

Relay 1 & relay 4: Dual FORM-A, 1A/230Vac, 3A/115V

Relay energized mode: Energized levels compare with set-points:

Hi / Lo / Go.12 / Go.233 / Hi.HLd / Lo.HLd

Relay control action through RS-485 remote command: DO function

External Control Input(ECI)

Input Mode: 3 ECI points, contact or open collector (O.C. input)

Function: Programmable for relative PV (Tare) / PV hold / reset for Max/Min hold / DI / relay reset

Debouncing time?: Steeable time: 5~255 (x8mS)

Analog Output(optional)

Accuracy: $\leq \pm 0.1\%$ of F.S., 16 bits DA converter

Ripple: $\leq \pm 0.1\%$ of F.S.

Response time: ≤ 100 mS. (10~90% of input)

Isolation: AC 2.0 KV between input and output

Output range: Specify either voltage or current output when ordering

Voltage: 0~5V / 0~10V / 1~5V programmable

Current: 0~10mA / 0~20mA / 4~20mA programmable

Output capability: Voltage: 0~10V: $\geq 1000\Omega$;

Current: 4(0)~20mA: $\leq 600\Omega$ max

Functions: R_{OH5} : output range high: -19,999~29,999

R_{OL5} : output range Low: -19,999~29,999

R_{OLH5} : output high limit: 0.00~110.00%

Digital fine adjust: R_{OPRO} : Settable range: -38,011~+27,524

R_{OSPn} : Settable range: -38,011~+27,524

RS-485 Communication(optional)

Protocol: Modbus RTU mode

Address: 1~255

Baud rate: 4800/9600/19200/38400 bps

Parity: None / Even / Odd

Data bits: 8 bits

Stop bit: 1 or 2

Remote display: show the value from RS-485 command of master

Distance: 1200M max

Safety

Isolation: AC 2.0 KV for 1 min,

Between Power / Input / Output / Case

Insulation resistance: $\geq 100M\Omega$ @500Vdc, Between Power / Input / Output

Isolations: Between Power / Input / Relay / Analog / RS-485 / E.C.I.

EMC: EN 55011:2002; EN 61326:2003

Safety(LVD): EN 61010-1:2001

Environmental Conditions

Operating temp.: 0~60 °C

Humidity rating: 20~95 %RH, Non-condensing

Temp. coefficient: ≤ 100 PPM/°C

Storage temp.: -10~70 °C

IP degree of protection: Front panel: IP52 ; Housing: IP20

Power Supply

Power supply: AC115/230V, 50/60Hz;

Optional: AC 85~264V, DC 100~300V, AC/DC 20~56V

Power consumption: <5.0VA maximum

Back up memory: By EEPROM

Mechanical Structure

Dimensions: 96mm(W) x 48mm(H) x 120mm(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)

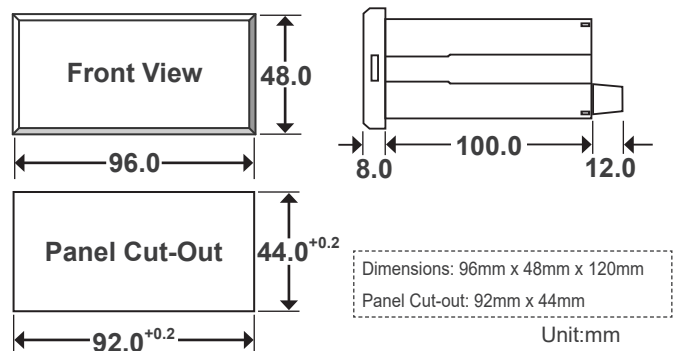
10A 300Vac, M2.5, 1.3~2.0mm²(16~22AWG)

Weight: 550g / 350g(Aux. Power Code: ADH or ADL)

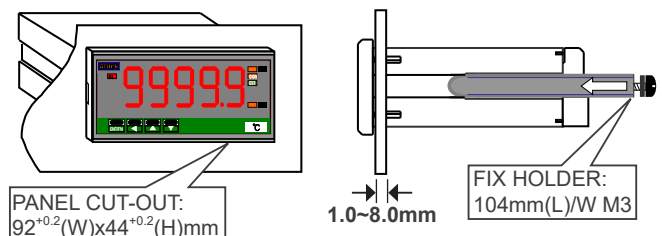
Front Panel



Dimensions

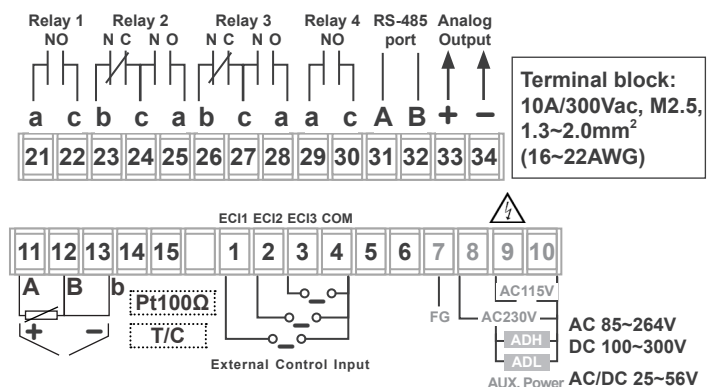


Installation



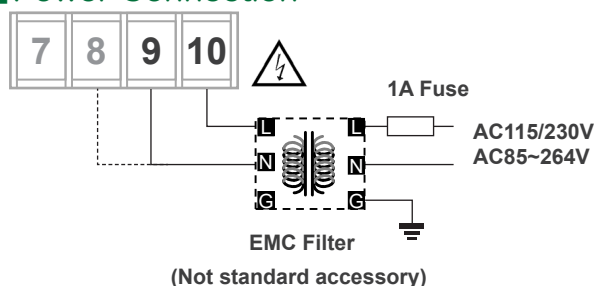
The meter should be installed in a place where it does not exceed the maximum operating temperature and provides good air circulation.

Connection Diagram

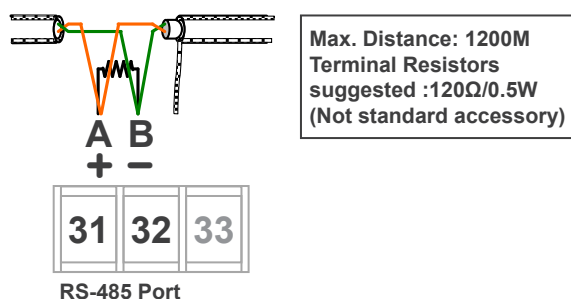


⚠ Please check the voltage of power supplied first, and then connect with the specified terminals. It is recommended that power supplied to the meter should be protected by a fuse or circuit breaker.

Power Connection



RS-485 Communication Port



Display & Functions

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

Display functions: PV / Max(Mini) Hold / RS-485 programmable in (Please refer to step A-07) [DISPLAY] function of [FUNCTION GROUP]

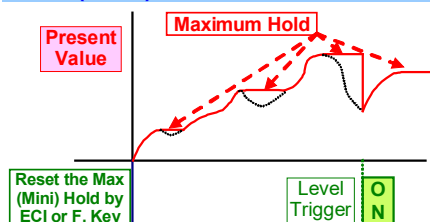
Present Value [PV]: The display will show the value that is relative to input signal.

Maximum Hold [MAXHOLD] / Minimum Hold [MINHOLD]:

The meter will keep display in maximum/minimum value during power on until manual reset with front key in [USER LEVEL], rear terminal is close [ECI], or press front down or up key to reset (according to setting, please refer to the function of the ECI Group)

► Please find the sticker that enclosed in the package of the meter to stick it to the right side of square orange LED.

Max. (Mini.) Hold & Reset



Remote Display by RS-485 command [RS485]:

The meter will show the value that received from RS-485 sending. In past, The meter normally receive 4~20mA or 0~10V from AO or digital output from BCD module of PLC. We come up with a cost saving solution that PV shows the value through RS-485 command of master, so that can be wired from PLC

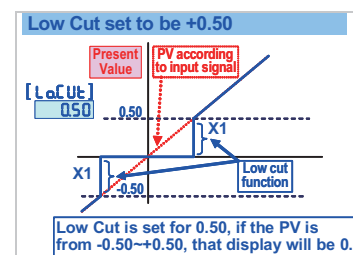
Other functions:

Low cut:

Relative PV(Δ PV) / PV Hold functions that set in [ECI GROUP]. please see details of ECI function. Settable range from -19,999~+99,999 counts. The users can set the value range.

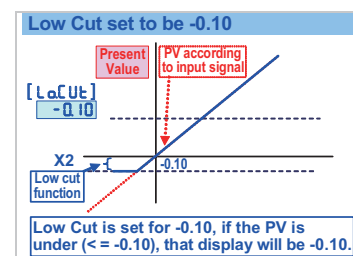
1. If set the positive value (X1) here to display "0" which it expressed to be low-cut the PV between "+X1 (plus)" & "-X1(minus)" /absolute value $PV < |$ Setting value (x1) |, the display will be shown 0

EX: Low Cut is set for 0.50. If the display is from -0.50~+0.50, that will be 0.



2. If set the negative value (X2) here to display "X2" which it expressed to be low-cut the PV that it's under the X2 setting value;

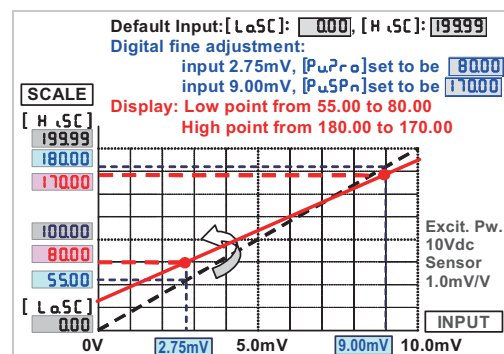
$PV < \text{Setting value}(X2)$, the display will be shown X2.
EX: Low Cut is set for -0.01. If the display is < -0.01 , and all the display will be -0.01.



Digital fine adjustment: Settable range: -19999~+29999

Users can get Fine Adjustment for Zero & Span of PV by front key of the meter, and "Just Key In" the value which user want to show in the current input signals.

Especially, the [PZERO] & [SPAN] are not only in zero & span of PV, but also any lower point for [PZERO] & higher point for [SPAN]. The meter will be linearization for full scale.



Average display:

Average set to be 3

Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6		
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Diagram illustrating the calculation of the average set to be 3. The samples are grouped into two sets of three:

- Group 1: Sample 1, Sample 2, Sample 3. The calculation is: $\text{Display Update Value} = (\text{Sample 1} + \text{Sample 2} + \text{Sample 3})/3$.
- Group 2: Sample 4, Sample 5, Sample 6. The calculation is: $\text{Display Update Value} = (\text{Sample 4} + \text{Sample 5} + \text{Sample 6})/3$.

Moving average:

Moving Average set to be 3

Sample 1 | Sample 2 | Sample 3 | Sample 4 | Sample 5 | Sample 6 | |

In first 3 samples, Display Update Value
 $= (\text{Sample 1} + \text{Sample 2} + \text{Sample 3})/3$

Display Update Value
 $= (\text{Sample 2} + \text{Sample 3} + \text{Sample 4})/3$

Display Update Value
 $= (\text{Sample 3} + \text{Sample 4} + \text{Sample 5})/3$

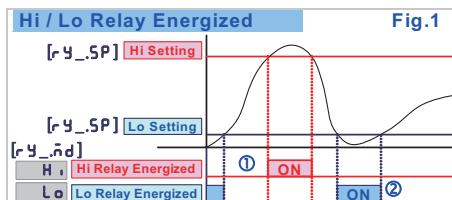
Display Update Value
 $= (\text{Sample 4} + \text{Sample 5} + \text{Sample 6})/3$

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

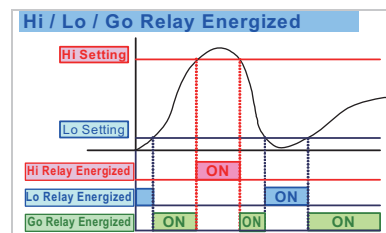
If the values of samples are over digital filter band (fix in firmware and about 5% of stable reading) 3 times (Digital Filter set to be 3) continuously, the meter will admit the samples and update the new reading. Otherwise, it will be as treat as a noise and skip the samples.

Relay operation mode: Hi / Lo / Go-1.2 / Go2.3 / Hi.HLd / Lo.HLd
programmable

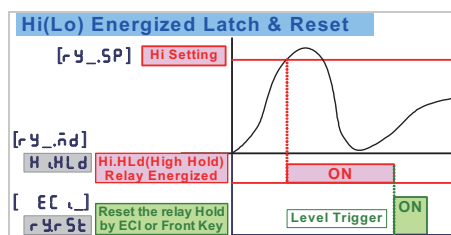
Lo (Fig.1- ②): Relay energizes when PV < Set Point



Go-2.3 **Go-2.3** : This function is programmable in Relay 4 only.
If the Relay 4 set to be Go function, the relay will compare with [r 425P] and [r 435P].
Go relay energized when the condition is [r 425P] (Hi) > PV > [r 435P] (Lo)


$$Hi.HLd \cdot Hi.HLd \cdot (Lo.HLd \cdot Lo.HLd):$$

As the PV Higher (or lower) than set-point, the relay will be energized to latch except manual reset by from key in [B5Er LEuEL] or [ECI] (ECI) set to be F4r5E is closed.



DO function **do** : The function has been designed not only a meter but also an I/O interface. In the case of motor control cabinet can't get the remote function. It's very easily to get the ON/OFF status of switch from CS2 series with RS485 function. If the [ry_.md] had been set **do** , the relay will be energized by RS485 command directly, but no longer to compare with set-point.

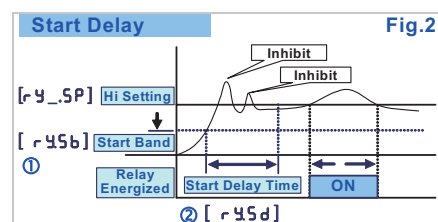
Start delay band and Start delay time:

The function has been designed for,

- ▶ To avoid starting current of inductive motor (6 times of rated current) with alarm.
- ▶ If the **ry_and** relay energized mode had been set to be **lo** (Lo) or **loHld** (Lo & latch). 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 **r45b** (Fig.2-①): Settable range from 0~9,999 counts

Start delay time **r45d** (Fig.2-②): Settable range from 0.0(s)~9(m)59.9(s);



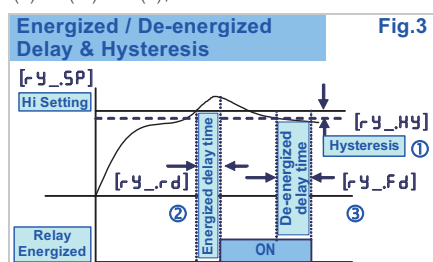
Hysteresis **[rY_HY]** (Fig.3- ①): Settable range from 0~9999 counts

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_r d]** (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_F d]** (Fig.3- ③): Settable range from 0.0(s)~ 9(m)59.9(s);

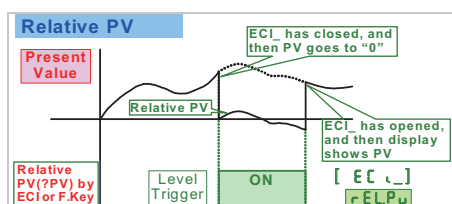


External Control Inputs (ECI)

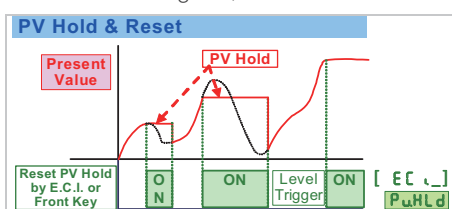
The three external control inputs are individually programmable to perform specific meter control or display functions. All E.C.I. have been designed in level trigger actions. Please pay attention, the ECI1 or ECI2 input will be disable while UP or Down Key has been set to be "YES".

Functions: Relative PV / PV Hold / Reset Max or Mini. Hold / DI / Reset for Relay Energized latch programmable.

Relative PV **[rELPv]**: The **[ECL]** can be set to be **[rELPv]** function. When the E.C.I. is closed, the reading will show the differential value.



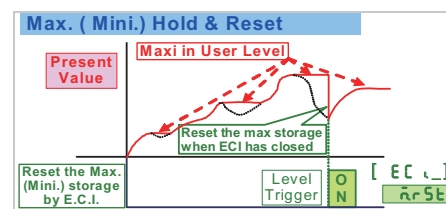
PV Hold **[PvHLd]**: The **[ECL]** can be set to be **[PvHLd]** (PV Hold) function. The display will be hold when the ECI is closed, until the ECI is to be open. Please refer to the below figures,



Reset for Maximum or Minimum Hold **[rSSt]**:

When the [dspl] function in [input group] selected **[rRvHd]** or **[rMinHd]**, the display will show Maximum or Minimum value.

The **[ECL]** function can be set to be **[rSSt]** function to reset the maximum and minimum value in [USE-LEVEL] by terminals of ECI (close). Please refer to the figure as below.

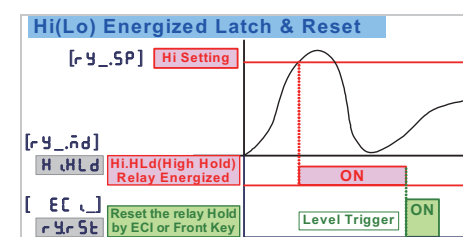


DI **[d]**:

The E.C.I can be set to be **[d]** function, when the meter building in RS485 port. It is easier to get remote monitoring a switch status through the meter as like as DI of PLC.

Reset for Relay Energized Latch **[rYrSt]**:

If the relay energized mode has been set to be **[H.HLd]** (Energized latch), and the **[ECL]** can be set to be **[rYrSt]** (Reset the Relay energized latch). When the PV meets the condition of relay energizing, the relay will be energized and latch until the ECI is to be closed.



Debouncing time:

The function is for avoiding noise signal into the meter. And The basic period is 8mseconds. It means you set the number that has to multiple 8 m-seconds.

For example: **[dEBnE]** set to be 5, it means 5 x 8mseconds = 40mseconds

Analog output(option)

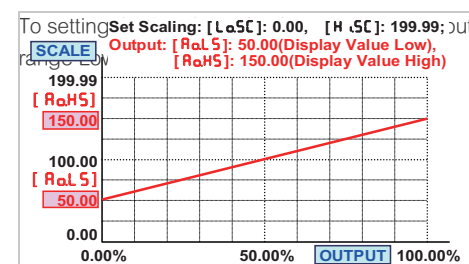
Please specify the output type either an 0~10V or 4(0)~20mA in ordering. The programmable output low and high scaling can be based on various display values. Reverse slope output is possible by reversing point positions.

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

Functions: Output High / Low scale, output limit, fine adjustment
Output range high **[RdHS]**:

To setting the Display value High to versus output range High(as like as 20mA in 4~20)

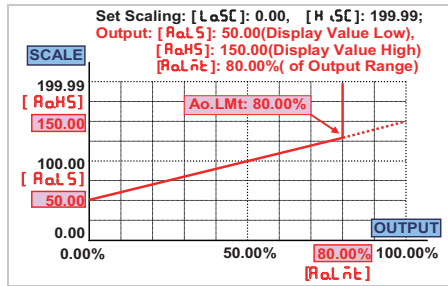
Output range low **[RdLS]**:



The range between **[RdHS]** and **[RdLS]** should be over 20% of span at least; otherwise, it will be got less resolution of analog output.

Output High Limit [R_{oL}L_{nt}]:

0.00~110.00% of output High User can set the high limit of output to avoid a damage of receiver or protection system.



Fine zero & span adjustment:

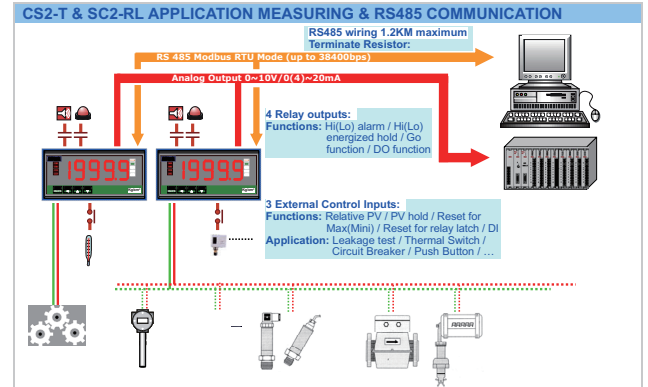
Users can do Fine Adjustment of analog output by front key on the panel. Please connect standard meter with the terminal of analog output. Press the front key(up or down key) to adjust and check the output.

Zero adjust [R_oP_ro]: Fine Zero Adjustment for Analog Output;
Settable range: -38011~27524

Span adjust [R_oS_Pn]: Fine Span Adjustment for Analog Output;
Settable range: -38011~27524

RS-485 Communication(Optional)

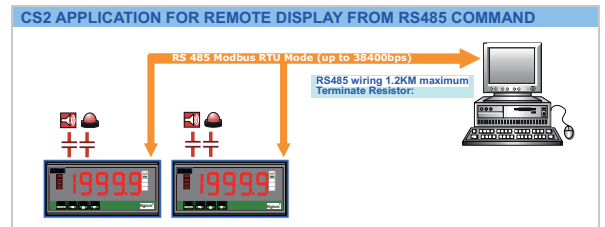
CS2 series supports Modbus RTU mode protocol to be used as Remote Terminal Unit (RTU) for monitoring and controlling in a SCADA (Supervisor Control And Data Acquisition) system. The baud rate can be up to 38400 bps. It's not only can be read the measured value and DI (external control inputs) status but also controls the relays output (DO) by RS485 communication ports.



Remote display:

The meter will show the value that received from RS485 command. In past, The meter normally receive 4~20mA or 0~10V from AO or digital output from BCD module of PLC. We support a new solution that PV shows the value from RS485 command of master so that can be save cost and wiring from PLC.

When the [d5PLy] is set to be RS-485, it means the PV screen will show the values through RS-485 command & data. The data is the same as PV that will be compared with the set-point, analog output and ECI functions so that is to control analog output, relay energized and so on.



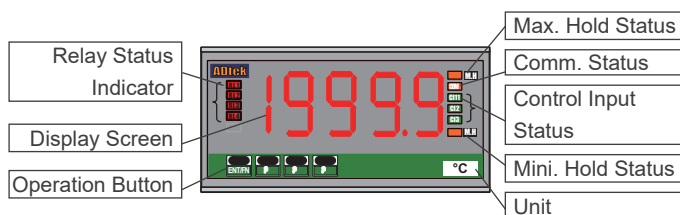
Error Message

Please check the specification and wiring, and turn on the meter to proceed self-inspection.

Self-diagnosis and error code:

Display	Description	Remark
ouFL	Display is positive-overflow (Signal is over display range)	(Please check the input signal)
-ouFL	Display is negative-overflow (Signal is under display range)	(Please check the input signal)
ouFL	ADC is positive-overflow (Signal is higher than input 120%)	(Please check the input signal)
-ouFL	ADC is negative-overflow (Signal is lower than input -120%)	(Please check the input signal)
EEP ↔ FR.L	EEPROM occurs error	(Please send back to manufactory for repaired)
R.i.nG ↔ Pu	Calibrating Input Signal do not process	(Please process Calibrating Input Signal)
R.i.C ↔ FR.L	Calibrating Input Signal error	(Please check Calibrating Input Signal)
R.o.nG ↔ Pu	Calibrating Output Signal do not process	(Please process Calibrating Output Signal)
R.o.C ↔ FR.L	Calibrating Output Signal error	(Please check Calibrating Output Signal)

Front Panel



Numeric Screens:

0.8"(20.0mm) red high-brightness LED for 4 2/3 digital present values.

I/O Status Indication

- Relay Energized: 4 square red LEDs
 - RL1** display when Relay 1 energized
 - RL2** display when Relay 2 energized
 - RL3** display when Relay 3 energized
 - RL4** display when Relay 4 energized
- External Control Input Energized: 3 square green LEDs
 - EC1** display when ECI 1 close(dry contact)
 - EC2** display when ECI 2 close(dry contact)
 - EC3** display when ECI 3 close(dry contact)
- RS-485 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.
- Max/Mini Hold indication: 2 square orange LEDs
 - M.H** displayed: When the display function has been selected in Maximum or Minimum Hold function.

Stickers:

Each meter has a sticker what are functions and engineer label enclosure.

- Relay energized mode: **HH** **Hi** **Lo** **LL** **DO**
- ECI functions mode:
 - PV.H** PV.H(PV Hold) / **Tare** Tare / **DI** DI(Digital Input)
 - M.RS** M.RS(Maximum or Minimum Reset) /
 - R.RS** R.RS(Reset for Relay Latch)
- Engineer Label: over 80 types

Operation Key: 4keys for Enter(Function) / Shift(Escape) /

Up key / Down key

	Setting Status	Function Index
Up key	Increase number	Go back to previous function index
Down key	Decrease number	Go to next function index
Shift key	Shift the setting position	Go back to this function index, and abort the setting
Enter/Fun key	Setting Confirmed and save to EEPROM	From the function index to get into setting status

Pass Word **P.CodE** : Settable range: 0000~9999

User has to key in the right pass word so that get into **P.r o G r a m m i n g L e v e l**. Otherwise, the meter will go back to measuring page.

If users forget the password, please contact with the service window.

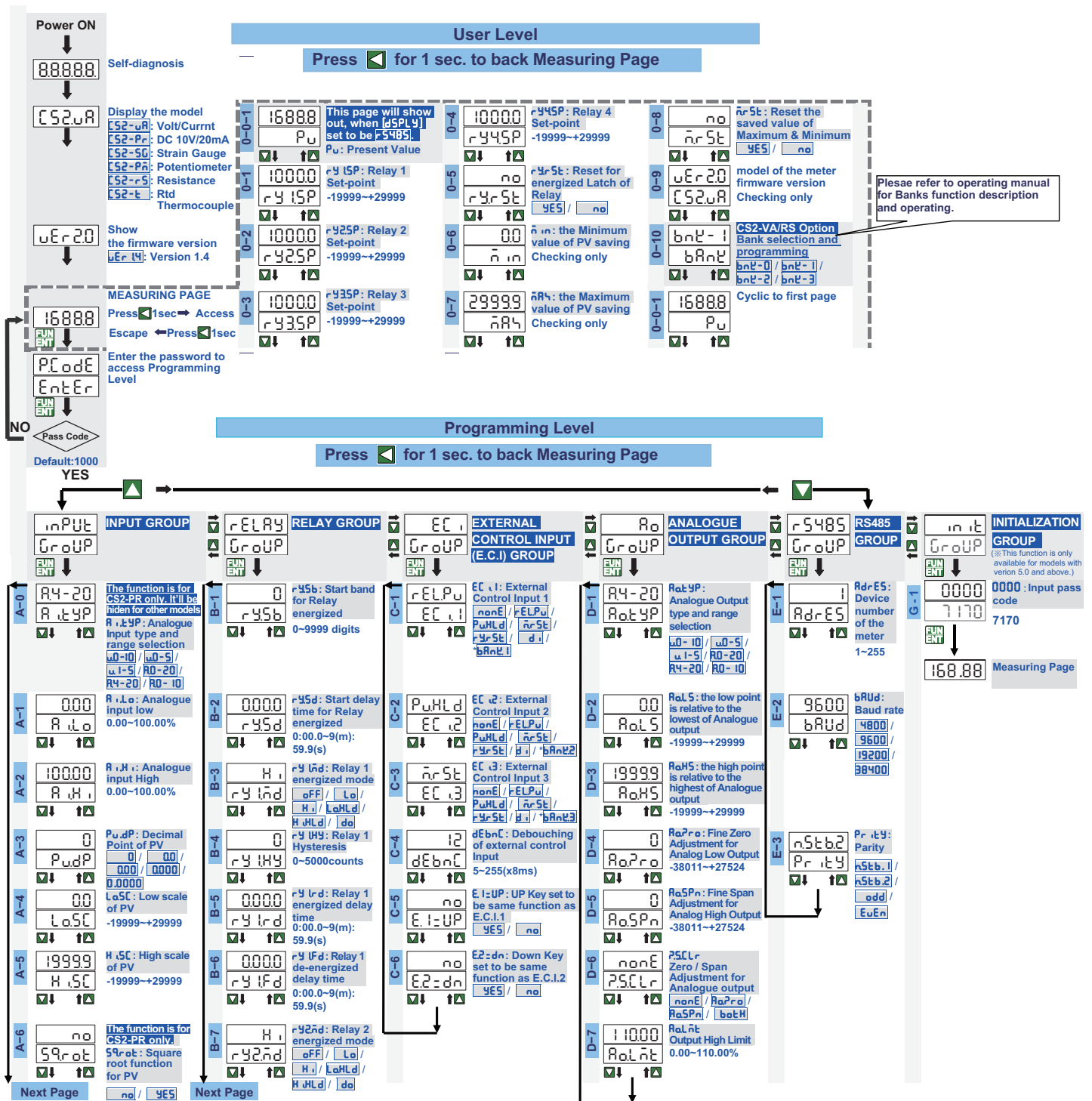
Function Lock: There are 4 levels programmable.

- None **nonE** : no lock all.
- User Level **USER** : User Level lock. User can get into User Level for checking but setting.
- Programming Level **ENG** : Programming level lock. User can get into programming level for checking but setting.
- ALL **ALL** : All lock. User can get into all level for checking but setting.

Front Key Function:

- The Key can be set to be the same function as the setting of ECI1. Ex. The ECI1 set to be **P.V.Hld** and the function **[E1=UP]** set to be **YES** in **[EC , GRoup]**. When user presses Key, the PV will hold as like as ECI1 close.
- The Key can be set to be the same function as the setting of ECI2. Ex. The ECI2 set to be **FELPu** and the function **[E2=dn]** set to be **YES** in **[EC , GRoup]**. When user presses Key, the PV will show relative value as like as ECI2 close.
 - If the front key function has been set, the terminal input for ECI will be disabling.

■ OPERATING FLOW CHART: Please refer to operating manual for detail description



A-7	00 PuPro ↓ ↑	PuPro: Fine Low point Adjustment for PV display -19999~+29999
A-8	00 PuSPn ↓ ↑	PuSPn: Fine High point Adjustment for PV display -19999~+29999
A-9	nonE PSClr ↓ ↑	PSClr: Clear Fine Zero / Span Adjustment for PV display nonE / PuPro / PuSPn / both
A-10	Pu dSPly ↓ ↑	dSPly: Display Function for PV screen Pu / H in JH / nRnH / S485
A-11	00 LoCut ↓ ↑	LoCut: Low Cut the PV -19999~+29999
A-12	5 AuG ↓ ↑	AuG: Average update for PV 1(None)~99times
A-13	1 mAuG ↓ ↑	mAuG: Moving Average update for PV 1(None)~10times
A-14	0 dF.Lt ↓ ↑	dF.Lt: Digital filter 0(None)/1~99times
A-15	0000 PCodE ↓ ↑	PCodE: Pass Code setting for access to Programming Level 0000~9999
A-16	nonE FLocL ↓ ↑	FLocL: Function Level Lock nonE / USEr / EnG / ALL
B-8	0 rY2HY ↓ ↑	rY2HY: Relay 2 Hysteresis 0~5000counts
B-9	0000 rY2rd ↓ ↑	rY2rd: Relay 2 energized delay time 0:00.0~9(m):59.9(s)
B-10	0000 rY2Fd ↓ ↑	rY2Fd: Relay 2 de-energized delay time 0:00.0~9(m):59.9(s)
B-11	Lo rY3nd ↓ ↑	rY3nd: Relay 3 energized mode oFF / Lo / Hi / LoHLd / H JHLd / do
B-12	0 rY3HY ↓ ↑	rY3HY: Relay 3 Hysteresis 0~5000counts
B-13	0000 rY3rd ↓ ↑	rY3rd: Relay 3 energized delay time 0:00.0~9(m):59.9(s)
B-14	0000 rY3Fd ↓ ↑	rY3Fd: Relay 3 de-energized delay time 0:00.0~9(m):59.9(s)
B-15	Lo rY4nd ↓ ↑	rY4nd: Relay 4 energized mode oFF / Lo / Hi / LoHLd / H JHLd / do / Co-12 / Co-23
B-16	0 rY4HY ↓ ↑	rY4HY: Relay 4 Hysteresis 0~5000counts
B-17	0000 rY4rd ↓ ↑	rY4rd: Relay 4 energized delay time 0:00.0~9(m):59.9(s)
B-18	0000 rY4Fd ↓ ↑	rY4Fd: Relay 4 de-energized delay time 0:00.0~9(m):59.9(s)