ENERMAX

Maboneng
Electrical Distributors

ENERMAX INFORMATION DOCUMENTATION

DOCUMENT VERSION: 01v02. Updated: 2017/03/14
PRODUCTS: 1. Enermax+ CT 1/5A meter,
2. Enermax 160A whole current meter.
CONTENTS: Installing, Menu navigation, Dimensions, Connections, Specifications & tender reference

- ENERGY & DEMAND STATIC METERS -

CT CONNECTED ENERMAX+ THREE PHASE THREE/FOUR WIRE.
WHOLE CURRENT: ENERMAX 160A FOUR WIRE.

Contents

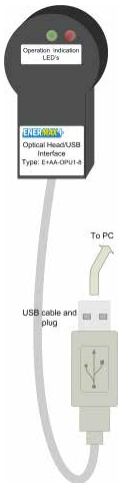
METER INSTALLATION

PLEASE READ INSTALLATION PRACTICE

- *Keep these instructions available for personnel responsible for proper installation.*
- *These instructions are a guide to the installation of the Enermax Meter.*
- *NOTE: BEFORE the meter is energised, make a final check that the voltage to be connected to the meter is within the rated voltage of the meter; at the same time also inspect for any physical damage that may have been caused during transportation or installation handling.*
- *ELECTRICAL CONNECTION diagrams are for a guide only and not meant as specific wiring diagrams for the user's installation.*
- *The information in this document does not supplant or take the place of any applicable NATIONAL and or LOCAL SAFETY CODES, or requirements of insurance underwriters.*
- *Apparatus covered by this instruction literature should be operated and serviced only by competent personnel familiar with good safety practice.*
- *These instructions are written for such personnel and are not intended as a substitute for proper training and experience in safety procedures for this type of equipment.*
- *All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions.*
- *If further information is desired by purchaser regarding his particular installation, operation, or maintenance of his equipment, Strike Technologies should be contacted.*
- *This document details the necessary information for the installation, functions, default parameters of the Enermax meter and meter specifications.*
- *Should the customer have requested a special configuration, the details of this will be listed in a separate document supplied with the meter.*

THE METER SOFTWARE

The PC meter management software package "Eman Plus" that can program both the CT and the whole current meters is version 01v43 or higher is now available for…



1. Configuring of the various meter parameter options.
2. Data transfer to and from the meter.
3. Viewing billing & profile data.
4. Reading online vectors of meter connections.

Communicating with the Meter

Local communication

The Enermax CT meter, 100A & 160A whole current meters all have the standard optical communication port. The optical port is a local comms interface and is linked to a computer using an optical head supplied separately.

Remote communication

Using a suitable expansion module communication with a PC or PLC can be achieved via any of the following plugin expansion modules:

- o RS232 serial interface
- o RS485 serial interface
- o GPRS network
- o Ethernet network

Optical head interface, USB connection to PC

INSTALLING METER

Unpacking

The Enermax is shipped in shock absorbent packaging; first ensure that there is no obvious mechanical breakage. Should the meter have been supplied to the customer's special configuration, there will also be a separate sheet listing the new configuration details.

Meter installation location

- Mount close to the measured feeder circuits and according to recognised local standards.
- Environmentally friendly location.
- Do not position in direct sunlight as this may cause overheating.
- Attach to a flat, stable surface such as a wall, board, or in a cabinet.

Meter Mounting

For access to the lower meter mounting holes….

- Remove the terminal cover by undoing the two screws on the lower front part of the meter.
- Using both hands lift the cover away from the body, giving access to the electrical connection terminals.
- CT 1/5A meter: Use 6mm bolts.
- 160A meter: Use 5mm bolts.
- Meter is shipped with the upper bracket is in its stowed position. It may be used in this position to save space (hang on bolt head); alternatively it can first be unscrewed and remounted in its extended position. Refer: Meter dimensions & mounting diagram.

THE 1/5A METER FRONT FACEPLATE & TERMINAL LAYOUT

Fig 1: CT/VT Meter faceplate and terminal diagram

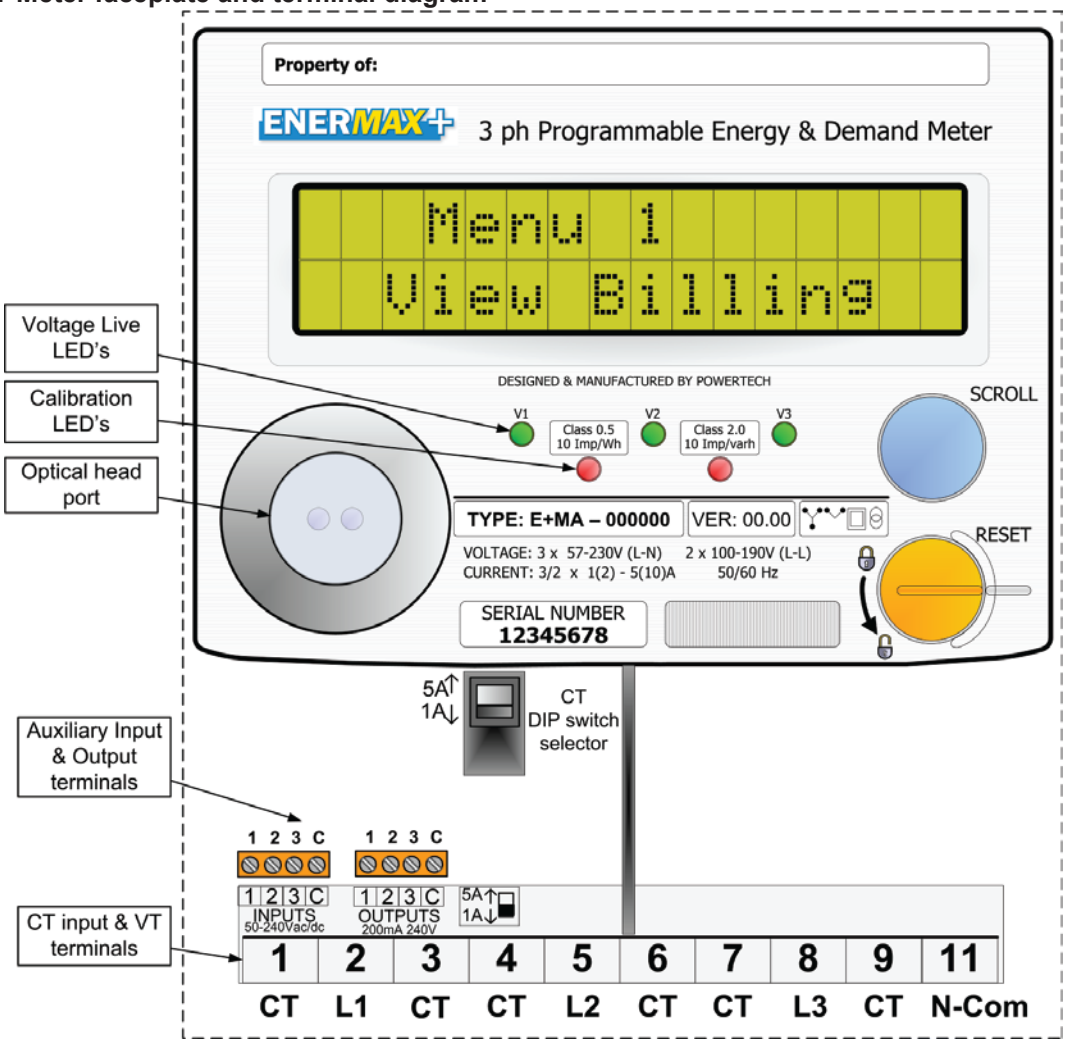
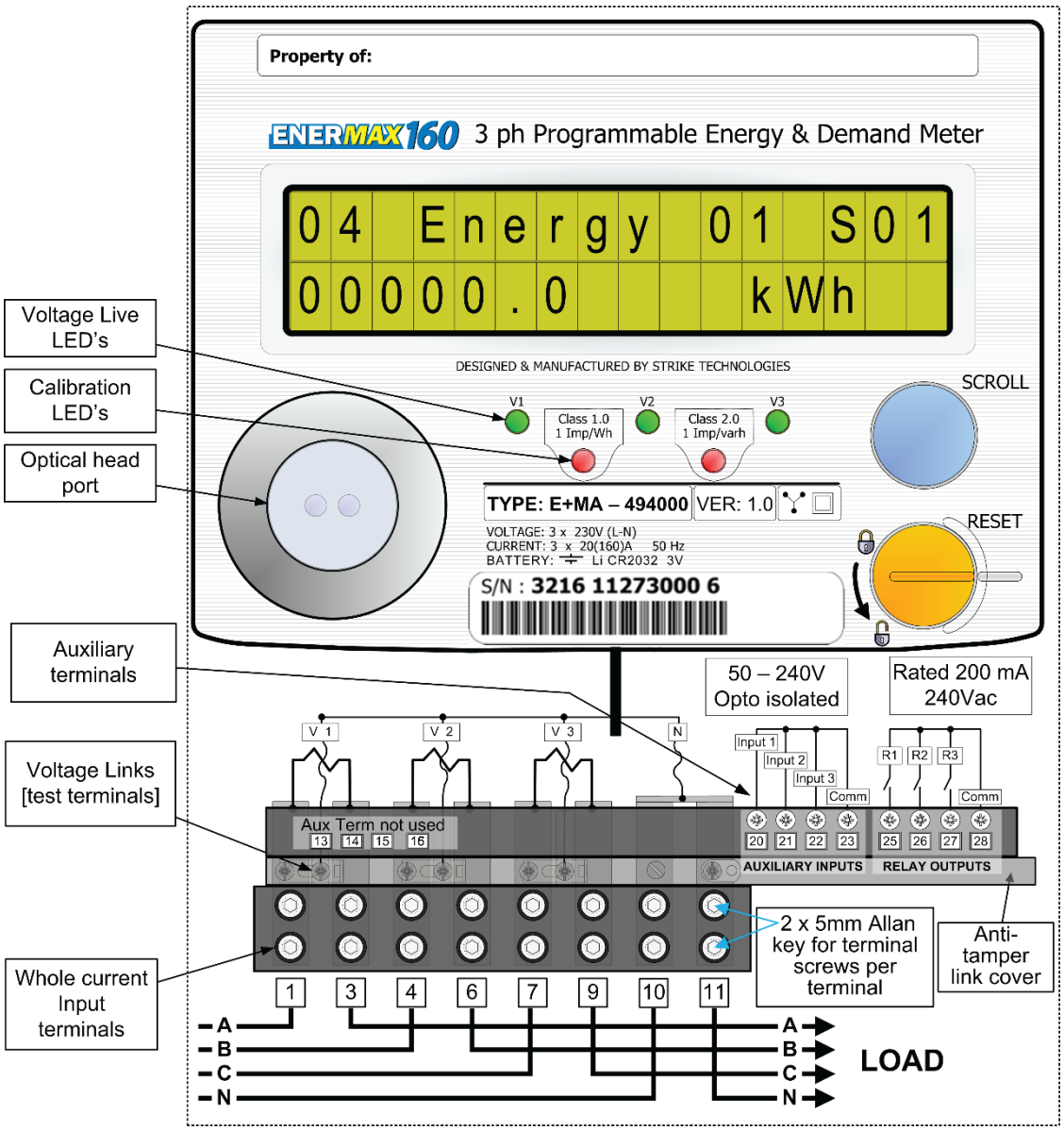


Fig 2: 160A Meter faceplate and connection diagram



Terminal numbers

The terminal numbering [1], [3] etc is embossed at the cable aperture on the terminal block. A full diagram of line and auxiliary connection is inside the terminal cover.

Wiring

The 160A meter model measures energy and demand in four wire systems, and should be wired accordingly. Refer to diagram in the meter terminal cover.

L1, L2 & L3 supply: Use the correct size cable for the feeder load; noting the distance from the meter.

Meter Links

The meter links have an anti-tamper cover that requires the seals to be removed for access. No normal operation access is required. When there are discrepancies in meter readings the links should be checked to be in place and secure.

160A cable insertion into terminals

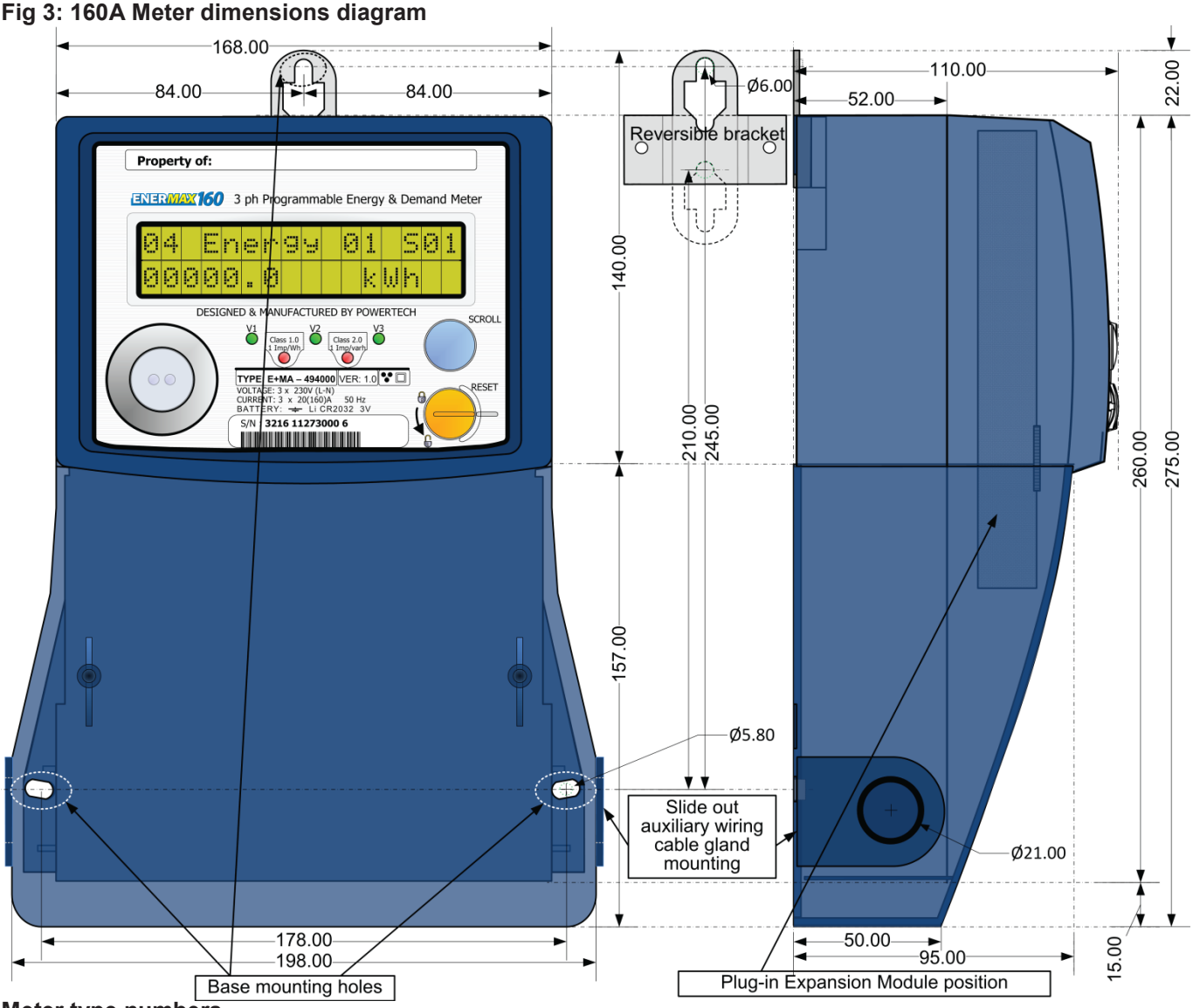
The cable connection requires the cable insulation to be stripped back 26mm for full insertion of copper into the terminal.

With both screws backed off, the terminal metal body will move back to show the full aperture size ready for the cable to be inserted.

With the cable fully inserted and the cable insulation pushed against the metal terminal, i.e. no copper extending from the metal terminal; tighten both screws alternately to allow even closure on the cable, and then fully tighten.

Note: the internal 160A circuit is made up of solid copper bar from the line–in to line-out to the load.

Fig 3: 160A Meter dimensions diagram



Meter type numbers

(*) indicates the available options

Type numbers last modified: 2012-10-09

E	+	M	A	-	6	5	4	0	0	0	Zero 0's: spare code space
E	+	M	A	-	1	5	3	0	0	0	
E	+	M	A	-	4	5	4	0	0	0	
E	+	M	A	-	4	9	4	0	0	0	

Spare

Spare

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3: CT meter - Calibrated for Class 0.5 3 wire only (*)
4: CT meter - Calibrated for Class 0.5 4 wire only (*)
4: 160A meter - Calibrated for Class 1.0 4 wire only (*)
0: CT meter - Calibrated for Class 0.5 both 3 or 4 wire

5: CT Range 1A or 5A, class 0.5 (*)
7: DIRECT Range 40 to 100A, class 1.0 (Discontinued, replaced with 160A)
9: DIRECT Range 20 to 160A, class 1.0 (*)

6: 4 wire L-N Range 57.7V to 63.5 50Hz (*)
1: 3 wire L-L Range 100V to 120V 50Hz (*)
4: 4 wire L-L Range 100V to 400V L-N 58V to 230V 50Hz (*)
5: 3 wire L-L Range 380V to 550V 50Hz
0: Calibrated for Class 0.5, 3 or 4 wire L-N 57.7V to 230V, L-L 100V to 400V

A: Version with M16 memory, 3 inputs & 3 outputs, Optical port, LCD (Standard)

M: Meter

E+: Enermax meter

Fig 4: CT meter dimensions & mounting diagram

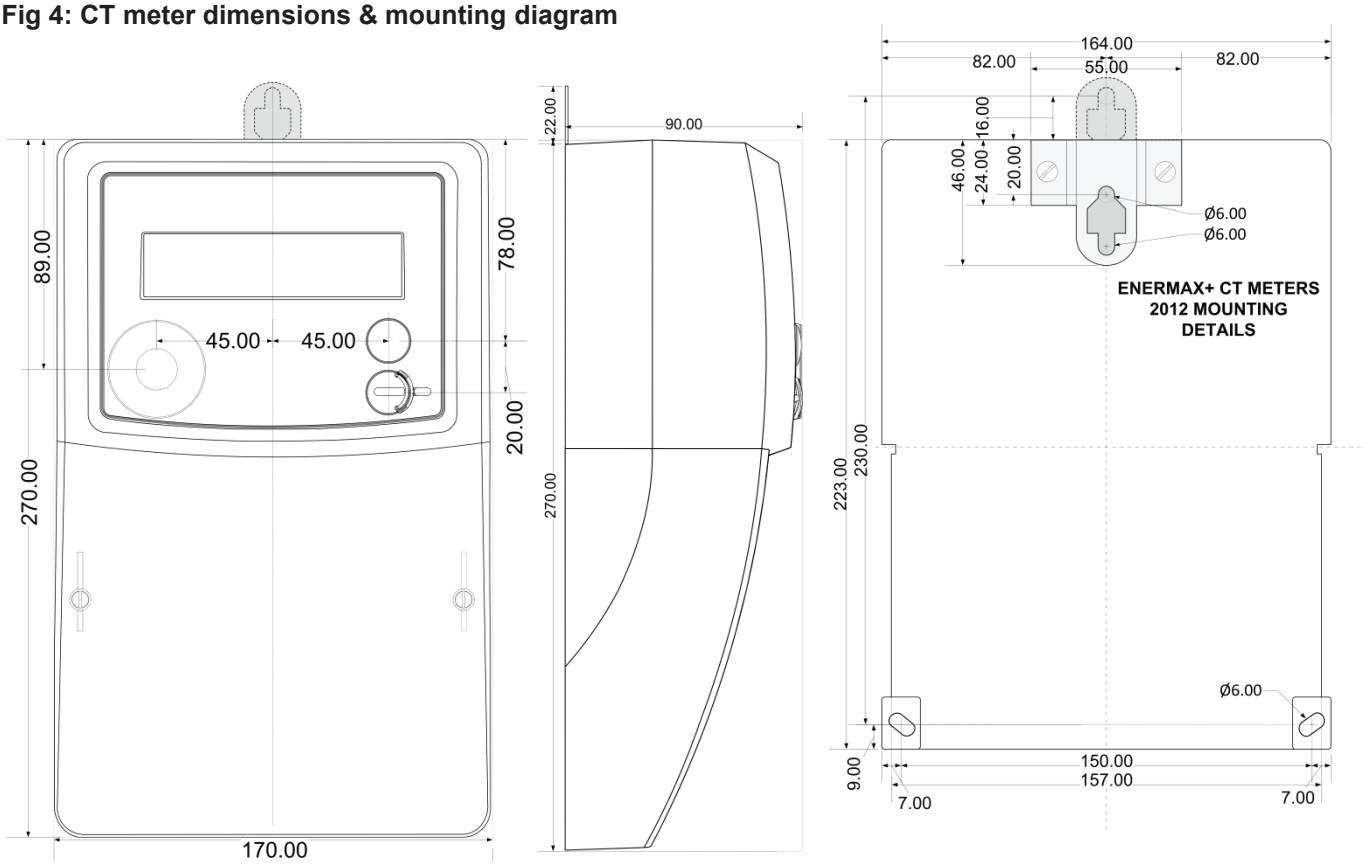


Fig 5: Meter CT, VT connections for three or four wire application and auxiliary connections.

IMPORTANT NOTES

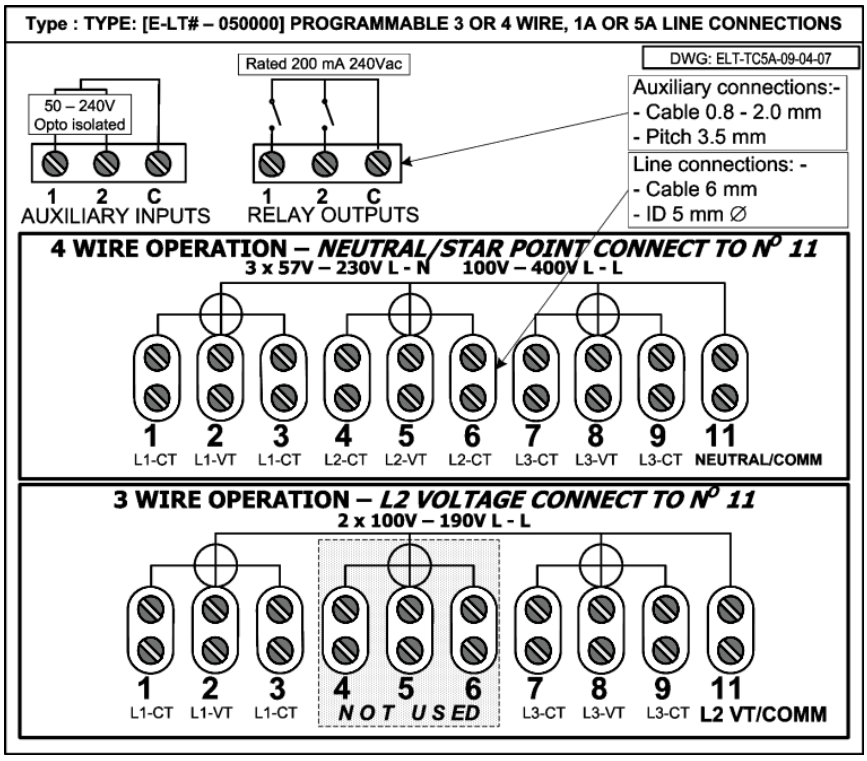
*The CT operated meter measures power by referencing **terminal 11**; it must be connected for the meter to work correctly.*

Three or four wire

When connecting to a three or four wire system, the Enermax meter must be ordered specifically for the system and voltage it is to be connected.

- *FOUR WIRE: all three voltages are connected, L1, L2 & L3 with neutral to terminal 11.*
- *THREE WIRE: only two voltages are connected, L1 & L3 with L2 common connected to terminal 11.*

PLEASE REFERENCE *the diagrammatic connection diagrams in this document for guide to meter system voltage connection applications.*



Powering up the meter

When supplied with power, the green LED within the optical communication window will light.
Three LCD enunciators labelled VT1, VT2, and VT3 on the top of the LCD screen will indicate when line voltages are within the threshold setting of 85% of the setup voltage.
Upon first power up of the meter a start-up screen will be displayed for a few moments.
Thereafter the default display register will be displayed.

1/5A	Emax+ Startup v00.410
160A	Emax+ Startup v05.11

STANDARD FACTORY SETTINGS WHEN SHIPPED

NAVIGATING THE MENUS

There are 16 menus in the Enermax+, each one with a series of displays supplying you with information about the electrical system being monitored, and the meter itself.

- Menus 1 to 8 are user programmable;
- Menus 9 to 16 are factory set and non-programmable.
- For your convenience menus 1 and 2 have been pre-programmed for the two most common requirements, kWh & Block Demand, and kWh & Thermal Demand. You can re-program these to suit your own requirements.

Noting: the default display register will be displayed after start-up. The display will also revert to this display when the meter has been left in another display and no scrolling has occurred for a period of 2 minutes.
Top left of the display is where the meter is in the display sequence and alternates to the unique alpha code identifying the source of the information being displayed. Using the blue scroll button to move down the displays, the first six displays show information on how to access the higher level menus. The remaining displays show billing information for energy and demand.

Factory default programmed settings

User display registers:

Meter menus

The second pre-programmed menu shows billing information based on the kWh and thermal demand of the electrical system being monitored.

Factory pre -configure d user settings

Menus 1 & 2.

Meters from stock are supplied with a basic meter menu function, these will assessing and changing where necessary to suit the meters site installation and tariff functions where applicable.

Menus 3 to 8 are empty, and can be programmed to suit the application.

Menu 1

GG	01 FOR GUIDANCE SeeDisplays 1to6	Information screen
GN	02 MENUS 1 TO 8 UserProgrammable	Information screen
GO	03 MENUS 9 TO 16 Reference menus	Information screen
GH	04 ToAccessMenus Hold BothButtons	Information screen
GF	05 ReadRegisters PushScrollButton	Information screen
GP	06 To Exit Menu Hold BothButtons	Information screen
GI	07 Following... Billing Readings	Information screen
GD	08 Read Running Energy & Demand	Information screen
JQ	09 Energy 01 Run 0000053.13 kWh	Running energy & units
NV	10 MD01 Peak Run Highest Demand	Running MD function
NW	11 MD01 Reg Run 00000.0 VA	Running MD value & units
NX	12 MD01 Date Run yyyy/mm/dd hh:mm	Running MD date/time
NY	13 MD01 Info Run fBlk Non 01 0000	Running MD algorithm, settings & active i
GE	14 Read LastRset Energy & Demand	Information screen
JQ	15 Energy 01 S01 0000000.0 kWh	Stack 1 energy & units
NV	16 MD01 Peak S01 Highest Demand	Stack 1 MD function
NW	17 MD01 Reg S01 00000.0 VA	Stack 1 MD value & units
NX	18 MD01 Date S01 yyyy/mm/dd hh:mm	Stack 1 MD date/time
NY	19 MD01 Info S01 fBlk Non 01 0000	Stack 1 MD algorithm, settings & active inf
GQ	20 Following... TamperProofValue	Information screen
JS	21 Energy 02 Run 0000053.13 kWh	Running tamperproof energy & units
OA	22 MD02 Reg Run 00000.0 VA	Running tamperproof MD value & units
OC	23 MD02 Info Run nBlk Non 01 0000	Run tamperproof MD algorithm, settings, active i

Menu 2

GF	01 ReadRegisters PushScrollButton	Information screen
GP	02 To Exit Menu Hold BothButtons	Information screen
GI	03 Following... Billing Readings	Information screen
GD	04 Read Running Energy & Demand	Information screen
JQ	05 Energy 01 Run 0000053.13 kWh	Running energy &units
OD	06 MD03 Peak Run Highest Demand	Running MD function
OE	07 MD03 Reg Run 00000.0 VA	Running MD value & units
OF	08 MD03 Date Run yyyy/mm/dd hh:mm	Running MD date/time
OG	09 MD03 Info Run fThm Non 01 0000	Running MD algorithm, settings & active info
GE	10 Read LastRset Energy & Demand	Information screen
JQ	11 Energy 01 S01 0000000.0 kWh	Stack 1 energy & units
OD	12 MD03 Peak S01 Highest Demand	Stack 1 MD function
OE	13 MD03 Reg S01 00000.0 VA	Stack 1 MD value & units
OF	14 MD03 Date S01 yyyy/mm/dd hh:mm	Stack 1 MD date/time
OG	15 MD03 Info S01 fThm Non 01 0000	Stack 1 MD algorithm, settings & active info
GQ	16 Following... TamperProofValue	Information screen
JS	17 Energy 02 Run 0000053.13 kWh	Running tamperproof energy & units
OI	18 MD04 Reg Run 00000.0 VA	Running tamperproof MD value & units
OK	19 MD04 Info Run nThm Non 01 0000	Run tamperproof MD algorithm, settings & active info

CT & WHOLE CURRENT METERS - TENDER REFERENCE

Inputs & Outputs.

Auxiliary: Input 1 block interval sync, Input 2 Month-end reset sync, Input 3 selects installation menu.
Output 1: block interval sync, Output 2: Month-end reset sync, Output 3: Voltage failure.

Factory pre-configured fixed settings

Menus 9 to 16 containing the following information:

09	Reference: The first 40 energy registers for running and stack 1
10	Reference: The first 40 demand registers for running and stack 1…4
11	Reference: The Last demand
12	Reference: The Instantaneous V, A, W, VA, VAR, PF, phase angles, Quadrants etc.
13	Reference: Access to information on the module fitted in bay 1 in the meter.
14	Reference: Access to information on the module fitted in bay 2 in the meter.
15	Reference: Access to Info/set/State. E.G. date/time.
16	Factory reference only: Factory use during manufacture

Example Menu 15

Menu 15

FU	03 RTC Time 08:01:45	Meter's real time
FT	04 RTC Date 2005/12/05	Meter's real date
SD	05 CM UART S1 300 Rx 17815	Monitor optical head comms counts valid! & counts valic
SE	06 CM UART S2 RxErr 0	Count of attempts with incorrect comms settings
SF	07 CM Mode - C Rx ID To: 0	Protocol status
SG	08 CM CommsEvent Idle	What is being loaded into the meter
BT	09 CM Serial No 00000000	Meter serial number
BA	10 Meter Model 34W230V50/60HZCT	What the meter can be set for
TJ	11 Meter type 4W 400V 5A 50Hz	What the meter is set for
RO	25 CM Inputs HW State:000	Monitors state if the meters inputs
RP	26 CM Outputs State:000	Monitors state if the meters outputs
DA	27 Tariff Name Two Part Tariff	Displays the current tariff being used by the met
SS	28 TariffSummary Hol:N S:01D3S1t0	Indicates the current holiday, season, day & special day
ST	29 Tariff R1 - 16 0000000000000000	From left to right; rate 1 to 16, will display 1 when active
SU	30 Tariff R17 - 32 0000000000000000	From L to R; rate 17 to 32, will display 1 when act
WH	31 Prof 1 Detail SUM 30 1478	Channel 1 profile settings: Sum data every 30min; record
WI	32 Prof 1 Value ---------- Wh	Channel 1 profile present periods: Value & units
WJ	33 Prof 2 Detail SUM 30 1478	Channel 2 profile settings: Sum data every 30min; record
WK	34 Prof 2 Value ---------- Wh	Channel 2 profile present periods: Value & units
WL	35 Prof 3 Value Detail: Not used	Channel 3 profile settings: not set to record
BC	12 MM FW Version V00.106	Meter's measurement firmware version
BU	13 CM FW Version v.00.970 05/11/2	Meter's operating firmware version
AQ	14 ImportVersion 2005/12/05	Display text version used by meter
BB	18 MM switches 5A tamper: 44	Monitors the CT 1/5A setting
TN	19 CT Pri/Sec 10000/5 Swt:5	Programmed current ratio & setting of CT switch
TO	20 VT Pri/Sec 132000/110	Programmed voltage ratio
TM	21 IntMeterConst 100.000	Programmed meter internal constant (multiplier)
JK	22 StackInfo Run 2005/11/29	Date running registers where last moved t stack 1
CN	23 MER Lockout 00.00	Month-End reset will be blocked out for Hrs 00:00
RN	24 CM Inputs SW State:000	Meter state can be=ON or OFF, state depends c setting
WM	36 Prof 3 Detail Value: Not used	Channel 3 profile not set
WN	37 Prof 4 Value Detail: Not used	Profile not set
WO	38 Prof 4 Detail Value: Not used	Profile not set
WP	39 Prof 5 Value Detail: Not used	Profile not set
WQ	40 Prof 5 Detail Value: Not used	Profile not set
WR	41 Prof 6 Value Detail: Not used	Profile not set
WS	42 Prof 6 Detail Value: Not used	Profile not set
WT	43 Prof 7 Value Detail: Not used	Profile not set
WU	44 Prof 7 Detail Value: Not used	Profile not set
WV	45 Prof 8 Value Detail: Not used	Profile not set
WW	46 Prof 8 Detail Value: Not used	Profile not set

EXPANSION MODULES

Installing

The meter needs to be in a safe state when installing the expansion module, i.e. either powered down or use the meter expansion module meter safe insertion function in the factory menus 13 (EM1) & 14 (EM2).
Presently only the 160A meters firmware has been upgraded for this function.
It is generally possible for the CT meters to be taken off-line without interrupting the consumers supply.

Installation location & plugging in

The meter has two module plugin bays, No1 (left bay) & No2 (right bay) refer to figure 6.
A number of expansion modules are available to increase input/output lines, and to add remote communication facilities to the Enermax. Expansion modules are fitted by sliding the module upwards into the bay, and pushing it firmly into place till the catch latches. To release it, press the spring catch on the body of the module then slide down and out of the bay.

Enermax 160A Expansion Module Safe Insertion

Directly connected meters cannot be isolated from the supply when the consumer is operational, for this reason the meter firmware upgrade has now been created to insert expansion modules without isolating the meter. This is presently functional in the latest v05.430 160A meters.

Expansion module safe insertion - menu location

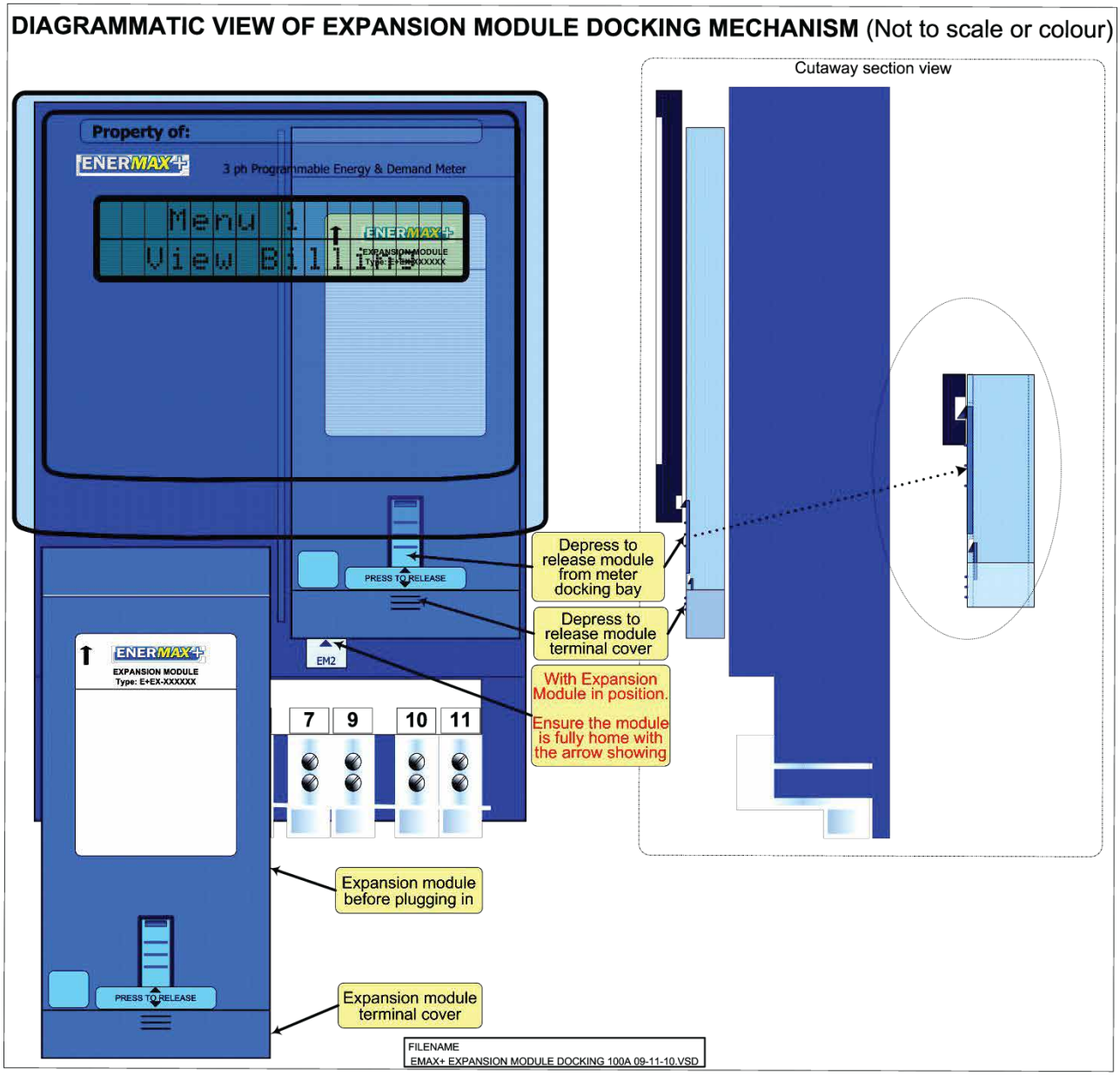
There are separate menus for expansion modules 1 and 2 with EM1 menu shown below. Both M13 (EM1) & M14 (EM2) menus are identical in there structure.
The table below indicates the meters screen and the process to put the meter in the safe mode to prepare for inserting an expansion module.

Safe mode process g uide

In this order….. press and hold the reset button, then immediately also press and hold the scroll button to access all the menus. The switch to all menu access will not take more than four seconds, if it does not change within this time release the buttons and check the reset button is not in the locked position. With the users default menu number showing, use the scroll button to move the display to menu M13.	
Menu 13 Expansion Module EM1	
M13 List?=Reset! Exp Module EM1	While at this menu display, press and hold RESET button
01 ReadRegisters PushScrollButton	This display indicates you have now entered M13 menu for expansion module in bay 1.
02 To Exit menu Hold BothButtons	This display indicated how the user can exit the M13 menu.
03 EM1SafeInsert Press RESET	***Before*** you press RESET the terminal cover must be removed and expansion module ready to insert. While in this display the user can start the safe insertion cycle (time remaining 30sec). Press RESET to install the EM1 module; this ensures data integrity while plugging the module into the meter.
04 ImportVersion 2013/09/10 01v13	To bypass the EM1 power-down for module insertion, don't press RESET, press the SCROLL button.
03 EM1SafeInsert TimeRemaining 30	There is a need to insert the EM1 module before the time remaining elapses. Once it has elapsed data integrity cannot be ensured, i.e. plugging in the module when safe insert is not active has the potential to corrupt a portion of the meters data.
Power On 12345 v05 .430 13372001	Display indicates the meter has ended the safe insertion period and returning the meter to its normal function.
01 FOR GUIDANCE SeeDisplays 1to6	When the meter has a default display timeout set the meter will automatically revert back to the default display. The display example is showing the factory default setting.

Fig 6: Meter expansion module docking.

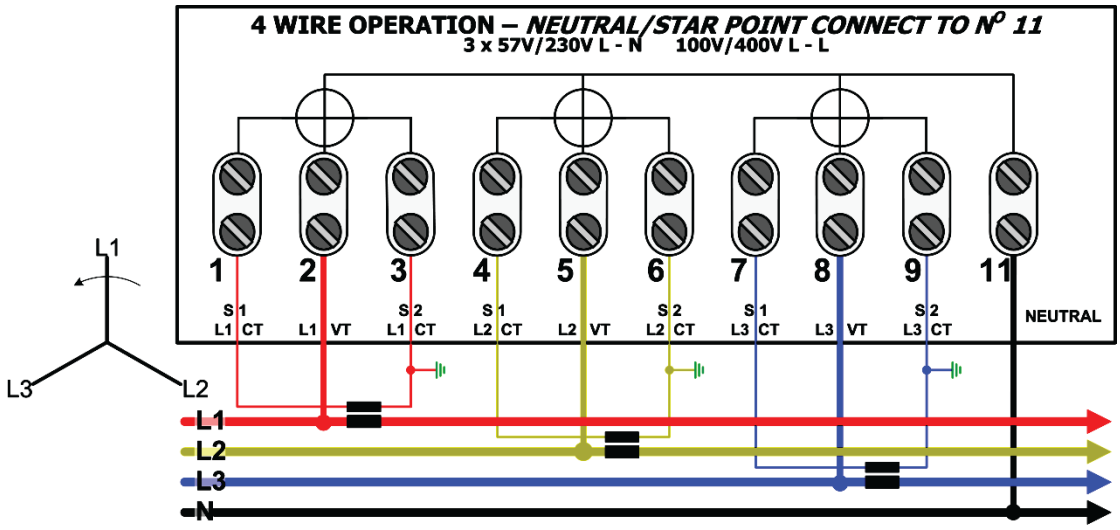
Note the 160A meter expansion module docking bays are the same fitting as the 5A CT connected meter.



CURRENT TRANSFORMER (CT) OPERATED METER DIAGRAMMATIC CONNECTION EXAMPLES

Fig 7: 3 phase 4 wire supply, 230V L-N direct voltage diagrammatic connected system.

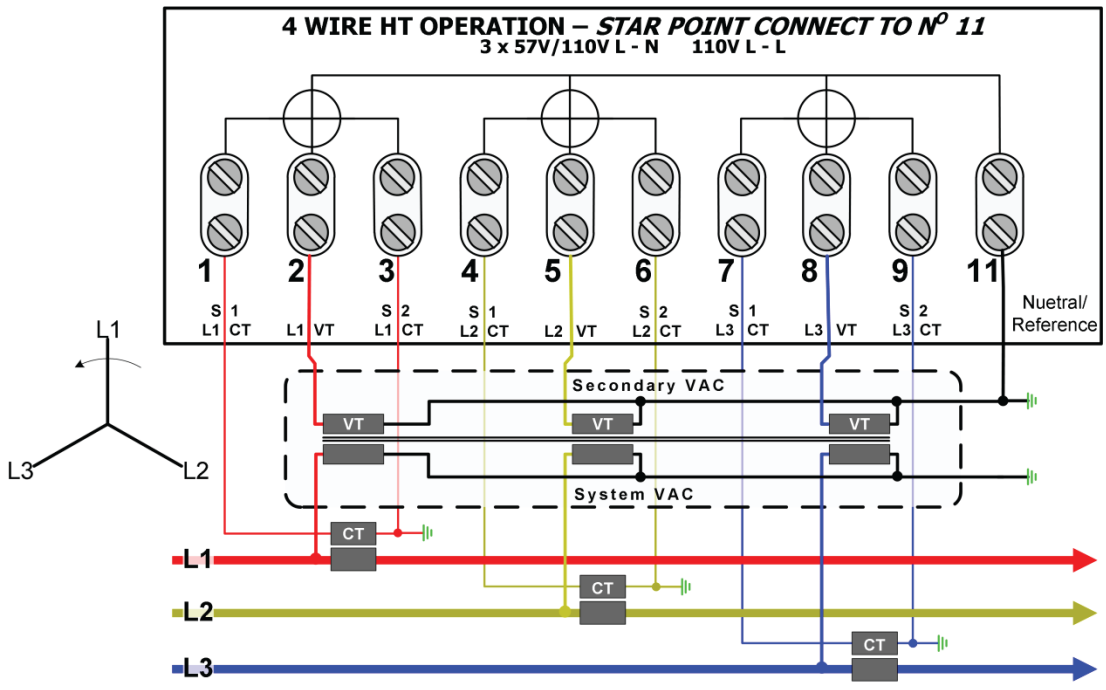
Direct voltage four wire system 400V L-L with 230V L-N reference on meter terminals.
The meter requires programming to suit the VT & CT ratio system connection.
The Enermax meter cannot be used without connecting terminal 11.



Note: The CT earth connections can be S1 or S2 depending on design preferences.
The Enermax+ internal CT's are not earthed, allowing S1 or S2 to be externally earthed as required.

Fig 8: 3 phase 3 wire supply, medium to high voltage 4 wire diagrammatic connected system.

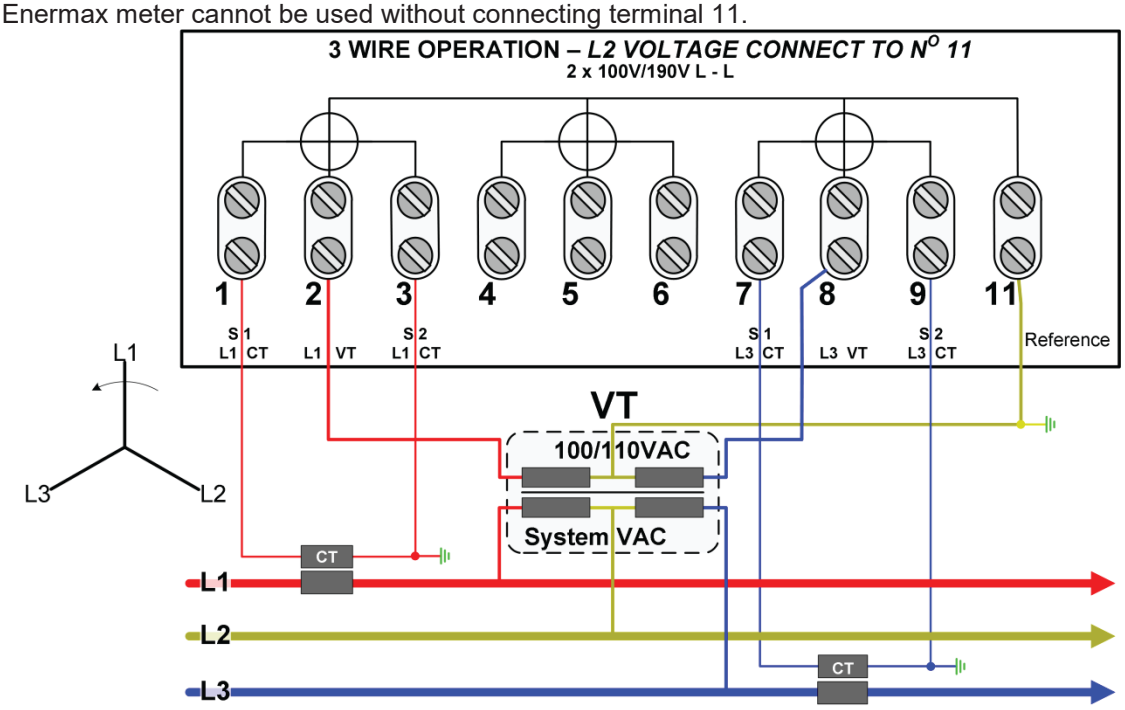
Four wire transformer secondary connected 110V L-L with 63.5V L-Common reference on meter terminals, transformer primary three wires connected to system voltage (11000V L-L).
The meter requires programming to suit the VT & CT ratio system connection.
The Enermax meter cannot be used without connecting terminal 11.



Note: The CT earth connections can be S1 or S2 depending on design preferences.
The Enermax+ internal CT's are not earthed, allowing S1 or S2 to be externally earthed as required.

Fig 9: 3 phase 3 wire supply, medium to high voltage 3 wire diagrammatic connected system.

Three wire transformer secondary connected 110V L-L with 110V L-Common reference on meter terminals, transformer primary three wires connected to system voltage.
The meter requires programming to suit the VT & CT ratio system connection.
The Enermax meter cannot be used without connecting terminal 11.



Note: The CT earth connections can be S1 or S2 depending on design preferences. The Enermax+ internal CT's are not earthed, allowing S1 or S2 to be externally earthed as required.

METER SPECIFICATIONS FOR CT & 160A MODELS

ELECTRICAL PARAMETERS

Accuracy :
- E160A : Active energy to IEC 62053-21 Class (1).
- E160A : Reactive energy to IEC 62053-23 (2).
- CT 1/5 A: Active energy to IEC 62053-22 (0.5).
- CT 1/5A : Reactive energy to IEC 62053-23 (2).

Line Frequency :
- E160A : Nominal 50Hz
- E160A : Tolerance ± 5%
- CT 1/5A : Nominal 50Hz.
- CT 1/5A : Tolerance ± 5%.

Measurement, starting thresholds : IEC62053-22.
- E160A : 3Ph Phase to Neutral/Comm 230V.
- E160A : 3Ph Start Amps, Phase % 0.1% $I_{N.}$
- E160A : 3Ph Start Volts, Phase to Neutral 120V.
- CT 1/5A : 3Ph Phase to Neutral/Comm 230V.
- CT 1/5A : 3Ph Start Amps, Phase % 0.1% $I_{N.}$
- CT 1/5A : 3Ph Start Volts, Phase to Neutral 3w-57, 4w-110, 4w-230V

Nominal Current In : IEC62053-21.
- E160A : I_N 20A
- E160A : I_{MAX} 160A.
- E160A : Short circuit 0.5s @ 20 x $I_{MAX.}$
- CT 1/5A : I_N 1/5 Dip Swt.
- CT 1/5A : I_{MAX} 200%.
- CT 1/5A : Short circuit: 0.5s @ 20 x $I_{MAX.}$

Line Nominal Voltages : Range
- E160A : 3Ph four wire: Line to line, 200V to 400V, Absolute: 90% to 120%.
- E160A : 3Ph four wire: Line to Neutral, 120V to 230V, Absolute: 90% to 120%.
- CT 1/5A : 3Ph four wire: Line to Neutral, 57V to 230V, Absolute: 80% to 120%.
- CT 1/5A : 3Ph 3 wire: Line to common, 57V to 230V, Absolute: 80% to 120%.

Burden per phase in Voltage Circuit : IEC 62053-21
Test conditions: three phases connected.
- No expansion modules fitted:
  E160A : 3ph 230Vac: <1.0W <2.0VA.
  CT 1/5A : 3ph 230Vac: <1.0W <2.0VA.
- Two expansion modules fitted:
  E160A : 3ph 230Vac: <2.0W <3.0VA.
  CT 1/5A : 3ph 230Vac: <2.0W <3.0VA.

Line Burden per phase in Current Circuit :
- E160A : 160A: <0.02VA.
- CT 1/5A : 1A: <0.05VA. 5A: <0.1VA

Insulation withstand IEC62052-11. E160A & CT 1/5A

Impulse Voltage : IEC62052-11. E160A & CT 1/5A
- Test with accordance specified in IEC 60060-1.

Electrostatic Discharges : IEC62052-11. E160A & CT 1/5A
Contact discharged 8kV.

Electromagnetic RF Fields : IEC62052-11.E160A & CT 1/5A
- 80 MHz–2 GHz tested to IEC 61000-4-3, 10 and 30 V/m.
- Radio Interference Suppression, IEC/CISPR 22 Class B.

Fast Transient Burst Test : IEC62052-11. E160A & CT 1/5A
- 4kV.

Surge immunity Test : IEC62052-11. E160A & CT 1/5A
- 4kV.

Real Time Clock : IEC62054-21. E160A & CT 1/5A
- Accuracy: @ 25 Deg C: 0.5s/day.
- Synchronising Crystal or line frequency. Via computer Master Station.

Battery : (Only supports RTC during power down).
- Replaceable 3V Lithium, Battery model CR2032.
- Meter powered-down total period, ten years.

METER CONNECTIONS - E160A & CT 1/5A

Clearance and Creepage : IEC62052-11 Class 2.
- Voltage phase to earth derived from rated system… ≥300V.
- Rated impulse voltage 6000V.

E160A Line Phase Terminals : IEC62052-11.
- 8 terminals aperture size: 12mm high, 11.5mm wide.
- Total maximum rectangle area: 138mm2.
- Each terminal clamps the cable with 2 x 8mm coated screws.
- Terminal Block Insulation Material IEC62052-11, Flame retardant Polycarbonate.

- Cable 70mm^2 19/2.39 strands: 11.9mm Dia
- Cable 95mm^2 19/2.57 strands: 12.8mm Dia
- Cable Copper insertion depth: 28mm
- Cable Insulation insertion depth: 6mm + 3.6mm barrier

1/5 A Line Phase Terminals : IEC62052-11.
- 10 terminals aperture size: 5mm ID.
- Each terminal clamps the cable with 2 x 4mm coated brass screws.
- Terminal Block Insulation Material IEC62052-11, Flame retardant Polycarbonate.

- Cable: 6mm^2:
- Cable Copper insertion depth: 24mm
- Cable Insulation insertion depth: 8mm

Auxiliary terminal connections & I/O :
Isolation: Input to output $V_{I/O}$ 3750V_{RMS}.
Impulse: Specification 2.5kV. Inputs & Outputs (Bridged) (Bridged).
Program: Function: pulse/control. Inputs/Outputs.
Term: clamp 0.08-5mm^2 3 +1 comm. Inputs & Outputs.
Wire size: 1.5mm^2 3 +1 common. Inputs & Outputs.

Inputs: Digital. Qty 3.
Current: AC < 2 mA ohmic at 250V.
Voltage: 15…250 VDC or 50…250VAC.
Isolation: 2kV Withstand.

Outpu ts : Solid state SPST relays. Qty 3.
Life expectancy: no moving parts to fail.
Output Form: Dead state: N/O.
Output State: Standby state: N/O or N/C.
Current: Maximum 200mA.
Voltage: 250VDC - 250VAC.

USER INTERFACES- E160A & CT 1/5A

Meter Buttons :
- One wire sealed Reset button.
  For Month-End reset, press & hold till displays confirms.
- One scroll button. For Scrolling Displays or Menus.

LCD liquid crystal display :
- Type: Two rows of 16 dot matrix characters, each row 8mm high.

LED'S :
Calibration LED's, IEC62052-11.
- Faceplate: Two Red, 1 Imp/Wh & 1 Imp/varh. (20mm apart centre to centre).
  Indication of voltage above set threshold.
- Faceplate: Three green: V1, V2, V3 line failure indication LED's.
- Faceplate: One green healthy indication LED, located inside optical head comms aperture.

Communications - Optical Port : E160A & CT 1/5A
- Type: Serial, Bidirectional half duplex, IEC 62056-21, IEC 62056-21 Mode C
- Rx/Tx: Protocols, IEC 62056-21 Mode C.
  Baud: Max bit rate: 115200.

ENVIRONMENT- E160A & CT 1/5A

Shock and Vibration : IEC62052-11.
- Shock: IEC 60068-2-27, Vibration: IEC 60068-2-6.

Humidity : IEC62052-11.
- None condensing up to 95%.

Temperature : IEC62052-11 & IEC 62053-22.
- Operation range: -25°C to +55°C.
- Storage range: -25°C to +70°C.
- Coefficient Range: -20°C to+55°C.

Housing : IEC62052-11 (5.9).
- Impermeability: IP52.
- Materials: IEC62052-11.

INSTALLATION

Dimensions :
- E160A: Width 198mm Depth 110mm Height 275mm.
- CT 1/5A: Width 170mm Depth 85mm Height 270 mm.
- Mounting bracket: E160A & CT 1/5A when reversed, add 22 mm on meter height.

Mounting :
- Mount meter indoors on flat surface with three fixing screws. E160A : ≤5mm. CT 1/5A : ≤6mm.

Terminal cover :
- Secured with two wire sealable screws.
- Auxiliary cable access:
  E160A: Slide out aux gland mounting.
  CT 1/5A: breakouts.

Meter cover :
- Secured with a second set of two wire sealable screws under the terminal cover.

SHIPPING

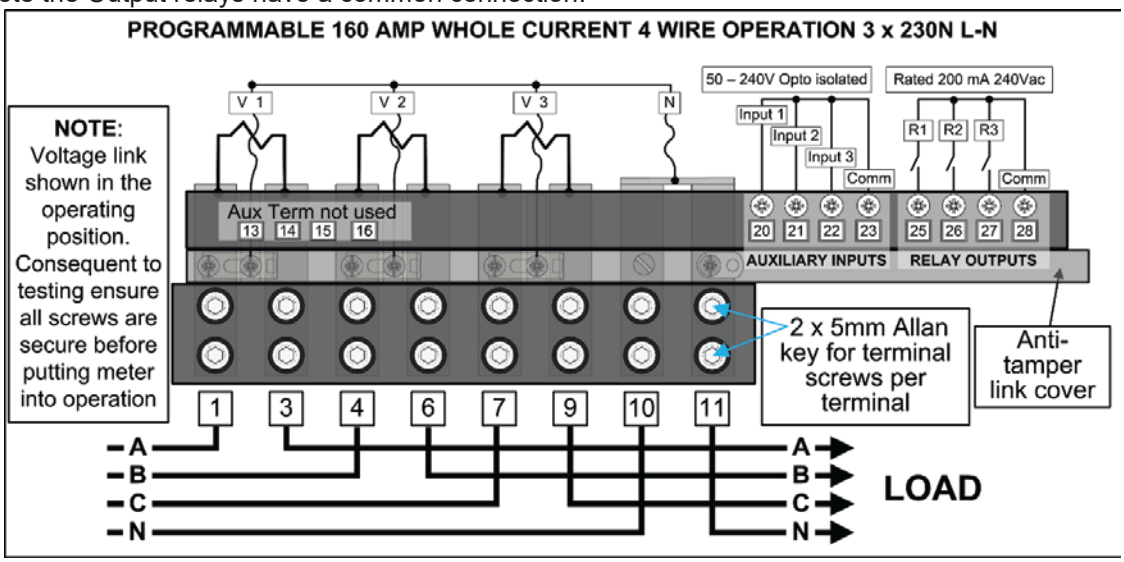
Meter :
- E160A: Loose without packaging: Mass 2.5kg.
- E160A: With packaging: Mass 2.8kg.
- E160A: Packaging dimensions W250 D160 H310mm.
- CT 1/5A: Loose without packaging: Mass 1.5kg.
- CT 1/5A: With packaging: Mass 1.8kg.
- CT 1/5A: Packaging dimensions W210 D140 H310mm.

2016-03-03: All specifications subject to change without prior notice.

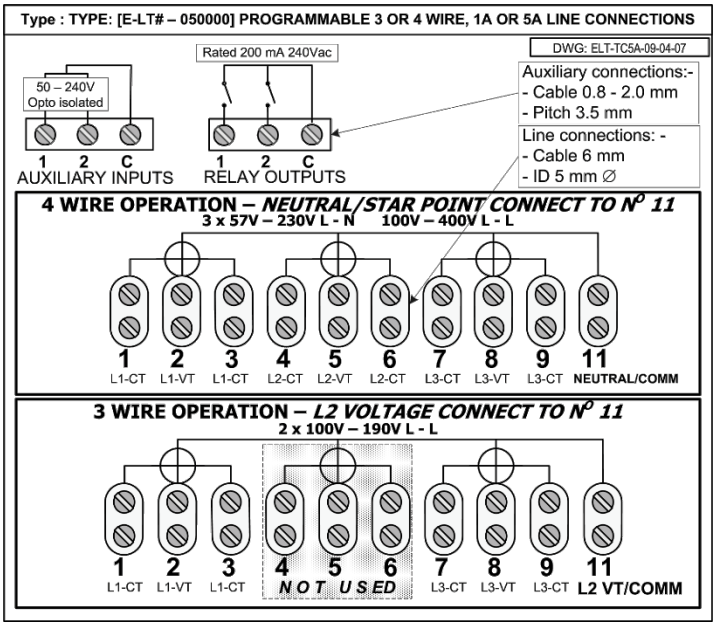
Annexure 1

Terminal block

1. 160A meter: Terminal block and casing structure:
    a. The 160A connection terminal block is secure and rigid and can cause no undue forces on the internal circuitry. The meter mounting screws add additional rigidity as they firmly clamp either side of the terminal block to the surface of the plate/chassis where the meter is mounted.
    b. The internal circuit is solid copper bar that extends into the terminal cavity to make direct contact with the conductor/cable connection.
2. Terminal diagram fitted inside the terminal cover.
3. Note the Inputs have a common connection.
4. Note the Output relays have a common connection.



5. CT meters diagrams 3W or the 4W will be inside the terminal cover.



Serial number

1. Serial number/barcode format.

Output & Inputs

1. Output relays 3 SSR outputs:
   No bounce as it is a solid state relay. Isolated output. Can be programmed for…
   a. Energy Pulse outputs: Active energy, reactive energy. Pulse wetting time 80ms.
   b. Pulse/state output: Block period (integration period resets), Active tariff rates, Events.
   c. Number of operations life expectancy: Not applicable, no moving parts.

2. Meter I/O: The meter has three inputs and three outputs. The inputs have a common connection but separate from the outputs. The outputs also have a common connection.

3. I/O Expansion modules used to extend the meters inputs and outputs. Max of two expansion modules can be fitted.
   The expansion modules types offer the following.
   E+EA-4N4T00: total of four inputs plus a total of four outputs.
   - Two inputs with one common connection plus a second group of two inputs with one common connection. Each group is isolated from each other.

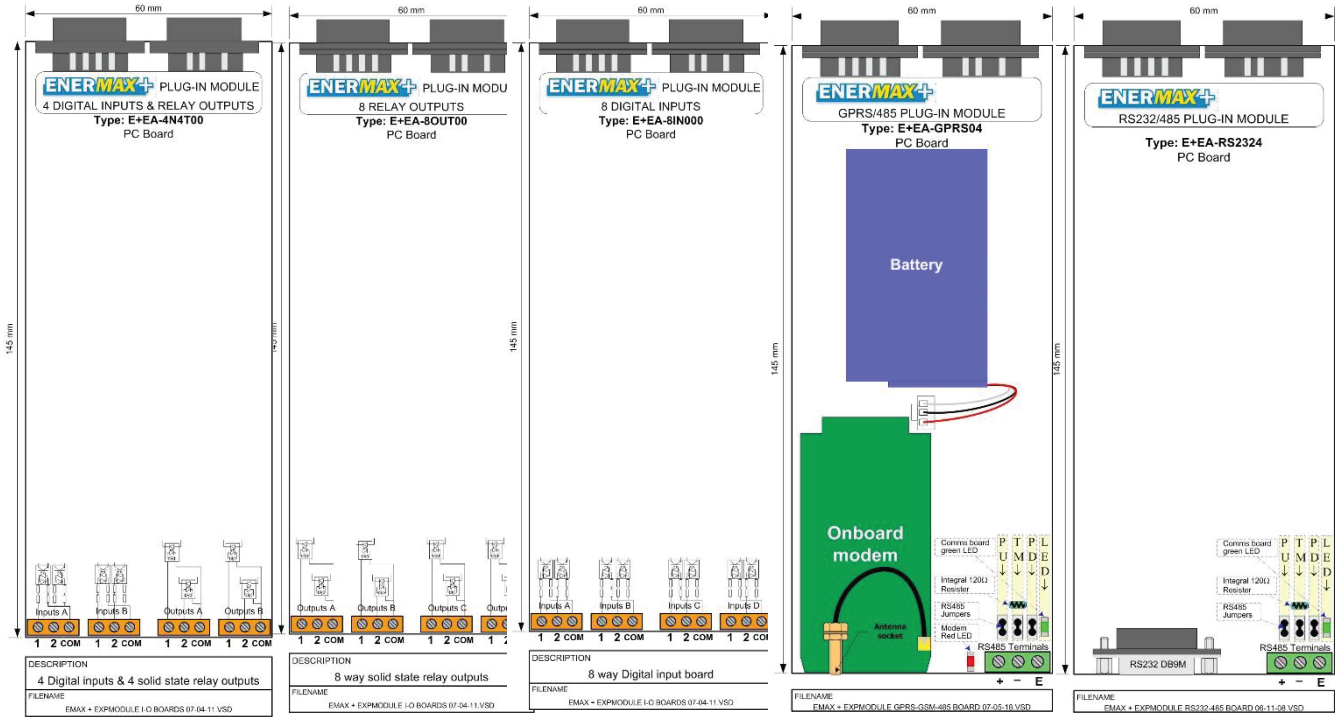
   E+EA-8OUT00: total of four outputs.
   - Eight outputs in four groups, each group has one common connection. Can have a different voltage controlled from each group. Each group is isolated from each other.

   E+EA-8IN000: total of four inputs.
   - Eight inputs in four groups, each group has one common connection. Can have a different control circuit to each group. Each group is isolated from each other.

Communications

1. Meter communications.
   Standard port on the meter: The meter can be programmed or data read via the optical port on the front of the meter. The optical head connects to the computer USB port.
   Expansion modules: All communications modules have a RS485 port fitted as standard.
   The three other communication modules are Cell modem, LAN, and RS232.
   The meters can be multi-dropped using the RS 485 port on any of the communication plug-in modules.
   a. All data can be retrieved from the meter with remote communications inclusive of billing, profile and event logging. Online readings can be evaluated on remote communications.

   Expansion modules.



Measured values

1. POWER FLOW MEASURABLE.
   The meter measures all four quadrants for import/export values of watt, Var, PF.
   Maximum demand is date and time stamped for both kW MD and kVA MD. All values are programmable to be on the display.
2. IEC62053-21: 2003 [clause 8.2].
   [Limits of error due to influence quantities].
   The meter complies with the above standard and value tested referenced in "Table 8 Influence quantities".
3. IEC62053-24: 2014 [clause 8.3].
   [Limits of error due to influence quantities].
   The meter complies with the above standard and value tested referenced in "Table 8 Influence quantities".

LCD METER DISPLAY

1. The display is not influenced by the power supply.
   The LCD display is easy to read and non-blinking.
   HISTORY: The history displays are selectable to put into the display in any sequence required by the user and can then be scrolled to from the default display, or the user can use one of the other user menus to display less used information.
2. Online information.
   a. Voltage L1, L2 & L3, Current L1, L2 & L3, Watts L1, L2 & L3, vars L1, L2 & L3, Hz, Temperature, PF L1, L2 & L3, VA L1, L2 & L3,
   b. Phase angle L1, L2 & L3 volt to volt or volt to amp and quadrants.
3. Number of power outages: Meter information can be retrieved by going to [Task] [Read meter info pack] and retrieving the data.
4. Last meter configuration date and time of programming can be selected and displayed from 05 Programming setup information.
5. Remotely reading specific registers.
   a. Meter registers in use can be read by specifying under [Tasks] [Task Control] [Job/Task management] to be read remotely or via the optical head.

Billing data

1. Maximum demand reset & energy registers.
   The registers can use import or export for the recording of energy in all quadrants
   Maximum demand can be kW or kVA.
   a. Demand registers: The date and time is stamped against the maximum demand kW and VA MD.
      The user can select the current maximum demand and up to sixteen historic maximum demands.
      The sixteen historic demand registers are the result of the last sixteen month-end resets.
   b. Month-end reset methods:
      i. AUTOMATIC MONTH-END RESET METHODS: Are programmable for…
      ii. CONTINUOUS ENERGY REGISTER ACCUMULATOR: On the event of a month-end reset, the current maximum demand will be reset to zero. The current energy registers are not reset to zero, i.e. energy registers will continuously accumulate energy to the maximum accumulator capacity, and at that point the energy registers will rollover back to zero.
      iii. ENERGY REGISTER RESET ON MONTH-END: With this setting both the current maximum demand and the current energy registers are reset to zero.
      iv. MANUAL MONTH-END RESET METHODS: Wire or similar seal can be used to inhibit any month-end rest occurring via the meter reset button. Reset programmable for…
      v. CONTINUOUS ENERGY REGISTER ACCUMULATOR: on the event of a month-end reset, the current maximum demand will be reset to zero. The current energy registers are not reset to zero, i.e. energy registers will continuously accumulate energy to the maximum accumulator capacity, and at that point the energy registers will rollover back to zero.
      vi. ENERGY REGISTER RESET ON MONTH-END: With this setting both the current maximum demand and the current energy registers are reset to zero.
      vii. CUMULATIVE MAXIMUM DEMAND: This register is available for display and record.
2. Energy registers memory.
   a. Energy can be stored in registers as follows...
      i. Register for total energy consumption.
      ii. Individual registers for each tariff period.
3. Tariff combinations: It is possible to record both active and apparent demand in each of the rate periods.

Profile data

1. DATA CHANNELS: Total of eight date and time stamped channels can be used to record data.
   a. Configuring: The channels a fully configurable for the energy and demand registers in the four quadrants to record every 15 or 30 or 60 minute period.
   b. Data capacity: With four channels recording every thirty minutes the user will have four hundred days data before the oldest data is over written.
   c. Measurement periods configurable…
      Select from range: 1 to 6 minutes in one minute steps, then in steps of 10, 12, 15, 20, 30, & 60 minute periods.
   d. Any combination of the following can be selected up to a maximum of eight channels.
      i. PHASE ANGLE: Algorithm selection: [Minimum] or [Maximum] or [Average].
         - Derived register selection 1: Phi of voltage to current L1 or L2 or L3 or 3phase total.
         - Derived register selection 1: Phi of voltage to voltage L1 to L2 or L1 to L3.

      ii. POWER FACTOR: Algorithm selection: [Minimum] or [Maximum].
         - Derived register selection 1: PF of voltage to current L1 or L2 or L3 or 3phase total.

      iii. QUADRANT: Algorithm selection: [Snapshot].
         - Derived register selection 1: Quadrant of L1 or L2 or L3 or 3phase total.

      iv. FREQUENCY: Algorithm selection: [Minimum] or [Maximum] or [Average].
         - Derived register selection 1: System frequency.

      v. TEMPERATURE: Algorithm selection: [Minimum] or [Maximum] or [Average].
         - Derived register selection 1: meter temperature.

      vi. VOLTAGE: Algorithm selection: [Minimum] or [Maximum] or [Average].
         - Derived register selection 1: Voltage of L1 or L2 or L3.

      vii. CURRENT: Algorithm selection: [Minimum] or [Maximum] or [Average].
         - Parameter selection: Current of L1 or L2 or L3.

      viii. POWER/ENERGY: Algorithm selection: [VA using Watts & vars] [Thermal] [Average] [Sum].
         - Parameter selection: Energy of L1 or L2 or L3.
         - Can record VA demand and energy consumption

Event logging

1. Events recorded with date & time stamp.
   a. Measurement categories configurable…
      Select from range: 1 to 6 minutes in one minute steps, then in steps of 10, 12, 15, 20, 30, & 60 minute periods.
   b. Data capacity: stores minimum of 400 days with four channels recording.
   c. Events stored in the meters memory.

      i. INPUTS & OUTPUTS: Monitor and record meter or expansion modules.
         - Input start-End, Output on-event.

      ii. TARIFFS: Monitor and record start-End.
         - Holidays, Season change.

      iii. BILLING: Tariff rate change for energy and demand,
         - Monitor and record slot energy and demand start-End, MER and type on event.

      iv. DEMAND: Monitor and record external block sync on-event.

      v. DISPLAY: Monitor and record on-event menu access.
         - Via the buttons or vectored to, or a pop up message occurs.

      vi. VOLTAGE: VT event L1, L2, L3.

      vii. CEM: Comms event manager
         - Parameter selection: Current of L1 or L2 or L3.

      viii. RTC: Real time clock when time up-dated - monitor clock sampling period and clock changes.

Tariffs

1. Tariff variable that can be configured for each tariff template:
   - Time and date when the tariff rates start and stop.
   - Date when holiday rate applies.
   - Energy Wh and varh pulse values can be set.

   The template steps are made up of...

YEARS:	Settings to configure number of years the SEASON(S) to run.
SEASONS:	[12] Settings to configure number of Months/Days the season is to run.
WEEKS:	7 day cycle using selected DAY TYPES.
EXCLUSION DATES (holiday):	[96] Settings to change DAY TYPE operation on pre-set dates.
DAY TYPES:	[8 per season] Mon to Friday plus special day. Selection to configure the RATE TIMES in each days 24 hour cycle.
RATE:	[32] Settings to allocate RATE name and colour.

TIME SWITCHING RESOLUTION:	[1/5/10/15/30/Other] Block period accumulating times.
Switching time resolution (minute):	1
Switching times:	64 / Season
Day types:	8 / Season
Seasons:	12
Change of season dates:	12/24
Exclusion dates:	96

2. Tariffs for different weekend day types: Every day can be independently scheduled for different tariff schedules and grouped for use over the season period to accommodate the schedule. The exclusion dates can be used within a day type to change the tariff schedules.

Meter reading displays

1. Display sequence.
   The display sequence is user configurable in all the user menus.

Meter engineering

1. Voltage threshold setting.
   The threshold is set in the Eman Plus Master Station SW; Setup Templates; Engineering (Group); Advanced Settings; Other settings; V1, V2, V3 voltage LED indicator.
   The setting is defaulted to 80% of the meter voltage that has been selected under [3/4 Wire, CT & VT Settings; Input Voltage to meter select].
   The range allowed is 100% down to 70% to trigger the LED when level falls below the setting, and then activates the log with time and date stamp when line voltage falls below the set threshold.
   When the voltage level rises above the set threshold it is again logged with time and date stamp.

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