ATO

Waterproof Ultrasonic Level Sensor

User Manual



ATO-BRW700-CS03

● Important Notice

Thank you very much for choosing our products. We are committed to providing you with sincere service for as long as you use them. Our company strives for excellence in quality and places even greater emphasis on providing excellent after-sales service.

Improper operation may shorten the product's lifespan, reduce its performance, and, in severe cases, lead to accidents. Please ensure this manual is provided to the end user and read carefully before using the product. Please keep this manual in a safe place for future reference. We reserve the right to modify this manual due to updates in product technology and manufacturing processes. Any changes will be made without prior notice, and we reserve the right to the final interpretation of this manual.

● Product Overview

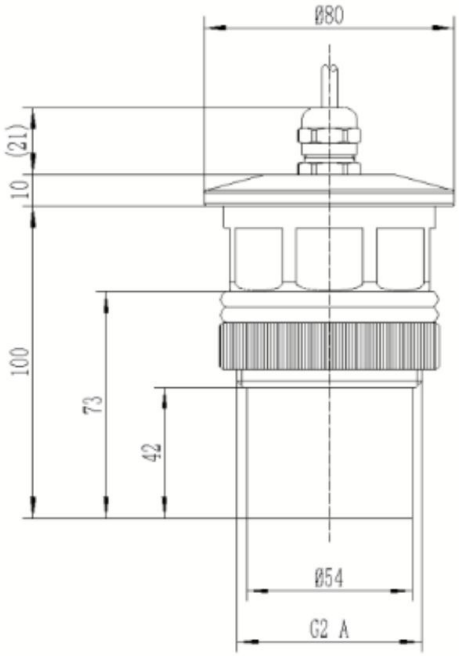
The waterproof ultrasonic level sensor is an integrated measuring instrument consisting of a sensor and a built-in intelligent circuit control system.

It is a device used to measure the distance from a surface to the surface of a liquid or object. The level sensor is easy to install and maintain, and is widely used for non-contact distance measurement to reliably determine the surface level of clear water, wastewater, adhesives, slurry, or channel flow, among other applications.

• Technical Specifications

Supply Voltage	12–30 VDC
Output Signal	
Operating Current	30 mA @ 12 V DC
Power Consumption	<0.25 W
Measuring Range	0–5–10 m
Accuracy	0.3%–1% FS
Response Time	≤1 s
Dead Zone	≤40 cm
Operating Temperature	–20–60 °C
Cable Length	2 m
Operating Frequency	40 kHz ±5%
Detection Angle	Half-power angle at -3 dB (pulse width): 11.3° ±10%
Housing Material	Apex angle: 26.6° ±10%
Operating Pressure	PC
Protection Rating	≤0.3 MPa

• Electrical Interfaces and Wiring Methods



RS485 Electrical Interface Wire Color Definitions	
Red line	12-30V DC
Black line	Ground
Green line	RS485 A(485+)
White line	RS485 B(485-)
RS485+4-20mA Electrical Interface Wire Color Definitions	
Red line	12-30V DC
Black line	Ground
Green line	RS485 A(485+)
White line	RS485 B(485-)
Blue line	Iout

● Important Notes

1. After opening the product packaging, please inspect the product to ensure it is in good condition, verify that the product matches the relevant information in the user manual, and keep the user manual in a safe place for at least one year.

2. Connect the wires strictly according to the product's wiring diagram, and operate the product within its permitted excitation voltage range; never exceed the rated voltage.

3. Do not strike the product, as this may damage its exterior or internal components.

4. This product contains no user-serviceable parts. In the event of a malfunction, please contact our company.

5. For product failures occurring under normal operating conditions, the warranty period is one year (12 months from the date of shipment by our company to the date of return). Whether a failure is deemed to have occurred under normal conditions shall be determined based on the assessment by our quality control inspectors. Repairs performed after this period will incur a service fee; however, all our products are eligible for lifetime repair service.

6. When installing multiple units of this product, the spacing between them should be greater than 5 meters.

7. For any matters not covered herein, please visit our company's website or call us for further information.

(RS485) MODBUS Communication Protocol

● Basic Communication Protocol Settings

Communication Protocol: MODBUS-RTU.

Communication Parameters:

Default baud rate 9600 bps (selectable options include 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, and 115200 bps; configurable per user requirements), 1 start bit, 8 data bits, no parity (odd or even parity selectable), 1 stop bit. The sensor must be powered off and on again after changing the communication parameters.

Slave Address:

The factory default is 1, configurable according to user requirements. 200 is the universal slave address; do not set it to 200 if multiple slaves are to be used.

● Maintain the Register List

Note: This register address table corresponds to the parameters of standard sensors. If you select a different sensor, please contact our technical support team.

Parameters	MODBUS Hold Register Addresses (16-bit)
Distance Value	Address: 0000H, Distance/Height Value, 2 bytes (high-byte first), unit: mm
Current Signal Value	Address: 0001H, Analog Signal Output Value, 2 bytes (high-byte first), unit: uA (This value is valid for the analog signal output option)
Temperature Value	Address: 0002H, Temperature value, 2 bytes (high-byte first); divide the read value by 10 to obtain the measured temperature
Baud Rate	Address: 0062H, Set to 48, 96, 192, 384, 576, or 1152, corresponding to baud rates 4800, 9600, 19200, 38400, 57600, and 115200, respectively. For example, the default baud rate is 9600, so the setting value is 0x0060
Slave Address	Address: 006BH, default slave address is 1

Note: Access to other addresses is prohibited.

● Modbus RTU Command

Supported MODBUS function codes: 0x03, 0x06

Example of function code 03H: Read measurement data from the sensor with slave address 1.

★Master query command:

Slave Address	01H	Start Address
Function	03H	Function Code
Starting Address Hi	00H	Upper 8 bits of the start register address
Starting Address Lo	00H	Lower 8 bits of the start register address
No. of Registers Hi	00H	Upper 8 bits of the number of registers
No. of Registers Lo	01H	Lower 8 bits of the number of registers
CRC Check Lo	84H	Lower 8 bits of the CRC check code
CRC Check Hi	0AH	Upper 8 bits of the CRC check code

★ **On-board response:**

Slave Address	01H	Start Address
Function	03H	Function Code
Byte Count	02H	Length: 2 bytes
Data Hi	00H	Distance at this point: 247 mm
Data Lo	F7H	
CRC Check Lo	F9H	Lower 8 bits of the CRC check code
CRC Check Hi	C2H	Upper 8 bits of the CRC check code

06H Function Code Example: Changing the Baud Rate (In this example, it is changed to 57,600 bps)

Host query commands:

Slave Address	01H	Start Address
Function	06H	Function Code
Starting Address Hi	00H	The address of the baud rate hold register is 0062H
Starting Address Lo	62H	
Data Hi	02H	When the baud rate is 57,600 bps, the register value is 576, which is 0x0240
Data Lo	40H	
CRC Check Lo	28H	Lower 8 bits of the CRC check code
CRC Check Hi	84H	Upper 8 bits of the CRC check code

★ **On-board response:**

Slave Address	01H	Start Address
Function	06H	Function Code
Starting Address Hi	00H	The address of the baud rate hold register is 0062H
Starting Address Lo	62H	
Data Hi	02H	When the baud rate is 57,600 bps, the register value is 576, which is 0x0240
Data Lo	40H	
CRC Check Lo	28H	Lower 8 bits of the CRC check code
CRC Check Hi	84H	Upper 8 bits of the CRC check code