

DEM-4MC-V Din-rail Power Meter

User Manual



Version: 1.11

Revision: 2024.11

Read me

When you use DEM-4MC-V three phase energy meter, be sure to read this user manual carefully, and be able to fully understand the implications, the correct guidance of operations in accordance with user manual, which will help you make better use of DEM-4MC-V three phase energy meter, and help to solve the various problems at the scene.

1. Before the meter turning on the power supply, be sure that the power supply within the provisions of the instrument;
2. When installation, the current input terminal must non-open, voltage input terminals must Non-short circuit;
3. Communication terminal (RS232/RS485) is strictly prohibited to impose on high pressure;
4. Be sure the instrument wiring consistent with the internal system settings;
5. When communicating with the PC, instrument communication parameters must be consistent with the PC.



- **Please read this user manual carefully**
- **Please save this document**

Directory

| | |
|---|---------------|
| 1. - SUMMARIZE | - 3 - |
| 2. - TECHNICAL PARAMETERS | - 4 - |
| 3. - INSTALLATION AND START-UP | - 5 - |
| 3.1.- INSTALLATION | - 5 - |
| 3.2.- CONNECTION TERMINAL | - 9 - |
| 3.3.- TYPICAL WIRING | - 10 - |
| 4.- SCREEN DISPLAY | - 11 - |
| 4.1.- BUTTON DESCRIPTION | - 11 - |
| 4.2.- OVERALL SCREEN | - 12 - |
| 5.- SETUP PROCEDURE | - 13 - |
| 5.1.- ENTER SETUP MENU | - 13 - |
| 5.2.- INPUT SIGNAL SETUP | - 14 - |
| 5.3.- SYSTEM SETUP | - 15 - |
| 5.4.- COMMUNICATION SETUP | - 16 - |
| 5.5.- DESCRIPTION OF MENU CHARACTERS | - 17 - |
| 6.- PULSE OUTPUT (OPTIONAL) | - 18 - |
| 7.- COMMUNICATION INTERFACE | - 19 - |
| 7.1.- CONNECTION FOR RS485 BUS | - 19 - |
| 7.2.- MODBUS © PROTOCOL | - 20 - |
| 7.3.- REGISTER MAP | - 21 - |
| 7.4.- CONFIGURATION MENU (FUNCTION 03 TO READ & 0 FUNCTION 06 TO WRITE) | - 26 - |
| 7.5.- EXAMPLE | - 27 - |
| 8.- SAFETY CONSIDERATIONS | - 28 - |
| 9.- MAINTENANCE | - 28 - |
| 10.- TECHNICAL SERVICE | - 29 - |

1. - SUMMARIZE

The three-phase din rail electric energy meter adopts a pen-segment LCD screen, which is a combined AC power measurement terminal. It is a highly integrated product for the application of AC parameter measurement. It has the optional functions of three-phase AC power measurement and calculation, energy accumulation, harmonic analysis, voltage and current imbalance analysis, multi-rate electric energy metering, maximum demand metering, 4-way switch input, 2-way relay output and others.

The DEM-4MC-V three-phase energy meter is a 4M width din rail energy meter, which uses an external CT to extend the current range up to 999A. DEM-4MC-V also provides a communication interface to connect with the computer monitoring system, supports RS485 interface MODBUS communication protocol, and can upload the data collected by measurement and equipment status. This three-phase digital energy meter is suitable for electric power, communication, railway, transportation, environmental protection, petrochemical, steel and other industries, used to monitor the power consumption of AC equipment.

FEATURES

- Hall CT/ Rogowski coil connections;
- Provide energy import and export measurement (IMP & EXP);
- With one port energy pulse output;
- RS485 Modbus communication (optional);
- Standard 35mm din rail mounting, width 4 Modules size;
- Detect voltage, current, active/reactive energy, power, frequency, max demand etc.

APPLICATIONS

- All power parameter measurement;
- Energy measurement and electrical fire monitor and control;
- Transformers, generators, capacitors and electric motors distributed detection;
- Medium and low pressure systems;
- SCADA, EMS, DCS integrators.

2. - TECHNICAL PARAMETERS

| Parameter | Value |
|-----------------------|--|
| Auxiliary power | 85-265Vac/dc |
| Voltage measurement | Rated 110V, 380V RMS value, Accuracy 0.2%, |
| Current measurement | Hall CT, Rogowski coil connection |
| Frequency | 50/60Hz, Accuracy ± 0.01 Hz |
| Display | LCD with white backlit |
| Maximum display value | 99,999,999MWh |
| Energy accuracy | Class 0.5, IEC 62053-21 |
| Pulse constant | 1 channel, 5000imp/kWh |
| I/O module | 2DO, 2DI optional |
| Communication | RS-485 MODBUS-RTU |
| Withstand voltage | 2.5KV 1min |
| Insulation | Input, output, power supply to Shell $>5M\Omega$ |
| Storage environment | -40~70°C |
| Working environment | -25~55°C Altitude ≤ 2500 m, 0~95%RH, non-condensing, non-corrosive gas |

3. - INSTALLATION AND START-UP



The manual you hold in your hand contains information and warnings that the user should respect in order to guarantee a proper operation of all the instrument functions and keep it in safety conditions. The instrument must not be powered on and used until its definitive assembly is on the cabinet's door.

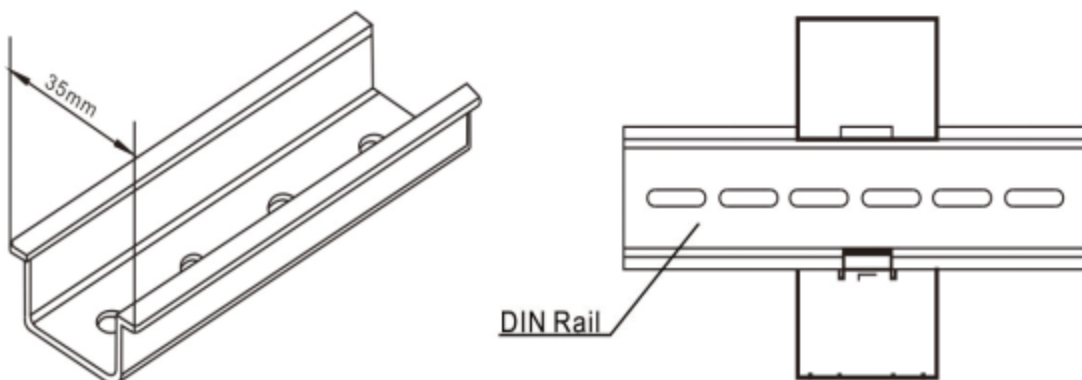
If the instrument is not used as manufacturer's specifications, the protection of the instrument will be damaged.

When any protection failure is suspected to exist (for example, it presents external visible damages), the instrument must be immediately powered off. In this case contact a qualified service representative.

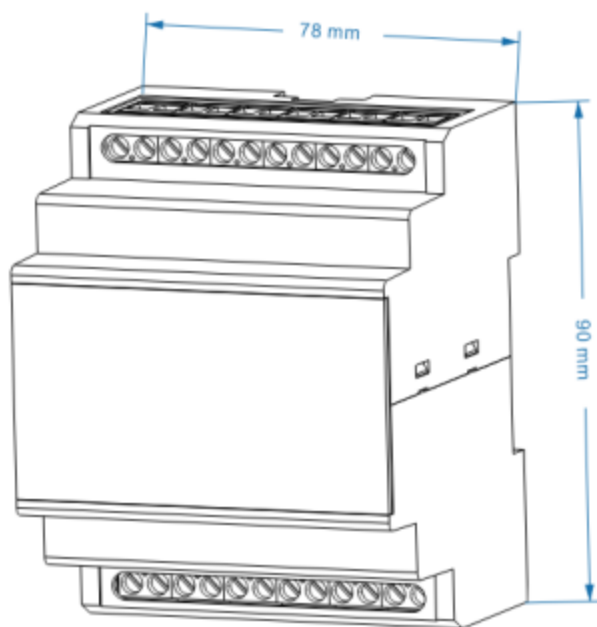
3.1.- Installation

Mounting

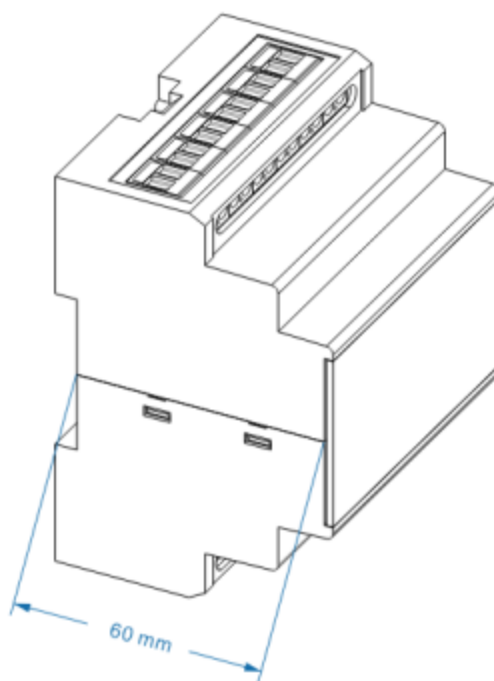
Instrument is to be mounted on 35mm Din-rail. Keep all connections into the cabinet. Please note that with the instrument powered on, the terminals could be dangerous to touch and cover opening actions or elements removal may allow accessing dangerous parts. Therefore, the instrument must not be used until this is completely installed.



Dimension: 78*90*60 mm W*H*D



Front view



Side view

Notes:

Input signal: DEM-4MC-V using a separate acquisition calculate for each measurement channel, to ensure consistent in use, for different load forms, it's a variety of connection mode. Access wire shall be met the current is 2.5 square millimeters and the voltage is 1.5 square millimeters.

A. Voltage input

Input voltage should not exceed the rated input voltage products 450V.
Otherwise, you should use external VT. Suggest 1A fuse be installed in the voltage input side.

B. Current Input

Optional Hall CT, Rogowski coil connection
When the CT is connected with other meters, make sure wiring methods be used in series.

Warning: Forbid to install a CT on the live feeder wire with open secondary leads. This can be extremely dangerous!

Before remove the current input connection, must be sure to disconnect the primary circuit or shorted secondary circuit of CT.

C. Sequence of wire

Warning: Please make sure that the input voltage and current corresponding to the same phase, sequence, and the same direction; Otherwise, the Values and symbols will be wrong! (Power and Energy)

Always observe the physical orientation of CT (P1 - P2) when installing on the feeder wire.
Always pay attention to wiring polarity and phasing when terminating the CT leads to the DEM-4MC-V. S1 connect to Ix*, S2 connect to Ix.

The input network configuration of instrument depends on the CT number of the system:
in the condition of 2 CT, select the three-phase, three-lines two components;
in the condition of 3 CT, select the three-phase, four-lines three component mode.

Instrument connection mode, set of the instrument (programming input network NET) should be the same load wiring as measured wiring. Otherwise, the measurement instrument will lead to incorrect voltage or power.

In three-phase 3 wire mode, measurement and shows the line voltage;
In three-phase 4 wire mode, measurement and shows the phase voltage and line voltage both.

D. Auxiliary power

DEM-4MC-V with universal (AC / DC) power input, if not for a special statement, we provide the 90-240AC/DC power interface for standard products, please ensure that the auxiliary power can match with meter to prevent unexpected damage.

- A. Suggest install 1A fuse in the fire line side.
- B. For the areas with poor power quality, suggest install lightning surge suppressor and rapid burst suppressor to prevent lightning strikes.

3.2.- Connection Terminal

Upper terminal

| No. | Marked | Notes |
|-----|--------|------------------------------|
| 20 | DO1 | Digital output 1 |
| 19 | | |
| 70 | DIC | Digital input |
| 71 | DI1 | |
| 72 | DI2 | |
| 48 | RP- | Active energy pulse output - |
| 47 | RP+ | Active energy pulse output + |
| - | - | - |
| 59 | B | RS485- |
| 58 | A | RS485+ |
| 2 | N L | AUX input 85-265Vac/dc |
| 1 | | |

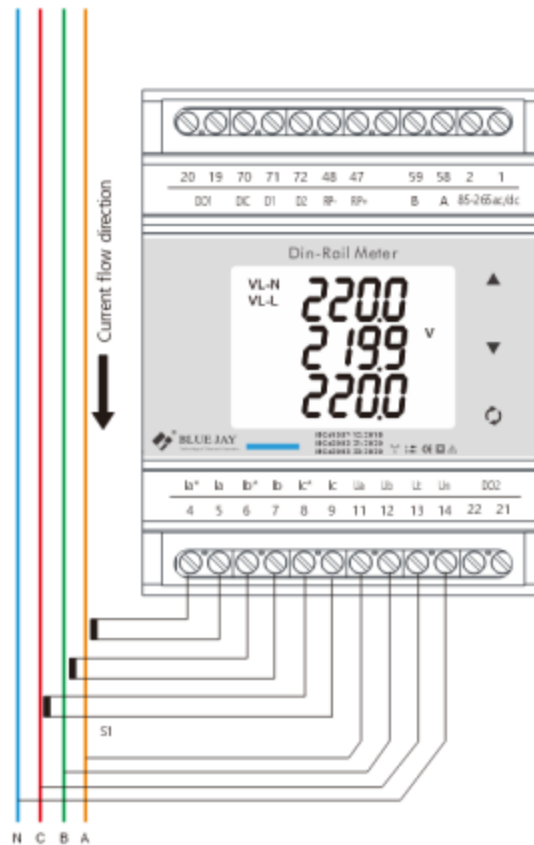
Lower terminal

| No. | Marked | Notes |
|-----|--------|----------------------------|
| 4 | IA* | Current A-phase - S1 input |
| 5 | IA | |
| 6 | IB* | Current B-phase - S1 input |
| 7 | IB | |
| 8 | IC* | Current C-phase - S1 input |
| 9 | IC | |
| 14 | Un | Neutral voltage input |
| 13 | Uc | Voltage C-phase input |
| 12 | Ub | Voltage B-phase input |
| 11 | Ua | Voltage A-phase input |
| 22 | DO2 | Digital output 2 |
| 21 | | |

Note:

The terminal pin definition may change depends on customer order, please refer to the label on the meter!

3.3.- Typical Wiring



Note:

This connection drawing is for reference only; the actual connecting terminal please refer to the label on the rear part.





WARNINGS!


If power = -0.01 is shown for any of the phases and voltage and current are not zero for this phase, check out following points:

- Assure that A, B and C phases coincide in voltage and current.
- Correct polarity? Reverse the current transformer placed at this phase.

4.- SCREEN DISPLAY

4.1.- Button description

| Button | In Monitor Screen | In Config Sub-menu | In Parameter Setup |
|--|--|---|-------------------------------|
|   | Move to previous or next page | Move cursor up and down to select function | Move setting cursor to left |
|  | Press and hold: Call out password screen | Move cursor up and down to select function | Scroll selection number 0 ~ 9 |
|  | Press and hold: Display version information | Confirm the values & Entry or jump to down level menu | |

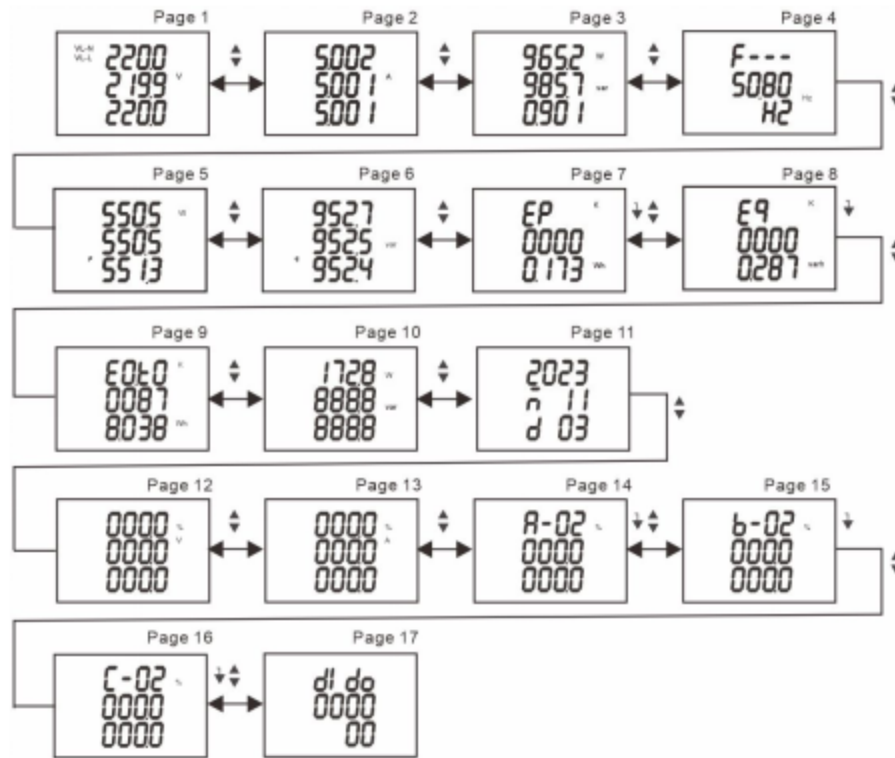
Note: In **Config.** menu, if change the setting value, press and hold  for exit menu, device will call out confirm screen ask "SAVE".

Then press and hold  for *exit without saving*;

press and hold  for *save and exit*.

4.2.- Overall screen

Press the ▲ and ▼ on any display interface, the corresponding data will be displayed in the measurement data display area. Pages right side marked with ↓ indicate that this page has a sub-menu.




Page 1-8: Standard functions

| Page No. | Description | Page No. | Description |
|----------|-----------------------------|----------|----------------------------|
| Page 1 | System voltage | Page 5 | Split-phase active power |
| Page 2 | Primary current | Page 6 | Split-phase reactive power |
| Page 3 | Total active/reactive power | Page 7 | Positive active energy |
| Page 4 | System frequency | Page 8 | Inductive reactive energy |

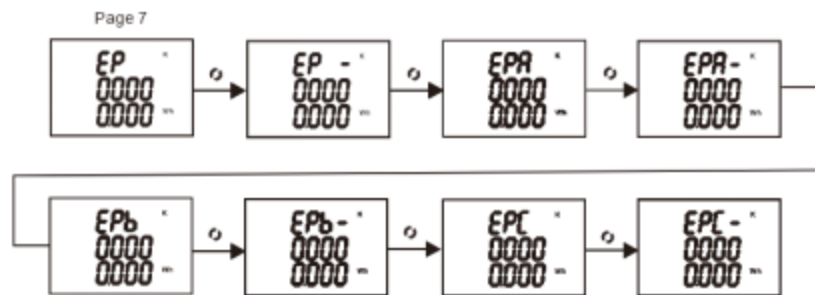
Page 9-17: Optional functions

| Page No. | Description | Page No. | Description |
|----------|-----------------------------------|----------|---|
| Page 9 | TOU (Multi-tariff) record | Page 14 | A phase individual harmonic 2 th -31 th |
| Page 10 | Max demand record | Page 15 | B phase individual harmonic 2 th -31 th |
| Page 11 | Real-time clock | Page 16 | C phase individual harmonic 2 th -31 th |
| Page 12 | Voltage total harmonic distortion | Page 17 | DI/DO event record |
| Page 13 | Current total harmonic distortion | | |

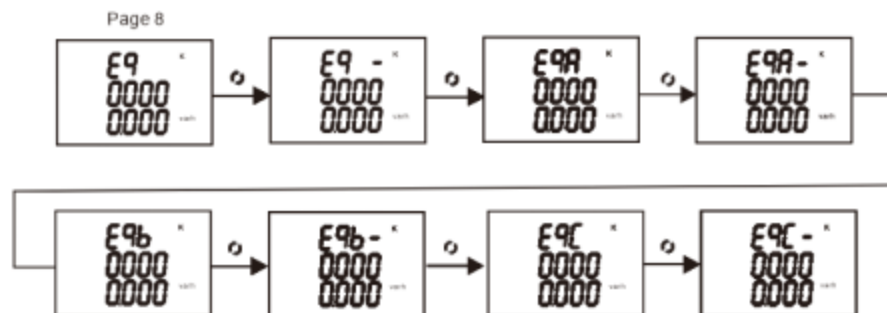
4.2.1.- Page 7,8 submenu details

In page 7-8 press  will display the A, B, C split phase active energy and A, B, C split reactive energy, as follows:


Split-phase active energy:

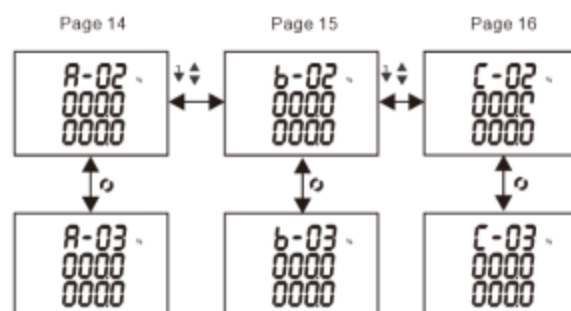


Split-phase reactive energy:



4.2.2.- Page 14,15,16 submenu details

In page 14-16 press  will display the A, B, C phase individual harmonic 2th-31th, as follows:





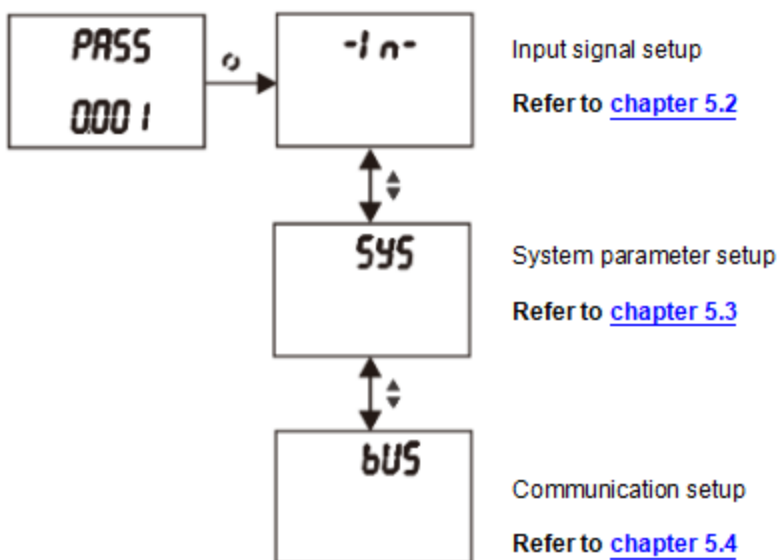
Notes:

Above picture shows the fully functional measurement screen pages. If not select certain function, you can ignore the corresponding screen.

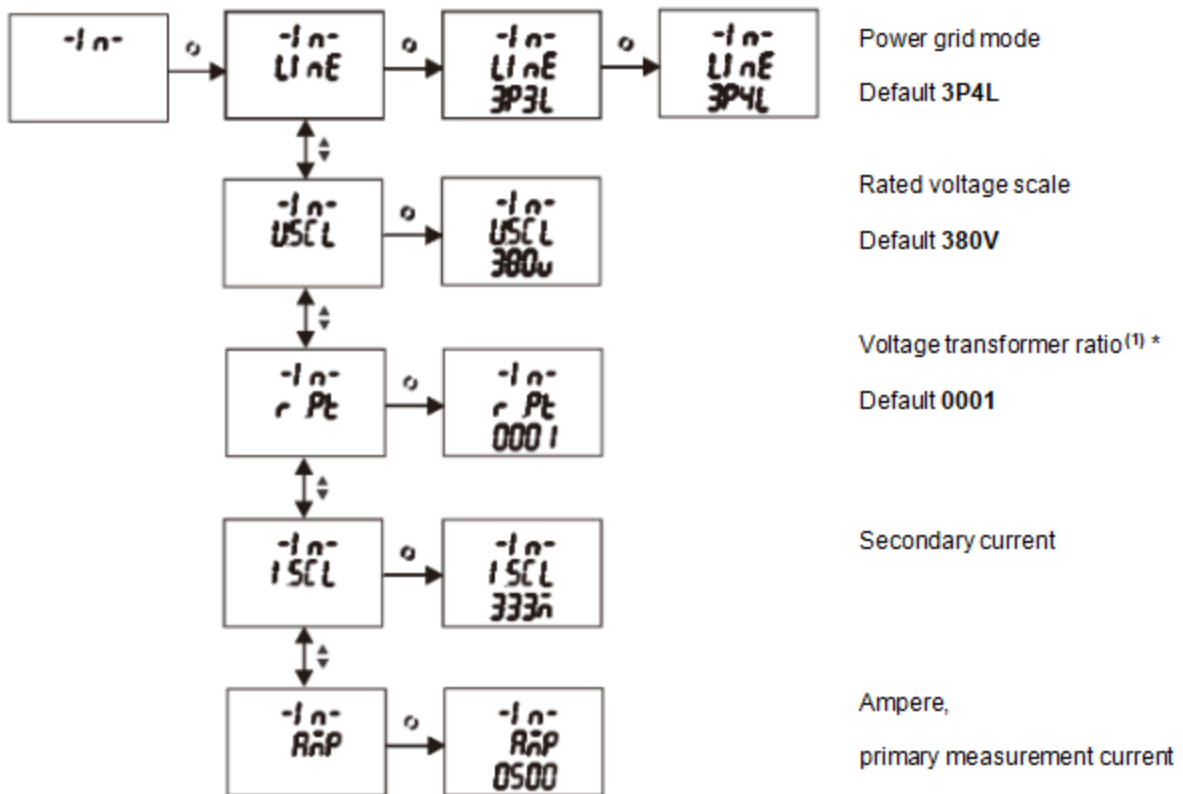
5.- SETUP PROCEDURE

5.1.- Enter setup menu

In measuring screen, press and hold the  button, and the prompt of "Password" will appear, and enter the password (default is **0001**), press  button to enter the configuration menu, DEM-4MC-V provides three configure parameters items: system factory commissioning (SYS), input (-IN-), and communication (Bus). Adopt LCD display layered menu structure management.



5.2.- Input signal setup

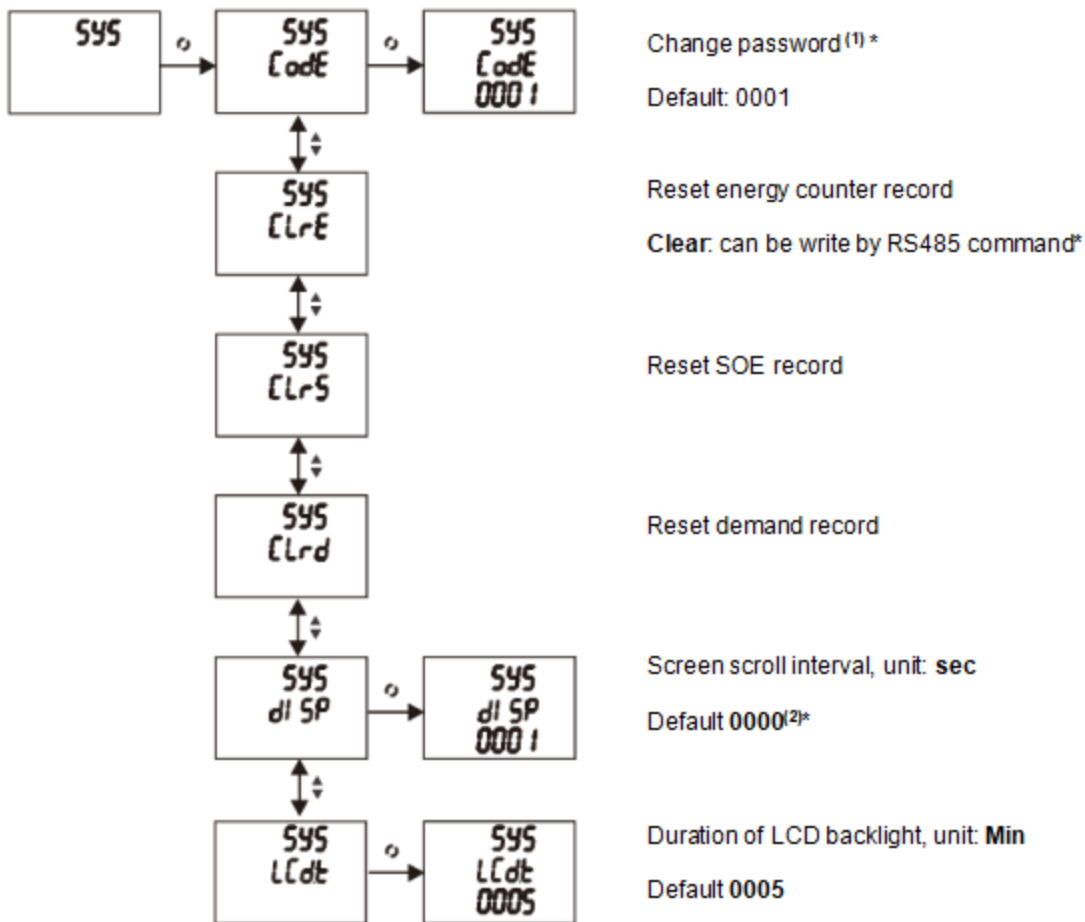


Notes:

- (1) In medium or high voltage system, set this value can expand measuring range. Values represent the current transformer (primary side voltage) / (secondary side current). Must set **U.scl** in 100V or other specified VT secondary voltage.
- (2) If order specified power grid is 3P3L, Blue Jay will connect **Un** and **Ub** terminal internally. Screen only display phase to phase parameters.
- (3) Blue Jay calibrates meter under 380V range, and high-quality linearity performance ensures that the meter can accurately measure in the lower voltage range. That can be compatible with 120V, 220V, 230V, 240V, 277V system.

If need to use in different voltage scale or different types CT, please contact our sales team for more details.

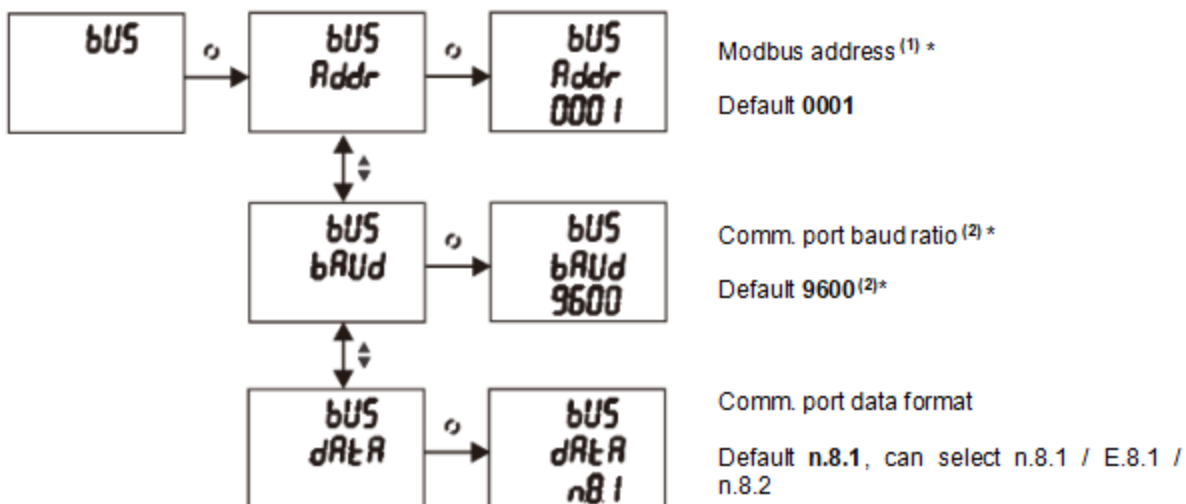
5.3.- System setup



Notes:

- (1) If change the password, please keep the password in safety, or only return to Blue Jay for reset new password!
- (2) Set 0000 mean manually switch each monitor screen pages.

5.4.- Communication setup



Note:

- (1) Modbus address setup range 1-247.
- (2) Baud ratio can select 1200 / 2400 / 4800/ 9600 / 19200, and regular meter equipped with communication port max baud ratio is 19200bps. If need higher speed, please contact Blue Jay sales team.

5.5.- Description of menu characters

| | |
|--------------|---|
| PASS | (Password) User password |
| Erro | (Error) Wrong input information |
| -i n- | (Input) User Display data settings menu |
| bUS | (Bus) Communication settings menu |
| SYS | (System) System settings menu (for factory debugging, not open yet) |
| Code | (Code) Modify password value |
| dAtA | (Data) Communication parameter setting |
| Addr | (Address) Local communication address setting |
| bAUd | (Baud) Communication baud rate |
| oB 1 | (o.8.1) Indicates 8 data bits, 1 stop bit, odd parity |
| EB 1 | (e.8.1) Indicates 8 data bits, 1 stop bit, even parity |
| nB 1 | (n.8.1) Indicates 8 data bits, 1 stop bit, no parity bit |
| USCL | (U.scl) Select rated input voltage |
| ISCL | (I.scl) Select rated input current |
| r. Ct | (R.ct) Set the current multiplier |
| r. Pt | (R.pt) Set voltage ratio |
| SYS | (System) System settings menu (for factory debugging, not open yet) |
| TYPE | (Type) What parameters to set |
| PARr | (Para Corresponding parameter selection |
| vALU | (Value) Set the corresponding alarm value |

6.- PULSE OUTPUT (OPTIONAL)

DEM-4MC-V provides 1* pulse output for the active energy.

The host / PLC / DI module can cumulative the data of both the active and reactive power energy sent by the pulse from opt coupler relay.

1). Electrical specification: voltage $VCC \leq 48V$, $I_z \leq 50mA$.

2). Pulse constant: 5000 imp / kWh, pulse up to 80ms.

This means: When the device detects 1 kWh, the port will generate 5000 pulse

Note:

1 kWh energy is for secondary side energy data, if there have PT and CT accessed; primary side energy data is "1 kWh \times PT ratio \times CT ratio".

| Voltage (V) | Current (A) | Pulse constant (imp / kWh) |
|-------------|-------------|----------------------------|
| 380 or 220 | 5 | 5000 |
| | 1 | 20000 |
| 100 | 5 | 20000 |
| | 1 | 80000 |

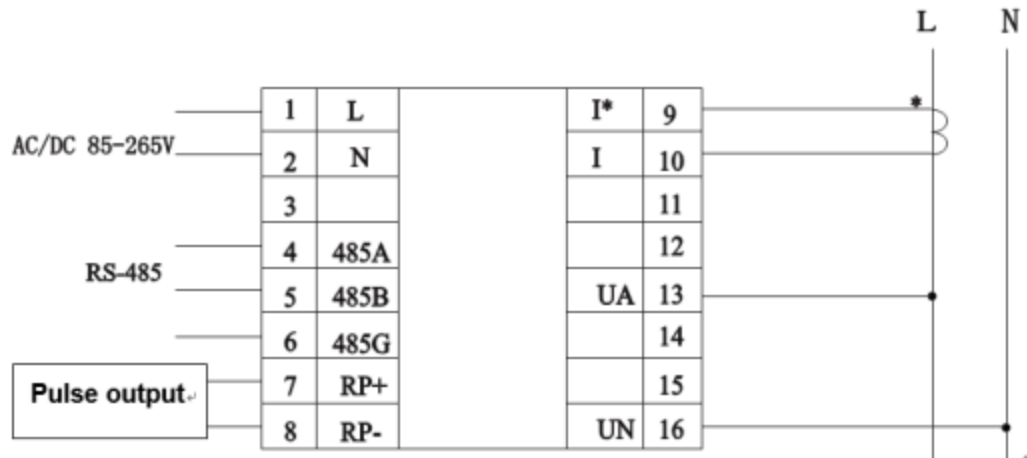
Example: In measure time "T", the received total pulse is "N",
Primary side input of voltage is 10Kv
Primary side input of current is 400A.
Secondary side measurement range is 100V and 5A.

In the time "T", energy accumulated is: $N / 20000 \times 100 \times 80$

7.- COMMUNICATION INTERFACE

7.1.- Connection for RS485 BUS

The composition of the RS-485 cabling must be carried out with a meshed screen cable (minimum 3 wire), diameter of not less than 0.5mm², with a maximum distance of 1,200 m between the DEM-4MC-V... and the master unit. This Bus may connect a maximum of 32pcs.



Notes:

- For communication with the master unit, user can choose RS-485 to RS-232 converter or RS485 to USB adapter to use.
- For expand the number of devices in the communication network, a signal repeater can be used.
- RS485 PIN number is 58,59,60
- Due to product modifications or special requirements, the interface pin place may be change. For details, please refer to product label on the rear side

7.2.- MODBUS © Protocol

Modbus RTU Frame Format:

| | | |
|-------------------------|---------------|--|
| Address code | 1 BYTE | <i>Slave device address 1-247</i> |
| Function code | 1 BYTE | <i>Indicates the function codes like read coils / inputs</i> |
| Data code | 4 BYTE | <i>Starting address, high byte Starting address, low byte Number of registers, high byte Number of registers, low byte</i> |
| Error Check code | 2 BYTE | <i>Cyclical Redundancy Check (CRC)</i> |

MODBUS FUNCTIONS:

| Code | Meaning | Description |
|--------------------|------------------------|---|
| FUNCTION 01 | Read Coil Status | <i>Only valid when equipped DO port</i> |
| FUNCTION 02 | Read Input Status | <i>Only valid when equipped DI port</i> |
| FUNCTION 03 | Reading of n Words | <i>This function permits to read all the electrical parameters</i> |
| FUNCTION 05 | Force Single coil | <i>When DO in remote control mode can work</i> Disable in default |
| FUNCTION 06 | Preset Single register | <i>If need valid this code, please contact Blue Jay Sales Team before your order!</i> |

Note: Float data follow **IEEE754**, float low bit first, high bit next. **(CD AB)**

7.3.- Register Map

7.3.1.- Basic power data -Primary Side

| Register | Data | Byte | | Instruction |
|----------|------------|-------|---|--|
| 0x00 | Ua | float | 2 | Phase to line voltage, Unit: V |
| 0x02 | Ub | float | 2 | |
| 0x04 | Uc | float | 2 | |
| 0x06 | Uab | float | 2 | Phase to phase voltage, Unit: V |
| 0x08 | Ubc | float | 2 | |
| 0x0a | Uca | float | 2 | |
| 0x0c | Ia | float | 2 | Three phase current, Unit: A |
| 0x0e | Ib | float | 2 | |
| 0x10 | Ic | float | 2 | |
| 0x12 | Pa | float | 2 | Active power, Unit: kW |
| 0x14 | Pb | float | 2 | |
| 0x16 | Pc | float | 2 | |
| 0x18 | $P\Sigma$ | float | 2 | |
| 0x1a | Qa | float | 2 | Reactive power, Unit: kVar |
| 0x1c | Qb | float | 2 | |
| 0x1e | Qc | float | 2 | |
| 0x20 | $Q\Sigma$ | float | 2 | |
| 0x22 | Sa | float | 2 | Apparent power, Unit: kVA |
| 0x24 | Sb | float | 2 | |
| 0x26 | Sc | float | 2 | |
| 0x28 | $S\Sigma$ | float | 2 | |
| 0x2a | PFa | float | 2 | Power factor, 0~1.000 |
| 0x2c | PFb | float | 2 | |
| 0x2e | PFc | float | 2 | |
| 0x30 | $PF\Sigma$ | float | 2 | |
| 0x32 | FR | float | 2 | Frequency, Unit:0.01Hz |
| 0x34 | Ep+ | float | 2 | Positive active energy, Unit: kWh |
| 0x36 | Ep- | float | 2 | Negative active energy, Unit: kWh |
| 0x38 | Eq+ | float | 2 | Inductive reactive power, Unit: kVarh |
| 0x3a | Eq- | float | 2 | Capacitive reactive power |
| 0x3c | ES | float | 2 | Total apparent energy, unit: VAh |
| 0x3e | EpA+ | float | 2 | A phase positive active energy, unit: kWh |
| 0x40 | EpA- | float | 2 | A phase negative active energy |
| 0x42 | EqA+ | float | 2 | A phase inductive reactive energy, unit: kVarh |
| 0x44 | EqA- | float | 2 | A phase capacitive reactive energy |

| | | | | |
|------|------|-------|---|---|
| 0x46 | ESA | float | 2 | A phase apparent energy, unit VAh |
| 0x48 | EpB+ | float | 2 | B phase positive active energy, unit: kWh |
| 0x4A | EpB- | float | 2 | B phase negative active energy |
| 0x4C | EqB+ | float | 2 | B phase inductive reactive energy, unit: kVarh |
| 0x4E | EqB- | float | 2 | B phase capacitive reactive energy |
| 0x50 | ESB | float | 2 | B phase apparent energy, unit: VAh |
| 0x52 | EpC+ | float | 2 | C phase positive active energy, unit: kWh |
| 0x54 | EpC- | float | 2 | C phase negative active energy |
| 0x56 | EqC+ | float | 2 | C phase inductive reactive energy, unit: kVarh |
| 0x58 | EqC- | float | 2 | C phase capacitive reactive energy |
| 0x5A | ESC | float | 2 | C phase apparent energy, unit: VAh |
| 0x5C | Io | float | 2 | Real-time measurement zero-sequence current data, unit: A (Reserved function) |

7.3.2.- Basic power data -Secondary Side

| Register | Data | Byte | | Instruction |
|----------|------------|--------|---|--|
| 0x100 | Ua | int | 1 | Phase to line voltage, Unit: 0.1V |
| 0x101 | Ub | int | 1 | |
| 0x102 | Uc | int | 1 | |
| 0x103 | Uab | int | 1 | Phase to phase voltage, Unit: 0.1V |
| 0x104 | Ubc | int | 1 | |
| 0x105 | Uca | int | 1 | |
| 0x106 | Ia | int | 1 | Three phase Current, Unit: 0.001A |
| 0x107 | Ib | int | 1 | |
| 0x108 | Ic | int | 1 | |
| 0x109 | Pa | int | 1 | Active power, Unit: W |
| 0x10a | Pb | int | 1 | |
| 0x10b | Pc | int | 1 | |
| 0x10c | $P\Sigma$ | int | 1 | |
| 0x10d | Qa | int | 1 | Reactive power, Unit: Var |
| 0x10e | Qb | int | 1 | |
| 0x10f | Qc | int | 1 | |
| 0x110 | $Q\Sigma$ | int | 1 | |
| 0x111 | Sa | int | 1 | Apparent power, Unit: VA |
| 0x112 | Sb | int | 1 | |
| 0x113 | Sc | int | 1 | |
| 0x114 | $S\Sigma$ | int | 1 | |
| 0x115 | PFa | int | 1 | Power factor, 0~1.000 |
| 0x116 | PFb | int | 1 | |
| 0x117 | PFc | int | 1 | |
| 0x118 | $PF\Sigma$ | int | 1 | |
| 0x119 | FR | int | 1 | Frequency, Unit:0.01Hz |
| 0x11a | Ep+ | Int 32 | 2 | Positive active energy, Unit: Wh |
| 0x11c | Ep- | Int 32 | 2 | Negative active energy, Unit: Wh |
| 0x11e | Eq+ | Int 32 | 2 | Inductive reactive power, Unit:Varh |
| 0x120 | Eq- | Int 32 | 2 | Capacitive reactive power |
| 0x122 | ES | int | 2 | Total apparent energy, unit: VAh |
| 0x124 | EpA+ | int | 2 | A phase positive active energy, unit: kWh |
| 0x126 | EpA- | int | 2 | A phase negative active energy |
| 0x128 | EqA+ | int | 2 | A phase inductive reactive energy, unit: kVarh |
| 0x12A | EqA- | int | 2 | A phase capacitive reactive energy |
| 0x12C | ESA | int | 2 | A phase total apparent energy, unit VAh |

| | | | | |
|-------|--------|-----|---|--|
| 0x12E | EpB+ | int | 2 | B phase positive active energy, unit: kWh |
| 0x130 | EpB- | int | 2 | B phase negative active energy |
| 0x132 | EqB+ | int | 2 | B phase inductive reactive energy, unit: kVarh |
| 0x134 | EqB- | int | 2 | B phase capacitive reactive energy |
| 0x136 | ESB | int | 2 | B phase total apparent energy, unit: VAh |
| 0x138 | EpC+ | int | 2 | C phase positive active energy, unit: kWh |
| 0x13A | EpC- | int | 2 | C phase negative active energy |
| 0x13C | EqC+ | int | 2 | C phase inductive reactive energy, unit: kVarh |
| 0x13E | EqC- | int | 2 | C phase capacitive reactive energy |
| 0x140 | ESC | int | 2 | C phase total apparent energy, unit: VAh |
| 0x142 | Io | int | 1 | Real-time measurement zero-sequence current data, unit: 0.001A (Reserved function) |
| 0x143 | Ang_Ua | int | 1 | A phase voltage angle, unit: 0.1 degree |
| 0x144 | Ang_Ub | int | 1 | B phase voltage angle |
| 0x145 | Ang_Uc | int | 1 | C phase voltage angle |
| 0x146 | Ang_Ia | int | 1 | A phase current angle |
| 0x147 | Ang_Ib | int | 1 | B phase current angle |
| 0x148 | Ang_Ic | int | 1 | C phase current angle |

7.3.3.- Meter status

| Register | Data | Byte | | Instruction |
|----------|-------------|------|---|--|
| 0x200 | DO | int | 1 | Remote control relay output status Bit0~1: channel 1~2 output status |
| 0x201 | DI | int | 1 | DI information Bit0~3: channel 1~4 opening status |
| 0x202 | DZ | int | 1 | Setting value over-limit status Bit0~4: channels 1~5 setting value over-limit status |
| 0x20A | TIME.year | int | 1 | Internal RTC real-time time: Year-Month-Day-Hour-Minute-Second-Week (integer, the last char is not used) |
| 0x20B | TIME.month | int | 1 | |
| 0x20C | TIME.date | int | 1 | |
| 0x20D | TIME.hour | int | 1 | |
| 0x20E | TIME.minute | int | 1 | |
| 0x20F | TIME.second | int | 1 | |
| 0x210 | TIME.day | int | 1 | |

7.4.- Configuration menu (Function 03 to Read & 0 Function 06 to Write)

| Register | Data | Byte mode | | Instruction | |
|----------|---|-----------|---|---|----------------------|
| 0x20A | TIME.year | Int | 1 | Internal RTC real-time time: Year-Month-Day-Hour-Minute-Second-Week (integer, the last char is not used) | |
| 0x20B | TIME.month | Int | 1 | | |
| 0x20C | TIME.date | Int | 1 | | |
| 0x20D | TIME.hour | Int | 1 | | |
| 0x20E | TIME.minute | Int | 1 | | |
| 0x20F | TIME.second | Int | 1 | | |
| 0x210 | TIME.day | Int | 1 | | |
| 0x900 | Wiring mode | Int | 1 | 0: 3P4W 1: 3P3W 2CT | 2: 3P3W 3CT |
| 0x901 | Voltage range | Int | 1 | 0: 100V | 1: 380V |
| 0x902 | Current range | Int | 1 | 0: 1A | 1: 5A |
| 0x903 | PT ratio | Int | 1 | 1-9999 | |
| 0x904 | CT ratio | Int | 1 | 1-9999 | |
| 0x905 | RS485 address | Int | 1 | 1-247 | |
| 0x906 | Baud rate | Int | 1 | 0: 2400 1: 4800 | 2: 9600 3: 19200 |
| 0x907 | Data format | Int | 1 | 0: n.8.1 1: o.8.1 | 2: e.8.1 3: n.8.2 |
| 0x908 | Display control | Int | 1 | 0-9sec, 0 for manual switch mode | |
| 0x909 | Password | Int | 1 | 1-9999 | |
| 0x90a | Channel 2 communication address | Int | 1 | 1-247 | |
| 0x90b | Channel 2 communication baud rate | Int | 1 | 0: 2400 1: 4800 | 0: 2400 1: 4800 |
| 0x90c | Channel 2 communication data format | Int | 1 | 0: n.8.1 1: o.8.1 | 0: n.8.1 1: o.8.1 |
| 0x90d | Voltage deviation secondary reference value | Int | 1 | Unit: 0.1V | |
| 0x90e | Frequency deviation reference value | Int | 1 | Unit: 0.01HZ | |

7.5.- Example

Host inquiry slave device

| Addr. | Func. | Data Address high | Data Address low | Data Number high | Data number low | CRC16 low | CRC16 high |
|-------|-------|-------------------|------------------|------------------|-----------------|-----------|------------|
| 0CH | 03H | 00H | 00H | 00H | 06H | C4H | D5H |

PC user ask upload UA, UB, UC, IA, IB, IC

Slave device response

| Addr. | Func. | Byte count | Data1 high | Data1 low | Data2 high | Data2 low | Data3 high | Data3 low |
|------------|-----------|------------|------------|------------|------------|-----------|------------|-----------|
| 0CH | 03H | 0CH | 03H | E8H | 03H | E9H | 03H | E8H |
| Data4 high | Data4 low | Data5 high | Data5 low | Data6 high | Data6 low | CRC16 low | CRC16 high | |
| 13H | 84H | 13H | 88H | 13H | 8AH | A6H | D6H | |

Show the data:

UA=3E8H (100.0)

UB=3E9H (100.1)

UC=3E7H (99.9)

IA=1384H (4.996)

IB=1388H (5.000)

IC=138AH (5.002)

Notes:

1. Blue Jay disable the 06 function in default setting, if Activated the write command, please check the host device program to avoid the meaningless write operation, that may reduce the reduce the register working life.
2. When the write is unsuccessful, no return data from the slave device. In this addition, please re-send write inquiry again.

8.- SAFETY CONSIDERATIONS



All installation specification described at the previous chapters named:
INSTALLATION AND STARTUP, INSTALLATION MODES and SPECIFICATIONS.

Please note that with the instrument powered on, the terminals could be dangerous to touching and cover opening actions or elements removal may allow accessing dangerous parts. This instrument is factory-shipped at proper operation condition.

- ◆ The device must have a professional installation and maintenance
- ◆ Any operation of the device, you must cut off the input signal and power;

9.- MAINTENANCE

The DEM-4MC-V three phase energy meter does not require any special maintenance. No adjustment, maintenance or repairing action should be done when the instrument is open and powered on, should those actions are essential, high-qualified operators must perform them.

Before any adjustment, replacement, maintenance or repairing operation is carried out, the instrument must be disconnected from any power supply source.

When any protection failure is suspected to exist, the instrument must be immediately put out of service. The instrument's design allows a quick replacement in case of any failure.

10.- TECHNICAL SERVICE

FAQ's

- 1.- Once cabled and connected is seen to give a correct voltage and current reading, but shows negative values for active power (generation).

This is an error with the cabling for the current transformer secondary; the direction of the transformer current has to be respected as shown in the connection diagram. The current transformers have a two face primary; the current must pass from P1 to P2 giving the result in secondary (S1 and S2) of 5 amps.

The error stems from:

- a). The current transformers have been incorrectly installed. As a result, it gives the direction of the current as passing from P2 to P1; to resolve this problem, the current transformer does not have to be dismantled and installed again, but the transformer secondary (S1 and S2) just has to be inverted.
 - b). The connection of the current secondary in the current transformers have been incorrectly connected; to resolve this problem just connect the S1 transformer secondary to the S1 on the meter and the S2 on the current transformer to the S2 on the meter.
- 2.- Once cabled and connected, is seen to give an incoherent Power factor and Cos Φ reading (-0.01 or similar).

This is again a current transformer and voltage phase connection error phase A, must correspond to the current transformer installed in phase A; phase B, must correspond to the current transformer installed in phase B; and phase C, must correspond to the current transformer installed in phase C.

This connection terminal is clearly shown on the area side of the device.

- 3.- The measuring voltage and is displaying the secondary voltage (for example 110 volts). Ensure that the voltage Transformer ratio has been correctly set.
- 4.- Device does not correctly display the current reading. It shows values varying between 0 to 5 amps of current. Ensure that the Current Transformer ratio has been correctly set.

Calculation formula of electrical parameter

| Formula | Parameter |
|--|--|
| $U = \sqrt{\frac{1}{N} \sum_{n=0}^N u_n^2} \quad n = 0, 1, 2, \dots, N$ | Voltage RMS value |
| $I = \sqrt{\frac{1}{N} \sum_{n=0}^N i_n^2} \quad n = 0, 1, 2, \dots, N$ | Current RMS value |
| $P = \frac{1}{N} \sum_{n=1}^N (i_{an} u_{an} + i_{bn} u_{bn} + i_{cn} u_{cn})$ | Total active power cycle average |
| $P_s = UI$ | Single-phase apparent power cycle average |
| $\cos \theta = \frac{P_p}{P_s}$ | Power factor |
| $P_q = \sqrt{P_s^2 - P_p^2}$ | Reactive power (Pq is positive and the direction cannot be determined; P algorithm can be used to shift the voltage component by 90°) |
| $W = \int P * dt$ | Electric energy |

Note: In above formula, N for sampling points in one AC wave.

For any inquiry about the instrument performance or any failure, contact to Blue Jay's technical service.

Blue Jay - After-sales service

E-mail: tech@cqbluejay.com