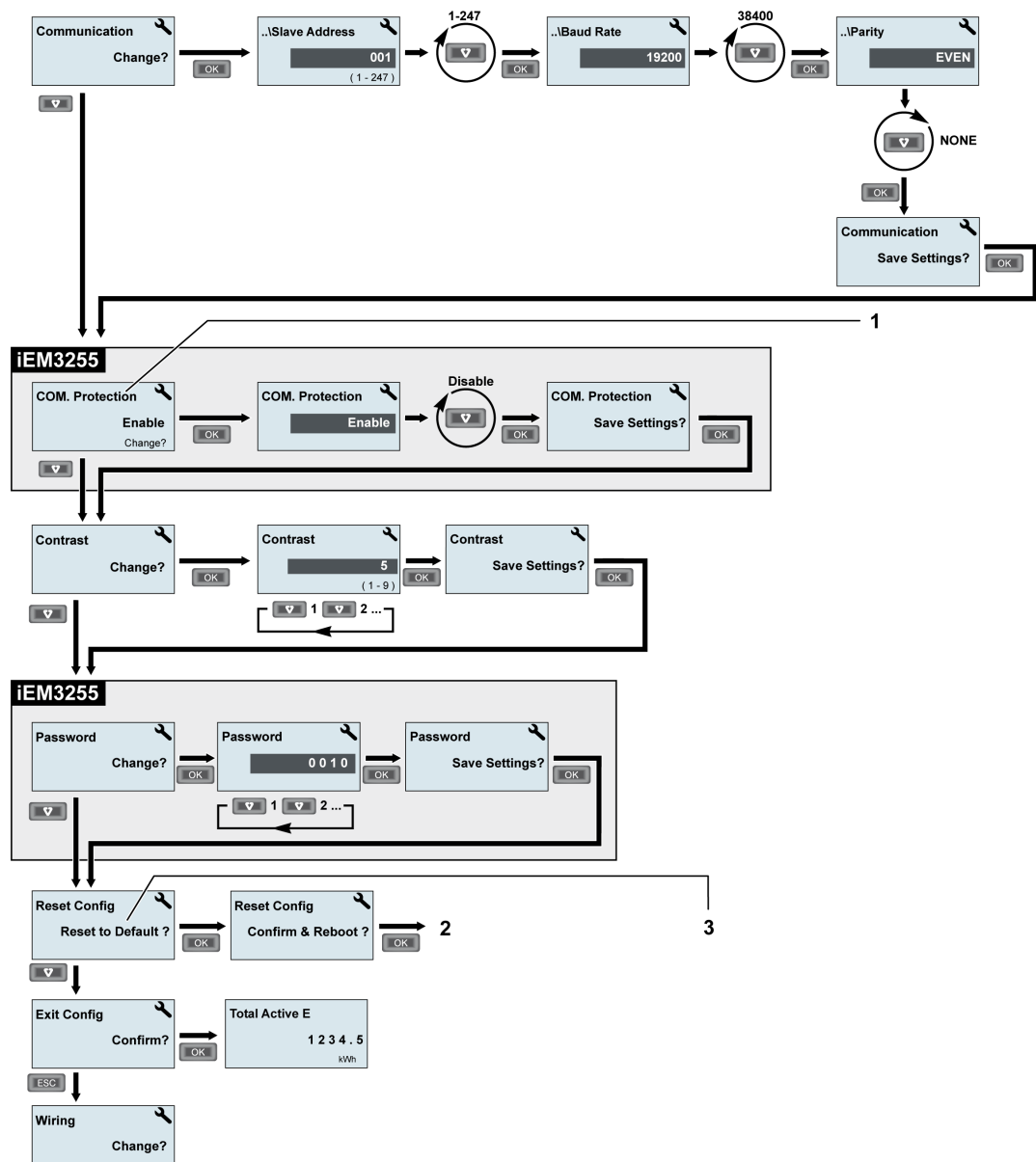
## Configuration Menu for iEM3250 / iEM3255











1 If **COM. Protection** is enable, any configuration related to energy measurement, such as wiring, frequency, etc., can not be changed through communication

2 Password will not be reset

3 Meter restarts

**NOTE:** number of stop bits = 1

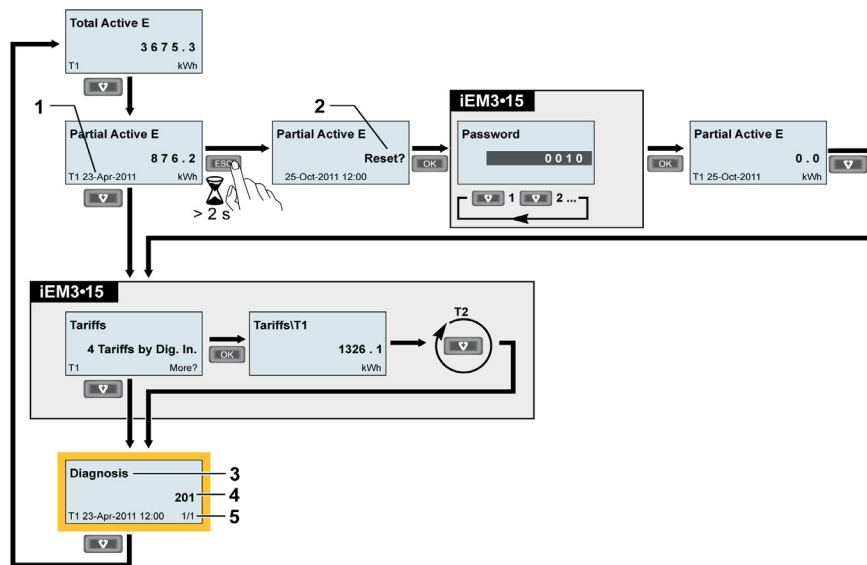
## HMI Display

### Available Displayed Information

The following information is available in display mode:

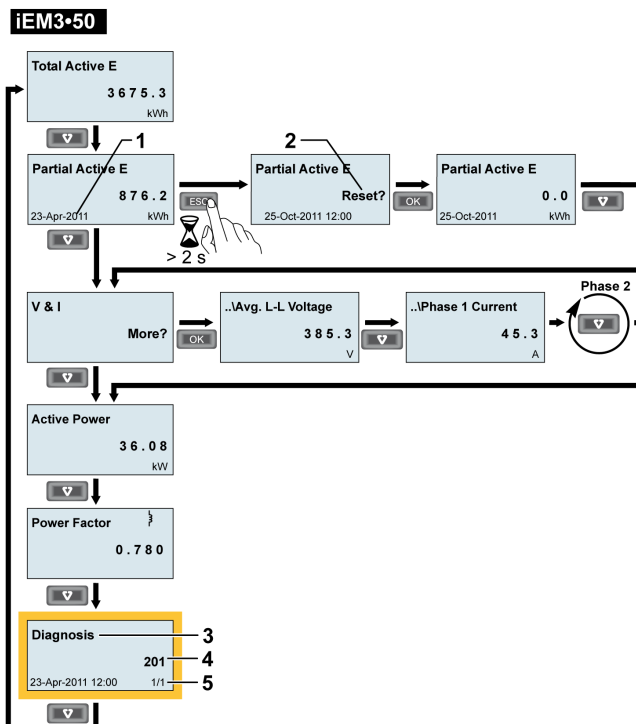
Information	iEM3100	iEM3110	iEM3115	iEM3150	iEM3155	iEM3200	iEM3210	iEM3215	iEM3250	iEM3255
Total Active Energy Import	√	√	√	√	√	√	√	√	√	√
Total Active Energy Export	–	–	–	–	√	–	–	–	–	√
Total Reactive Energy Import	–	–	–	–	√	–	–	–	–	√
Total Reactive Energy Export	–	–	–	–	√	–	–	–	–	√
Partial Active Energy Import	√	√	√	√	√	√	√	√	√	√
Partial Reactive Energy Import	–	–	–	–	√	–	–	–	–	√
Active Energy Import per Tariffs (T1 ... T4)	–	–	√	–	√	–	–	√	–	√
Average voltage	–	–	–	√	√	–	–	–	√	√
Current per phase	–	–	–	√	√	–	–	–	√	√
Active Power (kW)	–	–	–	√	√	–	–	–	√	√
Reactive Power (kVAR)	–	–	–	–	√	–	–	–	–	√
Apparent Power (kVA)	–	–	–	–	√	–	–	–	–	√
Power Factor	–	–	–	√	√	–	–	–	√	√
Frequency	–	–	–	–	√	–	–	–	–	√
Operation Time	–	–	–	–	√	–	–	–	–	√

## iEM3100 / iEM3110 / iEM3115/ iEM3200 / iEM3210 / iEM3215



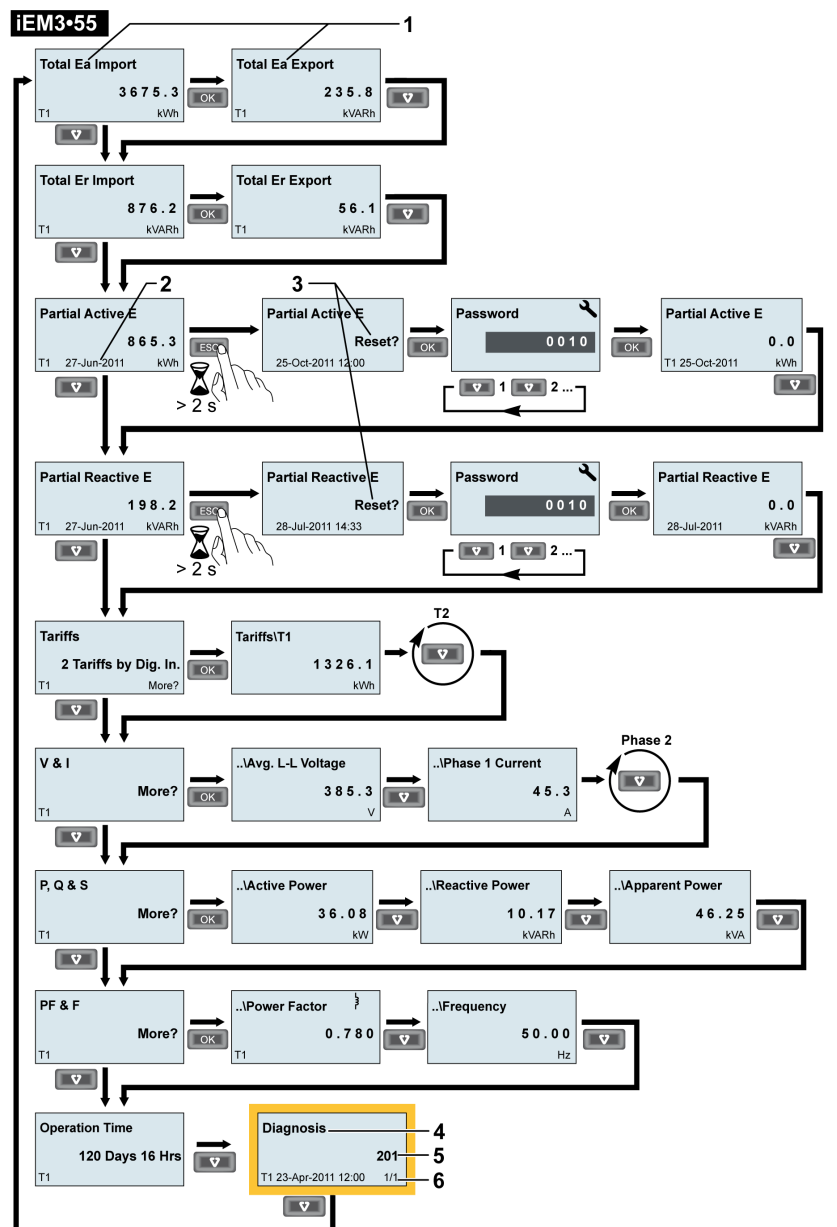
- 1 Date of last reset.
- 2 Reset all energy measurements except total active energy.
- 3 Diagnosis screen appears on specific event, see chapter troubleshooting.
- 4 Diagnosis code explained in chapter troubleshooting.
- 5 List of existing diagnosis.

## iEM3150 / iEM3250



- 1 Date of last reset.
- 2 Reset all energy measurements except total active energy.
- 3 Diagnosis screen appears on specific event, see chapter troubleshooting.
- 4 Diagnosis code explained in chapter troubleshooting.
- 5 List of existing diagnosis.

## iEM3155 / iEM3255



- 1 Import / Export indicated for total active / reactive (Ea / Er) energy, the other energy measurements are only Import energy measurements.
- 2 Date of last reset.
- 3 Reset all measurements except total active energy and total reactive energy.
- 4 Diagnosis screen appears on specific event, see chapter troubleshooting.
- 5 Diagnosis code explained in chapter troubleshooting.
- 6 List of existing diagnosis.

---

### What Is in This Chapter?

This chapter contains the following sections:

Section	Topic	Page
4.1	Modbus Configuration	54
4.2	Modbus Functions	55
4.3	Command Interface	58
4.4	Modbus Register Table	65
4.5	Read Device Identification	70

## 4.1 Modbus Configuration

### Configuration of RS-485 Communication Port

#### Communication Parameters

Before initiating any communication processes, configure the Modbus communication port via the human machine interface (**Config** → **Communication** menu command):

Parameters	Authorized Values	Default Value
Baud rate	<ul style="list-style-type: none"> <li>9600 Baud</li> <li>19 200 Baud</li> <li>38 400 Baud</li> </ul>	19 200 Baud
Parity	<ul style="list-style-type: none"> <li>Odd</li> <li>Even</li> <li>None</li> </ul> <p><b>NOTE:</b> number of stop bit = 1</p>	Even
Address	1–247	1

#### Signaling of Communication Activity

The yellow communication LED indicates the status of communication between the Energy Meters (EMs) and the master as follows:

If...	Then...
The LED is flashing	Communication with the device has been established. <b>NOTE:</b> If there is an error online, the LED is also flashing.
The LED is off	There is no active communication between the master and the slave

---

## 4.2 Modbus Functions

---

### What Is in This Section?

This section contains the following topics:

Topic	Page
Function List	56
Table Format	57

## Function List

### Introduction

There are three different ways of using the Modbus communication:

- by sending commands using the command interface (*see page 58*)
- by reading the Modbus registers
- by reading Device Identification (*see page 70*)

### Description

Sending commands using the command interface is supported by Modbus function 16.

Reading Modbus registers is supported by Modbus function 3.

Read Device Identification is supported by Modbus function 43/14.

The table below describes the three 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 energy meter, use the function 3 (Read).
- To change the tariff, use the function 16 (Write) by sending a command to the energy meter.



## Table Format

Register tables have the following columns:

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

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

## Unit Table

The following data types appear in the Modbus register list:

Type	Description	Range
UInt16	16 bit unsigned integer	0...65535
Int16	16 bit signed integer	-32768...+32767
UInt32	32 bit unsigned integer	0...4 294 967 295
UTF8	8 bit field	multibyte character encoding for Unicode
Float32	32 bit value	Standard representation IEEE for floating number (with single precision)
Bitmap	—	—
DATETIME	See below	—

DATETIME format:

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

## 4.3 Command Interface

---

### What Is in This Section?

This section contains the following topics:

Topic	Page
Presentation	59
Command List	60

## Presentation

### Description

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

### Command Request

The following table describes a Modbus command request:

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

The following table describes a command block:

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

### Command Result

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

The following table describes the command result:

Register Address	Content	Size (Int16)	Data (example)
5375	Requested Command Number	1	2008 (Set Tariff)
5376	Result <sup>(1)</sup>	1	0 (Valid Operation)

<sup>(1)</sup>List of Command Result codes:

- 0 = Valid Operation
- 3000 = Invalid Command
- 3001 = Invalid Parameter
- 3002 = Invalid Number of Parameters
- 3007 = Operation Not Performed

## Command List

The following commands are available:

Command	Relevant Command Number	Page
Set Date/Time	1003	<i>(see page 61)</i>
Set Wiring	2000	<i>(see page 61)</i>
Set Pulse Output (iEM3155 / iEM3255)	2003, 2038	<i>(see page 62)</i>
Set Tariff (iEM3155 / iEM3255)	2008, 2060	<i>(see page 63)</i>
Set Digital Input as Partial Energy Reset (iEM3155 / iEM3255)	6017	<i>(see page 62)</i>
Input Metering Setup (iEM3155 / iEM3255)	6014	<i>(see page 63)</i>
Overload Alarm Setup (iEM3155 / iEM3255)	7000, 20000, 20001	<i>(see page 63)</i>
Communications Setup	5000	<i>(see page 64)</i>
Reset Partial Energy Counters	2020	<i>(see page 64)</i>
Reset Input Metering Counter (iEM3155 / iEM3255)	2023	<i>(see page 64)</i>

## 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	–	23	Hour
	W	1	UInt16	–	0–59	Minute
	W	1	UInt16	–	0–59	Second
	W	1	UInt16	–	–	(Reserved)

## Set Wiring

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

(1) For iEM3250 / iEM3255. Reserved by iEM3150 / iEM3155

**Set Pulse Output (iEM3155 / iEM3255)**

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
2003	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	0, 1	Pulse Output 0 = Disable 1 = Enable
	W	2	Float32	pulse/kWh	(1) (2)	Pulse Frequency
	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	Energy Pulse Duration
(1) iEM3155: 1, 10, 20, 100, 200, 1000						
(2) iEM3255: 0.01, 0.1, 1, 10, 100, 500						

**Set Tariff (iEM3155 / iEM3255)**

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 0 = Disable Multi-Tariff 1 = Use COM as Tariff Control (maximum 4 tariffs) 2 = Use 1 Digital Input as Tariff Control (2 tariffs) 4 = Use RTC as Tariff Control (maximum 4 tariffs)
2008	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	1–4	Tariff <sup>(1)</sup> 1 = T1 2 = T2 3 = T3 4 = T4
(1) Only if Multi-Tariff is controlled by COM.						

**Set Digital Input as Partial Energy Reset (iEM3155 / iEM3255)**

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
6017	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	0, 1	Digital Input to Associate: 0 = Disable 1 = Enable

**Input Metering Setup (iEM3155 / iEM3255)**

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: 0 = Disable 1 = Enable

**Overload Alarm Setup (iEM3155 / iEM3255)**

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)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	0, 1	0 = Disable 1 = Enable
	W	2	Float32	–	0.0–1e10	Pickup Setpoint
	W	2	UInt32	–	–	(Reserved)
	W	2	Float32	–	–	(Reserved)
	W	2	UInt32	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	4	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
	W	1	UInt16	–	–	(Reserved)
20000	W	1	UInt16	–	–	(Reserved)
	W	2	Float32	–	–	(Reserved)
	W	2	UInt32	–	–	(Reserved)
	W	1	Bitmap	–	0,1	Digital Output to Associate 0 = Unassociated 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 0 = 9600 1 = 19200 2 = 38400
	W	1	UInt16	–	0, 1, 2	Parity 0 = Even 1 = Odd 2 = None
	W	1	UInt16	–	–	(Reserved)

**Reset Partial Energy Counters**

Command Number	Action (R/W)	Size	Type	Unit	Range	Description
2020	W	1	UInt16	–	–	(Reserved) (1) (2)
(1)iEM3150/iEM3250: Partial Active Energy and Phase Energy registers will be reset.						
(2)iEM3155/iEM3255: Partial Active / Reactive Energy, Energy by tariff and Phase Energy registers will be reset.						

**Reset Input Metering Counter (iEM3155 / iEM3255)**

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



## 4.4 Modbus Register Table

### Register List

The following table lists the accessible registers:

Register	Page
System (iEM3150 / iEM3155 / iEM3250 / iEM3255)	(see page 66)
Meter Setup and Status (iEM3150 / iEM3155 / iEM3250 / iEM3255)	(see page 66)
Energy Pulse Output Setup (iEM3155 / iEM3255)	(see page 66)
Command Interface (iEM3150 / iEM3155 / iEM3250 / iEM3255)	(see page 67)
Communication (iEM3150 / iEM3155 / iEM3250 / iEM3255)	(see page 67)
Input Metering Setup (iEM3155 / iEM3255)	(see page 67)
Digital Input (iEM3155 / iEM3255)	(see page 67)
Digital Output (iEM3155 / iEM3255)	(see page 68)
Meter Data (iEM3150 / iEM3155 / iEM3250 / iEM3255)	(see page 68)
Overload Alarm (iEM3155 / iEM3255)	(see page 69)

**System (iEM3150 / iEM3155 / iEM3250 / iEM3255)**

Register Address	Action (R/W/WC)	Size	Type	Units	Description
30	R	20	UTF8	–	Meter Name
50	R	20	UTF8	–	Meter Model
70	R	20	UTF8	–	Manufacturer
130	R	2	UInt32	–	Serial Number
132	R	4	DATETIME	–	Date of Manufacture
136	R	5	UTF8	–	Hardware Revision
1637	R	1	UInt16	–	Present Firmware Version (DLF format): X.Y.ZTT
1845–1848	R/WC	1 X 4	UInt16	–	Date/Time Reg. 1845: Year (b6:b0) 0–99 (year from 2000 to 2099) Reg. 1846: Month (b11:b8), Weekday (b7:b5), Day (b4:b0) Reg. 1847: Hour (b12:b8), Minute (b5:b0) Reg. 1848: Millisecond

**Meter Setup and Status (iEM3150 / iEM3155 / iEM3250 / iEM3255)**

Register Address	Action (R/W/WC)	Size	Type	Units	Description
2004	R	2	UInt32	Second	Meter Operation Timer Not applicable for iEM3150 / iEM3250
2014	R	1	UInt16	–	Number of Phases
2015	R	1	UInt16	–	Number of Wires
2016	R/WC	1	UInt16	–	Power System 0 = 1PH2W L–N 1 = 1PH2W L–L 2 = 1PH3W L–L with N 3 = 3PH3W 11 = 3PH4W 13 = 1PH4W multi L with N
2017	R/WC	1	UInt16	Hz	Nominal Frequency
2025	R	1	UInt16	–	Number VTs Not applicable for iEM3150 / iEM3155
2026	R/WC	2	Float32	V	VT Primary Not applicable for iEM3150 / iEM3155
2028	R/WC	1	UInt16	V	VT Secondary Not applicable for iEM3150 / iEM3155
2029	R/WC	1	UInt16	–	Number CTs Not applicable for iEM3150 / iEM3155
2030	R/WC	1	UInt16	A	CT Primary Not applicable for iEM3150 / iEM3155
2031	R/WC	1	UInt16	A	CT Secondary Not applicable for iEM3150 / iEM3155
2036	R/WC	1	UInt16	–	VT Connection Type 0 = Direct Connect 1 = 3PH3W (2 VTs) 2 = 3PH4W (3 VTs) Not applicable for iEM3150 / iEM3155

**Energy Pulse Output Setup (iEM3155 / iEM3255)**

Register Address	Action (R/W/WC)	Size	Type	Units	Description
2129	R/WC	1	UInt16	Millisecond	Energy Pulse Duration
2131	R/WC	1	UInt16	–	Digital Output Association 0 = Disable 1 = DO1 enable for active energy pulse output
2132	R/WC	2	Float32	pulse/kWh	Pulse Weight

**Command Interface (iEM3150 / iEM3155 / iEM3250 / iEM3255)**

Register Address	Action (R/W/WC)	Size	Type	Units	Description
5250	R/W	1	UInt16	–	Requested Command
5252	R/W	1	UInt16	–	Command Parameter 001
5374	R/W	1	UInt16	–	Command Parameter 123
5375	R	1	UInt16	–	Command Status
5376	R	1	UInt16	–	Command Result codes: <ul style="list-style-type: none"> <li>● 0 = Valid Operation</li> <li>● 3000 = Invalid Command</li> <li>● 3001 = Invalid Parameter</li> <li>● 3002 = Invalid Number of Parameters</li> <li>● 3007 = Operation Not Performed</li> </ul>
5377	R/W	1	UInt16	–	Command Data 001
5499	R	1	UInt16	–	Command Data 123

**Communication (iEM3150 / iEM3155 / iEM3250 / iEM3255)**

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

**Input Metering Setup (iEM3155 / iEM3255)**

Register Address	Action (R/W/WC)	Size	Type	Units	Description
7032	R/WC	20	UTF8	–	Label
7052	R/WC	2	Float32	pulse/unit	Pulse Constant
7055	R/WC	1	UInt16	–	Digital Input Association 0 = Disable for input metering 1 = Enable for input metering

**Digital Input (iEM3155 / iEM3255)**

Register Address	Action (R/W/WC)	Size	Type	Units	Description
7274	R	1	UInt16	–	Digital Input Control Mode: 0 = Normal (Input Status) 2 = Multi-tariff Control 3 = Input Metering 5 = All Energy Reset
8905	R	2	Bitmap	–	Digital Input Status (only Bit 1 is used): Bit 1 = 0, relay open Bit 1 = 1, relay closed

**Digital Output (iEM3155 / iEM3255)**

Register Address	Action (R/W/WC)	Size	Type	Units	Description
9673	R	1	UInt16	–	Digital Output Control Mode Status: 2 = Alarm 3 = Energy 0xFFFF = Disable

**Meter Data (iEM3150 / iEM3155 / iEM3250 / iEM3255)**

Register Address	Action (R/W/WC)	Size	Type	Units	Description
Current					
3000	R	2	Float32	A	I1: phase 1 current
3002	R	2	Float32	A	I2: phase 2 current
3004	R	2	Float32	A	I3: phase 3 current
3010	R	2	Float32	A	Current Avg
Voltage					
3020	R	2	Float32	V	Voltage L1–L2
3022	R	2	Float32	V	Voltage L2–L3
3024	R	2	Float32	V	Voltage L3–L1
3026	R	2	Float32	V	Voltage L–L Avg
3028	R	2	Float32	V	Voltage L1–N
3030	R	2	Float32	V	Voltage L2–N
3032	R	2	Float32	V	Voltage L3–N
3036	R	2	Float32	V	Voltage L–N Avg
Power					
3054	R	2	Float32	kW	Active Power Phase 1
3056	R	2	Float32	kW	Active Power Phase 2
3058	R	2	Float32	kW	Active Power Phase 3
3060	R	2	Float32	kW	Total Active Power
3068	R	2	Float32	kVAR	Total Reactive Power Not applicable for iEM3150 / iEM3250
3076	R	2	Float32	kVA	Total Apparent Power Not applicable for iEM3150 / iEM3250
Power Factor					
3084	R	2	Float32	–	Total Power Factor: -2 < PF < -1 = Quad 2, active power negative, capacitive -1 < PF < 0 = Quad 3, active power negative, inductive 0 < PF < 1 = Quad 1, active power positive, inductive 1 < PF < 2 = Quad 4, active power positive, capacitive
Frequency					
3110	R	2	Float32	Hz	Frequency
Total Energy (cannot be reset)					
3204	R	4	Int64	Wh	Total Active Energy Import
3208	R	4	Int64	Wh	Total Active Energy Export Not applicable for iEM3150 / iEM3250
3220	R	4	Int64	VARh	Total Reactive Energy Import Not applicable for iEM3150 / iEM3250
3224	R	4	Int64	VARh	Total Reactive Energy Export Not applicable for iEM3150 / iEM3250
Energy Reset (Partial Energy, Energy by Tariff, Phase Energy)					
3252	R	4	DATETIME	–	Energy Reset Date and Time
Partial Energy					
3256	R	4	Int64	Wh	Partial Active Energy Import

Register Address	Action (R/W/WC)	Size	Type	Units	Description
3272	R	4	Int64	VARh	Partial Reactive Energy Import Not applicable for iEM3150 / iEM3250
Phase Energy					
3518	R	4	Int64	Wh	Active Energy Import Phase 1
3522	R	4	Int64	Wh	Active Energy Import Phase 2
3526	R	4	Int64	Wh	Active Energy Import Phase 3
Input Metering Counter					
3554	R	4	DATETIME	–	Input Metering Accumulation Reset Date and Time Not applicable for iEM3150 / iEM3250
3558	R	4	Int64	Unit	Input Metering Accumulation Not applicable for iEM3150 / iEM3250
Energy by Tariff (Not applicable for iEM3150 / iEM3250)					
4191	R/WC	1	UInt16	–	MultiTariffs Energy Active Rate 0: multi tariff disabled 1 to 4: rate A to rate D <b>NOTE:</b> Only modifiable by command in case of COM Control Mode
4196	R	4	Int64	Wh	Rate A Active Energy Import
4200	R	4	Int64	Wh	Rate B Active Energy Import
4204	R	4	Int64	Wh	Rate C Active Energy Import
4208	R	4	Int64	Wh	Rate D Active Energy Import

**Overload Alarm (iEM3155 / iEM3255)**

Register Address	Action (R/W/WC)	Size	Type	Units	Description
45001	R/WC	1	Bitmap	–	Overload Alarm Setup: 0x0000 = Disabled 0x0100 = Enabled
45002	R/WC	2	Float32	kW	Pickup Setpoint
45004	R/WC	1	Bitmap	–	Digital Output to Associate: 0x0000 = Digital Output unassociated to overload alarm 0x0100 = Digital Output associated to overload alarm
45005	R	1	Bitmap	–	Activated Status: 0x0000 = Alarm is inactive 0x0100 = Alarm is active
45006	R	1	Bitmap	–	Unacknowledged Status: 0x0000 = Historic alarm is acknowledged by the user 0x0100 = Historic alarm is unacknowledged by the user
45007	R	4	DATETIME	–	Last Alarm - Time Stamp
45011	R	2	Float32	kW	Last Alarm - Value

## 4.5 Read Device Identification

### Register List

#### Read Device Identification

The energy meters supports the Basic Device Identification with the mandatory objects:

- VendorName
- ProductCode
- Revision Number

ObjectID	Object Name/Description	Object Length	Object Value	Note
0x00	VendorName	16	SchneiderElectric	–
0x01	ProductCode	09	A9MEM3100 A9MEM3110 A9MEM3115 A9MEM3150 A9MEM3155 A9MEM3200 A9MEM3210 A9MEM3215 A9MEM3250 A9MEM3255	The ProductCode is identical to the catalogue number of each reference
0x02	MajorMinorRevision	04	V1.0	Equivalent to X.Y in register 1637

The Read Device ID code 01 and 04 are supported:

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

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

# Technical Characteristics

5

## Specifications

### Electrical Characteristics

Characteristic			Value	Energy Meters
Voltage range	U		3x100/173 V AC...3x277/480 V AC ( $\pm 20\%$ 50/60Hz)	iEM31•• / iEM32••
Current	In		5 A, withstanding 10 A continuously	iEM32••
	I <sub>max</sub>		63 A	iEM31••
Maximum device consumption			< 10 VA	iEM31•• / iEM32••
One solid state relay output	Voltage		5...40 V DC	iEM3155 / iEM3255
	Current		50 mA	iEM3155 / iEM3255
	Output resistance		0.1...50 Ohm	iEM3155 / iEM3255
One optical coupler output for remote transfer	Pulses per kWh		Configurable	iEM3110 / iEM3210
	Voltage		5...30 V DC	iEM3110 / iEM3210
	Current		1...15 mA	iEM3110 / iEM3210
	Pulse width		Configurable, the minimum width is 50 ms	iEM3110 / iEM3210
	Standard		IEC 62053-31 compatible (S0 format output)	iEM3110 / iEM3210
One optical coupler input	Maximum input:	Voltage	40 V DC	iEM3155 / iEM3255
		Current	4 mA burden	iEM3155 / iEM3255
	Voltage off		0...5 V DC	iEM3155 / iEM3255
	Voltage on		11...40 V DC	iEM3155 / iEM3255
	Standard		IEC61131-2 compatible (TYPE 1)	iEM3155 / iEM3255
Two optical coupler inputs for tariff control	Maximum input:	Voltage	40 V DC	iEM3115 / iEM3215
		Current	4 mA burden	iEM3115 / iEM3215
	Voltage off		0...5 V DC	iEM3115 / iEM3215
	Voltage on		11...40 V DC	iEM3115 / iEM3215
	Standard		IEC61131-2 compatible (TYPE 1)	iEM3115 / iEM3215
Internal clock	Quartz crystal based	Time error	< 2.5 s/day (30 ppm) at 25° C	iEM3115 / iEM3155 / iEM3215 / iEM3255
	Backup by super capacitor	Backup time	> 3 days at 25° C	iEM3115 / iEM3155 / iEM3215 / iEM3255

**Measurement Accuracy**

Characteristic		Value	Energy Meters
Active energy		Class 1 conforming to IEC 62053-21 and IEC 61557-12 (PMD DD): $I_{max}=63$ A, $I_b=10$ A, and $I_{st}=0.04$ A	iEM31**
		Class B conforming to EN 50470-3: $I_{max}=63$ A, $I_{ref}=10$ A, $I_{min}=0.5$ A, and $I_{st}=0.04$ A	iEM31**
Reactive energy		Class 2 conforming to IEC 62053-23 and IEC 61557-12 (PMD DD): $I_{max}=63$ A, $I_b=10$ A, and $I_{st}=0.05$ A	iEM3155
for x/1A current input	Active energy	Class 1 conforming to IEC 62053-21 and IEC 61557-12 (PMD SD): $I_{max}=1.2$ A, $I_n=1$ A, and $I_{st}=0.002$ A	iEM3200 / iEM3210 / iEM3215
		Class 1 conforming to IEC 62053-21 and IEC 61557-12 (PMD Sx): $I_{max}=1.2$ A, $I_n=1$ A, and $I_{st}=0.002$ A	iEM3250 / iEM3255
		Class B conforming to EN 50470-3: $I_{max}=1.2$ A, $I_n=1$ A, $I_{min}=0.01$ A, and $I_{st}=0.002$ A	iEM32**
	Reactive energy	Class 2 conforming to IEC 62053-23 and IEC 61557-12 (PMD Sx): $I_{max}=1.2$ A, $I_n=1$ A, and $I_{st}=0.003$ A	iEM3255
for x/5A current input	Active energy	Class 0.5S conforming to IEC 62053-22 and IEC 61557-12 (PMD SD): $I_{max}=6$ A, $I_n=5$ A, and $I_{st}=0.005$ A	iEM32**
		Class 0.5S conforming to IEC 62053-22 and IEC 61557-12 (PMD Sx): $I_{max}=6$ A, $I_n=5$ A, and $I_{st}=0.005$ A	iEM3250 / iEM3255
		Class C conforming to EN 50470-3: $I_{max}=6$ A, $I_n=5$ A, $I_{min}=0.05$ A, and $I_{st}=0.005$ A	iEM32**
	Reactive energy	Class 2 conforming to IEC 62053-23 and IEC 61557-12 (PMD Sx): $I_{max}=6$ A, $I_n=5$ A, and $I_{st}=0.015$ A	iEM3255

**Mechanical Characteristics**

Characteristic		Value	Energy Meters
Degree of protection	Front panel	IP40	iEM31** / iEM32**
	Casing	IP20	iEM31** / iEM32**
Recommended terminal tightening torque	Power	$16 \text{ mm}^2 / 1.8 \text{ N.m}$	iEM31**
	Pulse output	$2.5 \text{ mm}^2 / 0.5 \text{ N.m}$	iEM3110 / iEM3210
	Tariff control	$1.5 \text{ mm}^2 / 0.5 \text{ N.m}$	iEM3115 / iEM3215
	Voltage input	$2.5 \text{ mm}^2 / 0.5 \text{ N.m}$	iEM32**
	Current input	$6 \text{ mm}^2 / 0.8 \text{ N.m}$	iEM32**
	Digital input/output	$1.5 \text{ mm}^2 / 0.5 \text{ N.m}$	iEM3155 / iEM3255
	RS 485	$2.5 \text{ mm}^2 / 0.5 \text{ N.m}$	iEM3150 / iEM3155 / iEM3250 / iEM3255

**Other Characteristics**

Characteristic	Value	Energy Meters
Operating temperature	$-25^\circ\text{C} \dots +55^\circ\text{C}$ (K55)	iEM31** / iEM32**
Degree of pollution	2	iEM31** / iEM32**
Overvoltage and measurement category	III	iEM31** / iEM32**
Active energy display	In kWh or MWh up to 99999999 MWh	iEM32**
	In kWh: 8 + 1 digits up to 99999999.9	iEM31**
Meter indicator	500 flashes / kWh	iEM31**
	5000 flashes / kWh without consideration of transformer ratios	iEM32**



---

## Maintenance and Troubleshooting

# 6

---

### What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Safety Precautions	74
Troubleshooting	75

## Safety Precautions

### Presentation

The following safety precautions must be thoroughly implemented before attempting to repair electrical equipment or carry out maintenance. Carefully read and follow the safety precautions described below.

### **DANGER**

#### **RISK OF ELECTRIC SHOCK, ARC FLASH OR BURNS**

- Wear suitable personal protective equipment and follow the currently applicable electrical safety instructions. See, for example, standard NFPA 70E when carrying out work in the USA.
- Only qualified personnel should maintain this equipment. Such work should be performed only after reading all the installation instructions.
- Turn off all power supplying this equipment before working on or inside it.
- NEVER work alone.
- Beware of potential hazards and wear personal protective equipment.

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

### **NOTICE**


#### **RISK OF DAMAGE TO THE ENERGY METER**

- Never open the energy meter unit.
- Do not attempt to repair any components in the energy meter range, either in the unit or an accessory.

**Failure to follow these instructions can result in equipment damage.**

## Troubleshooting

### Presentation

Diagnostic code	iEM3100 / iEM3200	iEM3110 / iEM3210	iEM3115 / iEM3215	iEM3150 / iEM3250	iEM3155 / iEM3255	Description	Possible solution
—	√	√	√	√	√	LCD display is not visible.	Check and adjust LCD contrast settings or contact Schneider-Electric service.
—	√	√	√	√	√	Push button failure.	Restart the energy meter by power off and power on again. If there is still no response, contact Schneider-Electric service.
101, 102	√	√	√	√	√	Metering stops due to internal error. Total energy consumption can be displayed by pressing  .	Enter the configuration mode and implement <b>Reset Config</b> or contact Schneider-Electric service.
201	√	√	√	√	√	Metering continues. Mismatch between frequency settings and frequency measurements.	Correct frequency settings according to the nominal frequency of the network.
202	√	√	√	√	√	Metering continues. Mismatch between wiring settings and wiring inputs.	Correct wiring settings according to wiring inputs.
203	√	√	√	√	√	Metering continues. Phase sequence reverse.	Check wire connections or correct wiring settings.
204	√	√	√	√	—	Metering continues. Total active energy negative due to incorrect voltage and current connections.	Check wire connections.
205	—	√	√	—	√	Metering continues. Date and Time are reset due to last power failure.	Set Date and Time.
206	—	√	—	—	√	Metering continues. Pulse missing due to overspeed of energy pulse output.	Set the suitable parameters of the energy pulse output.
207	—	—	√	—	√	Metering continues. Abnormal internal clock function.	Restart the energy meter by power off and power on again. If there is still no response, contact Schneider-Electric service.











**DOCA0005EN-01**

**Schneider Electric Industries SAS**

35, rue Joseph Monier  
CS30323  
F - 92506 Rueil Malmaison Cedex

[www.schneider-electric.com](http://www.schneider-electric.com)

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

04/2012