

When the level matters

Continuous Level Control
and Point Level Detection



Always the right technology for you

GF Piping Systems offers a wide range of technologies to measure levels in tanks either continuously or to detect point level thresholds. Due to the high diversity of process liquids and types of vessels, different methods are required to keep control of fluids - not only in piping systems but also in tank applications.

+ Comprehensive

Complete offering of proven technologies & materials to cover individual requirements of each tank application. GF offers all components to design filling control systems from water to chemical tanks.

+ Easy

Integration is easily done thanks to universal interfaces. Simple commissioning onsite via display or PC configuration tool. One partner to cover all your requirements in tank level measurement.

+ Economical

Long-life time assured. Industrial standard electronics, non-contact technologies embedded in high-performance materials such as PP, PVDF, PTFE, PPS or stainless steel ensure long term reliable tank control.

GF got the variety – you got the choice

Guided radar level transmitter

Type 2291

Radar level transmitter

Type 2290

Conductive multipoint switch

Type 2281

Ultrasonic level transmitter

Type 2260 / 2270

Ultrasonic gap switch

Type 2284

Hydrostatic level sensor

Type 2250

Float switch

Type 2285

Vibration fork

Type 2280

Ultrasonic gap switch

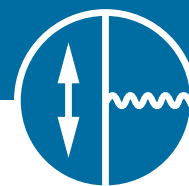
Type 2284

Vibration fork

Type 2280



Continuous level control



To detect the level in a tank continuously, GF offers a variety measurement technologies. Depending on application requirements and characteristics of the process liquid, either a non-contact or contact device can be utilized. GF level sensors provide accurate level information through analogue or digital signals to ensure easy interfacing with PLCs.

Main applications

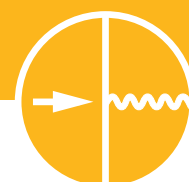
- Inventory management
- Batching and dosing processes

Special application feature

- Open channel flow measurement (Type 2260 & 2270)



Point level detection



To maintain full control over the liquid level in tanks, point level switches can be used for a physical detection of critical filling levels. These instruments provide additional safety and control. They are often installed together with a continuous level sensor as a back-up system. They can also be used to directly control filling and emptying process.

Main applications

- Overfill protection
- High and low level alarms
- Pump control
- Dry-run protection for pumps

Special application feature

- Leakage detection in double containment piping systems or double-wall tanks



Continuous level control

Radar technology

Stay in touch without contact

Non-contacting radar level transmitter type 2290

Non-contacting radar is favored due to its safety and long-term reliability.

+ Benefits

- Non-contacting radar for corrosive & fuming process liquids
- Large LCD display
- Precise results ± 3 mm (0.12 inch)
- Selected process parameterizations
- Easy volume calculation thanks to pre-defined tank shapes
- Customizable 99 point linearization

+ Specifications

Measured values	Level, distance; calculated dimensions: volume, mass
Accuracy	± 3 mm (± 0.1 inch)
Measuring range	0.2 - 18 m, special units up to 23 m
EX approvals	ATEX, IECEx
Frequency	25 GHz (K-Band)
Communication certifications	R&TTE, FCC
Process isolation	PP, PTFE, SS316



+ Features

Wetted part PP (Polypropylene)

Further wetted part options:



Stainless steel
SS316 Ti,
DIN 1.4571



PTFE
All units come
with FPM sealings



Display



- Dot matrix LCD plugin display
- Comprehensive, text based configuration menu
- Graphical illustration of reflection bar graph to ease onsite setup

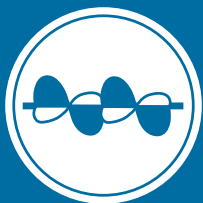
Housing

PBT plastic housing IP67 / NEMA 4x

Outputs

2 wire 4-20 mA / HART communication protocol





The radar principle is the most advanced measuring technology to measure tank levels even in challenging conditions such as in chemical fumes, pressurized tanks or light foams. Electromagnetic waves emitted by an antenna travel through the tank unaffected by fumes, changes of pressure, density, viscosity or temperature. In addition to this, radar beams have the ability to penetrate slightly conductive foams.

Radar is widely unaffected by process conditions.

The direct line if things get tough

Guided radar level transmitter type 2291

In vessels containing heavily agitated liquids or dense foam layers, the contacting guided radar is the an even more reliable choice.

+ Benefits

- Reliable on agitated liquids and heavy chemical fumes
- Great performance on low dielectric liquids and foams
- Large LCD display
- High-performance coatings available to protect contacting probes from liquid
- Ideal for compact tanks

+ Specifications

Measured values	Level, distance; calculated dimensions: volume, mass
Accuracy	+/- 5 mm (0.2 inch), +/- 0.05 % of probe length
Measuring range	0.3 m - 6 m (11.8 inch - 236.2 inch) (process liquid) extended ranges available upon request
EX approvals	ATEX, IECEx
Sensing field	ø 600 mm (23.6 inch)
Process isolation	FEP, PFA, PP coated



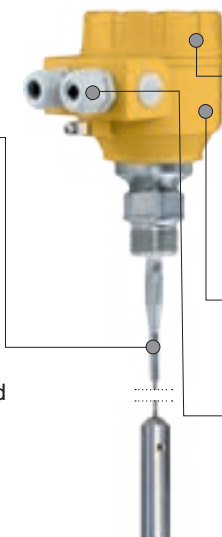
+ Features

Wetted part

- Cable
- Stainless steel
 - Optional: FEP coated



- Optional: rod
- Stainless steel
 - Optional: PFA or PP coated



Display



- Dot matrix LCD plugin display
- Menu text based configuration
- Graphical illustration of reflection curve

Housing PBT plastic housing IP67

Outputs 2 wire 4-20 mA / HART



Continuous level control

Ultrasonic technology

Fundamental level control

Non-contacting ultrasonic level transmitter type 2260 / 2270

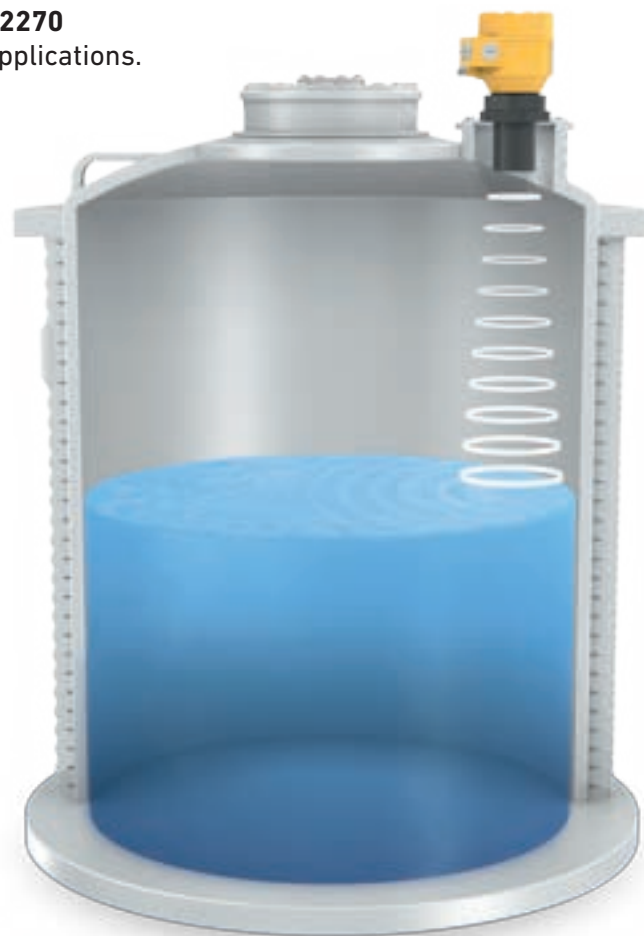
Robust and principle the right choice in numerous tank applications.
Easy installation, reliable operation.

+ Benefits

- Non-contact
- Large LCD display (2260)
- Precise results ± 3 mm (0.12 inch)
- Selected process parameterizations
- Easy volume calculation due to pre-defined tank shapes
- Customizable linearization curve to measure volumes of tanks with exceptional geometries

+ Specifications

Measured values	Distance, level, volume, mass, open channel flow rate
Accuracy	$\pm 0.2\%$ of measured distance + 0.05 % of range
Measuring range	0.2 - 15 m, special units up to 24 m on request
Resolution	2 mm (0.08 inch)
Power supply voltage	12...36 V DC
EX approvals	ATEX



+ Features

Display version

Type 2260

Display plug in

Housing

PBT plastic housing IP67 / NEMA 4x

Compact beam angle

Only 5 - 6 degree

Wetted materials

PP or PVDF

Rugged blind version

Type 2270

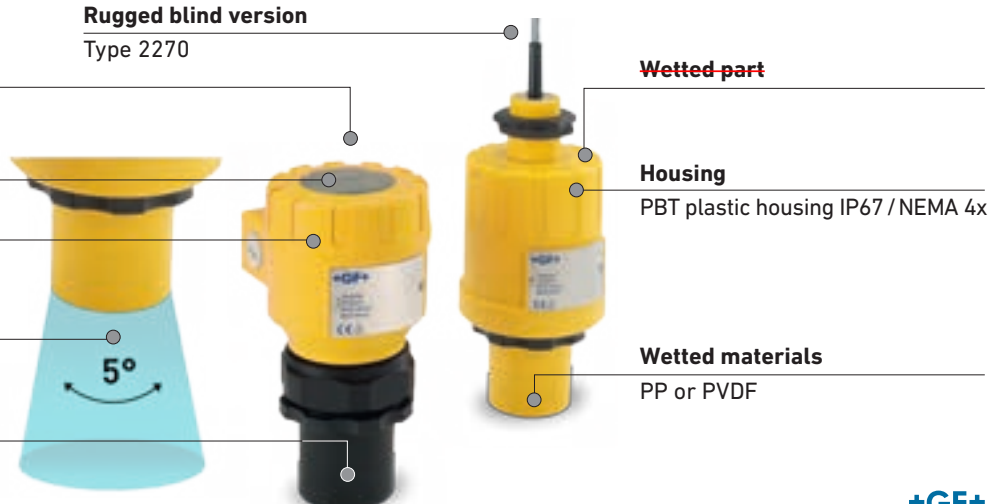
Wetted part

Housing

PBT plastic housing IP67 / NEMA 4x

Wetted materials

PP or PVDF





This principle is based on the velocity of ultrasonic sound. Top-mounted, the sensor head emits an ultrasonic time taken impulse. The transit time of this burst is either reduced or extended and is proportionally to the tank level. Since the speed of sound in air is fixed, an accurate calculation of the tank level can be made.

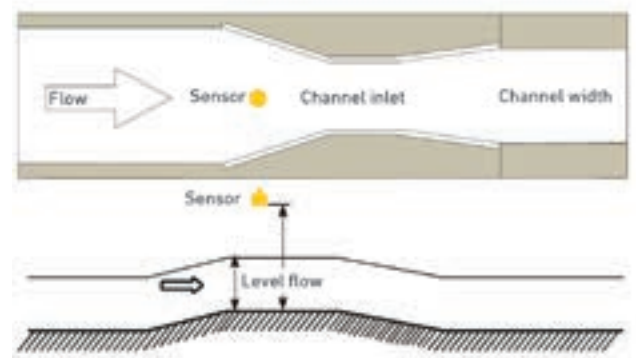
- Ultrasonic technology is the most economical non-contacting solution to detect tank levels
- No re-calibration required
- Additional feature: Flow measurement in open channels

+ Open Channel Flow

GF ultrasonic level sensors are also widely used to derive flow rates from the level measurement in open channels. The level of the media as it passes through an open channel is proportional to the flowrate. Knowing the channels dimensions allows a precise calculation of the flow.

Special feature exclusively available for ultrasonic sensors type 2260 & 2270:

- 13 different standard pre-defined channels such as parshall flume, thomson weirs, palmer-bowlus or rectangular weirs
- 2 internal flow totalizers
- Programmable pulse volumetric relay to indicate flow rate to a PLC system



Continuous level control

Hydrostatic technology

High-end hydrostatic level sensor

Submersible hydrostatic level sensor type 2250 and side-mount type 2450

Unaffected by foam layers, agitation or chemical fumes.

Superior chemical compatibility.

+ Benefits

- High performance materials PVDF, ceramic & FPM
- Current or digital interfaces
- Submersible or side mount
- Flush ceramic diaphragm
- Highly sensitive sensor detects small changes of level
- Enhanced circuitry to eliminate sensor drift

+ Specifications

Measures values	Level, pressure
Measuring range	0-7 m, 0-35 m (0-23 ft, 0-115 ft)
Accuracy	+/- 1 % FS
Power supply voltage	12...24 V DC
Approvals	CE, FCC

+ Features

Type 2450 side-mount
with type 9900
SmartPro transmitter



Diaphragm
chemically resistant ceramic

Outputs

4-20mA or HART Communication Protocol

HART

Sensor body

One-piece injection molded PVDF



2250 submersible level sensor

with PVC-U union end to allows easy customizing of a submersible conduit





Mounted through the tank wall or submersed from the top of the tank, a hydrostatic sensor measures the weight of a water column. The change and therefore the pressure at the sensor is proportional to the change in the tank level. A capillary tube in the cable ensures that changes of the atmospheric pressure can be compensated.

Hydrostatic level = height x specific gravity

- Robust level technology and easy to use
- Can handle a wide range of liquids in vented tanks
- Detects slightest changes of level accurately

+ Unimpressed by harsh conditions

The 2250 Hydrostatic level sensor is the solution for difficult applications where the process environment is extremely harsh, as for example in the electroplating industries. The surface treatment of the final product takes place in various immersion baths holding different chemical solutions. The level of the holding tanks needs to be maintained very accurately, for this reason the tanks are covered to prevent evaporation and the electrolyte level is maintained using the 2250 sensor. The key advantage of the 2250 Hydrostatic Level sensor over the non-contacting level sensors is the non-conductive one-piece injection molded PVDF body which does not interfere with the plating process. This is only one of many examples of use.

Benefits

- Great chemical resistance in the corrosive process solution due to one-piece injection molded PVDF body and ceramic diaphragm
- Non-conductive sensor assembly does not interfere with the plating process
- Easy submersible application
- Accurate level of solution in the closed tank displayed on 9950 or 9900 multi-parameter transmitter



Electroplating submersion tank.

Point level detection Technology

Get peace of mind - redundant safety for your tank application

GF offers a carefully selected range of point level switches. Different process conditions require dedicated working principles and wetted materials of excellent quality.

Point level switches ensure a safe control of industrial tanks.

+ Benefits

- **Reliable operation**
Choose the most suitable working principle for your application
- **Long lifetime**
Select from a variety of materials to guarantee long-term reliability even in corrosive environments
- **Excellent cost-benefit ratio**
A range of solutions from simple float switches to more advanced technologies allows you to choose the right product for your application.



+ Product overview

2280 *Swing forks



Principle: Contact to liquids dampens the vibrating fork which activates the alarm contact

Advantages

- Proven method
- PFA coating available
- No moving parts, maintenance free
- Easy wiring. Open collector or current output
- ATEX certified

Specifications	
Sensor material	Stainless steel 1.4571
Output	3-wire PNP / NPN, 2-wire AC, relay
Connection	Cable, DIN plug, terminal box
Approvals	CE, ATEX, WHG
Process connection	1" BSP, 1" NPT

* A range of solutions from simple float switches to more advanced technologies allows you to choose the right product for your application.



Point level sensors have to be robust and reliable to act quickly in the case of an emergency.

These sensors build a redundant back-up system to compliment the continuous level sensor installed. If the continuous control system fails the point level switch is able to prevent overfilling of a tank or protect pumps from running dry.

2281 Conductive multipoint switch



Measure conductive process liquids. At desired levels the media acts as transmission media for a low-voltage. This way a relay provides point level feedback.

Advantages

- Easy onsite installation and length adjustment
- One sensor providing up to 4 point levels
- Economical solution
- PE coating available
- Allows complete filling and emptying control of a tank

Specifications

Sensor material	Stainless steel PP
Output	External relay
Connection	Cable, terminal box
Approvals	CE
Process connection	1 ½" BSP

2282 Guided float switch



The switch is mounted on the side of the vessel. A hinged plastic float with a magnet floats up and down through the liquid level. The encapsulated reed contact is operated by the magnet.

Advantages

- Full plastic PP or PVDF
- Compact design
- Optimized for small vessels
- Hi or low level activation

Specifications

Sensor material	PP, PVDF
Output	Reed contact
Connection	Cable
Approvals	CE
Process connection	½" BSP, ½" NPT

2284 Ultrasonic gap switch



The process liquid fills the gap which allows an ultrasonic pulse to pass between both fork arms. This activates the switch.

Advantages

- Full plastic PPS housing
- Reliable even in high viscosities

Specifications

Sensor material	PPS
Output	Relay
Connection	Cable, terminal box
Approvals	CE
Process connection	¾" NPT, 1" BSP, 1" NPT

2285 Float switch



The type 2285 is floating on the level of the measured liquid because its relative density is less than the water. The level switching is done when the contact reaches the ±45° switching angle.

Advantages

- Double chambered PP body
- Lead free microswitch approved for drinking water

Specifications

Sensor material	PP
Output	Microswitch
Connection	Neoprene cable
Approvals	CE

Bring it all together

Centralised tank control with the 9950 dual channel SmartPro transmitter



The modularity of the 9950 SmartPro **not only allows it** to display current tank levels but also to control a pump or a valve in emergency to prevent over or **under filling** conditions.

+ Multiple interfaces - tank logic control made easy

The 9950 Smart Pro **offers** two input channels which **will** accept all GF measurement sensors. Its input module 3-9950.393-3 is especially convenient to design a tank control loop. It offers 2 mechanical relays and 4 binary inputs - perfect fit for one or two continuous sensors and up to four point level switches giving you a total of six process inputs or, the second standard input can be used to connect any other GF sensor such as a flowmeter or an analytical sensor.

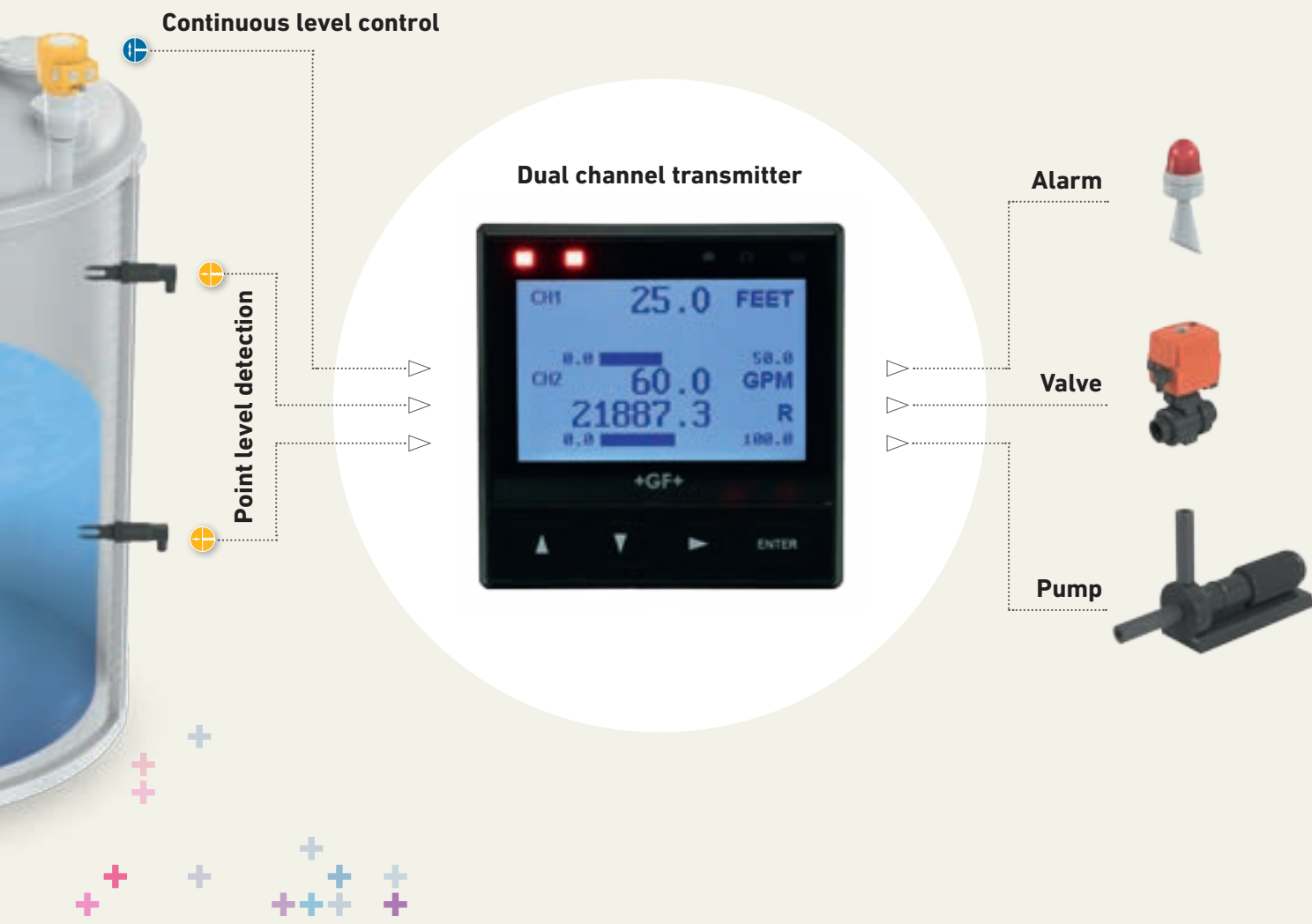
+ Continuous level control

Choose any continuous level sensor to connect to the 9950 standard inputs. The clear visibility of the display informs operators about the current tank level and alarm status at a

glance. Individually combine the continuous measurement with a mechanical relay, for example, to indicate a high alarm through a visual feedback or to open / close a valve. The 9950 SmartPro also forwards the measurement to a PLC as a 4-20mA current signal pre-scaled on the transmitter either to tank level or volume.

+ Emergency shut-down / automatic refill

Connect any type of Point level Switch to the input module 9950.393-3 binary inputs. The advanced Boolean logic allows a logical link between the status of the switches to the triggering of the mechanical relays. If the mains of a pump run over the relay, the 9950 can shut-off the pump to avoid overfilling in case of a hi-hi alarm or activate a valve to open to force a filling process avoiding dry operation of the pumps.



+ Get more from your tank

The 9950 offers two inputs. The second input can be used to directly measure incoming or effluent flow. Or connect analytical sensors to measure e.g. pH, conductivity or salinity of the process liquids as quality indicators.

+ Technical features

The 9950 includes advanced features such as derived functions, advanced multiple relay modes, and timer-based relay functions. Derived functions allows for the control of a relay or current loop with the sum, delta (difference), or ratio of two measurements, for example, delta pressure and delta temperature. The 9950 has a state-of-the-art microprocessor, dot matrix display, 1/4 DIN size, NEMA 4X front face, dual power 12 to 24 VDC, or 100 to 240 VAC, calendar and clock function.

+ Specifications

Outputs

- 2x 4...20 mA loops

Relay options

- 4 mechanical relays
- 2 mechanical & 2 solid state relays
- 2 mechanical relays & 4 binary inputs


Product overview

Continuous level control

Application considerations		Continuous level			
		Ultrasonic 2270 / 2260	Hydrostatic 2250	Radar unguided 2290	Radar guided 2291
Measured values	Level	+	+	+	+
	Volume	+	+	+	+
	Mass (calculated)	0	+	0	0
	Open channel	+	–	0	–
Process media	Changing density	+	0	+	+
	Changing dielectric	+	+	0	0
	Change in temperature and pressure	0	0	+	+
	Condensing vapors	0	+	+	+
	Bubbles	0	+	0	0
	Foam	–	+	0	0
	Coating liquids	+	0	+	0
	Crystallizing liquids	+	0	+	0
	Sludge & slurries	+	0	+	0
Tank considerations	Top down mount	+	+	+	+
	Bottom / side mount	–	+	–	–
	Mount close to object / wall	0	+	0	0
	High turbulence	–	+	0	+
	Angled surface	–	+	0	+
	High empty & fill rates	+	+	+	+
	Obstructions	0	+	0	0
	Agitation	0	+	0	0
	Non-metallic vessel	+	+	+	0
	Center mount	0	+	0	+
	Small tanks < 1.5 m	+	+	0	+

- + unconditionally applicable
- 0 conditionally applicable
- not applicable

Point level detection

Application		 Point level detection				
		Vibration forks 2280	Ultrasonic gap switch 2284	Conductive multipoint 2281	Guided float 2282	Float switch 2285
Process media	Changing density	+	+	+	o	o
	Changing dielectric	+	+	o	+	+
	Pressure & temperature changes	+	+	+	+	+
	Condensing vapors	+	+	o	+	+
	Bubbles	+	o	+	+	+
	Foam	–	o	o	o	o
	Coating liquids	o	+	–	–	+
	Crystallizing liquids	o	+	–	–	+
	Sludge & slurries	o	o	–	–	+
	Max. temperature	130 ° C 266 ° F	70 ° C 158 ° F	80 ° C 176 ° F	100 ° C 212 ° F	50 ° C 122 ° F
	Sludge & slurries	o	o	–	–	+
Approval	Intrinsically safe (ATEX)	+	–	–	–	–

- + unconditionally applicable
- o conditionally applicable
- not applicable



Disclaimer: The contents of this guide are recommendations based on experiences. Make sure to consider all application-specific conditions at all times such as chemical composition, temperature and viscosity of the medium during the selection process.

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