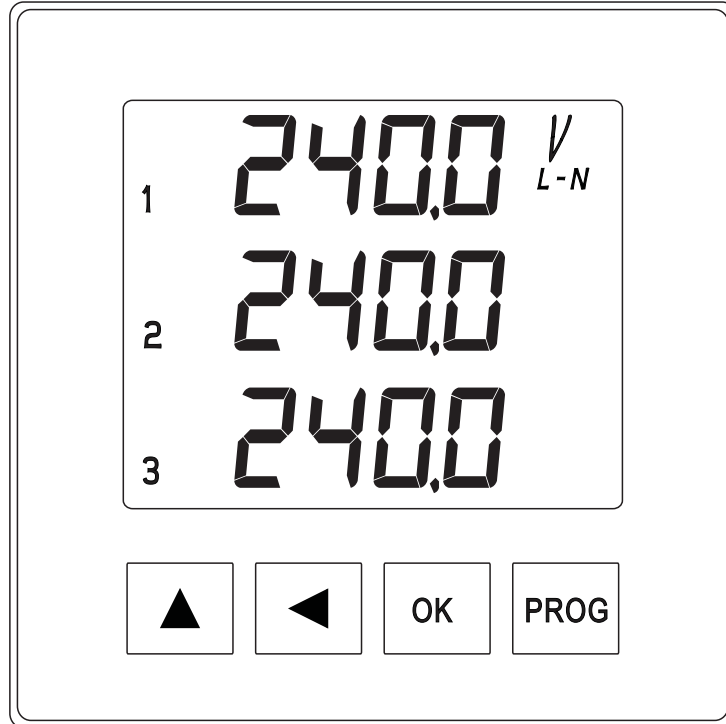


# T330

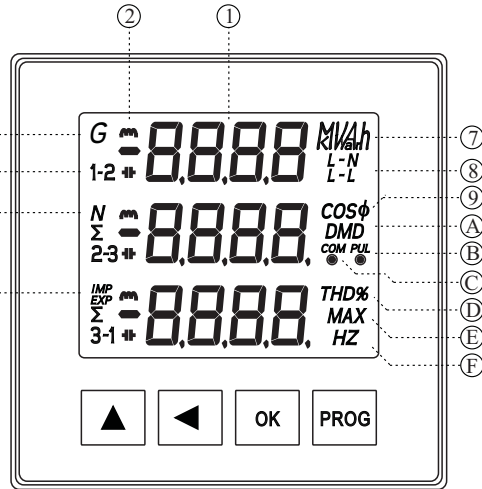
## Instruction Manual



# 1. Hardware Structure :

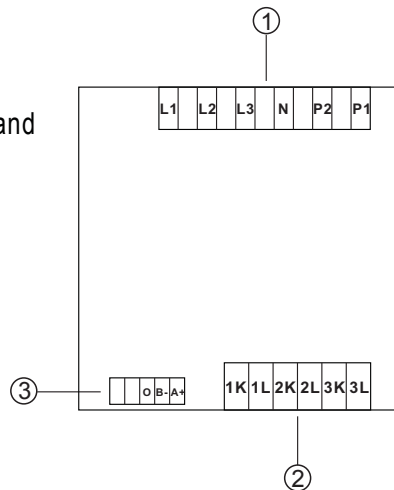
## 1.1 Display Screen:

- ① 3 rows of 4 digits
- ② Inductive/ capacitive load or positive/negative value
- ③ Generator display
- ④ Value in line-neutral or line-line voltage  
1: L1 value, 12 : L1-2 voltage(line to line)  
Σ: System value
- ⑤ N- phase current display
- ⑥ Measured energy  
**IMP**: Import WH  
**EXP**: Export WH
- ⑦ Measured units
- ⑧ Line-line voltage or phase voltage
- ⑨ Power factor
- A Actual demand
- B **PUL**: Pulse function ● : Flashing as the communication is in progress
- C **COM**: RS 485 function ● : Flashing as the communication is in progress
- D Individual harmonic rate(%)
- E Max. memorized values
- F System frequency



## 1.2 Terminals Configuration :

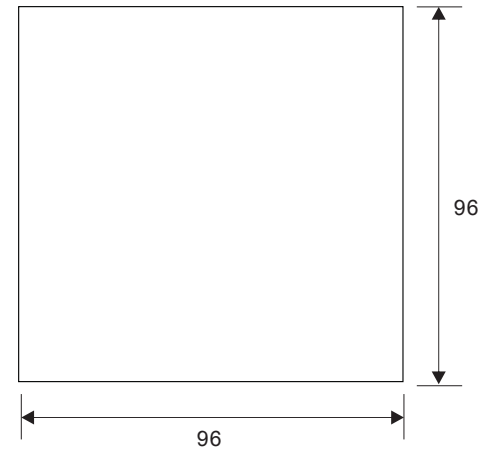
- ① Auxiliary power supply, voltage inputs and generator contact terminal
- ② Current inputs
- ③ Extended modules



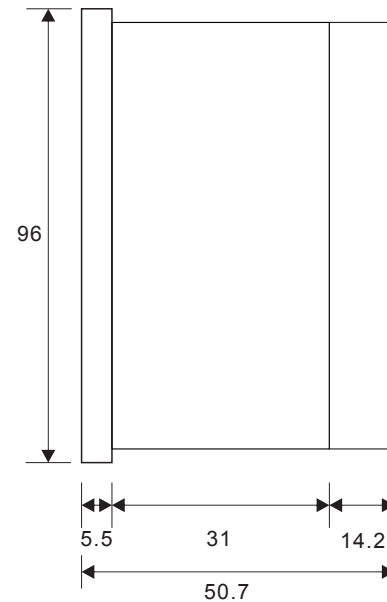
# 2. Installation/ Wiring :

## 2.1 Dimension and Panel Cut-out (Unit : mm)

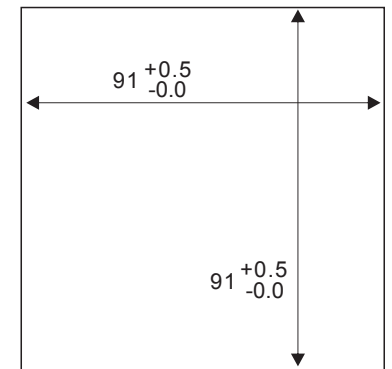
### ● Front View



### ● Side View

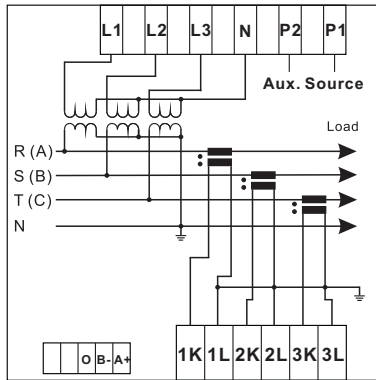


### ● Cut-Out Size

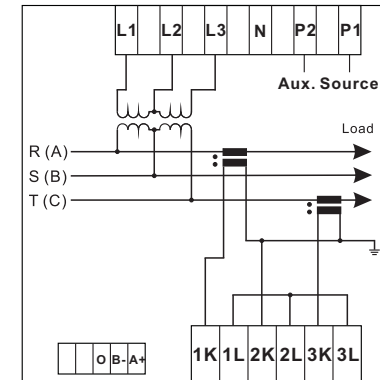


## 2.2 Connection Diagrams:

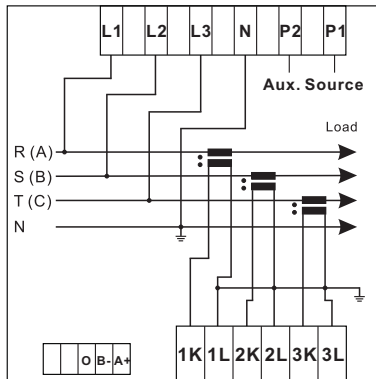
- 3 Phase 4 Wire(3 PTs, 3 CTs)  $5Y5 nEt = 3P4L$



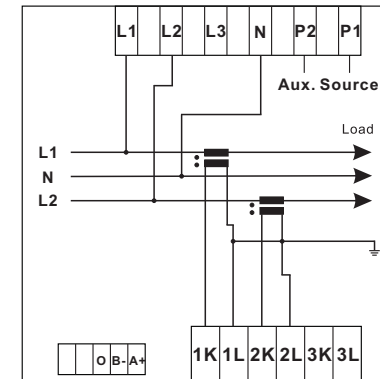
- 3 Phase 3 Wire (2 PTs, 2 CTs)  $5Y5 nEt = 3P3L$



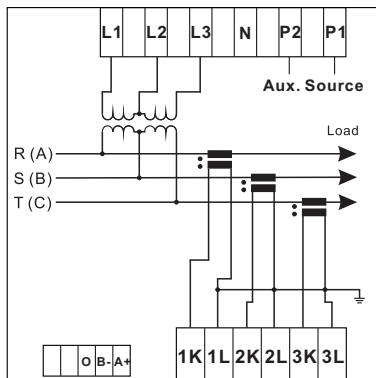
- 3 Phase 4 Wire(Only 3CTs)  $= 3P4L$



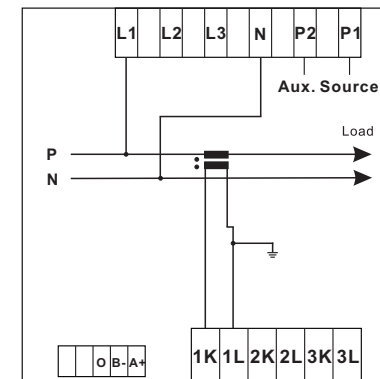
- 1 Phase 3 Wire (Only 2 CTs)  $5Y5 nEt = 1P3L$



- 3 Phase 3 Wire (2PTs,3CTs)  $5Y5 nEt = 3P3L$



- 1 Phase 2 Wire (Only 1 CT)  $5Y5 nEt = 1P2L$



### 3. Functions of Buttons:

#### 3.1 Keys Programming

- ▲ Shift to next parameter
- ▲ + PROG Shift to previous parameter
- ◀ Advance to the next page
- ◀ + PROG Advance to the previous page
- PROG Access to the Set-up Flowchart (See 4.1)
- OK + PROG Set up the Power on display screen
- ▲ + OK Shift to total harmonic level formula :

$V_{rms}$  : The RMS Volt waveform  
 $V_{(1)rms}$  : The RMS Volt on fundamental frequency waveform

$$THD = \sqrt{\frac{V_{rms}^2 - V_{(1)rms}^2}{V_{(1)rms}^2}} \times 100\% \quad \text{Temporarily display: } \underline{THdF}$$

$$THD = \sqrt{\frac{V_{rms}^2 - V_{(1)rms}^2}{V_{rms}^2}} \times 100\% \quad \text{Temporarily display: } \underline{THdr}$$

#### 3.1.1 Symbols of Phase Sequence (Refer to 1.1)

**Display** : 4 digits at the maximum figures up to 9999

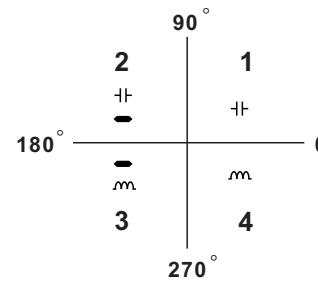
**Decimal point position of The M/K unit:** The position of the decimal point in the M/K unit will automatically be varied with the rated inputs (CT and PT ratio set-up)

##### Values in line-neutral or line-line voltage

- 1 : L1 values in line-neutral;    1-2 : L1-L2 line-line voltage
- 2 : L2 values in line-neutral;    2-3 : L2-L3 line-line voltage
- 3 : L3 values in line-neutral;    3-1 : L3-L1 line-line voltage
- Σ : System values

##### Symbols :

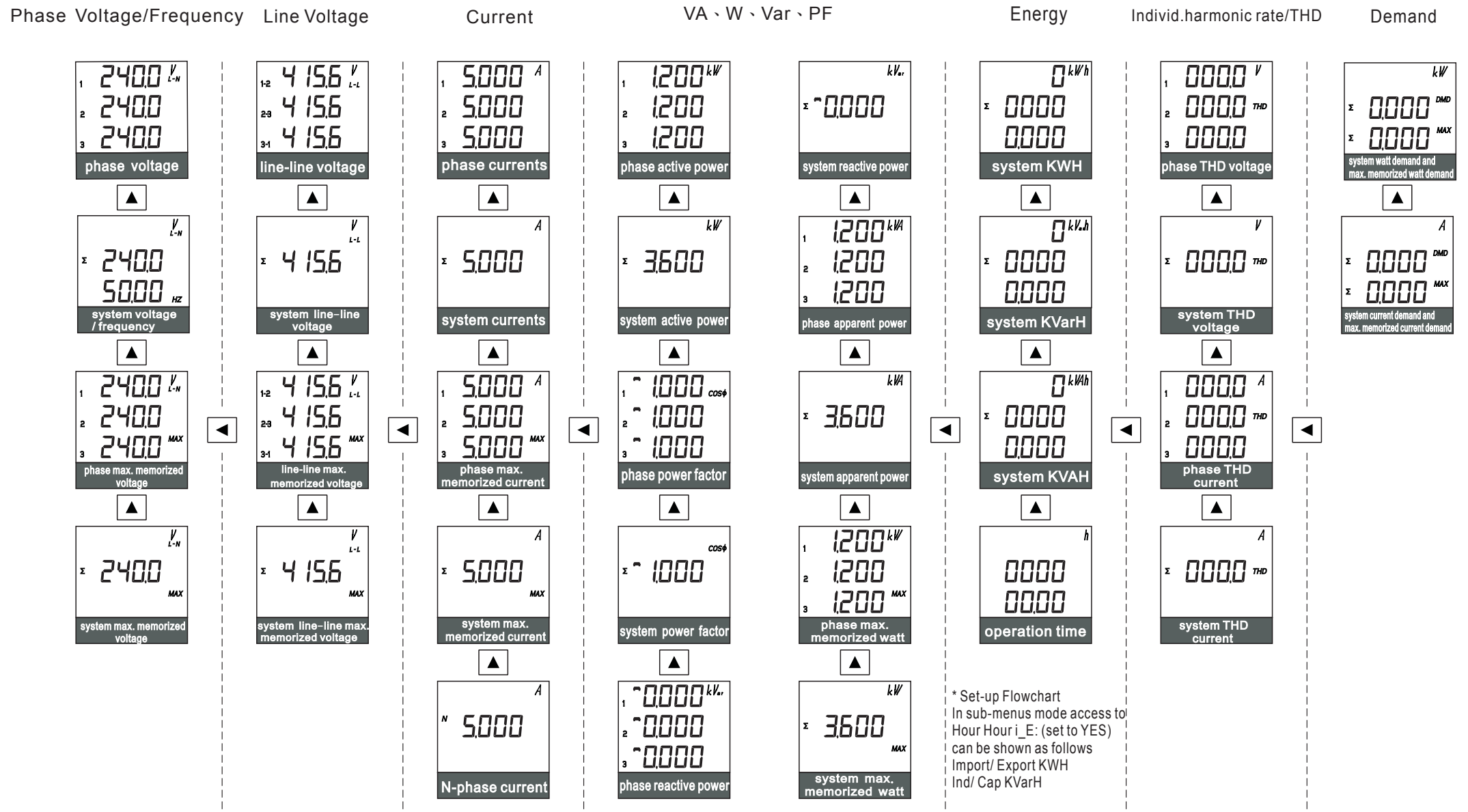
- m : Inductive load
- + : Capacitive load
- : Negative watt (Reverse current flow)



The angle lain between a base of measured voltage and the current is divided into 4 quadrants.

### 3. Display Mode and Button Functions :

#### 3.2 Display in 3P4W: 5Y5 nEt = 3P4L



### 3.3 Display in 3P3W: $SYS \text{ rEt} = 3P3L$

Line-line voltage  
/ Frequency

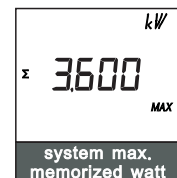
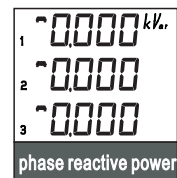
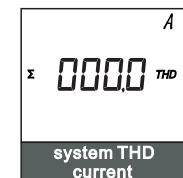
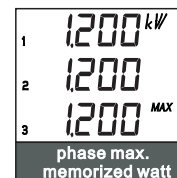
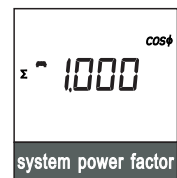
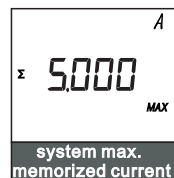
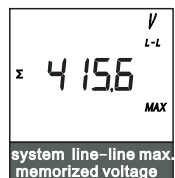
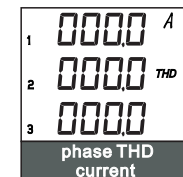
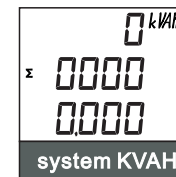
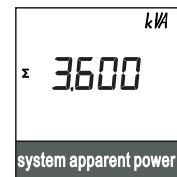
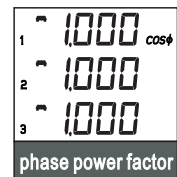
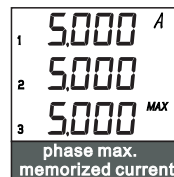
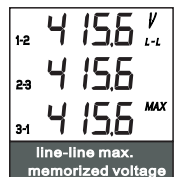
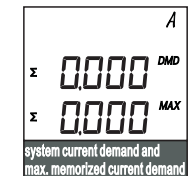
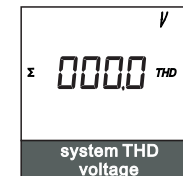
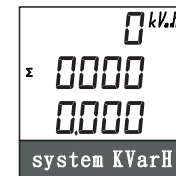
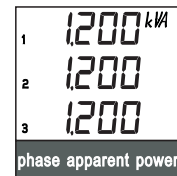
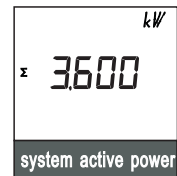
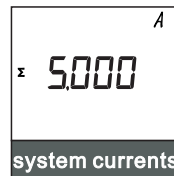
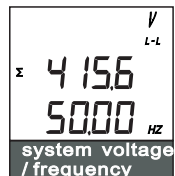
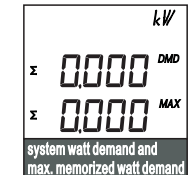
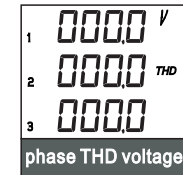
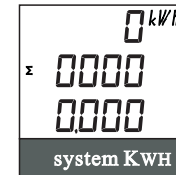
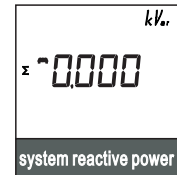
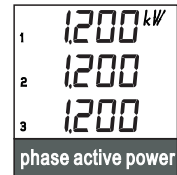
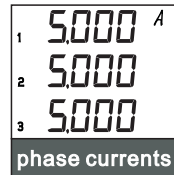
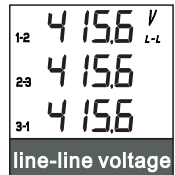
Current

VA · W · Var · PF

Energy

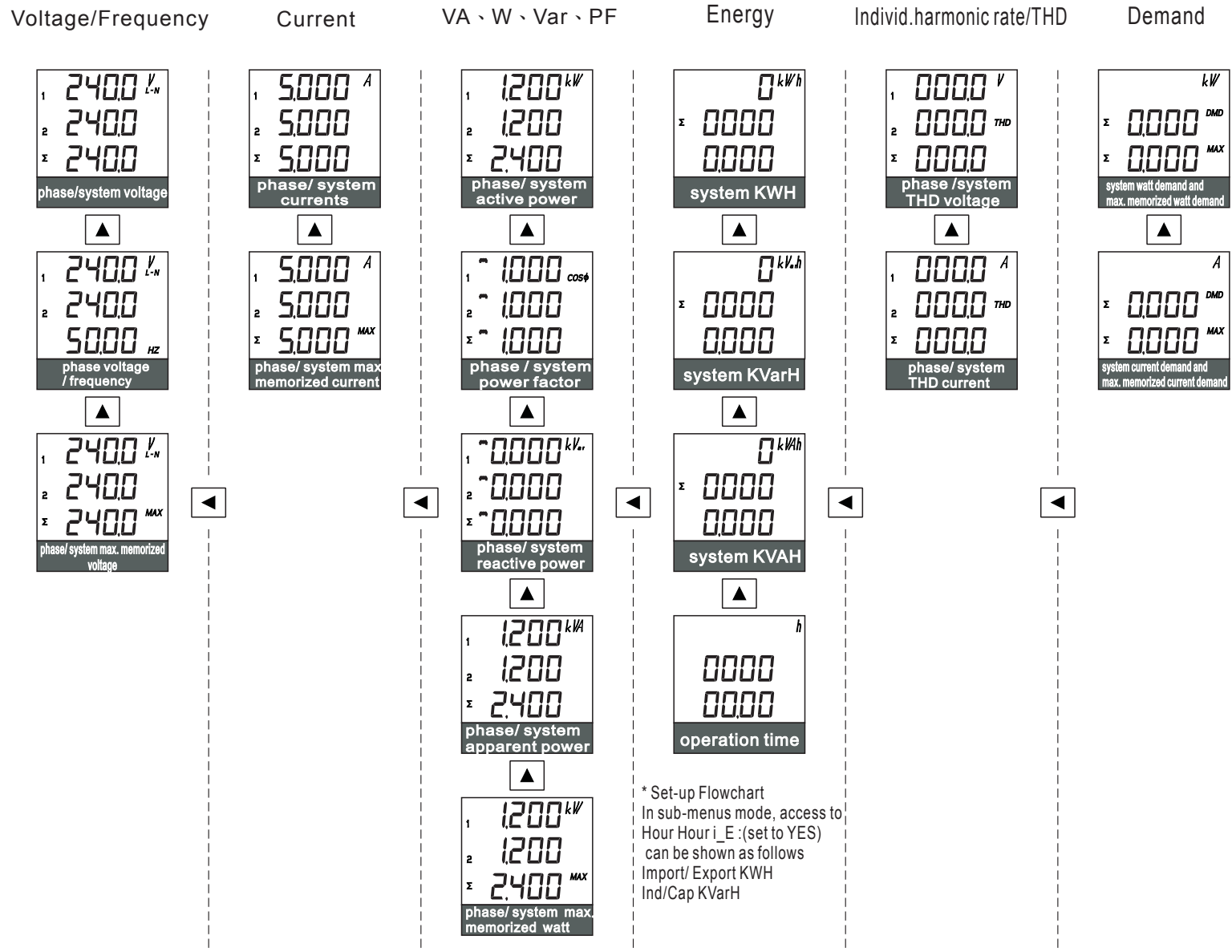
Individ.harmonic rate/THD

Demand

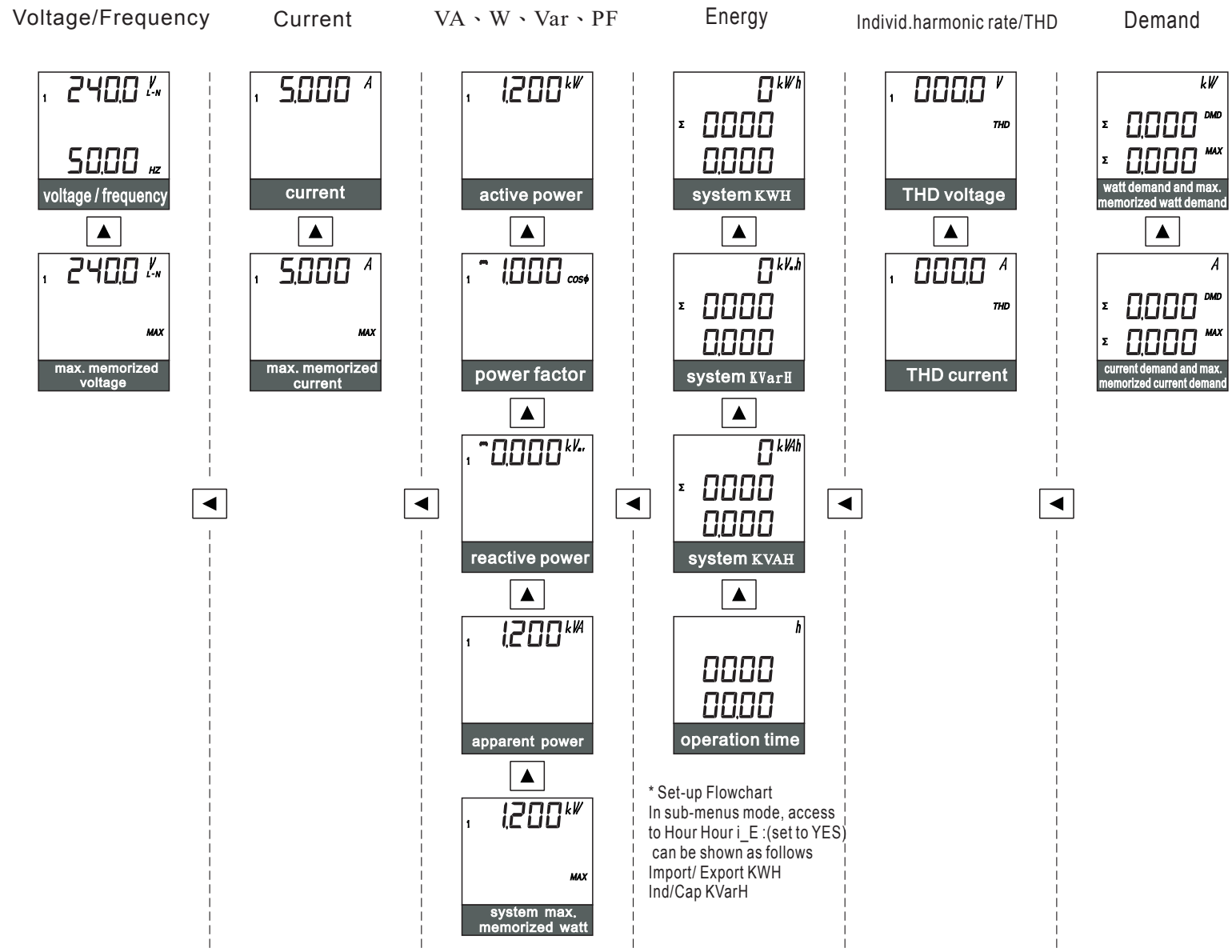


\* Set-up Flowchart  
In sub-menus mode access  
to Hour Hour i\_E: (set to YES)  
can be shown as follows  
Import/ Export KWH  
Ind/ Cap KVarH

### 3.4 Display in 1P3W: 545 nEt = 1P3L



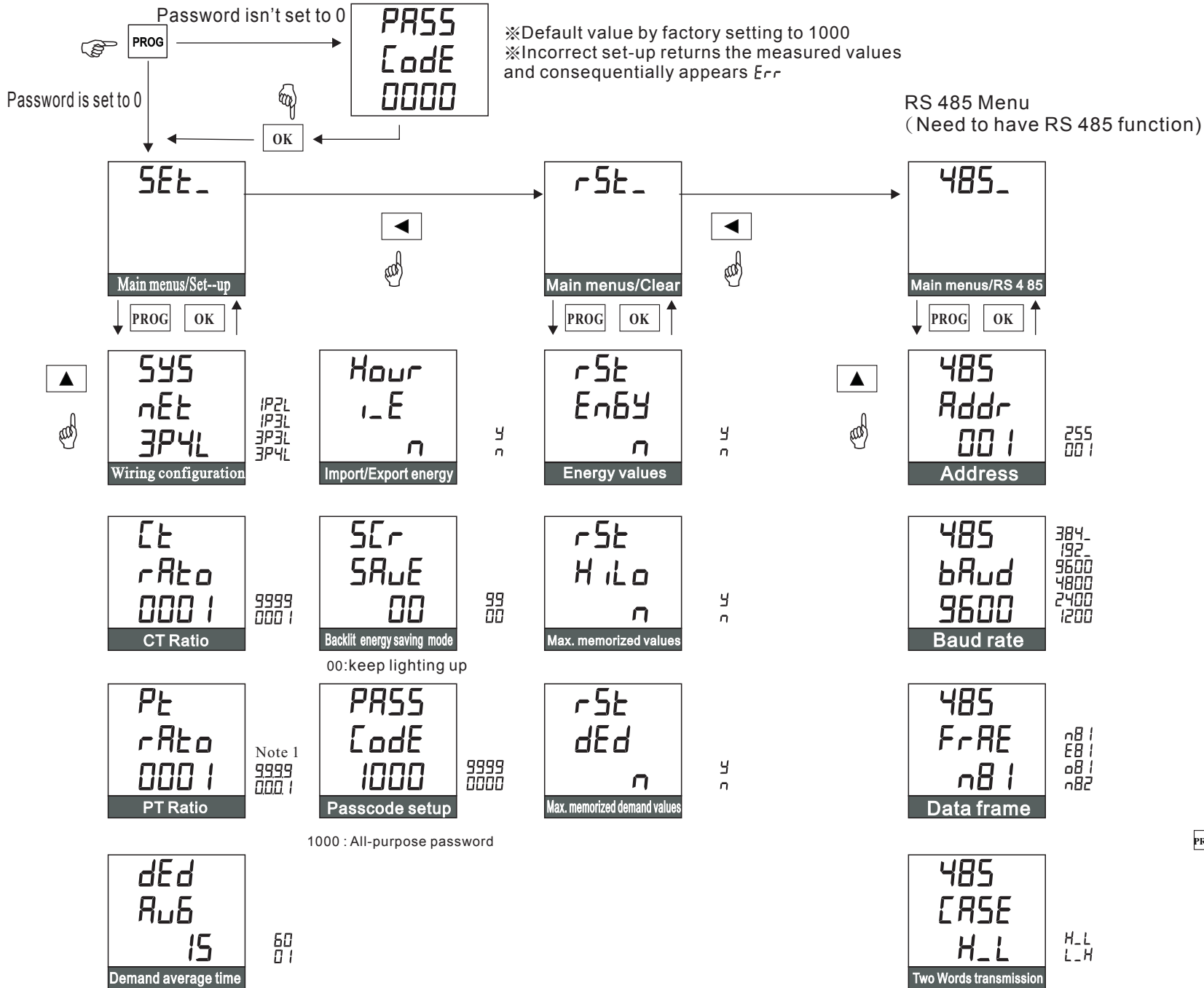
### 3.4 Display in 1P2W: $SYS \ nEt = 1P2L$





## 4. Set-up Flowchart/ Buttons:

### 4.1 Set-up Flowchart :



### 4.2 Buttons :

#### ● Functions :

#### Main menu

- PROG** Access to sub-menus
- ◀** Advance to the next menu
- OK** Return to measured values
- ▲** Disable

#### Sub-menu

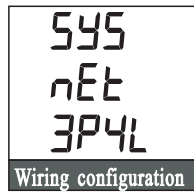
- PROG** Access to values set-up
- OK** Return to main menu
- ▲** Advance to next sub-menu
- ◀** Disable

#### Values Set-up

- ▲** Increased value
- ◀** Vary digits position
- OK** Confirm then return to sub-menus
- PROG** Disable

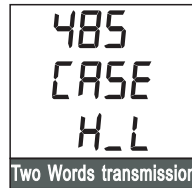
Note 1: At the presence of PT ratio set-up, press **PROG** **OK** simultaneously for setting the decimal point position.

### 4.3 The reminders of Sub-Menus Set-up :



The electrical connection shall correspond with the set wiring configuration

1P2L  
1P3L  
3P3L  
3P4L



Being applied to Double Words" transmission

H\_L : Hi word is set ahead, Low word is set behind  
It is defined as "Swapped Float"

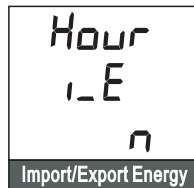
L\_H : Low word is set ahead, Hi word is set behind  
It is defined as "Float"



At the presence of PT ratio set-up, press

**PROG** **OK** simultaneously for setting the decimal point position.

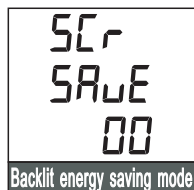
9999  
000.1



WH : Import/Export values  
VarH : Ind/Cap values

**IMP**: Import WH  
**EXP**: Export WH

n u  
**m**: Ind VarH  
**+**: Cap VarH



Time set-up for backlit energy saving .  
After a touch on any of buttons, the  
backlit will automatically be lit up

99  
00  
00:keep lighting up

## 5. Specifications:

### 5.1 Measured Parameters and Accuracy :

Display	SYS	L1	L2	L3	Accuracy
L-Lvolt	●*	●	●	●	0.2%
L-Nvolt	●*	●	●	●	0.2%
Current	●*	●	●	●	0.2%
Active power	●	●	●	●	0.5%
Reactive power	●	●	●	●	0.5%
Apparent power	●	●	●	●	0.5%
Power factor	●*	●	●	●	0.5%
Frequency	●				0.05Hz
Import(KWH)	●				IEC62053-22 Class 0.5S
Ind(KVarH)	●				IEC62053-23 Class 2
Export(KWH)	●				IEC62053-22 Class 0.5S
Cap(KVarH)	●				IEC62053-23 Class 2
THD	●*	●	●	●	2%
Demand	●				0.5%

\*Average value accuracy :F.S.%

### 5.2 Characteristics:

#### ● Accuracy performance range:

Voltage	0.6 ~ 120%
Current	0.2 ~ 120%
Power energy	Volt : 0.6 ~ 120% , Amp : 0.2 ~ 120%
Power factor	COSθ(SINθ) 0.5 ~ 1
Frequency	45 ~ 65Hz

#### ● Input Voltage :

Line-line Voltage	3 ~ 520V
Line-neutral Voltage	2 ~ 300V
Maximum overload	750V
Input impedance	≥ 800KΩ
Power consumption	≤ 0.1VA

#### ● Input Current :

Current	5A , 1A(Option)
Power consumption	≤ 0.1VA
Isolation	Phase to phase 600V
Starting current	0.2%F.S.

- **THD % display :**
  - Current ..... 1~120% F.S.
  - Voltage ..... 10~120% F.S.
- **Power supply :**
  - Auxiliary power supply ..... AC/DC85~265V  
DC20~60V ( OPTION )
  - Power consumption ..... ≤ 4.5VA(Without RS-485)  
≤ 5VA(With RS-485)
  - Frequency Range ..... 45 ~ 65Hz
- **Display screen :**
  - Format ..... LCD white backlit
  - Digit height ..... 3 rows of 4 digits 0.5" , 13.0mm
- **Set-up/ Memorized Value :**
  - Memory method ..... FRAM
  - Memory time ..... At least 20 years
- **Communication :**
  - Interface ..... RS485
  - Protocol ..... MODBUS , RTU frame
  - Baud rate ..... 1200 ~ 38400 programmable
  - Address ..... 1 ~ 255 programmable
  - Data formal ..... N,8,1/N,8,2/O,8,1/E,8,1 programmable
  - Parallel connection ..... 32 meters

## 6. Communications:

### 6.1 Communication protocol :

Adopting MODBUS communication shall use a repeater as the meters are in parallel connection more than 30 pcs.

### 6.2 Transmission mode :

RTU MODE ◦

### 6.3 Communication method :

Rs485 (Half-Duplex)

### 6.4 MODBUS Frame :

#### 6.4.1 Basic Comm and Framing: Hexadecimal Code

Start of frame	Address Field	Function Code	Data Field	Error Check	End of Frame
----------------	---------------	---------------	------------	-------------	--------------

Start of frame : The data is not transmitted by a silent period of at least 4 characters

Address field : The valid MODBUS addresses are in the range of 1-255, the address 0 for broadcast command is only valid for Function Code ⇒ 06H

Function code : 03H⇒Read data  
06H⇒Write data

Data field : The start address of a register. Reading N WORDS and Writing N values

Error check : 16bit CRC ◦

End of frame : The date is not transmitted by a silent period of at least 4 characters

#### 6.4.2 Bit Per Byte: Access to sub-menus 485 → FrAE to set-up

Start Bit	Data Bit	Parity	Stop	Frame
1	8	None	2	N · 8 · 2
1	8	Odd	1	O · 8 · 1
1	8	Even	1	E · 8 · 1
1	8	None	1	N · 8 · 1

### 6.5 Reading Register Command :

Query :

Start of Frame	Address Field	Function Code	Start Address Hi	Start Address Lo	Number of Word Hi	Number of Word Lo	Error Check	End of Frame
	01H~FFH	03H	0~nnH	0 ~ nnH	0H	1~nnH	CRC Lo   CRC Hi	
	1 Byte	1 Byte	2Byte		2 Byte		2 Byte	

Response : (Command is correct)

Start of Frame	Address Field	Function Code	Number of Data Byte Count	D0 · D1.. Dn (Hi,Lo,Hi,Lo....)	Error Check	End of Frame
	01H~FFH	03H			CRC Lo   CRC Hi	
	1 Byte	1 Byte	1Byte		2 Byte	

### 6.6 Writing Register Command: A single writing WORD command

Query :

Start of Frame	Address Field	Function Code	Start Address Hi	Start Address Lo	Value Hi..	Value ..Lo	Error Check	End of Frame
	01H~FFH	06H	0~nnH	0 ~ nnH	Setting Value		CRC Lo   CRC Hi	
	1 Byte	1 Byte	2Byte		2 or 4 Byte		2 Byte	

Response : (Response to the writing data if the command is correct)

Start of Frame	Address Field	Function Code	Start Address Hi	Start Address Lo	Value Hi..	Value ..Lo	Error Check	End of Frame
	01H~FFH	06H	0~nnH	0 ~ nnH	Setting Value		CRC Lo   CRC Hi	
	1 Byte	1 Byte	2Byte		2 or 4 Byte		2 Byte	

### 6.7 Message Error : (A command is error)

Start of Frame	Address Field	Function Code	Error Code	Error Check	End of Frame
	01H~FFH	83H or 86H		CRC Lo   CRC Hi	
	1 Byte	1 Byte	1 Byte	2 Byte	

- Function Code : Response to the received Function Code but MSB is set to 1, it functions like 03H ⇒ 83H
- Error Code :
  - 01 : Error Function ◦
  - 02 : Error Data Address ◦
  - 03 : Error Data Value ◦

## 6.8 The CRC Calculation :

The CRC is calculated on all byte of a message from the Address Filed to the last data byte ended (Data Field); Furthermore, it means that the data received is in error if the CRC calculation performed on host does not match the received data.

The CRC Calculation Performed:

1. Load a CRC register with 0 x FFFF
- 2 Exclusive- OR the first 8 bits of the message with the low-order byte of the CRC register. Put the result in the CRC register.
- 3.Shift the CRC register one bit to the right then fill the message in high-order of the CRC register with a zero, and compare the bit shifted out (SLSB).
4. Repeat step 3 if the SLSB=0; Exclusive- OR the CRC register with the value A001(Hex), then put the result in the CRC register if the SLSB=1.
5. Repeat steps 3 and 4 until the 8 bits have been performed and tested.
6. Repeat steps 2 to 5 until all bytes have been performed.
7. Swap a message with low and high order bytes of the CRC register.

### CRC Checkup Routine :

The CRC register returned is as unsigned short int.

The starting address and the field of the data are transmitted, and the high and low order bytes of the returned CRC register have been swapped.

```
/*CRC Generation Function with 'C' language*/
/* Msg:*message to calculate CRC upon*/
/* usDatalen: number of bytes in message*/
unsigned int CRC16(char *Msg,unsigned char usDatalen)
{
    unsigned char uchCRCHi=0xFF; /*CRC high byte*/
    unsigned char uchCRCLo=0xFF; /*CRC low byte*/
    unsigned char uIndex;
    while(usDatalen--)*pass through message buffer*
    {
        uIndex=uchCRCHi^*Msg++; /*calculate the CRC*/
        uchCRCHi=uchCRCLo^auchCRCHi[uIndex];
        uchCRCLo=auchCRCLo[uIndex];
    }
}
return (uchCRCHi<<8|uchCRCLo);
```

```
static unsigned char auchCRCHi[]={
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,
0x80,0x41,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,0x01,0xc0,
0x80,0x41,0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x00,0xc1,
0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x00,0xc1,
0x81,0x40,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,
0x80,0x41,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,
0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,0x00,0xc1,
0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,
0x80,0x41,0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,
0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,0x01,0xc0,
0x80,0x41,0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,
0x80,0x41,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,
0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,0x01,0xc0,
0x80,0x41,0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,
0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,0x01,0xc0,
0x80,0x41,0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,
0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,0x01,0xc0,
0x80,0x41,0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40};
```

```
static unsigned char auchCRCLo[]={
0x00,0xc0,0xc1,0x01,0xc3,0x03,0x02,0xc2,0xc6,0x06,
0x07,0xc7,0x05,0xc5,0xc4,0x04,0xcc,0x0c,0x0d,0xcd,
0x0f,0xcf,0xce,0x0e,0x0a,0xca,0xcb,0x0b,0xc9,0x09,
0x08,0xc8,0xd8,0x18,0x19,0xd9,0x1b,0xdb,0xda,0x1a,
0x1e,0xde,0xdf,0x1f,0xdd,0x1d,0x1c,0xdc,0x14,0xd4,
0xd5,0x15,0xd7,0x17,0x16,0xd6,0xd2,0x12,0x13,0xd3,
0x11,0xd1,0xd0,0x10,0xf0,0x30,0x31,0xf1,0x33,0xf3,
0xf2,0x32,0x36,0xf6,0xf7,0x37,0xf5,0x35,0x34,0xf4,
0x3c,0xfc,0xfd,0x3d,0xff,0x3f,0x3e,0xfe,0xfa,0x3a,
0x3b,0xfb,0x39,0xf9,0xf8,0x38,0x28,0xe8,0xe9,0x29,
0xeb,0x2b,0x2a,0xea,0xee,0x2e,0x2f,0xef,0x2d,0xed,
0xec,0x2c,0xe4,0x24,0x25,0xe5,0x27,0xe7,0xe6,0x26,
0x22,0xe2,0xe3,0x23,0xe1,0x21,0x20,0xe0,0xa0,0x60,
0x61,0xa1,0x63,0xa3,0xa2,0x62,0x66,0xa6,0xa7,0x67,
0xa5,0x65,0x64,0xa4,0x6c,0xac,0xad,0x6d,0xaf,0x6f,
0x6e,0xae,0xaa,0x6a,0x6b,0xab,0x69,0xa9,0xa8,0x68,
0x78,0xb8,0xb9,0x79,0xbb,0x7b,0x7a,0xba,0xbe,0x7e,
0x7f,0xbf,0x7d,0xbd,0xbc,0x7c,0xb4,0x74,0x75,0xb5,
0x77,0xb7,0xb6,0x76,0x72,0xb2,0xb3,0x73,0xb1,0x71,
0x70,0xb0,0x50,0x90,0x91,0x51,0x93,0x53,0x52,0x92,
0x96,0x56,0x57,0x97,0x55,0x95,0x94,0x54,0x9c,0x5c,
0x5d,0x9d,0x5f,0x9f,0x9e,0x5e,0x5a,0x9a,0x9b,0x5b,
0x99,0x59,0x58,0x98,0x88,0x48,0x49,0x89,0x4b,0x8b,
0x8a,0x4a,0x4e,0x8e,0x8f,0x4f,0x8d,0x4d,0x4c,0x8c,
0x44,0x84,0x85,0x45,0x87,0x47,0x46,0x86,0x82,0x42,
0x43,0x83,0x41,0x81,0x80,0x40};
```

## 6.9 Setting Data Address: (Integers)

### 6.9.1 Set-up :

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
0000	0000H	Display Page	Integer	1	R/W	0 - n (Note)
0001	0001H	Display Item	Integer	1	R/W	0 - n (Note)
0002	0002H	Power on Page	Integer	1	R/W	0 - n (Note)
0003	0003H	Power on Item	Integer	1	R/W	0 - n (Note)
0004	0004H	Reserve	Integer	1	R/W	
0005	0005H	Reserve	Integer	1	R/W	
0006	0006H	Reserve	Integer	1	R/W	
0007	0007H	System Net	Integer	1	R/W	0 - 3 (Note)
0008	0008H	Demand Average Times	Integer	1	R/W	1 - 60 (Note)
0009	0009H	485 Address	Integer	1	R/W	1-255
0010	000AH	485 Baud Rate	Integer	1	R/W	0 - 5
0011	000BH	485 Frame	Integer	1	R/W	0 - 3
0012	000CH	485 Case (HiLo  LoHi)	Integer	1	R/W	0 - 1 (Note)
0013	000DH	CT Ratio	Integer	1	R/W	1 - 9999
0014	000EH	PT Ratio	Integer	1	R/W	1 - 9999
0015	000FH	Password	Integer	1	R/W	0 - 9999
0016	0010H	Reset High	Integer	1	R/W	0 - 1 (1:Clear)
0017	0011H	Reset Energy	Integer	1	R/W	0 - 1 (1:Clear)
0018	0012H	Reset Demand High	Integer	1	R/W	0 - 1 (1:Clear)
0019	0013H	Display High Function	Integer	1	R/W	0 - 1 (1:YES)
0020	0014H	Display Hour I,E	Integer	1	R/W	0 - 1 (1:YES)
0021	0015H	Screen Save	Integer	1	R/W	0 - 99 (Note)
0022	0016H	Pulse Numbers	Integer	1	R/W	0 - 3 (Note)

### Remarkable descriptions:

Contents	Description
Display Page	0 : V · 1 : A · 2 : P · 3 : THD
Display Item	Corresponding the displayed parameters and wiring configuration
Power On Page	The desired parameters in system as the meter is powered on 0 : V · 1 : A · 2 : P · 3 : THD
Power On Item	Corresponding the displayed parameters
System Net	System nEt : Wiring configuration, 0:3P4L,1:3P3L,2:1P3L,3:1P2L
Demand Average Times	The average demand time setting : 1-60 min.
485 Baud Rate	0:1200,1:2400,2:4800,3:9600,4:19200,5:38400
485 Frame	0:n,8,2,1:o,8,1,2:e,8,1,3:n,8,1
485 CASE	Two Words for transmission (Float/ Long) 0:Lo_Hi,1:Hi_Lo
Screen Save	Backlit energy saving mode 00:Keep lighting up 01-99: Backlit disabled
PUL x Pulse Numbers	0:P 1,1:P 10,2:P 100,3:P1000

### 6.9.2 Values : Floating Point, Word transmission refers to 485 CASE for set-up

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
4096	1000H	I_R L1	Float	2	R	A
4098	1002H	V_RN	Float	2	R	V
4100	1004H	V_RS	Float	2	R	V
4102	1006H	VA_R	Float	2	R	VA
4104	1008H	W_R	Float	2	R	W
4106	100AH	Var_R	Float	2	R	Var
4108	100CH	PF_R	Float	2	R	PF
4110	100EH	I_S L2	Float	2	R	A
4112	1010H	V_SN	Float	2	R	V
4114	1012H	V_ST	Float	2	R	V
4116	1014H	VA_S	Float	2	R	VA
4118	1016H	W_S	Float	2	R	W
4120	1018H	Var_S	Float	2	R	Var
4122	101AH	PF_S	Float	2	R	PF
4124	101CH	I_T L3	Float	2	R	A
4126	101EH	V_TN	Float	2	R	V
4128	1020H	V_TR	Float	2	R	V
4130	1022H	VA_T	Float	2	R	VA
4132	1024H	W_T	Float	2	R	W
4134	1026H	Var_T	Float	2	R	Var
4136	1028H	PF_T	Float	2	R	PF
4138	102AH	$\Sigma A$ ( $\Sigma \Rightarrow$ SYS)	Float	2	R	A
4140	102CH	$\Sigma V\phi$	Float	2	R	V
4142	102EH	$\Sigma VL$	Float	2	R	V
4144	1030H	$\Sigma VA$	Float	2	R	VA
4146	1032H	$\Sigma W$	Float	2	R	W
4148	1034H	$\Sigma Var$	Float	2	R	Var
4150	1036H	$\Sigma PF$	Float	2	R	PF
4152	1038H	$\Sigma HZ$	Float	2	R	HZ
4154	103AH	$\Sigma VAH$	Float	2	R	VAH
4156	103CH	$\Sigma WH$ (Import)	Float	2	R	WH
4158	103EH	$\Sigma WH$ (Export)	Float	2	R	WH
4160	1040H	$\Sigma WH$ (Total)	Float	2	R	WH
4162	1042H	$\Sigma VarH$ (Ind)	Float	2	R	VarH
4164	1044H	$\Sigma VarH$ (Cap)	Float	2	R	VarH
4166	1046H	$\Sigma VarH$ (Total)	Float	2	R	VarH
4168	1048H	$\Sigma An$	Float	2	R	A
4170	104AH	Maximum I_R L1	Float	2	R	A
4172	104CH	Maximum V_RS	Float	2	R	V
4174	104EH	Maximum W_R	Float	2	R	W
4176	1050H	Maximum I_S L2	Float	2	R	A
4178	1052H	Maximum V_ST	Float	2	R	V
4180	1054H	Maximum W_S	Float	2	R	W
4182	1056H	Maximum I_T L3	Float	2	R	A
4184	1058H	Maximum V_TR	Float	2	R	V
4186	105AH	Maximum W_T	Float	2	R	W

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
4188	105CH	Maximum SA ( $\Sigma \Rightarrow$ SYS)	Float	2	R	A
4190	105EH	Maximum SVL	Float	2	R	V
4192	1060H	Maximum SW	Float	2	R	W
4194	1062H	Demand SW	Float	2	R	W
4196	1064H	Maximun Demand SW	Float	2	R	W
4198	1066H	Demand SA	Float	2	R	A
4200	1068H	Maximun Demand SA	Float	2	R	A
4202	106AH	I_R THD L1	Float	2	R	%
4204	106CH	V_RN THD	Float	2	R	%
4206	106EH	V_RS THD	Float	2	R	%
4208	1070H	I_S THD L2	Float	2	R	%
4210	1072H	V_SN THD	Float	2	R	%
4212	1074H	V_ST THD	Float	2	R	%
4214	1076H	I_T THD L3	Float	2	R	%
4216	1078H	V_TN THD	Float	2	R	%
4218	107AH	V_TR THD	Float	2	R	%
4220	107CH	SA THD ( $\Sigma \Rightarrow$ SYS)	Float	2	R	%
4222	107EH	SV THD	Float	2	R	%
4224	1080H	Generator SVAH	Float	2	R	VAH
4226	1082H	Generator SWH (Import)	Float	2	R	WH
4228	1084H	Generator SWH (Export)	Float	2	R	WH
4230	1086H	Generator SWH (Total)	Float	2	R	WH
4232	1088H	Generator SVarH (Ind)	Float	2	R	VarH
4234	108AH	Generator SVarH (Cap)	Float	2	R	VarH
4236	108CH	Generator SVarH (Total)	Float	2	R	VarH
4238	108EH	Generator Status	Float	2	R	0:Normal 1:Generator

6.9.3 Values: Long Integers, Word transmission refers to 485 CASE for set-up

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
256	100H	Hour Scale	Long	2	R	
258	102H	SVAH (SaSYS)	Long	2	R	VAH
260	104H	SWH (Import)	Long	2	R	WH
262	106H	SWH (Export)	Long	2	R	WH
264	108H	SWH (Total)	Long	2	R	WH
266	10AH	SVarH (Ind)	Long	2	R	VarH
268	10CH	SVarH (Cap)	Long	2	R	VarH
270	10EH	SVarH (Total)	Long	2	R	VarH
272	110H	Generator SVAH	Long	2	R	VAH
274	112H	Generator SWH (Import)	Long	2	R	WH
276	114H	Generator SWH (Export)	Long	2	R	WH
278	116H	Generator SWH (Total)	Long	2	R	WH
280	118H	Generator SVarH (Ind)	Long	2	R	VarH
282	11AH	Generator SVarH (Cap)	Long	2	R	VarH
284	11CH	Generator SVarH (Total)	Long	2	R	VarH
286	11EH	Generator Status	Long	2	R	0:Normal 1:Generator

Hour Scale : The values will be re-calculated if the ratio of primary to secondary has been changed.

Value=Received Data \* 10 ^ (Hour Scale - 3 ).

Example : The address 132H is represented as 12345678 , and the Hour Scale is 5, thus the hour reading is calculated as follows.

$$\begin{aligned} \Sigma WH &= 12345678 * 10 ^ ( 5 - 3 ) = 12345678 * 10 ^ 2 \\ &= 12345678 * 100 = 1234567800. \\ &= 1234567800 WH = 1234567.800 KWH = 1234.5678 MWH. \end{aligned}$$

If Hour scale = 5 , put 5 in the given formula then get (5-3 = 2) , and the unit for energy register is programmed as WH, so (2-3 = -1) is represented as 0.1KWH , or (2-6 = -4) as 0.0001 MWH.

6.9.4 Value: Integers

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
504	1F8H	V Unit	Integer	1	R	See 6.9.5
505	1F9H	V Dot	Integer	1	R	See 6.9.5
506	1FAH	A Unit	Integer	1	R	See 6.9.5
507	1FBH	A Dot	Integer	1	R	See 6.9.5
508	1FCH	Power_Unit	Integer	1	R	See 6.9.5
509	1FDH	Power_Dot	Integer	1	R	See 6.9.5
510	1FEH	Energy Unit	Integer	1	R	See 6.9.5
511	1FFH	Energy Dot	Integer	1	R	See 6.9.5
512	200H	I_R L1	Integer	1	R	A
513	201H	V_RN	Integer	1	R	V
514	202H	V_RS	Integer	1	R	V
515	203H	VA_R	Integer	1	R	VA
516	204H	W_R	Integer	1	R	W
517	205H	Var_R	Integer	1	R	Var
518	206H	PF_R	Integer	1	R	PF/1000
519	207H	I_S L2	Integer	1	R	A
520	208H	V_SN	Integer	1	R	V
521	209H	V_ST	Integer	1	R	V
522	20AH	VA_S	Integer	1	R	VA
523	20BH	W_S	Integer	1	R	W
524	20CH	Var_S	Integer	1	R	Var
525	20DH	PF_S	Integer	1	R	PF/1000
526	20EH	I_T L3	Integer	1	R	A
527	20FH	V_TN	Integer	1	R	V
528	210H	V_TR	Integer	1	R	V
529	211H	VA_T	Integer	1	R	VA
530	212H	W_T	Integer	1	R	W
531	213H	Var_T	Integer	1	R	Var
532	214H	PF_T	Integer	1	R	PF/1000
533	215H	SA (SaSYS)	Integer	1	R	A
534	216H	SVF	Integer	1	R	V
535	217H	SVL	Integer	1	R	V
536	218H	SVA	Integer	1	R	VA
537	219H	SW	Integer	1	R	W
538	21AH	SVar	Integer	1	R	Var
539	21BH	SPF	Integer	1	R	PF/1000
540	21CH	SHZ	Integer	1	R	HZ/100
541	21DH	SVAH Hi Word	Integer	1	R	VAH
542	21EH	SVAH Lo Word	Integer	1	R	VAH
543	21FH	SWH (Import) Hi Word	Integer	1	R	WH
544	220H	SWH (Import) Lo Word	Integer	1	R	WH
545	221H	SWH (Export) Hi Word	Integer	1	R	WH
546	222H	SWH (Export) Lo Word	Integer	1	R	WH
547	223H	SWH (Total) Hi Word	Integer	1	R	WH
548	224H	SWH (Total) Lo Word	Integer	1	R	WH



## 6.9.4 Value: Integers

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
549	225H	SVarH (Ind) Hi Word	Integer	1	R	VarH
550	226H	SVarH (Ind) Lo Word	Integer	1	R	VarH
551	227H	SVarH (Cap) Hi Word	Integer	1	R	VarH
552	228H	SVarH (Cap) Lo Word	Integer	1	R	VarH
553	229H	SVarH (Total) Hi Word	Integer	1	R	VarH
554	22AH	SVarH (Total) Lo Word	Integer	1	R	VarH
555	22BH	SAn	Integer	1	R	A
556	22CH	Maximum I_R L1	Integer	1	R	A
557	22DH	Maximum V_RS	Integer	1	R	V
558	22EH	Maximum W_R	Integer	1	R	W
559	22FH	Maximum I_S L2	Integer	1	R	A
560	230H	Maximum V_ST	Integer	1	R	V
561	231H	Maximum W_S	Integer	1	R	W
562	232H	Maximum I_T L3	Integer	1	R	A
563	233H	Maximum V_TR	Integer	1	R	V
564	234H	Maximum W_T	Integer	1	R	W
565	235H	Maximum SA (Σ⇒SYS)	Integer	1	R	A
566	236H	Maximum SVL	Integer	1	R	V
567	237H	Maximum SW	Integer	1	R	W
568	238H	Demand SW	Integer	1	R	W
569	239H	Maximun Demand SW	Integer	1	R	W
570	23AH	Demand SA	Integer	1	R	A
571	23BH	Maximun Demand SA	Integer	1	R	A
572	23CH	I_R THD L1	Integer	1	R	0.1%
573	23DH	V_RN THD	Integer	1	R	0.1%
574	23EH	V_RS THD	Integer	1	R	0.1%
575	23FH	I_S THD L2	Integer	1	R	0.1%
576	240H	V_SN THD	Integer	1	R	0.1%
577	241H	V_ST THD	Integer	1	R	0.1%
578	242H	I_T THD L3	Integer	1	R	0.1%
579	243H	V_TN THD	Integer	1	R	0.1%
580	244H	V_TR THD	Integer	1	R	0.1%
581	245H	SA THD (SaSYS)	Integer	1	R	0.1%
582	246H	SV THD	Integer	1	R	0.1%
583	247H	G SVAH Hi Word	Integer	1	R	VAH
584	248H	G SVAH Lo Word	Integer	1	R	VAH
585	249H	G ΣWH (Import) Hi Word	Integer	1	R	WH
586	24AH	G ΣWH (Import) Lo Word	Integer	1	R	WH
587	24BH	G ΣWH (Export) Hi Word	Integer	1	R	WH
588	24CH	G ΣWH (Export) Lo Word	Integer	1	R	WH
589	24DH	G SWH (Total) Hi Word	Integer	1	R	WH
590	24EH	G SWH (Total) Lo Word	Integer	1	R	WH
591	24FH	G SVarH (Ind) Hi Word	Integer	1	R	VarH
592	250H	G SVarH (Ind) Lo Word	Integer	1	R	VarH
593	251H	G SVarH (Cap) Hi Word	Integer	1	R	VarH

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
594	252H	G ΣVarH (Cap) Lo Word	Integer	1	R	VarH
595	253H	G ΣVarH (Total) Hi Word	Integer	1	R	VarH
596	254H	G ΣVarH (Total) Lo Word	Integer	1	R	VarH
597	255H	Generator Status	Integer	1	R	0:Normal 1:Generator
598	256H	Work Day	Integer	1	R	Day
599	257H	Work Hour	Integer	1	R	Hour
600	258H	Work Minute	Integer	1	R	Minute

## 6.9.5 Unit and Decimal Point :

The received integer data is as the primary values. And the set-up in unit and decimal point must be completed after receiving data.

**\*\*The received values will be correct after the set-up in CT&PT ratio has completed\*\***

Data Address	Contents	Descriptions
1FAH	V Unit	Display unit in volt. 0 : None , 3 : K , 6 : M , 9 : G °
1FBH	V Dot	The decimal point position for voltage 0 : None , 1 : One, others for analogy
The displayed voltage includes phase volt, line volt, max/min values and so on		
1FCH	A Unit	Display unit in amp. 0 : None , 3 : K , 6 : M , 9 : G °
1FDH	A Dot	Display decimal point position for amp. 0 : None , 1 : One, others for analogy
The displayed current includes current, neutral current, max/min values, current demand and so on		
1FEH	Power Unit	Display unit in power 0 : None , 3 : K , 6 : M , 9 : G °
1FFH	Power Dot	The decimal point position for power 0 : None , 1 : One, others for analogy
The displayed power includes VA,W, Var, Max/Min Watt, Demand Watt, Var and so on.		

Others :

PF : Fixed decimal point position at 3 digits.

Hz : Fixed decimal point at 2 digits.

**\*\* If the Unit set to 6 represents M, and the Dot set to 3 represents 000, and then it can also be regarded as Unit=K and Dot=0. The other collocation can be analogized as well. \*\***

例 : 11.4KV/114V · 100/5A · 3P4W °

PT Ratio: 100 times CT Ratio: 20 times

V Unit : 3. V Dot : 2. A Unit : 0. A Dot : 2. Power Unit : 6. Power Dot : 3

If the fed volt is at 11.4kV, the fed amp is at 65A, the fed power factor is at 0.95, and the fed frequency is at 60, and therefore, the values in VA derives from 11.4KV x 65A x 3=2223000=20223MVA=2223kVA. And the values in W derives from VA x PF=223000 x 0.95=2111850

The RS485 received the following values:

V : 1140 ° A : 6500 ° VA : 2223 ° W : 2111 ° WH : 1234 ° PF : 950 ° Hz : 6000 °

Detailed explanations for the above values are below:

V : 11.40KV, Unit in K(V Unit = 3), Decimal point at 2 digits (V Dot = 2) °

A : 65.00A ° (A Unit = 0), Decimal point at 2 digits (A Dot = 2) °

VA : 2.223MVA 或 2223KVA °

(Power Unit = 6), (Power Dot = 3). Unit in M (decimal point at 3 digits) or Unit in K (without decimal point) W : 2.111MW or 2111KW. Please refer to the description of VA.

Unit in K (Energy Unit = 3), without decimal point (Energy Dot = 0)

PF : 0.950. Decimal point at 3 digits.

Hz : 60.00Hz. Decimal point at 2 digits.

Notice: The Unsigned Int is non-symbol, but the Signed Int is a value with positive/negative.

The values will be measured correctly if the corresponsive signals are matched.

Negative and positive readings like W · Var · PF. Positive : 0-32767 · Negative : 32768-65535 °

For example : PF = 0.95 : RS485 Readings : 950 °

PF = -0.95 : RS485 Readings : 64586 ? - (65536 - 64586) = -950

## 6.9.6 Value: Common integers

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
1016	3F8H	V Unit	Integer	1	R	See 6.9.5
1017	3F9H	V Dot	Integer	1	R	See 6.9.5
1018	3FAH	A Unit	Integer	1	R	See 6.9.5
1019	3FBH	A Dot	Integer	1	R	See 6.9.5
1020	3FCH	Power_Unit	Integer	1	R	See 6.9.5
1021	3FDH	Power_Dot	Integer	1	R	See 6.9.5
1022	3FEH	Energy_Unit	Integer	1	R	See 6.9.5
1023	3FFH	Energy_Dot	Integer	1	R	See 6.9.5
1024	400H	V_RN	Integer	1	R	V
1025	401H	V_SN	Integer	1	R	V
1026	402H	V_TN	Integer	1	R	V
1027	403H	V_RS	Integer	1	R	V
1028	404H	V_ST	Integer	1	R	V
1029	405H	V_TR	Integer	1	R	V
1030	406H	I_R	Integer	1	R	A
1031	407H	I_S	Integer	1	R	A
1032	408H	I_T	Integer	1	R	A
1033	409H	SW (SaSYS)	Integer	1	R	W
1034	40AH	SPF	Integer	1	R	PF/1000
1035	40BH	SWH (Total) Lo Word	Integer	1	R	WH
1036	40CH	SWH (Total) Hi Word	Integer	1	R	WH
1037	40DH	Demand SW	Integer	1	R	W
1038	40EH	Maximun Demand SW	Integer	1	R	W
1039	40FH	Demand SA	Integer	1	R	A
1040	410H	Maximun Demand SA	Integer	1	R	A
1041	411H	SHZ	Integer	1	R	HZ/100
1042	412H	SVF	Integer	1	R	V
1043	413H	SVL	Integer	1	R	V
1044	414H	SA	Integer	1	R	A
1045	415H	SVA	Integer	1	R	VA
1046	416H	SVar	Integer	1	R	Var
1047	417H	SVAH Lo Word	Integer	1	R	VAH
1048	418H	SVAH Hi Word	Integer	1	R	VAH
1049	419H	SVarH (Total) Lo Word	Integer	1	R	VarH
1050	41AH	SVarH (Total) Hi Word	Integer	1	R	VarH
1051	41BH	G SWH (Total) Hi Word	Integer	1	R	WH
1052	41CH	G SWH (Total) Lo Word	Integer	1	R	WH
1053	41DH	G SVAH Hi Word	Integer	1	R	VAH
1054	41EH	G SVAH Lo Word	Integer	1	R	VAH
1055	41FH	G SVarH (Total) Hi Word	Integer	1	R	VarH
1056	420H	G SVarH (Total) Lo Word	Integer	1	R	VarH
1057	421H	Generator Status	Integer	1	R	0:Normal 1:Generator
1058	422H	Work Day	Integer	1	R	Day
1059	423H	Work Hour	Integer	1	R	Hour
1060	424H	Work Minute	Integer	1	R	Minute

\*\* Energy/ Hour: Lo Word is set ahead, Hi Word is set behind