



Badger Meter Europa

Sensor series L2xx 2-wire ultrasonic level transmitter

Technical Bulletin
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Features

- Compact design
- Non contact intelligent ultrasonic
- Automatic temperature compensation
- Simple two step setup
- Two wire 4-20 mA loop powered operation
- Intrinsically safe
- EEx ia II C T6



Description

The L2xx series is a 2-wire, ultrasonic level instrument designed to measure liquid levels in closed or open tanks over a 50 foot (15 m) range. For simple installation it can be suspended from its cable, hung from 1/2" NPS conduit, or screwed into a 2" NPS (L215; 2,5") (BSP available) fitting. The units use a two wire 4-20 mA loop simplifying installation.

Normal setup is done using a magnetic key for security. Simply use a target or the actual tank levels and select the required 4 or 20 mA output by holding the key over the zero or span positions on the transmitter. Two LED indicators are activated to assist in the setting up and operation.

The L2xx series level transmitters are fully rated to operate in harsh environments where the atmospheres are corrosive, or hazardous. Employing a Tefzel™ nose, the unit can be threaded into a 2" (2,5") NPS opening and sealed. The container pressure can be as high as 28 psi (2 bar) above atmosphere, with temperatures from -4°F to 140°F (-20° C up to +60° C).

General

The ultrasonic processor-based 2-wire loop powered level transmitter is installed to measure the fluid level in accordance with the manufacturer's recommendations. The level transmitter has a microprocessor-based electronic and two LED indicators to allow simple 2-step field programming. The level transmitter is self-compensating for ambient temperature conditions and provides the level output over the 4-20 mADC loop current. The unit is intrinsically safe approved.

Four models are available: L206 (20'/6 m range), L208 (26'/8 m range), L210 (32'/10 m range) and L215 (50'/15 m range).

- Model L206 for shot distances up to 20 feet (6000 mm) with a dead zone of 10 inches (254 mm)
- Model L208 for shot distances up to 26 feet (8000 mm) with a dead zone of 12 inches (305 mm)
- Model L210 for shot distances up to 33 feet (10000 mm) with a dead zone of 16 inches (406 mm)
- Model L215 for shot distances up to 50 feet (15000 mm) with a dead zone of 20 inches (508 mm)

The level transmitter is supplied with 16 feet (4.9 m) sensor cable.

Operation

The L2xx series ultrasonic transducers are used for level measurement in open or closed vessels. Short controlled ultrasonic pulses emanating from the unit are aimed at a reflective target surface, after filtering out the noise, the time taken for the reflective pulses to strike the transducer are converted to linear measurements and conveyed to the remote indicator/recorded as a current value.

L2xx-e.doc 02/03

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Two-wire operation

The unit is powered from an external 4-20 mA DC loop current, 17 to 30 VDC. The loop must provide at least 17 volts for proper operation. The distance (level) is then indicated as an output on the current. The unit can be set up for the 4-20 to be spanned directly or inversely proportional.

Acoustic sensor

The acoustic sensor capable of transmitting and receiving acoustic signals is permanently mounted at the measuring site and positioned according to the manufacturer's recommendations. The sensor operates at a transmitted beam angle of 8 to 11 degrees, has built-in temperature compensation in the housing and be capable of indefinite submergence without degradation. The sensor function is over an ambient temperature range of -4°F to 140°F (-20°C to 60°C).

Troubleshooting

The unit will be supplied with two (2) different colored LED's, clearly visible on the topworks: Depending upon the sequencing of the LED, basic troubleshooting can be quickly and easily conducted.

Transmitter specifications

The transmitter contains all necessary circuitry to activate, register and utilize the transmitted and received acoustic signal with the capability to interchange sensors without factory recalibration. The transmitter incorporates sophisticated processing capability to properly distinguish proper signals to produce a reliable and accurate output signal. The transmitter is operating on a 2-wire 4-20 mA DC loop. The ultrasonic level transmitter contains 2 LED displays. The transmitter is enclosed in a NEMA 4X (IP68) (indoor/outdoor) housing constructed of ABS material with a Teflon™ (PVC) nose suitable for mounting at the location indicated on the plans. All components are of industrial grade to insure operation of an extended temperature range.

Operating parameters

The accuracy of the transmitter is unaffected by temperature changes within the specified temperature ranges. In the event of a prolonged loss of acoustic signal, the transmitter indicates this condition by defaulting to 22 mA. The level signal output will be on a 4-20 mA DC, current output directly or inversely proportional. The accuracy is $\pm 0.25\%$ of maximum span.

Mounting details

The housing has two methods of mounting. One is a 1/2 inch NPT threaded conduit located on the topworks. The other is a 2 inch (L215; 2,5") NPS flange thread on the nose for insertion into a tank. Supplied with the unit will be a magnetic key for programming and one (1) instruction manual. For additional copies a web site location will be provided.

Transducer cable specification

16 feet (4,9 m) of continuous signal cabling is supplied with the sensor to eliminate the requirement of a cable splice in the hazardous area. The cable shall be installed in an exclusive 1/2" (12 mm) continuous, watertight, metallic conduit.



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Specifications

L series 2-wire (loop powered) level transmitters

	L206	L208	L210	L215
Range	10 in. to 20 ft. (0.25m to 6.00m in liquids at 74°F (23°C)	12 in. to 26 ft. (0.30m to 8.00m in liquids at 74°F (23°C)	16 in. to 33 ft. (0.40m to 10.00m in liquids at 74°F (23°C)	20 in. to 50 ft. (0.5m to 15.00m in liquids at 74°F (23°C)
Current output	4-20 mA span directly or inversely proportional	4-20 mA span directly or inversely proportional	4-20 mA span directly or inversely proportional	4-20 mA span directly or inversely proportional
Accuracy	Better or equal to +/- 0.25% of maximum span	Better or equal to +/- 0.25% of maximum span	Better or equal to +/- 0.25% of maximum span	Better or equal to +/- 0.25% of maximum span
Resolution	0.12 in. (3mm)	0.12 in. (3mm)	0.12 in. (3mm)	0.12 in. (3mm)
Point setting	By magnetic key, non-volatile storage	By magnetic key, non-volatile storage	By magnetic key, non-volatile storage	By magnetic key, non-volatile storage
Status indication	Two visible LED's	Two visible LED's	Two visible LED's	Two visible LED's
Fault current	22 mA	22 mA	22 mA	22 mA
Loop load	$R_{max} = \frac{V_{supply} - 17}{22} \text{ k}\Omega$	$R_{max} = \frac{V_{supply} - 17}{22} \text{ k}\Omega$	$R_{max} = \frac{V_{supply} - 17}{22} \text{ k}\Omega$	$R_{max} = \frac{V_{supply} - 17}{22} \text{ k}\Omega$
Beam angle	8°	11°	11°	11°
Frequency	55 kHz to 60 kHz	45 kHz to 50 kHz	45 kHz to 50 kHz	35 kHz to 40 kHz
Storage temperature	-40°C to 80° C -40°F to 176°F	-40°C to 80° C -40°F to 176°F	-40°C to 80° C -40°F to 176°F	-40°C to 80° C -40°F to 176°F
Operating temperature	-20°C to 60°C (-4°F to 140°F) Please note that instrument has internal temperature compensation.	-20°C to 60°C (-4°F to 140°F) Please note that instrument has internal temperature compensation.	-20°C to 60°C (-4°F to 140°F) Please note that instrument has internal temperature compensation.	-20°C to 60°C (-4°F to 140°F) Please note that instrument has internal temperature compensation.
Container pressure	28 psi (200 kPa) above atmospheric	28 psi (200 kPa) above atmospheric	28 psi (200 kPa) above atmospheric	28 psi (200 kPa) above atmospheric
Enclosure rating	IP68 submersible	IP68 submersible	IP68 submersible	IP68 submersible
Approx. weight	2.2 lbs (1 kg) including integral 16 ft. (5m) cable	2.2 lbs (1 kg) including integral 16 ft. (5m) cable	2.2 lbs (1 kg) including integral 16 ft. (5m) cable	2.5 lbs (1.2 kg) including integral 16 ft. (5m) cable
Dimensions	Width: 4.1 in. (105mm) Length: 4.1 in. (105mm) Overall height: 4.3 inc. (112mm)	Width: 4.1 in. (105mm) Length: 4.1 in. (105mm) Overall height: 4.3 inc. (112mm)	Width: 4.1 in. (105mm) Length: 4.1 in. (105mm) Overall height: 4.3 inc. (112mm)	Width: 4.1 in. (105mm) Length: 4.7 in. (120mm) Overall height: 4.3 inc. (112mm)
Housing details	UV resistant ABS housing and Tefzel™ nose	UV resistant ABS housing and Tefzel™ nose	UV resistant ABS housing and PVC nose	UV resistant ABS housing and PVC nose
Mounting	Suspended from cable or ½ in. NPT conduit, mounted in 2" NPS flange	Suspended from cable or ½ in. NPT conduit, mounted in 2" NPS flange	Suspended from cable or ½ in. NPT conduit, mounted in 2" NPS flange	Suspended from cable or ½ in. NPT conduit, mounted in 2,5" NPS flange
Supply voltage	17 V to 30 VDC (max.) 24 VDC typical operating voltage	17 V to 30 VDC (max.) 24 VDC typical operating voltage	17 V to 30 VDC (max.) 24 VDC typical operating voltage	17 V to 30 VDC (max.) 24 VDC typical operating voltage
Certifications	EEx ia IIC T6 (Tamb = -20°C to 60°C) IA No: SABS S/S361 X Ui=28V Ii=93 mA Pi=0.65W Li=4uH Ci=100nF IEC61326-1 / IEC801-3 / EN55011 Intrinsically Safe	EEx ia IIC T6 (Tamb = -20°C to 60°C) IA No: SABS S/S361 X Ui=28V Ii=93 mA Pi=0.65W Li=4uH Ci=100nF IEC61326-1 / IEC801-3 / EN55011 Intrinsically Safe	EEx ia IIC T6 (Tamb = -20°C to 60°C) IA No: SABS S/S361 X Ui=28V Ii=93 mA Pi=0.65W Li=4uH Ci=100nF IEC61326-1 / IEC801-3 / EN55011 Intrinsically Safe	EEx ia IIC T6 (Tamb = -20°C to 60°C) IA No: SABS S/S361 X Ui=28V Ii=93 mA Pi=0.65W Li=4uH Ci=100nF IEC61326-1 / IEC801-3 / EN55011 Intrinsically Safe

Dimensions

L x W x H 105 x 105 x 112 mm, 105 x 120 x 112 mm (L215).
4.1 x 4.1 x 4.4 inches, 4.1 x 4.7 x 4.4 inches (L215).

Weight Approx. 1 kg with 4,9 m cable
Approx. 2 lbs with 16 feet cable



Wiring

