

MANUAL

Model: MA5H-A

Compound Input
Digital Panel Meter



DCbox

CE 

1-1 General

This manual will show you how to operate the meter.

It's easy to use, please follow the steps as below:

- (1) **Order and purchase:** Please refer to chapter 1-2 and check out which specification is suited for your needs.
- (2) **Installation:** Please refer to chapter 2-wiring.
- (3) **Function:** Please refer to chapter 1-6 and chapter 3 to choose.
- (4) **Perform correct setting** of the product according to the application.
- (5) **Ensure safety** in the event of product failure by taking safety measures, such as installing a separate monitoring system.

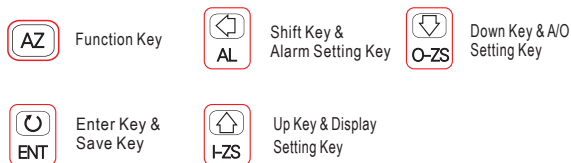
1-2 Ordering Code

MA5H-A - Code1 Code2 - Code3 - Code4 Code5 Code6

Code1	Input Type	Compound Input	Code3	Aux. Power	Code4	Alarm Output
D	DC	S01	0~10Vdc/0~5Vdc/ 4~20mAdc/0~20mAdc	A AC/DC100~240V	N	None
A	AC AVG			C DC 22~50V	R1	1 Relay
M	AC TRMS	S02	0~500Vac/0~50Vac/ 0~5Aac/0~1Aac		R2	2 Relays
P	3 Wire Potentiometer				R3	3 Relays
I	2 Wire Resistor	S03	0~500Vdc/0~50Vdc/ 0~100mVdc/0~50mVdc		R4	4 Relays
L	Load Cell				O1	1 Open Collect
2	2, 3 Wire Sensor	S04	PT100/ Thermocouple		O2	2 Open Collect
4	4 Wire Sensor		After select Compound Input, could not select Code2.		O3	3 Open Collect
					O4	4 Open Collect

Code2	Voltage	Current	Potentiometer	Resistor	Code5	Analog Output
V1	0~50mV	A1 0~20uA	P1 500Ω~10KΩ	I1 0~10Ω	N	None
V2	0~5V	A2 0~200uA	P2 10KΩ~100KΩ	I2 0~100Ω	A	4~20mA
V3	1~5V	A3 0~2mA	P3 100KΩ~1MΩ	I3 0~1KΩ	V	0~10V
V4	0~10V	A4 0~20mA	PO Option	I4 0~10KΩ	O	Option
V5	0~36V	A5 0~200mA		I5 0~100KΩ		
V6	0~300V	A6 4~20mA	Load Cell	IO Option	Code6	RS-485 Output
V7	0~600V	A7 0~2A	L1 1mV/V EX.5V		N	None
VO	Option	A8 0~5A	L2 2mV/V EX.5V		Y	Yes
		A9 0~10A	L3 3mV/V EX.5V			
		AO Option				

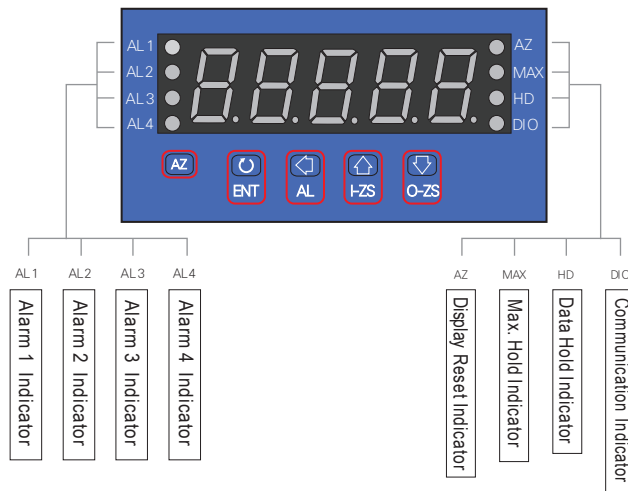
1-3 Key Function



	AZ		
Measuring Status	Enable the setting function	Enter to parameter groups	Hold for 3 sec. enter to Alarm Setpoint Modification
Parameter Page			Enter to parameter setting
Parameter Setting	ALrSt: oFF nAR4, AP, Hd	Save the value	Move the cursor left

			Compound Key 
Measuring Status	Hold for 3 sec. enter to Display Group Setting	Hold for 3 sec. enter to A/O Group Setting.	In any status can back to measuring status
Parameter Page	Back to the last parameter page	Go to the next parameter page	
Parameter Setting	Increase the digit	Decrease the digit	

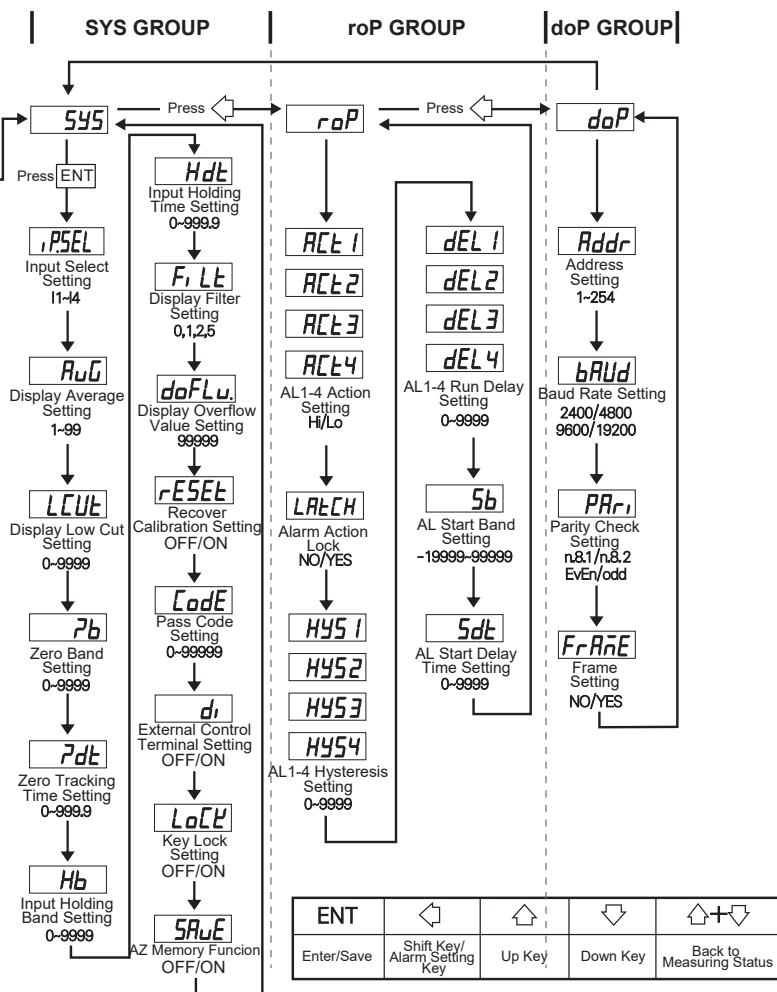
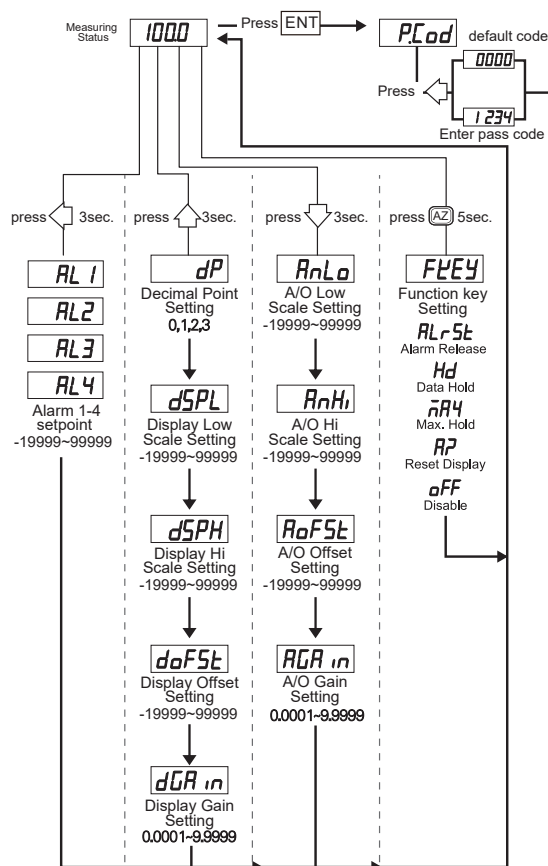
1-4 Panel Function



1-5 LED Display Characters

A	b	C	d	E	F	G	H	i	J	K	L	M
A	b	C	d	E	F	G	H	i	J	K	L	M
n	o	P	q	r	S	t	U	v	W	X	y	Z
n	o	P	q	r	S	t	U	v	W	X	y	Z
1	2	3	4	5	6	7	8	9	0	/	.	
1	2	3	4	5	6	7	8	9	0	/	.	

1-6 Programming Mode Operating Procedure



1-7 Parameter Description

Parameter Notation	Name	Discription
SY5	System group setting	Modifying system group function.
IPSEL	Input signal selection setting (For compound input)	Setting input signal: ● S01 ● S02 ● S03 I1(0~10Vdc, 0~500Vac, 0~500Vdc) I2(0~5Vdc, 0~50Vac, 0~50Vdc) I3(4~20mAdc, 0~5Aac, 0~100mV) I4(0~20mAdc, 0~1Aac, 0~50mV) EX:If input signal is 0~10Vdc, it will set i1.
dP	Decimal point setting	Setting decimal point:1,2,3,4 (digit) Ex: If display value 100.0 need to change to 10.00, set "dP" as "2".
dSPL	Display low scale	Setting display low scale to correspond to display low value: If input low value "4mAdc" corresponds to display low value "0", set "dSPL" as "0". *Please refer to 3-1.
dSPH	Display hi scale	Setting display hi scale to correspond to display hi value: If input hi value "20mAdc" corresponds to display hi value "100.0", set "dSPH" as "100.0". *Please refer to 3-1.
AuG	Average	Setting display scale average: (1~99) The average can smooth the display scale and outputs for input values with dramatic fluctuations, such as spike noise.
LCuT	Display low cut	Setting display low cut: (0~9999) If the input value is less than "LCuT", the display value will become to "0" Ex: If "LCuT" set "10", then the display value will become to "0" while the input value is less than "10". *Please refer to 3-1.
CoDE	Pass code	Setting pass code: (0~19999) Setting pass code before access into system parameters can prevent non-user to modify the parameters. *Initial pass code: 0

Parameter Notation	Name	Discription
LoCK	Key Lock	Setting key lock: Turn on or turn off the key lock function on (key lock on) / oFF (key lock off)
dGAin	Display gain setting	Setting display gain: If the display hi scale is different from the required value, this can be corrected by this setting. Formula: Display hi scale * "dGAin" = Actual display hi value. Ex: Display hi scale is "100", but actual display value should be "150", then "dGAin" need to set as "1.500".
doFSt	Display offset setting	Setting display offset: If the display low scale is different from the required value, this can be corrected by this setting. Formula: Display low scale + "doFSt" = Actual display low value. Ex: Display low scale is "10", but actual display value should be "15", then "doFSt" need to set as "5".
Zb	Zero band setting	Setting zero band: (0~9999) If input signal is not over "Zb", the display value will track to "0". P.S. This setting need to use with "Zdt".
Zdt	Zero tracking time setting	Setting zero tracking time: (0~9999 secs.) The display will track to "0" when the input value is in "Zb" range during the time (secs.) "Zdt". P.S. This setting need to use with "Zb". Ex: "Zb" set as "10", "Zdt" set as "3", the display value will track to "0" when input signal is read as "8" but don't over "10" during "3 secs".
Hb	Input holding band setting	Setting input holding band: (0~9999) If input signal is not over "Hb", the display value will track to "precent value". P.S. This setting need to use with "Hdt"

Parameter Notation	Name	Discription
Hdt	Input holding time setting	Setting input holding time: (0~9999 secs.) The display will track to "percent value" when the input value is in "Hb" range during the time (secs) "Hdt". P.S. This setting need to use with "Hb" Ex: "Hb" set as "10", "Hdt" set as "3", the percent value is "100", the display value will track to "100" when input signal is read as "8" but don't over "10" during "3 secs". P.S. The "percent value" range need to out of "Zb" setting, "Hb" will be enable to work.
F.Lt	Display filter setting	Setting display filter: 0: The last digit counting show as "0". 1: The last digit counting show as "0,1,2,3,4,5,6,7,8,9" 2: The last digit counting show as "0,2,4,6,8" 5: The last digit counting show as "0,5"
doFLv.	Display overflow value setting	Setting display overflow value: If the "percent value" is over this setting, the display will show as "doFLv".
FKEY	Setting function key	Function key setting: ALr5t (Alarm release) Hd (Data hold) hRA (Max. hold) RP (Reset display) aFF (Turn off) *Please refer to 3-1.
SAuE	AZ key memory function	Setting AZ key memory function: This function can memorize the function when the meter is power off. on (Memory on), aFF (Memory off)

Parameter Notation	Name	Discription
rESET	Recover calibration setting	Setting recover calibration: This function can recover the factory calibration value for the product. NO (Do not recover calibration), YES (Recover calibration).
roP	Relay output group	Modifying relay output group function. (The setting are only available when the relay weld on the product).
ALt 1 ~ ALt 4	Alarm 1~4 action setting	Setting alarm action: Hi: If the "present value" is over the alarm setpoint, the relay will be on. Lo: If the "present value" is under the alarm setpoint, the relay will be off. *Please refer to 3-2
HYS 1 ~ HYS 4	Alarm 1~4 hysteresis setting	Setting alarm hysteresis: When the alarm trig "on", the "present value" need to "under HYS" or "over HYS", the alarm will be "off". (Depends on the alarm action). *Please refer to 3-2.
dEL 1 ~ dEL 4	Alarm 1~4 run delay time setting	Setting alarm run delay time (0~9999 sec.) The alarm will trig "on" after "dEL" when the "present value" reach the alarm setpoint.
Sb	Alarm start band setting	Setting alarm start band: The "present value" is not over "Sb", the relay will not be "on". P.S. The function is only available when the alarm start to compare at the first time. P.S. This setting need to use with "Sdt". *Please refer to 3-2.
Sdt	Alarm start delay time setting	Setting alarm start delay time: The alarm will trig "on" after "sdt" when the "present value" reach the alarm setpoint. P.S. The function is only available when the alarm starts to compare at the first time. P.S. This setting need to use with "Sb". *Please refer to 3-2.

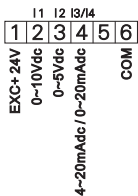
Parameter Notation	Name	Discription
LALCH	Alarm action lock	Setting alarm action lock When the "present value" reach the "alarm setpoint", the alarm and display value will be locked on. NO (Disable), YES (Enable) <i>P.S. This setting need to use with "FKEY"</i> <i>*.Please refer to 3-2.</i>
RoP	Analog output group	Modifying analog output group function. (The setting are only available when the analog output module weld on the product).
AnLo	Analog output low scale	Setting analog output low value to correspond to display low value: If analog output low value "4mAdc" corresponds to display low value "0", set "AnLo" as "0".
AnHi	Analog output hi scale	Setting analog output hi value to correspond to display hi value: If analog output hi value "20mAdc" corresponds to display low value "100", set "AnHi" as "100".
RoFSt	Analog output offset	Setting analog output offset: If the analog output low scale is different from the required value, this can be corrected by this setting.
RGa.in	Analog output gain	Setting analog output gain: If the analog output hi scale is different from the required value, this can be corrected by this setting.
doP	RS485 output group	Modifying RS485 output group function. (The setting are only available when the RS485 module weld on the product).

Parameter Notation	Name	Discription
Addr	Address	Modifying address: 1~254
bAud	Baud rate	Selecting baud rate: 0: 2400, 1:4800, 2: 9600, 3:19200
PRr,	Parity check	Selecting parity check: 0:N.8.1., 1:N.8.2., 2:EVEN, 3:ODD
FrAnE	Frame order	Setting frame order: no (From Hi to Low), yes (From Low to Hi)
AL 1 ~ AL 4	Alarm 1~4 setpoint	Setting alarm range: -19999~99999
d,	External Control Function Setting	Setting external control: ON or OFF

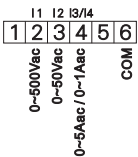
2-1 Wiring Connection

Compound input (S01, S02, S03, S04)

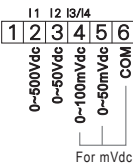
● S01 Input



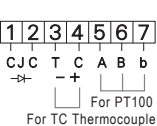
● S02 Input



● S03 Input

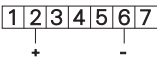


● S04 Input

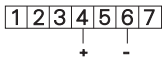


Input

● Voltage(AC,DC)



● Current(AC,DC)



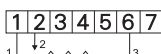
● 2 wire Resistor



● 2,3 wire sensor(Transmitter)



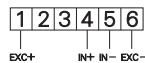
● 3 wire Potentionmeter



● 4 wire sensor (Transmitter)



● Load cell



(Voltage)



Output

● Analog Output



● RS485 Output



Power

● AC Power

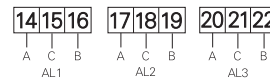


● DC Power

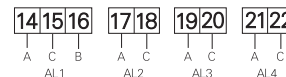


Relay

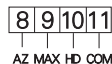
● Relay *1~3



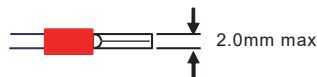
● Relay *4



External Control



Terminal

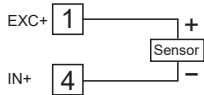


10A 300Vac, M2.6, 16~22AWG

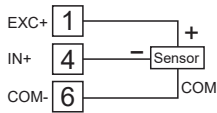
*Beware not to over-tighten the terminal screws, the torque should not exceed 5kg-cm.

2-2 The Meter Offers the Excitation Power

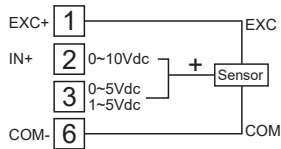
Connect with 2 wire sensor (Current)



Connect with 3 wire sensor (Current)

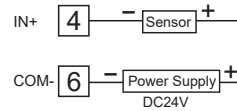


Connect with 3 wire sensor (Voltage)

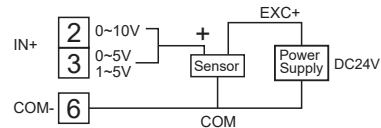


2-3 The Meter Connects with the Extra Power Supply

Current



Voltage



Control Output Wiring

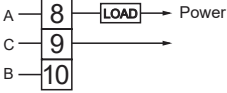
Control output wiring has 3 types as below:

- (1) Relay output can drive load, SSR or magnetic contactor.
- (2) Current: 4~20mA, 0~20mA selectable.
- (3) Voltage: 0~1V, 0~5V, 1~5V, 0~10V selectable.
- (2).(3)Linear voltage or current can drive proportional valve, inverter, transmitter or other analog input devices.

2-4 Alarm Output Wiring

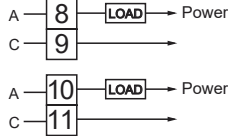
Relay output to drive load
(Do No Overload)

● AL1



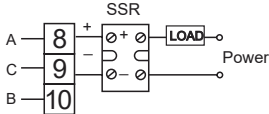
10A 120Vac / 5A 250Vac/30Vdc

● AL1, AL2 exist simultaneously

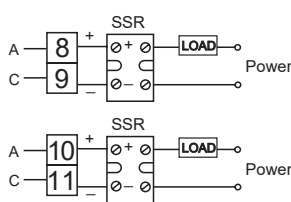


Relay output to drive SSR contactor

● AL1

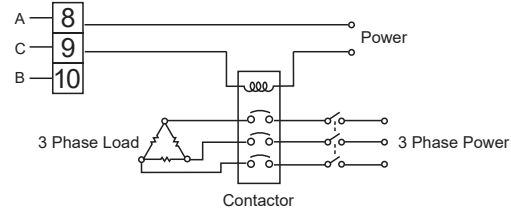


● AL1, AL2 exist simultaneously

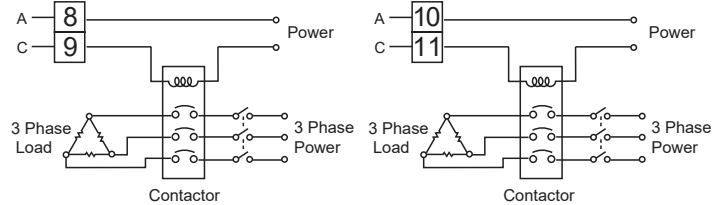


Relay output to drive magnetic contactor

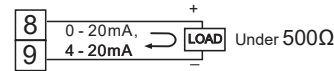
● AL1



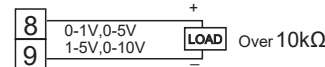
● AL1, AL2 exist simultaneously



Linear Current



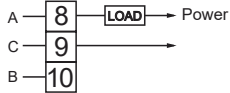
Linear Voltage



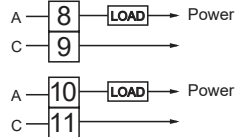
Relay output to drive load (Do No Overload)

10A 120Vac / 5A 250Vac/30Vdc

● AL1

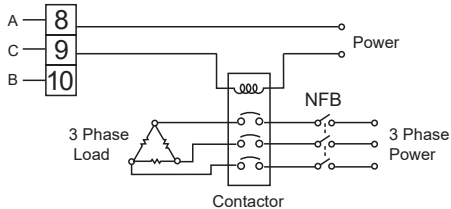


● AL1, AL2 exist simultaneously

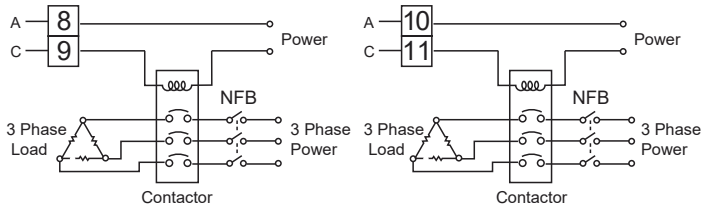


Relay output to drive magnetic contactor

● AL1

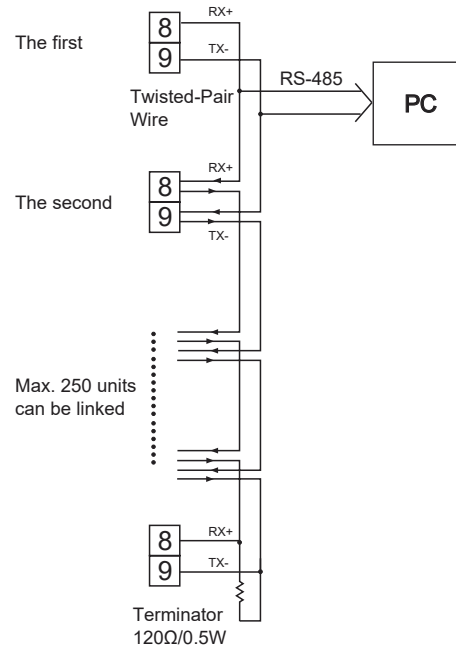


● AL1, AL2 exist simultaneously



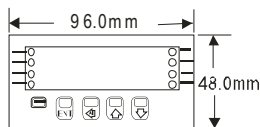
2-5 Data Communication

RS-485 Wiring

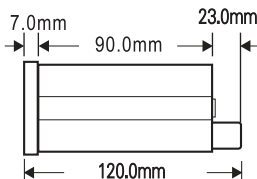


2-6 Dimension

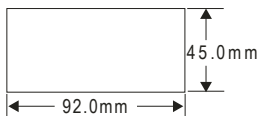
• Front View



• Side View



• Cut-out

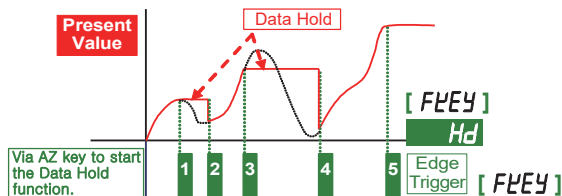


Chapter 3-Program Active Diagram

3-1 Display Function Active

Setting the AZ key to Data Hold function.

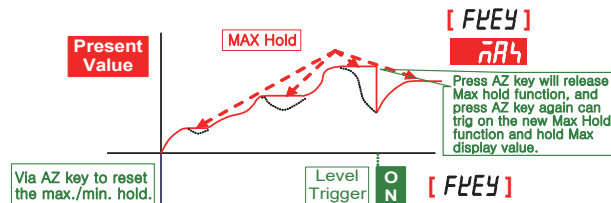
Hd (Data Hold) in **FKEY**



*Press function key again to reset. (HD indicator will bright)

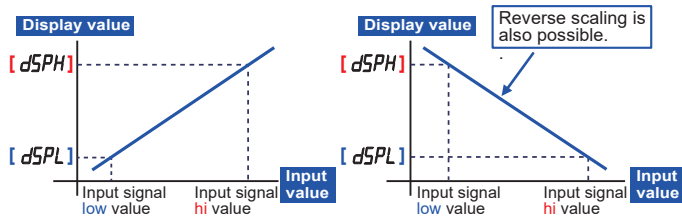
Setting the AZ key to Max. Hold function.

MAX (Max. Hold) in **FKEY**



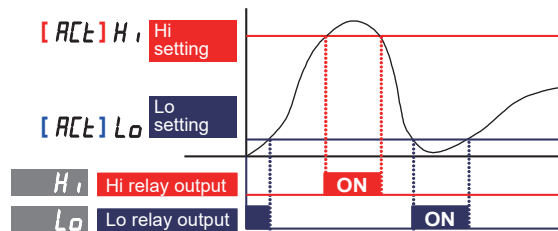
*Press function key again to reset. (MAX indicator will bright)

dSPL **dSPH** Display low / hi value

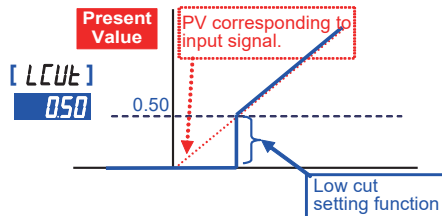


3-2 Alarm Active

Alarm active **ACT1** ~ **ACT4**,
alarm point **H1**, **Lo** setting.



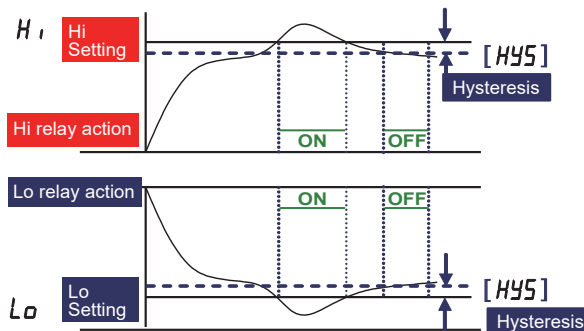
LCUE Low cut setting



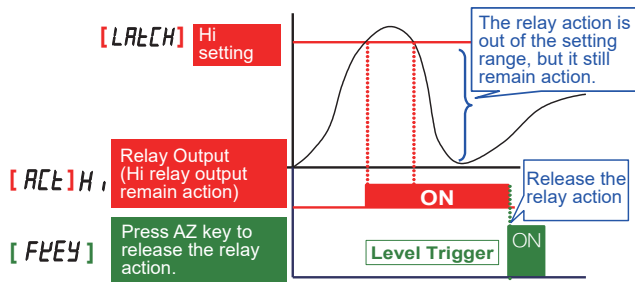
If set **[LCUE]** to 0.50,
when PV lower than 0.50, the value will display "0".

HYS Alarm hysteresis setting

[HYS1 ~ HYS4]



[LATCH] Alarm action lock setting



*Please set AZ key function as "LATCH" in the parameter FKEY.

Modbus RTU Protocol

The meter also offers the additional features of transmitting 8 bit binary for RS-485 Modbus RTU. 1 start bit, 1 stop bit and checking parity bit: None, Even, Odd.

Communication transmits rates can reach to 2400, 4800, 9600, 19200 bps.

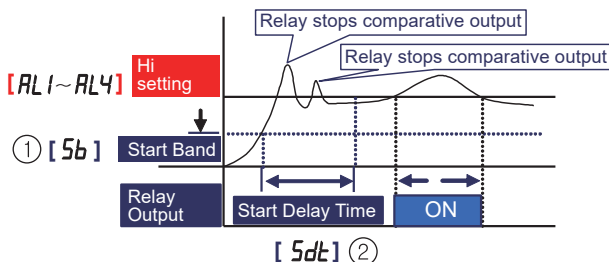
4-1 Read Instruction Architecture

Select function code(03) Read Holding Registers

Slave Address (1~254): Model MA4, MA5(Addr)

Function code (03)	Read
Starting Address Hi (00)	Hexadecimal
Starting Address Lo	Hexadecimal
*Please refer to 4-2 Modbus Protocol Address Table.	
No. of Word Hi (00)	Hexadecimal
No. of Word Lo (01~04)	Hexadecimal
CRC Hi	-----
CRC Lo	-----

[5b] [5dt] Alarm start delay time setting (It must be used together).



4-2 Modbus RTU Mode Protocol Address Table

Example:

Reading the present value of Model MA5H-A(Display),
Set Addr: 1

Slave Address	01
Function Code	03
Starting Address Hi	00
Starting Address Lo	1E
No. of Word Hi	00
No. of Word Lo	02
CRC Hi/LO	CRC 16

Reading the present value of Model MA5H-A(Display),
Set Addr: 15

Slave Address	15
Function Code	03
Starting Address Hi	00
Starting Address Lo	26
No. of Word Hi	00
No. of Word Lo	02
CRC Hi/LO	CRC 16

Data: 16Bit / 32Bit, +/- is 8000~7FFF (-32768~32767), 80000000~7FFFFFFF(-2147483648~2147483647)					
Modbus	HEX	Name	Descriptions	Act	
40001	0000				
40002	0001	STATUS	Current alarm output & external control input status display; range:0000~00FE(0~0254) Bit0=AZ, Bit1=HDMAX, Bit2=HOLD, Bit4=AL1, Bit5=AL2, Bit6=AL3, Bit7=AL4	R	
40004	0003	DP	Decimal point setting; range: 0000~0003 (0~3) 0:10 ⁰ , 1:10 ¹ , 2:10 ² , 3:10 ³	R/W	
40005	0004	BAUD	Baud rate setting; range: 0000~0003 (0~3) 0:2400, 1:4800, 2:9600, 3:19200	R/W	
40006	0005	PARI	Parity setting; range: 0000~0003 (0~3), 0:N.8.1., 1:N.8.2., 2:EVEN, 3:ODD	R/W	
40007	0006	AVG	Display average setting; range: 0001~0063 (1~99)	R/W	
40009	0008	ADDR	Address setting; range: 0000~00FF (1~254)	R/W	
40019	0012	CODE	Pass code setting; range:00000000~0001869F(0~99999) Hi Bit	R/W	
40020	0013		Pass code setting; range:00000000~0001869F(0~99999) Low Bit	R/W	
40021	0014	DSPL	Display low scale setting; range:FFFFB1E1~0001869F(-19999~99999) Hi Bit	R/W	
40022	0015		Display low scale setting; range:FFFFB1E1~0001869F(-19999~99999) Low Bit	R/W	
40023	0016	DSPH	Display hi scale setting; range:FFFFB1E1~0001869F(-19999~99999) Hi Bit	R/W	
40024	0017		Display hi scale setting; range:FFFFB1E1~0001869F(-19999~99999) Low Bit	R/W	
40026	0019	DISPLAY	Current display; range:FFFFB1E1~0001869F(-19999~99999) Low Bit	R	
40027	001A		Current display; range:FFFFB1E1~0001869F(-19999~99999) Hi Bit	R	
40031	001E	DISPLAY	Current display; range:FFFFB1E1~0001869F(-19999~99999) Low Bit	R	
40032	001F		Current display; range:FFFFB1E1~0001869F(-19999~99999) Hi Bit	R	
40039	0026	DISPLAY	Current display; range:FFFFB1E1~0001869F(-19999~99999) Hi Bit	R	
40040	0027		Current display; range:FFFFB1E1~0001869F(-19999~99999) Low Bit	R	
40059	003A	AL1	Alarm 1 Setting range:FFFFB1E1~0001869F(-19999~99999) Hi Bit	R/W	
40060	003B		Alarm 1 Setting range:FFFFB1E1~0001869F(-19999~99999) Low Bit	R/W	
40061	003C	AL2	Alarm 2 Setting range:FFFFB1E1~0001869F(-19999~99999) Hi Bit	R/W	
40062	003D		Alarm 2 Setting range:FFFFB1E1~0001869F(-19999~99999) Low Bit	R/W	
40063	003E	AL3	Alarm 3 Setting range:FFFFB1E1~0001869F(-19999~99999) Hi Bit	R/W	
40064	003F		Alarm 3 Setting range:FFFFB1E1~0001869F(-19999~99999) Low Bit	R/W	
40065	0040	AL4	Alarm 4 Setting range:FFFFB1E1~0001869F(-19999~99999) Hi Bit	R/W	
40066	0041		Alarm 4 Setting range:FFFFB1E1~0001869F(-19999~99999) Low Bit	R/W	

Appendix—Error Code of Self-Diagnosis and Exclusion Method

Error Symbol	Discription	Exclusion Method
ioFL	Input signal is over 120% of input range.	Please use the handheld meter to measure the input signal and make sure the input signal range is correct.
- ioFL	Input signal is under -10% of input range.	
RdEr	Input signal is over 180% of input range or meter error.	Please return to original equipment manufacturer for the repairing.
E-00	EEPROM reading / writing suffers the interference (about 1 million times).	
dSPH	Input signal is over display range (99999).	Please check dSPH , doFLu value is higher than specified range or not.If yes, please adjust dSPH , doFLu value.
dSPL	Input signal is under display range (-19999).	Please check dSPL , doFLu value is under than specified range or not.If yes, please adjust dSPL , doFLu value.

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