

CS1-VA VOLT / CURRENT Meter

DESCRIPTION

CS1-VA economic type Voltage/Current Indicator has been designed with high accuracy measurement, display and communication of 0~600V or 0~10A for DC/AC/TRMS.

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 and testing applications.



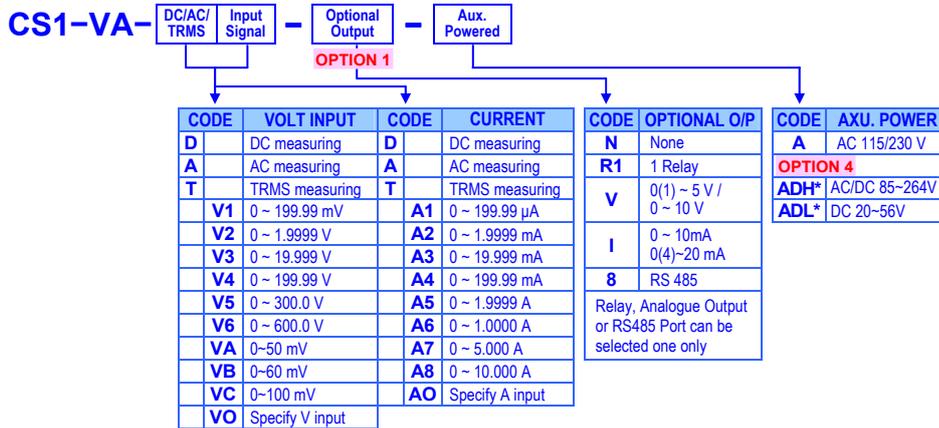
FEATURE

- Measuring Voltage 0~600V or Current 0~10A for DC / AC / TRMS
- 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

- Testing Equipments for Volt/Current Measuring, Alarm, Control and Communication with PC/PLC
- MCC panel, Machinery, Switch gear... for Voltage or Current Measuring, Alarm and Remote I/O with PC/PLC

ORDERING INFORMATION



TECHNICAL SPECIFICATION

Input		Measuring Range		Input Impedance	
Measuring Range DC / AC / TRMS	Input Impedance	Measuring Range DC / AC / TRMS	Input Impedance	Measuring Range DC / AC / TRMS	Input Impedance
Voltage	0~50~100 mV	≥5M ohm	Current	0~199.99µA	1K ohm
	0~199.99 mV	≥5M ohm		0~1.9999 mA	100 ohm
	0~1.9999 V	≥1M ohm		0~19.999 mA	10 ohm
	0~19.999 V	≥1M ohm		0~199.99 mA	1 ohm
	0~199.99 V	≥1M ohm		0~1.9999 A	0.05 ohm
	0~300.0 V	≥2M ohm		0~5.000 A	0.02 ohm
	0~600.0 V	≥2M ohm		0~10.000 A	0.01 ohm

- Calibration:** Digital calibration by front key
- A/D converter:** 16 bits resolution
- Accuracy:** DC: $\leq \pm 0.04\%$ of FS $\pm 1C$
AC: $\leq \pm 0.1\%$ of FS $\pm 1C$
- Sampling rate:** 15 cycles/sec
- Response time:** ≤ 100 m-sec.(when the $R_{UL} = "1"$) in standard

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 range:** -19999~29999;

- Scaling function:** L_{5C}: Low Scale; Settable range: -19999~+29999
H_{5C}: High Scale; Settable range: -19999~+29999
Programmable from 0 / 0.0 / 0.00 / 0.000 / 0.0000
- Decimal point:** 0.0FL, when input is over 20% of input range Hi
-0.0FL, when input is under -20% of input range Lo
- Over range indication:** Maximum and Minimum value storage during power on.
- Under range indication:** PV / Max(Mini) Hold / RS 485 Programmable
- Max / Mini recording:** Relative PV / PV Hold / Reset for maxi(mini) hold /
- Display functions:** Reset for relay energized latch programmable
- Front key functions:** Settable range: -19999~29999 counts
- Low cut:** P_{uP}ro: Settable range: -19999~+29999
- Digital fine adjust:** P_{uSP}n: 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 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: ≤ 500Ω max
Functions:	RaHS (output range high): Settable range: -19999~29999 RaLS (output range Low): Settable range: -19999~29999
Digital fine adjust:	RaPno : Settable range: -38011~+27524 RaSPno : 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 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) #A1~A3(current input): 20A/300Vac, M3.5, 12~22AWG Others: 10A 300Vac, M2.6, 16~22AWG
Weight:	350g

Power

Power supply:	AC115/230V,50/60Hz; Optional: AC 85~264V, DC 100~300V or DC 20~56V
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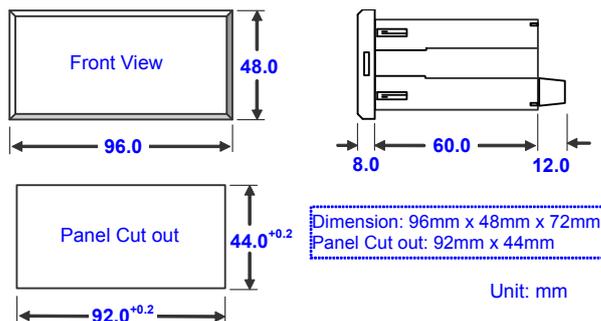
Power consumption: 3.0VA maximum

Back up memory: By EEPROM

FRONT PANEL

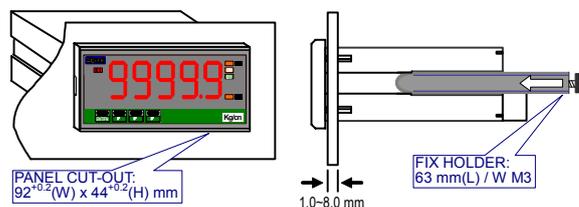


DIMENSIONS

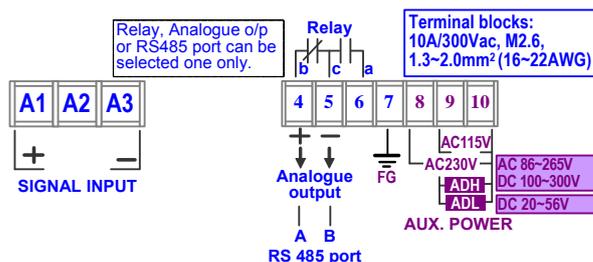


INSTALLATION

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

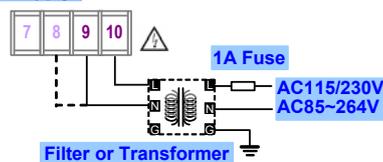


CONNECTION DIAGRAM

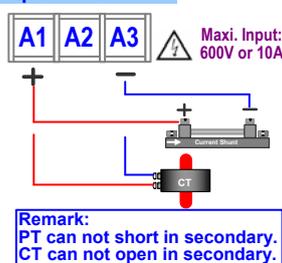


Please check the voltage of power supplied first, and then connect to the specified terminals. It is recommended that power supplied to the meter be protected by a fuse or circuit breaker.

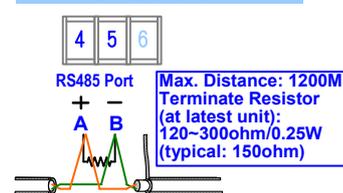
Power Supply



Input connection



RS485 Communication Port

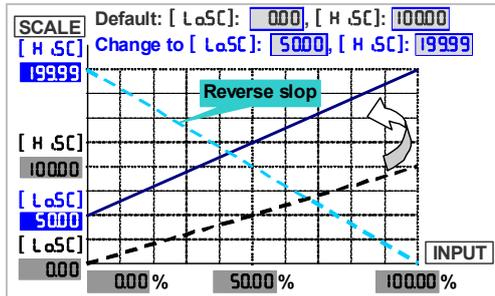


Amend: 2010/4/26: Modify the terminals and range for DC power supply from AC/DC 20~56V to DC 20~56V.

FUNCTION DESCRIPTION

Scaling function:

Setting the [LoSC] (Low scale) and [HiSC] (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 course 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)

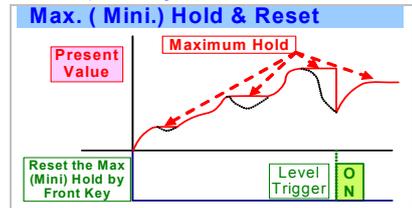
PV / Max(Mini) Hold / RS 485 programmable in [dSPLY] function of [INPUT GROUP]

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

Maximum Hold [MaxHld] / Minimum Hold [MinHld]:

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 [rSt].)

- ▶ Please find the [MH] 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:

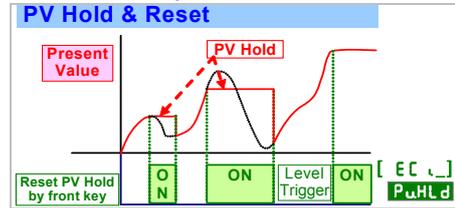
Relative PV / PV Hold / Reset for maxi(mini) hold / Reset for relay energized latch programmable in [dRELAY] function of [INPUT GROUP]

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

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

PV Hold [PvHld]: [dRELAY] 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 [PvH] sticker to stick on the right side of square green LED.

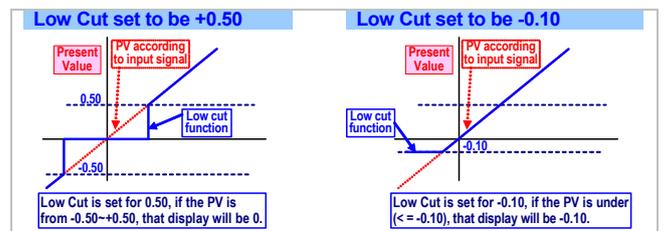


Reset for Max(Mini) Hold: when the [dSPLY] in [INPUT GROUP] set to be [MaxHld] or [MinHld], [dRELAY] function can be set to be [rSt] to reset the display when it is holding in maxi or mini value.

Reset for relay energized latch: when the [rY Ld] in [RELAY GROUP] set to be [HHLd] or [LHLd], [dRELAY] 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.

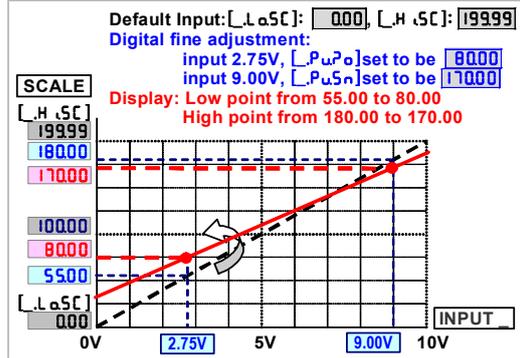


Digital fine adjustment:

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 [PwPr0] & [PwSPn] are not only in zero & span of PV, but also any lower point for [PwPr0] & higher point for [PwSPn]. The meter will be linearization for full scale.

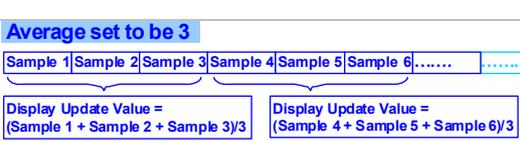
The adjustment can be clear in function [P5CLR]



Reading Stable Function

Average:

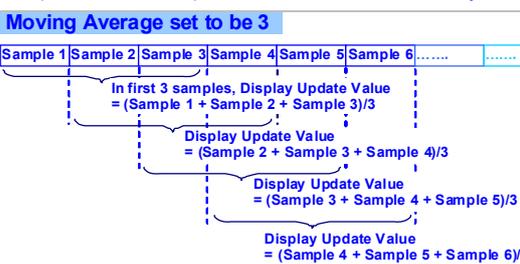
Basically, the sampling rate of meter is 15cycles/sec. If the function set to be 3 times, It means the meter will update of display will be 5 times/sec.



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.



Remark: The higher moving average setting wouldn't cause the response time of Relay and Analogue output slower after first 3 samples.

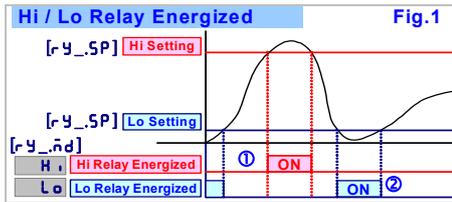
Digital filter:

The digital filter can reduce the magnetic noise in field.

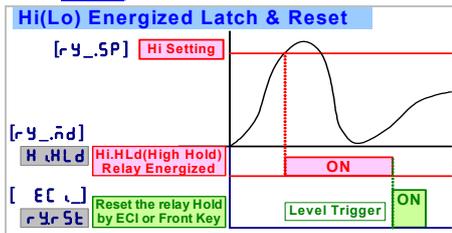
Control functions(option)

Relay energized mode:

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

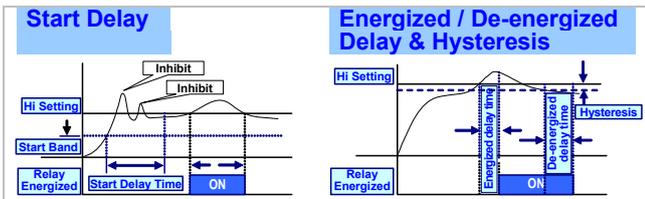


Hi.HLd (Lo.HLd): When the PV is Higher (or lower) than set-point, the relay will be energized and latch until manual reset by from key in [user level] or press down key to reset (If the [d_n_P_E_Y] function set to be [r_y__St])



Energized functions:

Start delay / Energized & De-energized delay / Hysteresis



Analogue output(option)

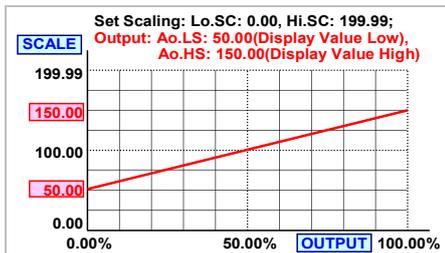
Please specify the output type either an 0~10V or 4(0)~20mA in ordering. The programmable output low and high scaling can be based on various display values. Reverse slope output is possible by reversing point positions.

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:

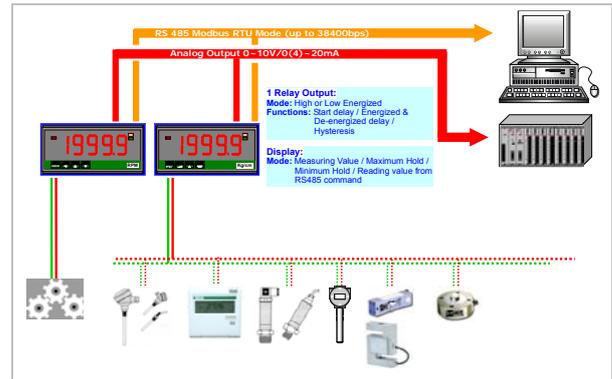
Users can get Fine Adjustment of analogue output by front key of the meter. Please connect standard meter to the terminal of analogue output. To press the front key (up or down key) of meter to adjust and check the output.

[r_a?_r_o]: Fine Zero Adjustment for Analog Output;
 Settable range: -38011~27524;

[r_aSP_n]: 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.

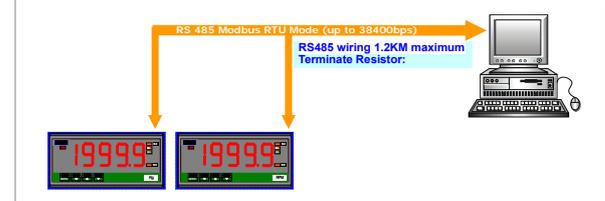


Remote display:

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 [d5PL Y] 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)
A.I.nG → Pu	Calibrating Input Signal do not process	(Please process Calibrating Input Signal)
A.I.C → FAIL	Calibrating Input Signal error	(Please check Calibrating Input Signal)
RoC.nG → Pu	Calibrating Output Signal do not process	(Please process Calibrating Output Signal)
RoC → FAIL	Calibrating Output Signal error	(Please check Calibrating Output Signal)

■ OPERATING KEY

*Please access to the Programming Level to check and set the parameters when users start to run the meter

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

■ The meter has designed operation similar as PC's and . In any page, press key means "enter" or "confirm setting", and press key means "escape()" or "shift".

■ In Programming Level, the screen will return to Measuring Page after do not press any key over 2 minutes, or press for 1 second.

	Function Index	Setting Status
(=) Enter/Fun key	(1) In any page, press to access the level or function index (2) From the function index to access setting status	(3) Setting Confirmed, save to EEPROM and go to next function index
(=) Shift key	(1) In measuring page, press for 1 second to access user level. (2) In function index, press for 1 second to go back upper level. (3) In function group index, press for 1 second to go back measuring page	(4) In setting status, press to Shift the setting position. (5) In setting status, press for 1 second to abort setting and go back this function index.
(=) Up key	(1) In function index, press to go back to previous function index	(2) In setting status for function, press to select function (3) During number Setting, press can roll the digit up
(=) Down key	(1) In Function Index Page, press will go to the next Function Index Page.	(2) In setting status for function, press to select function (3) During number Setting, press can roll the digit down.

■ FRONT PANEL



■ Numeric Screens

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

■ I/O Status Indication

● **Relay Energized:** 1 square red LED

display when Relay 1 energized;

● **RS485 Communication:** 1 square orange LED

will flash when the meter is receive or send data, and flash quickly means the data transient quicker.

● **Max/Mini Hold indication:** 2 square orange LEDs

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:**

● Down key functions mode:

PV.H(PV Hold) / Tare / DI(Digital Input)

M.RS(Maximum or Minimum Reset) /

R.RS(Reset for Relay Latch)

● **Engineer Label:** over 80 types.

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

■ **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.

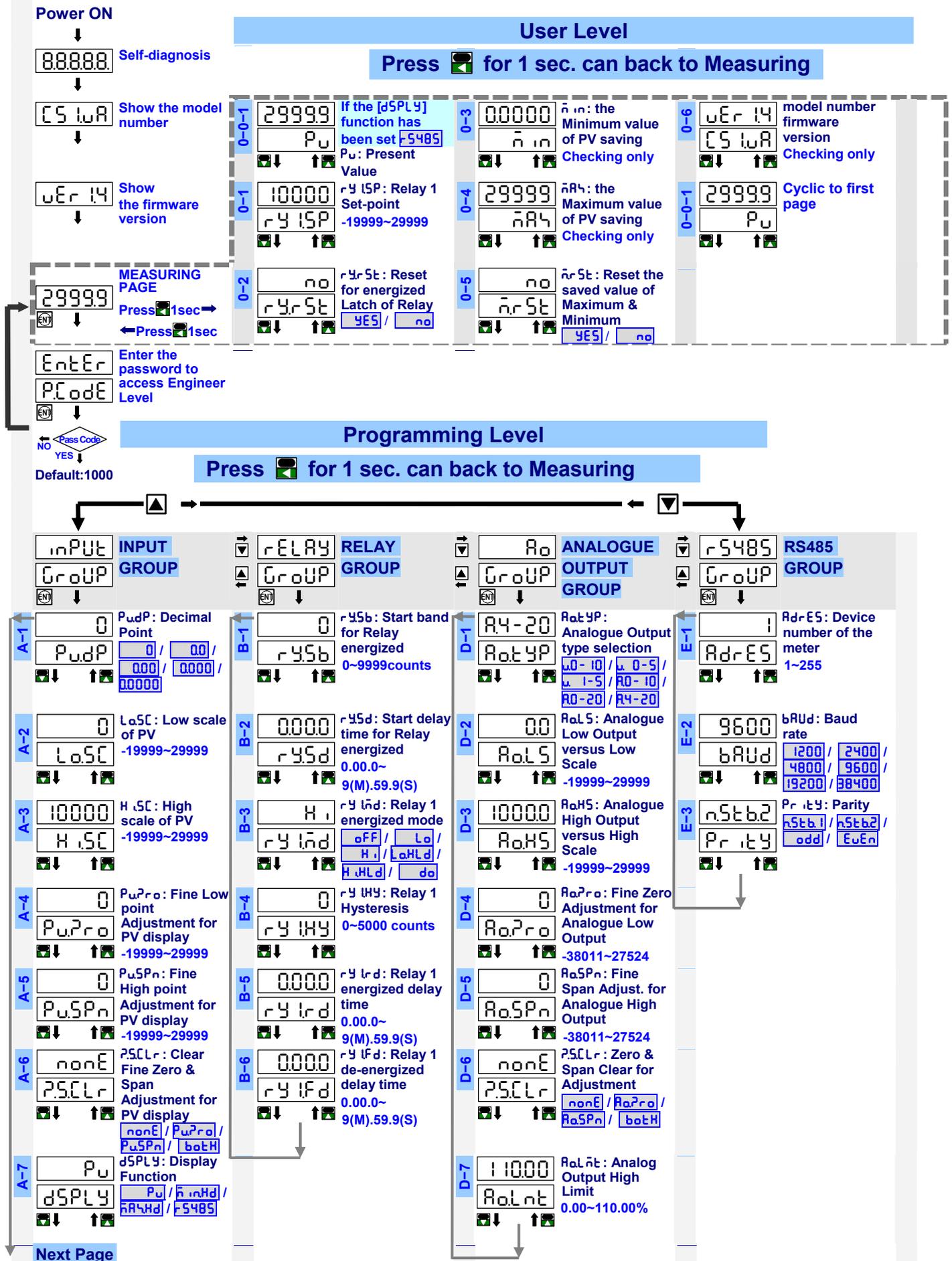
User can get into programming level for checking but setting.

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

■ **Front Key Function:**

● The Key can be set to be / / / programmable.

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



A-8	0 LoCUT	LoCUT: Low Cut Function -1999~2999
A-9	5 AUG	AUG: Average update for PV 1(None)~99 times
A-10	1 nAUG	nAUG: Moving Average update for PV 1(None)~10 times
A-11	0 dFILT	dFILT: Digital filter 0(None)/1~99 times
A-12	nonE dnKEY	dnKEY: Down key function nonE / FELPu / PwHLd / nRSE / rYrSt
A-13	0 PCode	PCode: Pass Code for enter Engineer Level 0000~9999
A-14	nonE FLock	FLock: Function Level Lock nonE / USEr / EnG / ALL

- ▶ Please refer to operating manual for detail description
- ▶ Please refer to operating manual for Banks function description and operating.