Instrumentation for the food & beverage industry

Enhanced plant performance, efficiency & reliability

ABB Instrumentation
Industrial IT - Optimizing your instrumentation assets
To help you improve the efficiency of your entire business and production process, ABB is committed globally to Industrial IT. It involves the development of systems and products guaranteed to inter-operate and communicate using the same information standard within a single digital architecture.

Industrial IT and Asset Optimization with ABB instruments provide features and benefits across the full scope of our offering. Intelligent field instruments not only provide highly accurate process measurement data, but process information is available at the click of a mouse for predictive maintenance, advanced trouble shooting, optimized spares handling, hence increased product availability and process security.

A range of fieldbus opportunities
ABB is actively involved in the development of fieldbus policy direction and technical standards and supports the major process automation protocols in widespread use throughout industry.

ABB has a proven track record in the food and beverage industry and, as a leading international group, can provide truly global solutions.

We have made significant investments in developing our portfolio of products and services to provide our customers with a modern, integrated suite of tools.

A heritage to be proud of
ABB Instrumentation’s ability to satisfy customers’ needs has never been greater, being built upon the leading names and brands in the automation world: Bailey, Bush Beach Engineering, Fischer & Porter, Hartmann & Braun, Kent, Schoppe & Faesser, Sensycon, Taylor, TBI Bailey.

Instrumentation Services
Our broad scope of services lay the foundation for end-to-end support for your enterprise. ABB Instrumentation Services delivers the knowledge and global experience required to keep your assets operating at peak reliability and accuracy.

ABB provides a full scope of services from start-up and commissioning through lifecycle support.

- Installation and Commissioning
- Preventative Services
- Calibration Services
- Maintenance
- Consulting
- Training
- Migration/Upgrades
- Parts and Repair

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Talk to ABB first
ABB supplies an unparalleled selection of instrumentation equipment and systems for use in all types of food and beverage production processes. Utilizing ABB’s innovative products, you can create advanced systems that will help you ensure economical, reliable and safe performance of your plant facilities.
### Electromagnetic Flowmeter FXE4000
With pulsed DC magnetic field excitation. For all standard measurements. Remote or integral transmitter, with stainless steel or coated housing.
- Process connections: weld stubs, food industry fittings acc. DIN 11851, Tri-Clamps, Wafer and fixed flange designs
- Certificates: EHEDG, 3A FDA accepted materials
- Communication: HART, PROFIBUS DP/PA, FOUNDATION Fieldbus
- Certified calibration for cold/waste water or fluids other than water

### Electromagnetic Flowmeter FSM4000
With AC magnetic field excitation. For measurement of two-phase liquids or pulsating flows (e.g. piston pumping). Remote transmitter, with stainless steel or coated housing.
- Process connections: weld stubs, food industry fittings acc. DIN 11851, Tri-Clamps, 1/8 inch sanitary connections, wafer and fixed flange designs
- Certificates: EHEDG, 3A FDA accepted materials
- Communication: HART, PROFIBUS PA, FOUNDATION Fieldbus
- Certified calibration for cold/waste water or fluids other than water

### Electromagnetic Flowmeter FXF2000
For filling and dosage operations with pulse output for additional processing in integrated control systems. Integral transmitter in stainless steel.
- Easy cleaning and sterilization including automated CIP/SIP systems
- Certificates: EHEDG, 3A FDA accepted materials
- Continuous measurement with current and pulse output

### Electromagnetic Flowmeter FXM2000
With pulsed DC magnetic field excitation. For high precision measurement (+/- 0.2% of rate.) Remote or integral transmitter.
- Process connections: flange, wafer, Tri-Clamps or assorted hygienic connections
- Certificates: EHEDG, 3A FDA accepted materials
- Communication: HART, PROFIBUS DP

### Electromagnetic Flowmeter FES7000 (Fill-MAG)
For rapid filling operations from small volumes to complete fillings of containers. With AC magnetic field excitation and high performance microprocessor converter.
- Local data input/output
- Control of under/over filling
- Remote recipe loading
- Central control of parameter via interface
- Automatic residue correction
- Four programmable filling and pre-contact volumes
- Certified calibration for fluids other than water
- Certificates: EHEDG, 3A FDA accepted materials

### Measurement of conductive fluids, slurries and pastes in continuous processing.

### Measurement of conductive fluids, slurries and pastes for filling and dosing in batch processes.
**Swirl Flowmeter FS4000**
Integral or remote transmitter with high-performance DSP converter.
- Process connection: flange or wafer assembly
- Short or no conditioning sections
- No upstream and downstream piping required
- Optional integrated PT100 for temperature monitoring or for saturated steam calculations
- Communication: HART, PROFIBUS PA, FOUNDATION Fieldbus

**Vortex Flowmeter FV4000**
Integral or remote transmitter with high-performance DSP converter.
- Process connection: flange
- Optional integrated PT100 for temperature monitoring or for saturated steam calculations
- Communication: HART, PROFIBUS PA, FOUNDATION Fieldbus

**Variable Area Flowmeters**
In glass or metal construction.
- Process connection: flanges, food industry fittings according to DIN 11851
- Inlet and outlet straight sections are not required
- Communication: HART

**Direct gas mass flow measurement, independant of pressure and temperature.**

**Thermal Mass Flowmeter**
For CO₂ dosing in breweries and softdrink bottling plant applications.
- Hygienic design
- CIP and SIP applications
- Process connections: DIN/ANSI flanges, tube threads S, food industry fittings acc. DIN 11851
- Communication: HART, PROFIBUS DP

**Simultaneous measurement of mass flow, density/concentration and temperature for conductive and non-conductive fluids.**

**Coriolis Mass Flowmeter**
Typical applications: desalinated water, oils, fats, alcohol, liquid sugars, and other fluids where the mass or density has to be determined.
- Hygienic design
- Flowmeter primaries DN 1.5 to DN 150
- Process connections: DIN/ASME flanges, Tri-clamps, food industry fittings acc. DIN 11851
- Self-draining construction
- Certificates: EHEDG, FDA accepted materials
- Communication: HART

**Measurement of conductive fluids, non-conductive fluids, vapors or gases.**

**Flow Measurement**
Actuators and Positioners

I/P Converters

ABB I/P converters are designed to be flexible, tough and immune to shock and vibration. They can be mounted in a variety of configurations.

- More than one million units in use
- Compact design, low weight
- Shock and vibration immune to 10g
- Various signal ranges available
- Wide operating temperature range
- Explosion protection certificates
- Field, direct and DIN rail mounting

Positioners

ABB positioners provide flexible and cost effective valve management and control. Features include:

- Smart and analog versions available
- Compact and robust design
- Modular design
- In-built self-diagnostics and continuous self-monitoring
- Automatic self-commissioning and valve tuning program
- Able to withstand severe shock/vibration
- Communication: HART, PROFIBUS PA, FOUNDATION Fieldbus

Analytical Instruments

AX400 and TB82/4 Analyzers and Transmitters

High specification and superior performance analyzers and transmitters for pH, redox (ORP) and conductivity measurements.

- AX400 available with single sensor input with PID or two sensor input for a cost effective solution
- TB82/4 includes comprehensive diagnostic capabilities and a rugged housing for harsh environments
- Available with HART, FOUNDATION fieldbus, PROFIBUS PA and DP communications

TB5 and AP Series pH, Redox (ORP) Sensors

These robust sensors provide reliable measurements in a variety of applications and are designed to withstand the harshest conditions and sterilization processes.

Applications
- Sugar refining
- pH control in corn processing and derivative
- Maximize yields in alginate production
- Clean-in-place
- Water treatment for process or boilers
- Waste treatment

Conductivity Sensors

ABB offers three measuring techniques to cover the broadest range of applications. The TB4043 toroidal sensor includes 3-A Sanitary Standards approval for use in food and dairy processes.

Applications
- Sugar refining
- Salinity control in soup production
- Lye peeling
- Clean-in-place
- Boiler water treatment

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Pressure Transmitters and Sensors
The 2600T family includes a comprehensive specially designed line of pressure transmitters and sensors for the food and beverage industries. This family covers all of your applications, including:

- All Welded Remote Seal / High Temp - High Vacuum
- Juice de-aeration - eg. orange
- Vegetable de-aeration - eg. tomato
- Vessel steam cleaning
- Evaporator eg. sugar

Hygienic standard process connections
- Tri-clamp
- DIN 11851 and 11864-1 or 11864-2
- ISO 2853
- Flush or extended sanitary models
- Cherry Barrel and aseptic types

Customized Hygienic process connections:
- DRD, Varivent, Biocontrol, SMS, RJT...

Application specific machining of process wetted parts
- Foils Ra <0,4 µm
- Turned parts Ra <0,8 µm

Temperature Sensors for Hygienic Production Areas
Surface sensors in stainless steel for temperature measurements on container facings, piping and thermal converters.
Sensors for insertion in pipelines in stainless steel for direct temperature measurements:
- Hygienic design
- Extensive range of process connections
- Conform to EHEDG, 3A
- High accuracy
- Quick response time
- High process pressure up to 140 bar
- Optimized cleanability of the system

Temperature Sensors for Non-Hygienic Production Areas
For temperature measurement in steamlines, cold water lines or utility lines.
- With different thermowells and a variety of process connections and sensor heads
- With head mounted temperature transmitter
- Rechargeable measuring insets

Temperature Transmitters
Head mounted, field mounted or rail mounted.
- Excellent long-term stability
- Wide operating temperature range
- Extensive programming capabilities
- Communication: HART, PROFIBUS PA, FOUNDATION Fieldbus
ScreenMaster Series Advanced Videographic Recorders

ABB's range of videographic recorders delivers the latest in electronic data recording technology for food and beverage industry applications:

- Comprehensive range offering from 6 to 36 channels
- Remote supervision and data access solutions provided via Ethernet communications
- High capacity Compact Flash and SmartMedia memory card options greatly reduce need for operator intervention
- 21 CFR Part II compliant

Process Controllers

ABB’s range of process controllers set the highest standards in industrial instrumentation. From simple single loop to advanced control options (including feed forward, cascade and ratio control), a controller is available to match any application. Features available in most units include:

- Built-in 2 wire transmitter power supply
- Links to central PLC or SCADA systems via Modbus
- Front plate rated to NEMA 4X/IP 66 protection
- Windows™ based PC Configuration Software

Recorders

The COMMANDER series of circular chart recorders includes a range of models specifically designed for Food and Beverage applications. The COMMANDER 1900 is a fully programmable, circular chart recorder with integral capability for single or dual PID control. Specific applications can be met by using the full range of options available, including one to four-pen recording, flow totalization, process alarms and ramp/soak profile.

Pasteurizer Recorder/Controller

Three separate models give outstanding coverage for pasteurizer applications. From a simple recording device to the top of the range Hot/Cold product controller/recorder, all versions are fitted with a 4-position, true-time event pen that indicates forward flow, divert, CIP and secondary divert.

- COMMANDER 1951 records the hot product temperature and either divert set point or cold product temperature
- COMMANDER 1952 is a recorder/controller that records hot product and either divert set point or cold product temperature and controls hot water temperature
- COMMANDER 1953 is the top of the range combining all the capabilities of the 1952 with cold product temperature control from the cold product temperature probe

Multi-Recipe Profile Recorder/Controller

The COMMANDER 1960 is designed for applications where advanced ramp/soak profiling control and the recording of multiple process parameters is all-important. It is designed as a totally self-contained unit with the following features:

- 20 profiles/99 segments
- Guaranteed ramp/soak
- Dedicated time events to assign relays/outputs to individual or multiple segments
Pasteurization

Pasteurization is necessary in the milk/dairy/juice industry, where products must reach a certain temperature and be held at that temperature for a defined time interval to assure product safety.

In the USA, the Food and Drug Administration (FDA) has extensive regulations that spell out the legal requirements for this process.

In Europe, it is a legal requirement for companies to record the pasteurization of all dairy products.

**How the process works**

Pasteurization involves the pumping of raw material from a storage tank through the pasteurizer/heat exchanger unit where it is heated to a specific temperature to kill micro-organisms. Pasteurization temperatures vary according to the product being treated and is defined by a time-temperature relationship where the product reaches a specific temperature for a defined time interval to assure the product safety.

When the specific temperature is reached, the ‘hot’ product is pumped from the pasteurizer unit through a holding tube which has a three-way valve and a temperature probe fitted at the end of the tube.

Should the temperature be too low the three-way valve is switched diverting the product back into the storage tank for recycling. The ‘hot’ product pasteurizing temperature is recorded on a chart or videographic recorder for traceability purposes. When the ‘hot’ product reaches the specific temperature the product passes back through the pasteurizer/heat exchanger and cooler unit from where it is passed out for packaging and distribution. The chart or videographic recorder also records the cold product temperature.

**How can ABB help?**

ABB supplies a range of instrumentation equipment suitable for pasteurization applications, including:

- Paper chart recorders
- Videographic data recorders
- Controllers
- Pressure transmitters
- Temperature measurement
- I/P Converters
- Positioners
- Flow measurement

Pasteurization Control Systems
In Milk, Dairy, Food and Juice Processing Plant

- Recorder/Controller
- Divert Valve Status
- Divert Valve Control
- Pump Power Output (FDA Dairy Applications Only)
- Temperature measurement
- Pressure Transmitter
- Mains Power
- Steam
- Steam Control Valve
- Valve
- I to P Converter
- Main Power
- Divert Pump
- Storage Tank
- Pasteurization Unit
- Cold Product OUT
- Hot Water Tank
- Cold Product Temperature
- Hot Water Temperature
- Cold Product
- OUT
- Pressure Transmitter
- Flowmeter
- Actuator and Positioner
- Pump
- Booster Pump
- Cold Product
-IN
**Cold storage monitoring**

Where perishable products are stored prior to final distribution, it is a general requirement for the temperature and also the humidity of the storage conditions to be recorded and controlled.

**Large Cold Storage Monitoring Systems**

for Frozen and Chilled Food

There has been a particular emphasis by government legislation in recent years to monitor cold storage areas, particularly those used for the storage of frozen foods, such as ice cream, meat and fish, chilled foods, including prepared meals, cheeses, yogurts and other dairy products. In addition, many food storage areas are also used for food preparation, an example being prepared meats and fish, which must be weighed, sliced and packed at temperatures of around 45°F (7°C).

**The application**

In a typical cold storage application, multiple temperature sensors will be installed around the storage or preparation area. The number of probes will depend on the size of the area concerned.

These probes will be connected to a recorder, such as ABB’s Commander or ScreenMaster videographic series recorder. If there is a long cable run between the sensors and the recorder, in-head RTD temperature transmitters may be necessary to avoid interference from other electrical sources.

**How can ABB help?**

ABB supplies a range of instrumentation equipment suitable for cold storage applications, including:

- Paper chart recorders
- Videographic data recorders
- Controllers
- Flowmeters – differential pressure, variable area, thermal mass, vortex & swirl
- Pressure transmitters
- Temperature sensors

**Process steam**

Steam flow systems are essential for ensuring the correct quantities of high quality steam are produced for food and beverage processing applications. Too little or too much steam can result in the product being under-treated or overcooked, each resulting in product spoilage and posing a potential risk to health.

**How it works:**

Steam flow from each boiler passes through a Vortex Flowmeter, with flow signals generated at the Flowmeter being passed to a chart recorder or SM series videographic data recorder to enable the flow information to be displayed.

To maximise measurement accuracy, two orifice plate assemblies are fitted, with the signals being transmitted to the data recorder.

**How can ABB help?**

ABB supplies a range of instrumentation equipment suitable for process steam applications, including:

- Paper chart recorders
- Videographic data recorders
- Controllers
- Flowmeters – differential pressure, variable area, thermal mass, vortex & swirl
- Pressure transmitters
- Temperature sensors

**Steam Flow Usage Systems**

in Food, Beverages and Drink Processing Plant

To further protect against spoilage and potential contamination of products, it is also vitally important to control the quality of the steam itself.

This illustration shows an example of a typical steam flow application.
Evaporator control

Evaporation concerns the removal of water from a product to produce a concentrate. The process is typically used in the production of:

- Juices
- Milk/powdered milks
- Whey products
- Sugars
- Glycerins
- Industrial salts
- Foods

**How does it work?**

- Steam enters the steam chest space surrounding the tubes
- The solution to be evaporated is fed into the evaporator body through a distributor
- The solution moves upwards into the tubes, which are then heated by the steam surrounding them
- The solution within the tubes absorbs heat as it comes into contact with the tube walls
- When the solution reaches boiling point, the water starts to vaporize. Initially, small pockets of vapor form near the base of the tubes. As steam is continuously applied to keep the tubes hot, the solution continues to vaporize and the pockets of vapor expand
- Unvaporized liquid is forced above the vapor pockets towards the tops of the tubes. As the mixture of solution and vapor rises from the top of the tubes, the vapor continues upwards, whilst the heavier liquid falls back
- Because of the boiling action, this liquid cannot return to the tubes. Instead, it travels to the bottom of the evaporator through the large central downtake
- The returned liquid is mixed with incoming feed from the feed distributor and again is carried upward through the tubes, where further vaporization takes place

**How can ABB help?**

ABB supplies a range of instrumentation equipment suitable for evaporation applications, including:

- Pressure transmitters
- Level transmitters
- Flow measurement
- Temperature measurement
- Positioners
- Process indicators
- Recorders
- Controllers
- Conductivity
**Water treatment**

Treatment of process effluent is vital to remove as many potential contaminants as possible before water is discharged back into the environment.

Before water can be safely discharged, there are several steps that have to be undertaken. The primary treatment process as shown below is concerned with the initial separation of process waste into waste sludge and liquid effluent, with each then subjected to a series of further treatments.

During primary treatment, the effluent is continuously checked for pH (i.e. acidity/alkalinity), dissolved oxygen, turbidity and temperature. This is important to ensure the correct conditions for aquatic life upon final discharge.

For environmental reporting purposes, the quality and quantity of the treated effluent also needs to be measured and recorded.

**How it works:**

Continuous measurement of pH, dissolved oxygen, turbidity and temperature using online sensor equipment allows the correct conditions to be maintained.

The diagram shows how signals from the sensors feed into valve-operated control systems designed to regulate the treatment process.

Changes in the pH level from the set point, for example, are controlled by a signal sent to positioners on valves governing the supply of acid and alkali to the process. In a similar way, any variations in turbidity will be met with an increase or decrease in the amount of flocculant supplied to the process, with a signal sent from the sensor to the valve on the flocculant feed line.

**Retort control**

Retorting destroys organisms which generate spoilage spores and harmful bacteria such as salmonella, botulism and thermophiles. Close control of the retort process is necessary to ensure optimum product quality. Overcooking canned food adversely affects both taste and appearance, while undercooking can result in spoilage.

To prevent overcooking and minimize retort production time, the product needs to be cooled as rapidly as possible.

During the retort process, there is a risk that some cans will distort if immediately exposed to atmospheric pressure after being cooked due to their size and internal pressure. To avoid this, these cans must be pressure cooled before the retort pressure is reduced back to atmospheric levels. This is achieved by circulating cool water through the retort while maintaining the cooking pressure.

The retort control system can be divided into three key groups of components:

1. Temperature control system used to control product temperature during the cooking period
2. Cycle control components used to control on/off types of functions and timing portions of the cycle
3. Pressure control to maintain cook pressure during the pressure cool period

**How can ABB help?**

ABB supplies a range of instrumentation equipment suitable for retort control applications, including:

- Paper chart recorders
- Videographic data recorders
- Controllers
- Electromagnetic flowmeters
- Analytical sensors and transmitters for pH, dissolved oxygen, turbidity, etc
- Temperature measurement
- Valve actuators and positioners

Using recording devices such as a chart or videographic data recorder enables data to be stored for reporting purposes and allows operators to identify potential links between effluent quality and specific events in the treatment process.

**How can ABB help?**

ABB supplies a range of instrumentation equipment suitable for water treatment applications, including:

- Paper chart recorders
- Videographic data recorders
- Controllers
- Pressure transmitters
- I/P Converters
- Valve positioners and actuators
- Temperature measurement
- Valve actuators and positioners

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ABB is a leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 102,000 people.

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