

CS1-VA 4 2/3 Digits Voltage/Current Meter

ADTEK

CS1-VA

Description

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

In addition, you can select 1 set of 1 Relay output, or 1 Analog output, or 1 RS-485 (Modbus RTU Mode) to create new function such as control, alarm, transmission or communication that can be widely applied in industrial testing.



Feature

- Measuring Voltage 0~600V or Current 0~10A for DC / AC / TRMS
- Option available 1 of 1 relay, 1 analog output or RS-485(Modbus RTU mode)
- 1 relay can be programmed individual to be a Hi / Lo / Hi Hold / Lo Hold energized with Start Delay / Hysteresis / Energized & De-energized Delay functions.
- Analog output or RS-485 communication port in option
- High-voltage Input module is optional for metering high-voltage signal.
- CE Approved & RoHS

Applications

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

Ordering Information

CS1 - VA — DC/AC/TRMS Input Signal — Optional Output — Aux. Power

CODE	Voltage Input	CODE	Current	CODE	Optional O/P	CODE	Aux. Power
D	DC measuring	D	DC measuring	N	None	A	AC 115/230V
A	AC measuring	A	AC measuring	R1	1 Relay	ADH	AC 85~264V
T	TRMS measuring	T	TRMS measuring	V	0(1)~5 V 0~10 V	ADL	DC 100~300V
V1	0~199.99 mV	A1	0~199.99 μA	I	0~10mA 0(4)~20 mA		
V2	0~1.9999 V	A2	0~1.9999 mA	8	RS-485		
V3	0~19.999 V	A3	0~19.999 mA	Relay, Analog Output or RS-485 Port can be selected one only			
V4	0~199.99 V	A4	0~199.99 mA				
V5	0~300.0 V	A5	0~1.9999 A				
V6	0~600.0 V	A6	0~1.0000 A				
VA	0~50 mV	A7	0~5.000 A				
VB	0~60 mV	A8	0~10.000 A				
VC	0~100 mV						
VM	0~333 mV						
VZ	0~20 mV						
HV	0~1.6 V (Only available when working with High-voltage input module MHV-4V)						

Technical Specification

Input

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

- A/D converter: 16 bits resolution
- Accuracy: DC: $\leq \pm 0.04\%$ of F.S. 1C
AC: $\leq \pm 0.1\%$ of F.S. 1C
- Sampling rate: 15 cycles/sec
- Response time: ≤ 100 mS(when the $R_{LOAD} = "1"$) 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: $L_{\alpha}5\zeta$: Low Scale; Setting range: -19999~+29999
 $H_{\alpha}5\zeta$: High Scale; Setting range: -19999~+29999
 Decimal point: Programmable from 0 / 0.0 / 0.00 / 0.000 / 0.0000
 Over range indication: $\alpha\alpha FL$, when input is over 20% of input range Hi
 Under range indication: $-\alpha\alpha FL$, when input is under -20% of input range Lo
 Max / Mini recording: Maximum and Minimum value storage during energization.
 Display functions: PV / Max(Mini) Hold / RS-485 Programmable
 Front key functions: Relative PV / PV Hold / Reset for maxi(mini) hold / Reset for relay energized latch programmable
 Low cut: Settable range: -19999~29999 counts
 Digital fine adjust: $P_{\alpha}P_{r\alpha}$: Setting range: -19999~+29999
 $P_{\alpha}5P_{n}$: Setting range: -19999~+29999

Reading Stable Function

Average: Setting range: 1~99 times
 Moving average: Setting range: 1(None)~10 times
 Digital filter: Setting range: 0(None)/1~99 times

Control Functions (Optional)

Set-points: One 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(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: $\leq 0.1\%$ of F.S.; 16 bits DA converter
 Ripple: $\leq 0.1\%$ 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 in 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; $\leq 600\Omega$ max
 Functions: $R_{\alpha}H5$: Settable range: -19999~29999/99999
 $R_{\alpha}L5$: Settable range: -19999~29999/99999
 $R_{\alpha}L\bar{n}t$ (output High Limit): 0.00~110.00% of output High
 Digital fine adjust: $R_{\alpha}P_{r\alpha}$: Settable range: -38011~+27524
 $R_{\alpha}5P_{n}$: Settable range: -38011~+27524

RS-485 Communication (Optional)

Protocol: Modbus RTU mode
 Address: 1~255
 Baud rate: 1200/2400/4800/9600/19200/38400 bps
 Data bits: 8 bits
 Parity: None / Even / Odd
 Stop bit: 1 or 2

Remote display: to show the value from RS-485 command of master
 Distance: 1200M max

Power Supply

Range: AC115/230V,50/60Hz;
 Optional: AC 85~264V, DC 100~300V or DC 20~56V
 Power consumption: 3.0VA maximum
 ADH/ADL: 8VA/4.0W
 Memory storage: By EEPROM

Safety

Dielectric strength: AC 2.0 KV for 1 min, between Power/Input/Output/Case
 Insulation resistance: $\geq 100M\Omega$ at 500Vdc, Between Power/Input/Output
 Isolation: Between Power / Input / Relay, Analog, RS-485
 EMC: EN 55011:2002; EN 61326:2003
 Safety(LVD): EN 61010-1:2001

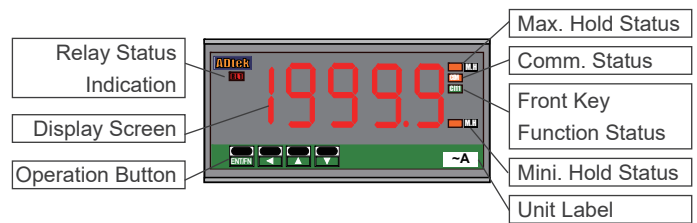
Environmental Conditions

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

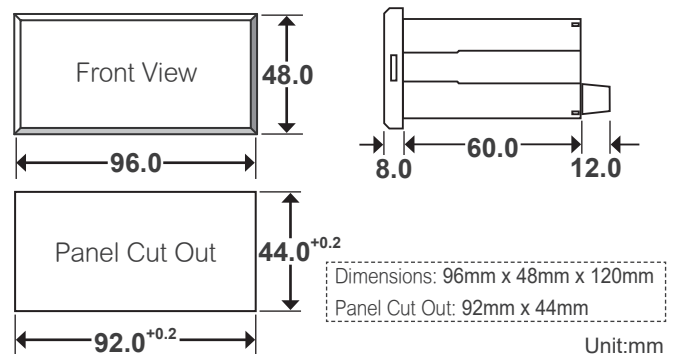
Mechanical Structure

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)
 #A1~A3(current input): 20A/300Vac, M3.5, 12~22AWG
 Others: 10A 300Vac, M2.5, 16~22AWG
 Weight: 350g

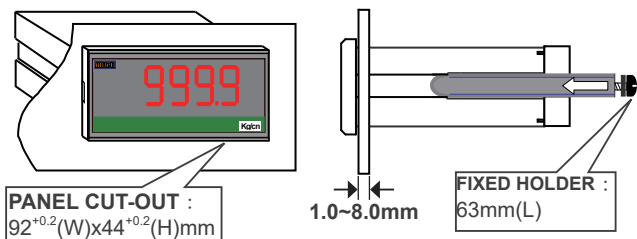
Front Panel



Dimensions

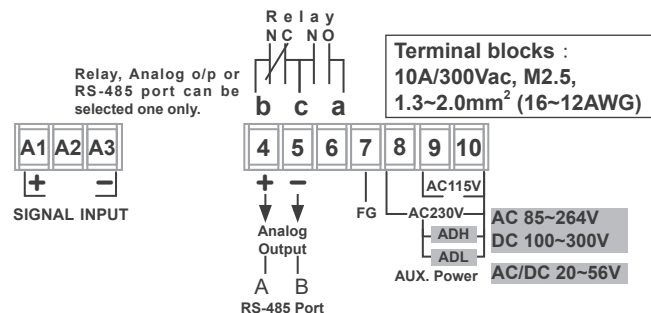


Installation



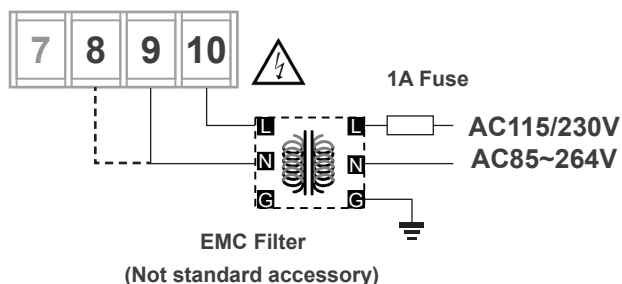
The meter should be installed in a location where it does not exceed the maximum operating temperature and provides good air circulation.

Terminal Block

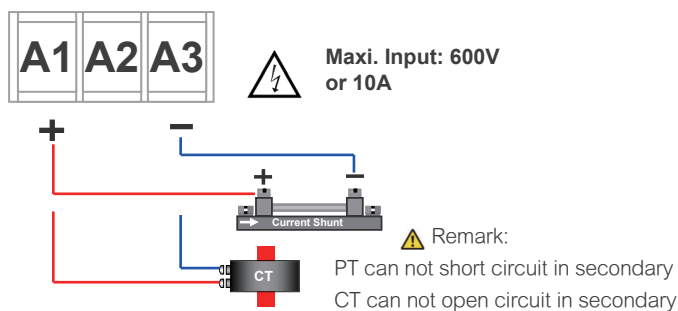


⚠ Please check the voltage of power supplied first, and then connect to the specified terminals. It is recommended that power supplied to the meter should be protected by a fuse or circuit breaker.

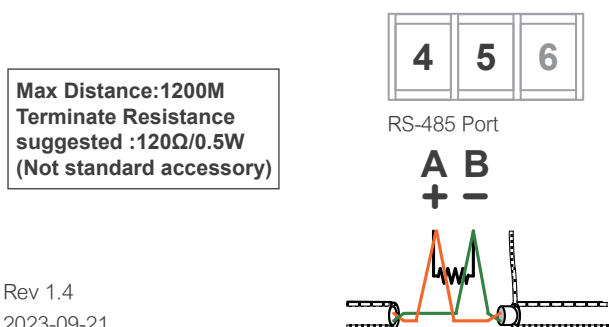
Power Connection



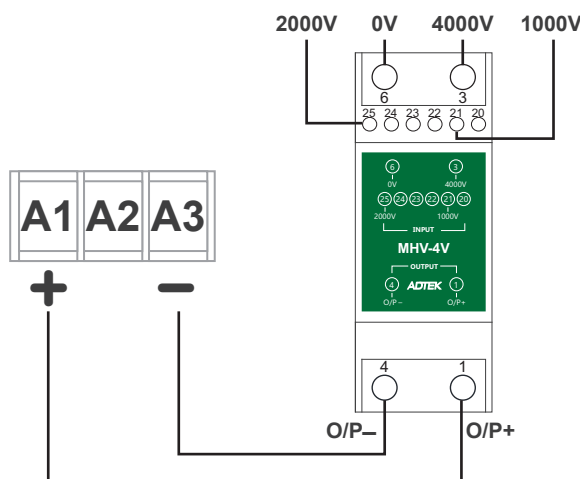
Input Connection



RS-485 Communication Port



MHV-4V High-Voltage Input Module Connection

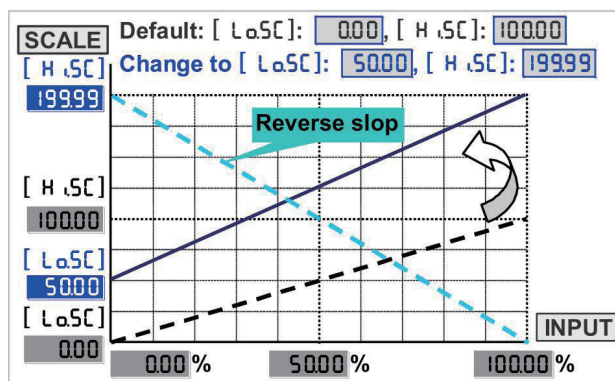


Function Description

Display range & function setting:

Set the [L.S.C] (Low scale) and [H.S.C] (High scale) in [INPUT GROUP] for relative input signal and reverse input signal.

Please refer to the figure as below.



*Narrow range may cause display lower 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.

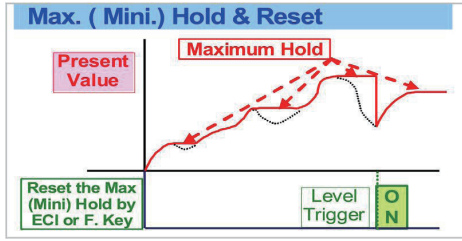
Display functions: PV / Max(Mini) Hold / RS-485 (Please refer to step A-07)[DISPLAY] function of [INPUT GROUP]

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

Maximum Hold **h_{max}hd** / Minimum Hold **h_{min}hd**:

The meter will keep display in maximum(minimum) value when energizing until reset by hand. (If the down key function in [INPUT GROUP] has been set to **h_{rs}st**)

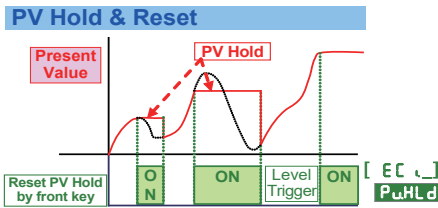
▶ Please find the **LED** sticker inside the package of the meter, and attach it above the square orange LED.



Remote Display by RS-485 command `-5485` :
 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 of master. In this way, the users don't have to pay for another indicator and it is easier for meter maintenance.

Front key functions: Relative PV / PV Hold / Reset for max(mini) hold / Reset for relay energized latch programmable in `[d5PLy]` function of `[inPwE GrOP]`

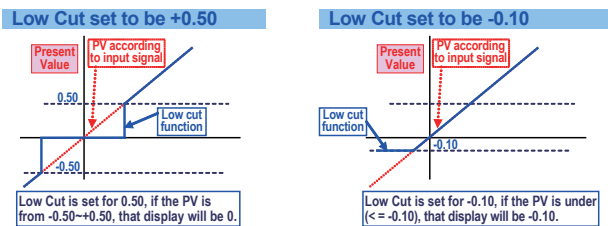
Relative PV `[ELPw]` : `[d5PLy]` function can be set to be `[ELPw]` function. When user press the `[ON]` key, the display will show the differential value(Δ PV), until press `[ON]` key again.
 ▶ Please find the `[PVH]` sticker, and attach it on the right side of square green LED.



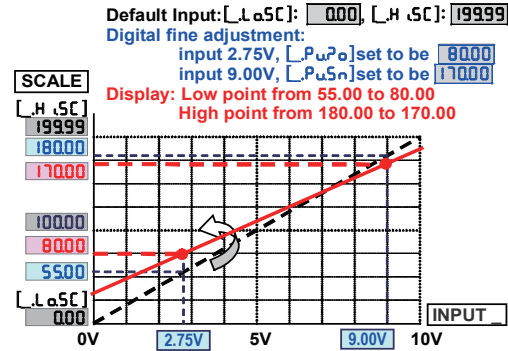
Reset for Maximum or Minimum Hold `[r5Et]` :
 When the `[d5PLy]` function in `[inPwE GrOP]` selected `[R5Hd]` or `[R5Md]`, the display will show Maximum or Minimum value.
 The `[EC]` function can be set to be `[r5Et]` function. The display will be hold when the ECI is closed until the ECI is to be open. Please refer to the below figures,

Reset for relay energized latch: `[r5Et]` :
 When the `[r5Et]` in `[rELRy GrOP]` set to be `[H5Hd]` or `[L5Hd]`, `[d5PLy]` function can be set to be `[r5Et]` to reset the relay when it is energizing and latching.

Low cut:
 If the setting value is positive, it means the absolutely value of PV \leq Setting value, and the display will show 0. If the setting value is negative, it means when PV under setting value (PV \leq -Setting value), the display will show setting value.

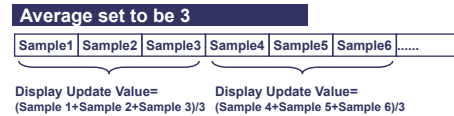


Digital adjustment:
 Users will get fine adjustment for Zero & Span of PV shown on the front key of the meter during the test. However there may be some errors even if the user is adjusting the lower point for `[PwPo]` & higher point for `[PwSn]` back and forth.
 To save time, we've offered a solution that the user can simply input the value by setting "Just Key In". The adjustment can be cleared by function `[P5CLr]`



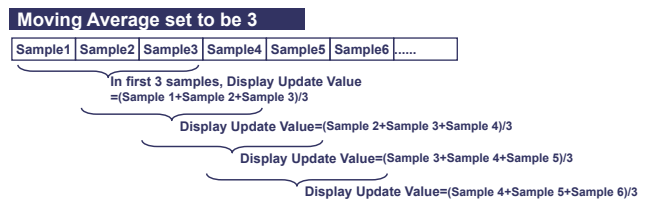
Reading Stable Function

Average:
 Basically, the sampling rate of meter is 15cycles/sec. If the function was set to be 3 times, it means the display value would be updated will be 5 times/sec.



Remark: The higher the setting, the slower the response time of Relay and Analog output will be.

Moving average:
 If the function was set to be 3 times, the meter would take 3 samples at the first cycle. After that, then it will be updated 15 times/sec continuously.



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

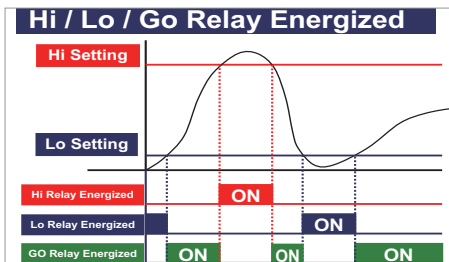
Digital filter:
 The digital filter can reduce the magnetic noise in field.

Control Functions (Optional)

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

Hi : Relay will energize when PV > Set-Point

Lo : Relay will energize 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 [rY1SP] and [rY2SP]:

[rY1SP] (Hi) > PV > [rY2SP] (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 [rY3SP] and [rY35P]:

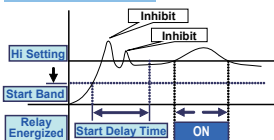
[rY35P] (Hi) > PV > [rY3SP] (Lo)

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

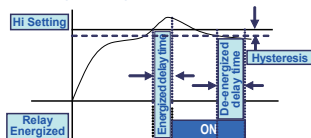
When the PV is Higher (or lower) than set-point, the relay will be energized and latch until manual reset by from key in [user level] or press down

key to reset(If the [dNEEY] function set to be [Yr5L])

Start Delay



Energized / De-energized Delay & Hysteresis



Analog Output (Optional)

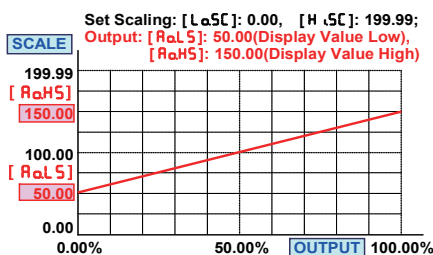
Please specify the output type either an 0~10V or 4(0)~20mA when purchasing. The programmable output low and high scaling can be set based on various display values. Reverse slope output is possible by reversing point positions.

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

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

Functions: RαH5 (output range high): when setting high display value versus output range as like as 20mA in 4~20, it shows 150.0

RαL5 (output range low): when setting low display value versus output range as like as 4mA in 4~20, it shows 50.0.



The range between [RαH5] and [RαL5] should be over 20% of span at least; otherwise, it will be got less resolution of analog output.

Zero-span adjustment:

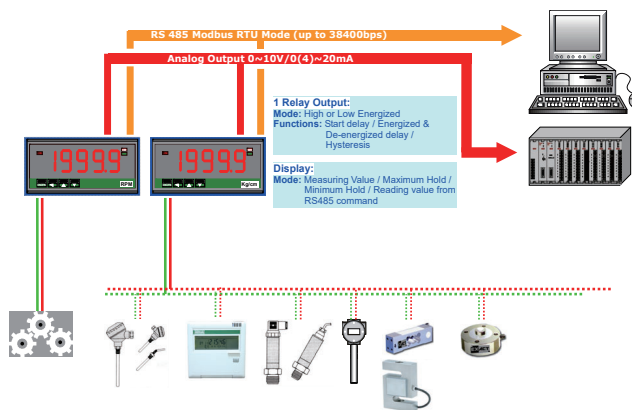
Users can get fine adjustment of analog output on the front key of the meter. Please connect standard meter to the terminal of analog output. Please press the front key (up or down key) of meter to adjust and check the output.

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

[RαSPα]: Fine Span Adjustment for Analog Output; Settable 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 read display value.

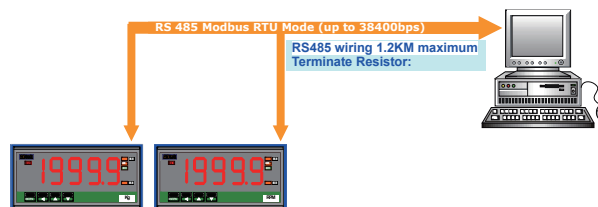


Remote Display:

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

CS1 APPLICATION FOR REMOTE DISPLAY FROM RS485 COMMAND

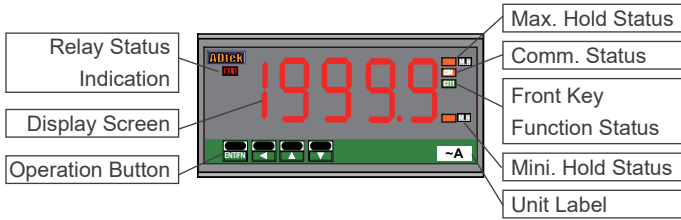


■ Error Message

Before using, 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.L	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. ↔ FA.L	Calibrating Input Signal error	(Please check Calibrating Input Signal)
A.o.nG ↔ Pu	Calibrating Output Signal do not process	(Please process Calibrating Output Signal)
A.o. ↔ FA.L	Calibrating Output Signal error	(Please check Calibrating Output Signal)



■ Numeric Screens

0.8"(20.0mm) red high-brightness LED for 4 2/3 or 5 digital present value.

- I/O Status Indication
- Relay Energized: 1 square red LED
RL display when Relay 1 energized
- RS-485 Communication: 1 square orange LED
COM will flash when the meter receives or sends data. It means the data transient quicker when COM flash faster.
- 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: HN Hi Lo LL DO
- E.C.I. 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

■ Operation Button

4 keys for ENTER (Function) / ESC (Shift/Escapes) / ↑ (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
ESC 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

Pass Code: 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 the same function as the setting of ECI1.
 Ex. The ECI1 set to be P.U.H.L.D and the function [E.I.H.P] set to be YES in [E.C. , G.R.O.U.P]. 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 -E.L.P.U and the function [E.I.H.P] set to be YES in [E.C. , G.R.O.U.P]. 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 disabling.

A-8	<input type="text" value="0"/> <input type="text" value="Low Cut"/> 	Low Cut : Low Cut Function -19999~29999
A-9	<input type="text" value="5"/> <input type="text" value="Average"/> 	Average : Average update for PV 1(None)~99 times
A-10	<input type="text" value="1"/> <input type="text" value="Moving Average"/> 	Moving Average : Moving Average update for PV 1(None)~10 times
A-11	<input type="text" value="0"/> <input type="text" value="Digital filter"/> 	Digital filter : Digital filter 0(None)/ 1~99 times
A-12	<input type="text" value="nonE"/> <input type="text" value="Down key function"/> 	Down key function : Down key function nonE / FELPu / PwHtd / rSt / YrSt
A-13	<input type="text" value="0"/> <input type="text" value="Pass Code"/> 	Pass Code : Pass Code for enter Engineer Level 0000~9999
A-14	<input type="text" value="nonE"/> <input type="text" value="Function Level Lock"/> 	Function Level Lock : Function Level Lock nonE / WSEr / EnG / ALL

Split Core CT Ordering Information

US – CTV — Hole — Primary Current — 2

CODE	Diameter(mm)	CODE	Rated Current
10	Φ10	005	5A
16	Φ16	060	60A
		100	100A
		150	150A
24	Φ24	200	200A
35	Φ35	300	300A
		400	400A
		600	600A
50	Φ50	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)

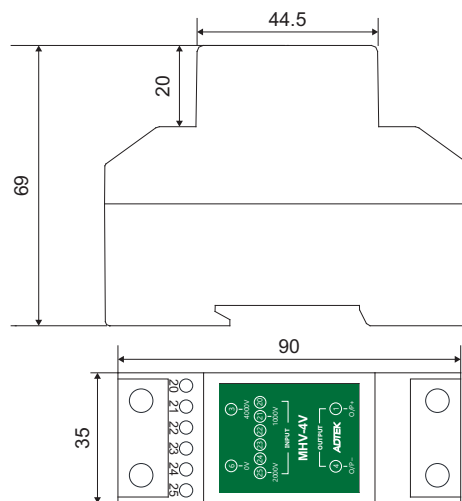
MHV – 4V

Input Voltage Range: AC/DC 0~4000V

Accuracy: ±2%



Dimensions



Unit: mm

Terminal Block

