



F&B CUSTOMER DAY 2018 | SURABAYA , SEPTEMBER 5, 2018

# Achieving your maximum product quality using ABB outstanding measurement technology

Budiono, Service Sales Manager, Measurement & Analytics business unit



# Business Unit Measurement & Analytics

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		 Los Gatos Research A MEMBER OF THE ABB GROUP

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## Who we are...




- About 5000 employee in 50+ Countries
- 26 Factories in 10 Countries
- Market Leading in Products and Services

## What we do...

- Vast portfolio with straightforward benefits
- Help customers to improve productivity and lower environmental impact

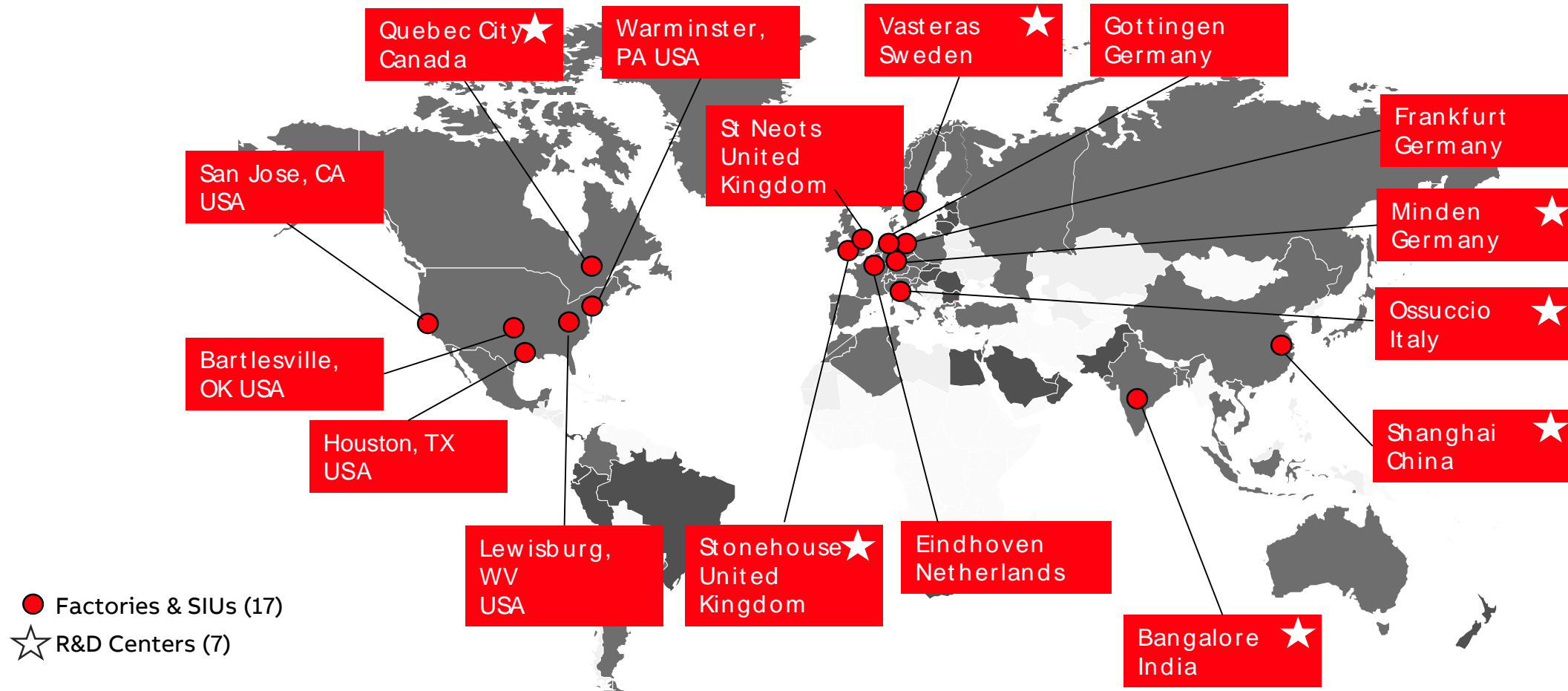
# BU Overview- IAMA Measurement & Analytics

‘Measurement made easy’

<b>What</b> <i>(Offering)</i>	<b>Delivering data for the digital era</b>		
	<b>Instrumentation</b>	<b>Analytics</b>	<b>Force</b>
	~ 43%	~ 29%	~ 5%
<b>For whom</b> <i>(Customers)</i>	<b>Utilities</b>	<b>Industry</b>	<b>Transport &amp; Infrastructure</b>
	~ 13% of revenue	~ 85% of revenue	~ 2% of revenue
<b>Where</b> <i>(Geographies)</i>	<b>Globally</b>		
	Asia, Middle East , Africa 34%	Americas 31%	Europe 35%
<b>How</b> <i>(Values)</i>	<b>Customer intimacy</b>	<b>Channel Partner Focus</b>	<b>Innovation and digitalization</b>
			

# Measurement & Analytics

## Global presence



# What we do...

Four product groups with a large variety of product lines



EMF	Coriolis	Pressure	M'Strictive Level
VA	Vortex/Swirl	Ultrasonic Level	Radar Level
DP	Thermal Mass	Laser Level	Positioners
Gas Flow	FCU./RTU	Actuators	Temperature

Cont. Gas	Comb. Gas
Gas Chrom.	Rem. Sensing
FTIR/FTNIR.	pH/Condy
CWA	TDLA

Flatness	Rolling Mill
Dimension	Web Tension
Cylmate	Weighing
Tools	

- Start-up & Commissioning
- Spare Parts & Repairs
- Calibration
- Upgrades & Migration
- Professional Training Programs
- Flexible Service Agreements
- Corrective & Preventive Maintenance
- Optimization & Advanced Services
- Full Service Agreements
- Remote Access
- Verification

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# Increase Your Product Quality in F&B Applications? Sure!

- Precise Level Measurement for your process control
- Density Measurement with Mass flowmeter
- Accurate pressure and temperature measurement in your process
- Accurate Level Measurement in your tank/ vessel
- Accurate Control for your Control Valve with Smart Positioner
- Process Data recorder and controller

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# Flow Measurement



# Flow Measurement Overview

Complete Flowmeter Portfolio



**Electromagnetic**



**Coriolis**



**VA**



**Vortex/Swirl**



**DP**



**Thermal**



**Gas Flow**



**Comp./RTU**



# Flowmeter for liquids, gases and steam

## Comparison of flow measurement principles

### Flowmeter for Liquids

Measurement principle

Type of Liquid

Conductive

Pulsating

Viscosity

### Flowmeter for Gases

Measurement principle

Corrosive Gas

Density

### Flowmeter for Steam

Measurement principle

### General Limits for each principle

Temperature

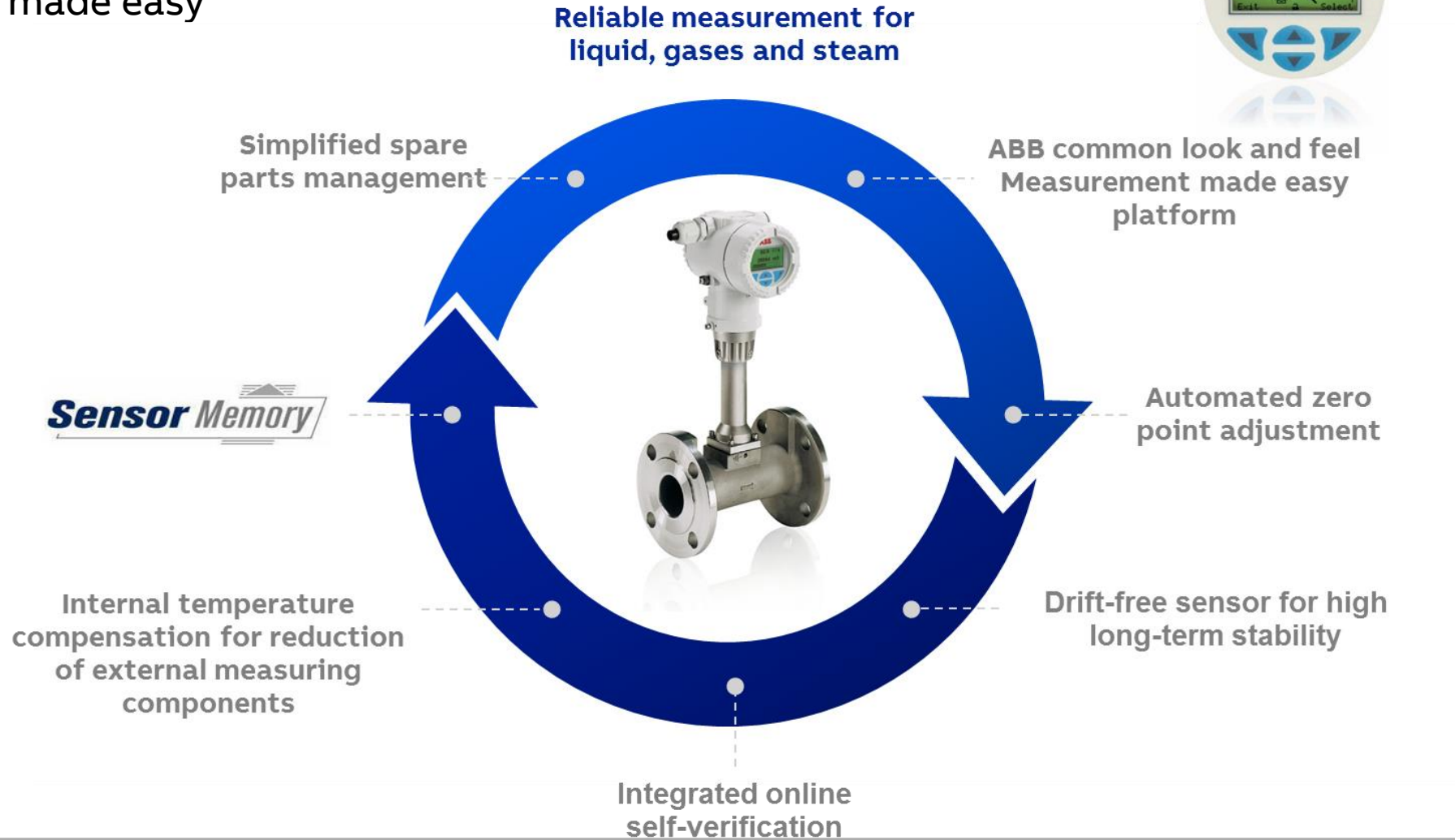
Pressure

Application, product features	Electro-magnetic	Vortex/Swirl	Thermal mass	Coriolis mass	Variable area	Differential pressure	Flow computers
<b>Liquids</b>							
Conductive	•	•		•	•	•	
Non-conductive		•		•	•	•	
Solids content	•			•	•	•	
Pulsating	•			•	•		
Viscosity > 10 cSt	•	•		•		•	
Liquid calculations				•			•
Custody liquid measurement	•			•			•
Gas/oil well optimization							•
<b>Gases</b>							
Dry/clean		•	•	•	•	•	
Moist		•	•	•	•	•	
Corrosive				•	•	•	
Contaminated		•	•	•	•	•	
Gas calculations		•					•
Custody gas measurement				•			•
<b>Steam*</b>							
Fluid temperature	-40...180 °C -40...356 °F	-55...400 °C -67...752 °F	-25...300 °C -13...572 °F	-50...205 °C -58...401 °F	-20...400 °C -4...752 °F	-50...500 °C -58...932 °F	
Ambient temperature	-40...60 °C -40...140 °F	-40...85 °C -40...185 °F	-25...70 °C -13...158 °F	-40...70 °C -40...158 °F	-25...60 °C -13...140 °F	-40...85 °C -40...185 °F	-40...60 °C -40...140 °F
Accuracy	0.2% of rate	0.5% of rate	1% of rate	0.1% of rate 1 g/l	1.6 per VDI/VDE 3513	0.7% of max.	0.075% of DP/SP span Flow-X: 0.002%
<b>Partially filled pipelines</b>	•						
Nominal diameter	DN 1...2400 [1/25...96"]	DN 15...400 [1/2...16"]	DN 25...3000 [1...120"]	DN 1.5...150 [1/16...6"]	DN 15...100 [1/2...4"]	DN 15...8000 [1/2...320"]	
Typical up-/ downstream sections	3D/2D	15D/5D 3D/2D	15D/5D	0D/0D	0D/0D	10D/4D	
Standard pressure ratings	PN 10...250 CL 150...2500 JIS 7.5...20K	PN 10...64 CL 150 CL 300	PN 40 CL 150 CL 300	PN 16...100 CL 150...600 JIS 5...20K	PN 16...100 CL 150...600	PN 10...400 CL 150...2500	
Hygienic/sterile certifications	EHEDG 3A, FDA			EHEDG FDA			
Certified calibrations	•	•	•	•	•	•	•
Ex-approvals	ATEX, IEC FM, CSA NEPSI, GOST	ATEX, FM CSA NEPSI, GOST	ATEX, FM CSA GOST	IECEX, ATEX cFMus, NEPSI GOST	ATEX, FM CSA	ATEX, FM CSA	ATEX CSA IEC, UI, FM
Communication	FF, HART PA	FF, HART, PA	HART, DPV1	HART, PA FF MODBUS	HART	FF, HART PA	Totalflow, Serial MODBUS TCP/IP, HART

\* e.g. saturated steam, superheated steam

# VortexMaster & SwirlMaster

Measurement made easy



# SwirlMaster FSS430/450

Comparison Reducer-Vortex vs. SwirlMaster



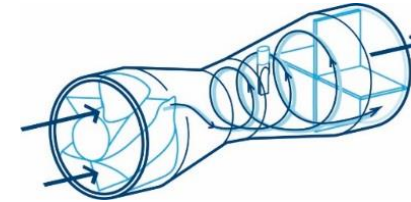
## Reducer Vortex Meter

Vortex meter with up to 2 diameter reduced bore

High pressure loss

Limited accuracy

Same demand for up- and downstream sections of installation space



## SwirlMaster FSS400

Makes reducer Vortex obsolete as it works with lower flow speed

Lower pressure loss

Better accuracy than Vortex

Lowest demand for Installation Space (up- and downstream sections)

# Coriolis mass flowmeter

## Product portfolio

### FCBxxx Sensor



Bent double tube design  
DN 15 ... DN 150 [1/2 ... 6"]

### FCHxxx Sensor



Bent double tube design, EHEDG approved  
DN 25 ... DN 80 [1 ... 3"]



	Series	<b>FCBx30</b>	<b>FCBx50*</b>	<b>FCHx30</b>	<b>FCHx50*</b>
	<b>T<sub>med</sub></b>	-50°C ... 160°C [-58°F ... 320°F]	-50°C ... 205°C [-58°F ... 400°F]	-50°C ... 160°C [-58°F ... 320°F]	-50°C ... 205°C [-58°F ... 400°F]
<b>Liquids</b>	<b>Mass</b>	0.4 %, Optional: 0,25; 0.2 %	0.15 %, Optional: 0.1 %	0.4 %, Optional: 0,25; 0.2 %	0.15 %, Optional: 0.1 %
	<b>Density</b>	10g/l density	2g/l, Optional: 1g/l; 0.5g/l	10g/l density	2g/l, Optional: 1g/l; 0.5g/l
<b>Gas</b>	<b>Mass</b>	1 %	0.5 %	1 %	0.5 %

## II – Coriolis flowmeter designs – Advantages of ABB sensor design

CoriolisMaster FCB & FCH



- + Small, compact and lightweight design
- + High operation frequencies, insensitive to noise
- + Short tube length results in high zero point accuracy
- + Large inner diameters results in higher flow capacity and lower pressure drop

# Lower pressure loss due to optimized design

CoriolisMaster

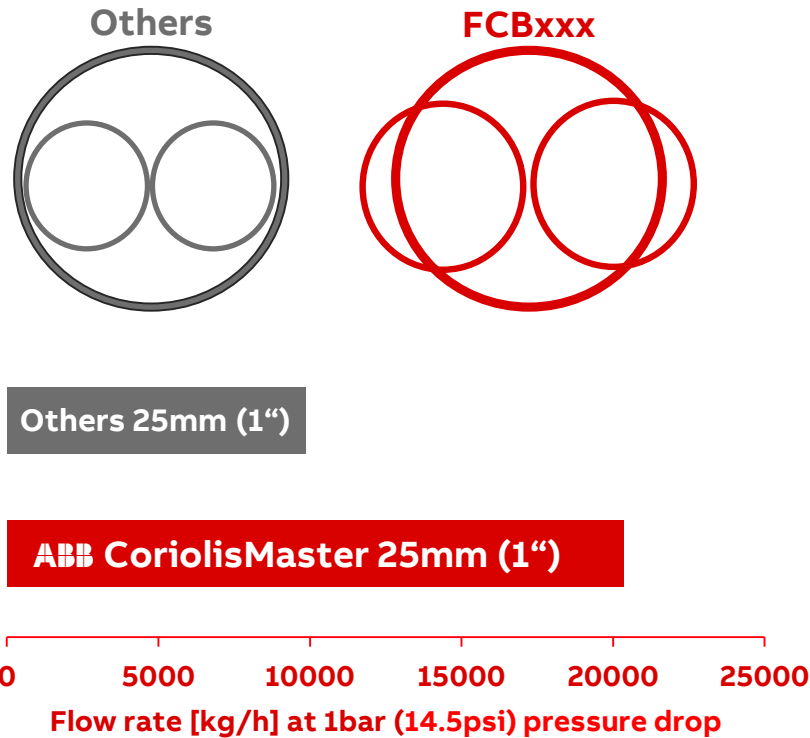
## ABB design results in

The new design has wider the inner tube diameters.

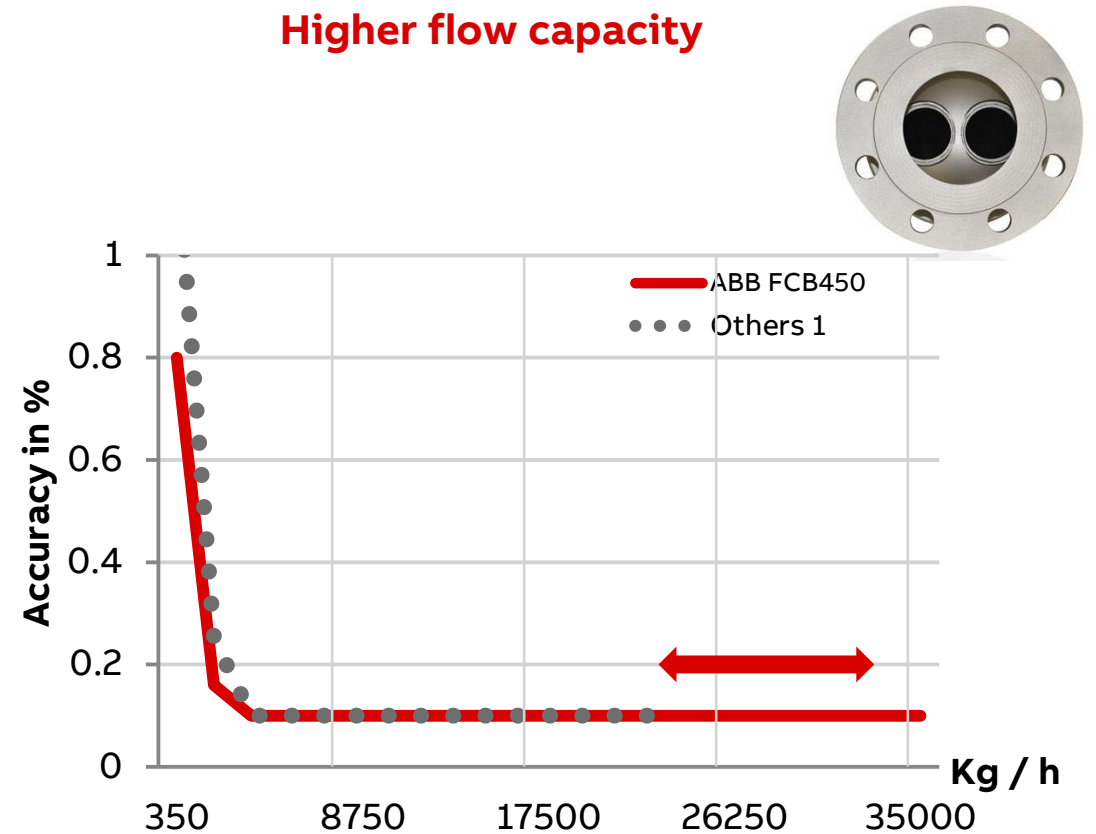
This resulting in

- 50 to 90 % lower pressure drop and
- Higher flow capacities up to 50%

## Lower pressure loss



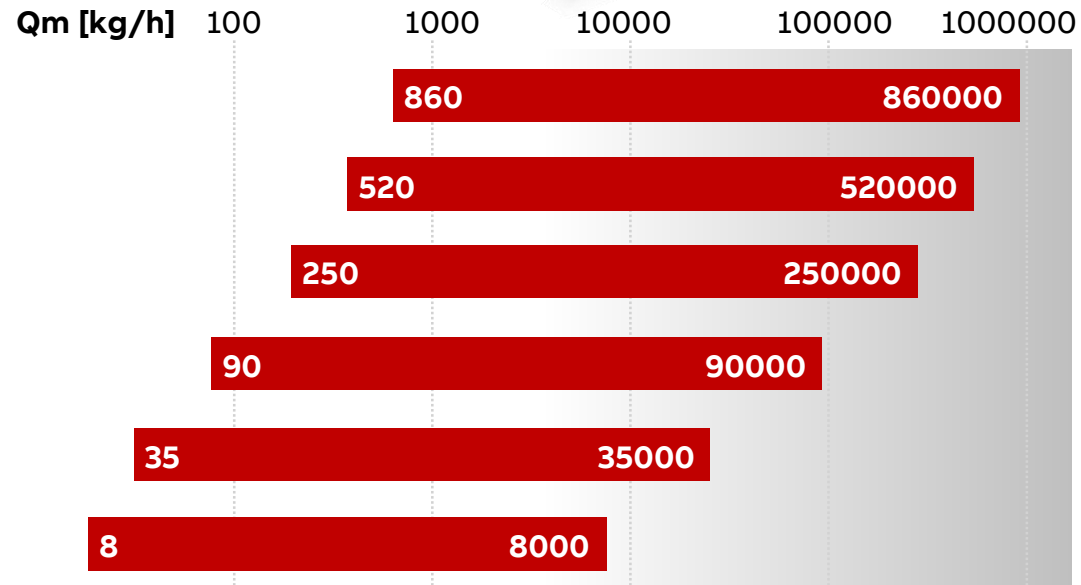
## Higher flow capacity



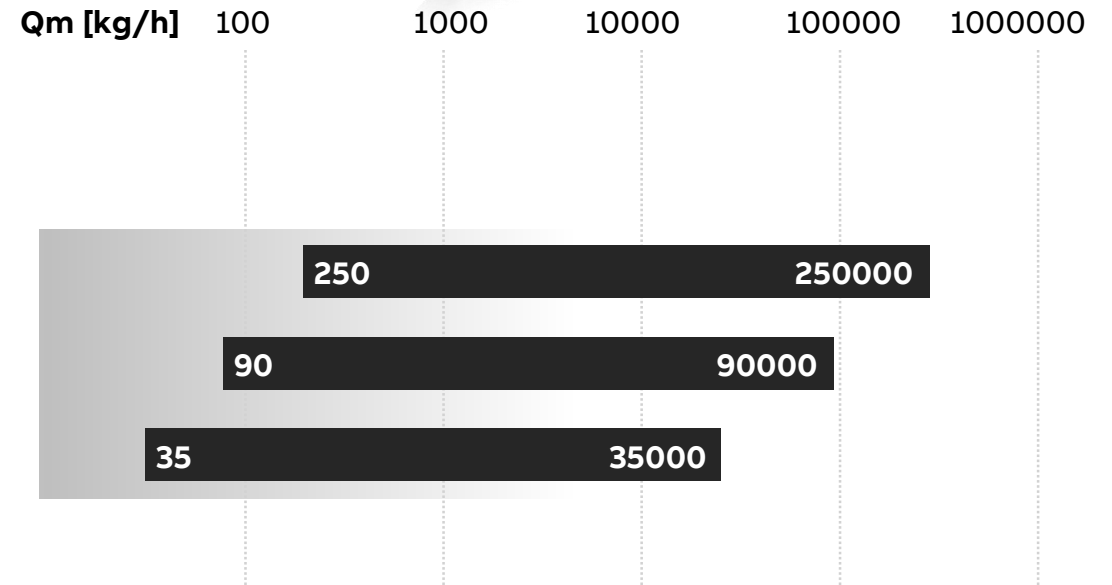
# Coriolis mass flowmeter

Wide flow range per meter = minimum number of meter sizes

## FCBxxx Sensor

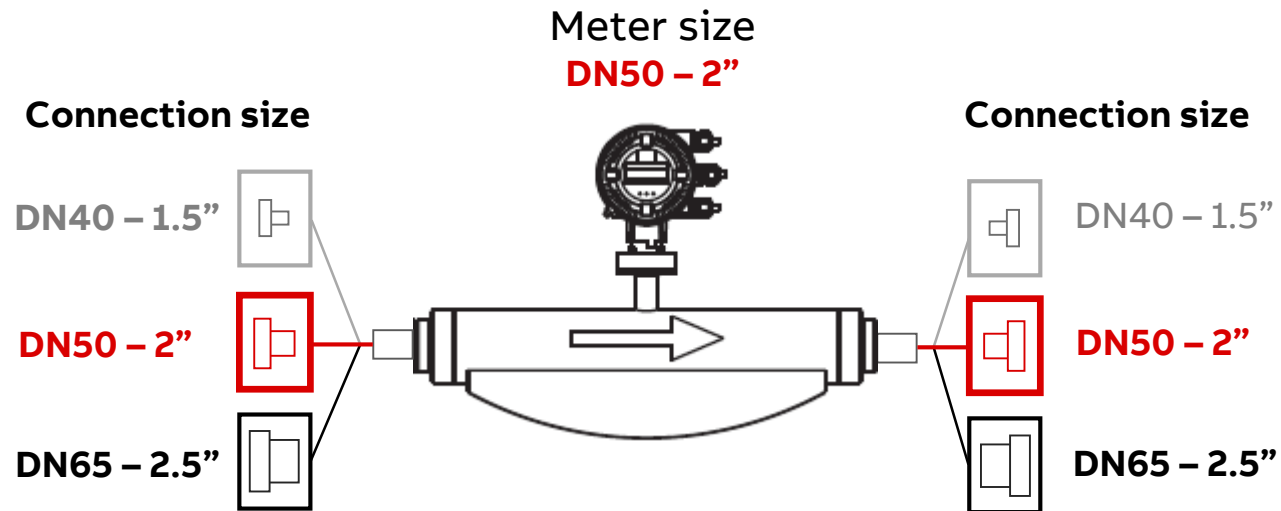


## FCHxxx Sensor



# CoriolisMaster – Flexible flange connection concept

CoriolisMaster FCB & FCH – Example



Flexible handling of flange connections allow application adjustable in terms of

- Pressure loss/flow rates for various meter sizes
- Existing pipe sizes without modification
- Existing budget



# Food & Beverage industry



## Coriolis Mass flowmeter



Target industry	Specific areas	Main product
Process monitoring	Any dairy products, oils, fruit juices, alcohol, chocolate, mayonnaise, ketchup, etc.	FCB400 FCH400 (if polishing needed)
Truck filling	Any dairy products, oils, fruit juices, alcohol, chocolate, mayonnaise, ketchup, etc.	FCB400 FCH400 (if polishing needed)
Dosing of additives	Dosing of small quantities	MS2
Fast filling applications	Filling of bottles, cans or small containers	FCB100
General	All standard applications where no 3A or <0.8um roughness is required	FCB400 or FCH400

# SensyMaster – Thermal mass flowmeter Portfolio

## Product Portfolio

	Product		Industry	Application
Process flowmeter	<b>SensyMaster</b> FMT400 FMT200		Metals and minerals energy Oil and Gas downstream Chemistry / petro chemistry Food and Beverage Bio gas Wastewater – Treatment	Burner control Gas-/Energy distribution Gas distribution Gas monitoring / Combustion control CO2 in carbonation Air-/Gas distribution Sensitive gas monitoring Ventilation flow
Test meter	<b>Sensyflow</b> FMT700-P * FMT200-ECO2		Automotive industry system integrators Engine manufacturer Catalytic converter manufacturer Testing institutes	Test stands Accurate & dynamic intake air measurements emission testing / quality assurance Homologation dynamic and compact Air, gas burner control, dosing

# Thermal mass flowmeter

## SensyMaster – Product overview

### FMT230



- Modbus RTU & RS485
- Applications up to 150 °C
- Accuracy better than 1,2 %
- Up to 2 application selectable

### FMT250



- Modbus RTU & RS485
- Applications up to 300°C
- Accuracy better than 0,6 %
- Up to 8 application selectable
- Diagnostic: Enhanced

### FMT430



- Communication: HART
- Common Look & Feel
- Applications up to 150 °C
- Accuracy better than 1,2 %
- Up to 2 application selectable

### FMT450

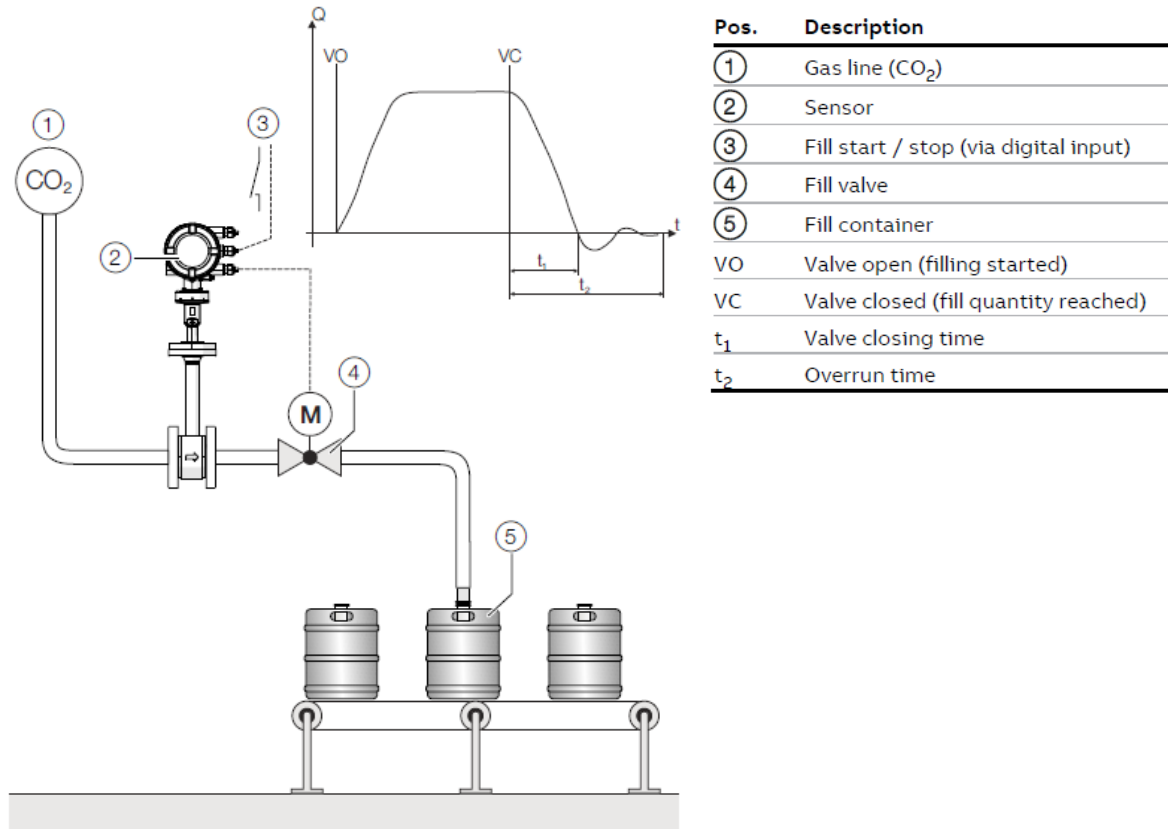


- Communication: HART
- Common Look & Feel
- Applications up to 300 °C
- Accuracy better than 0,6 %
- Up to 8 application selectable
- Diagnostic: Enhanced

- SensorApplicationMemory: **Save your data**
- Outstanding sensor technology: **Long term stability and repeatability**
- Wide range of housing types (Alu & SST): **Match your environmental conditions**

# Filling & Dosing application solution

Special application – [PT] Filling application (example CO2 filling)



- The integrated FillMass fill function allows filling processes to be recorded in > 3 seconds.
- For this purpose, the filling quantity is given via an adjustable totalizer.
- The fill function is controlled via the HART interface or via the digital input.
- The valve is triggered via one of the digital outputs and closed again once the preset filling quantity is reached.
- The transmitter measures the overrun quantity and calculates the overrun correction from this.
- Additionally, the low flow cut-off can be activated if required.

# Application limits for gases – covered by the ProductSelectionAssistant [PSA]

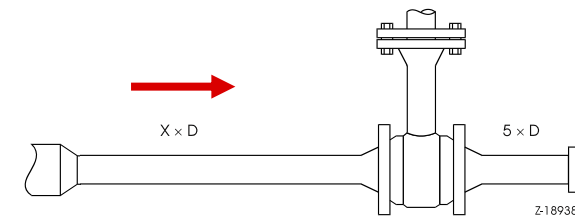
## Thermal mass flowmeter – Benefits & limits

### Advantages

- Measurement from nearly zero is possible
- Wide measuring range → up to 1 : 150
- Wide pressure range: 0.6 to 40 bar(a) [9 to 580 psia]
- Wide temperature range: -25 to 300 °C [-13 °F to 572°F]
- Lowest pressure drop
- High accuracy

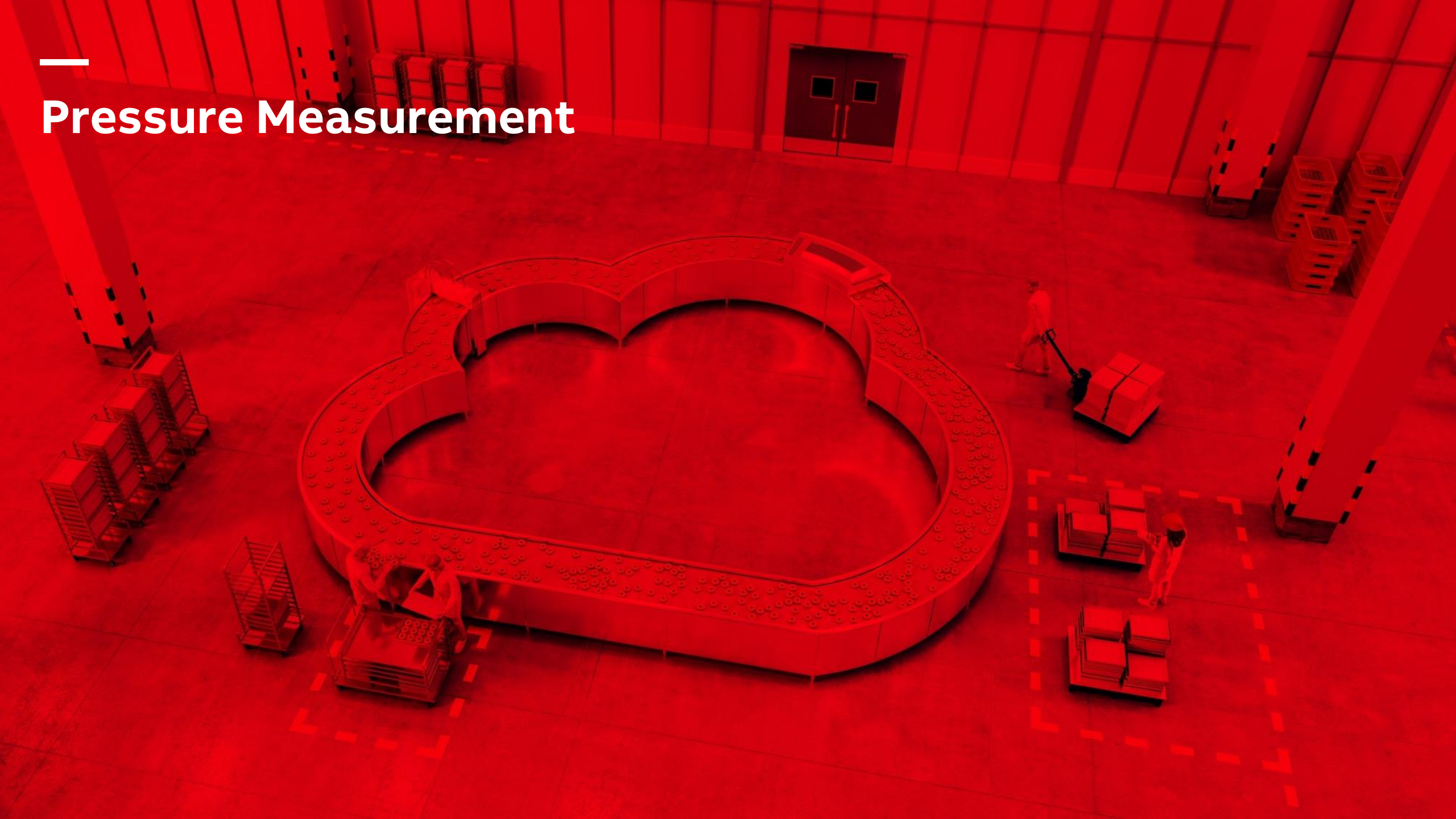
### Limitations

- Only gas measurement
- Composition of the gas has to be known
- Condensate must be avoided
- Sticky dirt can lead to deviations
- Straight inlet/outlet sections are necessary, e.g. 15 x D inlet and 5 x D outlet (same as vortex)



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# Pressure Measurement



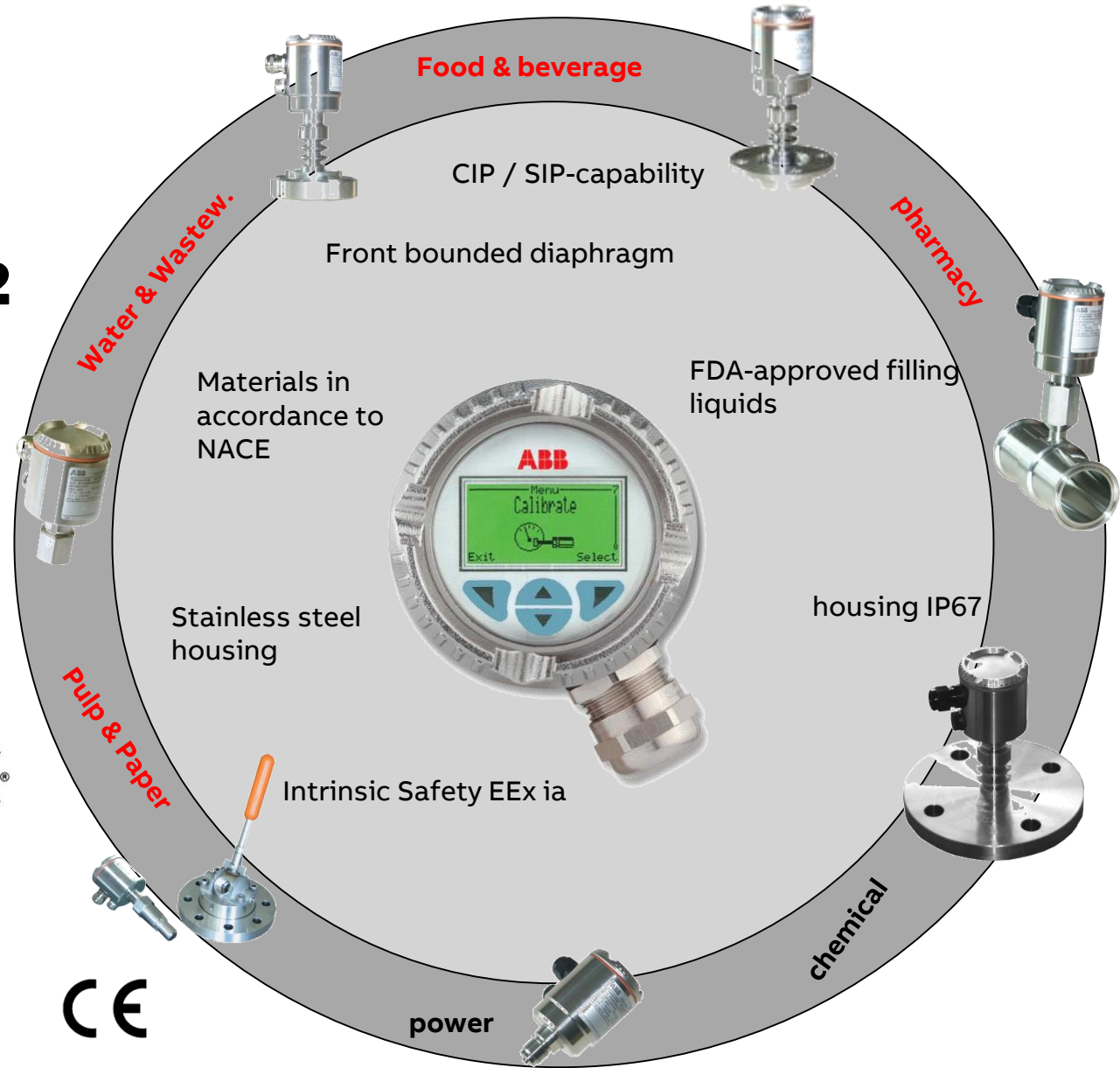
# Pressure Measurement



**SIL2**



**PED**



# 261 Compact class pressure transmitters

## Key facts



- Gauge and absolute pressure measurement
- Measuring spans from 3 mbar to 600 bar
- Stand. accuracy 0,1%
- Turn down 1:20
- Innovative display / HMI
- Output signal 4...20 mA / HART
- Small housing, made from stainless steel 316L,
- acc. to the FDA, 3A, requirements
- Base: 'piezo' silicon pressure sensors
- Cover out of stainless steel or stainless steel and plastic (Window out of Macrolon®)
- Ingress protection IP67 (on request IP68)
- Sealed electronic unit
- Great variety of process connections



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# Temperature Measurement



# TTF200 Temperature Transmitter

## Temperature Transmitter - Head

### Temperature Transmitter Head-mounted

#### – TTH300

- Dual-channel sensor input
- Hot backup redundancy
- Drift detection
- Display with configuration buttons
- 4...20 mA HART, PA, FF



#### – TTH200

- Single-channel sensor input
- Display without configuration buttons
- 4...20 mA HART



## Temperature Transmitter - Field

### Temperature Transmitter Field-mounted

#### – TTF300

- Dual-channel sensor input
- Hot backup redundancy
- Drift detection
- Display with configuration buttons
- 4...20 mA HART, PA, FF, wireless HART



#### - TTF200

- Single-channel sensor input
- Display without configuration buttons
- 4...20 mA HART



## Temperature Transmitter - Rail

### Temperature Transmitter Rail-mounted

#### – Mid-tier TTR200

- Single-channel sensor input
- LED status information (service port)
- 4...20 mA HART



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# TTF200 Temperature Transmitter

## Key features

### Input

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#### Sensor

- RTD resistance thermometer 2-, 3-, 4-wire
  - Pt100 according to IEC 60751, JIS C1604, MIL-T-24388
  - Ni according to DIN 43760
  - Cu according to recommendation OIML R 84
- Thermocouples types
  - B, E, J, K, N, R, S, T in accordance with IEC 60584
  - U, L in accordance with DIN 43710
  - C, D in accordance with ASTM E-988
- Resistance measurement
  - 0...500  $\Omega$ , 0...5000  $\Omega$
- Voltages measurement
  - -125...125 mV, -125... 1100 mV

### Output

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#### Current loop 4...20 mA HART

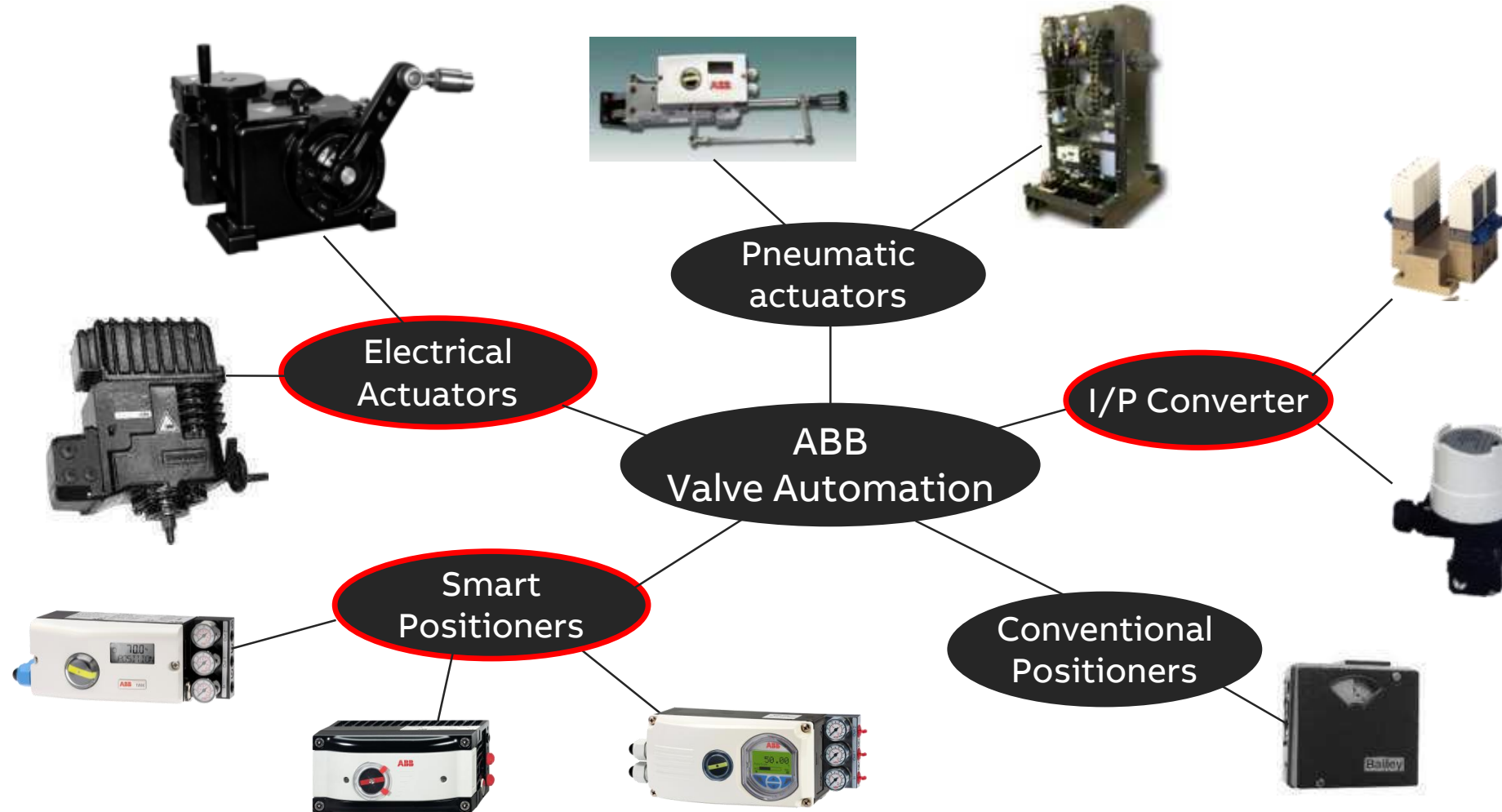
- Transmission behavior
  - Temperature linear
  - Resistance linear
  - Voltage linear
- Output signal
  - Configurable 4...20 mA (standard)
  - Configurable 20...4 mA
- Simulation mode
  - Configurable 3.5...23.6 mA
- Error current signal
  - Configurable over range 22 mA (20.0...23.6 mA)
  - Configurable under range 3.6 mA (3.5...4.0 mA)

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# Actuator and Positioners



# Actuator & Positioner Product Portfolio



# Contrac Electrical Actuators

Which applications does this apply to?



Drum level control valve  
Start-up valve  
Minimum quantity control valve  
Pressure reduction stations  
Injection control valve  
Feed water preheating

Feed water control valve  
Bottle flow control valve  
Induced air fan / suction draught control  
Burner air butterfly valves  
Airflow butterfly valves

Mill carrier air flow butterfly valves  
Fuel control  
Butterfly valves- re-circulation  
District heating control  
Burnout butterfly valves

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# Analytical Measurement



# Analytical Measurement

 Aluminium	 Ammonia ✓	 Chlorine
 Chloride ✓	 Conductivity	 Dissolved Organics
 Dissolved Oxygen	 Fluoride	 Hydrazine
 Hydrogen Purity & Purge Gas	 Iron	 Manganese
 Nitrate	 Packaged Analyzer Systems	 pH & Redox/ORP ✓
 Phosphate	 Silica	 Sodium
 Turbidity ✓	 Water Hardness	 Zirconia In Situ Oxygen and Combustion ✓

Application example in Food and Beverage Industry:

1. Process eg. Measurement of PH and Conductivity in CIP Line, Ice Cream, Sugar Industry, Dairy.
2. Utility eg O2 Measurement in Utility Boiler.
3. Exhaust and Waste eg pH & Dissolved Oxygen Measurement in Waster Water Treatment Plant, Effluent Neutralisation.





# AX466 Brewery & Dairy

## Heat Exchanger NH<sub>3</sub> Leakage Detection – pH/pH

Heat taken from process or waste water using a chiller

Ammonia is used as the cooling agent

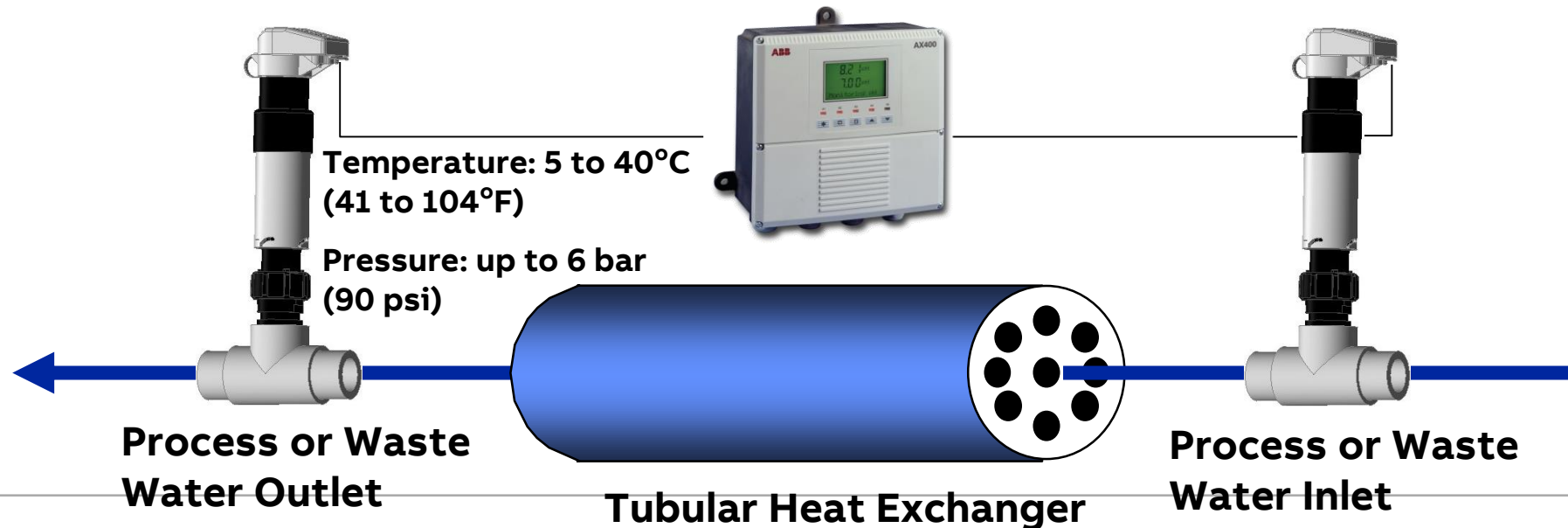
Danger of ammonia breakthrough

Detection of a pH delta ensures rapid leakage detection

$\Delta$ 1pH is very small NH<sub>3</sub> leak

Cheaper and less maintenance than absolute NH<sub>3</sub> measurement

Less maintenance using dual input conductivity analyzer but less sensitive

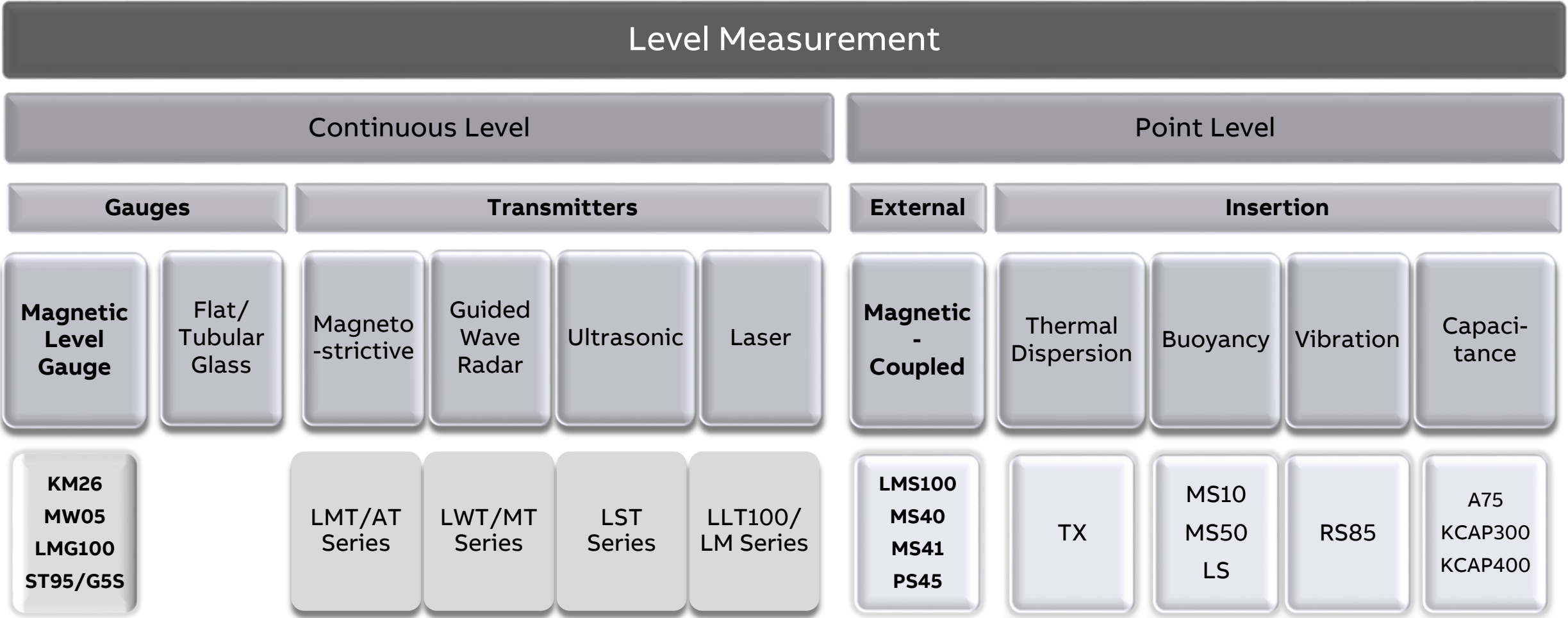


# Level Measurement



# ABB Level Measurement

## Level Measurement



# Level Measurement for F&B Application



**KM26**  
Magnetic  
Level Gauge  
with 4-20 mA  
Output



**LLT100**  
Laser Level  
Transmitter



**AT100**  
Magnetostrictive  
Level Transmitter



**LM80** Laser  
Level  
Transmitter



**LMS200**  
MLG  
Switch



**LST** Ultrasonic Level  
Transmitter



# Certifications and Approvals

## LLT100 approvals

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Hazardous area (FM, ATEX, IECEx)

- Safe for gas, Ex db “flame path” (Class 1/ Division 1 (zone 1))
- Safe for dust, Ex tb “dust exclusion” (Zone 21)
- Laser beam is intrinsically safe for use into Zone 0, when product is in Zone 1
  - Must use fused glass flanges
  - OP IS – intrinsically safe for laser emission

In addition:

- Canadian Registration Number (CRN)
- KOSHA
- INMETRO

FDA, Hygienic certification (3A)



# Level due Obstructions and Mixers

## Level Control in Mixers



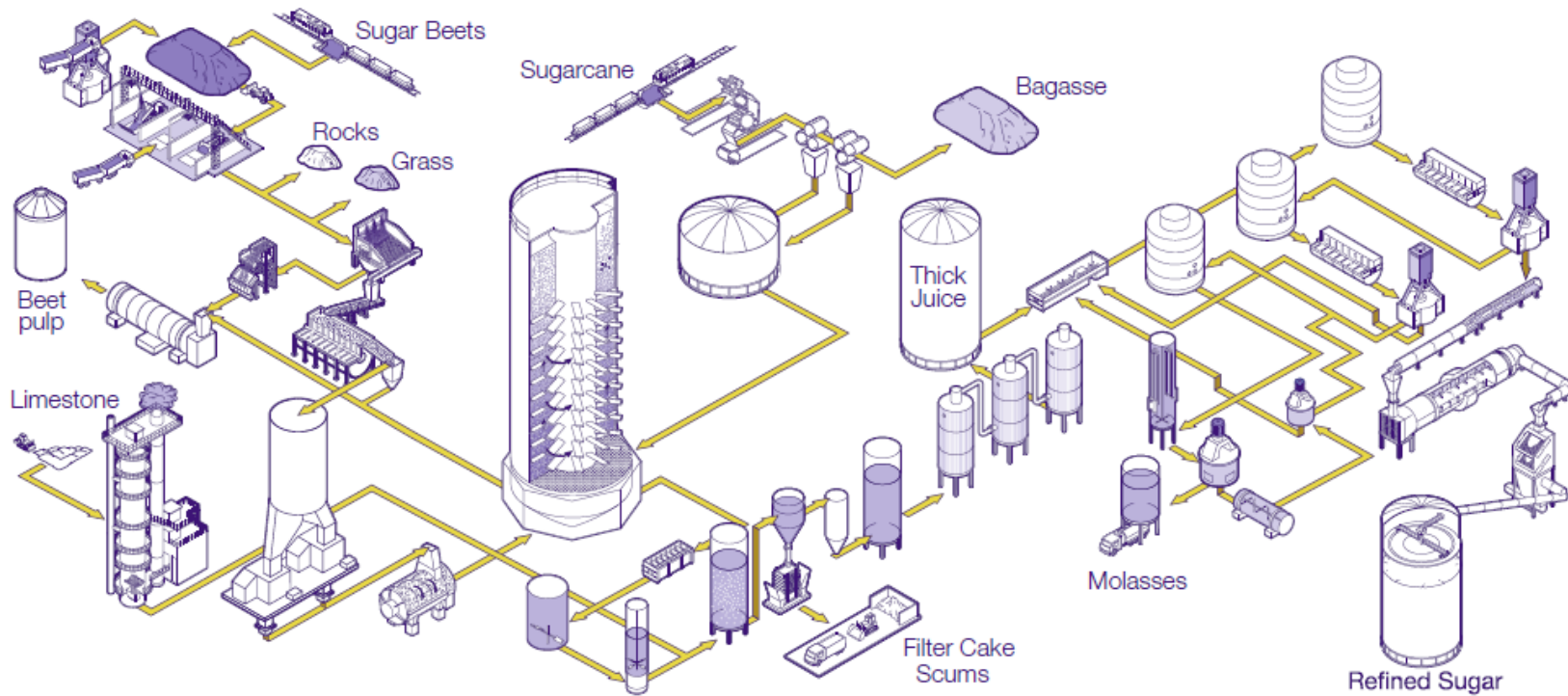
### Situation:

Mixing liquid and solid ingredients, splashing and dusty might occur

### LLT100 Solution:

- Narrow beam to avoid mixer blades
- Filter functions for reliable measurement
- Tracks fast surface changes
- Reliable measurement with dusty environment
- Hygienic model, if necessary

# Process Landscape



Reliable measurement in the presence of environment variations  
Non-contact : ideal for sticky products  
Narrow beam: easy to install in constraint space

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# Summary

## Take Home Message

Laser technology can be sold on its advantages

- Non-Contact, maintenance free
- Narrow beam
- Measures great distances
- No calibration
- Rapid response
- Easy Installation



# Applications

## Sugar plant



### Location

Sugar Plant, North America

### Process

Sodium hydroxide tank level control for treatment of boiler Feedwater

### Challenge

Precise level measurement & control. Customer had two competitor switches which did not perform well, would cause false change of state

### Solution

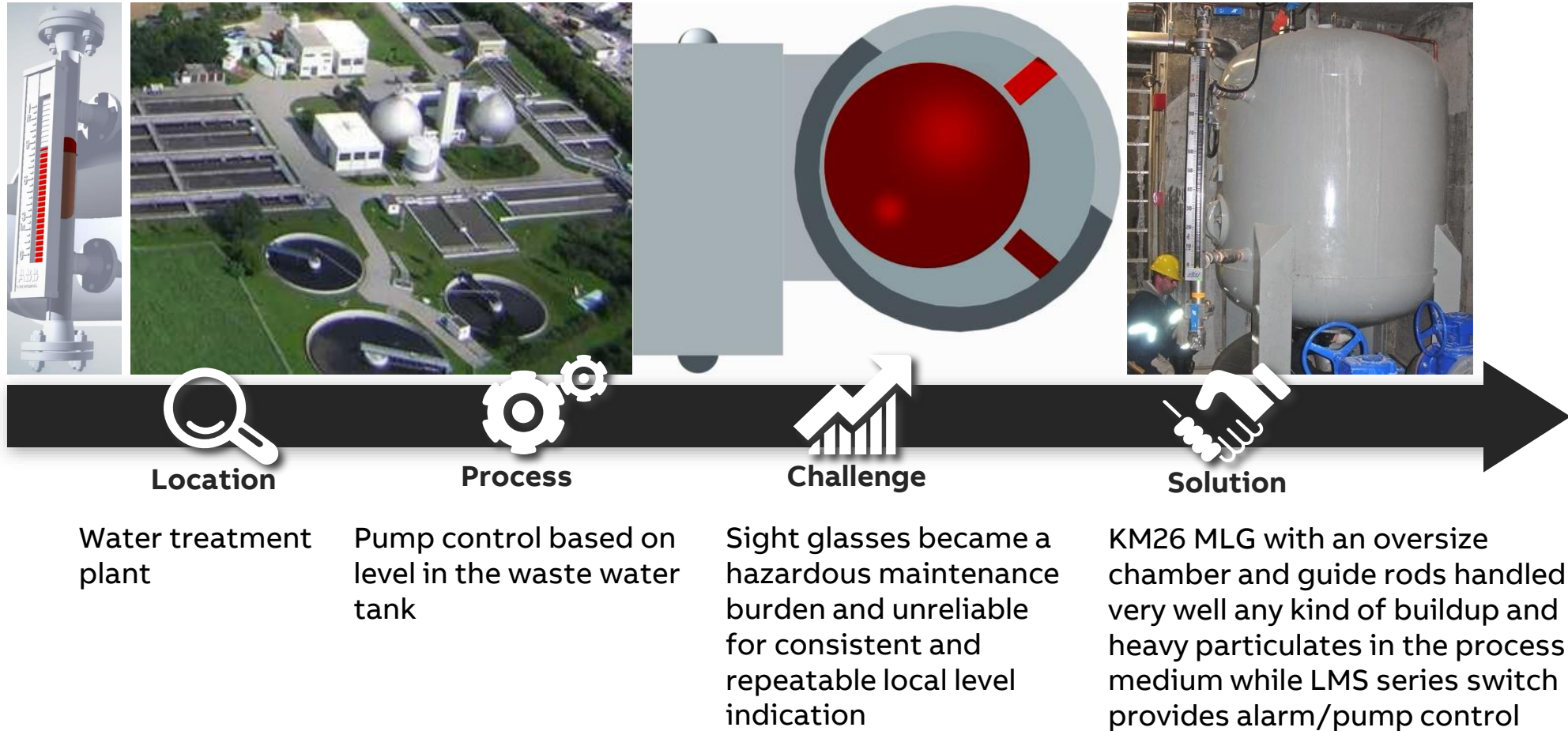
Replaced the existing switches with three LMS200 on the chamber for accurate level control and Valve/ pump control

### End user response

**“No false change of state occurred during this campaign. The technicians were pleased with the spacious housing design to effortlessly terminate the connections.”**

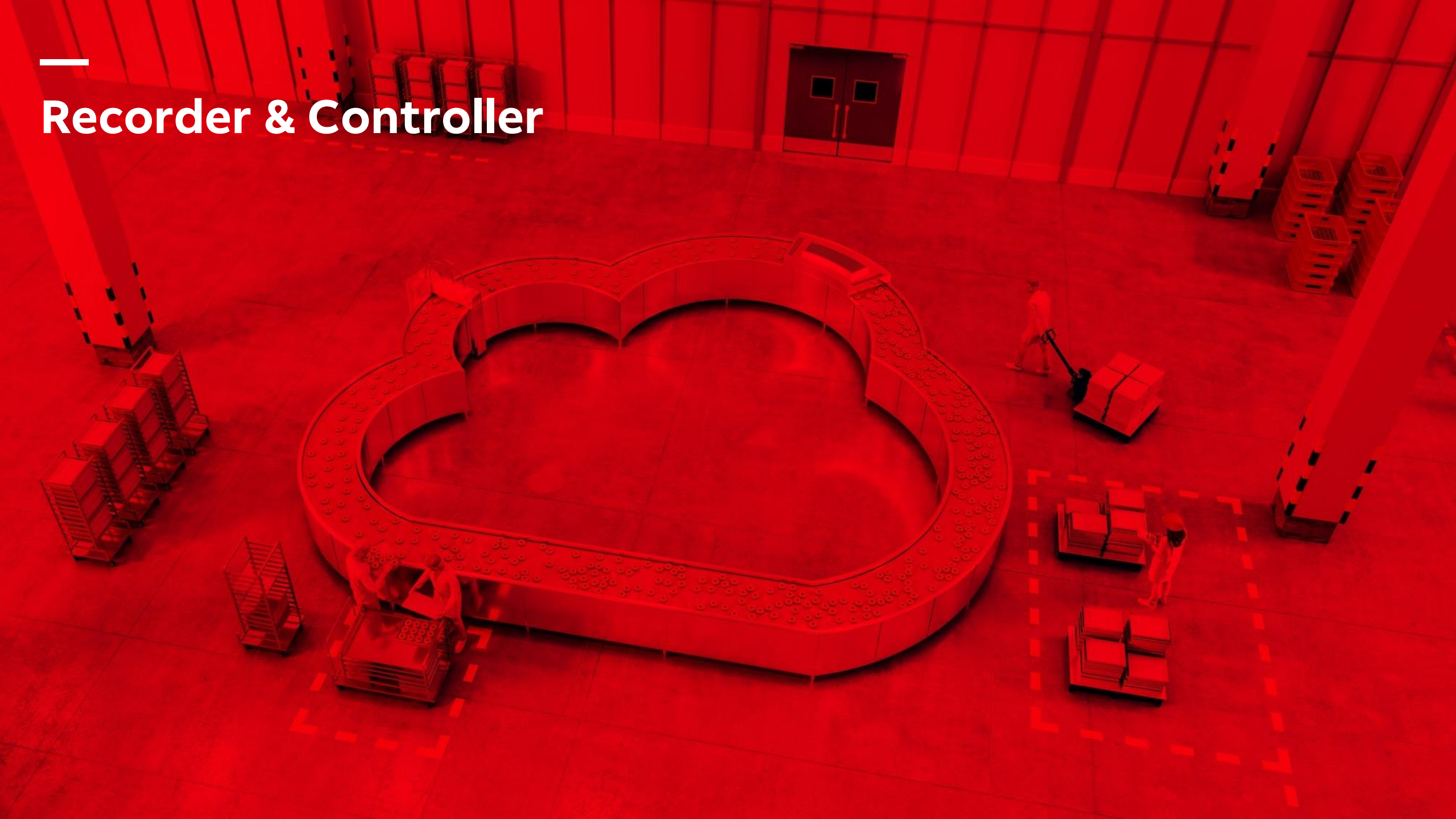
# Applications

## Wastewater



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# Recorder & Controller



# ABB Recording & Control

## Product overview

Paperless recorders

Process controllers & indicators

Circular chart recorders



# Services to match every need

Long-term commitment to maintain your assets

## Rapid response



- Remote troubleshooting
- QR Code remote assistant
- Technical Support
- On-site Repair
- Workshop Repair

## Lifecycle management



- Life Cycle Assessment
- Preventive maintenance plan
- Spare parts management

## Performance improvement



- Condition monitoring
- Verification
- Predictive maintenance

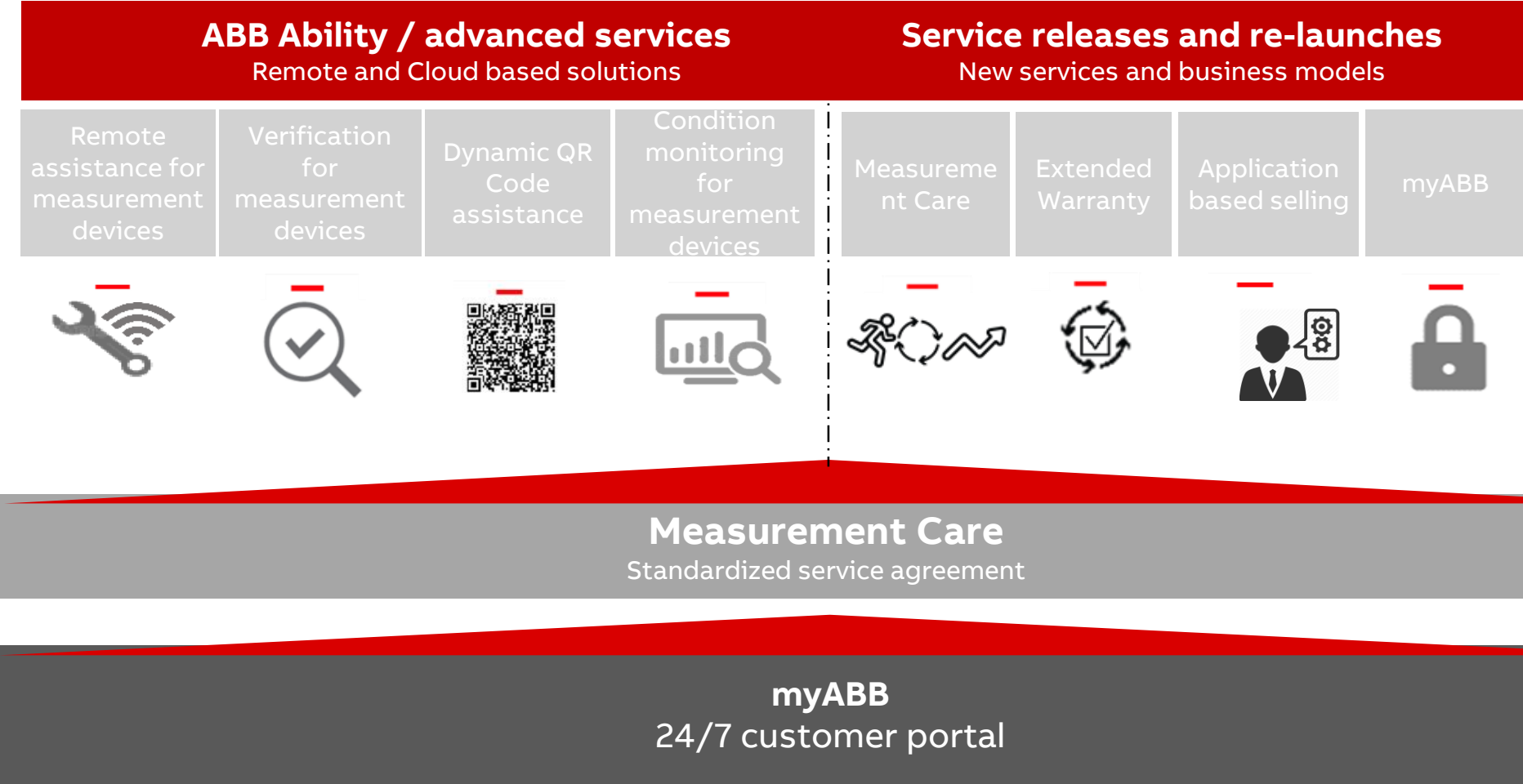
## Additional services



- Training
- Retrofits and Upgrades
- myABB customer portal
- Evergreen warranty
- Resident engineer

Measurement Care service contracts – tailor made - to support your needs

# IAMA service solutions



# Service PG

Advanced solutions on-device, on-site & on-cloud

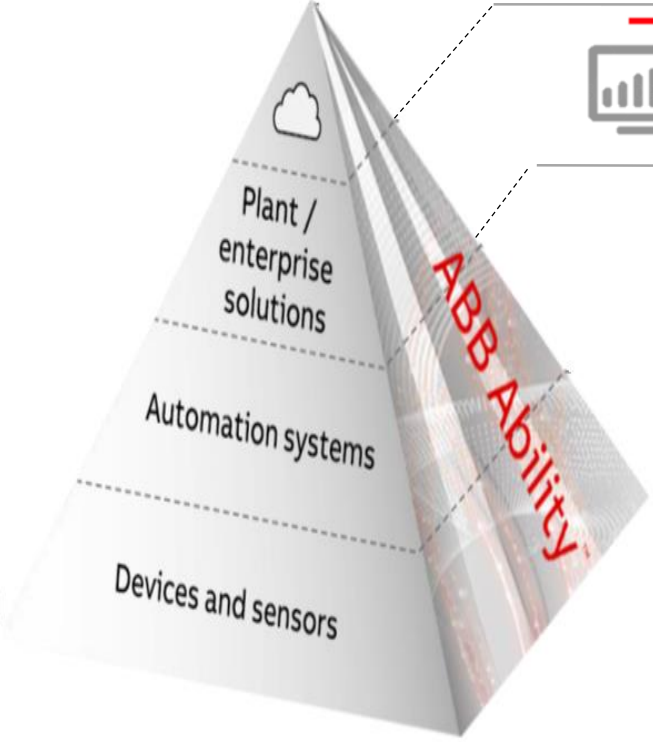
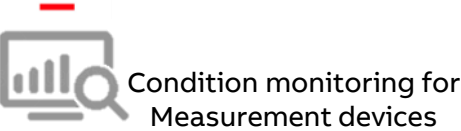
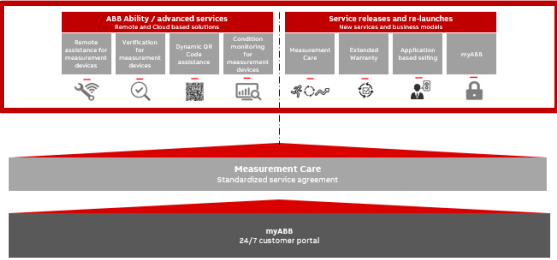


ABB Field Instrumentation and Analytical Products and Systems

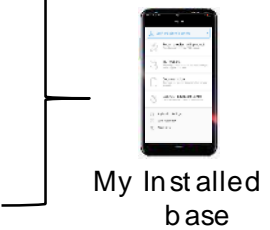


ABB Field Instrumentation



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# Thank you!

If you have any questions, please visit our websites at:

*<http://new.abb.com/products/measurement-products>*



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**So let's talk**



**ABB**