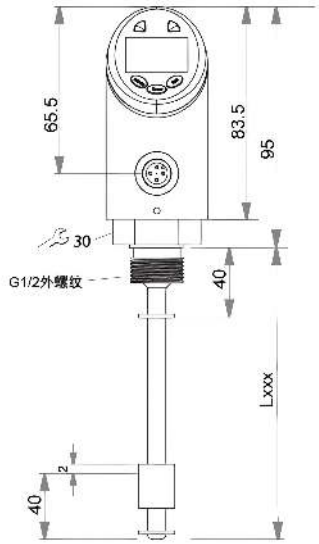
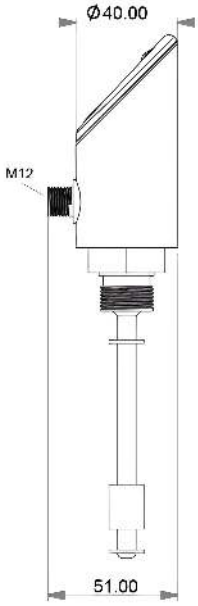
IO-Link Sensor

LTH-G1/2N-LI6D-SC/Lxxx

Liquid level/temperature sensor with display





- IO-Link Smart liquid level/temperature Sensor
- 4-digit large digital tube display, mirroring, semi-transparent design
- The upper part of the housing can be rotated 300℃
- Normally open/normally closed,PNP/NPN/push-pull,hysteresis/window configurable
- Switching signal/analog signal,switching signal/IO-Link can be set
- The display panel adopts an integrated housing
- The main body of the housing is made of stainless steel
- The interface is M12 A code 4-pin
- Key lock function, simple key menu operation
- Sensor parameters can be set via buttons and IO-Link
- The starting and ending points of the analog signal can be set

Model	LTH-G1/2N-LI6D-SC/Lxxx
Operating voltage	24VDC ± 10%
Operating current	< 200mA
Temperature parameters	
Measuring range	-50℃ – 150℃
Interface type	M12, A-coded, 4-pin
Measuring element	PT1000
Temperature measurement accuracy	0.5℃
Liquid level parameters	
Lxxx customization range	L250 and L500 are standard products, and the remaining customized lengths start from 250mm Start to increase exponentially in units of 40mm, such as 290, 330, 370... When it exceeds 500mm, it will be multiplied by 40mm starting from 500mm. increasing, such as 540, 580, 620...
Measuring range	40-(Lxxx-40) mm
Interface type	M12, A-coded, 4-pin
Measuring element	Magnetic resistance
Measurement accuracy	5mm (only for L250 and L500, other customized length accuracy is 10mm)
Float material	NBR 17.5x25mm
Output parameters	
OUT1 Signal	Temperature switching signal or IO-Link (automatic wake-up)
OUT2 Signal	Liquid level switching signal or liquid level 4-20mA or 20-4mA
Switching signal output type	NPN/PNP/Push-Pull, NO/NC, Hysteresis/Window programmable
Switching signal output current	250mA
Switch point SP1 setting range	-49.8℃-150℃
Release point rP1 setting range	-50℃-149.8℃

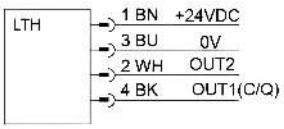
IO-Link M12 interface



1 = +24VDC
2 = OUT2
3 = 0V
4 = OUT1(C/Q)

Note: OUT1: Temperature switching signal or IO Link
OUT2: Liquid level switching signal or liquid level analog signal

Wiring diagram



IO-Link Sensor

LTH-G1/2N-LI6D-SC/Lxxx

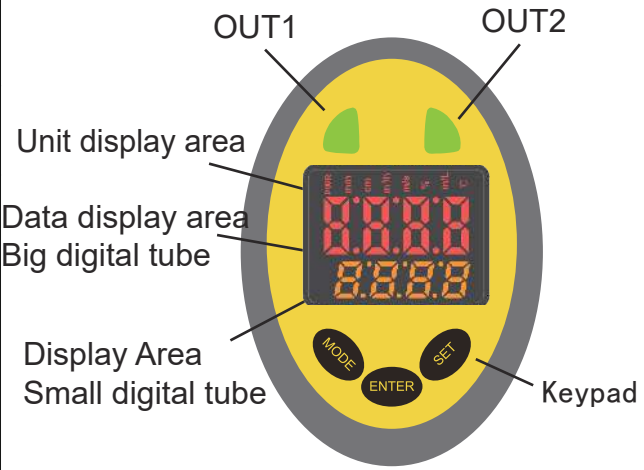
Liquid level/temperature sensor with display

Output parameters	
Switch point SP2 setting range	45mm – (Lxxx-40)mm
Release point rP2 setting range	40mm – (SP2-5)mm
Temperature switching signal output resolution	0.1℃
Analog signal output maximum load	500Ω
Analog signal output accuracy	0.5%F.S
Minimum interval between analog start and end points	50mm
IO-Link	
Vendor ID	1317 (0x0525)
Device ID	198929 (0x030911)
Number of interfaces	1
IO-Link protocol version	V1.1
IO-Link input bytes	4 bytes(32Bit)
Frame type	TYPE_2_V
Transmission rate	COM2 38.4kbit/s
Minimum cycle time	3400us
ISDU(Indexing Service)	Support
Block parameter operations	Not support
Data storage (DS)	Support
Operating temperature	-40-80℃
Protection temperature	IP65

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Status Indicator

PWR	Red On: Power supply is normal; Off: Power supply is abnormal; Flashing: IO-Link is communicating normally
mm cm ℃	Red On: represents the unit of the current digital tube display data Off: not the current unit
OUT1 OUT2	Green: On: Enable output on the corresponding digital signal pin Off: Disable output on the corresponding digital signal pin IO-Link process data mapping Note: This LED indicates the output status and is not an alarm light.
Big digital tube	Red Displays the sensor measurement data "----"is displayed to indicate invalid data
Small digital tube	Orange Displays the sensor temperature data "----"is displayed to indicate invalid data Display Loc Indicates that the key lock is turned on



Note: The display area adopts a semi-transparent design.
It can be seen when the LED is on,
but not when it is off;
other unused units are not visible on the sensor.

Enlarged view of unit display area



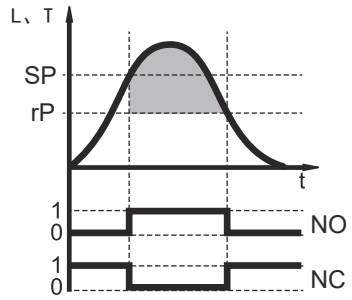
IO-Link process data mapping

BYTE	BYTE0								BYTE1							
BIT	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
DATA	Lbit15	Lbit14	Lbit13	Lbit12	Lbit11	Lbit10	Lbit9	Lbit8	Lbit7	Lbit6	Lbit5	Lbit4	Lbit3	Lbit2	Lbit1	Lbit0

BYTE	BYTE2								BYTE3							
BIT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DATA	Tbit13	Tbit12	Tbit11	Tbit10	Tbit9	Tbit8	Tbit7	Tbit6	Tbit5	Tbit4	Tbit3	Tbit2	Tbit1	Tbit0	OUT2	OUT1

Note: Lbit represents 16-bit level data, which is a signed number in mm units ranging from 40 to (Lxxx-40). (Note: When the level data is invalid, the data is-4096) Tbit represents 14 bits of temperature data, which is a signed number with ℃ as the unit, ranging from-500 to 1500, that is, the actual temperature is amplified by 10 times. (Note: when the temperature data is invalid, the data is-4096)
OUT1 and OUT2 represent the output status of switch quantity;
Using the right shift instruction, remove OUT1 and OUT2 to obtain 14-bit temperature data.

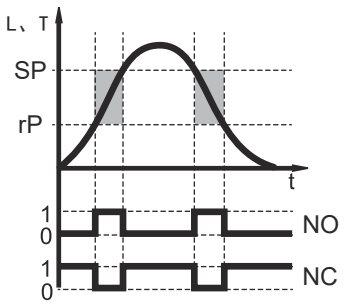
Description of switching signal data and analog signal data output



Hysteresis Mode

This method can ensure a stable switch, state, not affected by the fluctuation of liquid level, temperature and set point

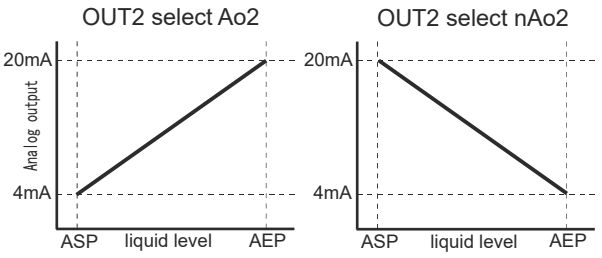
The switch range can be set by the user through the switch point (SP) and release point (rP)



Windowed Mode

Determine whether the level and temperature are within a specific range (window), and trigger the output switch under corresponding conditions to generate an alarm signal

The switch range can be set by the user through the window upper limit (SP) and window lower limit （rP）



liquid level Analog signal correspondence

When the analog output is selected, the user can do so Set the analog starting point (ASP) and analog end point (AEP） to determine the corresponding relationship

The minimum spacing between ASP and AEP is 50mm; AEP should be greater than ASP;

Note: 1. SP should be greater than rP when setting, and SP value can be set first and then rP; if SP is set less than rP, rP will be reduced to the allowable maximum value
2. AEP should be greater than ASP, so you can set AEP first and then set ASP; if AEP is set less than ASP, ASP will be reduced to the maximum allowable value

User Manual

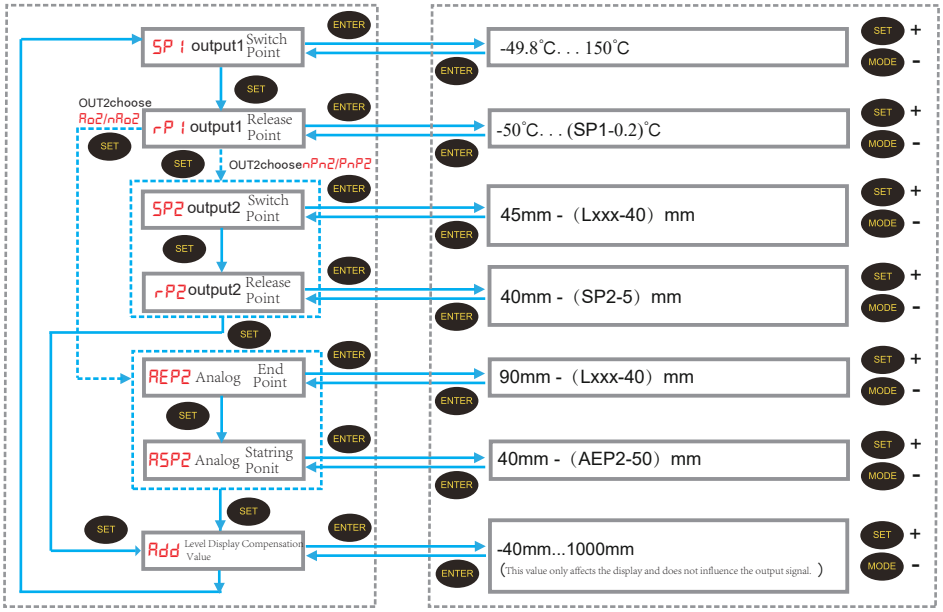
Key Operation

Simple menu operation



MODE >2s

MODE Return Save



Normal display mode

- In this mode, press the MODE button for more than 2 seconds to enter the first level menu
- In this mode, press the ENTER key + SET key simultaneously for more than 6 seconds to turn the key lock on or off.
  When turned on, the small digital tube display area will displayLoC,Then switch to temperature display.

First level menu

- In this menu, press SET to switch options.
- Press MODE to return and save the parameters.
- Press ENTER to enter the next menu level

Second level menu

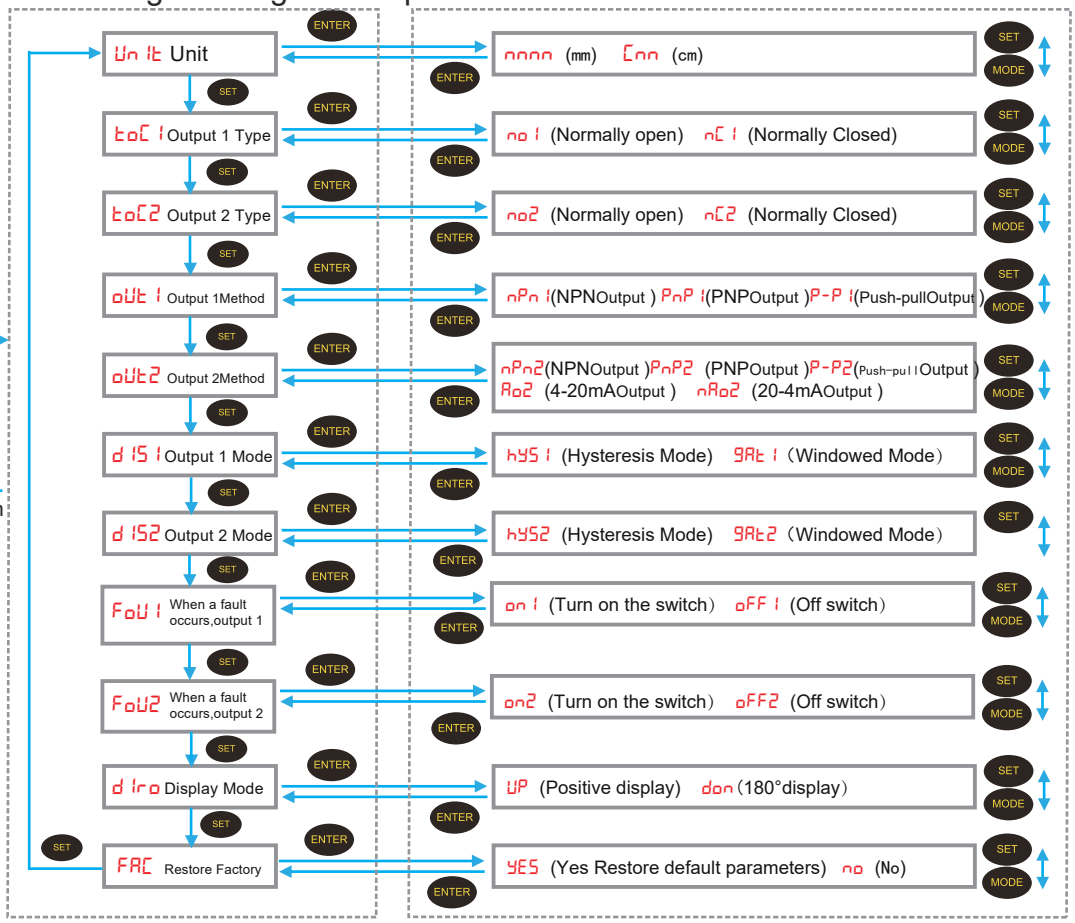
- Press the SET button to increase the setting value.
- Long press to increase the value.
  Press the MODE button to decrease the setting value.
  Long press to decrease the value
- Press ENTER to confirm and return to the previous menu.
  Note: Confirmation does not mean saving

Programming menu operation



MODE + SET >2s

MODE Return Save



Normal display mode

- In this mode, press the MODE button for more than 2 seconds to enter the first level menu
- In this mode, press the ENTER key + SET key simultaneously for more than 6 seconds to turn the key lock on or off.
  When turned on, the small digital tube display area will displayLoC,Then switch to temperature display.

First level menu

- In this menu, press SET to switch options.
- Press MODE to return and save the parameters.
- Press ENTER to enter the next menu level

Second level menu

- In this menu, press SET or MODE to switch options.
- Press ENTER to confirm the option and return to the previous level.

Note: After entering the simple or programming menu, if there is no key operation within 3.5 minutes, it will automatically return to the normal display mode without changing the setting parameters;
For the switch output mode, NPN controls the 0V switch, providing a low level without a high level; PNP controls the 24V switch, providing a high level without a low level;
P-P push-pull is a combination of NPN and PNP;

User Manual

Liquid level/Temperature sensor model naming rules

LTH – G1/2 N – LI 6 D – SC / Lxxx

Liquid level/Temperature sensor

LTH: Smart

Mechanical interface

G1/2: G1/2external thread
(length can be customized)

G1: G1external thread
(length can be customized)

Probe material

N: 304 Stainless steel
E: 316L Stainless steel

Output signal

L：4…20mA+1
switch signal,configurable to
2 switch signals IO-LINK(Smart)

LU: 0…10V+1
switch signal,configurable to
2 switch signals IO-LINK(Smart)

DPN: 2 switch signals, normally open/normally closed IO-LINK(Smart)

Customized extension probe

Lxxx: Probe length mm
250、290、330、370、
410、450、490、500、
540、580.....

Electrical Interface

SC:M12 Connectors

Display

D:Liquid level/Temperature digital tube display
Alarm LED display

Supply voltage

6: 24VDC ± 10%

FAC Default Parameters

Parameter list	FAC Default Value
SP1	50℃
rP1	45℃
SP2	Lxxx/2
rP2	Lxxx/2-5
AEP2	Lxxx-40
ASP2	40
Add	0
Unit	mm
toC1	no1
toC2	no2
oUt1	PnP1
oUt2	PnP2
dIS1	hyS1
dIS2	hyS2
FoU1	oFF1
FoU2	oFF2 *
dIro	UP
Loc	0:unlock

* When[oUt2]selects analog signal output,
In case of an internal fault,
The output signal will run according to the parameter settings in[FoU2]

	FoU2=ON	FoU2=OFF
[oUt2] =Ro2	20mA	4mA
[oUt2] =nRo2	4mA	20mA

IO-Link parameters

Parameter data/ Request data/Indexing Service（ISDU indexed service data unit）

Index	Subindex	Parameter name	length	Permissions	Describe
0x02 2	0	System Commands	1Byte	Write	0x80 128 Device reset 0x82 130 Factory reset
0x10 16	0	Manufacturer's name	8Byte	Read	Sentinel
0x11 17	0	Manufacturer Description	41Byte	Read	Sentinel Industrial Ethernet manufacturer
0x12 18	0	Product name	14Byte	Read	LTH-xxx-xxx-SC
0x13 19	0	Product ID	8Byte	Read	19892901
0x14 20	0	Product Description	26Byte	Read	Liquid Level sensor io-link
0x15 21	0	Serial-Number	10Byte	Read	1989290101
0x16 22	0	Hardware version	8Byte	Read	HW-V0.01
0x17 23	0	Software version	8Byte	Read	FW-V0.01
0x18 24	0	Apply Tags	maximum 32Byte	Read Write	ApplicationSpecificTag is used to mark the device in the application This item is defined in the IODD file and is included in DataStorage(DS)
0x19 25	0	Function Label	maximum 32Byte	Read Write	FunctionTag is a special tag for device functions, including This item is not defined in the IODD file and can be set directly through Index
0x1A 26	0	Local Tags	maximum 32Byte	Read Write	LocationTag is a special tag used for local devices, including DS This item is not defined in the IODD file and can be set directly through Index
0x24 36	0	Device status	1Byte	Read	0:The device is operating normally; 1:Maintenance is required; 2:Incorrect operating environment or parameters; 3:The device is temporarily invalid; 4:The device fails to operate;

Index	Subindex	Parameter name	length	Permissions	Ranges
0x1F4 500	0	Unit Liquid Level	1Byte	Read Write	0: mm mm 1: cm Centimeter
0x1F5 501	0	toC1 Output 1 Type	1Byte	Read Write	0: NO Normally open 1: NC Normally Closed
0x1F6 502	0	toC2 Output 2 Type	1Byte	Read Write	0: NO Normally open 1: NC Normally Closed
0x1F7 503	0	oUt1 Output 1 method	1Byte	Read Write	0: NPN output 1: PNP output 2: P-P push-pull output
0x1F8 504	0	oUt2 Output 2 method	1Byte	Read Write	0: NPN output 1: PNP output 2: P-P push-pull output 3: Ao (4-20mA) 4: nAo (20-4mA)
0x1F9 505	0	diS1 Output 1 Mode	1Byte	Read Write	0: hyS hysteresis mode 1: gAt window mode
0x1FA 506	0	diS2 Output 2 Mode	1Byte	Read Write	0: hyS hysteresis mode 1: gAt window mode
0x1FB 507	0	diro Display Mode	1Byte	Read Write	0: UP positive display 1: don180° display
0x1FC 508	0	Lock Key lock	1Byte	Read Write	0: Unlocked 1: Key locked
0x1FD 509	0	When FoU1 fails, output mode 1	1Byte	Read Write	0：oFF1(Off switch） 1：on1(Turn on the switch）
0x1FE 510	0	When FoU2 fails, output mode 2	1Byte	Read Write	0：oFF2(Off switch） 1：on2(Turn on the switch）
0x258 600	0	SP1 Output 1 Switch point	2Byte	Read Write	-498 to 1500 Note: Unit ℃ SP1 should be greater than rP1 otherwise it will be rejected
0x259 601	0	rP1 Output 1 Release Point	2Byte	Read Write	-500 to 1498 Note: Unit ℃ rP1 should be less than SP1 otherwise it will be rejected
0x25A 602	0	SP2 Output 2 Switch point	2Byte	Read Write	45 to Lxxx-40 Note: Unit mm SP2 should be greater than rP2 otherwise it will be rejected
0x25B 603	0	rP2 Output 2 Release Point	2Byte	Read Write	40 to SP2--5 Note: Unit mm rP2 should be less than SP2 otherwise it will be rejected
0x25C 604	0	ASP2 Analog Starting point	2Byte	Read Write	40 to AEP2-50 Note: Unit mm ASP2 should be smaller than AEP2 otherwise it will be rejected
0x25D 605	0	AEP2Analog End point	2Byte	Read Write	90 to Lxxx-40 Note: Unit mm AEP2 should be greater than ASP2 otherwise it will be rejected
0x25E 606	0	Add liquid leveldisplay Comp ensate value	2Byte	Read Write	-40 to 1000 Note: Unit mm

Error code

32785 / 0x8011：Invalid index

32786/0x8012：Invalid subindex

32819 / 0x8033：The length of the written parameter exceeds the defined length

32820/0x8034：The length of the written parameter is less than the defined length

32816/0x8030：The written parameter exceeds the settable range