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1. Introduction

1.1. General

M180R - single-phase, 20(80)A, Class1, direct measurement watt-hours electronic meter with two-way **P**ower **L**ine **C**ommunication (**PLC**) interface for transmitting and receiving data over the power network to a central unit (Concentrator)

M180R has internal load switching relay and is capable of remotely disconnecting and reconnecting power from/to the customer.

Optional: M180R can receive metering data from other sources, like water/ gas meters via unlicensed RF communication and send report to the concentrator via power line.

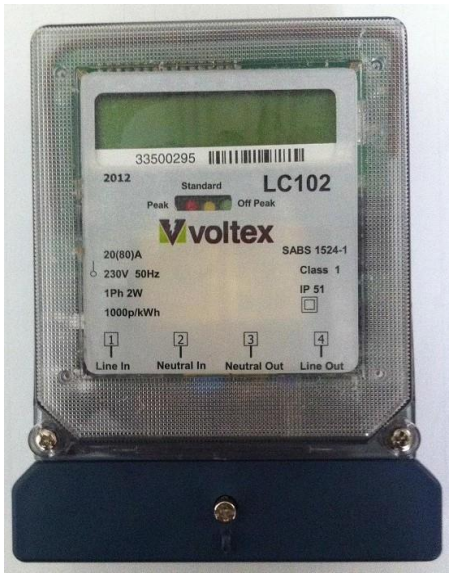

Fig. 1.1 General view of meter

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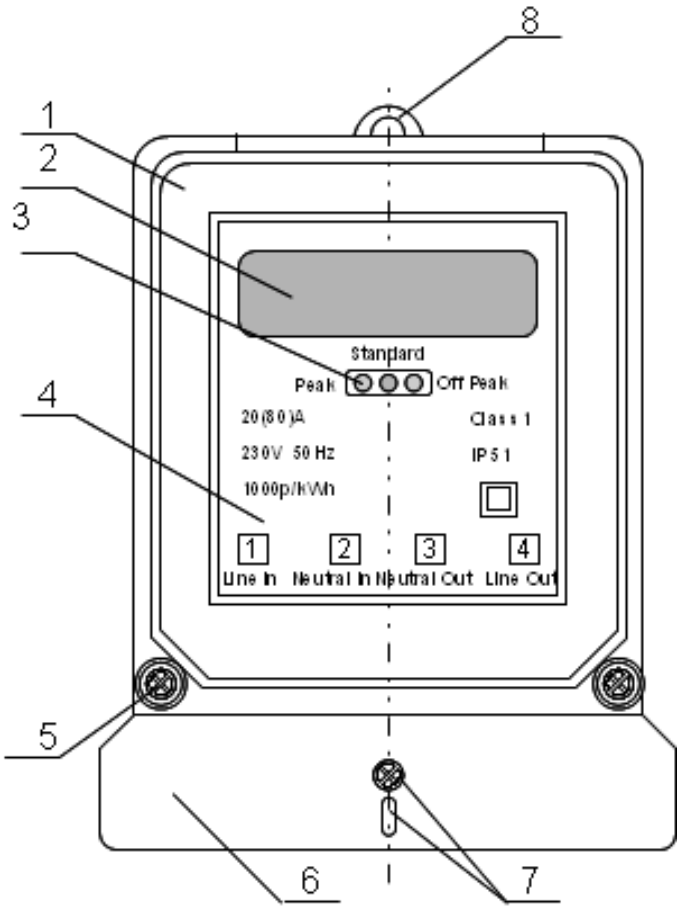
2. Product information

2. 1. Meter parts



1	Upper cover	5	Upper cover's screw and sealing
2	LCD display (protected by transparent	6	Terminal cover
3	Tariff rate color indicators (red,	7	Terminal cover's screw and sealing point
4	Label	8	Hook

Fig. 2.1 Meter front view

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2.2. Technical Data

General	
Nominal Voltage (Un)	230V AC
Supply Voltage range	80% - 115% Un
Nominal Frequency (fn)	50Hz
Consumption at Un	1.2 W – 8 Var (Capacitive)
System connections	3 phase 4 wire
Measurement	
Class index acc. to IEC62053-21	Class 1
Basic Current (Ib)	20A
Maximum continuous current (Imax)	80A
Environmental	
Temperature range	
operation	-10ºC to 55ºC
storage	-25ºC to 70ºC
Insulation Strength	
Protective Class acc. to IEC62052-11	Class I I
Display	
Type	LCD with led back light
Format	16 Characters x 2 Lines
Character size	4.3mm x 2.95mm
LED Indicators	
Peak tariff	Red
Standard tariff	Yellow
Off Peak tariff	Green
Flash rate	1000 imp/kWh
Communication Interfaces	
PLC Frequency range	A-band 60-90 kHz
PLC Method	Spread FSK
Optical Comm. port **IrDA** baud rate	9600bps
Optional: **RF** -receive only - Frequency	Unlicensed 433 MHz

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Disconnection device	
Type	Polarized latching relay
Maximum switching current	100A
Maximum switching power	25kVA
Mechanical life	100 000 operation minimum
Weight and Dimensions/ Case protection	
Weight	635 g
Width	122 mm
Height	155 mm
Depth	57 mm
Enclosure protection (IEC60529)	IP51
Phase connections	
Connection system type	Screw type terminals
Diameter	9.0mm
Maximum conductor cross-section	25 mm²
Minimum conductor cross-section	6 mm²
Screw dimension	M6x12
Screw head	Slotted,/comb. drive
Max. screw head diameter	8 mm
Tightening torque	<2.5 Nm

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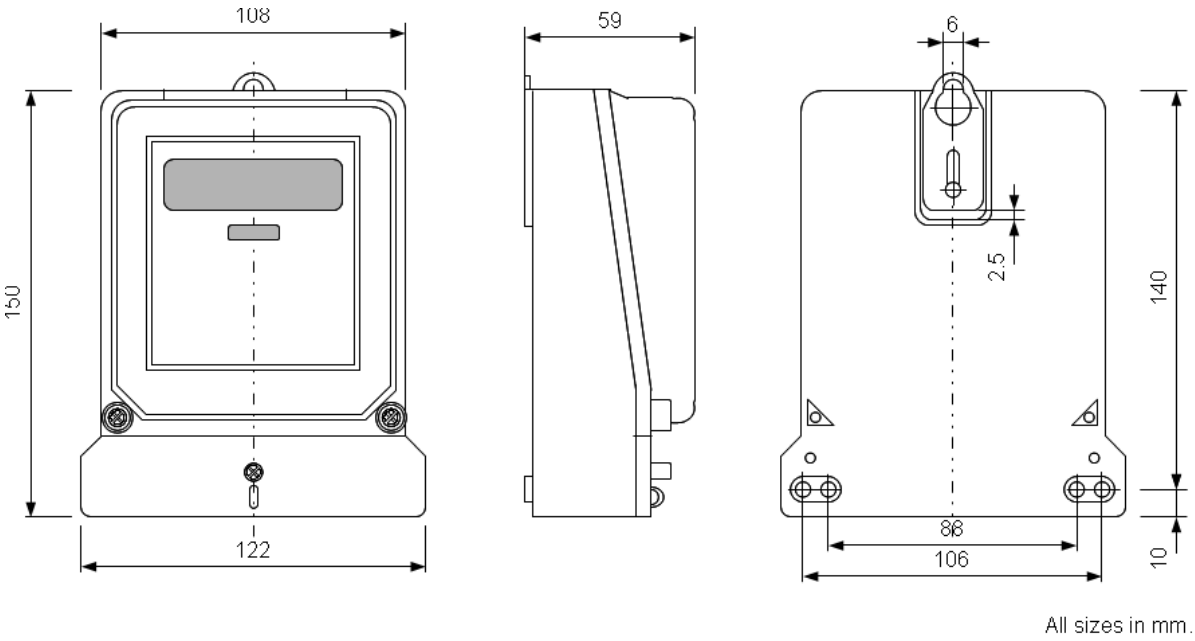

Fig.2.2 Meter Dimensions

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3. Safety regulations

The following safety regulations must be observed at all times:

- When installing or opening the meter the connections must be free of voltage.
  Touching parts under voltage is life threatening. The relevant preliminary fuses should therefore be removed and kept in a safe place until the work is completed, so that other persons cannot replace them unnoticed.
- Local safety regulations must be observed.
- Installation of the meters must be performed by qualified industrial electricians only.
- Meters which have fallen must not be installed, even if no damage is apparent, but must be returned for testing to the service or the manufacturer. Internal damage can result in functional disorders or short circuits.
- The meters must on no account be cleaned with water or with high pressure devices.

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4. Installation

Installation and commissioning must be performed by a qualified industrial electricians only!

The persons installing the meter must be familiar with and observe the normal local safety regulations and safety regulations specified in this "Installation Instruction".

The installer is responsible that the electricity meter is correctly and safety installed.

4.1. Protection requirements

Circuit protection for electricity meter must be installed: fuse or circuit breaker with maximum switching current less than maximal continuous current of the meter according to the technical specification.

4.2. Mounting the meter

WARNING! The connecting wires at the place of installation must not be live when fitting the meter. Touching live parts is life threatening. The corresponding preliminary fuses should therefore be removed and kept in a safe place until work is completed, so that they cannot be replaced by anyone unnoticed.

The meter should be mounted on the meter board or similar devices provided for this purpose. The meter has one hanger on the top backside of the meter lower case and two mounting holes in the terminal block, see Fig *2.1, Fig* 2.2.

1. Determine the correct meter position for mounting the meter.

2. Set the meter hanger in desired position and fix it by screw.

3. Unscrew the meter terminal cover and remove it.

4. Shut off power to line. Make sure voltage is zero. Check with a phase tester or universal measuring instrument whether the connecting wires are live. If so, remove the corresponding preliminary fuses and keep them in a safe place until installation is completed, so that they cannot be replaced by anyone unnoticed.

5. Make the three holes for fixing screws on the surface where the meter has to be installed. The mounting dimensions are according to *Fig* 2.2.

6. Fit the meter, using the three fixing screws, on the mounting board :

1. First fasten the upper screw.
2. By using two screws, fasten the meter through the bottom holes in the meter's terminal block to the mounting board.

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4.3. Connecting and commissioning the meter

WARNING! The connecting wires at the place of installation must not be live when fitting the meter. Touching live parts is life threatening. The corresponding preliminary fuses should therefore be removed and kept in a safe place until work is completed, so that they cannot be replaced by anyone unnoticed.

The meters are ready to be installed as they are calibrated and tested at the factory.

1. Shut OFF power to line. Make sure voltage is zero. Check with a phase tester or universal measuring instrument whether the connecting wires are live. If so, remove the corresponding preliminary fuses and keep them in a safe place until installation is completed, so that they cannot be replaced by anyone unnoticed.

2. Remove the terminal cover in order to get easy access to the terminal connections.

3. Shorten the connecting wires to the required length and then strip them. If a stranded wire is used, this must be provided with ferrules for connection.

4. Connect the wires according to connection diagram, see *Fig. 4.1*. Tighten the terminal screws firmly.

5. Make sure that the screws are tightened properly and the wires are not loose.

WARNING! Insufficiently tightened screws at the phase connections can lead to increased power losses at the terminals and therefore to undesirable heating.

6. Check that the electricity meter is correctly wired and connected to specified voltage. Verify the input wires and output wires are connected correctly. Make sure that phase is connected to a phase and neutral to the neutral according to connection diagram.

7. Check that the input terminals are connected to a source of power after the fuse or circuit-breaker with rated switching current less than max. Current of the meter in order to provide circuit protection.

8. Close the terminal block with terminal cover and fasten it by a screw. Seal terminal cover in order to prevent non-authorized access.

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9. Insert the preliminary fuses that were removed before installation. Turn ON power to line.

WARNING! Leaving the terminal covers open may cause a risk of touching the electrified terminals which is life threatening. For any modifications to the installation therefore the preliminary fuses must always be removed again and kept in a safe place until completion of work, so that they cannot be replaced by anyone unnoticed.

10. Make sure that the meter is activated and displays information.
One of the LEDs (red, or yellow, or green) should be ON or pulsing and the LCD display screens should be scrolling automatically every 2 second.

Check if electricity is supplied to the customer. The meter has a disconnecting unit so it may take up to 2 minutes for the customer to receive electricity.

If the customer does not receive electricity, shut OFF power to line and repeat steps 1, 6 -10.

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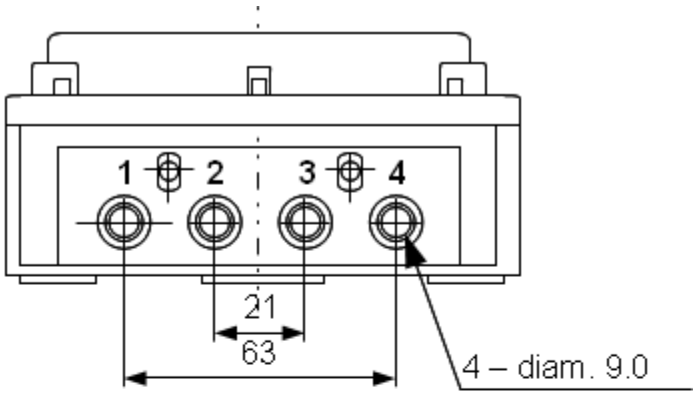

All sizes in mm.

Connection Diagram

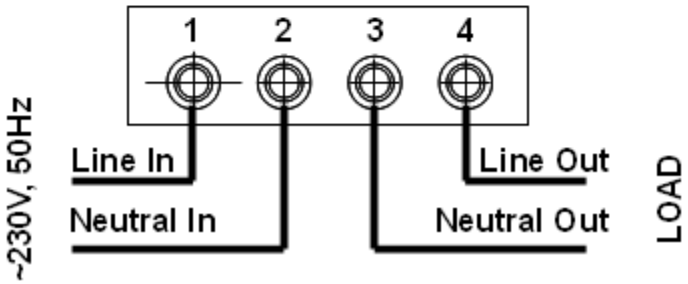

Fig. 4.1. Terminal dimensions and connection diagram - M180R

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5. Functions

5.1. Reading and Controlling of the meter.

The meters M180R measure electric energy consumption.
Control of the meter can only be done remotely thru the concentrator.
The meter's readings is displayed on the LCD, placed on the front of the meter, or thru the concentrator.

5.2. Operating LCD Display.

The electricity meter's data is displayed on its LCD.
The LCD screens scroll automatically every 2 seconds, without the intervention of the customer.
The LCD Display has 2 lines of 16 characters each.

5.2.1. Bottom line information

The bottom line shows long messages running from right to left, that are sent from the Control Center to the customer.

The messages can be sent to all the customers together – ***general message***, or to a specific customer individually - ***individual message***.

If the message starts with three dots (…) - it is an individual message sent only to this meter's display, otherwise it is a general message sent to all the customers.

5.2.2. Top line information

5.2.2.1. Display screens when power is ON

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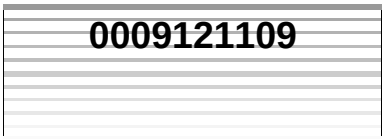
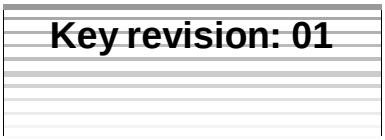
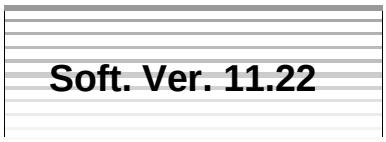
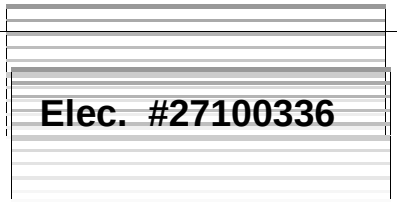
The first 5 screens appear in the following sequence only once, immediately when the meter is turned ON.

Screen 1		Program version
Screen 2		Key revision
Screen 3	**Tariff index: 01**	Tariff index
Screen 4		Software Version
Screen 5		Electricity Meter ID

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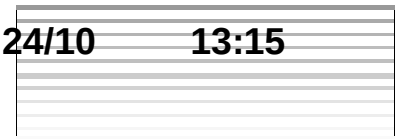
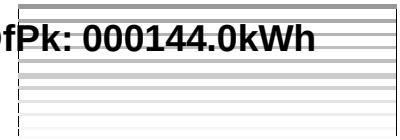
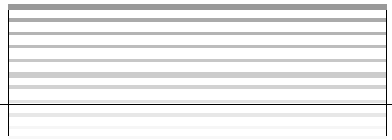
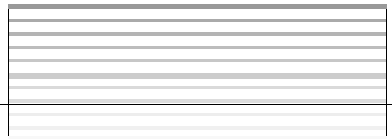
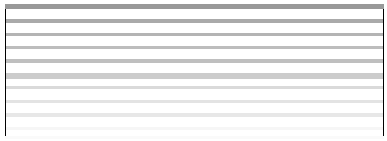
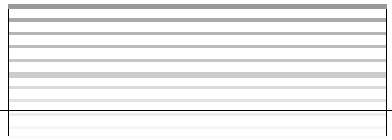
5.2.2.2. Auto-scrolling display screens

The following screens are continuously scrolling and changing every 2 seconds

Screen 6		Current Date and Time (updated from Concentrator)
Screen 7		Reading of accumulated Power consumption in Of Peak tariff, in kWh.
Screen 8		Reading of accumulated consumption in Standard tariff, in kWh.
Screen 9		Reading of accumulated consumption in Peak tariff, in kWh
Screen 11		TOU Duration: The duration period of present tariff is indicated in a special message: HH:MM<NNNN<hh:mm HH:MM–start time of current tariff NNNN–current tariff name hh:mm– end time of current tariff
Screen 12		In case Appliance Control Device (PLSWITCH) is installed in order to control the load in the customer's residence, a screen will display the status of the load plug: ON/OFF

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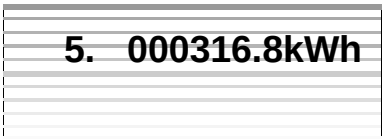
Screen 15		Reading of Total (peak, of peak, standard tariffs) accumulated Power consumption, in kWh

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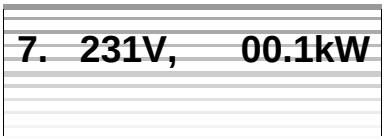
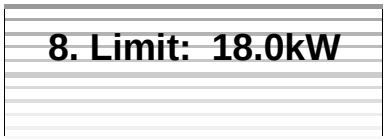
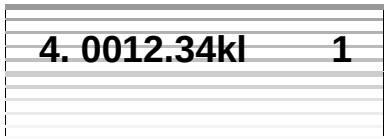
Screen 16		The current measures: Power Line Voltage, in V and operating Power Demand, in kW
Screen 17		The maximum power limit. In case the customer exceeds this limit, the meter will disconnect for few minutes
In case the meter works with a Water Meter, the following screens are applied:		
Screen 10		Water meter reading received from water unit, in kiloliters. The last digit changes from 0 to 7 after each message received from water unit (approximately every 20 minutes), this is in order to indicate that water meter is working and transmit data
Screen 13		Water Meter ID
Screen 14		The pulse rate of Water Meter

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5.3 LED indicators:

The LED indicators are placed below the front transparent window (see *Fig. 2.1*, position 3). While the meter is ON, the light of one of the LEDs is visible and flashes at a frequency dependent on the present power and meter constant. The Meter Constant (LED flash rate) as indicated on the label is 1000 imp/kWh.

The LED color indicates the tariff rate that is currently active:

Current tariff	Light Color	Position
Peak tariff	Red	Left
Standard tariff	Yellow	Center
Off Peak tariff	Green	Right

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6. Maintenance instructions:

The following points should be checked on the meters periodically:

- The meter is in operation and serviceable.
- All seals are undamaged
- The condition of plastic around the terminals is undamaged
- Wire isolation is undamaged
- The meter is dry.
- The plastic covers are clean and transparent

If the meter's transparent window is dirty and needs to be cleaned, use damp cleaning cloth to remove the dirt.

WARNING! Make sure no liquid enters into the meter as this could damage the meter.

It should not be necessary to recalibrate the meter during its lifetime. The meter's calibration is to be checked according to requirements of the Electricity Company.

If the meter does not operate correctly, the meter should be disconnected, removed and sent to the responsible service and repair center.

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7. Disconnecting meters:

The meter should be removed as follows:

1. Turn OFF power to line.
2. Check that the connecting wires are not live using a phase tester or universal measuring instrument. If they are live, remove the corresponding preliminary fuses and keep these in a safe place until work is completed,
   So that they cannot be replaced by anyone unnoticed.
3. Remove the two seals, unscrew plastic terminal cover and open it.
4. Check that the meter's terminals are not live using a phase tester or universal measuring instrument. If they are live, repeat step 2.
3. Release the terminal screws of the connecting wires with a suitable screwdriver and withdraw the connecting wires from the terminals.
4. Release three fixing screws and remove the meter.
5. Fit a substitute meter as described in Section 4 “Installation”.

The protection provided by the equipment may be impaired if the product is used in a manner not specified in the Manual.

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