PD76-E4E-MFF

Multifunction Digital Panel Meter

User Manual

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Ⅰ.Introduction

1.1 General

PD76-E4E-MFF Digital indicating Panel Mounted Electrical Measuring Instrument is designed for the electrical monitoring for utilities, industrial mining corporations, intelligence towers and communities. It adopts large scale IC, digital sampling technology and SMT technology.

The instrument is equipped with 128*24 dot matrix LCD display, can measure all the common electrical parameters with high accuracy, such as three-phase voltage, three-phase current, active power, reactive power, frequency, power factor, active energy, reactive energy, four quadrant energy, 1-31 times harmonic measuring, energy pulse output and 1Hz clock output. With high speed RS485 communication port and conformance to the Modbus protocol. There are four programming pushbuttons in the faceplate, it is very convenient for users to achieve switching display and meter's parameters program setup at site, with high flexibility.

There are many extended function modules to choose, for instance, 4 switching input and 4 analog output （0～20mA/4～20mA ） module, 4 switching input and 4 switching output module, 6 switching input and 2 analog output module. Analog output is for energy and electricity transportation output, and the function of 4 switching input and output is for local or remote switching signal monitoring and control output ("remote communication" and " remote control" function).

PD76-E4E-M7F with excellent performance and reasonable price, it can replace the normal electricity transportation instrument, measurement indicating meter, energy measuring meter and other related accessorial units.

PD76-E4E-M7F can be used widely for energy management system, transformer substation automatization, switching network automatization, industrial automatization, intelligence buildings, intelligence switchboards and switch cabinets, it is characteristic of convenient installation, simple wiring, easy maintenance, and less works. It also can be connected with PLC and industry control computers.

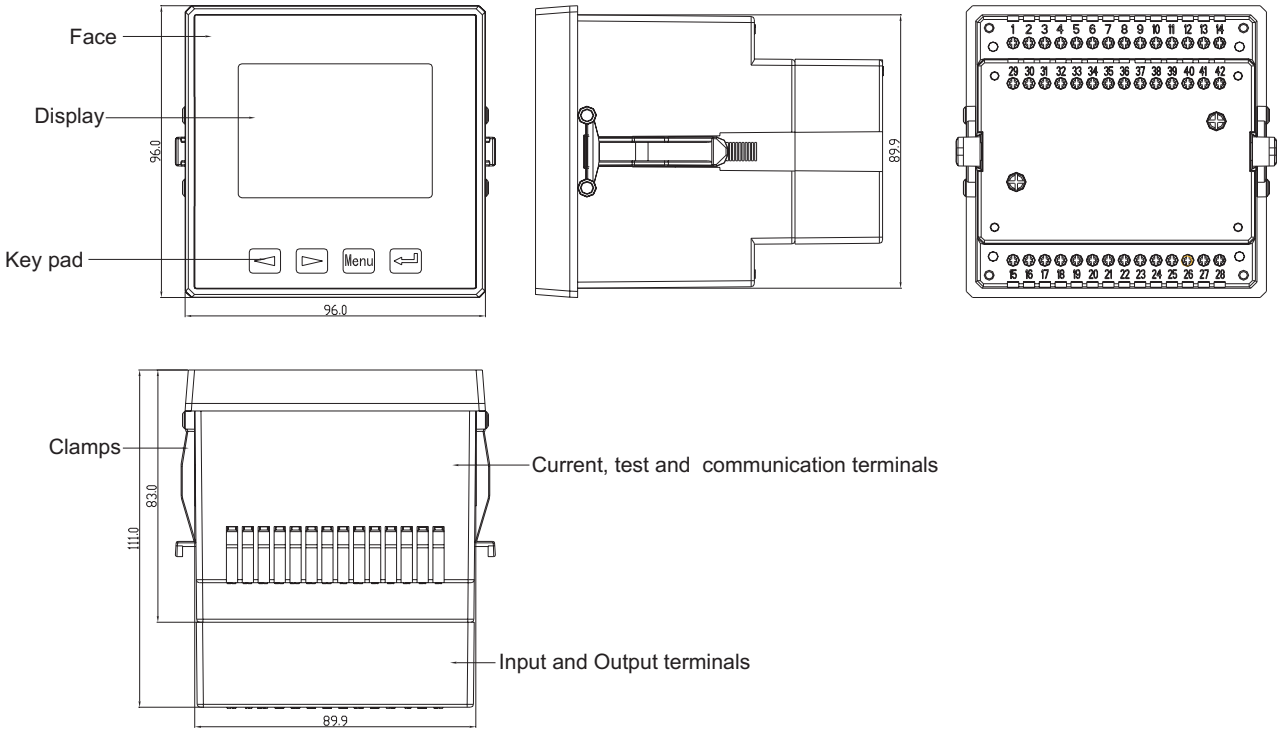
1.2Technical parameters

Technical parameter			Value
Input	Network		3P3W, 3P4W
	Voltage	Reference	AC 100V, 220V, 400V
		Overload	Lasting: 1.2* Un , Momently: 2*Un (30 s)
		Consumption	<0.5VA(each phase)
		Resistance	>500KΩ
	Current	Reference	AC 1A 、5A
		Overload	Lasting: 1.2* In , Momently: 20*In (2s)
		Resistance	<20mΩ(each phase)
	Frequency		45～65Hz
Output	Energy pulse		Two pulse output
	Constant		Active: 10000imp/kwh Reactive: 10000imp/kvarh
	Communication	Mode	RS-485
		Protocol	MODBUS-RTU/ASCII
		Baud rate	1200、2400、4800、9600
	Display		LCD
Accurancy	U, I		±0.2%
	kW, kVAR,kVA		±0.5%
	Frequency		±0.2%
	kWh		±0.5%
	kVARh		±2%
Power supply	Range		AC、DC 80～270V
	Consumption		<5VA
Security	Over-voltage	Input and auxiliary power supply	>2KV50Hz/1min
		Input and output	>2KV50Hz/1min
		Output and auxiliary power supply	>2KV50Hz/1min
	Insulated resistance		Input, output and auxiliary power supply against the watchcase >100MΩ
	Case anti-fire		V0 class
Electromagnetic compatibility	Electrostatic discharge		±15KV
	Fast transient burst		±4KV
	Electromagnetic RF fields		80MHz～1000MHz 10V/m

Ambient temperature	Temperature	Operation :-10～60°C, Storage :-25～70°C
	Humidity	≤95%RH,(without dew, corrosive gas)
	Altitude	≤3000m

2. Outline and installation

2.1 Dimension



Picture 1 Installation Diagram

2.2 How to Install

① Drill a hole (size: 90mm×90mm) in the switching cabinet

② Take out the meter,clamps and screws.

③ Insert the meter into the hole

④ Fix the clamps and fasten the screws

2.3 Terminals Layout

Upper row:Current, test and communication terminals

Current terminal							Test terminal			485①		485②	
*1	2	*3	4	*5	6	7	8	9	10	11	12	13	14
IA		IB		IC		P+	Q+	P-	Q-	A1	B1	A2	B2

Picture 2 Current, test and communication terminals

Note:"P+"—active impulse output positive "P-"—active impulse output earthed

"Q+" — reactive impulse output positive "Q-"— reactive impulse output earthed

"A1、B1" —RS485① (optional, needs hardware support)

"A2、B2" —RS485② (optional, needs hardware support)

Middle row:Input and output terminals

Output terminals								Switching input terminals					
+29	30	+31	32	+33	34	+35	36	37	38	39	40	41	42
AOUT1		AOUT2		AOUT3		AOUT4		DIN1	DIN2	DIN3	DIN4	COM	

Picture 3 4 switching inout and 4 analog output terminals

Output terminals								Switching input terminals					
+29	30	+31	32	+33	34	+35	36	37	38	39	40	41	42
DOUT1		DOUT2		DOUT3		DOUT4		DIN1	DIN2	DIN3	DIN4	COM	

Picture 4 4 switching inout and 4 switching output terminals

Output terminals								Switching input terminals					
+29	30	+31	32	+33	34	+35	36	37	38	39	40	41	42
DOUT1		DOUT2		-	-	DIN1	DIN2	DIN3	DIN4	DIN5	DIN6	COM	

Picture 5 6 switching inout and 2 switching output terminals

Note:According to the type of meter, there are two kinds of output terminals: switching output terminals and analog output terminals, the function needs hardware support

Com—switching input earthed.

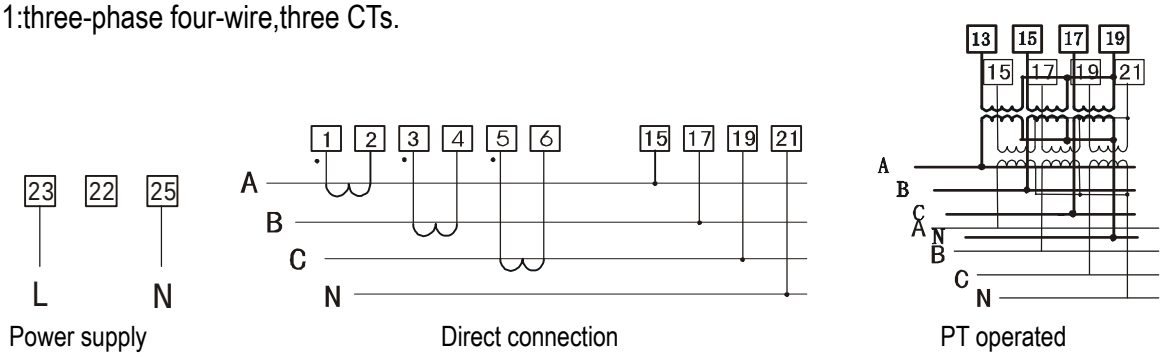
Bottom row: Voltage and power supply terminals

Voltage terminals								Power supply					
15	16	17	18	19	20	21	22	23	24	25	26	27	28
UA		UB		UC		UN		L		N			

Picture 6 Singal terminals

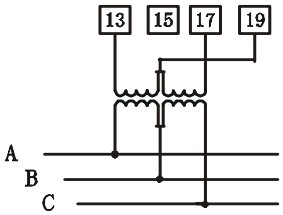
The instrument has different wiring methods for different types of load

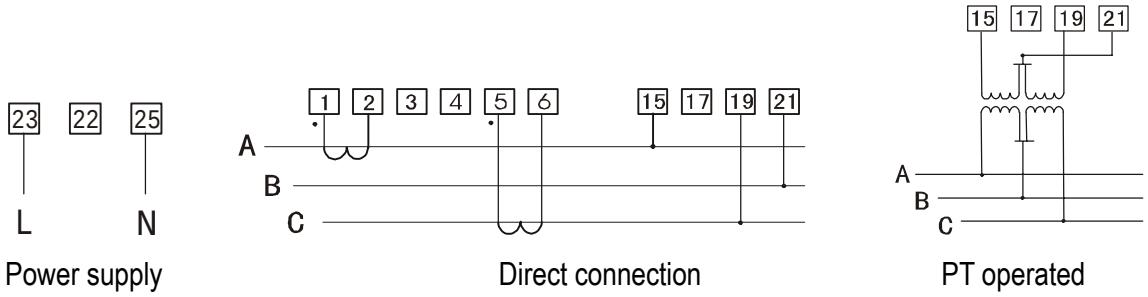
Type 1:three-phase four-wire,three CTs.



Picture 7 Wiring method 1

Type 2:three- phase three- wire,two CTs.





Picture 8 Wiring method 2

Note:

A. Voltage input: input voltage should not be higher than the rated voltage （100V or 400V） , otherwise, it should adopt PT, and 1A fuse is required.

B. Current input:the rated input current is 5A.outside CT is required in the case of the input current >5A.if there are other instruments also connected to the same CT, the instruments should be connected in series. Before disconnecting current input, first make sure the CT is off. In order to remove conveniently, we suggest use socket instead connected to the CT directly.

C. Make sure the voltage and current line connected correctly, phase and direction in sequence, otherwise, the value and symbol can’t be shown normally (power and energy) .

D. Power supply. the voltage range of power supply is AC/DC 80~270V.In order to protect the instrument, we suggest install 1A fuse for the phase line when adopting alternating current power supply. In the region where the quality of electricity is poor, we suggest use surge suppresser and fast impulse suppresser.

3. Functions

3.1 Electrical parameters measuring

Three phase voltage, three phase current, active powr, reactive power, frequency, power factor, active energy, reactive energy, four-quadrant energy

3.2 Harmonic measuring

The instrument can measure 1-31 times harmonic current/voltage, it's convenient for users to analyse the network harmonic.

Both current harmonic and voltage harmonic are shown as the percent (%) of fundamental wave

3.3 Multi-rate

The instrument has the multi-rate function for energy measurement. Maximal supports 10 time periods and 4 tariff. It can storage the forward active energy, reserve active energy, forward reactive energy, reserve reactive energy of current month,last month and the month before last month.

Time period: when programming, it shows which time period the instrument is working in. the duration of time period starts at its beginning time and ends at the beginning time of the coming time period.

Tariff: when programming, they are shown as 1,2,3 and 4, which mean peak tarrif, off-peak tarrif, shouder tarrif and vale tarrif.

3.4 Maximal demand record

Record the each tarrif's maximal demand (includes +A,-A, +R,-R) as well as the time stamp of current month, last month and the month before last month

Maximal demand——The maximal everage power within intergration period.

Integration period—— It is fixed to be 15 minutes.

Sliding period——It is for the maximal demand measurement, range from 1-15 minutes.

3.5 Switching input

The instrument has t 4 or 6 switching input monitor function (need the support of hardware and software). Real time monitoring the state of each switching input, it's indicated by the low byte of DIO.

DIO low byte:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
-	-	-	-	DI3	DI2	DI1	DI0

DI0~DI5 stand for the 1-6 switching input state, 0-input signal disconnected. 1-input signal connected

3.6 Analog output

AOSIx	output item	0	Close the channel of analog output
		1~26	26 energy consumption measured, output 0~20mA
		129~154	26 energy consumption measured, output 4~20mA
AOSx	Output parameter value	1~9999	corresponding with the parameter value of 20mA output

Analog output setting

All setting data of analog output is standardized to 2 bytes (SX) according to a formula. The value is range from 1 to 1999(absolute value) .

Example: for 10kV/100V meter, set the first analog output （4～20mA） corresponding with UA , we get AOSI1 and PT

should be set to 129 and 100 according to Figure 19.We also get AOS1 (AOS1 = U/PT×10 = 10kV/100×10 = 1000) according to Figure 21.When the first side voltage is 10kV, the first analog output 20 mA current.

3.7 Switching output

DOSIx	Switching output items	0	The switching output channel is off
		1~26	For 26 measuring energy
		128	The switching output channel is on
DOSxL	Warning lower limit value	0~9999	Output warning when measured value is less than this value
DOSxH	Warning upper limit value	0~9999	Output warning when measured value is higher than this value
Note:1. refer to table 15 for energy address 2. when warning lower limit is 0, lower limit warning will be invalid ; when warning upper limit is 9999,upper limit warning will be invalid			

Figure 2 Switching output settings

All setting data of switching output is standardized to 2 bytes (SX) according to a formula. The value is range from 1 to 1999(absolute value).details of the formula as shown in figure 4. The meter has 10 units Schmitt sections when calculating alarm output. For example, if the measurement value is less than warning lower limit at first, then it must be higher than warning upper limit with10 units in order to end warning. Likewise, the measurement value must be less than warning upper limit 10 units in order to stop warning. So, warning upper limit should be higher than warning lower limit with 20 units.The maximal warning lower limit is 9979 and the least warning upper limit is 0020

For example: for 10kV/100V meter, set the first switching output corresponding with UA warning when UA<8kV or UA>12kV. We know DOSI1 (DOSI1=1) and PT (PT= 100) according to Figure 20. Likewise, we know DOS1L and DOS1H(DOS1L = UL/PT×10 = 8kV/100×10 = 800,DOS1H= UH/PT×10 = 12kV/100×10 = 1200)

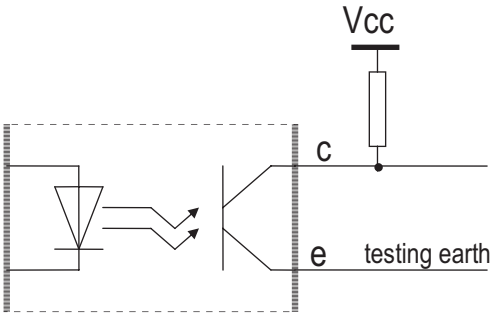
According to Figure 3.So when the first side voltage is less than 8kV or more than 12kV, the first switching output closed.

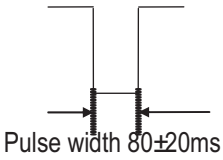
Item	Formula	Value range	Symbol	Note
voltage	Sx = U/PT×10	1~9999	No symbol	UA,UB,UC,UAB,UBC,UCA
current	Sx = I/CT×1000	1-9999	No symbol	IA,IB,IC
Frequency	S x = F×100	1-9999	No symbol	FR
Power factor	Sx = PF×1000	1-9999	No symbol	PFA,PFB,PFC,PFS
Active power	Sx = P/PT/CT	1-9999	No symbol	PA,PB,PC,PS
Reactive power	Sx = Q/PT/CT	1-9999	No symbol	QA,QB,QC,QS
Apparent power	Sx = S/PT/CT	1-9999	No symbol	SA,SB,SC,SS
Note: PT-voltage variation rate CT-current variation rate				

Figure 3 switching output/analog outut setting data exchange formula

3.8 Energy pulse output function

With active,reactive two energy pulse output testing ports. the pulse constant: active 10000imp/kwh, reactive 10000imp/kVARh, :





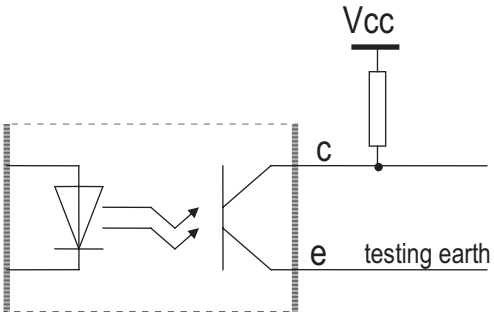
Vcc=5V(12V,24V)

R=Vcc/5mA(kΩ)

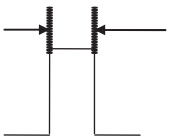
meter inside photo copper output

(when period<200ms, 1:1)

By setting the SOUT to change reactive energy pulse output to 1Hz clock output. The sketch map of testing port is as follows



Pulse width 500ms



Vcc=5V(12V,24V)

R=Vcc/5mA(kΩ)

meter inside photo copper output

3.9 Backlight

By setting the BCW to turn on/off the backlight

Backlight control word BCW :

BCW	0	AUTO automatic off after 10 minuters if no operation
	1	ON always on
	2	OFF always off

Figure 4 Backlight control word

3.10 RS485

The instrument is equipped with a RS485 communication port, the available baud rate: 1200bps 2400bps 4800bps 9600bps 19200bps 38400bps

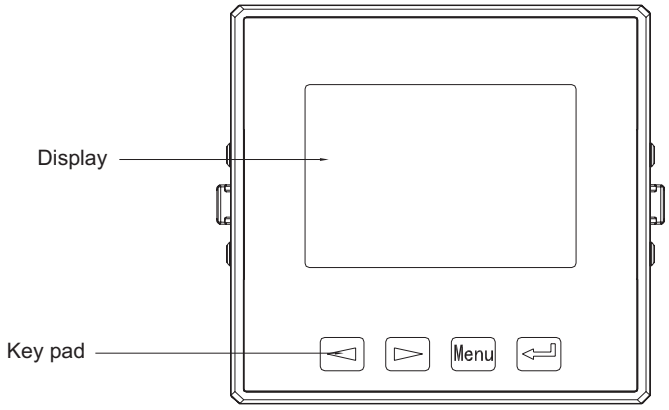
Communication control word as follows

CBS Baud rate	00H	1200bps	-
	01H	2400bps	-
	02H	4800bps	-
	03H	9600bps	-
	04H	19200bps	-
	05H	38400bps	-
CDS Data format	00H	NONE	Without verify
	01H	ODD	Odd
	02H	EVEN	Even
CPS Protocol	00H	RTU	Modbus- RTU
	01H	ASCII	Modbus- ASCII

Figure 5 communication control word

4. Operation

4.1 Nameplate



Picture 9 nameplate

4.2 Pushbutton:

"◄≤: It is for the switch from automatic display mode to manually display mode. Forth display modes under manually display. Under menu operation mode, to forth the menu item and contrast display. When type into numbers, push "◄≤to increase the number quickly.

"► ≤:It is for the switch from automatic display mode to manually display mode. Forth display modes and contrast display item under manually display. When type into numbers, push "► ≤ to move cursor.

"MENU≤:under automatic display mode, push it to enter menu mode. Under menu mode, it is for returning to upper menu.

"↵ ≤:under menu mode, push "↵ ≤ to enter into sub-menu, or to comfirm the input and return to upper menu. If the instrument shows "Error≤, then means the data input is incorrect, user may push any key to re-input.

When return from menu mode to automatic display mode, if any parameter has been amended, the instrument will show "save≤, then push "MENU≤ to exit without saving, push"↵ ≤ to save and exit. If no parameter changed, then exit directly.

4.3 Automatic display mode

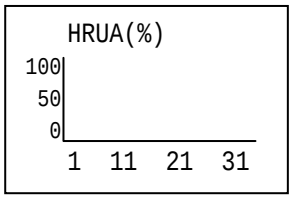
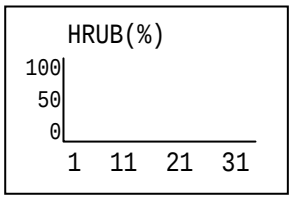
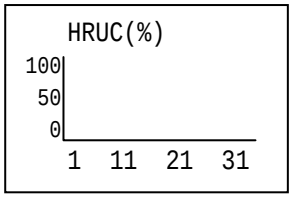
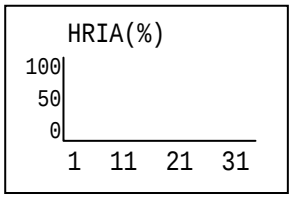
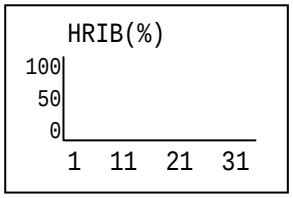
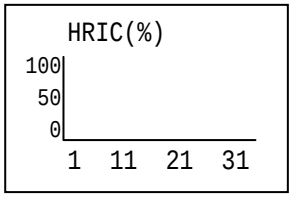
The instrument will work in automatic display mode when one of the following happened.

1. Firstly, instrument shows the startup interface after powr on, then enter into automatic display mode as soon as the system becomes stable.
2. No operation for 30 seconds under manually display mode.
3. After exiting from the main menu.

After entering into this mode, the instrument displays according to the pre-stting modes. User can program by stting the DCW (display control word), details of the display modes are as follows.

Display mode	Example	Description
00	--	Cycle display mode 01--19

Display mode	Example	Description
01	Ua 000.0 V Ub 000.0 V Uc 000.0 V Ue 000.0 V	Display A,B,C three phase voltage and neutral voltage, Unit: V or kV
02	Uab 000.0 V Ubc 000.0 V Uca 000.0 V	Display AB,BC,CA voltage, Unit: V or kV
03	Ia 0.000 A Ib 0.000 A Ic 0.000 A Ie 0.000 A	Display A,B,C three phase current and neutral current, Unit: A or kA
04	Pa 0000kW Pb 0000kW Pc 0000kW P 0000kW	Display A,B,C three phase active power and total active power.
05	Qa 0000kvar Qb 0000kvar Qc 0000kvar Q 0000kvar	Display A,B,C three phase reactive power and total reactive power.
06	Sa 0000kVA Sb 0000kVA Sc 0000kVA S 0000kVA	Display A,B,C three phase apparent power
07	PFa 0.000 PFb 0.000 PFc 0.000 PF 0.000	Display A,B,C three phase power factor and total power factor
08	P 0000kW Q 0000kvar S 0000kVA F 00.00Hz	Display total active power, reactive power, apparent power and frequency

Display mode	Example	Description
09	Act. Energy+ 000000.00 kWh Act. Energy- 000000.00 kWh	Display forward active power, reverse active power
10	Re. Energy+ 000000.00 kvarh Re. Energy- 000000.00 kvarh	Display forward reactive power, reserve reactive power
11		Display harmonic of phase A voltage, shown as the percent of fundamental wave
12		Display harmonic of phase B voltage , shown as the percent of fundamental wave
13		Display harmonic of phase C voltage, shown as the percent of fundamental wave
14		Display harmonic of phase A current, shown as the percent of fundamental wave
15		Display harmonic of phase B current, shown as the percent of fundamental wave
16		Display harmonic of phase C current, shown as the percent of fundamental wave

Display mode	Example	Description
17	Digit Input 8 7 6 5 4 3 2 1 - - - - - - - -	State of switching input "-" without the switching input "0" the switching input is disconnected "C" the switching input is connected
18	Digit Output 8 7 6 5 4 3 2 1 - - - - - - - -	State of switching output "-" without the switching output "0" the switching output is disconnected "C" the switching output is connected
19	Time 1996.01.01 12:00:00	Display the time and date

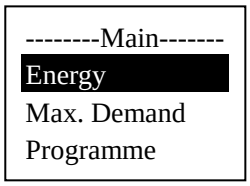
Figure 6 display mode

4.4 Manually display mode

Under automatic display mode, push "◄" or "► " to enter into manually display mode, then again push "◄" or "► " to display the contents. It will return to automatic display mode if there is no operation for 30 seconds.

4.5 Menu operation mode

when instrument under free working mode, push"MENU" to enter into menu operation mode, then firstly gets the" main menu", the contents of it are as follows:



Push"◄", "► "or"←┘ to enter into different sub-menus. Push"MENU" to return to free working mode.

Note: the LCD can only display 4 lines information, user can push "◄" or "► " to show the next screen/page.

4.5.1 Programme mode

When in the main menu, push "◄" or "► "to select "Programme", then push "←┘ " to program. Firstly, the system will ask the user to type into password., only with correct password can enter into the sub-menu.

Under menu operation mode, the instrument provides some parameters setting menu items, such as: "Basic Setting", "Input","Communication", "Analog Output", "Digital Output", "Multi Tariff", etc.

The menu's structure is as follows, users can set the proper parameters as per their own requirements.

First layer	Second layer	Data format	Description
Password	-	0000	Input password, only valid password can enter program.
Basic Setting	Display Item	0-19	Set display control word
	Backlight	3 modes	Backlight control modes:AUTO,ON,OFF

	Scroll Time	1-99	Turning time, it effects when DISP set as 0.
	Time	YYYY.MM.DD HH:MM:SS	Set the date and time of instrument
	Rolling Time	1-15	Sliding period, unit: minute
	Pulse Output	0-1	Second signal/reactive energy pulse output select (0-output reactive energy pulse,1-second signal)
	Clear Energy	YES	After confirmation, reset the energy data to zero
	Clear Demand	YES	After confirmation, reset the demand data to zero
	Reset Setting	YES	After confirmation, reset the system parameters as factory's setting
Input	Network Type	3P4W/3P3W	Electrical network type: 3P3W, 3P4W
	Voltage Rate	1-9999	Voltage variation
	Current Rate	1-9999	Current variation
Communication	Address	1-247	Meter Modbus communication address
	Baud	1200-38400	Baud rate 1200、2400、4800、9600、19200、38400
	Parity Bit	3 modes	None、Odd、Even
	Protocol	RTU/ASCII	2 communication modes: Modbus-RTU、Modbus-ASCII.
Multi Tariff	Billing Date	DD-HH	Set automatic month switching time (DD-day,HH-hour).
	Time Period xx	HH:MM-RR	Set the starting time of time period, RR stands for the tariff number
About	PD76-E4E		

Figure 7 Menu structure

Note:1.The product of voltage and current variation rate should be≤100000,otherwise some displayed data will be overflow

2. when x is 1、2、3 or 4,it is for no.1, no.2, no.3, or no.4 analog (or switching) output setting

3. XX range from 1—10, stand for 10 periods of time.

4. demand period is fixed to be 15 minutes. User cant reset again within 5 minutes after resetting the demand, it wont be effect.

4.5.2 Multi-rate energy inquire mode

When in the main menu, push "◄" or "►"to select "Energy", then push "←┘" to enter into "multi-rate energy" sub-menu. Below is the sub-munu structure:

First layer	Second layer	Data format	Description
Act. Energy+	Current	Total 000000.00 kWh	(current month) total forward active energy
		Tariff x 000000.00 kWh	(current month) tarrif x forward active energy
	Last Month	Total 000000.00 kWh	(last month) total forward active energy
		Tariff x 000000.00 kWh	(last month) tarrif x forward active energy
	Before Last Mon	Total 000000.00 kWh	(before last month) total forward active energy
		Tariff x 000000.00 kWh	(before last month) tarrif x forward active energy
Act.	Current	Total 000000.00 kWh	(current month) total reverse active energy

Energy-		Tariff x 000000.00 kWh	(current month) tarrif x reverse active energy
	Last Month	Total 000000.00 kWh	(last month) total reverse active energy
		Tariff x 000000.00 kWh	(last month) tarrif x reverse active energy
	Before Last Mon	Total 000000.00 kWh	(before last month) total reverse active energy
		Tariff x 000000.00 kWh	(before last month) tarrif x reverse active energy
Re. Energy+	Current	Total 000000.00 kvarh	(current month) total forward reactive energy
		Tariff x 000000.00 kvarh	(current month) tarrif x forward reactive energy
	Last Month	Total 000000.00 kvarh	(last month) total forward reactive energy
		Tariff x 000000.00 kvarh	(last month) tarrif x forward reactive energy
	Before Last Mon	Total 000000.00 kvarh	(before last month) total forward reactive energy
		Tariff x 000000.00 kvarh	(before last month) tarrif x forward reactive energy
Re. Energy-	Current	Total 000000.00 kvarh	(current month) total reverse reactive energy
		Tariff x 000000.00 kvarh	(current month) tarrif x reverse reactive energy
	Last Month	Total 000000.00 kvarh	(last month) total reverse reactive energy
		Tariff x 000000.00 kvarh	(last month) tarrif x reverse reactive energy
	Before Last Mon	Total 000000.00 kvarh	(before lastt month) total reverse reactive energy
		Tariff x 000000.00 kvarh	(before last month) tarrif x reverse reactive energy

Figure 8 “Multi-rate” menu structure

4.5.3 deamnd and the time stamp inquire mode

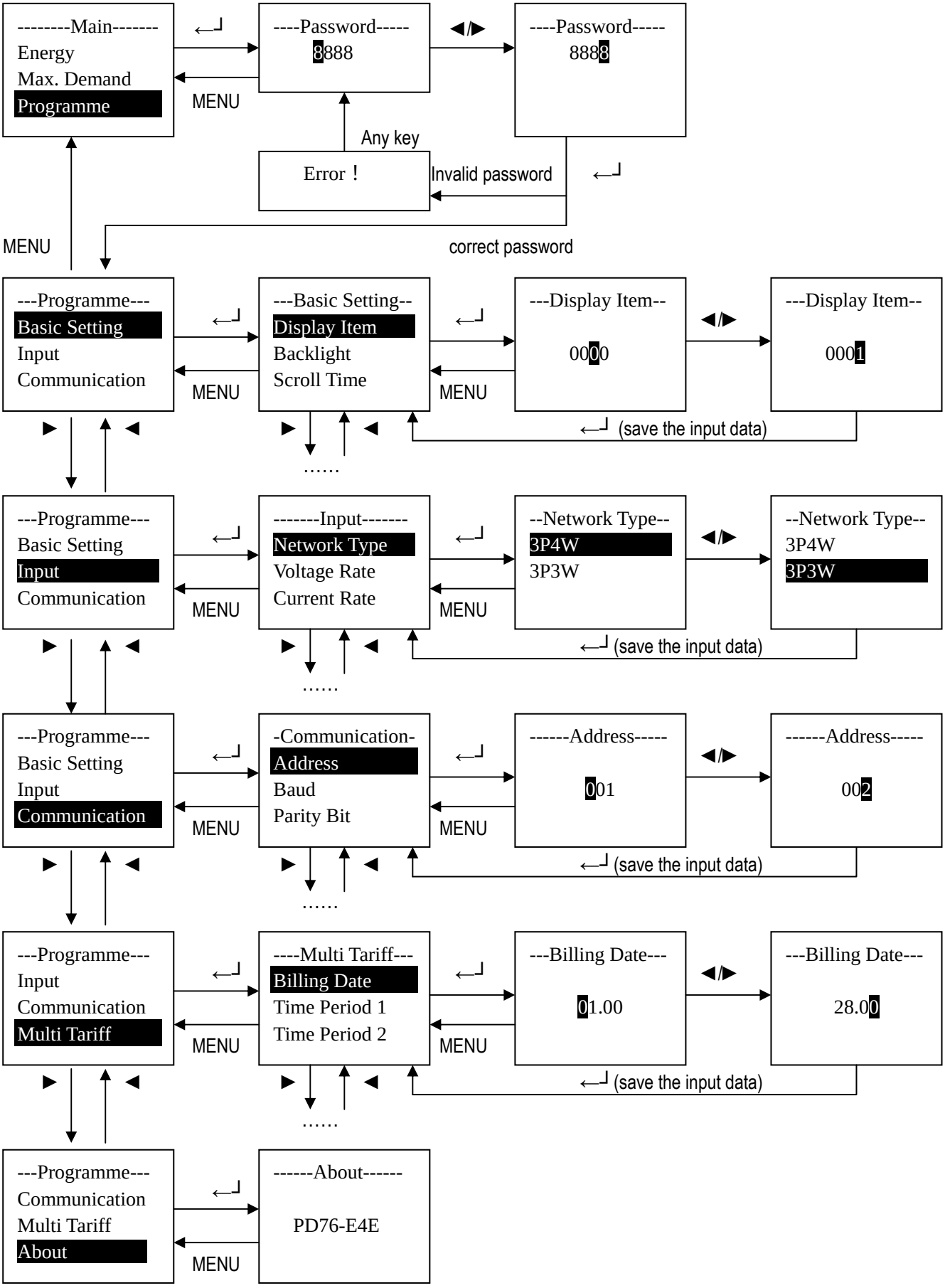
When in the main menu, push “◄” or “►”to select “Max.Demand”, then push “←┘” to enter into deamnd and the time stamp inquire mode

Below is the sub-munu structure:

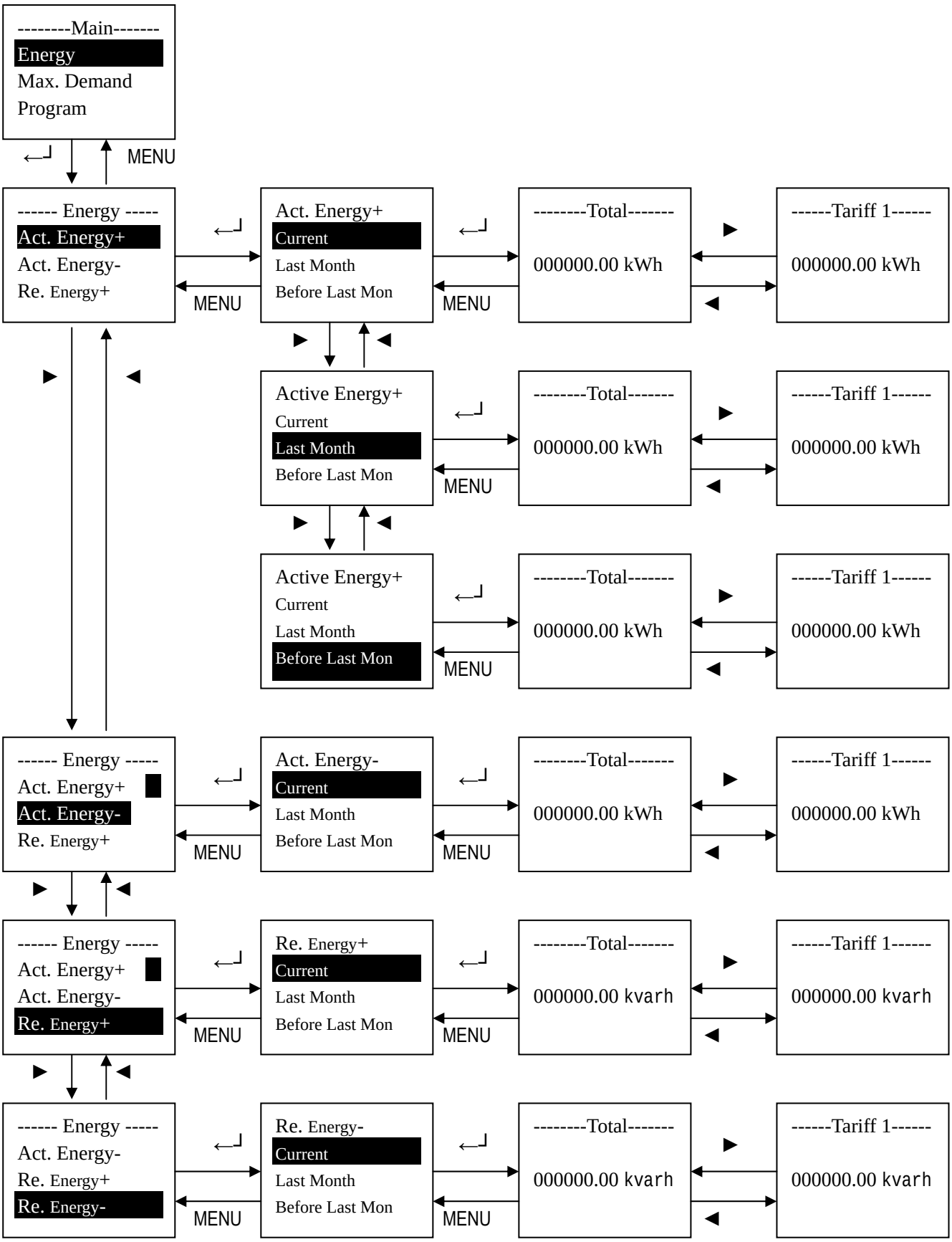
First layer	Second layer	Data format	Description
Act. Demand+	Current	Total 00.00 kW 00.00.00:00	(current month) forward active demand and time stamp (month/day/hour/minute)
		Tariff x 00.00 kW 00.00.00:00	(current month) taffif x forward active demand and time stamp (month/day/hour/minute)
	Last Month	Total 00.00 kW 00.00.00:00	(last month) forward active demand and time stamp (month/day/hour/minute)
		Tariff x 00.00 kW 00.00.00:00	(last month) taffif x forward active demand and time stamp (month/day/hour/minute)
	Before Last Mon	Total 00.00 kW	(before last month) forward active demand and time stamp (month/day/hour/minute)

		00.00.00:00	
		Tariff x 00.00 kW 00.00.00:00	(before last month) taffif x forward active demand and time stamp (month/day/hour/minute)
Act. Demand-	Current	Total 00.00 kW 00.00.00:00	(current month) reverse active demand and time stamp (month/day/hour/minute)
		Tariff x 00.00 kW 00.00.00:00	(current month) taffif x reverse active demand and time stamp (month/day/hour/minute)
	Last Month	Total 00.00 kW 00.00.00:00	(last month) reverse active demand and time stamp (month/day/hour/minute)
		Tariff x 00.00 kW 00.00.00:00	(last month) taffif x reverse active demand and time stamp (month/day/hour/minute)
	Before Last Mon	Total 00.00 kW 00.00.00:00	(before last month) reverse active demand and time stamp (month/day/hour/minute)
		Tariff x 00.00 kW 00.00.00:00	(before last month) taffif x reverse active demand and time stamp (month/day/hour/minute)
Re. Demand+	Current	Total 00.00 kvar 00.00.00:00	(current month) forward reactive demand and time stamp(month/day/hour/minute)
		Tariff x 00.00 kvar 00.00.00:00	(current month) tarrif x forward reactive demand and time stamp(month/day/hour/minute)
	Last Month	Total 00.00 kvar 00.00.00:00	(last month) forward reactive demand and time stamp(month/day/hour/minute)
		Tariff x 00.00 kvar 00.00.00:00	(last month) tarrif x forward reactive demand and time stamp(month/day/hour/minute)
	Before Last Mon	Total 00.00 kvar 00.00.00:00	(before last month) forward reactive demand and time stamp(month/day/hour/minute)
		Tariff x 000000.00 kvarh	(before last month) tarrif x forward reactive demand and time stamp (month/day/hour/minute)
Re. Demand-	Current	Total 00.00 kvar 00.00.00:00	(current month) reverse reactive demand and time stamp(month/day/hour/minute)
		Tariff x 00.00 kvar 00.00.00:00	(current month) tarrif x reverse reactive demand and time stamp(month/day/hour/minute)
	Last Month	Total 00.00 kvar 00.00.00:00	(last month) reverse reactive demand and time stamp(month/day/hour/minute)
		Tariff x 00.00 kvar 00.00.00:00	(last month) tarrif x reverse reactive demand and time stamp(month/day/hour/minute)
	Before Last Mon	Total 00.00 kvar 00.00.00:00	(before last month) reverse reactive demand and time stamp(month/day/hour/minute)
		Tariff x 00.00 kvar 00.00.00:00	(before last month) tarrif x reverse reactive demand and time stamp(month/day/hour/minute)

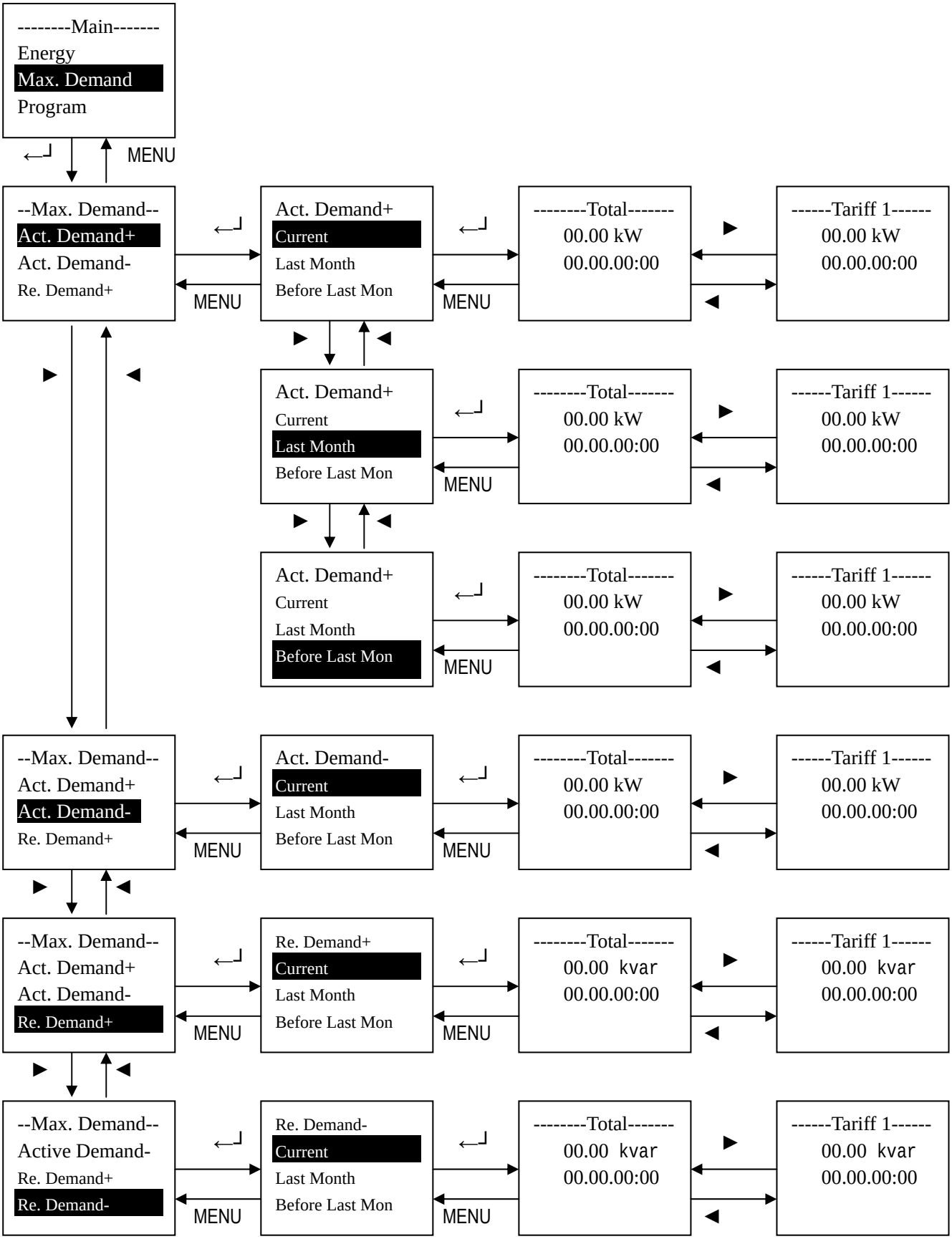
Figure 9 “demand and the time stamp” menu structure



Picture 10 “program mode” operation sample



Picture 11 “multi-rate energy” inquiry

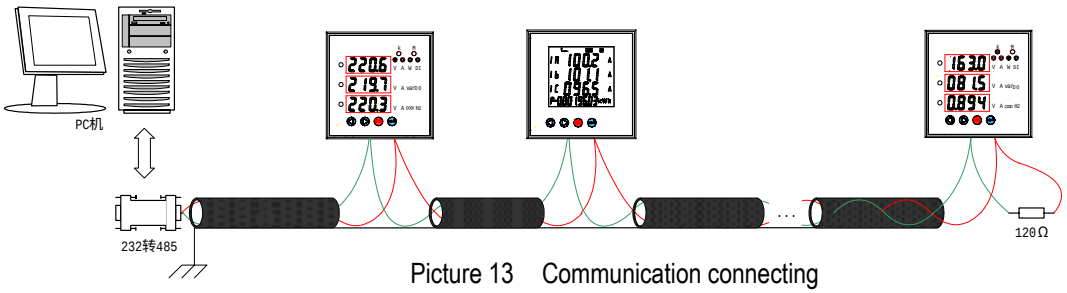


Picture 12 “demand and time stamp” inquiry

5. Communication

5.1 Forward

PD76-24C-M7F provides RS485 communication port, adopts Modbus (both Modbus-RTU and Modbus-ASCII) communication protocol. Up to 32 meters can be connected together with single communication wire, you can set its own communication address for each of them. Different series meter varies in the number of communication wiring terminals. it should use twisted-pair wire for communication connecting, and diameter of the twisted-pair wire should not be less than 0.5mm^2 .The communication wire should be away from strong electric cable or strong electric field,maximal communication distance is 1200 meters,the typical wiring method is as picture 9 shown. User can also select other proper wiring method according to site situation.



Picture 13 Communication connecting

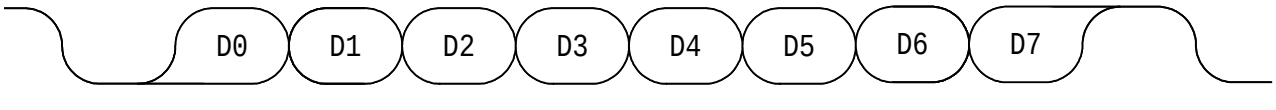
Modbus protocol uses a master-slave technique, in which firstly one device (the master) initiates transactions (queries). The other devices (the slaves) respond by supplying the requested data to the master, or by taking the action requested in the query. The work mode is semi-duplex.

Modbus protocol only allows the communication between master （PC,PLC,etc） and slaves,and does not allow the data exchange between independent terminal devices. As a result, the terminal devices will not use communication line when initialization, only response the query signal.

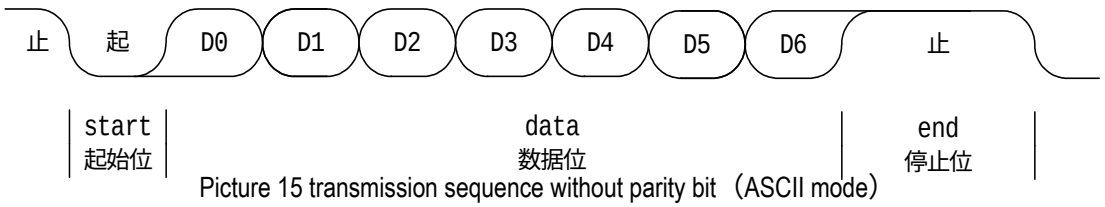
5.2 Byte format

5.2.1 ASCII mode

When controllers are setup to communicate on a Modbus network using ASCII mode, each eight-bit byte in a message is sent as two ASCII characters. The main advantage of this mode is that it allows time intervals of up to one second to occur between characters without causing an error. Each transmission contains 10 bit serial data. During transmission, lower bit first, then higher bit. User can select odd, even or without parity. The transmission sequence of both types are as follows:



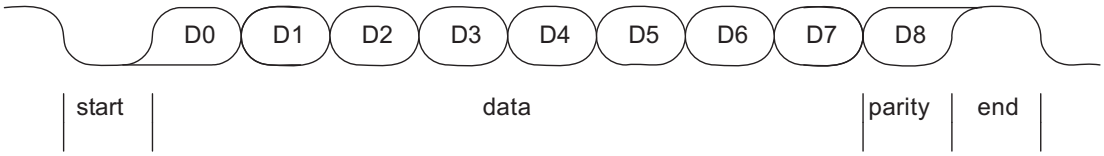
Picture 14 transmission sequence with parity bit （ASCII mode）



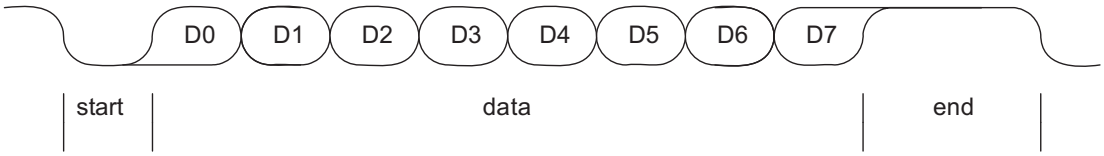
Picture 15 transmission sequence without parity bit （ASCII mode）

5.2.2 RTU

When controllers are setup to communicate on a Modbus network using RTU mode,each byte in the frame can be used for transaction directly. So its greater character density allows better data throughput than ASCII for the same baud rate. Each transmission contains 11 bit serial data. During transmission, lower bit first, then higher bit. User can select odd, even or without parity. The transmission sequence of both types are as follows



Picture 16 transmission sequence with parity bit (RTU mode)



Picture 17 transmission sequence without parity bit (RTU mode)

5.3 Frame format

Frame is the basic unit for transaction message. In Modbus protocol, master and slave use the same frame format.
In ASCII mode, messages start with a colon (:) character (ASCII 3A hex),and end with a carriage return-line feed (CRLF) pair (ASCII 0D and 0A hex) . The allowable characters transmitted for all other fields are hexadecimal 0 ... 9, A ... F. The frame format as shown in figure 10

Start addressing	Address code	Function code	Data field	LRC check	End
:(3AH)	2 bytes	2 bytes	N bytes	2 bytes	0DH, 0AH

Figure 10 ASCII frame format

In RTU mode, messages start with as well as end at a silent interval of at least 3.5 character times. The entire message frame must be transmitted as a continuous stream. If a silent interval of more than 1.5 character times occurs before completion of the frame, the receiving device flushes the incomplete message and assumes that the next byte will be the address field of a new message. RTU message format as shown in figure 11.

Start	Address code	Function code	Data field	LRC check	end
4-bytes interval time	1 byte	1 byte	N byte	2 bytes	4-bytes interval time

Figure 11 RTU frame format

5.3.1 Address code (Address)

Address code is to specify which slave communicates with the master, each slave has its unique address code. Both address code sending to or response from the slave indicates its address. Available addresses are 1-247, the rest are reserved.

5.3.2 Function code (Function)

Function code is to specify what function the slave to perform. The supported function codes and their definition as well as their operation are listed below.

Function code	Definition	Operation
03/04H	Read register	Read data from the register(s)
10H	Write one or more continuous registers	Write n*16-bit binary number into.n regesters

Figure 12 Function code

5.3.3 Date field（Data）

Data field are different because of different function code. These data can be numerical value, reference address, etc. for instance, function code 03H specifies the value which meter read register, then the data field much contain the start address and read length of the register.

5.3.4 Verify code

Verify code is to estimate the data received correct or not for the master and slave, it guarantees the communication system more reliable.

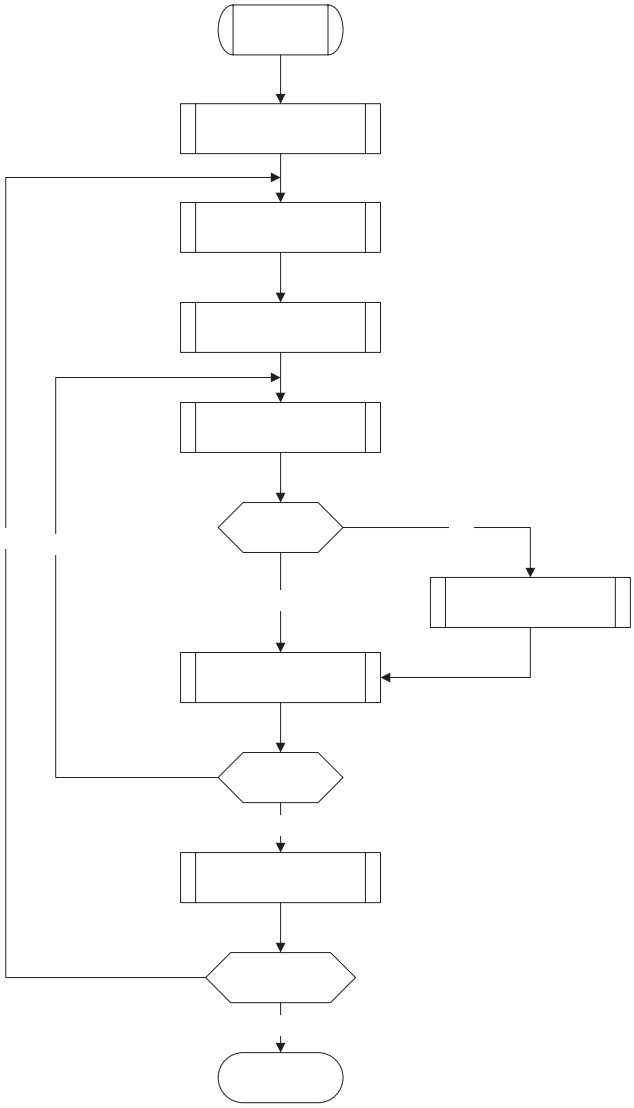
Modbus-ASCII adopts the LRC to verify, The LRC is calculated by adding together successive eight-bit bytes in the message, discarding any carries, and then two's complementing the result. The LRC is an eight-bit field, therefore each new addition of a character that would result in a value higher than 255 decimal simply rolls over the field's value through zero. Because there is no ninth bit, the carry is discarded automatically.

Modbus-RTU adopts the CRC-16 to verify, it contains a 16-bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message. The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value it received in the CRC field. If the two values are not equal, an error results.

The CRC is started by first preloading a 16-bit register to all 1's. Then a process begins of applying successive eight-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC.

During generation of the CRC, each eight-bit character is exclusive ORed with the register contents. The result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register is then exclusive ORed with a preset, fixed value. If the LSB was a 0, no exclusive OR takes place.

This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next eight-bit character is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the characters of the message have been applied, is the CRC value. The calculating process of CRC-16 is as follow.



Picture 18, calculating progress of CRC-16 verify code

5.4 **Error management**

The meter will response message when it has examined error which out of the error codes, the highest bit of function code is 1. That is, the function code slave response is what it received plus 128. The format of error message frame which rebound from the slave is as follows:

Address code	Function code (highest bit 1)	Error code	Verification code	
			Low byte	High byte
1 byte	1 byte	1 byte	1 byte	1 byte

Figure 13 Invalid message frame format return from the slave

Error code as follows:

01H	Invalid function code	Meter doesn't support the function code received
02H	Invalid data address	The data address received is out of range
03H	Invalid data value	The date value received is out of range

5.5 Samples of Communication message

5.5.1 Read Register （function code 03/04H）

This function allows user to obtain the data and system parameters which the meter sampling and recording. The maximal register number which master requests is 125. The following sample is reading three basic data IA、IB、IC from the client which address code is 01H （the length of each register is 2 bytes, the start address of IA is 0100H,number of register is 3）.

	ASCII code	HEX code
Start	:	3AH
Address code	01	30H 31H
Function code	03	30H 33H
Original register address	0107	30H 31H 30H 37H
Number of register	0003	30H 30H 30H 33H
Verification code	F1	46H 31H
Stop	<CR><LF>	0DH 0AH

Figure 14 read register master demand data frame (ASCII code)

Start		4 bytes time interval
Address code		01H
Function code		03H
Original register address	High byte	Original register address
	Low byte	
Number of register	High byte	Number of register
	Low byte	
Verification code	Low byte	Verification code
	High byte	
Stop		4 bytes time interval

Figure 15 Read register master inquire data frame(RTU mode)

The data return from the master indicating IA＝03EDH(1.005)、IB＝03F0H(1.008)、IC＝03E0H(0.992),the actually value of current can be gained according to the appendix.

	ASCII code	HEX code
Start	:	3AH
Address code	01	30H 31H
Function code	03	30H 33H
Byte	06	30H 36H
Register 1 data	03ED	30H 33H 45H 44H
Register 2 data	03F0	30H 33H 46H 30H

Register 3 data	03E0	30H 33H 45H 30H
Verification code	30	33H 30H
Stop	<CR><LF>	0DH 0AH

Figure 16 Write register slave response data frame

Start		4 bytes time interval
Address code		01H
Function code		03H
Byte		06H
Register 1 data	High byte	03H
	Low byte	EDH
Register 2 data	High byte	03H
	Low byte	F0H
Register 3 data	High byte	03H
	Low byte	E0H
Verification code	Low byte	8CH
	High byte	5EH
Stop		4 bytes time interval

Figure 17 Read register slave response data frame

5.5.2 Write multiple register（10H）

This function is for the master to write multiple data into register, the register should be writable, and the number should be within the range of address. The maximal number of registers which Modbus communication protocol allows to save into is 60. Following is the example of setting LED display to the lightest (grade 16th)

	ASCII code	HEX code
Start	:	3AH
Address code	01	30H 31H
Function code	10	31H 30H
Original register address	000A	30H 30H 30H 41H
Number of register	0001	30H 30H 30H 31H
Write bytes	02	30H 32H
Write data	0010	30H 30H 31H 30H
Verification code	D2	44H 32H
Stop	<CR><LF>	0DH 0AH

Figure 18 write register server enquire data frame（ASCII mode）

Start	4 bytes time interval
Address code	01H

Function code		10H
Original register address	High byte	00H
	Low byte	0AH
Number of register	High byte	00H
	Low byte	01H
Write byte		02H
Write data	High byte	00H
	Low byte	10H
Verification code	Low byte	A7H
	High byte	36H
Stop		4 bytes time interval

Figure 19 Write register master enquire data frame （RTU mode）

	ASCII code	HEX code
Start	:	3AH
Address code	01	30H 31H
Function code	10	31H 30H
Original register address	000A	30H 30H 30H 41H
Number of write register	0001	30H 30H 30H 31H
Verification code	E4	45H 34H
Stop	<CR><LF>	0DH 0AH

Figure 20　Write register slave response data frame （ASCII mode）

Start		4 bytes time interval
Address code		01H
Function code		10H
Original register address	High byte	00H
	Low byte	0AH
Number of register	High byte	00H
	Low byte	01H
Verification code	Low byte	21H
	High byte	CBH
Stop		4 bytes time interval

Figure 20　Write register slave response data frame （RTU mode）

Appendix

1. Address information

System Parameters				
Address	Initial setting	Item	Description	Property
0000H	-	SERH	Series Number high bit	R
0001H	-	SERL	Series Number low bit	R
0002H	-	STATE	System working state (reserved)	R
0003H	8888	PSW	Password for programming	R/W
0004H	1	ADDR	Meter address	R/W
0005H	9600	CBS	Select baud rate	R/W
0006H	0	CDS	Select communication data format	R/W
0007H	RTU	CPS	Select communication protocol	R/W
0008H	0	DCW	Display control word	R/W
0009H	2	DTT	When DCW=0 displays turning time, Unit: second	R/W
000AH	1	BCW	Backlight and brightness control word	R/W
000BH	0	NET	Network type (0 - 3P4W,1 - 3P3W)	R/W
000CH	1	URATIO	Voltage ratio 注1	R/W
000DH	1	IRATIO	Current ratio 注1	R/W
000EH	-	WRST	Reset energy accumulate value	R/W
000FH	0	AOSI1	Analog output 1 item setting	R/W
0010H	9999	AOS1	Analog output 1 full scale output parameters value setting	R/W
0011H	0	AOSI2	Analog output 2 item setting	R/W
0012H	9999	AOS2	Analog output 2 full scale output parameters value setting	R/W
0013H	0	AOSI3	Analog output 3 item setting	R/W
0014H	9999	AOS3	Analog output 3 full scale output parameters value setting	R/W
0015H	0	AOSI4	Analog output 4 item setting	R/W
0016H	9999	AOS4	Analog output 4 full scale output parameters value setting	R/W
0017H	0	DOSI1	Switching output 1 item setting	R/W
0018H	0000	DOS1L	Switching output 1 alarm lower limit value	R/W
0019H	9999	DOS1H	Switching output 1 alarm upper limit value	R/W
001AH	0	DOSI2	Switching output 2 item setting	R/W
001BH	0000	DOS2L	Switching output 2 alarm lower limit value	R/W
001CH	9999	DOS2H	Switching output 2 alarm upper limit value	R/W
001DH	0	DOSI3	Switching output 3 item setting	R/W
001EH	0000	DOS3L	Switching output 3 alarm lower limit value	R/W
001FH	9999	DOS3H	Switching output 3 alarm upper limit value	R/W

0020H	0	DOSI4	Switching output 4 item setting	R/W
0021H	0000	DOS4L	Switching output 4 alarm lower limit value	R/W
0022H	9999	DOS4H	Switching output 4 alarm upper limit value	R/W
0023H	0	DIDLY	Switching input stable time	R/W
0024H	0	DODLY	Switching output stable time	R/W
Working information				
Address	Initial setting	Item	Description	Property
0100H	-	DIO	Switching state	R
Electrical data				
Address	Energy address	Item	Description	Property
0101H	1/129	UA/UAB	A phase voltage(3P4W)/AB phase voltage(3P3W)	R
0102H	2/130	UB/UBC	B phase voltage(3P4W)/BC phase voltage(3P3W)	R
0103H	3/131	UC/UCA	C phase voltage(3P4W)/CA phase voltage(3P3W)	R
0104H	4/132	UAB	AB line voltage(3P4W)	R
0105H	5/133	UBC	BC line voltage(3P4W)	R
0106H	6/134	UCA	CA line voltage(3P4W)	R
0107H	7/135	IA	A phase current	R
0108H	8/136	IB	B phase current	R
0109H	9/137	IC	C phase current	R
010AH	10/138	PS	Total active power	R
010BH	11/139	PA	A Phase active power	R
010CH	12/140	PB	B Phase active power	R
010DH	13/141	PC	C Phase active power	R
010EH	14/142	QS	Total reactive power	R
010FH	15/143	QA	A Phase reactive power	R
0110H	16/144	QB	B Phase reactive power	R
0111H	17/145	QC	C Phase reactive power	R
0112H	18/146	PFS	Total power factor	R
0113H	19/147	PFA	A Phase power factor	R
0114H	20/148	PFB	B Phase power factor	R
0115H	21/149	PFC	C Phase power factor	R
0116H	22/150	SS	Total apparent power	R
0117H	23/151	SA	A Phase apparent power	R
0118H	24/152	SB	B Phase apparent power	R
0119H	25/153	SC	C Phase apparent power	R
011AH	26/154	FR	Frequency	R

Energy data				
Address	Display code	Item	Description	property
011BH	-	+Ph(H)	(current) total forward active energy consumption	R/W
011CH	-	+Ph(L)		R/W
011DH	-	+Ph(H)	(current) T1 forward active energy consumption	R/W
011EH	-	+Ph(L)		R/W
011FH	-	+Ph(H)	(current) T2 forward active energy consumption	R/W
0120H	-	+Ph(L)		R/W
0121H	-	+Ph(H)	(current) T3 forward active energy consumption	R/W
0122H	-	+Ph(L)		R/W
0123H	-	+Ph(H)	(current) T4 forward active energy consumption	R/W
0124H	-	+Ph(L)		R/W
0125H	-	-Ph(H)	(current) total reverse active energy consumption	R/W
0126H	-	-Ph(L)		R/W
0127H	-	-Ph(H)	(current) T1 reverse active energy consumption	R/W
0128H	-	-Ph(L)		R/W
0129H	-	-Ph(H)	(current) T2 reverse active energy consumption	R/W
012AH	-	-Ph(L)		R/W
012BH	-	-Ph(H)	(current) T3 reverse active energy consumption	R/W
012CH	-	-Ph(L)		R/W
012DH	-	-Ph(H)	(current) T4 reverse active energy consumption	R/W
012EH	-	-Ph(L)		R/W
012FH	-	+Qh (H)	(current) total forward reactive energy consumption	R/W
0130H	-	+Qh (L)		R/W
0131H	-	+Qh (H)	(current) T1 forward reactive energy consumption	R/W
0132H	-	+Qh (L)		R/W
0133H	-	+Qh (H)	(current) T2 forward reactive energy consumption	R/W
0134H	-	+Qh (L)		R/W
0135H	-	+Qh (H)	(current) T3 forward reactive energy consumption	R/W
0136H	-	+Qh (L)		R/W
0137H	-	+Qh (H)	(current) T4 forward reactive energy consumption	R/W
0138H	-	+Qh (L)		R/W
0139H	-	-Qh (H)	(current) total reverse reactive energy consumption	R/W
013AH	-	-Qh (L)		R/W
013BH	-	-Qh (H)	(current) T1 reverse reactive energy consumption	R/W
013CH	-	-Qh (L)		R/W

013DH	-	-Qh (H)	(current) T2 reverse reactive energy consumption	R/W
013EH	-	-Qh (L)		R/W
013FH	-	-Qh (H)	(current) T3 reverse reactive energy consumption	R/W
0140H	-	-Qh (L)		R/W
0141H	-	-Qh (H)	(current) T4 reverse reactive energy consumption	R/W
0142H	-	-Qh (L)		R/W
0143H	-	+Ph(H)	(last month) total forward active energy consumption	R/W
0144H	-	+Ph(L)		R/W
0145H	-	+Ph(H)	(last month) T1 forward active energy consumption	R/W
0146H	-	+Ph(L)		R/W
0147H	-	+Ph(H)	(last month) T2 forward active energy consumption	R/W
0148H	-	+Ph(L)		R/W
0149H	-	+Ph(H)	(last month) T3 forward active energy consumption	R/W
014AH	-	+Ph(L)		R/W
014BH	-	+Ph(H)	(last month) T4 forward active energy consumption	R/W
014CH	-	+Ph(L)		R/W
014DH	-	-Ph(H)	(last month) total reverse active energy consumption	R/W
014EH	-	-Ph(L)		R/W
014FH	-	-Ph(H)	(last month) T1 reverse active energy consumption	R/W
0150H	-	-Ph(L)		R/W
0151H	-	-Ph(H)	(last month) T2 reverse active energy consumption	R/W
0152H	-	-Ph(L)		R/W
0153H	-	-Ph(H)	(last month) T3 reverse active energy consumption	R/W
0154H	-	-Ph(L)		R/W
0155H	-	-Ph(H)	(last month) T4 reverse active energy consumption	R/W
0156H	-	-Ph(L)		R/W
0157H	-	+Qh (H)	(last month) total forward reactive energy consumption	R/W
0158H	-	+Qh (L)		R/W
0159H	-	+Qh (H)	(last month) T1 forward reactive energy consumption	R/W
015AH	-	+Qh (L)		R/W
015BH	-	+Qh (H)	(last month) T2 forward reactive energy consumption	R/W
015CH	-	+Qh (L)		R/W
015DH	-	+Qh (H)	(last month) T3 forward reactive energy consumption	R/W
015EH	-	+Qh (L)		R/W
015FH	-	+Qh (H)	(last month) T4 forward reactive energy consumption	R/W
0160H	-	+Qh (L)		R/W

0161H	-	-Qh (H)	(last month) total reverse reactive energy consumption	R/W
0162H	-	-Qh (L)		R/W
0163H	-	-Qh (H)	(last month) T1 reverse reactive energy consumption	R/W
0164H	-	-Qh (L)		R/W
0165H	-	-Qh (H)	(last month) T2 reverse reactive energy consumption	R/W
0166H	-	-Qh (L)		R/W
0167H	-	-Qh (H)	(last month) T3 reverse reactive energy consumption	R/W
0168H	-	-Qh (L)		R/W
0169H	-	-Qh (H)	(last month) T4 reverse reactive energy consumption	R/W
016AH	-	-Qh (L)		R/W
016BH	-	+Ph(H)	(two months ago) total forward active energy consumption	R/W
016CH	-	+Ph(L)		R/W
016DH	-	+Ph(H)	(two months ago) T1 forward active energy consumption	R/W
016EH	-	+Ph(L)		R/W
016FH	-	+Ph(H)	(two months ago) T2 forward active energy consumption	R/W
0170H	-	+Ph(L)		R/W
0171H	-	+Ph(H)	(two months ago) T3 forward active energy consumption	R/W
0172H	-	+Ph(L)		R/W
0173H	-	+Ph(H)	(two months ago) T4 forward active energy consumption	R/W
0174H	-	+Ph(L)		R/W
0175H	-	-Ph(H)	(two months ago) total reverse active energy consumption	R/W
0176H	-	-Ph(L)		R/W
0177H	-	-Ph(H)	(two months ago) T1 reverse active energy consumption	R/W
0178H	-	-Ph(L)		R/W
0179H	-	-Ph(H)	(two months ago) T2 reverse active energy consumption	R/W
017AH	-	-Ph(L)		R/W
017BH	-	-Ph(H)	(two months ago) T3 reverse active energy consumption	R/W
017CH	-	-Ph(L)		R/W
017DH	-	-Ph(H)	(two months ago) T4 reverse active energy consumption	R/W
017EH	-	-Ph(L)		R/W
017FH	-	+Qh (H)	(two months ago) total forward reactive energy consumption	R/W
0180H	-	+Qh (L)		R/W
0181H	-	+Qh (H)	(two months ago) T1 forward reactive energy consumption	R/W
0182H	-	+Qh (L)		R/W
0183H	-	+Qh (H)	(two months ago) T2 forward reactive energy consumption	R/W
0184H	-	+Qh (L)		R/W

0185H	-	+Qh (H)	(two months ago) T3 forward reactive energy consumption	R/W
0186H	-	+Qh (L)		R/W
0187H	-	+Qh (H)	(two months ago) T4 forward reactive energy consumption	R/W
0188H	-	+Qh (L)		R/W
0189H	-	-Qh (H)	(two months ago) total reverse reactive energy consumption	R/W
018AH	-	-Qh (L)		R/W
018BH	-	-Qh (H)	(two months ago) T1 reverse reactive energy consumption	R/W
018CH	-	-Qh (L)		R/W
018DH	-	-Qh (H)	(two months ago) T2 reverse reactive energy consumption	R/W
018EH	-	-Qh (L)		R/W
018FH	-	-Qh (H)	(two months ago) T3 reverse reactive energy consumption	R/W
0190H	-	-Qh (L)		R/W
0191H	-	-Qh (H)	(two months ago) T4 reverse reactive energy consumption	R/W
0192H	-	-Qh (L)		R/W

Multi-rate information				
Address	Initial setting	Itme	Description	Property
0200H	-	RTC	Minute second (MMSS)	R/W
0201H	-		Day hour (DDHH)	R/W
0202H	-		Year month (YYMM)	R/W
0203H	01.00	ADT	AMR date and time (DDHH)	R/W
0204H	1	RATE1	Time period 1 rate setting	R/W
0205H	00:00	PS1	Time period 1 starting time setting	R/W
0206H	1	RATE2	Time period 2 rate setting	R/W
0207H	00:00	PS2	Time period 2 starting time setting	R/W
0208H	1	RATE3	Time period 3 rate setting	R/W
0209H	00:00	PS3	Time period 3 starting time setting	R/W
020AH	1	RATE4	Time period 4 rate setting	R/W
020BH	00:00	PS4	Time period 4 starting time setting	R/W
020CH	1	RATE5	Time period 5 rate setting	R/W
020DH	00:00	PS5	Time period 5 starting time setting	R/W
020EH	1	RATE6	Time period 6 rate setting	R/W
020FH	00:00	PS6	Time period 6 starting time setting	R/W
0210H	1	RATE7	Time period 7 rate setting	R/W
0211H	00:00	PS7	Time period 7 starting time setting	R/W

0212H	1	RATE8	Time period 8 rate setting	R/W
0213H	00:00	PS8	Time period 8 starting time setting	R/W
0214H	1	RATE9	Time period 9 rate setting	R/W
0215H	00:00	PS9	Time period 9 starting time setting	R/W
0216H	1	RATE10	Time period 10 rate setting	R/W
0217H	00:00	PS10	Time period 10 starting time setting	R/W
0218H	1	ROLL	Demand sliding period	R/W
0219H	0	SOUT	Second signal/reactive pulse output select (0-reactive,1-second signal)	R/W
021AH	-	CPR	Rate of current time period (high bit is time period)	R
021BH	-	BATT	Voltage of back-up battery	R
Demand information				
Address	Display code	Item	Description	Property
0300H	-	DPP	Current month forward active demand	R/W
0301H	-	DPPT(H)	Occur time of current month forward active demand (Month/day/hour/minute)	R/W
0302H	-	DPPT(L)		R/W
0303H	-	DPP1	Current month T1 forward active demand	R/W
0304H	-	DPPT1(H)	Occur time of current month T1 forward active demand (Month/day/hour/minute)	R/W
0305H	-	DPPT1(L)		R/W
0306H	-	DPP2	Current month T2 forward active demand	R/W
0307H	-	DPPT2(H)	Occur time of current month T2 forward active demand (Month/day/hour/minute)	R/W
0308H	-	DPPT2(L)		R/W
0309H	-	DPP3	Current month T3 forward active demand	R/W
030AH	-	DPPT3(H)	Occur time of current month T3 forward active demand (Month/day/hour/minute)	R/W
030BH	-	DPPT3(L)		R/W
030CH	-	DPP4	Current month T4 forward active demand	R/W
030DH	-	DPPT4(H)	Occur time of current month T4 forward active demand (Month/day/hour/minute)	R/W
030EH	-	DPPT4(L)		R/W
030FH	-	DPP	Current month reverse active demand	R/W
0310H	-	DPPT(H)	Occur time of current month reverse active demand (Month/day/hour/minute)	R/W
0311H	-	DPPT(L)		R/W
0312H	-	DPP1	Current month T1 reverse active demand	R/W
0313H	-	DPPT1(H)	Occur time of current month T1 reverse active demand (Month/day/hour/minute)	R/W
0314H	-	DPPT1(L)		R/W
0315H	-	DPP2	Current month T2 reverse active demand	R/W
0316H	-	DPPT2(H)	Occur time of current month T2 reverse active demand	R/W

0317H	-	DPPT2(L)	(Month/day/hour/minute)	R/W
0318H	-	DPP3	Current month T3 reverse active demand	R/W
0319H	-	DPPT3(H)	Occur time of current month T3 reverse active demand	R/W
031AH	-	DPPT3(L)	(Month/day/hour/minute)	R/W
031BH	-	DPP4	Current month T4 reverse active demand	R/W
031CH	-	DPPT4(H)	Occur time of current month T4 reverse active demand	R/W
031DH	-	DPPT4(L)	(Month/day/hour/minute)	R/W
031EH	-	DPP	Current month forward reactive demand	R/W
031FH	-	DPPT(H)	Occur time of current month forward reactive demand	R/W
0320H	-	DPPT(L)	(Month/day/hour/minute)	R/W
0321H	-	DPP1	Current month T1 forward reactive demand	R/W
0322H	-	DPPT1(H)	Occur time of current month T1 forward reactive demand	R/W
0323H	-	DPPT1(L)	(Month/day/hour/minute)	R/W
0324H	-	DPP2	Current month T2 forward reactive demand	R/W
0325H	-	DPPT2(H)	Occur time of current month T2 forward reactive demand	R/W
0326H	-	DPPT2(L)	(Month/day/hour/minute)	R/W
0327H	-	DPP3	Current month T3 forward reactive demand	R/W
0328H	-	DPPT3(H)	Occur time of current month T3 forward reactive demand	R/W
0329H	-	DPPT3(L)	(Month/day/hour/minute)	R/W
032AH	-	DPP4	Current month T4 forward reactive demand	R/W
032BH	-	DPPT4(H)	Occur time of current month T4 forward reactive demand	R/W
032CH	-	DPPT4(L)	(Month/day/hour/minute)	R/W
032DH	-	DPP	Current month reverse reactive demand	R/W
032EH	-	DPPT(H)	Occur time of current month reverse reactive demand	R/W
032FH	-	DPPT(L)	(Month/day/hour/minute)	R/W
0330H	-	DPP1	Current month T1 reverse reactive demand	R/W
0331H	-	DPPT1(H)	Occur time of current month T1 reverse reactive demand	R/W
0332H	-	DPPT1(L)	(Month/day/hour/minute)	R/W
0333H	-	DPP2	Current month T2 reverse reactive demand	R/W
0334H	-	DPPT2(H)	Occur time of current month T2 reverse reactive demand	R/W
0335H	-	DPPT2(L)	(Month/day/hour/minute)	R/W
0336H	-	DPP3	Current month T3 reverse reactive demand	R/W
0337H	-	DPPT3(H)	Occur time of current month T3 reverse reactive demand	R/W
0338H	-	DPPT3(L)	(Month/day/hour/minute)	R/W
0339H	-	DPP4	Current month T4 reverse reactive demand	R/W
033AH	-	DPPT4(H)	Occur time of current month T4 reverse reactive demand	R/W

033BH	-	DPPT4(L)	(Month/day/hour/minute)	R/W
033CH	-	DPP	Last month forward active demand	R/W
033DH	-	DPPT(H)	Occur time of last month forward active demand	R/W
033EH	-	DPPT(L)	(Month/day/hour/minute)	R/W
033FH	-	DPP1	Last month T1 forward active demand	R/W
0340H	-	DPPT1(H)	Occur time of last month T1 forward active demand	R/W
0341H	-	DPPT1(L)	(Month/day/hour/minute)	R/W
0342H	-	DPP2	Last month T2 forward active demand	R/W
0343H	-	DPPT2(H)	Occur time of last month T2 forward active demand	R/W
0344H	-	DPPT2(L)	(Month/day/hour/minute)	R/W
0345H	-	DPP3	Last month T3 forward active demand	R/W
0346H	-	DPPT3(H)	Occur time of last month T3 forward active demand	R/W
0347H	-	DPPT3(L)	(Month/day/hour/minute)	R/W
0348H	-	DPP4	Last month T4 forward active demand	R/W
0349H	-	DPPT4(H)	Occur time of last month T4 forward active demand	R/W
034AH	-	DPPT4(L)	(Month/day/hour/minute)	R/W
034BH	-	DPP	Last month reverse active demand	R/W
034CH	-	DPPT(H)	Occur time of last month reverse active demand	R/W
034DH	-	DPPT(L)	(Month/day/hour/minute)	R/W
034EH	-	DPP1	Last month T1 reverse active demand	R/W
034FH	-	DPPT1(H)	Occur time of last month T1 reverse active demand	R/W
0350H	-	DPPT1(L)	(Month/day/hour/minute)	R/W
0351H	-	DPP2	Last month T2 reverse active demand	R/W
0352H	-	DPPT2(H)	Occur time of last month T2 reverse active demand	R/W
0353H	-	DPPT2(L)	(Month/day/hour/minute)	R/W
0354H	-	DPP3	Last month T3 reverse active demand	R/W
0355H	-	DPPT3(H)	Occur time of last month T3 reverse active demand	R/W
0356H	-	DPPT3(L)	(Month/day/hour/minute)	R/W
0357H	-	DPP4	Last month T4 reverse active demand	R/W
0358H	-	DPPT4(H)	Occur time of last month T4 reverse active demand	R/W
0359H	-	DPPT4(L)	(Month/day/hour/minute)	R/W
035AH	-	DPP	Last month forward reactive demand	R/W
035BH	-	DPPT(H)	Occur time of last month forward reactive demand	R/W
035CH	-	DPPT(L)	(Month/day/hour/minute)	R/W
035DH	-	DPP1	Last month T1 forward reactive demand	R/W
035EH	-	DPPT1(H)	Occur time of last month T1 forward reactive demand	R/W

035FH	-	DPPT1(L)	(Month/day/hour/minute)	R/W
0360H	-	DPP2	Last month T2 forward reactive demand	R/W
0361H	-	DPPT2(H)	Occur time of last month T2 forward reactive demand	R/W
0362H	-	DPPT2(L)	(Month/day/hour/minute)	R/W
0363H	-	DPP3	Last month T3 forward reactive demand	R/W
0364H	-	DPPT3(H)	Occur time of last month T3 forward reactive demand	R/W
0365H	-	DPPT3(L)	(Month/day/hour/minute)	R/W
0366H	-	DPP4	Last month T4 forward reactive demand	R/W
0367H	-	DPPT4(H)	Occur time of last month T4 forward reactive demand	R/W
0368H	-	DPPT4(L)	(Month/day/hour/minute)	R/W
0369H	-	DPP	Last month reverse reactive demand	R/W
036AH	-	DPPT(H)	Occur time of last month reverse reactive demand	R/W
036BH	-	DPPT(L)	(Month/day/hour/minute)	R/W
036CH	-	DPP1	Last month T1 reverse reactive demand	R/W
036DH	-	DPPT1(H)	Occur time of last month T1 reverse reactive demand	R/W
036EH	-	DPPT1(L)	(Month/day/hour/minute)	R/W
036FH	-	DPP2	Last month T2 reverse reactive demand	R/W
0370H	-	DPPT2(H)	Occur time of last month T2 reverse reactive demand	R/W
0371H	-	DPPT2(L)	(Month/day/hour/minute)	R/W
0372H	-	DPP3	Last month T3 reverse reactive demand	R/W
0373H	-	DPPT3(H)	Occur time of last month T3 reverse reactive demand	R/W
0374H	-	DPPT3(L)	(Month/day/hour/minute)	R/W
0375H	-	DPP4	Last month T4 reverse reactive demand	R/W
0376H	-	DPPT4(H)	Occur time of last month T4 reverse reactive demand	R/W
0377H	-	DPPT4(L)	(Month/day/hour/minute)	R/W
0378H	-	DPP	(two months before) forward active demand	R/W
0379H	-	DPPT(H)	(two months before) Occur time of forward active demand	R/W
037AH	-	DPPT(L)	(Month/day/hour/minute)	R/W
037BH	-	DPP1	(two months before) T1 forward active demand	R/W
037CH	-	DPPT1(H)	(two months before) Occur time of T1 forward active demand	R/W
037DH	-	DPPT1(L)	(Month/day/hour/minute)	R/W
037EH	-	DPP2	(two months before) T2 forward active demand	R/W
037FH	-	DPPT2(H)	(two months before) Occur time of T2 forward active demand	R/W
0380H	-	DPPT2(L)	(Month/day/hour/minute)	R/W
0381H	-	DPP3	(two months before) T3 forward active demand	R/W
0382H	-	DPPT3(H)	(two months before) Occur time of T3 forward active demand	R/W

0383H	-	DPPT3(L)	(Month/day/hour/minute)	R/W
0384H	-	DPP4	(two months before) T4 forward active demand	R/W
0385H	-	DPPT4(H)	(two months before) Occur time of T4 forward active demand	R/W
0386H	-	DPPT4(L)	(Month/day/hour/minute)	R/W
0387H	-	DPP	(two months before) reverse active demand	R/W
0388H	-	DPPT(H)	(two months before) Occur time of reverse active demand	R/W
0389H	-	DPPT(L)	(Month/day/hour/minute)	R/W
038AH	-	DPP1	(two months before) T1 reverse active demand	R/W
038BH	-	DPPT1(H)	(two months before) Occur time of T1 reverse active demand	R/W
038CH	-	DPPT1(L)	(Month/day/hour/minute)	R/W
038DH	-	DPP2	(two months before) T2 reverse active demand	R/W
038EH	-	DPPT2(H)	(two months before) Occur time of T2 reverse active demand	R/W
038FH	-	DPPT2(L)	(Month/day/hour/minute)	R/W
0390H	-	DPP3	(two months before) T3 reverse active demand	R/W
0391H	-	DPPT3(H)	(two months before) Occur time of T3 reverse active demand	R/W
0392H	-	DPPT3(L)	(Month/day/hour/minute)	R/W
0393H	-	DPP4	(two months before) T4 reverse active demand	R/W
0394H	-	DPPT4(H)	(two months before) Occur time of T4 reverse active demand	R/W
0395H	-	DPPT4(L)	(Month/day/hour/minute)	R/W
0396H	-	DPP	(two months before) forward reactive demand	R/W
0397H	-	DPPT(H)	(two months before) Occur time of forward reactive demand	R/W
0398H	-	DPPT(L)	(Month/day/hour/minute)	R/W
0399H	-	DPP1	(two months before)T1 forward reactive demand	R/W
039AH	-	DPPT1(H)	(two months before) Occur time of T1 forward reactive	R/W
039BH	-	DPPT1(L)	demand (Month/day/hour/minute)	R/W
039CH	-	DPP2	(two months before)T2 forward reactive demand	R/W
039DH	-	DPPT2(H)	(two months before) Occur time of T2 forward reactive	R/W
039EH	-	DPPT2(L)	demand (Month/day/hour/minute)	R/W
039FH	-	DPP3	(two months before)T3 forward reactive demand	R/W
03A0H	-	DPPT3(H)	(two months before) Occur time of T3 forward reactive	R/W
03A1H	-	DPPT3(L)	demand (Month/day/hour/minute)	R/W
03A2H	-	DPP4	(two months before)T4 forward reactive demand	R/W
03A3H	-	DPPT4(H)	(two months before) Occur time of T4 forward reactive	R/W
03A4H	-	DPPT4(L)	demand (Month/day/hour/minute)	R/W
03A5H	-	DPP	(two months before) reverse reactive demand	R/W
03A6H	-	DPPT(H)	(two months before) occur time of reverse reactive demand	R/W

03A7H	-	DPPT(L)	(Month/day/hour/minute)	R/W
03A8H	-	DPP1	(two months before) T1 reverse reactive demand	R/W
03A9H	-	DPPT1(H)	(two months before) occur time of T1 reverse reactive	R/W
03AAH	-	DPPT1(L)	demand (Month/day/hour/minute)	R/W
03ABH	-	DPP2	(two months before) T2 reverse reactive demand	R/W
03ACH	-	DPPT2(H)	(two months before) occur time of T2 reverse reactive	R/W
03ADH	-	DPPT2(L)	demand (Month/day/hour/minute)	R/W
03AEH	-	DPP3	(two months before) T3 reverse reactive demand	R/W
03AFH	-	DPPT3(H)	(two months before) occur time of T3 reverse reactive	R/W
03B0H	-	DPPT3(L)	demand (Month/day/hour/minute)	R/W
03B1H	-	DPP4	(two months before) T4 reverse reactive demand	R/W
03B2H	-	DPPT4(H)	(two months before) occur time of T4 reverse reactive	R/W
03B3H	-	DPPT4(L)	demand (Month/day/hour/minute)	R/W

Additional energy data

Address	Initial setting	Itme	Description	Property
0400H	-	UE	Neutral voltage	R
0401H	-	IE	Neutral current	R

Harmonic information

Address	Initial setting	Itme	Description	Property
2000H	-	HRUA0	Phase A voltage AC content A (%)	R
2001H	-	HRUA1	Phase A voltage fundamental wave content (%)	R
2002H	-	HRUA2	Phase A voltage 2 times harmonic content (%)	R
2003H	-	HRUA3	Phase A voltage 3 times harmonic content (%)	R
2004H	-	HRUA4	Phase A voltage 4 times harmonic content (%)	R
2005H	-	HRUA5	Phase A voltage 5 times harmonic content (%)	R
2006H	-	HRUA6	Phase A voltage 6 times harmonic content (%)	R
2007H	-	HRUA7	Phase A voltage 7 times harmonic content (%)	R
2008H	-	HRUA8	Phase A voltage 8 times harmonic content (%)	R
2009H	-	HRUA9	Phase A voltage 9 times harmonic content (%)	R
200AH	-	HRUA10	Phase A voltage 10 times harmonic content (%)	R
200BH	-	HRUA11	Phase A voltage 11 times harmonic content (%)	R
200CH	-	HRUA12	Phase A voltage 12 times harmonic content (%)	R
200DH	-	HRUA13	Phase A voltage 13 times harmonic content (%)	R
200EH	-	HRUA14	Phase A voltage 14 times harmonic content (%)	R

200FH	-	HRUA15	Phase A voltage 15 times harmonic content （%）	R
2010H	-	HRUA16	Phase A voltage 16 times harmonic content （%）	R
2011H	-	HRUA17	Phase A voltage 17 times harmonic content （%）	R
2012H	-	HRUA18	Phase A voltage 18 times harmonic content （%）	R
2013H	-	HRUA19	Phase A voltage 19 times harmonic content （%）	R
2014H	-	HRUA20	Phase A voltage 20 times harmonic content （%）	R
2015H	-	HRUA21	Phase A voltage 21 times harmonic content （%）	R
2016H	-	HRUA22	Phase A voltage 22 times harmonic content （%）	R
2017H	-	HRUA23	Phase A voltage 23 times harmonic content （%）	R
2018H	-	HRUA24	Phase A voltage 24 times harmonic content （%）	R
2019H	-	HRUA25	Phase A voltage 25 times harmonic content （%）	R
201AH	-	HRUA26	Phase A voltage 26 times harmonic content （%）	R
201BH	-	HRUA27	Phase A voltage 27 times harmonic content （%）	R
201CH	-	HRUA28	Phase A voltage 28 times harmonic content （%）	R
201DH	-	HRUA29	Phase A voltage 29 times harmonic content （%）	R
201EH	-	HRUA30	Phase A voltage 30 times harmonic content （%）	R
201FH	-	HRUA31	Phase A voltage 31 times harmonic content （%）	R
2100H	-	HRUB0	Phase B voltage AC content A（%）	R
2101H	-	HRUB1	Phase B voltage fundamental wave content（%）	R
2102H	-	HRUB2	Phase B voltage 2 times harmonic content （%）	R
2103H	-	HRUB3	Phase B voltage 3 times harmonic content （%）	R
2104H	-	HRUB4	Phase B voltage 4 times harmonic content （%）	R
2105H	-	HRUB5	Phase B voltage 5 times harmonic content （%）	R
2106H	-	HRUB6	Phase B voltage 6 times harmonic content （%）	R
2107H	-	HRUB7	Phase B voltage 7 times harmonic content （%）	R
2108H	-	HRUB8	Phase B voltage 8 times harmonic content （%）	R
2109H	-	HRUB9	Phase B voltage 9 times harmonic content （%）	R
210AH	-	HRUB10	Phase B voltage 10 times harmonic content （%）	R
210BH	-	HRUB11	Phase B voltage 11 times harmonic content （%）	R
210CH	-	HRUB12	Phase B voltage 12 times harmonic content （%）	R
210DH	-	HRUB13	Phase B voltage 13 times harmonic content （%）	R
210EH	-	HRUB14	Phase B voltage 14 times harmonic content （%）	R
210FH	-	HRUB15	Phase B voltage 15 times harmonic content （%）	R
2110H	-	HRUB16	Phase B voltage 16 times harmonic content （%）	R
2111H	-	HRUB17	Phase B voltage 17 times harmonic content （%）	R
2112H	-	HRUB18	Phase B voltage 18 times harmonic content （%）	R

2113H	-	HRUB19	Phase B voltage 19 times harmonic content （%）	R
2114H	-	HRUB20	Phase B voltage 20 times harmonic content （%）	R
2115H	-	HRUB21	Phase B voltage 21 times harmonic content （%）	R
2116H	-	HRUB22	Phase B voltage 22 times harmonic content （%）	R
2117H	-	HRUB23	Phase B voltage 23 times harmonic content （%）	R
2118H	-	HRUB24	Phase B voltage 24 times harmonic content （%）	R
2119H	-	HRUB25	Phase B voltage 25 times harmonic content （%）	R
211AH	-	HRUB26	Phase B voltage 26 times harmonic content （%）	R
211BH	-	HRUB27	Phase B voltage 27 times harmonic content （%）	R
211CH	-	HRUB28	Phase B voltage 28 times harmonic content （%）	R
211DH	-	HRUB29	Phase B voltage 29 times harmonic content （%）	R
211EH	-	HRUB30	Phase B voltage 30 times harmonic content （%）	R
211FH	-	HRUB31	Phase B voltage 31 times harmonic content （%）	R
2200H	-	HRUC0	Phase C voltage AC content （%）	R
2201H	-	HRUC1	Phase C voltage fundamental content C （%）	R
2202H	-	HRUC2	Phase C voltage 2 times harmonic content (%)	R
2203H	-	HRUC3	Phase C voltage 3 times harmonic content (%)	R
2204H	-	HRUC4	Phase C voltage 4 times harmonic content (%)	R
2205H	-	HRUC5	Phase C voltage 5 times harmonic content (%)	R
2206H	-	HRUC6	Phase C voltage 6 times harmonic content (%)	R
2207H	-	HRUC7	Phase C voltage 7 times harmonic content (%)	R
2208H	-	HRUC8	Phase C voltage 8 times harmonic content (%)	R
2209H	-	HRUC9	Phase C voltage 9 times harmonic content (%)	R
220AH	-	HRUC10	Phase C voltage 10 times harmonic content (%)	R
220BH	-	HRUC11	Phase C voltage 11 times harmonic content (%)	R
220CH	-	HRUC12	Phase C voltage 12 times harmonic content (%)	R
220DH	-	HRUC13	Phase C voltage 13 times harmonic content (%)	R
220EH	-	HRUC14	Phase C voltage 14 times harmonic content (%)	R
220FH	-	HRUC15	Phase C voltage 15 times harmonic content (%)	R
2210H	-	HRUC16	Phase C voltage 16 times harmonic content (%)	R
2211H	-	HRUC17	Phase C voltage 17 times harmonic content (%)	R
2212H	-	HRUC18	Phase C voltage 18 times harmonic content (%)	R
2213H	-	HRUC19	Phase C voltage 19 times harmonic content (%)	R
2214H	-	HRUC20	Phase C voltage 20 times harmonic content (%)	R
2215H	-	HRUC21	Phase C voltage 21 times harmonic content (%)	R
2216H	-	HRUC22	Phase C voltage 22 times harmonic content (%)	R

2217H	-	HRUC23	Phase C voltage 23 times harmonic content (%)	R
2218H	-	HRUC24	Phase C voltage 24 times harmonic content (%)	R
2219H	-	HRUC25	Phase C voltage 25 times harmonic content (%)	R
221AH	-	HRUC26	Phase C voltage 26 times harmonic content (%)	R
221BH	-	HRUC27	Phase C voltage 27 times harmonic content (%)	R
221CH	-	HRUC28	Phase C voltage 28 times harmonic content (%)	R
221DH	-	HRUC29	Phase C voltage 29 times harmonic content (%)	R
221EH	-	HRUC30	Phase C voltage 30 times harmonic content (%)	R
221FH	-	HRUC31	Phase C voltage 31 times harmonic content (%)	R
2300H	-	HRIA0	Phase A current AC content (%)	R
2301H	-	HRIA1	Phase A fundamental wave content (%)	R
2302H	-	HRIA2	Phase A current 2 times harmonic content (%)	R
2303H	-	HRIA3	Phase A current 3 times harmonic content (%)	R
2304H	-	HRIA4	Phase A current 4 times harmonic content (%)	R
2305H	-	HRIA5	Phase A current 5 times harmonic content (%)	R
2306H	-	HRIA6	Phase A current 6 times harmonic content (%)	R
2307H	-	HRIA7	Phase A current 7 times harmonic content (%)	R
2308H	-	HRIA8	Phase A current 8 times harmonic content (%)	R
2309H	-	HRIA9	Phase A current 9 times harmonic content (%)	R
230AH	-	HRIA10	Phase A current 10 times harmonic content (%)	R
230BH	-	HRIA11	Phase A current 11 times harmonic content (%)	R
230CH	-	HRIA12	Phase A current 12 times harmonic content (%)	R
230DH	-	HRIA13	Phase A current 13 times harmonic content (%)	R
230EH	-	HRIA14	Phase A current 14 times harmonic content (%)	R
230FH	-	HRIA15	Phase A current 15 times harmonic content (%)	R
2310H	-	HRIA16	Phase A current 16 times harmonic content (%)	R
2311H	-	HRIA17	Phase A current 17 times harmonic content (%)	R
2312H	-	HRIA18	Phase A current 18 times harmonic content (%)	R
2313H	-	HRIA19	Phase A current 19 times harmonic content (%)	R
2314H	-	HRIA20	Phase A current 20 times harmonic content (%)	R
2315H	-	HRIA21	Phase A current 21 times harmonic content (%)	R
2316H	-	HRIA22	Phase A current 22 times harmonic content (%)	R
2317H	-	HRIA23	Phase A current 23 times harmonic content (%)	R
2318H	-	HRIA24	Phase A current 24 times harmonic content (%)	R
2319H	-	HRIA25	Phase A current 25 times harmonic content (%)	R
231AH	-	HRIA26	Phase A current 26 times harmonic content (%)	R

231BH	-	HRIA27	Phase A current 27 times harmonic content (%)	R
231CH	-	HRIA28	Phase A current 28 times harmonic content (%)	R
231DH	-	HRIA29	Phase A current 29 times harmonic content (%)	R
231EH	-	HRIA30	Phase A current 30 times harmonic content (%)	R
231FH	-	HRIA31	Phase A current 31 times harmonic content (%)	R
2400H	-	HRIB0	Phase B current AC content (%)	R
2401H	-	HRIB1	Phase B fundamental wave content (%)	R
2402H	-	HRIB2	Phase B current 2 times harmonic content (%)	R
2403H	-	HRIB3	Phase B current 3 times harmonic content (%)	R
2404H	-	HRIB4	Phase B current 4 times harmonic content (%)	R
2405H	-	HRIB5	Phase B current 5 times harmonic content (%)	R
2406H	-	HRIB6	Phase B current 6 times harmonic content (%)	R
2407H	-	HRIB7	Phase B current 7 times harmonic content (%)	R
2408H	-	HRIB8	Phase B current 8 times harmonic content (%)	R
2409H	-	HRIB9	Phase B current 9 times harmonic content (%)	R
240AH	-	HRIB10	Phase B current 10 times harmonic content (%)	R
240BH	-	HRIB11	Phase B current 11 times harmonic content (%)	R
240CH	-	HRIB12	Phase B current 12 times harmonic content (%)	R
240DH	-	HRIB13	Phase B current 13 times harmonic content (%)	R
240EH	-	HRIB14	Phase B current 14 times harmonic content (%)	R
240FH	-	HRIB15	Phase B current 15 times harmonic content (%)	R
2410H	-	HRIB16	Phase B current 16 times harmonic content (%)	R
2411H	-	HRIB17	Phase B current 17 times harmonic content (%)	R
2412H	-	HRIB18	Phase B current 18 times harmonic content (%)	R
2413H	-	HRIB19	Phase B current 19 times harmonic content (%)	R
2414H	-	HRIB20	Phase B current 20 times harmonic content (%)	R
2415H	-	HRIB21	Phase B current 21 times harmonic content (%)	R
2416H	-	HRIB22	Phase B current 22 times harmonic content (%)	R
2417H	-	HRIB23	Phase B current 23 times harmonic content (%)	R
2418H	-	HRIB24	Phase B current 24 times harmonic content (%)	R
2419H	-	HRIB25	Phase B current 25 times harmonic content (%)	R
241AH	-	HRIB26	Phase B current 26 times harmonic content (%)	R
241BH	-	HRIB27	Phase B current 27 times harmonic content (%)	R
241CH	-	HRIB28	Phase B current 28 times harmonic content (%)	R
241DH	-	HRIB29	Phase B current 29 times harmonic content (%)	R
241EH	-	HRIB30	Phase B current 30 times harmonic content (%)	R

241FH	-	HRIB31	Phase B current 31 times harmonic content (%)	R
2500H	-	HRIC0	Phase C current AC content (%)	R
2501H	-	HRIC1	Phase C current fundamental wave content (%)	R
2502H	-	HRIC2	Phase C current 2 times harmonic content (%)	R
2503H	-	HRIC3	Phase C current 3 times harmonic content (%)	R
2504H	-	HRIC4	Phase C current 4 times harmonic content (%)	R
2505H	-	HRIC5	Phase C current 5 times harmonic content (%)	R
2506H	-	HRIC6	Phase C current 6 times harmonic content (%)	R
2507H	-	HRIC7	Phase C current 7 times harmonic content (%)	R
2508H	-	HRIC8	Phase C current 8 times harmonic content (%)	R
2509H	-	HRIC9	Phase C current 9 times harmonic content (%)	R
250AH	-	HRIC10	Phase C current 10 times harmonic content (%)	R
250BH	-	HRIC11	Phase C current 11 times harmonic content (%)	R
250CH	-	HRIC12	Phase C current 12 times harmonic content (%)	R
250DH	-	HRIC13	Phase C current 13 times harmonic content (%)	R
250EH	-	HRIC14	Phase C current 14 times harmonic content (%)	R
250FH	-	HRIC15	Phase C current 15 times harmonic content (%)	R
2510H	-	HRIC16	Phase C current 16 times harmonic content (%)	R
2511H	-	HRIC17	Phase C current 17 times harmonic content (%)	R
2512H	-	HRIC18	Phase C current 18 times harmonic content (%)	R
2513H	-	HRIC19	Phase C current 19 times harmonic content (%)	R
2514H	-	HRIC20	Phase C current 20 times harmonic content (%)	R
2515H	-	HRIC21	Phase C current 21 times harmonic content (%)	R
2516H	-	HRIC22	Phase C current 22 times harmonic content (%)	R
2517H	-	HRIC23	Phase C current 23 times harmonic content (%)	R
2518H	-	HRIC24	Phase C current 24 times harmonic content (%)	R
2519H	-	HRIC25	Phase C current 25 times harmonic content (%)	R
251AH	-	HRIC26	Phase C current 26 times harmonic content (%)	R
251BH	-	HRIC27	Phase C current 27 times harmonic content (%)	R
251CH	-	HRIC28	Phase C current 28 times harmonic content (%)	R
251DH	-	HRIC29	Phase C current 29 times harmonic content (%)	R
251EH	-	HRIC30	Phase C current 30 times harmonic content (%)	R
251FH	-	HRIC31	Phase C current 31 times harmonic content (%)	R

Figure 22 Address Information

Note:1. the product of voltage and current rate should not be exceed 100000,otherwise some displayed data may be overflow

2. when the value read is zero, write 0AA55H to reset accumulated energy data, other values are invalid.

3. write 0AA55H into WRST （000EH） for energy data resetting.

2. Energy data exchange

All the energy data response from the meter is regulated as 2 bytes (4 bytes for energy), the negative is shown by offset according to a formula. The details of formula is as 16 shown,PT-voltage variation rate,CT-current variation rate.

Item	Formula	Value range	symbol	Note
Voltage	U = RX×PT×0.01	0~65535	No symbol	UA,UB,UC,UAB,UBC,UCA
Current	I = RX×CT×0.001	0~65535	No symbol	IA,IB,IC
Frequency	F = RX×0.01	0~65535	No symbol	FR
Power factor	PF = RX×0.0001	-10000~10000	No symbol	PFA,PFB,PFC,PFS
Active power	P = RX×PT×CT	-32768~32767	No symbol	PA,PB,PC,PS
Reactive power	Q = RX×PT×CT	-32768~32767	No symbol	QA,QB,QC,QS
Apparent power	S = RX×PT×CT	0~65535	No symbol	SA,SB,SC,SS
Energy	W = RX×PT×CT×10	$0\sim2^{32}-1$	No symbol	+Wh,-Wh,+varh,-varh

Figure 23, Data exchange formula