finder®
RELAYING INNOVATION

THREE PHASE ENERGY METER 7E.85

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RISK INFORMATION

INFORMATION FOR YOUR OWN SAFETY

This manual does not contain all of the safety measures operating the equipment (module, device) for different conditions and requirements. However, it does contain information which you must know for your own safety and to avoid damages.
These information are highlighted by a warning triangle indicating the degree of potential danger.



WARNING

This means that failure to observe the instruction can result in death, serious injury or considerable material damage.



CAUTION

This means hazard of electric shock and failure to take the necessary safety precautions will result in death, serious injury or considerable material damage.

QUALIFIED PERSONNEL

Operation of the equipment (module, device) described in this manual may only be performed by qualified personnel.
Qualified personnel in this manual means person who are authorized to commission, start up, ground and label devices, systems and circuits according to safety and Regulatory standards.

PROPER HANDLING

The prerequisites for perfect, reliable operation of the product are proper transport, proper storage, installation and proper operation and maintenance. When operating electrical equipment, parts of this equipment automatically carry dangerous voltages. Improper handling can therefore result in serious injuries or material damage.

- Use only insulating tools
- Do not connect while circuit is live (hot)
- Place the meter only in dry surroundings
- Do not mount the meter in an explosive area or expose the meter to dust, mildew and insects
- Make sure the wires are suitable for the maximum current of this meter
- Make sure the AC wires are connected correctly before activating the current/voltage to the meter
- Do not touch the meter connecting clamps directly with metal, blank wire and your bare hands as you may get electrical shock
- Make sure the protection cover is placed after installation
- Installation, maintenance and reparation should only be done by qualified personnel
- Never break the seals and open the front cover as this might influence the function of the meter, and will cause no warranty
- Do not drop, or allow strong physical impact on the meter as the high precisely components inside may be damaged
- Designed to be mounted inside of switchboards or cabinet on DIN RAIL
- This device must have a suitable sized Circuit Breaker feeding the Multi Function Energy Meter so it does not exceed the maximum rated current
- The supply wiring of this device shall be suitable sized cable to match the installed circuit breaker
- A Disconnection Device (Circuit Breaker) should be installed close to the Multi Function Energy Meter
- The Disconnection Device shall be marked as the Disconnection Device for the Multi Function Energy Meter

DISCLAIMER

We have checked the contents of this publication and every effort has been made to ensure that the descriptions are as accurate as possible.
However, deviations from the description cannot be completely ruled out, so that no liability can be accepted for any errors contained in the information given.
The data in this manual is checked regularly and the necessary corrections are included in subsequent editions.
We are grateful for any improvements that you suggest.

PRODUCT INTRODUCTION

The 7E.85 energy meters measures and displays the characteristics of single phase two wire (1p2w), single phase three wire (1p3w), three phase three wire (3p3w,) and three phase four wire (3p4w) supplies, including voltage, frequency, current, power, active and reactive energy, imported or exported. Energy is measured in terms of kWh, kVArh. Maximum demand current can be measured over preset periods of up to 60 minutes. 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(CT). The 7E.85 energy meters can be configured to work with a wide range of CTs with 1A/5A output, giving the unit a wide range of operation. Three types of communication port are available on the meter for remote data transmission: RS485 Modbus , M-Bus and Ethernet Modbus TCP.
This unit can be powered from a separate auxiliary AC powersupply. Alternatively it can be powered from the monitored supply, where appropriate.

PRODUCT CHARACTERISTICS

- Bi-directional measurement IMPORT and EXPORT
- Ethernet Modbus TCP (Only for 7E.85.8.400.0410)
- Modbus RS485 RTU (For 7E.85.8.400.0210, 7E.85.8.400.0212)
- M-Bus EN13757-3 (Only for 7E.85.8.400.0312)
- Multi-parameters measurement
- LCD with white backlit, adjustable backlit time

MEASUREMENTS

- Phase voltage: V1, V2, V3
- Line voltage: V1-2, V2-3, V3-1
- Current: I1, I2, I3,IN
- Active power: P1, P2, P3, P_total (total active power)
- Reactive power: Q1, Q2, Q3, Q_total (total reactive power)
- Apparent power: S1, S2, S3, S_Total (total apparent power)
- Frequency: Hz
- Power factor: PF
- Active energy: Ep_imp (import active energy), Ep_exp (export active energy), Ep_total (total active energy)
- Reactive energy: Eq_imp (import reactive energy), Eq_exp (export reactive energy), Eq_total (total reactive energy)
- THD-I and THD-U
- Maximum demand: MD

SETUP

- Ethernet Modbus TCP setup
- Modbus RS485 RTU & M-bus EN13757-3 Setup
- Demand Interval Time
- Backlit time
- Supply system 1p2w, 3p3w,3p4w
- Reset
- Password modification

MODELS TABLE

MODEL	RS485 MODBUS	MBUS EN13757-3	TARIFFS (RTC)	DUAL SOURCES	ETHERNET TCP	DIGITAL INPUT
7E.85.8.400.0210	●	Uscita				
7E.85.8.400.0212	●			●		
7E.85.8.400.0312		●		●		
7E.85.8.400.0410					●	

TECHNICAL PARAMETERS

TECHNICAL PARAMETERS

Voltage AC (Un)	3*230/400VAC
Voltage range	100 - 277V a.c. (not for 3p3w supplies)
Voltage between phase	100 to 480V a.c (3p supplies only)
Current input	0.05-5(6)A, Max.6A
Over current withstand	20Imax for 0.5S
Frequency rating value	50/60Hz
Frequency range	45 - 65Hz
AC voltage withstand	4KV/1min
Impulse voltage withstand	6kV – 1.2µS waveform
Power consumption	≤ 2W/10VA
Display	LCD with white backlit
Max. reading	9999999.9 kWh/kVArh

ACCURACY

Voltage	0.5% of range maximum
Current	0.5% of normal
Frequency	0.2% of mid frequency
Power factor	1% of unity(0.01)
Active Power	±1% of range maximum
Reactive power	±1% of range maximum
Apparent power	±1% of range maximum
Active energy	Class1 IEC 62053-21/ Class 0.5S IEC62053-22/ Class B or C EN50470-3:2022
Reactive energy	Class2 IEC 62053-23

COMMUNICATION

RS485 MODBUS RTU

For Modbus RTU, the following RS485 communication parameters can be configured from the Set-up menu:

Baud Rate	2400,4800,9600,19200,38400bps
Parity	NONE(default)/ ODD / EVEN
Stop bits	1 or 2
RS485 network address	nnn 3-digit number, 001 to 247Port: 502

ETHERNET MODBUS TCP (ONLY FOR 7E.85.8.400.0410)

For Ethernet Modbus TCP, the following communication parameters can be configured from the Set-up menu:

Type	Ethernet
Protocol	Modbus-TCP
Modbus address range	1-247
IP	192.168.1.200 (default)
Port	502
MASK	255.255.255.0
Gateway	192.168.1.1
DHCP	Off (default)

M-BUS COMMUNICATION (FOR 7E.85.8.400.0312)

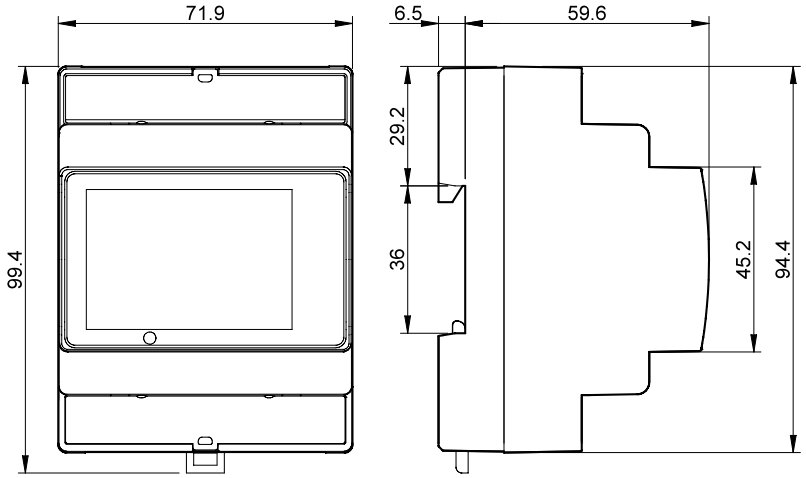
The meter provides an M-Bus port for remote communication. The protocol fully comply with EN13757-3.
The following communication parameters can be configured via M-bus communication:

Baud Rate	600,1200, 2400, 4800, 9600bps
Parity	NONE/ODD/EVEN (default)
Stop bits	1 or 2
M-Bus network primary address	nnn - 3 digits number from 001 to 250
M-Bus network secondary address	00 00 00 00 to 99 99 99 99

PERFORMANCE CRITERIA

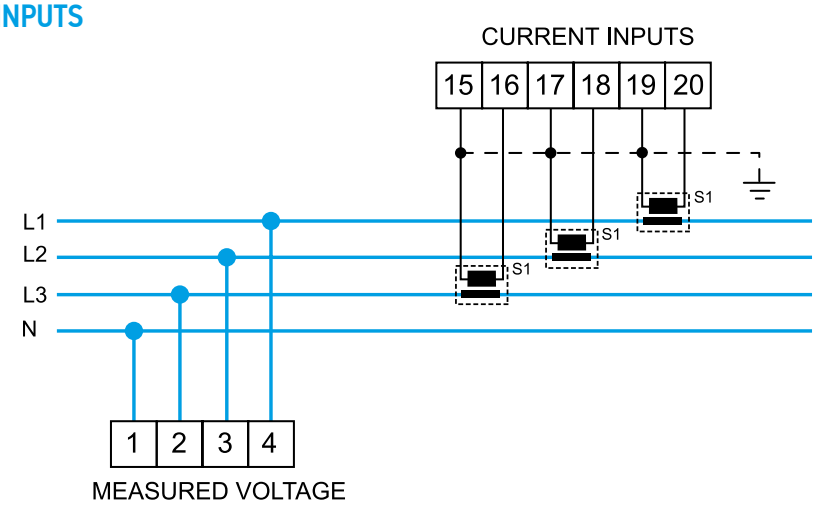
Operation humidity	≤90%
Storage humidity	≤95%
Operating temperature	-40°C~+70°C
Storage temperature	-40°C~+80°C
International standard	IEC62053-21
Installation category	CATIII
Protection against penetration of dust and water	front panel IP51 (indoor)
Insulating encased meter of protective class	II
Altitude	≤2000m

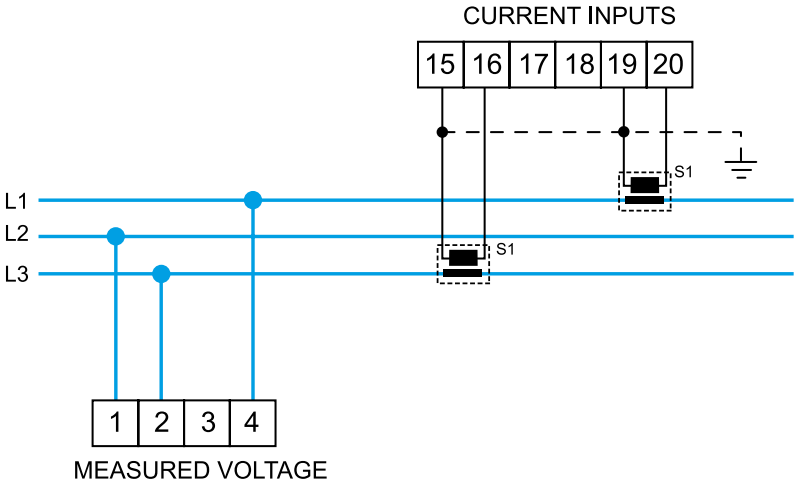
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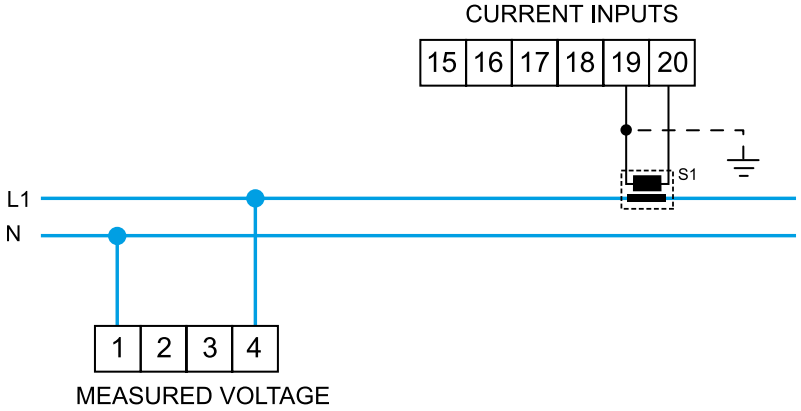


WIRING DIAGRAM

CURRENT AND VOLTAGE INPUTS

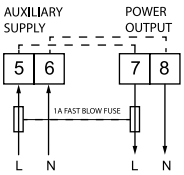




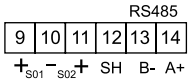


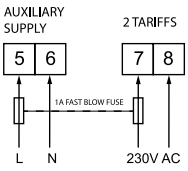
DEFINITIONS OF OTHER TERMINALS

7E.85.8.400.021x Modbus RS485 RTU, Dual tariffs
For Modbus RTU, the following RS485 communication parameters can be configured from the Set-up menu:
Baud rate: 2400, 4800, 9600, 19200, 38400 bps
Parity: NONE (default)/ODD/EVEN
Stop bits: 1 or 2
RS485 network address nnn - 3-digit number, 001 to 247

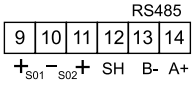


7E.85.8.400.0210, Single tariff

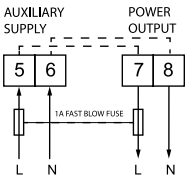




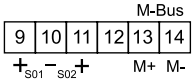
7E.85.8.400.0212, Dual tariffs

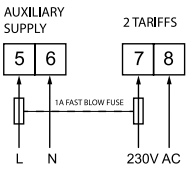


7E.85.8.400.031x Mbus, Dual Tariffs
The meter provides an M-Bus port for remote communication.
The protocol fully comply with EN13757-3.
The following communication parameters can be configured via M-bus communication.
Baud rate: 600, 1200, 2400, 4800, 9600 bps
Parity: NONE/EVEN (default)/ODD
Stop bits: 1 or 2
M-Bus network primary address: nnn - 3 digits number from 001 to 250
M-Bus network secondary address: 00 00 00 00 to 99 99 99 99

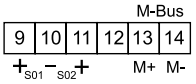


7E.85.8.400.0310, Single tariff

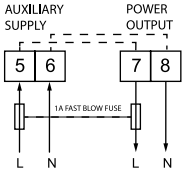




7E.85.8.400.0312, Dual tariffs

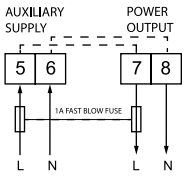


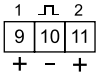
7E.85.8.400.0410 Modbus (ETH) TCP
For Ethernet Modbus TCP, the following comminication parameters can be configured from the Set-up menu:
Modbus address range: 1-247
IP: 192.168.1.200 (default)
Port: 502
MASK: 255.255.255.0
Gateway: 192.168.1.1
DHCP: on / off (default)





7E.85.8.400.0510 LoRaWAN wireless

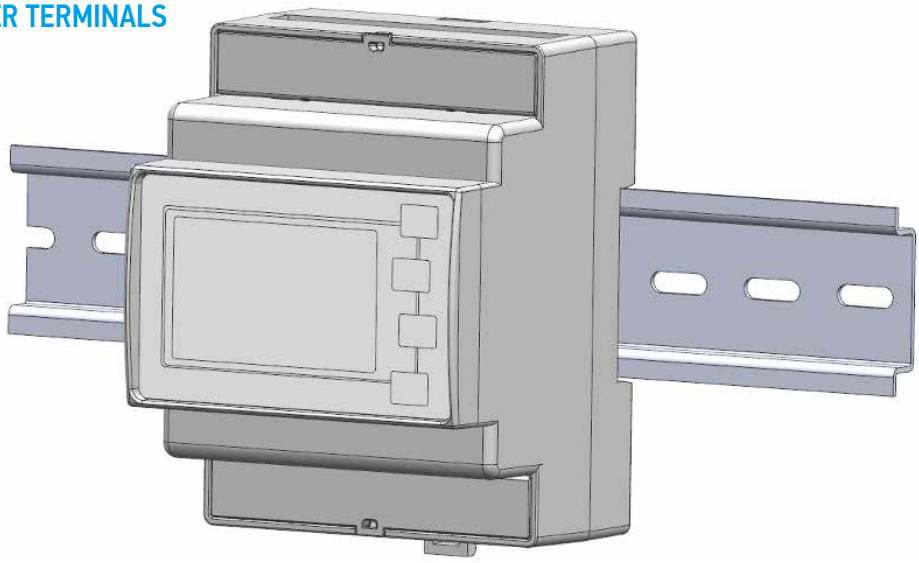




WIRING GUIDE

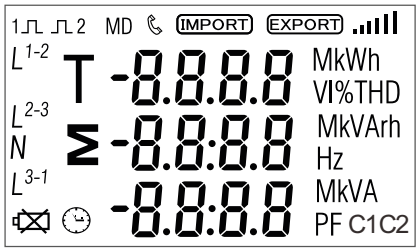
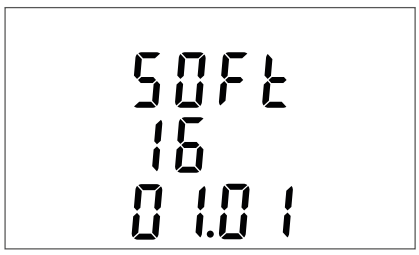
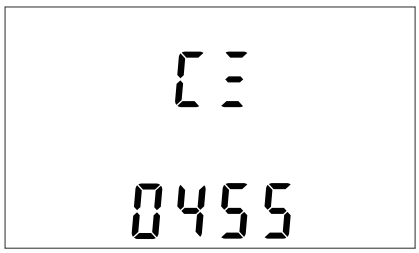
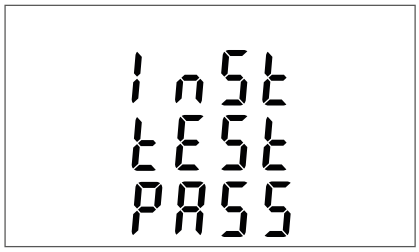
Terminal 1 2 3 4 5 6 7 8	Measurement Connection	Screw Connection	Diameter 3.0mm*PH1
	Strip Length	6-7mm	
	Screw	M3	
	Rigid/supple	0.5-2.5mm² (21 ~ 14AWG)	
	Tightening torque	0.4Nm	
	Model	PZ0	
Terminal 9 ~ 20	Measurement Connection	Screw Connection	Diameter 3mm*PH1
	Strip Length	6-7mm	
	Screw	M3	
	Fixed/flexible(Wire Range)	0.5-2.5mm² (21 ~ 14AWG)	
	Tightening torque	0.4Nm	
	Model	PZ0	

DEFINITIONS OF OTHER TERMINALS

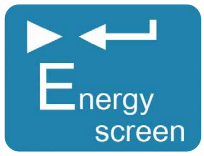


OPERATION

INSTALLATION DISPLAY

	The first screen lights up all display segments and can be used as a display check
	The second screen and the third screen indicates the firmware installed in the unit NOTE The actual display might be different with the left on here
	
	The interface performs a self-test and indicates the result if the test passes

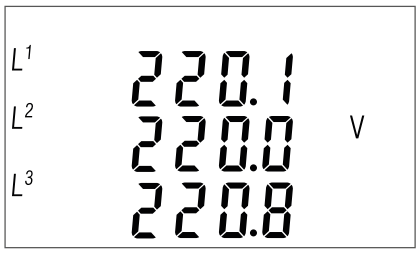
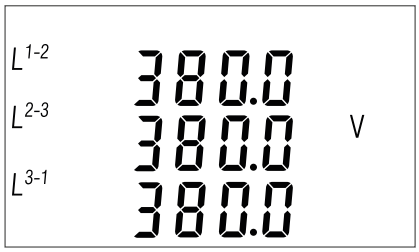
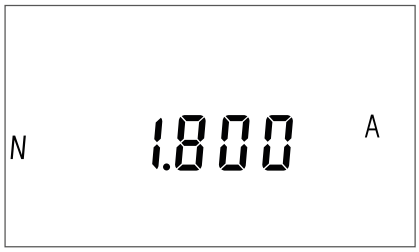
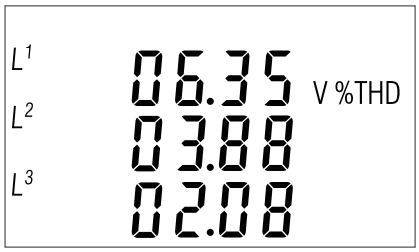
BUTTON FUNCTIONS

BUTTON	SHORT CLICK		LONG PRESS (3s)	
	DISPLAY MODE	SETUP MODE	DISPLAY MODE	SETUP MODE
	V1 V2 V3 V1-2 V2-3 V3-1 I1 I2 I3 IN V %THD I %THD	Return to previous menu		
	Hz PF PF1 PF2 PF3 MD of I1 I2 I3 MD of Power	Previous page or increase value		
	P1 P2 P3 Q1 Q2 Q3 S1 S2 S3 P-t Q-t S-t	Next page or decrease value		
	Active E-t Reactive E-t Imp Active E Exp Active E Imp Reactive E Exp Reactive E	Move to right side	Enter Setup mode	Confirm setting

MEASUREMENTS

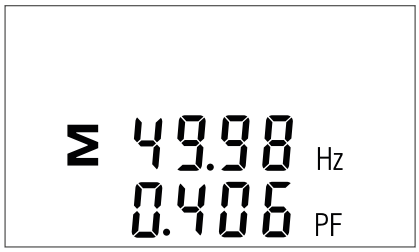
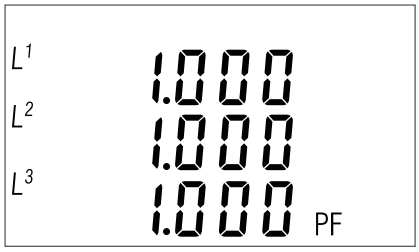
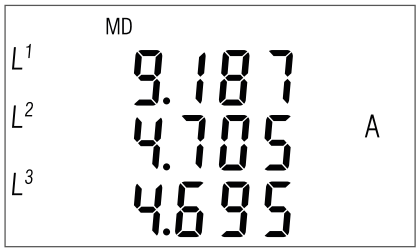
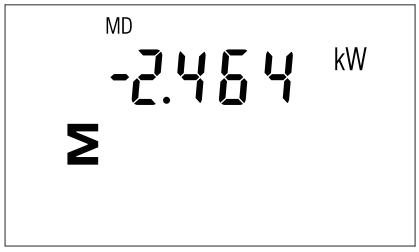
VOLTAGE AND CURRENT

Each successive pressing of the ESC V/I button selects a new range:

	Phase to neutral voltage
	Phase to phase voltage
	Current on each phase
	Neutral current
	Phase to neutral voltage THD%
	Phase to neutral current THD%

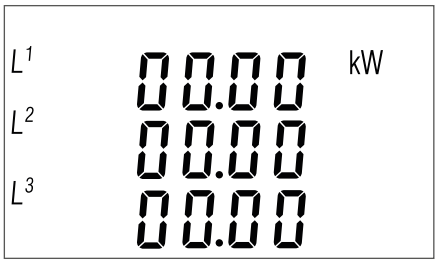
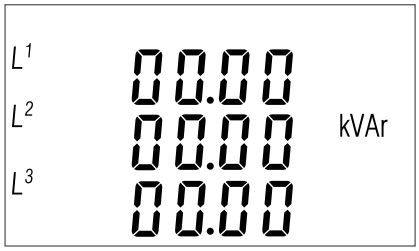
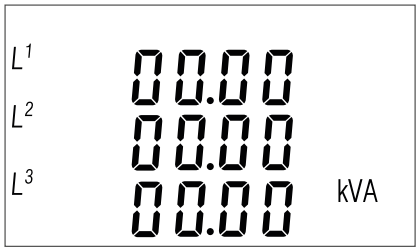
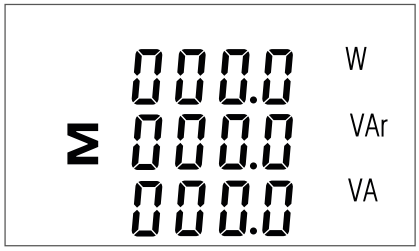
FREQUENCY, POWER FACTOR AND DEMAND

Each successive pressing of the ▲ f/MD button selects a new range:

	Frequency and Power Factor (total)
	Power Factor of each phase
	Maximum current demand on each phase
	Maximum total power demand

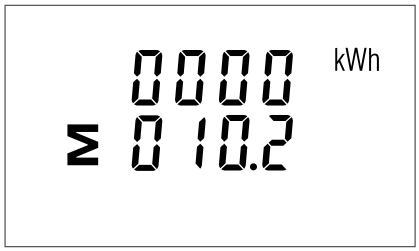
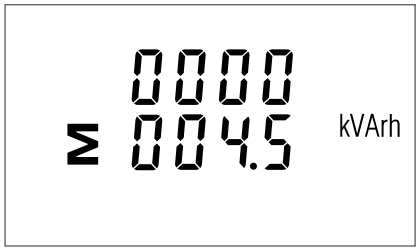
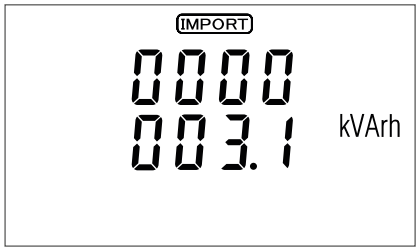
POWER

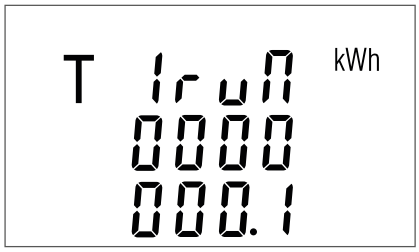
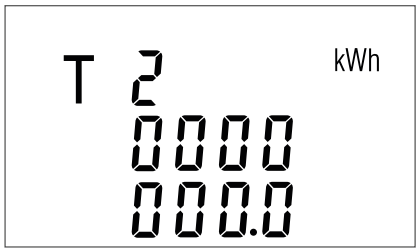
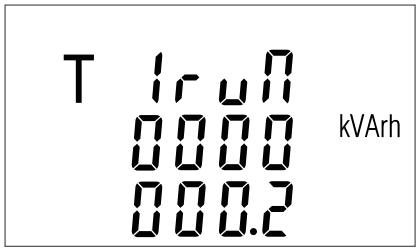
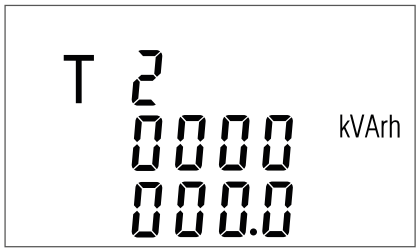
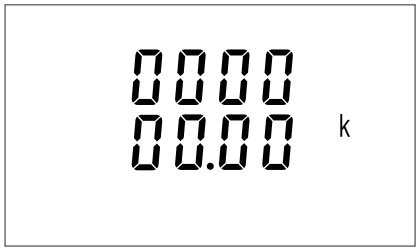
Each successive pressing of the Power screen button select a new range:

	Instantaneous Active Power in kW
	Instantaneous Reactive Power in kVAr
	Instantaneous Volt-amps in kVA
	Total W, VAr, VA

ENERGY

Each successive pressing of the Energy screen button shows following measurements:

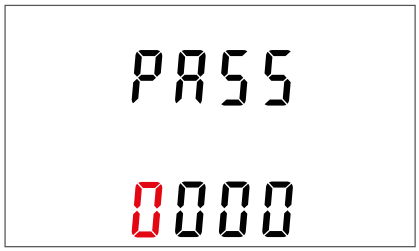
	Total active energy in kWh
	Total reactive energy in kVArh
	Imported active energy in kWh *Not shown on multi tariffs meter
	Exported active energy in kWh *Not shown on multi tariffs meter
	Imported reactive energy in kVArh *Not shown on multi tariffs meter
	Exported reactive energy in kVArh *Not shown on multi tariffs meter

	T1 Active Energy in kWh. For Multi Tariffs version only (7E.85...12)
	T2 Active Energy in kWh. For Multi Tariffs version only (7E.85...12)
	T1 Reactive Energy in kWh. For Multi Tariffs version only (7E.85...12)
	T2 Reactive Energy in kWh. For Multi Tariffs version only (7E.85...12)
	Carbon emissions per kWh of electricity

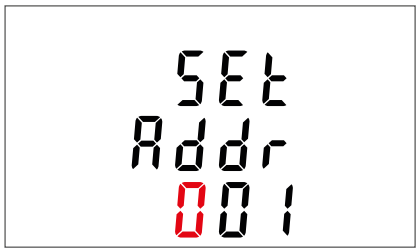
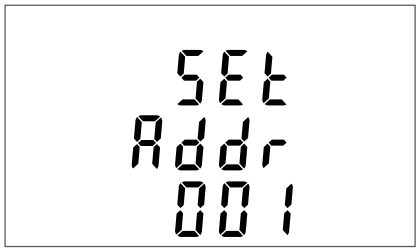
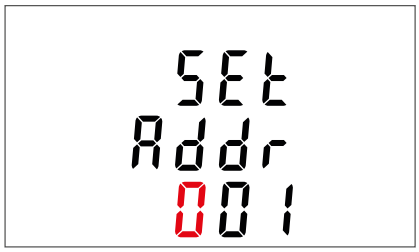
SETUP MODE

The meter's settable parameters are password protected.
By long pressing the 4th button "E", the user can get into the setup mode.

PASSWORD VALIDATION

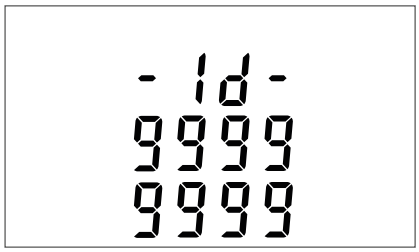
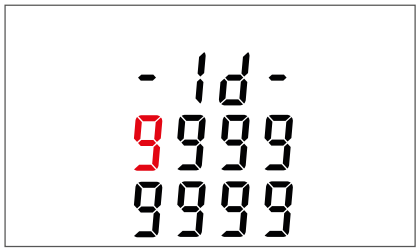
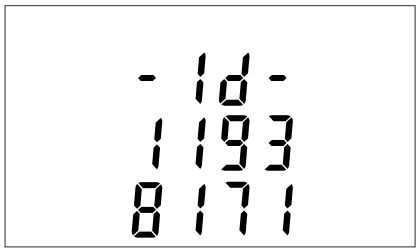
	Press button f/MD and Power screen to enter password Long press button Energy screen for password confirmation If an incorrect password is entered, the display will show "Err" If the password is correct, the unit will show the setup menu Password: default 1000

COMMUNICATION ADDRESS

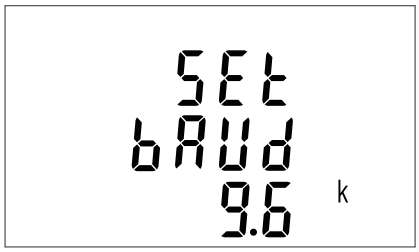
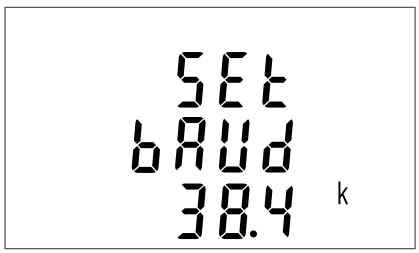
	Communication address setup Long press Energy screen to enter the setup Address range 001~247 Address range 001~250 (Mbus protocol)
	Communication address setup Long press button Energy screen to enter the setup mode
	Press button f/MD and Power screen set the addresses Long press button Energy screen to confirm

M-BUS SETUP (ONLY FOR 7E.85.8.400.031X)

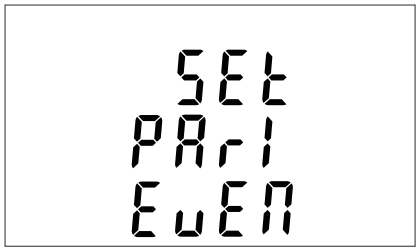
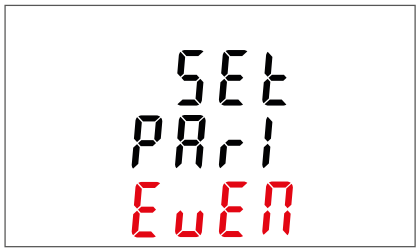
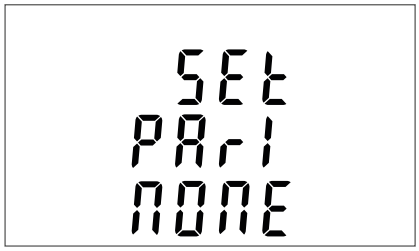
M-BUS SECONDARY ADDRESS SETTING

	Secondary address: 00000001 to 99999999 From the Set-Up Menu, use f/MD and Power screen buttons to find the setting page
	Long press Energy screen to enter the selection routine The current setting will flash
	Use f/MD and Power screen buttons to set the secondary address.

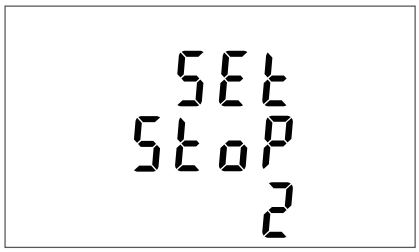
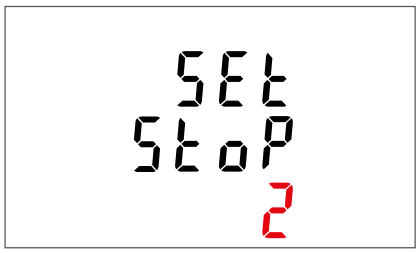
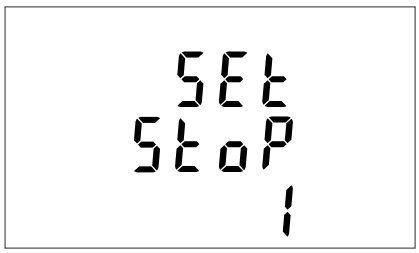
BAUD RATE SETTING

	From the Set-up menu, use f/MD and Power screen buttons to select the Baud Rate option
	Press Energy screen to enter the selection routine The current setting will flash
	Use f/MD and Power screen buttons to choose Baud rate 0.3k, 0.6k, 2.4k, 4.8k, 9.6k

PARITY

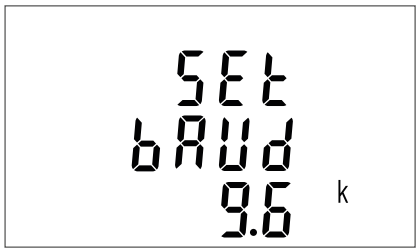
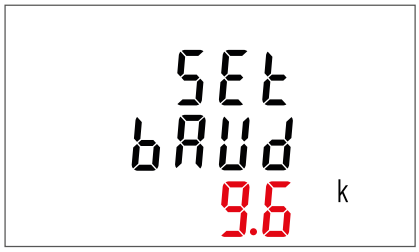
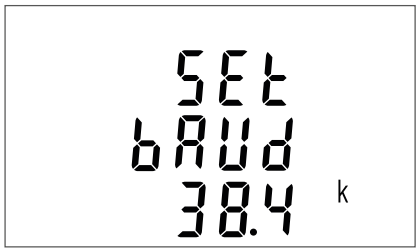
	From the Set-up menu, use f/MD and Power screen buttons to select the Parity option
	Press Energy screen to enter the selection routine The current setting will flash
	Use f/MD and Power screen buttons to choose Parity (EVEN / ODD / NONE)

STOP BITS

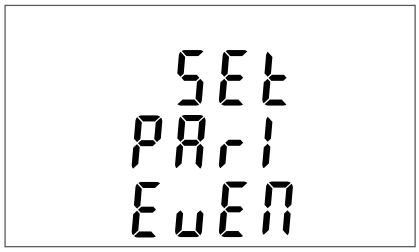
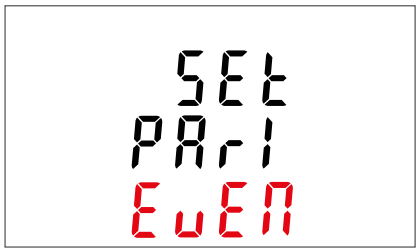
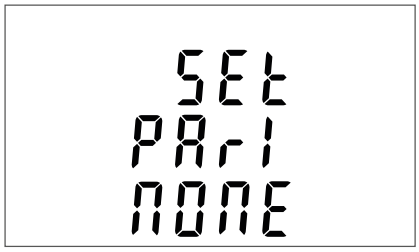
	From the Set-up menu, use f/MD and Power screen buttons to select the Stop Bit option
	Press Energy screen to enter the selection routine The current setting will flash
	Use f/MD and Power screen buttons to choose Stop Bit (2 or 1)

RS485 MODBUS RTU SETUP (FOR 7E.85.8.400.021X)

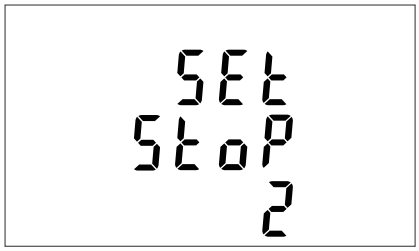
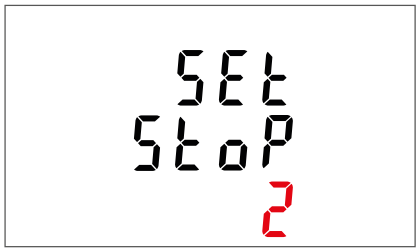
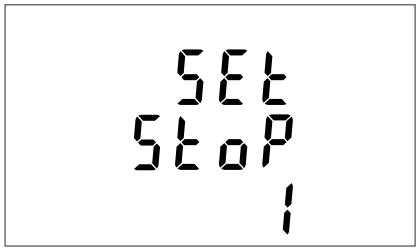
BAUD RATE SETTING

	From the Set-up menu, use f/MD and Power screen buttons to select the Baud Rate option
	Press Energy screen to enter the selection routine The current setting will flash
	Use f/MD and Power screen buttons to choose Baud rate 2.4k. 4.8k, 9.6k, 19.2k, 38.4k

PARITY

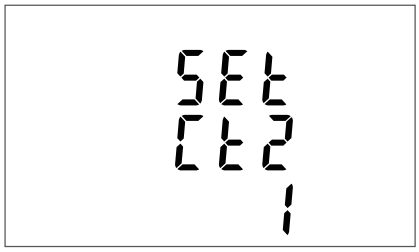
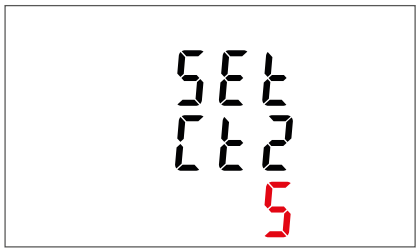
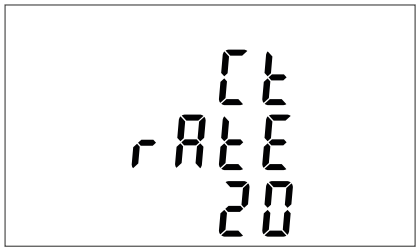
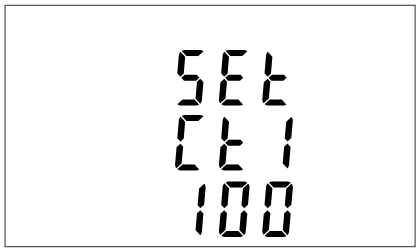
	From the Set-up menu, use f/MD and Power screen buttons to select the Parity option
	Press Energy screen to enter the selection routine The current setting will flash
	Use f/MD and Power screen buttons to choose Parity (EVEN / ODD / NONE)

STOP BITS

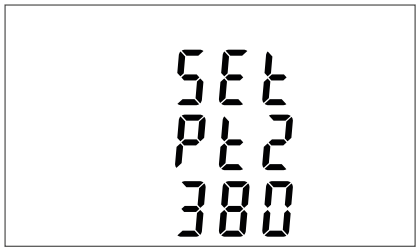
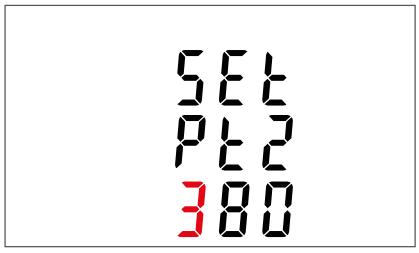
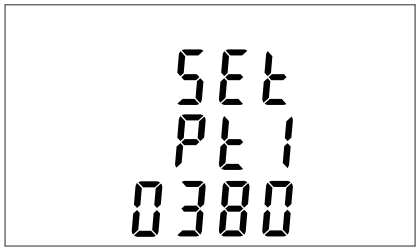
	From the Set-up menu, use f/MD and Power screen buttons to select the Stop Bit option
	Press Energy screen to enter the selection routine The current setting will flash
	Use f/MD and Power screen buttons to choose Stop Bit (2 or 1)

CT SETTING

Don't write primary and secondary value of CT but only secondary and CT Ratio that is 20 for CT 100/5
WARNING: Following MID directive, the CT setting can be done ONLY 1 TIME.
This is necessary to avoid changes (due to scams) after installation.

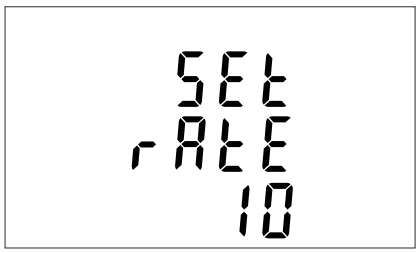
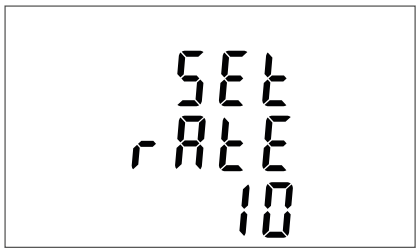
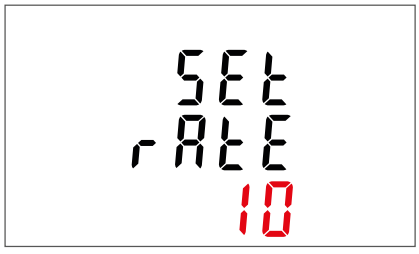
	From the Set-up menu, use ▲ f/MD and ▼ Power screen buttons to select the CT option
	**Modbus and MBus version** Secondary CT setting Press Energy screen to enter the CT secondary current selection routine.:5A/1A eg. for CT 100/5, CT2 is 5
	**7M.38...021X Modbus version ONLY** Set CT-rate value Press Energy screen to enter the CT Ratio setting screen The range is from 0001 to 9999 eg. for CT 100/5, CT ratio is 20
	**7M.38...031X M-Bus version ONLY** Set CT1 value Press Energy screen to enter the CT1 setting screen The range is from 0001 to 9999 eg. for CT 100/5, CT1 is 100

PT SETTING

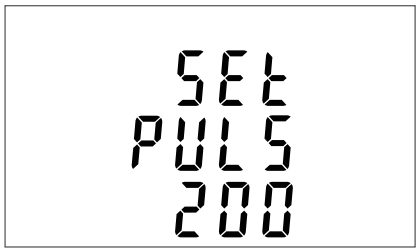
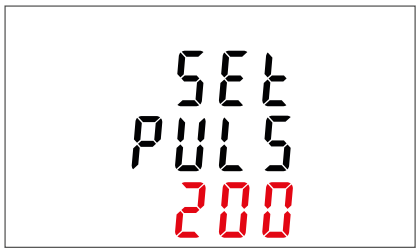
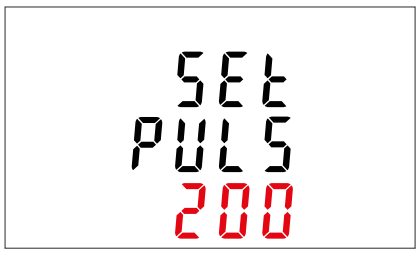
	From the Set-up menu, use f/MD and Power screen buttons to select the PT option The screen will show the voltage PT secondary voltage value The default value is 400 V
	Secondary PT setting Press Energy screen to enter the PT secondary voltage selection routine The range is from 100 to 500 V
	Set PT 1 value Press Energy screen to enter the PT ratio screen The range is from 0001 to 9999

PULSE SETUP (NOT AVAILABLE ON 7E.85.8.400.0410)

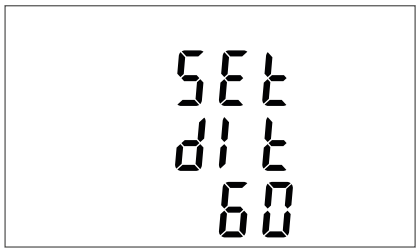
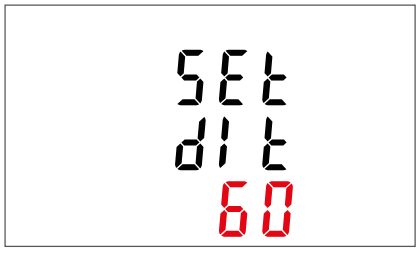
PULSE RATE SETUP

	Use this to set the energy represented by each pulse Rate can be set to 1 pulse per 0.01/0.1/1/10/100/1000kWh/kVArh
	From the Set-Up Menu, use f/MD and Power screen buttons to select the pulse rate option
	Press Energy screen to enter the selection routine The current setting will flash 0.01/0.1/1/10/100/1000kWh/ kVArh per pulse Use f/MD and Power screen and buttons to choose pulse rate Long press Energy screen to confirm the setting and press to return to the main

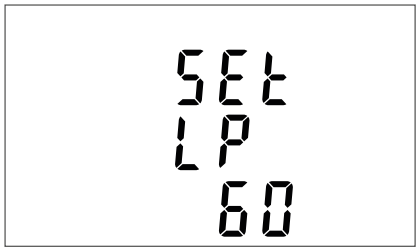
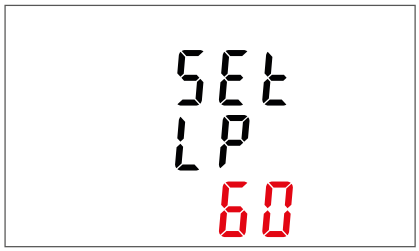
PULSE DURATION SETUP

	The energy monitored can be active or reactive and the pulse width can be set as 200,100 or 60 ms
	From the Set-Up Menu, use ▲ f/MD and ▼ Power screen buttons to select the pulse width option
	Press ▶↵ Energy screen to enter the selection routine The current setting will flash Use ▲ f/MD and ▼ Power screen buttons to choose pulse rate Long press ▶↵ Energy screen to confirm the setting and press ◀ ESC V/I to return to the main Set-Up Menu

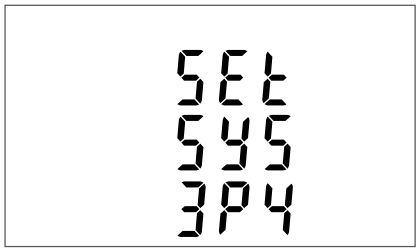
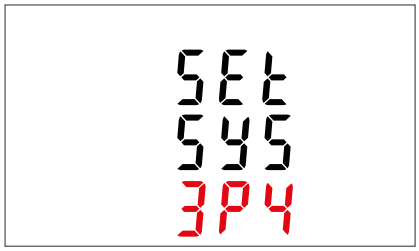
DEMAND INTERVAL TIME SETUP

	Long press button ▶↵ Energy screen to enter the setup
	Press button ▲ f/MD and ▼ Power screen to set the demand period value Long press button ▶↵ Energy screen to confirm Option: 0,5, 8, 10, 15, 20, 30, 60(default) Unit: min

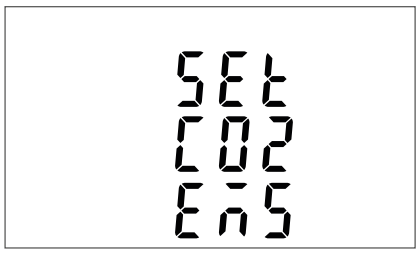
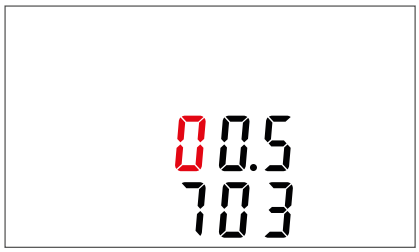
BACKLIT POWER TIME SETUP

	Long press button Energy screen to enter the setup
	Press button ▲ f/MD and ▼ Power screen to set the value Long press button Energy screen to confirm Option: ON, OFF, 5, 10, 30, 60(default), 120 mins ON means backlit always on, OFF means backlit always off

SYSTEM TYPE SETUP

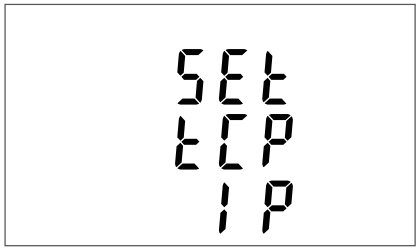
	Long press button Energy screen to enter the setup
	Press button ▲ f/MD and ▼ Power screen to setup the supply system Option: 3P4W, 3P3W, 1P2W Long press button Energy screen to confirm Option: 3P4W(default), 3P3W, 1P2W

CO2 SETUP

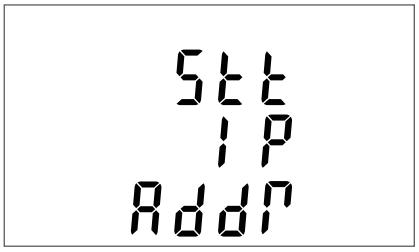
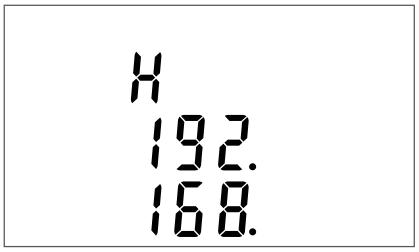
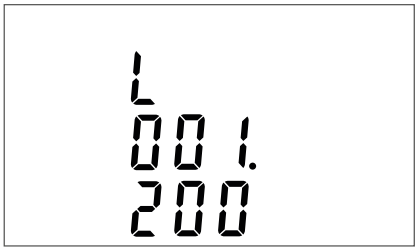
	Long press button Energy screen to enter the CO2 setup
	Press button ▲ f/MD and ▼ Power screen to setup the CO2 rate Default (0.5703)

ETHERNET MODBUS TCP SETUP (ONLY FOR 7E.85.8.400.0410)

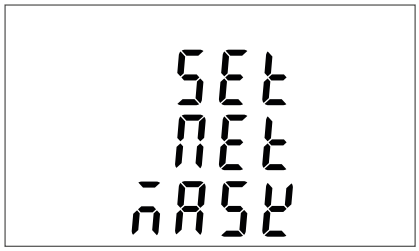
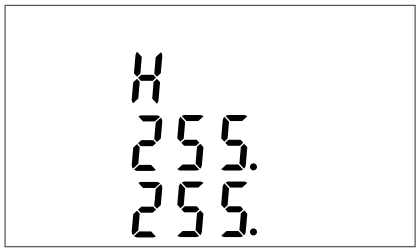
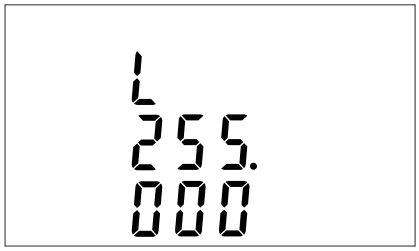
DHCP FUNCTION SETUP

	Long press button Energy screen to enter the setup mode of TCP IP information
	Press button ▲ f/MD and ▼ Power screen to choose DHCP on or off Default: off

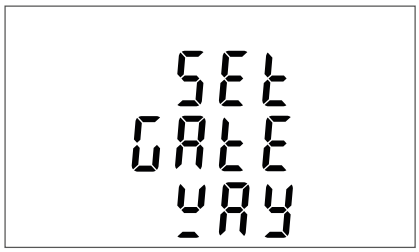
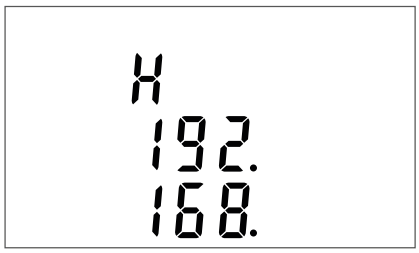
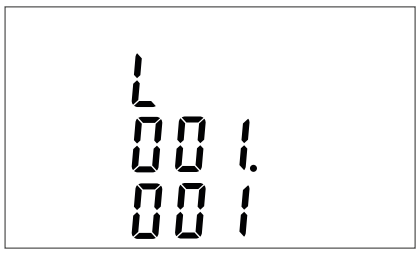
TCP IP ADDRESS SETUP

	Long press button Energy screen to set IP address
	IP-High 192.168 (default)
	IP-Low 001.200 (default)

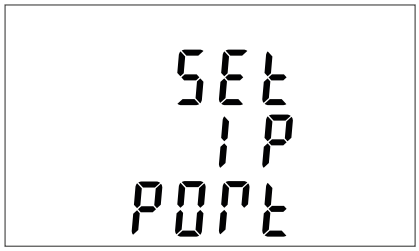
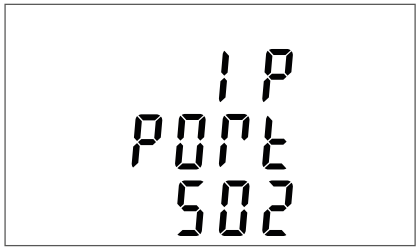
SUBNET MASK ADDRESS SETUP

	Long press button Energy screen to enter the setup mode
	Subnet mask-High 255.255 (default)
	Subnet mask-Low 255.0 (default)

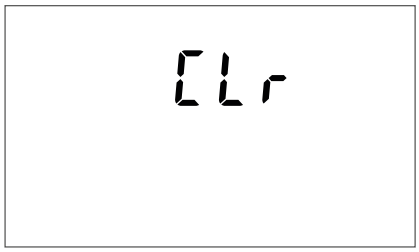
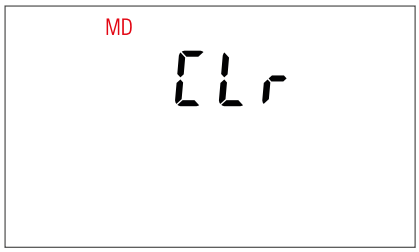
TCP GATEWAY ADDRESS SETUP

	Long press button Energy screen to enter the setup mode of IP address of TCP gateway
	TCP gateway address - High: 192.168 (default)
	TCP gateway address - Low: 001.001 (default)

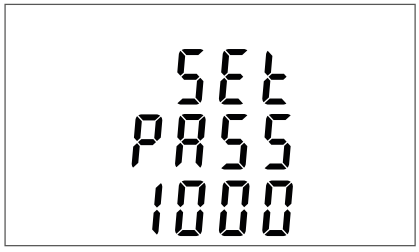
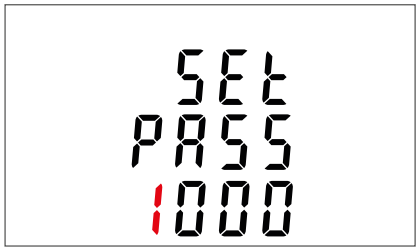
TCP IP PORT SETUP

	Long press button Energy screen to enter the setup mode of TCP IP port
	TCP IP port: 502 (default)

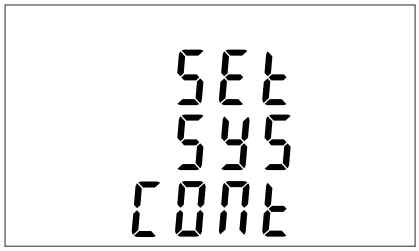
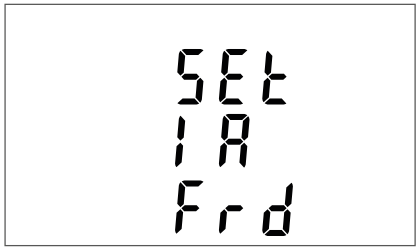
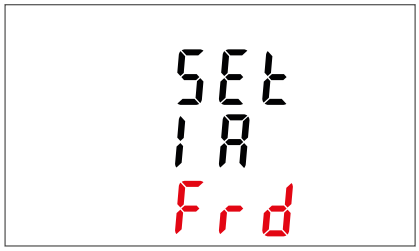
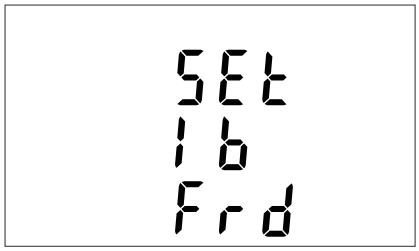
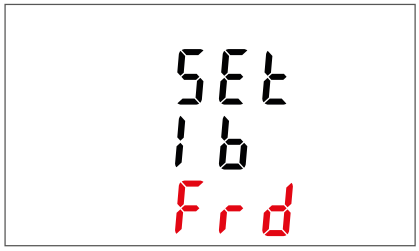
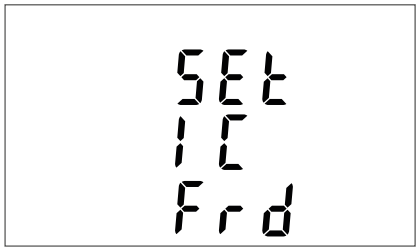
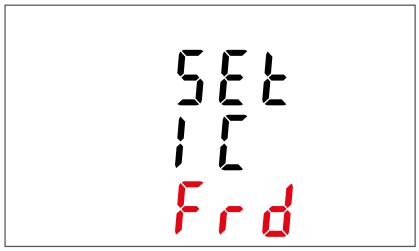
CLR SETUP

	From the Set-up menu, use ▲ f/MD and ▼ Power screen buttons to select the reset option
	Press Energy screen to enter the selection routine The MD will flash

PASSWORD MODIFICATION SETUP

	Long press button Energy screen to enter the setup mode
	Press button ▲ f/MD and ▼ Power screen to enter the new password Long press button Energy screen to confirm Range: 0000~9999, default 1000

CURRENT DIRECTION SET-UP

	Use f/MD and Power screen buttons to select page “SET sys cont”
	Press to Energy screen enter Phase A, the default is Frd (forward)
	Press button f/MD and Power screen to change the current direction Long press button Energy screen to confirm
	Press to Energy screen enter Phase B, the default is Frd (forward)
	Press button f/MD and Power screen to change the current direction Long press button Energy screen to confirm
	Press to Energy screen enter Phase C, the default is Frd (forward)
	Press button f/MD and Power screen to change the current direction Long press button Energy screen to confirm

finder
RELAYING INNOVATION