2000mm Ultrasonic Fuel Level Sensor UFL2000
Specification

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I. Overview

UFL2000 fuel level meter is a sensing device that uses ultrasonic detection technology to measure the non-contact liquid level of fuel and liquid substances. Compared with traditional testing equipment, UFL2000 fuel level meter has high measurement accuracy and is easy to use. It can be externally installed (without destroying the container structure), and can be connected to networked devices for network monitoring and management. The ultrasonic fuel quantity monitoring sensor is optimized for vehicle monitoring mode. It can adapt to vehicles running or stationary at various speeds on various roads, and can output more stable data for other liquids loaded on the vehicle. UFL2000 fuel level meter is referred to as sensor.

II. Product Features

Non-contact measurement, no need to change the shape of the container, no need to polish the surface paint layer of the container;
Metal casing, internal circuit potting treatment, rainproof design, suitable for outdoor environment; built-in powerful magnet, external waterproof adhesive, easy to install, fixed and firm;
Wide voltage operation, DC 12~48V power supply, suitable for all kinds of vehicles;
RS232 output interface, compatible with various sensor signal connections;
High-frequency ultrasonic testing, high solid penetration, suitable for containers of various materials such as metal and plastic
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-scale measurement resolution

III. Application

Vehicle fuel quantity monitoring
Liquid level measurement

Container water level monitoring

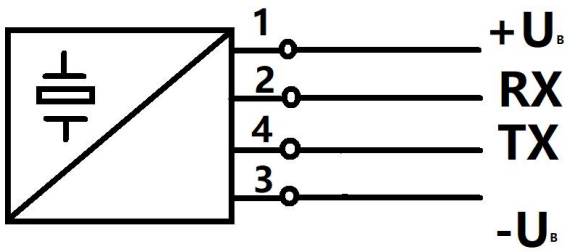
IV: Parameters

Technical data	
General Specifications	
Sensing distance	20…2000mm
Adjustment range	20…2000mm
Unusable area	0…20mm
Standard target plate	100mm×100mm
Transducer frequency About	2 MHz
Response delay About	85 ms
Indicators/Operating means	
LED yellow	solid: NO LED flash:
LED red	flashing:
Electrical specifications	
Operating voltage U_B	5…12 VDC ripple10%ss
No-load supply current	≤20mA
Output	
Output type	1 digital output RS485 or UART/TTL
Resolution	
Deviation of the characteristic curve	±1% of full-scale value
Repeat accuracy	±0.1% of full-scale value
Load impedance	>1k Ohm

Maximum switching current	mA
Temperature influence	±1.5% of full-scale value
Ambient conditions	
Ambient temperature	-25…70℃
Storage temperature	-40…85℃
Mechanical specifications	
Protection grade	IP68
Connection	PVC cable,4-CABLE
Material	
Housing	PBT OR FRP
Transducer	Epoxy resin/hollow; Polyurethane foam
Weight	30g
Compliance with standards and Directives	
Standard conformity	CE/ CCC

V. Wire connection

1 RD=RED
2 GN=GREEN
3 BK=BLACK
4 YL=YELLOW



VI: MODBUS Communication

MODBUS RTU communication protocol

1. The hardware uses RS-485/422/UART TTL, master-slave half/full duplex communication, with the master calling the slave address and the slave responding to communication.
2. Data frame 10 bits, 1 start bit, 8 data bits, 1 stop bit, no checksum.
Baud rate 9600 19200 115200 (default is 9600)
3. Function code 03H: Read register value

Host sends:

1	2	3	4	5	6	7	8
ADR	03H	Starting register high byte	Starting register low byte	High number of registers in bytes	Low number of registers in bytes	CRC code low byte	CRC code high byte

1st byte ADR: Slave address code (x01~0xFE default 0x01)
Second byte 03H: Read register value function code
3rd and 4th bytes: starting address of the register to be read
5th and 6th bytes: number of registers to be read
7th and 8th bytes: CRC16 checksum from bytes 1 to 6

When the slave receives correctly, it sends back:

1	2	3	4、5	6、7		M-1、M	M+1	M+2
ADR	03H	total bytes	Register Data 1	Register Data 2	。。。	Register data M	CRC code low byte	CRC code high byte

1st byte ADR: Slave address code
Second byte 03H: Return the read function code
The total number of bytes from 4 to M (including 4 and M) in the third byte
4th to M bytes: Register data
M+1 and M+2 bytes: CRC16 checksum from byte 1 to M

4. Function code 06H: Write a single register value

Host sends:

1	2	3	4	5	6	7	8
ADR	06	Register address high byte	Low byte register address	High byte data	Low byte data	CRC code low byte	CRC code high byte

When the slave receives correctly, it sends back:

1	2	3	4	5	6	7	8
ADR	06	Register high byte	Register low byte	High byte data	Low byte data	CRC code low byte	CRC code high byte

When the slave receives an error, it sends back:

1	2	3	4	5
ADR	86H	Error message code	CRC code low byte	CRC code high byte

1st byte ADR: Slave address code (=001~254)
Byte 1 86H: Function code for writing register value error
3rd byte information code: see information code table
4th and 5th bytes: CRC16 checksum from bytes 1 to 3

5. Register Definition Table: (Note: Register addresses are encoded in hexadecimal, with the higher bits coming first)

Register address	Content Description	only read	only write	Register address	Content Description	only read	only write
1000	Measurement distance (mm) (2-byte high-order)	√		1001	Instantaneous temperature value (℃) (where the high bit is the positive and negative indicator bit, and the temperature is 1 below zero, otherwise it is zero; the low bit is the temperature value)	√	
				100E	Device address (default 01H) (value range 0x00-0FA)		
1010	Baud rate (default 9600; values: 01-9600, 02--19200, 03-115200)			1011	Reserved		
1012	Liquid types (01 water, 02 diesel, 03 gasoline)			0019	Reserved		
001A	Reserved			001B	Reserved		

(1) Example of reading a single register: reading distance (current sensor address is 0x01)
send out:
01 03 10 00 00 01 80 CA
return:
01 03 02 06 78 BB C6
The two red bytes indicate that the current measurement value is 1656 (0x0678=1656 in millimeters)
(2) Example of reading multiple registers: reading distance and temperature (current sensor address is 0x01)
send out:
01 03 10 00 00 02 C0 CB
return:
01 03 04 07 78 00 16 FA 90
The two red bytes represent: current distance of 1912mm (0x0778), temperature of 22 ℃ (0x0016);
(3) Example: Write baud rate
send out:
01 06 10 10 00 01 4D 0F
Write baud rate 01 (9600)
return:
01 06 10 10 00 01 4D 0F
Returning 01 indicates successful writing
(4) Example: Read the currently set liquid type
Send:
01 03 10 12 00 01 20 CF
(5) Example: Setting the type of liquid to be measured
01 06 10 12 00 01 CE CF
01 Water, 02 Diesel, 03 Gasoline

VII. Installation

There is a set of install shell for this fuel level sensor, it include shell A and shell B, as picture:

1/ First, use fuel level sensor to locate a point on the bottom of the tank and mark it, make sure the signal is good.
2/ Stick the Shell A with strong glue at the marked point on the bottom of tank.
3/ Put the fuel level sensor into the Shell A, pay attention that there is no any bubbles and gap between the sensor and tank surface, the best way is to put some coupling agent on the sensor surface when put the sensor into Shell A.
4/ Screw up Shell B to Shell A, fix the sensor tightly.

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