



PTS-Tech®

WWW.TRANSDUCERSANDMETERS.COM

4 1/2 ACTIVE POWER METER

MW-5

■ **FEATURE**

- Measuring AC Watt / 1P2W, 1P3W, 3P3W, 3P4W Unbalanced systems
- Direct input 500V / 50A maximum with high accuracy current transformer.
- 2 relay can be programmed individual to be a Hi / Lo / Hi Latch / Lo Latch energized with Start Delay / Hysteresis / Energized & De-energized Delay functions, or to be a remote control.
- 2 external control inputs can be programmed individual to be relative
- Relative PV / PV Hold / Maximum or Minimum Hold □
- Other application: DI (remote monitoring) / Reset for Relay Energized □ Latch....
- RS 485 communication port in option
- Outside dimensions is DIN standard (96 x 48 mm)
- **CE Approved & RoHS**



DESCRIPTION

MW-5 Watt Meter provide high accuracy measurement, display and communication functions. They are also building in 2 Relay outputs, 2 External Control Inputs and 1 RS485(Modbus RTU Mode) with versatile functions such as remote I/O, alarm and communication for a wide range of applications.

FEATURE

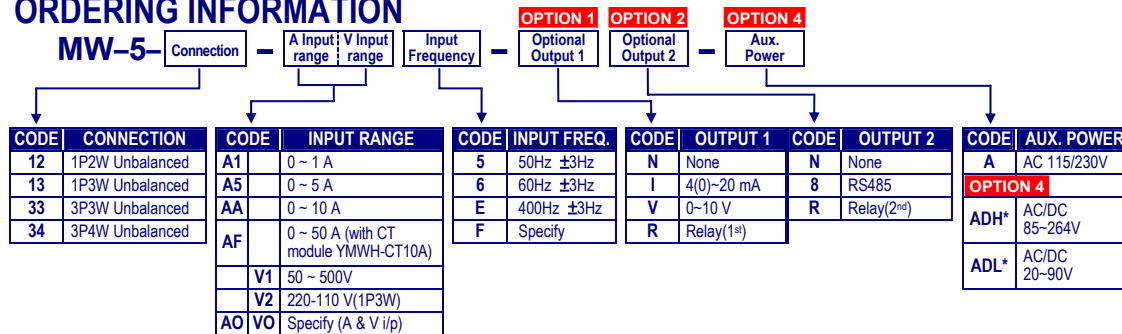
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APPLICATIONS

Control panels and Consumption monitoring
Power managements for building automation

Switchgear distribution systems
Power Testing Equipment

ORDERING INFORMATION



TECHNICAL SPECIFICATION

Measurement & Connection

Connection	AC Input			Input Burden
	Voltage	Current	Freq.	
1P2W	50~500V _{eff}	1A	50 Hz	Voltage: ≤0.5VA/phase or Current: ≤0.1VA/phase
1P3W	220V _{eff} ~110V _{eff}	5A	60 Hz	
3P3W	50~500V _{eff}	50A	400 Hz	
3P4W	50~500V _{eff}			

* The maximum input is 500V and 5A. If the input over the level please connects with CT or PT to the meters. The 50A input is connected to a CT module(YMWH-CT10A).

Accuracy & Resolutions

Parameters	Accuracy	Resolution(Programmable)	Display Range
Active Power	0.5%	1/0.01K/0.1K/1K/0.01M/0.1M/1M	0~29999

Input

- Measurement:** True rms measurement
- Waveform effect:** ≤ 0.2% of F.S. at 30% distortion
- A/D Converter:** 16 bits resolution
- Accuracy:** ≤ 0.5% of FS ± 1C;
- Sampling Rate:** 15 cycles/sec
- Response Time:** ≤100 msec.(when the AvG = "1") in standard
- Connection:** 1P2W, 1P3W, 3P3W, 3P4W, Unbalance
- Input Range:** Voltage: 0 ~ 500V_{eff}(max.)
Unit for primary of PT programmable: V and KV
PT ratio(primary) programmable: 50.0V~999.99KV
PT ratio(secondary) programmable:50.0~500.0V
Direct input: primary = secondary = under 500V
Current: 0 ~ 1/~ 5/~ 10/~ 50A (max.)
CT ratio(primary) programmable: 1~9999.9A
CT ratio(secondary) programmable: 1.000~9.999A
50A Direct input with optional module

Frequency: 50/60 Hz±3 Hz, 400 Hz±3 Hz

Max. Input over capability:

- Voltage:** 2 x rated continuous;
4 x rated for 2 seconds
- Current:** 3 x rated continuous;
10 x rated for 10 seconds;
50 x rated for 1 second(for 5A input type)

Control Functions (Optional)

- Set-Points:** Two set-points
- Relay:** Dual FORM-A, 1A/230Vac, 3A/115V
- Relay Energized Mode:**
 - Relative Power:** Hi / Lo / Hi.HLd / Lo.HLd / do / oFF
 - Functions:** Start delay / Energized & De-energized delay / Hysteresis / Energized Latch
Start band: 0~9999 counts
Start delay time: 0:00.0~9(Minutes):59.9(Second)
Energized delay time: 9(Minutes):59.9(Second)
De-energized delay time: 9(Minutes):59.9(Second)
Hysteresis: 0~5000 counts

External Control Inputs

- Input Mode:** 2 ECI points, Contact or open collect input, Level trigger
- Functions:** There are flexible functions can be programmed for
Power: Relative PV / PV Hold / Reset Max or Mini. Hold / Reset for Relay latch.
- Digital Input(DI):** Remote monitoring
- Debouncing Time:** 5 ~ 255 x 8mseconds

RS 485 Communication(optional)

Protocol: Modbus RTU mode
Baud Rate: 1200/2400/4800/9600/19200/38400 programmable
Data Bits: 8 bit programmable
Parity: Even, odd or none (with 1 or 2 stop bit) programmable
Address: 1 ~ 255 programmable
Remote Display: to show the value from RS485 command of master
Distance: 1200M
Terminate Resistor: 150Ω at latest 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 / RS485 / E.C.I.
EMC: EN 55011:2002; EN 61326:2003
Safety(LVD): EN 61010-1:2001

Environmental

Operating Temp.: 0~60 °C
Operating Temp. Coefficient: 20~95 %RH, Non-condensing
Temp. Coefficient: ≤ 100 PPM/°C
Storage Temperature: -10~70 °C
Enclosure: Front panel: IEC 549 (IP54); Housing: IP20

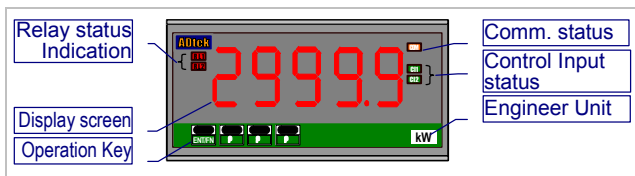
Mechanical

Dimensions: 96mm(W) x 48mm(H) x 120mm(D)
Panel Cutout: 92mm(W) x 44mm(H)
Case Materiel: ABS fire-protection (UL 94V-0)
Mounting: Panel flush mounting
Terminal Block: Plastic NYLON 66 (UL 94V-0)
 Relay, A/O and RS485: 5A 300Vac, M2.6, 22~16AWG
 Other: 10A 600Vac, M3.0, 15~10AWG(1.5~2.5mm²)
Weight: 550g / 350g(Aux. Power Code: AH, D25)

Power

Power Supply: AC115/230V,50/60Hz;
Excitation Supply: DC24V/30mA maximum in standard
Power: 5.0VA maximum
Back Up Memory: By EEPROM

FRONT PANEL



Display: 4 1/2 digital; 0.8"(2.0mm) red high-brightness LED
I/O Status: RS 485 communication: 1 square orange LED will flash when the meter is receive or send data, and COM flash quickly means the data transient quickly
COM: E.C.I. function indication: 2 square green LED display when External Control input 1 close(dry contact)
EC1: display when External Control input 2 close(dry contact)
EC2: Relay energized indication: 2 square red LED display when Relay 1 energized;
RL1: display when Relay 2 energized;
RL2:

Stickers: For symbol of function
HH/Hi/Lo/LL/DO: Symbol of function for Relay: HH / Hi / Lo / LL / DO
PV.H/Tare/DI/M.RS/R.RS: Symbol of function for E.C.I.: PV.H(PV Hold) / Tare / DI / M.RS(Maximum or Minimum Reset) / R.RS(Reset for Relay Latch)

Operating Key: 4 keys for Enter(Function) / Shift(Escape) / Up / Down
Up key: Increment the value / Back to previous function
Down key: Decrement the value / Go to next function
Shift key: Move the flash digit position / Return back to upper level / Escape
Enter/Fun key: Access setting status / Stores selected parameter or set value and index to next parameter.

Security Function: 4 digits password settable from 0000~9999
 You have to enter correct pass word so that access Programming Level for configuration. the meter can be changed the pass word in Engineer Level. If you forget the pass word, please contact with our company.

Lock Function: 4 lock mode for None / Normal Level / Programming Level / All(Normal Level & Programming Level)

None: No lock, all function can be set and change
Normal Level: The functions in normal level can not be set, but, they still can access the level and view.

Programming Level: The functions in programming level can not be set, but, they still can access the level and view.

All: Normal Level and Programming Level have been locked.

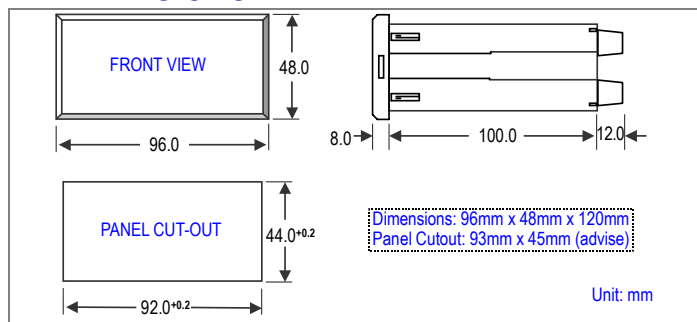
UP Key Function: The UP key on front panel can be set to be same function as what was ECI 1 set.

Down Key Function: The DOWN key on front panel can be set to be same function as what was ECI 2 set.

For example: If the [ECi.1] in [ECi GroUP] was set to be [Pv.HLd] function, and [E.1=UP] was set to be [YES] . It means, when you press the UP key, the PV will be hold and the square LED of ECi1 will be bright until you press UP key again.

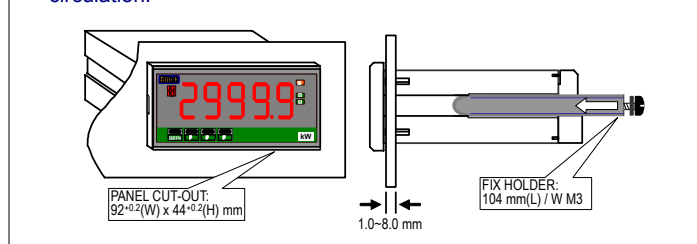
In case of UP or Down Key function have been set, the terminal of ECI will be locked out.

DIMENSIONS



INSTALLATION

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

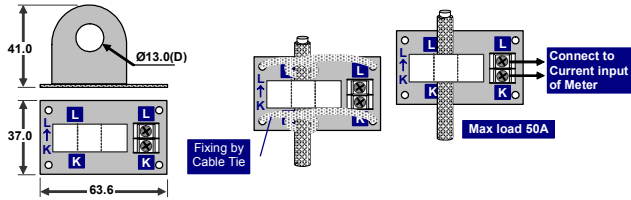


CONNECTION DIAGRAM

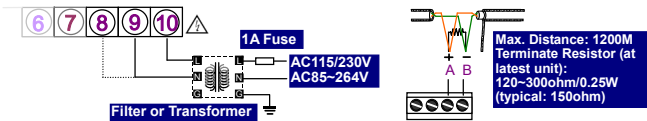
Please check the voltage of power supplied first, and then connect to the specified terminals. It is recommended that power supplied to the meter be protected by a fuse or circuit breaker.

Relay, RS485, A/O: wiring: M2.6, AWG22~16(0.5~1.3mm²)
Other: Wiring: M3.0, AWG15~10(1.5~2.5mm²)

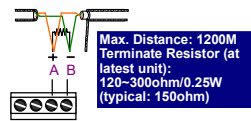
High precision CT module – YMWH-CT10A – 0.1class



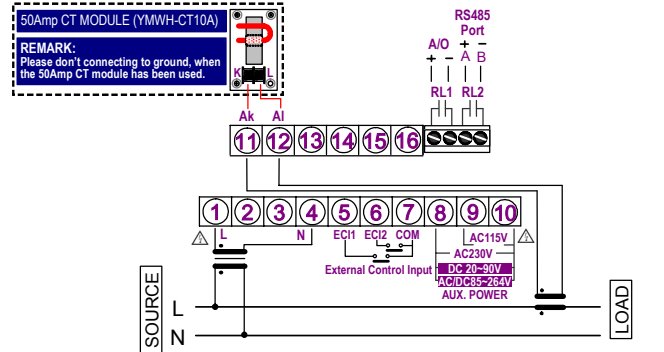
Aux. Power Connection



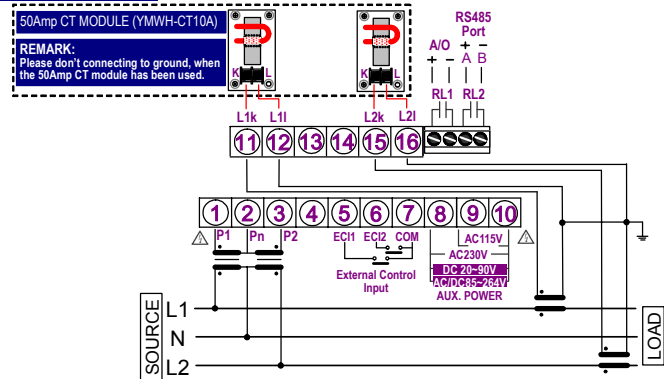
RS485 Communication Port



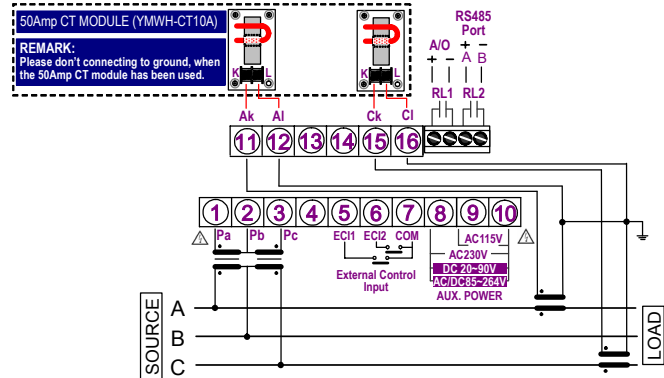
1Phase 2Wire



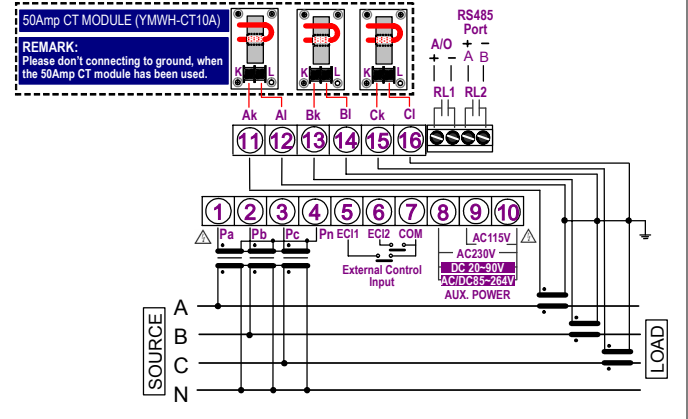
1Phase 3Wire



3Phase 3Wire



3Phase 4Wire



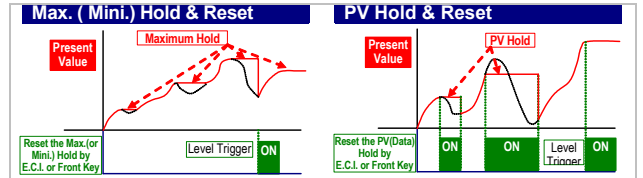
FUNCTION DESCRIPTION

Display & Functions

Display Messages: **ovFL**, when input is over 120% of +signal range
-ovFL: Appears when input is under -120% of -signal range

Max / Mini Memory: The meter will store the maximum and minimum reading in **[user level]** during power on in order to review status of reading.

Display functions: **PV / Max(Mini) Hold / RS 485 Selectable in display**
Function of [Input Group] (Please refer to step A-10)
Present Value [Pv] : The display will show the value that relates to Input signal.
Maximum Hold [Max.H] / Minimum Hold [Mini.H] : The meter will keep display in maximum(minimum) value, until manual reset by front key in **[User Level]** . **[External Control Input (E.C.I.)]** is close or press front down or up key to reset (UP Key or Down Key function have been set) Please find the **[M.H]** sticker that enclosure the package of the meter to stick on the up side of square red LED

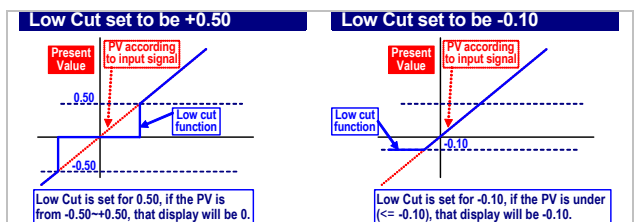


Remote display by RS485 command [RS485] : The meter support a **innovation solution** that the value received from RS485 command of master. In past, The meter normally receive 4~20mA or 0~10V from AO module or BCD code from DO module of PLC .The innovation solution **saves cost and wiring** from PLC.

PV Hold [Pv.HLD] : **[External Control Input(E.C.I.)]** can be set to be **[PV Hold]** function(Please refer to the function of ECI Group). The display will be hold, when the E.C.I. is closed.
➤ Please find the **[P.V.H]** sticker to stick on the up side of square green LED.

Low Cut:

[Lo.Cut] Settable range: 0~+29999 counts
If the setting value is positive, it means when the absolutely value of PV ≤ Setting value, the display will be 0. If the setting value is negative, it means when the PV under setting value(PV≤ -Setting value), the display will be setting value.



Reading Function

The functions are to get more stable reading.
[AvG] Settable range: 1~99 times
 Basically, the sampling rate of meter is 15cycles/sec.
 If the AVG function set to be 3 times, It means the meter will update of display will be 5 times/sec.

Average:

Average set to be 3



Display Update Value = (Sample 1 + Sample 2 + Sample 3)/3
 Display Update Value = (Sample 4 + Sample 5 + Sample 6)/3

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

Moving Average:

[M.AVG] Settable range: 0(None)/1~10 times
 If the function to be set 3 times, the meter will update delay in first 3 samples, then it will update 15 times/sec continuously.

Moving Average set to be 3



In first 3 samples, Display Update Value = (Sample 1 + Sample 2 + Sample 3)/3
 Display Update Value = (Sample 2 + Sample 3 + Sample 4)/3
 Display Update Value = (Sample 3 + Sample 4 + Sample 5)/3

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

Digital Filter:

[D.FiLT] Settable range: 0(None)/1~99 times
 The digital filter can decrease the magnetic noise in field.

Digital Fine-Adjustment:

[Pv.Zro] & **[Pv.SPn]** Settable range from 0~+99999;
 Users can get Fine Adjustment for Zero & Span of PV by front key of the meter, and "Just Key In" the value which user want to show in the current input signals.
 Especially, the **[Pv.Zro]** & **[Pv.SPn]** are not only in zero & span of PV, but also any lower point for **[Pv.Zro]** & higher point for **[Pv.SPn]**. The meter will be linearization for full scale.

Input & PT/CT Ratio

The hardware of meter will be made the input range according to the code of ordering information. If the meter has to be change input range, please contact with our technical support division.

Voltage range:

Voltage: 0 ~ 500V_{AC} (max.)
 Unit for primary of PT programmable: V and KV
 PT ratio(primary) programmable: 50.0V~999.99KV
 PT ratio(secondary) programmable:50.0~500.0V
 Direct input: primary = secondary = under 500V

Current range:

Current: 0 ~ 1/ ~ 5/ ~ 50A (max.)
 CT ratio(primary) programmable: 5(1)~9999.9A
 CT ratio(secondary) programmable: 1.000~9.999A
50A Direct input with optional module

If the meter has been specified in 50A input direct, the 50A CT module will be enclosure. Please set the primary of CT to be 50.0A, when the meter is to be programming.

Control Functions(Optional)

The meter offers 2 relay outputs available. They can be programmed functions for difference applications.

Remark: Please pay attention, due to the optional terminals limited, the meter can support 2 options only in one meter. Please refer to the ordering information.

Set-Points:

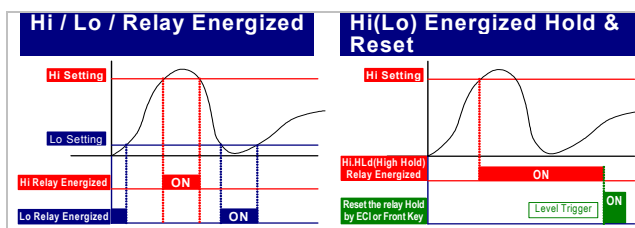
Two set-points

Relay:

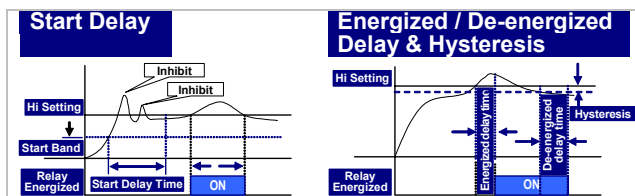
2 Relays Output model: Dual FORM-A

Energized Mode:

Hi / Lo / Hi.HLd / Lo.H Ld / do selectable
Hi: Relay will energize when PV > Set-Point
Lo: Relay will energize when PV < Set-Point
Hi.HLd (Lo.HLd): When the PV is Higher (or lower) than set-point, the relay will be energized and latch until manual reset by from key in **[User Level]**, **[External Control Input] (E.C.I.)** is close or press front down or up key to reset (UP Key or Down Key functions have been set).



DO function: Energized by RS485 command of master.
 The function was designed to get remote control by RS485 command of master.
 Start delay / Energized & De-energized delay / Hysteresis
 Please refer to figure as below

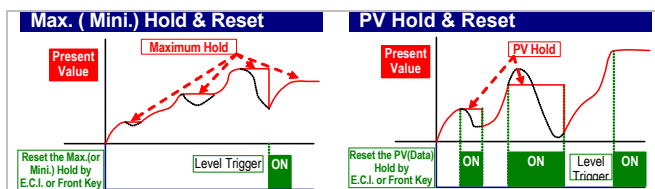


External Control Inputs(ECI)

The two external control inputs are individually programmable to perform specific meter control or display functions. All E.C.I. have been designed in level trigger actions. Please pay attention, the ECI1 or ECI2 input will be disable while UP or Down Key has been set.

Input mode:
Functions:

2 ECI points, Contact or open collect input
Relative PV / PV Hold / Reset Max or Mini. Hold / DI / Reset for Relay Energized latch programmable
Relative PV: The E.C.I. can be set to be **[Relative PV]** function. When the E.C.I. is closed, the reading will show the differential value(ΔPV).
PV Hold: The E.C.I. can be set to be **[PV Hold]** function. The display will be hold when the E.C.I. is closed, until the E.C.I. is to be open. Please refer to the below figure.
Reset for Maximum or Minimum Hold: When the **[Display]** function in **[INPUT GroUP]** selected **[MAX.H]** or **[Mini.H]**, the display will show Maximum or Minimum value, and can be reset by the E.C.I(close). Please refer to the below figure.



DI: The E.C.I can be set to be **[DI]** function, when the meter specified in RS485 port. It is easier to get remote monitoring a switch status through the meter as like as DI module of PLC.

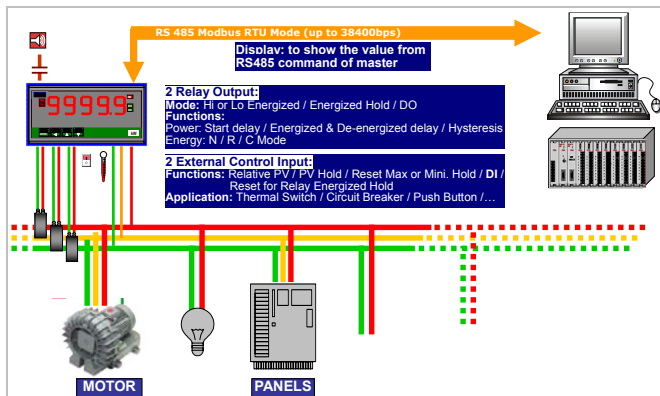
Reset for Relay Energized Hold: If relay energized mode was set to be Energized latch, the E.C.I. can be set to be **[Reset Relay function]**. When the PV meets the condition of relay energizing, the relay will be hold until the E.C.I. is closed.

Debouncing time:

5~255 x 8mseconds
 The function is for avoiding noise signal to into the meter. And the basic period is 8 mseconds. It means you set the number that has to multiple 8 mseconds.
 For example:
[dEbnc] set to be 5, it means
 5 x 8 mseconds = 40 mseconds

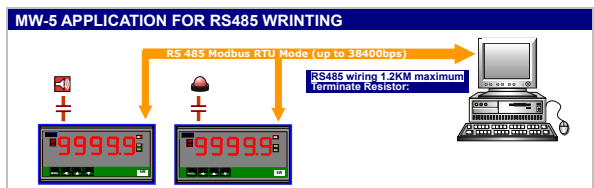
RS 485 communication(optional)

The RS485's protocol is Modbus RTU mode, and baud rate up to 38400 bps. It's convenience to remote monitoring for reading and ECI status, also for remote control in general systems.



Remote Display:

The display screen can be written by RS485 command. In past, The meter normally receive 4~20mA or 0~10V from AO card or BCD card of PLC. We support a **new solution** by RS485 writing in so that can be **save cost and wiring** into PLC. When the [**dsPLY**] set to be RS485, it means, the display will show the number from RS485 command & data. The data(number) will be same as PV that will compare with set-point, analogue output and ECI functions so that is to control analogue output, relay energized and so on.



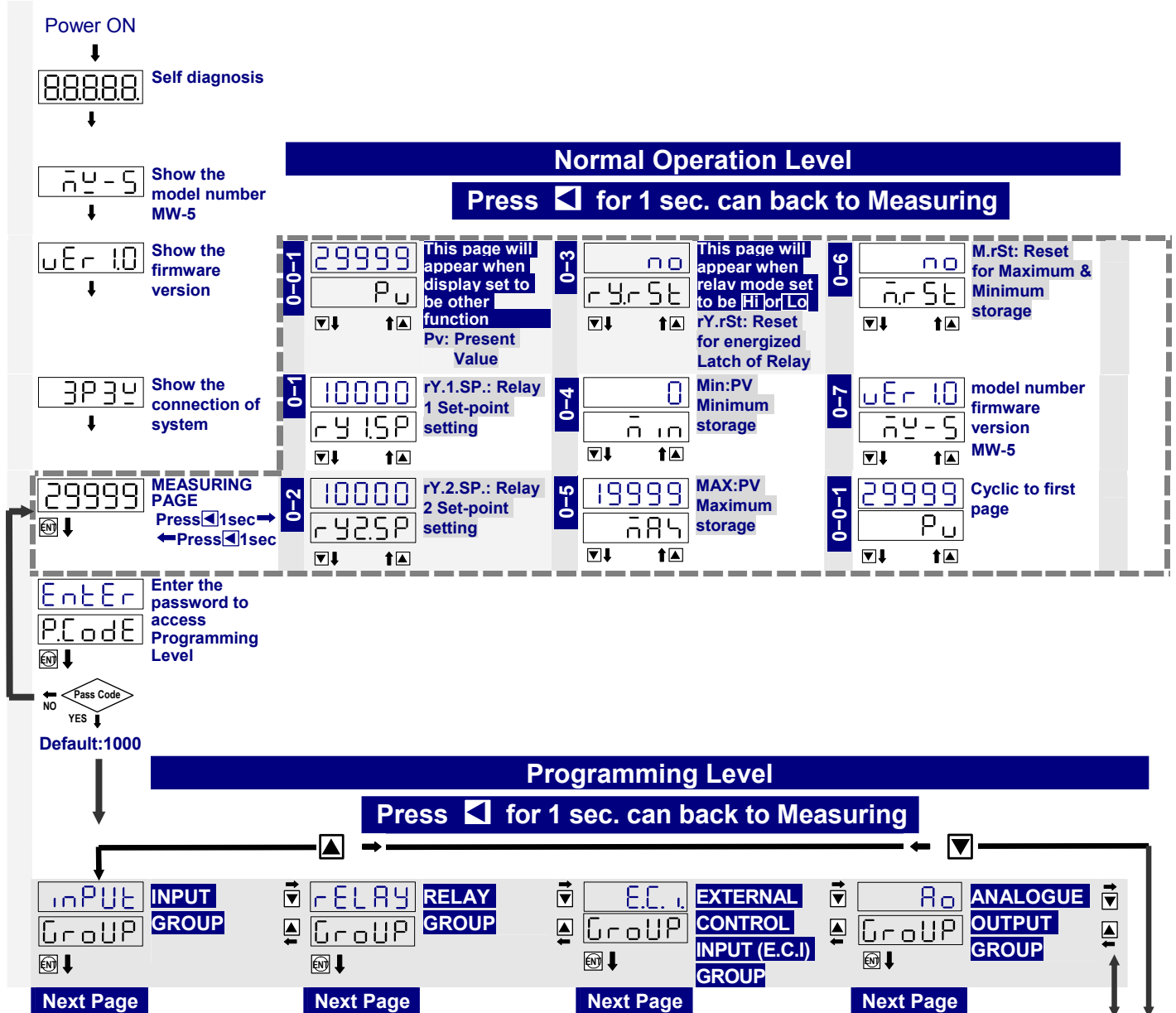
Calibration

System calibration by potentiometers on PCB and front key. Please confirm with our engineer.

■ ERROR MASAGE

DESCRIPTION	DISPLAY	FLASH	REMARK
BEFORE POWER ON, PLEASE CHECK THE SPECIFICATION AND CONNECTION AGAIN.			
SELF-DIAGNOSIS AND ERROR CODE:			
ouFL : Display is positive-overflow (Signal is over display range)	ouFL		(Please check the input signal)
-ouFL : Display is negative-overflow (Signal is under display range)	-ouFL		(Please check the input signal)
ouFL : ADC is positive-overflow (Signal is higher than input 120%)	ouFL		(Please check the input signal)
-ouFL : ADC is negative-overflow (Signal is lower than input -120%)	-ouFL		(Please check the input signal)
EeP / FA IL : EEPROM occurs error	EeP	FA IL	(Please send back to manufactory for repaired)
A i.C.nG / Pu : Calibrating Input Signal do not process	A i.C.nG	Pu	(Please process Calibrating Input Signal)
A i.C. / FA IL : Calibrating Input Signal error	A i.C.	FA IL	(Please check Calibrating Input Signal)
Ro.C.nG / Pu : Calibrating Output Signal do not process	Ro.C.nG	Pu	(Please process Calibrating Output Signal)
A i.C. / FA IL : Calibrating Output Signal error	A i.C.	FA IL	(Please check Calibrating Output Signal)

■ OPERATING DIAGRAM



A-1	v.Unit: Engineer Unit of voltage for primary of PT	B-1	rY.Sb: Start band of Relay energized	C-1	E.C.i.1: External Control Input 1	D-1	Ao.Tvp: Analogue Output type selection
A-2	Pt.Pri: Primary voltage of PT	B-2	rY.Sd: Start delay time of Relay energized	C-2	E.C.i.2: External Control Input 2	D-2	Ao.LS: Analogue Low Output versus Low Scale
A-3	Pt.SEC: Secondary voltage of PT	B-3	rY1.Md: Relay 1 energized mode	C-3	dEbnc: Debouncing of external control Input	D-3	Ao.HS: Analogue High Output versus High Scale
A-4	Ct.Pri: Primary current of CT	B-4	rY1.HY: Relay 1 Hysteresis	C-4	E.1=Up: Up key function	D-4	Ao.Zro: Fine Zero Adjustment for Analog Low Output
A-5	Ct.SEC: Secondary current of CT	B-5	rY1.rd: Relay 1 energized delay	C-5	E.2=dn: Down key function	D-5	Ao.SPn: Fine Span Adjustment for Analog High Output
A-6	W.Unt: Resolution and engineer unit of active power	B-6	rY1.Fd: Relay 1 de-energized delay			D-6	Z.S.CLR: Zero & Span Clear for Adjustment
A-7	Pv.Zro: Fine Zero Adjustment for PV display	B-7	rY2.Md: Relay 2 energized mode			D-7	Ao.LMt: Analog Output High Limit
A-8	Pv.SPn: Fine Span Adjustment for PV display	B-8	rY2.HY: Relay 2 Hysteresis				
A-9	Z.S.CLR: Clear Fine Zero & Span Adjustment for PV display	B-9	rY2.rd: Relay 2 energized delay				
A-10	dSPLY: Display function selection	B-10	rY2.Fd: Relay 2 de-energized delay				
A-11	Lo.Cut: Low Cut level to show "0"						
A-12	AvG: Average for display smooth						
A-13	M.AvG: Moving Average for display smooth						
Next Page							
						RS485 GROUP	
						E-1	AdreS: Device number of the meter
						E-2	bAUd: Baud rate
						E-3	PritY: Parity

A-14	0 d.F iLlE ▼↓ ↑▲	d.FiLt: Digital filter for display to reduce noise influence
A-15	0 P.CodE ▼↓ ↑▲	P.CodE: Pass Code Setting for access Programming Level
A-16	nonE F.LoCk ▼↓ ↑▲	Function Level Lock