# CM1-PR ECNOMIC PROCESS Indicator

## DESCRIPTION

**CM1 series Indicator has been designed in simple function and 4 digital 20.0mm LED displays with economic cost.**
**They are can be programmed by tack switches that are hidden in backside of front bezel.**
**They are also available 1 option of 2 Relay outputs, 1 Analogue output or 1 RS485(Modbus RTU Mode) interface with versatile functions such as control, alarm, re-transmission or communication for a wide range of industrial applications.**


## FEATURE

- **Measuring 0(1)~5V/0~10V, 0~10mA/0(4)~20mA ( or 2 wire sensor with 24Vdc excitation supply )**
- **Optional output available for one of 2 relay, analogue or RS485**
- **CE Approved & RoHS**

## APPLICATIONS

- **2 wire sensing transducers as like as pressure, level and so on….**
- **Process alarm or communication for data collection.**

## ORDERING INFORMATION

**CM1−PR−** [Input Signal] − [Optional Output] − [Excitation Supply] − [Aux. Powered]

OPTION

| CODE | INPUT RANGE |
|---|---|
| A2 | 0 ~ 10mA |
| A3 | 0 ~ 20mA |
| A4 | 4 ~ 20mA |
| V4 | 0 ~ 5V |
| V5 | 0 ~ 10V |
| V6 | 1 ~ 5V |

| CODE | OPTIONAL O/P |
|---|---|
| N | None |
| R2 | 2 Relay |
| I | A/O: (0)4~20mA 0~10mA |
| V | A/O: 0~10V (0)1~5V |
| 8 | RS 485 |

Relay, Analogue output or RS485 Port can be selected one only.

| CODE | EXCIT. SUPPLY |
|---|---|
| N | None |
| E24 | DC 24V |
| EO | Specify |

| CODE | AXU. POWER |
|---|---|
| A | AC115 / 230V |

## TECHNICAL SPECIFICATION

### Input Range

| Voltage Input Range | Input Impedance | Current Input Range | Input Impedance |
|---|---|---|---|
| 1(0)~5V,0 ~ 10 V | ≥ 1M ohm | 4(0)~20 mA,0~10mA | 250 ohm |

**Calibration:** Digital calibration by front key
**A/D converter:** 12 bits resolution
**Accuracy:** ≤± 0.1% of FS ± 1C
**Sampling rate:** 15 cycles/sec
**Response time:** ≤ 100 msec.(when the AvG = "1") in standard

### Display & Functions

**LED:** Numeric: 4 digits, 0.8"(20.0mm) red high-brightness LED
**Display range:** -1999~+9999
**Scaling function:** LoSC : Low Scale; Settable range: -1999~+9999
HiSC : High Scale; Settable range: -1999~+9999
**Decimal point:** Programmable from 0 / 0.0 / 0.00 / 0.000
**Over range Indication:** ouFL , when input is over 110% of input range Hi
**Under range indication:** -ouFL , when input is under -0% of input range Lo
**Max / Mini recording:** Maximum and Minimum value storage during power on.
**Low cut:** LoCUt : Settable range: -1999~+9999 counts

### Reading Stable Function

**Average:** AvG Settable range: 1~99 times
**Moving average:** mAvG Settable range: 1~99 times
**Digital filter:** dF iLt Settable range: 1~99 times

### Control Functions(option)

**Set-points:** Two set-point
**Control relay:** 2 Relay, FORM-C, 5A/230Vac, 10A/115V
**Relay energized mode:** Energized levels compare with set-points:
Hi / Lo / Hi.HLd / Lo.HLd programmable

**Energizing functions:** Start delay / Energized & De-energized delay / Hysteresis Energized Latch
Start band(Minimum level for Energizing): 0~9999counts
Start delay time: 0:00.0~9(Minutes):59.9(Second)
De-energized delay time: 0.00.0~9(Minutes):59.9(Second)
Hysteresis: 0~5000 counts

### Analogue output(option)

**Accuracy:** ≤± 0.2% of F.S. ; 12 bits DA converter
**Ripple:** ≤± 0.1% of F.S.
**Response time:** ≤100 msec. (10~90% of input)
**Isolation:** AC 2.0 KV between input and output
**Output range:** Specify either Voltage or Current output in ordering
Voltage: 0~5V / 0~10V / 1~5V programmable
Current: 0~10mA / 0~20mA / 4~20mA programmable
**Output capability:** Voltage: 0~10V: ≥ 1000Ω;
Current: 4(0)~20mA: ≤ 600Ω max
**Functions:** AoHS (output range high): Settable range: -1999~+9999
AoLS (output range Low): Settable range: -1999~+9999
**Digital fine adjust:** AoPro : Settable range: -1999~+9999
AoSPn : Settable range: -1999~+9999

### RS 485 Communication(option)

**Protocol:** Modbus RTU mode
**Baud rate:** 1200/2400/4800/9600/19200/38400 programmable
**Data bits:** 8 bits
**Parity:** Even, odd or none (with 1 or 2 stop bit) programmable
**Address:** 1 ~ 255 programmable
**Distance:** 1200M
**Terminate resistor:** 150Ω at last unit.

### Power

**Power supply:** AC115/230V±15%,50/60Hz;
**Power consumption:** 3.0VA maximum

| | |
|---|---|
| **Back up memory:** | By EEPROM |

**Electrical Safety**

| | |
|---|---|
| **Dielectric strength:** | AC 2.0 KV for 1 min, Between Power / Input / Output / Case |
| **Insulation resistance:** | ≥100M ohm at 500Vdc, Between Power / Input / Output |
| **Isolation:** | Between Power / Input / Relay, Analogue or RS485 |
| **EMC:** | EN 55011:2002; EN 61326:2003 |
| **Safety(LVD):** | EN 61010-1:2001 |

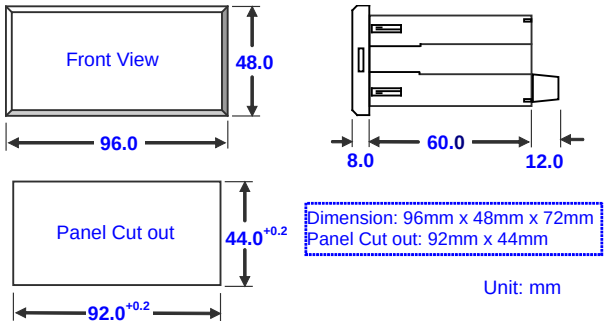
**Environmental**

| | |
|---|---|
| **Operating temp.:** | 0~60 ˚C |
| **Operating humidity:** | 20~95 %RH, Non-condensing |
| **Temp. coefficient:** | ≤100 PPM/˚C |
| **Storage temp.:** | -10~70 ˚C |
| **Enclosure:** | Front panel: IEC 549 (IP54); Housing: IP20 |

**Mechanical**

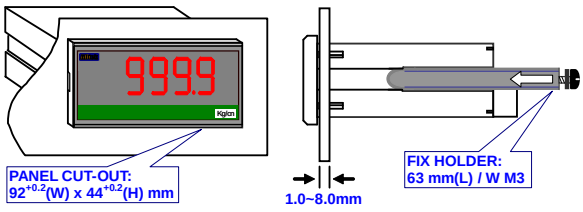
| | |
|---|---|
| **Dimensions:** | 96mm(W) x 48mm(H) x 72mm(D) |
| **Panel cutout:** | 92mm(W) x 44mm(H) |
| **Case material:** | ABS fire-resistance (UL 94V-0) |
| **Mounting:** | Panel flush mounting |
| **Terminal block:** | Plastic NYLON 66 (UL 94V-0)<br>20A/300Vac, M3.5, 12~22AWG |
| **Weight:** | 310g |

## ■ DIMENSIONS

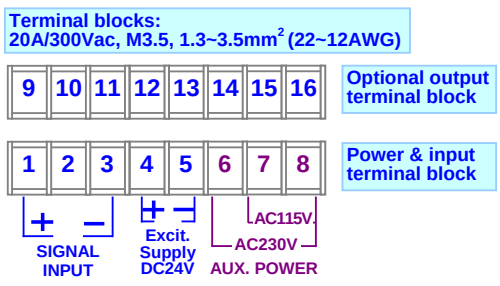



## ■ INSTALLATION

The meter should be installed in a location that dose not exceed the maximum operating temperature and provides good air circulation.



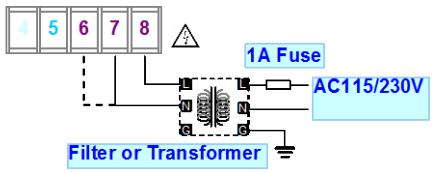

## ■ CONNECTION DIAGRAM



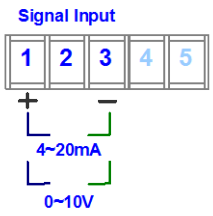

**Power and Input**

Please check the voltage of power supplied first, and then connect to the specified terminals. It is recommended that power supplied to the meter be protected by a fuse or circuit breaker.

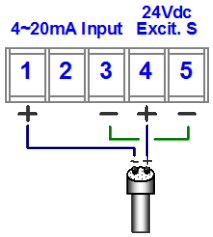
**Power Supply**




**Signal Input**



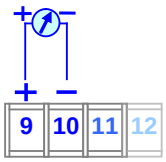

**2 wire sensor Input connection**



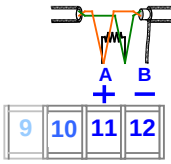

**Output ( one output available of Relay, Analogue or RS485 )**

**Relay output**


**Analogue output**



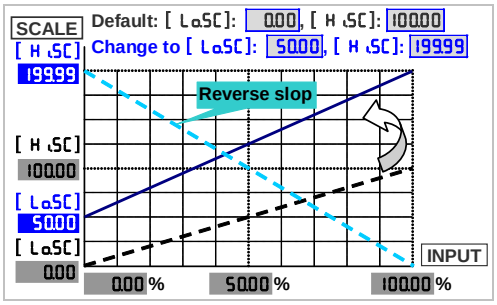

**RS485 port**




## ■ FUNCTION DESCRIPTION

**Scaling function:**

Setting the [ LoSC ] (Low scale) and [ H iSC ] (High scale) in [ inPUt GroUP ] to relative input signal. **Reverse scaling will be done too.** Please refer to the figure as below,




*Too narrow scale may course display lower resolution.

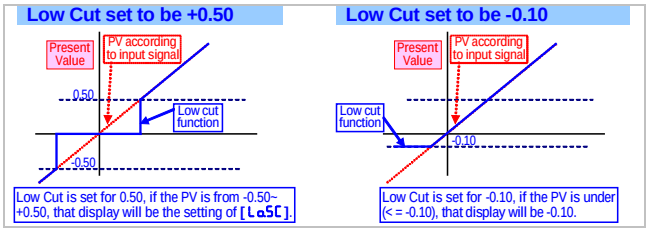
## Display & Functions

**Max / Mini recording:** The meter will storage the maximum and minimum value in **[ user level]** during power on in order to review drifting of PV.

**Reset for Max(Mini) Hold** rSt: The maximum and minimum recording can be reset by rSt in **[ user level]** .

**Low cut:**

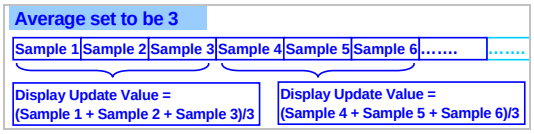
If the setting value is positive, it means when the absolutely value of PV ≤ Setting value, the display will be the setting of [LoSC]. If the setting value is negative, it means when the PV under setting value (PV≤ -Setting value), the display will be setting value of [LoUt].




## Reading Stable Function

**Average:**

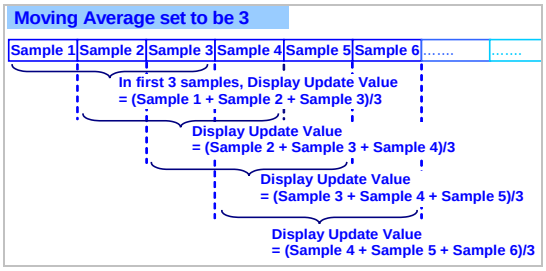
Basically, the sampling rate of meter is 15cycles/sec. If the function set to be 3 times, It means the meter will update of display will be 5 times/sec.




Remark: The higher average setting will cause the response time of Relay and Analogue output slower.

**Moving average:**

If the function to be set 3 times, the meter will update delay in first 3 samples, then it will update 15 times/sec continuously.




Remark: The higher moving average setting wouldn't cause the response time of Relay and Analogue output slower after first 3 samples.

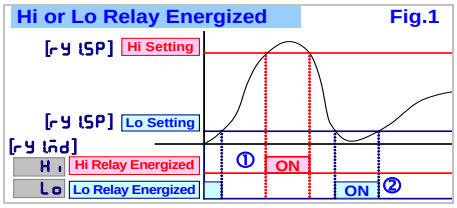
**Digital filter:** The digital filter can reduce the magnetic noise in field.

## Control functions(option)

**Relay energized mode:** Hi / Lo / Hi.HLd / Lo.HLd programmable

**Hi** HI **(Fig.1-①):** Relay will energize when PV > Set-Point

**Lo** Lo **(Fig.1-②):** Relay will energize when PV < Set-Point




**Energized functions:** Start delay / Energized & De-energized delay / Hysteresis

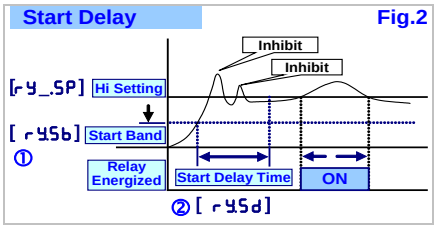
**Start delay band and Start delay time:**

The functions have Been designed for,

- ► To avoid starting current of inductive motor (6 times of rated current) with alarm.
- ► If the rY_Md relay energized mode had been set to be Lo(Lo). As the meter is power on and no input to display the "0" caused the relay will be energized. User can set a band and delay time to inhibit the energized of relay.

**Start band** rYSb **(Fig.2-①):** Settable range from 0~9999 Counts

**Start delay time** rYSd **(Fig.2-②):** Settable range from 0.0(s)~9(m)59.9(s);



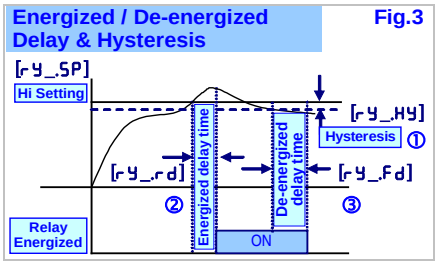

**Hysteresis** rY_HY **(Fig.3-①):** Settable range from 0~5000 Counts

As the display value is swing near by the set point to cause the relay on and off frequently. The function is to avoid the relay on and off frequently such as compressor……etc.,

**Relay energized delay** rY_rd **(Fig.3-②):** Settable range from 0.0(s)~9(m)59.9(s);

The function is to avoid the miss action caused by noise. Sometime, the display value will swing caused by spark of contactor…etc.. User can set a period to delay the relay energized.

**Relay de-energized delay** rY_Fd **(Fig.3-③):** Settable range from 0.0(s)~9(m)59.9(s);




## Analogue output(option)

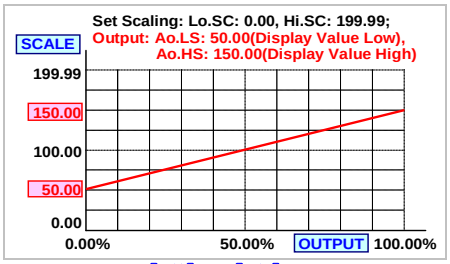
Please specify the output type either an o~10V or 4(0)~20mA in ordering. The programmable output low and high scaling can be based on various display values. Reverse slope output is possible by reversing point positions.

**Output range:** Voltage: 0~5V / 0~10V / 1~5V programmable
Current: 0~10mA / 0~20mA / 4~20mA programmable

**Functions:**

**Output range high** AoHS:
Setting the Display value High to versus output range High(as like as 20mA in 4~20)

**Output range low** AoLS:
Setting the Display value Low to versus output range Low(as like as 4mA in 4~20)




The range between AoHS and AoLS should be over 20% of span at least; otherwise, it will be got less resolution of analogue output.

**Fine zero & span adjustment:**

Users can get Fine Adjustment of analogue output by front key of the meter. Please connect standard meter to the terminal of analogue output. To press the front key (up or down key) of meter to adjust and check the output.

**Zero adjust** [AoPro]: Fine Zero Adjustment for Analog Output;
Settable range: -1999~9999;

**Span adjust** [AoSPn]: Fine Span Adjustment for Analog Output;
Settable range: -1999~9999;

## RS 485 Communication(option)

The RS485's protocol is Modbus RTU mode, and baud rate up to 38400 bps. It's convenience to remote monitoring, display for reading.

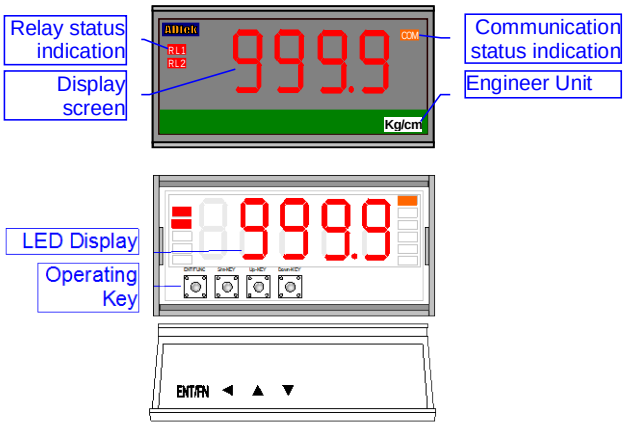
# OPERATING KEY

***Please access to the Programming Level to check and set the parameters when users start to run the meter**

- **Operating Key: 4 keys for Enter(Function) / Shift(Escape) / Up key / Down key**
- **The meter has designed operation similar as PC's and Enter. In any page, press key means "enter" or "confirm setting", and press key means "escape(Esc)" or "shift".**
- **In Programming Level, the screen will return to Measuring Page after do not press any key over 2 minutes, or press for 1 second.**

| | Function Index | Setting Status |
|---|---|---|
| **(= FUN ENT) Enter/Fun key** | (1) In any page, press to access the level or function index<br>(2) From the function index to access setting status | (3) Setting Confirmed, save to EEProm and go to next function index |
| **(= ◀) Shift key** | (1) In measuring page, press for 1 second to access user level.<br>(2) In function index, press for 1 second to go back upper level.<br>(3) In function group index, press for 1 second to go back measuring page | (4) In setting status, press to Shift the setting position.<br>(5) In setting status, press for 1 second to abort setting and go back this function index. |
| **(= ▲) Up key** | (1) In function index, press to go back to previous function index | (2) In setting status for function, press to select function<br>(3) During number Setting, press can roll the digit up |
| **(= ▼) Down key** | (1) In Function Index Page, press will go to the next Function Index Page. | (2) In setting status for function, press to select function<br>(3) During number Setting, press can roll the digit down. |

# FRONT PANEL



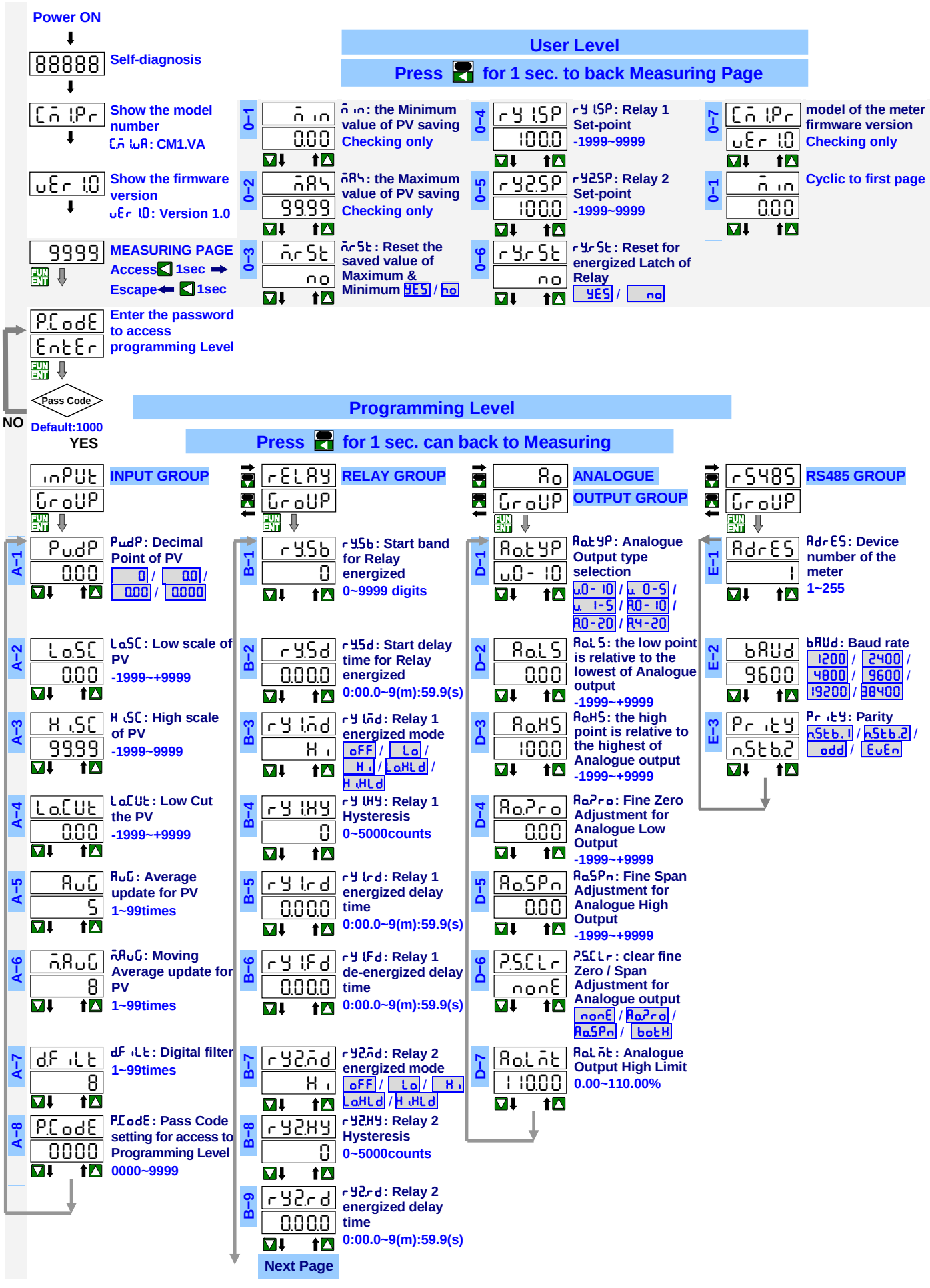

- **Number screen**
  0.8"(20.0mm) red high-brightness LED for 5 digital present value.
- **I/O Status Indication**
  - **Relay Energized:** 2 square red LED
    RL1 display when Relay 1 energized;
    RL2 display when Relay 2 energized;
  - **RS485 Communication:** 1 square orange LED
    COM will flash when the meter is receive or send data, and COM flash quickly means the data transient quicker.

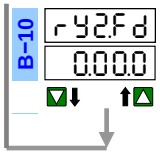
- **Stickers:**
  Each meter has a sticker for engineer units.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ~μA | ~mA | ~A | ~KA | =μA | =mA | =A | =KA | |
| ~μV | ~mV | ~V | ~KV | =μV | =mV | =V | =KV | |
| A hr | A min | A sec | A rms | V rms | A/mA | W/A | Var/A | |
| W | KW | MW | WH | KWH | MWH | W/WH | W/Var | |
| Var | KVar | MVar | QH | KQH | MQH | COSθ | Var/VarH | |
| VA | KVA | MVA | VAH | KVAH | MVAH | θ | KVarH | |
| Hz | PF | KA | KV | KHz | MVarH | KM/hr | | |
| A | mA | V | mV | Ω | KΩ | °C | °F | %RH |
| RPM | M/min | Y/min | F/min | M/sec | % | ° | MΩ | |
| Kg/cm² | Bar | mmH₂O | mmHg | KPA | mmAq | PSI | mBar | PA |
| M³/min | ml/min | Ton/D | L/min | Torr | M³/hr | Kg-cm | cmHg | |
| mm | cm | M | KM | ft | Yard | ppm | ppb | C.C |
| g | KG | Ton | T-cm | NT-cm | PH | MPM | L | |

- **Operating Key:** 4 keys for Enter(Function) / Shift(Escape) / Up key / Down key
- **Pass Word:** Settable range:0000~9999;
  User has to key in the right pass word so that get into **[Programming level]**. Otherwise, the meter will go back to measuring page. If user forgets the password, please contact with the service window.

# OPERATING DIAGRAM (The detail description of operation, please refer to operating manual.)






**r42Fd: Relay 2 de-energized delay time**

**0:00.0~9(m):59.9(s)**

**Plesae refer to operating manual for detail description**