



*Handheld Unit PR-300/310*

*User Manual*

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## 1. Summary

Along with the development of electronic multifunction meters, users are in urgent need of something to manage it. Handheld-unit PR-310 is a good tool for you to program and read meters.

PR-310 uses AMD188ES which is compatible with CPU8086, its operating system is simplified DOS, which can run software compiled from assembly language, C language and Pascal language.

PR-310 offer two virtual hard disks:

**Flash** Where user can store software to save space of RAM;

**RAM** The memory space is 700K or more, can save many records which have been read from meters and configuration parameters.

The file management method is same as PC, parameters are saved in PR-310 in files, and records saved in PR-310 in with database. It's convenient for user to manage these data.

PR-310 provides a variety of communication interfaces for user's convenience.

**RS232:** Through which PR-310 can communicate with PC to download software and upload reading records.

**RS485:** Through which PR-310 can program, read meters and perform on-site diagnosis.

**Infrared remote control:** Software-modulated mode; effective distance is about 4~5 Meters.

**Optical orifice control:** It is compliance with IEC1107 standard, and Handheld-unit can read ABB, Landis+Gyr etc meters with it.

**IrDA remote control:** While the amount of meter-reading data increases, the old low-speed infrared communication can't meet the requirement, so PR-310 is designed to work with the new IrDA standard.

## 2. The buildup of PR-310 Terminal

➤ Handheld-unit PR-310	1
➤ RS485 wire	1 (Handheld-unit communicate with meter with it)
➤ RS232 wire	1 (Handheld-unit communicate with PC with it)
➤ Software	1 (CD)
➤ Handbag	1
➤ Battery (1300mAH)	4

**Note:** The software is self-extract, which can run on Windows 95/98 and 2000/XP. The default extract path is C:\. To finish installation, user can click 'UNZIP' at first, and then file will be copied to PC, click 'CLOSE' when finished.

Please install BDE before running software on PC.

**Optional components:**

- IrDA port
- IEC1107 port
- Battery-Change

**3. Main Technical Features**

CPU: AMD188

Frequency: 11MHz

Memory:

ROM's memory space is 512K bytes

RAM's memory space is 1M bytes

LCD: 128×64 lattice LCD (with LED backlight)

Connection port: To connect to RS485 or RS232

Keyboard: 30 keys, user can input English letters

Power supply: 5 batteries (AA) for work power, and 1 battery (lithium, 3V) for data backup

**4. The keys of PR-310 and the explanation of keys functions**

PR-310 has 30 keys; they can be divided into 5 groups.

**4. 1 "ON", "OFF" and "Break" Key**

Press "ON" to turn on PR-310.

Press "OFF" to turn off PR-310.

Press "Break" to produce an interrupt which can interrupt the communication of PR-310 and PC

**4. 2 "Shift" Keys**

Press "Shift" only is meaningless; "shift" must be pressed together with other key

Example: If you want to input 'b', then you must press "shift" at first, the light of "shift" will be turned on (This means Handheld-unit is in shift state), and then press "1", at last press "shift" twice to finish input. At last the light of "shift" will be turned off (This means Handheld-unit is out of shift state).

**4. 3 Num Key**

"0"- "9" :Press "0"- "9" key in normal state, the corresponding number will be input.

**4. 4 Alphabetic keys**

"a"... "z", "A"... "Z": You can input alphabetic letters into PR-310

Example: You want to input 'b', then you must press "shift" at first, the light of "shift" will be turned on (This mean Handheld-unit is in shift state), and then press "1", at last press "shift" twice to finish input. At last the light of "shift" is turned off (This means Handheld-unit is out of shift state). If upper is needed, you must press "CAPS" to make PR-310 into state of abnormality, then input alphabet.

## 4. 5 Control Keys

Validation key: Same as ENTER key on PC

“F1”: Press it will make PR-310 enter function menu

Clock, Light, CAPS used for system functions

Shift, ESC and DEL, etc. which are used make selections

Read, Time switch, Program, Bottom, F1-F5 etc. keys are shortcut keys for PRENG\_04.exe.

## 4. 6 Other sign key

Arithmetic symbol keys “+ - \* /” provide some simple computing functions.

# 5. Operations

## 5. 1 Power-On

Press “ON” to turn on PR-310; You can press “F1” after pressing “ON”, PR-310 will enter system menu. If PR-310 can't be turned on, **the most possible cause is that battery has been exhausted.**

## 5. 2 Power-Off

PR-310 can be turned off only when waiting for input. Press “OFF” to turn off PR-310, if PR-310 can't be turned off, user can press the reset button to shut down the power.

PR-310 has auto-off function, in other words if user don't press any keys for a period of time, PR-310 will shut down automatically.

Note: User must press “break” to make PR-310 quit communications while PR-310 is in transferring state.

## 5. 3 Reset

There is a hole behind the PR-310, which is PR-310's reset key. If user uses a stick to tap the key, PR-310 will reset.

## 5. 4 Enter or Exit procedure

In the interface of power-on, PR-310 is controlled by system. If correct Autoexec.bat and software (PRENG\_04.exe) are saved on hard disk, user can press “ENTER” to load software directly. Now PR-310 is controlled by user application. It can return control to system by pressing “ESC”.

## 5. 5 Use System Function

In the power-on interface, pressing “F1”key will display function menu.

Screen Display is as following:

1. Config	2. Execute
3. Options	4. Transfer
5. SysInfor	6. Tools

## 5. 5. 1 Config

The system configurations include timer's settings and security settings.

**Password is needed to turn on PR-310. If password is not correct, then user can not use programming software.**

### 1. Timer Setting:

The first item is "Timer XXm" in menu of "Config". The "XXm" is auto-off time of PR-310. If user wants to change this value, please press "DEL" to select it; then press "Enter" to confirm the operation; press "ESC" to quit the operation.

### 2. Security: Set up password

1. The second item is "Security setting", please select it at first.
2. Then input old password at the position of the first line (The old password must be correct, otherwise the next operation couldn't be carried on). Please press "Enter" to confirm the operation after completing input. If you want to quit the operation please press "ESC".
3. Then input new password at the position of the second line. Please press "Enter" to confirm the operation after completing input. If you want to quit the operation please press "ESC".
4. Input new password again at the position of the third line. Please press "Enter" to confirm the operation after completing input. If you want to quit the operation please press "ESC".

## 5. 5. 2 Execute

The second item "Execute" can list all executable procedures (\*.exe). User can select one by moving the highlight cursor, then press "Enter" to load it.

## 5. 5. 3 Options – communications options

The third item "Option" can be used for the setup of Com.

1. First select **Comm**: Please move the cursor to first line, then press "DEL" to select, press "Enter" to confirm at last. If you want to drop the selection, you can press "DEL". The selections include RS485, RS232 and IrDA.
2. Selecting **baud-rate**: Options include 150,300,600,1200,2400,4800,9600 and 19200
3. **Initialization**: The selection can restore baud-rate to 9600

**The above settings should match with the configurations on PC..**

## 5. 5. 4 SysInfor

The fifth item "SysInfor" can make user know the information of file in PR-310.

Select "RAM": Display all files in the memory space of RAM.

Select "ROM": Display all files in the memory space of ROM.

### 5. 5. 5 Tools

**Clock:**

In this function, clock can be displayed on the screen. If you want to change clock, please press "DEL" at first, then press "→" and "←" to select the item which you want to modify, press "↑" and "↓" to modify the value.

Note: You must input correct password before modifying clock, otherwise you can't change clock.

Calculator: This function is invalid.

Check: PR-310 check it self with this function.

### 5. 5. 6 Transfer – files transferring

The 4th item "Transfer" can be used for the communication of PR-310 and PC. If you select this item, PR-310 would come into communication state, and then you can upload procedures to PR-310, or download procedures from PC, or erase procedures on PR-310.

The PR-310 provides with the machine the standard RS-232 connects an electric cable, the concrete operation is as following

The first step: The electric cable provided with the factory house should link with PR-310 correspondingly.

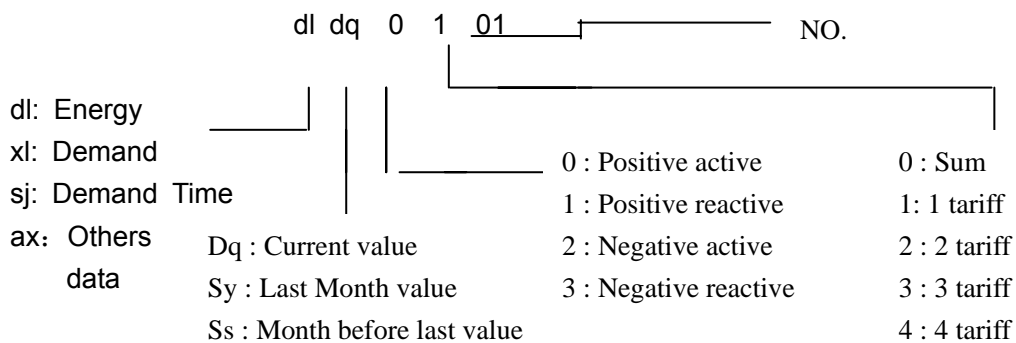
The second step: Under the PC machine Windows95 environment carry out the software(TRANSFER.exe).

### [Database]

**Creating Database:** This function is for meter reading and programming

The multifunction electrical meter's reading records are saved in NEWBBDIANZI.dbf, which includes the information of Energy, demand and demand-time; and the information of user is saved in user.dbf. The information of user include serial no, user name, the time of reading meter etc.

The definition of database fields:



## 6. Explanation of special files

### Autoexec.bat

User can write path (the location of execute procedure) into Autoexec.bat. Then the file will allow user run procedures directly at meter power-on.

For example: If you want to run PRENG\_04 .exe on hard disk C directly, then you should write "C:\PRENG\_04.exe" in AUTOEXEC.BAT

## 7. The Instruction of PRENG\_04.EXE

### 7. 1 The Instruction of Programming and Reading

The meter-reading data is managed by database, and the database is established by the procedure which runs on PC. The procedure is saved in CD which we provide. User can select or delete data item at any time. It's important that user must download files (database and pr.300) into PR-310 before using PRENG\_04.exe.

PRENG\_04.exe offers following functions:

1. Clock: Setting or checking Date and Time of PR-310;
2. Time-switching: Setting or checking time-switching.
3. Initial Energy: Place Constant (frequency division number). Decimal digits and Initial Energy Value etc. into the multifunction Meter.
4. Program: set Clock and Time-switching into the multifunction meter.
5. Read Meter: Copy the multifunction meter's data into PR-310
6. Display Date: Display the date that has been read
7. Check Parameter: Reading the meter's parameters from multifunction meter and save it in file (Pr.300).
8. Infrared remote control display: Control multifunction meter to display data

If password has been set for PR-310, the procedure (PRENG\_04.exe) will prompt user to input the password. If Password is correct, the procedure can be used for Programming; otherwise the procedure can only be used for Reading .

### 7. 2 Concrete Operations

You can see main interface as following after inputting password.(User can modify the password, and the way to modify please view 5.5.1). The procedure will only have reading function if "ESC" key is pushed (without inputting password). Main interface:

Welcome To Use  
PR310  
Program Procedure  
H-COMMA-04121704

In the main interface, you can press corresponding key to execute some functions.

**7. 2. 1 Clock:**

In the main interface, press “F3” key, displays:

(Assuming current time is 16:45:04, Date 04, 10, 2002)

16:45:04  
 04-10-2002  
 Wednesday  
 Enter to Modify

Press “Esc” to exit the operation and return to main interface. Press “Enter” to enter clock modification operation, Reverse-white display of data is modifiable item, “Up” or “Down” or input num directly can adjust time. Use right or left key to move cursor. Press “enter” to confirm after completing modifying.

**7. 2. 2 Time-switching:**

In the main interface, press “F4” key, can check and modify season and Weekend;

The 1st case of  
 Time-switch  
 Press key to enter  
 Up or down to select

(Assume Old Time is 08:00 – 12:00)

The 1st segment:  
 Begin(HHMM):0800  
 End (HHMM):1200  
 Tariff : 1

(Assuming input the origin time is 09:00)

The 2nd segment:  
 Begin(HHMM):0900  
 End Enter to end  
 Tariff : 1

(Assuming input the end time is 11:30)

The 2nd segment:  
 Begin(HHMM):0900  
 End (HHMM):1130  
 Tariff : 1

The 2nd case of  
 Time-switch:  
 Press key to enter  
 up or down to select

Press “Up” or “Down” to select setting contents.  
 Press “Esc” to exit the operation.  
 Press “Enter” to enter time-switching setting.

This view is the first time switch setting.  
 If you want to check it only, then you may press “Enter” all along; and if you wan to modify it, then you may input num directly, press “Enter” at last.

Now input to end the time directly, and then press “Enter” to display.

Press Up or Down key to select a tariff to complete one segment input. You may set 10 segments in one time switch at most.. The input time muse be in sort ascending. The last time must be like the first time.

Press Up or Down key to select other time-switching.  
 press “Esc” to Exit the operation.  
 Press “Enter” to set time switch.

All 4 sets of times setting after completing, Enter the season setting

Set season  
  
Press key to enter  
up or down to select

Press "Esc" to give up setting  
season; press "Enter" to  
display.

(Assuming old Season is 1.1-3.1 One)

The 1st section:  
Begin(MMDD):0101  
End (MMDD):0301  
Tariff : 1st case

If you want to check it only, then you may press  
"Enter" all along; and if you want to modify it, then  
you may input num directly, press "Enter" at last.

(Assuming input the origin Date is 3.1)

The 2 section:  
Begin(MMDD):0301  
End Enter to end  
Tariff : 1st case

Can input to end the time directly  
now, display

(Assuming input the end Date is 5.1)

The 2 section:  
Begin(MMDD): 0301  
End (MMDD): 0501  
Tariff : 1st case

Press Up or Down key to select a time-switch  
or select a fixed tariff to complete one  
segment input. You may set 10 segments in  
one season at most.. The input time muse be  
in sort ascending. The last time must be like  
the first time.

After completing the season setting, the procedure will enters the weekend setting.

(Suppose the rest days is Sunday or Saturday.)

The 1st rest day:  
Former option: Sun  
Later option : (0-6) 0 ?  
Tariff: 4

This view is setting of rest day. You  
may select 0~6 as rest day.

Press "Esc" to give up the operation.  
If you want to check it only, you may  
press "Enter" all along.

(Assuming Weekend is Saturday)

The 1st rest day:  
Former option: Sat  
Later option : (0-6) 6 ?  
Tariff: 4

Press Up or Down to select a time  
switch or a fixed tariff.

(Assuming tariff is four)

The 1st rest day:  
Former option: Sat  
Later option : (0-6) 6  
Tariff: 4

Press "Enter" to complete the first rest day setting .The second rest day's setting is like the first rest day's.

### 7. 2. 3 Reading meter

In the main interface, press "F2" to display four items operation with related Read meter:

1. METER READING
2. DISPLAY DATABASE
3. CHECK PARAMETER
4. INFRARED WAKE-UP

A: Under the interface, press "1" to enter Reading meter with Infrared.

(If there is a meter which not be read in database, the nether view would be display on the screen.)

No: 000000123456  
  
Hit Enter to reading  
Hit Esc to input

Press Up or Down to search all of meters which not be read.  
Press "Enter" to display.

(If there is nothing in database, you may input num directly as serial no.

000000123456  
Please aim at meter

Press "Esc" to give up the operation;  
Press "Enter" to read meter.

Reading Meter  
Please wait...

read meter complete display:

Reading Complete  
Hit key to continue

press any key return main interface

(Note: The procedure of reading meter will send a command to correct time in meter)

B: Under the main interface, press “2” to enter reading meter operation.

Meter Num: 6  
480kb is free

press any key display

No: 000000123456  
Reading Time  
02/04/10 10/21

Press Up or Down to search a record

Press “<-” to display the first record

Press “->” to display the last record

(Under the interface, the procedure allow you to input serial no. directly to query.)

C: Check On Parameter

1. READING NEW DATA  
2. DISPLAY DATA

Press “2” to reading parameter and save.

Press “1” to display reading data.

Input serial no:

Input serial no which you want to read.

Enter to continue

After press “Enter” to start reading meter

Reading Meter  
Please wait...

After Reading meter, display reading data and save data in pr.300

D: Infrared Wake-up:

Aim at meter  
Press Enter

Press "Enter" at this time will start reading meter.

### 7. 2. 4 PROGRAMME

In the main interface, press "Set" to display two items operation with related Programme.

- 1. PROGRAMMING
- 2. PRESET PARAMETER
- 3. SELECT DISPLAY

A: Under the interface, select "1" to administer Programming with infrared.

Input serial No:

Input serial No and then press "Enter" to start programming

( Note: Please input serial No. while programming meter. If you press "Enter" to program meter while have other meter hang together, then may appear that the meter which you program is not you want to program.)

Aim at Meter  
Press Enter

At this time you should confirm that the meter is placed in the programming state.  
Please press "Enter" to start.

Setting...  
Please wait

This view mean that the programming is under way.

Setting Meter  
No: xxxxxxxxxxxxxxxxx  
Enter to begin  
Esc to input No

This view tell you the electrical meter type and its No.

Setting  
Please wait...

display setting now

Setting complete  
Hit key to continue

The procedure will hint you that you may press "Enter" to continue setting bottom pre-value and serial No.

**B: Under the Programming interface, Press"2" to set programming parameter:**

Reset Date:  
New value(DDHH): 0408  
(Reset Date:1-28)

Press enter not change original setting, input two num complete to Reset Date Setting.

Demand Mode: Rolling  
Demand Interval: 15  
Rolling Interval: 01

Press "Enter" to keep original setting, press "Up" or "Down" to select different fashion(Rolling and Block), press "Enter" to complete setting

Demand Mode: Block  
Demand Interval: 15  
Block Interval: 01

Input two num and press "Enter" to complete new setting, The same method complete the setting of "Block Interval".

(The setting of baud rate aim at the not electrical meter only)

Allow 485 Program  
Allowed  
0: Unallowed  
1: Allowed

The setting aim at the not electrical meter only.  
Press "Enter" to keep original value.  
Press "0" key to disallow to program with 485  
Press "1" key to allow to program with 485

Protection level  
One Level  
0: One  
1: Two

Press "Enter" to keep original value.  
Press "0" key to one level  
Press "1" key to two level

Infrared Reset  
Allowed  
0: Unallowed  
1: Allowed

Press "Enter" to keep original value.  
Press "0" key to disallow to reset with Infrared  
Press "1" key to allow to reset with Infrared.

485 Reset  
Allowed  
0: Unallowed  
1: Allowed

Press "Enter" to keep original value.  
Press "0" key to disallow to reset with RS485  
Press "1" key to allow to reset with RS485

Auto Reset  
Allowed  
0: Unallowed  
1: Allowed

Press "Enter" to keep original value.  
Press "0" key to disallow to auto reset  
Press "1" key to allow to auto reset

Manual Reset  
Allowed  
0: Unallowed  
1: Allowed

Press "Enter" to keep original value.  
Press "0" key to disallow to manual reset. Press "1" key to allow to manual reset

C: Under the main Programming interface ,select 3,select display project

- 1. MECHANIC METER
- 2. ONE PHRASE METER
- 3. THREE PHRASE METER
- 4. NEW THREE METER

Press Numkey("1"~"4") to select manifestation project.

- 1. Positive
- 2. Negative
- 3. None
- 4. None

Select your need of manifestation, once choose successfully, you program meter hereafter no longer need of choosing.

**7. 2. 5 Base Value – Initial Energy Value:**

Under the main interface , press “F5”key to enter Preset Base Value, serial No, reset ,the current time of setting,  
Operation is as follow.

**A: PRESET BASE VALUE:**

Show after carrying out “Preset Set Base Value”.

Input serial No:

Input serial No. at this time .Press ”Enter  
“to Start:

MeterType:  
Mechanic Meter  
Enter to continue  
Esc to select

Press “Enter” to keep original lvalue

Input MeterType:  
0—KW      1--KVar

Select meter type is active or reactive.

Constant(Kw): 7200  
Decimal digits: 2

Press “Enter” to keep original value.  
Input four arithmetic figure to complete new setting.  
The setting of decimal digits use method as above.

Input base value:

Press “Enter” directly to set base value as “000000”,or input new value as base value.

Input base value:  
X X X X X X  
Setting base value?

Press "Esc" to give up the operation as above;  
Press "Enter" to continue.

Select tariff:  
Select (1—4) 1  
1 : 1      2 : 2  
3 : 3      4 : 4

Press "Enter" to keep original value.  
Input corresponding num to select tariff, then press "Enter" to complete selecting tariff.

Enter to continue

Press "Enter" to start setting base value.

Setting...

Setting is completed  
Hit key to continue..

Press any key to return last class menu after complete setting base value. If the communication come amiss midway, please adjust meter and Handheld-unit 's angle.

**B: SET SERIAL NO:**

Display after complete setting serial no:

Input serial No:

At this time input original serial no.

According to this importation the serial no which you want to set, then aim at meter and press "Enter" to confirm.

**C: RESET DEMAND:**

Reset Demand Operation similar as above.

**D: SET TIME**

Set Time Operation similar as above.

**E: CLEAR PHASE DATA**

Erasing the records of break phrase.

**7. 2. 6 Function**

You will see nether menu after press 'F1' key:

- |   |
|---|
| <ol style="list-style-type: none"> <li>1. CHANGE PASSWORD</li> <li>2. 485 PROTOCOL TEST</li> <li>3. SET PULSE</li> <li>4. ERASE DATABASE</li> </ol> |
|---|

- |  |
|--|
| <ol style="list-style-type: none"> <li>5. LOAD DISPLAY ITEM</li> <li>6. SELECT CHANNELS</li> </ol> |
|--|

**A: CHANGE PASSWORD:**

Under the main interface, you can press "F1" key to enter menu of function, then select the first item, you will see nether menu:

**(Note: The password is the highest level of meter, it can be used to program, and at the beginning of time we give a value to it, the value is '666666'.If you change the password of meter, you must change this password at the same time, and must keep the password of the meter accord to this password in Handheld-unit. Otherwise you can't program meter no longer except this password in Handheld-unit is correct.)**

- |   |
|---|
| <p>Old Password: 666666<br/>New Password:</p> |
|---|

Input password at this menu

- |  |
|--|
| <p>Old Password: 666666<br/>New Password:<br/>111111<br/>Set in hand-held?</p> |
|--|

Press confirm key to set password into Handheld-unit.  
Press ESC key to give up this operation.

**B: 485 PROTOCOL TEST:**

Under the main interface, you can press “F1” key to enter menu of function, then select the second item, you will see nether menu:

1. DTL PROTOCOL TEST  
2. MONITOR 485

Select ‘1’: You can use Handheld-unit to carry out protocol testing.

Select ‘2’: You can use Handheld-unit to monitor the communication of meter

**C: SET PULSE:**

Under the main interface, you can press “F1” key to enter menu of function, then select the third item, you will see nether menu:

The 1st channel of pulse output:  
Import active Y  
(1/Y : 0/N)

Input‘0’: the meter will not output pulse when current is positive.

Input‘1’, the meter will output pulse when current is positive

You will finish others content of pulse setting like the above method

You will input serial No. and then press key to program meter after you finish all setting of pulse.

**D: ERASE DATABASE:**

Under the main interface, you can press “F1” key to enter menu of function, then select the fourth item, you will see nether menu:

Delete all data?  
It Will never revert!  
Hit enter to delete

Press “Light” key, you will give up this operation;

Press ”Enter” key, all of records in the database will be erase, and it can’t recovery for ever.

**E: SET DISPLAY**

Under the main interface, you can press “F1” key to enter menu of function, then select the fifth item ,you will see nether menu:

1. LOAD  
2. NOT LOAD

Select‘1’:HandHeld-unit will get the content of display into meter when you program meter

Select‘2’: Handheld-unit will not get the content of display into meter when you program meter

## 8. The definition of external ports

15 needle D form plug

1 pin:	RS485A	The input line of RS485
2 pin:	RS485B	The input line of RS485
6 pin:	TXD0	The output line of RS232 0
7 pin:	RXD0	The input line of RS232 0
9 pin:	GND	Power ground
13 pin:	TXD1	The output line of RS232 1
14 pin:	RXD1	The input line of RS232 1
15 pin:	VDD	Power supply(5 V)

## 9. Special attentions when programming meter

1. The electrical meter has two level of programming protection:

- Level 1: it supports password-programming pattern of DL/T 645 protocol. So long as password is correct users can directly program through infrared channel and 485 channel, without opening seal. Default setting of our company's product is this level.
- Level 2: firstly, seal must be opened. Then users can enter into "program status" through pushing reset button and program according to the means described in level 1.

It's recommended that user should set programming protection as level 2.

2. It is recommended that user should input serial no while programming meter.

3. It's advantageous that user should check parameter of meter after programming by "Check Parameter" which in reading meter .Because display content can't change generally ,User can select not set display content in order to save time.

4. Because of load profile recording is relevant with the capacity of meter's memory, the software can't set this function. And this function can be established by PC only.

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