CS2-F FREQUENCY Meter

■DESCRIPTION

CS2-F 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 building in 4 Relay outputs, 3 External Control Inputs, 1 Analogue output and 1 RS485(Modbus RTU Mode) interface with versatile functions such as control, alarm, re-transmission and communication for a wide range of testing and machinery control 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
- 4 relay can be programmed individual to be a Hi / Lo / Hi Latch / Lo Latch / Go energized with Start Delay / Hysteresis / Energized & De-energized Delay functions, or to be a remote control.
- Analogue output and RS 485 communication port in option
- 3 external control inputs can be programmed individual to be Tare (Relative PV) / PV Hold / Maximum or Minimum Hold / DI (remote monitoring) / Reset for Relay Energized Latch….
- CE Approved & RoHS

■APPLICATIONS

- MCC panel, Machinery, Switch gear... for Frequency Measuring, Alarm and Remote I/O with PC/PLC
  - ☑ Fantastic 4 Relay functions as like as Hi / Lo / Hi latch / Lo latch / DO(Remote control by PC/PLC).
  - ☑ Flexible 3 DI functions as like as Reset for Relay energized and Remote monitoring by PC/PLC.
- Testing Equipments for Frequency Measuring, Alarm and Communication with PC/PLC
  - ☑ Flexible 3 DI functions as like as Maximum/Minimum hold, PV hold and Relative PV.
  - ☑ On line testing station for appliance, check points of PCB as so on.

■ORDERING INFORMATION

CS2-F- [Input Mode] [Input level] – [Relay Output] – [Analogue Output] – [RS 485 Port] – [AUX. POWER] ★ – [*Optional Function] Customize function is welcome. Please contact with our sales for detail.

OPTION 1 | OPTION 2 | OPTION 3

CODE		INPUT MODE
V		Voltage Pulse
	05	5V pulse
	12	12V pulse
	24	24V pulse
S	36	30~600Vac
O	xx	Specify

CODE	REALY OUTPUT
N	None
R2	2 Relay
R4	4 Relay

CODE	ANALOG O/P
N	None
V	0(1) ~ 5 V 0 ~ 10 V
I	0 ~ 10 mA 0(4)~20 mA

CODE	RS 485 PORT
N	None
8	RS 485

CODE	AUX. POWER
A	AC 115/230 V
OPTION 4	
ADH*	AC 85~264V DC 100~300V
ADL*	DC 20~90V

■TECHNICAL SPECIFICATION

Input

Input Frequency	Input Mode	Input Level
0.01Hz ~ 50 Hz 0.01Hz ~ 100KHz 0.01Hz ~ 140KHz (option)	Voltage Pulse	High Level: over 2/3 of input level Low Level: under 1/3 of input level
	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 AuG = "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: 4 square red LED
RS 485 communication: 1 square orange LED
E.C.I. function indication: 3 square green LED
Max/Mini Hold indication: 2 square orange LED
Display range: **0.0000~99999** with auto moving of decimal point
Resolution of PV: Decimal point will Auto-changed according to input
(Auto-Moving for d.p.) **Auto / Semi-Auto / Fix; 3 mode programmable**

Compensation factor: Compensate error from 0.001~9.999
Over range indication: ouFL, when input is over 20% of input range Hi
Max / Mini recording: Maxi & Mini Value of PV storage during power on.
Display functions: **PV / Max(Mini) Hold / RS 485 programmable**
Front key functions: **Up and down key can be set to be a function as ECI.**
Low cut: Settable range: -19999~29999 counts
Digital fine adjust: PuPro: Settable range: 0~+99999
PuSPn: Settable range: 0~+99999

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

Control Functions(option)

Set-points:	Four set-points
D.P. of set point:	Programmable from 0 / 0.0 / 0.00 / 0.000 / 0.0000
Control relay:	Four relays Relay 2 & Relay 3: Dual FORM-C, 5A/230Vac, 10A/115V 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.23 / **Hi.HLd** / **Lo.HLd**; programmable **DO function:** Energized by RS485 command of master.
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

External Control Inputs(ECI)

Input mode:	3 ECI points, Contact or open collect input, Level trigger
Functions:	Relative PV(Tare) / PV Hold / Reset Max or Mini. Hold / **DI** / Reset for Relay Energized latch
Debouncing time:	*Settable range 5 ~255 (x 8mseconds)*

Analogue output(option)

Accuracy:	**≤± 0.1% of F.S.; 16 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: -19999~29999 **AoLS** (output range Low): Settable range: -19999~29999 **AoLnt** (output High Limit): 0.00~110.00% of output High
Digital fine adjust:	**AoPro:** Settable range: -38011~+27524 **AoSPn:** Settable range: -38011~+27524

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:	150Ω at last unit.

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 / RS485 / E.C.I.
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
Vibration Test:	1~800 Hz, 3.175 g^2/Hz

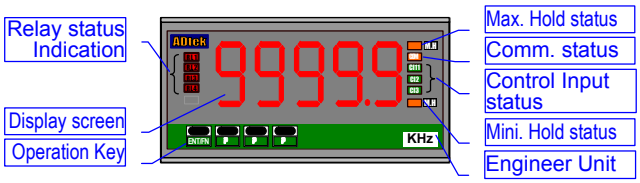
Mechanical

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, M2.6, 1.3~2.0mm²(16~12AWG)
Weight:	550g / 350g(Aux. Power Code: ADH or ADL)

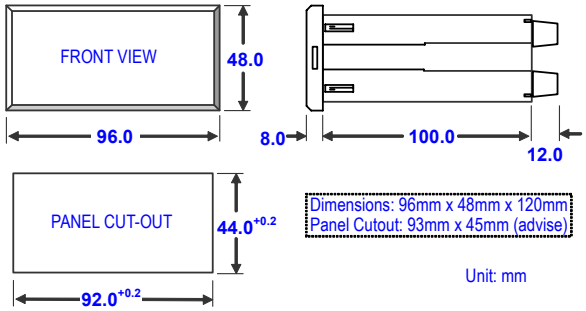
Power

Power Supply:	AC115/230V,50/60Hz; **Optional: AC 85~264V / DC 100~300V or DC 20~56V**
Power Consumption:	5.0VA maximum
Back Up Memory:	By EEPROM

■FRONT PANEL

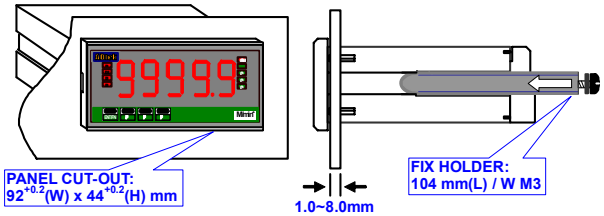


■DIMENSIONS

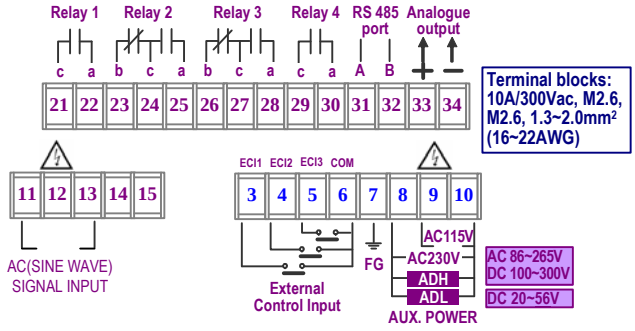


■INSTALLATION

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

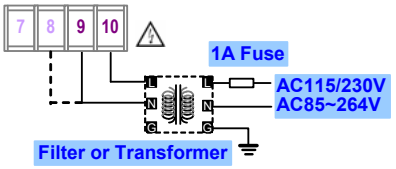


■CONNECTION DIAGRAM

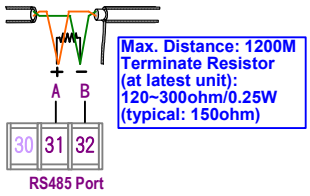


Please check the voltage of power supplied first, and then connect to the specified terminals. It is recommended that power supplied to the meter be protected by a fuse or circuit breaker.

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 i]:

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 [MAnUL]: The decimal point will be fixed by setting

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 [MAnUL] / [AUto] can be programmed.

Manual [MAnUL]: There is a period named [i to] can be set from 0.0 sec ~ 999.9 sec. 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 **[itoMd]** set to be [MAnUL], ito 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]**

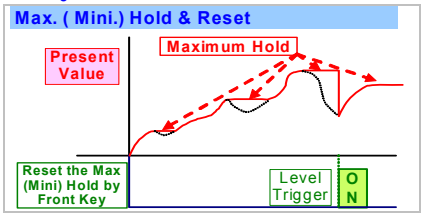
(Please refer to step A-07)

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

Maximum Hold [MAxHd] **/ Minimum Hold** [miHd] **:**

The meter will keep display in maximum(minimum) value during power on, until manual reset by front key in **[User Level]**, rear terminal is close **[External Control Input(E.C.I.)]** or press front down or up key to reset (according. to setting, please functions of refer to the ECI Group)

▶ Please find the MM sticker that enclosure the package of the meter to stick on the right side of square orange LED

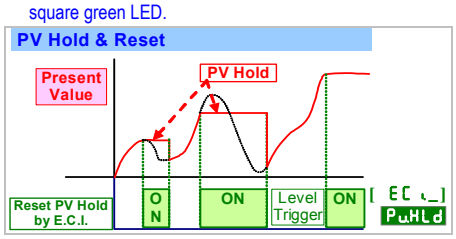


Remote Display by RS485 command [rS485] **:**

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.

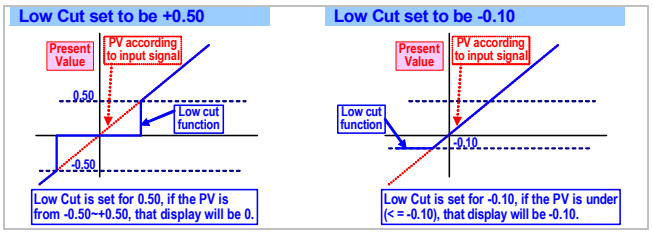
PV Hold [PuHLd] **:** **[External Control Input(E.C.I.)]** can be set to be [PuHLd] function(Please refer to the function of ECI Group). The display will be hold, when the E.C.I. is closed.

▶ Please find the ECI PV.H sticker to stick on the right side of square green LED.



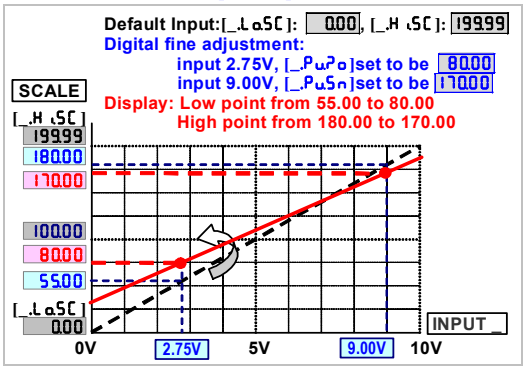
Low cut:

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 **[PuPro]** & **[PuSPn]** are not only in zero & span of PV, but also any lower point for **[PuPro]** & higher point for **[PuSPn]**. The meter will be linearization for full scale. The adjustment can be clear in function **[PSCLr]**



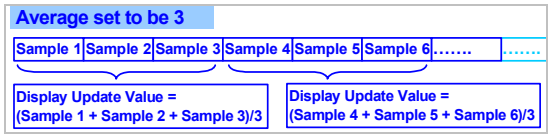
Compensation factor: Settable range: 0.001~9.999

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

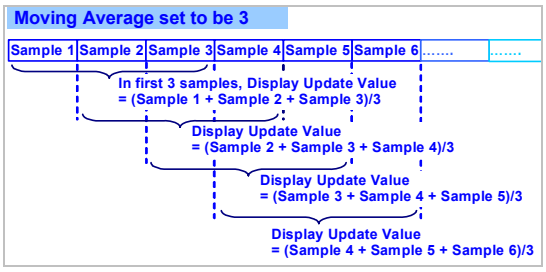
Average:

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.



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.



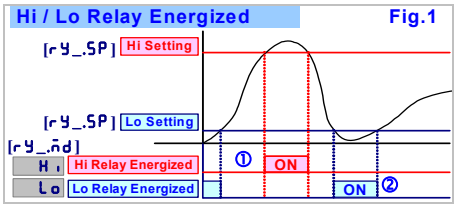
Digital filter: The digital filter can reduce the magnetic noise in field.

Control functions(option)

Relay energized mode: Hi / Lo / **Hi.HLd** / **Lo.HLd** / **do** / **Go-1.2** / **Go-2.3** programmable

Hi [H i](Fig.1-①): Relay will be energized when PV > Set Point

Lo [Lo](Fig.1-②): Relay will be energized when PV < Set Point



Go-1.2 [Go-12]: This function is programmable in Relay 4 only. If the Relay 4 set to be Go function, the relay will compare with **[ry 1SP]** and **[ry2SP]**.

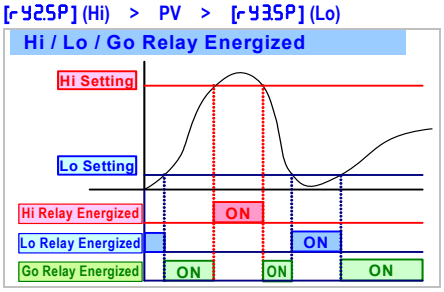
Go relay energized when the condition is

[ry 1SP] (Hi) > PV > **[ry2SP]** (Lo)

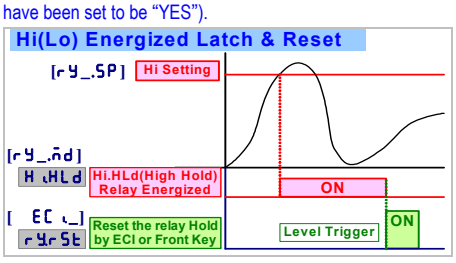
Go-2.3 [Go-23]: This function is programmable in Relay 4 only. If the Relay 4 set to be Go function, the relay will compare with **[ry2SP]** and **[ry3SP]**.

Go relay energized when the condition is

[ry2SP] (Hi) > PV > **[ry3SP]** (Lo)

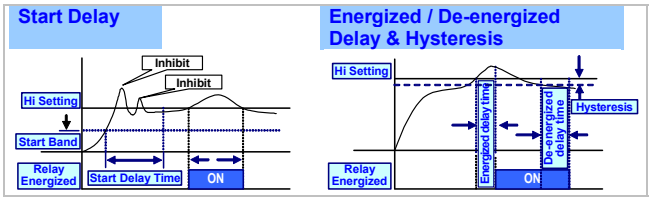


Hi.HLd [H iHLd] (**Lo.HLd** [LoHLd]) : When the PV is Higher (or lower) than set-point, the relay will be energized and latch until manual reset by from key in **[User Level]**, **[External Control Input(E.C.I.)]** is closed or Press front down or up key to reset (UP Key or Down Key functions have been set to be "YES").



DO function [do]: Energized by RS485 command of master. The function was designed to get remote control by RS485 command of master. The typical application is to control a switch in field from computer center as like as digital output(DO) of PLC.

Energized Functions: Start delay / Energized & De-energized delay / Hysteresis



External Control Inputs(ECI)

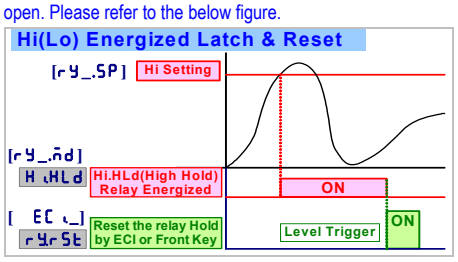
The three external control inputs are individually programmable to perform specific meter control or display functions. All E.C.I. have been designed in level trigger actions. Please pay attention, the ECI1 or ECI2 input will be disable while UP or Down Key has been set to be "YES".

Input mode: 3 ECI points, Contact or open collect input, level trigger

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

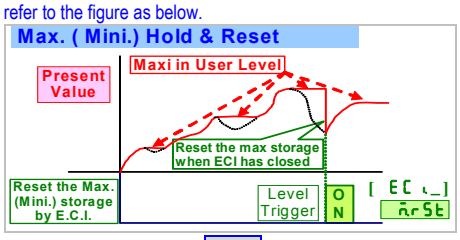
Relative PV or Tare [rELPv]: The E.C.I. can be set to be [rELPv] function. When the E.C.I. is closed, the reading will show the differential value.

PV Hold [PvHLd]: The E.C.I. can be set to be [PvHLd] function. The **display will be hold** when the E.C.I. is closed, until the E.C.I. is to be open. Please refer to the below figure.



Reset for Maximum or Minimum Hold:

When the **[dSPLY]** function in **[inPUt GroUP]** selected [MAXHd] or [h inHd], the display will show Maximum or Minimum value, and can be reset by the E.C.I (close). Please refer to the figure as below.



DI [di]: The E.C.I can be set to be [di] 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: If relay energized mode has set to be Energized latch ([H iHLd] / [LoHLd]), the E.C.I. can be set to be [ryrSt]. When the PV meets the condition of relay energizing, the relay will be energized and latch until the E.C.I. is closed.

Debouncing time:

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

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

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

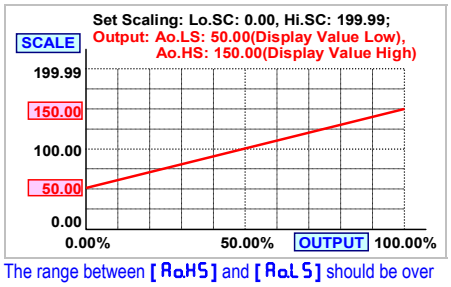
Functions: Output High / Low scale, output limit, fine adjustment

Output range high [AoHS]:

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

Output range low [AoLS]:

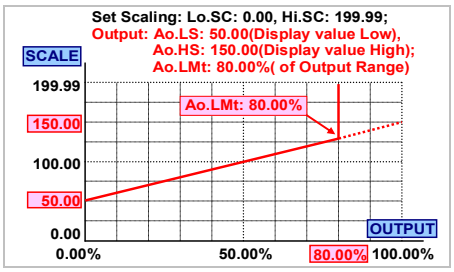
To setting the Display value Low to versus output range Low(as like as 4mA in 4~20)



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

Output High Limit [AoLnt]:

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:

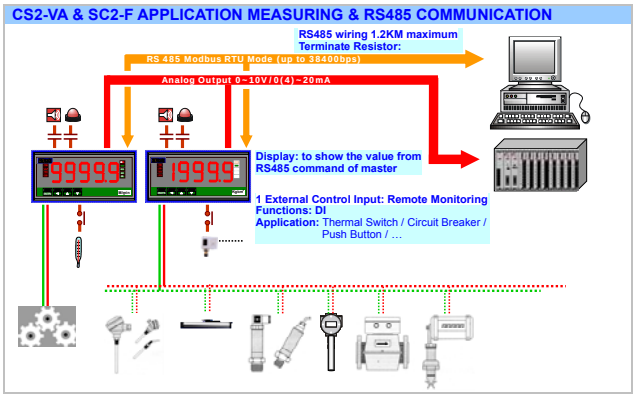
Users can get Fine Adjustment of analogue output by front key of the meter. Please connect standard meter to the terminal of analogue output. To press the front key(up or down key) of meter to adjust and check the output.

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

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

RS 485 communication(option)

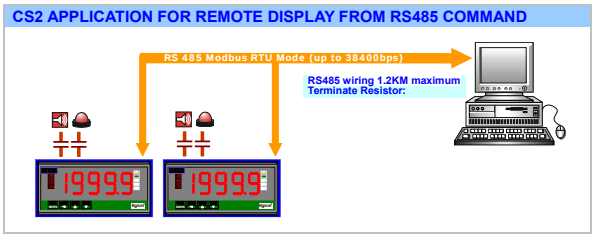
The RS485's protocol is Modbus RTU mode, and baud rate up to 38400 bps. It's not only convenience to remote monitoring, display for reading and ECI status, but also for remote control in the case that doesn't have any DIO device in the field.



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 **[dSPLY]** 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.



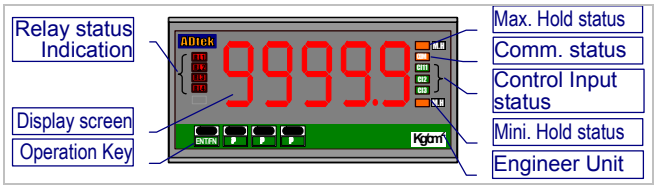
■ ERROR MESSAGE

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)
AiCnG ⇄ Pu	Calibrating Input Signal do not process	(Please process Calibrating Input Signal)
AiC ⇄ FAiL	Calibrating Input Signal error	(Please check Calibrating Input Signal)
AoCnG ⇄ Pu	Calibrating Output Signal do not process	(Please process Calibrating Output Signal)
AoC ⇄ 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:** 4 square red LED
  - 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 LED
  - ECI1 display when E.C.I. 1 close(dry contact)
  - ECI2 display when E.C.I. 2 close(dry contact)
  - ECI3 display when E.C.I. 3 close(dry contact)
- **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
  - MAX 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
- **E.C.I. 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 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 PCodE: 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.

Function Lock: There are 4 levels programmable.

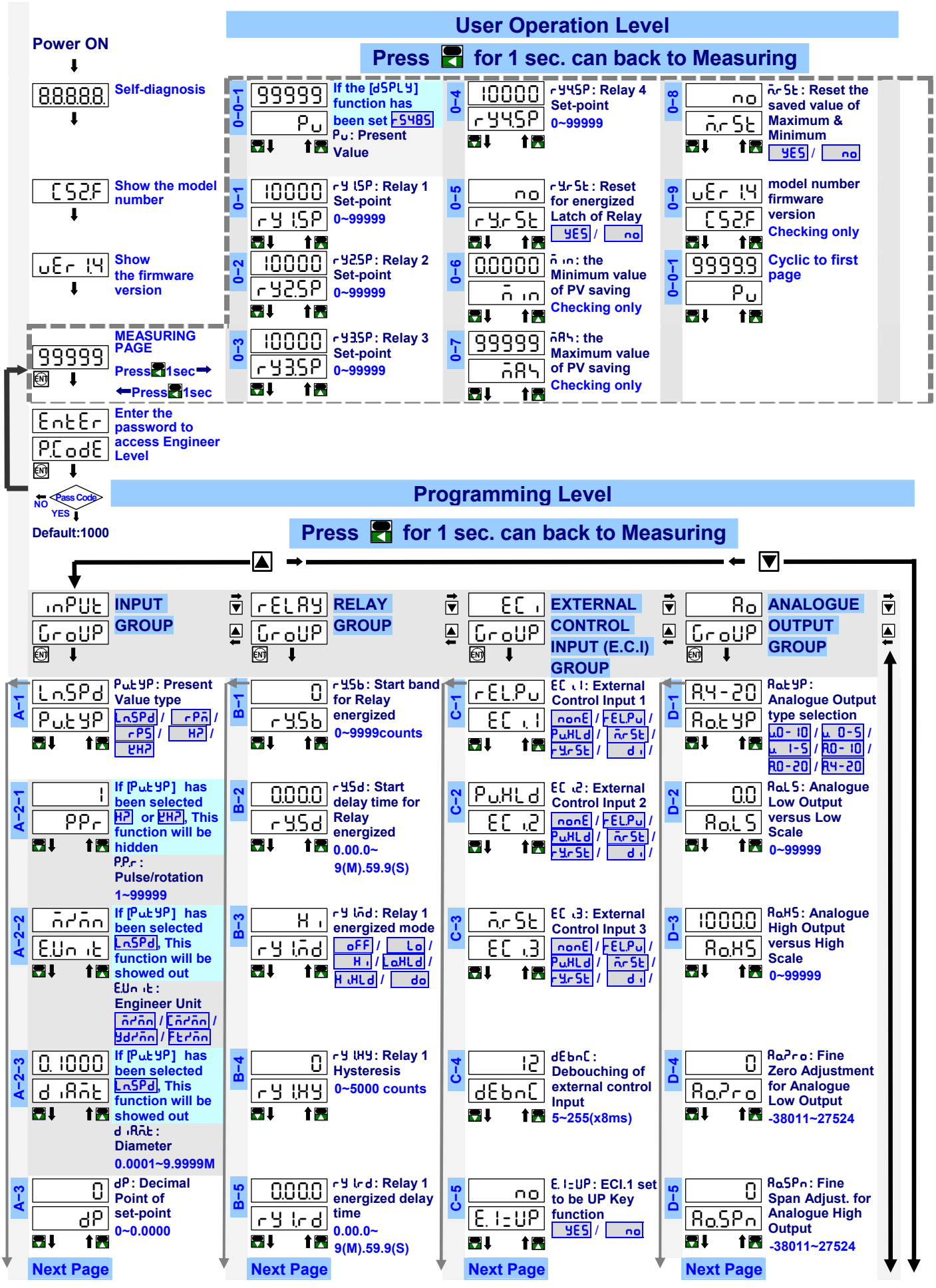
- **None** nonE: no lock all.
- **User Level** USEr: User Level lock. User can get into User Level for checking but setting.
- **Programming Level** EnG: Programming level lock. User can get into programming level for checking but setting.
- **ALL** ALL: All lock. User can get into all level for checking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

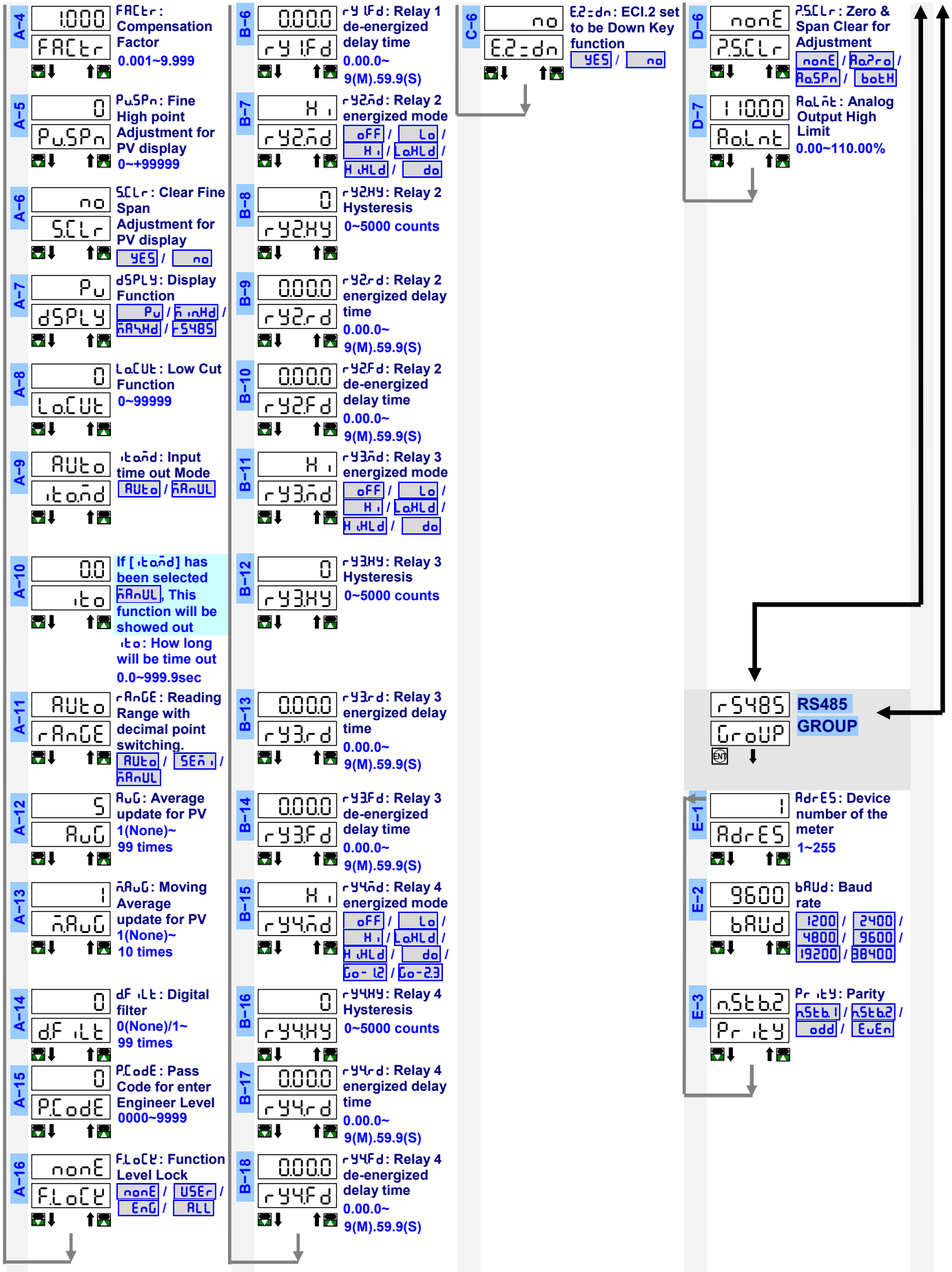
Front Key Function

- The Key can be set to be the same function as the setting of ECI1. Ex. The ECI1 set to be PuHLd and the function [E.1: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 rELPu and the function [E.2: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 DIAGRAM (The detail description of operation, Plesae refer to operating manual)





► Plesae refer to operating manual for detail description.