- **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

he 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.
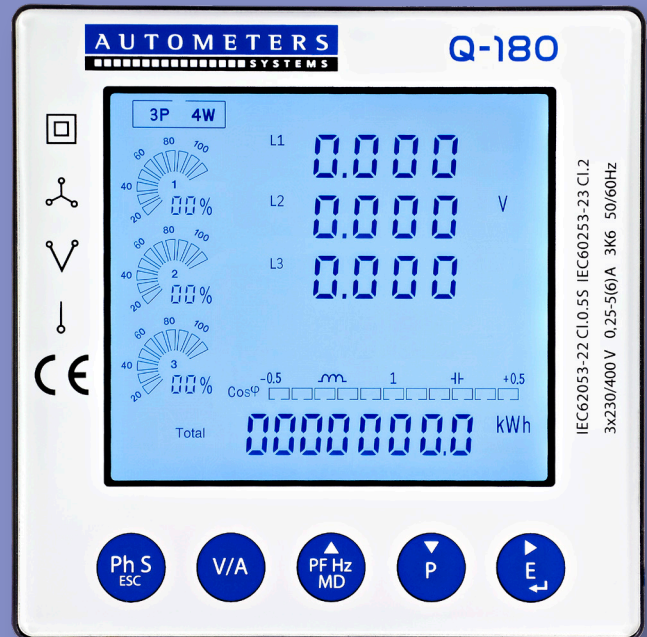
In order to measure energy, the unit requires voltage and current inputs in addition to the supply required to power the product. The requisite current input(s) are obtained via current transformers. The Q-180 can be configured to work with a wide range of CTs, giving the unit a wide range of operation. 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.
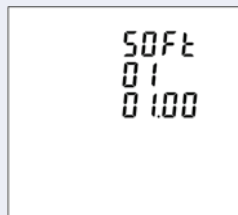
1.6 Display

- Liquid crystal display with backlit (360₀ 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
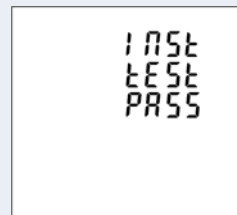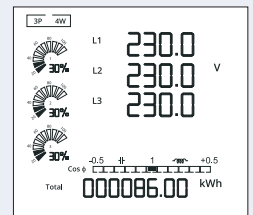- Display scrolling: automatic or manual (Programmable)

2. Start up screens
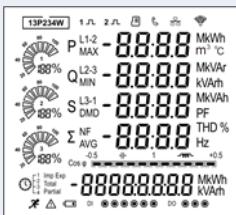
The first screen lights all LED segments and can be used as a display LED check	The second screen indicates the software version of the unit. (the above picture is just for reference)	The unit performs a self-test and the screen indicates if the test is passed.	After a short delay, the default measurement screen appears.

3. Keys and Displays

3.1 Button Functions

Button	Click	Press and hold down for 2 seconds
Ph S *ESC*	■ Display power, voltage, current and energy information of each phase ■ Exit from the menu	■ Automatic Scroll display ON / OFF
V/A ◀	■ Display Voltage and current information of the selected system type. (3p4w, 3p3w and 1p2w) ■ Phase sequence ■ Left side move	■ Individual Harmonic Distortion of Voltage up to 63rd
MD PF Hz ▲	■ Display power factor, frequency, Max. Demand. ■ Max. and Min. of current and voltage ■ Up page or add value	■ Individual Harmonic Distortion of Current up to 63rd
P ▼	■ Display active power, reactive power and apparent power information of the selected system type. ■ Down page or reduce value	■ Running hour ■ Full Screen checking ■ Modbus / Ethernet setting ■ information ■ Tariff Information
E ◀ ▶	■ Display total / import / export active or reactive energy information of the selected system type. ■ 4 tariff energy and RTC ■ Right side move	■ 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
Ph S ESC	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		
V/A	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		

5

Click button	3 Phase 4 Wire		3 Phase 3 Wire		1 Phase 2 Wire	
	Screen	Parameters	Screen	Parameters	Screen	Parameters
PF Hz MD ▲	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
P ▼	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
E ▶	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:

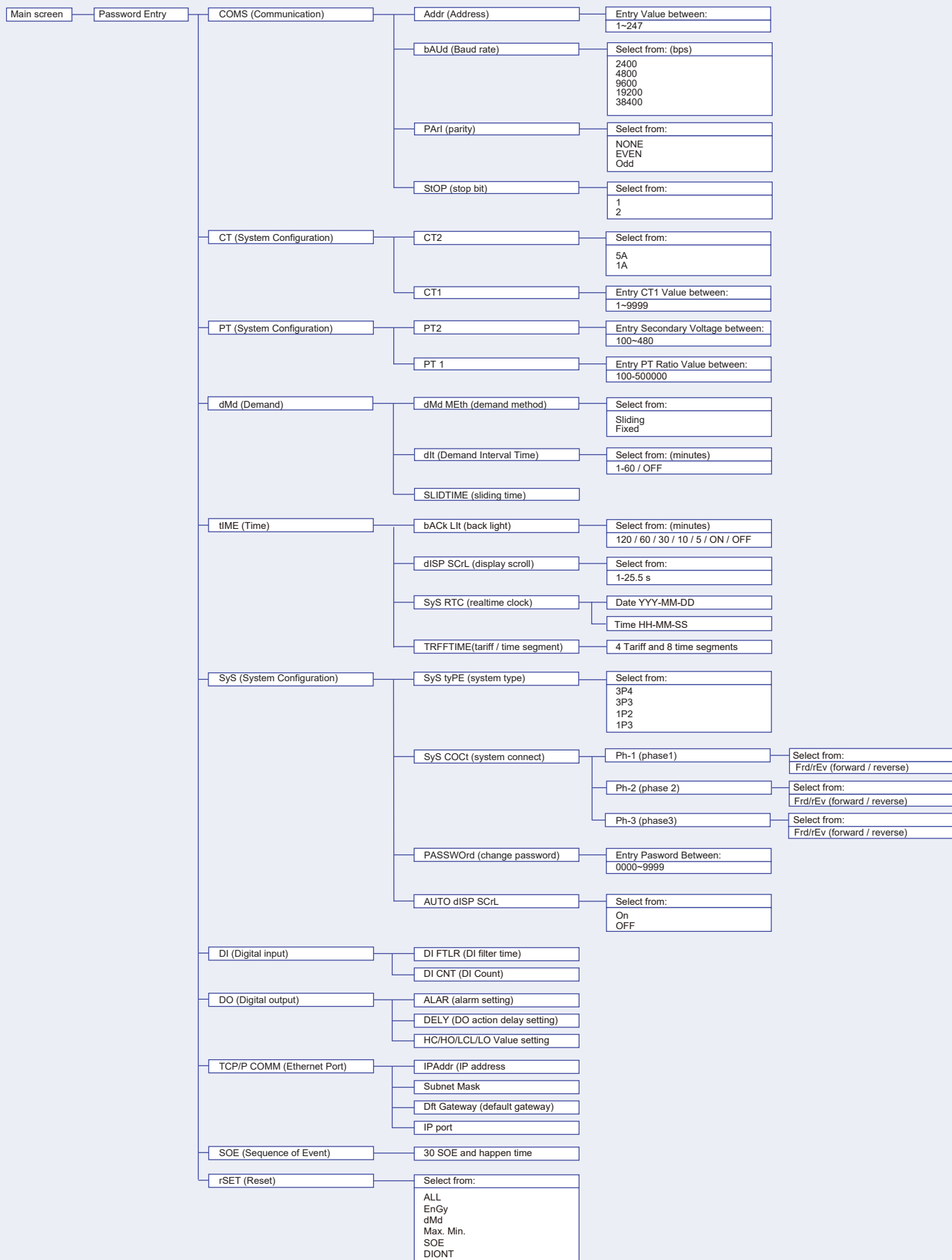Press the button **V/A** for 2 seconds to check Harmonic distortion of Voltage
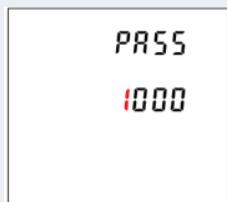
2~63rd Harmonic distortion of voltage

Press the button **PF Hz MD** for 2 seconds to check Harmonic distortion of current

2~63rd Harmonic distortion of current

4. Programming the meter

Main screen → Password Entry			
COMS (Communication)	Addr (Address)	Entry Value between: 1~247	
	bAUd (Baud rate)	Select from: (bps) 2400 4800 9600 19200 38400	
	PArI (parity)	Select from: NONE EVEN Odd	
	StOP (stop bit)	Select from: 1 2	
CT (System Configuration)	CT2	Select from: 5A 1A	
	CT1	Entry CT1 Value between: 1~9999	
PT (System Configuration)	PT2	Entry Secondary Voltage between: 100~480	
	PT 1	Entry PT Ratio Value between: 100-500000	
dMd (Demand)	dMd MEth (demand method)	Select from: Sliding Fixed	
	dIt (Demand Interval Time)	Select from: (minutes) 1-60 / OFF	
	SLIDTIME (sliding time)		
tIME (Time)	bACk LIt (back light)	Select from: (minutes) 120 / 60 / 30 / 10 / 5 / ON / OFF	
	dISP SCrL (display scroll)	Select from: 1-25.5 s	
	SyS RTC (realtime clock)	Date YYYY-MM-DD	
		Time HH-MM-SS	
	TRFFTIME(tariff / time segment)	4 Tariff and 8 time segments	
SyS (System Configuration)	SyS tyPE (system type)	Select from: 3P4 3P3 1P2 1P3	
	SyS COCt (system connect)	Ph-1 (phase1)	Select from: Frd/rEv (forward / reverse)
		Ph-2 (phase 2)	Select from: Frd/rEv (forward / reverse)
		Ph-3 (phase3)	Select from: Frd/rEv (forward / reverse)
	PASSWOrd (change password)	Entry Pasword Between: 0000~9999	
	AUTO dISP SCrL	Select from: On OFF	
DI (Digital input)	DI FTLR (DI filter time)		
	DI CNT (DI Count)		
DO (Digital output)	ALAR (alarm setting)		
	DELY (DO action delay setting)		
	HC/HO/LCL/LO Value setting		
TCP/P COMM (Ethernet Port)	IPAddr (IP address		
	Subnet Mask		
	Dft Gateway (default gateway)		
	IP port		
SOE (Sequence of Event)	30 SOE and happen time		
rSET (Reset)	Select from: ALL EnGy dMd Max. Min. SOE DIONT		

4.1 Password Entry

PRSS
1000

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

By firmly pressing the button ▶ (E↵) 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

SEt
rS
485
COnn
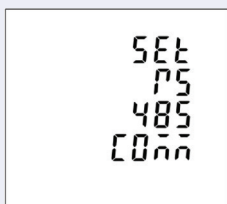
The RS485 port can be used for communications using Modbus RTU protocol. Parameters such as Address, Baud rate, Parity, Stop bit can be selected.

Long press ▶ (E↵) to enter the Address option.

4.2.1 Address

SEt
Addr
001
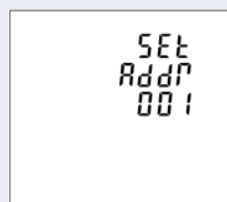
An RS485 network can accommodate up to 255 different devices, each identified by an address.
The Modbus address range on the Q-180 is between 001~247
Default setting from Autometers is 001

Long press ▶ (E↵) to enter the selection routine.

The address setting will flash. Use (PF Hz MD ▲) and (P ▼) , ▶ (E↵) to set the address with the range 001~247.

Long press ▶ (E↵) for confirmation.

4.2.2 Baud rate

SEt
bAUd
9600

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

From the Set-up menu, Use (PF Hz MD ▲) and (P ▼) to select the Baud rate options.

Long press ▶ (E↵) to enter the selection routine.

The Baud Rate setting will flash. Use (PF Hz MD ▲) and (P ▼) to choose Baud Rate.

SEt
bAUd
19200

Example shows:
SET Baud rate 19200 (bps)

And long press ▶ (E↵) for confirmation

4.2.3 Parity

SEt PArI nOnE
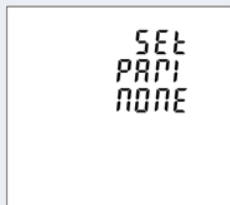
Parity Options: NONE, EVEN, ODD.
Default Parity : NONE
Note that if parity is set to ODD or EVEN, Stop Bits will be set to 1 and cannot be changed.

From the Set-up menu, Use (PF Hz MD) and (P) to select the Parity options.

Long Press (E) to enter the selection routine.

The Parity setting will flash. Use (PF Hz MD) and (P) to choose Parity.

SEt PArI EVEN

Example shows:
Set Parity: EVEN

And long press (E) for confirmation.

Press (Ph S ESC) to return the main set up menu.

SEt PArI Odd
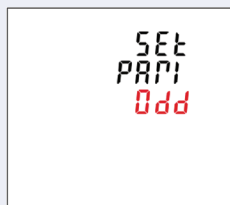
Example shows:
Set Parity: ODD

And long press (E) for confirmation.

Press (Ph S ESC) to return the main set up menu.

4.2.4 Stop Bit

SEt StOP 1
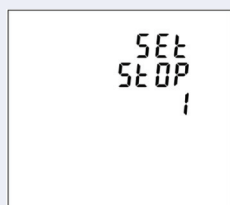
Stop Bit options: 1 or 2.
Default Stop Bit : 1
Note that if parity is set to ODD or EVEN, Stop Bits will be set to 1 and cannot be changed.

From the Set-up menu, Use (PF Hz MD) and (P) to select the Stop Bit options.

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

Use (PF Hz MD) and (P) to choose Stop Bit.
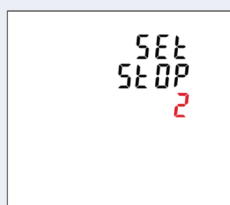
SEt StOP 2

Example shows Set Stop bit 2

And long press (E) and long press (Ph S ESC) to return the Communication set

4.3 C.T. (Current Transformer)

SEt Ct
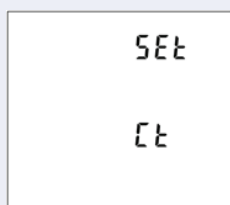
From the main Set-up menu, Use (PF Hz MD) and (P) to select the CT option.

4.3.1 C.T.2 (Current Transformer Secondary)
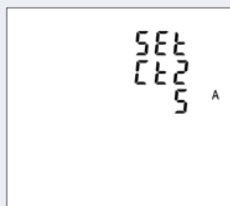
Set secondary current input the meter Options: 5A or 1A
Default CT2: 5A

Long press **E** to enter the CT2 routine.

Press **E** for 2s, the CT2 setting will flash.

Use **PF Hz MD** and **P** to choose CT2 with 5A or 1A.
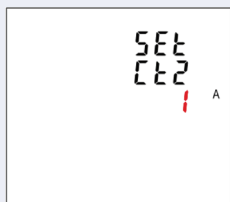
Example shows : Set CT2 1A

And long press **E** for confirmation.

4.3.2 C.T.1 (Current Transformer Primary)
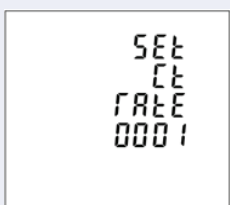
To program the current ratio in the meter simply enter the primary current.

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

Long press **E** to enter the CT Rate routine.

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

Use **PF Hz MD** and **P** to choose the first digit of the CT value.

Press **E** to move the cursor to the right. When you have

entered the desired setting long press **E** for confirmation and then
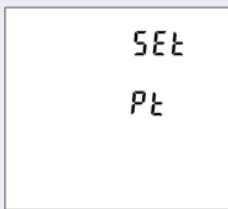
press **Ph S ESC** to return to the main menu.
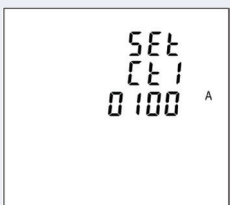
4.3.3. Example of meter set at 200/5 amp
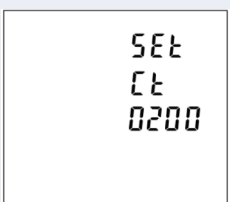
Example of how the display should look for a meter programmed to 200/5 amp.

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.
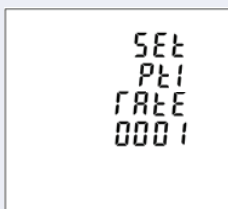Use (PF Hz MD) and (P) , ⊕ to choose PT2 with 174~480.

4.4.1 P.T.2

```
SEt
Pt2
230 v
L-n
```
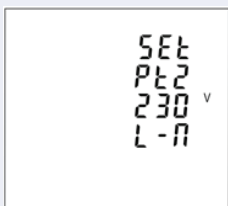
Set secondary voltage input the meter
Range: 100V ~ 480V
Default: 230V

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 (P) to enter the PT2 routine.

Press ⊕ for 3s, the PT2 setting will flash.

Use (V/A) or (P) , ⊕ to select PT2.

Long press ⊕ for confirmation.

Press (Ph S ESC) to return the PT set up menu.
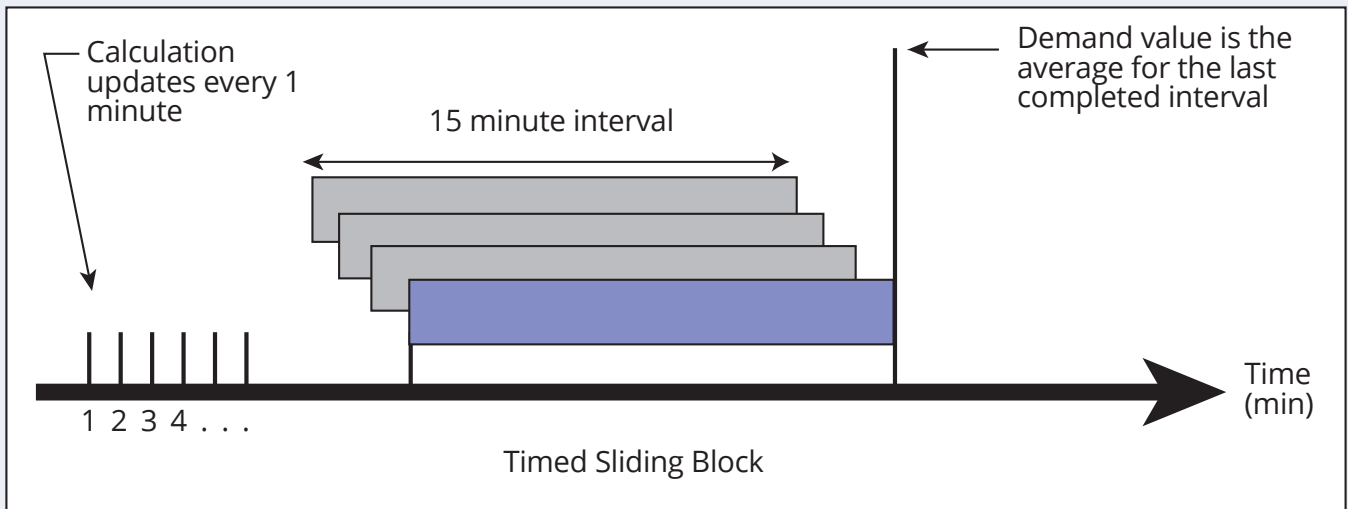
4.5 Demand

```
SEt
dmd
```
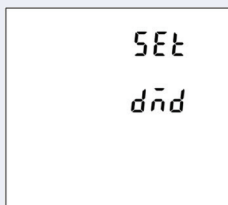
This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement.
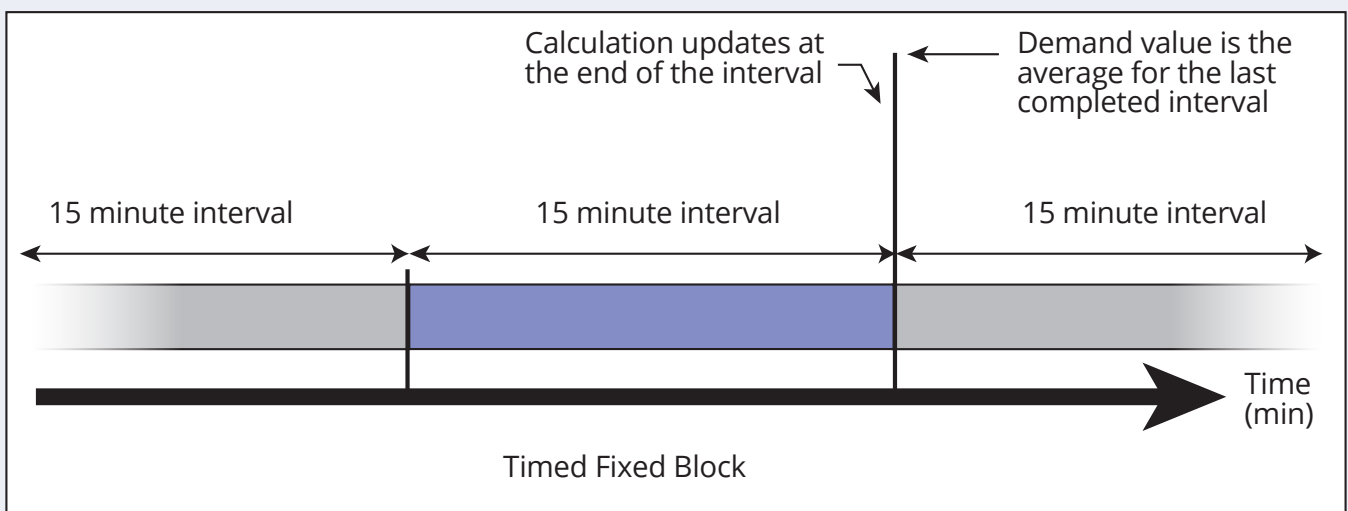The options are: OFF, 5, 8, 10, 15,30, 60 minutes.

From the Set-up menu, Use (PF Hz MD) and (P) 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.
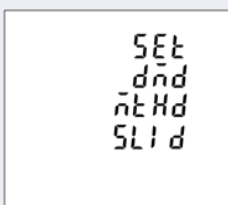
Slide Block: Select a demand interval time (DIT) from 1 to 60 minutes (in 1 minute increments). Set the calculation update time from 1 to 59minutes. The power meter displays the demand value for the last completed interval.

Calculation updates every 1 minute

15 minute interval

Demand value is the average for the last completed interval

Time (min)

1 2 3 4 . . .

Timed Sliding Block

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

Calculation updates at the end of the interval

Demand value is the average for the last completed interval

15 minute interval

15 minute interval

15 minute interval

Time (min)

Timed Fixed Block

4.5.1 Demand method

SEt
dnd
ntHd
SLId

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

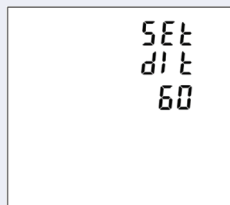Use [PF Hz MD] and [P] to enter Demand calculation method.

SEt
dnd
ntHd
FI:

Long press [E] to enter the routine.

The setting will flash. Use [PF Hz MD] and [P] to choose Options.

And long press [E] for confirmation.

Press [Ph S ESC] 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.
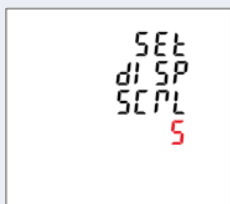Default is 60 minutes. range from 1 to 60. Off means function closed.

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

Use [PF Hz MD] and [P] to choose Options. And long press [E] 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.
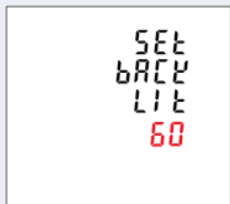
4.6 Time

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

From the Set-up menu, Use [PF Hz MD] and [P] 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.
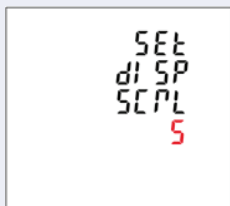
Long press [E] to enter the Backlit time routine.

Press [P] for 2s, the setting will flash.

Use [PF Hz MD] and [P] to choose Options.

And long press [E] 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 [PF Hz MD] and [P] to select Display scroll time option.

Press [E] for 2s, the setting will flash. Use [PF Hz MD] and [P] to choose Options.

And Long press [E] for confirmation.

Press [Ph S ESC] to return the Time set up menu.

4.6.3 System RTC

```
SEL
SYS
RTC
```

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

Press **E** to get into date and time setting.

```
SEL
dALE
2017
10.01
```

Set the date of RTC.
Left picture shows 2017-Otc-1st The format is YYYY-MM-DD

```
SEL
LInE
16:20
:58
```
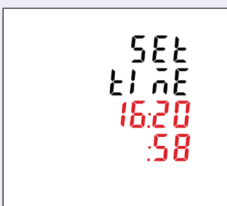
Set the time of RTC
Left picture shows 16:20:58 The format is HH-MM-SS

4.6.4 Tariff Time

```
SEL
LNFF
LInE
```
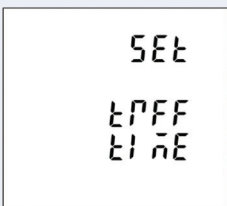
This option is to set the time segments with different tariffs.

Press **E** to get into the time segments and tariffs setting.

```
LInE
01
06:00
FEE1
```
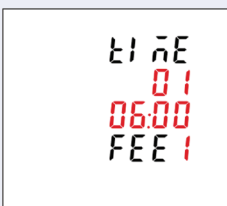
Set the time segments and corresponding tariffs
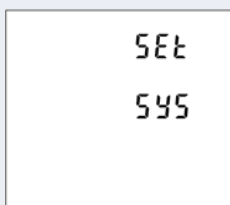Left pictures shows:
 Time
 01 – time segment number , range from 01 to 08
06:00 – starting time of this time segment, format :
HH-MM FEE1 – Tariff 1 , range 1~4.

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

4.7 System

```
SEL
SYS
```

TThe 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 **PF Hz MD** and **P** to select the System option.

4.7.1 System Network

```
SEt
SYS
tYPE
3P4
```

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

Long press [E ↵] to enter the System type routine.

Press [E ↵] for 2s, the setting will flash. Use [PF Hz MD ▲] and [P ▼] to choose Options.

And Long press [E ↵] for confirmation.

```
SEt
SYS
tYPE
3P3
```

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

4.7.2 System Connect

```
SEt
SYS
CnCt
```

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

Use [PF Hz MD ▲] and [P ▼] to select the correction option.
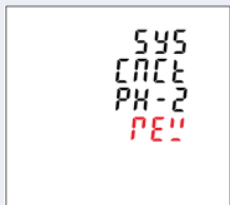
```
SYS
CnCt
PH-1
Frd
```

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

Long press [E ↵] to enter the Phase 1 correction.
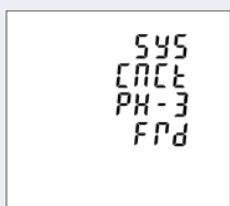
Press [E ↵] for 2s, the setting will flash. Use [PF Hz MD ▲] and [P ▼] to choose Options.

Long press [E ↵] for confirmation.

```
SYS
CnCt
PH-2
rEv
```

Press [P ▼] enter Phase 2 correction.

Press [E ↵] for 2s, the setting will flash. Use [PF Hz MD ▲] and [P ▼] to choose Options.

Long press [E ↵] for confirmation.

```
SYS
CnCt
PH-3
Frd
```

Press [P ▼] enter Phase 3 correction.

Press [E ↵] for 2s, the setting will flash. Use [PF Hz MD ▲] and [P ▼] to choose Options.

Long press [E ↵] for confirmation. Press [Ph S ESC] 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 (PF Hz MD) and (P) to select the change password option.

Press (E) for 2s, the setting will flash.

Use (PF Hz MD) and (P) to increment the number.

Press (E) to choose options.

Long press (E) for confirmation.

This meter provides a function with automatic display scroll setting.
Options: on and off
There are two ways:
1.

Use (PF Hz MD) and (P) to select the automatic display scroll option.

Press (E) for 2s, the setting will flash.

Use (PF Hz MD) and (P) to choose options "On" or "Off".

Long press (E) for confirmation.
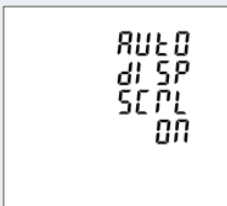
2.
Escape the Setting menu.

Long press (Ph S ESC) for 2 secs.

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

Long press (Ph S ESC) for 2 secs, then the screen shows the currently selected Automatic Scroll display OFF.

4.8 Digital Input (DI)

SEt
dI

This option is to set Digital input parameter.

Press (E) to get to the submenu

SEt
dI
FLtr
100

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

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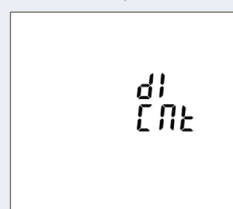
This screen is to check the counting number of each digital inputs.

By pressing (E) the user can see counting numbers.

dI - 1
0000
0008
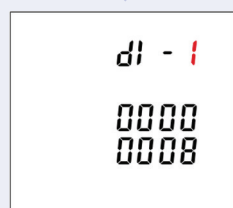
Left picture shows Digital input 1, counting number is 8.

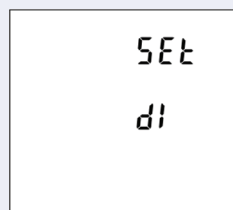By pressing (PF Hz MD) and (P) the user can see counting number of different digital inputs.

4.9 Digital Outputs (DO)

4.9.1 General

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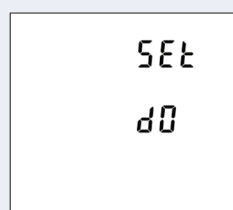
This option is to set Digital Output parameter and check the status.

Press (E) to get the sub-menu

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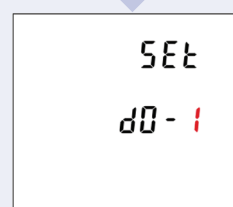
This screen to choose the Digital output number which you want to check.
Left picture shows DO-1.

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

Use (PF Hz MD) and (P) to choose the different output.

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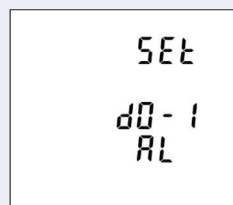
This screen is to set the alarm information link to DO-1 For details , please refer to part 4.9.2

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
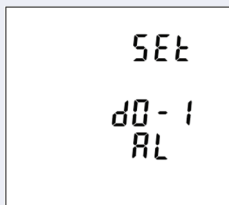
This option is to set alarm for DO.

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.

SEt
dO-1
LC v
100

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.

SEt
dO-1
LO v
170

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

SEt
tCP
IP
COnn
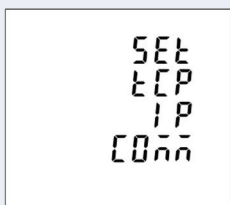
This menu is to set the parameter for Ethernet communication.

Press ▶ E ↵ to get the sub-menu

SEt
IP
Addr

This option is to set the IP address.

SEt
Sub
NEt
MASk
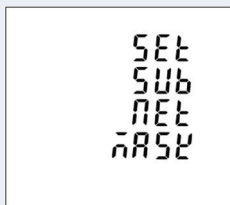
This option is to set Subnet Mask

SEt
dFt
GAtE
yAy
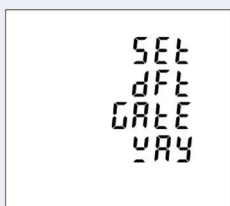
This option is to set the default Gateway

SEt
IP
POrt
502
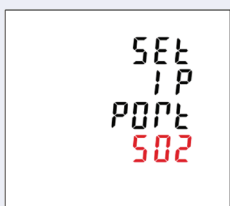
This option is to set the IP port

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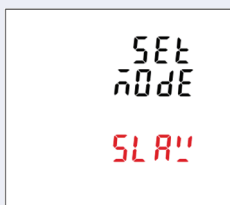
This option is to set the meter Ethernet mode
SLAV = slave
MAST = Master
When it is set to be Master, it can work as a RS485-TCP/IP convertor.

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
2. Meter power on
3. CT2 changed
4. CT1 changed
5. PT2 changed

6. PT1 changed
7. Energy reset
8. Demand reset
9. Alarm happens
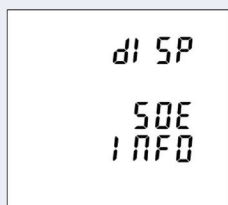
This menu is to check sequence of events (SOE). The meter can record 30 events.

Press [E] to go to the sub-menu
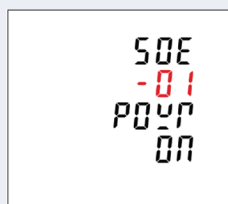
Left picture shows No.1 event

Use [PF Hz MD] and [P] to check other events.
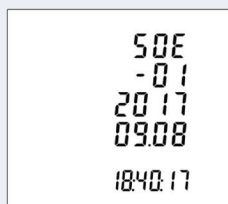
Press [E] to find date and time the event happened.

4.12 Reset
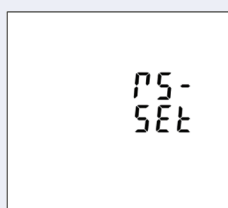
This unit provides a function with reset for different information.

Press [E] to go to the sup-menu

Use [PF Hz MD] and [P] to select the Reset option.
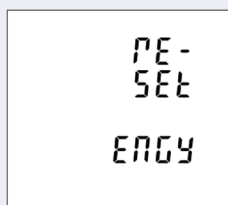
This option is to reset Energy information.
It would reset active, reactive, apparent, import, export energy information.
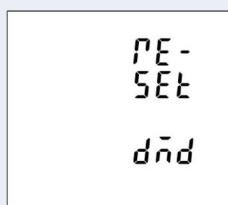
This option is to reset the demand information.
It would reset current and power demand information.
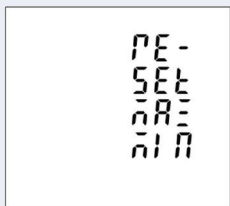
rE-SEt nA:nI n	This option it to reset the Max. and Min. information
rE-SEt SOE	This option is to reset the SOE information.
rE-SEt dI CnE	This option is to reset Digital input counting.
rE-SEt ALL	This option is to reset all information.
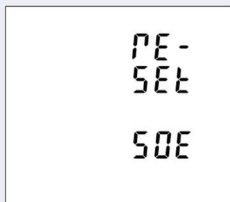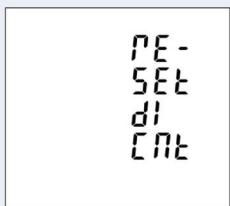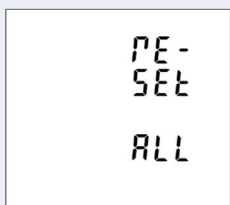
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5. Specifications

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
	CT Ratings 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 Categort	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. Maintentance

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 shows warning symbol 🔋 .
The battery should be replaced with a new one.
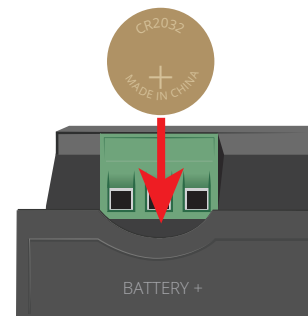
⚠️ **Isolate the mains from the meter before changing the battery**

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
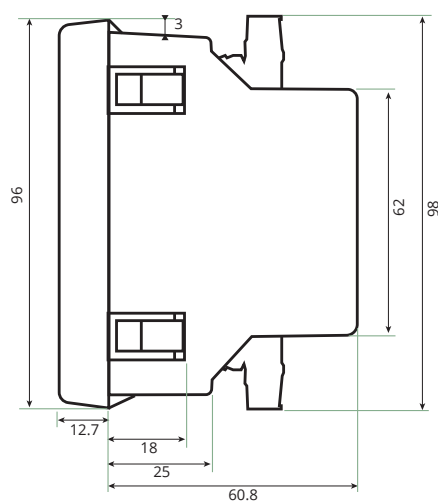
Cut out 92mm x 92mm
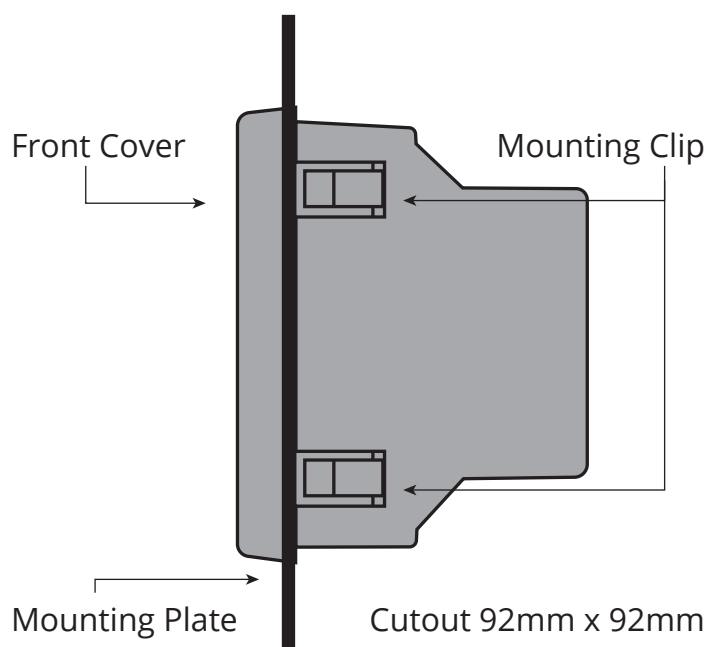Units = mm

Q-180 rear view

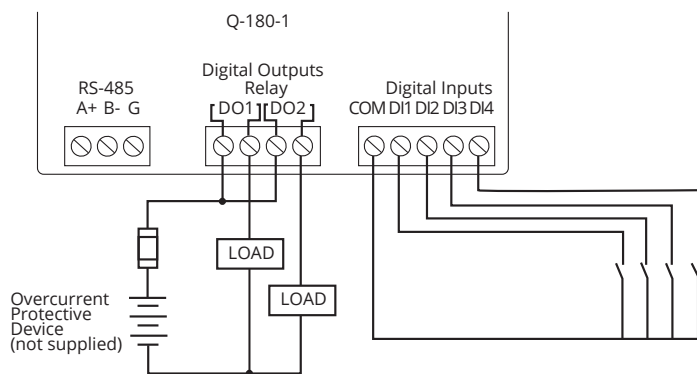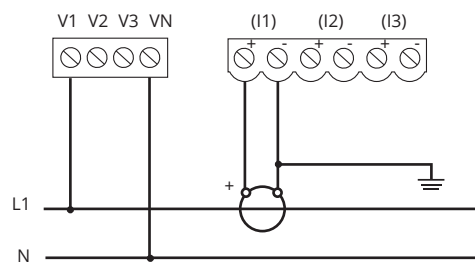## 7.4 The Q-180 series
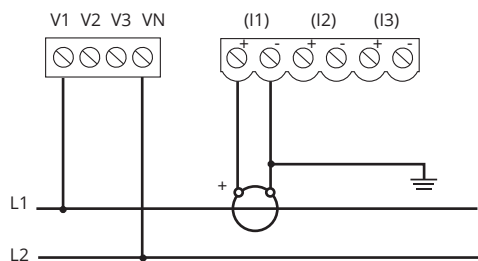
| Q-180 | Q-180-2 | Q-180-3 | Q-180-4 |

7.5 Mounting

Front Cover

Mounting Clip

Mounting Plate

Cutout 92mm x 92mm

7.6 Wiring diagram

RS485 / DI / DO

1P2W(L+N) 1CTs

1P2W(L+L) 1CTs
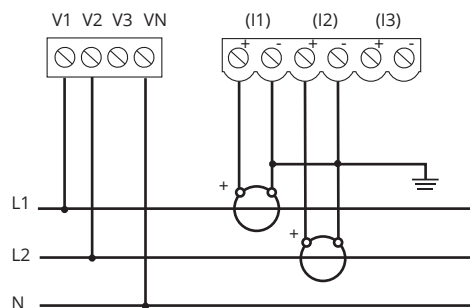
1P3W(L+L+N) 2CTs
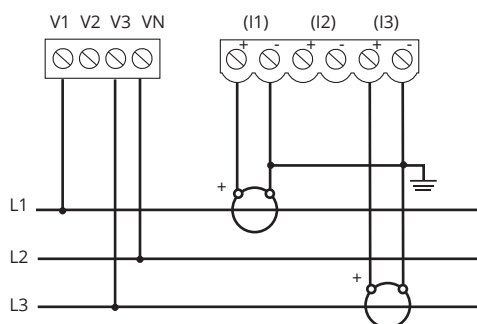
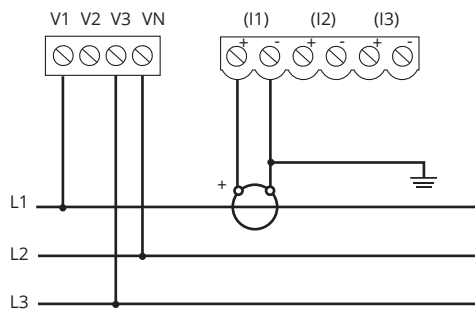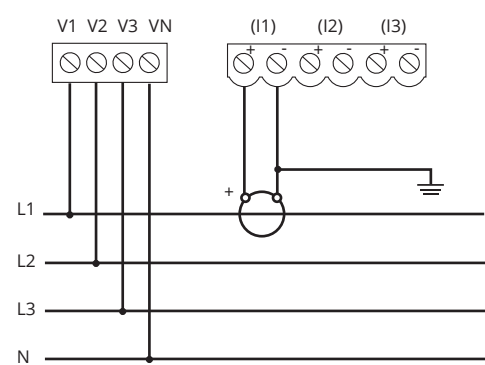**3P3W 2CTs**
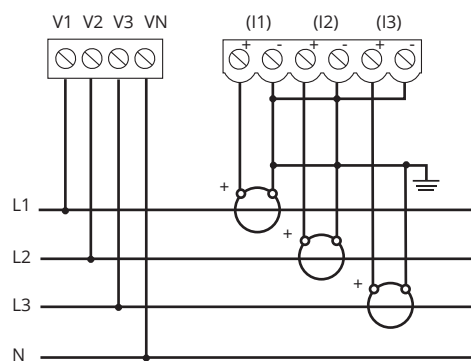
3P4W 3CTs
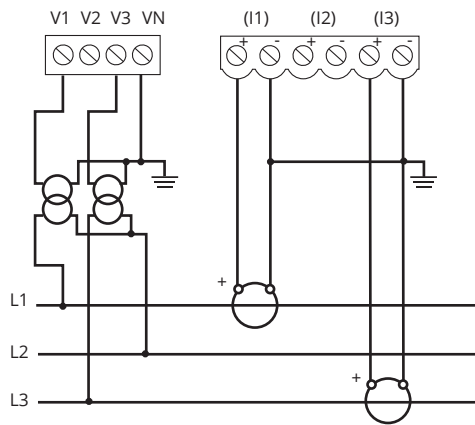
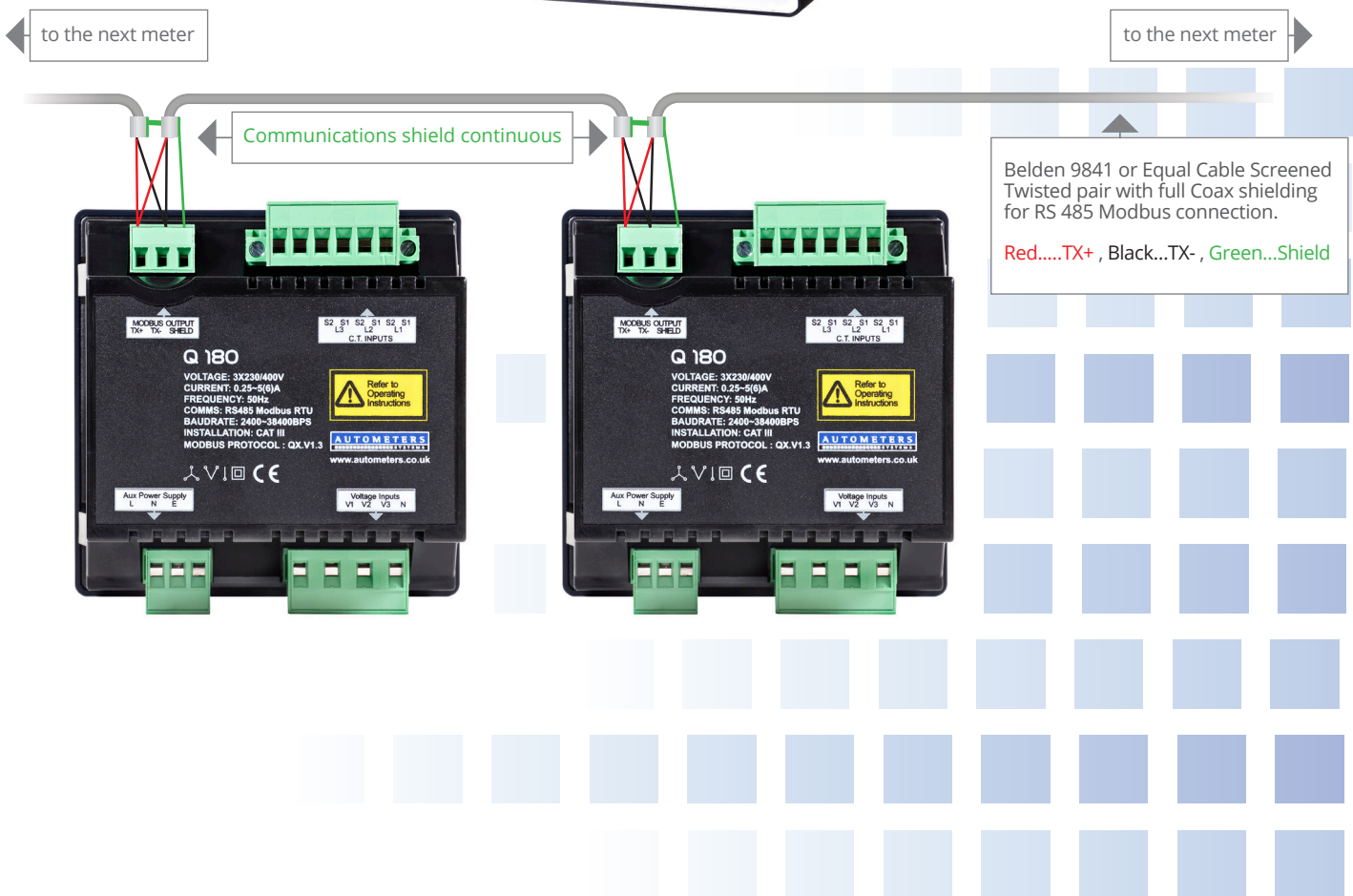**3P3W 2PT 2CTs**
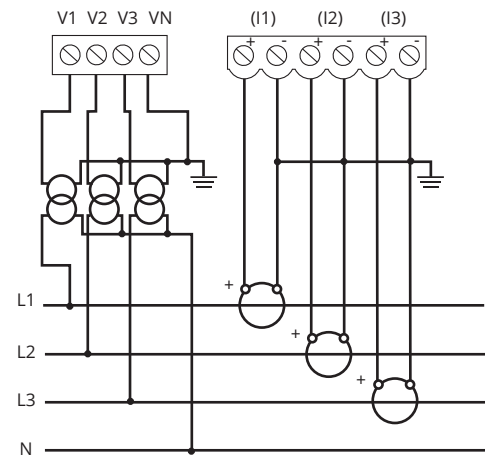
3P3W 3PT 3CTs

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

AUTOMETERS SYSTEMS   Q-180

Communications shield continuous

Belden 9841 or Equal Cable Screened Twisted pair with full Coax shielding for RS 485 Modbus connection.

Red.....TX+ , Black...TX- , Green...Shield

MODBUS OUTPUT
TX+ TX- SHIELD

S2 S1 S2 S1 S2 S1
L3   L2   L1
C.T. INPUTS

Q 180

VOLTAGE: 3X230/400V
CURRENT: 0.25~5(6)A
FREQUENCY: 50Hz
COMMS: RS485 Modbus RTU
BAUDRATE: 2400~38400BPS
INSTALLATION: CAT III
MODBUS PROTOCOL : QX.V1.3

Refer to Operating Instructions

AUTOMETERS SYSTEMS
www.autometers.co.uk

Aux Power Supply
L   N   E

Voltage Inputs
V1 V2 V3 N

MODBUS OUTPUT
TX+ TX- SHIELD

S2 S1 S2 S1 S2 S1
L3   L2   L1
C.T. INPUTS

Q 180

VOLTAGE: 3X230/400V
CURRENT: 0.25~5(6)A
FREQUENCY: 50Hz
COMMS: RS485 Modbus RTU
BAUDRATE: 2400~38400BPS
INSTALLATION: CAT III
MODBUS PROTOCOL : QX.V1.3

Refer to Operating Instructions

AUTOMETERS SYSTEMS
www.autometers.co.uk

Aux Power Supply
L   N   E

Voltage Inputs
V1 V2 V3 N

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Ref. Q-180.03.2018