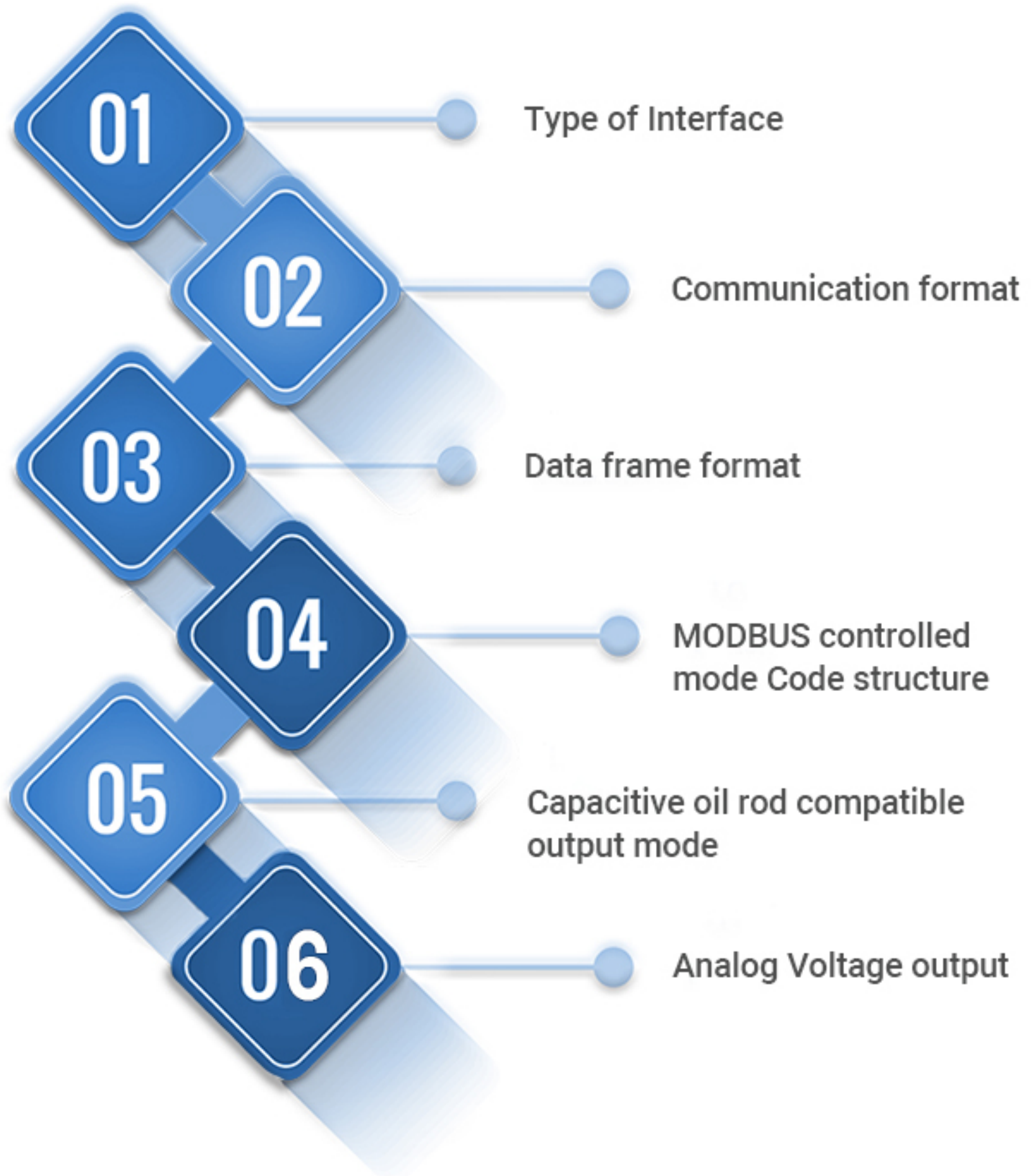


U02 Module Output Interface



1. Type of interface

Data quantity interface: Sensor RS232/RS485/TTL-UART three interfaces for communication, it can work in automatic output mode, MODBUS controlled mode, capacitive oil rod, voltage analog quantity each mode (default is automatic output mode, use MODBUS In the controlled mode or the capacitive stick compatible mode, you can automatically switch to the desired mode by sending the corresponding command), and the control method is different for different modes.

Voltage analog interface: 0~5V voltage analog quantity.

2. Communication format

Interface	Baud Rate	Data Bit	Stop Bit	Check
Data quantity	9600 bit/S	8	1	N/A

3. Auto output mode data frame format

(1) Data frame structure

*XD, hour, ID Number, Liquid level, real-time value, signal quality, temperature, check code#

(2) Data range instruction

Name	Start Bit	Hour	ID number	Fuel level value	Real time value	Signal quality	Temperature	checksum	End code
Range	*XD	0000-9999	00-nn	0000-9999	0000-9999	0000-0030	0248	0000-9999	#
Description	-	Unit : Hour	Any two characters	Unit : 0.1mm	Unit : 0.1mm	-	Unit : 0.1mm	-	-

(3) Example

The equipment automatically uploads the fuel quantity information at a time of 2 seconds, as below:

Start Bit	Hour	ID number	Fluid level value	Real time value	Signal quality	Temperature value	Checksum	End code
*XD	0000	01	1786	1796	0000	0320	1371	#

The data format of the frame is: *XD,0000,01, 1786,1796,0000,0320,1371#

Calculation method of checksum: the cumulative sum of all data from hour to temperature value (comma is also counted), displayed in ASCII code

The total length of the data sent is 37 bytes, and the bytes for calculating the checksum are
 $\text{sum} = \text{rx}[4] + \text{rx}[5] + \dots + \text{rx}[30] + \text{rx}[31]$

4. MODBUS Controlled output

(1) Register function table

Mode: RTU, Sensor module as slave, Sensor address: 01 (0x01) Default, 0xFF is broadcast address

Check: CRC-16/MODBUS $x16 + x15 + x2 + 1$

MODBUS(03) Read function register address				
Status	Register	Byte_H	Byte_L	Description
Read only	0X00FF	Software version	System status	Version 1.0 : 10(0x0A) , Normal: 128(0x80) Abnormal:255(0xFF)note
Read only	0X0100	Distance		Unit:0.1mm
Read only	0X0101	Temperature		Unit:0.1mm
Read only	0X0102	Hours		Start timing from boot, not saved when power is off, only the low byte of the minute data is valid
Read only	0X0103	Minute		
Read only	0X0104	Alarm status		Low byte is valid, alarm: 166 (0xAA) no alarm: 0 (0x00), alarm only when the fuel quantity is abnormal

MODBUS(06) write function register address			
Read-Write	0X0105	Sound travel speed	The speed of sound waves in the medium The unit is: decimeter/second
Read-Write	0X0106	Baud Rate	0x01-9600(Default),0x02-14400,0x03-19200 , 0x04-38400, 0x05-56000, 0x06-57600, 0x07-76800,0x08-115200, 0x09-128000
Read-Write	0X0107	Address setting	When setting the address, replace the unknown device address with 0xFF, and the set address cannot be 0xFF, the default is 0x01
Read-Write	0X0108	Set alarm threshold	Range(15-60)mm/30s . default 30mm/30s
Read-Write	0X0109	Set alarm timing	Range(15-250)S/ .default 60s/
Read-Write	0X010A	Correction (Liter)	Default is off
Read-Write	0X010B	Capacity (after calibration)	The function is reserved
Read-Write	0X010C	Set automatic sending time	Set interval time range of the automatic output signal (2-15)S
Read only	0X010D	Signal quality	Indicates the quality of the signal obtained by the current sensor, the smaller the value, the higher the signal quality
Read-Write	0X010E	Set max measurement distance	Distance range (100-1000)mm Set
Read only	0X010F	Set to switch from controlled output to auto output	When the product is in controlled output, it can be adjusted to automatic output through instructions
Read-Write	0X0110	Set different medium mode	0X01 for fuel level, 0x02 for water level, default is 0x01

Note (1): The abnormal flag is used to indicate the working status of the sensor circuit. When the sensor detects an abnormal ultrasonic measurement state or an abnormal temperature measurement, the sensor abnormality flag is set to indicate that the data is not referable at this time.

(2) Example

Example 1: Read the status of 5 registers continuously from the first address (0X00FF):

Master: 01 03 00 ff 00 05 b5 F9

Slave: 01 03 0A 21 80 04 F9 01 15 00 00 00 19 B0 FB

Example 2: Write a single address (0X0105) to modify the media speed to 13000 dm/s:

Master: 01 06 01 05 32 C8 8C C1

Slave machine: 01 06 01 05 32 C8 8C C1

5. Capacitive Oil Rod compatible output mode

Commands sent from the terminal or computer to the level gauge

ASCII: \$!RY0151

Hexadecimal: 24 21 52 59 30 31 35 31 0D 0A

Level meter reply:

ASCII: *CFV0100FA32B6

00FA32 is the current AD value, 00 is less than 6 bytes and replaced by 0. FA32 is the hexadecimal ASCII representation of the current oil level AD value, which means that the current oil level value is 0xFA32.

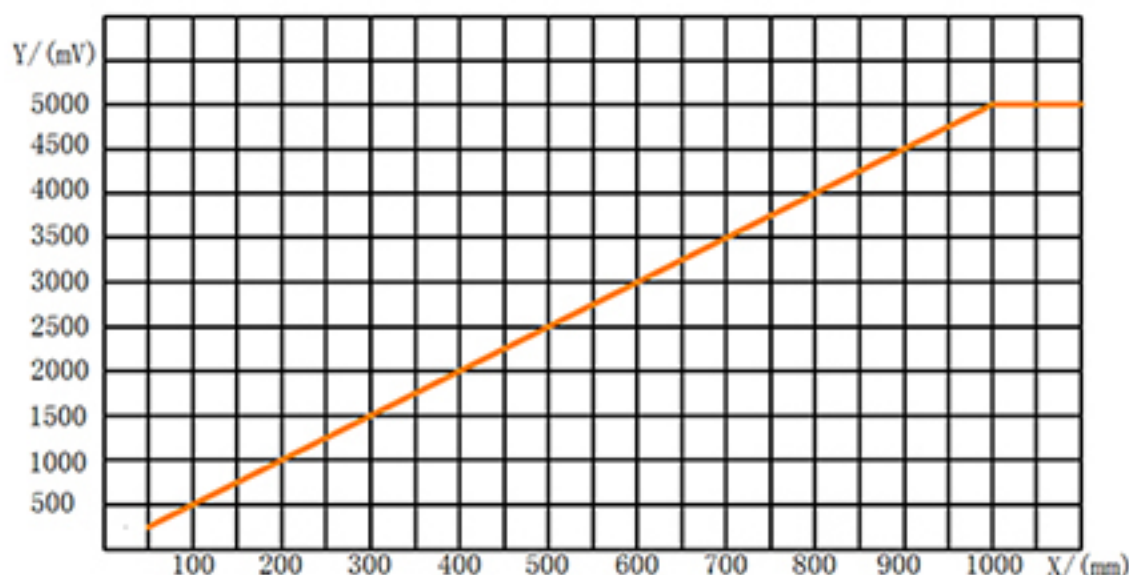
Note: The AD value of 000000~~00FFFF corresponding to the 0%~100% change of the oil level

Hexadecimal: 2A 43 46 56 30 31 30 30 46 41 33 32 42 36 0D 0A

Note: The AD value of 000000~~00FFFF corresponding to the change of oil level 0~999.9mm

6. Analog Voltage output

(1) Distance vs. voltage diagram



Note: The X-axis represents distance, and the Y-axis represents voltage.

(2) Formula

By reading the voltage value output by the voltage analog output pin, the corresponding distance value can be calculated. The sensor factory defaults to a voltage value of 0-5000mV corresponding to a distance value of 0-1000mm, and every 5mV voltage corresponds to a distance of 1mm. When the detection distance is greater than 1000mm, the output voltage is $\approx 5000\text{mV}$, and when no liquid is detected, the output voltage is less than 50mV.

For example: when the current output pin voltage value is 3000mV

By: $S = U / 5000 * 1000$

Get: distance = $3000 / 5000 * 1000 = 600\text{mm}$

Therefore: the current detection distance value of the liquid is 600mm.

Note: The resistive load of the voltage analog output pin is less than or equal to 3mA.