CS1-RL 5-Digit Pulse/Frequency Meter

ADTEK

Description

CS1-RL economic type Frequency Indicator is equipped with high accuracy measurement, display and communication of frequency.

It features user defined range of frequency input, 0.01Hz~ 100KHz (optional purchase for ~140KHz), and the display resolution will change based on the maximum input frequency.

It is able to select one from these three functions, 1 relay output, 1 analog output, or 1 RS485 (Modbus RTU Mode) interface; they provides many functions such as control, alarm, re-transmission, and communication.

Features

- Measuring frequency range: 0.01~100KHz; ~140KHz (optional purchase); voltage pulse or sine wave (appointed range).
- Accuracy: ± 0.005%; display range: 0~99999; automatically move the decimal point according to the setting range.
- Able to select one from these 3 functions, 1 relay output, 1 analog output, or 1 RS485
- 1 relay can be programmed individually to be a Hi / Lo / Hi Latch / Lo Latch energized with Start Delay / Hysteresis / Energized & De-energized Delay functions.
- Optional purchase: analog output or RS 485 communication port
- CE Approved & RoHS

Applications

- Work with PC/PLC for RPM, linear speed measurement for linear equipment, and alarm
- Testing for frequency measurement, alarm, and communication

Ordering Information

CS1 ─ RL — Input Mode | Input Level — Optional Output — Excitation Voltage — Aux. Powered ★ — *Optional Functions

CODE		Input
C	00	Contact
N		NPN
P		PNP
V		Voltage pulse
	05	5V pulse
	12	12V pulse
	24	24V pulse

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

Able to selecte one from these 3 outputs, relay, analog output or RS485

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

The excitation voltage has to match the inpulse level. For example, DC12V to 12Vp

CODE	Aux. Power
A	AC 115/230V
ADH	AC 85~264V DC 100~300V
ADL	AC/DC 20~56V

If the user specified for ADH or ADL, it was able to slect 1 from these 3 outputs, relay, analog output, or RS485.

★

CODE	Optional Function
HFM	140kHz high frequency mode

Measurement and Wiring

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; inpulse level: 5Vp, 12Vp, 24Vp can be adjusted with dip switches on the backside of the meter.		

Technical Specification

Input

Calibration:	no need to proceed calibration
Input range:	egular range: 0.01Hz ~ 100KHz (optional purchase: ~140KHz)
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; settable range in manul mode: 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, Auto-Moving for d.p

Resolution of PV: automatically move the decimal point according to the setting range; Auto-Moving for d.p.; auto / semi-auto / fix; 3 modes programmable

Compensation factor: Compensating 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 adjustment: PuPro: Settable range: 0~+99999
PuSPn: Settable range: 0~+99999

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: 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(M):59.9(S)
Energized delay time: 0.00.0~9(M):59.9(S)
De-energized delay time: 0.00.0~9(M):59.9(S)
Hysteresis: 0~5000 counts

Analog Output (optional)

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 when 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: AoHS (output range high):
Settable range: 0~99999
AoLS (output range Low):
Settable range: 0~99999

Digital fine adjustment: AoPro: Settable range: -38011~27524
AoSPn: Settable range: -38011~27524

RS 485 Communication (optional)

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: 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, Analog, RS485

EMC: EN 55011:2002; EN 61326:2003

Safety(LVD): EN 61010-1:2001

Work Environment

Operating Temp.: 0~60 ℃

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

Temp. Coefficient: ≤100 PPM/℃

Storage Temp.: -10~70 ℃

Enclosure: Front panel: IEC 529 (IP52); Housing: IP20

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, M2.6, 1.3~2.0mm^2(16~22AWG)

Weight: 350g

Power

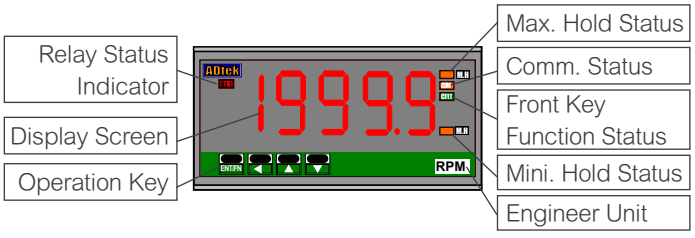
Power Supply: AC115/230V,50/60Hz;
Optional: AC 85~264V / DC 100~300V or AC/DC 20~56V

Excitation Supply: DC12V, 24V/30mA maximum

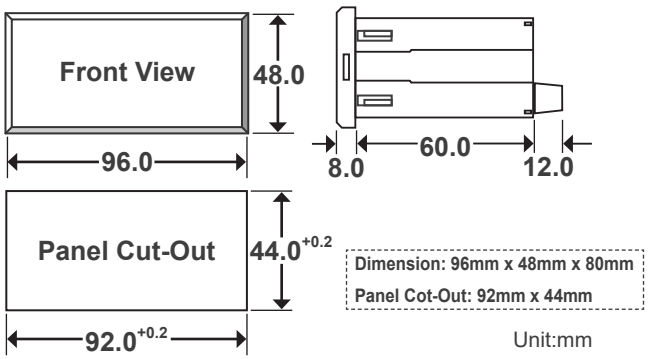
Power Consumption: 3.0VA maximum
ADH/ADL: 8VA/4.0W

Back Up Memory: By EEPROM

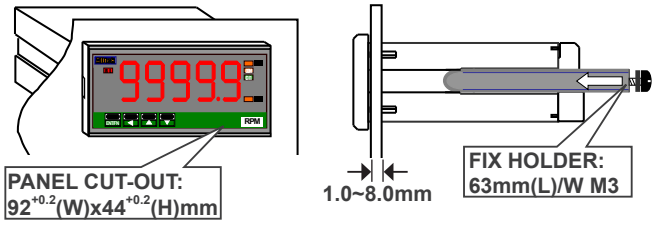
Front Panel



Dimensions

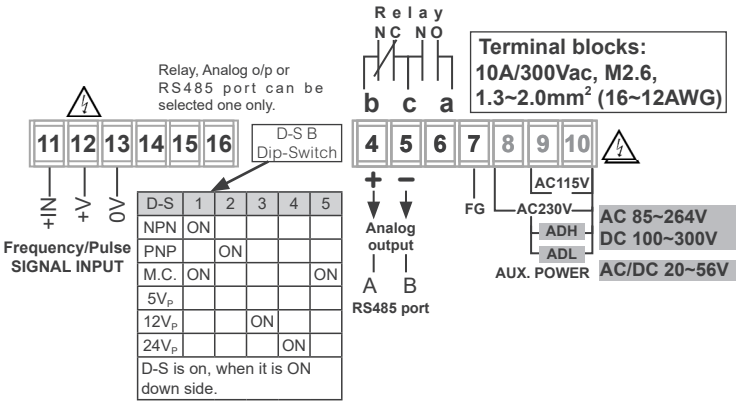


Installation



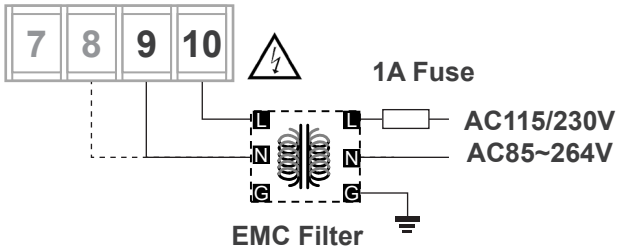
The meter should be installed in a place where it does not exceed themaximum operating temperature and provides good air circulation.

Pin Assignment

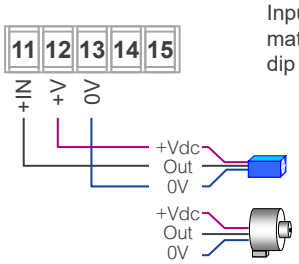


⚠ Please check the voltage of power supplied first, and then connect with the specified terminals. It is recommended that power supplied to the meter be protected by a fuse or circuit breaker.

Power Connection



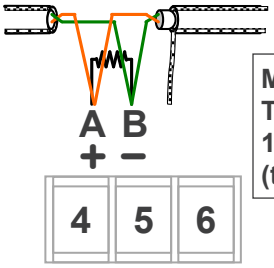
Sensor Input Connection



Input mode and impulse level should match input signal when adjusting with dip switches.

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					

RS485 Communication Port



Max Distance:1200M
Terminate Resistance:
120~300Ω/0.25W
(typical: 150Ω)

RS485 Port

Function Description

Input Functions

Input range: regular range (user-defined): 0.01Hz ~ 100KHz (optional purchase: ~140KHz)

It can satisfy the application requirement of RPM, linear speed, and frequency, so the users don't need to specify the input range.

Auto range display: auto range / semi-auto range / manual range; the description is as below.

Auto range AUto : the decimal point will automatically move up according to the input frequency to keep high-resolution reading.

Semi-Auto range SEMI : the decimal point will automatically move up according to the input frequency to keep high-resolution reading.
It shows "overflow" if the input frequency is over the display range.

Manual range MANUL : Fixed decimal point

Time out of input:

In the case of low frequency that the meter can not identify if it is at extreme low frequency and no input.

The meter has two switching modes, MANUL / AUto to set the setting value to "0".

Manual MANUL : the meter will show 0.0 when it is at low frequency; when it is over a set period of time, and there is still no impulse input, then the meter will regard it as no frequency input, and show "0. "

Auto range AUto : when it is at low frequency, the meter will start calculating the time of the value staying at "0" based on the user experience of the equipment. It usually will be 4 times the previous reading.

Period of time out: Settable: 0.0 sec~999.9sec

If the time out mode [toMd] set to be MANUL , it shows to.

Display & Functions

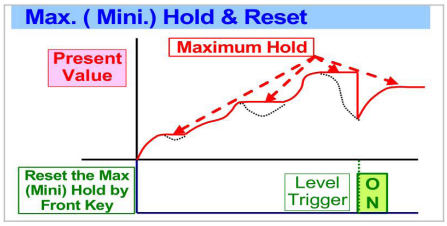
Max / Mini recording: The meter wills store the maximum and minimum value in [user level] during power on in order to review drifting of PV.

Display functions: PV / Max(Mini) Hold / RS 485 can be in [inPUt GroUP] [dSPLY] (Please refer to step A-07).

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

Maximum Hold MAXHd / Minimum Hold M inHd : The meter will keep display in maximum/ minimum value during power on until manual reset with front key in [User Level]. If terminal is off [Digital Input (DI.)], then press front down or up key to reset.

▸ Please find the MAX sticker enclosed in the package, and stick it to 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 come up with a cost saving solution that PV shows the value through RS485 command of master.

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

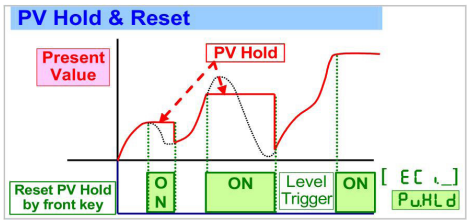
Relative PV rELPV : The [dnKEY] function can be set to be rELPV function. When user presses the ▼ key, the display will show the differential value (ΔPV) until press ▼ key again.

▸ Please find the REL.PV sticker, and stick it to the right side of square green LED.

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

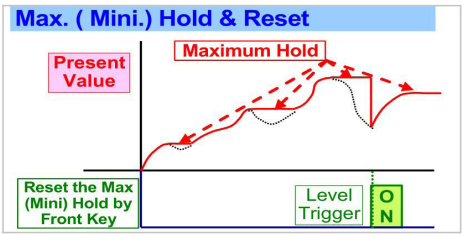
When user presses the ▼ key, the display will be hold until press the ▼ key again.

▸ Please find the PV.H sticker and stick it to the right side of square green LED.



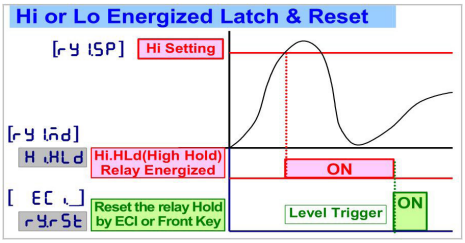
Reset for Max(Mini) Hold MnrSt :

When the [dSPLY] in [inPUt GroUP] set to be MAXHd or M inHd , [dnKEY] function can be set to be MnrSt to reset the display when it stays in maxi or mini value.



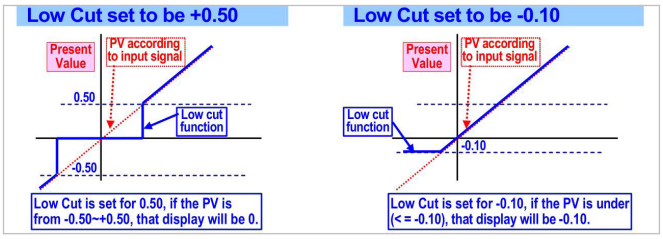
Reset for relay energized latch rYrSt :

When [rY inA] in [rELAY GroUP] is set to be H iHLd or LoHLd , [dnKEY] function can be set to be rYrSt to reset the relay (when it is energizing and latching).



Low cut:

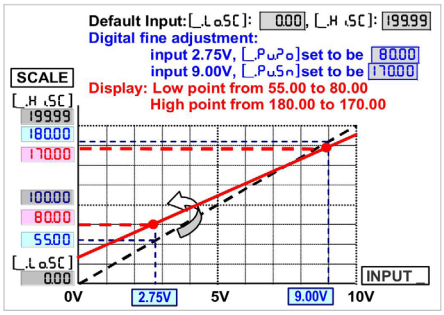
If the setting value is positive, it shows "0", |PV| ≤ setting value; if the setting value is negative, it shows "setting value", |PV| ≤- setting value.



Digital fine adjustment:

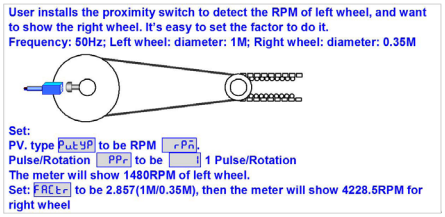
n the past, the engineers had to spend lots of time on adjusting high/low values to meet the requirement.

With the functions of [PuPro] and [PuSPn], 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 [PSCLr].



Compensation factor: Settable range: 0.001~9.999

Users can set the parameters to show compensating values. It can be applied on the indirect detection of gear/ wheel speed sensor.



Reading Stable Function

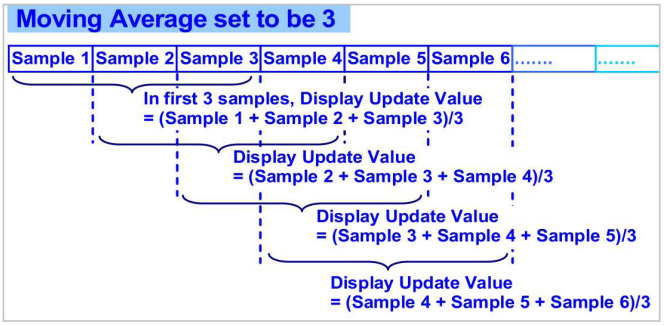
Average:

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 is, the slower the response time of relay and analog output will be.

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.



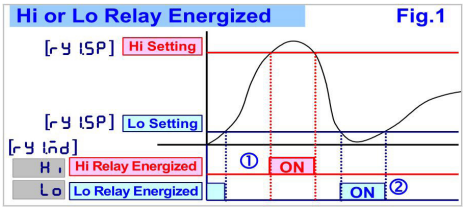
Digital filter：The digital filter can reduce the magnetic noise in field.

Control Functions (optional)

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

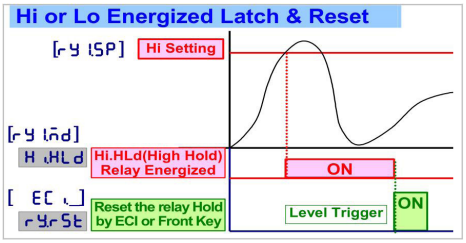
Hi [H i] (Fig.1- ①): Relay will energize when PV > Set-Point

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

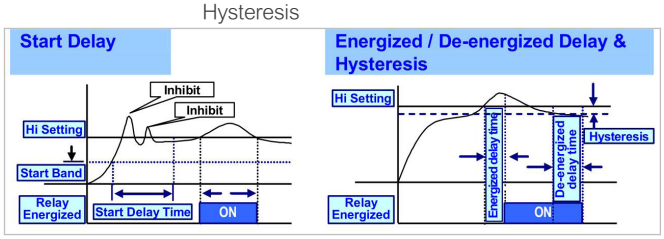


Hi.HLd [H iHLd] (Lo.HLd [LoHLd]):

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] or press down key to reset(If the [dnbEY] function set to be [ryrSt])



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

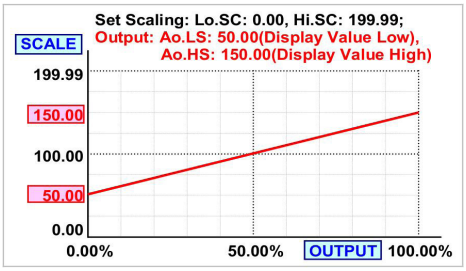


Analog Output(Option)

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 [AoHS]:
Set the high limit of display value to high output limit such as 20mA to 4~20.
Output range low [AoLS]:
Set the low limit of display value to low output limit such as 4mA in 4~20.



The range between AoHS and AoLS should be over 20% of span at least, otherwise, it will be low resolution of analog output.

Fine zero & span adjustment:

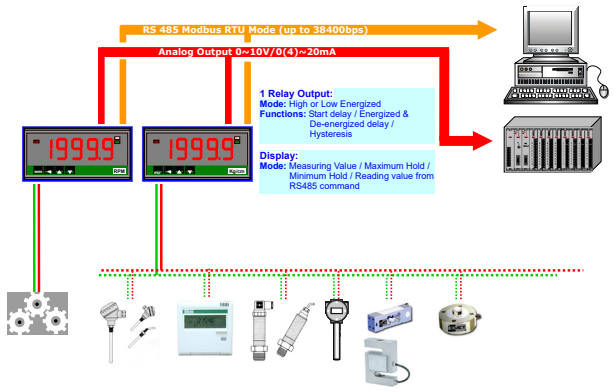
Users can do Fine Adjustment of analog output by front key on the panel. Please connect standard meter with the terminal of analog output. Press the front key(up or down key) to adjust and check the output.

Zero adjust [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;

RS485 Communication (optional)

The protocol of RS485 is Modbus RTU mode, and baud rate is up to 38400 bps. The users can proceed parameter setting, reading, and remote display.

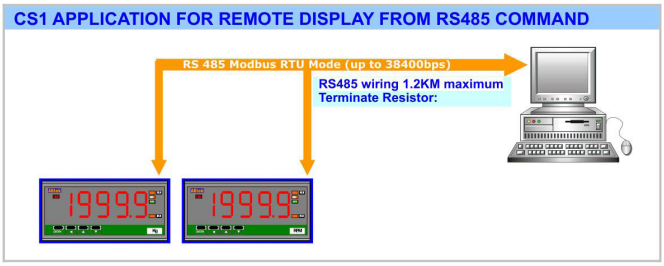


Remote display:

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 come up with a cost saving solution that PV value shows on the panel through RS485 command of master.

When the [dSPLY] is set to be RS485, it means the screen will show the values through RS485 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.

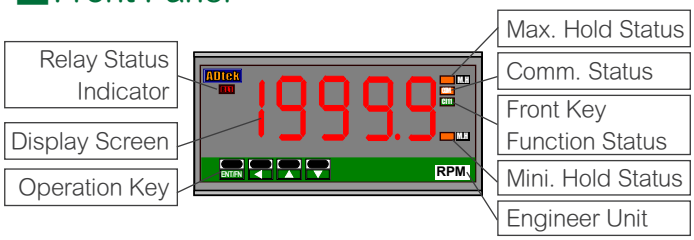
CS2 proceed remote display with RS485 COMMAND



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 ⇄ 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
- 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 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 Enter/Fun key	Setting Confirmed and save to EEProm	From the function index to get into setting status

Password: Settable range:0000~9999

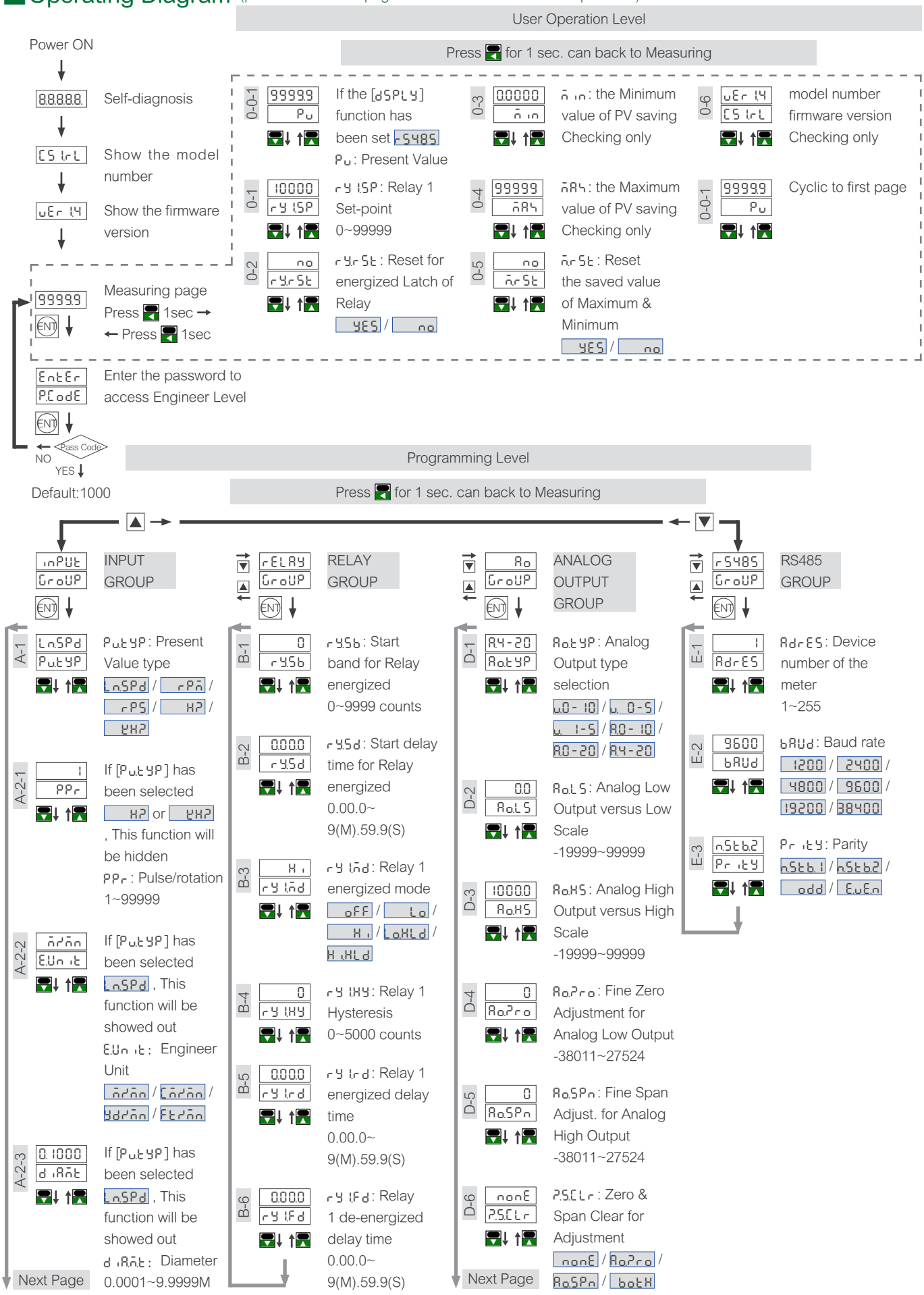
User has to key in the right pass word so that get into [Programming level]. Otherwise, the meter will go back to measuring page. If user forgets the password, please contact with the service window.

- 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 / ArSt / FuSt programmable.

Operating Diagram (please refer to last pages for more details about the operation.)



A-3 | 0 / dP | dP: Decimal Point of set-point 0~0.0000

A-4 | 1.000 / FACtr | FACtr: Compensation Factor 0.001~9.999

A-5 | 0 / Pu.SPn | Pu.SPn: 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 / H inXd / HAXd / 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 / SEA i / MANUL

A-12 | 5 / AvG | AvG: Average update for PV 1(None)~99 times

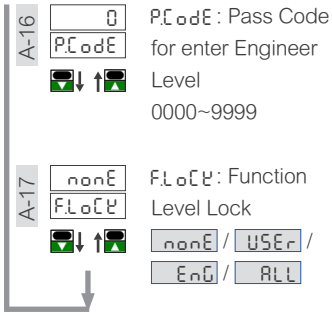
A-13 | 1 / MAvG | MAvG: Moving Average update for PV 1(None)~10 times

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

Next Page

D-7 | 110.00 / AoLnt | AoLnt: Analog Output High Limit 0.00~110.00%



PCodE : Pass Code
for enter Engineer
Level
0000~9999

FLoCY : Function
Level Lock
nonE / USEr /
EnG / ALL

▸ Plesae refer to operating manual for more details.