

# CS1-PR PROCESS Indicator

## DESCRIPTION

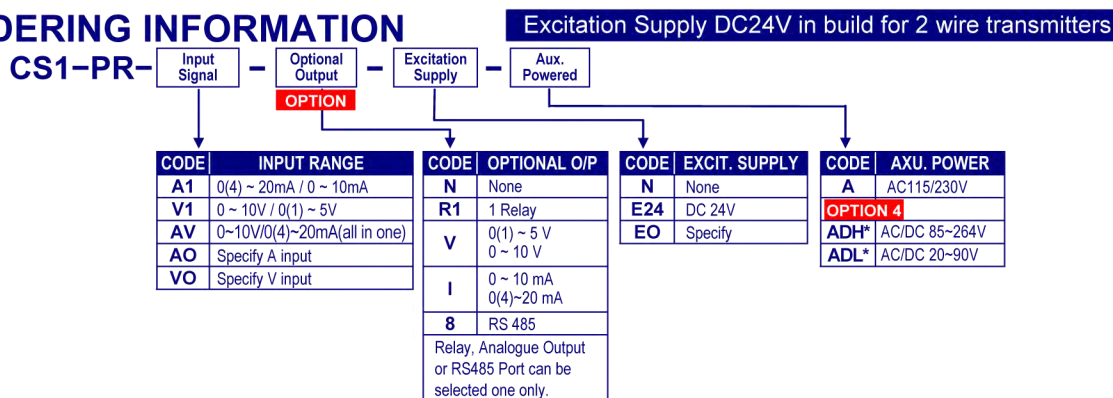
CS1-PR **economic** type Process Indicator has been designed with high accuracy measurement, display and communication of **DC signal 0~10V and 4(0)~20mA**. They are also available 1 option of 1 Relay outputs, 1 Analogue output or 1 RS485(Modbus RTU Mode) interface with versatile functions such as control, alarm, re-transmission or communication for a wide range of industrial applications.



## FEATURE

- Measuring linear signal 0~10V and 0(4)~20mA in one indicator(input code: AV)
- Square Root function available by programming
- 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

## ORDERING INFORMATION



## TECHNICAL SPECIFICATION

### Input

Input Range	Input Impedance	Input Range	Input Impedance
<b>Voltage</b> 0 ~ 10 V	≥ 1M ohm	<b>Current</b> 4(0)~20 mA	250 ohm

> The Meter can be 0~10V and 0~20mA in one unit, according to connection #11 or #12

**Calibration:** Digital calibration by front key  
**A/D converter:** 16 bits resolution  
**Accuracy:** ±0.04% of FS ± 1C;  
**Sampling rate:** 15 cycles/sec  
**Response Time:** ≤100 msec.(when the AvG = "1") in standard  
**Input type:** 0~10V / 0~5V / 1~5V / 0~10mA / 0~20mA / 4~20mA programmable for coding AV(option)

### 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 / Rel. PV): 1 square green LED

**Display range:** -19999~29999;  
**Scaling function:** Lo.SC: Low Scale; Settable range: -19999~+29999  
 Hi.SC: High Scale; Settable range: -19999~+29999  
**Decimal point:** Programmable from 0 / 0.0 / 0.00 / 0.000 / 0.0000  
**Over range indication:** ovFL, when input is over 120% of input range Hi  
**Under range indication:** -ovFL, when input is under -20% of input range Lo  
**Max / Mini recording:** Maximum and Minimum value 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:** Pv.Zro: Settable range: -19999~+29999  
 Pv.SPn: Settable range: -19999~+29999

### 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:** 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 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  
**Voltage:** 0~10V: ≥ 1000Ω;  
**Current:** 4(0)~20mA: ≤ 600Ω max  
**Functions:** Ao.HS(output range high): Settable range: -19999~29999  
 Ao.LS(output range Low): Settable range: -19999~29999  
**Digital fine adjust:** Ao.Zro: Settable range: -38011~+27524  
 Ao.SPn: 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  
**EMC:** EN 55011:2002; EN 61326:2003  
**Safety(LVD):** EN 61010-1:2001

### Environmental

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

### Mechanical

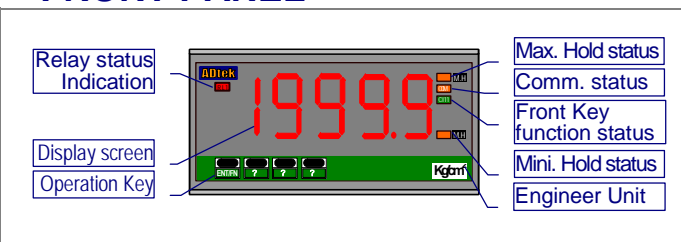
**Dimensions:** 96mm(W) x 48mm(H) x 72mm(D)  
**Panel cutout:** 92mm(W) x 44mm(H)  
**Case material:** ABS fire-resistance (UL 94V-0)  
**Mounting:** Panel flush mounting  
**Terminal block:** Plastic NYLON 66 (UL 94V-0)  
 10A 300Vac, M2.6, 1.3~2.0mm<sup>2</sup>(16~12AWG)  
 350g / 300g(Aux. Power Code: ADH or ADL)

### Weight:

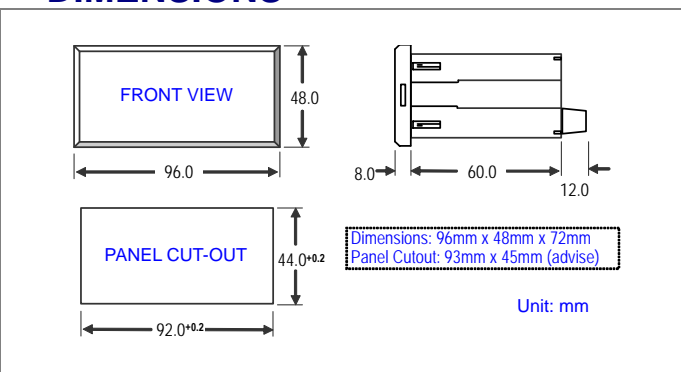
### Power

**Power supply:** AC115/230V,50/60Hz;  
**Optional:** AC/DC 85~264V or 20~90V(RoHS version)  
**Excitation supply:** DC24V/30mA maximum in standard  
**Power Consumption:** 4.5VA maximum  
**Back up memory:** By EEPROM

## FRONT PANEL

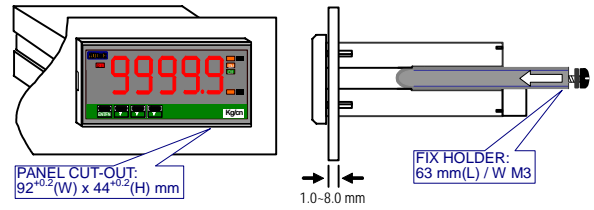


## DIMENSIONS

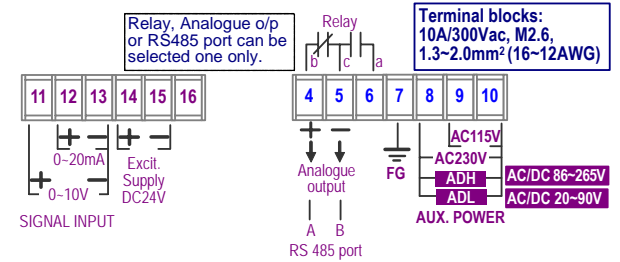


## INSTALLATION

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

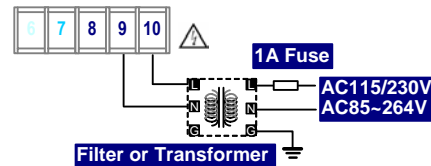


## CONNECTION DIAGRAM

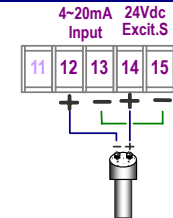


Please check the voltage of power supplied first, and then connect to the specified terminals. It is recommended that power supplied to the meter be protected by a fuse or circuit breaker.

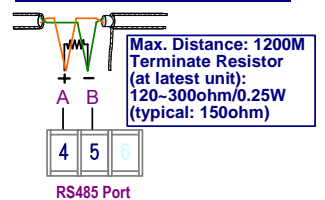
### Power Supply



### 2 wire Transmitter connection



### RS485 Communication Port



## FUNCTION DESCRIPTION

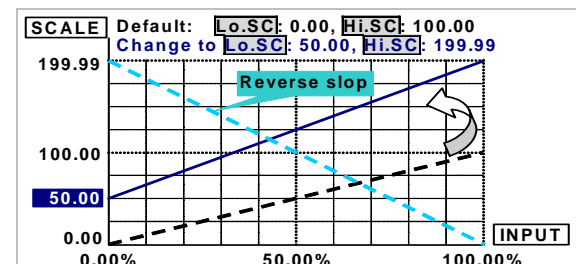
### Input & Scaling Functions

**Dual input types:** (Option Code: AV)

Voltage and Current Type are in one unit available in option. If the customer specify the input coding for AV, the meter will be calibrated for 0~10V and 0~20mA in factory. The user can use in 0~10V or 4(0)~20mA by difference terminals connection(#11 & #13 for 0~10V or #12 & #13 for 4(0)~20mA) and programming in [ Ai.YP ] of [ inPUt GroUP ] .

### Scaling function:

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



\*Too narrow scale may cause display lower resolution.

## Display & Functions

### Max / Mini recording:

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

### Display functions:

(Please refer to step A-07)

PV / Max(Mini) Hold / RS 485 programmable in

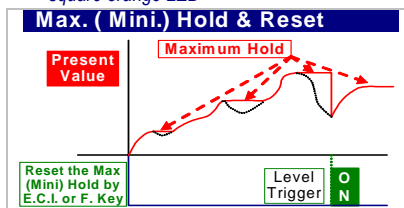
[ dSPly ] function of [ inPUt GroUP ]

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

**Maximum Hold [Max.H] / Minimum Hold [Mini.H]:**

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 [ M.rSt ].)

- 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 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:

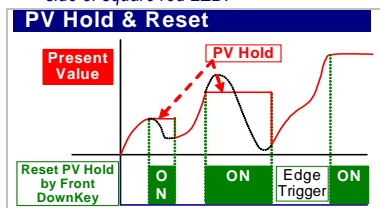
**Relative PV / PV Hold / Reset for maxi(mini) hold / Reset for relay energized latch programmable in [ dn.KEY ] function of [ inPUt GroUP ]**

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

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

**PV Hold [Pv.HLd]:** [ dn.KEY ] function can be set to be [ Pv.HLd ] function. When user press the [ dn.KEY ] key, the display will be hold until press the [ dn.KEY ] key again.

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

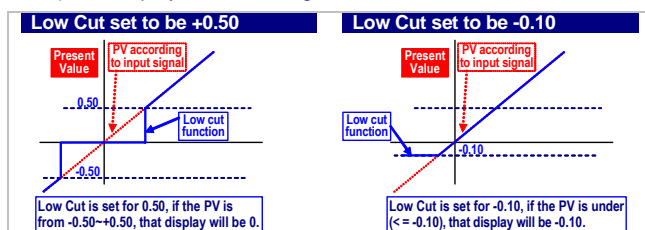


**Reset for Max(Mini) Hold:** when the [ dSPly ] in [ inPUt GroUP ] set to be [ Max.H ] or [ Mini.H ], [ dn.KEY ] function can be set to be [ M.rSt ] to reset the display when it is holding in maxim or mini value.

**Reset for relay energized latch:** when the [ rY1.Md ] in [ rELAY GroUP ] set to be [ Hi.HLd ] or [ Lo.HLd ], [ dn.KEY ] function can be set to be [ Y.rSt ] 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  $PV \leq \text{Setting value}$ , the display will be 0. If the setting value is negative, it means when the PV under setting value ( $PV \leq -\text{Setting value}$ ), the display will be setting value.

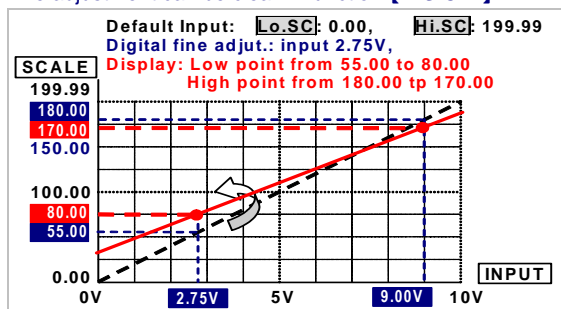


### Digital fine adjustment:

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

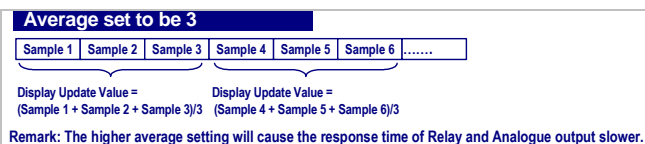
The adjustment can be clear in function [ Z.S.Clr ].



### Reading Stable Function

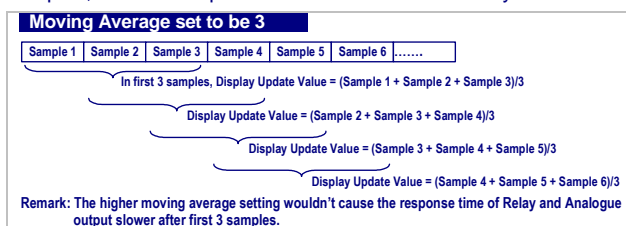
#### Average:

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:

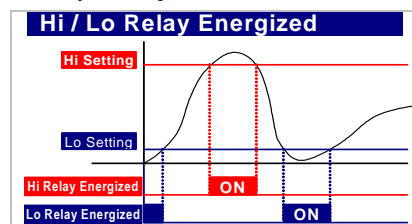
The digital filter can reduce the magnetic noise in field.

### Control functions(option)

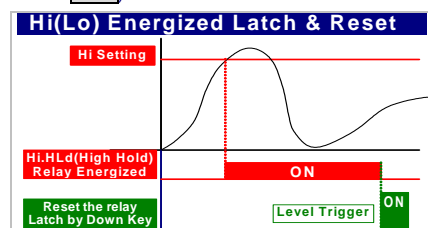
**Relay energized mode:** Hi / Lo / Hi.HLd / Lo.HLd programmable

Hi: Relay will energize when  $PV > \text{Set-Point}$

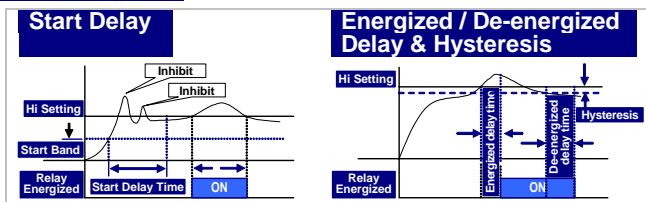
Lo: Relay will energize when  $PV < \text{Set-Point}$



**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 front key in [ User Level ] or press down key to reset (If the [ dn.KEY ] function set to be [ Y.rSt ])

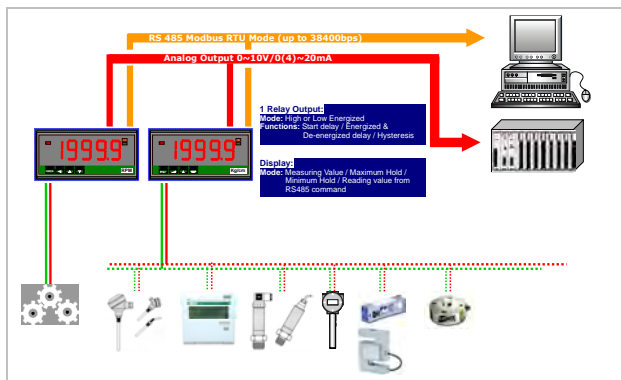


**Energized functions:** Start delay / Energized & De-energized delay / Hysteresis



**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.

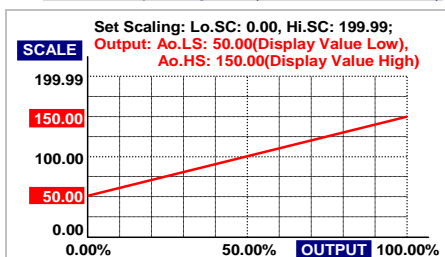


**Analogue output(option)**

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:** **Ao.HS(output range high):** setting the Display value High to versus output range High(as like as 20mA in 4~20)  
**Ao.LS(output range Low):** 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 of meter.

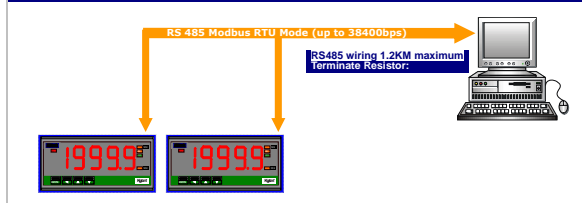
- [ Ao.Zro ]** : Fine Zero Adjustment for Analog Output;  
Settable range: -38011~27524;
- [ Ao.Spn ]** : Fine Span Adjustment for Analog Output;  
Settable range: -38011~27524;

**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 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.

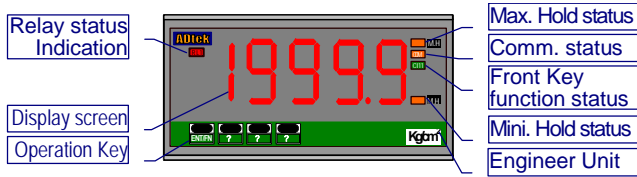
**CS1 APPLICATION FOR REMOTE DISPLAY FROM RS485 COMMAND**



**■ ERROR MASAGE**

DESCRIPTION	DISPLAY	FLASH	REMARK
<b>BEFORE POWER ON, PLEASE CHECK THE SPECIFICATION AND CONNECTION AGAIN.</b>			
<b>SELF-DIAGNOSIS AND ERROR CODE:</b>			
ouFL : Display is positive-overflow (Signal is over display range)	ouFL		(Please check the input signal)
-ouFL : Display is negative-overflow (Signal is under display range)	-ouFL		(Please check the input signal)
ouFL : ADC is positive-overflow (Signal is higher than input 120%)	ouFL		(Please check the input signal)
-ouFL : ADC is negative-overflow (Signal is lower than input -120%)	-ouFL		(Please check the input signal)
EEP / FA IL : EEPROM occurs error	EEP	FA IL	(Please send back to manufactory for repaired)
A i.C.nG / Pu : Calibrating Input Signal do not process	A i.C.nG	Pu	(Please process Calibrating Input Signal)
A i.C. / FA IL : Calibrating Input Signal error	A i.C.	FA IL	(Please check Calibrating Input Signal)
AoC.nG / Pu : Calibrating Output Signal do not process	AoC.nG	Pu	(Please process Calibrating Output Signal)
A i.C. / FA IL : Calibrating Output Signal error	A i.C.	FA IL	(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 for Relay Latch)
- **Engineer Label:** over 80 types.

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

	Setting Status	Function Index
<b>▲</b> Up key	Increase number	Go back to previous function index
<b>▼</b> Down key	Decrease number	Go to next function index
<b>ESC</b> Shift key	Shift the setting position	Go back to this function index, and abort the setting
<b>ENTR</b> 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:** no lock all.
- **User Level:** User Level lock. User can get into User Level for checking but setting.
- **Programming Level:** Programming level lock. User can get into programming level for checking but setting.
- **ALL:** All lock. User can get into all level for checking but setting.

- **Front Key Function**

- The **▼** Key can be set to be **rEL.Pv** / **Pv.HLd** / **M.rSt** / **rY.rSt** programmable.

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

Power ON

8888.8 Self-diagnosis

CS1Pr Show the model number

uEr 1.0 Show the firmware version

MEASURING PAGE  
Press 1sec →  
← Press 2sec

Enter the password to access programming Level

Pass Code  
Default:1000

## User Level

Press for 1 sec. can back to Measuring

0-0-1	19999 Pv	This page will show out, when dSPly set to be RS485. Pv: Present Value	0-3	00000 Min:PV Minimum storage	Checking only	0-6	CS1Pr uEr 1.0	model number firmware version	Checking only
0-1	rY1SP 10000	rY1.SP.: Relay 1 Set-point setting -19999~+29999	0-4	MAV 10000	MAX:PV Maximum storage	Checking only	0-0-1	19999 Pv	Cyclic to first page
0-2	rYrSt no	rY.rSt: Reset for energized Latch of Relay YES no	0-5	M.rSt no	M.rSt: Reset for Maximum & Minimum storage YES no				

## Programming Level

Press for 1 sec. can back to Measuring

GROUP input	INPUT GROUP	GROUP RELAY	RELAY GROUP	GROUP ANALOGUE OUTPUT	ANALOGUE OUTPUT GROUP	GROUP RS485	RS485 GROUP
A-0	Ai.tYP: Analogue input type selection v.0-10   v.0-5 v.1-5   A.0-10 A.0-20   A.4-20	B-1	rY.Sb: Start band for Relay energized 0~9999counts	D-1	Ao.TvD: Analogue Output type selection v.0-10   v.0-5 v.1-5   A.0-20 A.4-20   A.0-10	E-1	Adres: Device number of the meter 1~255
A-1	Pv.dP: Decimal Point of PV 0~0.0000	B-2	rY.Sd: Start delay time for Relay energized 0:00.0~ 9(m):59.9(s)	D-2	Ao.LS: Analogue Low Output versus Low Scale -19999~+29999	E-2	baud: Baud rate 1200 2400 4800 9600 19200 38400
A-2	Lo.SC: Low scale of PV -19999~+29999	B-3	rY1.Md: Relay 1 energized mode oFF   Lo   Hi Lo.HLd   Hi.HLd do	D-3	Ao.HS: Analogue High Output versus High Scale -19999~+29999	E-3	PrItY: Parity n.Stb.1 n.Stb.2   odd EvEn
A-3	Hi.SC: High scale of PV -19999~+29999	B-4	rY1.HY.: Relay 1 Hysteresis 0~5000counts	D-4	Ao.Zro: Fine Zero Adjustment for Analogue Low Output -38011~+27524		
A-4	Pv.Zro: Fine Low point Adjustment for PV display -19999~+29999	B-5	rY1.rd: Relay 1 energized delay time 0:00.0~ 9(m):59.9(s)	D-5	Ao.SPn: Fine Span Adjustment for Analogue High Output -38011~+27524		
A-5	Pv.SPn: Fine High point Adjustment for PV display -19999~+29999	B-6	rY1.Fd: Relay 1 de-energized delay time 0:00.0~ 9(m):59.9(s)	D-6	Z.S.CLr: Zero & Span Clear for Adjustment nonE   Ao.Zro Ao.SPn   both		

Next Page

CS1-PR

A-6	Z.S.CLR: Clear Fine Zero & Span Adjustment for PV display nonE   Pv.Zro Pv.SPn   botH
A-7	dSPLY: Display Function Pu Pv   Mini.H MAx.H   RS485
A-8	Lo.CuT: Low Cut Function 0 -19999~+29999
A-9	AvG: Average update for PV AuG S 1(None)~99 times
A-10	M.AvG: Moving Average update for PV nu.AuG 1 1(None)~10 times
A-11	d.FiLT: Digital filter dFiLT 0 0(None)/1~99 times
A-12	dn.KEY: Down key function dnKEY nonE   rEL.Pv Pv.HLd   M.rSt rY.rSt
A-13	P.CodE: Pass Code for enter Programming Level PCodE 0000 0000~9999
A-14	F.LoCk: Function Level Lock FLoCk nonE   USEr EnG   ALL

➤ Plesae refer to operating manual for detail description