Iskra®

User's Manual

GB

Single-phase electrical energy meter WM1-6
Single-phase electrical energy meter WM1-6Z
Single-phase electrical energy meter WM1M6

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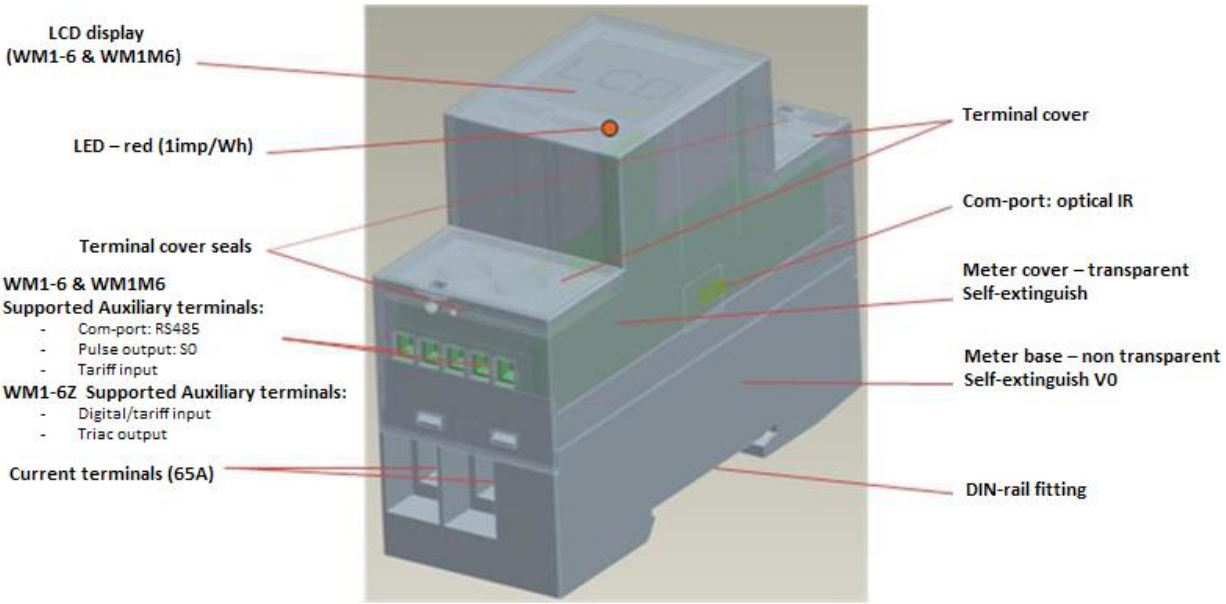
1. DESCRIPTION

The meters **WM1-6, WM1-6Z** and **WM1M6** (MID certified) are intended for energy measurements in single-phase electrical power network and can be used in residential, industrial and utility applications. Meters measure energy directly in 2-wire networks according to the principle of fast sampling of voltage and current signals. A built-in microprocessor calculates energy, power and power factor from the measured signals. It also controls LCD (WM1-6 and WM1M6 only), LED and installed modules.

Housing is provided with terminals protection covers, which can be sealed up against non-authorized access. They are built to be fastened to EN 60715 standard guides.

1.1 Overview

- Single-phase direct connected DIN-rail mounting meter.
- MID approval (WM1M6).
- Class 1 for active energy according to EN 62053-21 and B according to EN 50470-3.
- Class 2 for reactive energy according to EN 62053-23.
- Basic current 5 A (I_b).
- Maximum current 65 A (I_{max}).
- 230 V rated system voltage input (U_n).
- Voltage operating range (-20 % ... +15 %) U_n.
- Reference frequency 50Hz or 60 Hz.
- Power consumption voltage circuit < 8 VA at U_n.
- Temperature range climatic condition as indoor meter according EN 62052-11.
- Display LCD 7+1 digit (100Wh resolution) - WM1-6 and WM1M6 only.
- Multifunctional front red LED.
- Pulse output (option) according to EN 62053-31:2001.
- Serial communication (option).
- Tariff input (option).
- DIN-rail mounting according to EN 60715.
- Sealable terminal cover.
- 2-DIN modules width.
- External bistable switch control (option).



2. INSTALLATION

- To prevent electrical shock and/or equipment damage, disconnect electrical power at the main fuse or circuit breaker before installation or any servicing.
- Make sure, that no voltage is present in the installation.
- Prevent the disconnecting device from being switched on accidentally.
- Connect the module according to electrical diagram.
- WM1-6Z has build-in antenna. Please install WM1-6Z as far as possible from metal elements.

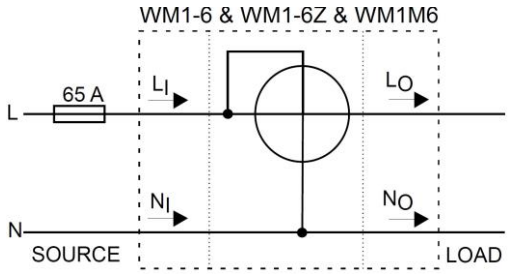
NOTE!

Module installation requires a great degree of skill and may be performed only by a qualified and licensed electrician.

Even when the module is turned off, voltage may be present on its terminals. Any works on configuration changes related to connection mode or load must be always performed by disconnected power supply (disable the fuse).

Do not connect the module to loads exceeding recommended values. Connect the module only in accordance to the below diagrams. Improper connections may be dangerous. Electrical installation must be protected by over current protection fuse 65 A and rated breaking capacity 1500 V (ESKA 522.7..) must be used according to wiring diagram to achieve appropriate overload protection of the module.

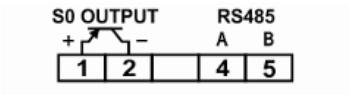
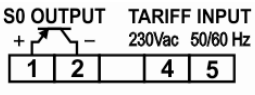
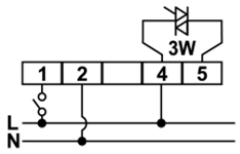
2.1 Electrical diagram 230VAC



L_I	Live input
N_I	Neutral input
L_O	Live output
N_O	Neutral output

2.2 Connection of modules

Meter can be equipped with different modules.

WM1-6 & WM1M6		WM1-6Z
		
Pulse out. & communication	Pulse out. & tariff input	Digital/Tariff input & Triac output

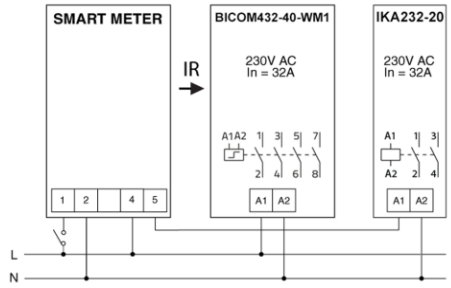
RS485 serial communication with the MODBUS protocol, which enables data transmission and thus connection of the measuring places into the network for the control and management with energy. They can also be equipped with tariff input (option). Both supported only on WM1-6 and WM1M6.

A built-in pulse output (option) is designed for sending data to the devices for checking and monitoring consumed energy.

Triac output for triggering external relay. Supported only on WM1-6Z.

Check labels on the side of the meter to check what modules are built in.

It is possible to connect two external modules. One controlled by built-in optical (IR) communication port on the side, second controlled by Triac output.



Picture above indicates connection of two external relays to WM1-6Z. BICOM432-40-WM1 connected via optical (IR) communication port and IKA232-20 connected via Triac output.

3. COMMUNICATION

3.1 RS485

Galvanic separated serial RS485 communication module can be built- in. There are 5 different baud rates possible for RS485 communication:

- 1200 bits/s
- 2400 bits/s
- 4800 bits/s
- 9600 bits/s (factory default)
- 19200 bits/s

It uses MODBUS RTU protocol to read and change settings of the meter and to read measuring results.
RS485 serial communication can be used together with optical (IR) communication in order to control a bistable switch Iskra BICOM.

NOTE!

WM1-6Z does not support RS485 communication.

3.2 Optical IR

Meter has built-in optical (IR) communication port on the side as a standard. Special WM-USB adapter (size 1 DIN module) can easily be attached to it. It can be used for direct communication with PC to change settings of devices without RS485 communication. Communication settings for WM-USB are fixed to:

Communication speed	19200 bit/s
Frame	8, none, 2
Address	33

Drivers for WM USB are installed automatically when MiQen 2.1 software is installed. If not, it is possible to install them manually from …"MiQen 2.1 installation folder" / Drivers.

NOTE!

Supported on all variants of WM1 (WM1-6, WM1-6Z and WM1M6).

3.3 Z-WAVE

NOTE!

Supported only on WM1-6Z.

Z-Wave is a wireless communications protocol for home automation. It is oriented to the residential control and automation market.

A Z-Wave automation system can be remote controlled via the Internet, using a Z-Wave gateway or central control device which serves as both the Z-Wave hub controller and portal to the outside.

Module Inclusion (Adding to Z-wave network)

- Connect module to power supply
- Enable add/remove on main controller
- auto-inclusion (works for about 5 seconds after connected to power supply) or
- press service button S for more than 2 second

NOTE!

For auto-inclusion procedure, first set main controller into inclusion mode and then connect module to power supply.

Module Exclusion/Reset (Removing from Z-Wave network)

- Connect module to power supply.
- Bring module within maximum 1 meter (3 feet) of the main controller.
- Enable add/remove mode on main controller.
- Press service button S for more than 6 seconds.

By this function, all parameters of the module are set to default values and own ID is deleted.
If service button S is pressed more than 2 and less than 6 second module is excluded, but configuration parameters are not set to default values.

Association

Association enables Smart meter module to transfer commands inside Z-Wave network directly to other Z-Wave modules.

Associated Groups:
Group 1: Lifeline group (reserved for communication with the main controller), 1 node allowed.

Configuration parameters

Parameter no. 7 – Input 1 switch function selection
Available configuration parameters (data type is 1 Byte DEC):

- default value 4
- 0 disabled
- 2 IR external relay control – mono stable push button
- 3 IR external relay control - bi stable switch
- 4 External relay control – mono stable push button
- 5 External relay control – bi stable switch

Parameter no. 10 - Activate / deactivate functions ALL ON / ALL OFF
Available configuration parameters (data type is 2 Byte DEC):

- default value 255
- 255 - ALL ON active, ALL OFF active
- 0 - ALL ON is not active, ALL OFF is not active
- 1 - ALL ON is not active, ALL OFF active
- 2 - ALL ON active, ALL OFF is not active

Smart meter module responds to commands ALL ON/ ALL OFF that may be sent by the main controller or by other controller belonging to the system.

Parameter no. 11 - Automatic turning off IR external relay output after set time

When IR external relay is ON it goes automatically OFF after time defined by this parameter. Timer is reset to zero each time the module receive ON command regardless from where it comes (push button, associated module, controller,..). Available configuration parameters (data type is 2 Byte DEC):

- default value 0
- 0 - Auto OFF disabled
- 1 – 32535 = 1second – 32535 seconds. Auto OFF enabled with define time, step is 1s.

Parameter no. 12 - Automatic turning on IR external relay output after set time

When IR external relay is OFF it goes automatically ON after time defined by this parameter. Timer is reset to zero each time the module receive OFF command regardless from where it comes (push button, associated module, controller,..). Available configuration parameters (data type is 2 Byte DEC):

- default value 0
- 0 - Auto ON disabled
- 1 – 32535 = 1second – 32535 seconds. Auto ON enabled with define time, step is 1s.

Parameter no. 13 - Automatic turning off External relay output after set time

When External relay is ON it goes automatically OFF after time defined by this parameter. Timer is reset to zero each time the module receive ON command regardless from where it comes (push button, associated module, controller,..). Available configuration parameters (data type is 2 Byte DEC):

- default value 0
- 0 - Auto OFF disabled
- 1 – 32535 = 1second – 32535 seconds. Auto OFF enabled with define time, step is 1s.

Parameter no. 14 - Automatic turning on External relay after output set time

When External relay is OFF it goes automatically ON after time defined by this parameter. Timer is reset to zero each time the module receive OFF command regardless from where it comes (push button, associated module, controller,..). Available configuration parameters (data type is 2 Byte DEC):

- default value 0
- 0 - Auto ON disabled
- 1 – 32535 = 1second – 32535 seconds. Auto ON enabled with define time, step is 1s.

Parameter no. 40 – Power reporting in Watts on power change

Set value means percentage, set value from 0 – 100 = 0% - 100%. Available configuration parameters (data type is 1 Byte DEC):

- default value 10
- 0 – Reporting disabled
- 1 – 100 = 1% - 100% Reporting enabled. Power report is send (push) only when actual power in Watts in real time changes for more than set percentage comparing to previous actual power in Watts, step is 1%.

NOTE!

If power changed is less than 1W, the report is not send (pushed), independent of percentage set. When reporting Watts, module will automatically reports also V (Voltage), A (Amperes), Power factor, kVar (Reactive Power).

Parameter no. 42 – Power reporting in Watts by time interval

Set value means time interval (0 – 32535) in seconds, when power report is send. Available config. parameters (data type is 2 Byte DEC):

- default value 0
- 0 – Reporting Disabled
- 1 – 32535 = 1 second – 32535 seconds. Reporting enabled, Power report is send with time interval set by entered value. When reporting Watts, module will automatically reports also V (Voltage), A (Amperes), Power factor, kVar (Reactive Power).

Parameter no. 45 – Reset Power counters
Available configuration parameters (data type is 1 Byte DEC):
- default value 0
- 0 no function
- 1 reset counter 1 – KWh
- 2 reset counter 2 – kVARh
- 4 reset counter 3 – kVAh
- 15 reset ALL counters

Parameter no. 100 – Enable / Disable endpoints IR external relay and External relay
Enabling IR external relay and External relay or both of them, means that endpoint (IR external relay) and endpoint (External relay) or both will be present on UI. Disabling them will result in hiding endpoints according to parameter set value. Note that hiding endpoint has no impact on its functionality. Available configuration parameters (data type is 1 Byte DEC):
- default value 0
- 0 - Endpoints IR external relay and External relay disabled
- 1 - Endpoints IR external relay disabled, External relay enabled
- 2 - Endpoints IR external relay enabled, External relay disabled
- 3 - Endpoints IR external relay and External relay enabled

NOTE!

After parameter change, first exclude module (without setting parameters to default value) and then re include the module.

If you don't have IR BiComm relay module mounted and you enable IR communication (Parameter 100 is 2 or 3) there will be no valid IR relay state reported. It will report IR COMMUNICATION ERROR and LED2 will blink.

Parameter no. 110 - Maximum Power auto off
Set value means Maximum Power Consumption (0 - 15000) in watts (W), when relays are turned off according to Parameters no. 111 and 112. Available configuration parameters (data type is 2 Bytes DEC):
default value 0
- 0 - no function
- 1 - 15000 = 1 W - 15000 W Maximum Power Consumption.

Parameter no. 111 - Delay overpower off
Set value means number of second to power off relay (defined by Parameters no. 110 and 112) before restart (30 - 32535) in seconds (s). Available configuration parameters (data type is 2 Bytes DEC):
- default value 30
- 30 – 32535 = 30 s – 32535 s delay.

Parameter no. 112 - Relay to power off
Set value selects relay to be powered off when threshold is reached (defined by Parameters no. 110 and 111). Available config. parameters (data type is 1 Byte DEC):
default value 0
- 0 - switch between the 2 relays (power off relay 1 first, after power on, if power consumption is still over, power off relay 2, ...)
- 1 - always power off relay 1 (IR external relay)
- 2 - always power off relay 2 (External relay)
- 3 - always power off both relays (relay 1 and relay 2)

Parameter no. 130 – Serial Number
Read only. Unsigned Value (16bit). 2 decimal places.

Parameter no. 131 – Meter Software reference
Read only. Unsigned Value (16bit). 2 decimal places.

Parameter no. 132– Meter Hardware reference
Read only. Unsigned Value (16bit), 2 decimal places.

Parameter no. 140– Voltage U1
Read only. Unit: V. Binary Unsigned Value (24bit), 1 decimal place.

Parameter no. 141– Current I1
Read only. Unit: A. Binary Unsigned Value (24bit), 3 decimal places.

Parameter no. 142– Active Power Total (Pt)
Read only. Unit: W. Binary Signed Value (24bit), 1 decimal place.

Parameter no. 143– Reactive Power Total (Qt)
Read only. Unit: kVAR. Binary Signed value (24bit), 1 decimal place.

Parameter no. 144– Power Factor Total (PFt)
Read only. Unsigned Value (16bit), 4 decimal places.

Parameter no. 145– Energy Counter 1 – Active power accumulated (import)
Read only. Unit: Kwh. Signed Long Value (32bit), 1 decimal place.

Parameter no. 146– Energy Counter 2 – Reactive power accumulated
Read only. Unit: kVARh. Signed Long Value (32bit), 1 decimal place.

Parameter no. 147– Energy Counter 3 – Apparent power accumulated
Read only. Unit: KVAh. Signed Long Value (32bit), 1 decimal place.

Parameter no. 148– Energy Counter 4 – Active power accumulated (export)
Read only. Unit: Kwh. Signed Long Value (32bit), 1 decimal place.

Z-Wave Classes

Z-Wave Device Class:
ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_ALWAYS_0N
GENERIC_TYPE_METER
SPECIFIC_TYPE_WHOLE_HOME_METER_SIMPLE
Z-Wave Supported Command Classes:
COMMAND_CLASS_ZWAVEPLUS_INFO_V2
COMMAND_CLASS_BASIC
COMMAND_CLASS_SWITCH_ALL
COMMAND_CLASS_SWITCH_BINARY_V2
COMMAND_CLASS_METER_V4
COMMAND_CLASS_MULTI_CHANNEL_V4
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3
COMMAND_CLASS_CONFIGURATION
COMMAND_CLASS_VERSION_V2
COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2
COMMAND_CLASS_DEVICE_RESET_LOCALLY
COMMAND_CLASS_POWERLEVEL
COMMAND_CLASS_ASSOCIATION_V2
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V2
COMMAND_CLASS_DEVICE_RESET_LOCALLY
COMMAND_CLASS_CRC_16_ENCAP
COMMAND_CLASS_FIRMWARE_UPDATE_MD_V2
COMMAND_CLASS_MARK
COMMAND_CLASS_BASIC
COMMAND_CLASS_SWITCH_BINARY_V2
Endpoint 1 (IR external relay):
Device Class:
GENERIC_TYPE_SWITCH_BINARY
SPECIFIC_TYPE_POWER_SWITCH_BINARY
Command Classes:
COMMAND_CLASS_ZWAVEPLUS_INFO_V2
COMMAND_CLASS_BASIC
COMMAND_CLASS_SWITCH_BINARY_V2
COMMAND_CLASS_VERSION_V2
COMMAND_CLASS_ASSOCIATION_V2
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V2
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3
COMMAND_CLASS_CRC_16_ENCAP
COMMAND_CLASS_MARK
COMMAND_CLASS_BASIC
Endpoint 2 (External relay):
Device Class:
GENERIC_TYPE_SWITCH_BINARY
SPECIFIC_TYPE_POWER_SWITCH_BINARY
Command Classes:
COMMAND_CLASS_ZWAVEPLUS_INFO_V2
COMMAND_CLASS_BASIC
COMMAND_CLASS_SWITCH_BINARY_V2
COMMAND_CLASS_VERSION_V2
COMMAND_CLASS_ASSOCIATION_V2
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V2
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3
COMMAND_CLASS_CRC_16_ENCAP
COMMAND_CLASS_MARK
COMMAND_CLASS_BASIC

NOTE!

Endpoints are shown/hidden by Parameter No.100
BASIC SET/GET on root device is mapped to basic set/get of both endpoints.

This product can be included and operated in any Z-Wave network with other Z-Wave certified devices from any other manufacturers. All constantly powered nodes in the same network will act as repeaters regardless of the vendor in order to increase reliability of the network.

4. MEASUREMENTS

Metering functions are done with compute engine (CE). Each 250 ms, firmware is transforming the values of these registers to human readable values. There are four different energy counters, which can be configured each to measure one of seven different types of energy. For MID meters, these energy counters are configured only in production. For Non-MID counters they can be also reconfigured during use. These are:

- Total Absolute Active Energy (kWh)
- Total Absolute Reactive Energy (kvarh)
- Total Absolute Apparent Energy (kVAh)
- Import Active Energy (kWh)
- Export Active Energy (kWh)
- Import Reactive Energy (kvarh)
- Export Reactive Energy (kvarh)

Actual measured values:

- Active Power
- Reactive Power
- Apparent Power
- Power Factor
- Voltage
- Frequency
- Current

5. INPUT AND OUTPUT MODULES

As an option device can have built-in:

- Tariff input that supports measurement of energy in two tariffs. When there is voltage on it (check values in technical data) it stores data in Tariff 2 registers otherwise in Tariff 1 registers. Tariffs can be set via communication by MiQen software. Supported on WM1-6 and WM1M6.
- Pulse (SO) output module that countsabsolute active energy with a fixed pulse rate 1 imp/Wh.
- Triac output/Digital input for triggering external relay. Supported only on WM1-6Z.

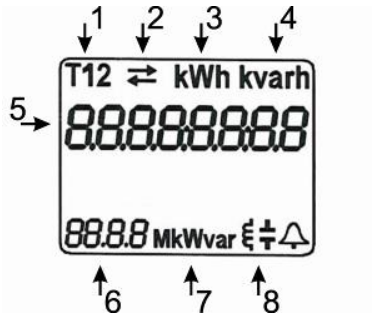
6. LCD

NOTE!

No LCD display on WM1-6Z.

On LCD measured data are presented. Display scrolls automatically. Displayed quantities and scroll time can be set via communication by MiQen software.

6.1 Display description

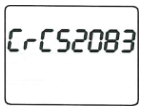


1. Tariff set for displayed counter
2. Energy import (→)
   Energy export (←)
3. kWh display
4. kvarh display
5. Value
6. Info:
   kVAh display
   A – currently active counter
   S – apparent power
   PF – power factor
   U – voltage
   F – frequency
   I – current
7. W – active power
   var – reactive power
8. inductive / capacitive

Startup displays:

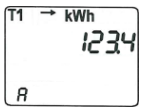
Segment check

Built version

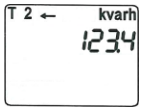


CRC check

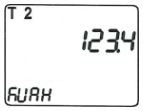
Energy counter displays:
up to 4 counters – are displaying current energy counter **settings** (tariff, import / export / total, active / reactive / apparent), its **value** and **current activity** (counting (A) / not counting ( )).



Energy counter:
Set tariff: 1 (T1)
dir.: imp. (→)
Value: 123.4 kWh
Currently: active (A)

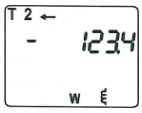


Energy counter:
Set tariff: 2 (T2)
Energy dir.: exp. (←)
Value: 123.4 kvarh
Currently: not active

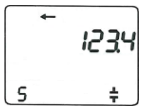


Energy counter:
Set tariff: 2 (T2)
Energy dir: total
Value: 123.4 kVAh
Currently: no data

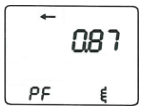
Other displays:
are displaying measured **quantity** (P, Q, S, PF, U, f and I), its **value**, **direction** of active energy flow (import / export), **reactance** (inductive / capacitive) and active tariff. Some examples of displays are shown below:



P (W)
Value: -123.4
Inductive
E flow: exp.(←)
Current tariff: T2



S (VA – no unit displayed)
Value: 123.4
Capacitive
E flow: exp.(←)
Current tariff: -



Power factor
Value: 0.87
Inductive
E flow: exp.(←)
Current tariff: -

7. LED

Multifunctional LED counting pulses for Active Energy 1 imp/Wh. If constantly lit indicates no load (I < 0,02A).

8. SETTINGS

All parameterization can be done via communication with **MiQen software** (version 2.1 or later). **WM1M6 (MID)** has limited parameterization. Counter settings and counter reset are not enabled.
With MiQen software meter can be set to **Test measuring mode** that displays measurements with precision of 2 digits. After power off meter automatically goes back to normal operation.

8.1 Security - password

Meter has possibility of two level password (4 characters from A to Z).
Password Level 1 – enables resetting the counters.
Password Level 2 – enables all available settings and resets.
If meter password is forgotten, device serial number should be sent to Iskra d.d. to receive device default password.

9. SERVICE AND MAINTENANCE

If meter is used under specified conditions, it should not be necessary to recalibrate it during its lifetime. If degradation in the performance is observed it has probably been partly damaged and should be sent for repair or exchanged. In the meter firmware and parameter control function is integrated. In case of ERROR 1 or ERROR 2 indication on LCD the meter should be returned to manufacturer.

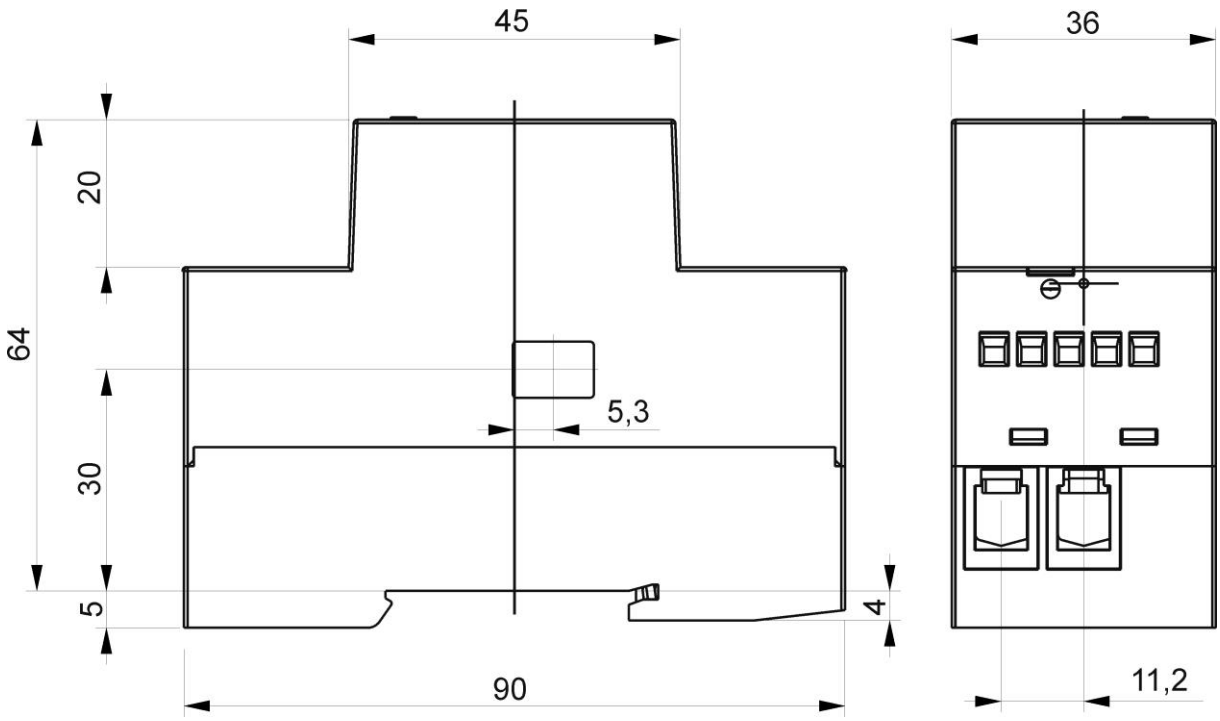
9.1 Firmware upgrade

Firmware upgrade is only possible for **WM1-6** (non MID) and **WM1-6Z** type meter. Upgrade is done via proprietary software using optical IR communication port.

NOTE!

Do not interrupt power supply or communication line during upgrade - the device could become inoperative! Repairing of device in this case is to be done by authorized service.

10. DIMENSIONAL DRAWINGS



11. TECHNICAL DATA

Rail mounting according DIN EN 60715

Mechanical input:

Main inputs	
Contacts capacity:	1.5 ... 16 (25) mm^2
Connection screws:	M5
Max torque:	3.5 Nm (PZ2)
Optional modules	
Contact capacity:	0.05 ... 1 (2.5) mm^2
Screws:	M3
Max torque:	0.6 Nm

Measuring input:

Type (connection):	single phase (1b)
Reference current (Iref):	5 A
Maximum current (Imax):	65 A
Minimum current (Imin):	0.25 A
Transitional current (Itr):	0.5 A
Starting current:	20 mA
Power consumption at Iref	< 0.1 VA
Voltage (Un):	230 V (-20 % … + 15 %)
Power consumption at Un:	< 8 VA
Nominal frequency (fn):	50 and 60 Hz

Accuracy:

Active energy and power:	class 1 (B)
Standard:	EN 62053-21, EN 50470-3
Reactive energy and power:	class 2
Standard:	EN 62053-23

LCD:

Number of digits:	8 (7+1)
Height of digits:	4.52 mm

LED:

Color:	red
Pulse rate:	1 imp/Wh
LED on:	no load indication

Pulse output (option):

Pulse rate:	1 imp/Wh
Pulse duration:	32 ±2 ms
Rated voltage DC:	40 V max
Switched current	40 mA max
Standard:	EN 62053-31 (A&B)

Serial communication (option):

Type:	RS485
Speed:	1200 to 19200 bit/s
Frame:	8, N, 2
Protocol:	MODBUS RTU

Optical communication:

Type:	IR
Connection:	via WM USB adapter
Speed:	19200 bit/s
Frame:	8, N, 2
Protocol:	MODBUS RTU
Address:	33 - fixed

Digital/Tariff input (option):

Rated voltage:	230 V (± 20%)
Input resistance:	450 kOhm

Triac output (option):

Rated voltage:	230 V (± 20%)
Load:	max. 3 W

Ambient conditions and Safety:

According standards for indoor active energy meters.

Temperature and climatic condition according to EN 62052-11

Dust/water protection:	IP50
Operating temp. range:	-25 ... 55 °C
Storage temp. Range	-40 ... 70 °C
Enclosure material:	self extinguish complying UL94 V
Indoor meter:	yes
Degree of pollution:	2
Protection class:	II
AC voltage test:	4 kV
Installation Category:	300 Vrms cat. III
Standard:	EN 50470
Wireless range:	up to 30 m indoors (depending on building materials)
Weight(with packaging):	150 g(170 g)
Frequency range:	868.4MHz, Z-Wave
Installation:	Din rail 35 mm
Dimensions(W x H x D)	36 x 90 x 64 mm
Package dimensions (W x H x D):	37 x 91 x 78 mm
Colour:	RAL 7035

EC Directives conformity:

EC Directive on Measuring Instruments **2014/32/EU**
EC Directive on EMC **2014/30/EU**
EC Directive on Low Voltage **2014/35/EU**
EC Directive WEEE **2002/96/EC**

11.1 Disposal

It is forbidden to deposit electrical and electronic equipment as municipal waste.
The manufacturer or provider shall take waste equipment free of charge.

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