4 1/2 DIGITAL MICRO-PROCESS Watt / Var / Power Factor / Phase Angle METER with 1~2 ALARMS / ANALOG OUTPUT / RS-485

AM5P

FEATURES

- Accuracy: ±0.25% F.S. ±1 digit
- Measuring AC Watt / Var / Power Factor / Phase Angle
- High brightness 0.8" LED display range: -19999~19999; decimal point selectable
- Display range programmable
- 1~2 Alarms (Hi or Lo) programmable / Analog output (15 bit resolution) / Loop Power Output / RS-485 communication optional (The above options can exist together)
- High stability, non-flammable case (PC), high safety
- CE approval

ORDER INFORMATION: AM5P - Code 1 - Code 2 Code 3 Code 4 Code 5 - Code 6 - Code 7 Code 8 Code 9

Code 1	Input Type
W	Watt
V	Var
C	Power Factor
A	Phase Angle

Code 2	Connection
1	1Φ2W
2	1Φ3W
3	3Φ3W
4	3Φ4W

Code 3	Input Volt
1	0~120V
2	0~240V
3	0~480V
O	Option

Code 4	Input Amp
1	0~1A
2	0~5A
O	Option

Code 5	Frequency
4	400Hz
5	50Hz
6	60Hz
O	Option

Code 6	Aux. Power
A	AC/DC 100~240V
B	DC 12V
C	DC 24V
D	DC 30V~90V

Code 7	Alarm Output
N	None
R1	1 Relay
R2	2 Relays
O1	1 Open Collect
O2	2 Open Collect

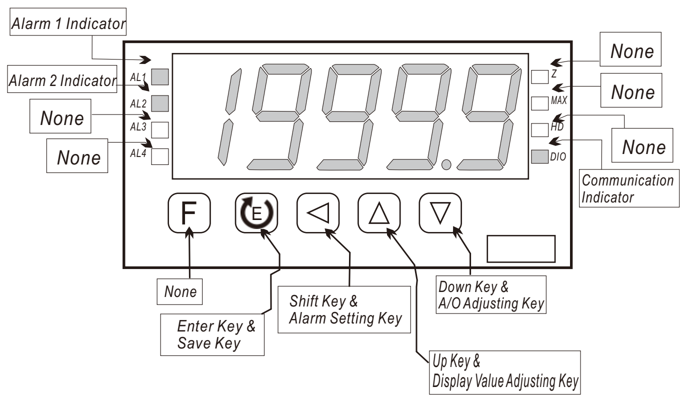
Code 8	Analog Output
N	None
A	4~20mA
V	0~10V
L	LOOP POWER:15-30Vdc 4-20mA out put
O	Option

Code 9	RS-485
N	None
Y	Yes

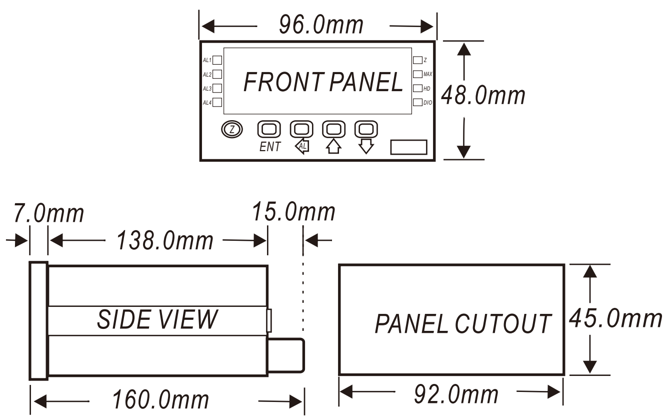
SPECIFICATION

- Accuracy: ±0.25% F.S. ±1 digit
- Display Screen: High brightness red LED; 20.3mm(0.8")
- Sampling Time: 16 cycles / sec
- Display Range: -19999~19999
- Zero Adjustment: -19999~19999
- Over Range Indication: doFL / ioFL or -doFL / -ioFL
- Polarity Indication: Automatic with "-" indication
- Parameters Setting: Push buttons
- Back Up Memory: EEPROM
- Alarm Action: "≧ (Hi) on" or "< (Lo) on"
- Alarm Run Delay Time: 0~99 sec
- Relay Contact: AC 277V / 7A; DC 30V / 7A
- Analog Output Resolution: 15 bit
- Output Response Time: <250 msec (0~90%)
- Output Capability: Voltage Output: <20mA
  Current Output: <10V
- Communication: RS-485 Modbus RTU mode
- Baud Rate: 38400 / 19200 / 9600 / 4800 bps
- Temperature Coefficient: 100ppm / °C (0~60°C)
- Operating Temperature: 0~60°C
- Operating Humidity: 20~90% RH (non-condensing)
- Storage Temperature: -10~70°C
- Storage Humidity: 20~90% RH (non-condensing)
- Power Supply: AC/DC 100~240V; DC 12 / 24 / 30~90V
- Power Consumption: 8.5VA (all functions output)
- Surge Test: 1.5KVac / 1min (Input / Power)
- Input Impendence: Voltage: >2V for 20KΩ / V; ≦2V for >200MΩ
  Current: ≧0.2A at 100mV; <0.2A at 1V
- Safety: IEC 61000-4-2
  IEC 61000-4-3
  IEC 61000-4-4
  IEC 61000-4-5
  IEC 61000-4-6
  IEC 61000-4-8
  IEC 61000-4-11

FRONT PANEL & KEY FUNCTIONS



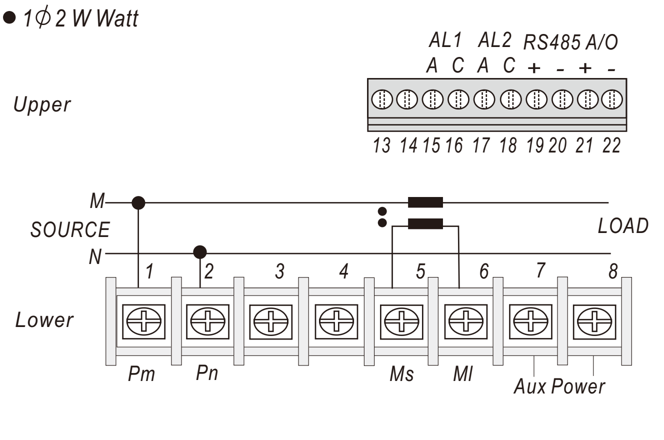
DIMENSION



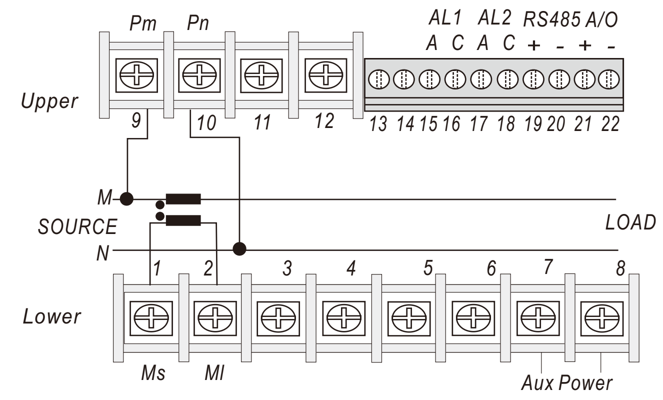
WIRING CONNECTION

Watt / Var	Power Factor / Phase Angle

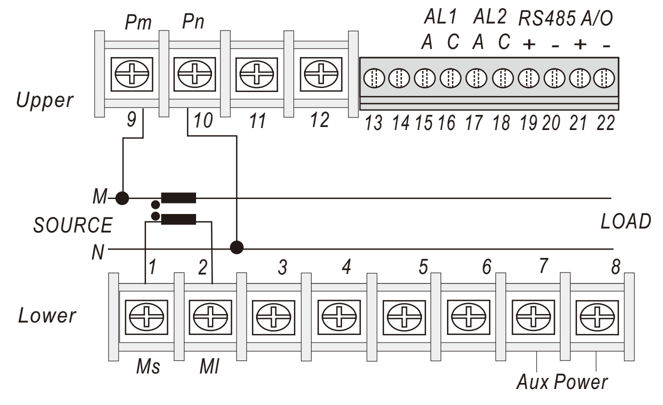
● 1ϕ 2 W Watt



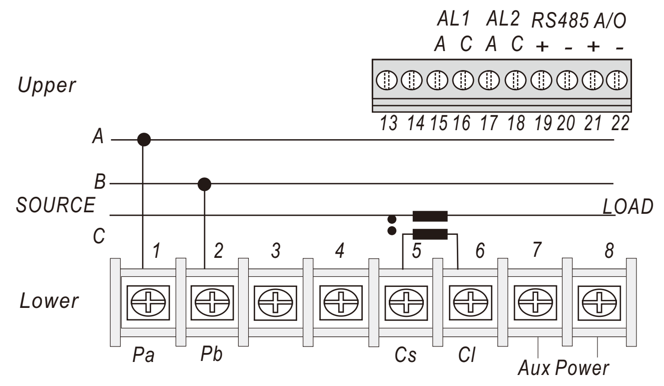
● 1ϕ 2 W Power Factor / Phase Angle



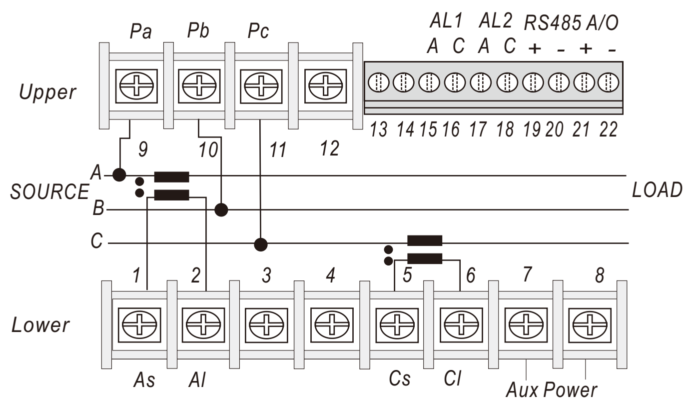
● 1ϕ 2 W Var



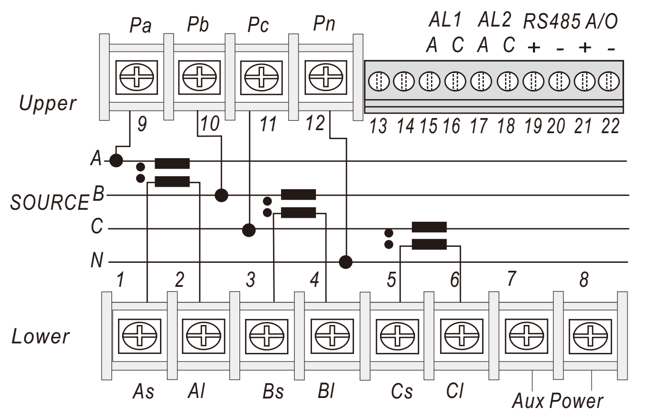
● 3ϕ 3 W (1ϕ 3W) Power Factor / Phase Angle



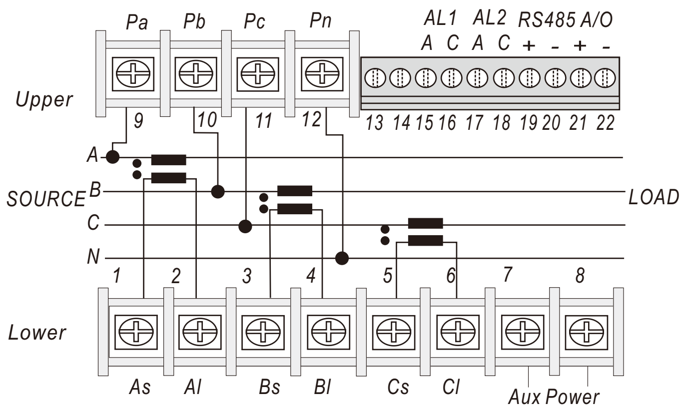
● 3ϕ 3 W (1ϕ 3W) Watt / Var



● 3ϕ 4 W Power Factor / Phase Angle



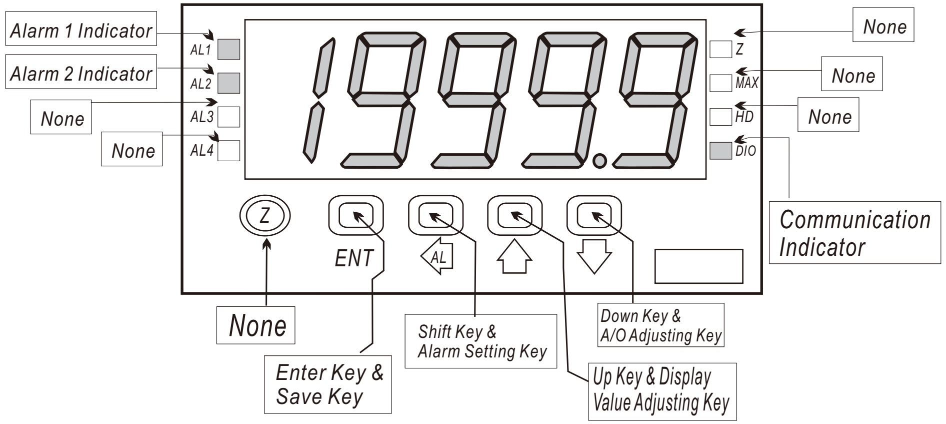
● 3ϕ 4 W Watt / Var



AM5P 4 1/2 DIGITAL MICRO-PROCESS Watt / Var / Power Factor / Phase Angle METER with 1~2 ALARMS / ANALOG OUTPUT / RS-485 MANUAL

✱ Please understand key indicators & functions at the first operation.

FRONT PANEL & KEY FUNCTIONS



Key Name	Symbol	Descriptions
Reset Key	Z	1. Press this key to enable the reset function & reset indicator (Z) is light; press this key again to disable the reset function & reset indicator (Z) is dark.
Enter Key & Save Key	ENT	1. In the measuring status, press this key can enter to parameter pages. 2. In the parameter setting, press this key can save the value & go to next parameter.
Shift Key & Alarm Setting Key	⇦AL	1. In the measuring page, press this key for 3 sec can enter to alarm setting page (The selecting digit will be flashed) 2. In the parameter setting , press this key can move the cursor left.
Up Key & Display Value Adjusting Key	⇧	1.In the measuring status, press this key for 3 sec can enter to display value adjustment of "ZERO" & "SPAN" 2. In the parameter setting, press this key can increase the digits.
Down Key & A/O Adjusting Key	⇩	1. In the measuring status, press this key for 3 sec can enter to analog output adjustment. 2. In the parameter setting , press this key can decrease the digits.

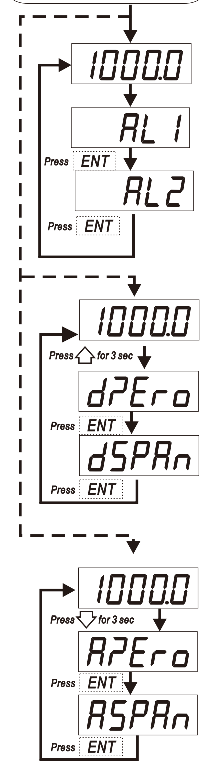
**1. The following block charts are parameters codes, parameter codes & parameters will alternate flashing if the parameters can be modified.

2. To modify the parameters, please press ⇦AL ⇧ ⇩ , and press **ENT** to save the parameter after the modification.

3. Please don't forget the new pass code after modification.

4. In any pages, press ⇧ & ⇩ , or don't press any keys for 2 minutes that will back to measuring status.

GENERAL MODE OPERATING PROCEDURES

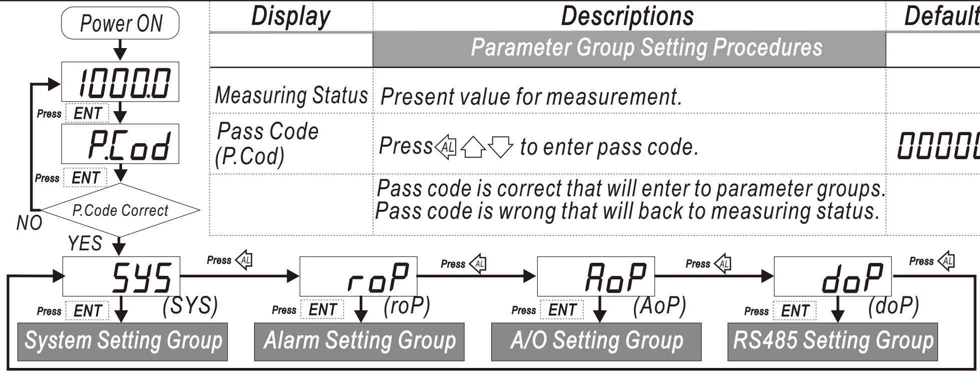


Display	Descriptions	Default
	Alarm Setpoint	
Measuring Status	Present value for measurement	
Alarm 1 Setpoint (AL1)	Press ⇦AL ⇧ ⇩ to modify alarm 1 setpoint.	00000
Alarm 2 Setpoint (AL2)	Press ⇦AL ⇧ ⇩ to modify alarm 2 setpoint.	00000
	Display: "ZERO" & "SPAN" Adjustment	
Measuring Status	Present value for measurement.	
Display Zero Adjustment (dZEro)	Press ⇦AL to select adjusting speed rate, press ⇧ ⇩ to modify the zero value. PS: To use this function to adjust the real zero value.	00000
Display Span Adjustment (dSPAn)	Press ⇦AL to select adjusting speed rate, press ⇧ ⇩ to modify the span value. PS: To use this function to adjust the real span value.	00000
	Analog Output: "ZERO" &"SPAN" Adjustment	
Measuring Status	**The following steps are only available for analog output.**	
A/O Zero Adjustment (AZEro)	Press ⇦AL to select adjusting speed rate, press ⇧ ⇩ to modify the A/O zero. PS: To use this function to adjust the real A/O zero.	00000
A/O Span Adjustment (ASPAn)	Press ⇦AL to select adjusting speed rate, press ⇧ ⇩ to modify the A/O span. PS: To use this function to adjust the real A/O span.	00000

Remark: 1. There are 4 parameter groups of "System Setting Group(SYS)", "Alarm Setting Group(roP)", "Analog Output Setting Group (AoP)" & "RS485 Setting Group(doP)" for modification.
2. Press ⇦AL to select each group page, and press **ENT** to enter each group or parameter page for modification or saving the parameters.
3. Some of optional functions of parameter pages still exist, but the functions are disable.

PROGRAMMING MODE OPERATING PROCEDURES

Display	Descriptions	Default
	Parameter Group Setting Procedures	
Measuring Status	Present value for measurement.	
Pass Code (P.Cod)	Press ⇦AL ⇧ ⇩ to enter pass code.	00000
	Pass code is correct that will enter to parameter groups. Pass code is wrong that will back to measuring status.	



	Display	Descriptions	Default
SYS	System Setting Page (SYS)	**System Setting Group Procedures**	
dP	Decimal Point Setting (dP)	Press ⇧⇩ to select decimal point (0, 1, 2, 3, 4). EX: if the value shows "0.00" that means the decimal point is 2 digits.	Customers specify
dSPL	Display Low Scale Setting (dSPL)	Press⇦⇧⇩ to modify display low scale for the input signal zero value. EX: If the input signal is 4~20mA; 4mA is shown display 0.00, this parameter must be set for 000.00.	Customers specify
dSPH	Display Hi Scale Setting (dSPH)	Press⇦⇧⇩ to modify display high scale for the input signal span value. Display Hi Scale Calculation: (If there are no PT & CT ratio, they can be omitted.) DSPH = Basic Watt x PT ratio x CT ratio	Customers specify
AuG	Display Average Setting (AvG)	Press⇦⇧⇩ to modify display average (1~99). PS: Please use this function for stable display value when input signal is unstable.	00005
LCUt	Display Low Cut Setting (LCUt)	Press⇦⇧⇩ to modify display low cut to 0 (0~99).	00000
CodE	Pass Code Setting (CodE)	Press⇦⇧⇩ to modify pass code (0~19999). PS: Please don't forget the new pass code after modification.	00000
LoCK	Key Lock Setting (LoCK)	Press ⇧⇩ to lock the keys, using key lock function only can view the parameters, but cannot modify any values. PS: no (unlock) , YES ("ENT" unlock , others lock).	no
		Alarm Setting Group Procedures	
roP	Alarm Setting Page (roP)	**The following steps are only available for alarm output.**	
ACt1 / ACt2	Alarm Action Setting: Alarm 1 (ACt1), Alarm 2 (ACt2)	Press ⇧⇩ to modify alarm value that is ≧(Hi) or <(Lo) for alarm action. PS: 1. There are 2 alarms output optional. 2. This page is exist without alarm output, but the function will be disabled. 3. Press **ENT** to save the value and go to the next parameter.	Hi
HYS1 / HYS2	Alarm Hysteresis Setting: Hysteresis 1 (HYS1), Hysteresis 2 (HYS2)	Press⇦⇧⇩ to modify the value, when alarm runs lower or higher display value (depends on alarm action). Alarm setpoint ±this value (0~999) will turn off the alarm. PS: 1. There are 2 alarms output optional. 2. This page is exist without alarm output, but the function will be disabled. 3. Press **ENT** to save the value and go to the next	00000
dEL1 / dEL2	Alarm Run Delay Setting: Delay Time 1 (dEL1), Delay Time 2 (dEL2)	Press⇦⇧⇩ to modify the value, when the display value reach the alarm value that need to wait for this time (0~99 sec) for alarm action. PS: 1. There are 2 alarms output optional. 2. This page is exist without alarm output, but the function will be disabled. 3. Press **ENT** to save the value and go to the next	00000
Sb	Alarm Start Band Setting (Sb)	Press⇦⇧⇩ to modify the value (-99~+99), if the display value don't over this range; the alarm will not be act.	00000
Sdt	Alarm Start Band Time Setting (Sdt)	Press⇦⇧⇩ to modify the value (0~99 sec), if the display value reach alarm start band value; the alarm will be act after this value (sec).(The function is used with "Sb" function.)	00000

(Press ENT between each display step.)

	Display	Descriptions	Default
		A/O Setting Group Procedures	
AoP	A/O Setting Page (AoP)	**The following steps are only available for analog output.**	
PoLAr	A/O Polarity Setting (PoLAr)	Press ⇧⇩ to select output for positive or negative pole. PS : Voltage output ,NO: positive pole output (0~+10V) YES: positive & negative pole output (-10~+10V)	no
AnLo	A/O Low Scale Setting (AnLo)	Press⇦⇧⇩ to adjust A/O low scale to correspond to the display value (programmable). EX : A/O is 0~10V, the display is 10.0 to output 0V, this value must be set for 10.0.	00000
AnHi	A/O Hi Scale Setting (AnHi)	Press⇦⇧⇩ to adjust A/O hi scale to correspond to the display value (programmable). EX : A/O is 0~10V, the display is 90.0 to output1 0V, this value must be set for 90.0.	99999
		RS485 Setting Group Procedures	
doP	RS485 Setting Page (doP)	**The following steps are only available for RS-485.**	
Addr	Address Setting (Addr)	Press⇦⇧⇩ to modify address (0~255).	00000
bAUd	Baud Rate Setting (bAUd)	Press ⇧⇩ to select baud rate (38400/19200/9600/4800).	19200
PAri	Parity Setting (PAri)	Press ⇧⇩ to select parity (n.8.2/n.8.1/even/odd).	n.8.2

(Press ENT between each display step.)

Error Code of Self-Diagnosis

Display	Descriptions
ioFL	Input signal is over 120% of input range.
-ioFL	Input signal is under -20% of input range.
AdEr	Input signal is over 180% of input range or meter error.
doFL	Input signal is over display range (99999)
-doFL	Input signal is under display range (-19999)
E-00	EEPROM reading/writing suffers the interference (about 1 million times).

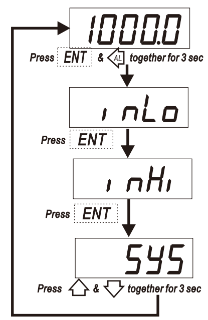
**Please check the wiring connection is correct first, if the problem still exist, please return the meter to the factory.

Modbus RTU Mode Protocol Address Table

Data: 16Bit / 32Bit, +/- is 8000~7FFF (-32768~32767), 80000000~7FFFFFFF(-2147483648~2147483647)

Modbus	HEX	Name	Descriptions	Act
40001	0000	ID	Model number identification; AM5P is "08"	R
40002	0001	STATUS	Current alarm output & external control input status display; range: 0000~0030 (0~48) (Bit5: AL2, Bit4: AL1)	R
40003	0002	TYPE	Input type setting; range: 0000~0002 (0~2) 0:FACT, 1:ANGLE, 2:POWER	R/W
40004	0003	ACT1	Alarm 1 act setting; range: 0000~0001 (0~1) 0:HI, 1:LO	R/W
40005	0004	ACT2	Alarm 2 act setting; range: 0000~0001 (0~1) 0:HI, 1:LO	R/W
40006	0005	POLAR	Analog output polarity setting; range: 0000~0001 (0~1) 0:NO, 1:YES	R/W
40007	0006	LOCK	Key lock setting; range: 0000~0001 (0~1) 0:NO, 1:YES	R/W
40008	0007	DP	Decimal point setting; range: 0000~0004 (0~4) 0:10^{0}, 1:10^{-1}, 2:10^{-2}, 3:10^{-3}, 4:10^{-4}	R/W
40009	0008	BAUD	Baud rate setting; range: 0000~0003 (0~3) 0:38400, 1:19200, 2:9600, 3:4800	R/W
40010	0009	PARI	Parity setting; range: 0000~0003 (0~3), 0:N.8.2., 1:N.8.1., 2:EVEN, 3:ODD	R/W
40011	000A	AVG	Display average setting; range: 0001~0063 (1~99)	R/W
40012	000B	LCUT	Display low cut setting; range: 0000~0063 (0~99)	R/W
40013	000C	ADDR	Address setting; range: 0000~00FF (0~255)	R/W
40014	000D	DEL1	Alarm 1 act delay time setting; range: 0000~0063 (0~99)	R/W
40015	000E	DEL2	Alarm 2 act delay time setting; range: 0000~0063 (0~99)	R/W
40016	000F	SB	Alarm start band setting; range: FF9D~0063 (-99~99)	R/W
40017	0010	SDT	Alarm start delay time setting; range: 0000~0063 (0~99)	R/W
40018	0011	HYS1	Alarm 1 hysteresis setting; range: 0000~03E7 (0~999)	R/W
40019	0012	HYS2	Alarm 2 hysteresis setting; range: 0000~03E7 (0~999)	R/W
40020	0013	CODE	Pass code setting; range: 0000~4E1F (0~19999)	R/W
40021	0014	AZERO	Analog output zero setting; range: D8F1~270F (-9999~9999)	R/W
40022	0015	ASPAN	Analog output span setting; range: D8F1~270F (-9999~9999)	R/W
40023	0016	DSPL	Display low scale setting; range: B1E1~4E1F (-19999~19999)	R/W
40024	0017	DSPH	Display hi scale setting; range: B1E1~4E1F (-19999~19999)	R/W
40025	0018	AL1	Alarm 1 setpoint setting; range: B1E1~4E1F (-19999~19999)	R/W
40026	0019	AL2	Alarm 2 setpoint setting; range: B1E1~4E1F (-19999~19999)	R/W
40027	001A	ANLO	Analog output low scale setting; range: B1E1~4E1F (-19999~19999)	R/W
40028	001B	ANHI	Analog output hi scale setting; range: B1E1~4E1F (-19999~19999)	R/W
40029	001C	DISPLAY	Current display; range: B1E1~4E1F (-19999~19999)	R

CALIBRATION OPERATING PROCEDURES



Display	Descriptions	Default
	Calibration	
Measuring Status	Present value for measurement Press **ENT** & AL together for 3 sec will enter to calibration operating procedures.	
Input Low Scale Calibration (inLo)	1. Input standard low scale signal. 2. Press AL ⇧ ⇩ to calibrate input low scale.	
Input Hi Scale Calibration (inHi)	1. Input standard hi scale signal. 2. Press AL ⇧ ⇩ to calibrate input hi scale.	
System Setting Page(SYS)	1. Finish calibration operating procedures will enter to system setting group. 2. Press ⇧ & ⇩ together to back to measuring status.	

Warning: Calibration of this meter requires a standard signal with 0.01% accuracy or better and an external meter with 0.005% accuracy or better.