



# PROCESS AUTOMATION

LEVEL MEASUREMENT

OVERVIEW



## Vibracon – LVL

### MEASURING PRINCIPLE:

Frequency Shift – The frequency of vibration of the fork is reduced when it comes into contact with the measuring medium. The electronic interface internal to the sensor is used to create an output signal based on this change.

### CHARACTERISTICS:

- Compact housing with extended length fork designs
- Intrinsically safe, flameproof and explosion-proof designs for hazardous location application
- Various electrical outputs – transistor, relay, 2-wire AC, NAMUR, AS-i
- Aluminum, plastic and stainless steel housings
- Wide range of process connections with protective coatings
  - Maintenance free
  - Certifications – ATEX, FM, CSA, WHG, 3-A

### APPLICATION:

Universal use for overspill prevention, dry-run detection and min/max regulation for virtually all liquid level applications.

## CAPACITIVE LIMIT SWITCH – LCL

### MEASURING PRINCIPLE:

Capacitance – The probe together with its surroundings (tank wall) creates a capacitor that changes in value as material is added or removed from a tank. This change is detected and an output is emitted from the probe as an electronic switch signal.

### CHARACTERISTICS:

- Compact housing with standard and extended length versions
- Automatic build-up compensation
- Suitable for dusty environments in hazardous and non-hazardous areas
- Various electrical outputs – transistor and relay
- No maintenance required
- Certifications – ATEX, CSA, WHG

### APPLICATION:

Capacitive probes can be used to detect solids and liquids in a wide range of point level applications.





## CONDUCTIVE ELECTRODE

### MEASURING PRINCIPLE:

Conductive. Cost effective limit level detection in conductive liquids, two, three or five electrodes (rod or rope type) are installed above the medium. As soon as a conductive liquid creates a connection between the electrodes, a switch signal is generated. Usable in form of a compact design with integrated electronics or with separate electrode relay.

### CHARACTERISTICS:

- Rod type up to 4 m or rope type up to 15 m
- 2-5 switch points can be realized via one single probe, suitable for simple 2-point control
- Simple and durable structure with plastic housing (probe material: high-grade steel)
- Equalization not necessary
- Various electrical outputs: AC relay, DC-pnp, NAMUR
- Approvals: ATEX 2G Ex ia, 3G Ex nC, WHG

### APPLICATION:

Determination of limiting values or interfacial level indication for gasoline and petroleum layers in tanks, wells and sewer pipes.



## MAGNETIC IMMERSION PROBE - LML

### MEASURING PRINCIPLE:

Guided Float – A magnet built into a float operates reed switches contained in the rod of the probe resulting in single or multiple set points.

### CHARACTERISTICS:

- Plastic or stainless steel wetted parts
- Easy installation
- Wide range of process connections
- Hazardous area mounting options

### APPLICATION:

Point level detection for a wide range of liquid materials.



## FLOAT SWITCHES - LFL

### MEASURING PRINCIPLE:

Float – The tilting movement of the float, as it sinks and rises with the liquid level, is detected by a built-in switch and triggers the mercury-free switching process.

### CHARACTERISTICS:

- Simple and inexpensive
- Available in various shapes and sizes
- Mercury-free switch element
- Cables for a wide range of applications including acid, lye, oil or contaminated water
- High density cable for continuous movement
- Suitable for hazardous and safe areas

### APPLICATION:

Simple and inexpensive point level detection for liquids.



## INTERFACES AND CONTROLLERS FOR LEVEL SENSORS

Product group	Type	Output	Controller	Function	Haz. Area		
Vibracon	LVL-M1/M2	NAMUR	<b>KFD2-SR2-EX1.W</b>	Transformer Isolated Barrier	Yes		
Vibracon	LVL-MC2	NAMUR	<b>KFA6-SR2-EX1.W</b>	Transformer Isolated Barrier	Yes		
Conductive probe	LKL-P	24 V DC	<b>KFD2-ER-1.W.LB</b>	Electrode relay	No		
		24 V DC	<b>KFD2-ER-EX1.W.LB</b>	Electrode relay	Yes		
		24 V DC	<b>KFD2-ER-2.W.LB</b>	Electrode relay	No		
		230 V AC	<b>KFA6-ER-1.W.LB</b>	Electrode relay	No		
			<b>KFD2-SR2-EX1.W</b>	Transformer Isolated Barrier	Yes		
Mag. immersion	LML	Magnetic switch	<b>KFA6-SR2-EX2.W</b>	Transformer Isolated Barrier	Yes		
Float switch	LFL-N	NAMUR					
Barcon	LHC-M	4 mA ... 20 mA	<b>KFD2-CR-1.300</b>	Power Supply	No		
Barcon	PPC-M	4 mA ... 20 mA	<b>KFD2-STC4-EX1</b>	Power Supply	Yes		
Ultrasonic	LUC-M	4 mA ... 20 mA	<b>KFD2-CRG-1.D</b>	Power Supply + 2 Limit Values	No		
Pulscon	LTC	4 mA ... 20 mA	<b>KFD2-CRG-EX1.D</b>	Power Supply + 2 Limit Values	Yes		
		4 mA ... 20 mA	<b>DA5-IU-2K-C</b>	Display-Power Supply + 2 Limit Values	No		
		4 mA ... 20 mA/HART	<b>KFD2-STC4-1.20</b>	Power Supply	No		
		4 mA ... 20 mA/HART	<b>KFD2-STC4-EX1</b>	Power Supply	Yes		
		PA	<b>KFD2-BR-EX1.3PA93</b>	Power Supply	Yes		
		PA	<b>KFD2-BR-1.PA.93</b>	Power Supply	No		
		FF	<b>KLD2-PR-EX1-IEC</b>	Power Supply-Fisco + Entity	Yes		
		FF	<b>KLD2-PR-EX1-IEC1</b>	Power Supply- Fisco	Yes		
		FF	<b>KLD-PR-1.IEC</b>	Power Supply	No		
		Water probe	LGC	Temp./PT100	<b>KFD2-UT-1</b>	Converter	No
				PT100/4 mA ... 20 mA	<b>KFD2-CR-1300</b>	Power Supply	No
Temp./PT100	<b>KFD2-UT-EX1</b>			Converter	Yes		
PT100/4 mA ... 20 mA	<b>KFD2-STC4-EX1</b>			Power Supply	Yes		
Mag. immersion	LMC	4 mA ... 20 mA	<b>KFD2-STC4-EX1</b>	Power Supply	Yes		
		Potentiometer	<b>KFD2-PT2-Ex1</b>	Power Supply	Yes		

### ULTRASONIC - LUC



#### MEASURING PRINCIPLE:

Ultrasonic – The total time for an ultrasonic wave to be reflected from the medium surface is measured by the probe. This value is then transmitted to the control system as a proportional level within the tank or vessel.

#### CHARACTERISTICS:

- Sensing range from 0.3 m ... 15 m (1 ft ... 49 ft)
- Simple to install and program
- Fixed target suppression
- Mapping feature for non-linear tanks
- Wide range of electrical outputs – 2/4-wire AC/DC, 4 mA ... 20 mA, HART, Profibus-PA
- Certifications for PTB-EEExia, CSA, FM



#### APPLICATION:

Suitable to be used for continuous level measurement for liquids and bulk materials.

### Pulscon - LTC



#### MEASURING PRINCIPLE:

Guided Microwave – A transmitted pulse is guided down a stainless steel rod or rope and is reflected at the surface of the material. The level of the medium is determined by the sensor electronics and is based on the total run time of the pulse.

#### CHARACTERISTICS:

- Suitable for liquids or bulk material
- Sensing range from 0.5 m ... 35 m (18 in ... 115 ft)
- Rod, rope, or coax
- Simple to install and program
- Not effected by pressure, temperature or turbulence
- Optional display
- Multiple process connections
- Various electrical outputs – 2/4-wire AC/DC, 4 mA ... 20 mA, HART, Profibus-PA, FOUNDATION H1
- Certifications according to ATEX, FM, CSA

#### APPLICATION:

This probe is a universal solution for applications involving liquids or bulk material.



## Barcon – LHC/PPC



### MEASURING PRINCIPLE:

Pressure – The measured pressure is transferred through a stainless steel membrane or ceramic capacitive transducer and is transformed into a temperature compensated output signal. This signal is proportional to the pressure or the detected liquid level.

### CHARACTERISTICS:

- Durable and extremely accurate
- Piezo-resistive or ceramic capacitive sensing
- Sensing range from 10 mbar (0.15 psi/4 in. H<sub>2</sub>O) to 400 bar (600 psi)
- Various process connections
- Aluminum or stainless steel housing
- Accuracy better than 0.2 %
- Simple to install and configure
- Optional LC-Display
- Electrical outputs – 4mA ... 20mA, HART, PROFIBUS PA

### APPLICATION:

Suitable for continuous level measurement of liquid and viscous mediums as well as gauge pressure measurement of gases and liquids in pipes and closed tanks.

## LEVEL GAUGE PROBE - LGC

### MEASURING PRINCIPLE:

Hydrostatic Pressure – The pressure of a liquid column is transformed into a proportional level signal using a ceramic-capacitive sensor.

### CHARACTERISTICS:

- Heavy duty and extremely accurate sensor
- Sensing range from 100 mbar (1.5 psi/40 in. H<sub>2</sub>O) to 20 bar (300 psi)
- Accuracy better than 0.2%
- Fully encapsulated housing
- 60 m (200 ft) probe cable length
- Integrated surge suppressor
- 4 mA ... 20 mA electrical output
- Optional temperature measurement
- Certifications for ATEX, FM, CSA

### APPLICATION:

Use for applications requiring continuous liquid level measurement. Specially suited for water and sewage applications in wells and purification plants.

## MAGNETIC IMMERSION PROBE - LMC

### MEASURING PRINCIPLE:

Guided Float – A magnet built into a float enables or disables a series of reed switches and resistive networks mounted inside the probe housing. The total resistance generated by the opening or closing of the switches is converted by an interface module into a standard output signal that is proportional to the liquid level.

### CHARACTERISTICS:

- Plastic or stainless steel wetted parts
- Easy installation
- Wide range of process connections
- Hazardous area solutions available

### APPLICATION:

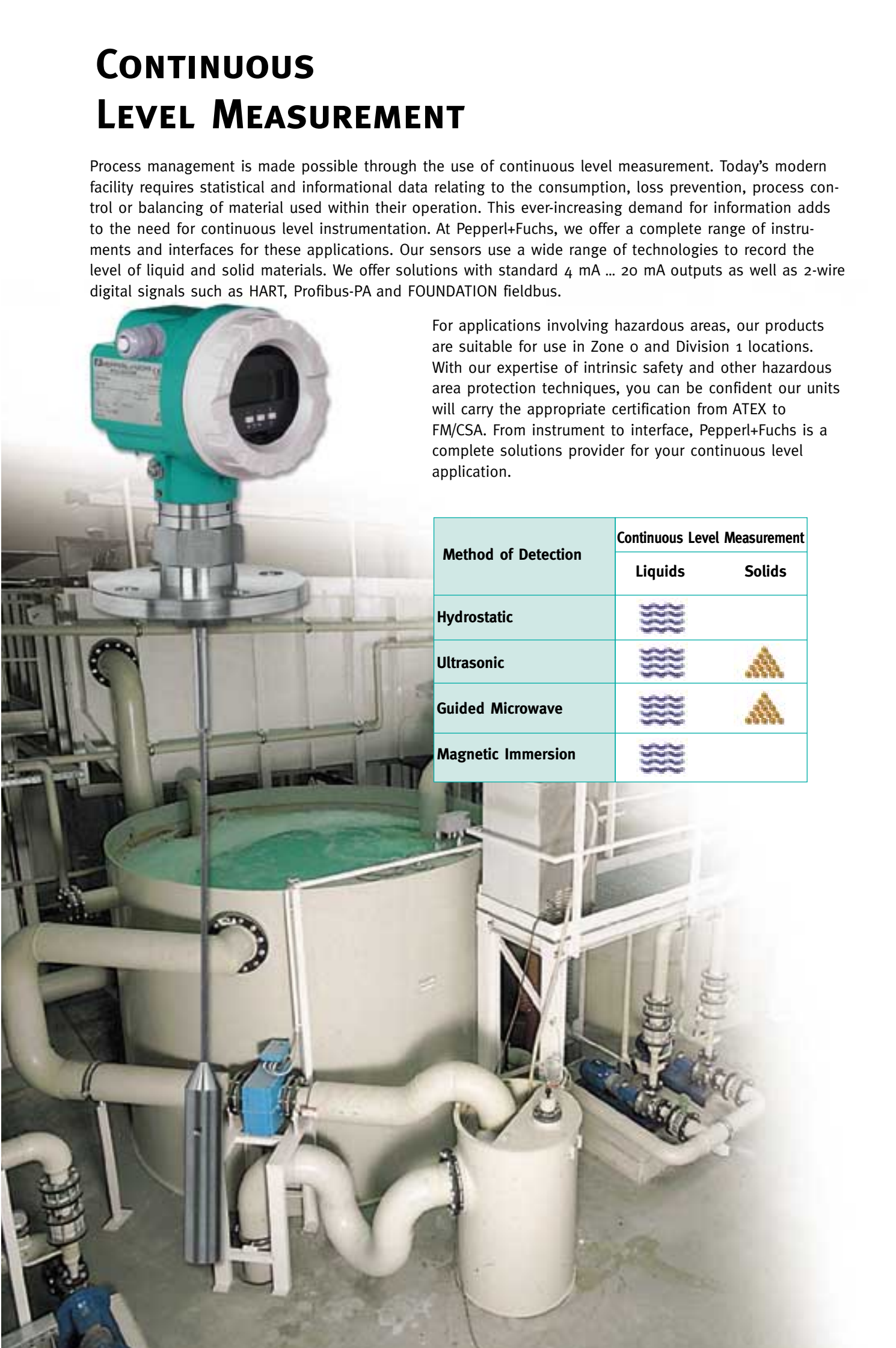
Continuous level measurement for all liquids.









# CONTINUOUS LEVEL MEASUREMENT

Process management is made possible through the use of continuous level measurement. Today's modern facility requires statistical and informational data relating to the consumption, loss prevention, process control or balancing of material used within their operation. This ever-increasing demand for information adds to the need for continuous level instrumentation. At Pepperl+Fuchs, we offer a complete range of instruments and interfaces for these applications. Our sensors use a wide range of technologies to record the level of liquid and solid materials. We offer solutions with standard 4 mA ... 20 mA outputs as well as 2-wire digital signals such as HART, Profibus-PA and FOUNDATION fieldbus.

For applications involving hazardous areas, our products are suitable for use in Zone 0 and Division 1 locations. With our expertise of intrinsic safety and other hazardous area protection techniques, you can be confident our units will carry the appropriate certification from ATEX to FM/CSA. From instrument to interface, Pepperl+Fuchs is a complete solutions provider for your continuous level application.









Method of Detection	Continuous Level Measurement	
	Liquids	Solids
Hydrostatic		
Ultrasonic		
Guided Microwave		
Magnetic Immersion		

# POINT LEVEL DETECTION

Today, level detection is the basis for facility management and process control in the chemical, petrochemical, environmental and other related industries. With an extensive line of products, Pepperl+Fuchs can solve your specific application for these and many other industries by offering solutions to accurately detect a wide range of medium in various conditions. At Pepperl+Fuchs, level control means more than product alone. It means adhering to all of the legal requirements in your particular region. We are aligned with all national, international and European standards plus our active involvement in standard committees provides strong commitment and knowledge. Our products are suitable for hazardous locations as well as areas susceptible to overflow damage since ATEX, FM, CSA and WHG§19 are integral in our design criteria.

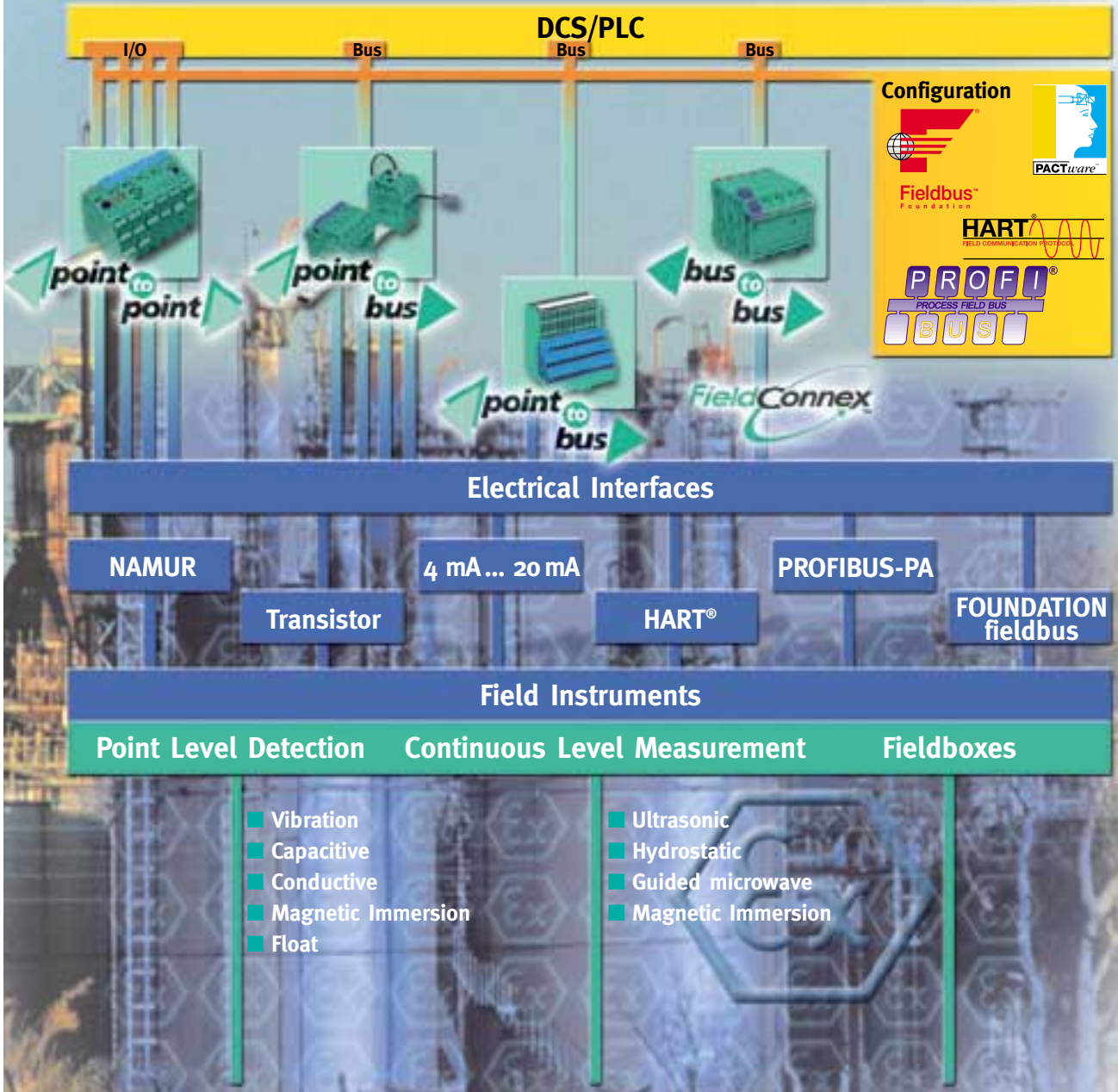


We offer solutions for a wide range of point level applications such as overflow/dry-run prevention and min-max regulation. Our products are used to determine whether a predetermined level has been achieved or exceeded or whether the level has fallen below the critical point.

Method of Detection	Point Level Measurement	
	Liquids	Solids
Vibration		
Capacitive		
Conductive		
Magnetic Immersion		
Float		

# INSTRUMENTATION USED IN PROCESS AUTOMATION

Complete system solutions from the field to the control panel



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