

AUTOMETERS Q-180 - All Versions

Multifunction Power Analyser



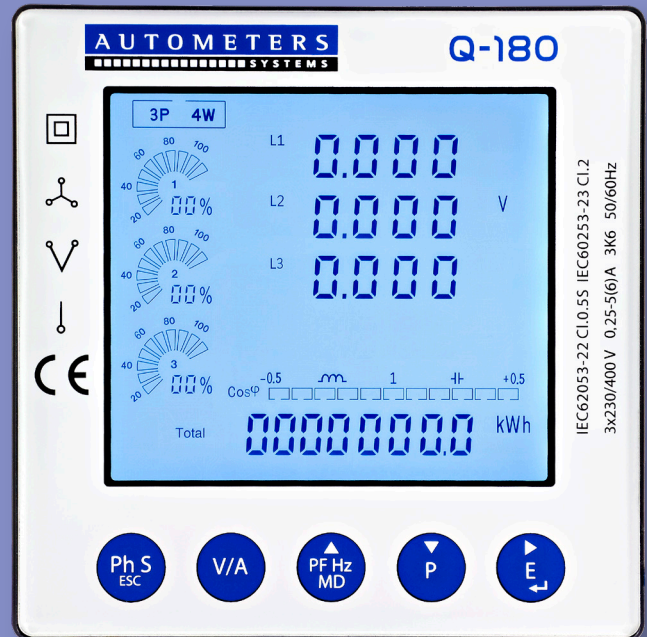
- Multi-parameter Measurements
- Up to 63rd THD and IHD
- RS485 Modbus RTU
- Ethernet TCP Gateway
- Multi-tariffs
- Digital Input/Output
- Accuracy Class 0.5s
- Bar Graph for Power Indication
- Backlit LCD Display for Full Viewing Angles
- Push-in Installation and Plug-in Connection

AUTOMETERS
SYSTEMS

Introduction

The multifunction energy analyzer Q-180 series is a new-generation of intelligent panel meters, used not only in the electricity transmission and power distribution system, but also in the power consumption measurement and analysis in high voltage intelligent power grid.

This document provides operating, maintenance and installation instructions for the Autometers Q-180 series. The unit measures and displays the characteristics of 1p2w, 3p4w and 3p3w supplies, including voltage, frequency, current, power and active and reactive energy, imported or exported, Harmonic, Power factor, Max. Demand etc. Energy is measured in terms of kWh, kVarh and kVAh. Maximum demand current can be measured over preset periods of up to 60minutes.



In order to measure energy, the unit requires voltage and current inputs in addition to the supply required to power the product. The requisite current input(s) are obtained via current transformers. The Q-180 can be configured to work with a wide range of CTs, giving the unit a wide range of operation. Built-in interfaces provides RS485 Modbus RTU and Ethernet TCP/IP communication. Digital input and outputs are provided for external signal counting and external device control. 30 types parameters can be set for alarm. The unit uses plug-in terminals for easy wiring and push-in mechanism for quick installation.

I. Unit Characteristics

1.1 The Unit can measure and display:

- Line voltage and THD% (total harmonic distortion) of all phases
- 2~63rd voltage IHD% (Individual Harmonic distortion) of all phases
- Line Frequency
- Phase Sequence
- Currents, Current demands and current THD% of all phases
- 2~63rd current IHD% of all phases
- Active power, reactive power, apparent power, maximum power demand and power factor
- Max./ Min.Current and voltage, Max.current demand
- Import / export / total active energy
- Import / export / total reactive energy
- Total active energy of each phase
- Multi Tariff active energy
- DPF (Displacement Power factor, Modbus read only)
- Voltage crest factor (Modbus read only)
- Current K factor (Modbus read only)

1.2 The unit has password-protected set-up screens for:

- Communication setting: Modbus address, Baud rate, Parity, Stop bit
- CT setting: CT 1 (Primary) , CT2 (Secondary), CT rate
- PT setting: PT1 (Primary), PT2 (Secondary) , PT rate
- Demand setting: demand method, Demand interval time
- Time setting: Backlit time, display scroll time, system RTC, Tariff Time
- System configuration: System type, System connect, Change password, Auto display scroll
- DI setting: DI filter time ,DI count,
- DO setting: Alarm setting, Delay time, HC(high value to close), HO (High value to open),
- LO(Low value to open), LC(low value to close)
- Ethernet(TCP/IP) Communication setting: IP Address, Subnet Master, Gateway, IP port , Mode
- SOE (sequence of event) Information: 20 SOE and times
- Reset: Energy, Demand, Max.Min value, SOE, DI count, All

1.3 CT and PT

- CT1 (primary current): 1~9999A
- CT2 (secondary current): 1A or 5A
- PT1 (primary voltage): 100V ~ 500,000V
- PT2 (secondary voltage): 100 to 480 V AC (L-L)

1.4 RS485 Serial-Modbus RTU

This unit uses a RS485 serial port with Modbus RTU protocol to provide a means of remote monitoring and controlling. Please check the Part 4.2 for the details of setting.

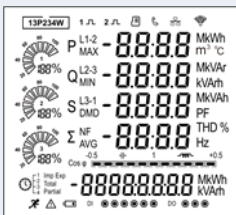
1.5 Ethernet TCP/IP

Two pulse outputs indicate real-time energy measurement. Pulse output 1 is configurable, pulse output 2 is fixed to active energy, 3200imp/kWh.

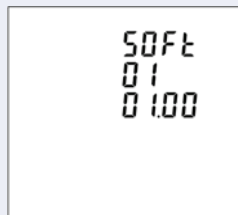
1.6 Display

- Liquid crystal display with backlit (360° full viewing angles)
- 4 lines, 4 digits per line to show electrical parameters
- 5th line, 8 digits to show energy
- Bar graph for power indication
- Display update time: 1 sec. for all parameters
- Display scrolling: automatic or manual (Programmable)

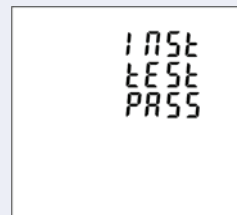
2. Start up screens



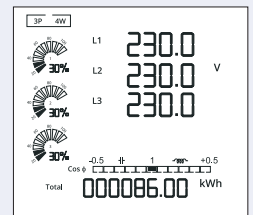
The first screen lights all LED segments and can be used as a display LED check



The second screen indicates the software version of the unit. (the above picture is just for reference)








The unit performs a self-test and the screen indicates if the test is passed.





After a short delay, the default measurement screen appears.




3. Keys and Displays

3.1 Button Functions

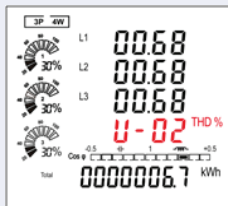
Button	Click	Press and hold down for 2 seconds
	<ul style="list-style-type: none"> ■ Display power, voltage, current and energy information of each phase ■ Exit from the menu 	<ul style="list-style-type: none"> ■ Automatic Scroll display ON / OFF
	<ul style="list-style-type: none"> ■ Display Voltage and current information of the selected system type. (3p4w, 3p3w and 1p2w) ■ Phase sequence ■ Left side move 	<ul style="list-style-type: none"> ■ Individual Harmonic Distortion of Voltage up to 63rd
	<ul style="list-style-type: none"> ■ Display power factor, frequency, Max. Demand. ■ Max. and Min. of current and voltage ■ Up page or add value 	<ul style="list-style-type: none"> ■ Individual Harmonic Distortion of Current up to 63rd
	<ul style="list-style-type: none"> ■ Display active power, reactive power and apparent power information of the selected system type. ■ Down page or reduce value 	<ul style="list-style-type: none"> ■ Running hour ■ Full Screen checking ■ Modbus / Ethernet setting information ■ Tariff Information
	<ul style="list-style-type: none"> ■ Display total / import / export active or reactive energy information of the selected system type. ■ 4 tariff energy and RTC ■ Right side move 	<ul style="list-style-type: none"> ■ Set-up mode entry ■ Confirmation


3.2 Display Mode Screen Sequence

Click button	3 Phase 4 Wire		3 Phase 3 Wire		1 Phase 2 Wire	
	Screen	Parameters	Screen	Parameters	Screen	Parameters
	1	Phase 1 – Power Voltage Current kWh	1	Phase 1 – Power Voltage Current kWh	1	Phase 1 – Power Voltage Current kWh
	2	Phase 2 – Power Voltage Current kWh	2	Phase 2 – Power Voltage Current kWh		
	3	Phase 3 – Power Voltage Current kWh	3	Phase 3 – Power Voltage Current kWh		
	4	Phase 1 – Power Voltage Current kVarh	4	Phase 1 – Power Voltage Current kVarh	2	Phase 1 – Power Voltage Current kVarh
	5	Phase 2 – Power Voltage Current kVarh	5	Phase 2 – Power Voltage Current kVarh		
	6	Phase 3 – Power Voltage Current kVarh	6	Phase 3 – Power Voltage Current kVarh		
	1	Voltage L1-N Voltage L2-N Voltage L3-N			1	Voltage L1-N
	2	Voltage L1-L2 Voltage L2-L3 Voltage L3-L1	1	Voltage L1-L2 Voltage L2-L3 Voltage L3-L1		
	3	Current L1 Current L2 Current L3 Current Neutral	2	Current L1 Current L2 Current L3	2	Current L1
	4	THD% of Voltage L1 THD% of Voltage L2 THD% of Voltage L3	3	THD% of Voltage L1-2 THD% of Voltage L2-3 THD% of Voltage L3-1	3	THD% of Voltage L1
	5	THD% of Current L1 THD% of Current L2 THD% of Current L3	4	THD% of Current L1 THD% of Current L2 THD% of Current L3	4	THD% of Current L1
	6	Phase Sequence	5	Phase Sequence		

Click button	3 Phase 4 Wire		3 Phase 3 Wire		1 Phase 2 Wire	
	Screen	Parameters	Screen	Parameters	Screen	Parameters
	1	Total Power Factor Frequency	1	Total Power Factor Frequency	1	Total Power Factor Frequency
	2	PF L1 PF L2 PF L3	2	PF L1 PF L2 PF L3		
	3	Max. DMD of Current L1 Max. DMD of Current L2 Max. DMD of Current L3	3	Max. DMD of Current L1 Max. DMD of Current L2 Max. DMD of Current L3	2	Max. DMD of Current L1
	4	Max. DMD of W Max. DMD of Var Max. DMD of VA	4	Max. DMD of W Max. DMD of Var Max. DMD of VA	3	L1 Max. DMD of W L1 Max. DMD of Var L1 Max. DMD of VA
	5	Max. Voltage L1-N Max. Voltage L2-N Max. Voltage L3-N	5	Max. Voltage L1-2 Max. Voltage L2-3 Max. Voltage L3-1	4	Max. Voltage L1-N
	6	Min. Voltage L1-N Min. Voltage L2-N Min. Voltage L3-N	6	Min. Voltage L1-2 Min. Voltage L2-3 Min. Voltage L3-1	5	Min. Voltage L1-N
	7	Max. Current L1 Max. Current L2 Max. Current L3 Max. Current Neutral	7	Max. Current L1 Max. Current L2 Max. Current L3	6	Max. Current L1
	8	Min. Current L1 Min. Current L2 Min. Current L3 Min. Current Neutral	8	Min. Current L1 Min. Current L2 Min. Current L3	7.	Min. Current L1
	1	Active Power L1 Active Power L2 Active Power L3	1	Active Power L1 Active Power L2 Active Power L3		
	2	Reactive Power L1 Reactive Power L2 Reactive Power L3	2	Reactive Power L1 Reactive Power L2 Reactive Power L3		
	3	Apparent Power L1 Apparent Power L2 Apparent Power L3	3	Apparent Power L1 Apparent Power L2 Apparent Power L3		
	4	Total Active Power Total Reactive Power Total Apparent Power	4	Total Active Power Total Reactive Power Total Apparent Power	1	L1 Active Power L1 Reactive Power L1 Apparent Power
	1	Total kWh	1	Total kWh	1	Total kWh
	2	Total kVarh	2	Total kVarh	2	Total kVarh
	3	Import kWh	3	Import kWh	3	Import kWh
	4	Export kWh	4	Export kWh	4	Export kWh
	5	Import kVarh	5	Import kVarh	5	Import kVarh
	6	Export KVarh	6	Export KVarh	6	Export KVarh
	7	T1 kWh	7	T1 kWh	7	T1 kWh
	8	T2 kWh	8	T2 kWh	8	T2 kWh
	9	T3 kWh	9	T3 kWh	9	T3 kWh
	10	T4 kWh	10	T4 kWh	10	T4 kWh
	11	Date	11	Date	11	Date
	12	Time	12	Time	12	Time


3.3 Individual Harmonic Distortion:



Press the button  for 2 seconds to check Harmonic distortion of Voltage

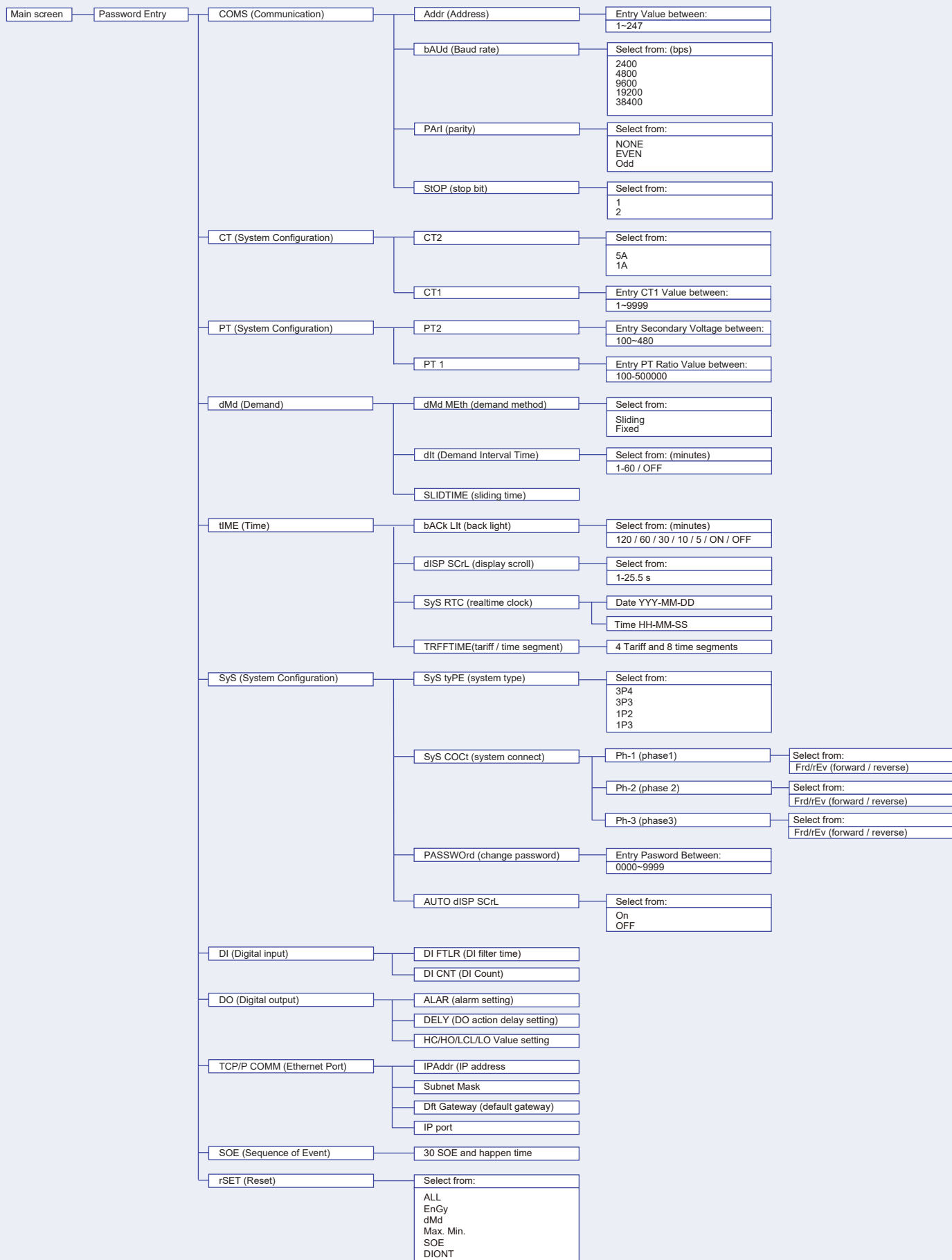
2~63rd Harmonic distortion of voltage



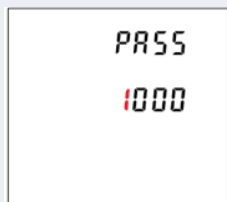
Press the button  for 2 seconds to check Harmonic distortion of current

2~63rd Harmonic distortion of current


4. Programming the meter



4.1 Password Entry



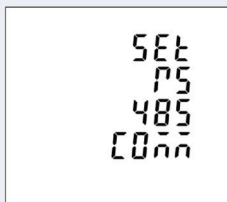
Setting-up mode is password protected, so you must enter the correct password.

By firmly pressing the button  for 2 seconds, the password screen appears.


The default password is 1000.

If an incorrect password is entered, the display shows ERR.

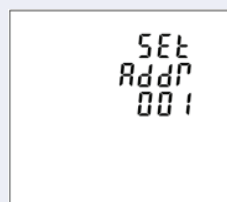
4.2 Communication



The RS485 port can be used for communications using Modbus RTU protocol. Parameters such as Address, Baud rate, Parity, Stop bit can be selected.

Long press  to enter the Address option.


4.2.1 Address






An RS485 network can accommodate up to 255 different devices, each identified by an address.

The Modbus address range on the Q-180 is between 001~247

Default setting from Autometers is 001

Long press  to enter the selection routine.

The address setting will flash. Use  and ,  to set the address with the range 001~247.


Long press  for confirmation.

4.2.2 Baud rate



Baud rate options: 2400 4800 9600 19200 38400 (bps). Default: 9600bps

From the Set-up menu, Use  and  to select the Baud rate options.

Long press  to enter the selection routine.

The Baud Rate setting will flash. Use  and  to choose Baud Rate.



Example shows:

SET Baud rate 19200 (bps)

And long press  for confirmation

4.2.3 Parity



Parity Options: NONE, EVEN, ODD.

Default Parity : NONE

Note that if parity is set to ODD or EVEN, Stop Bits will be set to 1 and cannot be changed.

From the Set-up menu, Use and to select the Parity options.

Long Press to enter the selection routine.

The Parity setting will flash. Use and to choose Parity.



Example shows:

Set Parity: EVEN

And long press for confirmation.

Press to return the main set up menu.



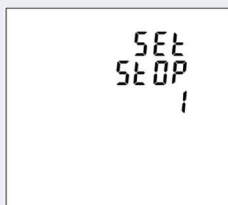
Example shows:

Set Parity: ODD

And long press for confirmation.

Press to return the main set up menu.

4.2.4 Stop Bit



Stop Bit options: 1 or 2.

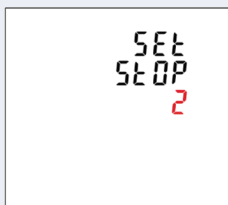
Default Stop Bit : 1

Note that if parity is set to ODD or EVEN, Stop Bits will be set to 1 and cannot be changed.

From the Set-up menu, Use and to select the Stop Bit options.

Long press to enter the Stop Bit routine. The Stop Bit setting will flash.

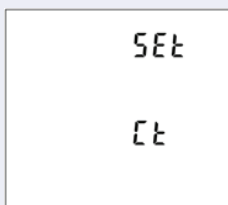
Use and to choose Stop Bit.



Example shows Set Stop bit 2

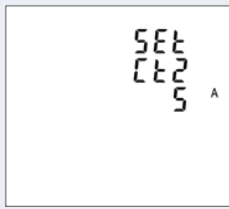
And long press and long press to return the Communication set

4.3 C.T. (Current Transformer)




From the main Set-up menu, Use and to select the CT option.



4.3.1 C.T.2 (Current Transformer Secondary)



Set secondary current input the meter Options: 5A or 1A
Default CT2: 5A

Long press  to enter the CT2 routine.

Press  for 2s, the CT2 setting will flash.

Use  and  to choose CT2 with 5A or 1A.



Example shows : Set CT2 1A

And long press  for confirmation.


4.3.2 C.T.1 (Current Transformer Primary)








To program the current ratio in the meter simply enter the primary current.

eg. if you require the meter to be set at 200amp program the numbers to be 0200.

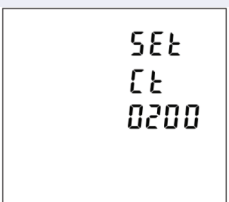
Long press  to enter the CT Rate routine.

Press  for 2s, the CT rate setting will flash.

Use  and  to choose the first digit of the CT value.

Press  to move the cursor to the right. When you have entered the desired setting long press  for confirmation and then press  to return to the main menu.

4.3.3. Example of meter set at 200/5 amp








Example of how the display should look for a meter programmed to 200/5 amp.

4.4 P.T.

SEt
Pt

The PT option sets the secondary voltage of the voltage transformer (PT) that give into the meter and the PT rate between the primary voltage to the secondary voltage.

For example: if the PT connect to the meter is 10000/100V (Primary voltage is 10000V, secondary voltage is 100V), then the PT rate is 100.

Long press  to enter the PT2 routine. Press , the PT2 setting will flash.
Use  and ,  to choose PT2 with 174~480.

4.4.1 P.T.2

SEt
Pt2
230 V
L-N

Set secondary voltage input the meter

Range: 100V ~ 480V

Default: 230V

Long press  for confirmation.


4.4.2 P.T.1. Rate (Primary Voltage)


SEt
Pt1
Rate
0001

Set primary voltage input the meter

Range: 1V ~ 2000V


Default: 1

Then press  to enter the PT2 routine.

Press  for 3s, the PT2 setting will flash.

Use  or ,  to select PT2.

Long press  for confirmation.

Press  to return the PT set up menu.

4.5 Demand

SEt
dnd

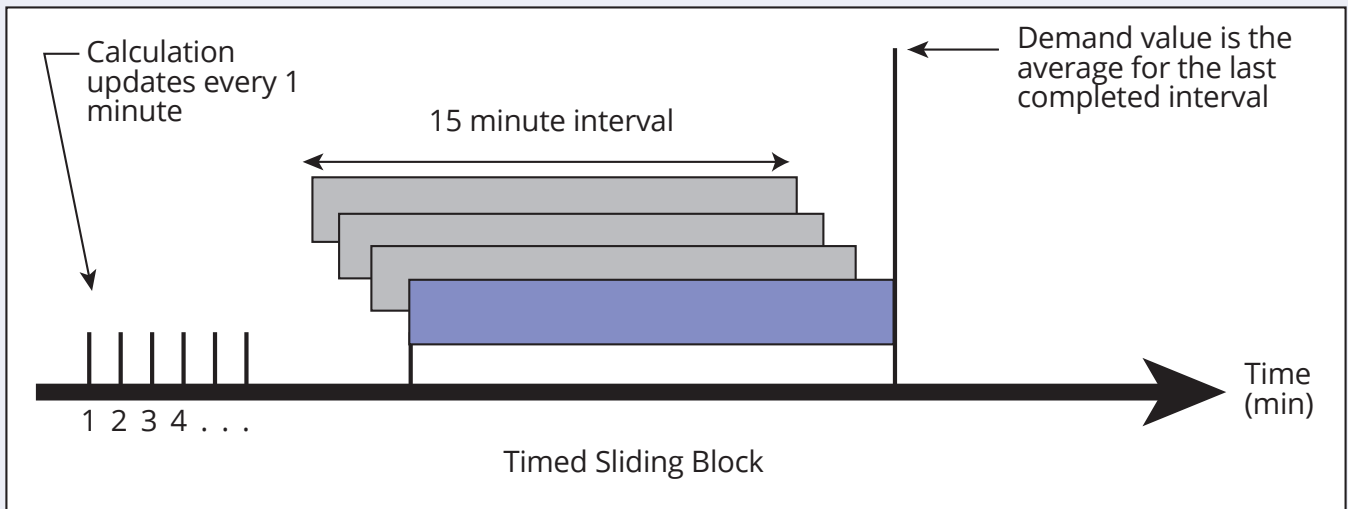
This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement.

The options are: OFF, 5, 8, 10, 15, 30, 60 minutes.

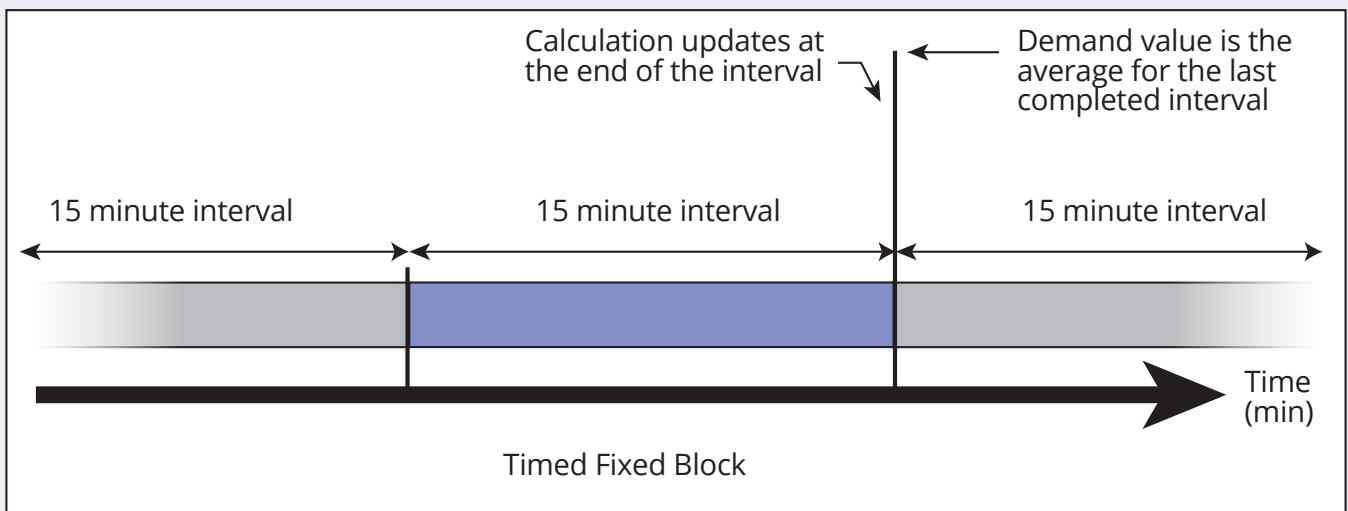
From the Set-up menu, Use  and  to select the Demand option.

The unit provides block interval demand calculation. In this method, you select a 'block' of time that power meter uses for the demand calculation. You choose how the power meter handles that block of time (interval). Two different modes are optional.

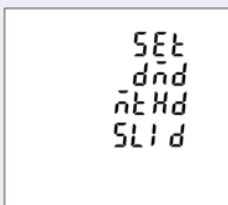
Slide Block: Select a demand interval time (DIT) from 1 to 60 minutes (in 1 minute increments). Set the calculation update time from 1 to 59 minutes. The power meter displays the demand value for the last completed interval.



Fixed Block: Select an interval from 1 to 60 minutes (in 1 minute increments). The power meter calculates and updates the demand at the end of each interval.



4.5.1 Demand method



The screen shows the Demand calculation method: Slid Options: Fix and Slid

Use and to enter Demand calculation method.



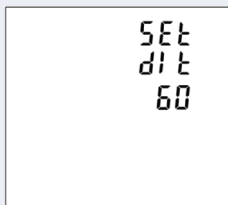
Long press to enter the routine.

The setting will flash. Use and to choose Options.

And long press for confirmation.

Press to return the Demand set up menu.

4.5.2 Demand interval time / Block time (DIT)



The screen will show the currently selected integration time. Default is 60 minutes. range from 1 to 60. Off means function closed.

Long press to enter the DIT routine. Press for 2s, the setting will flash.

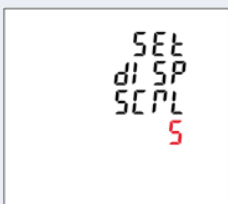
Use and to choose Options. And long press for confirmation.

4.5.3 Sliding time



The screen will show the Sliding time for the sliding mode. The sliding time shall be set not bigger than the DIT.

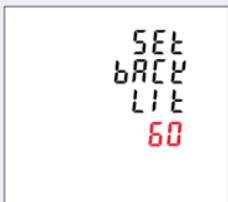
4.6 Time



This option sets the backlight lasting time and display scroll time.

From the Set-up menu, Use and to select the Time option.

4.6.1 Backlight time



The meter provides a function to set the backlit lasting time.

Options: ON/OFF/5/10/30/60/120 minutes. Default: 60

If it is set as 5, the backlit will be off in 5 minutes. Note: if it is set as ON, the backlit will always be on.

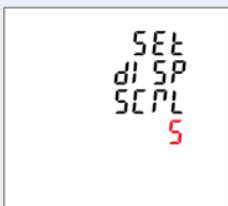
Long press to enter the Backlit time routine.

Press for 2s, the setting will flash.

Use and to choose Options.

And long press for confirmation.

4.6.2 Display Scroll time



The meter provides a function to set the Display scroll time. Options: 1~255s Default: 5. If it is set as 5, the display will scroll every 5s.

Use and to select Display scroll time option.

Press for 2s, the setting will flash. Use and to choose Options.


And Long press for confirmation.

Press to return the Time set up menu.

4.6.3 System RTC



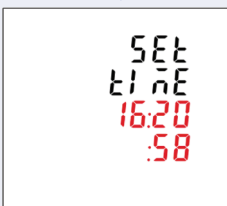
This option is to set the real time clock for the meter.

Press  to get into date and time setting.



Set the date of RTC.

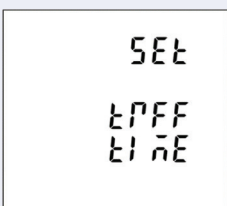
Left picture shows 2017-Oct-1st The format is YYYY-MM-DD




Set the time of RTC

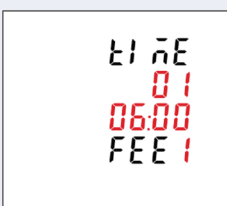
Left picture shows 16:20:58 The format is HH-MM-SS

4.6.4 Tariff Time



This option is to set the time segments with different tariffs.

Press  to get into the time segments and tariffs setting.



Set the time segments and corresponding tariffs


Left pictures shows:

Time

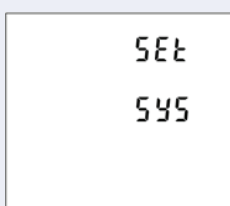
01 – time segment number , range from 01 to 08

06:00 – starting time of this time segment, format :

HH-MM FEE1 – Tariff 1 , range 1~4.


By pressing  the user can set the time segment and tariff information.

4.7 System

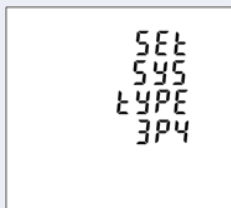


The Unit has a default setting of 3 phase 4 wire (3p4w). Use this section to set the type of electrical system.

Options: 3P34,3P3W,1P2W

From the Set-up menu, Use  and  to select the System option.

4.7.1 System Network

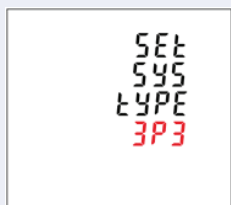


The screen shows the currently selected power supply is three phase four wire

Long press to enter the System type routine.

Press for 2s, the setting will flash. Use and to choose Options.

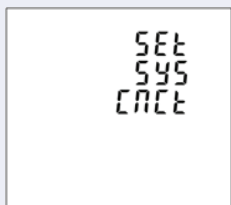
And Long press for confirmation.



Example shows:

The screen shows the currently selected power supply is three phase three wire

4.7.2 System Connect



This unit provides a function with Reverse connected current inputs correction setting.

Use and to select the correction option.

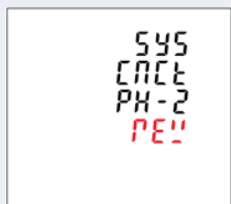


Options: Frd (forward) and rEv (reverse). The default is Frd (forward)

Long press to enter the Phase 1 correction.

Press for 2s, the setting will flash. Use and to choose Options.

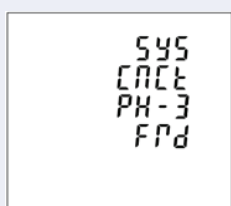
Long press for confirmation.



Press enter Phase 2 correction.

Press for 2s, the setting will flash. Use and to choose Options.

Long press for confirmation.



Press enter Phase 3 correction.

Press for 2s, the setting will flash. Use and to choose Options.

Long press for confirmation. Press to return the System set up menu.

4.7.3 Change password



This meter provides a function with password setting.
Default: 1000
Options: 0000~99999

Use and to select the change password option.



Press for 2s, the setting will flash.

Use and to increment the number.

Press to choose options.

Long press for confirmation.



This meter provides a function with automatic display scroll setting.
Options: on and off
There are two ways:

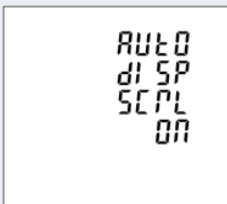
1.

Use and to select the automatic display scroll option.

Press for 2s, the setting will flash.

Use and to choose options "On" or "Off".

Long press for confirmation.



2.

Escape the Setting menu.

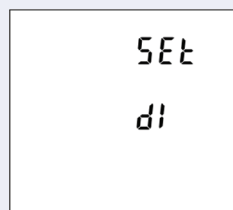
Long press for 2 secs.




For example,
The screen shows the currently selected Automatic Scroll display ON.
To switch to off:

Long press for 2 secs, then the screen shows the currently selected Automatic Scroll display OFF.

4.8 Digital Input (DI)

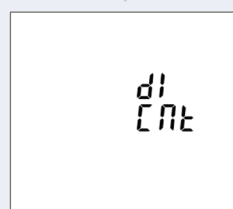


This option is to set Digital input parameter.


Press  to get to the submenu

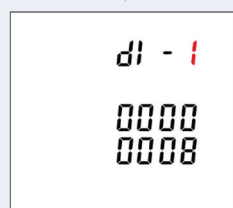


This is to set filtering time for a digital input signal.
Left picture shows 100mS





This screen is to check the counting number of each digital inputs.

By pressing  the user can see counting numbers.

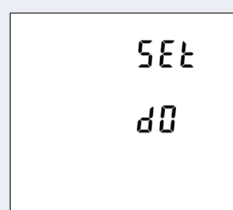


Left picture shows Digital input 1, counting number is 8.


By pressing  and  the user can see counting number of different digital inputs.

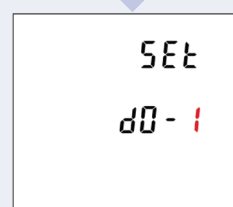
4.9 Digital Outputs (DO)

4.9.1 General






This option is to set Digital Output parameter and check the status.

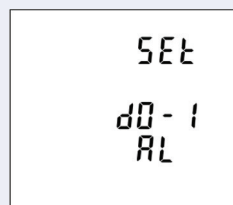
Press  to get the sub-menu



This screen to choose the Digital output number which you want to check.
Left picture shows DO-1.

Press  to set the parameter and to check the status of DO-1.

Use  and  to choose the different output.



This screen is to set the alarm information link to DO-1 For details , please refer to part 4.9.2

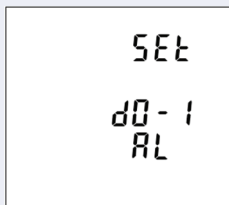


This screen is to set the digital output Type for DO-1
Left picture shows LEVE
LEVE = Level
PULS = Pulse



This screen is to control the status of DO-1 relay.
Left picture shows the status is Open

4.9.2 Alarm setting of DO



This option is to set alarm for DO.



The Alarm can be linked to the parameters below:

U1, U2, U3, Unav (L-N)

U12, U23, U31, Uuav (L-L)

I1, I2, I3, Iav, In

P1, P2, P3, P-total

Q1, Q2, Q3, Q-total

S1, S2, S3, S-total

PF1, PF2, PF3, PF-total

F (frequency)

Null means the Alarm is not linked to any parameter.

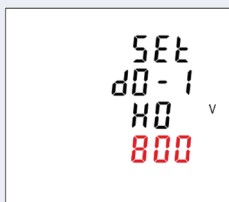


This option is to set the DO action delay time. The unit is mS. Left picture shows 200mS.



This option is to set the high value for DO-1 close.

Left picture shows HC (High value to Close) 1000V, that means when the U1 reaches to 1000V, the DO-1 will close.



This option is to set the high value for DO-1 open.

Left picture shows HO (High value to Open) 800V, that means when the U1 drops to 800V, the DO-1 will open.

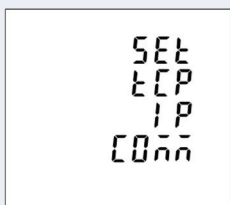


This option is to set the Low value for DO-1 Close.
Left picture shows LC (Low value to Close) 100V, that means when the U1 drops to 100V, the DO-1 will open.




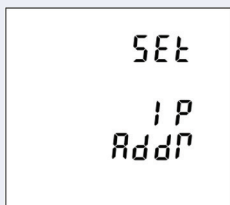
This option is to set the Low value for DO-1 open.
Left picture shows LO (Low value to Open) 170V, that means when the U1 returns to 170V, the DO-1 will open

4.10 Ethernet Communication

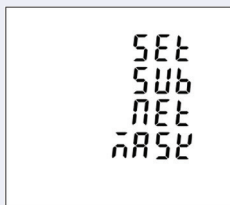


This menu is to set the parameter for Ethernet communication.

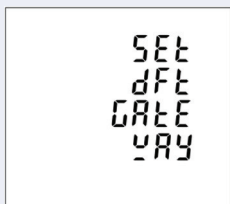
Press  to get the sub-menu



This option is to set the IP address.



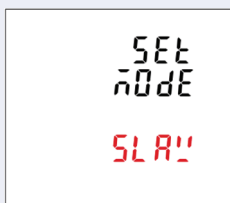
This option is to set Subnet Mask



This option is to set the default Gateway



This option is to set the IP port

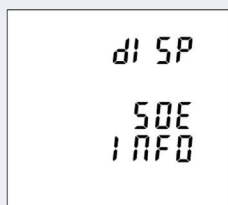


This option is to set the meter Ethernet mode
SLAV = slave
MAST = Master
When it is set to be Master, it can work as a RS485-TCP/IP convertor.


4.11 SOE information

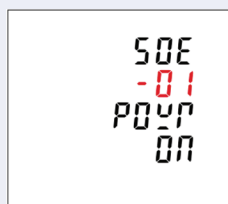
The meter provides SOE record. 30 events and their happen time will be saved in the SOE. When the following events happen, it would be recorded

- | | |
|--------------------|------------------|
| 1. Meter power off | 6. PT1 changed |
| 2. Meter power on | 7. Energy reset |
| 3. CT2 changed | 8. Demand reset |
| 4. CT1 changed | 9. Alarm happens |
| 5. PT2 changed | |





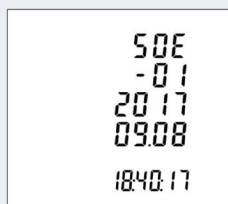
This menu is to check sequence of events (SOE). The meter can record 30 events.


Press  to go to the sub-menu



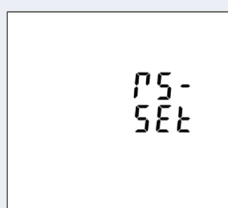
Left picture shows No.1 event

Use  and  to check other events.






Press  to find date and time the event happened.

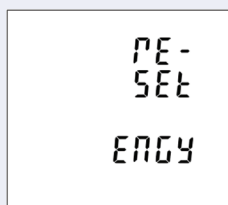
4.12 Reset



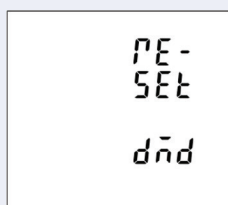
This unit provides a function with reset for different information.

Press  to go to the sup-menu

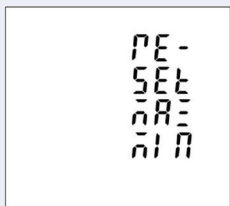
Use  and  to select the Reset option.



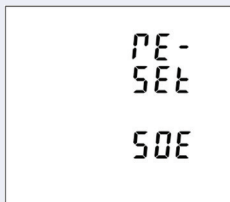
This option is to reset Energy information. It would reset active, reactive, apparent, import, export energy information.



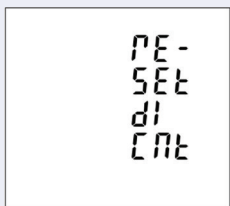
This option is to reset the demand information. It would reset current and power demand information.



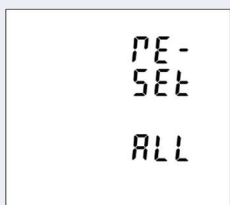
This option it to reset the Max. and Min. information



This option is to reset the SOE information.



This option is to reset Digital input counting.



This option is to reset all information.

5. Specifications

Table 1

Electrical characteristics		
Type of measurement		RMS including harmonics on three phase AC system (3p,3p+N) 128 samples per cycle
Measurement accuracy	Power	IEC 61557-12 Class 0.5
	Active Energy	IEC 62053-22 Class 0.5S, IEC 61557- Class 0.5
	Reactive Energy	IEC 62056-23 Class 2, IEC 61557-12 Class 2
	Frequency	±0.1%
	Current	±0.2%
	Voltage	±0.2%
	Power Factor	±0.01
	Harmonic Distortion	2
Data Update Rate		1 second nominal
Input-Voltage	VT Primary	100~500000V ac
	Un	230 V L-N
	Measured Voltage with Over-range and Crest Factor	100 to 480V ac 100 to 276V ac
	Permanent Overload	490V L-L 280V L-N
	Impedance	1M Ω
	Frequency Range	45~66Hz
Input-Current	CT Ratings	Primary 1~9999A
		Secondary 1A / 5A
	Measured current with Over-range and Crest Factor	5mA~6A
	Withstand	Continuous 8A 120A for 0.5 Seconds
	Impedance	<1mΩ
	Frequency Range	45~66Hz
	Burden	<0.036VA at 6A
Auxiliary Power Supply	Operating Range	65~480V AC / 80~660V DC
	Power Consumption	<7VA/3.5W
	Frequency	45 to 65Hz
Digital Output	Number/Type	2 electromagnetic relay
	Output Frequency	1Hz maximum
	Switching Current	250V ac at 3.0 Amps, 100k cycles
	Isolation	2.5KV ac for 1 min
Digital Input	Number	4
	Input Resistance	10kΩ
	Maximum Frequency	1kHz
	Response Time	10 milliseconds
	Isolation	2.5KV ac for 1 min

Mechanical Characteristics	
Weight	250g
IP Degree of Protection (IEC 60529)	IP51 front display
Dimensions (WxHxD)	96x96x70.3
Mounting Position	Vertical
Panel Thickness	1~5mm
Material of meter case	Self-extinguishing UL 94 V-0
Mechanical environment	M1
Environmental Characteristics	
Operating Temperature	-25 to 55°C
Storage Temperature	-40 to 70°C
Humidity Rating	<95% RH at 50°C (non condensing)
Pollution Degree	2
Altitude	2000m
Vibration	10Hz to 50Hz, IEC 60068-2-6
Electromagnetic Compatibility	
Electrostatic Discharge	IEC 61000-4-2
Immunity to Radiated Fields	IEC 61000-4-3
Immunity to Fast Transients	IEC 61000-4-4
Immunity to Impulse Waves	IEC 61000-4-5
Conducted Immunity	IEC 61000-4-6
Immunity to Magnetic Fields	IEC 61000-4-8
Immunity to Voltage Dips	IEC 61000-4-11
Radiated Emissions	EN55011 Class A
Conducted Emissions	EN55011 Class A
Harmonics	IEC 61000-3-2
Safety	
Measurement Category	Per IEC61010-1 CAT III
Current Inputs	Require external Current Transformer for Insulation
Over voltage Category	CAT III
Dielectric Withstand	As per IEC61010-1 Double Insulated front panel display
Protective Class	II
Communications	
Interface standard and protocol	RS485 and MODBUS RTU
Communication address	1~247
Transmissions mode	Half duplex
Data type	Floating point
Transmission distance	1000m Maximum
Transmission speed	240bps~38400bps
Parity	None (default), Odd, Even
Stop bits	1 or 2
Response time	<100 mS

Table 2

Features	Models				
Instantaneous Measurements					
Current	●	●	●	●	●
Voltage L-N	●	●	●	●	●
L-L	●	●	●	●	●
Frequency	●	●	●	●	●
Active Power	●	●	●	●	●
Reactive Power	●	●	●	●	●
Apparent Power	●	●	●	●	●
Power Factor	●	●	●	●	●
Energy Values					
Active Energy	●	●	●	●	●
Reactive Energy	●	●	●	●	●
Apparent Energy	●	●	●	●	●
Demand Values					
Current	●	●	●	●	●
Active, Reactive, Apparent Power	●	●	●	●	●
Maximum Demand Values					
Maximum Current	●	●	●	●	●
Maximum Active Power	●	●	●	●	●
Maximum Reactive Power	●	●	●	●	●
Maximum Apparent Power	●	●	●	●	●
Min. and Max. Value					
Active Power per Phase and Total	●	●	●	●	●
Reactive Power per Phase and Total	●	●	●	●	●
Apparent Power per Phase and Total	●	●	●	●	●
PF per Phase and Total	●	●	●	●	●
Current per Phase and Average	●	●	●	●	●
THDI per Phase	●	●	●	●	●
THDu L-L and L-N	●	●	●	●	●
Power-Quality Values					
Total Harmonic Distortion	●	●	●	●	●
Individual Harmonic Distortion	63rd	63rd	63rd	63rd	63rd
Multi Tariffs	*	*	*	*	*
Running Hour	●	●	●	●	●
Real Time Clock	●	●	●	●	●
Network					
Single Phase 2 Wire	●	●	●	●	●
Two Phase 3 Wire	●	●	●	●	●
Three Phase 3 Wire	●	●	●	●	●
Three Phase 4 Wire	●	●	●	●	●
CT Programmable	●	●	●	●	●
PT Programmable	●	●	●	●	●

Features	Models				
Inputs and Outputs					
Digital Inputs	--	4	--	4	4
Digital Outputs	--	2	--	2	2
Alarms	--	30	--	30	30
Communications					
RS485	●	●	●	●	●
M-Bus	*	*	*	*	*
Lora	*	*	*	*	*
Ethernet	--	--	●	●	●
Ethernet Gateway	--	--	--	--	●
Accuracy					
Active Energy	Cl.0.5s	Cl.0.5s	Cl.0.5s	Cl.0.5s	Cl.0.5s
Reactive Energy	1%	1%	1%	1%	1%
Current	0.5%	0.5%	0.5%	0.5%	0.5%
Voltage	0.5%	0.5%	0.5%	0.5%	0.5%
Power	0.5%	0.5%	0.5%	0.5%	0.5%
THD and IHD	2%	2%	2%	2%	2%
Hz	0.2%	0.2%	0.2%	0.2%	0.2%
Number of Measurement Points per Circle	128	128	128	128	128
Auxiliary Power Supply	●	●	●	●	●

Note: ● = included
 * = optional
 — = not included


6. Maintenance

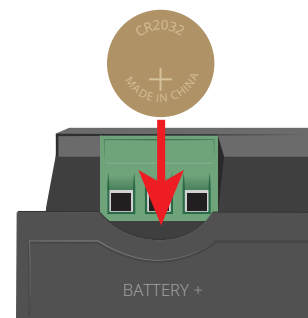
In normal use, little maintenance is needed. As appropriate for service conditions, isolate electrical power, inspect the unit and remove any dust or other foreign material present. Periodically check all connections for freedom from corrosion and screw tightness, particularly if vibration is present.

The front of the case should be wiped with a dry cloth only. Use minimal pressure, especially over the viewing window area. If necessary wipe the rear case with a dry cloth. If a cleaning agent is necessary, isopropyl alcohol is the only recommended agent and should be used sparingly. Water should not be used. If the rear case exterior or terminals should be contaminated accidentally with water, the unit must be thoroughly dried before further use. Should it be suspected that water might have entered the unit, factory inspection and refurbishment is recommended

In the unlikely event of a repair being necessary, it is recommended that the unit be returned to Autometers Systems Ltd.

6.1 Battery Replacement

The meter provides multi tariffs and RTC, it has a 3V DC battery as backup power supply. When the battery voltage is lower than 2.4V DC, the meter LCD will show warning symbol . The battery should be replaced with a new one.



Isolate the mains from the meter before changing the battery

7. Installation

The unit may be mounted in a panel of any thickness up to a maximum of 3 mm. Leave enough space behind the instrument to allow for bends in the connection cables. The unit is intended for use in a reasonably stable ambient temperature within the range -25°C to +55°C. Do not mount the unit where there is excessive vibration or in excessive direct sunlight.

7.1 Safety

The unit is designed in accordance with IEC 61010-1:2010 – Permanently connected use, Normal condition. Installation category III, pollution degree 2, basic insulation for rated voltage.

7.2 EMC Installation Requirements

Whilst this unit complies with all relevant EU EMC (electro-magnetic compatibility) regulations, any additional precautions necessary to provide proper operation of this and adjacent equipment will be installation dependent and so the following can only be general guidance: Avoid routing wiring to this unit alongside cables and products that are, or could be, a source of interference.

The auxiliary supply to the unit should not be subject to excessive interference. In some cases, a supply line filter may be required.

To protect the product against incorrect operation or permanent damage, surge transients must be controlled. It is good EMC practice to suppress transients and surges at the source. The unit has been designed to automatically recover from typical transients; however in extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 10 seconds to restore correct operation.

Screened communication leads are recommended and may be required. These and other connecting leads may require the fitting of RF suppression components, such as ferrite absorbers, line filters etc., if RF fields cause problems.

It is good practice to install sensitive electronic instruments that are performing critical functions in EMC enclosures that protect against electrical interference causing a disturbance in function.

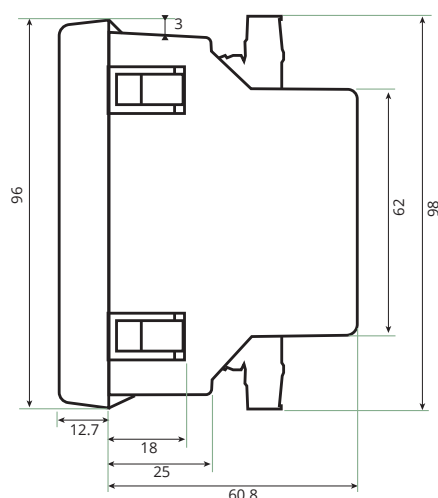


WARNING

- During normal operation, voltages hazardous to life may be present at some of the terminals of this unit. Installation and servicing should be performed only by qualified, properly trained personnel abiding by local regulations. Ensure all supplies are de-energized before attempting connection or other procedures.
- Terminals should not be user accessible after installation and external installation provisions must be sufficient to prevent hazards under fault conditions.
- This unit is not intended to function as part of a system providing the sole means of fault protection - good engineering practice dictates that any critical function be protected by at least two independent and diverse means.
- The unit does not have internal fuses therefore external fuses must be used for protection and safety under fault conditions.
- Never open-circuit the secondary winding of an energized current transformer.
- This product should only be operated with CT secondary connections Earthed.
- If this equipment is used in a manner not specified by the manufacturer, protection provided by the equipment may be impaired.

Auxiliary circuits (communication & relay outputs) are separated from metering inputs and 110-400V auxiliary circuits by at least basic insulation. Such auxiliary circuit terminals are only suitable for connection to equipment which has no user accessible live parts. The insulation for such auxiliary circuits must be rated for the highest voltage connected to the instrument and suitable for single fault condition. The connection at the remote end of such auxiliary circuits should not be accessible in normal use. Depending on application, equipment connected to auxiliary circuits may vary widely.

7.3 Dimensions



Cut out 92mm x 92mm
Units = mm



Q-180 rear view

7.4 The Q-180 series



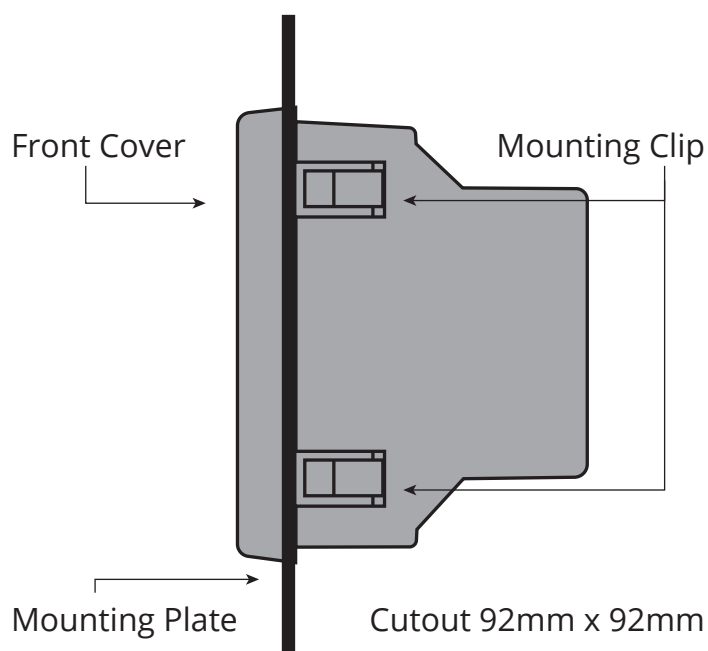
Q-180

Q-180-2

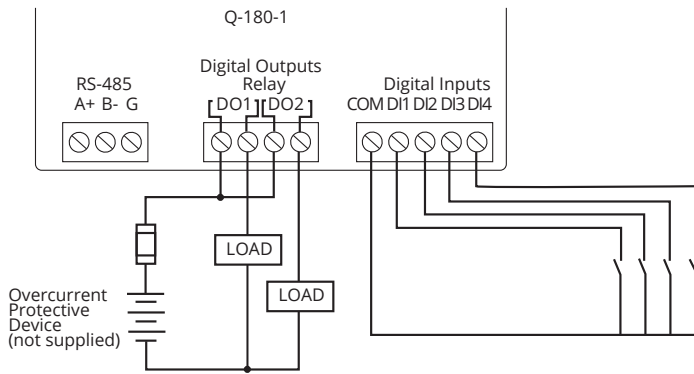
Q-180-3

Q-180-4

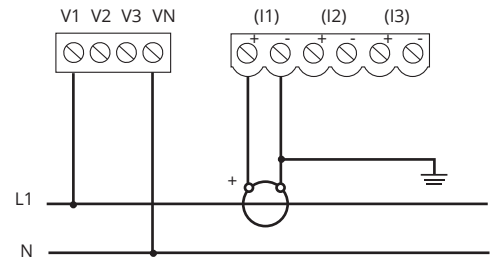
7.5 Mounting



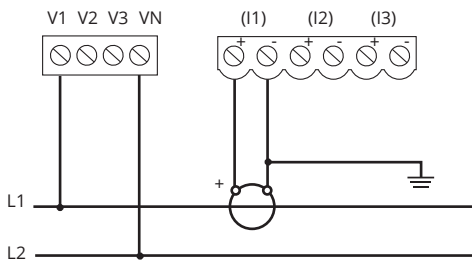
7.6 Wiring diagram



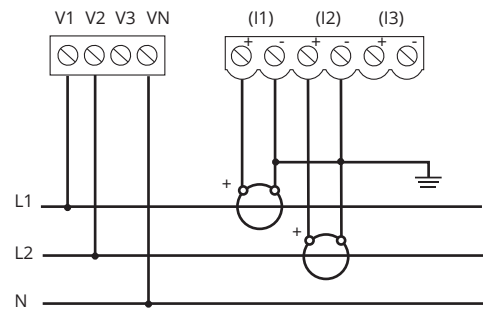
RS485 / DI / DO



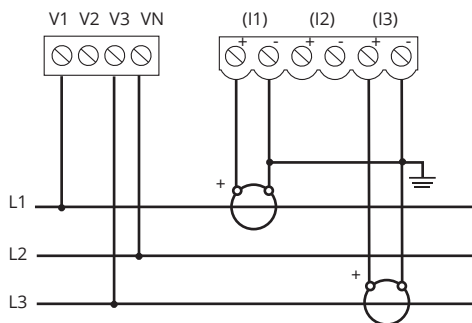
1P2W(L+N) 1CTs



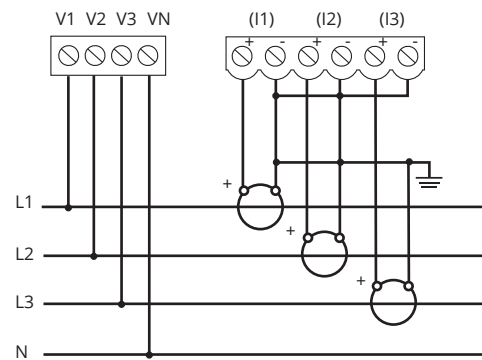
1P2W(L+L) 1CTs



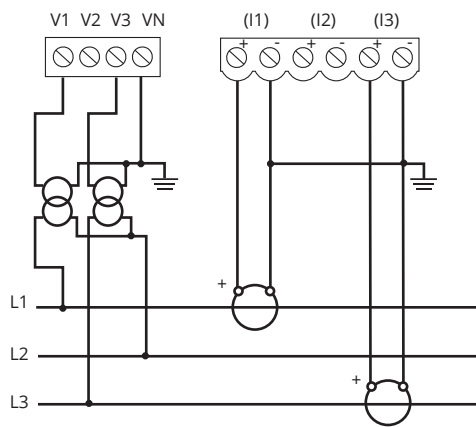
1P3W(L+L+N) 2CTs



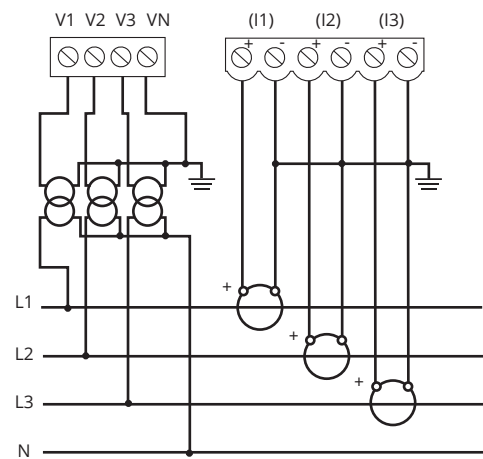
3P3W 2CTs



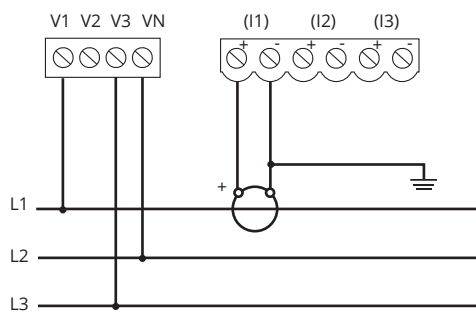
3P4W 3CTs



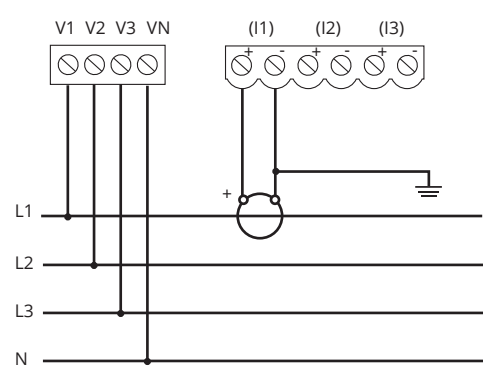
3P3W 2PT 2CTs



3P3W 3PT 3CTs



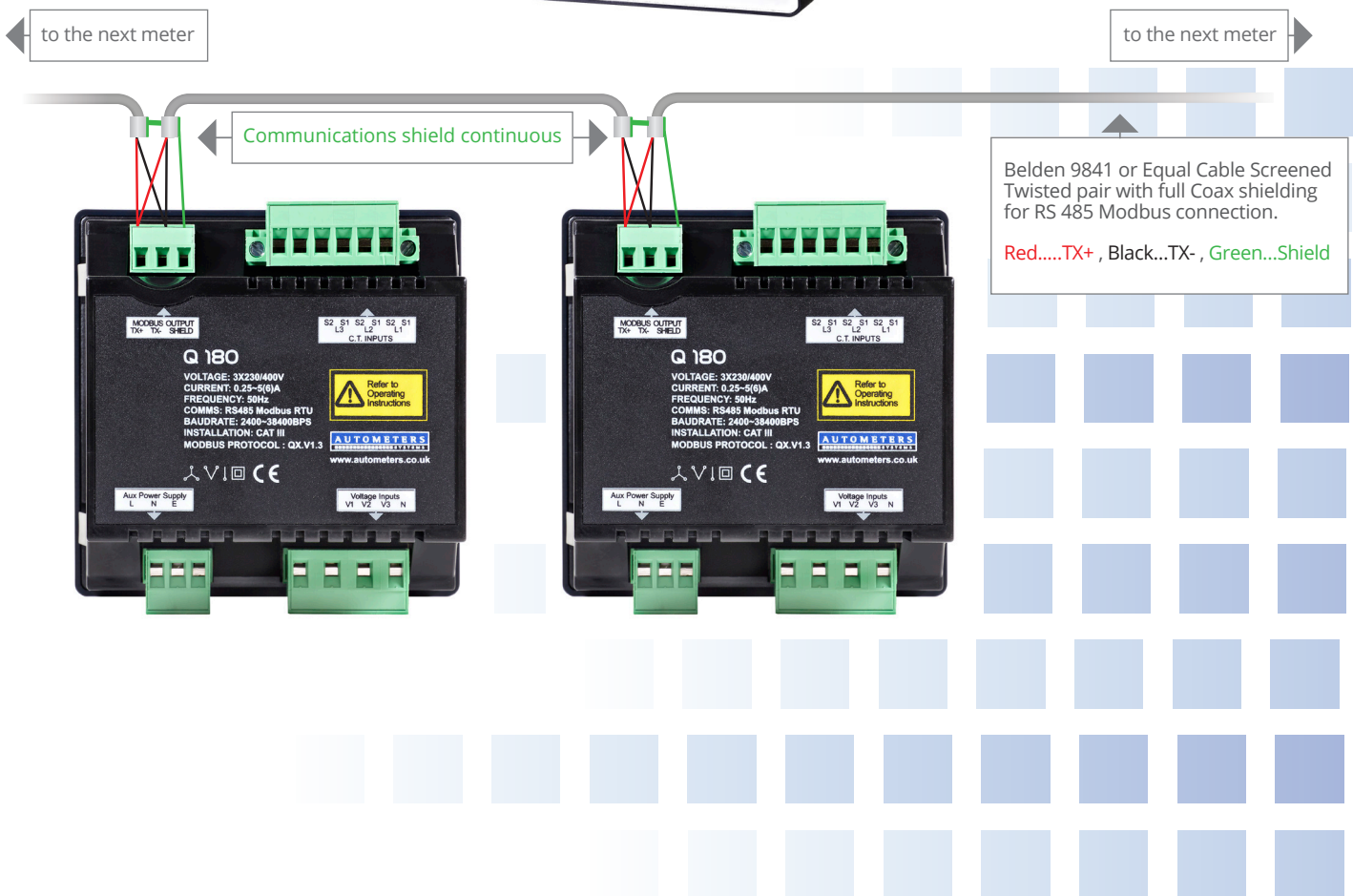
3P3W 1CT Balance load



3P4W 1CT Balance load

Q-180 connection

This meter is for monitoring only and can not be connected to the Autometers Horizon Data Monitoring System



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4B Albany Road, Chorlton-cum-Hardy
Manchester M21 0AW
Email: sales@autometers.co.uk
Phone: 00(44) 0161 861 9056
Fax: 0161 881 3745
www.autometers.co.uk

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