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1. Introduction

1.1. General

M380, M320CT - Three-phase, low voltage 3x230(400)V, electronic meters enabling advanced communicating capability for monitoring and managing the power network.

These meters measure active and reactive electric energy consumption and transmit data over the power network, using two way **Power Line Communication (PLC)** to a central unit – concentrator – from which data is transmitted to the billing center by cellular communication – GSM/GPRS.

M380 – Direct connection meter.

M320CT - CT (current transformers) connection meter.



Fig. 1.1 Meter view



2. Product information

2. 1. Meter parts

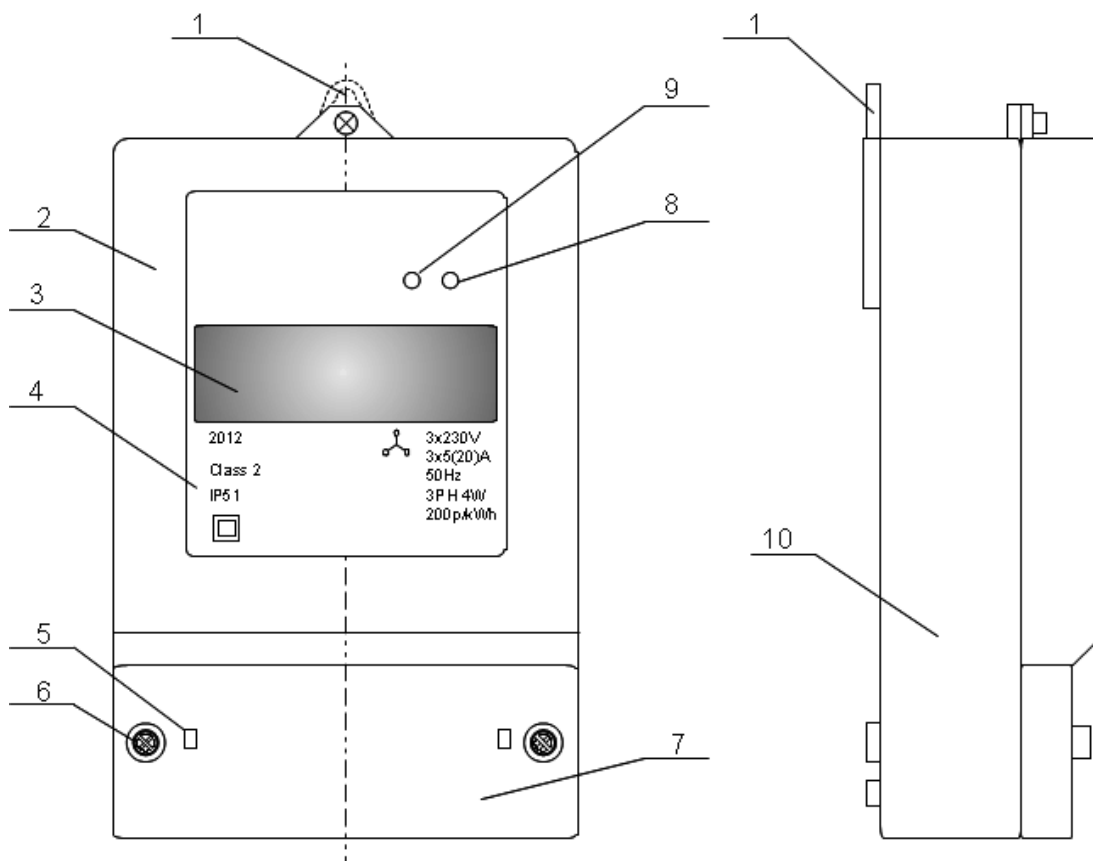


Fig. 2.1 Meter front/side view

1	Hook	6	Terminal cover's screw and sealing point
2	Upper cover	7	Terminal cover
3	LCD display (protected by transparent window)	8	IrDA port
4	Label	9	Red LED
5	Sealing points	10	Lower part of case



2.2. Technical Data

General	
Nominal Voltage (Un)	3 x 230V AC
Supply Voltage range	80% - 115% Un
Nominal Frequency (fn)	50Hz
Consumption at Un	5 W – 4.1 Var (Capacitive)
System connections	3 phase 4 wire
Measurement	
Class Index	
Active energy acc. to IEC62053-21	Class 2
Reactive energy acc. to IEC62053-23	Class 2
M380	
Basic Current (Ib)	3x20A
Maximum continuous current (Imax)	3x80A
M320CT	
Basic Current (Ib)	3x5A
Maximum continuous current (Imax)	3x20A
Environmental	
Temperature range	
operation	-10°C to 55°C
storage	-25°C to 70°C
Protection rating	IP51
Insulation Strength	
Protective Class acc. to IEC62052-11	Class II
Display	
Type	LCD
Format	16 Characters x 2 Lines
Character size	9.55mm x 5.2mm
LED Indicator	
Flash rate	200 imp/kWh
Communication Interfaces	
PLC Frequency range	A-band 60-90 kHz
PLC Method	Spread FSK
Optical Comm. port IrDA baud rate	9600bps



Weight and Dimensions/ Case protection	
Weight	1300 g
Width	145 mm
Height	228 mm
Depth	74 mm
Enclosure protection acc. IEC60529	IP51
Phase connections M380	
Connection system type	Screw type terminals
Diameter	8.6mm
Maximum conductor cross-section	25 mm ²
Minimum conductor cross-section	6 mm ²
Screw dimension	M6x12
Screw head	Slotted,/comb. drive
Max. screw head diameter	< 8 mm
Tightening torque	<2.5 Nm

Phase connections M320CT	
Current connections	
Connection system type	Screw type terminals
Diameter	6 mm
Maximum conductor cross-section	6 mm ²
Minimum conductor cross-section	4 mm ²
Screw dimension	M4x8
Screw head	Slotted,/comb. drive
Max. screw head diameter	< 6.8 mm
Tightening torque	<1.5 Nm
Voltage inputs	
Connection system type	Screw type terminals
Diameter	4.5 mm
Maximum conductor cross-section	1.5 mm ²

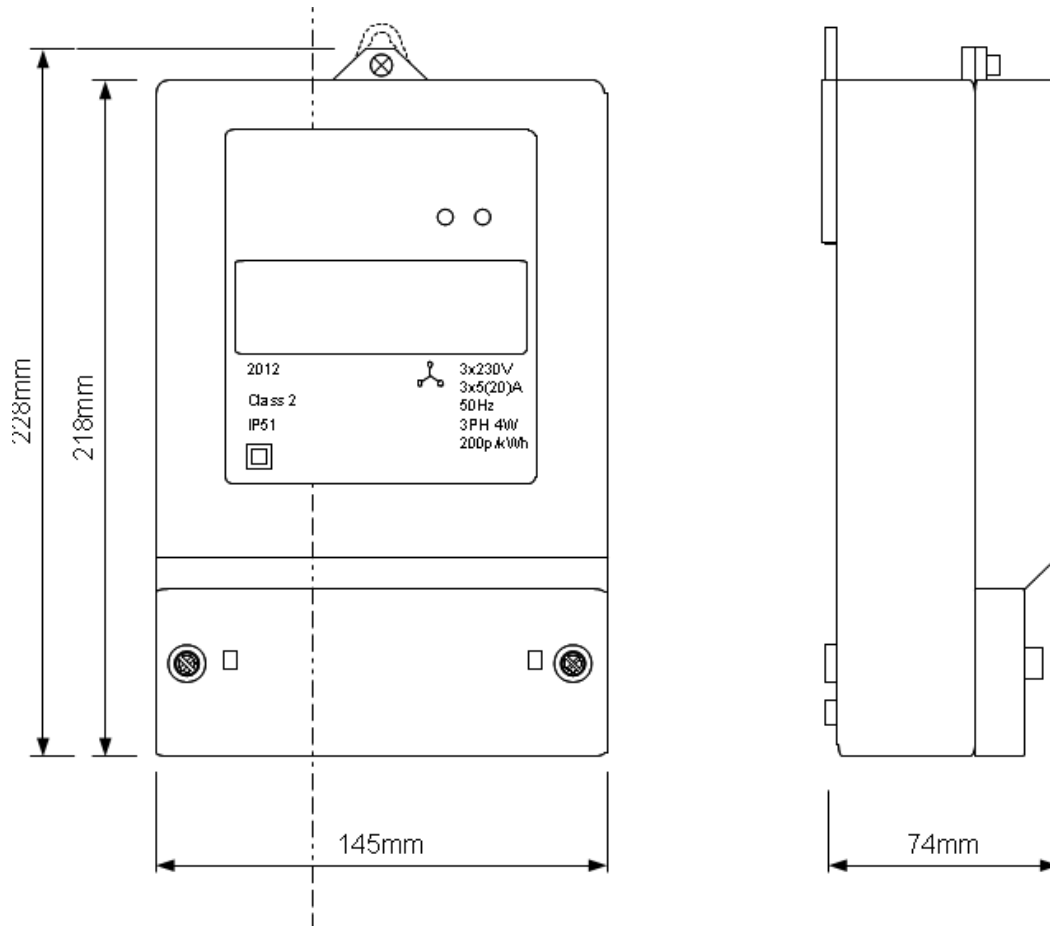


Fig.2.2 Meter Dimensions



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.



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 Manual".

The installer is responsible that the electricity meter is correctly and safely 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 dangerous to life. 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 hook on the top backside of the meter's lower case and two mounting holes in the terminal block, see Fig 4.1.

1. Determine the correct meter position for mounting the meter.
2. Set the meter hook in desired position and fix it by a screw .The hook on the meter's backside can be moved up and down as shown on Fig 4.1.
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 with Fig 4.2.
6. Fit the meter with the three fixing screws on the mounting board :
 1. First support the meter on the upper screw by the hook .
 2. by using two screws, mount the meter through the bottom two holes in the meter's terminal block on to the surface .

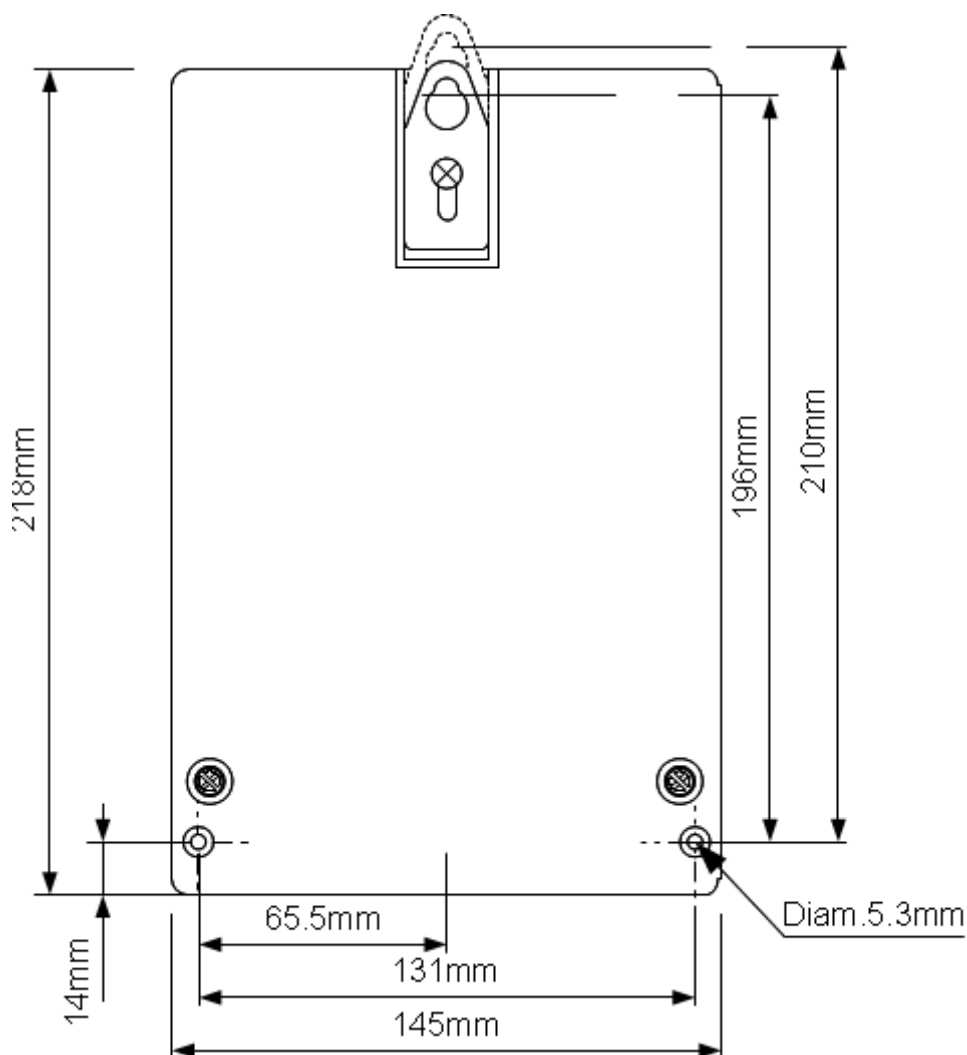


Fig.4.1 Meter Backside view

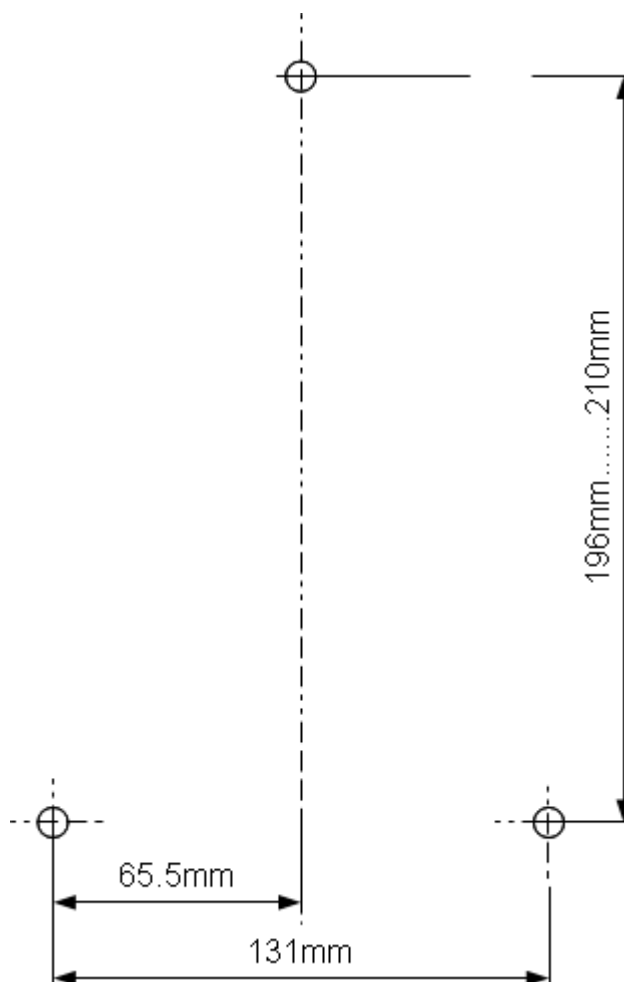


Fig.4.2. Drilling plan



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 dangerous to life. 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 already 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 to get easy access to terminal connections.
3. Shorten connecting wires to the required length and then strip them. If stranded wire is used, this must be provided with ferrules for connection.
4. Connect the wires according to the diagram on the terminal cover and according to installation diagram in this guide, see Fig. 4.3, 4.4. 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 3x230(400)V. Verify that the inputs and outputs of each phase are connected correctly. Make sure each phase is connected to a phase and neutral to the neutral according to connection diagram on the terminal cover.
7. Check that the input terminals are connected to a source of power after 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 two screws. Seal with two seals in order to prevent non-authorized access.



9. Insert preliminary fuses removed for 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 the meter is activated and displays information. The red LED is ON or pulsing and the LCD display screens are scrolling automatically every 2 second.

Check on the display whether all three phases L1, L2, L3 are indicated. If one phase is not present the displayed voltage value of this phase will be 000 V or less than 090V.

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

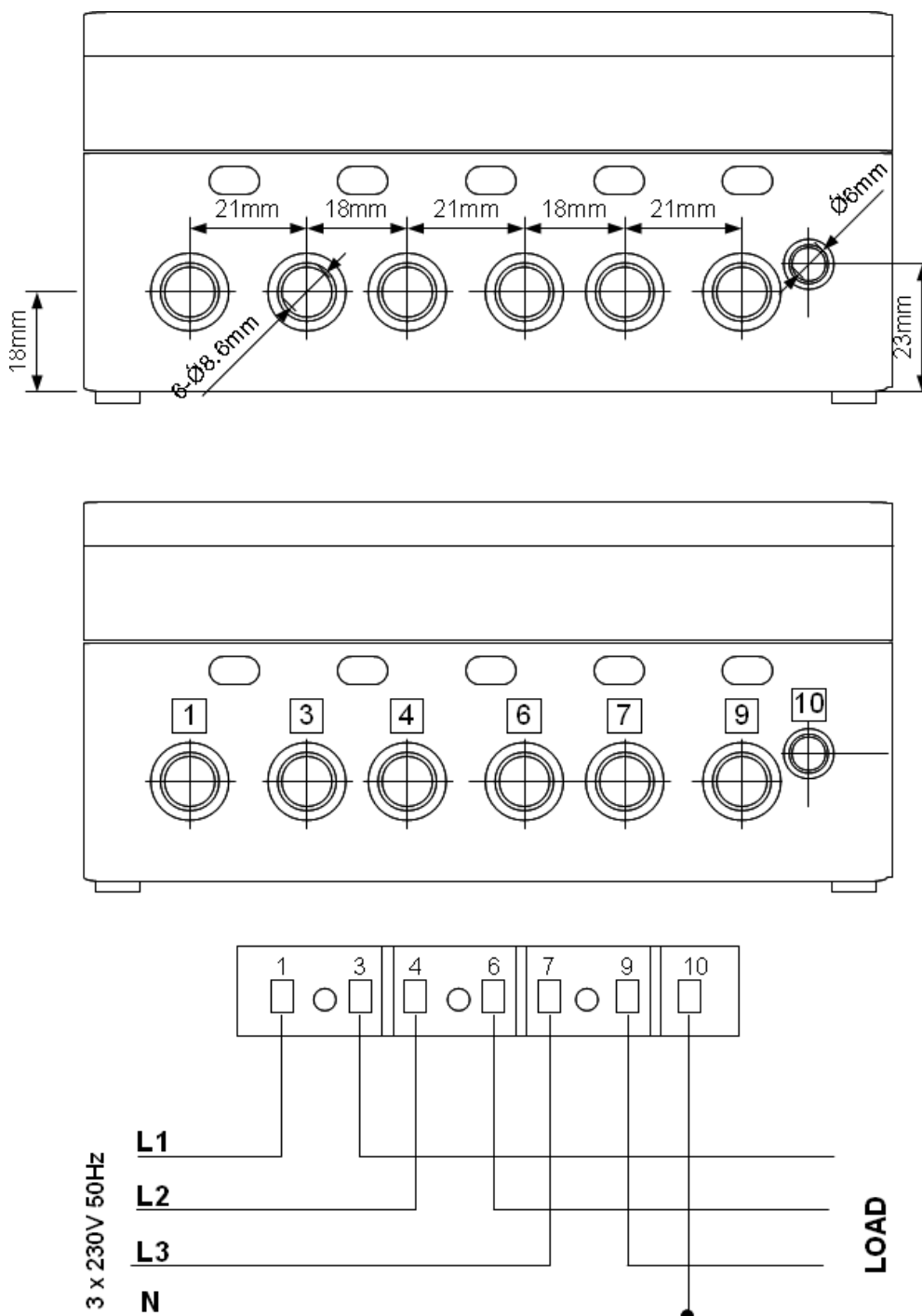


Fig. 4.3. Terminal dimensions and connection diagram M380

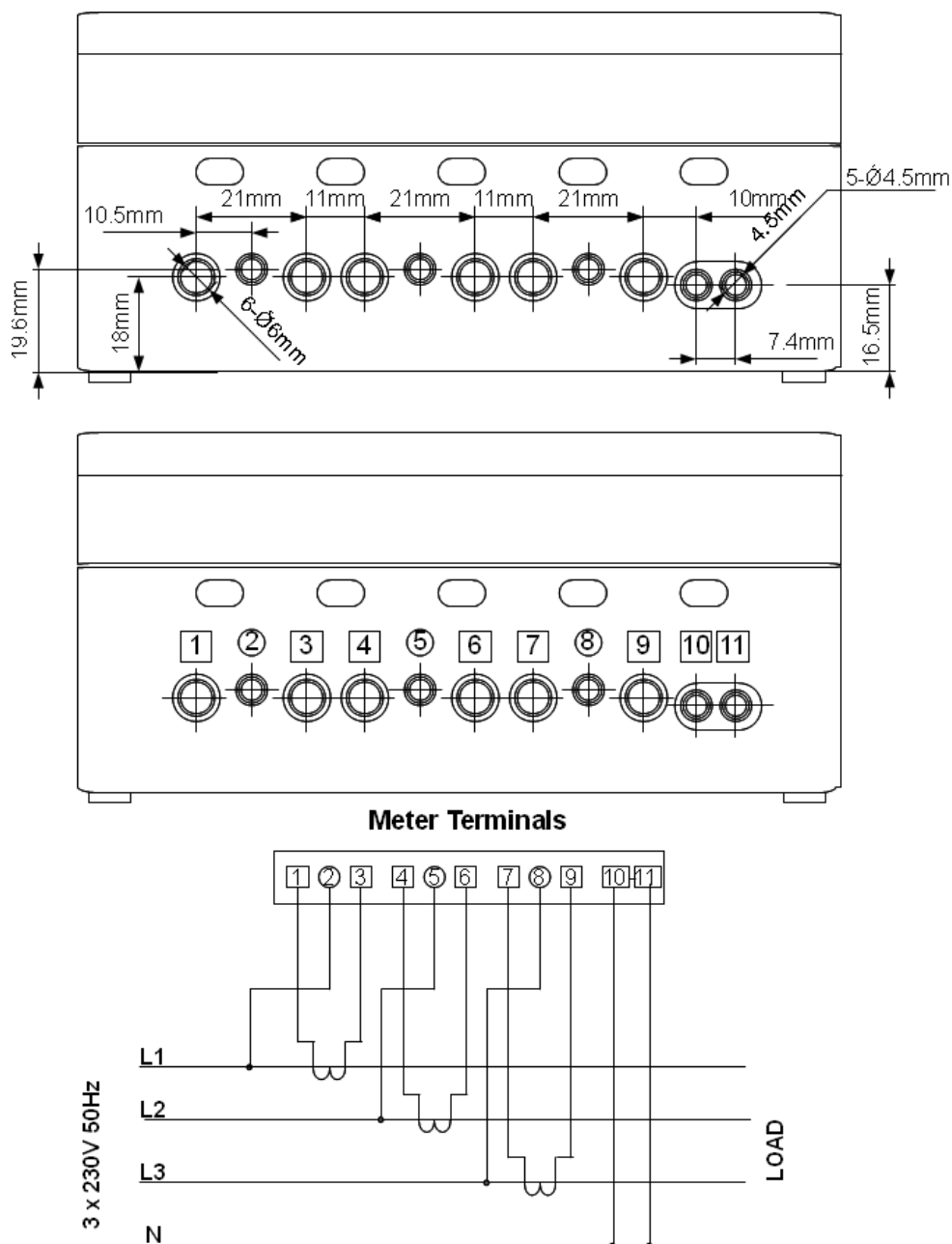


Fig. 4.4. Terminal dimensions and connection diagram M320CT



5. Functions

5.1. Reading and Controlling of the meter.

The meters M380, M320CT measure electric energy consumption. Control of the meter can only be done remotely thru the concentrator.

5.2. Operating LCD Display.

The electricity meter's data is displayed on its LCD .

The 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 scrolls long messages running from right to left, that are sent from the AMI (Advanced Metering Infrastructure) Control Center to the customer.

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

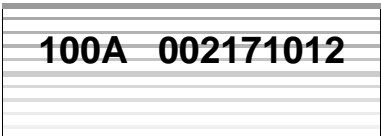
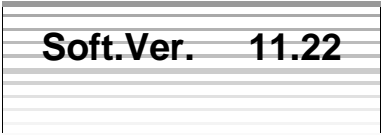
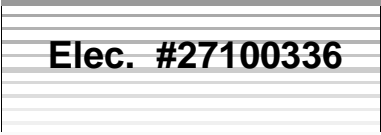

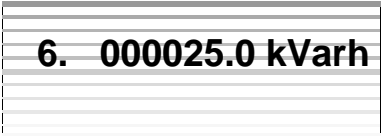
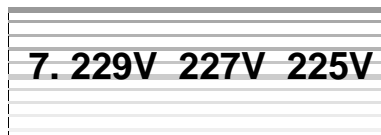
If the message starts with three dots (...), it is an individual message sent only to this meter's display, otherwise it is a general message sent to all the users.

5.2.2. Top line information

5.2.2.1. Display screens when power is ON



The **Screens 1 - 6** appear in this sequence only once immediately when the meter is turned ON.

Screen 1		Program version
Screen 2		Software version
Screen 3		Electricity Meter ID
Screen 4		Reading of Total (peak, of peak, standard tariff) active accumulated Power consumption, in kWh
Screen 5		Reading of Total (peak, of peak, standard tariff) reactive accumulated Power consumption, in kWh
Screen 6		The current measure of Power Line Voltage in all three phases L1, L2, L3



5.2.2.2. Auto-scrolling display screens

The following screens are continuously scrolling and changing every 2 seconds

Screen 7		Current Date and Time (updated from Concentrator)
Screen 8		Reading of accumulated Power consumption in Of Peak tariff, in kWh.
Screen 9		Reading of accumulated consumption in Standard tariff, in kWh.
Screen 10		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 hh:mm – end time of current tariff NNNN – current tariff name
Screen 12		In case an 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



Screen 4	5. 000316.8kWh	Reading of Total (peak, of peak, standard tariffs) active accumulated Power consumption, in kWh
Screen 5	6. 000025.0 kVarh	Reading of Total (peak, of peak, standard tariffs) reactive accumulated Power consumption, in kVarh
Screen 6	7. 229V 227V 225V	The current measure of Power Line Voltage in all three phases L1, L2, L3

5.3 Test LED indicator:

The red LED is placed under the front transparent window (see Fig. 2.1, position 9) and should be used for meter testing. The red LED indicates power consumption. While the meter is on, its red light is visible and flashes at a rate depending on the power passing through the meter relative to the pulse rate indicated on the label.
The Meter Constant (LED flash rate) as indicated on the label is 200 imp/kWh



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.



7. Disconnecting meter:

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.