CS1-RL PULSE (FREQ.) Indicator

■ 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

- RPM, Linear line speed of Machinery Measuring, Alarm or Communication with PC/PLC
- Testing Equipments for Frequency Measuring, Alarm or Communication

■ ORDERING INFORMATION

CS1−RL− [Input Mode | Input Level] **−** [Optional Output] **−** [Excitation Supply] **−** [Aux. Powered]

OPTION 1

CODE		INPUT
C	00	Contact
N		NPN
P		PNP
V		Voltage pulse
	05	5V pulse
	12	12V pulse
	24	24V pulse
O	xx	Specify

CODE	OPTIONAL OUTPUT
N	None
R1	1 Relay
V	0(1) ~ 5 V / 0 ~ 10 V
I	0 ~ 10 mA / 0(4)~20 mA
8	RS485

Relay, Analogue Output or RS485 Port can be selected one only

CODE	EXCITATION
E05	DC 5 V
E12	DC 12 V
E24	DC 24 V

The excitation supply has to match the input mode. The standard is DC12V for 12Vp input mode.

CODE	AUX. POWER
A	AC 115/230 V
OPTION 4	
ADH	AC 85~264V / DC 100~300V
ADL	DC 20~56V

If the user has specified ADH or ADL, the meter will be only 1 function available in Relay, Analogue, RS485 and excitation supply.

■ TECHNICAL SPECIFICATION

Input

Input Frequency	Input Mode	Input Level
0.01Hz ~ 50 Hz	Mech. Contact	
0.01Hz ~ 50 Hz 0.01Hz ~ 100KHz 0.01Hz ~ 140KHz (option)	NPN	High Level: 8~12V; Low Level: 0.0~4.0 V (with excitation supply 12Vdc)
	PNP	
	Voltage Pulse	High Level: over 2/3 of input level Low Level: under 1/3 of input level
Input Mode (NPN, PNP, Contact) & Level (5Vp, 12Vp, 24Vp) changeable by dip switch of rear terminal block.		

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 m-sec(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
Down key function indication (Reset for Max.(Mini.) Hold / PV Hold / Relative. PV): 1 square green LED

Display type: **RPM / RPS / Linear line speed / Frequency programmable**
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: **Relative PV / PV Hold / Reset for maxi(mini) hold / Reset for relay energized latch programmable**
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

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:	**≤± 0.1% of F.S.;**
Ripple:	≤± 0.1% of F.S.
Response time:	≤100 m-sec. (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:	Ao.HS (output range high): Settable range: 0~99999 Ao.LS (output range Low): Settable range: 0~99999
Digital fine adjust:	Ao.Pro: Settable range: -38011~27625 Ao.SPn: Settable range: -38011~27625

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
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 529 (IP52); Housing: IP20

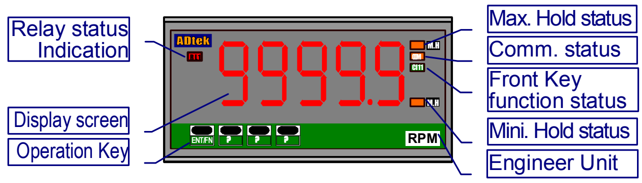
Mechanical

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, 1.3~2.0mm²(16~22AWG)
Weight:	350g

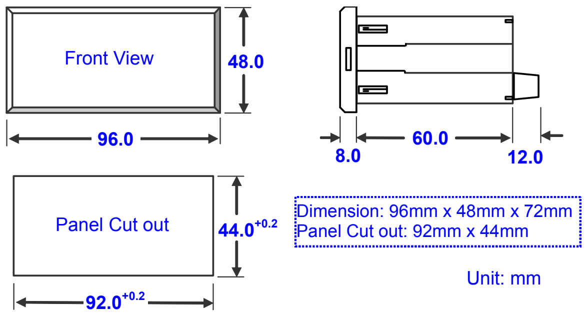
Power

Power Supply:	AC115/230V,50/60Hz; **Optional: AC 85~264V / DC 100~300V or DC 20~56V**
Excitation Supply:	DC12V, 24V/30mA maximum
Power Consumption:	3.0VA maximum
Back Up Memory:	By EEPROM

FRONT PANEL

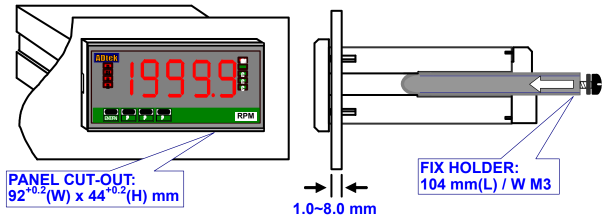


DIMENSIONS

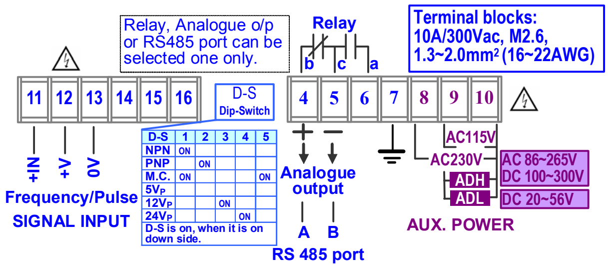


INSTALLATION

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

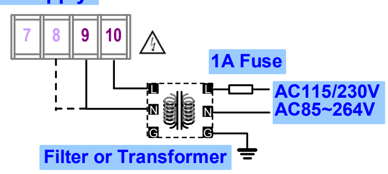


CONNECTION DIAGRAM

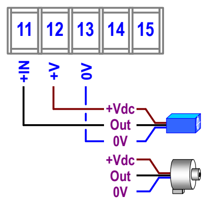


Please check the voltage of power supplied first, and then connect to the specified terminals. It is recommended that power supplied to the meter be protected by a fuse or circuit breaker.

Power Supply



Sensor input connection

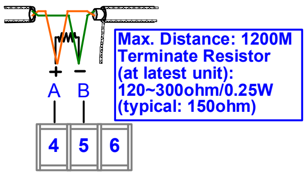


Please change the dip-switch on rear of meter to match the input mode and level.

D-S	1	2	3	4	5
NPN	ON				
PNP		ON			
Mech. Contact	ON				ON
Voltage pulse $5V_P$					
Voltage pulse $12V_P$			ON		
Voltage pulse $24V_P$				ON	
D-S is on when it is in down site					

CS1-RL

RS485 Communication Port



RS485 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 [SEmi]: 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

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 [ito] 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], it's will be show out.

Display & Functions

Max / Mini recording: The meter wills 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]**

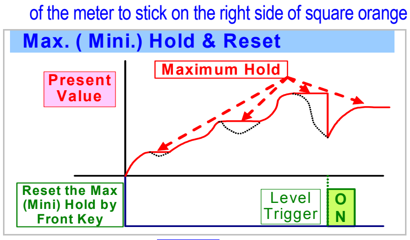
(Please refer to step A-07)

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

Maximum Hold [MAHd] / **Minimum Hold** [MinHd] :

The meter will keep display in maximum (minimum) value during power on, until press front key to reset (If the down key function in [inPUt GroUP] has been set to [nrSt]) .

▶ Please find the [M.H] 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.

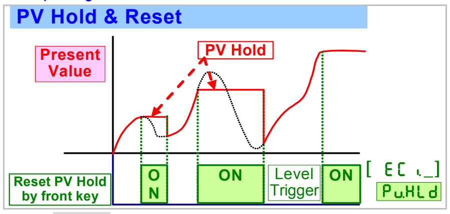
Front key functions: **Relative PV / PV Hold / Reset for maxi(mini) hold / Reset for relay energized latch programmable in [dnKEY] function of [inPUt GroUP]**

Relative PV [rEL.Pu]: The **[dnKEY]** function can be set to be [rEL.Pu] function. When user presses 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.

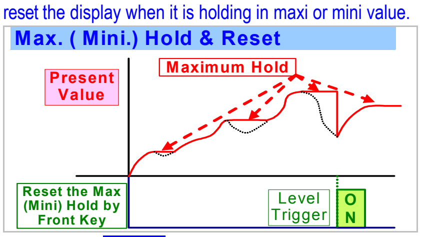
PV Hold [PuHLd]: The **[dnKEY]** function can be set to be [PuHLd] function. When user presses the key, the display will be hold until press the key again.

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



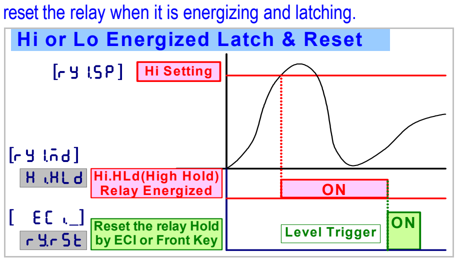
Reset for Max(Mini) Hold [nrSt]:

when the **[dSPLY]** in **[inPUt GroUP]** set to be [MAHd] or [MinHd] , **[dnKEY]** function can be set to be [nrSt] to reset the display when it is holding in maxi or mini value.



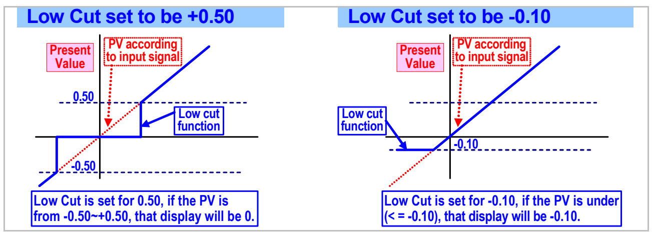
Reset for relay energized latch [rYrSt]:

when the **[rY Lnd]**in **[rELAY GroUP]** set to be [HiHLd] or [LoHLd] , **[dnKEY]** function can be set to be [rYrSt] 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.



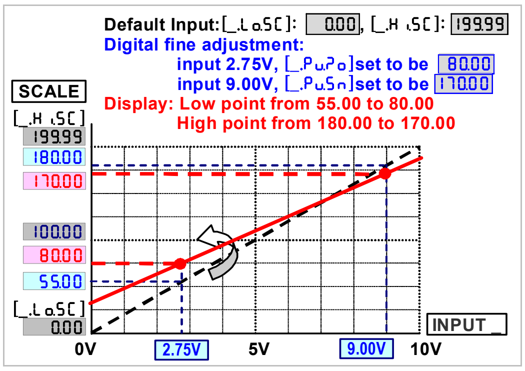
Digital fine adjustment:

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

The adjustment can be clear in function **[P.SCLr]**

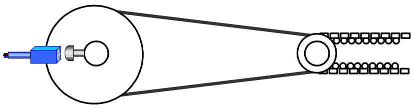
CS1- RL



Compensation factor: Settable range: 0.001~9.999

The factor is compensation of display. There are some applications that are indirect detection of sensor as like as Gear, wheel. User can set the factor to compensate the display.

User installs the proximity switch to detect the RPM of left wheel, and want to show the right wheel. It's easy to set the factor to do it.
Frequency: 50Hz; Left wheel: diameter: 1M; Right wheel: diameter: 0.35M

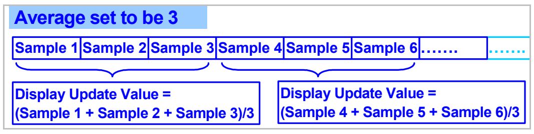


Set:
PV. type [PuEYP] to be RPM [rPm].
Pulse/Rotation [PPr] to be [1] 1 Pulse/Rotation
The meter will show 1480RPM of left wheel.
Set: [FACtr] to be 2.857(1M/0.35M), then the meter will show 4228.5RPM for right wheel

Reading Stable Function

Average:

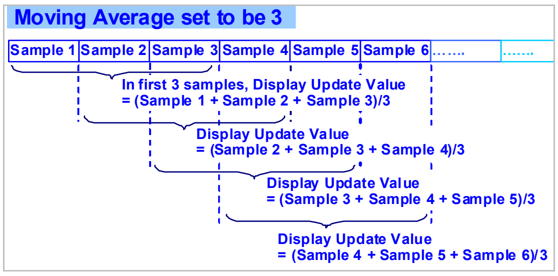
Basically, the sampling rate of meter is 15cycles/sec. If the function set to be 3 times, It means the meter will update of display will be 5 times/sec.



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.



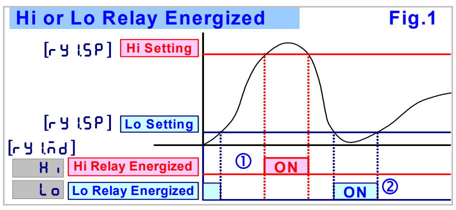
Digital filter: The digital filter can reduce the magnetic noise in field.

Control functions(option)

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

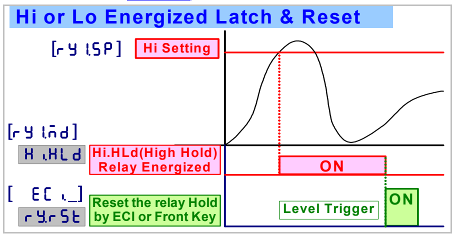
Hi [Hi](Fig.1-①): Relay will energize when **PV > Set-Point**

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

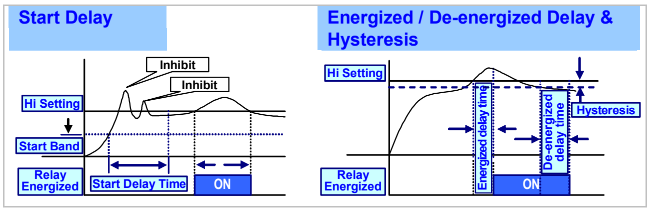


Hi.HLd [Hi.HLd] (Lo.HLd [Lo.HLd]) :

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 **[dn.KEY]** function set to be [rY.rSt])



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



Analogue output(option)

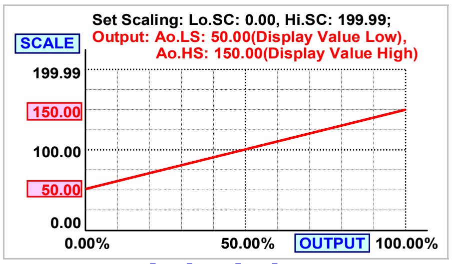
Please specify the output type either an o~10V or 4(0)~20mA in ordering. The programmable output low and high scaling can be based on various display values. Reverse slope output is possible by reversing point positions.

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

Functions:

Output range high [Ao.HS]: Setting the Display value High to versus output range High(as like as 20mA in 4~20)

Output range low [Ao.LS]: Setting the Display value Low to versus output range Low(as like as 4mA in 4~20)



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

Fine zero & span adjustment:

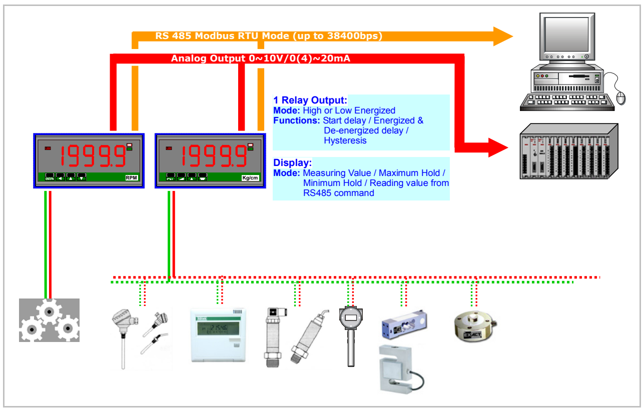
Users can get Fine Adjustment of analogue output by front key of the meter. Please connect standard meter to the terminal of analogue output. To press the front key(up or down key) of meter to adjust and check the output.

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

Span adjust [Ao.SPn]: 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.

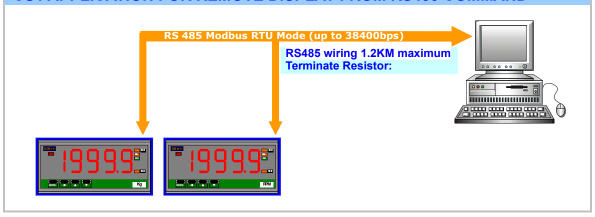


Remote display:

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 **[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.

CS1 APPLICATION FOR REMOTE DISPLAY FROM RS485 COMMAND



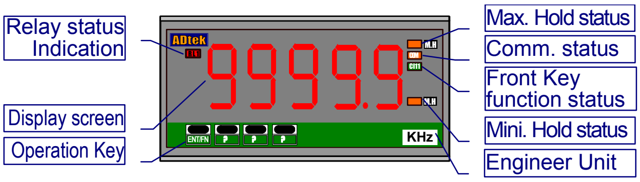
ERROR MESSAGE

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 values.

■ **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 for 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 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.

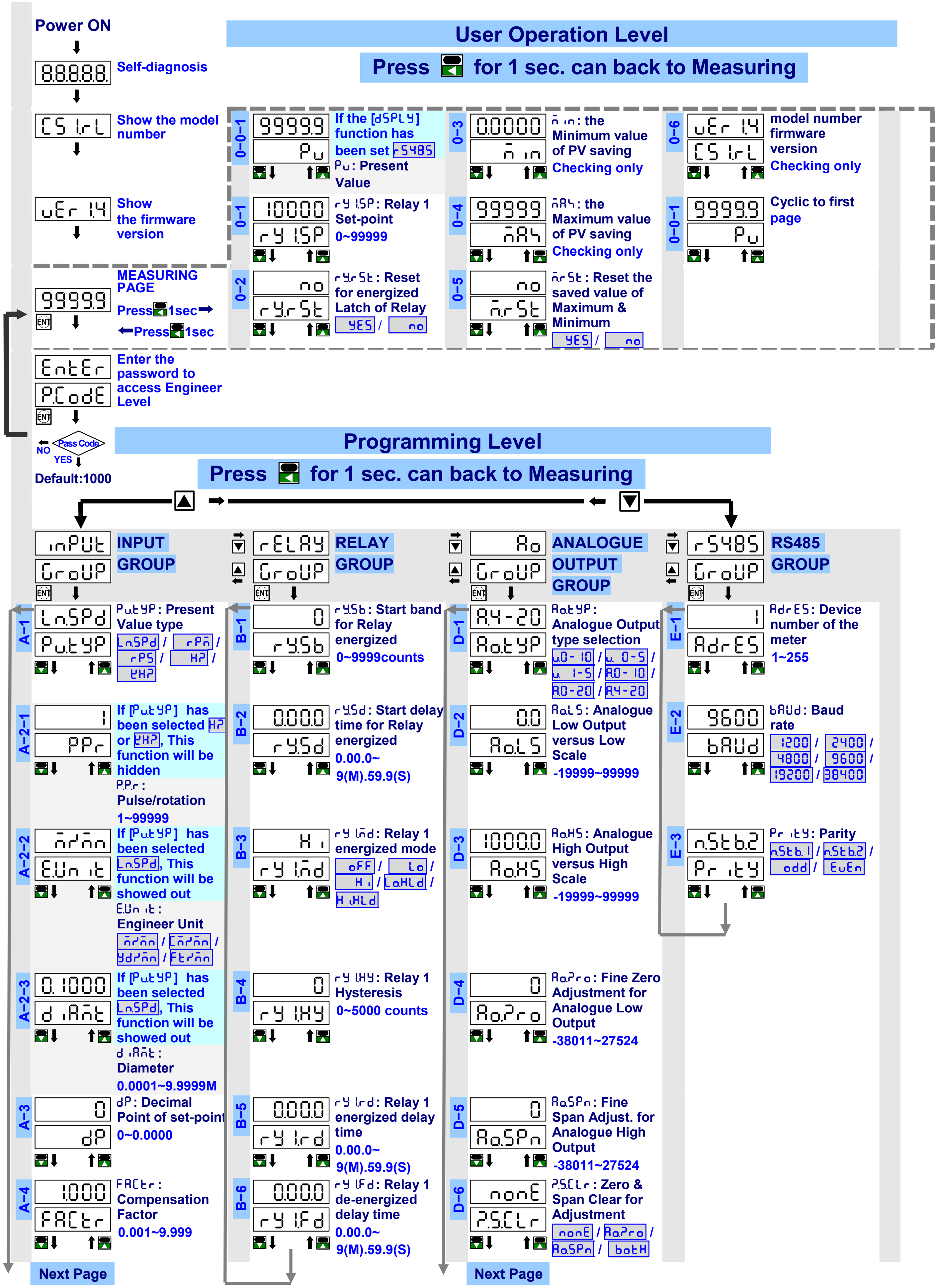
● **Programming Level** EnG: Programming level lock. User can get into programming level for checking but setting.

● **ALL** ALL: All lock. User can get into all level for checking but setting.

■ **Front Key Function:**

● The Key can be set to be rELPu / PuHLd / ñrSt / rYrSt programmable.

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



CS1-RL

Step	Display (value / parameter)	Description
A-5	0 / PuSPn	PuSPn: Fine High point Adjustment for PV display 0~+99999
A-6	no / SCLr	SCLr: Clear Fine Span Adjustment for PV display YES / no
A-7	Pu / dSPLY	dSPLY: Display Function Pu / minHd / mAXHd / rS485
A-8	0 / LoCUt	LoCUt: Low Cut Function 0~99999
A-9	AUto / itomd	itomd: Input time out Mode AUto / mAnUL
A-10	0.0 / ito	If [itomd] has been selected mAnUL, This function will be showed out ito: How long will be time out 0.0~999.9sec
A-11	AUto / rAnGE	rAnGE: Reading Range with decimal point switching. AUto / SEmi / mAnUL
A-12	5 / AuG	AuG: Average update for PV 1(None)~ 99 times
A-13	1 / mAuG	mAuG: Moving Average update for PV 1(None)~ 10 times
A-14	0 / dF iLt	dF iLt: Digital filter 0(None)/1~ 99 times
A-15	nonE / dnKEY	dnKEY: Down key function nonE / rELPu / PuHLd / mrSt / rYrSt
A-16	0 / PCodE	PCodE: Pass Code for enter Engineer Level 0000~9999
A-17	nonE / FLoCK	FLoCK: Function Level Lock nonE / USEr / EnG / ALL
D-7	110.00 / AoLmt	AoLmt: Analog Output High Limit 0.00~110.00%

▶ Plesae refer to operating manual for detail description.