Parameter manual

Product model: MFS-U02-RS232

Document version: V1.0

catalogue

Manual statement:
This manual is only used to explain the working principle, performance and circuit parameters of MFS-U02-RS232 oil level, and does not include application instructions such as use and installation methods. For other information, please contact us for corresponding information or training.

1. General View

1. Review

MFS-U02-RS232 oil level is a sensing device using ultrasonic detection technology to measure the height of the non-contact liquid level of oil and liquid material. Compared with traditional testing equipment, MFS-U02-RS232 oil level has high measurement accuracy and easy to use, and can be installed externally (without damaging the container structure) and connected to networked equipment to realize network monitoring and management. The ultrasonic oil monitoring sensor is designed to optimize the vehicle monitoring mode, which can adapt to various road vehicles running or stationary at various speeds, and output relatively stable data for other liquids loaded on the vehicle.

The MFS-U02-RS232 oil level is hereinafter referred to as the sensor.

2. Product characteristics

- Non-contact measurement, no need to change the container shape, no need to polish the container surface paint layer.
- Metal shell, internal circuit sealing treatment, rainwater prevention design, outdoor environment work without pressure.
- External waterproof 3M glue, and equipped with a special metal fixed bracket, simple installation, fixed firm.
- Wide voltage operation, DC 12~48V power supply, adapt to a variety of vehicles.
- RS232 / RS485 / 0~5V voltage analog / TTL-UAR T a variety of output interfaces, compatible with various sensing signal acquisition devices.
- High frequency band ultrasonic detection, high solid penetration, adapted to metal, plastic and other materials of containers.
- High stability measurement output, built-in anti-interference data processing model, intelligent filtering, compensation for environmental interference.
- High precision measurement output, built-in high precision calculation model, millimeter-level measurement resolution.

3. Scope of application

- Vehicle fuel tank oil volume monitoring.
- Tank fluid level measurement.
- Container water level monitoring.
- Filling of liquid fuel gas measurement.

2. Appearance Instructions

1. Appearance schematic diagram

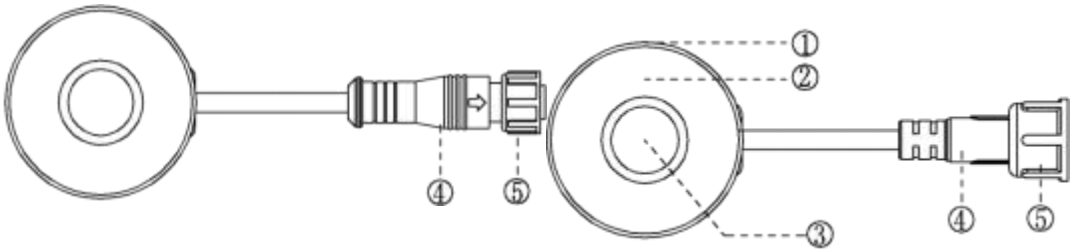


Figure 1 Front face of the sensor body

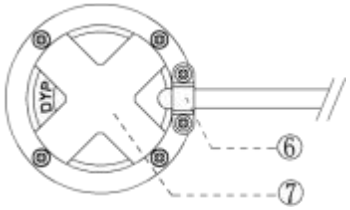


Figure 2. Back side of the sensor main body

① The sensor is an alloy body shell, which reliably protects the internal circuit and provides installation support.

② Strong waterproof adhesive paper, can firmly paste the sensor to the surface of the container, strengthen the signal coupling, fixed more firmly.

③ Ultrasonic transducers, referred to as transducers, core sensors, for ultrasonic mechanical energy and electrical signals converted to each other.

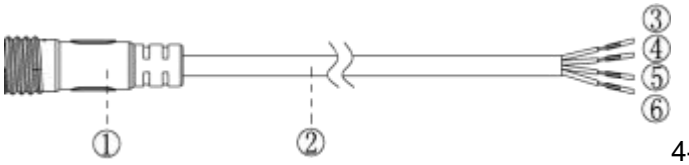
④ Sensor output connector, waterproof structure, used for quick plug and plug connection of sensor and signal line, connector according to model.

⑤ Sensor connector fixing cap for fastening the sensor output connector and signal line connector.

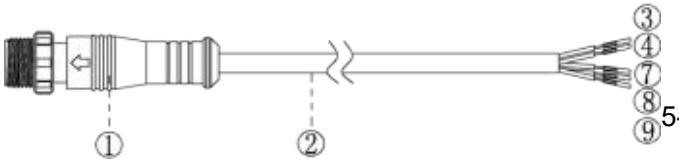
⑥ Sensor output line fixed piece, used to fix the sensor line, buffer signal line bending damage.

⑦ Sensor ultra-wide tie fixing slot, used for limiting tie position, strengthen the binding fixation firmness.

2. Lead description



4-core wire (RS232 / RS485)



5-core wire (analog voltage 0~5V / TTL-UART)

Figure 3. Signal extension line

① Sigwire connection plug, waterproof structure, used for the sensor output connector.

② 4-core signal line or 5-core signal line, the standard line length is 7 meters, sensor power supply, signal transmission ③ red core line, sensor power supply line, connected to the power supply positive electrode (power supply voltage range is DC 12~48V).

④ Black core wire, sensor power supply wire, and negative power supply electrode.

⑤ 4-core green line, sensor signal line, identified as RS232-RX / RS485-A, connect the user equipment RS232-TX / RS485-A terminal

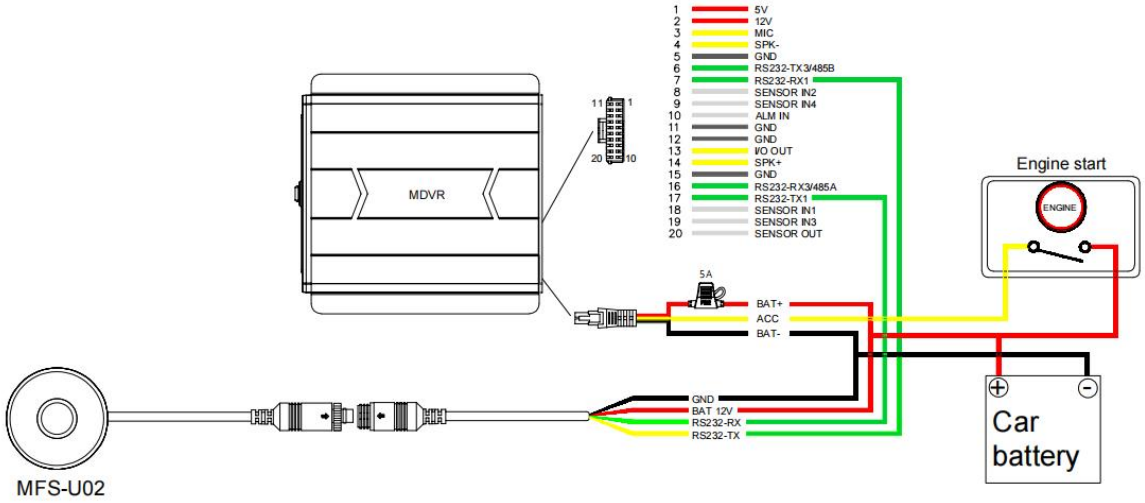
⑥ 4-core yellow line, sensor signal line, identified as RS232-TX / RS485-B, connect the

⑦ 5-core green line of the user equipment RS232-RX / RS485-B terminal, sensor analog voltage 0~5V output line.

⑧ 5-core yellow line, the sensor TTL-UART-TX signal output line.

⑨ 5-core blue line, the sensor TTL-UART-RX signal receiving line.

Note: If the interface needs terminal output, attach the installation instructions according to the requirements.



3. Communication Interface

1. Interface type

Data volume interface: sensor RS232 / RS485 / TTL-UAR T three interfaces for communication, can work in automatic output mode, MODBUS controlled mode, capacitive oil rod, voltage analog mode (default automatic output mode, using MODBUS controlled mode or capacitive oil rod compatible mode, can be automatically switched to the required mode with the corresponding command), different control modes are also different.

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

2. Communication format

joggle	Baud rate	data bit	stop bit	check bit
data size	9600 bit/S	8	1	not have

3. Automatic output mode data frame structure

(1) Data-frame structure

* XD, hour, ID number, liquid level, real-time value, signal quality, temperature, test code #

(2) Description of the data scope

name	Head code	hour	ID numb	Oil level	Real-time	signal quality	tempe rature	check sum	End code

			er	value	value				
Value range	*XD	0000-9999	00-nn	0000-9999	0000-9999	0000-0030	0248	0000-9999	#
explain	–	Unit: hour	Any two, the bit characters	unit: 0.1mm	unit: 0.1mm	–	Unit: 0.1℃	-	–

(3) Operation examples

The device will automatically upload the oil quantity information for 2 seconds in the following table:

Head code	hour	ID number	Liquid level value	Real-time value	signal quality	temperature scale	check sum	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 test sum: add sum of all data from hour to temperature value (comma), display the total length of data issued by ASCII 37 bytes, calculate test sum sum=rx [4] + rx [5] +... + rx [30] + rx [31]

4. MODBUS controlled mode command structure

(1) Register function list

read-write	0X010A	Calibration (liter)	The function is turned off by default
read only	0X010B	Capacity (after the calibration)	This feature is reserved
read-write	0X010C	Set the automatic send time	Set the interval time range (2-15) S
read only	0X010D	Signal quality	It represents the quality of the signal quality, the smaller the value, the higher the signal quality
read-write	0X010E	Set the maximum measurement distance	Set the distance range (100-1000) mm
write only	0X010F	Setting tings from controlled output to auto-output	When the product is in a controlled output, it can be adjusted to auto-output
read-write	0X0110	Set up the measurement media mode	0X01 is the oil mode and 0x02 is the water mode; Default is 0x01

Note (1): The abnormal mark is used to indicate the working state of the sensor circuit. When the sensor detects abnormal ultrasonic measurement state and temperature measurement, the abnormal mark is placed to indicate the non-referability of the data at this time.

(2) Operation examples

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

Host machine: 01 03 00 ff 00 05 b5 F9

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

Example 2: Write a single address (0X0105) The modified medium speed to 13000 minm / s:

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

Deliver: 01 06 01 05 32 C8 8C C1

5. Capacacitive oil rod compatible output mode

A command sent by the terminal or computer to the level

ASCII ： $!RY0151

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

The liquid level instrument replied:

ASCII ： *CFV0100FA32B6

00FA32 is the current AD value, 00 is less than 6 bytes, FA32 is the current level AD value ASCII, indicating hexadecimal, meaning the current level value is 0 xFA 32.

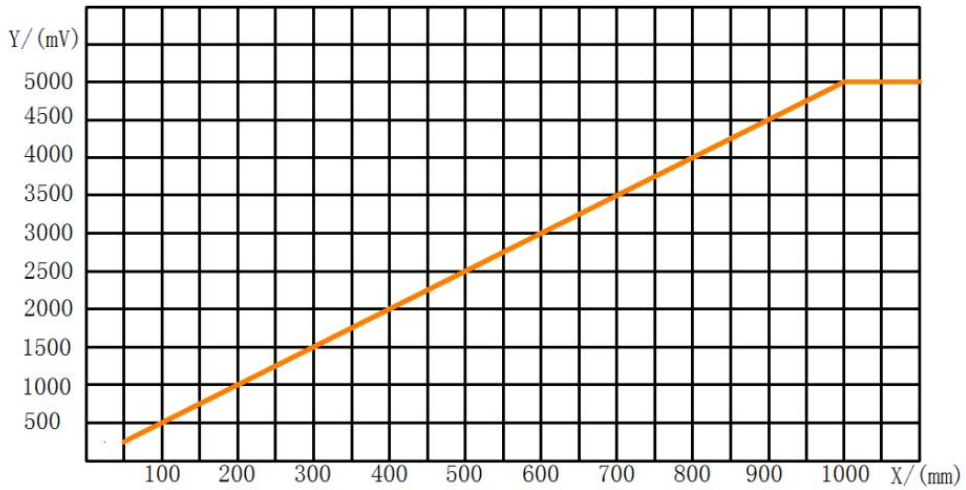
Note: This AD value is 000000~~00FFFF AD value corresponding to 00 ~ 100% change in oil level

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

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

6. Voltage analog output

1) Distance and voltage relationship diagram



Note: X axis represents distance and Y axis represents voltage.

2) The calculation method

By reading the voltage value of the output pin of the voltage analog amount, the corresponding distance value can be calculated. The default of the voltage value of 0-5000mV corresponds to the distance value of 01000mm, and the voltage of every 5mV

corresponds to the distance of 1mm.5000 mV voltage is output when the detection distance is greater than 1000mm, and less than 50mV when the liquid is not detected.

For example, when the current read analog output pin voltage value is 3000mV

By: S=U / 5000 * 1000;

D: distance =3000 / 5000 * 1000=600mm;

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

Note: voltage analog output pin resistance load 3 mA.

4. parameter

1. Basic parameters

Parameter item	parameter values	unit	remarks
input voltage	DC12～48	V	
Average working current	≤25	mA	（1）
measuring range	50～1000	mm	（2）
certainty of measurement	≤5	mm	（2）
resolving power	≤1	mm	
Measurement Angle	2～4	°	（3）
Measured container thickness	0.6～5.0	mm	（4）

remarks:

(1) The higher the power supply, the smaller the current is.

(2) Normal temperature and humidity, 1 standard atmospheric pressure, measuring liquid is 0 # diesel oil, detect other liquids, explain first when ordering; (3) target container wall 2mm thick, steel, content 50~100cm diesel oil, change the tilt Angle of the container test.

(4) The measurement distance is affected by the material and thickness of the container. If the special material or the test thickness is greater than 5.0mm, it should be explained when ordering.

2. Rated environmental conditions

project	least value	representative value	crest value	unit	remarks
Storage temperature	-25	25	70	℃	
Storage humidity		65%	90%	RH	（1）
working temperature	-20	25	60	℃	
Working humidity		65%	80%	RH	（2）

Note: (1) When the ambient temperature is 0-39℃, the highest humidity value is 90% (no condensation).

(2) When the ambient temperature is 40-50℃, the highest humidity is the highest humidity in nature at the current temperature (no condensation).

3. Rated electrical conditions

Parameter item	least value	representative value	crest value	unit	remarks
working voltage	10	24	48	V	
peak point current	150		500	mA	peak-to-peak value
Enter the ripple			200	mV	peak-to-peak value
input noise			500	mV	peak-to-peak value
ESD			±4K/±8K	V	（2）

Note: (1) The probe housing and output lead comply with IEC61000-4-2 standard.

4. Reliability test conditions

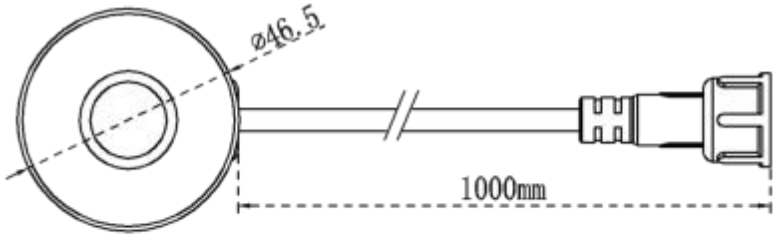
order number	test item	experiment condition	sample size
1	High temperature and high humidity	60℃, 85%RH，Power ON@24V，240hrs	3

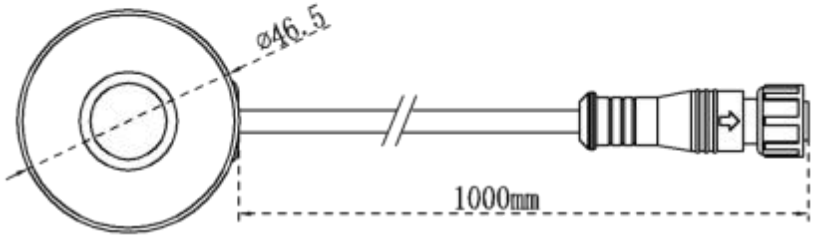
	work		
2	Low temperature work	-20℃, Power ON@24V，240hrs	3
3	High temperature and high humidity storage	70℃, 90%RH，storage，120hrs	3
4	Low temperature storage	-25℃, storage，120hrs	3
5	vibration test	10-200Hz,15min,2.0G, XYZ three axial, 0.5 hours for each axis	3
6	fall-down test	1.2m free fall, 5 times @ wood floor	3

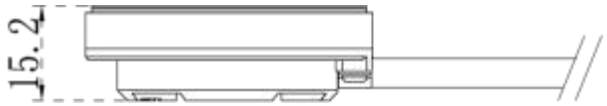
Note: After the test, the module determines OK through the functional test, and the performance decay rate is 10%.

5. Appearance size

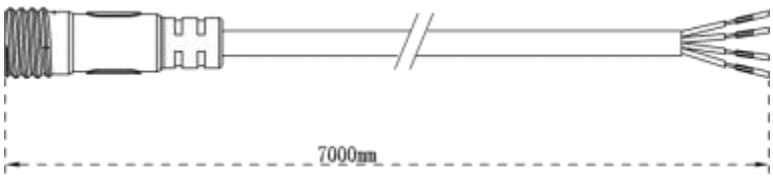
(1) Product body size (unit: mm)

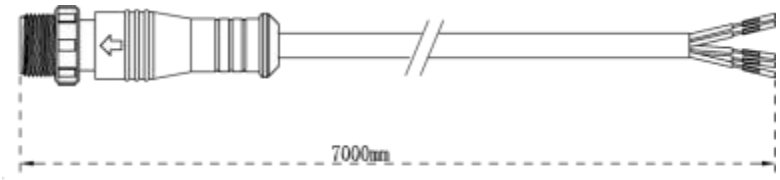






(2) Signal line size





5. Matters needing attention

1. The total length of the ultrasonic sensor transmission line is 8 meters by default. Users cannot lengthen the wire length by themselves. Change of wire size if required
Length, please communicate with our relevant technical personnel for processing.
2. During the installation, the vehicle should be parked on the flat road surface, and the liquid level in the fuel tank is 20cm high.
3. When installing the ultrasonic sensor, follow the installation instructions.
4. After refueling, the change of liquid level height must be greater than 30mm, otherwise the oil level value will not be updated.
5. Test the alarm function, which can be valid after one minute of power.

6. Version Statement

The document version will be updated with the product upgrade. Before using or understanding the product, please consult the sales staff, or check the company website to check the document version.