

## DESCRIPTION

CS1-F economic type Frequency Indicator has been designed with high accuracy measurement, display and communication of Frequency.

☑ The innovation feature is auto-range input from 0.01Hz~100KHz(option ~140KHz) and the display resolution will auto-change to show the highest according to input frequency.

They are also available 1 option of 1 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 panels and testing applications.



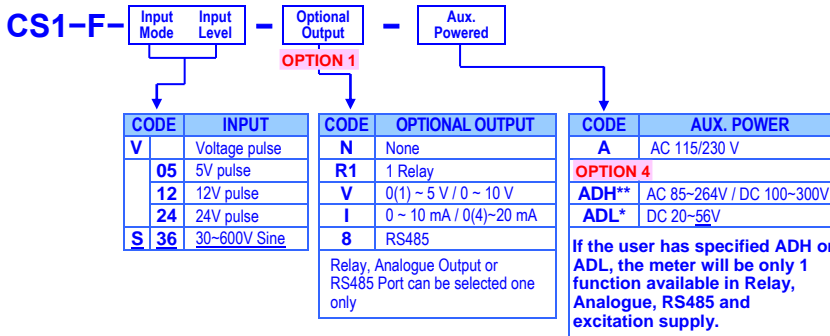
## FEATURE

- Measuring Frequency AUTO RANGE 0.01~100KHz / ~140KHz(optional) / Voltage pulse or sine wave(specify).
- Accuracy: ± 0.005%; Display range: 0~99999; Decimal Point auto moving according to input frequency
- Option available 1 of 1 relay, 1 analogue output or RS485(Modbus RTU mode)
- 1 relay can be programmed individual to be a Hi / Lo / Hi Latch / Lo Latch energized with Start Delay / Hysteresis / Energized & De-energized Delay functions.
- Analogue output or RS 485 communication port in option
- CE Approved & RoHS

## APPLICATIONS

- MCC panel, Machinery, Switch gear... for Frequency Measuring, Alarm or Communication with PC/PLC
- Testing Equipments for Frequency Measuring, Alarm or Communication with PC/PLC

## ORDERING INFORMATION



## TECHNICAL SPECIFICATION

Input		
Input Frequency	Input Mode	Input Level
0.01Hz ~ 50 Hz	Voltage Pulse	High Level: over 2/3 of input level
0.01Hz ~ 100KHz		Low Level: under 1/3 of input level
0.01Hz ~ 140KHz (option)	Sine Wave	

**Calibration:** Doesn't need calibration  
**Input range:** Auto range: 0.01Hz ~ 100KHz (~140KHz in option);  
**Accuracy:** ≤± 0.005% of FS± 1C;  
**Sampling time:** 15 cycles/sec(≥15Hz);  
 f cycles/sec(≤15Hz)  
**Response time:** ≤100 msec(when the AvG = "1")  
**Time out function:** Auto, Manual programmable, In manual mode, the period of time out can be set 0.0 sec~999.9sec

**Display & Functions**  
**LED:** Numeric: 5 digits, 0.8"(20.0mm)H red high-brightness LED  
 Relay output indication: 1 square red LED  
 RS 485 communication: 1 square orange LED  
 E.C.I. function indication: 1 square green LED  
 Max/Mini Hold indication: 2 square orange LED

**Display range:**  
**Resolution of PV:**  
**(Auto-Moving for d.p.)**  
**Compensation factor:**  
**Over range indication:**  
**Max / Mini recording:**  
**Display functions:**  
**Front key functions:**  
**Low cut:**  
**Digital fine adjust:**

**Reading Stable Function**  
**Average:** Settable range: 1~99 times  
**Moving average:** Settable range: 1(None)~10 times  
**Digital filter:** Settable range: 0(None)/1~99 times

**Down key function indication(Reset for Max(Mini) Hold / PV Hold / Rel. PV):** 1 square green LED  
 0.0000~99999 with auto moving of decimal point  
 Decimal point will Auto-changed according to input  
**Auto / Semi-Auto / Fix; 3 mode programmable**  
**Compensate error from 0.001~9.999**  
 0.0FL, when input is over 20% of input range Hi  
 Maxi & Mini Value of PV storage during power on.  
**PV / Max(Mini) Hold / RS 485 programmable**  
**Relative PV / PV Hold / Reset for maxi(mini) hold / Reset for relay energized latch programmable**  
 Settable range: -19999~29999 counts  
**PuPn:** Settable range: 0~+99999  
**PuSPn:** Settable range: 0~+99999

Amend: 2010/4/26: Modify the terminals and range for DC power supply from AC/DC 20~56V to DC 20~56V.



### Control Functions(option)

- Set-points:** One set-point
- Control relay:** 1 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)
- Energized 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:**  $\pm 0.1\%$  of F.S.;
- Ripple:**  $\leq \pm 0.1\%$  of F.S.
- Response time:**  $\leq 100$  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:  $\geq 1000\Omega$ ;**  
**Current: 4(0)~20mA:  $\leq 500\Omega$  max**
- Functions:** **Ra.H5**(output range high): Settable range: 0~99999  
**Ra.L5**(output range Low): Settable range: 0~99999  
**Ra.Pr.o:** Settable range: -38011~27524  
**Ra.SP.n:** Settable range: -38011~27524
- Digital fine adjust:**

### 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
- Remote Display:** to show the value from RS485 command of master
- Distance:** 1200M
- Terminate Resistor:** 150 $\Omega$  at last unit.

### Electrical Safety

- Dielectric Strength:** AC 2.0 KV for 1 min, Between Power / Input / Output / Case
- Insulation Resistance:**  $\geq 100M$  ohm at 500Vdc, Between Power / Input / Output
- Isolation:** Between Power / Input / Relay, Analogue, 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:**  $\leq 100$  PPM/°C
- Storage Temp.:** -10~70 °C
- Enclosure:** Front panel: IEC 529 (IP52); Housing: IP20

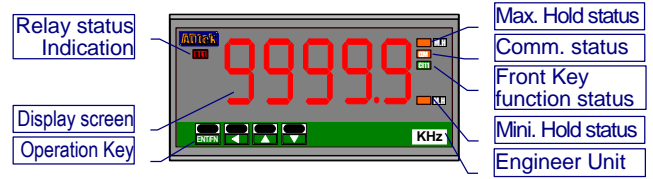
### Mechanical

- 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)  
10A 300Vac, M2.6, 1.3~2.0mm<sup>2</sup>(16~22AWG)
- Weight:** 350g

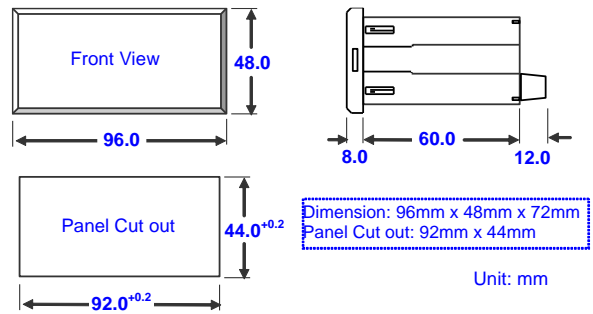
### Power

- Power Supply:** AC115/230V,50/60Hz;  
Optional: AC 85~264V / DC 100~300V or DC 20~56V
- Power Consumption:** 3.0VA maximum  
ADH/ADL: 8VA/4.0W
- Back Up Memory:** By EEPROM

## FRONT PANEL

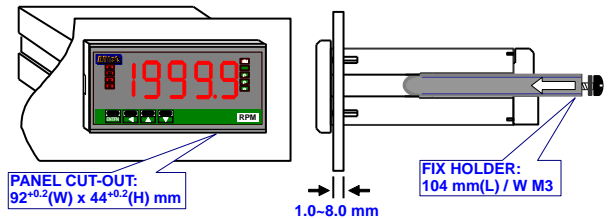


## DIMENSIONS

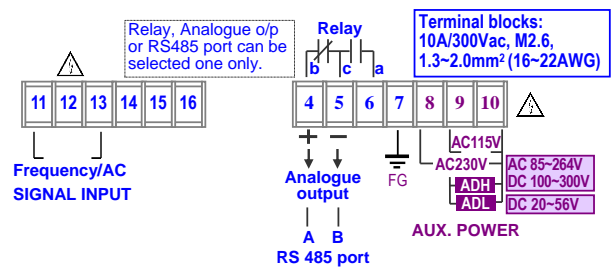


## INSTALLATION

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

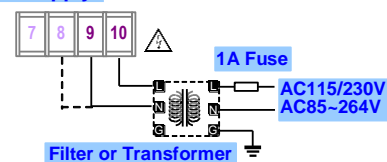


## CONNECTION DIAGRAM

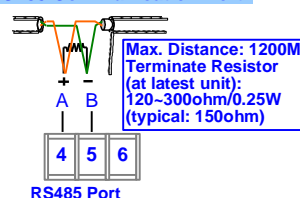


Please check the voltage of power supplied first, and then connect to the specified terminals. It is recommended that power supplied to the meter be protected by a fuse or circuit breaker.

### Power Supply



### RS485 Communication Port



# FUNCTION DESCRIPTION

## Input Functions

**Input range:** Auto-Range: 0.01Hz~100.00KHz(option 140KHz),  
The meter has been designed very wide input auto-range from 0.01Hz~100.00KHz (Option: 0.01Hz~140.00KHz) that can cover almost any application for RPM, Linear Line Speed and Frequency. User doesn't need to specify the input range.

**Auto range display:** programmable between Auto Range / Semi-Auto Range / manual range, The description as below,  
**Auto range [AUto]:** The decimal point will be auto changed according to the input frequency so that keep reading in the highest resolution.  
**Semi-Auto range [SEn]:** The decimal point will be auto changed according to the input frequency to keep reading in the highest resolution under setting position of decimal point.  
according to the setting of decimal point. So, it's possible to show "overflow", if the input frequency is over the display range.  
**Manual range [FRnUL]:** The decimal point will be fixed

## Time out of input:

In the case of low frequency, the meter can not to identify that is low frequency and no input until the next pulse input. Sometimes, it takes a long period.  
The meter builds in a time out function to cut out the reading to be "0". There are two modes [FRnUL] / [AUto] can be programmed.

**Manual [FRnUL]:** There is a period named [tO] can be set from 0.0 sec~999.9sec. The reading will display "0", when the next pulse doesn't input during the setting time.

**Auto range [AUto]:** The reading will display "0", when the next pulse doesn't input during the time that gave by formula of meter's firmware.

## Period of time out:

Settable: 0.0 sec~999.9sec  
If the time out mode [tO] set to be [FRnUL], it will be show out.

## Display & Functions

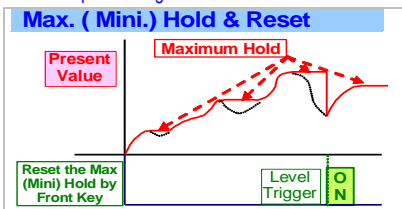
**Max / Mini recording:** The meter will storage the maximum and minimum value in [User Level] during power on in order to review drifting of PV.

**Display functions:** PV / Max(Mini) Hold / RS 485 programmable in [dSPLY] function of [InPUt GRoUP]

(Please refer to step A-07)

**Present Value [PV]:** The display will show the value that Relative to Input signal.

**Maximum Hold [FRSHd] / Minimum Hold [FRnHd]:**  
The meter will keep display in maximum(minimum) value during power on, until manual reset by front key in [User Level], rear terminal (ECI) is close or press front down or up key to reset (according to setting, please functions of refer to the ECI Group)  
▶ Please find the [M.M] sticker that enclosure the package of the meter to stick on the right side of square orange LED



**Remote Display by RS485 command [F5485]:**  
The meter will show the value that received from RS485 sending. 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 can so that can be save cost and wiring from PLC.

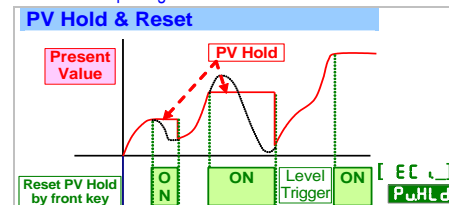
**Front key functions:** Relative PV / PV Hold / Reset for maxi(mini) hold / Reset for relay energized latch programmable in [dSPLY] function of [InPUt GRoUP]

**Relative PV [RELPU]: [dSPLY]** function can be set to be [RELPU] function. When user press the [key], the display will show the differential value(ΔPV), until press [key] again.

Please find the [R.PV] sticker to stick on the right side of square green LED.

**PV Hold [PvHLd]: [dSPLY]** function can be set to be [PvHLd] function. When user press the [key], the display will be hold until press the [key] again.

▶ Please find the [P.VH] sticker to stick on the right side of square green LED.

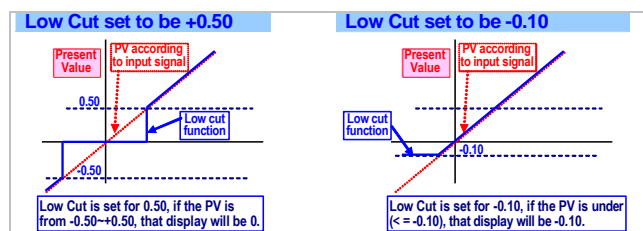


**Reset for Max(Mini) Hold:** when the [dSPLY] in [InPUt GRoUP] set to be [FRSHd] or [FRnHd], [dSPLY] function can be set to be [rSt] to reset the display when it is holding in maxim or mini value.

**Reset for relay energized latch:** when the [rY lnd] in [RELAY GRoUP] set to be [HLd] or [LHLd], [dSPLY] function can be set to be [YrSt] to reset the relay when it is energizing and latching.

## Low cut:

If the setting value is positive, it means when the absolutely value of PV ≤ Setting value, the display will be 0. If the setting value is negative, it means when the PV under setting value(PV ≤ -Setting value), the display will be setting value.

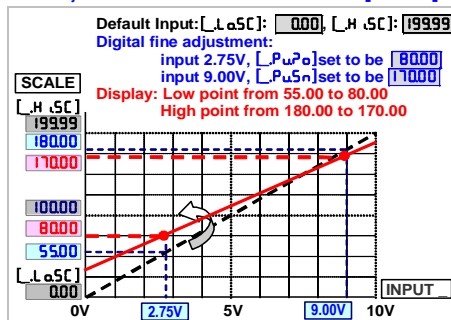


## Digital fine adjust:

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

The adjustment can be clear in function [P5CLr]



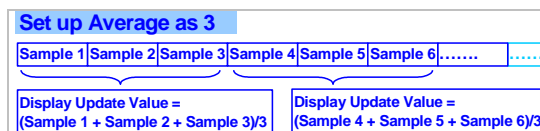
**Compensation factor:** Settable range: 0.001~9.999

The factor is compensation of display. There are some applications that are indirect detection. User can set the factor to compensate the display.

## Reading Stable Function

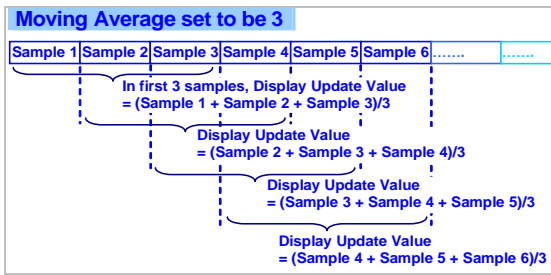
### Average:

Standard sampling rate is 15 cycles/sec.  
i.e. AVG set up as 3, it means display will update 5 times/sec



**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.



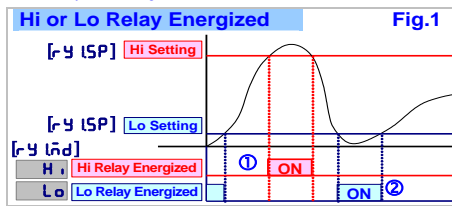
**Digital filter:**

The digital filter can reduce the magnetic noise in field.

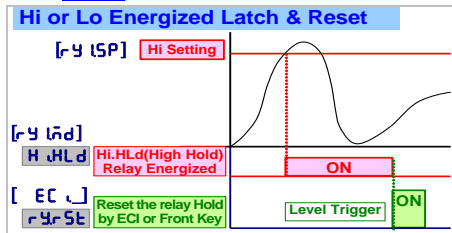
**Control functions(option)**

**Relay energized mode:**

Hi / Lo / Hi.HLD / Lo.HLD programmable  
**H :** Relay will energize when PV > Set-Point  
**Lo :** Relay will energize when PV < Set-Point

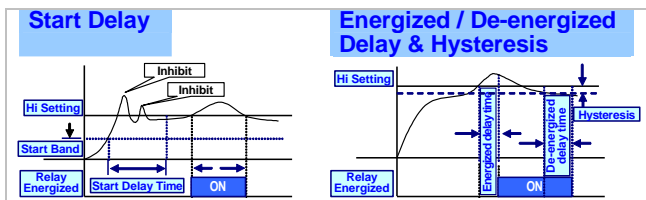


**Hi.HLD (Lo.HLD):** When the PV is Higher (or lower) than set-point, the relay will be energized and latch until manual reset by from key in [ user level] or press down key to reset (if the [dRSEY] function set to be [YrSE])



**Energized functions:**

Start delay / Energized & De-energized delay / Hysteresis



**Analogue output(option)**

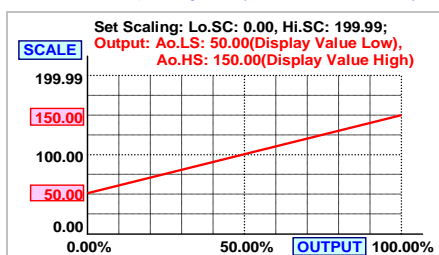
Please specify the output type either an 0~10V or 4(0)~20mA in ordering. The programmable output low and high scaling can be based on various display values. Reverse slope output is possible by reversing point positions.

**Output range:**

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

**Functions:**

**RoHS** (output range high): setting the Display value High to versus output range High(as like as 20mA in 4~20)  
**RoLS** (output range Low): setting the Display value Low to versus output range Low(as like as 4mA in 4~20)



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

**Fine zero & span adjustment:**

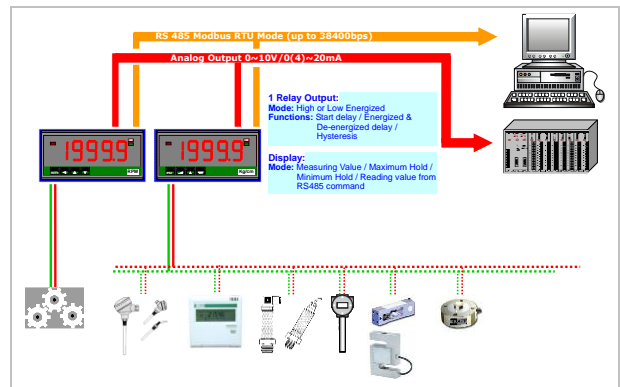
Users can get Fine Adjustment of analogue output by front key of the meter. Please connect standard meter to the terminal of analogue output. To press the front key(up or down key) of meter to adjust and check the output.

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

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

**RS 485 Communication(option)**

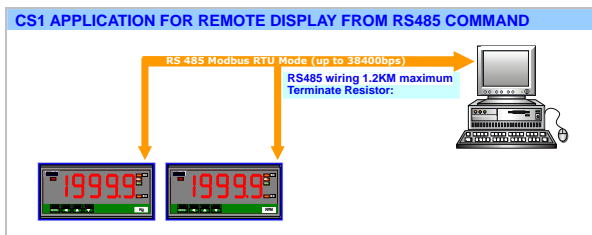
The RS485's protocol is Modbus RTU mode, and baud rate up to 38400 bps. It's convenience to remote monitoring, display for reading.



**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] set to be RS485, it means, the PV screen will show the number from RS485 command & data. The data(number) will be same as PV that will compare with set-point, analogue output and ECI functions so that is to control analogue output, relay energized and so on.



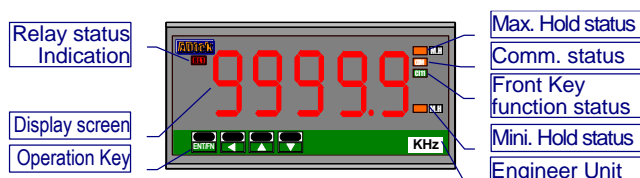
## ■ ERROR MESSAGE

BEFORE POWER ON, PLEASE CHECK THE SPECIFICATION AND CONNECTION AGAIN.

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 ↔ FAiL	EEPROM occurs error	(Please send back to manufactory for repaired)
Ai.nG ↔ Pu	Calibrating Input Signal do not process	(Please process Calibrating Input Signal)
AiL ↔ FAiL	Calibrating Input Signal error	(Please check Calibrating Input Signal)
Ao.nG ↔ Pu	Calibrating Output Signal do not process	(Please process Calibrating Output Signal)
AoL ↔ FAiL	Calibrating Output Signal error	(Please check Calibrating Output Signal)

## ■ FRONT PANEL:



### ■ Numeric Screens

0.8"(20.0mm) red high-brightness LED for 5 digital present value.

### ■ I/O Status Indication

- **Relay Energized:** 1 square red LED  
**RL1** display when Relay 1 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.
- **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**
- **Down key 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 fo Relay Latch)
- **Engineer Label:** over 80 types.

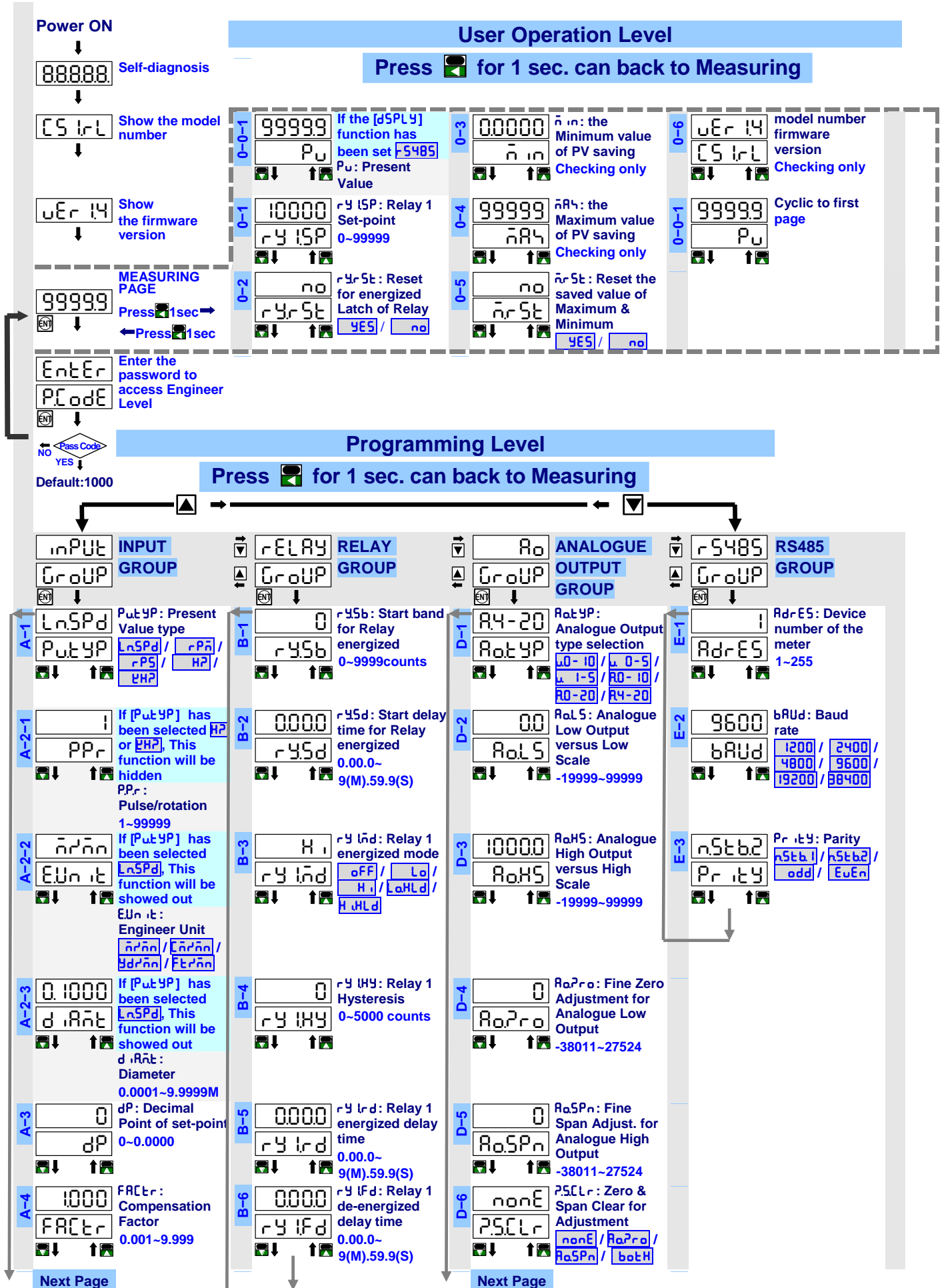
- **Operating Key:** 4 keys for Enter(Function) / Shift(Escape) / Up key / Down key

	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:** 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 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 **FELPu** / **PuHLd** / **nRSt** / **rYrSt** programmable.

■ OPERATING DIAGRAM (The detail description of operation, Please refer to operating manual)

CS1-F



**A-5** PuSPn: Fine High point Adjustment for PV display  
 0~+99999  
 PuSPn

**A-6** SCLr: Clear Fine Span Adjustment for PV display  
 YES / no  
 SCLr

**A-7** dSPLY: Display Function  
 Pu / rAnHd / rAnUL / F5485  
 dSPLY

**A-8** LoCUT: Low Cut Function  
 0~99999  
 LoCUT

**A-9** tAoNd: Input time out Mode  
 AUTO / rAnUL  
 tAoNd

**A-10** tO: How long will be time out  
 0.0~999.9sec  
 If [tAoNd] has been selected rAnUL, This function will be showed out  
 tO

**A-11** rAnGE: Reading Range with decimal point switching.  
 AUTO / SEt / rAnUL  
 rAnGE

**A-12** RuG: Average update for PV  
 1(None)~99 times  
 RuG

**A-13** rAnRuG: Moving Average update for PV  
 1(None)~10 times  
 rAnRuG

**A-14** dF iLt: Digital filter  
 0(None)/1~99 times  
 dF iLt

**A-15** dnPEY: Down key function  
 nonE / rELPu / PuHLd / rAnSt / rYrSt  
 dnPEY

**A-16** PCodE: Pass Code for enter Engineer Level  
 0000~9999  
 PCodE

**A-17** FLocY: Function Level Lock  
 nonE / USEr / EnG / ALL  
 FLocY

**D-7** RoLnt: Analog Output High Limit  
 0.00~110.00%  
 110.00  
 RoLnt

▶ Plesae refer to operating manual for detail description.