



**product principle**

The LT400 electronic liquid level/temperature integrated sensor can output multiple signals at the same time to meet the monitoring rod of liquid level and temperature in different places, while reducing the number of holes in the user box, simple, miniaturized design, beautiful shape to meet the needs of equipment upgrading (PNP/NPN/0... 20mA/4... 20mA), full scale scalable analog output. It can be flexibly installed according to different environments, so that the direction required by field conditions can be modified arbitrarily when adjusting the display and electrical output interface, and can be flexibly applied according to cable wiring.

**Product features**

- Easy to read, robust LED digital display
- New design for multi-functional applications
- Flexible configuration, output PNP/NPN switching
- Intelligent menu, transmission output range can be set
- Continuous adjustable switch point, easy to use
- Four switches and two analog signal outputs are available for the temperature/liquid level

**product application**

Machine tools/hydraulic and pneumatic systems/pumps and compressors/mechanical manufacturing/automation equipment

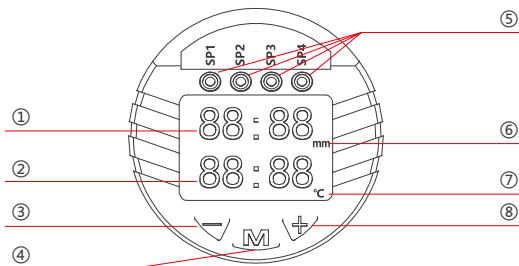
**output signal**

measurement	Switch output		Analog output
Liquid level	OUT1	OUT2	4...20mA/0...20mA 10-0V/0-10V
	PNP/NPN	PNP/NPN	
temperature	OUT3	OUT4	4...20mA/0...20mA 10-0V/0-10V
	PNP/NPN	PNP/NPN	

**Technical parameters**

- ◇ Power Supply: DC18... 30V
- ◇ Measuring range: (0-2m) Optional
- ◇ Current consumption: up to 600mA, including switching current
- ◇ Electrical connection: M12\*1-5pin/8pin aviation cable
- ◇ Safety: short circuit protection, reverse polarity protection
- ◇ Insulation: DC500V
- ◇ Overvoltage: DC36V
- ◇ Connecting time: < 3s
- ◇ Switching function: PNP/NPN, NO/NC arbitrary switching
- ◇ Switching current: maximum 400mA
- ◇ Response time: switch output/analog signal (0.2-5s)
- ◇ Load: Analog signal 4... 20 ma Ω 500 or less
- ◇ Service life: 1 million switching cycles
- ◇ Measuring accuracy: 10mm/5mm
- ◇ Measuring range: configurable (factory default -20... 80°C)
- ◇ Medium temperature: -20... 85 °C
- ◇ Ambient temperature: -20... 80 °C
- ◇ Storage temperature: -20... 65 °C
- ◇ Temperature accuracy: ±1°C
- ◇ Relative humidity: 45... 75%
- ◇ Shock resistance: 20g, 10... 2000Hz (compliant with IEC60068-2-6)
- ◇ Impact resistance: 50g, 6ms (according to IEC60068-2-27)
- ◇ Protection grade: IP67
- ◇ Connecting parts: 304 connecting rod, NBR or 304 stainless steel float
- ◇ Shell: POM engineering plastic

**Panel diagram**

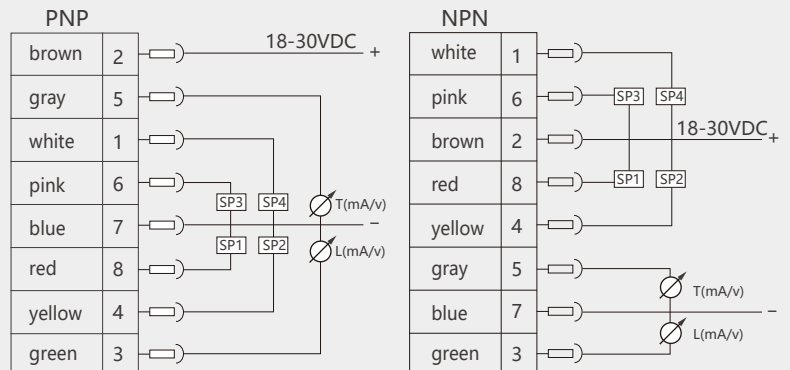


Serial number	Feature	Serial number	Feature
①	Liquid level value	⑤	Switch signal light
②	Temperature value	⑥	Liquid level unit
③	Decrease/serve menu key	⑦	Temperature unit
④	Confirm key	⑧	Add/down menu key

wiring diagram

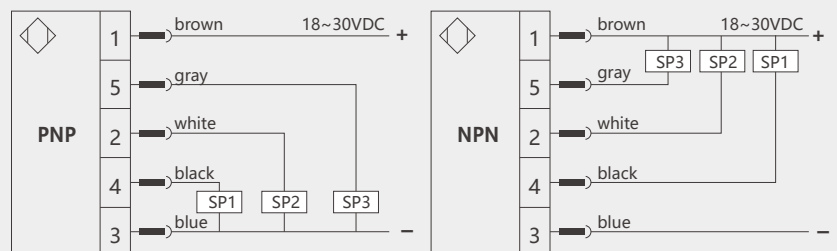
Four way switch quantity + two way analog quantity

2	brown	Power supply negative (+)
7	blue	Power supply negative (-)
8	red	SP1: Default level switch (temperature switch)
4	yellow	SP2: Default level switch (temperature switch)
6	pink	SP3: Default temperature switch (level switch)
1	white	SP4: Default temperature switch (level switch)
3	green	Liquid level simulation: L (mA/v)
5	gray	Temperature analog : T (mA/v)



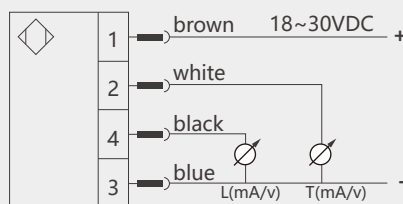
Three-way switch quantity

1	brown	Power supply positive (+)
3	blue	Power supply negative (-)
4	black	SP1: Default liquid level switch (temperature switch)
2	white	SP2: Default liquid level switch (temperature switch)
5	gray	SP3: Default temperature switch (level switch)



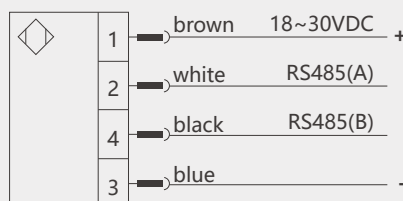
Two way analog

1	brown	Power supply positive (+)
3	blue	Power supply negative (-)
4	black	Liquid level simulation: L (mA/v)
2	white	Temperature analog: T (mA/v)



RS485

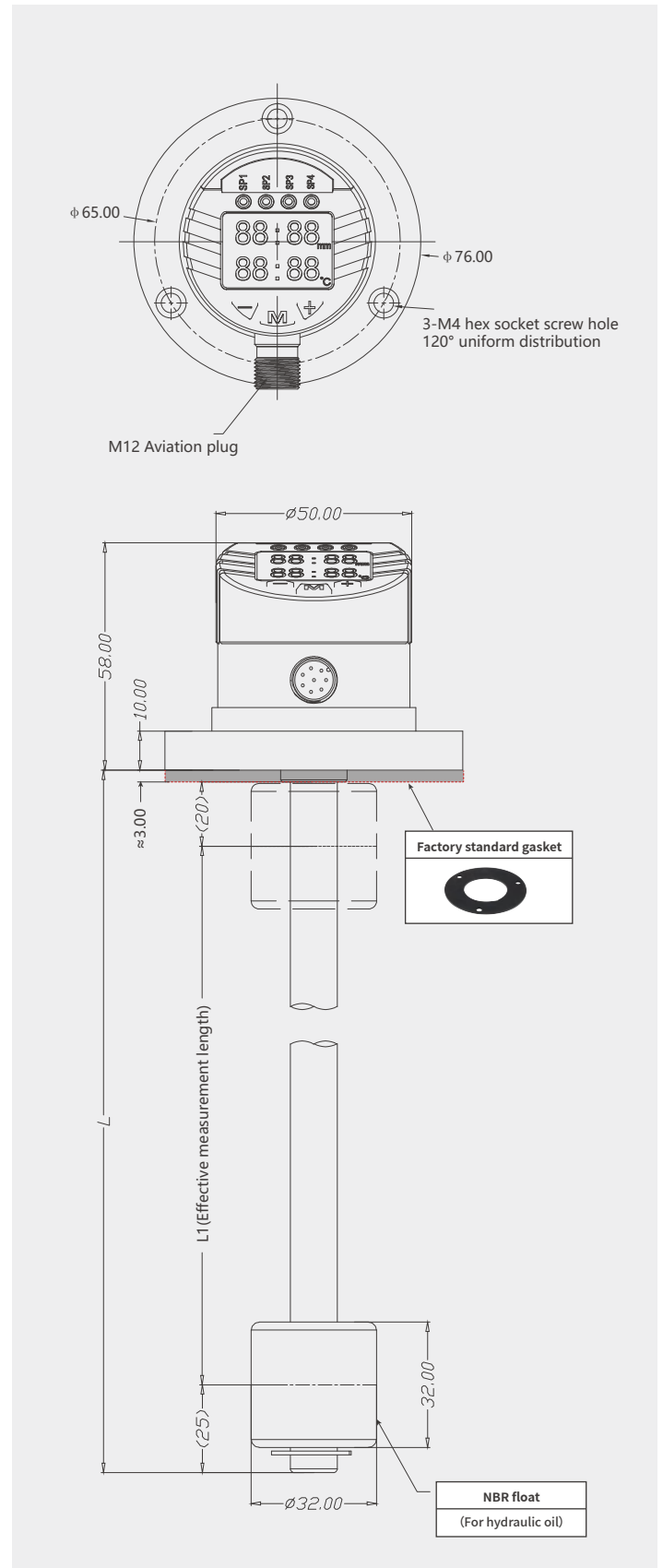
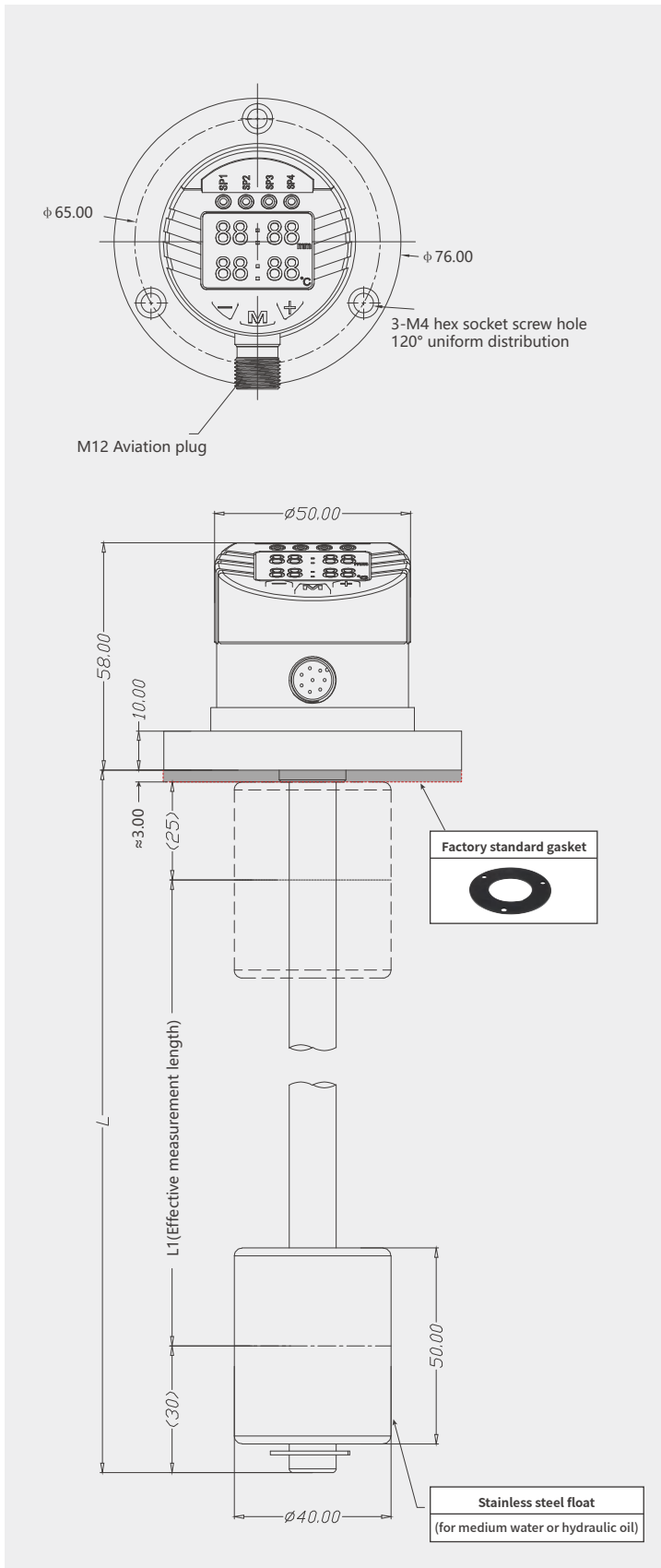
1	brown	Power supply positive (+)
3	blue	Power supply negative (-)
2	white	RS485(A)
4	black	RS485(B)



Size chart (mm)

Stainless steel float recommended box opening direct  $\phi 45\text{mm}$

It is recommended that the NBR float box be opened directly  $\phi 35 - \phi 40\text{mm}$



Selection table

LT400-	L0100	N	-	SA	M	detailed
LT400						Integrated level/temperature sensor
	L0100					Measuring range:100mm
	L0150					Measuring range:150mm
	L0200					Measuring range:200mm
	L0250					Measuring range:250mm
	L0300					Measuring range:300mm
	L0350					Measuring range:350mm
	L0400					Measuring range:400mm
	L0450					Measuring range:450mm
	L0500					Measuring range:500mm
	L0550					Measuring range:550mm
	L0600					Measuring range:600mm
	L0650					Measuring range:650mm
	L0700					Measuring range:700mm
	L0750					Measuring range:750mm
	L0800					Measuring range:800mm
	L0850					Measuring range:850mm
	L0900					Measuring range:900mm
	L0950					Measuring range:950mm
	L1000					Measuring range:1000mm
		N				Float type: NBR float (for oil)
		S				Float type: 304 float (for water)
			-			Measurement resolution: 10mm (default)
			5			Measurement resolution: 5mm
				SA		Four-way switch quantity + two-way analog quantity 4-20mA (8-core aviation plug)
				SV		Four-way switch quantity + two-way analog quantity 0-10V (8-core aviation plug)
				S3		Three-way switch quantity (5-pin aviation plug)
				A2		Two-channel analog 4-20mA (4-core aviation plug)
				V2		2-way analog 0-10V (4-core aviation plug)
				RS		RS485 communication (4-core aviation plug)
					M	M12*1 aviation plug

Optional accessories - Electrical accessories (M12\*1-8Pin)

name	Outline drawing/dimension drawing (unit :mm)	material	Model number
M12*1-8Pin (2m cable)		PVC	ZL08-PC02G
M12*1-8Pin (5m cable)			ZL08-PC05G
M12*1-8Pin (10m cable)			ZL08-PC010G
M12*1-8Pin (2m cable)		PUR	ZL08-PU02G
M12*1-8Pin (5m cable)			ZL08-PU05G
M12*1-8Pin (10m cable)			ZL08-PU010G

Optional accessories - Electrical accessories (M12\*1-5Pin)

name	Outline drawing/dimension drawing (unit :mm)	material	Model number
M12*1-5Pin (2m cable)		PVC	ZL05-PC02G
M12*1-5Pin (5m cable)			ZL05-PC05G
M12*1-5Pin (10m cable)			ZL05-PC010G
M12*1-5Pin (2m cable)		PUR	ZL05-PU02G
M12*1-5Pin (5m cable)			ZL05-PU05G
M12*1-5Pin (10m cable)			ZL05-PU010G

Optional accessories - Electrical accessories (M12\*1-4Pin)

name	Outline drawing/dimension drawing (unit :mm)	material	Model number
M12*1-4Pin (2m cable)		PVC	ZL04-PC02G
M12*1-4Pin (5m cable)			ZL04-PC05G
M12*1-4Pin (10m cable)			ZL04-PC010G
M12*1-4Pin (2m cable)		PUR	ZL04-PU02G
M12*1-4Pin (5m cable)			ZL04-PU05G
M12*1-4Pin (10m cable)			ZL04-PU010G

Optional accessories - Protective cover

LT400/LT420 Flow temperature integrated sensor



Order number: KTCS33663

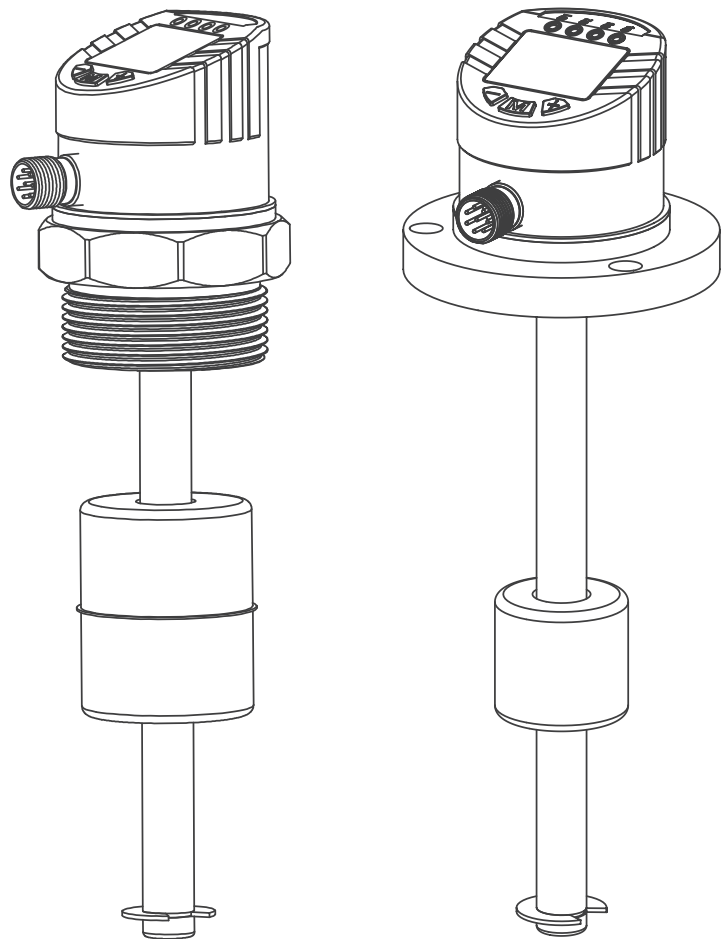
- Sensor and controller ——
- Flow
  - pressure
  - temperature
  - level
  - position



# Operation instruction

## Electronic temperature level sensor

### LT400/LT420 Series



## ————— **Safety statement** —————

- Before installing this device, please read this document to ensure that the product is suitable for your application and is not limited in any way;
- Failure to follow operating instructions or technical documentation may result in personal injury or property damage;
- Check compatibility of the product material with the medium under test in all application ranges;
- The equipment is only used as the tested medium, and it must only be ensured that the equipment is correctly used to ensure long-term stable operation and that the tested medium will not cause damage to the tested part of the product;

! The responsibility for determining whether the measurement sensor is suitable for the application lies with the operator, and the manufacturer accepts no responsibility for the consequences of improper use by the operator. Improper installation and use of the sensor results in invalid claims under warranty.  
Flow sensors monitor the medium flow of fluids

**Precautions: Beware of personal injury, overpressure danger!**

## ***Product introduction***

The LT400 electronic liquid level/temperature integrated sensor can output multiple signals at the same time to meet the monitoring rod of liquid level and temperature in different places, while reducing the number of holes in the user box, simple, miniaturized design, beautiful shape to meet the needs of equipment upgrading (PNP/NPN/0... 20mA/4... 20mA), full scale scalable analog output. It can be flexibly installed according to different environments, so that the direction required by field conditions can be modified arbitrarily when adjusting the display and electrical output interface, and can be flexibly applied according to cable wiring.

## ***Product characteristics***

- Easy to read, robust LED digital display
- New design for multi-functional applications
- Flexible configuration, output PNP/NPN switching
- Intelligent menu, transmission output range can be set
- Continuous adjustable switch point, easy to use
- Four switches and two analog signal outputs are available for the temperature/liquid level

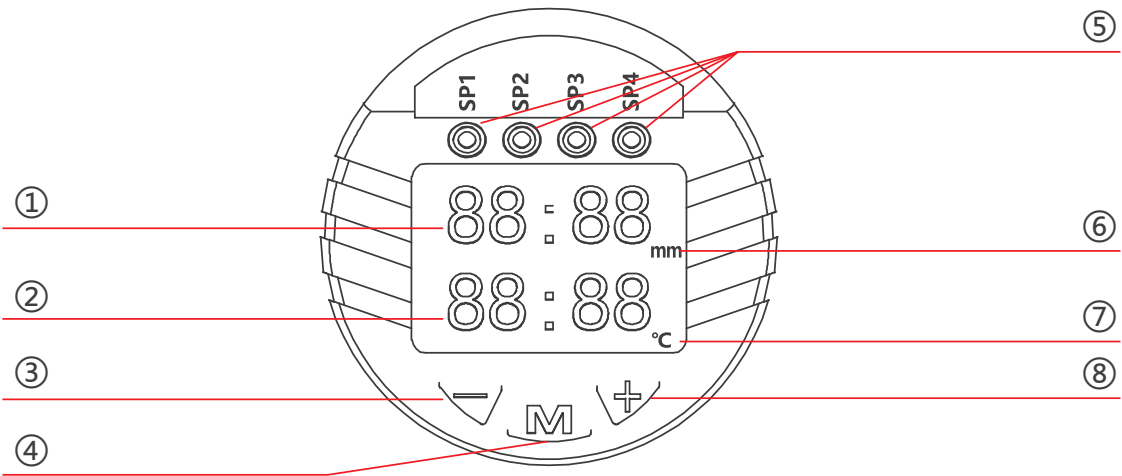
## ***Product application***

Machine tools/hydraulic lubrication systems  
/Mechanical manufacturing/automation equipment

## ***Technical parameter***

- ◇ Power Supply: DC18... 30V
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- ◇ Safety: short circuit protection, reverse polarity protection
- ◇ Insulation: DC500V
- ◇ Overvoltage: DC36V
- ◇ Connecting time: < 3s
- ◇ Switching function: PNP/NPN, NO/NC arbitrary switching
- ◇ Switching current: maximum 400mA
- ◇ Response time: switch output/analog signal (0.2-5s)
- ◇ Load: Analog signal 4... 20 ma  $\Omega$  500 or less
- ◇ Service life: 50 million switching cycles
- ◇ Measuring accuracy: 10mm
- ◇ Long-term deviation: 5mm
- ◇ Temperature
- Temperature range: configurable (factory default -20... 80°C)
- Medium temperature: -20... 85 °C
- Ambient temperature: -20... 80 °C
- Storage temperature: -20... 65 °C
- ◇ Relative humidity: 45... 75%
- ◇ Shock resistance: 20g, 10... 2000Hz (compliant with IEC60068-2-6)
- ◇ Impact resistance: 50g, 6ms (according to IEC60068-2-27)
- ◇ Protection grade: IP67
- ◇ Connecting parts: 304 connecting rod, NBR or 304 stainless steel float
- ◇ Shell: POM engineering plastic/alumina
- ◇ Electrical connection: PVC/PUR

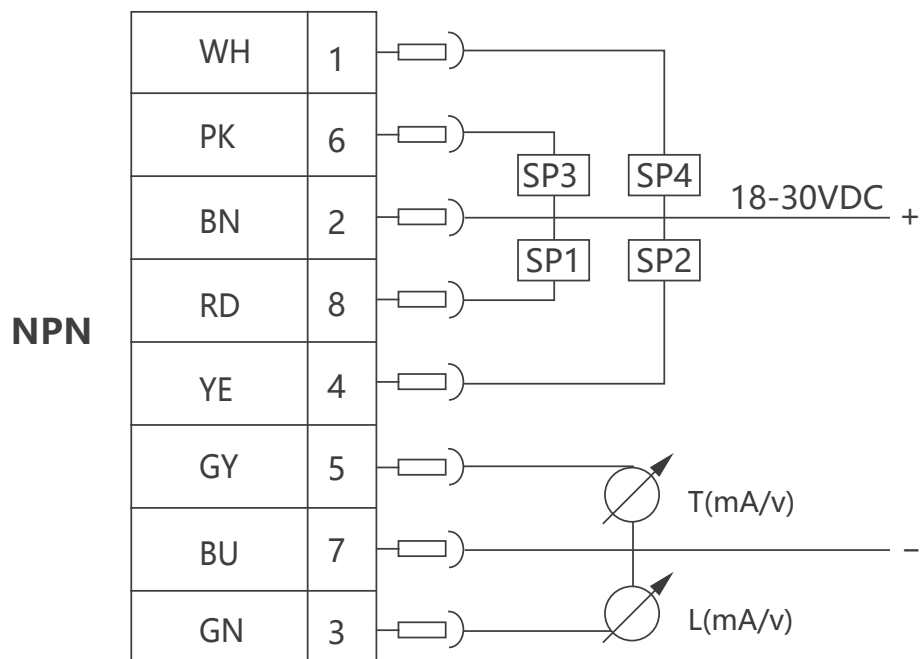
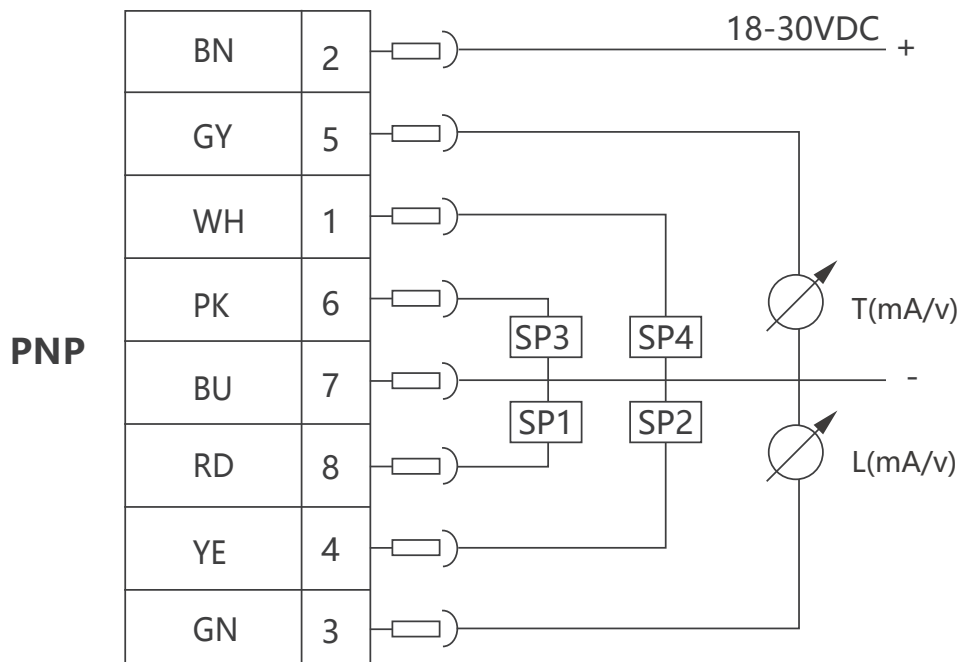
## Panel diagram



Serial number	Feature	Serial number	Feature
①	Liquid level value	⑤	Switch signal light
②	Temperature value	⑥	Liquid level unit
③	Decrease/serve menu key	⑦	Temperature unit
④	Confirm key	⑧	Add/down menu key

## Four-way switch quantity + two-way analog quantity

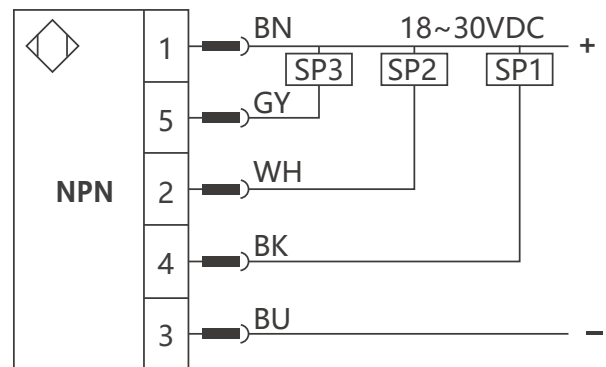
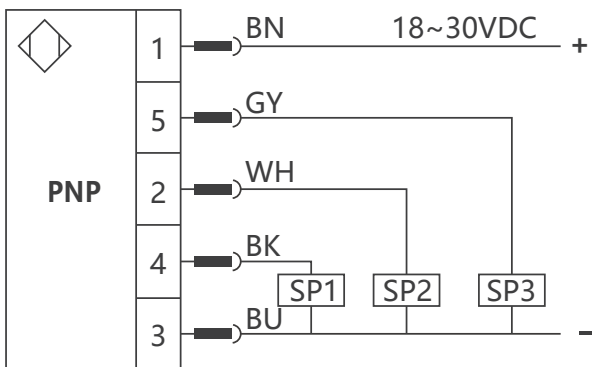
NO	Color	Function description
2	BN	Power positive (24VDC+)
7	BU	Power supply negative (-)
8	RD	SP1: Switch 1 Output default liquid level switch (switchable temperature switch)
4	YE	SP2: Switch 1 Output default liquid level switch (switchable temperature switch)
6	PK	SP3: Switch 1 Output default temperature switch (switchable liquid level switch)
1	WH	SP4: Switch 1 Output default temperature switch (switchable liquid level switch)
3	GN	Liquid Level Simulation : L(mA/v)
5	GY	Temperature analog: T(mA/v)



## Three-way switch quantity

NO	color	Function description
1	BN	Power supply positive (+)
3	BU	Power supply negative (-)
4	BK	SP1: Default level switch (temperature switch)

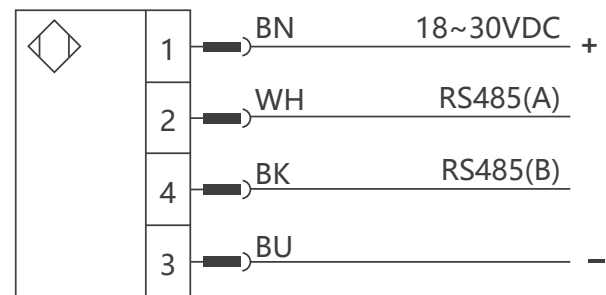
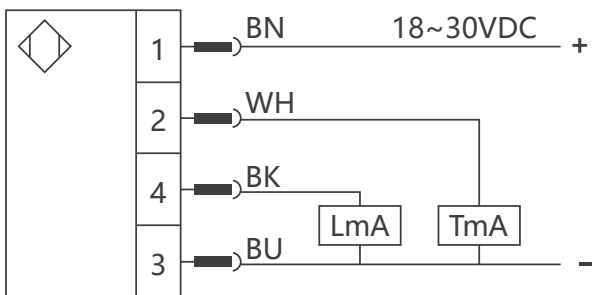
NO	color	Function description
2	WH	SP2: Default level switch (temperature switch)
5	GY	SP3: Default temperature switch (Level switch)



## Two analog channels/RS485

NO	color	Function description
1	BN	Power supply positive (+)
3	BU	Power supply negative (-)

NO	color	Function description
2	WH	Temperature analog (TmA) /RS485(A)
4	BK	Liquid Level Simulation (LmA) /RS485(B)



## Parameter/Function Description

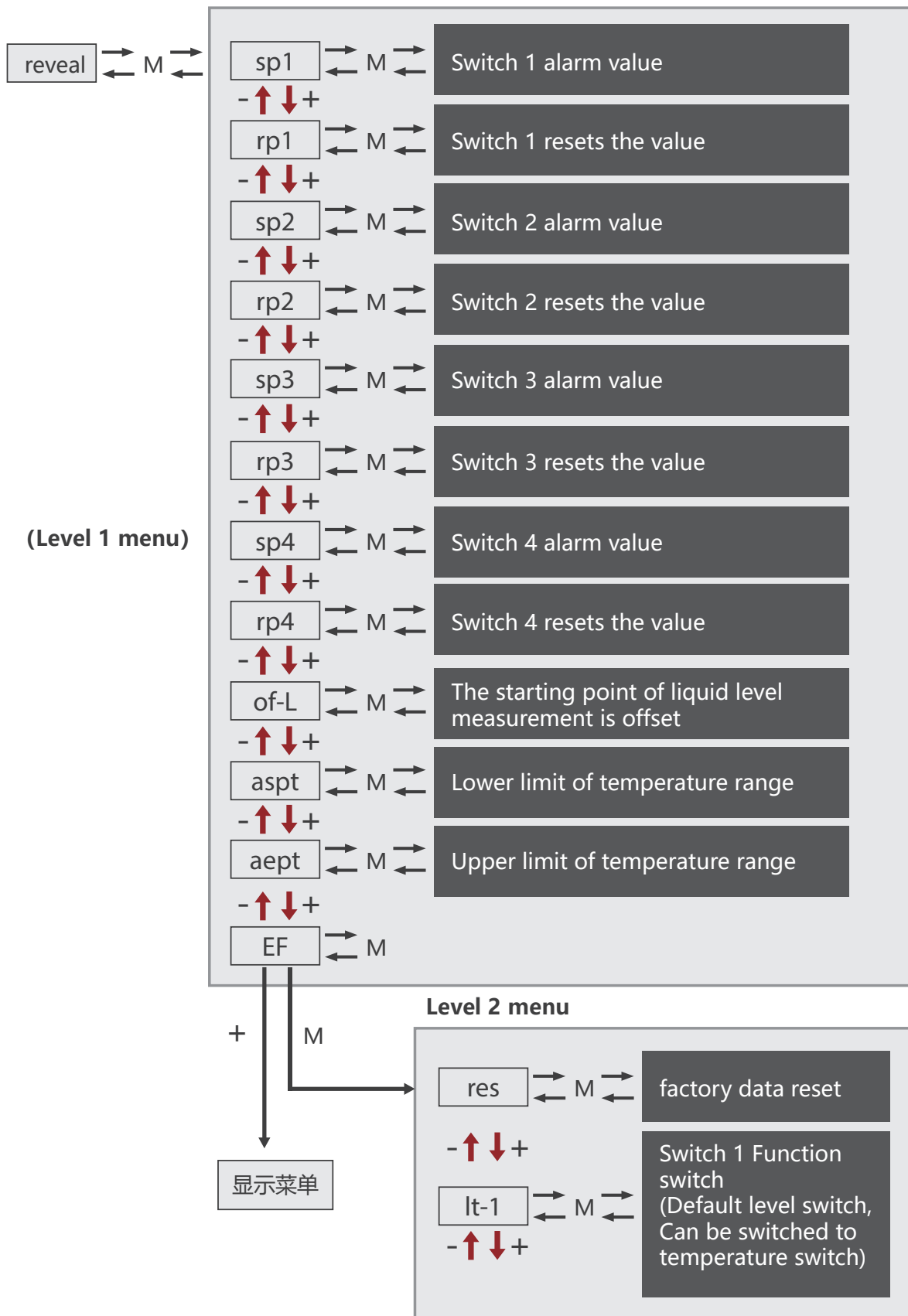
Level 1 menu		
sp1	Switch 1 Alarm value (factory default value is 100)	<p>After holding [+] or [-] flashing for 5 times, the setting value can be changed: At the press of a button, the value increases; Hold the button down, The value changes continuously.</p>
rp1	Switch 1 Reset value (factory default is 95)	
sp2	Switch 2 Alarm value (factory default value is 200)	
rp2	Switch 2 Reset value (Factory default is 195)	
sp3	Switch 3 alarm value (factory default value is 30.0°C)	
rp3	Switch 1 Reset value (factory default value is 29.5°C)	
sp4	Switch 4 alarm value (factory default value is 40.0 ° C)	
rp4	Switch 4 Reset value (Factory default value is 39.5°C)	
of-L	Level offset correction (default is 0) (Analog full scale value increases accordingly)	
aspt	Temperature range lower limit (factory default range lower limit -20°C)	<p>factory data reset Range reference value</p>
aept	Temperature range upper limit (factory default range upper limit 80°C)	
	Expand functionality/Open the Level 2 menu	
EF	"Press the [M] key to enter the Extended Level 2 menu Press the [+] key to exit.	

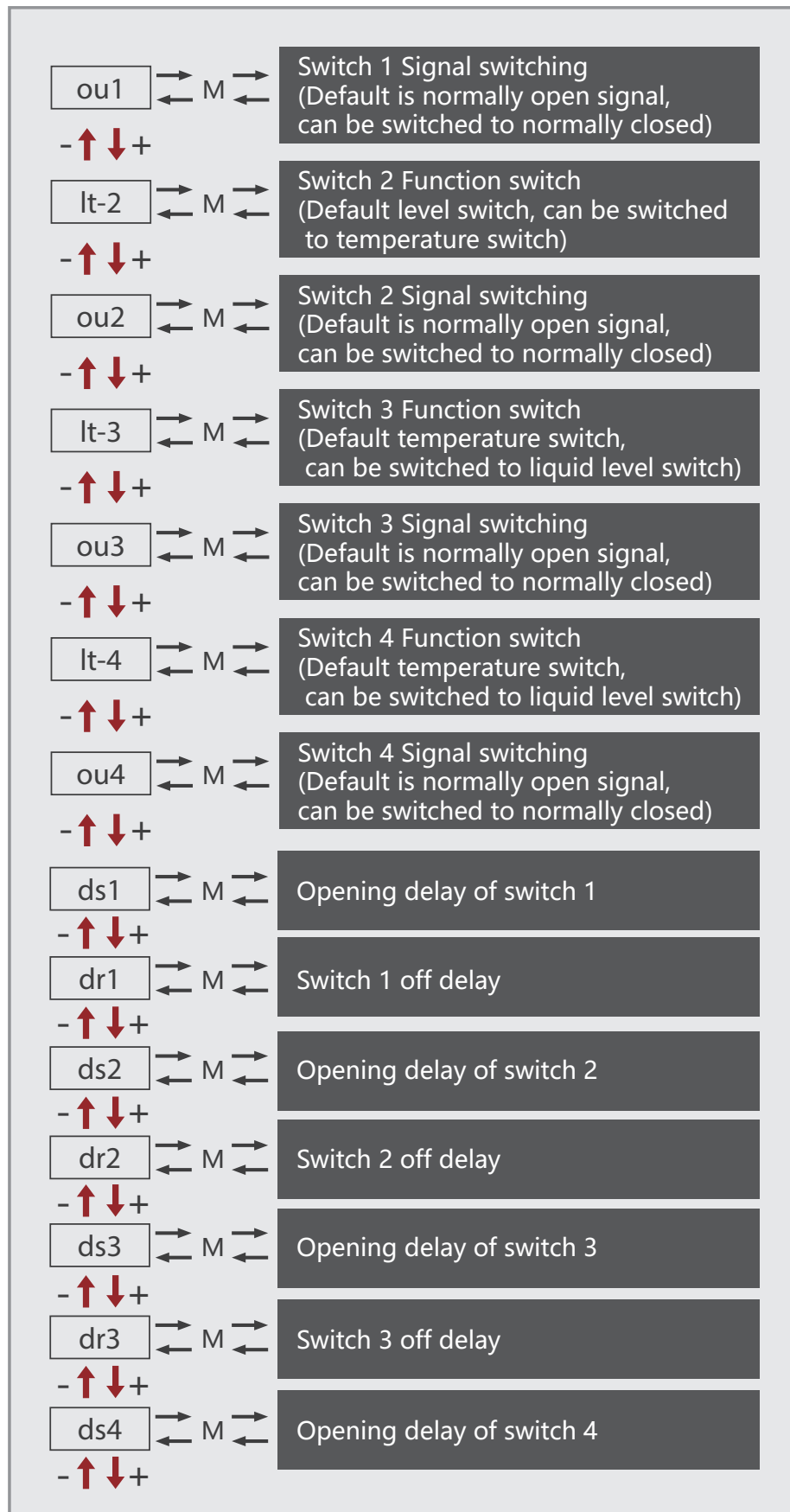
Level 2 menu		
res	factory data reset	Press and hold [+] to restore factory Settings
lt-1	Switch 1 Function: Liquid level/temperature (default liquid level)	After holding [+] or [-] flashing for 5 times, the setting value can be changed: At the press of a button, the value increases; Hold the button down, The value changes continuously.
ou1	Switch 1 signal: (Factory default is HNO) Hysteresis function: HNO (normally open) /HNC (normally closed) Window function: FNO (normally open) /FNC (normally closed)	
lt-2	Switch 2 Function: Liquid level/temperature (default liquid level)	
ou2	Switch 2 signal: (Factory default is HNO) Hysteresis function: HNO (normally open) /HNC (normally closed) Window function: FNO (normally open) /FNC (normally closed)	
lt-3	Switch 3 Function: Liquid level/temperature (default temperature)	
ou3	Switch 3 signal: (Factory default is HNO) Hysteresis function: HNO (normally open) /HNC (normally closed) Window function: FNO (normally open) /FNC (normally closed)	
lt-4	Switch 4 Function: Liquid level/temperature (default temperature)	
ou4	Switch 4 signal: (Factory default is HNO) Hysteresis function: HNO (normally open) /HNC (normally closed) Window function: FNO (normally open) /FNC (normally closed)	

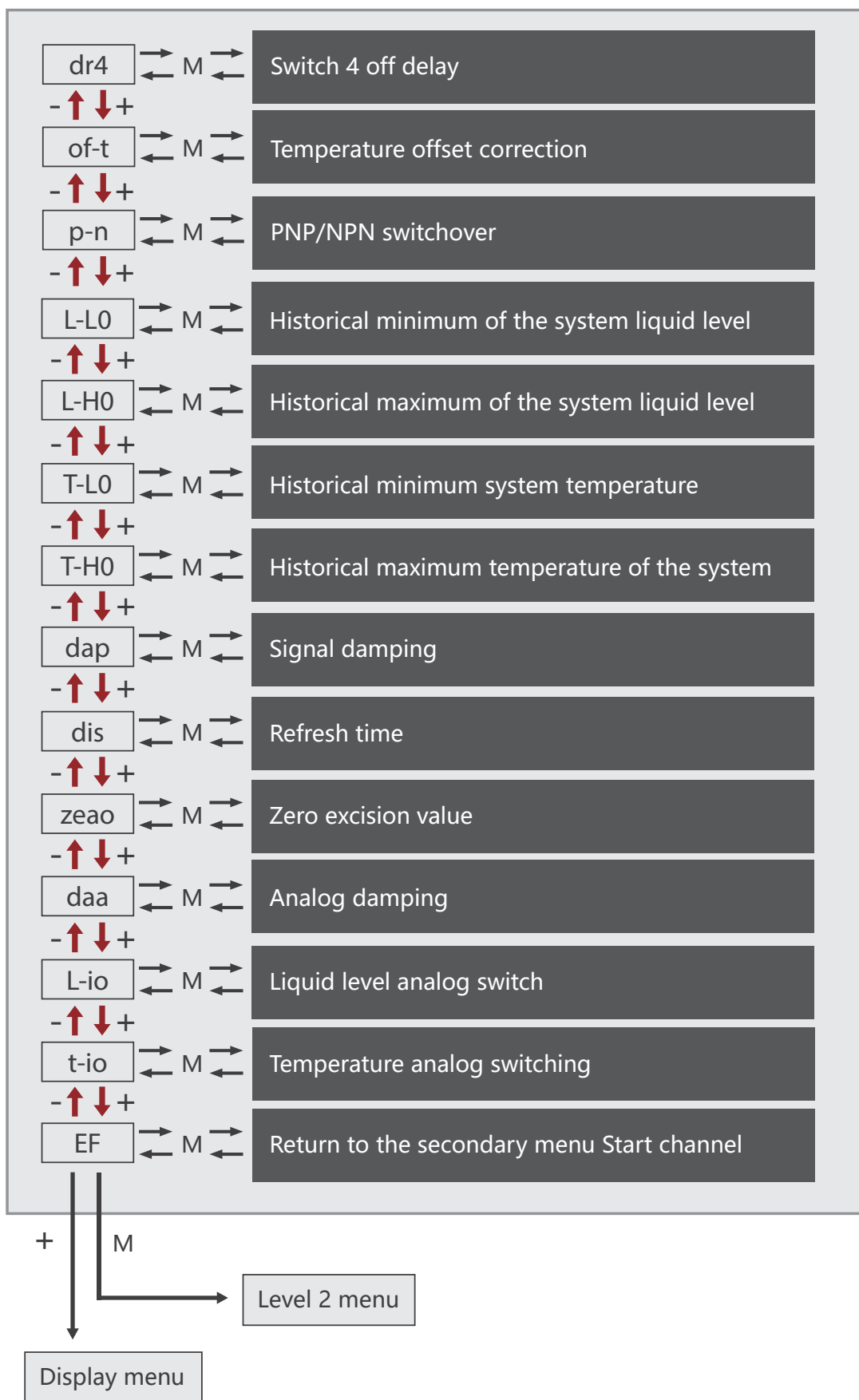
ds1	The start delay of OUT1. (Factory default is 0s)	<p>After holding [+] or [-] flashing for 5 times, the setting value can be changed: At the press of a button, the value increases; Hold the button down, The value changes continuously.</p>
dr1	Shutdown delay for OUT1. (Factory default is 0s)	
ds2	The start delay of OUT2. (Factory default is 0s)	
dr2	OUT2's shutdown delay. (Factory default is 0s)	
ds3	The start delay of OUT3. (Factory default is 0s)	
dr3	OUT3 shutdown delay. (Factory default is 0s)	
ds4	The start delay of OUT4. (Factory default is 0s)	
dr4	OUT4 shutdown delay. (Factory default is 0s)	
of-t	Temperature offset correction	
p-n	PNP/NPN switch (Factory default is PNP)	
L-L0	Historical minimum of the system liquid level.	
L-H0	Historical maximum of the system liquid level	
T-L0	Historical minimum system temperature.	
T-H0	Historical maximum temperature of the system	
dap	Signal damping (factory default: 0.06)	
dis	Refresh time (factory default is d1)	<p>After holding [+] or [-] flashing for 5 times, the setting value can be changed: At the press of a button, the value increases; Press and hold the button while the value continues to change. [d1] : The measurement value is updated every 0.1s [d2] : The measurement value is updated every 0.5s [d3] : The measurement value is updated every 1s</p>

zeao	Zero excision value (full scale %)	<p>After holding [+] or [-] flashing for 5 times, the setting value can be changed:  At the press of a button, the value increases;  Hold the button down, The value changes continuously.</p>
daa	Analog damping (factory default is 0.1s)	
L-io	Output analog switching: 4-20: (4-20mA) 20-4: (20-4mA) 0-20: (0-20mA) 20-0: (20-0mA)	
t-io	Output analog switching: 4-20: (4-20mA) 20-4: (20-4mA) 0-20: (0-20mA) 20-0: (20-0mA)	
EF	Expand functionality/Open the Level 2 menu	<p>Press the [M] key to enter the Extended level 2 menu  Press the [+] key to exit</p>

## Menu structure







## RS485通道

Level 1 menu		
of-l	Level correction	Hold [+] or [-] for at least 1s. After 1 second: The setting value can be changed: At the press of a button, the value increases; Press and hold the button while the value continues to change.
id	Address (system default is 1)	
baud	Baud rate setting (System default is 2)	
EF	Expand functionality/Open the Level 2 menu	
	Press the [M] key to enter the Extended Level 2 menu Press the [+] key to exit.	

Level 2 menu		
res	factory data reset	
	Press and hold [+] to restore factory Settings	
of-t	Temperature correction	<p>"Hold [+] or [-] for at least 1s. After 1 second: The setting value can be changed: At the press of a button, the value increases; Press and hold the button while the value continues to change.</p>
L-Lo	Low level value	
L-Ho	High liquid level value	
t-Lo	Low temperature value	
t-Ho	High temperature value	
dap	"Switch point damping/process data flow and display. (Factory default is 0.06)"	
dis	Update rate and direction of the display. (Factory default is d1)	
	<p>"Hold [+] or [-] for at least 1s. After 1 second: The setting value can be changed: At the press of a button, the value increases; Press and hold the button while the value continues to change.</p> <p>[d1] : The measurement value is updated every 10ms  [d2] : The measurement is updated every 100ms  [d3] : Update the measurement every 600ms"</p>	
zeao	Zero excision value (full scale %) (factory default is 0.5)	
	<p>"Hold [+] or [-] for at least 1s. After 1 second: The setting value can be changed: At the press of a button, the value increases; Press and hold the button while the value continues to change.</p>	
EF	Expand functionality/Open the Level 2 menu	
	Press the [M] key to enter the Extended level 2 menu	
	Press the [+] key to exit	

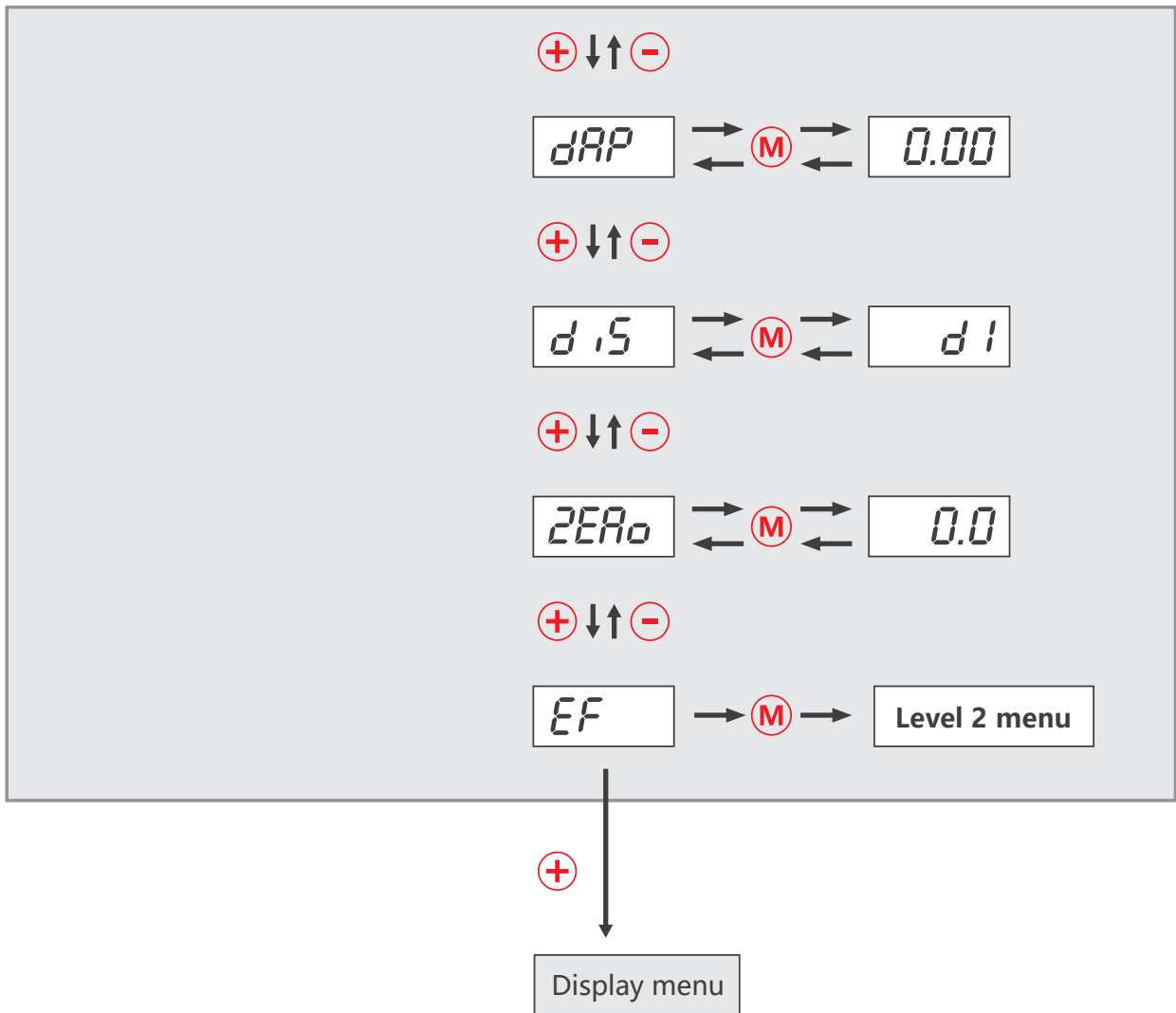
Display menu

↓ (M) Level 1 menu




oF-L	↔ (M) ↔	1
+ ↓ ↑ -		
d	↔ (M) ↔	1
+ ↓ ↑ -		
bAud	↔ (M) ↔	2
+ ↓ ↑ -		
EF		

+ ↓ ↑ -  
↘ (M) Level 2 menu  
↓  
Display menu

rES	↔ (M) ↔	rES
+ ↓ ↑ -		
oF-t	↔ (M) ↔	0.0
+ ↓ ↑ -		
L-Lo	↔ (M) ↔	0
+ ↓ ↑ -		
L-Ho	↔ (M) ↔	0
+ ↓ ↑ -		
t-Lo	↔ (M) ↔	-0.0
+ ↓ ↑ -		
t-Ho	↔ (M) ↔	0.0



## **Katu Electronic (Kunshan) Co.,Ltd.**

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-  Website: [www.katusensor.com](http://www.katusensor.com)
-  Factory: Building 27B, Jingdong Intelligent Industrial Park,  
No.9 Jinjie Road, Huaqiao Economic Development Zone,  
Kunshan City, Suzhou

# LT400-RS485

## Communication Protocol (MODBUS-RTU)

### 1. RTU Data Format Description

#### 1.1 Communication Mode

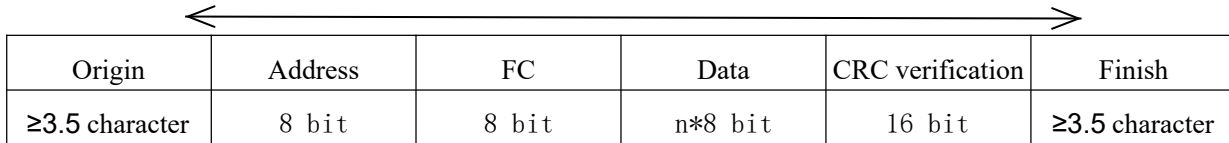
The instrument adopts MODBUS RTU format, and the protocol is used for master-slave query mode data communication.

#### 1.2 Data Format

In RTU mode, each byte (10 bits) is formatted as follows: the encoding system is 8-bit binary.

Each byte consists of: 1 start bit, 8 data bits (with the least significant bit sent first), and 1 stop bit. The baud rate is selectable from five options: 2400,4800,9600,19200, and 115200.

Modbus message



pour  
:

- (1) In RTU mode, idle intervals lasting at least 3.5 character time are used to separate message frames.
- (2) The whole frame must be sent as a continuous character stream.
- (3) The idle interval between two characters should not exceed 1.5 character time.

#### 1.3 Address

The protocol specifies that the instrument addresses range from 0 to 255, with 0 reserved for broadcast (which this protocol does not support), and the remaining addresses are reserved.

### 2. Configuration

#### LT400 Series Liquid Level and Temperature Sensor, No Parity Check, 8-Bit Data Bit, 1-Stop Bit

(Reboot after changing the address or baud rate)

LT400 series sensors		
Even-odd check	Not have	Fixed and cannot be changed
Data bit	8 bits	Fixed and cannot be changed
Stop bit	1st place	Fixed and cannot be changed

Display code	Parameter definition	Scope	Explain
id	Sensor address code (default 1)	1-250	Sensor address cannot conflict with other sensor addresses
baud	Sensor baud rate (default 2)	0-5	0 The baud rate is 2400 bps. 1 The baud rate is 4800 bps. 2 The baud rate is 9600 bps. 3 The baud rate is 19200 bps. 4 The波特 rate is 115200 bps.

### 3. Instruction Description

#### 03H (Read instruction)

#### Send data: 01 03 00 00 00 03 05 CB (16 base)

Instruct	01	03	00	00	00	03	05	CB
Explain	Sensor address	Read instruction	Register start address high bit	Register starting address low bit	High bit of read count	Least significant bit of read count	CRCL	CRCH
Explanation: Send a read command to the 01 sensor, starting from the 0000 register and reading 0003 registers.								

#### Return data: 01 03 06 00 00 01 23 00 01 10 83 (16-based)

Instruct	01	03	06	02	00	00	00	01	09	E1	01
Explain	Sensor address	Read instruction	Return 6 individual Byte	Register 1 high-order	Register 1 low-order	Register 2 high-order	Register 2 low-order	Register 3 high-order	Register 3 low-order	CRCL	CRCH
<p>Explanation: 01 The sensor responds to the read command and returns 6 data points.</p> <p>02 00:0200H, which equals 512 in decimal, indicating a liquid level of 512mm.</p> <p>00 00:0000H, which equals 0 in decimal, indicating positive pressure.</p> <p>01 09:0109H, which equals 265 in decimal (26.5°C);</p>											

### 4. Address (Register) and Meaning

10 16 base, modbus register is the same parameter in different writing, different upper computer software writing is different, one does not recognize when you can try another 2 kind.

(Recommended polling interval: more than 100ms. Wait 100ms after reading the previous sensor before reading this one)

10 address in base	16 address by base	MODBUS register	Parameter definition	Data type	Explain
0	0	40001	Level value	16 unsigned integer	Unit : mm
1	1	40002	Temperature positive and negative	16 unsigned integer	0 Positive, 1 is negative
2	2	40003	Temperature value	16 unsigned integer	°C, with one decimal place (256 being 25.6°C)

5. Modbus Poll Communication Reference

- (1) Open modbus-poll, select Settings> Read/Write Definition, set slave ID to 1, function to 03 Read, address to 0, and quantity to 3



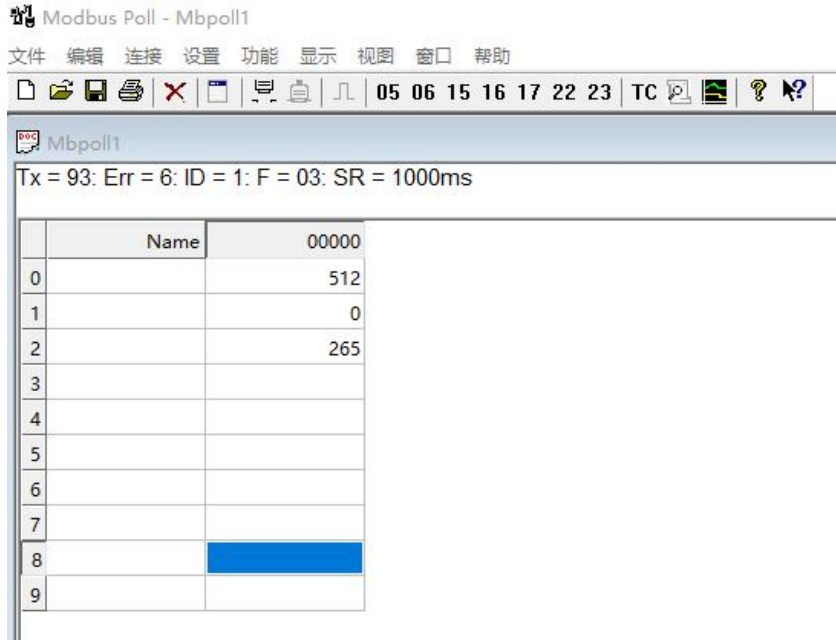
- (2) Click Menu> Connect-Connect

Connection method: Serial Port (select serial port), baud rate 9600,8-bit data, no parity, 1-bit stop bit, RTU mode, delay time 100ms.

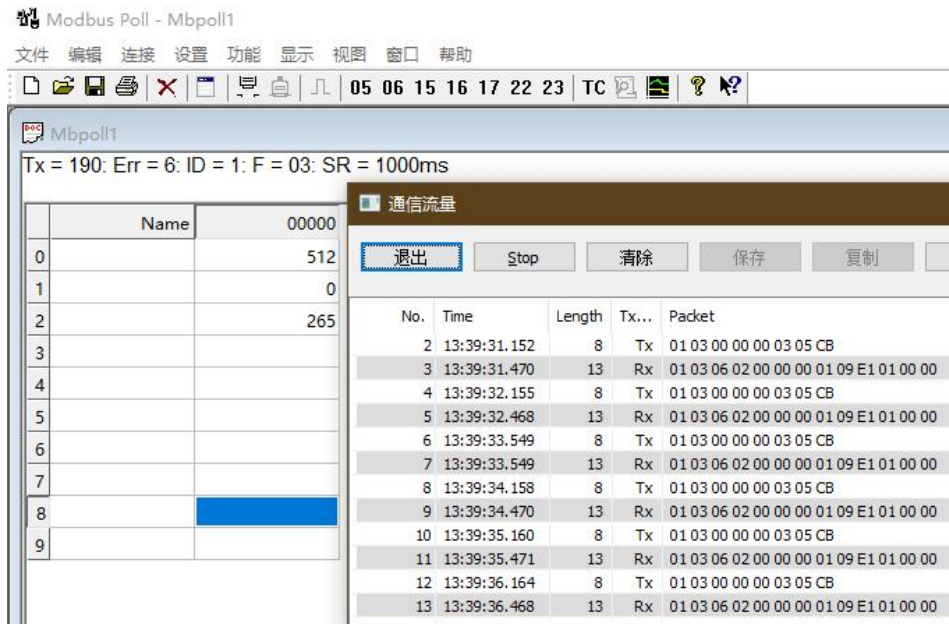


(3) You Can See the Current Read Value

Address 0 is 512, the current level is 512 mm, Address 1 is 0, the temperature is positive, Address 2 is 265, a decimal point, i.e., pressure 26.5°C.



(4) Click the Communication Menu to View Real-Time Command Sending and Receiving.



File revision history

Revise	Description	Date
V1.0	Initial version	
V1.1	Add 5. Modbus-poll communication reference	2025.12.30

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