THREE PHASE DIN RAIL ENERGY METER

COUNTIS M33

MANUAL V1.1

Statement

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Contents

Part 1 Product overview

1.1 Brief Introduction

COUNTIS M33 measures and displays the characteristics of single phase two wires (1p2w), three phase three wires (3p3w,) and three phase four wires (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.

COUNTIS M33 supports max. 100A direct connection. Saves the cost and avoid the trouble to connect external CTs, giving the unit a cost-effective and easy operation. Built-in interfaces provides pulse and RS485 Modbus RTU outputs. Configuration is password protected.

1.2 Product characteristics

● Measures kWh, Kvarh, KW, Kvar, KVA, P, F, PF, Hz, dmd, V, A, etc.

● Bi-directional measurement IMP & EXP

● Two pulse outputs

● RS485 Modbus

● DIN rail mounting 35mm

● 100A direct connection

The Unit can measure and display:

● Line voltage and THD% (total harmonic distortion) of all phases

● 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

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

● Changing password

- Supply system selection 1p2w, 3p3w,3p4w

- Demand Interval Time(DIT)

- Reset for demand measurements

- Pulse output duration

1.3 Application

COUNTIS M33 is a multi-functional three phase energy meter, designed for power system, public facilities, industrial applications and residential power monitoring needs. It can also be used in AC charging pile, solar photovoltaic and other occasions. Its complete communication function makes it very suitable for real-time power monitoring systems.

Part 2 General Specifications

2.1 Specifications

◆ Voltage： Rated Voltage (Un):3x230(400)V

Operational voltage: ±20% of Un

◆ Current： Rated Current (Ib)：10A

Max Current (Imax)： 100A

Operational current range : 0.4% Ib - Imax

Over current withstand: 20 Imax for 0.5s

◆ Operational frequency：Rated：50/60Hz

Range：45-65 Hz

◆ Insulation capabilities： AC voltage withstand 4KV/1min

Impulse voltage withstand 6kV – 1.2µS waveform

◆ Internal Power Consumption：≤ 2W.

◆ Pulse Output 1：Configurable

◆ Pulse Output 2：Fixed 400imp/kWh

◆ Display：LCD with backlit

◆ Max reading: 999999.99 kWh / kvarh

2.2 Accuracy

◆ Voltage：0.5%

◆ Current：0.5%

◆ Frequency：0.2%

◆ Power Factor：1%

◆ Active Power：0.5%

◆ Reactive Power：±1%

◆ Apparent power：±1%

◆ Active energy：Class1

◆ Reactive energy：Class2

2.3 RS485 Communication

◆ Bus Type：RS485

◆ Communication Protocol：Modbus RTU

◆ Baud rate： 2400/4800/9600/19200/38400bps

◆ Modbus Address：1-247

◆ Bus load：64pcs

◆ Communication distance：1000m

◆ Parity：EVEN /ODD/NONE

◆ Data bit：8

◆ Stop bit：1

2.4 Environment

◆ Operating humidity： ≤90%

◆ Storage humidity： ≤95%

◆ Operating temperature： -25℃~+55℃

◆ Storage temperature： -40℃~+70℃

◆ Standard： IEC 63052-11/IEC62053-21

◆ Accuracy： Class 1

◆ Installation category： CAT III

◆ Protection against penetration of dust and water： IP51（indoor）

◆ Insulating encased meter of protective class: II

◆ Altitude： ≤2000m

2.5 Dimensions
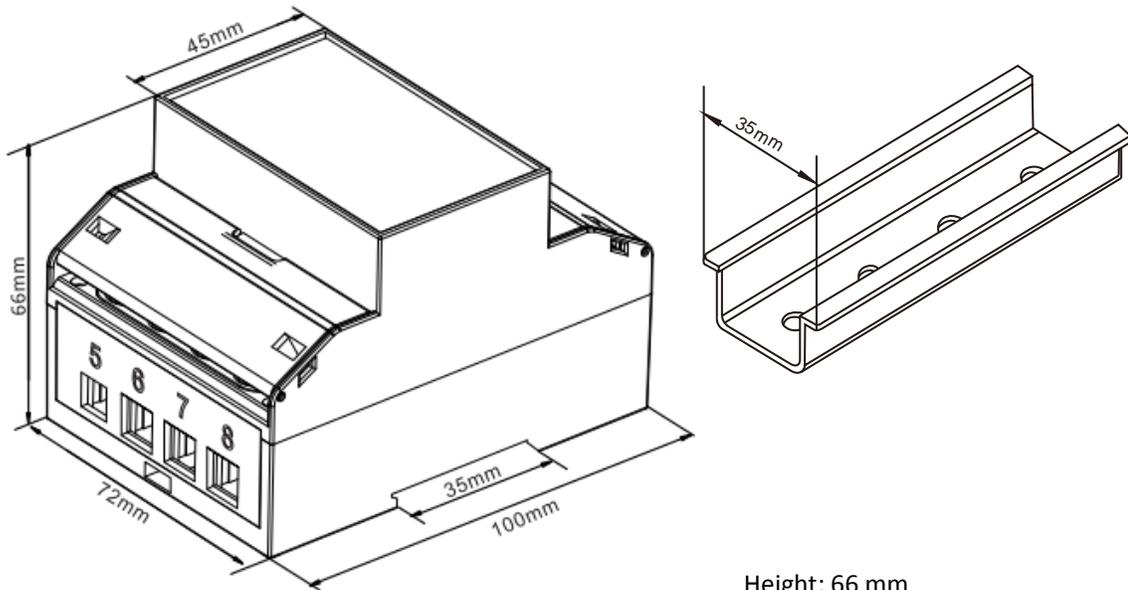
Height: 66 mm

Width: 72 mm

Length: 100 mm

2.6 Wiring Diagram
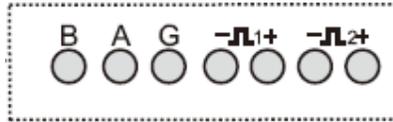
| 3P4W | 3P3W | 1P2W |
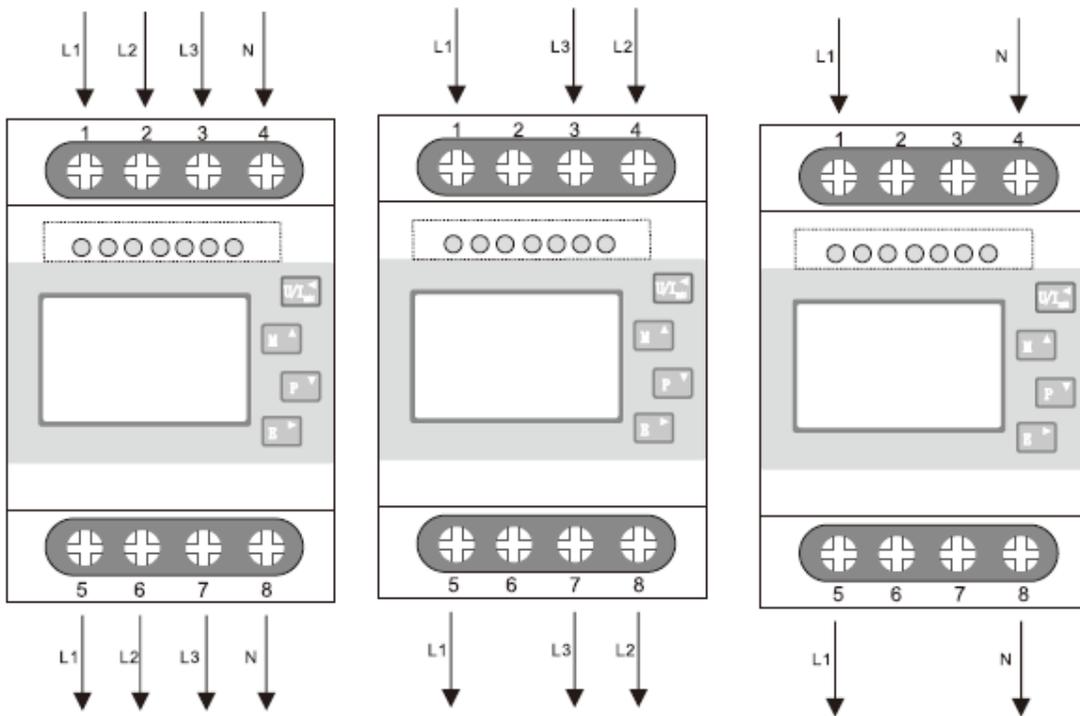
Part 3. Operation Instructions

3.1   Display and Operation

When the meter is powered on, the meter will initialize and do self-checking

Display as following:

1	Full screen
2	Software version
3	Self-checking finish

3.1.1 Button Definition

	Selects V and A display screen. In Set-up Mode, it is the "Left" or "Back" button
	Selects Hz and PF display screen. In Set-up Mode, it is the "Up" button
	Selects power display screen. In Set-up Mode, it is the "Down" button
	Selects energy display screen. In Set-up Mode, it is the "Enter" or "Right" button.

3.2 Measurement

3.2.1 Voltage & Current

Press button :

1	L¹ 000.0 L² 000.0 V L³ 000.0	Phase to neutral voltages(3p4w)
1-1	L¹⁻² 380.0 L²⁻³ 380.0 V L³⁻¹ 380.0	Phase to phase voltages(3p3w)
2	L¹ 0.000 L² 0.000 A L³ 0.000	Current on each phase
3	L¹ 00.00 V %THD L² 00.00 L³ 00.00	Phase to neutral voltage THD%(3p4w)
4	L¹ 00.00 I%THD L² 00.00 L³ 00.00	Current THD% for each phase
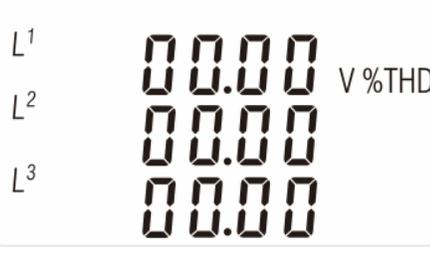
3.2.2 Frequency, Power Factor & Demand

Press button (F PF ▲) :

1		Frequency and Power Factor (total)
	Σ *00.00* Hz *0.999* PF	
2	L¹ *0.999* L² *0.999* L³ *0.999* PF	Power Factor of each phase
3	MD L¹ *0.000* L² *0.000* A L³ *0.000*	Maximum Current Demand
4	MD *0.000* kW Σ	Maximum Power Demand

3.2.3 Power

Press :

1	L^1 $\quad$ 0.000 $\quad$ kW L^2 $\quad$ 0.000 L^3 $\quad$ 0.000	Instantaneous Active Power in kW
2	L^1 $\quad$ 0.000 L^2 $\quad$ 0.000 $\quad$ kVAr L^3 $\quad$ 0.000	Instantaneous Reactive Power in kVAr
3	L^1 $\quad$ 0.000 L^2 $\quad$ 0.000 L^3 $\quad$ 0.000 $\quad$ kVA	Instantaneous Apparent Power in KVA
4	0.000 $\quad$ kW Σ 0.000 $\quad$ kVAr 0.000 $\quad$ kVA	Total kW, kVAr, kVA

3.2.4 Energy

Press button :

1	0000 kWh ≥ 031.4	Total active energy in kWh
2	0000 ≥ 00.00 kVArh	Total reactive energy in kVArh
3	IMPORT 0000 kWh 03.14	Imported active energy in kWh
4	EXPORT 0000 kWh 00.00	Exported active energy in kWh
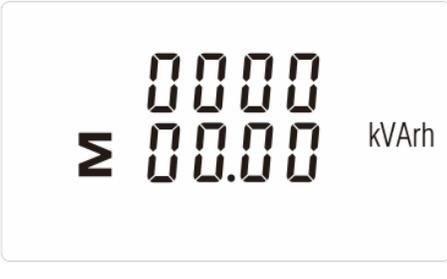
5		Imported reactive energy in kVArh
6		Exported reactive energy in kVArh

3.3 Setting by button

To enter set-up mode, pressing the button for 3 seconds, until the password screen appears.

Setting up is password-protected so you must enter the correct password (default '1000') before processing. If an incorrect password is entered, the display will show: Err

To exit setting-up mode, press [button UI ESC] repeatedly until the measurement screen is restored.

3.3.1 Button Operation

1. After Entering the Setting menu, use the [button F PF ▲] and [button P ▼] buttons to select the required item from the menu. Selection does not roll over between bottom and top of list

2. Press [button E ↵] for 3s to confirm your selection.

3. If an item flashes, then it can be adjusted by the [button F PF ▲] and [button P ▼] buttons. If not, there may be a further layer.

4. Having selected an option from the current layer, press [button E ↵] for 3s to confirm your selection. The SET indicator will appear.

5. Having completed a parameter setting, press [button UI ESC] to return to a higher menu level. The SET indicator will be removed and you will be able to use the [button F PF ▲] and [button P ▼] buttons for further menu selection.

6. On completion of all set-up, press [button UI ESC] repeatedly until the measurement screen is restored.

3.3.2 Number Entry Procedure

When setting up the unit, some screens require the entering of a number. In particular, on entry to the

setting up section, a password must be entered. Digits are set individually, from left to right. The procedure is as follows:

1. The current digit to be set flashes and is set using the ⬛F PF▲ and ⬛P▼

2. Press ⬛E↵ to confirm each digit setting. The SET indicator appears after the last digit has been set.

3. After setting the last digit, press ⬛U I ESC◀ to exit the number setting routine. The SET indicator will be removed.

3.3.3 Set Password

1	SEt PASS 1000	Use the ⬛F PF▲ and ⬛P▼ to choose the change password option
2-1	SEt PASS 1000	Press the ⬛E↵ to enter the change password routine. The new password screen will appear with the first digit flashing
2-2	SEt PASS 1000	Use ⬛F PF▲ and ⬛P▼ to set the first digit and press ⬛E↵ to confirm your selection. The next digit will flash.

Press [U I ESC] to exit the number setting routine and return to the Set-up menu. SET will be removed

3.3.4 Modbus Address

```
SEt
Addr
001
```
(The range is from 001 to 247)

1	``` SEt Addr 001 ```	From the Set-up menu, use [F PF ▲] and [P ▼] buttons to select the Address ID
2-1	``` SEt Addr 101 ```	Press [E ↵] button to enter the selection routine. The current setting will be flashing.
2-2	``` SEt Addr 101 ```	Use [F PF ▲] and [P ▼] buttons to choose Modbus Address(001 to 247)
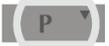
3.3.5 Baud Rate

Options: 2.4k. 4.8k, 9.6k, 19.2k, 38.4k.

1	5Et bAUd 9.6 k	From the Set-up menu, use [F PF▲] and [P▼] buttons to select the Baud Rate option.
2-1	5Et bAUd 9.6 k	Press [E↵] to enter the selection routine. The current setting will flash.
2-2	5Et bAUd 38.4 k	Use [F PF▲] and [P▼] buttons to choose Baud rate 2.4k. 4.8k, 9.6k, 19.2k, 38.4k

3.3.6 Parity

Options: EVEN / ODD / NONE.

1	5Et PArI EUEN	From the Set-up menu, use [F PF▲] and [P▼] buttons to select the Parity option.

2-1	SEt PArI EUEN	Press ⌜E ↵⌝ to enter the selection routine. The current setting will flash.
2-2	SEt PArI NONE	Use ⌜F PF▲⌝ and ⌜P ▼⌝ buttons to choose Parity (EVEN / ODD / NONE)

3.3.7 Stop bit

Option：1 or 2.

1	SEt StoP 2	From the Set-up menu, use ⌜F PF▲⌝ and ⌜P ▼⌝ buttons to select the Stop Bit option.
2	SEt StoP 2	Press ⌜E ↵⌝ to enter the selection routine. The current setting will flash. Use ⌜F PF▲⌝ and ⌜P ▼⌝ buttons to choose Stop Bit (2 or 1)

Note: Default is 1, and only when the parity is NONE that the stop bit can be changed to 2.

3.3.8 Pulse Output

This option allows you to configure the pulse output 1. 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 pulse output for:

Total kWh/ Total kVArh

Import kWh/Export kWh

Import KVArh/Export KVArh

1	SEt rLY kWh	From the Set-up menu, use [F PF▲] and [P ▼] buttons to select the Pulse output option.
2	SEt rLY kWh	Press [E ↵] to enter the selection routine. The unit symbol will flash. Use [F PF▲] and [P ▼] buttons to choose kWh or kVArh. On completion of the entry procedure, press [E ↵] to confirm the setting and press [U I ESC] to return to the main set up menu.

3.3.9 Pulse Constant

Use this to set the energy represented by each pulse. Rate can be set to 1 pulse per

dFt/0.01/0.1/1/10/100kWh/kVArh.

```
SEt
rAtE
  10
```

(It shows 1 impulse = 10kWh/kVArh)

1	```SEt rAtE 10```	From the Set-up menu, use [F PF ▲] and [P ▼] buttons to select the Pulse Rate option. Press [E ↵] to enter the selection routine. The current setting will flash. Note: When it's dFt, it means 2.5Wh/VArh
2	```SEt rAtE 10```	Use [F PF ▲] and [P ▼] buttons to choose pulse rate. On completion of the entry procedure, press [E ↵] to confirm the setting and press [U I ESC ▲] to return to the main set up menu.

3.3.10 Pulse Duration

The energy monitored can be active or reactive and the pulse width can be selected as

200, 100 (default) or 60ms.

(It shows pulse width of 200ms)

1		From the Set-up menu, use [F PF▲] and [P▼] buttons to select the Pulse width option.
2		Press [E ↵] to enter the selection routine. The current setting will flash. Use [F PF▲] and [P▼] buttons to choose pulse width. On Completion of the entry procedure, press [E ↵] to confirm the setting and press [U I ESC] to return to the main set up menu.

3.3.11 Demand Integration Time

This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement. The options are: 0, 5, 8, 10, 15, 20, 30, 60 minutes

1	SEt dIt 10	From the set-up menu, use [F PF▲] and [P ▼] buttons to select the DIT option. The screen will show the currently selected integration time.
2	SEt dIt 10	Press [E ↵] to enter the selection routine. The current time interval will flash Use [F PF▲] and [P ▼] buttons to select the time required. Press [E ↵] to confirm the selection. SET indicator will appear.

Press [U I ESC] to exit the DIT selection routine and return to the menu.

3.3.12 Set backlit lasting time

1	SEt LP 60	The backlit lasting time is settable Default lasting time is 60minutes For example, if it's set as 5, the backlit will be off in 5minutes from the last time operation on the meter.

2		Press [E] to enter the selection routine. The current time interval will flash
	SEt LP 60	The options can be: 0(always on),5,10,30,60,120minutes Use [F PF▲] and [P ▾] buttons to select the time required. Press [E] to confirm the set-up,

3.3.13 Set System

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

1		From the Set-up menu, use [F PF▲] and [P ▾] buttons to select the System option. The screen will show the currently selected power supply.
	SYS 3P3	
2		Press [E] to enter the selection routine. The current selection will flash. Use [F PF▲] and [P ▾] buttons to select the required system option: 1P2(W), 3P3(W), 3P4(W). Press [E] to confirm the selection. SET indicator will appear. Press [U I ESC] to exit the system selection routine and return to the menu. SET will disappear and you will be returned to the main Set-up Menu.
	SYS 3P3	

3.3.14 Clear

The meter provides a function to reset the maximum demand value of current and power.。

1		From the Set-up menu, use [F PF▲] and [P▼] buttons to select the reset option.
2	MD	Press [E↵] to enter the selection routine. The MD will flash. Press [E↵] to confirm the setting and press [U I ESC] to return to the main set up menu.

Part 4．Modbus resgiter Map

Function code	
04	to read input parameters

Address (Register)	Parameter Number	Input Register Parameter		Modbus Protocol Start Hex / Address		3 Ø	3 Ø	1 Ø
		Parameter	unit	Hi byte	Lo byte	4 W	3 W	2 W
0001	1	Phase 1 line to neutral volts.	Volts	00	00	√	X	√
0003	2	Phase 2 line to neutral volts.	Volts	00	02	√	X	X
0005	3	Phase 3 line to neutral volts.	Volts	00	04	√	X	X
0007	4	Phase 1 current.	Amps	00	06	√	√	√
0009	5	Phase 2 current.	Amps	00	08	√	√	X
0011	6	Phase 3 current.	Amps	00	0A	√	√	X
0013	7	Phase 1 power.	Watts	00	0C	√	X	√
0015	8	Phase 2 power.	Watts	00	0E	√	X	√
0017	9	Phase 3 power.	Watts	00	10	√	X	X
0019	10	Phase 1 volt amps.	VA	00	12	√	X	√
0021	11	Phase 2 volt amps.	VA	00	14	√	X	X
0023	12	Phase 3 volt amps.	VA	00	16	√	X	X
0025	13	Phase 1 Reactive Power	VAr	00	18	√	X	√
0027	14	Phase 2 Reactive Power	VAr	00	1A	√	X	X
0029	15	Phase 3 Reactive Power	VAr	00	1C	√	X	X
0031	16	Phase 1 power factor	None	00	1E	√	X	√

0033	17	Phase 2 power factor	None	00	20	√	X	X
0035	18	Phase 3 power factor	None	00	22	√	X	X
0037	19	Phase 1 phase angle.	Degrees	00	24	√	X	√
0039	20	Phase 2 phase angle.	Degrees	00	26	√	X	X
0041	21	Phase 3 phase angle.	Degrees	00	28	√	X	X
0043	22	Average line to neutral volts.	Volts	00	2A	√	X	X
0047	24	Average line current.	Amps	00	2E	√	√	√
0049	25	Sum of line currents.	Amps	00	30	√	√	√
0053	27	Total system power.	Watts	00	34	√	√	√
0057	29	Total system volt amps.	VA	00	38	√	√	√
0061	31	Total system VAr.	VAr	00	3C	√	√	√
0063	32	Total system power factor	None	00	3E	√	√	√
0067	34	Total system phase angle.	Degrees	00	42	√	√	√
0071	36	Frequency of supply voltages.	Hz	00	46	√	√	√
0073	37	Total Import kWh	kWh	00	48	√	√	√
0075	38	Total Export kWh.	kWh	00	4A	√	√	√
0077	39	Total Import kVArh .	kVArh	00	4C	√	√	√
0079	40	Total Export kVArh .	kVArh	00	4E	√	√	√
0081	41	Total VAh	kVAh	00	50	√	√	√
0083	42	Ah	Ah	00	52	√	√	√
0085	43	Total system power demand	W	00	54	√	√	√
0087	44	Maximum total system power demand	VA	00	56	√	√	√
0101	51	Total system VA demand.	VA	00	64	√	√	√

0103	52	Maximum total system VA demand.	VA	00	66	√	√	√
0105	53	Neutral current demand.	Amps	00	68	√	X	X
0107	54	Maximum neutral current demand.	Amps	00	6A	√	X	X
0201	101	Line 1 to Line 2 volts.	Volts	00	C8	√	√	X
0203	102	Line 2 to Line 3 volts.	Volts	00	CA	√	√	X
0205	103	Line 3 to Line 1 volts.	Volts	00	CC	√	√	X
0207	104	Average line to line volts.	Volts	00	CE	√	√	X
0225	113	Neutral current.	Amps	00	E0	√	X	X
0235	118	Phase 1 L/N volts THD	%	00	EA	√	X	√
0237	119	Phase 2 L/N volts THD	%	00	EC	√	X	X
0239	120	Phase 3 L/N volts THD	%	00	EE	√	X	X
0241	121	Phase 1 Current THD	%	00	F0	√	√	√
0243	122	Phase 2 Current THD	%	00	F2	√	√	X
0245	123	Phase 3 Current THD	%	00	F4	√	√	X
0249	125	Average line to neutral volts THD.	%	00	F8	√	X	√
0251	126	Average line current THD.	%	00	FA	√	√	√
0259	130	Phase 1 current demand.	Amps	01	02	√	√	√
0261	131	Phase 2 current demand.	Amps	01	04	√	√	X
0263	132	Phase 3 current demand.	Amps	01	06	√	√	X
0265	133	Maximum phase 1 current demand.	Amps	01	08	√	√	√
0267	134	Maximum phase 2 current demand.	Amps	01	0A	√	√	X
0269	135	Maximum phase 3 current demand.	Amps	01	0C	√	√	X
0335	168	Line 1 to line 2 volts THD.	%	01	4E	√	√	X
0337	169	Line 2 to line 3 volts THD.	%	01	50	√	√	X

0339	170	Line 3 to line 1 volts THD.	%	01	52	√	√	X
0341	171	Average line to line volts THD.	%	01	54	√	√	X
0343	172	Total kwh(3)	kwh	01	56	√	√	√
0345	173	Total kvarh(3)	kvarh	01	58	√	√	√
0347	174	L1 import kwh	kwh	01	5a	√	√	√
0349	175	L2 import kwh	kwh	01	5c	√	√	√
0351	176	L3 import kWh	kwh	01	5e	√	√	√
0353	177	L1 export kWh	kwh	01	60	√	√	√
0355	178	L2 export kwh	kwh	01	62	√	√	√
0357	179	L3 export kWh	kwh	01	64	√	√	√
0359	180	L1 total kwh	kwh	01	66	√	√	√
0361	181	L2 total kWh	kwh	01	68	√	√	√
0363	182	L3 total kwh	kwh	01	6a	√	√	√
0365	183	L1 import kvarh	kvarh	01	6c	√	√	√
0367	184	L2 import kvarh	kvarh	01	6e	√	√	√
0369	185	L3 import kvarh	kvarh	01	70	√	√	√
0371	186	L1 export kvarh	kvarh	01	72	√	√	√
0373	187	L2 export kvarh	kvarh	01	74	√	√	√
0375	188	L3 export kvarh	kvarh	01	76	√	√	√
0377	189	L1 total kvarh	kvarh	01	78	√	√	√
0379	190	L2 total kvarh	kvarh	01	7a	√	√	√
30381	191	L3 total kvarh	kvarh	01	7c	√	√	√

Function code	
10	to set holding parameter
03	to read holding parameter

Address Register	Paramet er Number	Parameter	Modbus Protocol Start Address Hex		Valid range	Mode
			High Byte	Low Byte		
0003	2	Demand Period	00	02	Write demand period: 0, 5,8, 10, 15, 20, 30 or 60 minutes, default 60. Setting the period to 0 will cause the demand to show the current parameter value, and demand max to show the maximum parameter value since last demand reset. Length : 4 byte Data Format : Float	r/w
0011	6	System Type	00	0A	Write system type: 3p4w = 3, 3p3w = 2 & 1p2w= 1 Requires password, see parameter 13 Length : 4 byte Data Format : Float	r/wp
0013	7	Pulse1 Width	00	OC	Write pulse1 on period in Milliseconds: 60, 100 or 200, default 100. Length : 4 byte	r/w

					Data Format : Float	
0015	8	Password Lock	00	OE	Write any value to password lock protected registers. Read password lock status: 0 = locked. 1 = unlocked. Reading will also reset the Pass word timeout back to one minute. Length : 4 byte Data Format : Float	r
0019	10	Network Parity Stop	00	12	Write the network port parity/stop bits for MODBUS Protocol, where: 0 = One stop bit and no parity, default. 1 = One stop bit and even parity. 2 = One stop bit and odd parity. 3 = Two stop bits and no parity. Requires a restart to become effective. Length : 4 byte Data Format : Float	r/w
0021	11	Network Node	00	14	Write the network port node Address: 1 to 247 for MODBUS Protocol, default 1. Requires a restart to become effective. Length : 4 byte Data Format : Float	r/w
0023	12	Pulse1 Divisor1	00	16	Write pulse divisor index: n= 0 to 5 0--0.0025 kWh(kVArh)/imp	r/w

					1--0.01 kWh(kVArh)/imp	
					2--0.1 kWh(kVArh)/imp	
					3—1 kWh(kVArh)/imp	
					4-10 kWh(kVArh)/imp	
					5-100 kWh(kVArh)/imp	
					Length : 4 byte	
					Data Format : Float	
0025	13	Password	00	18	Write password for access to protected registers. Length : 4 byte Data Format : Float	r/w
0029	15	Network Baud Rate	00	1C	Write the network port baud rate for MODBUS Protocol, where: 0 = 2400 baud. 1 = 4800 baud. 2 = 9600 baud, default. 3 = 19200 baud. 4 = 38400 baud. Requires a restart to become effective Length : 4 byte Data Format : Float	r/w
0087	44	Pulse 1 Energy Type	00	56	Write MODBUS Protocol input parameter for pulse output 1: 1: import active energy 2: total active energy	r/w

					4: export active energy, default 5: import reactive energy 6: total reactive energy 8: export reactive energy Length : 4 byte Data Format : Float	
61457	30729	Reset	F0	10	00 00 ： reset the Maximum demand Length : 2 byte Data Format: Hex	wo
64513	32257	Serial number	FC	00	Serial number Length: 4 byte Data Format: unsigned int32 Note: Only read	ro