

GQ12 Series Rail Mounting 3 Phase Energy Meter Manual



Features:

- True effective value measurement, electric parameters display , Kwh display can be switched by panel key.
- Optional multi-tariff rate function, max direct input current is 80A AC
- Kwh pulse output
- RS485 communication port, Modbus RTU or DL/645-2007 protocol
- Accuracy : active energy: 0.5S , reactive energy : 1.0S

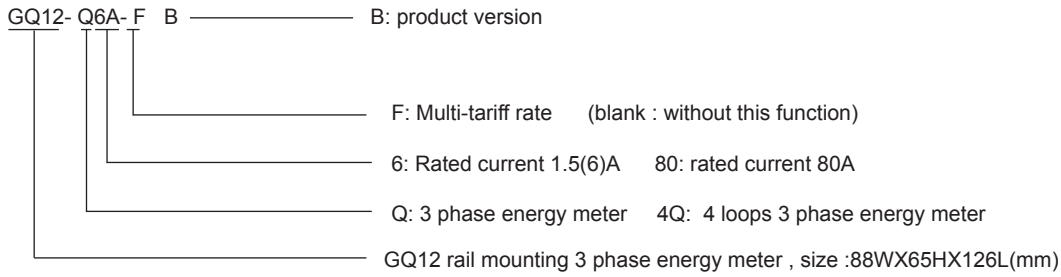
■ Specifications

Item	Specifications
Accuracy	Active energy: 0.5S , Reactive energy:1.0S
Rated Voltage	3X120V/208V , 3X240V/415V
Rated Current	1.5(6)A
Measure Net	3 phase 4 wire
Rated Frequency	50/60Hz
Work Voltage	Normal working voltage: 0.9Un-1.1Un , working voltage limit : 0.7Un-1.2Un
Start Current	0.004Ib
Power Consumption	Voltage circuit< 5VA/phase Current circuit : < 4VA/phase
Energy Pulse Output	Active power pulse , optoelectronic isolation , open-collector output , pulse width=80ms±20ms
Digit Communication	RS485, MODBUS-RTU or DL/T645-2007
Clock Error	≤0.5S/Day
Electromagnetic Compatibility	Meet for all the standard requirements in GB/T 17215
Temperature Range	Normal working temperature: -10~+45℃, Working temperature limit: -20~+55℃ Storage temperature: -40~+70℃
Relative humidity	≤95%RH (No condensation)
Dimension(mm)	126LX88WX65H

■ Function Illustration

Item	Function
Measure	Forward direction active energy and oppsite active energy accumulated separately
	Electric power is accumulated and stored in total, and T1, T2, T3, T4 four tariff rates
	Datasheet can be saved for 10 years after cutting off power.
clock&tariff rate	Clock has calendar , timing and leap year shift function , clock error is within 0.5s/day.
	Programable T1, T2, T3, T4 rate setting , can set 14 periods/day , time period interval is 15minutes
Display	LCD display , white background light
	Red LED indicates the active energy pulse output
Energy Pulse Output	One active energy pulse output , used for meter cablibration or outside energy collection
Communication	used for meter setting , remote meter reading , data collection ect
	Communication port: RS485
	Communication protocol : Modbus RTU or DL/T645-2007
	Baud rate: 1200bps , 2400bps , 4800bps , 9600bps
Meter Programing	Date , time setting
	Communication address setting
	T1 , T2, T3, T4 tariff rate setting
	Kwh clearance to zero setting
	Meter programming is by pc software

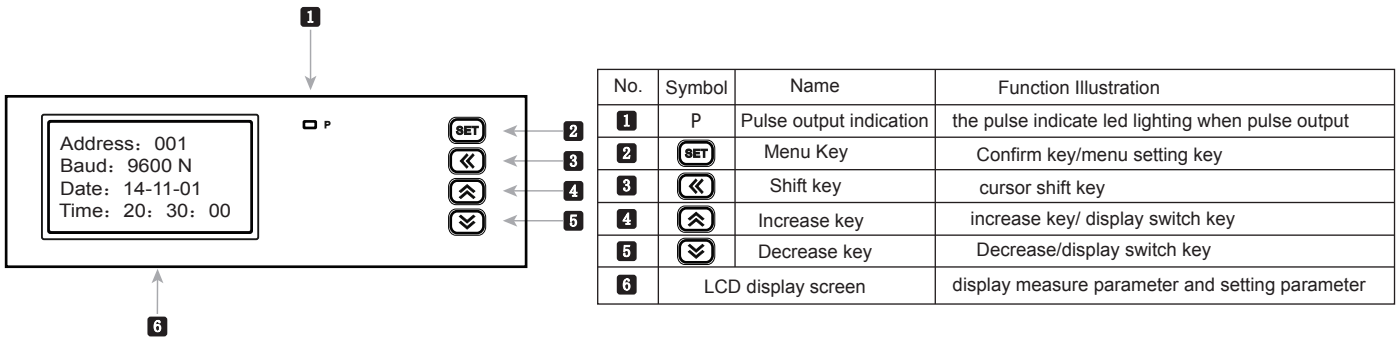
■ Model Illustration



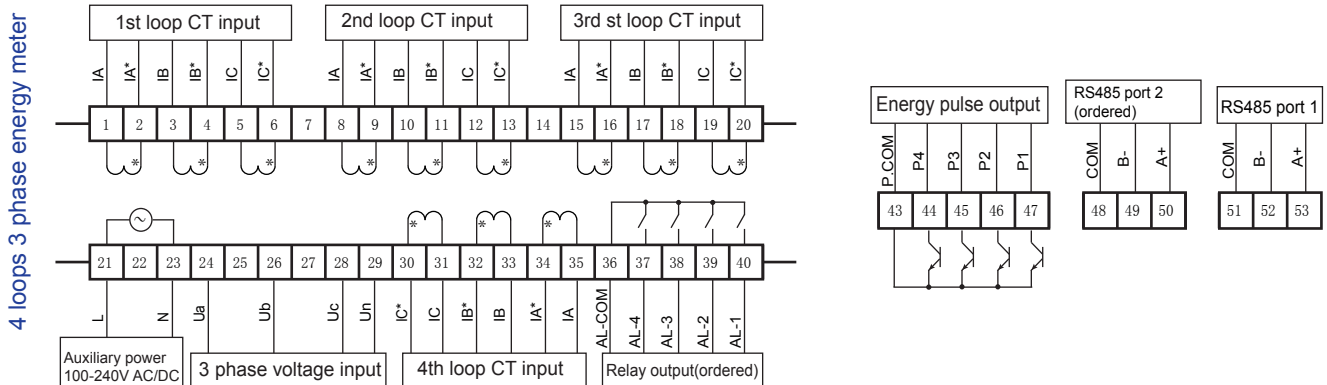
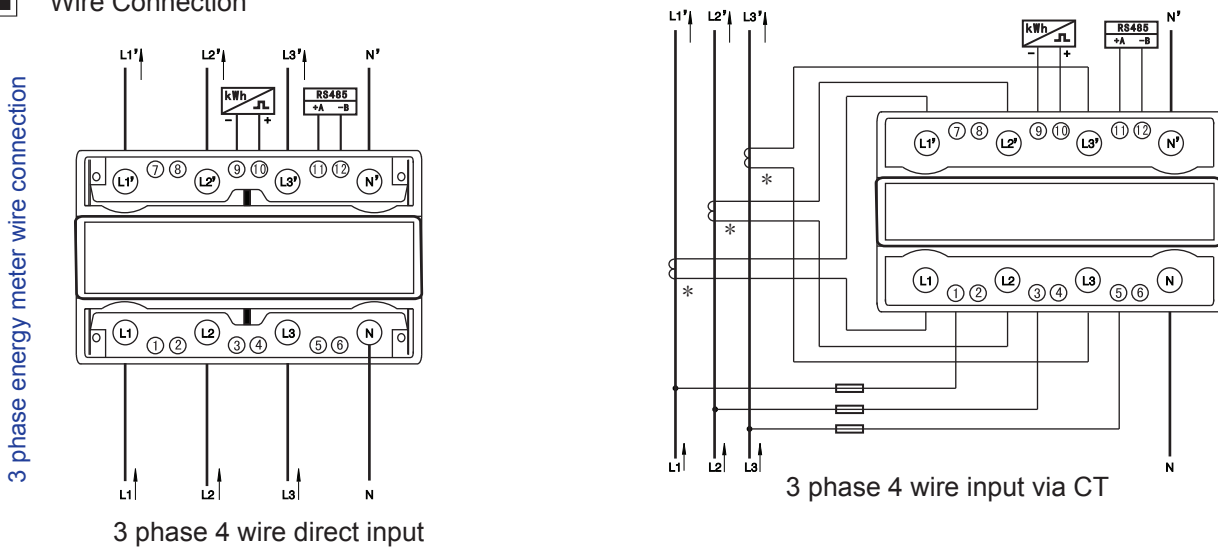
■ Model

Model	Accuracy	Rated Voltage	Input current	Input type	Multi-tariff rate	Communication	Pulse constant
GQ12-Q6A-F B	Active energy: 0.5S Reactive energy:1.0S	3x120V/208V 3x240V/415V	6A	input via CT	yes	RS485 Modbus RTU	6400 imp/kWh

■ Panel Illustration

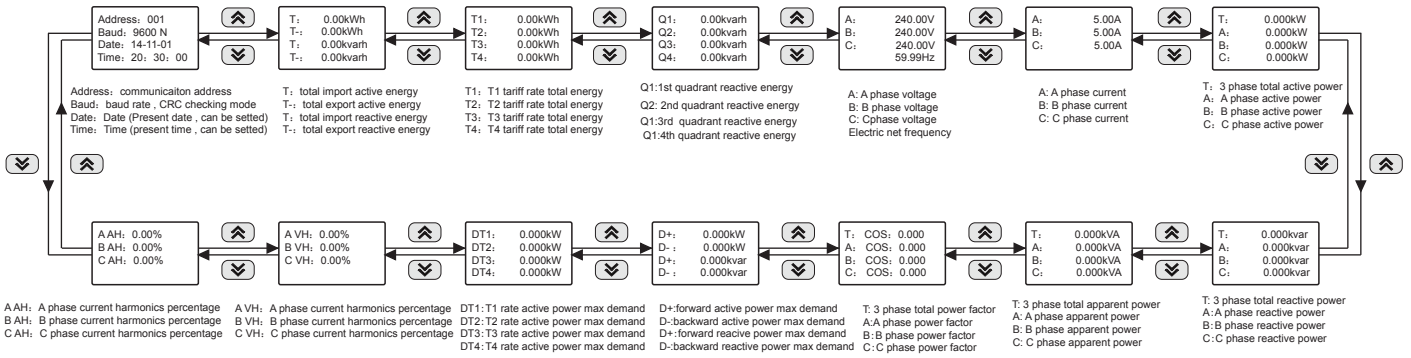


■ Wire Connection



Measure Display

1. Meter will display the following parameter in cycle (display interval is about 5S), User can press \downarrow or \uparrow to shift the display by manual

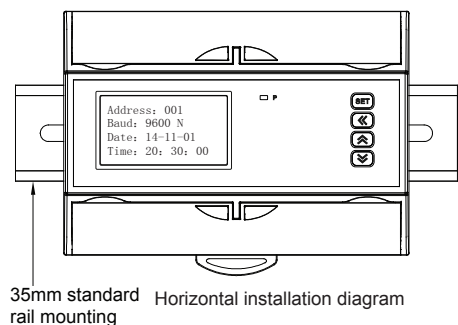
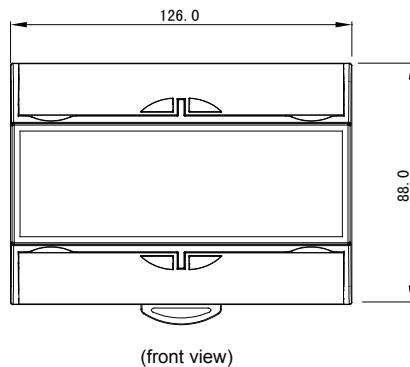
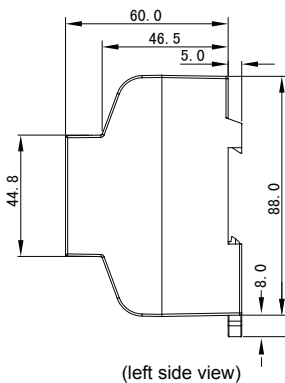


Menu Framework

1. In measure status, long press SET more than 5 seconds to enter set menu
2. In set menu, press \leftarrow to move position, press \rightarrow or \downarrow to modify, press SET to confirm and enter next level menu
3. After modifying the menu, long press SET to exit the menu

No.	Menu	Default Setting	Set Range	Description
1	Password	0000	0 - 9999	menu password. Input correct password, if you want to make setting. (password:9180)
2	ADDR	001	1 - 255	communication address setting
3	BAUD	04800 N	600 N - 19200 E	baud rate & check mode (N: no check O: odd check E: even check)
4	PT	000001	1 - 999999	voltage ratio
5	CT	000001	1 - 999999	current ratio
6	DEM TIME	15	1 - 15	demand cycle (unit: minute)
7	BL TIME	00	0 - 60	backlight delay time (unit: minute). set 0, keep on lighting all the time
8	DEMAND CLEAR	NO	NO or YES	clear demand statistics or not
9	ENERGY CLEAR	NO	NO or YES	Clear energy data or not
10	01-h:00 m:00 T:0	h:00 m:00 T:0	h:00 - 23(hour) m:00 - 59(minute) T:0 - 4(tariff rate) Note: T=0, present period is not valid	tariff rate period 1 parameters setting
11	02-h:00 m:00 T:0	h: start hour of present period m: start minute of present period T: present period tariff rate		tariff rate period 2 parameters setting
...
23	14-h:00 m:00 T:0	...		tariff rate period 14 parameters setting

Dimension



■ Communication Protocol

GQ12 adopts Modbus RTU communication protocol, RS485 half duplex communication, read function code 0x03, write function code 0x10, adopts 16 digit CRC check, the meter does not return for error check.

Data frame format:

start bit	data bit	stop bit	check bit
1	8	1	No

Abnormal communication processing:

when abnormal response, put 1 on the highest bit of function code. For example: if host request function code is 0x04, slave response function code is 0x84.

Error code type:

0x01--- Function code error :Meter received the unsupported function code

0x02--- Variable address error :Data location designated by host exceeds range of meter

0x03--- Variable value error : Data value sent from host exceeds the corresponding data range of meter

The first reading digit of negative data is 8

1. Read multi-register

For example, host reads Ua (A phase voltage is 220.0000V)

The address code of Ua is 0x016E, because Ua is double byte (4 byte), seizes 2 data register, the hexadecimal data of 220.0000V is 0x0021 91C0.

Host request (read multi-register)							
1	2	3	4	5	6	7	8
Meter address	Function code	Start address high bit	Start address low bit	data byte length high bit	data byte length low bit	CRC code low bit	CRC code high bit
0x01	0x03	0x01	0x6E	0x00	0x02	0xA4	0x2A

Slave normal answers (Read multi-register)								
1	2	3	4	5	6	7	10	11
Meter address	Function code	data byte number	Data 1 high bit	Data 1 low bit	Data 2 high bit	Data 2 low bit	CRC code low bit	CRC code high bit
0x01	0x03	0x04	0x00	0x21	0x91	0xC0	0xC7	0xF9

Function code abnormal answer: (For example, host request function code is 0x04).

Slave abnormal answers (Read multi-register)				
1	2	3	8	9
Meter address	Function code	error code	CRC code low bit	CRC code high bit
0x01	0x84	0x01	0x82	0xC0

2. Write multi-register

Eg: Host writes fixed data year (year data: 14 year)

Suppose the address code of year is 0x0006, because year is compression BCD code format seizes 1 data register, decimalist code of 14 year is 0X0014.

Host request (Write multi-register)										
1	2	3	4	5	6	7	8	9	10	11
Meter address	Function code	Start address high bit	Start address low bit	Data byte length high bit	Data byte length low bit	Data byte length	Data 1 high bit	Data 1 low bit	Data 2 high bit	Data 2 low bit
0x01	0x10	0x00	0x06	0x00	0x01	0x02	0x00	0x14	0xA6	0x39

Slave normal answer (Write multi-register)							
1	2	3	4	5	6	7	8
Meter address	Function code	Start address high 8 bit	Start address low 8 bit	Data byte length high bit	Data byte length low bit	CRC code low bit	CRC code high bit
0x01	0x10	0x00	0x06	0x00	0x01	0xE1	0xC8

Data position error answer: (For example, host request write address index is 0x0050).

Slave abnormal answer (Write multi-register)				
1	2	3	4	5
Meter address	Function code	Error code	CRC code low bit	CRC code high bit
0x01	0x90	0x02	0xCD	0xC1

No.	Address reflection	Variable name	Register number	Data type	Read / Write	Note
1	0x0100	Total active energy high bit	1	long	R	(negative is complement code) 0.01kWh
2	0x0101	Total active energy low bit	1			
3	0x0102	T1 tariff rate total active energy high bit	1	long		
4	0x0103	T1 tariff rate total active energy low bit	1			
5	0x0104	T2 tariff rate total active energy high bit	1	long		
6	0x0105	T2 tariff rate total active energy low bit	1			
7	0x0106	T3 tariff rate total active energy high bit	1	long		
8	0x0107	T3 tariff rate total active energy low bit	1			
9	0x0108	T4 tariff rate total active energy high bit	1	long		
10	0x0109	T4 tariff rate total active energy low bit	1			
11	0x0114	Backward total active energy high bit	1	long	R	0.01kWh
12	0x0115	Backward total active energy low bit	1			
13	0x011E	Total reactive energy high bit	1	long	R	(negative is complement code) 0.01Kvarh
14	0x011F	Total reactive energy low bit	1			
15	0x0128	Backward total reactive energy high bit	1	long		
16	0x0129	Backward total reactive energy low bit	1			
17	0x0132	1st quadrant total reactive energy high bit	1	long	R	0.01kvarh
18	0x0133	1st quadrant total reactive energy low bit	1			
19	0x013C	2nd quadrant total reactive energy high bit	1	long		
20	0x013D	2nd quadrant total reactive energy low bit	1			
21	0x0146	3rd quadrant total reactive energy high bit	1	long		
22	0x0147	3rd quadrant total reactive energy low bit	1			
23	0x0150	4th quadrant total reactive energy high bit	1	long		
24	0x0151	4th quadrant total reactive energy low bit	1			
25	0x016E	A phase voltage high bit	1	long	R	0.0001V
26	0x016F	A phase voltage low bit	1			
27	0x0170	B phase voltage high bit	1	long		
28	0x0171	B phase voltage low bit	1			
29	0x0172	C phase voltage high bit	1	long		
30	0x0173	C phase voltage low bit	1			
31	0x0174	A phase current high bit	1	long	R	0.0001A
32	0x0175	A phase current low bit	1			
33	0x0176	B phase current high bit	1	long		
34	0x0177	B phase current high bit	1			
35	0x0178	C phase current high bit	1	long		
36	0x0179	C phase current low bit	1			
37	0x017A	Total active power high bit	1	long	R	(negative is complement code) 0.0001Kw
38	0x017B	Total active power low bit	1			
39	0x017C	A phase active power high bit	1	long		
40	0x017D	A phase active power low bit	1			
41	0x017E	B phase active power high bit	1	long		
42	0x017F	B phase active power low bit	1			
43	0x0180	C phase active power high bit	1	long		
44	0x0181	C phase active power low bit	1			
45	0x0182	Total active power high bit	1	long	R	(negative is complement code) 0.0001Kvar
46	0x0183	Total active power low bit	1			
47	0x0184	A phase reactive power high bit	1	long		
48	0x0185	A phase reactive power low bit	1			

No.	Address reflection	Variable name	Register number	Data type	Read / Write	Note		
49	0x0186	B phase reactive power high bit	1	long	R	(negative is complement code) 0.0001kvar		
50	0x0187	B phase reactive power low bit	1					
51	0x0188	C phase reactive power high bit	1	long				
52	0x0189	C phase reactive power low bit	1					
53	0x018A	Total apparent power high bit	1	long	R	0.0001kVA		
54	0x018B	Total apparent power low bit	1					
55	0x018C	A phase apparent power high bit	1	long				
56	0x018D	A phase apparent power low bit	1					
57	0x018E	B phase apparent power high bit	1	long				
58	0x018F	B phase apparent power low bit	1					
59	0x0190	C phase apparent power high bit	1	long				
60	0x0191	C phase apparent power low bit	1					
61	0x0192	Total power factor bit	1	int			R	(negative is complement code) 0.01
62	0x0193	A phase power factor bit	1	int				
63	0x0194	B phase power factor bit	1	int				
64	0x0195	C phase power factor bit	1	int				
65	0x0199	Frequency	1	int	R	0.01Hz		
66	0x019A	Total forward active energy maxi demand high bit	1	long	R	0.0001kW		
67	0x019B	Total forward active energy maxi demand low bit	1					
68	0x01A1	T1 rate forward active energy maxi demand high bit	1	long				
69	0x01A2	T1 rate forward active energy maxi demand low bit	1					
70	0x01A8	T2 rate forward active energy maxi demand high bit	1	long				
71	0x01A9	T2 rate forward active energy maxi demand low bit	1					
72	0x01AF	T3 rate forward active energy maxi demand high bit	1	long				
73	0x01B0	T3 rate forward active energy maxi demand low bit	1					
74	0x01B6	T4 rate forward active energy maxi demand high bit	1	long				
75	0x01B7	T4 rate forward active energy maxi demand low bit	1					
76	0x01BE	Total backward active energy maxi demand high bit	1	long	R	0.0001kW		
77	0x01BF	Total backward active energy maxi demand low bit	1					
78	0x01E0	Total forward reactive energy maxi demand high bit	1	long	R	(negative is complement code) 0.0001kvar		
79	0x01E1	Total forward reactive energy maxi demand low bit	1					
80	0x0203	Total backward reactive energy maxi demand high bit	1	long	R	(negative is complement code) 0.0001kvar		
81	0x0204	Total backward reactive energy maxi demand low bit	1					
82		reserve						
83		reserve						
84		reserve						
85		reserve						
86		reserve						
87		reserve						
88	0x0000	Second	1	int	RW	compression BCD		
89	0x0001	Minute	1	int				
90	0x0002	Hour	1	int				
91	0x0003	Week	1	int				
92	0x0004	Day	1	int				
93	0x0005	Month	1	int				
94	0x0006	Year	1	int				
95	0x0007	Communication address	1	int	RW			

No.	Address reflection	Variable name	Register number	Data type	Read / Write	Note
96	0x0009	voltage ratio	1	int	R/W	
97	0x000A	current ratio	1	int		
98		reserve				
99	0x0032	backlight delay time	1	int	R/W	unit:minute
100	0x000F	demand cycle	1	int	R/W	unit: mintue
101		reserve				
102		reserve				
103	0x0064	Communication(high bit check mode,low bit baud rate)	1	int	R/W	0xCCBB CC = 0x00 No check BB = 0x10 4800bps BB = 0x20 9600bps
104		reserve				
105	0x000E	Day period 1 high bit	1	int	R/W	000n:tariff rate number
106	0x000F	Day period 1 low bit	1	int	R/W	mmhh:start time
107	0x0010	Day period 2 high bit	1	int	R/W	000n:tariff rate number
108	0x0011	Day period 2 low bit	1	int	R/W	mmhh:start time
109	0x0012	Day period 3 high bit	1	int	R/W	000n:tariff rate number
110	0x0013	Day period 3 low bit	1	int	R/W	mmhh:start time
111	0x0014	Day period 4 high bit	1	int	R/W	000n:tariff rate number
112	0x0015	Day period 4 low bit	1	int	R/W	mmhh:start time
113	0x0016	Day period 5 high bit	1	int	R/W	000n:tariff rate number
114	0x0017	Day period 5 low bit	1	int	R/W	mmhh:start time
115	0x0018	Day period 6 high bit	1	int	R/W	000n:tariff rate number
116	0x0019	Day period 6 low bit	1	int	R/W	mmhh:start time
117	0x001A	Day period 7 high bit	1	int	R/W	000n:tariff rate number
118	0x001B	Day period 7 low bit	1	int	R/W	mmhh:start time
119	0x001C	Day period 8 high bit	1	int	R/W	000n:tariff rate number
120	0x001D	Day period 8 low bit	1	int	R/W	mmhh:start time
121	0x001E	Day period 9 high bit	1	int	R/W	000n:tariff rate number
122	0x001F	Day period 9 low bit	1	int	R/W	mmhh:start time
123	0x0020	Day period 10 high bit	1	int	R/W	000n:tariff rate number
124	0x0021	Day period 10 low bit	1	int	R/W	mmhh:start time
125	0x0022	Day period 11 high bit	1	int	R/W	000n:tariff rate number
126	0x0023	Day period 11 low bit	1	int	R/W	mmhh:start time
127	0x0024	Day period 12 high bit	1	int	R/W	000n:tariff rate number
128	0x0025	Day period 12 low bit	1	int	R/W	mmhh:start time
129	0x0026	Day period 13 high bit	1	int	R/W	000n:tariff rate number
130	0x0027	Day period 13 low bit	1	int	R/W	mmhh:start time
131	0x0028	Day period 14 high bit	1	int	R/W	000n:tariff rate number
132	0x0029	Day period 14 low bit	1	int	R/W	mmhh:start time
133		reserve				

The program of achieving 16 bit CRC check code
 unsigned int Get_CRC(uchar*pBuf , uchar num)

```

{
  unsigned i, j;
  unsigned int wCrc=0xFFFF;
  for(i=0;i<num;i++)
  {
    wCrc=(unsigned int)(pBuf[i]);
    for(j=0; j<8; j++)
    {
      if(wCrc & 1){wCrc>>=1; wCrc=0xA001;}
      else wCrc>>=1;
    }
  }
  return wCrc;
}

```