

# 5 DIGITAL MICRO-PROCESS FLOW METER with 2~4 ALARMS / ANALOG OUTPUT / RS-485

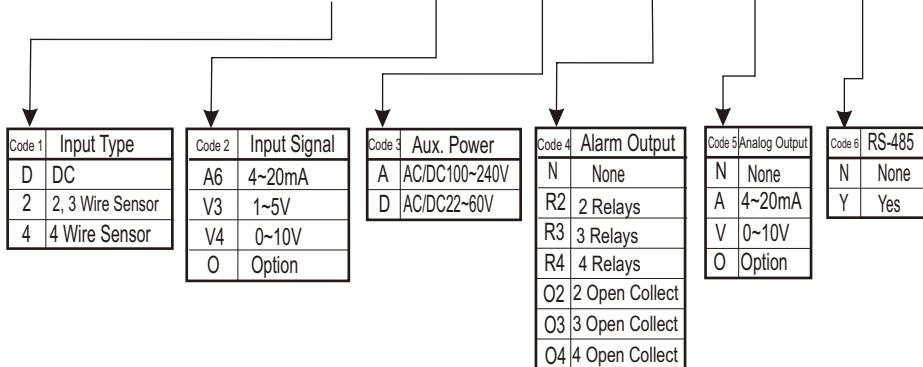
# KFM-A

## FEATURES

- Accuracy:  $\pm 0.05\%$  F.S.  $\pm 1$  digit
- High brightness 0.8" LED display range: -19999~99999; decimal point selectable
- Max. Hold / Data Hold / Reset / 2~4 Alarms (Hi or Lo) programmable / Analog output (15 bit resolution) / RS-485 communication optional (The above options can exist together)
- High stability, non-flammable case (PC), high safety
- CE approval



## ORDER INFORMATION: KFM-A- [Code 1] - [Code 2] - [Code 3] - [Code 4] - [Code 5] - [Code 6]

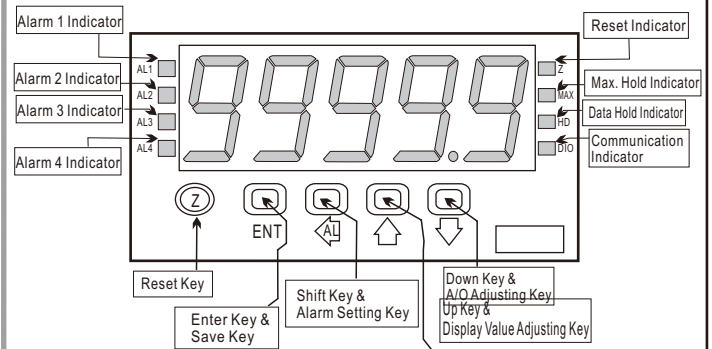


\*\*1: 2 wire type offers excitation power DC24V for 2 wire (Loop Power) flow sensors using.  
2: 3 Relay type only offers A(NormalOpen) output. O.C. (Open Collect) offers NPN of C.E. output.

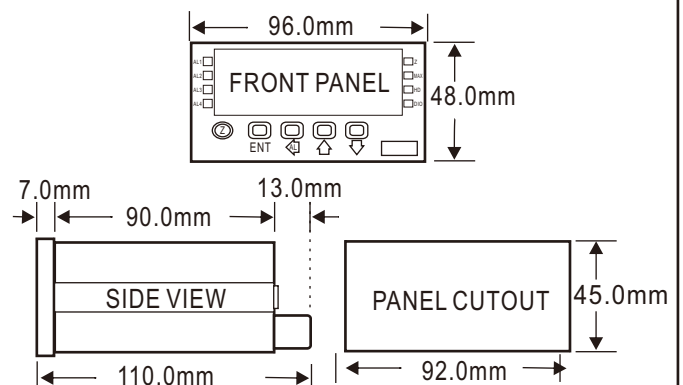
## SPECIFICATION

- ◆ Accuracy:  $\pm 0.05\%$  F.S.  $\pm 1$  digit
- ◆ Display Screen: High brightness red LED; 20.3mm(0.8")
- ◆ Sampling Time: 16 cycles / sec
- ◆ Display Range: -19999~99999
- ◆ Zero Adjustment: -19999~99999
- ◆ Over Range Indication: doFL / ioFL or -doFL / -ioFL
- ◆ Polarity Indication: Automatic with "-" indication
- ◆ Parameters Setting: Push buttons
- ◆ Back Up Memory: EEPROM
- ◆ Alarm Action: " $\geq$  (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; AC/DC 22~60V
- ◆ Power Consumption: 8.5VA (all functions output)  
1.5KVac / 1min (Input / Power)
- ◆ Surge Test: Voltage: >2V for 20K $\Omega$  / V;  $\leq$ 2V for >200M $\Omega$
- ◆ Input Impedence: Current:  $\geq$ 0.2A at 100mV; <0.2A at 1V

## FRONT PANEL & KEY FUNCTIONS



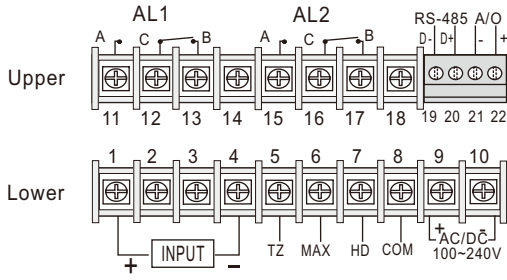
## DIMENSION



# WIRING CONNECTION

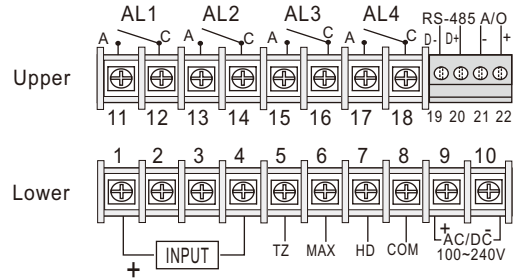
## 2 Alarms Output:

- Voltage, Current (DC)

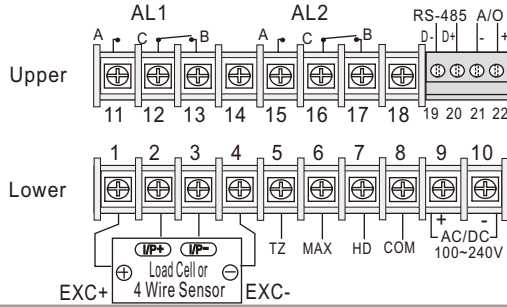


## 4 Alarms Output:

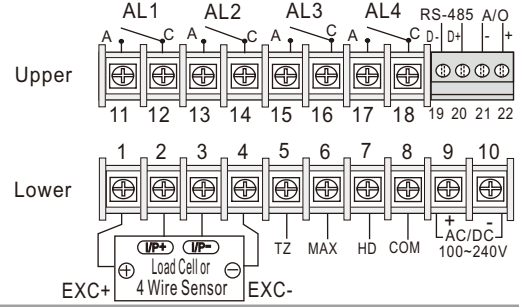
- Voltage, Current (DC)



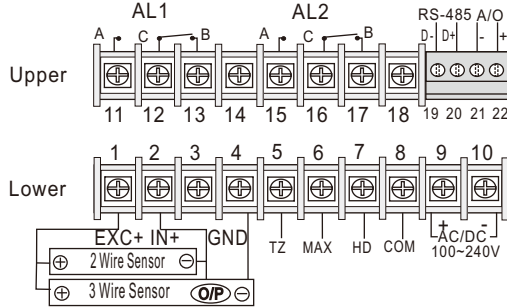
- 4 Wire Sensor or Load cell



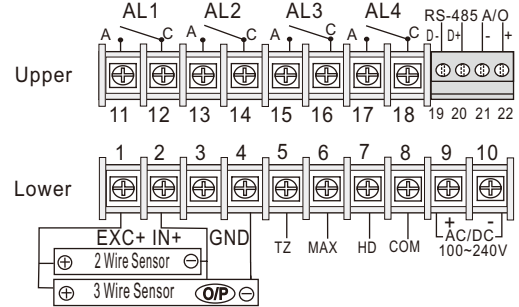
- 4 Wire Sensor or Load cell



- 2,3 Wire Sensor

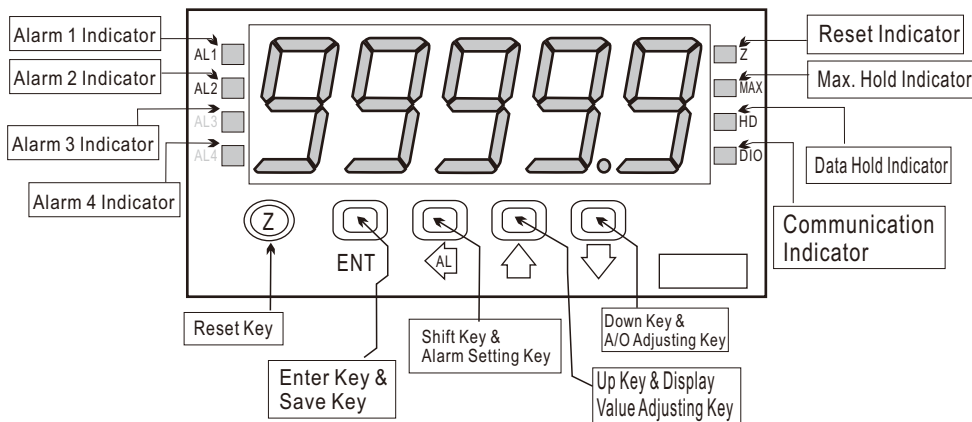


- 2,3 Wire Sensor



\* Please understand key indicators & functions at the first operation.

FRONT PANEL & KEY FUNCTIONS



Key Name	Symbol	Descriptions
Reset Key	Ⓩ	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 status, 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 ←↑↓, 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

Block Charts	Display	Descriptions	Default
<b>Alarm Setpoint</b>			
Power ON	10000	Measuring Status	Present value for measurement
Press ← for 3 sec	AL 1	Alarm 1 Setpoint (AL1)	Press ←↑↓ to modify alarm 1 setpoint.
Press ENT	AL 2	Alarm 2 Setpoint (AL2)	Press ←↑↓ to modify alarm 2 setpoint.
Press ENT	AL 3	Alarm 3 Setpoint (AL3)	Press ←↑↓ to modify alarm 3 setpoint.
Press ENT	AL 4	Alarm 4 Setpoint (AL4)	Press ←↑↓ to modify alarm 4 setpoint.
Press ENT		<b>Display: "ZERO" &amp; "SPAN" Adjustment</b>	
Power ON	10000	Measuring Status	Present value for measurement.
Press ↑ for 3 sec	dPZero	Display Zero Adjustment (dZErO)	Press ← to select adjusting speed rate, press ↑ ↓ to modify the zero value. PS: To use this function to adjust the real zero value.
Press ENT	dSPAN	Display Span Adjustment (dSPAN)	Press ← to select adjusting speed rate, press ↑ ↓ to modify the span value. PS: To use this function to adjust the real span value.
Press ENT		<b>Analog Output: "ZERO" &amp; "SPAN" Adjustment</b>	
Power ON	10000	Measuring Status	<b>The following steps are only available for analog output.</b>
Press ↓ for 3 sec	APEro	A/O Zero Adjustment (AZErO)	Press ← to select adjusting speed rate, press ↑ ↓ to modify the A/O zero. PS: To use this function to adjust the real A/O zero.
Press ENT	ASPAAn	A/O Span Adjustment (ASPAAn)	Press ← to select adjusting speed rate, press ↑ ↓ to modify the A/O span. PS: To use this function to adjust the real A/O span.

- 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 ← 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

Block Charts	Display	Descriptions	Default
<b>Parameter Group Setting Procedures</b>			
Power On	10000	Measuring Status	Present value for measurement
Press ENT	PCod	Pass Code (P.Cod)	Press ←↑↓ to enter pass code.
Press ENT		Pass code is correct that will enter to parameter groups; Pass code is wrong that will back to measuring status.	
<p>NO</p> <p>YES</p> <p>Press ← →</p> <p>Press ENT</p> <p>Press ENT</p> <p>Press ENT</p> <p>Press ENT</p>			
	SYS	System Setting Group	
	roP	Alarm Setting Group	
	AoP	A/O Setting Group	
	doP	RS485 Setting Group	

Display	Descriptions	Default
<b>System Setting Group Procedures</b>		
595 Press: ENT ↓ dP	System Setting Page (SYS) Decimal Point Setting (dP) Press $\uparrow$ $\downarrow$ 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
Press: ENT ↓ dSPL	Display Low Scale Setting (dSPL) Press $\leftarrow$ $\uparrow$ $\downarrow$ 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
Press: ENT ↓ dSPH	Display Hi Scale Setting (dSPH) Press $\leftarrow$ $\uparrow$ $\downarrow$ to modify display high scale for the input signal span value. EX: If the input signal is 4~20mA; 20mA is shown display 100.00, this parameter must be set for 100.00.	Customers specify
Press: ENT ↓ AvG	Display Average Setting (AvG) Press $\leftarrow$ $\uparrow$ $\downarrow$ to modify display average (1~99). PS: Please use this function for stable display value when input signal is unstable.	00005
Press: ENT ↓ LCuE	Display Low Cut Setting (LCuE) Press $\leftarrow$ $\uparrow$ $\downarrow$ to modify display low cut to 0 (0~99).	00000
Press: ENT ↓ CodE	Pass Code Setting (CodE) Press $\leftarrow$ $\uparrow$ $\downarrow$ to modify pass code (0~19999). PS: Please don't forget the new pass code after modification.	00000
Press: ENT ↓ di	Control DI Setting (di) Press $\uparrow$ $\downarrow$ to select control DI off(YES) or on(NO). PS: Control DI (Z, MAX, HD) & (COM) shorts, the functions starts.	no
Press: ENT ↓ LoCK	Key Lock Setting (LoCK) Press $\uparrow$ $\downarrow$ 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
<b>Alarm Setting Group Procedures</b>		
roP	Alarm Setting Page (roP) <b>The following steps are only available for alarm output.</b>	
Press: ENT ↓ ACt1 ACt2 ACt3 ACt4	Alarm Action Setting Alarm 1 (ACt1) Alarm 2 (ACt2) Alarm 3 (ACt3) Alarm 4 (ACt4) Press $\uparrow$ $\downarrow$ to modify alarm value that is $\geq$ (Hi) or $<$ (Lo) for alarm action. PS: 1. There are 4 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
Press: ENT ↓ HYS1 HYS2 HYS3 HYS4	Alarm Hysteresis Setting Hysteresis 1 (HYS1) Hysteresis 2 (HYS2) Hysteresis 3 (HYS3) Hysteresis 4 (HYS4) Press $\leftarrow$ $\uparrow$ $\downarrow$ to modify the value, when alarm runs lower or higher display value (depends on alarm action). Alarm setpoint $\pm$ this value (0~999) will turn off the alarm. PS: 1. There are 4 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.	00000
Press: ENT ↓ dEL1 dEL2 dEL3 dEL4	Alarm Run Delay Setting Delay Time 1 (dEL1) Delay Time 2 (dEL2) Delay Time 3 (dEL3) Delay Time 4 (dEL4) Press $\leftarrow$ $\uparrow$ $\downarrow$ 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 4 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.	00000
Press: ENT ↓ Sb	Alarm Start Band Setting (Sb) Press $\leftarrow$ $\uparrow$ $\downarrow$ to modify the value (-99~+99), if the display value don't over this range; the alarm will not be act.	00000
Press: ENT ↓ Sdt	Alarm Start Band Time Setting (Sdt) Press $\leftarrow$ $\uparrow$ $\downarrow$ 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

Display	Descriptions	Default
<b>A/O Setting Group Procedures</b>		
RoP	A/O Setting Page (AoP) <b>The following steps are only available for analog output.</b>	
Press: ENT ↓ PoLAr	A/O Polarity Setting (PoLAr) Press $\uparrow$ $\downarrow$ 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
Press: ENT ↓ AnLo	A/O Low Scale Setting (AnLo) Press $\leftarrow$ $\uparrow$ $\downarrow$ 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
Press: ENT ↓ AnHi	A/O Hi Scale Setting (AnHi) Press $\leftarrow$ $\uparrow$ $\downarrow$ 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 output 10V, this value must be set for 90.0.	99999
<b>RS485 Setting Group Procedures</b>		
doP	RS485 Setting Page (doP) <b>The following steps are only available for RS-485.</b>	
Press: ENT ↓ Addr	Address Setting (Addr) Press $\leftarrow$ $\uparrow$ $\downarrow$ to modify address (0~255).	00000
Press: ENT ↓ bAUd	Baud Rate Setting (bAUd) Press $\uparrow$ $\downarrow$ to select baud rate (38400/19200/9600/4800).	19200
Press: ENT ↓ PARi	Parity Setting (PARi) Press $\uparrow$ $\downarrow$ to select parity (n.8.2/n.8.1/even/odd).	n8.2
Press: ENT ↓ FrAnE	Frame Setting (FrAmE) Press $\uparrow$ $\downarrow$ to select frame type. (NO:Hi $\rightarrow$ Lo , YES:Lo $\rightarrow$ Hi)	no

### Error Code of Self-Diagnosis

Display	Descriptions
1 oFL	Input signal is over 120% of input range.
-1 oFL	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; KFM-A is "11"	R
40002	0001	STATUS	Current alarm output & external control input status display; range: 0000~00FE (0~254) (0:OFF, 1:ON) (Bit7:AL4, Bit6:AL3, Bit5:AL2, Bit4:AL1, Bit3:HD, Bit2:MAX, Bit1:AZ)	R
40003	0002	FUNC	Parameters setting; range: 0000~00FF (0~255) Bit0~3: ACT1~4 (0:HI, 1:LO), Bit4:CON, Bit5:POLAR	R/W
40004	0003	DP	Decimal point setting; range: 0000~0004 (0~4) 0:10 <sup>0</sup> , 1:10 <sup>1</sup> , 2:10 <sup>2</sup> , 3:10 <sup>3</sup> , 4:10 <sup>4</sup>	R/W
40005	0004	BAUD	Baud rate setting; range: 0000~0003 (0~3) 0:38400, 1:19200, 2:9600, 3:4800	R/W
40006	0005	PARI	Parity setting; range: 0000~0003 (0~3), 0:N.8.2., 1:N.8.1., 2:EVEN, 3:ODD	R/W
40007	0006	AVG	Display average setting; range: 0001~0063 (1~99)	R/W
40008	0007	LCUT	Display low cut setting; range: 0000~0063 (0~99)	R/W
40009	0008	ADDR	Address setting; range: 0000~00FF (0~255)	R/W
40010	0009	DEL1	Alarm 1 act delay time setting; range: 0000~0063 (0~99)	R/W
40011	000A	DEL2	Alarm 2 act delay time setting; range: 0000~0063 (0~99)	R/W
40012	000B	DEL3	Alarm 3 act delay time setting; range: 0000~0063 (0~99)	R/W
40013	000C	DEL4	Alarm 4 act delay time setting; range: 0000~0063 (0~99)	R/W
40014	000D	SB	Alarm start band setting; range: FF9D~0063 (-99~99)	R/W
40015	000E	SDT	Alarm start delay time setting; range: 0000~0063 (0~99)	R/W
40016	000F	HYS1	Alarm 1 hysteresis setting; range: 0000~270F (0~9999)	R/W
40017	0010	HYS2	Alarm 2 hysteresis setting; range: 0000~270F (0~9999)	R/W
40018	0011	HYS3	Alarm 3 hysteresis setting; range: 0000~270F (0~9999)	R/W
40019	0012	HYS4	Alarm 4 hysteresis setting; range: 0000~270F (0~9999)	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: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R/W
40024	0017		Display low scale setting; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R/W
40025	0018	DSPH	Display hi scale setting; range: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R/W
40026	0019		Display hi scale setting; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R/W
40027	001A	AL1	Alarm 1 setpoint setting; range: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R/W
40028	001B		Alarm 1 setpoint setting; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R/W
40029	001C	AL2	Alarm 2 setpoint setting; range: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R/W
40030	001D		Alarm 2 setpoint setting; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R/W
40031	001E	AL3	Alarm 3 setpoint setting; range: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R/W
40032	001F		Alarm 3 setpoint setting; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R/W
40033	0020	AL4	Alarm 4 setpoint setting; range: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R/W
40034	0021		Alarm 4 setpoint setting; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R/W

Modbus	HEX	Name	Descriptions	Act
40035	0022	ANLO	Analog output low scale setting; range: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R/W
40036	0023		Analog output low scale setting; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R/W
40037	0024	ANHI	Analog output hi scale setting; range: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R/W
40038	0025		Analog output hi scale setting; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R/W
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
40041	0028	INLO	Input low calibrated value display; range: 00029F16~004EA4A8 (171798~5153960) Hi Bit	R
40042	0029		Input low calibrated value display; range: 00029F16~004EA4A8 (171798~5153960) Low Bit	R
40043	002A	INHI	Input hi calibrated value display; range: 00029F16~004EA4A8 (171798~5153960) Hi Bit	R
40044	002B		Input hi calibrated value display; range: 00029F16~004EA4A8 (171798~5153960) Low Bit	R
40045	002C	MAX	Max. hold display; range: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R
40046	002D		Max. hold display; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R
40047	002E	HOLD	Data hold display; range: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R
40048	002F		Data hold display; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R
40049	0030	AZ	Auto zero; range: FFFFB1E1~0001869F (-19999~99999) Hi Bit	R
40050	0031		Auto zero; range: FFFFB1E1~0001869F (-19999~99999) Low Bit	R

## CALIBRATION OPERATING PROCEDURES

	Display	Descriptions	Default
<pre> graph TD     A[10000] -- "Press: ENT &amp; [Left Arrow] together for 3 sec" --&gt; B[1 nLo]     B -- "Press: ENT" --&gt; C[1 nHi]     C -- "Press: ENT" --&gt; D[545]     D -- "Press: [Up Arrow] &amp; [Down Arrow] together for 3 sec" --&gt; A                     </pre>	Measuring Status	Present value for measurement Press ENT & [Left Arrow] together for 3 sec will enter to calibration operating procedures.	
	Input Low Scale Calibration (inLo)	1. Input standard low scale signal. 2. Press [Left Arrow] [Up Arrow] [Down Arrow] to calibrate input low scale.	
	Input Hi Scale Calibration (inHi)	1. Input standard hi scale signal. 2. Press [Left Arrow] [Up Arrow] [Down Arrow] to calibrate input hi scale.	
	System Setting Page(SYS)	1. Finish calibration operating procedures will enter to system setting group. 2. Press [Up Arrow] & [Down Arrow] 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.**