

CS1-T 4 2/3 Digital Temperature(RTD) Meter ADTEK

Description

CS1-T economic type Temperature Indicator is designed for high accuracy measurement of Thermocouple or Pt100Ω, which is with display, control and communication function.

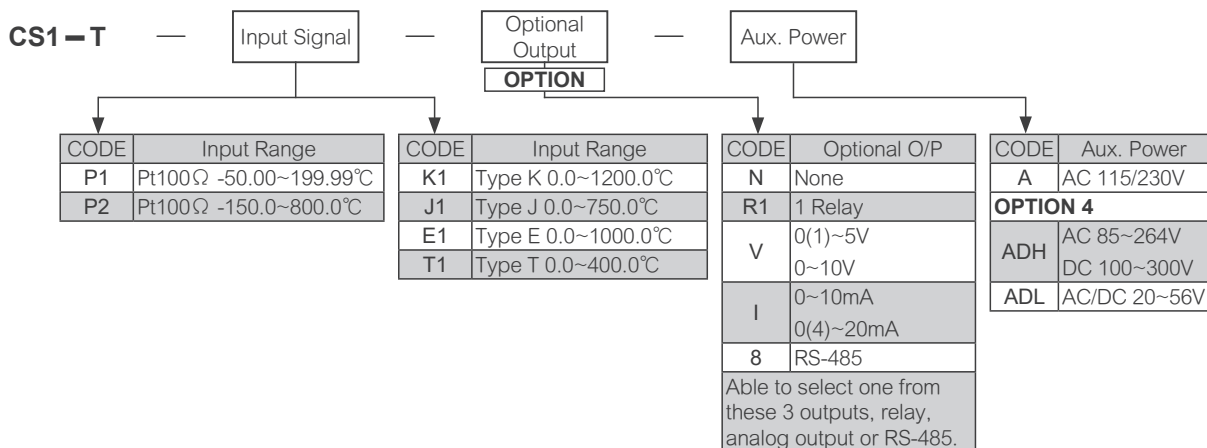
It allows one more optional function of Relay output, Analogue output, or RS-485 (Modbus RTU Mode) communication output. And that's how CS1-T provides mutple functions of control, alarm, re-transmission, or communication.



Features

- Measuring RTD: Pt100Ω; Thermocouple: K, J, E, T
- Available for one more optional function: relay output, analog output, or RS-485 Modbus RTU communication output
- 1 relay output can be programmed individually to be Hi / Lo / Hi Hold / Lo Hold energized with Start Delay / Hysteresis / Energized & De-energized Delay functions.
- CE Approved

Ordering Information



Technical Specification

Measuring Range	Input Impedance
P1 Pt100Ω -50.00~199.99°C	≥ 1MΩ
P2 Pt100Ω -150.0~800.0°C	
K1 Type K 0.0~1200.0°C	
J1 Type J 0.0~750.0°C	
E1 Type E 0.0~1000.0°C	
T1 Type T 0.0~400.0°C	

Technical Specification

Input

A/D converter: 16-bit resolution
Accuracy: Pt100Ω: ≤ ±0.1% of FS ±1C
Thermocouple: ≤ ±0.2% of FS ±1C
Sampling rate: 15 cycles/sec
Response time: ≤100 mS (when the AvG = "1") in standard
Cold junction in T/C: 25 ± 10°C, error ≤ 0.5°C

Display & Functions

LED: Numeric: 5 digits,
0.8" (20.0mm)H red high-brightness LED
Relay output indication: 1 square red LED

Rev 1.3

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RS-485 communication: 1 square orange 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: According to temperature sensor range
Decimal point: According to temperature sensor type
Over range indication: $\overline{\text{OUL}}$: when input is over 20% of input range Hi
Under range indication: $\overline{\text{OUL}}$: 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: -19,999~29,999
Digital fine adjust: $\text{P}_{\text{u}5\text{P}0}$: Settable range: -19,999~+29,999
 $\text{P}_{\text{u}5\text{P}1}$: Settable range: -19,999~+29,999

Reading stability 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(optional)

Set-points: 1 set points
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(optional)

Accuracy: $\leq \pm 0.1\%$ of F.S.

Ripple: $\leq \pm 0.1\%$ of F.S.

Response time: ≤ 100 mS. (10~90% of input)

Isolation: AC 2.0 KV between input and output

Output range: Specify either voltage or current output when ordering

Voltage: 0~5V / 0~10V / 1~5V programmable

Current: 0~10mA / 0~20mA / 4~20mA programmable

Output capability: Voltage: 0~10V: $\geq 1000\Omega$;

Current: 4(0)~20mA: $\leq 500\Omega$ max

Functions: R_{OH5} : output range high: -19,999~29,999

R_{OL5} : output range Low: -19,999~29,999

Digital fine adjust: R_{OFF} : Settable range: -38,011~+27,524

R_{ON} : Settable range: -38,011~+27,524

RS-485 Communication(optional)

Protocol: Modbus RTU mode

Address: 1~255

Baud rate: 4800/9600/19200/38400 bps

Parity: None / Even / Odd

Data bits: 8 bits

Stop bit: 1 or 2

Remote display: show the value from RS-485 command of master

Distance: 1200M max

Safety

Isolation: AC 2.0 KV for 1 min,
Between Power / Input / Output / Case

Insulation resistance: $\geq 100M\Omega$ @500Vdc, Between Power / Input / Output

Isolations: Between Power / Input / Relay / Analogue / RS-485

EMC: EN 55011:2002; EN 61326:2003

Safety(LVD): EN 61010-1:2001

Environmental Conditions

Operating temp.: 0~60 °C

Humidity rating: 20~95 %RH, Non-condensing

Temp. coefficient: ≤ 100 PPM/°C

Storage temp.: -10~70 °C

IP degree of protection: Front panel: IP52 ; Housing: IP20

Power Supply

Power supply: AC115/230V, 50/60Hz;

Optional: AC 85~264V, DC 100~300V, AC/DC 20~56V

Power consumption: 3.0VA maximum, ADH/ADL: 8VA/4.0W

Back up memory: By EEPROM

Mechanical Structure

Dimensions: 96mm(W) x 48mm(H) x 80mm(D)

Panel cutout: 92mm(W) x 44mm(H)

Case material: ABS fire-resistance (UL 94V-0)

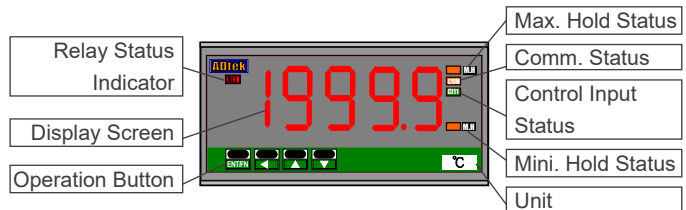
Mounting: Panel flush mounting

Terminal block: Plastic NYLON 66 (UL 94V-0)

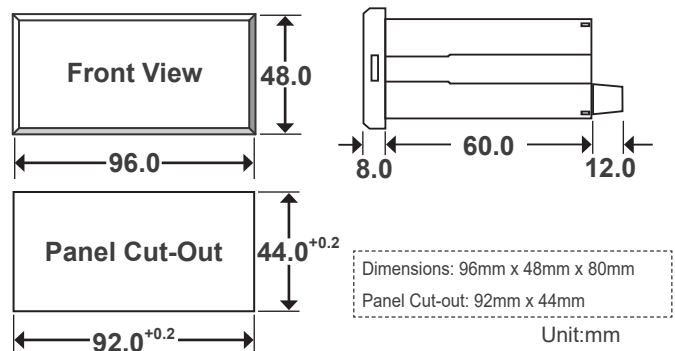
10A 300Vac, M2.5, 1.3~2.0mm²(16~22AWG)

Weight: 350g

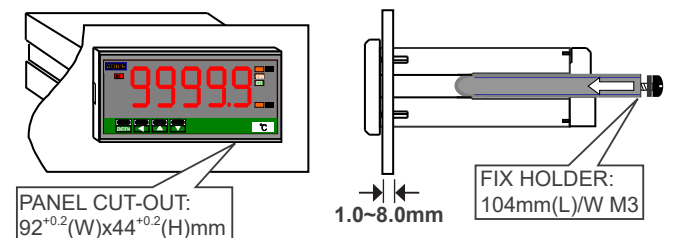
Front Panel



Dimensions

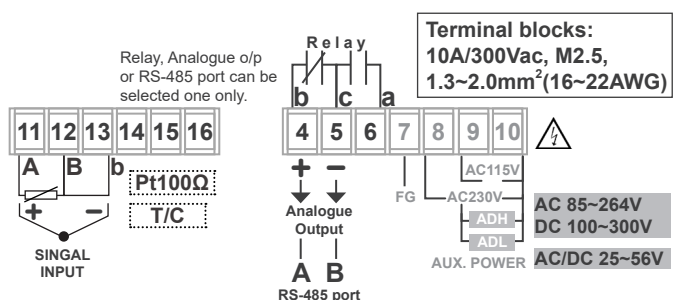


Installation



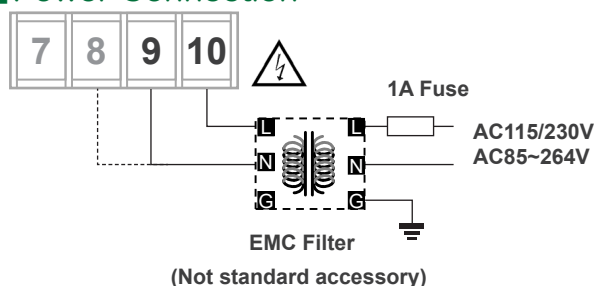
The meter should be installed in a place where it does not exceed the maximum operating temperature and provides good air circulation.

Connection Diagram

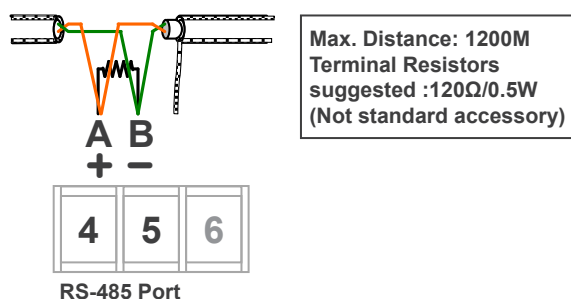


⚠ Please check the voltage of power supplied first, and then connect with the specified terminals. It is recommended that power supplied to the meter should be protected by a fuse or circuit breaker.

Power Connection



RS-485 Communication Port



Display & Functions

Max / Mini recording: The meter will store 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 (Please refer to step A-07) [dSPly] function of [inPUt GrOUP]

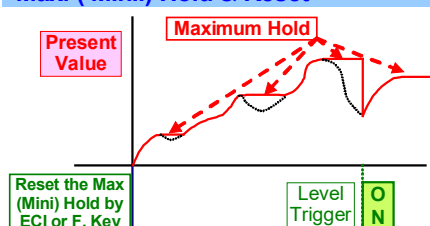
Present Value [PV]: The display will show the value that is relative to input signal.

Maximum Hold [Max Hold] / Minimum Hold [Min Hold]:

The meter will keep display in maximum/minimum value during power on until manual reset with front key (press Down key function in [inPUt GrOUP], and click [Reset]).

► Please find the [Reset] sticker, and stick it to the right side of square orange LED.

Max. (Mini.) Hold & Reset



Remote Display by RS-485 command [r5485]:

The meter will show the value that received from RS-485 sending. In past, The meter normally receive 4~20mA or 0~10V from AO or digital output from BCD module of PLC. We come up with a cost saving solution that PV shows the value through RS-485 command of master.

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

Relative PV [REL PV]: The [dSPly] function can be set to be [REL PV] function. When user presses the [REL] key, the display will show the differential value (Δ PV), until press [REL] key again.

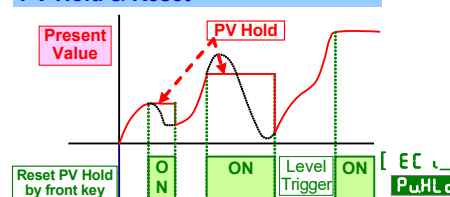
► Please find the [REL] sticker, and stick it to the right side of square green LED.

PV Hold [PV Hold]: The [dSPly] function can be set to be [PV Hold] function.

When user presses the [PV] key, the display will be hold until press the [PV] key again.

► Please find the [PV] sticker, and stick it to the right side of square green LED.

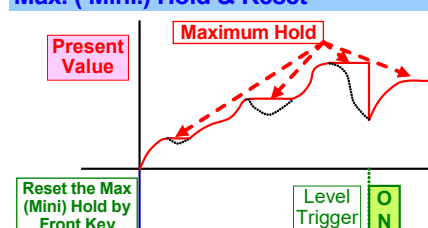
PV Hold & Reset



Reset for Max(Mini) Hold [Reset]:

When the [dSPly] in [inPUt GrOUP] set to be [Max Hold] or [Min Hold], [dSPly] function can be set to be [Reset] to reset the display when it is holding in maxi or mini value.

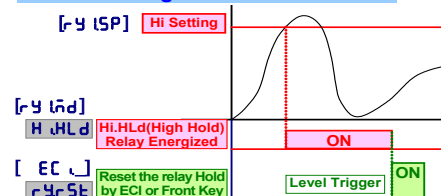
Max. (Mini.) Hold & Reset



Reset for relay energized latch [Reset]:

When the [r5 lnd] in [rELAY GrOUP] set to be [Hi.Hld] or [Lo.Hld], [dSPly] function can be set to be [Reset] to reset the relay when it is energizing and latching.

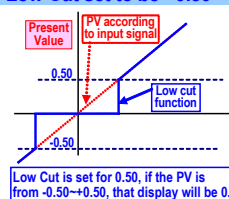
Hi or Lo Energized Latch & Reset



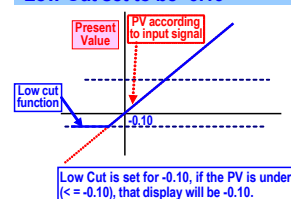
Low cut:

If the setting value is positive, it shows "0", $|PV| \leq$ setting value; if the setting value is negative, it shows "setting value", $|PV| \leq$ setting value.

Low Cut set to be +0.50



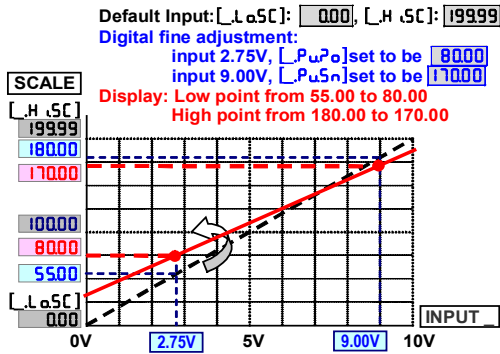
Low Cut set to be -0.10



Digital fine adjustment:

In the past, the engineers had to spend lots of time on adjusting high/low values to meet the requirement.

With the functions of [P_uP_o] & [P_uS_n], the users can set the corresponding vlaues with "Just Key in Values" according to actual needs. Also, users can clear the adjusted value with the function of [P_SCL_r].



Reading Stable Function

Average:

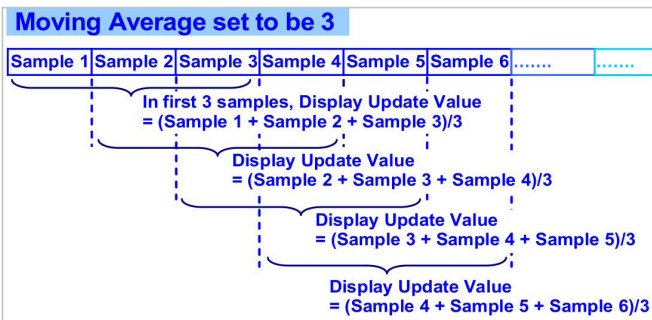
Basically, the sampling rate of meter is 15cycles/sec. If the function set to be 3 times, It means the meter will update the reading 5 times/sec.



Remark: The higher average setting will cause the response time of Relay and Analogue output slower.

Moving average:

If the function was set t be 3 times, the meter will update delay in first 3 samples, then update 15 times/sec continuously.



Remark: Except the 1st 3 samples, the value of the moving average wouldn't affect the response time of relay and analogue output.

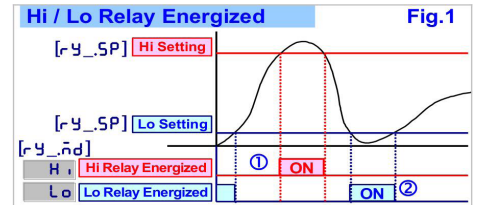
Digital filter: The digital filter can reduce the magnetic noise in field.

Control Functions(Optional)

Relay operation mode: Hi / Lo / Hi.HLd / Lo.HLd programmable

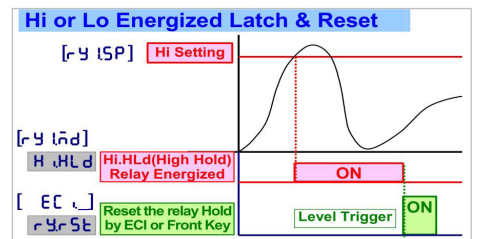
Hi [H_i] (Fig.1-①): Relay energizes when PV > Set Point

Lo [L_o] (Fig.1-②): Relay energizes when PV < Set Point

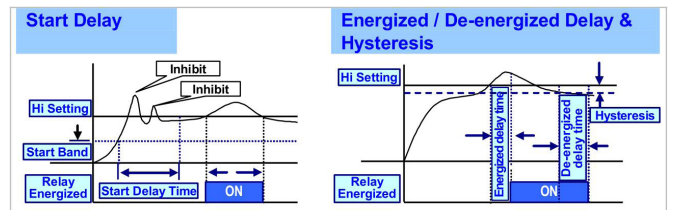


Hi.HLd [H_i.HLd] (Lo.HLd [L_o.HLd]):

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_nE_y] function set to be [r_y.S_t])



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

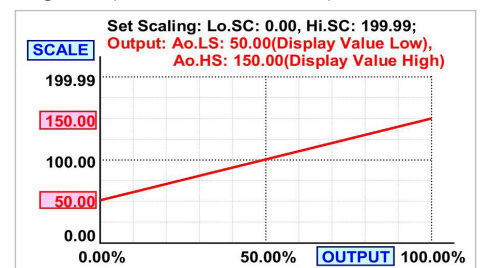


Analog Output(Optional)

Please specify the output type, 0~10V or 4(0)~20mA when ordering. The programmable output will correspond to low value and high value according to the setting value. The users can also set reverse output value (lower limit of the signal to high value; higher limit of the signal to low value).

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

Functions: Output range high [R_oH5]: Setting the Display value High to versus output range High(as like as 20mA in 4~20)
 Output range low [R_oL5]: Setting the Display value Low to versus output range Low(as like as 4mA in 4~20)



The range between R_oH5 and R_oL5 should be over 20% of span at least; otherwise, it will be got less resolution of analogue output.

Fine zero & span adjustment:

Users can do Fine Adjustment of analog output by front key on the panel. Please connect standard meter with the terminal of analog output. Press the front key(up or down key) to adjust and check the output.

Zero adjust [**R02r0**]:Fine Zero Adjustment for Analog Output;

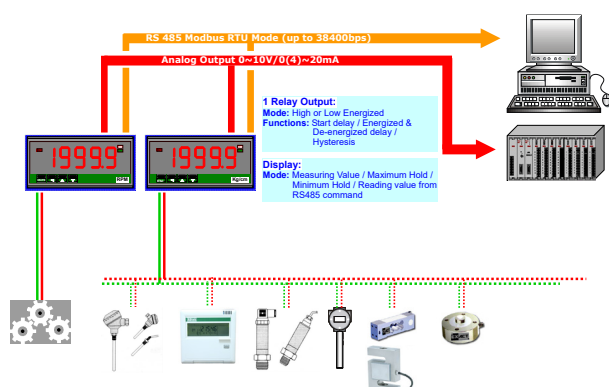
Settable range: -38011~27524

Span adjust [**R05Pn**]:Fine Span Adjustment for Analog Output;

Settable range: -38011~27524

■ RS-485 Communication(Optional)

The protocol of RS-485 is Modbus RTU mode, and baud rate is up to 38400 bps. The users can proceed remote display, reading values, and parameter setting.



Remote display:

The meter will show the value that received from RS-485 command. In past, The meter normally receive 4~20mA or 0~10V from AO or digital output from BCD module of PLC. We come up with a cost saving solution that PV value shows on the panel through RS-485 command of master.

When the [**d5PLy**] is set to be RS-485, it means the screen will show the values through RS-485 command & data. The data is the same as PV that will be compared with the set-point for relay action; analog output corresponding to the outputs.

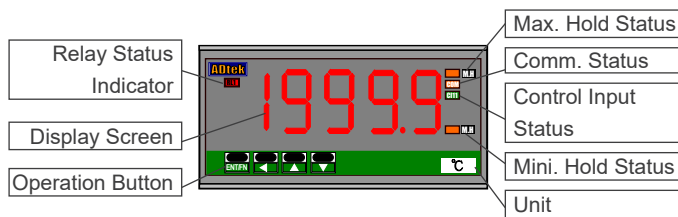
Error Message

Please check the specification and connection, and turn on the meter to proceed self-inspection.

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 ↔ FR.L	EEPROM occurs error	(Please send back to manufactory for repaired)
R.I.nC ↔ Pu	Calibrating Input Signal do not process	(Please process Calibrating Input Signal)
R.I.C ↔ FR.L	Calibrating Input Signal error	(Please check Calibrating Input Signal)
R.oC.nC ↔ Pu	Calibrating Output Signal do not process	(Please process Calibrating Output Signal)
R.oC ↔ FR.L	Calibrating Output Signal error	(Please check Calibrating Output Signal)

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
RL1 display when Relay 1 energized
- RS-485 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

Pass Word: Settable range:000

0~9999

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 USE: User Level lock. User can get into User Level for checking but setting.
- Programming Level En: 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 F.E.L.Pu / Pu.Hld / n.rSt / F.yrSt programmable.

Operating Key

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

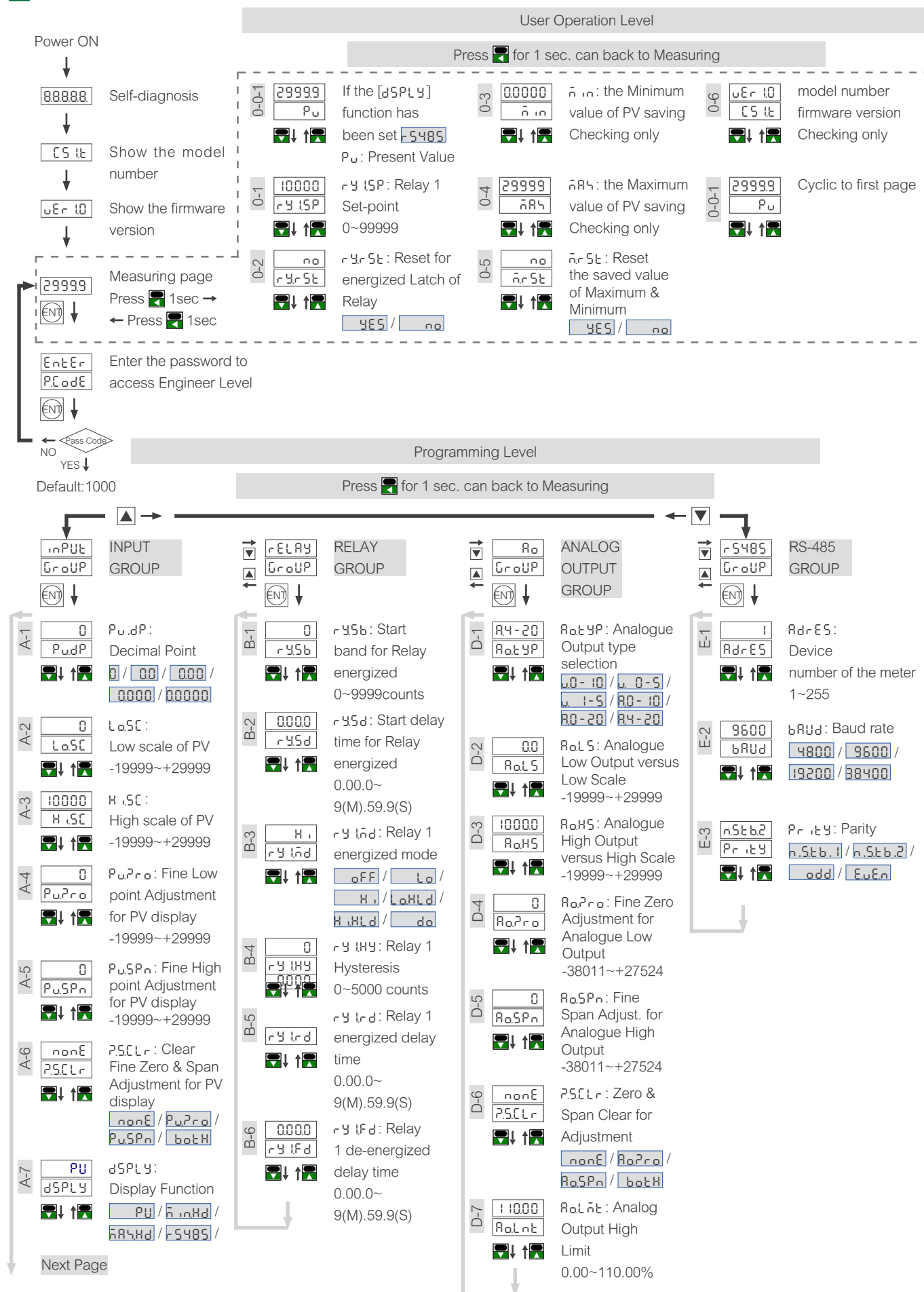
Operating Key: 4 keys for Enter(Function) / Shift(Escape) / Up key / Down key

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

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

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

OPERATING DIAGRAM (please refer to last pages for more details about the operation.)



A-8	0 Low Cut Function -19999~+29999	Low Cut Function -19999~+29999
A-9	5 Average update for PV 1(None)~99 times	Average update for PV 1(None)~99 times
A-10	1 Moving Average update for PV 1(None)~10 times	Moving Average update for PV 1(None)~10 times
A-11	0 Digital filter 0(None)/1~99 times	Digital filter 0(None)/ 1~99 times
A-12	none Down key function none / F.E.L.P.U / P.U.H.L.d / n.r.S.t / F.Y.r.S.t	Down key function none / F.E.L.P.U / P.U.H.L.d / n.r.S.t / F.Y.r.S.t
A-13	0 Pass Code for enter Engineer Level 0000~9999	Pass Code : Pass Code for enter Engineer Level 0000~9999
A-14	none Function Level Lock none / U.S.E.r / E.n.G / R.L.L	Function Level Lock none / U.S.E.r / E.n.G / R.L.L

► Please refer to operating manual for more details.