

LS20, EL, OMNI-L

Ультразвуковые датчики

GHM MESSTECHNIK



Технические характеристики

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Ultrasound Level Transmitter EL



Characteristics

The level transmitter consists of an ultrasound sensor which, contact-free, determines the separations of media of different types (fluids, transported goods, solids). The ultrasound sensor works on the principle of end-to-end measurement. Emitted ultrasound impulses are reflected at the surfaces, and return to the transducer after a transit time. The transit time is proportional to the distance. The sensors have a control input which makes it possible to synchronise up to 12 sensors with one another, or also to switch off the sensor. In normal operation, the control input (pin 2) is left open.

To switch the sensor off, the control input is connected to 0 V. In this case, the signal last existing at the analog output is frozen until the sensor is released again.

In order to synchronise several sensors with one another, the control inputs of all sensors are connected to one another. The sensors' pulse packages are then emitted simultaneously. The received ultrasound echo from each individual sensor is then evaluated and presented at the analog output.

Technical data

Types	EL-018HP0600	EL-018HP1500	EL-030HP2500
Connection	M18x1	M18x1	M30x1.5
Metering range	100..600 mm	200..1500 mm	300..2500 mm
Response time (at 90 %EW)	< 50 ms	< 90 ms	< 150 ms
Weight	0.05 kg	0.05 kg	0.15 kg

Combined data:

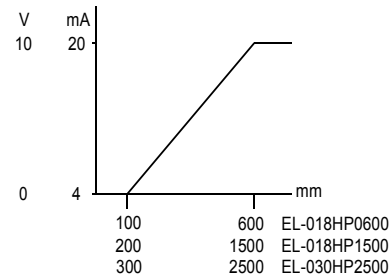
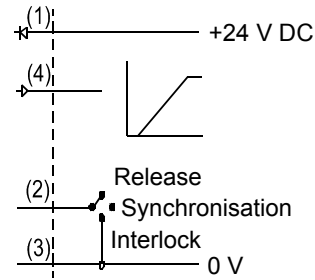
Sensor	piezoceramic ultrasound transducer
Sound beam	8 °
Linearity error	< 0.3 %
Repeatability	±2 mm
Temperature range	-20..+70 °C
Operating voltage	18..30 V DC
Output	0..10 V or 4..20 mA
Medium temperature	max. 90 °C
Construction material	PET 30 % glass fibre
Ingress protection	IP 67
Electrical connection	for round plug connector M12x1, 4-pole
Conformity	CE

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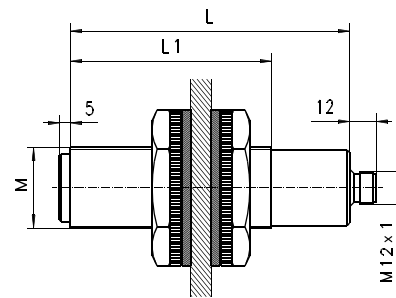
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EL

Wiring



Dimensions



Types	L	L1
EL-018HP0600V	92	65
EL-018HP1500V	92	65
EL-030HP2500V	130	62

Ordering code

EL - 1. 2. 3. 4. 5. P S

○=Option

1. Connection size	
018H	screw-in fitting M18x1
030H	screw-in fitting M30x1.5
2. Connection material	
P	PET
3. Range	
0600	100.. 600 mm
1500	200..1500 mm
2500	300..2500 mm
4. Output signal	
V	0..10 V
T	○ 4..20 mA
5. Optional	
S	for round plug connector M12x1, 4-pole

Ultrasonic Sensor Series LS20



- Measuring ranges from 30..8000 mm
- Switching- and analogue outputs
- Teach-In function
- Foreground fade-out
- Operating temperature -25..70 °C
- Protection class IP67

Characteristics

The LS20 measures the distance to an object within the detection zone contact less. Depending on the adjusted detect distance the switched output is set. LS sensors have internal temperature compensation. Because the sensors heat up on their own, the temperature compensation reaches its optimum working point after approximately 30 minutes of operation. The sensors indicate a blind zone, in which the distance cannot be measured. The operating range indicates the distance of the sensor that can be applied with normal reflectors with sufficient function reserve.

Technical data

Power supply
 Supply voltage U_B : 9..30 V DC, reverse polarity protection
 Voltage ripple : $\pm 10\%$
 No-load supply current : ≤ 80 mA
 Operating temperature : -25..70 °C
 CE-conformity : EN60947-5-2

Detecting zones	MB1	MB2	MB3	MB4	MB5
Min. range [mm]	30	60	200	350	600
Optimal range [mm]	250	350	1300	3400	6000
Max. range [mm]	350	600	2000	5000	8000
Ultrasonic frequency [Hz]	320	400	200	120	80
Solution, sampling rate [mm]	0.18	0.18	0.18	0.18	0.18

Display : LED red, 7,6 mm
 Indicating range : 0..999 Digit
 LED's : output indicators, 3-colors

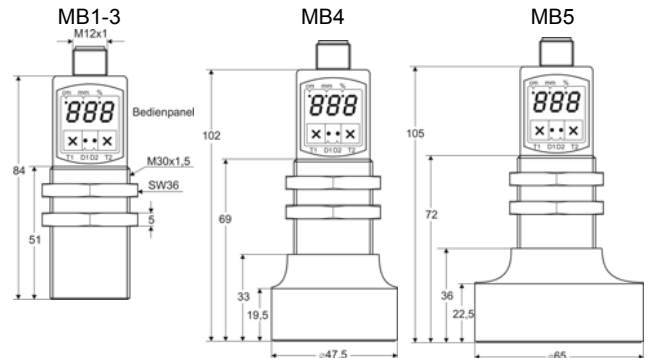
Output
 Switched output PNP : $U_S=U_B-2$ V; I_{max} 200 mA, short circuit proof, NO orNC programmable

-Switching hysteresis : programmable
 -Switching frequency : max. 11 Hz
 -Response time : min. 50 ms
 -Start-up delay : <300 ms
 Current output : 4..20 mA, $R_L \leq 100 \Omega$ at 9 V $\leq U_B \leq 20$ V
 $R_L \leq 500 \Omega$ at $U_B > 20$ V

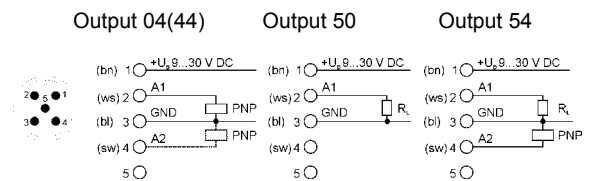
Voltage output : 0..10 V $R_L \geq 100$ k Ω at $U_B > 15$ V
Case : brass sleeve, nickel-plated;
 Plastic parts : PBT, TPU;
 Ultrasonic transducer : Polyurethane foam
 Epoxy resin with glass content

Weight : 150..270 g
 Connection : 5-pole plug M12, PBT
 Protection class : IP67

Dimensions



Connection diagram



Ordering code

LS20 - - -

1. Ranges [mm]	min..optimal/maximal detecting zones
1	30..250/350
2	60..350/600
3	200..1300/2000
4	350..3400/5000
5	600..6000/8000
2. Output	
04	1 PNP-switching output
44	2 PNP-switching outputs
50	1 analogue output 4..20 mA/0..10 V DC
54	1 analogue output, 1 PNP-switching output
3. Options	
00	without option
VA	case stainless steel 1.4571
Accessory connection cable	
SKM5E-02	2 m
SKM5E-02VA	2 m, plug material stainless steel
SKM5E-05	5 m
SKM5E-05VA	5 m, plug material stainless steel

Level Transmitter / Switch OMNI-L



- Ultrasound, level, and distance measurement with display
- Analog output, two switching outputs
- Compact construction
- Clear, easily legible, illuminated LCD display
- Modifiable units in the display
- Designed for industrial use
- Small, compact construction
- Very simple installation

Characteristics

The level sensor consists of the primary sensor (an ultrasound sensor) which, contact-free, determines the separations of media of different types (fluids, transported goods, solids). The ultrasound sensor works on the principle of end-to-end measurement. Emitted ultrasound impulses are reflected at the surfaces, and return to the transducer after a transit time. The transit time is proportional to the distance. The electronics convert the transit time into a distance, and output an analog output signal proportional to the separation. The separation is displayed in cm or inch (other units available on request).

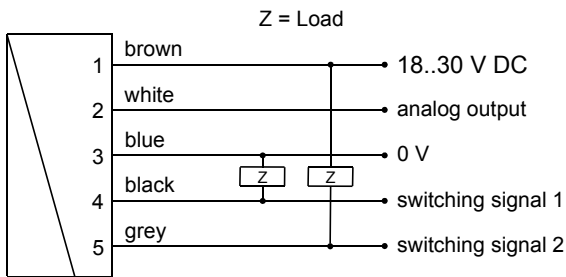
By turning the programming ring to right or left, it is simple to modify the parameters (e.g. switching point, hysteresis...). To protect from unintended programming, it can be removed, turned through 180°, and replaced, or completely removed, thus acting as a key.



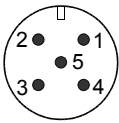
Technical data

Sensor	ultrasound transmitter / receiver	
Mechanical Connection	3-hole flange	
Metering ranges	1.5 m or 2.5 m	
Sound beam	8 degrees	
Measurement accuracy	±0.2 % FS	
Linearity error	< 0.3 % FS	
Temperature error	0.03 %/°C	
Working temperature	0..70 °C	
Storage temperature	-20..+80 °C	
Supply voltage	18..30 V DC	
Power consumption	< 3 W	
Analog output	0/4..20 mA (0/2..10 V available on request)	
Switching output	transistor output "push-pull" (resistant to short circuits and polarity reversal) I _{out} = 100 mA max.	
Hysteresis	adjustable, position of the hysteresis depends on minimum or maximum	
Display	backlit graphical LCD-Display (transreflective), extended temperature range -20..+70 °C, 32 x 16 pixels, background illumination, displays value and unit, flashing LED signal lamp with simultaneous message on the display.	
Electrical connection	for round plug connector M12x1, 5-pole	
Materials medium-contact	PET 30 % fibreglass, epoxy resin, POM	
Materials, non-medium-contact	housing	stainless steel 1.4305
	glass	mineral glass, hardened
	magnet ring	samarium-Cobalt POM
Ingress protection	IP 67	
Weight	approx. 0.3 kg	
Conformity	CE	

Wiring

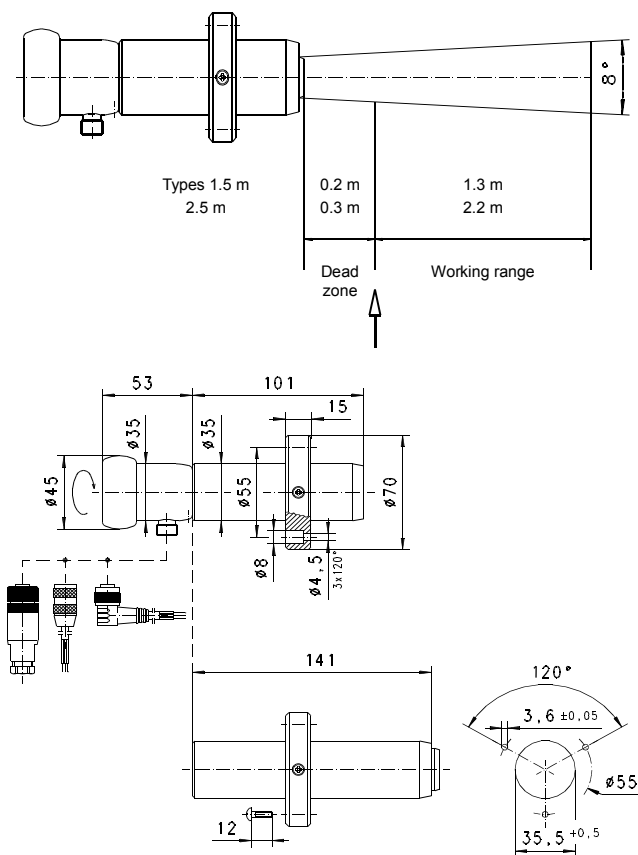


Connection example: PNP NPN



The switching outputs are self-configuring, depending on whether they are connected as PNP or NPN switches (push-pull). It is recommended to use shielded wiring.

Dimensions



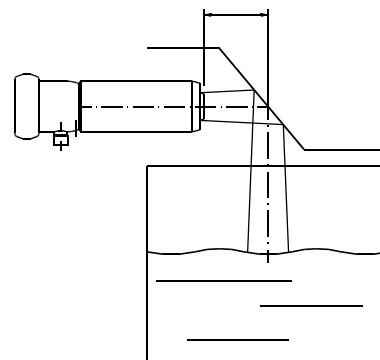
A gooseneck (optional) between the electronics head and the primary sensor provides freedom in the orientation and reading direction of the sensor.

Handling and operation

Installation

A $\varnothing 35.5$ hole and fixing drillings (see "Dimensions") must be broken through for the supplied stainless steel bolts (self-cutting). The separation from the container's outer wall must be taken into account (reflection!) The ultrasound cone must normally be opened vertically with the surface of the material being measured. The sensor's dead zone must be taken into account (see also example for fixing). Variations in measured values (e.g. due to movement from agitators) may be masked by the use of filter times on the device.

Dead zone

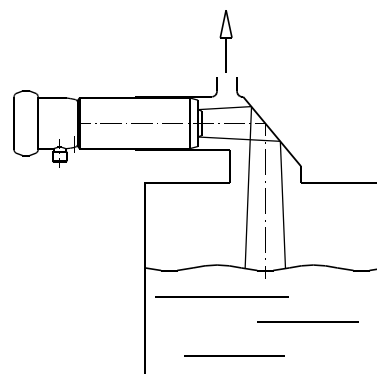


Possible arrangement of the sensors

It should be noted that the sensor has a limited working range (dead zone). This may mean that in some circumstances the sensor must be mounted relatively high in order to ensure the minimum separation from the measured material, and to avoid incorrect measurements. One possibility of reducing the installation height is the diversion of the ultrasound signal to a reflection surface in front of the sensor (see diagram).

Wave slap, and surfaces which are too steep to the surface of the level to be measured should be avoided. Temperatures $> 60^\circ\text{C}$ at the measured surface may result in deviations in accuracy (here, a ventilated or aspirated submersion tube can help).

Aspiration



High dust levels reduce the ultrasound signal and produce incorrect measurements. Depending on density, foams may or may not be recognised.

Programming

The annular gap of the programming ring can be turned to positions 1 and 2. The following actions are possible:



Set to 1 = continue (STEP)
Set to 2 = modify (EDIT)

Neutral position between 1 and 2

The ring can be removed to act as a key, or turned through 180° and replaced to create a programming protector. Operation is by dialog with the display messages, which makes its use very simple. Starting from the normal display (currently measured value with unit), if 1 (STEP) is repeatedly selected, then the display shows the following information in this order:

Display of the parameters, using position 1

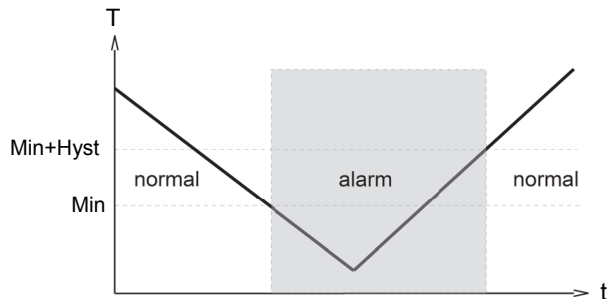
- Switching value S1 (switching point 1 in the selected unit)
- Switching characteristic of S1
- (MIN = monitoring of minimum value, hysteresis greater than switching value,
- MAX = monitoring of maximum value, hysteresis less than switching value)
- Hysteresis 1 (hysteresis value of S 1 in the set unit)
- Switching value S2
- Switching characteristic of S2
- Hysteresis 2
- Code:
After entering the code 111, further parameters can be defined:
- Filter (settling time of the display and output)
- Units: e.g. l/min or m³/h
- Output: 0..20 mA or 4..20 mA
- 0/4 mA (flow rate corresponding to 0/4 mA)
- 20 mA (flow rate corresponding to 20 mA)

Edit, using position 2

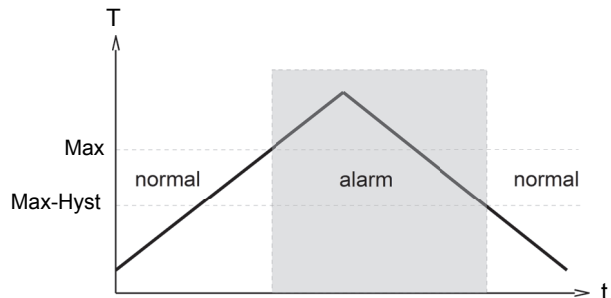
If the currently visible parameter is to be modified:

- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified.
- By repeatedly turning to position 2, values are increased; by turning to position 1, the next digit is reached.
- Leave the parameter by turning to position 1 (until the cursor leaves the row); this accepts the modification.
- If there is no action within 30 seconds, the device returns to the normal display range without accepting the modification.

The limit switches S1 and S2 can be used to monitor minimal or maximal. With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



The change to the alarm state is indicated by the integrated red LED and a cleartext in the display.

While in the normal state the switching outputs are at the level of the supply voltage; in the alarm state they are at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Overload of the switching output is detected, indicated on the display ("Check S1 / S2"), and the switching output is switched off.

Simulation mode

To simplify commissioning, the sensor supports a simulation mode for the analog output. It is possible to create a programmable value in the range 0..26 mA at the output (without modifying the process variable). This allows the wiring run between the sensor and the downstream electronics to be tested during commissioning. This mode is accessed by means of code 311.

Overload display

Overload of the switching output is detected, indicated on the display, and the switching output is set to high impedance.

Default setting

After setting the configuration parameters, they can be reset to factory values at any time, by means of code 989.

Starting from the normal display (current total and unit), if 1 (STEP) is selected repeatedly, then the display shows the following information:

Display of the parameters, using position 1

- Switching values S 1 and S 2: Switching values in the selected unit.
- Hysteresis direction of S 1 and S 2:
Max = Hysteresis less than S 1 or S 2
- Max = Hysteresis greater than S 1 or S 2
- Hystereses Hyst 1 and Hyst 2:
- Hysteresis values of the switching values in the set unit
- After entering code 111, further parameters can be defined (this should take place only if necessary)
- Filter: Selectable filter constants in seconds (affects display and output)
- Unit: e.g. bar or psi ...
- Output: 0..20 mA or 4..20 mA
- 0/4 mA: Displayed value for 0/4 mA
- 20 mA: Displayed value for 20 mA

Edit, using position 2

- If the visible parameter is to be modified:
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified. By repeatedly turning to position 2, values are increased; by turning to position 1, the next digit is reached. In this way, every digit can be modified. If there is no action within 5 seconds, the device returns to the normal display range without accepting the modification.

Saving the changes using position 1

- After leaving the last value, turn once to position 1; this accepts the modification.

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OMNI-L

Ordering code

1. 2. 3. 4.
OMNI-L **S**

○=Option

1. Range	
15	200..1500 mm
25	300..2500 mm
2. Output signal	
I	current output 0/4..20 mA
U	<input type="radio"/> voltage output 0/2..10 V (available on request)
3. Optional	
S	for round plug connector M12x1, 5-pole
4. Optional	
H	<input type="radio"/> model with gooseneck

Accessories

- Cable/round plug connector (KB...) see additional information "Accessories"
- Device configurator ECI-1

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