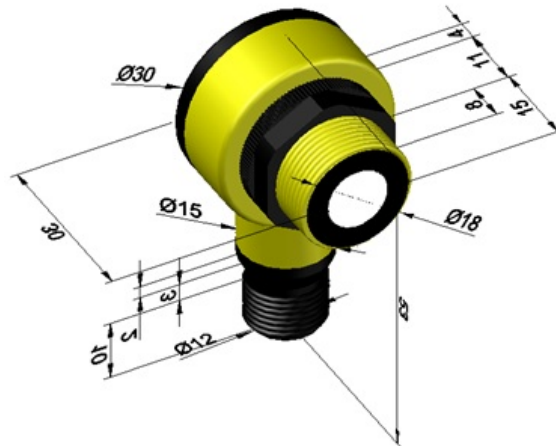# SUL802 Ultrasonic Level Sensor

(M18 analog output)
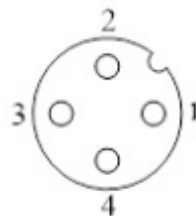
Users Manual

1. Dimensions: (unit: mm) Note: Small size needs to be customized.

2. Connection method:

1 Brown wire: power positive
2 Black wire: output
3 White wire: Learning Lines
4 Blue wires: power supply negative

3. Technical parameter:

Signal output	4~20ma	0~10V
Powered by	10~30VDC	15~30VDC
Measuring range	60~300mm	
Blind spot	60mm	
Standard test board	300x300mm	
Angle	10	
Repeatability	0.3%	
Temperature drift	0.05%/°C (built-in temperature compensation)	
Linearity	<1%	
Resolution	0.1% of range (0.5mm min)	
Response time	125ms	
Sync function	No	
Electromagnetic Compatibility	GB/T17626.2-2006 / GB/T17626.4-2008	
Power consumption	20ma	
Load	Current output: <500Ω Voltage output: >5kΩ	
Protect the circuit	Anti-reverse connection protection, instantaneous overvoltage protection	
Sensor frequency	400KHz	
Operating temperature	-20°C~+60°C	
Stored temperature	-40°C~+70°C	

Shell material	ABS
weight	165g
Cable length	2m

3.1 Temperature influence:

The speed of sound depends on the composition of the transmitted gas, the air pressure, air humidity, and temperature. For most ultrasonic applications, gas composition and pressure are relatively constant, while temperature may vary (for every 6°C change in average temperature, the speed of sound in air varies by 1%). In air, the propagation velocity of air is approximately equal to the following formula:

$$C_{m/s} = 20 \sqrt{273 + T_c}$$

$C_{m/s}$ = speed of sound in meters per second
T_c = temperature in °C

Temperature compensation can compensate 80~90% of the error caused by temperature (if there is a temperature gradient in the measurement range, the compensation effect will be weakened).

3.2 The temperature compensation device inside the sensor cannot adapt to the ambient temperature change as quickly as the external temperature compensation device. When the temperature changes and fluctuates rapidly, it is best to use an external temperature monitor to correct the distance measurement that the sensor fails to compensate in time, so as to complete the accuracy requirements required for detection and control. When using temperature compensation, direct exposure to sunlight will affect the temperature compensation accuracy of the sensor due to temperature changes. In addition, the temperature compensation function has a certain hysteresis, about 30 minutes.

3.3 Synchronization function: This product does not have a synchronization function, please do not install it side by side. If necessary, please consult the relevant personnel.

3.4 About measurement: Different objects under test have different reflection intensities to sound. For materials such as wool and corduroy that are easy to absorb sound, it is recommended to select some sensors with farther measurement range and lower frequency. Please keep a certain margin when measuring.

4. Signal indicator:

Operating status	Red LED	Yellow LED
Target detected during setup	Bright	Flicker
Target not detected	Flicker	Dark
Target is uncertain	Bright	Dark

5. Analog output mode:

The sensor has two analog output modes (rising and falling modes) as shown in the figure below:
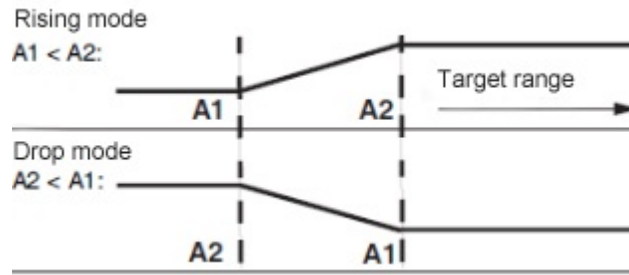
First the sensor is powered on, the red and yellow indicator lights on the back of the sensor will light up.

5.1 Set the farthest distance A2:

    5.11. Put a measured object at the place where you want to set the distance.

    5.12. Connect the white wire (learning wire) and the brown wire (power positive) together, during this period, if the measured object is captured, the yellow light will keep flashing. After four to five seconds in this state, remove the white wire. The setting is successful.

5.2 Set the closest distance A1:

    5.21. Put a measured object at the place where you want to set the distance.

    5.22. Please connect the white wire (learning wire) and the blue wire (power negative), and repeat the above steps.

Note: During the setting process, the yellow light and the red light may flash together, indicating that the sensor does not accurately capture the measured object. The sensor needs to be moved slightly to align it with the object under test. until the yellow light flashes continuously and individually. (This setting process must be completed within 3 minutes, otherwise the sensor will be locked. It needs to be disconnected from the power supply, re-powered, and then reset.

6. Waveform diagram of ultrasonic sensor: (There may be deviations during the experiment, for reference only.)
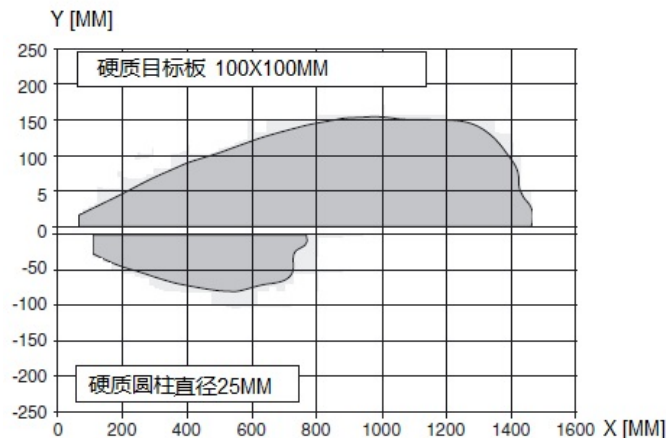
7. Installation:

Since the ultrasonic sensor is directional, be sure to pay attention to its installation location. It is recommended that the installation position be perpendicular to the object to be measured, so that the measurement data will be relatively accurate. (with mounting fixing nut)
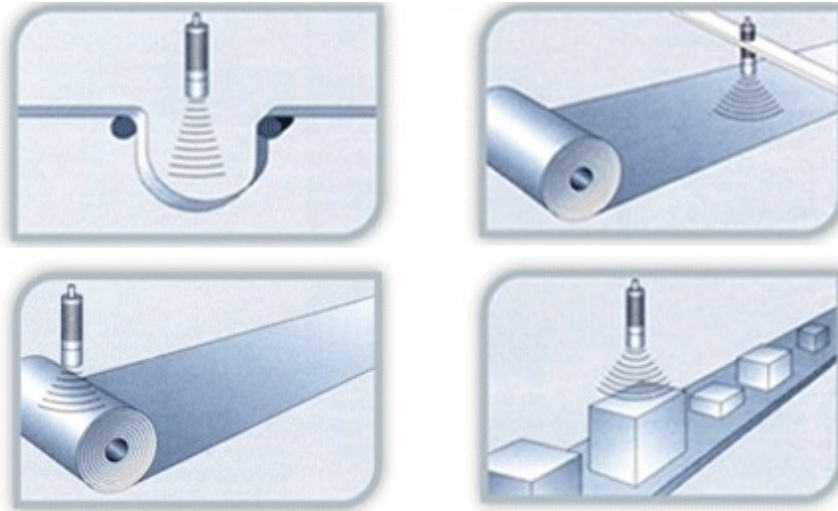
8. Notes:

8.1 The sensor is a precision instrument, please do not scratch the surface.

8.2 The sensor shell material is nickel-plated copper, please do not use it under strong acid and alkali conditions.

8.3 When the sensor is used, there should be no strong mechanical vibration, and the working environment should not have strong electromagnetic interference.

8.4 The sensor shall not be disassembled without permission. If it is disassembled without permission, the company will not be responsible for all the consequences caused by damage.

8.5 The sensor cannot be used in a vacuum area or explosion-proof area, and all consequences shall be borne by the customer himself.