MEASUREMENT & ANALYTICS

Level products
Measurement made easy

ABB

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Introduction

ABB is a leading global manufacturer of state-of-the-art instruments for liquid and bulk solids level measurement. Thanks to the technological heritage of K-TEK, our level measurement products demonstrate versatility in numerous applications, affording our customers a variety of practical and innovative solutions for their installation needs. ABB has numerous installations worldwide in applications such as oil and gas production, pulp and paper processing, mining and construction, food and beverage and chemical processing. The company operates offices, service locations and R&D facilities around the world.

Contents

Magnetic level gauges

KM26 magnetic level gauges are manufactured to suit your specific process requirements.

KM26 magnetic level gauges
ABB's KM26 Magnetic Level Gauge provides custom engineered solutions to liquid level applications in industries such as oil and gas, refinery, chemical, petrochemical, power generation and many more. The KM26 Magnetic Level Gauge has proven itself for over 35 years to be a safe, reliable and maintenence free solution for total and/or interface level measurement.

ABB offers the standard KM26 Magnetic Level Gauge with a chamber of virtually any non-magnetic material, extruded process connections, custom engineered floats and all accessories with 316 stainless steel construction. ABB also offers a dual chamber redundant level system, which has a proven record of improving feedwater heater efficiency and reliablility in power plants around the world.

- Highly visible level indication with no process fluid in contact with the glass
- All construction in–house by code certified welders
- Float designed and weighted for maximum accuracy
- Transmitter and switch options that can be installed, adjusted and maintained with no process interruption
- Safe for corrosive, flammable, toxic, high–temperature and high–pressure applications
- Rugged design – low or no maintenance
- ATEX constructional safety, IP68 and PED certifications; EAC TRCU approvals
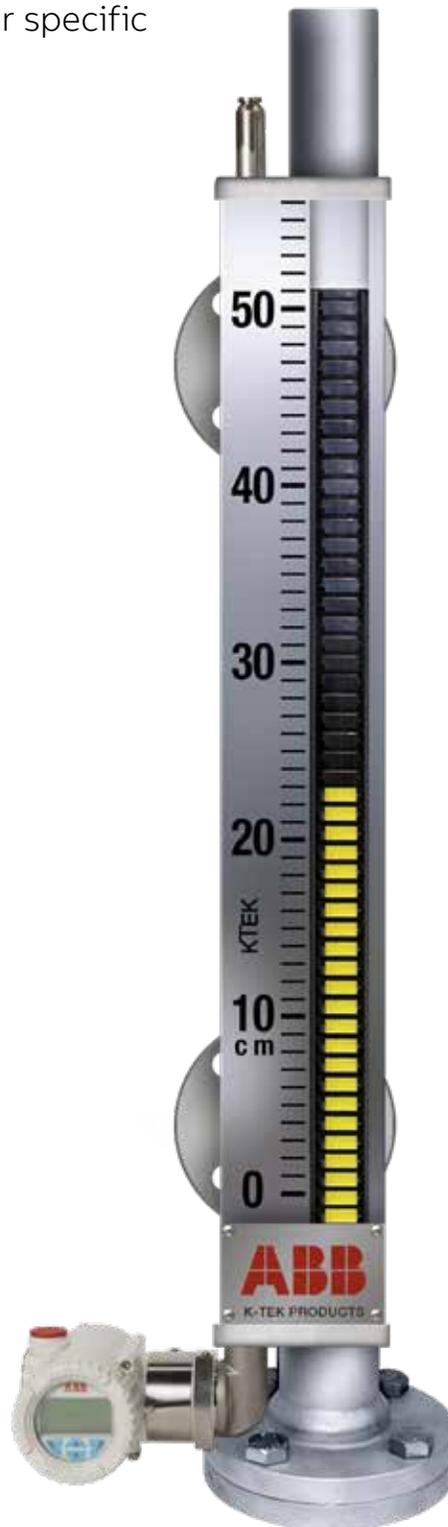
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Table 01

Process Capabilities	
Pressure	Full vacuum to 5000 psi (351 kg/cm2)
Temperature	– 320 to 1000° F / – 196 to 538° C
Specific gravity	0.25° specific gravity
Viscosity	All liquid viscosities
Interface	Interfaces as low as .03ΔSG

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KM26 magnetic level gauge

The MagWave® dual chamber magnetic level gauge
The MagWave® dual chamber magnetic level gauge combines a highly visible magnetic level indicator with the precise level measurement of a guided wave radar transmitter. Redundant level control can be achieved by adding an additional magnetostrictive transmitter or switch to the float chamber.

The MagWave® is a level measurement system which combines a highly visible magnetic level indication with an output from a Guided Wave Radar Transmitter. The Magwave features two separate close-coupled chambers for the level indicator float and the Guided Wave Radar antenna. Using single probe radar transmitters in the standard 1-1/2 inch chamber provides the measurement capabilities of coaxial style probes without the potential for fouling due to buildup. A separate float chamber allows the float to travel unobstructed throughout the range of measurement. Redundant level control can be achieved by adding an LMT Series magnetostrictive transmitter or switches to the float chamber.

- Redundant level measurement
  – guided wave radar
  – magnetostrictive transmitter
- Low cost of ownership
- Safe and simple installation
- 5 year warranty
- High visibility indicator
- Optional vent, drain and isolation valves
- Insulation for high and low temperature applications

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MagWave® dual chamber magnetic level gauge

Magnetic level gauge switches
Electric and pneumatic switches for point level safety alarm and control

	LMS100	MS40/EX
Switch type	Electric	Electric
Hazardous area rating	ATEX/IECEx, cFMus	FM,CSA
Enclosure	Hermetically sealed/explosion proof, NEMA 4x/IP66/67, 1/2" FNPT	MS40: stainless steel, NEMA 4x/IP56, 3/4 in FNPT cable connection MS40EX: stainless steel/explosion proof, NEMA 4X/IP56, 3/4 in FNPT
Switching mechanism	Reed Switch, AC/DC 1 amp, +/- 0.75" (1.9cm) deadband, SPDT	Cam driven, snap–action; AC: 10 amp, DC: ½ amp, 13/16 in deadband, DPDT
Pressure	N/A	N/A
Process temperature	Max 800ºF/427ºC with Insulation Pad options	Min –60° F/–51° C; Max. 300° F/149° C, 600 ° F/316° C with IP option
Application	High corrosive, hazardous area	High corrosive, hazardous area

PS45	MS41
Pneumatic	Electric
ATEX	FM, CSA, EAC and ATEX/IECEx certified
Stainless steel, NEMA 4x/IP56, ⅛ in MNPT	Stainless steel, dual compartment, hermetically sealed, explosion proof, NEMA 4X/IP56,1/2" MNPT
1 in deadband, pneumatic signal	Cam driven, snap–action; AC: 10 A, DC: 2.6 A
15 to 100 psig operating pressure	N/A
Min. 0ºF/-18ºC; Max. 180ºF/82ºC, 450ºF/232ºC with IP option	Min. -320ºF/-195ºC with option Max. 300ºF/149ºC, 1000ºF/538ºC with Insulation Pad options
High–corrosive, hazardous area pneumatic	High temperature, vibration and high–corrosive

Magnetic level gauge
Options and custom solutions

Indicators
Shuttle and bargraph indicators are available with the following:

- Process temp to 1000° f/ 538° c
- IP68, hermetically sealed tube
- Shuttle indicator
- Magnetically interlocked bargraph indicator for vibration resistance
- Standard or custom rulers in stainless steel or plastic
- Metric, US units or custom
- Field replaceable
- Single bar graph indicators available in:
  – Yellow/Black
  – Red/White
  – Red/Green
  – Red/Black
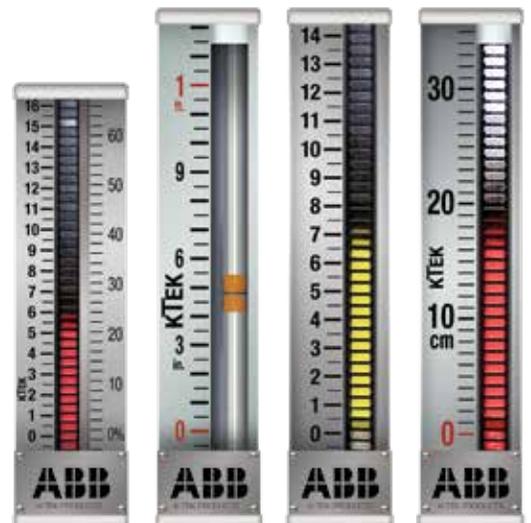
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Dual bar graph indicator

Shuttle indicator

Single bar graph indicators

Float design and construction
K–TEK floats are individually engineered for each application with the following:

- Minimum positive buoyancy of 75 grams
- Magnetic ring placed at liquid level
- Indicated level is the true level
- Hermetically sealed, no vents
- 360° magnetic ring
- Optional coated floats (Halar, Tefzel, Teflon–S)

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Teflon S coated

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360° magnetic ring

Old Glass Gauge Technology vs New Magnetic Gauge

Replacement of the instrument bridle with a K-TEK KM26, LMS100/MS41 and two PS45 switches eliminates:

- Multiple valves and pipe fittings
- Two gauge glasses including 16 U-bolts and nuts with possible leaks and fugitive emissions
- Readability problems with gauge glasses

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Old level measurement standard

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New level measurement standard with K-TEK products

Extruded outlets

Available in a variety of materials including:

- All stainless steel
- Alloy 20
- Alloy C-276
- Sizes depend on material, typically 1", 1-1/2" and 2"

Magnetostrictive level transmitters
Gauge mounted transmitters

ABB provides the only magnetostrictive level transmitters in the world to be certified for use in IEC 61508 SIL2 and SIL3 rated control loops.

With over 200,000 magnetostrictive transmitter installations worldwide, the LMT Series Magnetostrictive Level Transmitter continues to provide the highest accuracy and repeatability for liquid level applications in the oil and gas, power generation, chemical, food and beverage industries and many more. These transmitters are used extensively around the world to provide continuous level indication, and transmission of an analog and/or digital signal for monitoring or control. The Magnetostrictive Level Transmitter versatility allows direct in-tank installation or externally mounted to a magnetic level gauge. 4-20 mA HART and FOUNDATION Fieldbus protocol options make the magnetostrictive level transmitters compatible with most control systems.

Magnetostrictive level transmitters
Gauge insertion transmitters

LMT200

Our floats are individually engineered for each application with the following:

- Certified for use in SIL 2/3 applications per IEC61508
- High accuracy: .01% of full scale or +/-1.27 mm (+/- 0.05 in.), whichever is greater
- Superior piezo ceramic sensor (Patent # 5,473,245)
- Local indication with LCD display
- Factory calibrated to customer's specification
- Never requires recalibration: set it & forget it
- Dual compartment housing with separate field terminal compartment
- Loop powered
- 50 ft./15 m rigid probe length maximum
- Total and/or interface level measurement
- Field replaceable/upgradable electronics module
- Optional surge protection
- Built in RFI/EMI filter
- 4-20 mA HART and FOUNDATION Fieldbus

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LMT200
non–invasive magnetostrictive level transmitter

Magnetostrictive level transmitters
Direct insertion transmitters

The K-TEK Level product line provides the only magnetostrictive level transmitters in the world to be certified for use in IEC 61508 SIL2 and SIL3 rated control loops.

LMT100

- Certified for use in SIL 2/3 applications per IEC61508
- High accuracy: .01% of full scale or +/-1.27 mm (+/- 0.05 in.) mm, whichever is greater
- Superior piezo ceramic sensor (Patent # 5,473,245)
- Local indication with LCD display
- Factory calibrated to customer's specification
- Never requires recalibration: set it & forget it
- Dual compartment housing with separate field terminal compartment
- Loop powered
- Up to 30 ft./9 m rigid probe length
- Total and/or interface level measurement
- Field replaceable/upgradable electronics module
- Optional surge protection
- Built in RFI/EMI filter
- 4-20 mA HART and FOUNDATION Fieldbus
- Safely remove sensor without exposure to process.
- Several non-wetted sensor well designs
- Flexible Sensor with insertion well
- Available in Halar *FEP sensor inserted into 1 in. segmented 316/316L sensor well
- Available in braided stainless steel inserted into a 5/8 in. OD rigid probe to 15 ft./4.75 m
- Up to 75 ft./22 m probe length maximum

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LMT100 Direct insertion magneto-strictive liquid level transmitter with removable flexible sensor

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LMT100 Direct insertion magneto-strictive liquid level transmitter

Guided wave radar level transmitters
Radar level detection for liquids and solids

Stable readings in the most challenging environments. Now with LevelExpert™: the expert inside.
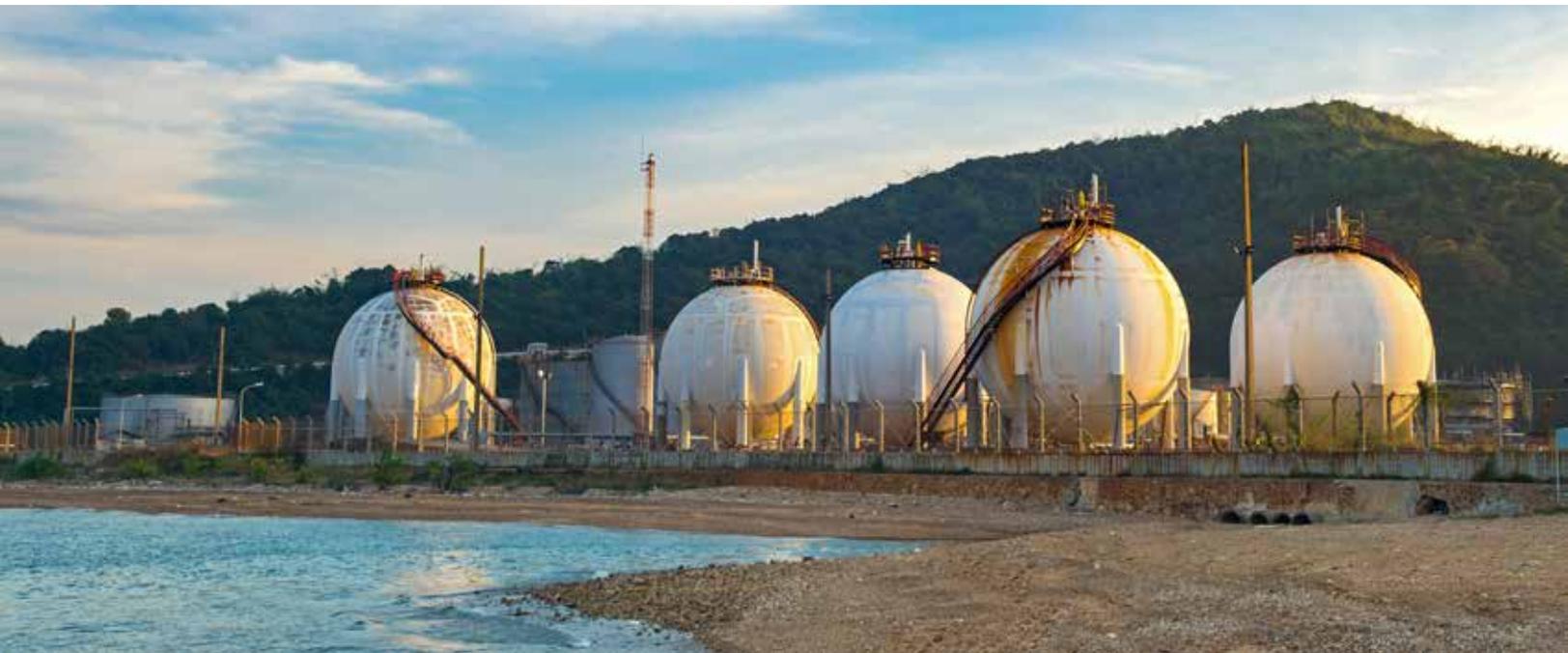
LWT series
With fast and reliable settings, ABB's LWT300 series of instruments emphasizes measurement made easy. With its LevelExpert™ technology based on 20 years of experience, simply enter installation data and basic process conditions, and let LevelExpert™ do the rest: no echo mapping or baseline correction required. Unlike traditional guided-wave radars that use device parameters requiring multiple adjustments, the LWT300 series of instruments does it for you. The instrument uses built-in intelligence to differentiate between the actual level and other false signals. It also keeps monitoring all these false signals while maintaining a reliable level reading. It is like having a level expert in each device. ABB's LWT300 series transmitters are equipped with on-board diagnostics that can be used for safety monitoring, improved reliability, downtime reduction, and performance verification. Standard on-board diagnostics monitor minimum and maximum electronics temperature, input voltage, probe loss or breakage, buildup detection and leakage of the primary process seal. These diagnostic features assist you in troubleshooting common problems without extensive testing and allow device health monitoring without requiring removal from the process or taking the device offline, thus saving valuable time and improving uptime.

Guided wave radar level transmitters
Radar level detection for liquids and solids

LevelExpert™ concentrates 20 years of industrial level measurement experience into an intelligent instrument made to accurately detect levels, even in the most demanding conditions.

Forget about baseline mapping and echo selection; LevelExpert™ knows how to find the right level through the clutter. The expert is now inside your guided-wave radar.

LWT300 series instruments cover a wide range of applications. They can meet your needs for applications up to 204 °C (400 °F) and 207 bars (3000 psi).

LWT series
• With LevelMaster™ for fast and easy setup
• Distance up to 197 ft. (60 m)
• Accuracy: 2 mm (5/64 in.)
• Resolution: 1 mm (3/64 in.)
• Temperature up to 400°F (204°F)
• Pressure up to 3000 psi (207 bar)
• Response time: 400 ms
• Temperature drift (digital): ±0.2 mm/10°C (max ± 2.5 mm (1 in.))

MT5000
• Reliable level measurement over varied process conditions
• Distance 2 to 217 ft (66 m)
• Temperatures to 800° F (427° C)
• Pressures to 5000 Psi/344 bar
• Standardization reduces inventory and training requirements
• Modular electronics

MT5100
• Provides both lower and upper level fluid indications
• Flooded or non–flooded chambers
• Transmission of interface and upper fluid signals with the use of the optional RI100 repeat indicator or via digital signal.
• Patented weak interface signal detection

MT5200
• Used in low dielectric liquid and bulk solids applications
• Unaffected by dust
• No moving parts
• Unaffected by feed flow
• Can measure levels with dielectric constants as low as 1.3

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LWT series

RF capacitance level switches
Direct–contact point level measurement for liquid or solids applications

Capacitance level switches
feature one-step external calibration, immunity to material build-up, and a wide selection of probes for even the most challenging applications from low dielectric bulk solids to sticky slurries. Whether the application involves liquids, pellets, granules, powders, chips, or flakes, ABB's RF Capacitance level switches feature one of the largest selections of probe elements available. In addition, the RF design means there are no moving parts to break or wear out.

A75
- Bulk solids and liquid applications
- Low cost level solution
- Fully potted electronics
- Built-in static protection
- Vibration resistant
- DPDT relay
- Process temperatures up to 450ºF/232ºC
- NEMA 4 enclosure
- 5, 10 or 15 second time delay

KCAP400
- Liquids or solids
- Integral and remote electronics available
- Easy set up via external magnet or push buttons
- Housing with glass viewing cover
- Wide variety of 2–element level sensing probes available 450° F (232° C) / 3000 psig (206.8 bar)
- Field selectable modes of operation:
  - single set point (horizontal or vertical installations)
  - dual set point (vertical insallations only)
  - pump control (vertical installations only)
- Element sensitivity down to 1.5 pf
- Explosion–proof enclosure

KCAP300
- Bulk solids/powders and granular applications
- KSHIELD™ 3 – element sensing probes and single setpoint electronics that provide immunity to build up
- Integral and remote electronics
- Easy set up via external magnet or push buttons
- Explosion–proof enclosure
- Element sensitivity down to 0.5 pF
- LED alarm display

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KCAP300 RF Capacitance switch with KSHIELD™ sensing probes and single setpoint electronics

RF capacitance level switches

Direct–contact point level measurement for liquid or solids applications

—
A75 RF level
switch

—
KCAP400 RF Capacitance switch with
selectable dual setpoint and pump control

Thermal dispersion level switches
Switches for flow, level or temperature applications

K–TEK's thermal dispersion switch products can be used for flow, level or temperature detection. One switch can be field configured to detect one of these three process conditions. Thermal Dispersion level switches are extremely rugged and versatile and have high pressure and temperature capabilities. These switches can be calibrated for point level, air/foam, foam and solid/liquid interface or flow applications.

TX
- For liquids or small granular solids
- No moving parts
- 316 L stainless steel all welded construction standard
- Explosion proof
- Pressure to 10,000 psi
- Temperatures to 500° F

Vibrating fork level switches
utilize a piezoelectric–driven tuning fork and smart microprocessor based electronics to keep the sensor in a resonant state, and detects when immersed in a liquid (RS85).

RS85
- Continuous self–test diagnostic
- Variety of process connections
- DPDT dry contact relays
- Hazardous location approvals
- Explosion–proof enclosure

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TX thermal dispersion switch

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RS85 vibrating fork liquid level switch

Buoyancy level switches
Point level switches offering high pressure capability that is reliable and repeatable

A complete line of buoyancy
point level switches for most chemical, petroleum or general process applications. This family of products includes a variety of horizontal floats, vertical floats, and displacer switches. ABB's simple and reliable design offers great flexibility with custom insertion lengths, temperature ratings to 1000º F/538º C. Pressure ratings to 5000 psig/345 bar, and a wide selection of alloys. The ABB buoyancy switches are the highest quality and cost efficient solution to industrial liquid point level sensing.

MS50
- Up to six SPDT switches per unit (NO and NC contacts)
- Interface and total level capability
- Suitable for high temperature applications
- 316/316 L stainless steel wetted parts standard
- Field adjustable and replaceable switches
- 316/316 L standard, exotic alloys and thermoplastic available
- Internal terminal block(s) connection

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MS50 Buoyancy level switch

Buoyancy level switches
Point level switches offering high pressure capability that are reliable and repeatable

MS10
- Electrical contacts are magnetically coupled to the float and isolated from process
- Mounting via 1-1/2" NPT process connection
- Optional flange mounting available
- Hermetically sealed SPDT switch (NO/NC contact)
- Vibration resistant
- Designed and constructed to FM, NEMA, and ANSI/ISA guidelines

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MS10 level switch

As a broad range of level measurement products, ABB offers a variety of accessory products that provide customers with total level solutions. When a complete level measurement system is designed with the right combination of accessory products, the highest degree of level detection and control can be achieved.

ST95
- High visibility, magnetically coupled barrier fluid level indication
- Magnetically coupled high/low level switches available
- All stainless steel construction available
- Designed for barrier fluid specific gravity requirements
- Switches for high and/or low level
- AT200 or LMT200 magnetostrictive level transmitter available
- Cooling coil available
- Fill, vent and drain valves available
- ASME code stamp and PED certification available

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ST95 Seal fluid supply tank
for barrier fluid systems

Level measurement accessories
Complementary products that help provide a complete level solution

EC
- Provides for easy isolation from process vessel
- Use with AT100, LMT100, MT5000, MS50 transmitters to replace conventional displacer type transmitters and controllers
- Use with MS50 for externally caged float switch
- Designed to ANSI/ASME B31.1, B31.3 as applicable
- Certification to NACE MRO175 and NACE MRO103 available

IR10/PP10
- Simplifies field relay implementation
- Broad application flexibility
- Easy mounting and installation
- Vibration resistant
- 10 amp contact rating
- Designed and constructed to FM, NEMA and ANSI/ISA guidelines
- Compact design
- Pump control

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EC External chamber

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IR10 Interposing relay /
PP10 Pump pack controller

Laser level transmitters
Bulk solids and liquid non–contact laser level measurement

The ABB family of laser level measurement products provides solutions for measuring the level of any bulk solids or liquids for inventory or process control.

Using narrow laser beams and advanced processing algorithms, they provide simple and reliable non-contact level measurement in industrial environments.

LLT100 laser level transmitter
- Ideal for measuring the level of any solid or liquid without contact
- Range up to 330 ft. (100 m) for level of solids
- Range up to 100 ft. (30 m) for level of liquids
- < 0.3˚ beam divergence = no false echoes. Simple to setup and not affected by changesin environment.
- HART communication
- Explosion proof Class 1 / Division 1
- 3A approval (Hygenic)

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LLT100 Laser level transmitter

LM80 laser level transmitter
- Ideal for plastics pellets, grain silos, crushers & rock silos, positioning applications without contact
- Range up to 330 ft. (100 m) for level of solids
- Range up to 500 ft. (150 m) for positioning
- No beam divergence = no false echoes. Simple to setup and not affected by changes in environment.
- Embedded laser pointer

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LM80 Laser level transmitter

LM200 laser level transmitter
- Ideal for long range positioning and long range level measurement
- Range up to 660 ft. (200 m) for level of solids
- Range up to 1310 ft. (400 m) for positioning
- Embedded laser pointer
- Same easy setup as LM80

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LM200 Laser level transmitter

Ultrasonic level transmitters
Level by sound knowledge

ABB's KSONIK is the only ultrasonic level transmitter that uses dynamic GAP technology in order to locate the correct echo. The KSONIK utilizes the minimum amount of GAP (Gain, Amplitude and Power) at every possible distance within the measuring range. This simply means that we reduce the power to give you the most accurate reading with a beam angle of only 3 degrees, and then enough power to push through the most dusty environments.

LST300 – the most powerful ultrasonic level transmitter in a compact form
- 2-wire instrument with HART digital communication
- Up to 10 m measurement range
- Wide temperature range of -40 to 85 ˚C
- Accuracy of ±2 mm or 0.2 % of full span (the larger one)
- Beam angle as low as 5˚ with false echo filtering for narrow spaces
- Easy installation with graphic echo display, advanced diagnostic and easy setup menu
- Unique GAP technology ensures the best performance under any condition
- IP66/67/68 and NEMA 4X (can submerge to 2 m depth for 24 hours)
- ATEX, IEC & FM Intrinsic safe and non sparking approved

LST400 – Make all the control easy through remote transmitter
- 4-wire instrument with HART digital communication
- Up to 30m measurement range
- 5 configurable relays / 8A
- Configurable as open channel flow meter
- Preconfigured flow curves for most common channels
- 21 point linearizer for calibration of non-linear vessels
- Pump control and cycling
- Automatic variable gain & power for difficult applications
- Integrated analytical software
- FM general purpose approved
- IP66/67/68 for sensor and IP65 for transmitter

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LST300 Ultrasonic level transmitter

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LST400 Ultrasonic level transmitter

Ultrasonic level transmitters
Level by sound knowledge

LST100 – Accurately track and measure the most expensive consumable on your site – chemicals

- Up to 10m measurement range
- 1 to 5 V output, which means low power consumption during all conditions
- Ultra-low power consumption equivalent to a 4 to 20 mA instrument functioning constantly at 4 mA
- Excellent for chemical tracking and remote monitor of stock levels
- Automatic variable gain & power for difficult applications
- Typically powered from a solar or battery power source
- FM Intrinsic safe and non sparking approved
- IP66/67/68 for whole unit

LST100 Ultrasonic level transmitter