TP EASTRON

MULTIFUNCTION POWER MONITOR

SMART X835

USER MANUAL

TPTECH
www.tptech.co.th
594/22 Hatairat Rd. Bangchan Klongsamwa Bangkok Thailand .10510

1 Introduction

The multifunction panel meter SMART X835 series is a top new-generation intelligent panel meter, 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 Eastron SMART X835 series. The unit measures and displays the characteristics of single phase two wires, three phase three wires and three phase four wires 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. 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 (CT).

The SMART X835 can be configured to work with a wide range of CTs, giving the unit a wide range of operation. Built-in interfaces provide pulse and RS485 Modbus RTU outputs. Configuration is password protected.

1.1 Measurement and display parameters

- Line voltage and THD% (total harmonic distortion) of all phases
- Key factor and Crest factor
- Line Frequency
- Currents, Current demands and current THD% of all phases
- Power, maximum power demand and power factor
- Active energy imported and exported
- Reactive energy imported and exported
- Real time date and time

1.2 Pass-word protected set-up

- RS485 Modbus setting
- CT Ratio and secondary current
- PT Ratio and secondary voltage
- Pulse output setting
- Demand Interval time
- Supply system selection 1phase2wire, 3phase 3wires and 3phase 4wires
- Energy and demand information reset
- Changing Password setting
- Auto scroll display interval setting
- Wiring correction configuration
- Date and time setting
- Multi-tariff setting (optional)
- 2~60th Current and Voltage harmonic
- AO setting (only for SMART X835–AO)

1.3 Current Transformer Current ratio

The unit can be configured to operate with CT ratio between primary and secondary current is 1 and 2000. There are two options of secondary current input: 1A or 5A

1.4 RS485 Serial – Modbus RTU

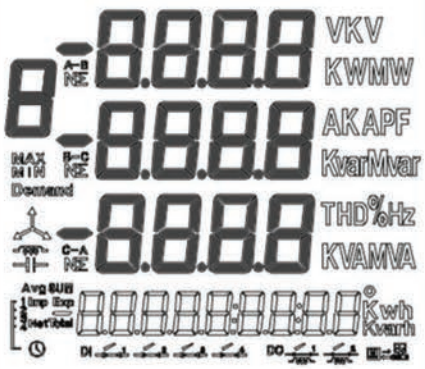
This uses an RS485 serial port with Modbus RTU protocol to provide a means of remotely monitoring and controlling the SMART X835 series.

Set-up screens are provided for setting up the RS485 port. See section 4.8

1.5 Pulse output

This provides 2 pulse outputs those clocks up measured active and reactive energy. The constant for both output are configurable.

2. Start-up Screens

	The first screen lights all display segments and can be used as a display check
	The second screen indicates the firmware installed in the unit and its build number.

TPTECH www.tptech.co.th
594/22 Hatairat Rd. Bangchan Klongsamwa Bangkok Thailand .10510

	Next the unit performs a self-test and indicates if the test passes.

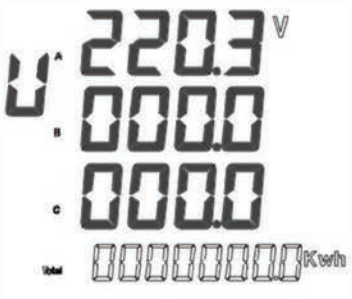
3. Measurements

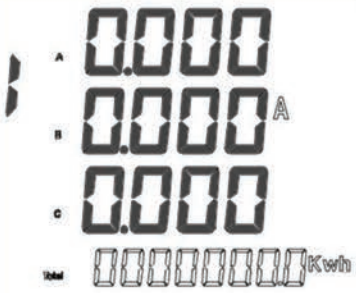
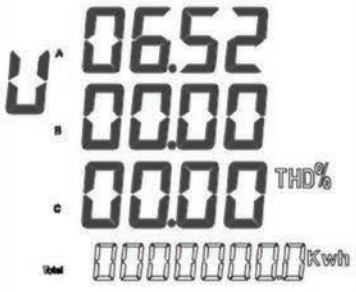
The buttons operate as follows

	Selects the Voltage and Current display screens In Set-up Mode, this is the “Left” or “Back” button.
	Select the Frequency and Power factor screens In Set-up Mode, this is the “Up” button
	Select the Power screens In Set-up Mode, this is the “Down” button
	Select the Energy display screens In Set-up mode, this is the “Enter” or “Right” button

3.1 Voltage and Current

Each successive pressing of the  button selects a new range:

	Phase to neutral voltages

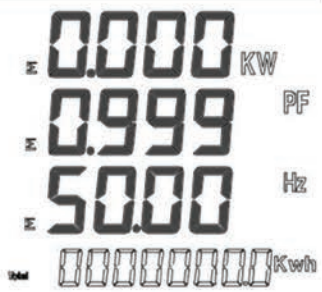
	Current on each phase
	Phase to neutral voltage THD%
	Current THD% for each phase
	Crest Factor
	Key Factor

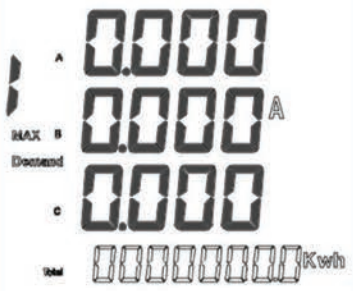
TPTECH
www.tptech.co.th
594/22 Hatairat Rd. Bangchan Klongsamwa Bangkok Thailand .10510

3.2 Frequency and Power Factor and Demand

Each successive pressing of the 

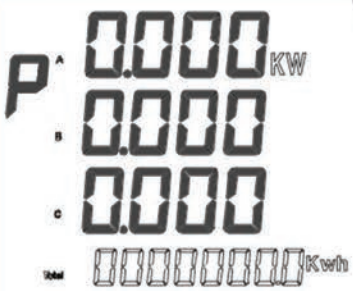
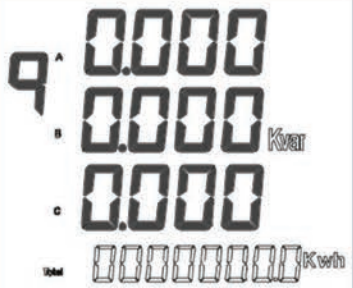
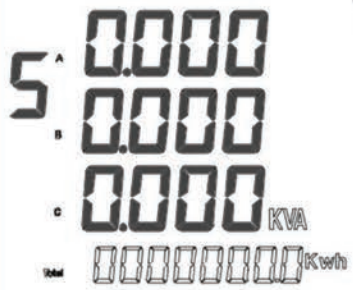
button selects a new range:

	Total kW Frequency Power factor (total)
	Power factor of each phase
	Max. Power demand

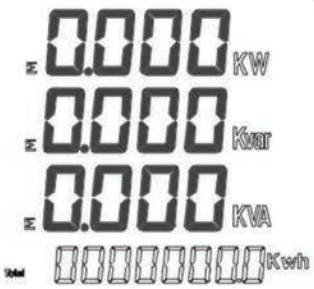
	Max. Current demand

3.3Power

Each successive pressing of the  button select a new range:

	Instantaneous active power (kW)
	Instantaneous reactive power (kVAr)
	Instantaneous Volt-amps (KVA)

TPTECH
www.tptech.co.th
594/22 Hatairat Rd. Bangchan Klongsamwa Bangkok Thailand .10510

	Total kW, kVArh, kVA

3.4 Energy Measurements

Each successive pressing of the  button selects a new range:

	Total active energy in kWh
	Total reactive energy in kVAh
	Imported active energy in kWh
	Exported active energy in kWh
	Imported reactive energy in kVArh
	Exported reactive energy in kVArh
	T1 Import Energy
	T2 Import Energy
	T3 Import Energy

	T4 Import Energy
	Date
	Time

4. Set-up

Long press button  to enter the set-up interface

The default pass-word is 1000,if the input is wrong,the LCD displays "PASS Err"

Press the button  to exit set-up interface.

4.1 Set-up Mode

4.1.1 Modbus Address

	The default address is 001. press  to activate the modification.

use  and  buttons to set the address with the range 001~247, and pressing the button  for confirmation.

Press button  to exit the number setting routine and return to the Set-up menu.

4.1.2 Baud Rate

From the Set-up menu, use  and  buttons to select the Baud Rate option.
The default is 9600bps.

Press  to enter the selection routine. The Baud Rate setting will flash

Use  and  buttons to choose Baud rate 2.4k. 4.8k, 9.6k, 19.2k, 38.4k

On Completion of the entry procedure, press  to confirm the setting and press  to return to the main set up menu.

4.1.3 Parity

From the Set-up menu, use  and  buttons to select the Parity option.

Press  to enter the selection routine. The current setting will flash.

Use M and P buttons to choose Parity (EVEN / ODD / NONE)

On Completion of the entry procedure, press E to confirm the setting and press UI ESC to return to the main set up menu.

4.1.4 Stop bits

From the Set-up menu, use M and P buttons to select the Stop Bit option.

Press E to enter the selection routine. The current setting will flash.

Use M and P buttons to choose Stop Bit (2 or 1)

On Completion of the entry procedure, press E to confirm the setting and press UI ESC to return to the main set up menu.

4.2 CT

From the Set-up menu, use M and P buttons to select the CT option. The screen will show the current CT primary current value.

Secondary CT setting Press E to enter the CT secondary current selection routine. 5A/1A

	Set CT Ratio Value Press  to enter the CT Ratio The range is from 0001~2000.
For example: if set the ratio to be 100, that means the primary current is secondary current x100.	

4.3 PT

	From the Set-up menu, use  and  buttons to select the PT option. The screen will show the voltage PT primary voltage value.
	Secondary PT setting Max. PT2 value is 500V
	Set PT Ratio Value Press  to enter the PT Ratio The range is from 0001~2000.
For example: if set the ratio to be 100, that means the primary current is secondary current x100.	

4.4 Pulse output

This option allows you to configure the pulse output. The output can be set to provide a pulse for a defined amount of energy active or reactive.

Use this section to set up the relay pulse output

Units: kWh kVArh

From the Set-up menu, use M and P buttons to select the Pulse output option.

Press E to enter the selection routine. The unit symbol will flash

Use M and P buttons to choose kWh or kVArh.

On completion of the entry procedure, press E to confirm the setting and press UI ESC to return to the main set up menu.

4.4.1 Pulse constant

Use this to set the energy represented by each pulse. Rate can be set to 1 pulse per 0.001kWh/0.01kWh/0.1kWh/1kWh/10kWh/100kWh.

(It shows 1 pulse = 0.001kWh/kVArh)

From the Set-up menu, use M and P buttons to select the Pulse Rate option.

	Press  to enter the selection routine. The current setting will flash
Use  and  buttons to choose pulse rate.	**1 pulse = 0.001/0.01/0.1/1/10/100kWh/kVArh** 0.001/0.01/0.1/1/10/100 kWh/kVArh per pulse
On completion of the entry procedure, press  to confirm the setting and press  to return to the main set up menu.	

4.4.2 Pulse Duration

(The default set-up is 200ms)

	From the Set-up menu, use  and  buttons to select the Pulse width option.
Press  to enter the selection routine. The current setting will flash.	
Use  and  buttons to choose pulse width(200/100/60ms)	
On Completion of the entry procedure, press  to confirm the setting and press  to return to the main set up menu.	

TPTECH
www.tptech.co.th
594/22 Hatairat Rd. Bangchan Klongsamwa Bangkok Thailand .10510

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

	From the set-up menu, use  and  buttons to select the dIT option. The screen will show the currently selected integration time.
Press  to enter the selection routine. The current time interval will flash	
Use  and  buttons to select the time required.	
Press  to confirm the selection.	

4.6 Supply System

Use this section to set the type of power supply being monitored.

	From the Set-up menu, use  and  buttons to select the System option. The screen will show the currently selected power supply
Press  to enter the selection routine. The current selection will flash	
Use  and  buttons to select the required system option: 3P4W,3P3W or 1P2W	
Press  to confirm the selection.	

4.7 CLR

4.7.1 Clear kWh

	From the Set-up menu, use  and  buttons to select the reset option.
Press  to enter the selection routine. The yes will flash.	
Press  to confirm the setting and press  to return to the main set up menu.	

4.7.2 Clear KVArh

	From the Set-up menu, use  and  buttons to select the reset option.
Press  to enter the selection routine. The yes will flash.	
Press  to confirm the setting and press  to return to the main set up menu.	

4.7.3 Clear Max Demand

	From the Set-up menu, use  and  buttons to select the reset option.
Press  to enter the selection routine. The YES will flash.	
Press  to confirm the setting and press  to return to the main set up menu.	

4.8 Change Password

PASS 0000	Use the M and P to choose the change password option
PASS 1100	Press the E to enter the change password routine. The new password screen will appear with the first digit flashing. Enter the new password and press E to confirm.
Press UI ESC to exit the number setting routine and return to the Set-up menu.	

4.9 Auto display in turns

SEt AUto 2000	From the set-up menu, use M and P buttons to select page "SET AUTO" Press the button E to activate the modification on the time. The left picture shows 2000mS, which means 2 seconds.
Use the M and P to set the auto display interval time.	
Press UI ESC to exit the number setting routine and return to the Set-up menu.	

4.10 Reverse connected current inputs correction setting.

SEt SYS CONt	From the Set-up menu, use  and  buttons to select page "SET SYS CONT"
SEt 1A Frd	Press to  enter Phase A , the default is FRD (forward)
SEt 1b Frd	Use  and  buttons to Phase B or C setting pages
Press button  to confirm the setting and press  to return to the main set up menu.	

4.10.1 How to operate if phase A is reversely connected

SEt 1A Frd	Go to phase A setting page

	Press  to enter the selection routine. The FRD will flash. Use  button to change FRD to REV.
On completion of the entry procedure, press  to confirm the setting and press  to return to the main set up menu.	

4.11 How to set date and time

	From the Set-up menu, use  and  buttons to select page "SET DAY TE"
 	Press button  to enter set-up interface, you will see the date information.The format is YYYY-MM-DD To change it , you need press the button  to activate the modification. You will see the digits flash. Use  and  buttons to choose the correct date information.
 	Press button  to enter set-up interface , you will see the time information.The format is HH-MM-SS To change it , you need press the button  to activate the modification. You will see the digits flash. Use  and  buttons to choose the correct time information
Press button  to return to the main set up menu.	

4.12 How to set Multi-tariffs

The meter can be set with max. 8 time periods and 4 tariffs. The user need set the starting time of each

period and choose which tariff it belongs to.

	From the Set-up menu, use  and  buttons to select page "SET TE FEE"
	Press button  to enter set-up interface , you will see the Period 1 start time information. The format is HH-MM The left side picture show period 1 start from 00:00 If you need change the time, please press the button  to activate the modification.
	After set the period 1 start time, you will see a page showing which tariff does period 1 belongs to. The left picture shows period 1 belong to FEE0. FEE0 means: no tariff. press  to activate the modification. use  and  buttons to choose the correct tariff from 1 to 4.
Press  to confirm the setting and press  to return to the main set up menu.	

4.13 Harmonic checking

	From the Set-up menu, use  and  buttons to select page "DISP ADU" Press the button  , you will see the Voltage Harmonic

HU d ISP	Press the button  , you will see the individual Voltage Harmonic from 2nd to 60th
U P0 02 00.00 THD%	U-----voltage P0 --- phase A /L1. P1 --- Phase B/L2 和 P2--- Phase C/L3 02 --- 2nd THD%
H 1 d ISP	Press the button  , you will see the individual Current Harmonic from 2nd to 60th
I P1 02 00.00 THD%	I--- Current P0 --- phase A /L1. P1 --- Phase B/L2 ,P2--- Phase C/L3 02 --- 2ND THD%
press  to return to the main set up menu.	

5 Specifications

5.1 Measured Parameters

The unit can monitor and display the following parameters of a single phase, 3-phase 3-wire or 3-phase 4-wire supply.

5.1.1 Voltage and Current

- Phase to neutral voltages 100 to 289V a.c. (not for 3p3w supplies)

- Voltages between phases 173 to 500V a.c. (3p supplies only)
- Percentage total voltage harmonic distortion (THD%) for each phase to N
- percentage current harmonic distortion for each phase
- Current on each phase
- Key factor
- Crest factor

5.1.2 Power factor and Frequency and Max. Demand

- Frequency in Hz
- Instantaneous power:
- Power 0 to999MW
- Reactive Power 0 to 999MVAr
- Volt-amps 0 to 999 MVA
- Maximum demanded power since last Demand reset Power factor
- Maximum demand current, since the last Demand reset (three phase supplies only)

5.1.3 Energy Measurements

Imported active energy	0 to 9999999.9 kWh
Exported active energy	0 to 9999999.9 kWh
Imported reactive energy	0 to 9999999.9 kVArh
Exported reactive energy	0 to 9999999.9 kVArh
Total active energy	0 to 9999999.9 kWh
Total reactive energy	0 to 9999999.9 kVArh

5.2 Accuracy

Voltage	0 • 5% of range maximum
Current	0 • 5% of nominal
Frequency	0 • 2% of mid-frequency
Power factor	1% of unity (0.01)
Active power (W)	±1% of range maximum
Reactive power (VAr)	±2% of range maximum
Apparent power (VA)	±1% of range maximum
Active energy (Wh)	Class 1 IEC 62053-21
Reactive energy (VARh)	±2% of range maximum

5.3 Auxiliary Supply

Two-way fixed connector with 2·5mm2 stranded wire capacity.

85 to 275V a.c. 50/60Hz ±10% or 120V to 380V d.c. ±20%. Consumption < 2W.

5.4 Interfaces for External Monitoring

The SMART X835 provides 3 communication ports:

1 RS485 port

2 ports of pulse input

5.4.1 Pulse Output

0.001=1Wh/VArh

0.01 = 10 Wh/VArh

0.1 = 100 Wh/VArh

1 = 1 kWh/kVArh

10 = 10 kWh/kVArh

100 = 100 kWh/kVArh

Pulse width 200/100/60 ms.

5.4.2 Modbus RTU

Baud rate 2400,4800,9600,19200,38400

Parity none/odd/even

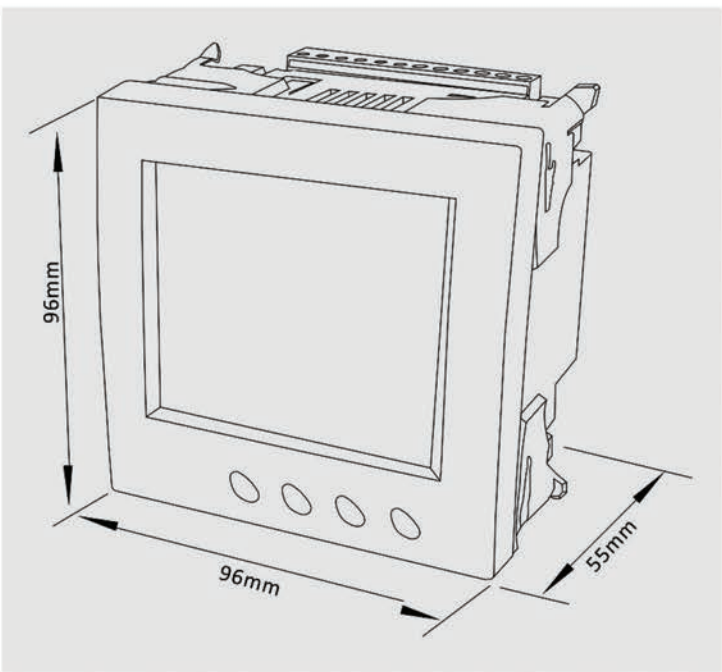
Stop bits 1 or 2

Network address *nnn* –001 to 247

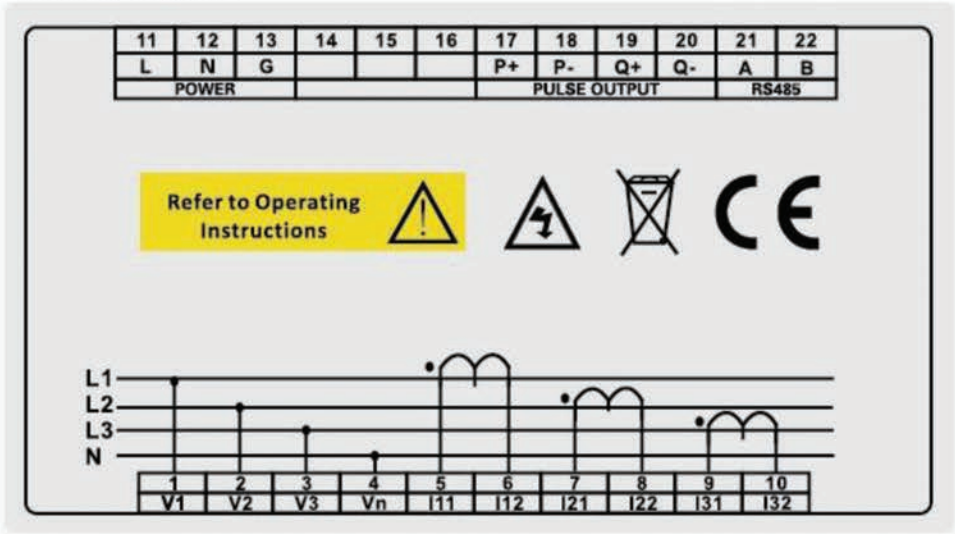
5.5 Environment

● Operating temperature	-25° C to +55° C*
● Storage temperature	-40° C to +70° C*
● Relative humidity	0 to 90%, non-condensing
● Altitude	Up to 3000m
● Vibration	10Hz to 50Hz, IEC 60068-2-6, 2g

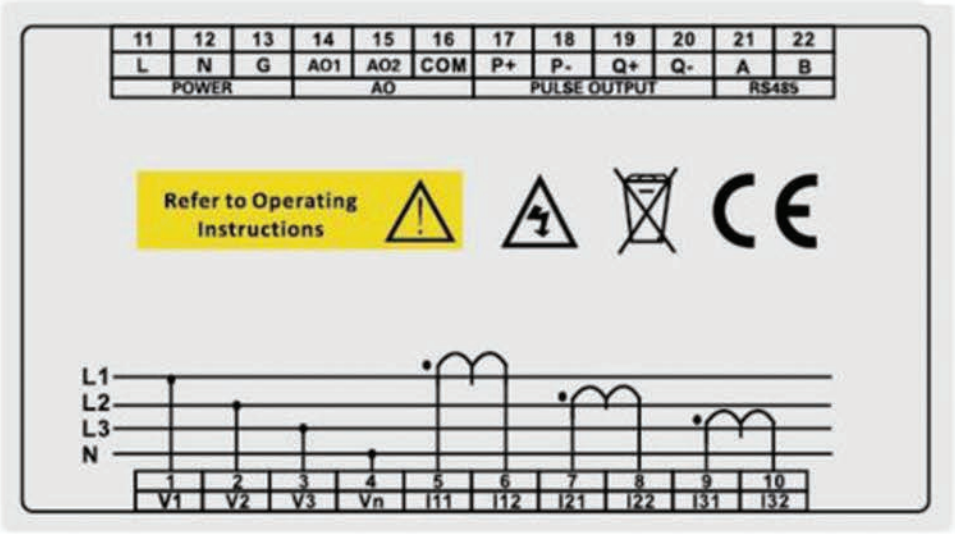
6. Dimensions



7. Wiring diagram



（Smart X835 Basic）



(Smart X835-AO)