

ADTEK

CODE	Optional Function
3BK	3 Banks
HSM	High Speed Mode

Measurement and Wiring

Measuring Range DC / AC / TRMS		Input Impedance	Measuring Range DC / AC / TRMS		Input Impedance
Voltage	0~50/~100 mV	≥5MΩ	Current	0~199.99 μA	1KΩ
	0~199.99 mV	≥5MΩ		0~1.9999 mA	100Ω
	0~333 mV	≥5MΩ		0~19.999 mA	10Ω
	0~1.9999 V	≥1MΩ		0~199.99 mA	1Ω
	0~19.999 V	≥1MΩ		0~1.9999 A	0.05Ω
	0~199.99 V	≥1MΩ		0~5.000 A	0.02Ω
	0~300.0 V	≥2MΩ		0~10.000 A	0.01Ω
	0~600.0 V	≥2MΩ			

Technical Specification

Input

A/D converter:	16 bits resolution
Accuracy:	DC: $\leq \pm 0.04\%$ of F.S. $\pm 1C$ AC: $\leq \pm 0.1\%$ of F.S. $\pm 1C$
Sampling:	15 cycles/sec
Response time:	≤ 100 mS(when the AvG = "1") in standard
Input range:	Input High and Low programmable R _{HI} : Setting range: 0.00~100.00% of input range R _{LO} : Setting range: 0.00~100.00% of input range
Overload capacity:	Voltage: 2x rated voltage continuous ; 4x rated/2s Current: 3x rated current continuous ; 10x rated/10s ; 50x rated/1s

Display & Functions

LED:	Numeric: 5 digits, 0.8" (20.0mm) red high-bright LED Relay output indication: 4 square red LED RS-485 communication: 1 square orange LED E.C.I. function indication: 3 square green LED Max/Mini Hold indication: 2 square orange LED
Display range:	-19999~29999;
Scaling function:	L _{SCALE} : Low Scale; Settable range: -19999~+29999 H _{SCALE} : High Scale; Settable range: -19999~+29999
Decimal point:	Programmable from 0 / 0.0 / 0.00 / 0.000 / 0.0000
Over range indication:	OFFL, when input is over 20% of input range Hi
Under range indication:	-OFFL, 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:	Up and down key can be set to be a function as ECI.
Low cut:	Settable range: -19999~29999 counts
Digital fine adjust:	P _{UPFAD} : Settable range: -19999~+29999 P _{DOWN} : 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 (Optional)

Set-points:	Four set-points
Control relay:	Four relays Relay 2 & Relay 3: Dual FORM-C, 5A/230Vac, 10A/115V Relay 1 & Relay 4: Dual FORM-A, 1A/230Vac, 3A/115V
Relay action mode:	Energized levels compared with set-points: Hi / Lo / Go.12 / Go.23 / Hi.HLd / Lo.HLd; RS-485 control relay switch through remote control; DO function
Relay action functions:	Start delay / Delay ON / Delay OFF / Hysteresis Start band: 0~9999 counts Start delay time: 0.00.0~9(M):59.9(S) Delay ON time: 0.00.0~9(M):59.9(S) Delay OFF time: 0.00.0~9(M):59.9(S) Hysteresis: 0~5000 counts

External Control Inputs (ECI)

Input mode:	3 ECI points, contact; open collector; level trigger
Functions:	Relative PV(Tare) / PV Hold / Reset for Max or Mini. Hold / DI / Reset for relay energized latch
Debouncing time:	5~255 (x8ms) programmable

Analog Output (Optional)

Accuracy:	$\leq \pm 0.1\%$ of F.S.; 16 bits DA converter
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:	Please specify either Voltage/Current output when purchasing. 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; $\leq 600\Omega$ max
Functions:	R _{OH5} (high output range): Settable range: -19999~29999 R _{OL5} (low output range): Settable range: -19999~29999 R _{OLHL} (output High Limit): 0.00~110.00% of output High
Digital fine adjust:	R _{ADFO} : Setting range: -38011~+27524 R _{ADPN} : Setting range: -38011~+27524

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 through RS-485 command
Distance:	1200M

Safety

Isolation:	AC 2.0 KV, 50/60Hz, for 1 min Between Power / Input / Output / Case
Insulation resistance:	$\geq 100M\Omega$ @ 500Vdc Between Power / Input / Output
Isolation:	Between Power / Input / Relay / Analog / RS-485 / E.C.I.
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
Degree of protection:	Front panel: IEC 529 (IP52); Housing: IP20

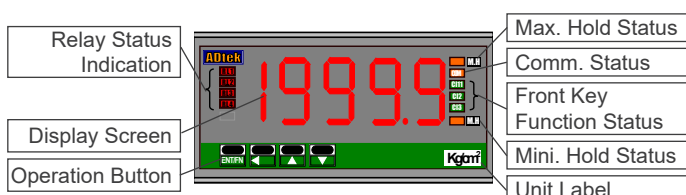
Mechanical Structure

Dimensions:	96mm(W) x 48mm(H) x 120mm(D)
Panel cutout:	92mm(W) x 44mm(H)
Material:	ABS fire-resistance (UL 94V-0)
Mounting:	Panel flush mounting
Wire terminal:	PA 66 (UL 94V-0)
	#A1~A3(current input): 20A/300Vac, M3.5, 12~22AWG Others: 10A 300Vac, M2.5, 16~22AWG
Weight:	550g / 350g(Aux. Power Code: ADH or ADL)

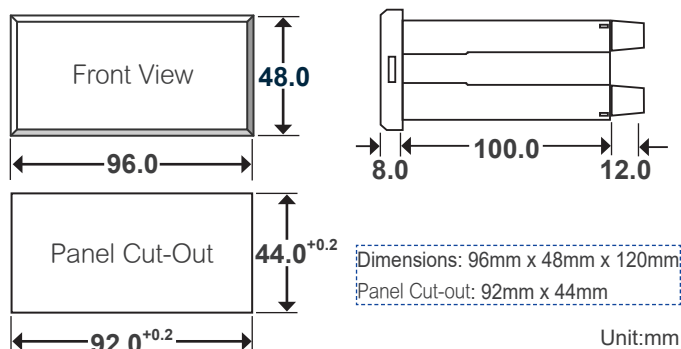
Power Supply

Range:	AC115/230V, 50/60Hz Optional: AC 85~264V / DC 100~300V or AC/DC 20~56V
Power consumption:	5.0VA maximum
Memory storage:	By EEPROM

Front Panel

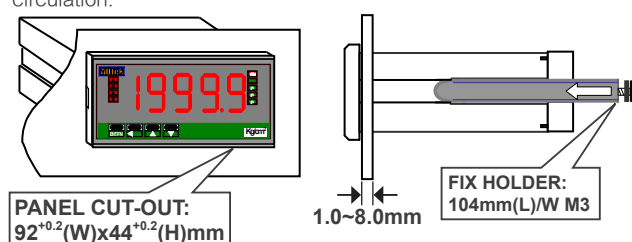


Dimensions

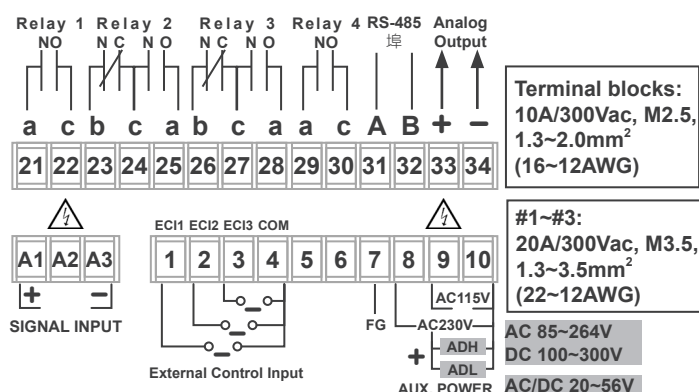


Installation

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

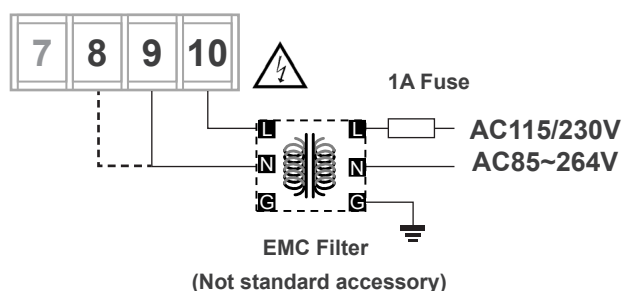


Terminal Block

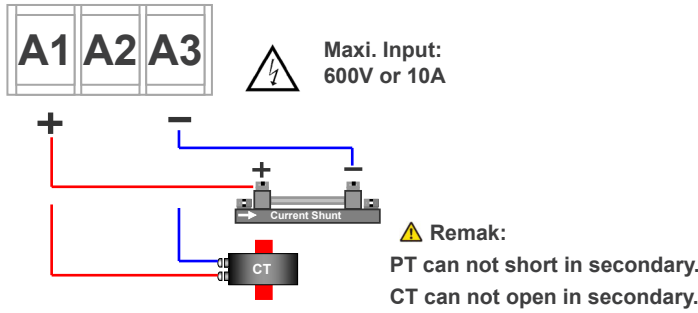


⚠ Please check the voltage of power supplied first, and then connect to the specified terminals. It is recommended that power supplied to the meter be protected by a fuse or circuit breaker.

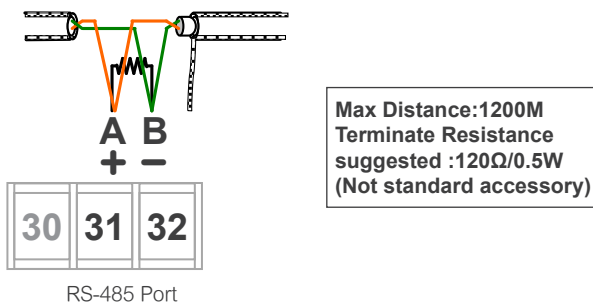
Power Connection



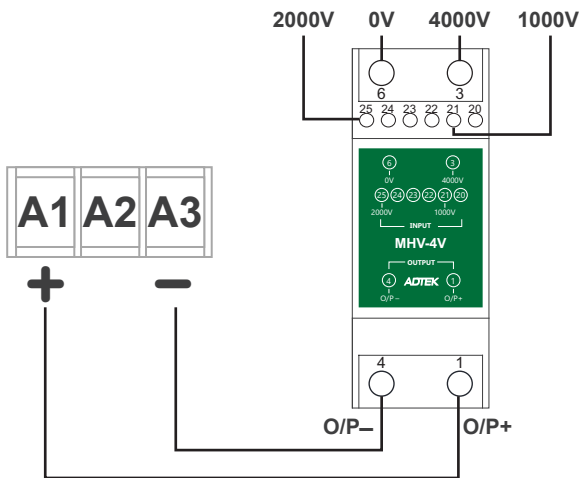
Input Connection



RS-485 Communication Port



MHV-4V High-Voltage Input Module Connection



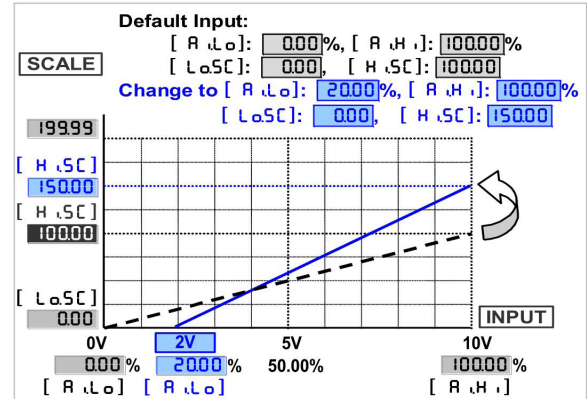
Function Description

Input & Scaling Functions

Input range: Analog input High and Low programmable

The meter was manufactured according to ordering code (ex. 0~10A or 0~300V) in factory. If the meter has to be installed in a difference range of input, the meter can be set to meet the input signal required with function [R.L.O.] and [R.H.I.] of input group.

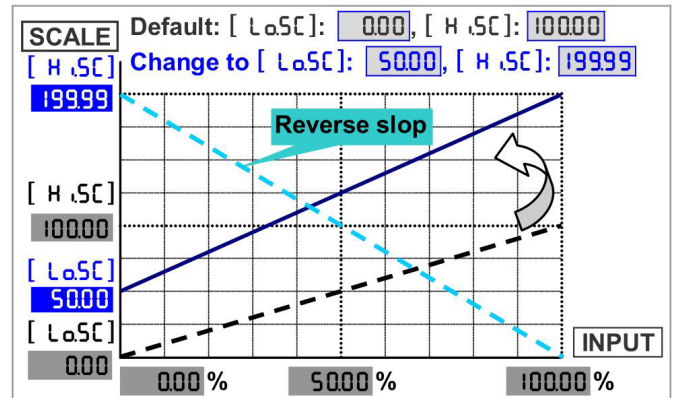
For example: The meter is 0~10Aac input, and the signal from sensor is 0~5Aac. Please enter into [INPUT GROUP] to set [R.H.I.] (Analog input high) to be 50.00%(10A x 50.00% = 5A). In this way, the input range will be changed to be 0~5A and the all relative parameters will work based on 0~5A, so the meter doesn't need any re-calibration after adjusting the [R.L.O.] and [R.H.I.]



*The setting may cause the display in low resolution, so please set lower resolution when the input signal level remains high.

Scaling function:

Set the [L.O.S.] (Low scale) and [H.S.] (High scale) in [INPUT GROUP] to meet relative input signal. Reverse scaling follow the same procedure. Please refer to the figure below,



*Too narrow scale may cause lower display resolution.

Display & Functions

Max / Mini recording: The meter will store the maximum and minimum value in [User Level] when energizing in order to review PV.

Display functions: PV / Max(Mini) Hold / relative PV(Δ PV) / RS-485 programmable

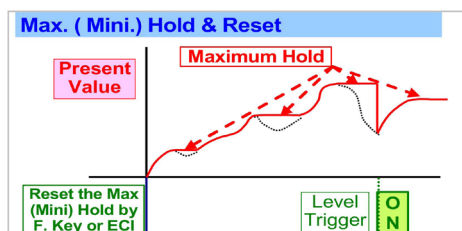
(Please refer to step A-09) [Display] function of [Input Group]

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 when energizing until reset by hand with front key in [User Level]. Turn off [External Control Input(E.C.I.)], and press Down or Up key to clear the record (please refer to the ECI Group for more details about the setting).

► Please find the **M.H** sticker, and attach it on the left side of square orange LED.



Remote Display by RS-485 command:

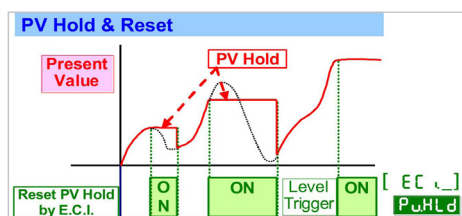
The meter will show the value that received from RS-485. In the past, The meter normally receive 4~20mA or 0~10V from AO or digital output from BCD module of PLC. We provide a new solution that PV can be shown on the panel through RS-485 command.

In this way, the users don't have to pay for another indicator and it is easier for meter maintenance.

PV Hold [PV Hold]: [External Control Input(E.C.I.)]

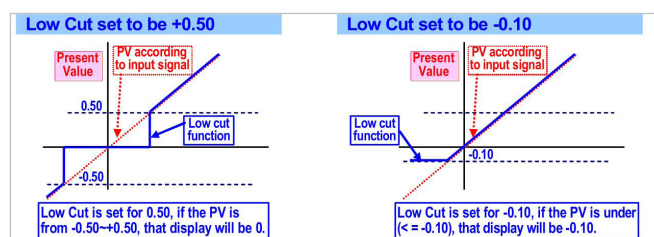
can be set to be **PV Hold** (please refer to the function of ECI Group). The display will be hold when the E.C.I. is closed.

► Please find the **ECI PVH** sticker, and attach it on the right side of square green LED.



Low cut:

If the setting value is positive, it means when the absolutely value of $PV \leq$ Setting value, the display will be 0. If the setting value is negative, it means when the PV under setting value ($PV \leq -$ Setting value), the display will be setting value.

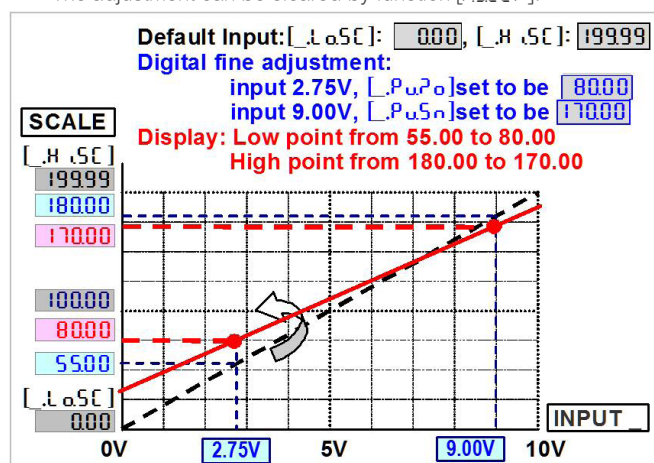


Digital adjustment:

Users will get fine adjustment for Zero & Span of PV shown on the front key of the meter during the test. However there may be some errors even if the user is constantly adjusting the lower point for [Zero] & higher point for [Span].

To save time, we've offered a solution that the user can simply input the value by setting "Just Key In".

The adjustment can be cleared by function [Reset].

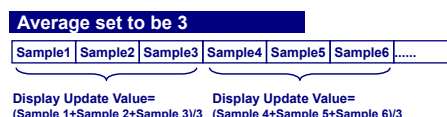


Reading Stable Function

Average:

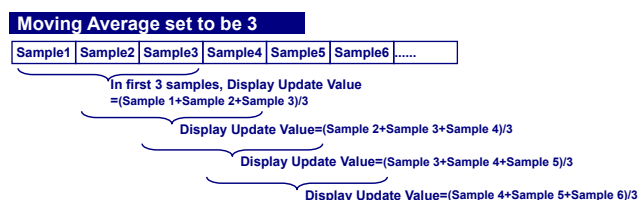
Normally, the sampling rate of the meter is 15 cycles/sec.

For instance, if the function was set to be 3, it means the display would show the average value for the first 3 sampling and proceed to update. After that, the display value will be updated 5 times/sec.



Moving average(M.AVG):

If the value was set to be 3, the meter would take 3 samples at the first cycle. After that, it will be updated 15 times/sec.



Remark: Except the 1st period, to set Moving Average will not change the output speed of relay and analog convertor.

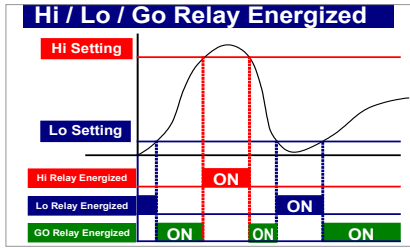
Digital Filter:

The digital filter can reduce the magnetic noise in field.

Control Functions (Optional)

Relay operation mode: Hi / Lo / Hi.HLd / Lo.HLd / do / Go-1.2 / Go-2.3 programmable

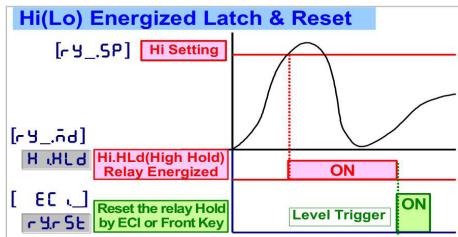
Hi **H** : Relay energizes when PV > Set Point
Lo **L** : Relay energizes when PV < Set Point



Go-1.2 **Go-1.2** : Only Relay 4 can proceed.
If Relay 4 was set to be "Go" mode, the relay will start comparing by reading **[rY15P]** and **[rY25P]**:

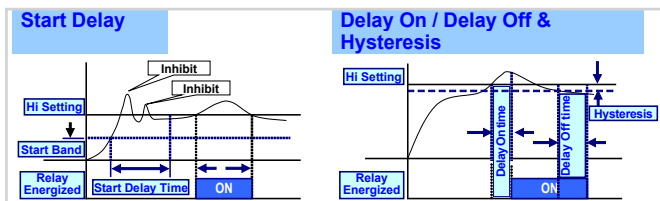
[rY15P] (Hi) > PV > [rY25P] (Lo)
Go-2.3 **Go-2.3** : Only Relay 4 can proceed.
If Relay 4 was set to be "Go" mode, the relay will start comparing by reading **[rY25P]** and **[rY35P]**:

[rY25P] (Hi) > PV > [rY35P] (Lo)
Hi.HLd **H.HLd** (Lo.HLd **L.HLd**):
When the relay was set to be Hi.HLd **H.HLd**, then **[EC1]** can be set to be **[rYrSt]** (Reset for latching relay).
When PV achieves certain levels, the relay will energize and latch until (E.C.I.) is closed by manual reset.



DO function **do** : Energized by RS-485 command of master.
The function was designed to get remote control by RS-485 command of master. The typical application is to control a switch in field from computer center as like as digital output(DO) of PLC.

Energized Functions: Start delay / Delay On / Delay Off / Hysteresis



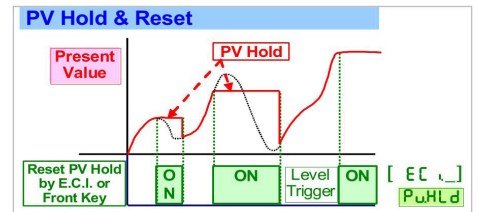
External Control Inputs (ECI)

These three external control inputs are designed to control the meter and the display, and all E.C.I. are designed with electrical trigger actions. Please note that EC1 or EC12 input will be disable while UP or Down Key is set to be "YES".

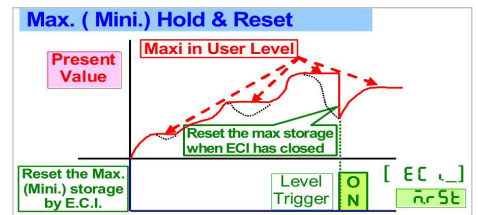
Functions: Relative PV / PV Hold / Reset Max or Mini. Hold / DI / Reset for Relay Energized latch

Relative PV **RELPU** : The E.C.I. can be set to be **RELPU** mode. The reading will show the deviation value when E.C.I. is closed.

PV Hold **PuHLd** : The E.C.I. can be set to be **PuHLd** mode. The PV on the display will be remained when the E.C.I. is closed. It will start running again when E.C.I. operates. Please refer to the figure below.



Reset for Maximum or Minimum Hold **MRSt** :
When the **[dSPLY]** function in **[mPUt GRoUP]** select **MRHd** or **MRHd**, the display will show Maximum or Minimum value, and it can be reset with E.C.I closed. Please refer to the figure below.



DI **dI** : The E.C.I can be set to be **dI** mode. It is easier to proceed with remote monitoring. A switch status through the meter as like as DI of PLC.

Reset for Relay Energized Latch:
If relay energized mode was set to be energized latch (**H.HLd** / **L.HLd**), E.C.I. can be set to be **[rYrSt]**, When PV achieves certain levels, the relay will energize and latch until (E.C.I.) is closed.

Debouncing time:
The function is designed to avoid noise signal transmitted to the meter. The basic cycle is 8 milli-seconds, so the setting should be the multiple of 8.
For example: **[dEBnC]** was set to be 5, it means 5 x 8 milli-seconds = 40 milli-seconds

Analog Output (Optional)

Please specify the output type either an 0~10V or 4(0) ~ 20mA when purchasing. The programmable output low and high scaling can be set 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

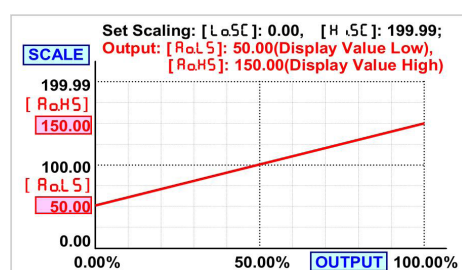
Functions: Output High / Low scale, output limit, fine adjustment

output range high [R_{oH5}]:

Set high display value when setting high output range, as like as 20mA in 4~20

output range low [R_{oL5}]:

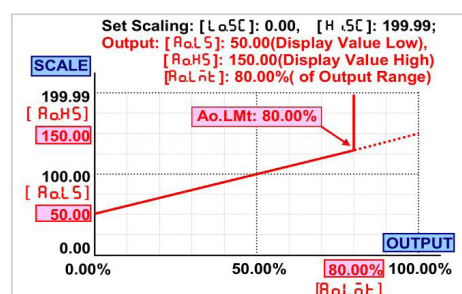
Set low display value when setting low output range, as like as 4mA in 4~20)



The range between R_{oH5} and R_{oL5} should be over 20% of span at least, otherwise, it will get less resolution of analog output.

Output High Limit [R_{oLmt}]:

0.00~110.00% of output High User can set the high limit of output to avoid system damage.



Zero-span adjustment::

Users can get fine adjustment of analog output on the front key of the meter. Please connect standard meter to the terminal of analog output, and press the front key (Up or Down key) of the meter to adjust until the accuracy reaches $\pm 0.1\%$.

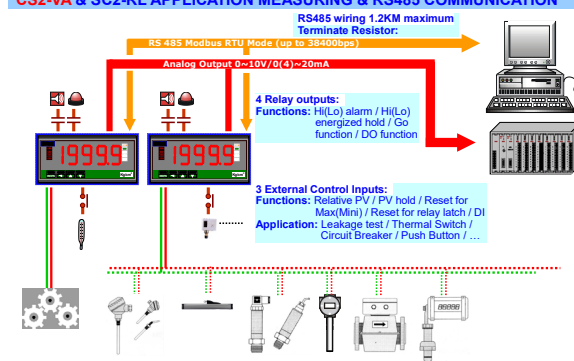
AO Zero [R_{oP r o}]: Fine Zero Adjustment for Analog Output; Setting range: -38011~27524;

AO Span [R_{oSP n}]: Fine Span Adjustment for Analog Output; Setting range: -38011~27524;

RS-485 Communication (Optional)

The RS-485' s protocol is Modbus RTU mode, and baud rate is up to 38400 bps. It's convenient to proceed remote monitoring to set parameter, read display value, and control the output.

CS2-VA & SC2-RL APPLICATION MEASURING & RS485 COMMUNICATION

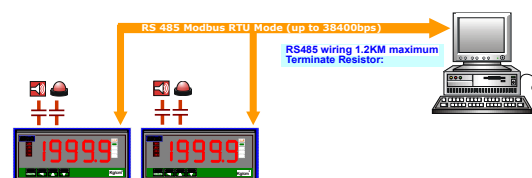


Remote Display:

The meter will show the value that received from RS-485 command. In the past, The meter normally receive 4~20mA or 0~10V from AO or digital output from BCD module of PLC .We provide a new solution that PV can be shown on the panel through RS-485 command of master. In this way, the users don't have to pay for another indicator and it is easier for meter maintenance.

When the [dSP L y] was set to be RS-485, the display will show the number through RS-485 command. The data(number) is equivalent to PV that can be compared with set-point, analog output and relay energized and so on.

CS2 APPLICATION FOR REMOTE DISPLAY FROM RS485 COMMAND



Optional Function

Please contact with our sales for additional customized function.

The appendix code of optional function will be added to the code of auxiliary power as like as xxx-A-HSM.

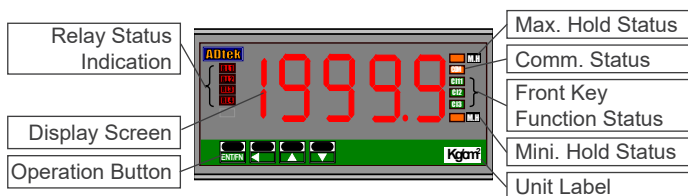
Banks function: (appendix code: -3BK)

- The function of the meter is designed to use CS2 to control difference process.
- For example: A pressure testing equipment; it has to measure multi-range with difference pressure transducers. The meter can pre-set 4 groups of parameter to show different range and the set-points of the relay. The operator just has to select the bank number (bank1) by using [External Control Input(ECI)] or operating the front key on [User Level] to meet the process.

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 range high 120%)	(Please check the input signal)
-ouFl	ADC is negative-overflow (Signal is lower than input range low -120%)	(Please check the input signal)
EEP ↔ FA IL	EEPROM occurs error	(Please send back to manufactory for repair)
A I.C.G ↔ Pu	Calibrating Input Signal do not process	(Please process Calibrating Input Signal)
A I.C ↔ FA IL	Calibrating Input Signal error	(Please check Calibrating Input Signal)
A o.C.G ↔ Pu	Calibrating Output Signal do not process	(Please process Calibrating Output Signal)
A o.C ↔ FA IL	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 value.

I/O Status Indication

- Relay Energized: 4 square red LED
 - display when Relay 1 energized;
 - display when Relay 2 energized;
 - display when Relay 3 energized;
 - display when Relay 4 energized;
- External Control Input Energized: 3 square green LED
 - display when E.C.I. 1 close(dry contact)
 - display when E.C.I. 2 close(dry contact)
 - display when E.C.I. 3 close(dry contact)
- RS-485 Communication: 1 square orange LED
 - will flash when the meter is receiving or sending 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:
- E.C.I. functions mode:
 - PV.H(PV Hold) / Tare / DI(Digital Input)
 - M.RS(Maximum or Minimum Reset) /
 - R.RS(Reset fo 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.

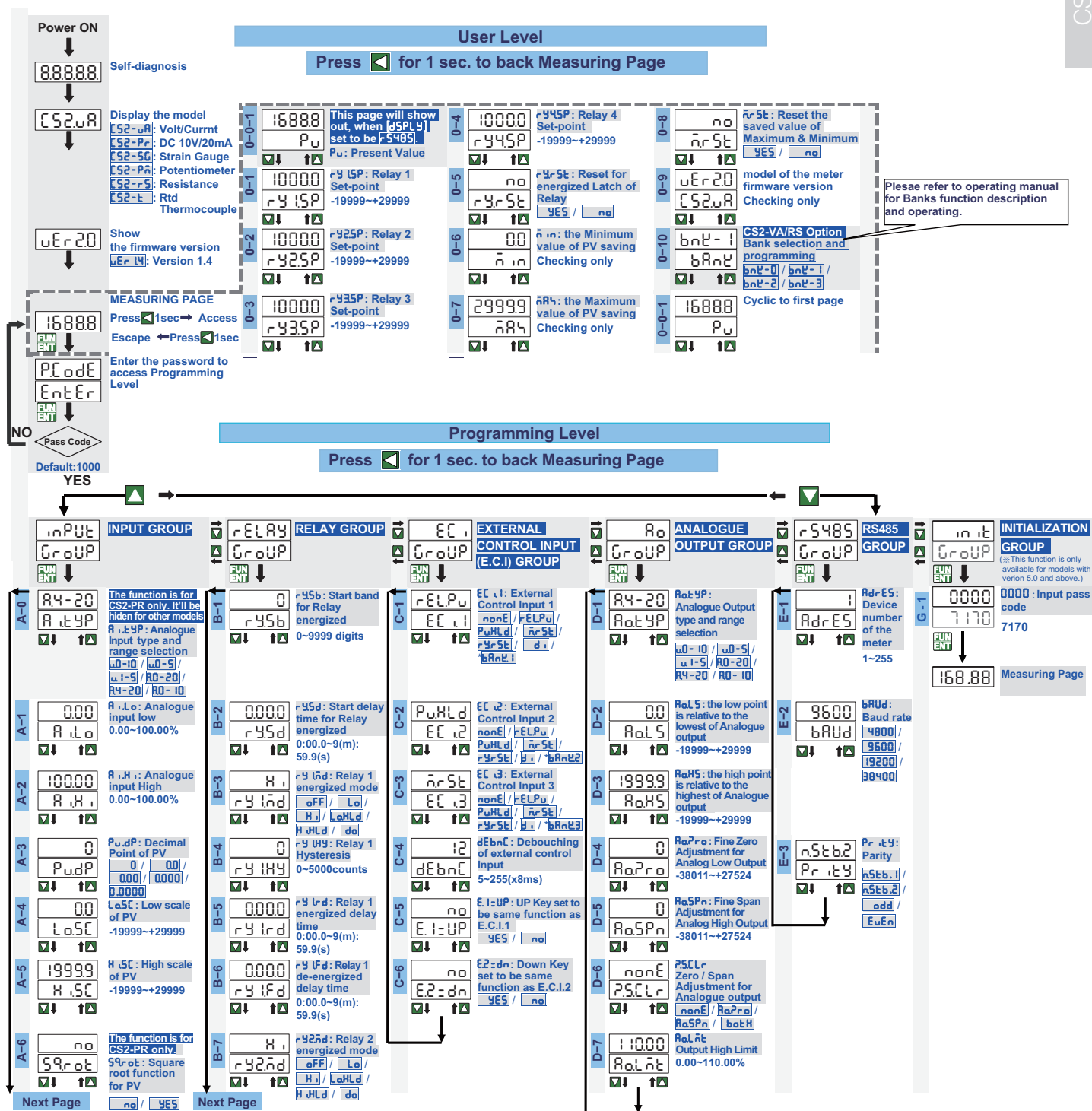
- Function Lock: There are 4 levels programmable.
- None : no lock all.
- User Level : User Level lock. User can get into User Level for checking but setting.
- Programming Level : Programming level lock. User can get into programming level for checking but setting.
- ALL : All lock. User can get into all level for checking but setting.

Front Key Function

- The Key can be set to be the same function as the setting of ECI1.
 - Ex. The ECI1 set to be and the function set to be in . When user presses Key, the PV will hold as like as ECI1 close.
 - The Key can be set to be the same function as the setting of ECI2.
 - Ex. The ECI2 set to be and the function set to be in . When user presses Key, the PV will show relative value as like as ECI2 close.
- If the front key function has been set, the terminal input for ECI will be disable.

Operating Diagram (please refer to the last pages for the information about the description of the operation.)

OPERATING FLOW CHART: Please refer to operating manual for detail description



A-7	00 PuPro: Fine Low point Adjustment for PV display -19999~+29999	B-8	0 rY2HY: Relay 2 Hysteresis 0~5000counts
A-8	00 PuSPn: Fine High point Adjustment for PV display -19999~+29999	B-9	0000 rY2rd: Relay 2 energized delay time 0:00.0~9(m):59.9(s)
A-9	nonE PSClr: Clear Fine Zero / Span Adjustment for PV display nonE / PuPro / PuSPn / both	B-10	0000 rY2Fd: Relay 2 de-energized delay time 0:00.0~9(m):59.9(s)
A-10	Pu dSPly: Display Function for PV screen Pu / Fin rH / nRnH / S485	B-11	Lo rY3nd: Relay 3 energized mode oFF / Lo / Hi / LoHLd / HiHLd / do
A-11	00 LoCut: Low Cut the PV -19999~+29999	B-12	0 rY3HY: Relay 3 Hysteresis 0~5000counts
A-12	5 RuG: Average update for PV 1(None)~99times	B-13	0000 rY3rd: Relay 3 energized delay time 0:00.0~9(m):59.9(s)
A-13	1 nRuG: Moving Average update for PV 1(None)~10times	B-14	0000 rY3Fd: Relay 3 de-energized delay time 0:00.0~9(m):59.9(s)
A-14	0 dF.Lt: Digital filter 0(None)/1~99times	B-15	Lo rY4nd: Relay 4 energized mode oFF / Lo / Hi / LoHLd / HiHLd / do / Go-12 / Go-23
A-15	0000 PCodE: Pass Code setting for access to Programming Level 0000~9999	B-16	0 rY4HY: Relay 4 Hysteresis 0~5000counts
A-16	nonE FLocL: Function Level Lock nonE / USEr / EnG / ALL	B-17	0000 rY4rd: Relay 4 energized delay time 0:00.0~9(m):59.9(s)
		B-18	0000 rY4Fd: Relay 4 de-energized delay time 0:00.0~9(m):59.9(s)

Split Core CT Ordering Information

US – CTV — Hole — Primary Current — 2

CODE	Diameter(mm)	CODE	Rated Current
10	Φ 10	005	5A
16	Φ 16	060	60A
		100	100A
		150	150A
24	Φ 24	200	200A
35	Φ 35	300	300A
		400	400A
		600	600A
50	Φ 50	800	800A

(The output line of mV on the secondary side of the CT needs to be wired independently, and cannot be connected together or grounded for protection purposes.)



Type	Current of primary (A)	Voltage of secondary (mV)	Accuracy %F.S.	Weight
US-CTV-10-005	5A	333	1.0	60g
US-CTV-16-060	60A	333	0.5	100g
US-CTV-16-100	100A	333	0.5	100g
US-CTV-16-150	150A	333	0.5	100g
US-CTV-24-200	200A	333	0.5	205g
US-CTV-35-300	300A	333	0.5	375g
US-CTV-35-400	400A	333	0.5	375g
US-CTV-35-600	600A	333	0.5	375g
US-CTV-50-800	800A	333	0.5	655g

High-Voltage Input Module (Optional)

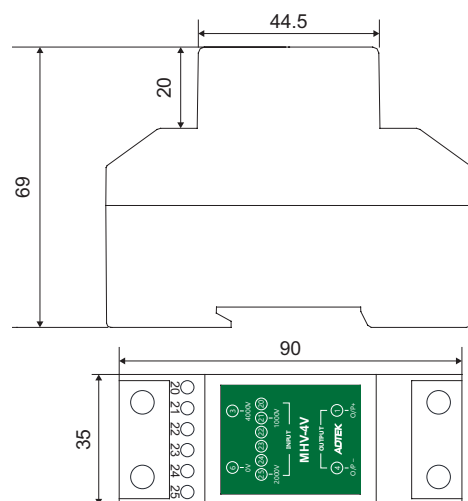
MHV – 4V

Input Voltage Range: AC/DC 0~4000V

Accuracy: $\pm 2\%$



Dimensions



Unit: mm

Terminal Block

