# Capacitive Intelligent Liquid Level Sensor

**FST700-204**

## Product Manual

**(V1.2)**

# SUCH

## ● Important statement

Thank you very much for choosing our products, we will serve you sincerely forever. The company pursues excellent quality and pays more attention to excellent after-sales service.

Operation errors will shorten the life of the product, reduce its performance, and may cause accidents in severe cases. Please hand over this manual to the end user and read it carefully before using the product. And please keep it in a safe place for reference when needed. The company reserves the right to modify this manual due to product technology and process updates. If there is any change, no further notice will be given, and the final interpretation of this manual is reserved.

## ● Product overview

Capacitive intelligent oil level sensor is suitable for continuously detecting the liquid level of various non-conductive liquids such as diesel, kerosene, gasoline, hydraulic oil, biodiesel, etc. It is used for oil levels in railway locomotives, automobile fuel tanks, oil tankers, oil depots, etc. Special liquid (oil) level measurement sensor tailored for accurate measurement.

## ● Features

◇ Simplify installation and commissioning;

◇ Optimized the sensor output curve, simplifying the difficulty of acquisition and processing;

◇ Strong anti-interference, polarity protection;

◇ Voltage, current, RS232, RS485 and other signal output modes are optional.

## ● Technical indicators

| Output signal | 4～20mA | 0～5V | 0～10V | RS485 | RS232 |
|---|---|---|---|---|---|
| Supply voltage | 9～30 VDC | 9～30VDC | 15～30VDC | 9～30VDC | |
| Range (mm) | 0~0.2...1.8m, or customized. There is a 5mm dead zone at the bottom of the sensor, which can be truncated on site according to requirements. It is recommended that the truncated length not exceed 30% of the overall length | | | | |
| Output accuracy | ±0.5%FS(≥600mm),±1%FS(≥400mm)<br>±3%FS(≥200mm),±5%FS(<200mm) | | | | |
| Operating temperature | -40～+85℃ | | | | |
| Storage temperature | -40～+85℃ | | | | |
| Three installation methods are optional | Threaded installation | | Quick installation | | Flange installation |
| | G1/2, M20*1.5 or customized | | No thread required, hole size Ø42 | | Standard flange mounting |

| Measuring medium | Diesel, kerosene, gasoline, hydraulic oil, biodiesel and other non-conductive liquid level media | |
|---|---|---|
| Electronic warehouse protection level | IP65 | |
| Material | Probe | Φ16 aluminum alloy (range≤1200), Φ16 stainless steel tube (range > 1200) or customized |
| | Electronic warehouse | 304 stainless steel |

## ● **Product dimensions**
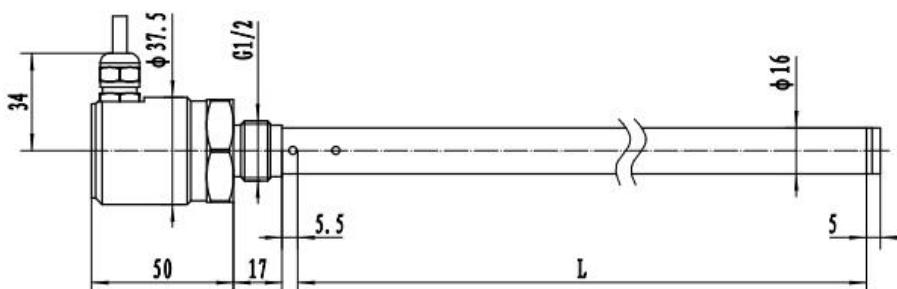


Threaded installation
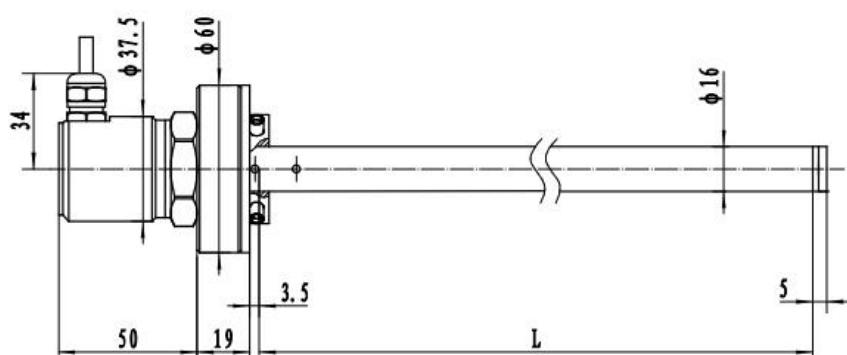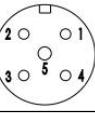


Quick installation method, hole size Ø42
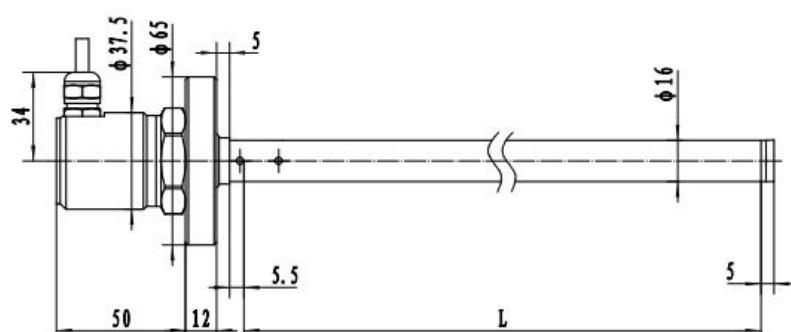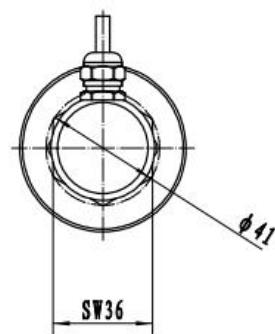


Flange installation
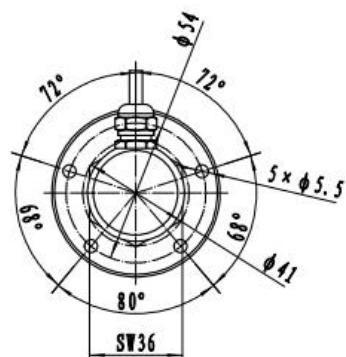
# ● Electrical Interface

| Direct line | M12 Connector | Current output | Voltage output | RS485 | RS232 |
|---|---|---|---|---|---|
| Red | 1: Brown | Vcc+ | Vcc+ | Vcc+ | Vcc+ |
| Green | 2: White | Lout | Vout | RS485_A | Rxd |
| Black | 3: Blue | GND | GND | GND | GND |
| White | 4: Black | / | / | RS485_B | Txd |
| Shield | | Shield | Shield | Shield | Shield |

# ● Precautions

1. After opening the product package, please check whether the appearance of the product is intact, check whether the relevant content of the product instruction manual is consistent with the product, and keep the product instruction manual for more than one year;

2. Wiring strictly according to the wiring diagram of the product, and work under the permissible excitation voltage of the product, and do not use it with overvoltage;

3. Do not knock the product, so as not to damage the appearance and internal structure;

4. The product has no customer-repairable parts, please contact our company in case of failure;

5. If the company's products fail under normal conditions, the warranty period is one year (13 months from the date of delivery by our company to the date of return). Whether the failure occurs under normal conditions can be tested by our company's quality inspector as the basis. For maintenance beyond the time limit, the company will charge a cost fee, and all products of the company will be maintained for life;

6. For the unfinished parts, please refer to our company website or call us for inquiries.

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# Attachment: MODBUS communication protocol V1.0

## ● Basic settings of communication protocol

Transmission mode: MODBUS-RTU mode

Communication parameters: default baud rate 9600bps (optional 1200bps, 2400bps, 4800bps, 9600bps, 14400bps, 19200bps, 28800bps, 38400bps, 57600bps, 115200bps, can be configured according to user requirements), 1 start bit, 8 data bits, none parity, 1 stop bit

Slave address: The factory default is 123 (can be set according to the agreement).

## ● Holding register list

| Parameter | Modbus holding register address (16 bits) |
|---|---|
| Slave address (Address) | 000AH, the default slave address is 123 |
| Baud rate | 000BH, the default slave address is 9600, save it as 96, and so on (divided by 100) |
| Oil level value | 0040H, the unit is 1/10mm |

Note: Other addresses are not allowed to access.

## ● Modbus RTU command

Supported MODBUS function codes: 0x03, 0x06

03H function code example: read the oil level data of the oil level sensor whose slave address is No. 123

★Host query command:

| Slave Address | 7BH | Slave address |
|---|---|---|
| Function | 03H | Function code |
| Starting Address Hi | 00H | The high 8 bits of the start register address |
| Starting Address Lo | 40H | The lower 8 bits of the start register address |
| No.of Points Hi | 00H | The high 8 bits of the number of registers |
| No.of Points Lo | 01H | The lower 8 bits of the number of registers |
| CRC Check-L | 8EH | CRC check code lower 8 bits |
| CRC Check-H | 44H | CRC check code high 8 bits |

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★Slave response:

| Slave Address | 7BH | Slave address |
|---|---|---|
| Function | 03H | Function code |
| Byte Count | 02H | Llength is 2 bytes |
| Data Hi | 06H | The upper 8 bits of the oil level data, at this time the oil level is: 173.8mm |
| Data Lo | CAH | The lower 8 bits of the oil level data, the oil level at this time is: 173.8mm |
| CRC Check- Lo | E2H | CRC check code lower 8 bits |
| CRC Check- Hi | 79H | CRC check code high 8 bits |

06H function code example: modify the baud rate (in this case, modify it to 57600bps)

★Host query command:

| Slave Address | 7BH | Slave address |
|---|---|---|
| Function | 06H | Function code |
| Address Hi | 00H | The holding register address of the baud rate is 000BH |
| Address Lo | 0BH | The holding register address of the baud rate is 000BH |
| Data Hi | 02H | When the baud rate is 57600bps, the value of the register is 0240H |
| Data Lo | 40H | When the baud rate is 57600bps, the value of the register is 0240H |
| CRC Check-L | F3H | CRC check code lower 8 bits |
| CRC Check-H | 02H | CRC check code high 8 bits |

★Slave response:

| Slave Address | 7BH | Slave address |
|---|---|---|
| Function | 06H | Function code |
| Address Hi | 00H | The holding register address of the baud rate is 000BH |
| Address Lo | 0BH | The holding register address of the baud rate is 000BH |
| Data Hi | 02H | When the baud rate is 57600bps, the value of the register is 0240H |

| Data Lo | 40H | When the baud rate is 57600bps, the value of the register is 0240H |
| --- | --- | --- |
| CRC Check-L | F3H | CRC check code lower 8 bits |
| CRC Check-H | 02H | CRC check code high 8 bits |

06H function code example: modify the slave address (this example is modified to 71)

★Host query command:

| Slave Address | 7BH | Slave address |
| --- | --- | --- |
| Function | 06H | Function code |
| Address Hi | 00H | The holding register address of the slave address is 000AH |
| Address Lo | 0AH | The holding register address of the slave address is 000AH |
| Data Hi | 00H | When the slave address is 71, the value of the register is 0047H |
| Data Lo | 47H | When the slave address is 71, the value of the register is 0047H |
| CRC Check-L | E2H | CRC check code lower 8 bits |
| CRC Check-H | 60H | CRC check code high 8 bits |

★Slave response：

| Slave Address | 7BH | Slave address |
| --- | --- | --- |
| Function | 06H | Function code |
| Address Hi | 00H | The holding register address of the slave address is 000AH |
| Address Lo | 0AH | The holding register address of the slave address is 000AH |
| Data Hi | 00H | When the slave address is 71, the value of the register is 0047H |
| Data Lo | 47H | When the slave address is 71, the value of the register is 0047H |
| CRC Check-L | E2H | CRC check code lower 8 bits |
| CRC Check-H | 60H | CRC check code high 8 bits |