#### . . . . . . **Ultrasonic Level Sensor** .

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**Operating Manual** 

#### Notes:

As the product is renewed continuously, it cannot be ensured that the product manual and installation manual are in line with the latest product. The Company cannot inform every client of the change (if any) in product itself and its operation instructions. Please directly contact the corporate sales personnel for any needs. The change includes but is not limited to the following:

- 1. Product blind area, performance parameters, functions, structure, shape, color, etc.
- 2. Software functions, structure, display mode, operating habit, etc.
- 3. Any operation on the hardware must be conducted after power off. Failures, like short circuit, caused by power-on operation are beyond the range of warranty.

4. The uncapping operations must be conducted after power off and no liquid is allowed to enter in the meter. Any failure caused by the entering in of liquid is beyond the range of warranty.

## Graphic Illustration:

- ★ Important notes, please read carefully and follow it strictly.
- ▲ General notes, please read carefully in order to avoid confusion.

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## 1. Introduction:

Ultrasonic level sensor (for liquid level measurement), it is non contact type level measuring instrument with high precision and reliability, easy to maintain and with better cost performance. It could satisfy many applications without contact with mediums.

## 2. Simple Setting

Because the installation conditions are different due to each project, so before using, we need to know some basic information: measuring range, zero point, full range, working conditions in tank and etc. So we must do configurations before installation of sensor. Please refer to the simple settings on next.

The ultrasonic sensor produced by us, under normal conditions, only need to do some basic and simple configurations to set some parameters following the instructions, then it will be ok for used normally in applications.

## **Button Functions:**



1. Enter into menus; 2. Quit the menu; 3. Confirm the parameters change.



1. Move the cursor; 2. Modify the parameter; 3. Choose menu

## 2.1 Enter into menu

Long press the set button (SET) for 2s to enter in the main menu.

The menu modes include expert setting mode and simply setting mode.

The menu query table of simple setting mode is as shown in the table below.



## 2.2 Select the measuring mode

Measuring modes are divided into distance measuring mode and material level measuring mode. And the factory default is material level measurement.

#### 2.3 Input the probe height value

Input probe height value to "reference zero point" (probe height is the

distance from probe emitting surface to tank bottom or pool bottom).

# 2.4 Diagram of distance mode and level mode

Under distance measuring mode, setting of reference zero point is meaningless and the positions of maximum of measuring range and minimum of measuring range are as shown in Fig. 1.1.



Fig. 1.1 Diagram of Distance Measurement

Under material level measuring mode, the positions of reference zero point, maximum

of measuring range and minimum of measuring range are as shown in Fig.

1.2.



Fig. 1.2 Diagram of Material Measurement Level

**Minimum of measuring range**: it is the value of distance between the reference plane to the position, which is positive when the minimum of measuring range is above the reference plane and negative when the minimum of measuring range is below the reference plane. The output current is 4mA when the liquid level is at such position.

**Maximum of measuring range**: it is the value of distance between the reference plane to the position, which is positive when the maximum of measuring range is above the reference plane and negative when the maximum of measuring range is below the reference plane. The output current is 20mA when the liquid level is at such position.

## 2.5 Anti-interference measures

The installed equipment must be grounded truthfully and independently and shall not share the public grounding with electrical cabinet or meter box.

Suggestions: when the ultrasonic level meter is connected with the frequency converter, PLC and other equipment with interference, the power supply part shall be added with isolation transformer, signal part shall be added with signal isolator and reliable grounding shall be provided.

★ The signal line shall not be wired in the same trunking with the power line and it shall be installed independently through metal tube or far away from the power line. If the signal line is not installed through tube independently, it shall be kept at least 1m away from the power line.

Function	Parameters
Measuring range	5m, 10m, 15m, 20m, 30m,
Accuracy	0.5%-1.0%
Resolution	3mm or 0.1%

3. Main technical parameters

Display	LCD		
Analog output	4 wires, $4\sim 20$ mA/ $510 \Omega$ load		
	2 wires, $4\sim 20$ mA/250 $\Omega$ load		
Relay	Optional 2 sets of AC 250V /8A or DC 30V/ 5A		
	Programmable state		
Power supply	Standard 24V DC		
	Optional 220V AC +15% 50Hz		
Temperature	Display :-20~+60°C		
	Probe: -20~+80°C		
Communication	RS485 or RS232 communication		
IP grade	Display IP66, probe IP68		

# 4. Installation Guide

# 4.1 Dimensions:

4.1.1 Enhanced integrated-type ultrasonic level meter





4.1.2 Updated plastic housing type



4.1.3 Explosion-proof integrated-type ultrasonic level meter





## 4.2 Installation guide

4.2.1 Understand terminology

① Measuring range: the meaning of measuring range is very important for meter type selection. Please refer to the diagrams below.



Ultrasonic wave beam is gathered by the probe. The emitting of impulse wave beam is like the light beam of flashlight. The further it is from the probe, the greater the diffusion area is.

Any objects within the range of emitting angle, such as pipe, support, weld joint, reinforcing rib, mixing propeller and hanging object, will lead to strong false echo, specially the objects within the range of emitting angle which are near the probe.

For example, the false echo caused by the pipe at 6m from the probe is 9 times stronger than that caused by the same pipe at 18m from the probe.

 $\star$  Try every effort to make the sensor axis perpendicular to the medium surface and avoid any other object within the range of emitting angle, such as pipe and support.

## 4.2.2 Select measuring range

Measuring range is decided by the range of ultrasonic probe which is subject to the site working environment, object to be measured and temperature, etc. Decide the measuring range needed based on the table below.

Liquid Surface	Attenuation Multiple	Attenuation Percentage	Magnification of Measuring Range
Stable	0dB	0%	Magnification is unnecessary
Ripple	510dB	50~67%	1 times of the measuring range
Major fluctuation(for example, there is mixing blade)	1020dB	90%	3 times of the measuring range

With Dust	Attenuation Multiple	Attenuation Percentage	Magnification of Measuring Range
None	0dB	0%	Magnification is unnecessary
Little	5dB	50%	1 times of the measuring range
Much	520dB	50~90%	3 times of the measuring range

With feedstock	Attenuation Multiple	Attenuation Percentage	Magnification of Measuring Range
None	0dB	0%	Magnification is unnecessary
Little	510dB	50~67%	1 times of the measuring range
Much	1040dB	67~99%	3 times of the measuring range

With Mist	Attenuation Multiple	Attenuation Percentage	Magnification of Measuring Range
None	0dB	0%	Magnification is unnecessary

Little	510dB	50~67%	1 times of the measuring range
Much	1020dB	67~99%	3 times of the measuring range

With Steam	Attenuation Multiple	Attenuation Percentage	Magnification of Measuring Range
None	0dB	0%	Magnification is unnecessary
Little	510dB	50~67%	1 times of the measuring range
Much	1020dB	67~90%	3 times of the measuring range

Temperature Difference between	Attenuation Multiple	Attenuation Percentage	Magnification of Measuring Range
Probe and Medium Surface			
≤20°C	0dB	0%	Magnification is unnecessary
≤40°C	510dB	50~67%	1 times of the measuring range
≤80°C	1020dB	67~90%	3 times of the measuring range

The calculation method of signal attenuation is to add all signal attenuation amounts if there are several conditions on site.

- With little feedstock 5...10dB
- With little steam 5...20dB

• Temperature difference between probe and medium surface  $\leq 40^{\circ}$  C 5...10dB Total minimum: 15dB, maximum: 40dB

Under such circumstances, if the actual maximum measuring range is 5m, ultrasonic level meter with measuring range of 50m shall be selected for the measurement.

4.2.3 Installation of thread at the bottom

 $\blacktriangle$  It is recommended to use plastic flange to connect with the sensor during the installation.

1. Install a flange over the top of the medium to be measured

2. Put 2pcs washers up and down of the flange with same dimension.

 $\bigstar$  After probe installation, the probe emission surface must be exposed from the cover plate or waveguide and it shall not be in the cover plate or waveguide.

4.2.4 Liquid Measurement

4.2.4.1 Flat-top tank

Normally, the flat-top tank has a short connecting pipe whose datum plane is the under surface of flange. Under the premise that the connecting pipe length is  $\leq 60$ mm, inner diameter is  $\geq 100$ mm and inner wall is smooth and free of burr and bulges, the measurement can be carried out if the emitting surface of installed probe is 3cm below the flange under surface.



The most ideal installation is to directly install the meter on the flat-top container without using the connecting pipe and the round opening on the container is good enough for the fixing of mounting flange or cardan joint. The probe emitting surface is below the datum plane.



Flange-type (locking flange) installation on the flat-top tank



In case of installation on nipple joint similar to a probe, the inner diameter of connecting pipe shall be identical to the external thread and the probe emitting surface must be exposed for at least 1cm from the connecting pipe and it shall not be inside the connecting pipe.



#### 4.2.4.2 Arch tank top

For arch tank, it's better not to install the meter in the middle of the tank top. Instead, the meter shall be installed at 1/2 or 2/3 of the tank top radius (under the premise that certain distance from the tank wall is met). The arch tank top is like convex lens to the ultrasonic pulse. If the probe is installed at the focus of convex lens, it will receive all the false echoes. Therefore, the sensor shall not be installed in the middle of the arch tank top.



For most arch tanks, the length of connecting pipe plus flange on the top is 150-180mm. But the part below the probe thread of ultrasonic level meter is not so long (elongated probe is available for customization to make sure the probe emitting surface is below the connecting pipe bottom). In this case, the proportional relation between the diameter and length of connecting pipe shall be noted.

S/N	Length of	Minimum inner	Remarks
	connecting pipe	diameter of	
		connecting pipe	
1	150mm	100mm	The inner wall of connecting pipe is free of burr and
2	200mm	150mm	bulges and vertical and the weld joint shall be
3	250mm	180mm	polished. The connection of connecting pipe and tank
4	300mm	220mm	top shall be outwards polished at an oblique angle of
5	400mm	280mm	45°.

#### 4.2.4.3 Open container

For open container, the support shall be used for installation. The bearing capacity of support shall be noted and certain distance shall be kept between the sensor and container wall. If the upper part and lower part of the open container or stock bin inner wall are flat and free of hanging objects and any other objects, the distance between the sensor and container wall is detailed as follows:

Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
measuring	distance to	measuring	distance to	measuring	distance to
range	wall	range	wall	range	wall
5m	0.5m	10m	1.0m	15m	1.5m
20m	2.5m	30m	3.5m	40m	5m
50m	6m	60m	7m	70m	8m



As the open container has no focusing effect, the sensor can be installed in the middle of the container.



#### 4.2.4.4 Draining well and common well

Normally, the wellhole and wellhead of drainage well are narrow and the well wall is uneven, which makes it difficult to conduct ultrasonic measurement. This can be solved by installing a section of connecting pipe or a whole measuring casing. Attention shall be paid to the fact that the blind area will be enlarged for about 50~100% after the sensor is put into the connecting pipe. So the factors for blind area expansion shall be considered.

Thus, when the connecting pipe is used, if the original probe blind area is 0.50m, it will be enlarged to 1.00m after the probe is put into the connecting pipe.



For common well (including water source well and deep well), normally the diameter is small and the best measuring effect can be reached by installing measuring casing. The inner wall of measuring casing must be smooth (PVC and PE pipe can be used) and the inside diameter shall be  $\geq$  150mm (measuring range within 4m). The manufacturer shall be contacted for connecting pipe longer than 4m. The measurement can be carried out as long as the measuring casing is clean and free of attached medium and internal joint.

The measuring casing shall be soaked in the medium all the time, which can ensure

the accurate measurement within the measuring casing.

# 4.3 Electrical wiring diagram

★ During power line connection, AC power line shall not be connected to any other terminals except AC terminals. Otherwise, the meter circuit or components and parts will be burnt.

★ 485, 232 and 4-20ma output terminals shall not be short-circuited as short circuit will lead to burning of internal circuits.

Wiring diagram:

Four wires:



**Electric Wiring Diagram of Enhanced Integrated Type with Four-wire System** 



24VDC Power Supply Wiring Diagram of Four-wire System

# Two wires :



Wiring Diagram of Two-wire System Ampere Meter Diagram of Two-wire System

# 5. Menu interface & Operation instructions

The menu modes include expert setting mode and simply setting mode.

See the homepage for menu query table of simply setting mode.

See the appendix for menu query table of expert setting mode.

Menu interface of expert setting mode and operating instructions are shown below:

![](_page_19_Picture_8.jpeg)

Enter into the "1 specialty setting mode" main menu:

• Interface of the main menu with unlocked parameters:

![](_page_20_Figure_2.jpeg)

♦"0 Set end"

Chose this item, and press SET to exit to the operating mode interface.

![](_page_20_Figure_5.jpeg)

• Interface of the main menu with locked parameters:

![](_page_20_Figure_7.jpeg)

## "1 Parameter locking"

If you do not want other people to make random changes of the parameters, you can lock the menu, and the menu can be unlocked with passwords. The initial password of the level meter is 25, and users can change the initial password and set their own passwords randomly (tips: please remember your own password, otherwise you need to contact with the manufacturer).

Descriptions:

Unlock: unlock, and all parameters of the menu can be changed randomly.

All-lock: for the conditions, the changes can be made only after entering password.

![](_page_21_Figure_3.jpeg)

 $\star$  If the parameters are locked, press SET and enter in the unlocking interface for parameter locking:

![](_page_21_Figure_5.jpeg)

♦ "2 Range Set "

Set reference zero point, low range point, high range point and display unit.

**1 Bottom Distance(Reference zero point)**: set the reference zero point of the level meter, and this value is only useful for material level measurement; the factory default is the maximum range.

**2 Range-L(Low range point)**: set the output measurement value relative to 4mA of the level meter, and the factory default is 0.

**3 Range-L(High range point)**: set the output measurement value relative to 20mA of the level meter, and the factory default is the maximum range.

**4 Unit Selection(Display unit)**: there are three optional units, including m, cm and mm, wherein m stands for meter, cm for centimeter and mm for millimeter. The factory default is m.

![](_page_22_Figure_0.jpeg)

# • "3 Measuring mode"

**1. Type Selection(Select mode)**: there are two optional items, i.e. distance measurement and material level measurement.

Distance measurement: the display value is the distance from the probe to the surface measured;

Material level measurement: the display value is the distance from the bottom to liquid surface, i.e. liquid level height.

The factory default is material level measurement.

2. Damping Rate(Response rate): there are three optional items, i.e. slow speed, medium speed and fast speed.

Slow speed: the response rate is slow and measuring accuracy is high, not easy to be disturbed;

Medium speed: the parameters are between those for slow speed and fast speed;

Fast speed: the response rate is fast and measuring accuracy is low, very easy to be disturbed. The factory default is medium speed.

**3.Safe Level(Safe material level)**: there are four optional items, i.e. hold, minimum value, maximum value and setting value.

Hold: the display value is the final measured value before wave loss, and the current is the corresponding value;

Minimum: the display value is 4mA after wave loss, and the current 4mA;

Maximum: the display value is 20mA after wave loss, and the current 20mA;

Setting value: the display value is the final measured value after wave loss, and the current output is the setting value of setting current. The factory default is the remaining value.

**4.Current Set(Set current)**: set the output current after wave loss, which shall be more than 3.6mA and less than 22mA, and become invalid in case of remaining/minimum/maximum values on reselection. The factory default is 3.6mA.

![](_page_23_Figure_5.jpeg)

◆"4 Transducer Set(Set probe)" (do not modify this parameter)

Is Algorithm Select( Set probe)" (do not modify this parameter)

# **♦**"6 Alarm setting" Set alarm relay.

**Alarm 1 mode**: closed mode, low-level alarm and high-level alarm are optional. Closed: relay 1 is out of service; low-level alarm: relay 1 sends low-level alarm signal; and high-level alarm: relay 1 sends high-level alarm signal. Factory default is closed mode.

Alarm 1 value: the unit is m and factory default is 0.

Alarm 1 Diff(Alarm 1 return difference): the unit is m, and after being triggered, the

alarm can be canceled only after the measured value reaches the alarm value +/- alarm return difference. Factory default is 0.

## Setting method of alarm 2/3/4 mode is the same as above.

# Example: (how to use a relay to control startup/shutdown of water pump)

Through alarm return difference, one relay can control the whole working process of water pump from low level to high level.

For water drainage: when water level is below 1m, water pump stop draining; when water level rises to 5m, water pump start to drain water. Detailed settings are shown below:

Alarm 1 mode: high-level alarm. Alarm 1 value: 5.00m; alarm 1 return difference: 4.00m.

For water supply: when water level is below 1m, water pump start to feed water; when water level rises to 5m, water pump stop feeding water.

Detailed settings are shown below:

Alarm 1 mode: low-level alarm. Alarm 1 value: 1.00m; alarm 1 return difference: 4.00m.

(refer to next page)

![](_page_25_Figure_0.jpeg)

# **•**"7 Calibration (Parameter correction)" (do not modify this parameter)

Carry out correction of range, sound velocity, current output and reference level.

# • "8 Communication setting"

**1.Address (Communication address):** select communication address; and the default is 1.

**2.Baud rate:** select communication frequency among 2400, 4800, 9600 and 19200; and the default is 9600.

**3.Working Mode (Operating mode):** select communication operating mode between "Automatic report mode" and "Inquiry mode"; and the default is "Automatic report mode".

![](_page_26_Figure_6.jpeg)

# "9 Reset options"

**1.Factory reset:** Yes: restore factory settings so that setting error can be resolved.

No: exit. Factory default is No.

2.System reset: Yes: restore system settings. No: exit. Factory default is No.

(Do not modify this item.)

![](_page_26_Figure_12.jpeg)

# 6. Faults and Handling

Faults	Causes	Handling
Level meter does not	Power supply is not well	Inspect power line.
work	connected	
Level meter does not	1. Power supply is not well	1. Inspect power line.
display data	connected.	2. Inspect the wiring and
	2. Wiring between LCD	connect it again.
	and mainboard falls off or	3. Maintain it in the factory.
	comes loose.	
	3. The LCD is damaged.	
Level meter works but	1. The measured area is	1. Replace the level meter
there is no change of	beyond the measuring	with a level meter with greater
trumpet icon(	range of level meter.	measuring range.
	2. The measured medium	2. The meter will restore the
the LCD, which means	has strong disturbance,	normal measurement
that the system is in	vibration or heavy dust.	automatically after the
wave loss state.	3. There are strong	measured medium gets back to
	interference sources around	calm.
	such as frequency converter	3. Check surrounding
	and motor.	environment and realize good
	4. The probe is not aligned	electromagnetic shielding. Do
	to the measured surface.	not share one power supply
	5. There are redundant	with frequency converter and
	objects in the measured	motor, and make it grounded
	space, such as support rod	reliably.
	and feed opening.	4. Reinstall probe and make it
	6. The liquid level is in a	perpendicular to liquid surface.
	blind area.	5. Select an appropriate
	7. The measured medium	position for installation and
	is soft powder or there is	prevent an interfering object.
	foam on liquid surface.	6. Raise the installation
		position of probe.
		7. Check whether the medium
		is powder. If so, consult the
		manufacturer.

# APPENDIX 1: MODBUS PROTOCOL OF ULTRASONIC SENSOR

MODBUS-RTU Communication Protocol

1. The hardware uses RS—485, master-slave half duplex communication, the master calls the slave by address, And slave to give feedback for the access communication.

- 2. Data frames 10 bits, 1 start bit, 8 data bits and 1 stop bit. No check bit.Baud rate: 2400 4800 9600 19200 (default 9600)
- 3、 Function code: 03H: read register value

Master sends:

1	2	3	4	5	6	7	8
ADR	03H	Start register higher bytes	Start register lower bytes	Number of register higher bytes	Number of register lower bytes	Lower byte of CRC code	Higher byte of CRC code

- 1st byte ADR : address code of slave  $(=001\sim254)$
- 2nd byte 03H : function code of read register value
- 3rd, 4th bytes : The starting address of the register to be read
- 5th, 6th bytes : number of registers to be read
- 7th, 8th bytes : CRC code 16 bits of check bytes from 1 to 6.

1	2	3	4、5	6, 7		M-1、M	M+1	M+2
ADR	03H	Total number of bytes	Register data 1	Register data 2	000	Register data M	Lower byte of CRC code	Higher byte of CRC code

When receive correctly, the slave returns:

1st byte	ADR:	address code of slave $(=001\sim254)$	
2nd byte	03H:	return read function code	
3rd byte	:	total number of bytes from 4 to M ( includes 4	and M)
4th to M	th bytes:	registers data	
M+1,M+2	2 bytes:	CRC code of 16 bits of check bytes from 1 to	М.

When receive error, it returns :

1	2	3	4	5
	83H	Information	CRC code	CRC code
ADK	830	code	lower bytes	higher bytes

1st byte ADR: address code of slave (=001~254)
2nd byte 83H: error reading register value
3rd byte information code : refer to information code list.
4th, 5th bytes : CRC code of 16 bits of check bytes from 1 to 3.

#### 4. Function code 06H: write single register value

Master sends:

1	2	3	4	5	6	7	8
		Higher bytes of	Lower bytes of	Higher	Lower	CRC code	CRC code
ADR	06	register address	Lower bytes of	bytes of	bytes of	lower	higher
		Tegister address		data	data	bytes	bytes

When slave receive correctly, it returns:

1	2	3	4	5	6	7	8
		Higher bytes of	Lower bytes of	Higher	Lower	CRC code	CRC code
ADR	06	register address	register address	bytes of	bytes of	lower	higher
				data	data	bytes	bytes

When receive error, it returns:

1	2	3	4	5
ADR	86H	Error information code	CRC code lower bytes	CRC code higher bytes

1st byte ADR: address code of slave (=001~254)
2nd byte 86H: error writing register value function code
3rd byte information code: refer to information code list.
4th, 5th bytes: CRC 16 bits check code from byte 1 to 3.

#### 5. Function code 10H: continuously write multiple registers values

Master sends:

1	2	3	4		5		6		7
ADR	10H	Higher byte of start register	Lower of register	bytes start	Number registers bytes	of higher	Number registers bytes	of lower	Total number of data bytes

8、9	10、11	N, N+1	N+2	N+3
Register data 1	Register data 2	Register data M	CRC code lower bytes	CRC code higher bytes

When slave receive correctly, it returns:

1	2	3	4	5	6	7	8
ADR	10H	Higher byte of start register	Lower bytes of start register	Number of registers higher bytes	Number of registers lower bytes	CRC code lower bytes	CRC code higher bytes

When receive error, it returns:

1	2	3	4	5
ADR	90H	Error information code	CRC code lower bytes	CRC code higher bytes

1st byte ADR: address code of slave (=001~254)
2nd byte 90H: function code of error writing register value
3rd byte information code: refer to information code list
4th, 5th bytes: CRC 16 bits check code from byte 1 to 3.

6. Register definition table: (Note: The register address is coded in hexadecimal)

Register	Content description	Read	Register	Content description	Read
address		only	address		only
0000	Distance/ level instantaneous value (2 bytes, higher byte first)	$\checkmark$	0001	Analog output instantaneous value (2 bytes, higher byte first)	$\checkmark$
0002	Temperature instant value	√ 0003		reserved	
	(2 bytes, higher byte first)		0003		
0004	reserved		0005	reserved	
0006	reserved		0007	reserved	
0008	reserved		0009	reserved	
000A	reserved		000B	reserved	
000C	reserved		000D	reserved	
000E	reserved		000F	reserved	
0010	reserved	$\checkmark$	0011	reserved	
0012	reserved	$\checkmark$	0013	reserved	
0022	Alarm 1 (2 bytes, higher byte first)		0023	Difference of alarm 1 (2 bytes, higher byte first)	
0024	Alarm 2(2 bytes, higher byte first)		0025	Difference of alarm 2 (2 bytes, higher	
				byte first)	
0026	Alarm 3(2 bytes, higher byte first)		0027	Difference of alarm3 (2 bytes, higher	
				byte first)	
0028	Alarm 4 (2 bytes, higher byte first)		0029	Difference of alarm 4 (2 bytes, higher	
				byte first)	
002A	Reference zero (2 bytes, higher byte		002B	High point of range (2bytes, higher byte	

	first)		first)	
002C	Low point of range (2bytes, higher byte first)	002D	Current setup (2bytes, higher byte first)	
002E	Blind area setup (2 bytes, higher byte first)	002F	reserved	
0030	reserved	0031	reserved	

004E	reserved	004	ŀF	reserved		
0050	reserved	005	51	reserved		
0052	reserved	00:	53	reserved		
0054	reserved	00:	55	reserved		
0056	reserved	003	57	reserved		
0058	reserved	00:	59	reserved		
005A	reserved	005	В	reserved		
005C	Alarm mode 1 alarm mode 2	005	D	Alarm mode 3	alarm mode 4	
005E	Measuring mode unit option	005	5F	Algorithm option	safe level	
0060	Probe type response speed	000	51	Factory reset	system reset	
0062	Baud rate working mode	000	53	reserved		
0064	reserved	000	55	reserved		
0066	reserved	000	57	reserved		
0068	reserved	000	59	reserved		
006A		006	B	Sensor type character v instrument address		V

#### Notes:

1. 2 bytes 16 bits expression, higher byte first (note: Floating-point numbers are expressed in hexadecimal notation when they are rounded by 100)

The distance or level returned is in cm.

For example: if address of sensor is 1,

Sending: 01 03 00 00 00 01 84 0A

Returns: 01 03 02 00 10 b9 88

Bytes in red means the measuring level at present is 0.16m (0\*0010)

Remarks: Positive and negative identification bit: when measuring value and temperature is

positive, top bit of higher byte is 0; when it is negative, top bit of higher byte is 1.

For example: when measuring level is - 0.16m, it returns : 01 03 02 80 10 E8 06

Measuring mode: 0 - distance ; 1 - level.
Safe level : =0, hold; =55, min; =AA, max; =A5, set value.
Alarm mode 1、2、3、4: 0 - off; 1 - low level alarm; 2 - high level alarm.
Unit options: =0, mm; =1, cm; =2, m.
Algorithm option: 0 - special condition one; 1 - special condition two; 2 - special condition three; 3 - special condition four; 4 - special condition five; 5 - special condition six; 6 - special condition seven.
Probe type: 0 - option 1; 1 - option 2; 2 - option 3; 3 - option 4; 4 - option 5; 5 - option 6; 6 - option 7; 7 - option 8; 8 - option 9.
Response speed: 0 - slow; 1 - medium; 2 - fast .
Factory reset: 0 - No; 1 - Yes.
Baud rate: 0-2400; 1-4800; 2-9600; 3-19200
Working mode: 0 - auto report mode; 1 - query mode.

3.

Registers are partitioned to perform read and write operations.

1<sup>st</sup> area: 0010 - 0021 read only

2<sup>nd</sup> area: 0022 - 005B read and write

3<sup>rd</sup> area: 005C - 006B read and write

In same area, could read ( or write ) a parameter at single time, also could batch read ( or write) all parameters in same area, read/write operations across regions are not allowed.

4. All the reserved register currently undefined, save compatibility for future upgrades.

# 7. Information code list :

code	meaning
01H	illegal function code
02H	illegal data address
03H	illegal data value
04H	CRC16 check error
05H	Receive correctly
06H	Receive error
07H	Parameter error

![](_page_35_Picture_0.jpeg)