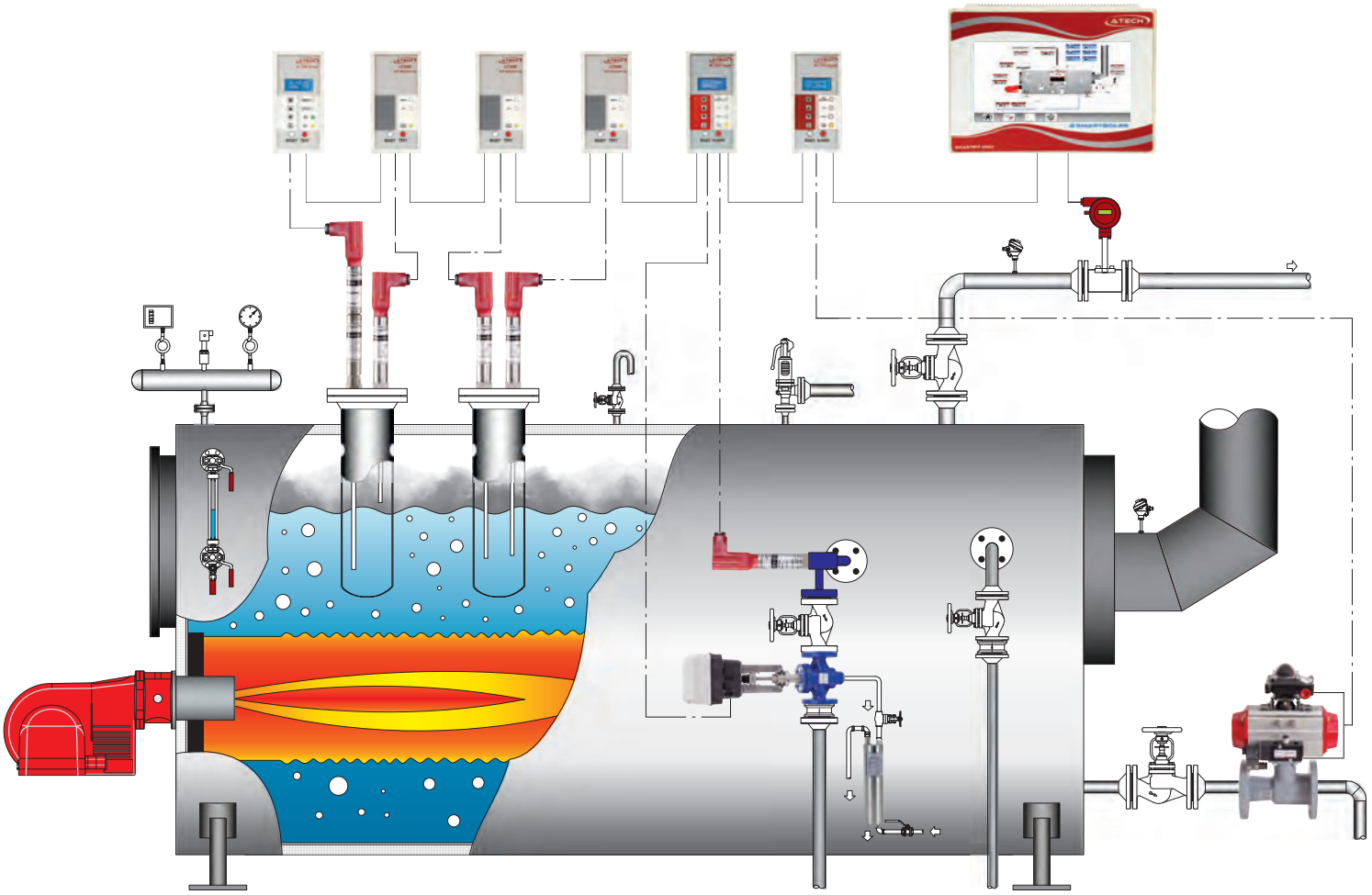
ATECH®

"Steam & Control Technologies..."



Steam Boiler Control

NEW GENERATION
BOILER HOUSE CONTROL SYSTEMS

www.atechtr.com

EN

ATECH®

"Steam & Control Technologies..."

Advanced, Safe and Reliable Boiler Control Systems

FOREWORD

Atech offers level and blowdown control systems and efficency monitoring systems for all type steam boilers.

This brochure gives you a detailed overview of our range of products and services for steam boiler control equipments.

What is particularly important to us at Atech: improving utility performance, lower energy consumption, safer steam systems and reducing environmental emissions.

The Atech's knowledge and expertise gives us a keen ability to serve to our customers for every solution, product and service we offer, and we stand firmly and confidently behind them all.

"Everything starts with a dream ... "

OUR PROMISE

To deliver intelligent and safety "Steam & Control Technologies" that improve utility performance, lower energy consumption, more safety steam systems and reduce environmental emissions.

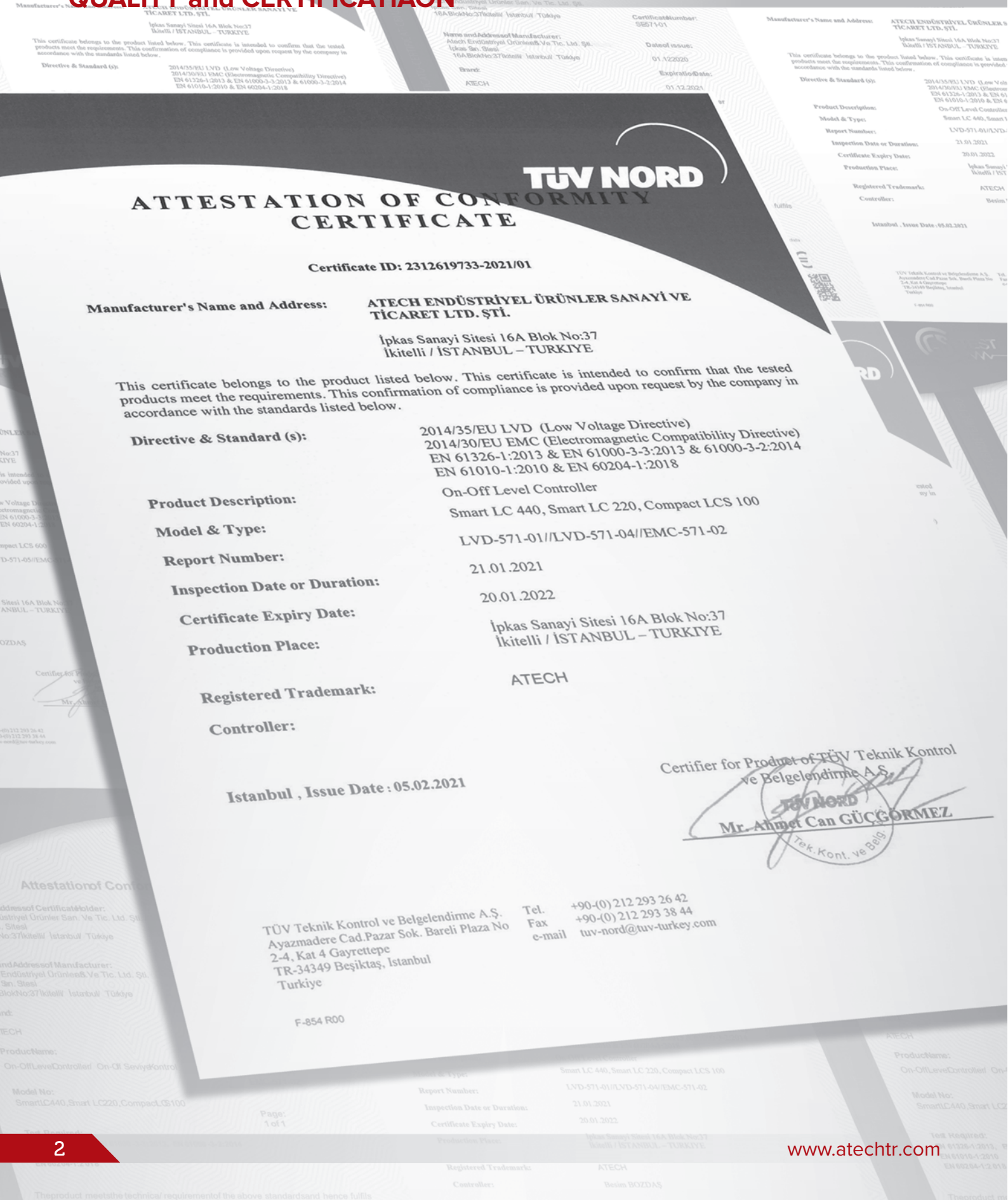
OUR MOTTO

"If someone can do it, we can do it. If no one can do it, we must do it."

OUR VISION

Create an enjoyable and safety life and livable environmental for our every customer, solution partners and employees.

QUALITY and CERTIFICATIAON



TÜV NORD

ATTESTATION OF CONFORMITY
CERTIFICATE

Certificate ID: 2312619733-2021/01

Manufacturer's Name and Address: ATECH ENDÜSTRİYEL ÜRÜNLER SANAYİ VE TİCARET LTD. ŞTİ.

İpkas Sanayi Sitesi 16A Blok No:37
İkitelli / İSTANBUL – TURKIYE

This certificate belongs to the product listed below. This certificate is intended to confirm that the tested products meet the requirements. This confirmation of compliance is provided upon request by the company in accordance with the standards listed below.

Directive & Standard (s): 2014/35/EU LVD (Low Voltage Directive)
2014/30/EU EMC (Electromagnetic Compatibility Directive)
EN 61326-1:2013 & EN 61000-3-3:2013 & 61000-3-2:2014
EN 61010-1:2010 & EN 60204-1:2018

Product Description: On-Off Level Controller

Model & Type: Smart LC 440, Smart LC 220, Compact LCS 100

Report Number: LVD-571-01//LVD-571-04//EMC-571-02

Inspection Date or Duration: 21.01.2021

Certificate Expiry Date: 20.01.2022

Production Place: İpkas Sanayi Sitesi 16A Blok No:37
İkitelli / İSTANBUL – TURKIYE

Registered Trademark: ATECH

Controller:

Istanbul , Issue Date : 05.02.2021

Certifier for Product of TÜV Teknik Kontrol ve Belgelendirme A.Ş.
TÜV NORD
Mr. Ahmet Can GÜÇGÖRMEZ
Tek. Kont. ve Belg.

TÜV Teknik Kontrol ve Belgelendirme A.Ş.
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QUALITY and CERTIFICATIAON

Our products are developed and manufactured in accordance with European Pressure Equipment Directive 2014/68/EU and under interpretation of the current standards for the operation of steam boiler systems.

Also self monitoring level alarm controllers / limiters produced by Atech, meet (24h/72h operation) TRD 604/EN 12952 and EN 12953 regulations for use in steam boiler operating without constant supervision.

Atech self monitoring level alarm controllers / limiters are designed, developed, manufactured and certified to SIL 2 and SIL 3, on the basis of the applicable EN standards as per IEC 61508 "Functional safety". SIL 2 and SIL 3 approved Atech self monitoring level alarm controllers / limiters provides increases the safety level of the boiler system.

All Controllers and Limiters compliance with EMC - Electromagnetic Compatibility Directive 2014 / 30 / EC and LVD - Low Voltage Directive 2014 / 35 / EC.

STEAM BOILERS

Steam Boilers

The use of steam as an energy carrier is particularly common in most of plants such as power stations, refineries and chemical plants. Steam boilers are also vital to the food industry, textile industry and many other industry sectors.

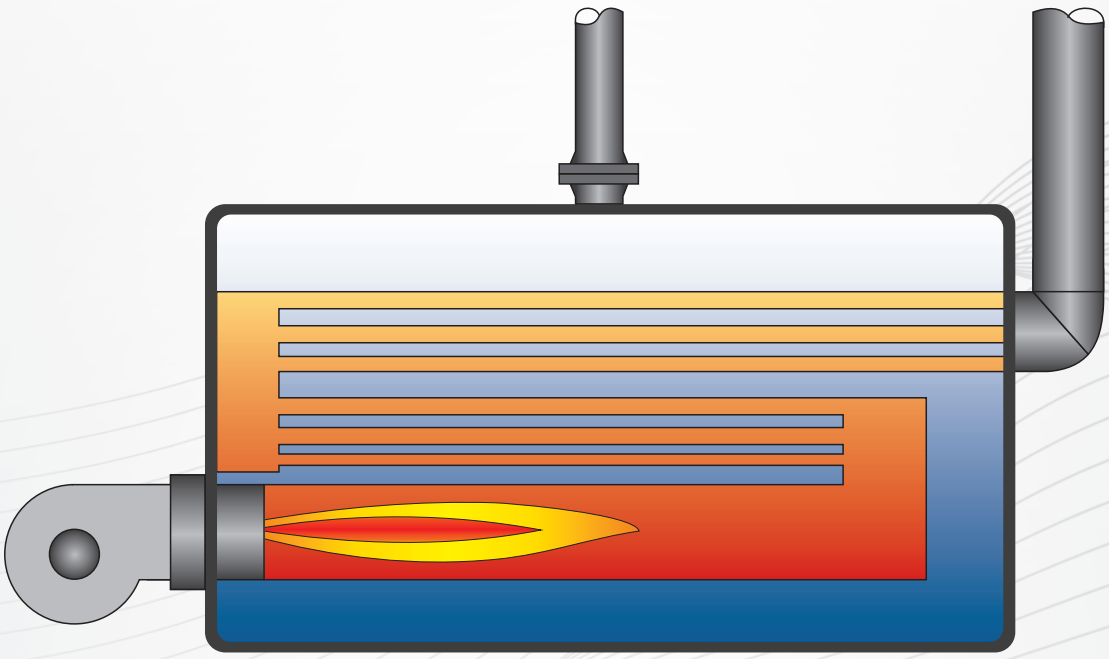
Steam boilers are used to create steam that has a higher steam pressure than atmospheric conditions. The boiling temperature and energy content of the steam also increase in addition to the pressure.

The various boiler types can be differentiated either by their design, combustion system or fuel type. Steam boilers are found in nearly all areas of industry and there are primarily two types of steam boilers:

Shell and tube boilers

Fire-tube boilers up to 25MW / 2500HP power and 25bar / 360psi pressure for hot water and steam applications represent the most commonly used type of boiler today. There are several designs, which are pretty much the same. The primary difference is how many times the flue-gases change direction inside the boiler and how many passage there are. Boilers of the most common three-pass design feature two assemblies of tubes. There is no turn at the rear of the furnace back to the door since the flue-gases pass into first tube assembly then turn 180° and enter the second tube assembly before exiting through stack.

The two-pass design is a single tube assembly. The flue-gases make a 180° turn at the rear of furnace back towards the door before entering the tubes and exhausting to the rear.



STEAM BOILERS

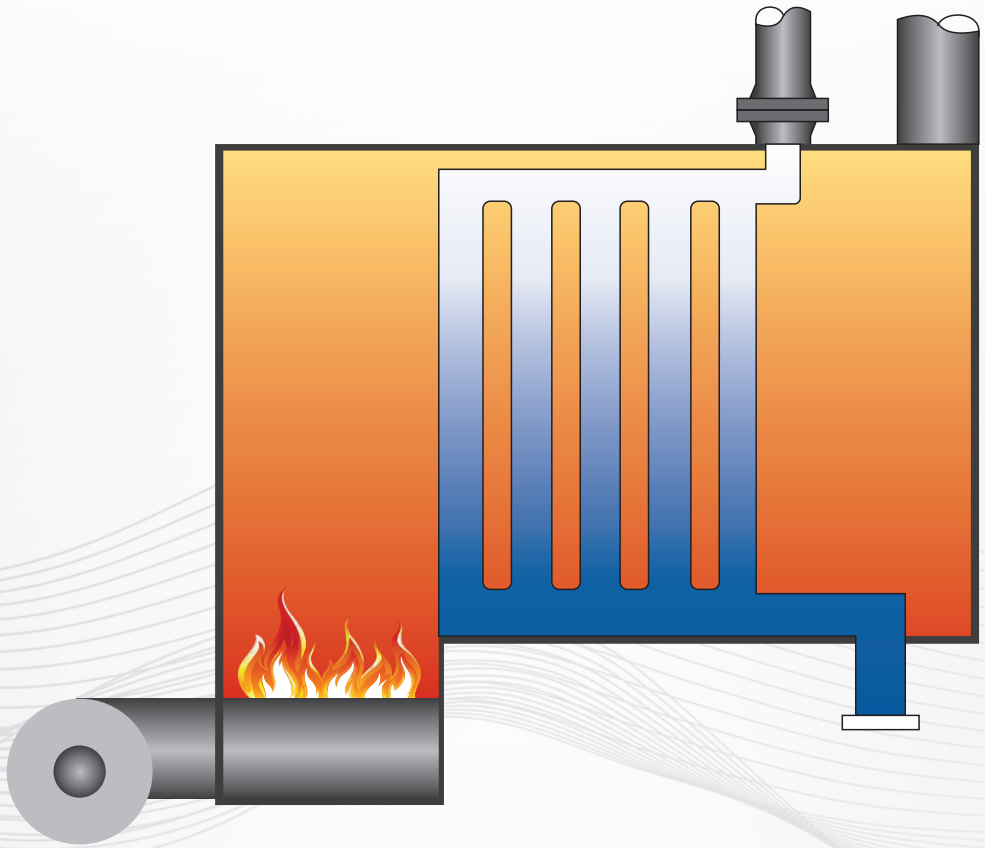
Water-tube boilers

Water tube boilers are usually used in large industrial plants and power generation stations where extremely high heat transfer rates are required to produce large quantities of steam. The water is heated in tubes and the fire (combustion process) is contained in the space around the tubes.

The watertube boiler design uses tubes to direct the boiler water through the hot gases from the combustion process, allowing the hot gases to transfer its heat through the tube wall into the water. The boiler water flows by convection from the lower drum to the upper drum.

Water tube type boiler systems are generally preferred in cases where fire tube type boilers cannot provide the required capacity, pressure and temperature and in applications that require rapid steam generation.

Water tube boilers are consisted of water tube panel walls. These walls are produced by in house automated panel wall welding machine with complete penetration and consisted of pipe-plate-pipe structure.



LEVEL MEASUREMENT IN STEAM BOILERS

Level Measurement, Control and Safety

A steam boiler delivery exactly what is being consumed in the system The steam boiler is always set for a specific steam pressure, and the operation of the steam boiler is solely controlled by means of this steam pressure set point.

A steam boiler is an autonomic device. It is purely self-controlled unit and must thus never be manually controlled by others from safety reasons.

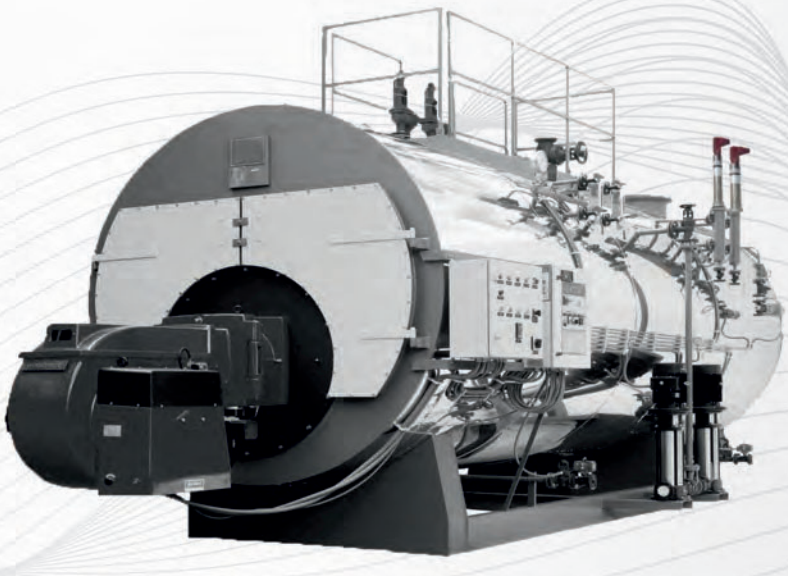
Boilers must be designed to operate efficiently and safely while responding rapidly to demand changes. Maintaining a stable interface level is critical to the safe and efficient operation of the boiler.

Safety

Most of the boiler failures can be attributed to low water conditions. For safe boiler operations this must be kept under check. Low-water level conditions in the boiler occur when the water in the boiler drum falls below the low water level mark.

With low water level conditions, severel boiler damage can be happen. If the boiler keeps runnig with low water level conditions, boiler 's furnace and the steel tubes can melt. This is called boiler collapse. If the boiler is feed with water in this conditions, boiler explosion can happen.

High water levels increase steam exit velocities and result in priming or boiler water carryover in to the distribution system. Priming results in wet dirty steam while carry-over can result in dangerous water hammer and pipe or equipment damage.

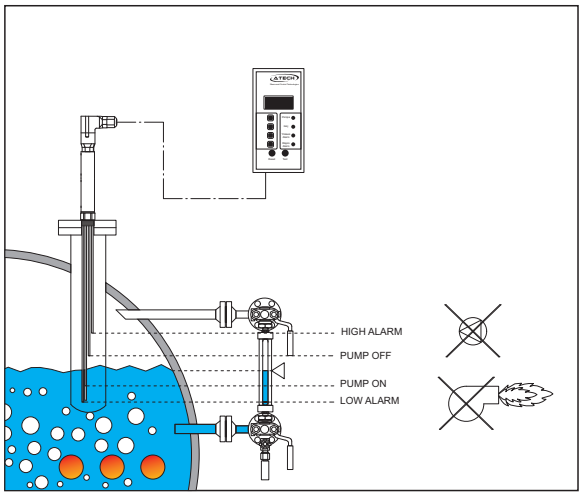


LEVEL MEASUREMENT IN STEAM BOILERS

On/Off Control

In on/off control the feed pump is switched on/off via a level sensor or a level transmitter. When the water level falls to the "Pump on" level, the pump starts pumping a large quantity of relatively cold water into the boiler.

This will reduce the quantity of steam and cause the steam pressure to fall.

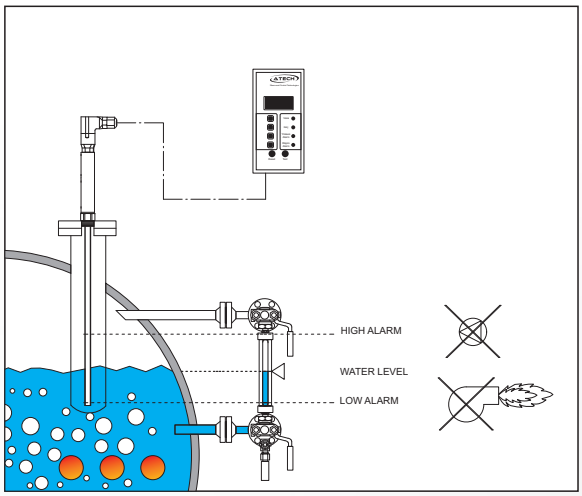


Modulating Control

In this type of system the water level in the boiler is controlled by a feed valve, which is controlled by a level controller and a level probe mounted on the boiler. The feed valve controls the water intake, which is adjusted according to steam consumption.

This, however, requires that the feed pump is set to continuous operation. This system operates smoothly and it is ideal for all types of steam boilers, both small and large, and will minimise the risk of over-boiling.

Besides, the water level in the boiler may be controlled directly by the variable speed pumps without using a feed water valve.



- **Single Element System**
Measures boiler level and regulates feed water flow to maintain that level. It is sufficient for single boiler utility plants with relatively static loads.

- **Two Element System**
Measures boiler level and steam flow and regulates feed water flow to maintain boiler level. Recommended for utility plants with multiple boilers and relatively static loads.

- **Three Element System**
Measures boiler level, steam flow and feed water flow, and regulates feed water flow to maintain boiler level. Strongly recommended for utility plants with dynamic loads.

AUTOMATIC BLOWDOWN IN STEAM BOILERS

Blowdown

Boiler blowdown is necessary in order to control the quality of boiler water in terms of dissolved and suspended solids. The concentration of impurities, which enter the boiler via the feed water, rises as pure steam is evaporated from the boiler. High levels of dissolved solids (TDS) can cause a number of problems:

Scale

- Poor control of blowdown coupled with poor water treatment, can encourage the formation of scale within the boiler. Scale insulates the heat transfer surfaces, reducing their heat transfer efficiency. This can cause fuel consumption to rise.
- There are also safety implications, as the scale may cause the heat transfer surfaces to overheat and become damaged.
- Scale and sludge may also block valves, pipework and for example, level control chambers, causing malfunction and danger.
- Corrosion may attack the metal beneath the scale.

Boiler blowdown cannot eliminate the problem of scale, but can keep water conditions fairly consistent, allowing the chemical dosing of the feed water to do its job, which helps to discourage scale from forming.

AUTOMATIC BLOWDOWN IN STEAM BOILERS

Water Carryover

High concentrations of dissolved and suspended solids may cause the water in the boiler to foam, or to boil in an unstable manner. This may result in carryover of dirt and water into the steam system, which is highly undesirable.

Clean, dry steam is necessary to;

- Avoid contamination of the product,
- Avoid blockages in the steam and condensate system which may be caused by dirt,
- Maximise the heat transfer efficiency of the system, which may be reduced if the steam is wet, or the heat transfer surfaces are contaminated,
- Avoid damaging and dangerous water hammer,
- To avoid sudden drops in the level of boiler water. If carryover (or priming) is severe, the boiler may even shut down on heavy loads, as foaming of the water can make the level difficult to meausre. This is a major operational consideration.

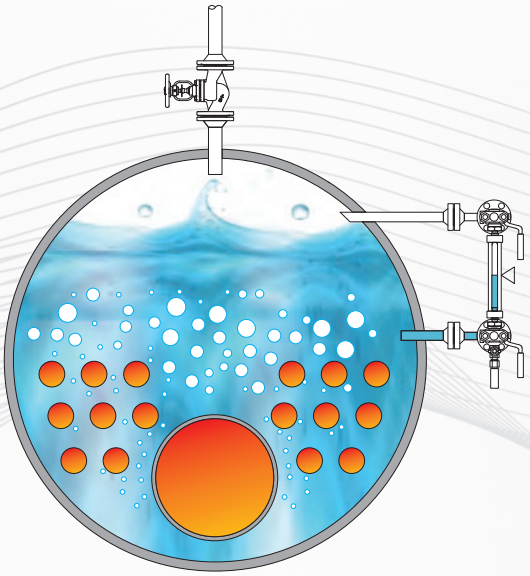
Automatic TDS (Conductivity) Control

Automatic TDS Control systems work by measuring the conductivity of the boiler water (which is related to the TDS level) and comparing it with the set point on the controller. This is the most effective method.

If the TDS (in ppm or µS/cm) is below the maximum permissible level, the blowdown valve remains closed. If the TDS exceeds the set point, the boiler blows down until the TDS falls below the set point.

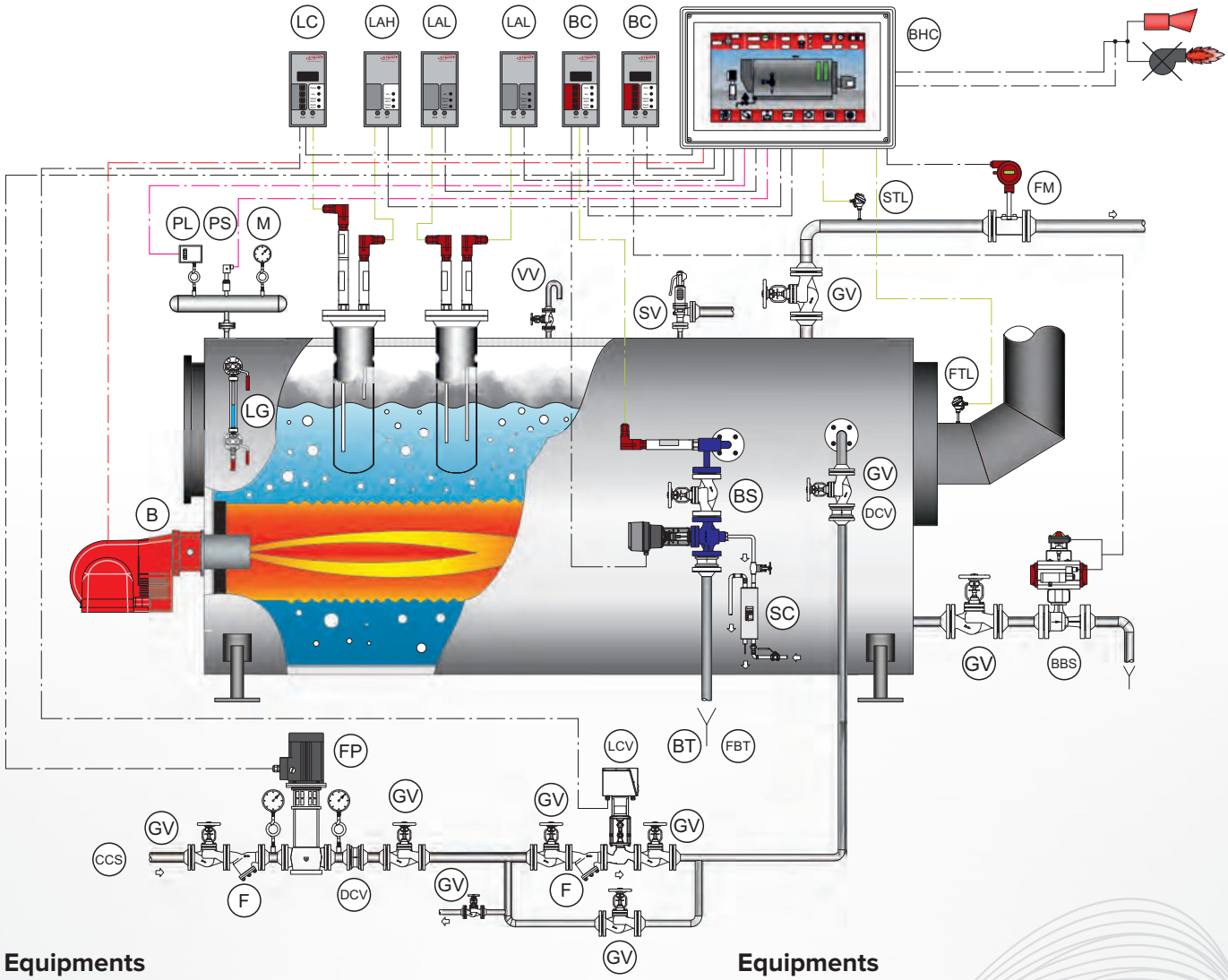
Automatic Bottom Blowdown Control

Bottom blowdown removes sludge from the bottom of a boiler. A build-up of sludge will lead to inefficient operation, and even a risk of boiler explosion. A bottom blowdown valve is opened, allowing blowdown to clear the boiler.



SAFETY EQUIPMENTS STEAM BOILERS

Atech Smart Model safety equipment according to EN 12953, EN 12952 and TRD 604 for 72-hour unattended operation, and with modulating water level control



Equipments

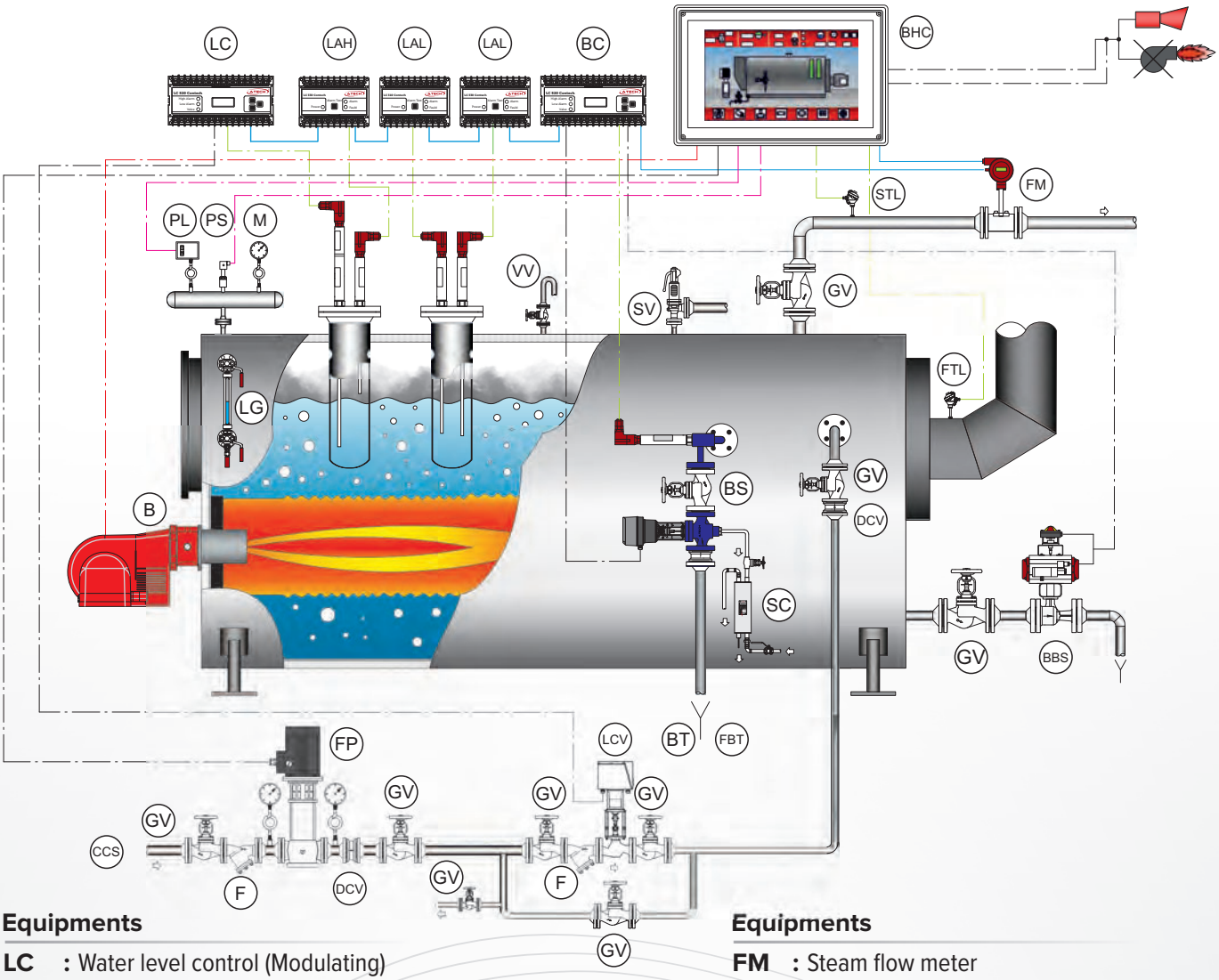
LC : Water level control (Modulating)
Atech LCS 500 Level Control
LAL : Water low level limiter (2 pcs)
Atech LAS 200 and LAL 300 Level Alarm
LAH : Water high level limiter
Atech LAS 200 and LAH 300 Level Alarm
BS : Automatic TDS blowdown system
Atech BCS 900 Automatic TDS Blowdown System (High TDS alarm output)
BBS : Automatic bottom blowdown system
Atech BCS 700 Automatic Bottom Blowdown System
SC : Sample cooler
Atech SC 9 Sample Cooler
CCS : Conductivity contamination monitoring system
Atech CCS 990 Condensate Contamination Control System
BHC : Boiler control system
Atech BHC Boiler House Control System

Equipments

FM : Steam flow meter
Atech FM-V Steam Flow Meter
FBT : Flash vessel for heat recovery
Atech FBT Flash Steam Vessel
BT : Blowdown cooler tank
Atech BT Blowndown Vessel
PL : Pressure limiter (2 pcs)
PS : Pressure transmitter (2 pcs)
SV : Safety valve (2 pcs)
LG : Direct water level indicator (2 pcs)
STL : Safety temperature limiter for steam
FTL : Safety temperature limiter for flue gas
M : Pressure gauge
B : *Burner*
FP : Feed water pump
GV : Shut-off valve
VV : Vent valve
DCV : Check valve

SAFETY EQUIPMENTS STEAM BOILERS

Atech Contech Model safety equipment according to EN 12953, EN 12952 and TRD 604 for 72-hour unattended operation, and with modulating water level control With Contect Model products, all devices can be connected to each other with MODbus communication protocol.



Equipments

LC : Water level control (Modulating)
Atech LCS 515 and LCS 525 Level Control
LAL : Water low level limiter (2 pcs)
Atech LAS 210 and LAL 310 Level Alarm
LAH : Water high level limiter
Atech LAS 210 and LAH 310 Level Alarm
BS : Automatic TDS blowdown system
Atech BCS 900 Automatic TDS Blowdown System (High TDS alarm output)
BBS : Automatic bottom blowdown system
Atech BCS 700 Automatic Bottom Blowdown System
SC : Sample cooler
Atech SC 9 Sample Cooler
CCS : Conductivity contamination monitoring system
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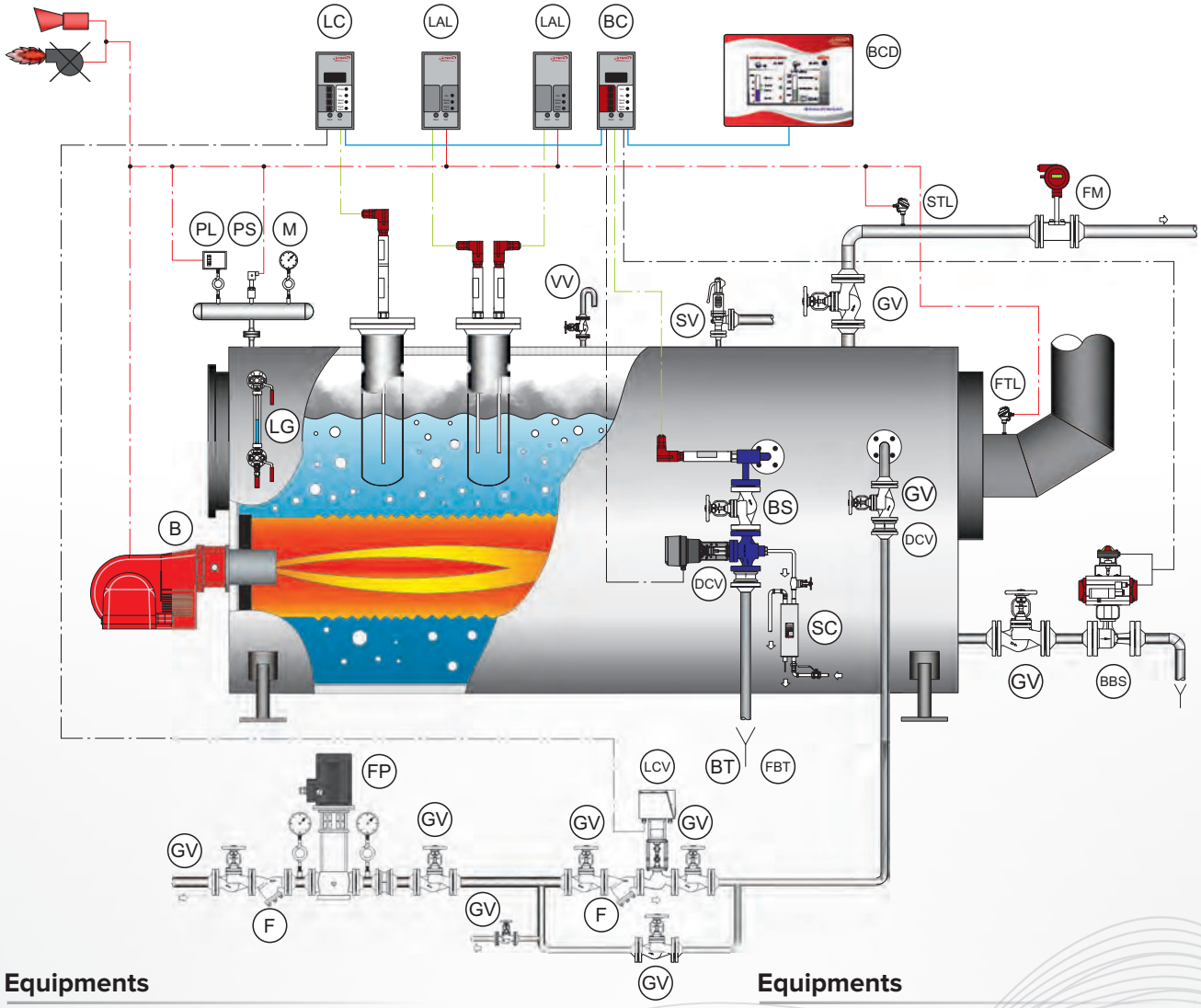
BHC : Boiler control system
Atech BHC Boiler House Control System

Equipments

FM : Steam flow meter
Atech FM-V Steam Flow Meter
FBT : Flash vessel for heat recovery
Atech FBT Flash Steam Vessel
BT : Blowdown cooler tank
Atech BT Blowndown Vessel
PL : Pressure limiter (2 pcs)
PS : Pressure transmitter (2 pcs)
SV : Safety valve (2 pcs)
LG : Direct water level indicator (2 pcs)
STL : Safety temperature limiter for steam
FTL : Safety temperature limiter for flue gas
M : Pressure gauge
B : Burner
FP : Feed water pump
GV : Shut-off valve
VV : Vent valve
DCV : Check valve

SAFETY EQUIPMENTS STEAM BOILERS

Atech safety equipments according to EN 12953, EN 12952 and TRD 604 for 24-hour unattended operation, and with modulating water level control



Equipments

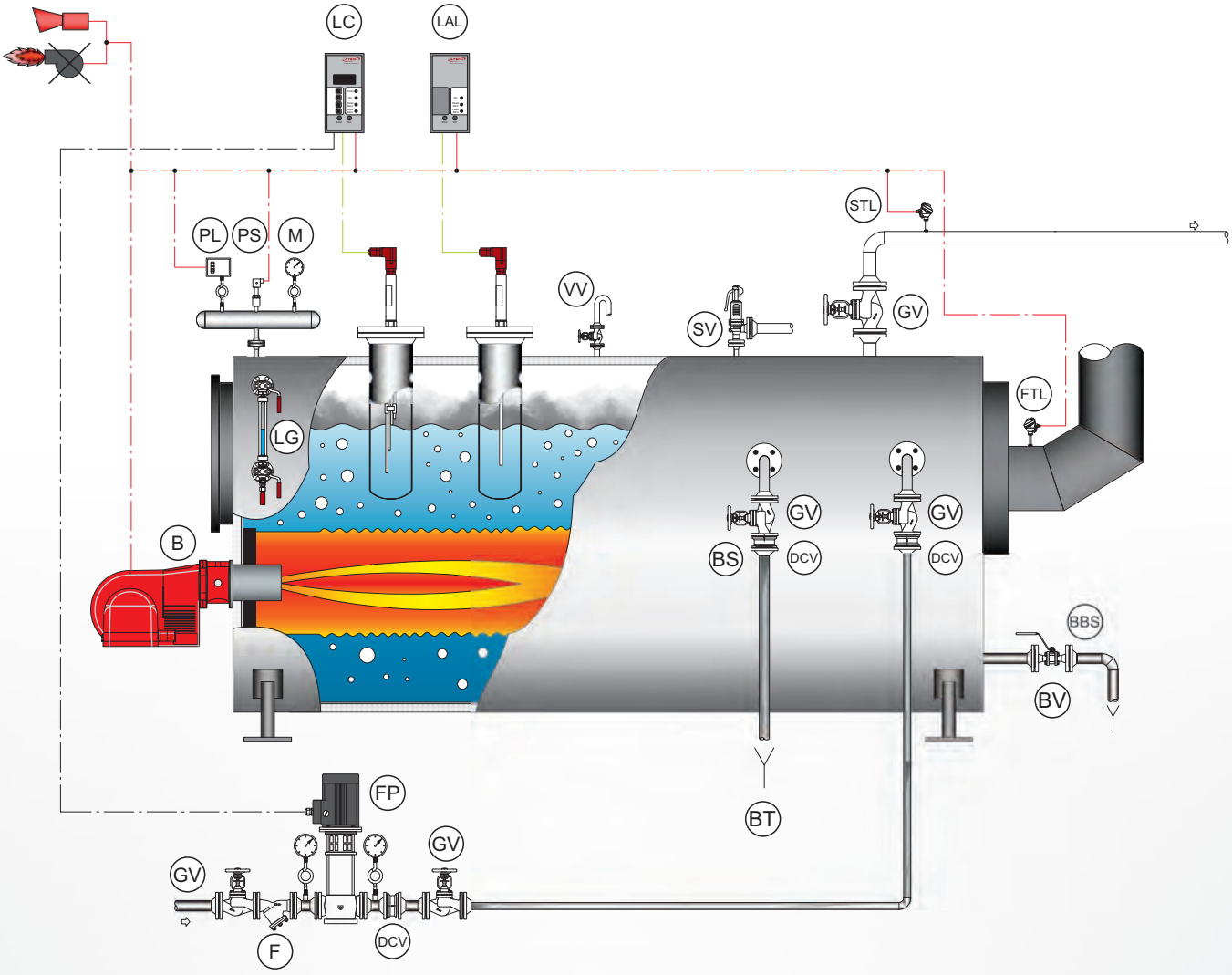
LC : Water level control (Modulating)
Atech LCS 500, LCS 525 and LCS 515 Level Control
LAL : Water low level limiter (2 pcs)
Atech LAS 200, LAS 210, LAL 300 and LAL 310 Level Alarm
BS : Automatic TDS blowdown system
Atech BCS 900 Automatic TDS Blowdown System
BBS : Automatic bottom blowdown system
Atech BCS 700 Automatic Bottom Blowdown System
SC : Sample cooler
Atech SC 9 Sample Cooler
BCD : Boiler Control Dispaly
Atech BCD Boiler Control Display
FM : Steam flow meter
Atech FM-V Steam Flow Meter

Equipments

FBT : Flash vessel for heat recovery
Atech FBT Flash Steam Vessel
BT : Blowdown cooler tank
Atech BT Blowndown Vessel
PL : Pressure limiter (2 pcs)
PS : Pressure transmitter (2 pcs)
SV : Safety valve (2 pcs)
LG : Direct water level indicator (2 pcs)
STL : Safety temperature limiter for steam
FTL : Safety temperature limiter for flue gas
M : Pressure gauge
B : Burner
FP : Feed water pump
GV : Shut-off valve
VV : Vent valve
DCV : Check valve

SAFETY EQUIPMENTS STEAM BOILERS

Safety equipment according to TRD 401
with constant attendance and with on-off water level control



Equipments

LC : Water level control (On-off)
Atech LCS 440, LCS 420, LCS 410 and LCS 100 Level Control
LAL : Water low level limiter
Atech LAS 200, LAS 210, LAL 300 and LAL 310 Level Alarm
BS : Manurel TDS valve
BBS : Manuel bottom blowdown
BT : Blowdown cooler tank
Atech BT Blowndown Vessel

Equipments

PL : Pressure limiter (2 pcs)
PS : Pressure transmitter (2 pcs)
SV : Safety valve (2 pcs)
LG : Direct water level indicator (2 pcs)
STL : Safety temperature limiter for steam
FTL : Safety temperature limiter for flue gas
M : Pressure gauge
B : Burner
FP : Feed water pump
GV : Shut-off valve
VV : Vent valve
DCV : Check valve
DCV : Check valve

"Steam & Control Technologies..."

Advanced, Safe and Reliable Boiler Control Systems

STEAM BOILERS CONTROL MODULS

Recent technological development, with the evolution of electronic control systems, has helped to improve safety and efficiency in the operation of steam boilers.

Atech boiler level control systems can be used for the safe operation of steam boiler systems that turn off burner respectively feed water pump when critical water levels are reached.

Atech automatic boiler surface blowdown control (TDS control) system can provide higher quality steam, and more fuel cost savings. It will be safer, more efficient and capable of generating higher quality steam for the boiler.

Atech boiler control systems are generally manufactured according to the European Pressurised Equipment Directive (2014/68/EU) and current standards for the operation of steam boiler systems (EN 12952-11, EN12953-9, TRD).

COMPACT MODULE LEVEL CONTROL

Level probe and controller in one compact system with integrated volt-free relay contacts.

No external electronic control device is required.

Simple installation, easy commissioning, no moving parts.

High service lifetime and very low failure rates. Also ensure the safe operation of steam boiler systems.

SMART MODULE LEVEL CONTROL, LEVEL ALARM and BLOWDOWN SYSTEMS

The probes have an extremely slim design with no big housing on the head which makes them easy and fast to install.

Depending on the application, there are many options for boiler level control and automatic blowdown systems.

CONTECH MODULE LEVEL CONTROL, LEVEL ALARM and BLOWDOWN SYSTEMS

The new Contech Module was developed as need-based solutions for steam boiler automation and also includes digital Modbus technology.

All functions are controlled by Atech level and blowdown controllers and displayed on a central display unit.

STEAM BOILERS CONTROL MODULS

NEW GENERATION BOILER HOUSE CONTROL SYSTEMS AT A GLANCE

Level Alarm (Limiters) Systems (SIL 2 & 3 apporved)

	LC 300	LC 300	LC 310	LC 310	LC 220	LC 210
Modul	Smart	Smart	Contech	Contech	Smart	Contech
Probe	LPL 300	LPH 300	LPL 300	LPH 300	LP 200	LP 200
Function / Control	Low Alarm	High Alarm	Low Alarm	High Alarm	Low & High Alarm	Low & High Alarm
Supply voltage	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC
Conductivity range	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm

Note: The LC 220 Level Alarm Controller does not have Self-Monitoring and SIL 2 & 3 approval features.

Level Control & Level Alarm (Limiters) Systems (Conductive)

	LC 410	LC 420	LC 440	LCS 100
Modül	Contech	Pro	Smart	Compact
Probe	LP 400	LP 400	LP 400	
Function / Control	High Alarm Pump In Pump On-Off Low Alarm	High Alarm Pump In Pump On-Off Low Alarm	High Alarm Pump In/Out Pump On-Off Low Alarm	High Alarm Pump In/Out Pump On-Off Low Alarm
Supply voltage	230 VAC	230 VAC	230 VAC	230 VAC
Conductivity range	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm

Level Control & Level Alarm (Limiters) Systems (Capacitive)

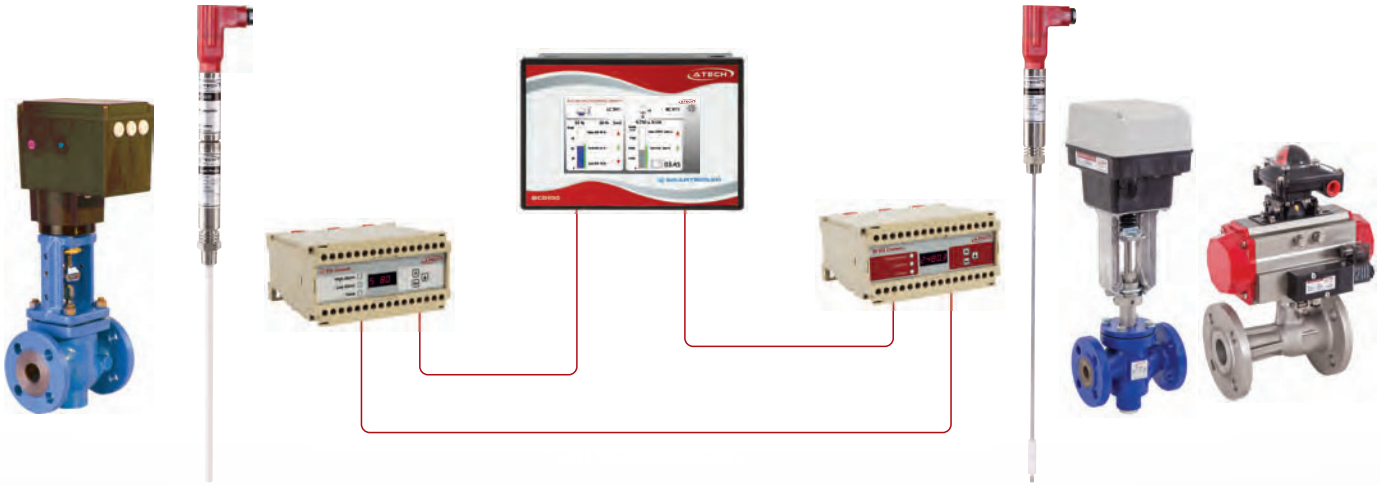
	LC 515	LC 525	LC 540	LC 540-D	LC 540-DA	LPA 420	LCS 600
Modul	Contech	Contech	Smart	Smart	Smart	Smart	Compact
Pre amplifier	LPA 500	LPA 500 LPA 420	LPA 500	LPA 500 LPA 420	LPA 500 LPA 420	LPA 420	
Probe	LP 500	LP 500	LP 500	LP 500	LP 500	LP 500	
Function / Control	* Valve Motor Drive * Low Alarm	High Alarm * Valve Motor Drive * Pump On-Off * 4-20 mA PID Low Alarm	High Alarm * Valve Motor Drive * Pump On-Off Low Alarm	High Alarm * Valve Motor Drive * Pump On-Off * 4-20 mA PID Low Alarm	High Alarm * Valve Motor Drive * Pump On-Off * 4-20 mA PID Low Alarm		
Signal	0-6 V Level	0-6 V Level 4-20 mA Level	0-6 V Level	0-6 V Level 4-20 mA Level	0-6 V Level 4-20 mA Level		
Output signal		4-20 mA Level	4-20 mA Level	4-20 mA Level	4-20 mA Level	4-20 mA Level	4-20 mA Level
Supply voltage	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC	24 VDC	24 VDC
Conductivity range	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm	> 10 µS/cm

Automated Blowdown Systems (Conductivity)

	BC 700	BC 715	BC 930	BC 935	BC 970	BC 971
Modul	Smart	Contech	Smart	Contech	Smart	Contech
Probe			CP 910 CP 920 CP 930 CP 950	CP 910 CP 920 CP 930 CP 950	CP 910 CP 920 CP 930 CP 950	CP 910 CP 920 CP 930 CP 950
Function / Control	Bottom blowdown valve control	Bottom blowdown valve control	TDS Blowdown Control High TDS Alarm	TDS Blowdown Control High TDS Alarm	TDS Blowdown Control High TDS Alarm	Bottom blowdown valve control TDS Blowdown Control High TDS Alarm
Output			4-20 mA conductivity	4-20 mA conductivity	4-20 mA conductivity	4-20 mA conductivity
Supply voltage	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC
Conductivity range			10-10.000 µS/cm	10-10.000 µS/cm	10-10.000 µS/cm	10-10.000 µS/cm
Blow down Valve	BCV 700 Series	BCV 700 Series	BCV 900 Series	BCV 900 Series	BCV 700 Series BCV 900 Series	BCV 700 Series BCV 900 Series

STEAM BOILERS CONTROL MODULS

CONTECH MODULE LEVEL & BLOWDOWN CONTROL



BCD 100 STEAM BOILER CONTROL DISPLAY

Safety, Controls and Connectivity

New Contech Module are developed as demand-based solutions for steam boiler automation, and also combines digital Modbus technology. All functions are controlled by Atech level and blowdown controllers and displayed on a central unit, the BCD 100 Boiler Control Display.

- In this series, the controller was separated from the operating unit,
- System operation and handling can be extremely clear and simple,
- The operator can enter parameters easly and reliably,
- High resolution, touch screen display (HMI),
- With separate control unit and greatly extended functionality,
- Setpoint values can be displayed or altered on the touchscreen display,
- Level, TDS and Bottom Blowdown measurement,

STEAM BOILERS CONTROL MODULS

BHC 1000 STEAM BOILER HOUSE CONTROL SYSTEM

The Steam Boiler House Control System BHC 1000 provides all necessary functions for operating steam boiler according to specialised safety and effeciency requirements. Boiler operating states, operating data and measured values can be viewed on its touch screen display.

It combines the controls for steam boilers plus individual module controls.

Features

- Special indicators give a quick overview of the boiler system condition,
- Safety chain and all necessary alarms,
- Limits for low and high water level alarms,
- Pressure limiter for maximum gauge pressure,
- On-off or modulating water level control,
- Control feed water pump, bottom blow-down and TDS control included,
- Integration of feed water tank, water analysis, degassing systems, dosing pumps,
- Dry running protection for feed water pumps,
- Alarm and fault messages with message memory,

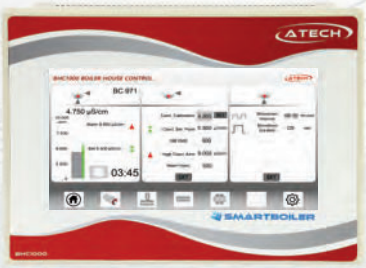
STEAM BOILERS CONTROL MODULS

BHC 1000 STEAM BOILER HOUSE CONTROL SYSTEM

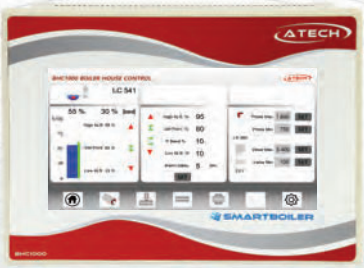
The SmartBoiler Steam Boiler House Control System BHC 1000 is the ideal solution for steam boilers for convenient control and operation. In addition to with a seperate touch panel (BHC 1000) the set points and actual values, it also displays trend values, error messages and limits.

Features

- Touchscreen display in 10 inches,
- In addition to the basic functions, further options and functions can be added to the BHC 1000 Control System,
- Operating hours counter for boilers, pumps and burners,
- Colour touchscreen display for simple operation and clear visualisation of operating conditions,
- Easy installation and minimum space requirement, available with control cabinet,



Overview of the steam boiler system condition can be displayed. Clear and easily understandable.

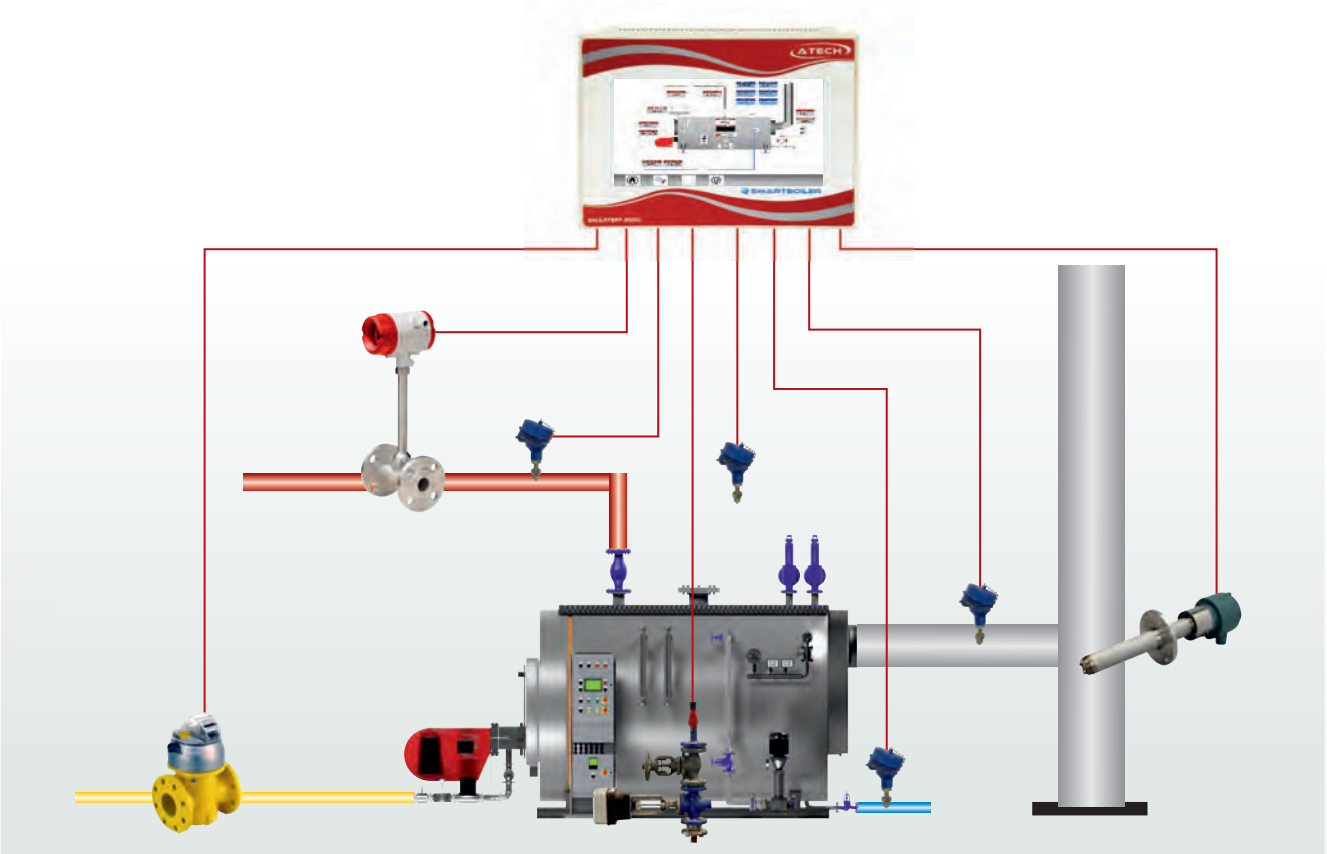


Setpoint values can be displayed or altered on the touchscreen display.

Plain text display of operating and fault messages.

STEAM BOILERS CONTROL MODULS

SMARTEFF 2000 EFFICIENCY MONITORNG SYSTEM FOR DTEAM BOILER



SmartEff 2000 Efficiency Monitoring System for steam boiler is a complete efficiency monitoring and analysis system for boilers. Continuous monitoring of performance parameters for prompt actions to improve boiler efficiency with direct or indirect method.

SmartEff 2000 efficiency monitoring unit takes input from the key field instruments and analysis performance of the steam boiler then displays important parameters locally on a touch screen HMI. The System monitors below parameters to undertake proactive actions leading to decrease in fuel bill.

Parameters for monitoring:

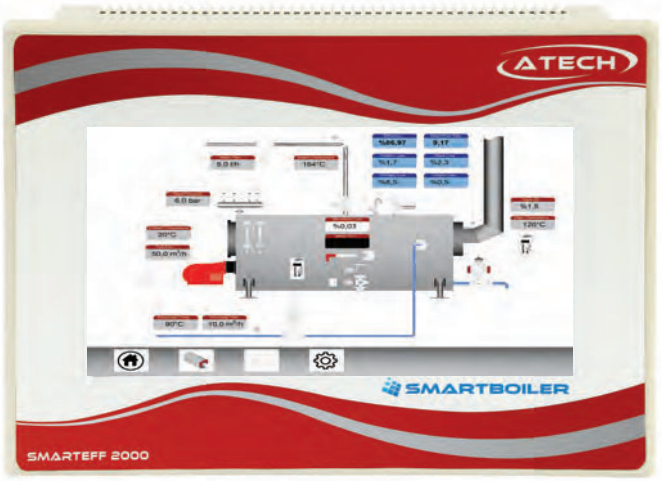
- Stack oxygen (%)
- Stack temperature (°C)
- Steam pressure (bar) / temperature (°C)
- Steam flow (kg/hr)
- Feed water temperature (°C)
- Ambient temperature (°C)
- Fuel consumption (for gas m^3/hr)
- Amount of blow down (kg/h or m^3/hr)

SmartEff components/Field instruments:

- SmartEff Unit (Computation & display unit)
- Steam flow meter
- Automated TDS and bottom blowdown system
- Oxygen analyzer
- Stack temperature transmitter
- Steam temperature transmitter
- Feed water temperature transmitter
- Ambient temperature transmitter
- Fuel flow meter

STEAM BOILERS CONTROL MODULS

SMARTEFF 2000 EFFICIENCY MONITORNG SYSTEM FOR DTEAM BOILER



Saving energy - reducing costs - protecting the environ

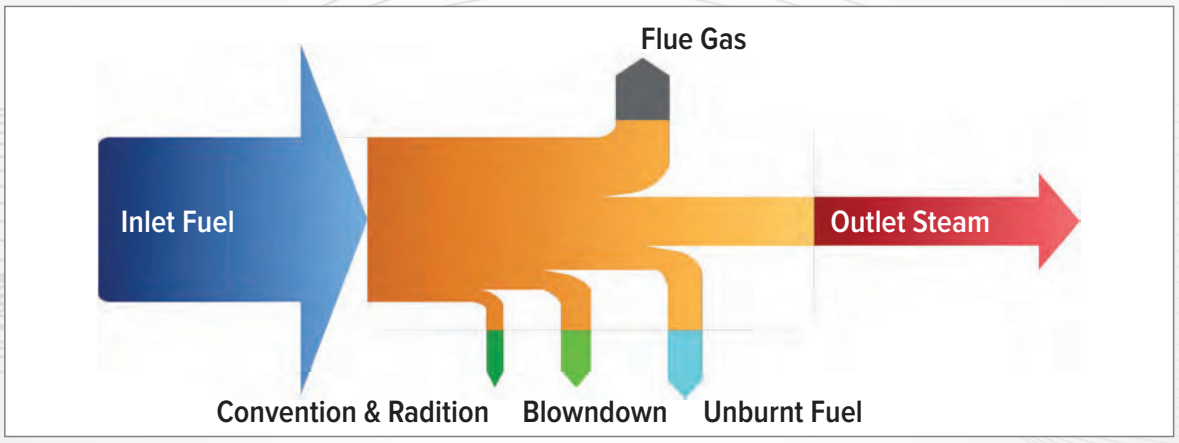
SmartEff 2000 Efficiency Monitorng System will help to improve the performance of the steam boiler. Our solution will provide information about the performance, condition and operating efficiency of the steam boiler.

Benefits

- Provides user-friendly interface,
- Meausere and monitor the parameters,
- Gives individualised recommendations for action,
- Reduce fuel costs and maximize steam production,
- Stores boiler performance data for long periods for review,
- Planning proactive preventive maintenance,
- Increase boiler availability and lifetime,
- Protecting the environment,

Calculated Parameters (%)

- Boiler efficiency
  - Direct efficiency (%),
  - Indirect efficiency (%),
- Steam to fuel ratio,
- Stack loss,
- Enthalpy loss,
- Blowdown loss,
- Radiation loss,
- Blowdown quantity,



COMPACT MODULE LEVEL CONTROL

STEAM BOILERS CONTROL MODULS

Recent technological development, with the evolution of electronic control systems, has helped to improve safety and efficiency in the operation of steam boilers.

Atech boiler level control systems can be used for the safe operation of steam boiler systems that turn off burner respectively feed water pump when critical water levels are reached.

Atech automatic boiler surface blowdown control (TDS control) system can provide higher quality steam, and more fuel cost savings. It will be safer, more efficient and capable of generating higher quality steam for the boiler.

Atech boiler control systems are generally manufactured according to the European Pressurised Equipment Directive (2014/68/EU) and current standards for the operation of steam boiler systems (EN 12952-11, EN12953-9, TRD).

COMPACT MODULE LEVEL CONTROL

Level probe and controller in one compact system with integrated volt-free relay contacts. No external electronic control device is required.

Simple installation, easy commissioning, no moving parts.

High service lifetime and very low failure rates. Also ensure the safe operation of steam boiler systems

LCS 100 COMPACT ON-OFF LEVEL CONTROL

LCS 600 COMPACT MODULATING LEVEL PROBE (4-20mA)

LCS 100 COMPACT ON-OFF LEVEL CONTROL

The LCS 100 Compact On-Off Level Control System is suited to control the level for steam boilers, feedwater tanks, deaertors and process vessels. With the LCS 100 Compact On-Off Level Control System, four levels can be signalled in conductive liquids. These four levels are:

1. High level alarm,
2. Pump off,
3. Pump on,
4. Low level alarm,

- Simple installation, easy commissioning, no moving parts.
- Two equipments are together in one compact system.
- Thus, no external control device is required.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar g
Connection	:	1", BSP - Screwed
Length	:	500, 800, 1.000 & 1.500 mm
Control Signals	:	Pump on-off, Low level alarm, High level alarm
Output	:	One relay for pump control, two reyals for low & high level alarms.
Control Types	:	Configurable as feed or as drain control

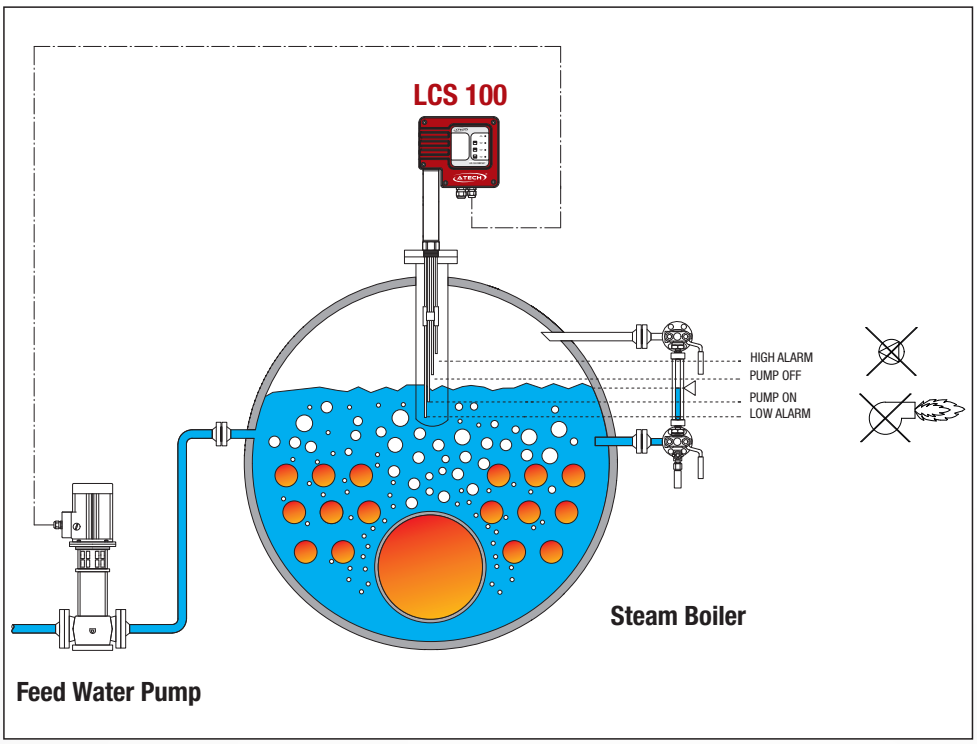
Types

Type	Length	Connection
LCS 105	500 mm	1", BSP - Screwed
LCS 108	800 mm	1", BSP - Screwed
LCS 110	1.000 mm	1", BSP - Screwed
LCS 115	1.500 mm	1", BSP - Screwed

Atech reserves the right to make changes without prior notice.

LCS 100 COMPACT ON-OFF LEVEL CONTROL

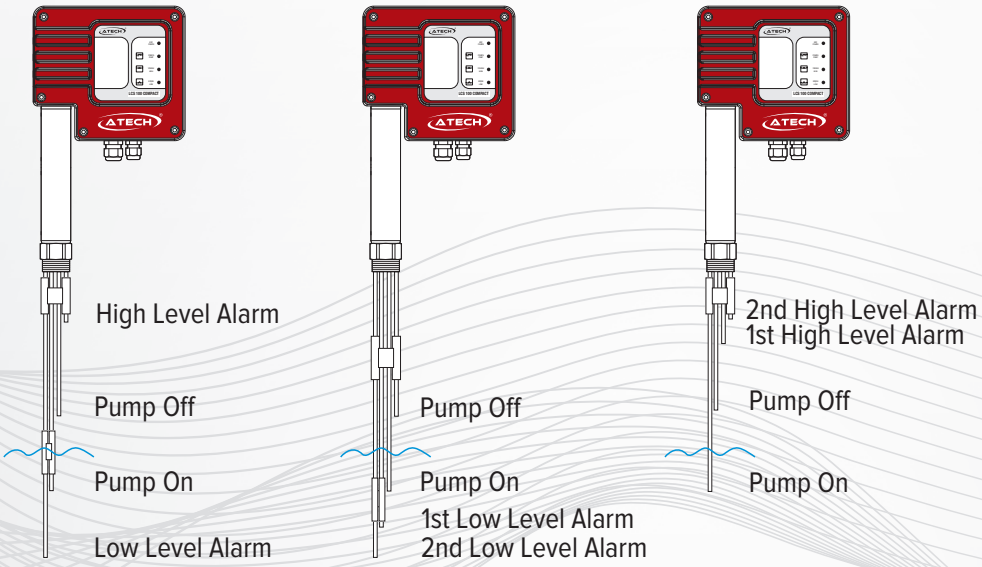
Applications



Two equipments are together in one compact system. Thus, no external control device is required.

The LCS 100 consisting of a level electrode with four tips and an integrated level switching controller.

With two level points control, the water level is kept at the desired level by switching the pump on or off respectively. Additionally low and high level alarm signals can be provided.



LCS 600 COMPACT MODULATING LEVEL PROBE (4-20 mA)

The LCS 600 Compact Modulating Level Probe works according to the capacitance measurement principle and is used for determining the level in electrically conductiveand non-conductive liquids.

The LCS 600 Compact Modulating Level Probe has a level transmitter to produce a standard signal of 4 - 20 mA. The level can be read off from a remote display unit.

- Simple installation, easy commissioning, no moving parts.
- Low cost solution with compact system.
- Flexible control options.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Connection	:	1/2", BSP - Screwed
Probe Length	:	500 mm to 1.500 mm
Output	:	4-20 mA level output
Supply	:	24 V dc (110 or 220 V ac optional)

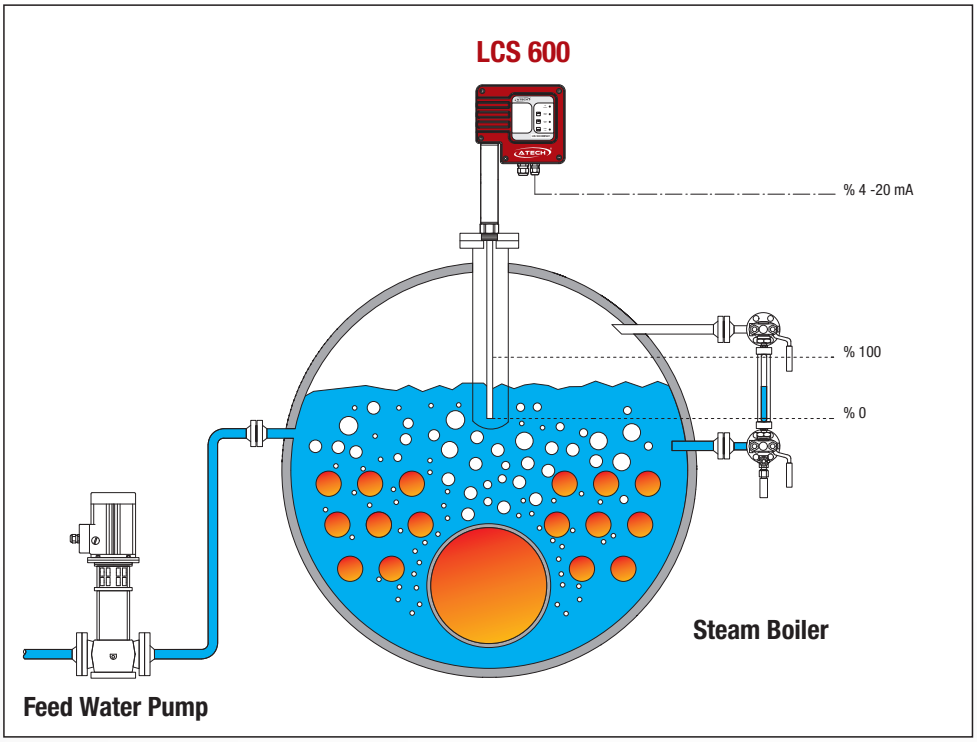
Types

Type	Length	Connection
LCS 605	500 mm	1/2", BSP - Screwed
LCS 606	600 mm	1/2", BSP - Screwed
LCS 607	700 mm	1/2", BSP - Screwed
LCS 608	800 mm	1/2", BSP - Screwed
LCS 609	900 mm	1/2", BSP - Screwed
LCS 610	1.000 mm	1/2", BSP - Screwed
LCS 611	1.100 mm	1/2", BSP - Screwed
LCS 612	1.200 mm	1/2", BSP - Screwed
LCS 613	1.300 mm	1/2", BSP - Screwed
LCS 614	1.400 mm	1/2", BSP - Screwed
LCS 615	1.500 mm	1/2", BSP - Screwed

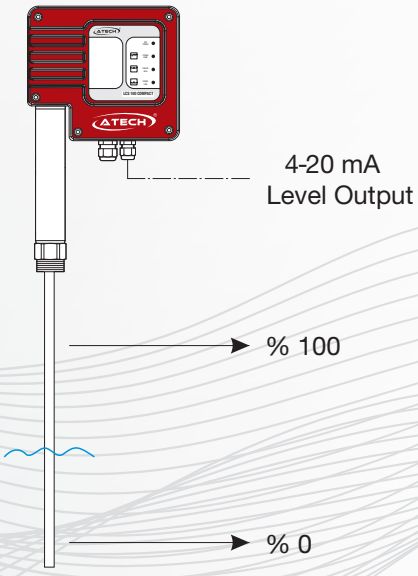
Atech reserves the right to make changes without prior notice.

LCS 600 COMPACT MODULATING LEVEL PROBE (4-20 mA)

Applications



The LCS 600 Compact Modulating Level Probe provides a proportional 4-20 mA level output signal, which can be switched to a level controller, a PLC or a frequency-controlled pump. The level controller or PLC can provide an appropriate output to a feedwater control valve to control level of steam boilers.



"Steam & Control Technologies..."

SMART MODULE LEVEL CONTROL AND LEVEL ALARM

STEAM BOILERS CONTROL MODULS

SMART MODULE LEVEL CONTROL / LEVEL ALARM

The probes have an extremely slim design with no big housing on the head which makes them easy and fast to install. Depending on the application, there are many options for boiler level control and automatic blowdown systems.

LAS 200 SMART LEVEL ALARM (LOW & HIGH)

LAL 300 SMART SELF MONITORING LOW LEVEL ALARM

LAH 300 SMART SELF MONITORING HIGH LEVEL ALARM

LCS 400 SMART ON-OFF LEVEL CONTROL

LCS 420 PRO ON-OFF LEVEL CONTROL

LCS 500 SMART MODULATING LEVEL CONTROL

LP 420 SMART MODULATING LEVEL TRANSMITTER (4-20 mA)

LAS 200 SMART LEVEL ALARM

The LAS 200 Smart Level Alarm System consists of LP 200 Level Probe and LC 220 Smart Level Controller to provide level alarm for steam boiler, feedwater tank and process the vessels.

With LAS 200 Smart Level Alarm System, low and high level alarm signals can be provided.
LC 220 Level Alarm Controller is DIN Panel type mounting.

- Consists of LP 200 Level Probe and LC 220 Smart Level Alarm Controller.
- Advanced safety with Alarm Test and Alarm Reset.
- On level alarms allows safe shutdown of the boiler.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Probe Connection	:	1", BSP - Screwed
Probe Length	:	500, 800, 1.000 and 1.500 mm
Control Signals	:	Low level alarm and High level alarm
Output	:	Two relay for low and high level alarm
Communication	:	Modbus - RS 485
Functions	:	Alarm Test and Alarm Reset

Types

LC 220 Controller

Type	Feature
LC 220	Level Alarm

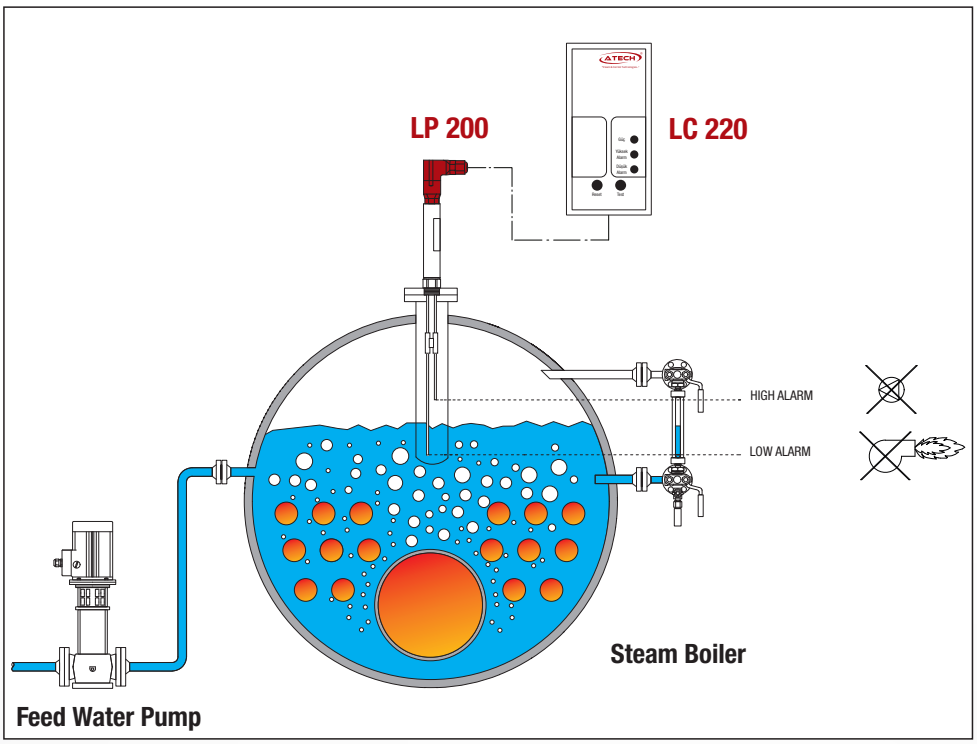
LP 200 Level Probe

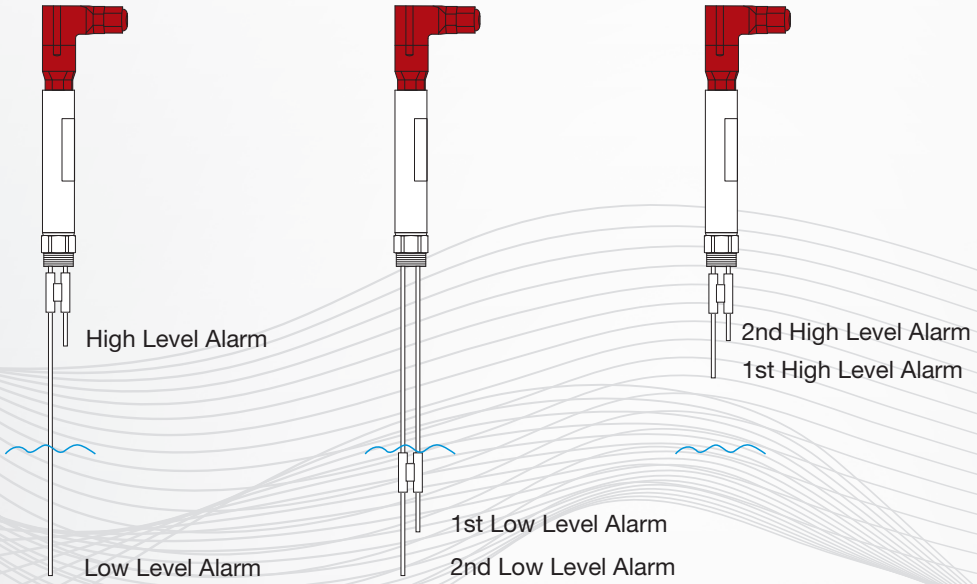
Type	Length	Connection
LP 205	500 mm	1", BSP - Screwed
LP 208	800 mm	1", BSP - Screwed
LP 210	1.000 mm	1", BSP - Screwed
LP 215	1.500 mm	1", BSP - Screwed

Atech reserves the right to make changes without prior notice.

LAS 200 SMART LEVEL ALARM

Applications





Level alarms can be checked at specific time intervals with Alarm Test function to test the operation of the burner protection circuit.

When the water falls below the adjusted switch points, low level alarm occurs and the burner protection circuit is interrupted, Alarm Reset function can be used to run burner again. To run the burner again, boiler operator person can use the reset function on of the controller.

LAL 300 SELF MONITORING LOW LEVEL ALARM

Self Monitoring LAL 300 Smart Level Alarm System consists of LPL 300 Low Level Probe and LC 300 Smart Level Alarm Controller to provide self monitoring low level alarm for steam boiler in accordance with TRD 604, sheet 1 and sheet 2 (24h/72h operation) as well as EN 12952 and EN 12953.

LC 300 Self Monitoring Level Alarm Controllers / Limiters are designed, developed, manufactured and certified to SIL 2 ve SIL 3, on the basis of the applicable EN standards as per IEC 61508 "Functional safety".

- Consists of LPL 300 Level Probe and LCL 300 Smart Level Alarm Controller.
- Self-monitoring low-water limiter with periodic self-checking.
- The equipment meets TRD 604/EN 12952 & EN 12953 regulations for use in steam boiler operating without constant supervision.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Probe Connection	:	1/2", BSP - Screwed
Probe Length	:	500, 1.000 and 1.500 mm
Control Signals	:	Low level alarm (Self monitoring)
Output	:	Two relay for low level alarm
Communication	:	Modbus - RS 485
Functions	:	Alarm Test and Alarm Reset

Types

LC 300 Controller

Type	Feature
LC 300	Self Monitoring & Alarm Test

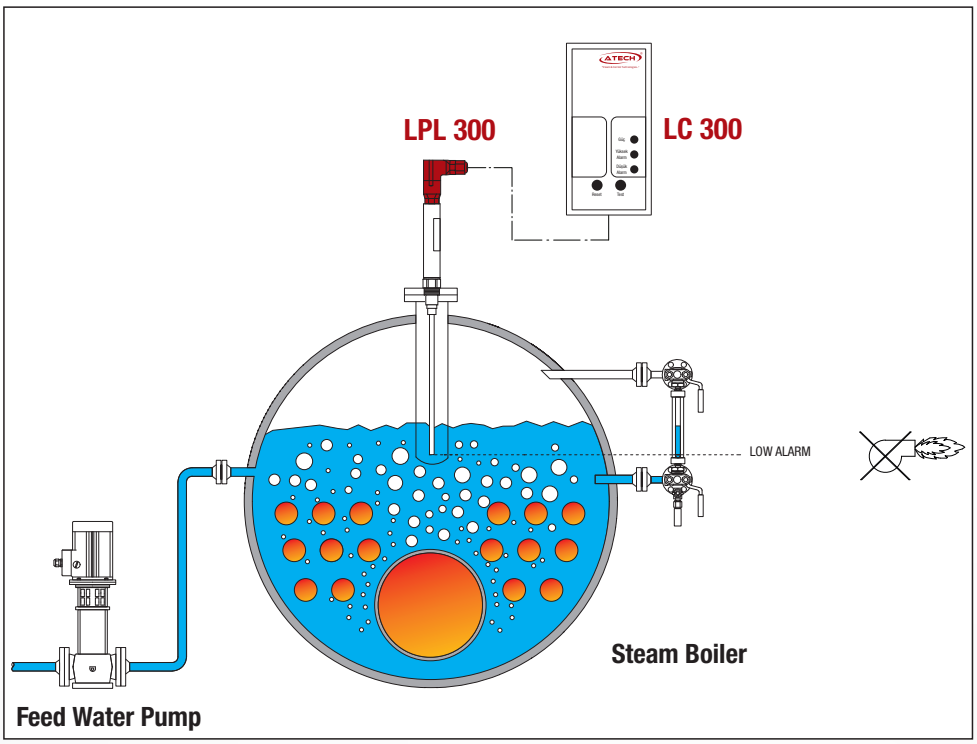
LPL 300 Level Probe

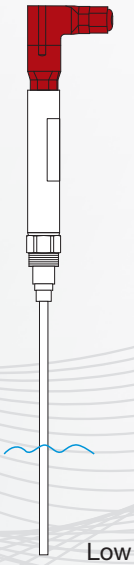
Type	Length	Connection
LPL 305	500 mm	1/2", BSP - Screwed
LPL 310	1.000 mm	1/2", BSP - Screwed
LPL 315	1.500 mm	1/2", BSP - Screwed

Atech reserves the right to make changes without prior notice.

LAL 300 SELF MONITORING LOW LEVEL ALARM

Applications





Low Level Alarm

SIL 2 and SIL3 approved LC 300 Self Monitoring Level Alarm Controllers / Limiters provide the safety level of the boiler system to be increased.

If all conditions for safety and correct boiler operation are met, the safety chain for steam boiler is enabled, the burner can switch on. If the water level drops below the LPL 300 Low Level Alarm probe tip, low level alarm can be activated and the burner may be shut down. Alarm Reset function can be used to run burner again. To run again the burner, boiler operator person can use reset function on the controller.

Safer operation of the steam boiler can be ensured with the Alarm Test and Alarm Reset functions.

LAH 300 SELF MONITORING HIGH LEVEL ALARM

Self Monitoring LAH 300 Smart High Level Alarm System consists of LPH 300 High Level Probe and LC 300 Smart Level Alarm Controller to provide self monitoring high level alarm for steam boiler in accordance with TRD 604, sheet 1 and sheet 2 (24h/72h operation) as well as EN 12952 and EN 12953.

LC 300 Self Monitoring Level Alarm Controllers / Limiters are designed, developed, manufactured and certified to SIL 2 ve SIL 3, on the basis of the applicable EN standards as per IEC 61508 "Functional safety".

- Consists of LPH 300 Level Probe and LCH 300 Smart Level Alarm Controller.
- Self-monitoring high-water limiter with periodic self-checking.
- The equipment meets TRD 604/EN 12952 & EN 12953 regulations for use in steam boiler operating without constant supervision.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Probe Connection	:	1/2", BSP - Screwed
Probe Length	:	500, 1.000 and 1.500 mm
Control Signals	:	High level alarm (Self monitoring)
Output	:	Two relay for high level alarm
Communication	:	Modbus - RS 485
Functions	:	Alarm Test and Alarm Reset

Types

LC 300 Controller

Type	Feature
LC 300	Self Monitoring & Alarm Test

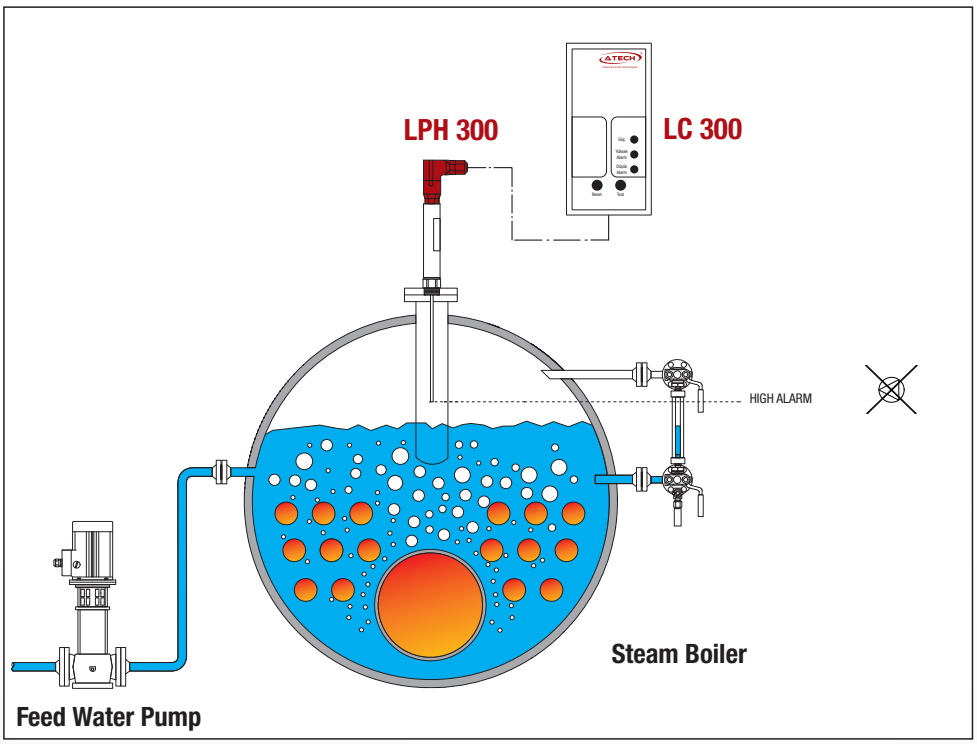
LPH 300 Level probe

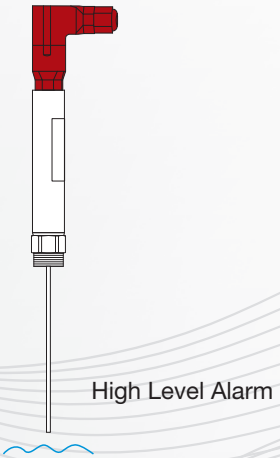
Type	Length	Connection
LPH 305	500 mm	1/2", BSP - Screwed
LPH 310	1.000 mm	1/2", BSP - Screwed
LPH 315	1.500 mm	1/2", BSP - Screwed

Atech reserves the right to make changes without prior notice.

LAH 300 SELF MONITORING HIGH LEVEL ALARM

Applications





SIL 2 and SIL3 approved LC 300 Self Monitoring Level Alarm Controllers / Limiters provide the safety level of the boiler system to be increased.

If the boiler water level rises to touch the LPH 300 High Level probe tip, the LC 300 controller to be de-energised and the alarm to sound, also the boiler feed water pump or feed water valve in operation may be switched off, and the burner supply could be turned off, depending on the boiler cotrol panel installation.

Safer operation of the steam boiler can be ensured with the Alarm Test and Alarm Reset functions.

LCS 400 SMART ON-OFF LEVEL CONTROL

The LCS 400 Smart On-Off Level Control System consists of LP 400 Level Probe and LC 440 Smart Level Controller to provide simple on-off level control for steam boilers, deaerator, feedwater tank and process vessels. With two level points control, the water level is kept at the desired level by switching the pump on or off respectively. Additionally low and high level alarm signals can be provided.

Level alarms can be checked at specific time intervals with Alarm Test function to test the operation of the burner protection circuit.

- Consists of LP 400 Level Probe and LC 440 Smart Level Controller.
- Advanced safety with Alarm Test and Alarm Reset.
- Smart technology, with LCD screen.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Probe Connection	:	1", BSP - Screwed
Probe Length	:	500, 800, 1.000 and 1.500 mm
Control Signals	:	Pump on-off, Low level alarm, High level alarm
Output	:	One relay for pump control, two relay for low and high level alarm
Control Types	:	Configurable as feed or as drain control
Communication	:	Modbus - RS 485
Functions	:	Alarm Test ve Alarm Reset
Display	:	Smart technology, LCD screen

Types

LC 440 Controller

Type	Feature
LC 440	Smart On-Off Level Control

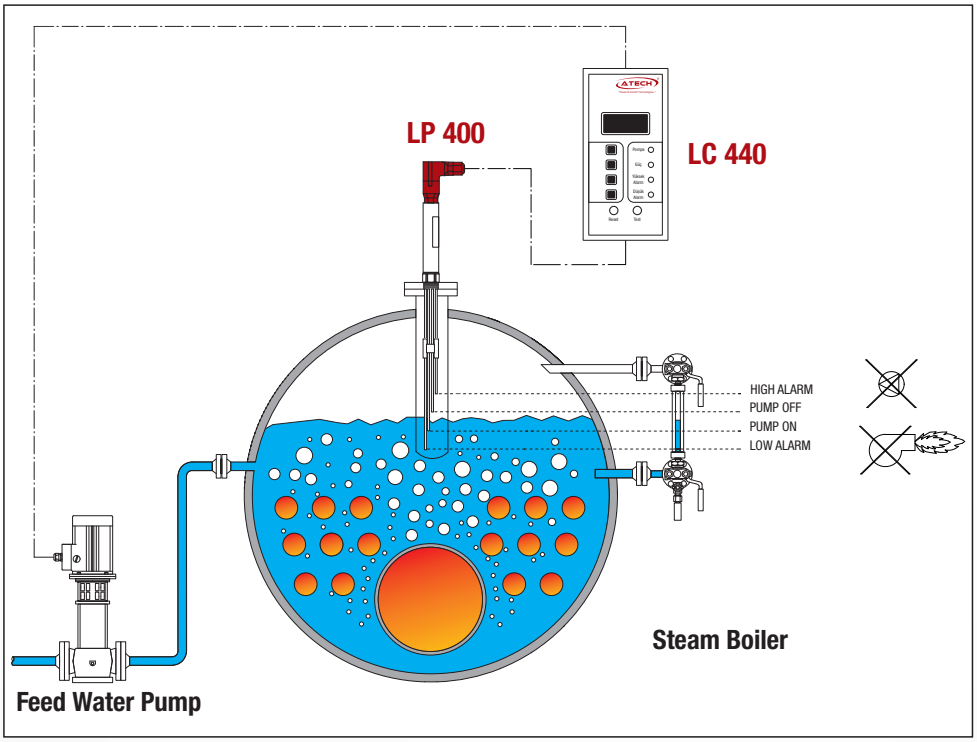
LP 400 Level probe

Type	Length	Connection
LP 405	500 mm	1", BSP - Screwed
LP 408	800 mm	1", BSP - Screwed
LP 410	1.000 mm	1", BSP - Screwed
LP 415	1.500 mm	1", BSP - Screwed

Atech reserves the right to make changes without prior notice.

LCS 400 SMART ON-OFF LEVEL CONTROL

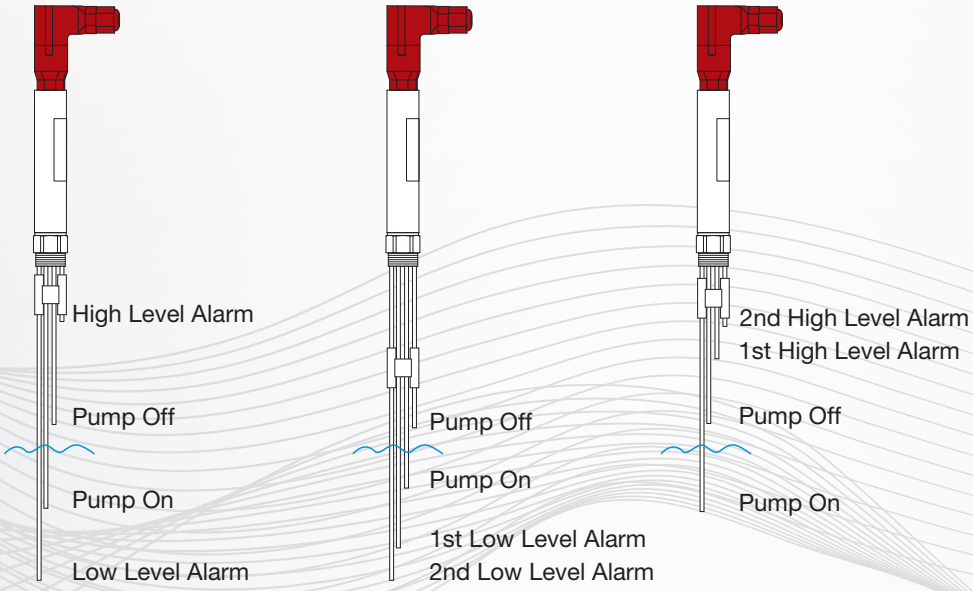
Applications



When the water falls below the adjusted switch points, low level alarm occurs and the burner protection circuit is interrupted, Alarm Reset function can be used to run feed pump again. To run the pump again, boiler operator person can use reset function on the controller.

When the boiler water level drops below the set low level alarm point, a low level alarm occurs and the burner safety chain circuit is interrupted.

If the boiler water level rises enough to touch the set high water level alarm point, a high water level alarm occurs, and depending on the boiler control panel setup, the boiler feed water pump or burner supply may be turned off.



LCS 420 PRO ON-OFF LEVEL CONTROL

The LCS 420 Pro On-Off Level Control System consists of LP 400 Level Probe and LC 420 Pro Level Controller to provide simple on-off level control for steam boilers, deaerators, feed water tank and process vessels. With two level points control, the water level is kept at the desired level by switching the pump on or off respectively. Additionally low and high level alarm signals can be provided.

Level alarms can be checked at specific time intervals with Alarm Test function to test the operation of the burner protection circuit.

- Consists of LP 400 Level Probe and LC 420 Smart Level Controller.
- Advanced safety with Alarm Test and Alarm Reset.
- Pro technology.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Probe Connection	:	1", BSP - Screwed
Probe Length	:	500, 800, 1.000 and 1.500 mm
Control Signals	:	Pump on-off, Low level alarm, High level alarm
Output	:	One relay for pump control, two relay for low and high level alarm
Control Types	:	Configurable as feed or as drain control.
Communication	:	Modbus - RS 485
Functions	:	Alarm Test and Alarm Reset

Types

LC 420 Controller

Type	Feature
LC 420	Pro On-Off Level Control

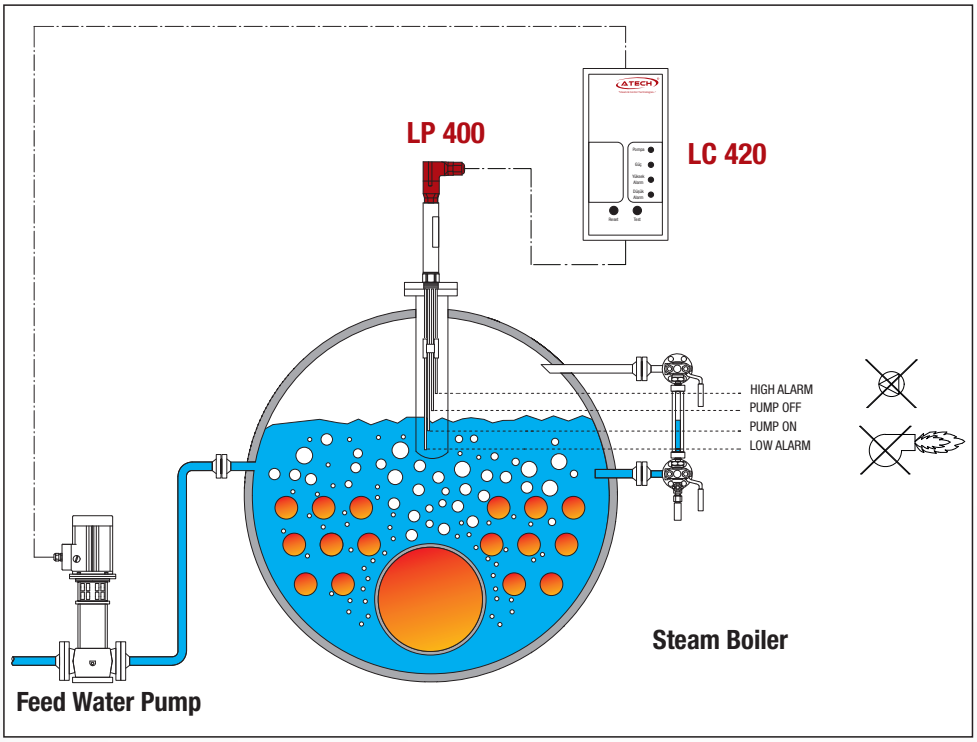
LP 400 Level probe

Type	Length	Connection
LP 405	500 mm	1", BSP - Screwed
LP 408	800 mm	1", BSP - Screwed
LP 410	1.000 mm	1", BSP - Screwed
LP 415	1.500 mm	1", BSP - Screwed

Atech reserves the right to make changes without prior notice.

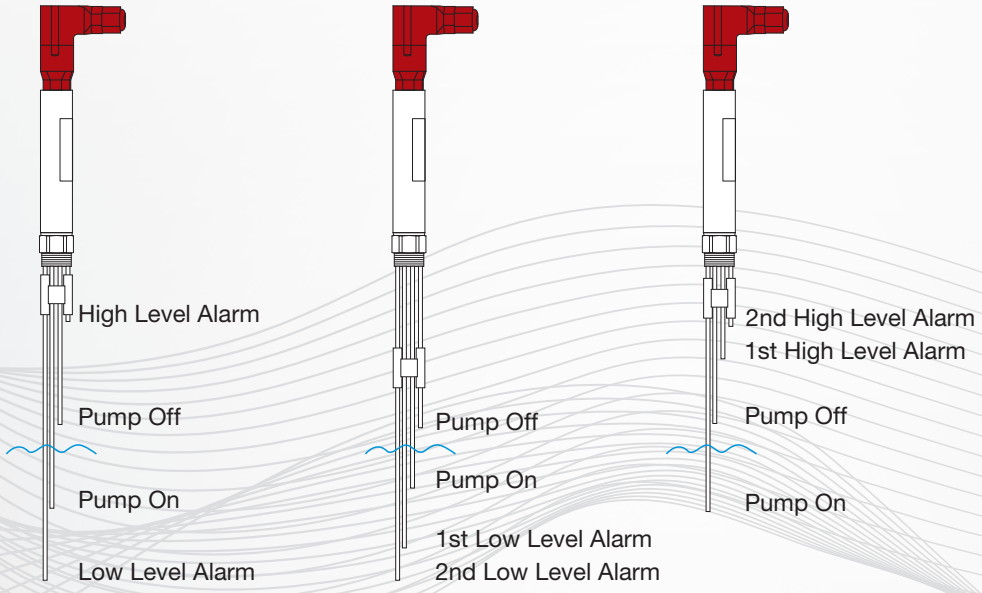
LCS 420 PRO ON-OFF LEVEL CONTROL

Applications



When the boiler water level drops below the set low level alarm point, a low level alarm occurs and the burner safety chain circuit is interrupted.

If the boiler water level rises enough to touch the set high water level alarm point, a high water level alarm occurs, and depending on the boiler control panel setup, the boiler feed water pump or burner supply may be turned off.



LCS 500 SMART MODULATING LEVEL CONTROL

In steam boilers LCS 500 Smart Modulating Level Control System is used where unavoidable fluctuations and sudden changes in the consumption of steam and high steam quality. Particularly to be preferred at high steam production capacity.

LCS 500 Smart Modulating Level Control System consisst of LP 500 Level Probe, LC 540 Smart Level Controller and LCV Level Control Valve.

Level is maintained within the control band defined by two preset limits. Additionally low and high levels are provided for safety-related requirement.

- Modbus RS 485 communications.
- Advanced safety with Alarm Test and Alarm Reset.
- Different level inputs.
- 2-way or 3-way boiler feed water valve options.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Connection	:	1/2", BSP - Screwed
Length	:	500 mm to 1.500 mm.
Control Signals	:	Modulating level control, Low alarm and High alarm
Output	:	Three step valve control, 4-20 mA level output, two relays for low & high alarms
Control Types	:	PID, Modulating or adjustable on-off
Communications	:	Modbus - RS 485
Functions	:	Alarm Test and Alarm Reset

Types

LC 540 Controller

Type	Features
LC 540	Three step valve control+ 4-20 mA level output
LC 540-D	Three step valve control+ 4-20 mA level output 4-20 mA PID control output
LC540-DA	Three step valve control+ 4-20 mA level output 4-20 mA PID control output + 4-20 mA level input

LPA Pre Amplifier

Type	Features
LPA 500	0-6 Vdc level output
LPA 420	4-20 mA level output

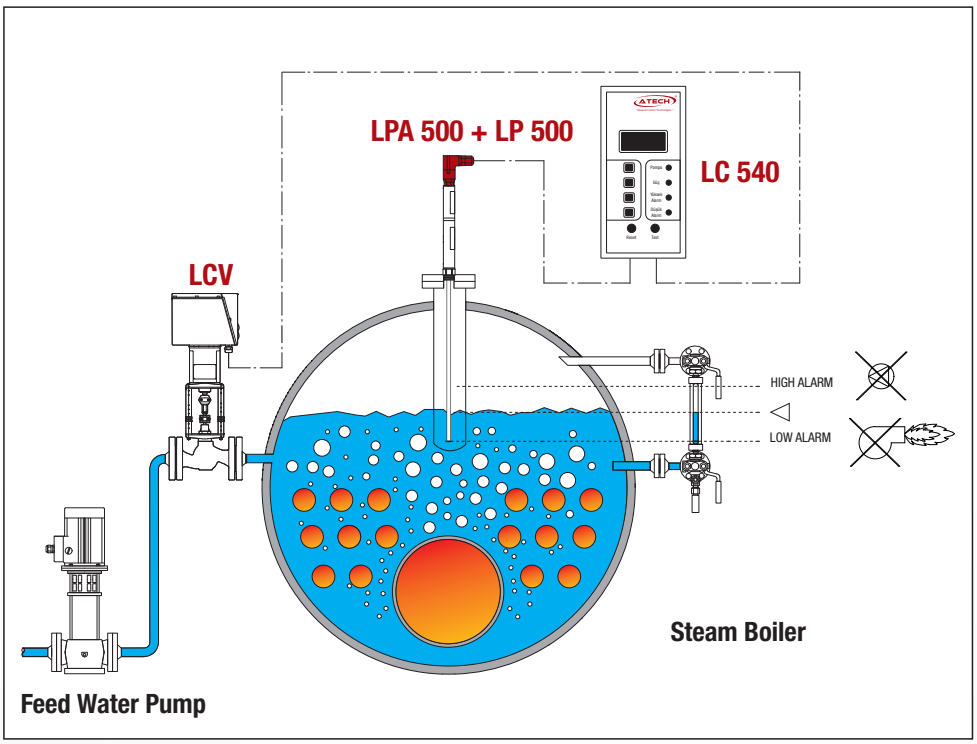
LP 500 Level Probe

Type	Length	Connection
LP 550	500 mm	1/2", BSP - Screwed
LP 560	600 mm	1/2", BSP - Screwed
LP 570	700 mm	1/2", BSP - Screwed
LP 580	800 mm	1/2", BSP - Screwed
LP 590	900 mm	1/2", BSP - Screwed
LP 510	1.000 mm	1/2", BSP - Screwed
LP 511	1.100 mm	1/2", BSP - Screwed
LP 512	1.200 mm	1/2", BSP - Screwed
LP 515	1.500 mm	1/2", BSP - Screwed

Atech reserves the right to make changes without prior notice.

LCS 500 SMART MODULATING LEVEL CONTROL

Applications



When the boiler water level drops below the set low level alarm point, a low level alarm occurs and the burner safety chain circuit is interrupted.

If the boiler water level rises enough to touch the set high water level alarm point, a high water level alarm occurs, and depending on the boiler control panel setup, the boiler feed water pump or burner supply may be turned off.

Level alarms can be checked at specific time intervals with Alarm Test function to test the operation of the burner protection circuit.

Safer operation of the steam boiler can be ensured with the Alarm Test and Alarm Reset functions.

LCV Boiler Feed Water Control Valve

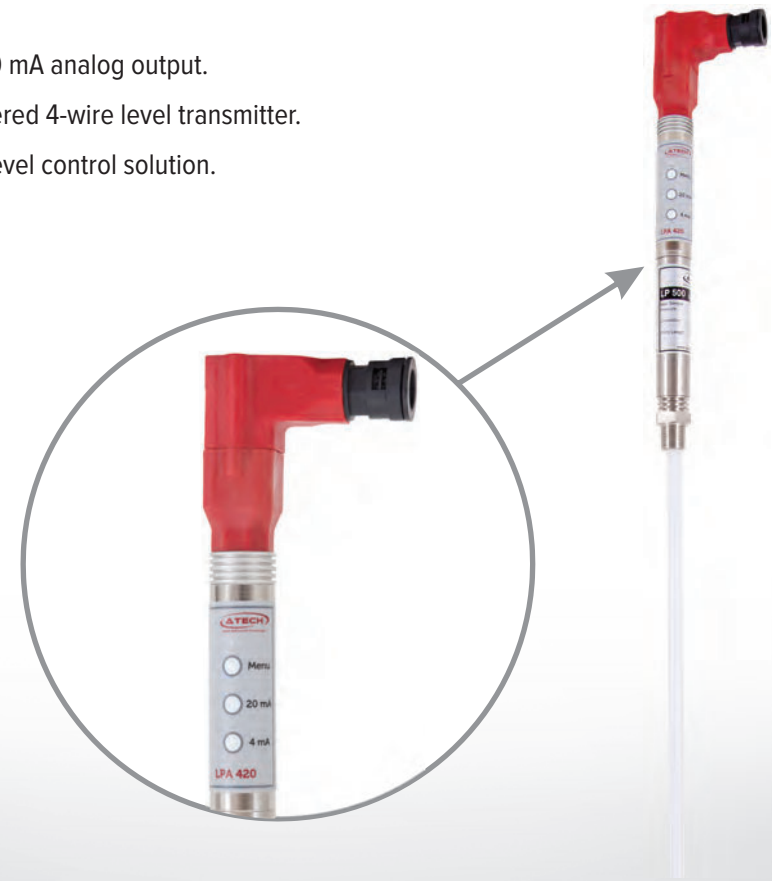
Valve Type	Pressure Rating	Type	Valve Type	Pressure Rating	Type	Connection	Kvs
2 way	PN 16	LCV 5125	3 way	PN 16	LCV 3125	DN 25, Flanged	2, 4, 6.3, 10
		LCV 5132			LCV 3132	DN 32, Flanged	6.3, 10, 16
		LCV 5140			LCV 3140	DN 40, Flanged	10, 16, 25
		LCV 5150			LCV 3150	DN 50, Flanged	16, 25, 40
		LCV 5165			LCV 3165	DN 65, Flanged	25, 40, 60
	PN 25	LCV 5225		PN 25	LCV 3225	DN 25, Flanged	2, 4, 6.3, 10
		LCV 5232			LCV 3232	DN 32, Flanged	6.3, 10, 16
		LCV 5240			LCV 3240	DN 40, Flanged	10, 16, 25
		LCV 5250			LCV 3250	DN 50, Flanged	16, 25, 40
		LCV 5265			LCV 3265	DN 65, Flanged	25, 40, 60
	PN 40	LCV 5425		PN 40	LCV 3425	DN 25, Flanged	2, 4, 6.3, 10
		LCV 5432			LCV 3432	DN 32, Flanged	6.3, 10, 16
		LCV 5440			LCV 3440	DN 40, Flanged	10, 16, 25
		LCV 5450			LCV 3450	DN 50, Flanged	16, 25, 40
		LCV 5465			LCV 3465	DN 65, Flanged	25, 40, 60

LPA 420 SMART MODULATING LEVEL TRANSMITTER (4-20 mA)

The LPA 420 preamplifier is a loop powered level transmitter for use with LP 500 capacitance probe. The level transmitter works according to the capacitance measurement principle and converts the level changes into a level-dependent current signal of 4-20 mA.

The LPA 420 Smart Modulating Level Probe provides a proportional 4-20 mA level output signal, which can be switched to a level controller (such as LC 540 or LC 525), a PLC (Programmable Logic Controller) or a frequency-controlled pump. The level controller (such as LC 540 or LC 525) or PLC can provide an appropriate output to the feedwater control valve to control level of steam boilers.

- Direct 4-20 mA analog output.
- Loop powered 4-wire level transmitter.
- Low cost level control solution.



Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Connection	:	1/2", BSP - Screwed
Length	:	500 mm to 1.500 mm
Output	:	4-20 mA level output
Supply	:	24 V dc

Types

LPA Pre Amplifier

Type	Feature
LPA 420	Pre amplifier - 4-20 mA output

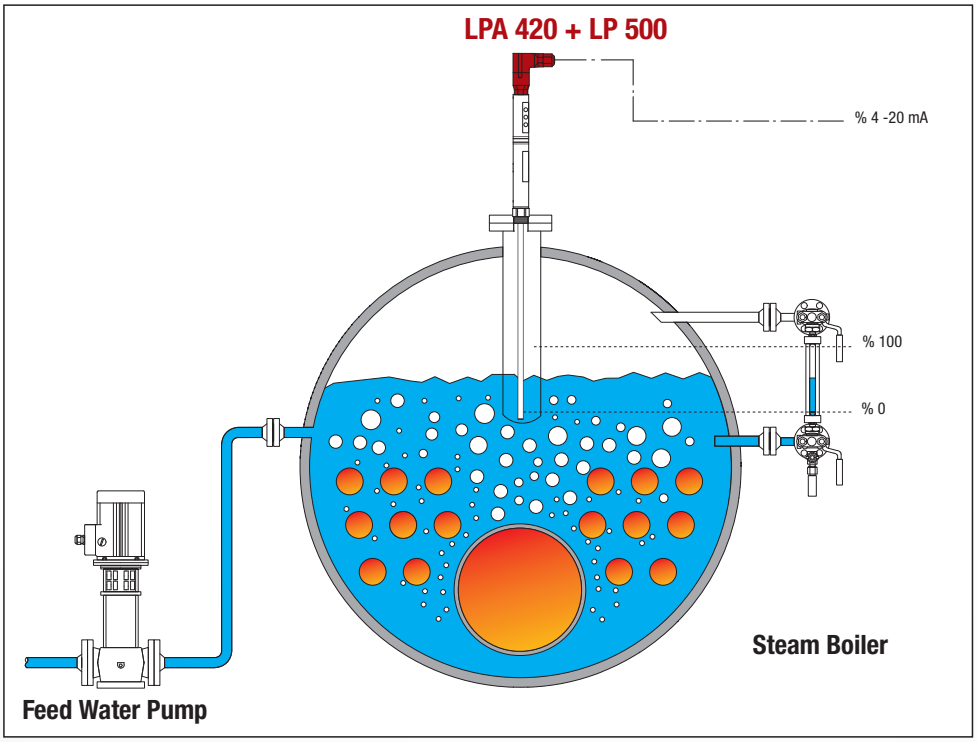
LP 500 Level probe

Type	Length	Connection
LP 550	500 mm	1/2", BSP - Screwed
LP 560	600 mm	1/2", BSP - Screwed
LP 570	700 mm	1/2", BSP - Screwed
LP 580	800 mm	1/2", BSP - Screwed
LP 590	900 mm	1/2", BSP - Screwed
LP 510	1.000 mm	1/2", BSP - Screwed
LP 511	1.100 mm	1/2", BSP - Screwed
LP 512	1.200 mm	1/2", BSP - Screwed
LP 515	1.500 mm	1/2", BSP - Screwed

Atech reserves the right to make changes without prior notice.

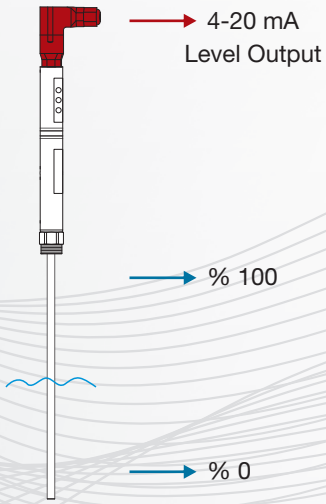
LPA 420 SMART MODULATING LEVEL TRANSMITTER (4-20 mA)

Applications



LPA 420 is a open loop powered 4-wire level transmitter. It is easily commissioned using just three buttons to set and calibrate the LPA 420.

Modulating



"Steam & Control Technologies..."

SMART MODULE BLOWDOWN CONTROL

STEAM BOILERS CONTROL MODULS

SMART MODULE BLOWDOWN CONTROL

BCS 700 SMART BOTTOM BLOWDOWN CONTROL

BCS 910 SMART CONDUCTIVITY CONTROL (FOR LOW CAPACITY)

BCS 920 SMART CONDUCTIVITY CONTROL (FOR COIL BOILERS)

BCS 930 SMART CONDUCTIVITY CONTROL (STANDARD MODEL)

BCS 940 SMART CONDUCTIVITY CONTROL (PROBE OUT OF THE BOILER)

BCS 950 SMART CONDUCTIVITY CONTROL (TEMPERATURE COMPENSATION)

BCS 970 SMART CONDUCTIVITY & BOTTOM BLOWDOWN CONTROL (COMBI MODEL)

CCS 990 CONDENSATE CONTAMINATION DETECTION SYSTEM

BCS 700 SMART BOTTOM BLOWDOWN CONTROL

Time controlled bottom blowdown system for single or multi-boiler installations comprises BC 700 Bottom Blowdown Controller and BCV 700 Pneumatically Actuated Bottom Blowdown Valve.

The bottom blowdown valve enables a fast opening and closing which is necessary for the blowing down. This fast opening causes a suction in the boiler whereby deposits solids are flushed out of the boiler.

- Fully automatic Smart control.
- Modbus RS 485 communications.
- Valve & Alarm Test and Alarm Reset.

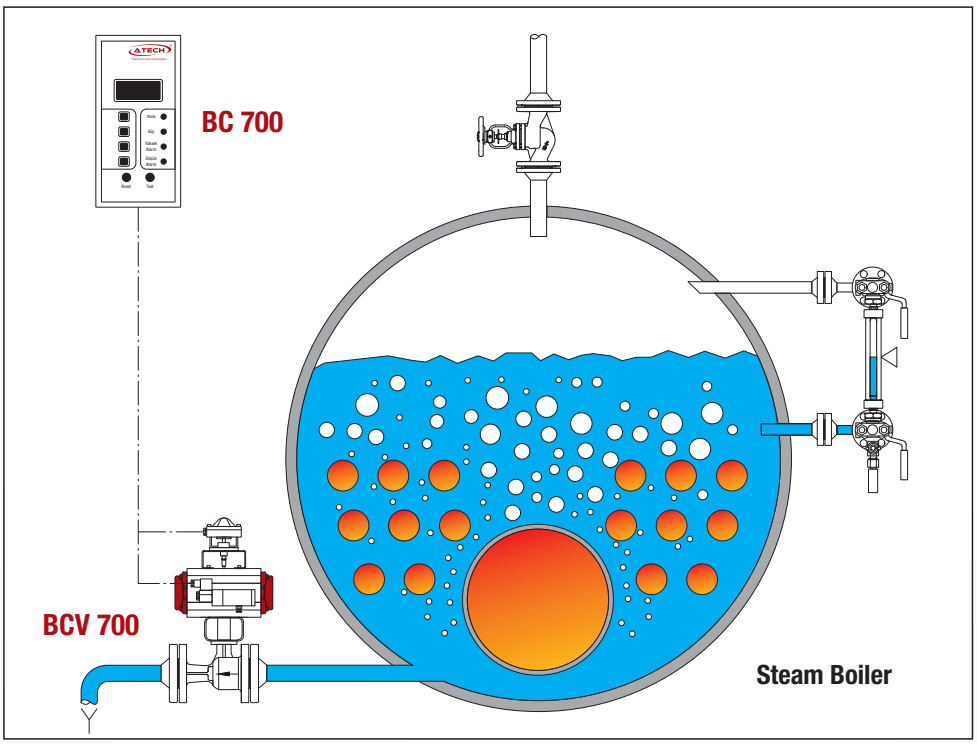
Technical Data

Nominal Pressure	:	PN 25 / PN 40
Max. Operating Temperature	:	220 °C / 238 °C
Max. Operating Pressure	:	18 bar / 32 bar
Valve Connection	:	DN 25 - DN 50, Flanged
Actuator	:	Pneumatic and spring return
Control Signals	:	Valve control relay, alarm relay
Alarms	:	Valve failed to open, valve failed to close
Output	:	One relay for alarm
Communication	:	Modbus - RS 485
Functions	:	Valve test, Alarm test, Alarm reset, Total blowdown time, Total number of blowdown, Communication to other controllers, Delay for other controller blowdown,
Screen	:	Smart technology, LCD screen.

Atech reserves the right to make changes without prior notice.

BCS 700 SMART BOTTOM BLOWDOWN CONTROL

Applications



The alarm relay releases to keep the high level safety, if blowdown valve fails to close fully after a certain period or to open in a certain period.

Types

BC 700 Blowdown Controller

Type	Feature
BC 700	Smart Blowdown Controller

BCV 700 Blowdown Control Valve

Type	Connection	Pressure Rate	Actuator Type
BCV 7225	DN 25, Flanged	PN 25	PA7-075
BCV 7232	DN 32, Flanged		
BCV 7240	DN 40, Flanged		PA7-088
BCV 7250	DN 50, Flanged		
BCV 7425	DN 25, Flanged	PN 40	PA7-075
BCV 7432	DN 32, Flanged		
BCV 7440	DN 40, Flanged		PA7-088
BCV 7450	DN 50, Flanged		

Other Accessories

Type	Feature
LS 700	Limit Switch
YV-3/2	Namur

BCS 910 SMART CONDUCTIVITY CONTROL (FOR LOW CAPACITY)

BCS 910 Smart Conductivity Control System, which can be used in small capacity boiler, consists of BC 900 Blowdown Controller, CP 910 Conductivity Probe and BCV 915 Blowdown Control Valve.

Accurate TDS control saves energy by reducing the blowdown rate to the minimum. Continuous TDS monitoring of the water within steam boilers requires good control of boiler blowdown in order to minimise carry over in the steam.

When TDS is low, valve simply remains closed. No unnecessary losses saves water treatment and chemical costs. Also it reduces water consumption and effluent disposal charges.

- Fully automatic Smart TDS control for small capacity boilers.
- Modbus RS 485 communications.
- Valve & Alarm Test and Alarm Reset.

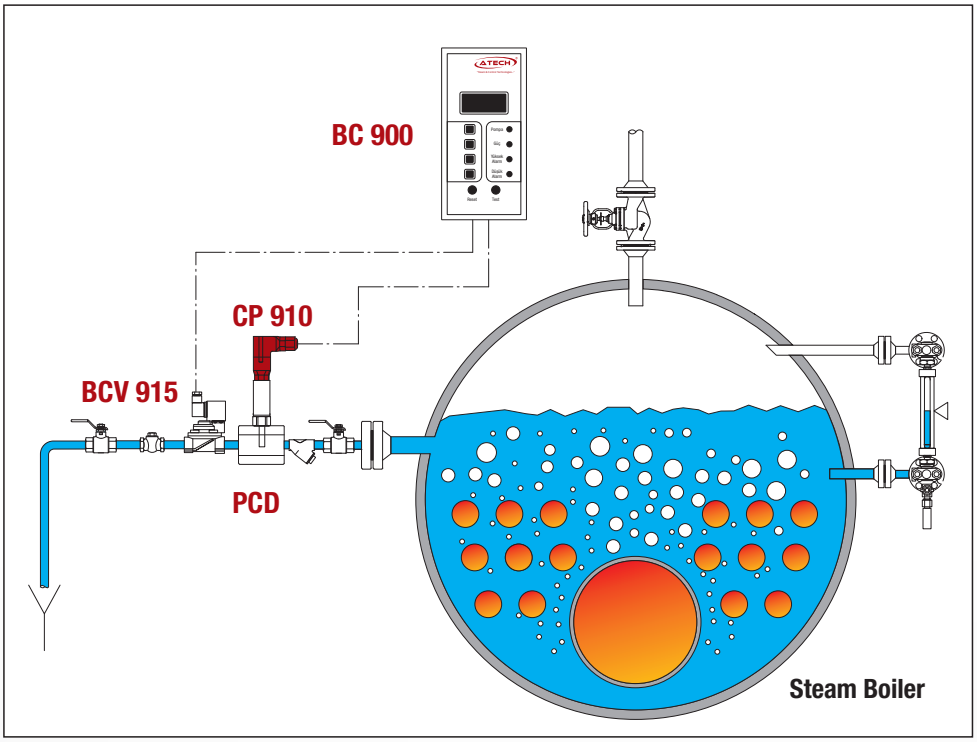
Technical Data

Nominal Pressure	:	PN 16
Max. Operating Temperature	:	200 °C
Max. Operating Pressure	:	14 bar
Probe Connection	:	1/2", BSP - Screwed
Probe Length	:	43,5 mm
Operating Principle	:	Single pole conductivity and temperature compensated
Valve Connection	:	1/2" veya 3/4" - Screwed
Actuator	:	Electric and solenoid.
Control Signals	:	Valve control relay and high TDS/conductivity alarm relay
Output	:	4-20 mA output and one relay for high TDS/conductivity alarm
Communications	:	Modbus - RS 485
Functions	:	Valve Test, Alarm Test and Alarm Reset
Screen	:	Smart technology, LCD screen.

Atech reserves the right to make changes without prior notice.

BCS 910 SMART CONDUCTIVITY CONTROL (FOR LOW CAPACITY)

Applications



Conductivity measurement with automatic temperature compensation provides accurate TDS/conductivity control.

Types

BC 900 Blowdown Controller

Type	Feature
BC 900	Smart Blowdown Controller

CP 900 Conductivity Probe

Type	Length	Connection
CP 910	43.5 mm	1/2", Screwed, PN 40

BCV 900 Blowdown Control Valve

Type	Connection	Actuator Type
BCV 915-15	1/2", Screwed, PN 16	230 Vac
BCV 915-20	3/4", Screwed , PN 16	

PC Probe Sensor Chamber

Type	Connection
PC D15	1/2", Screwed, PN 40
PC D20	3/4", Screwed, PN 40
PC W15	DN 15, Wafer, PN 40
PC W20	DN 20, Wafer, PN 40

BCS 920 SMART CONDUCTIVITY CONTROL (FOR COIL BOILERS)

BCS 920 Smart Conductivity Control System, which can be used in steam generator, consists of BC 900 Blowdown Controller, CP 920 Conductivity Probe and BCV 915 Blowdown Control Valve.

Steam generators produce steam containing about 10-15 % water. This water which contains dissolved solids must be separated. If the conductivity of the feed water exceeds a preset level, this separated water can be blowdown, otherwise can be returned to the feedtank thanks to BCS 920 Smart Conductivity Control System.

When TDS is low, valve simply remains closed. No unnecessary losses, saves water treatment and chemical costs. Also it reduces water consumption and effluent disposal charges.

- Fully automatic Smart TDS control for coil boilers.
- Modbus RS 485 communications.
- Valve & Alarm Test and Alarm Reset.

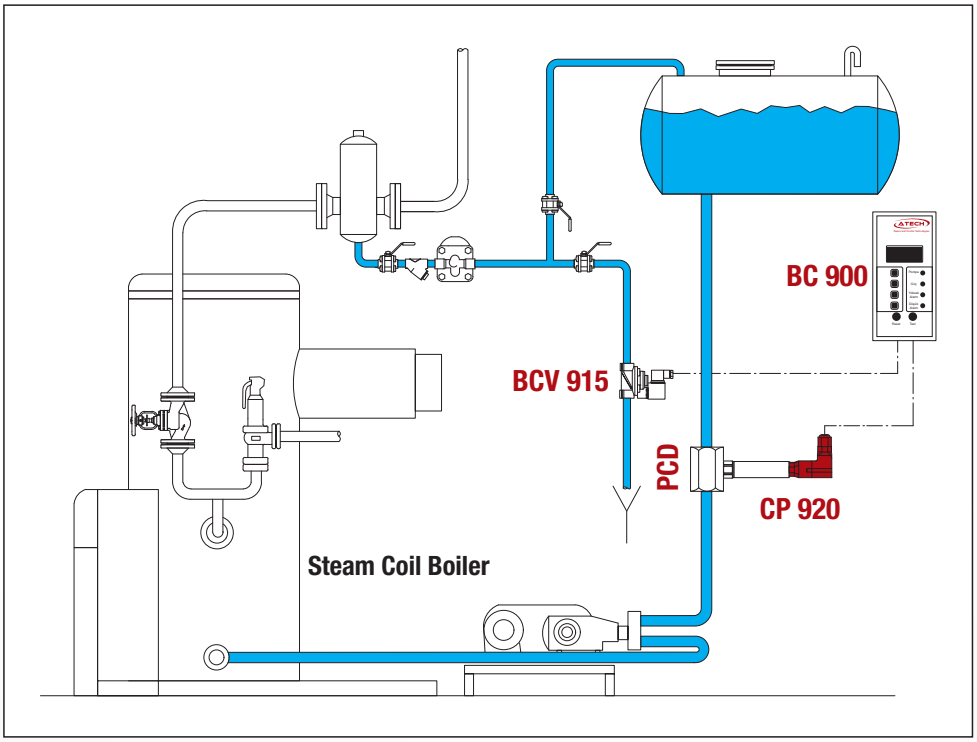
Technical Data

Nominal Pressure	:	PN 16
Max. Operating Temperature	:	200 °C
Max. Operating Pressure	:	14 bar
Probe Connection	:	1/2", BSP - Screwed
Probe Length	:	34,5 mm
Operating Principle	:	Single pole conductivity
Valve Connection	:	1/2" - 3/4", Screwed
Actuator	:	Electric and solenoid.
Control Signals	:	Valve control relay and high TDS/conductivity alarm relay
Output	:	4-20 mA output and one relay for high TDS/conductivity alarm
Communications	:	Modbus - RS 485
Functions	:	Valve Test, Alarm Test and Alarm Reset
Screen	:	Smart technology, LCD screen.

Atech reserves the right to make changes without prior notice.

BCS 920 SMART CONDUCTIVITY CONTROL (FOR COIL BOILERS)

Applications



Conductivity measurement with automatic temperature compensation provides accurate TDS/conductivity control.

Types

BC 900 Controller

Type	Feature
BC 900	Smart Blowdown Controller

CP 900 Conductivity Probe

Type	Length	Connection
CP 920	34.5 mm	1/2", Screwed, PN 40

BCV 900 Blowdown Control Valve

Type	Connection	Actuator Type
BCV 915-15	1/2", Screwed, PN 16	230 Vac
BCV 915-20	3/4", Screwed, PN 16	

PC Probe Sensor Chamber

Type	Connection
PC D32	11/4", Screwed, PN 40

BCS 930 SMART CONDUCTIVITY CONTROL (STANDARD MODEL)

BCS 930 Smart Conductivity Control System consists of BC 900 Blowdown Controller, CP 930 Conductivity Probe and BCV 900 Blowdown Control Valve.

CP 930 Condutivity Probe is is mounted directly into the boiler. BC 900 Controller measures the conductivity of the boiler water continuously. This measured value is compared with the set point in the controller. If it is lower than the set point the blowdown valve remains closed. If the measured value is higher than the set point the controller keeps open the blow down valve until the measured value drops below the set point.

- Conductivity probe is mounted into the boiler,
- Fully automatic Smart TDS control,
- Modbus RS 485 communications,
- Valve & Alarm Test and Alarm Reset,

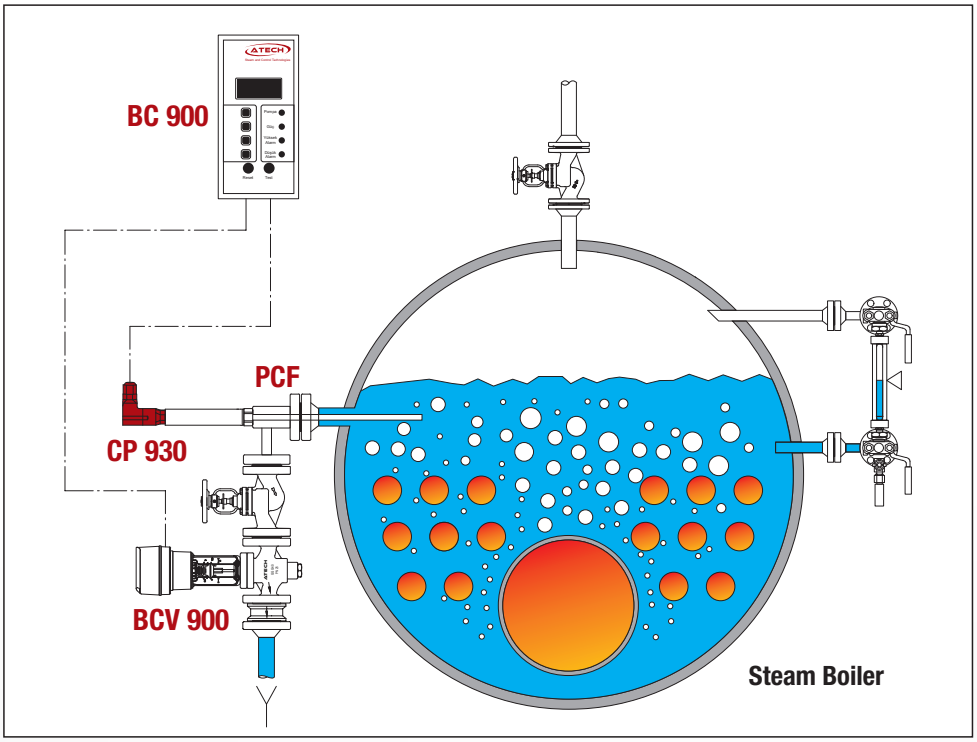
Technical Data

Nominal Pressure	:	PN 25 / PN 40
Max. Operating Temperature	:	220 °C / 238 °C
Max. Operating Pressure	:	18 bar / 32 bar
Probe Connection	:	1/2", BSP - Screwed
Prope Length	:	400 mm - 1.000 mm
Operating Principle	:	Single pole conductivity
Valve Connection	:	DN 20, DN 25 or DN 40, Flanged
Actuator	:	Electric and spring return
Control Signals	:	Valve control relay and high TDS/conductivity alarm relay
Output	:	4-20 mA output and one relay for high TDS/conductivity alarm
Communications	:	Modbus - RS 485
Functions	:	Valve Test, Alarm Test and Alarm Reset
Screen	:	Smart technology, LCD screen.

Atech reserves the right to make changes without prior notice.

BCS 930 SMART CONDUCTIVITY CONTROL (STANDARD MODEL)

Applications



When TDS is low, valve simply remains closed. No unnecessary losses, saves water treatment and chemical costs. Also it reduces water consumption and effluent disposal charges.

Types

BC 900 Controller

Type	Feature
BC 900	Smart Blowdown Controller

CP 900 Conductivity Probe

Type	Length	Connection
CP 934	400 mm	1/2", Screwed, PN 40
CP 930	500 mm	1/2", Screwed, PN 40
CP 936	600 mm	1/2", Screwed, PN 40
CP 938	800 mm	1/2", Screwed, PN 40
CP 931	1.000 mm	1/2", Screwed, PN 40

BCV 900 Blowdown Control Valve

Type	Connection	Actuator Type
BCV 925-20	DN 20, Flanged, PN 25	BA900-H
BCV 925-25	DN 25, Flanged, PN 25	BA900-H
BCV 925-40	DN 40, Flanged, PN 25	BA900-S
BCV 940-20	DN 20, Flanged, PN 40	BA900-H
BCV 940-25	DN 25, Flanged, PN 40	BA900-H
BCV 940-40	DN 40, Flanged, PN 40	BA900-S

PC Probe Connection TE

Type	Connection
PC F20x20	DN 20xDN 20-1/2", Flanged
PC F25x20	DN 25xDN 20-1/2", Flanged
PC F25x25	DN 25xDN 25-1/2", Flanged
PC F40x40	DN 40xDN 40-1/2", Flanged
PC F50x20	DN 50xDN 20-1", Flanged
PC F50x25	DN 50xDN 25-1", Flanged
PC F50x40	DN 50xDN 40-1", Flanged

BCS 940 SMART CONDUCTIVITY CONTROL (PROBE OUT OF THE BOILER)

BCS 940 Smart Conductivity Control System consists of BC 900 Blowdown Controller, CP 910 Conductivity Probe and BCV 900 Blowdown Control Valve.

CP 910 Condutivity Probe is for mounting in a sensor chamber. BCS 940 Smart Conductivity System works by periodically opening the blowdown valve in order to purge to the boiler water past the sensor. The controller measures the conductivity of the boiler water. This measured value is compared with the set point in the controller. If it is lower than the set point the blowdown valve closes at the end of the purge time and remains closed. If the measured value is higher than the set point the controller continues to blow down until the measured value drops below the set point.

- Conductivity probe is mounted outside the boiler.
- Fully automatic Smart TDS control.
- Modbus RS 485 communications.
- Valve & Alarm Test and Alarm Reset.

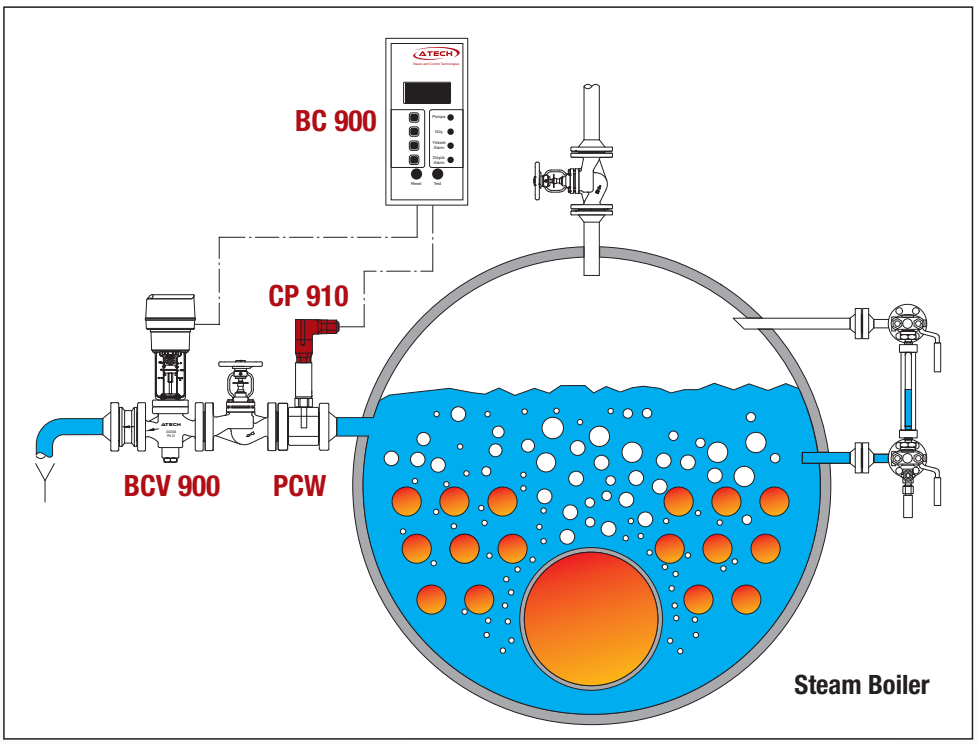
Technical Data

Nominal Pressure	:	PN 25 / PN 40
Max. Operating Temperature	:	220 °C / 238 °C
Max. Operating Pressure	:	18 bar / 32 bar
Probe Connection	:	1/2", BSP - Screwed
Prope Length	:	43,5 mm
Operating Principle	:	Single pole conductivity and temperature compensated
Valve Connection	:	DN 20, DN 25 veya DN 40, Flanged
Actuator	:	Electric and spring returned.
Control Signals	:	Valve control relay and high TDS/conductivity alarm relay
Output	:	4-20 mA output and one relay for high TDS/conductivity alarm
Communications	:	Modbus - RS 485
Functions	:	Valve Test, Alarm Test and Alarm Reset
Screen	:	Smart technology, LCD screen.

Atech reserves the right to make changes without prior notice.

BCS 940 SMART CONDUCTIVITY CONTROL (PROBE OUT OF THE BOILER)

Applications



When TDS/conductivity is low, valve simply remains closed. No unnecessary losses, saves water treatment and chemical costs. Also it reduces water consumption and effluent disposal charges.

Conductivity measurement with automatic temperature compensation provides accurate TDS/conductivity control.

Types

BC 900 Controller

Type	Feature
BC 900	Smart Blowdown Controller

CP 900 Conductivity Probe

Type	Length	Connection
CP 910	43.5 mm	1/2", Screwed, PN 40

BCV 900 Blowdown Control Valve

Type	Connection	Actuator Type
BCV 925-20	DN 20, Flanged, PN 25	BA900-H
BCV 925-25	DN 25, Flanged, PN 25	BA900-H
BCV 925-40	DN 40, Flanged, PN 25	BA900-S
BCV 940-20	DN 20, Flanged, PN 40	BA900-H
BCV 940-25	DN 25, Flanged, PN 40	BA900-H
BCV 940-40	DN 40, Flanged, PN 40	BA900-S

PC Probe Sensor Chamber

Type	Connection
PC W20	DN 20-1/2", Wafer, PN 40
PC W25	DN 25-1/2", Wafer, PN 40
PC W40	DN 40-1/2", Wafer, PN 40

BCS 950 SMART CONDUCTIVITY CONTROL (TEMPERATURE COMPENSATION)

BCS 950 Smart Conductivity Control System consists of BC 900 Blowdown Controller, CP 950 Conductivity Probe and BCV 900 Blowdown Control Valve.

Accurate TDS control saves energy by reducing the blowdown rate to the minimum. Continuous TDS monitoring of the water within steam boilers requires good control of boiler blowdown in order to minimise carry over in the steam.

When TDS is low, valve simply remains closed. No unnecessary losses, saves water treatment and chemical costs. Also it reduces water consumption and effluent disposal charges.

- Fully automatic Smart TDS control with conductivity measurement with temperature compensation.
- Modbus RS 485 communications.
- Valve & Alarm Test and Alarm Reset.

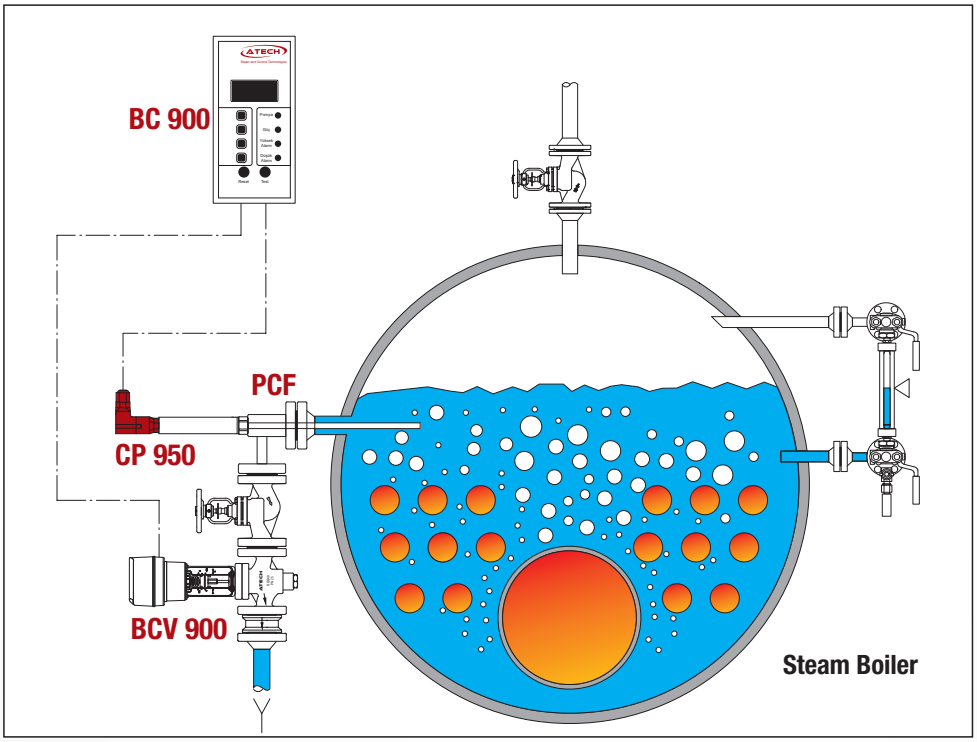
Technical Data

Nominal Pressure	:	PN 25 / PN 40
Max. Operating Temperature	:	220 °C / 238 °C
Max. Operating Pressure	:	18 bar / 32 bar
Probe Connection	:	1/2", BSP - Screwed
Prope Length	:	400 mm - 1.000 mm
Operating Principle	:	2 poles conductivity, temperature compensation
Valve Connection	:	DN 20, DN 25 or DN 40, Flanged
Actuator	:	Electric and spring return
Control Signals	:	Valve control relay and high TDS/conductivity alarm relay
Output	:	4-20 mA output and one relay for high TDS/conductivity alarm
Communications	:	Modbus - RS 485
Functions	:	Valve Test, Alarm Test and Alarm Reset
Screen	:	Smart technology, LCD screen.

Atech reserves the right to make changes without prior notice.

BCS 950 SMART CONDUCTIVITY CONTROL (TEMPERATURE COMPENSATION)

Applications



Conductivity measurement with automatic temperature compensation with CP 950 provides accurate TDS control.

Types

BC 900 Controller

Type	Feature
BC 900	Smart Blowdown Controller

CP 900 Conductivity Probe

Type	Length	Connection
CP 954	400 mm	1/2", Screwed, PN 40
CP 950	500 mm	1/2", Screwed, PN 40
CP 956	600 mm	1/2", Screwed, PN 40
CP 958	800 mm	1/2", Screwed, PN 40
CP 951	1.000 mm	1/2", Screwed, PN 40

BCV 900 Blowdown Control Valve

Type	Connection	Actuator Type
BCV 925-20	DN 20, Flanged, PN 25	BA900-H
BCV 925-25	DN 25, Flanged, PN 25	BA900-H
BCV 925-40	DN 40, Flanged, PN 25	BA900-S
BCV 940-20	DN 20, Flanged, PN 40	BA900-H
BCV 940-25	DN 25, Flanged, PN 40	BA900-H
BCV 940-40	DN 40, Flanged, PN 40	BA900-S

PC Probe Sensor Chamber

Type	Connection
PC F20x20	DN 20xDN 20-1/2", Flanged
PC F25x20	DN 25xDN 20-1/2", Flanged
PC F25x25	DN 25xDN 25-1/2", Flanged
PC F40x40	DN 40xDN 40-1/2", Flanged
PC F50x20	DN 50xDN 20-1", Flanged
PC F50x25	DN 50xDN 25-1", Flanged
PC F50x40	DN 50xDN 40-1", Flanged

BCS 970 SMART CONDUCTIVITY & BOTTOM BLOWDOWN CONTROL (COMBI MODEL)

BCS 970 Combi Conductivity & Bottom Blowdown Control System consist of BC 970 Combi Blowdown Controller, CP 930 Conductivity Probe, BCV 900 Blowdown Control Valve and BCV 700 Bottom Blowdown Control Valve.

This system offers a combination which controls two systems in one at the same time.

When TDS/conductivity is low, valve simply remains closed. No unnecessary losses, saves water treatment and chemical costs. Also it unnecessary reduces water consumption and effluent disposal charges.

It provides a complete solution by simultaneously controlling the bottom blowdown valve and TDS control valve.

- Fully automatic Combination of TDS and Botton Blowdown Control.
- Modbus RS 485 communications.
- Valve & Alarm Test and Alarm Reset.

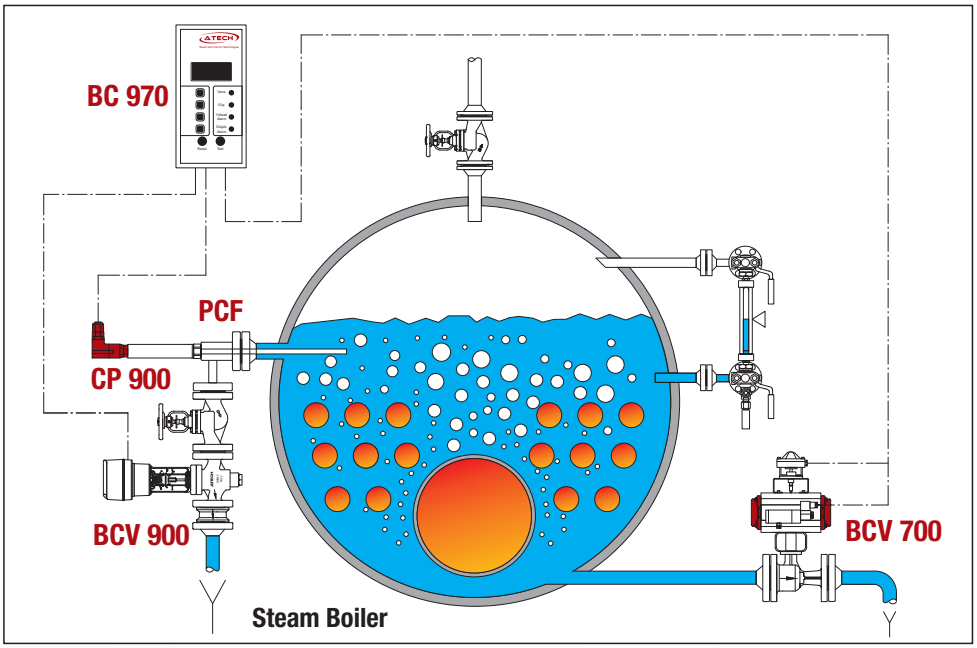
Technical Data

Nominal Pressure	:	PN 25 / PN 40
Max. Operating Temperature	:	220 °C / 238 °C
Max. Operating Pressure	:	18 bar / 32 bar
Probe Connection	:	1/2", BSP - Screwed
Probe Length	:	400 mm - 1.000 mm
Operating Principle	:	Single pole conductivity (CP 930), Single pole conductivity and temperature compensated (CP 910, CP 920, CP 950)
Blowdown Valve Connection	:	DN 20, DN 25 or DN 40, Flanged
Blowdown Valve Actuator	:	Electric and spring return.
Bottom Blowdown Valve Connection	:	DN 25 - DN 50, Flanged
Bottom Blowdown Actuator	:	Pneumatic and spring return
Control Signals	:	Valve control relay and high TDS/conductivity alarm relay, bottom blowdown alarm relay.
Output	:	4-20 mA output and one relay for high TDS/conductivity alarm
Communications	:	Modbus - RS 485
Functions	:	Valve Test, Alarm Test and Alarm Reset
Screen	:	Smart technology, LCD screen.

Atech reserves the right to make changes without prior notice.

BCS 970 SMART CONDUCTIVITY & BOTTOM BLOWDOWN CONTROL (COMBI MODEL)

Applications



In the BCS 970 Smart Combi Conductivity and Bottom Blowdown System, in addition to the standard conductivity sensor CP 930, the CP 950 conductivity sensor with built-in temperature sensor can also be used. Temperature compensation can be made in conductivity measurement with the CP 950 sensor.

Types

BC 970 Controller

Type	Feature
BC 970	Combi Conductivity and Bottom Blowdown Controller

CP 900 Conductivity Probe

Type	Type	Length	Connection
CP 934	CP 954	400 mm	1/2", Screwed, PN 40
CP 930	CP 950	500 mm	1/2", Screwed, PN 40
CP 936	CP 956	600 mm	1/2", Screwed, PN 40
CP 938	CP 958	800 mm	1/2", Screwed, PN 40
CP 931	CP 951	1.000 mm	1/2", Screwed, PN 40

BCV 900 Conductivity Blowdown Control Valve

Type	Connection	Actuator Type
BCV 925-20	DN 20, Flanged, PN 25	BA900-H
BCV 925-25	DN 25, Flanged, PN 25	BA900-H
BCV 925-40	DN 40, Flanged, PN 25	BA900-S
BCV 940-20	DN 20, Flanged, PN 40	BA900-H
BCV 940-25	DN 25, Flanged, PN 40	BA900-H
BCV 940-40	DN 40, Flanged, PN 40	BA900-S

PC F Probe Connection TE

Type	Connection
PC F20x20	DN 20xDN 20-1/2", Flanged
PC F25x20	DN 25xDN 20-1/2", Flanged
PC F25x25	DN 25xDN 25-1/2", Flanged
PC F40x40	DN 40xDN 40-1/2", Flanged
PC F50x20	DN 50xDN 20-1", Flanged
PC F50x25	DN 50xDN 25-1", Flanged
PC F50x40	DN 50xDN 40-1", Flanged

BCV 700 Bottom Blowdown Control Valve

Type	Connection	Pressure	Actuator Type
BCV 7225	DN 25, Flanged	PN 25	PA7-075
BCV 7232	DN 32, Flanged		
BCV 7240	DN 40, Flanged		PA7-088
BCV 7250	DN 50, Flanged		
BCV 7425	DN 25, Flanged	PN 40	PA7-075
BCV 7432	DN 32, Flanged		
BCV 7440	DN 40, Flanged		PA7-088
BCV 7450	DN 50, Flanged		

Other Accessories

Type	Feature
LS 700	Limit Switch
YV-3/2	Namur

CCS 990 CONDENSATE CONTAMINATION DETECTION SYSTEMS

CCS 990 Condensate Contamination Detection System consists of BC 900 Blowdown Controller, CP 920 Conductivity Sensor and 2-way or 3-way drain valve.

Smart Blowdown Controller BC 900 measures the conductivity of condensate with the CP 920 conductivity sensor. If the measured value exceeds the conductivity set value; The controller sends a signal to the 3-way or 2-way drain valve, enabling it to open. It sends condensate water with high conductivity value to the drainage. If the conductivity value is below the desired value, the returned condensate is sent to the condensate tank.

In case the condensate is dirty, it can be sent to the drain and an alarm can be provided by receiving an alarm output.

- Smart control for condensate contamination detection
- Modbus RS 485 communications.
- Valve & Alarm Test and Alarm Reset.

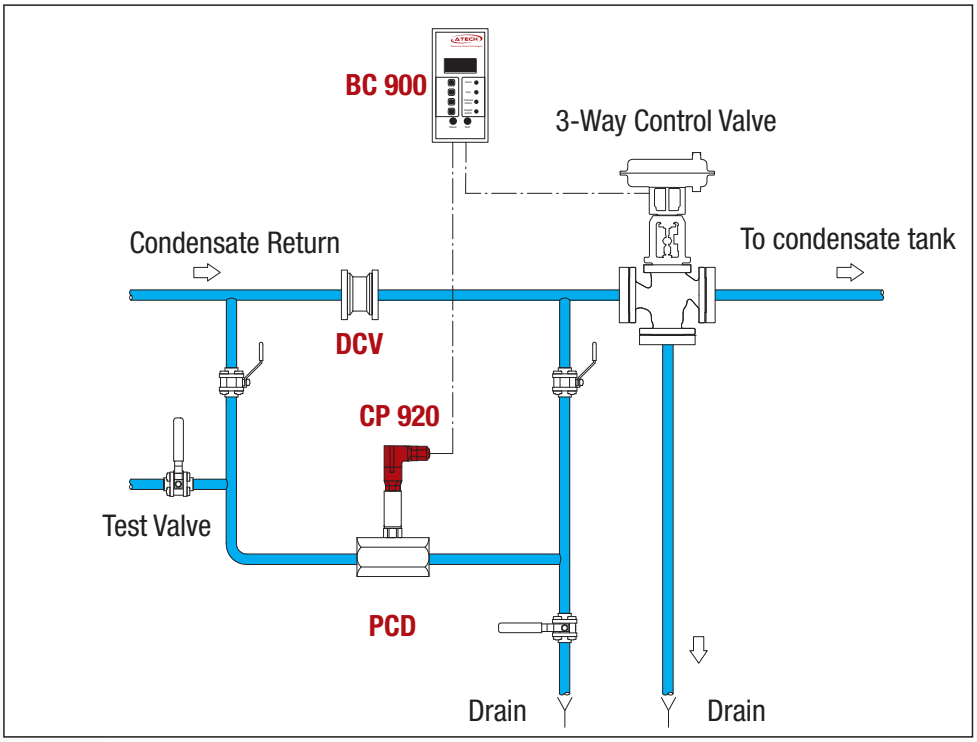
Technical Data

Nominal Pressure	:	PN 16
Max. Operating Temperature	:	200 °C
Max. Operating Pressure	:	14 bar
Probe Connection	:	1/2", BSP - Screwed
Prope Length	:	43,5 mm
Operating Principle	:	Single pole conductivity and temperature compensated
Control Signals	:	Valve control relay and high TDS/conductivity alarm relay
Output	:	4-20 mA output and one relay for high TDS/conductivity alarm
Communications	:	Modbus - RS 485
Functions	:	Valve Test, Alarm Test and Alarm Reset
Screen	:	Smart technology, LCD screen.

Atech reserves the right to make changes without prior notice.

CCS 990 CONDENSATE CONTAMINATION DETECTION SYSTEMS

Applications



It is very important to return condensate with high calorific value and monetary value to the condensate tank and boiler room.

In addition to recycling the condensate, the condensate must be clean enough to be used in the boiler again. Whether the returned condensate is clean or not should be checked by the Condensate Detection System.

The steam boiler is protected by the Condensate Detection System. In fact, direct use of steam on the products prevents any damage to the quality of the products.

Types

BC 900 Controller

Type	Feature
BC 900	Smart Blowdown Controller

CP 900 Conductivity Probe

Type	Length	Connection
CP 920	34.5 mm	1/2", Screwed, PN 40

PC Probe Sensor Chamber

Type	Connection
PC D32	11/4", Screwed, PN 40

SC 9 SAMPLE COOLER

Sample Cooler SC 9 provides a safe method of water samples from high temperature or pressure applications, specially for steam boiler applications. It also used for sampling in water, steam and condensate lines. Safe and accurate conductivity measurement of the sampling of boiler water can be done easily with sample cooler SC 9.

SC 9 sample coolers have been specifically designed to meet all customer requirements including for high pressure applications.

- Simple installation with mounting bracket,
- Removable design facilitates to clean,
- Compact design ensures max. thermal effeciency,

Technical Data

Coil / Sample Side

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar g
Connection	:	1/2", BSP - Screwed
Material	:	AISI 304 stainless steel (standard), AISI 316 stainless steel (optional).

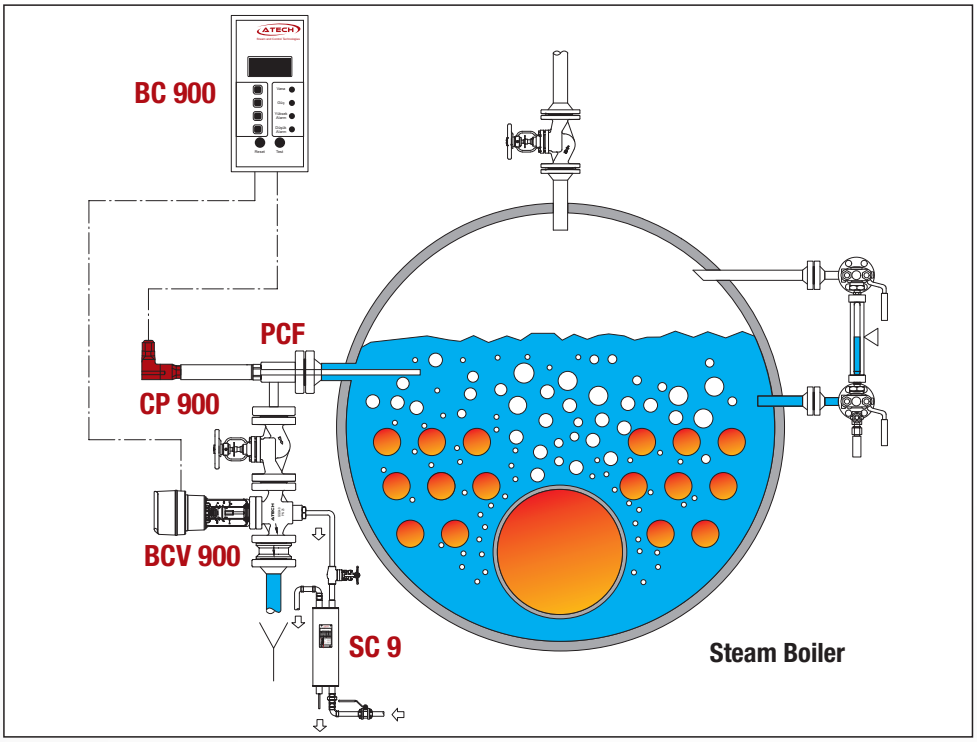
Shell / Cooling Side

Nominal Pressure	:	PN 16
Max. Operating Temperature	:	100 °C
Max. Operating Pressure	:	16 bar g
Connection	:	1/2", BSP - Screwed
Material	:	AISI 304 stainless steel (standard), AISI 316 stainless steel (optional).

Atech reserves the right to make changes without prior notice.

SC 9 SAMPLE COOLER

Applications



SC 9R Removable design facilitates to clean and coils can be cleaned in-place.

SC 9HC series High Capacity sample cooler is designed for situations where higher flow rate or lower pressure loss is required.

The SC 9H series Hygienic sample cooler is specially designed for quick and safe sampling from clean/pure steam and other hygiene systems.

Sample Cooler SC 9 can be supplied with sampling valve and cooling water inlet valve.

Types

SC 9 Sample Cooler

Type	Feature
SC 9	Standard
SC 9R	Removable
SC 9HC	High Capacity
SC 9H	Hygienic

IV Sample Inlet Valve

Type	Connection	Feature
IV 915	1/2", Screwed, PN 40	AISI 304 Stainless Steel

PDKV Cooling Inlet Ball Valve

Type	Connection	Feature
PDKV2	1/2", Screwed, PN 63	AISI 304 Stainless Steel

"Steam & Control Technologies..."

CONTECH MODULE LEVEL CONTROL

STEAM BOILERS CONTROL MODULS

CONTECH MODULE LEVEL CONTROL / LEVEL ALARM

LAS 210 CONTECH LEVEL ALARM (LOW&HIGH)

LAL 310 CONTECH SELF MONITORING LOW LEVEL ALARM

LAH 310 CONTECH SELF MONITORING HIGH LEVEL ALARM

LCS 410 CONTECH ON-OFF LEVEL CONTROL

LCS 515 CONTECH MODULATING LEVEL CONTROL

LCS 525 CONTECH MODULATING LEVEL CONTROL

LAS 210 CONTECH LEVEL ALARM

The LAS 210 Contech Level Alarm System consists of LP 200 Level Probe and LC 210 Contech Level Controller to provide level alarm for steam boiler, deaerator, feedwater tank and process vessels.

With LAS 210 Contech Level Alarm System, low and high level alarm signals can be provided.
LC 210 Level Alarm Controller is DIN Rail type mounting.

- It consists of LP 200 Level Sensor and LC 210 Contech Level Alarm Controller.
- Provides advanced security with Alarm Test functions.
- Enables te boiler to be stopped safely in case of level alarms.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Probe Connection	:	1", BSP - Screwed
Probe Length	:	500, 800, 1.000 and 1.500 mm
Control Signals	:	Low level alarm and High level alarm
Output	:	Two relay for low and high level alarm
Communication	:	Modbus - RS 485
Functions	:	Alarm Test

Types

LC 210 Controller

Type	Feature
LC 210	Level Alarm

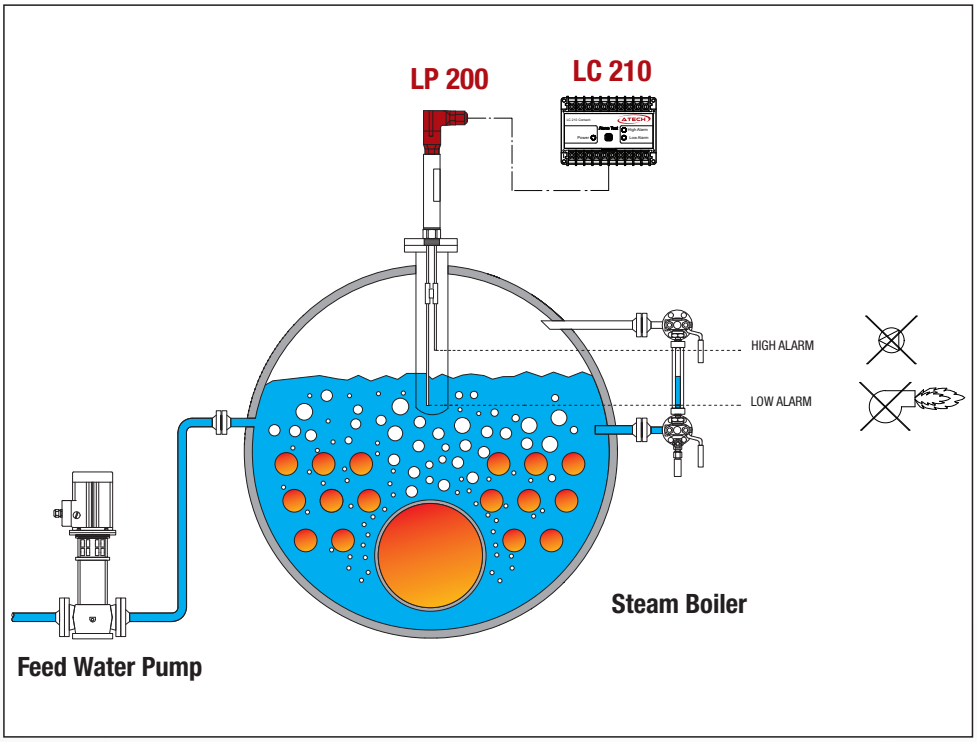
LP 200 Level Probe

Type	Length	Connection
LP 205	500 mm	1", BSP - Screwed
LP 208	800 mm	1", BSP - Screwed
LP 210	1.000 mm	1", BSP - Screwed
LP 215	1.500 mm	1", BSP - Screwed

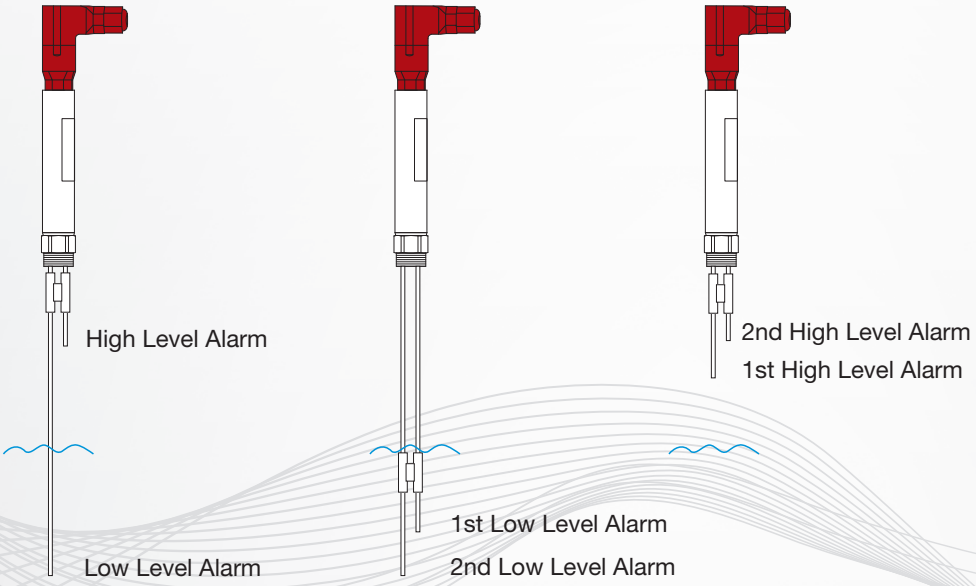
Atech reserves the right to make changes without prior notice.

LAS 210 CONTECH LEVEL ALARM

Applications



Level alarms can be checked at specific time intervals with Alarm Test function to test the operation of the burner protection circuit.



LAL 310 CONTECH SELF MONITORING LOW LEVEL ALARM

Self Monitoring LAL 310 Contech Level Alarm System consists of LPL 300 Low Level Probe and LC 310 Contech Level Alarm Controller to provide self monitoring low level alarm for steam boiler in accordance with TRD 604, sheet 1 and sheet 2 (24h/72h operation) as well as EN 12952 and EN 12953.

LC 310 Self Monitoring Level Alarm Controllers / Limiters are designed, developed, manufactured and certified to SIL 2 and SIL 3, on the basis of the applicable EN standards as per IEC 61508 "Functional safety".

- It consist of LPL 300 Low Level Sensor and LC 310 Contech Level Alarm Controller.
- Self checking low level alarm with periodic control.
- It meets EN 12952/EN 12953 and TRD 604 standards in unattended steam boiler operation.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Probe Connection	:	1/2", BSP - Screwed
Probe Length	:	500, 1.000 and 1.500 mm
Control Signals	:	Low level alarm (Self monitoring)
Output	:	Two relay for low level alarm
Communication	:	Modbus - RS 485
Functions	:	Alarm Test

Types

LC 310 Controller

Type	Feature
LC 310	Self Monitoring & Alarm Test

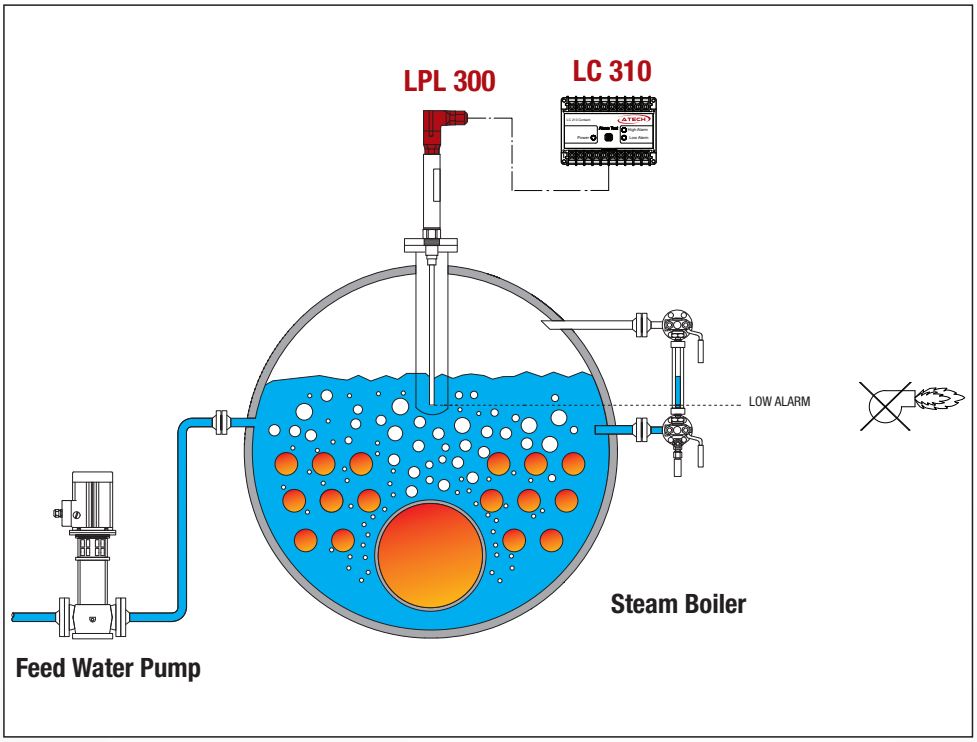
LPL 300 Level Probe

Type	Length	Connection
LPL 305	500 mm	1/2", BSP - Screwed
LPL 310	1.000 mm	1/2", BSP - Screwed
LPL 315	1.500 mm	1/2", BSP - Screwed

Atech reserves the right to make changes without prior notice.

LAL 310 CONTECH SELF MONITORING LOW LEVEL ALARM

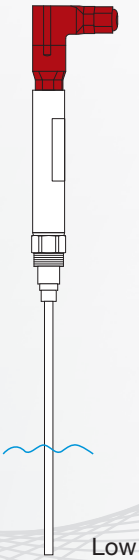
Applications



SIL 2 and SIL 3 approved LC 310 Self Monitoring Level Alarm Controllers / Limiters provides increases the safety level of the boiler system.

If all conditions for safety and correct boiler operation are met, the safety chain for steam boiler is enabled, the burner can switch on. If the water level drops below the LPL 300 Low Level Alarm probe tip, low level alarm can be activated and the burner may be shut down.

Level alarms can be checked at specific time intervals with Alarm Test function to test the operation of the burner protection circuit.



Low Level Alarm

LAH 310 CONTECH SELF MONITORING HIGH LEVEL ALARM

Self Monitoring LAH 300 Contech High Level Alarm System consists of LPH 310 High Level Probe and LC 310 Contech Level Alarm Controller to provide self monitoring high level alarm for steam boiler in accordance with TRD 604, sheet 1 and sheet 2 (24h/72h operation) as well as EN 12952 and EN 12953.

LC 310 Self Monitoring Level Alarm Controllers / Limiters are designed, developed, manufactured and certified to SIL 2 and SIL 3, on the basis of the applicable EN standards as per IEC 61508 "Functional safety".

- It consist of LPH 300 High Level Sensor and LC 310 Contech Level Alarm Controller.
- Self checking high level alarm with periodic control.
- It meets EN 12952/EN 12953 and TRD 604 standards in unattended steam boiler operation.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Probe Connection	:	1/2", BSP - Screwed
Probe Length	:	500, 1.000 and 1.500 mm
Control Signals	:	High level alarm (Self monitoring)
Output	:	Two relay for high level alarm
Communication	:	Modbus - RS 485
Functions	:	Alarm Test

Types

LC 310 Controller

Type	Feature
LC 310	Self Monitoring & Alarm Test

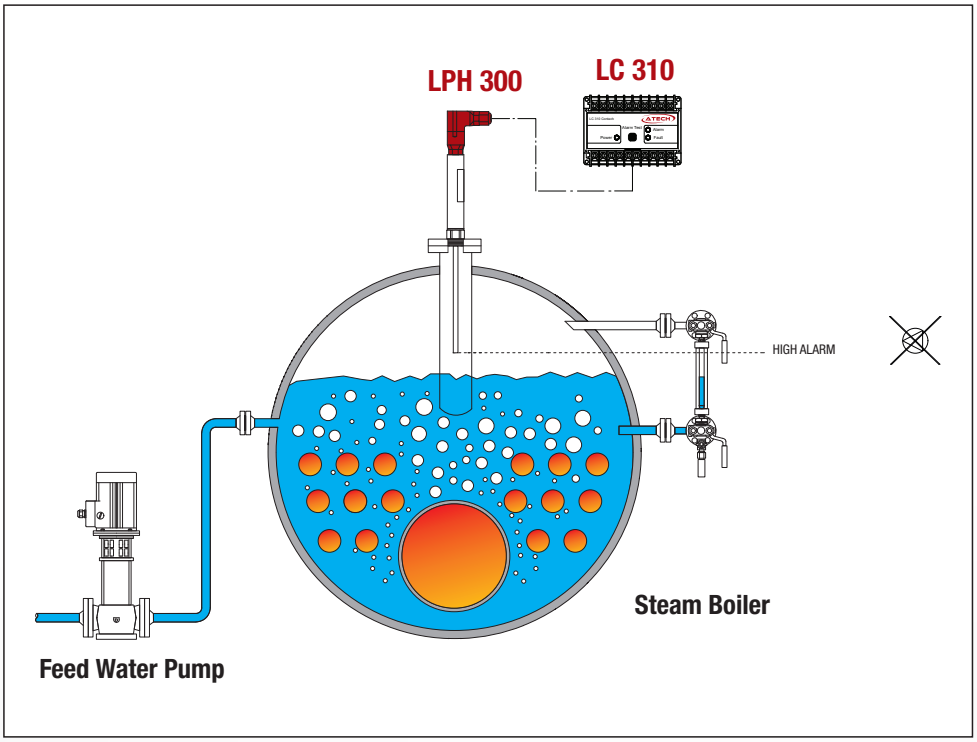
LPH 300 Level probe

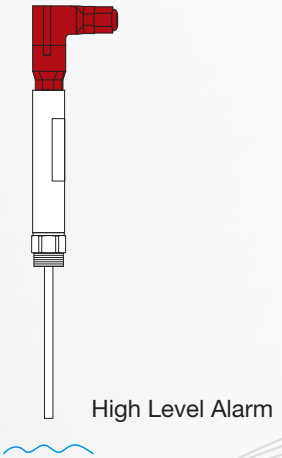
Teype	Length	Connection
LPH 305	500 mm	1/2", BSP - Screwed
LPH 310	1.000 mm	1/2", BSP - Screwed
LPH 315	1.500 mm	1/2", BSP - Screwed

Atech reserves the right to make changes without prior notice.

LAH 310 CONTECH SELF MONITORING HIGH LEVEL ALARM

Applications





SIL 2 and SIL 3 approved LC 310 Self Monitoring Level Alarm Controllers / Limiters provides increases the safety level of the boiler system.

If the boiler water level rises to touch the LPH 300 High Level probe tip, the LC 310 controller to be de-energised and the alarm to sound, also the boiler feed water pump or feed water valve in operation may be switched off, and the burner supply could be turned off, depending on the boiler cotrol panel installation.

Level alarms can be checked at specific time intervals with Alarm Test function to test the operation of the burner protection circuit.

LCS 410 CONTECH ON-OFF LEVEL CONTROL

The LCS 410 Contech On-Off Level Control System consists of LP 400 Level Probe and LC 410 Contech Level Controller to provide simple on-off level control for steam boilers, deaerator, feedwater tank and process vessels. LC 410 Contech On-Off Level Alarm Controller is DIN Rail type mounting. With two level points control, the water level is kept at the desired level by switching the pump on or off respectively. Additionally low and high level alarm signals can be provided.

Level alarms can be checked at specific time intervals with Alarm Test function to test the operation of the burner protection circuit.

- It consists of LP 400 Level sensor and LC 410 Contech On-Off Level controller.
- Provides advanced security with Alarm test function.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Probe Connection	:	1", BSP - Screwed
Probe Length	:	500, 800, 1.000 and 1.500 mm
Control Signals	:	Pump on-off, Low level alarm, High level alarm
Output	:	One relay for pump control, two relay for low and high level alarm
Communication	:	Modbus - RS 485
Functions	:	Alarm Test

Types

LC 410 Controller

Type	Feature
LC 410	Smart On-Off Level Control

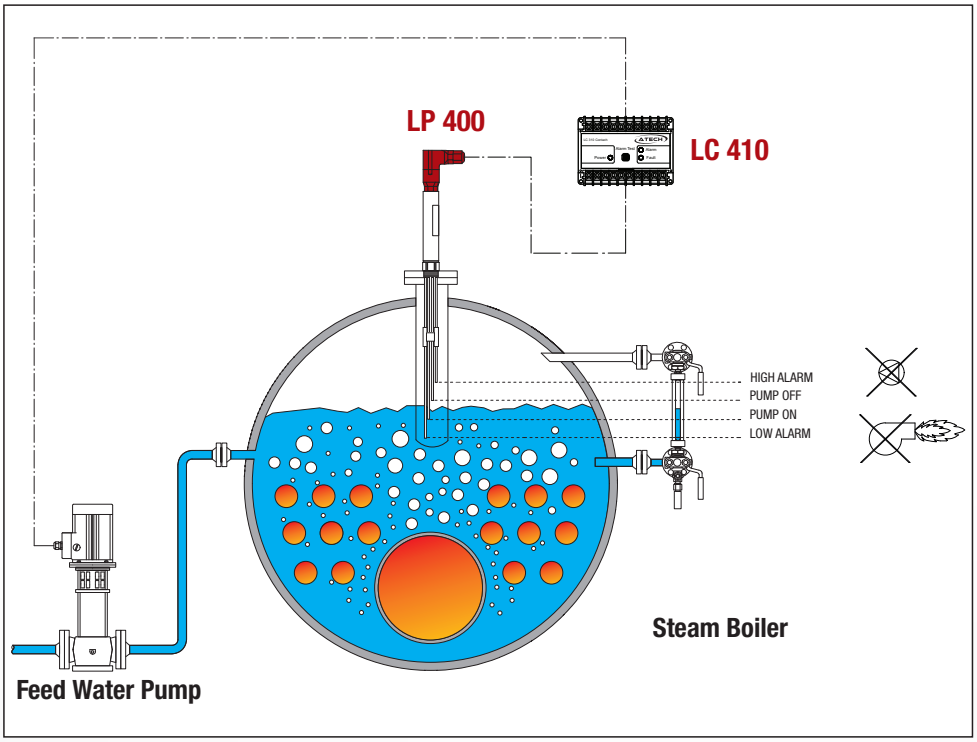
LP 400 Level probe

Type	Length	Connection
LP 405	500 mm	1", BSP - Screwed
LP 408	800 mm	1", BSP - Screwed
LP 410	1.000 mm	1", BSP - Screwed
LP 415	1.500 mm	1", BSP - Screwed

Atech reserves the right to make changes without prior notice.

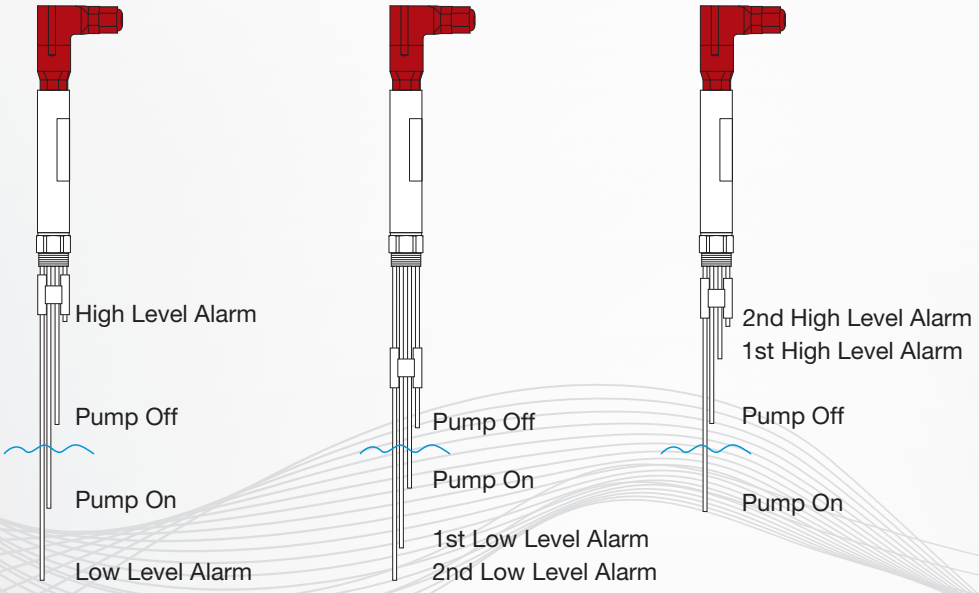
LCS 410 CONTECH ON-OFF LEVEL CONTROL

Applications



When the water falls below the adjusted switch points, low level alarm occurs and the burner protection circuit is interrupted.

If the boiler water level rises enough to touch the set high water level alarm point, a high water level alarm occurs, and depending on the boiler control panel setup, the boiler feed water pump or burner supply may be turned off.



LCS 515 CONTECH MODULATING LEVEL CONTROL

In steam boilers LCS 515 Contech Modulating Level Control System is used where unavoidable fluctuations and sudden changes in the consumption of steam and high steam quality. Particularly to be preferred at high steam production capacity.

LCS 515 Contech Modulating Level Control System consist of LP 500 Level Probe, LC 515 Contech Level Controller and LCV Level Control Valve.

- Advanced safety, reliable control.
- Modbus RS 485 communication.
- Provides advanced security with alarm test function.
- 2 way or 3 way boiler feed water valve options.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Connection	:	1/2", BSP - Screwed
Length	:	500 mm to 1.500 mm.
Control Signals	:	Modulating level control, Low alarm and High alarm
Output	:	Three step valve control, 4-20 mA level output, two relays for low & high alarms
Control Types	:	PID, Modulating or adjustable on-off
Communications	:	Modbus - RS 485
Functions	:	Alarm Test

Types

LC 525 Controller

Type	Features
LC 515	Modulating valve control + 4-20 mA level output signal

LPA Pre Amplifier

Type	Features
LPA 500	0-6 Vdc level output signal
LPA 420	4-20 mA level output signal

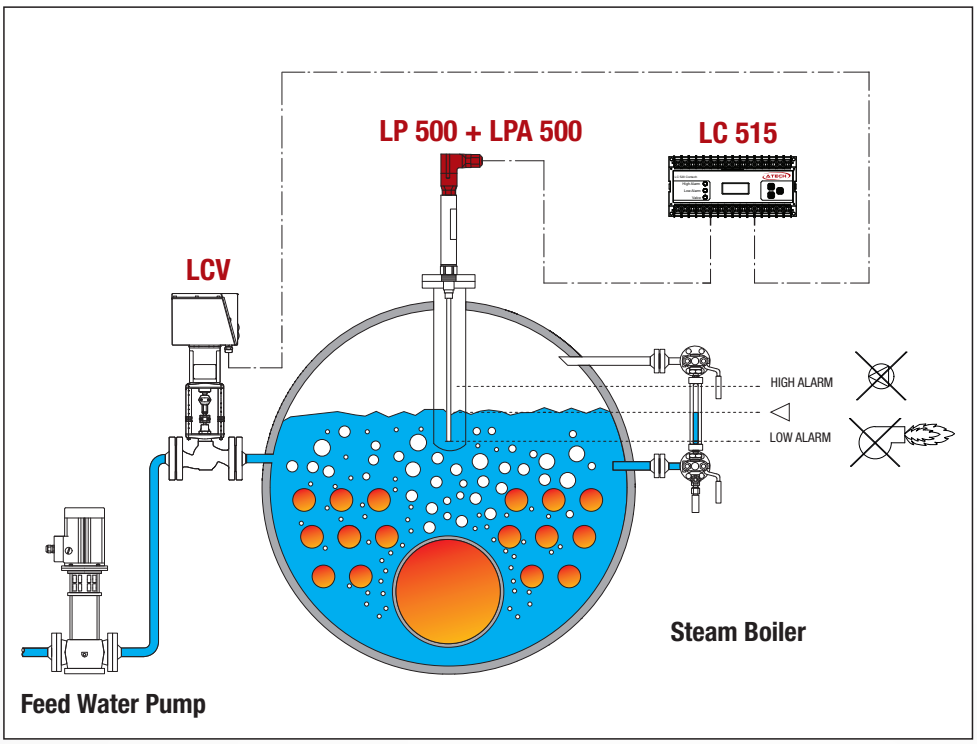
LP 500 Level Probe

Type	Length	Connection
LP 550	500 mm	1/2", BSP - Screwed
LP 560	600 mm	1/2", BSP - Screwed
LP 570	700 mm	1/2", BSP - Screwed
LP 580	800 mm	1/2", BSP - Screwed
LP 590	900 mm	1/2", BSP - Screwed
LP 510	1.000 mm	1/2", BSP - Screwed
LP 511	1.100 mm	1/2", BSP - Screwed
LP 512	1.200 mm	1/2", BSP - Screwed
LP 513	1.300 mm	1/2", BSP - Screwed

Atech reserves the right to make changes without prior notice.

LCS 515 CONTECH MODULATING LEVEL CONTROL

Applications



When the water falls below the adjusted switch points, low level alarm occurs and the burner protection circuit is interrupted.

If the boiler water level rises enough to touch the set high water level alarm point, a high water level alarm occurs, and depending on the boiler control panel setup, the boiler feed water pump or burner supply may be turned off.

Level alarms can be checked at specific time intervals with Alarm Test function to test the operation of the burner protection circuit.

LCV Boiler Feed Water Control Valve

Valve Type	Pressure Rating	Type	Valve Type	Pressure Rating	Type	Connection	Kvs
2 way	PN 16	LCV 5125	3 way	PN 16	LCV 3125	DN 25, Flanged	2, 4, 6.3, 10
		LCV 5132			LCV 3132	DN 32, Flanged	6.3, 10, 16
		LCV 5140			LCV 3140	DN 40, Flanged	10, 16, 25
		LCV 5150			LCV 3150	DN 50, Flanged	16, 25, 40
		LCV 5165			LCV 3165	DN 65, Flanged	25, 40, 60
	PN 25	LCV 5225		PN 25	LCV 3225	DN 25, Flanged	2, 4, 6.3, 10
		LCV 5232			LCV 3232	DN 32, Flanged	6.3, 10, 16
		LCV 5240			LCV 3240	DN 40, Flanged	10, 16, 25
		LCV 5250			LCV 3250	DN 50, Flanged	16, 25, 40
		LCV 5265			LCV 3265	DN 65, Flanged	25, 40, 60
	PN 40	LCV 5425		PN 40	LCV 3425	DN 25, Flanged	2, 4, 6.3, 10
		LCV 5432			LCV 3432	DN 32, Flanged	6.3, 10, 16
		LCV 5440			LCV 3440	DN 40, Flanged	10, 16, 25
		LCV 5450			LCV 3450	DN 50, Flanged	16, 25, 40
		LCV 5465			LCV 3465	DN 65, Flanged	25, 40, 60

LCS 525 CONTECH MODULATING LEVEL CONTROL

In steam boilers LCS 525 Contech Modulating Level Control System is used where unavoidable fluctuations and sudden changes in the consumption of steam and high steam quality capacity. Particularly to be preferred at high steam production capacity.

Level alarms can be checked at specific time intervals with Alarm Test function to test the operation of the burner protection circuit.

- Advanced safety, reliable control.
- Modbus RS 485 communication.
- Provides advanced security with alarm test function.
- 2 way or 3 way boiler feed water valve options.

Technical Data

Nominal Pressure	:	PN 40
Max. Operating Temperature	:	238 °C
Max. Operating Pressure	:	32 bar
Connection	:	1/2", BSP - Screwed
Length	:	500 mm to 1.500 mm.
Control Signals	:	Modulating level control, Low alarm and High alarm
Output	:	PID control, 3-position stepping valve control, 4-20 mA level output signal, two relay for low level alarm and high level alarm
Control Types	:	PID, Modulating or adjustable on-off
Communications	:	Modbus - RS 485
Functions	:	Alarm Test

Types

LC 525 Controller

Type	Features
LC 525	Modulating valve control + 4-20 mA level output signal 4-20 mA PID control output

LPA Pre Amplifier

Type	Features
LPA 500	0-6 Vdc level output signal
LPA 420	4-20 mA level output signal

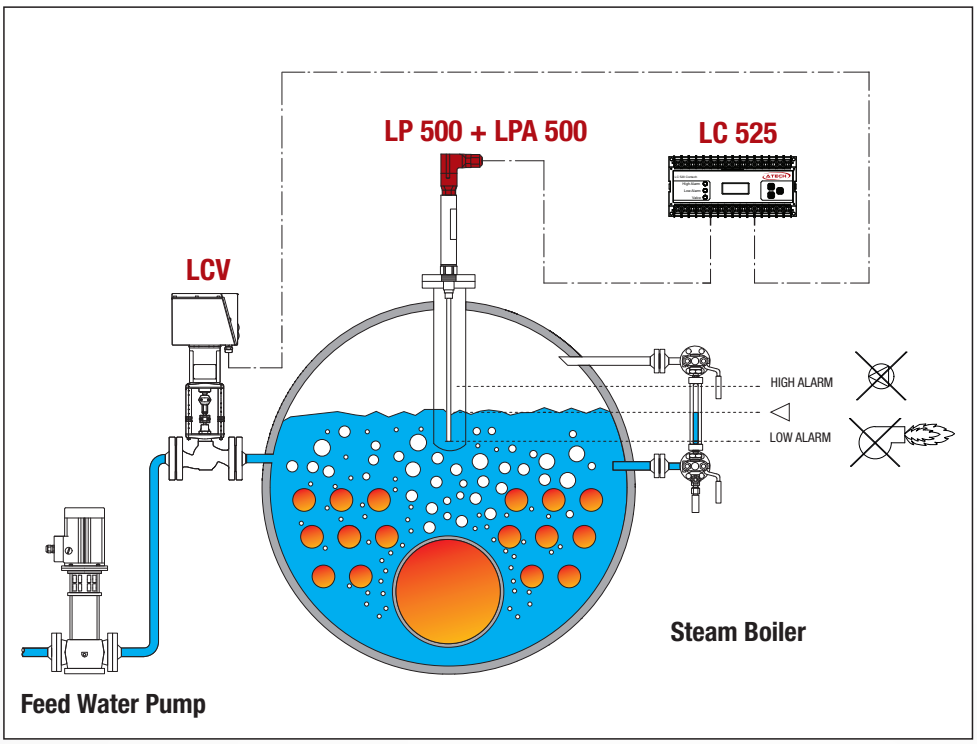
LP 500 Level Probe

Type	Length	Connection
LP 550	500 mm	1/2", BSP - Screwed
LP 560	600 mm	1/2", BSP - Screwed
LP 570	700 mm	1/2", BSP - Screwed
LP 580	800 mm	1/2", BSP - Screwed
LP 590	900 mm	1/2", BSP - Screwed
LP 510	1.000 mm	1/2", BSP - Screwed
LP 511	1.100 mm	1/2", BSP - Screwed
LP 512	1.200 mm	1/2", BSP - Screwed
LP 513	1.300 mm	1/2", BSP - Screwed

Atech reserves the right to make changes without prior notice.

LCS 525 CONTECH MODULATING LEVEL CONTROL

Applications



When the water falls below the adjusted switch points, low level alarm occurs and the burner protection circuit is interrupted.

If the boiler water level rises enough to touch the set high water level alarm point, a high water level alarm occurs, and depending on the boiler control panel setup, the boiler feed water pump or burner supply may be turned off.

LCV Boiler Feed Water Control Valve

Valve Type	Pressure Rating	Type	Valve Type	Pressure Rating	Type	Connection	Kvs
2 way	PN 16	LCV 5125	3 way	PN 16	LCV 3125	DN 25, Flanged	2, 4, 6.3, 10
		LCV 5132			LCV 3132	DN 32, Flanged	6.3, 10, 16
		LCV 5140			LCV 3140	DN 40, Flanged	10, 16, 25
		LCV 5150			LCV 3150	DN 50, Flanged	16, 25, 40
		LCV 5165			LCV 3165	DN 65, Flanged	25, 40, 60
	PN 25	LCV 5225		PN 25	LCV 3225	DN 25, Flanged	2, 4, 6.3, 10
		LCV 5232			LCV 3232	DN 32, Flanged	6.3, 10, 16
		LCV 5240			LCV 3240	DN 40, Flanged	10, 16, 25
		LCV 5250			LCV 3250	DN 50, Flanged	16, 25, 40
		LCV 5265			LCV 3265	DN 65, Flanged	25, 40, 60
	PN 40	LCV 5425		PN 40	LCV 3425	DN 25, Flanged	2, 4, 6.3, 10
		LCV 5432			LCV 3432	DN 32, Flanged	6.3, 10, 16
		LCV 5440			LCV 3440	DN 40, Flanged	10, 16, 25
		LCV 5450			LCV 3450	DN 50, Flanged	16, 25, 40
		LCV 5465			LCV 3465	DN 65, Flanged	25, 40, 60

CONTECH MODULE BLOWDOWN CONTROL

STEAM BOILER CONTROL MODULS

CONTECH MODULE BLOWDOWN CONTROL

BCS 715 CONTECH BOTTOM BLOWDOWN CONTROL

BCS 915 CONTECH CONDUCTIVITY CONTROL (FOR LOW CAPACITY)

BCS 925 CONTECH CONDUCTIVITY CONTROL (FOR COIL BOILERS)

BCS 935 CONTECH CONDUCTIVITY CONTROL (STANDARD MODEL)

BCS 945 CONTECH CONDUCTIVITY CONTROL (PROBE OUT OF THE BOILER)

BCS 955 CONTECH CONDUCTIVITY CONTROL (TEMPERATURE COMPENSATION)

BCS 971 CONTECH CONDUCTIVITY & BOTTOM BLOWDOWN CONTROL (COMBI MODEL)

BCS 715 CONTECH BOTTOM BLOWDOWN CONTROL

Time controlled bottom blowdown system for single or multi-boiler installations comprises BC 715 Bottom Blowdown Controller and BCV 700 Pneumatically Actuated Bottom Blowdown Valve. BC 715 controller is DIN Rail type mounting.

The bottom blowdown valve enables a fast opening and closing which is necessary for the blowing down. This fast opening causes a suction in the boiler whereby deposits solids are flushed out of the boiler.

- Fully automatic kontrol.
- Modbus RS 485 communication.
- Valve and Alarm Test.

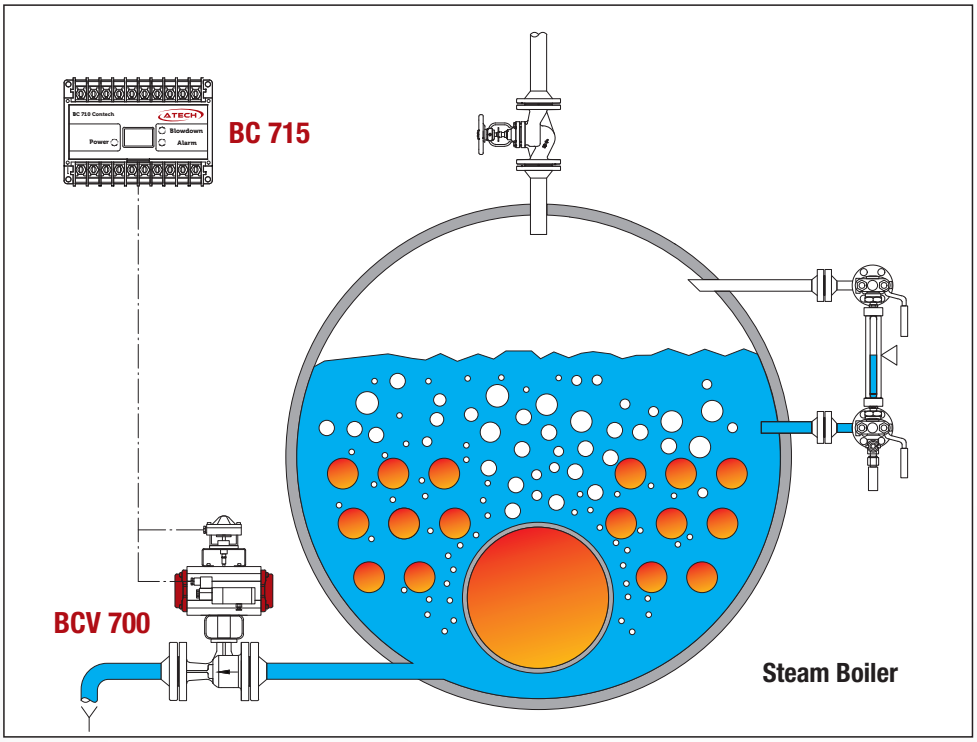
Technical Data

Nominal Pressure	:	PN 25 / PN 40
Max. Operating Temperature	:	220 °C / 238 °C
Max. Operating Pressure	:	18 bar / 32 bar
Valve Connection	:	DN 25 - DN 50, Flanged
Actuator	:	Pneumatic spring return
Control Signals	:	Valve control relay, alarm relay
Alarms	:	Valve failed to open, valve failed to close
Output	:	One relay for alarm
Communication	:	Modbus - RS 485
Functions	:	Valve test, Alarm test, Alarm reset, Total blowdown time, Total number of blowdown, Communication to other controllers, Delay for other controller blowdown,

Atech reserves the right to make changes without prior notice.

BCS 715 CONTECH BOTTOM BLOWDOWN CONTROL

Applications



The alarm relay releases to keep the high level safety, if blowdown valve fails to close fully after a certain period or to open in a certain period.

Types

BC 715 Blowdown Controller

Type	Feature
BC 715	Contech Bottom Blowdown Controller

BCV 700 Blowdon Control Valve

Type	Connection	Pressure Rate	Actuator Type
BCV 7225	DN 25, Flanged	PN 25	PA7-075
BCV 7232	DN 32, Flanged		
BCV 7240	DN 40, Flanged		PA7-088
BCV 7250	DN 50, Flanged		
BCV 7425	DN 25, Flanged	PN 40	PA7-075
BCV 7432	DN 32, Flanged		
BCV 7440	DN 40, Flanged		PA7-088
BCV 7450	DN 50, Flanged		

Other Accessories

Type	Feature
LS 700	Limit Switch
YV-3/2	Namur

BCS 935 CONTECH CONDUCTIVITY CONTROL (STANDARD MODEL)

BCS 935 Contech Conductivity Control System consist of BC 935 Blowdown Controller, CP 930 Conductivity Probe and BCV 900 Blowdown Control Valve.

CP 930 Condutivity Probe is for mounting in to the boiler directly. BC 935 Contech Controller measures the conductivity of the boiler water continuously. This measured value is compared with the set point in the controller. If it is lower than the set point the blowdown valve remains closed. If the measured value is higher than the set point the controller keeps open the blow down valve until the measured value drops below the set point.

- Fully automatic kontrol.
- Modbus RS 485 communication.
- Valve and Alarm Test

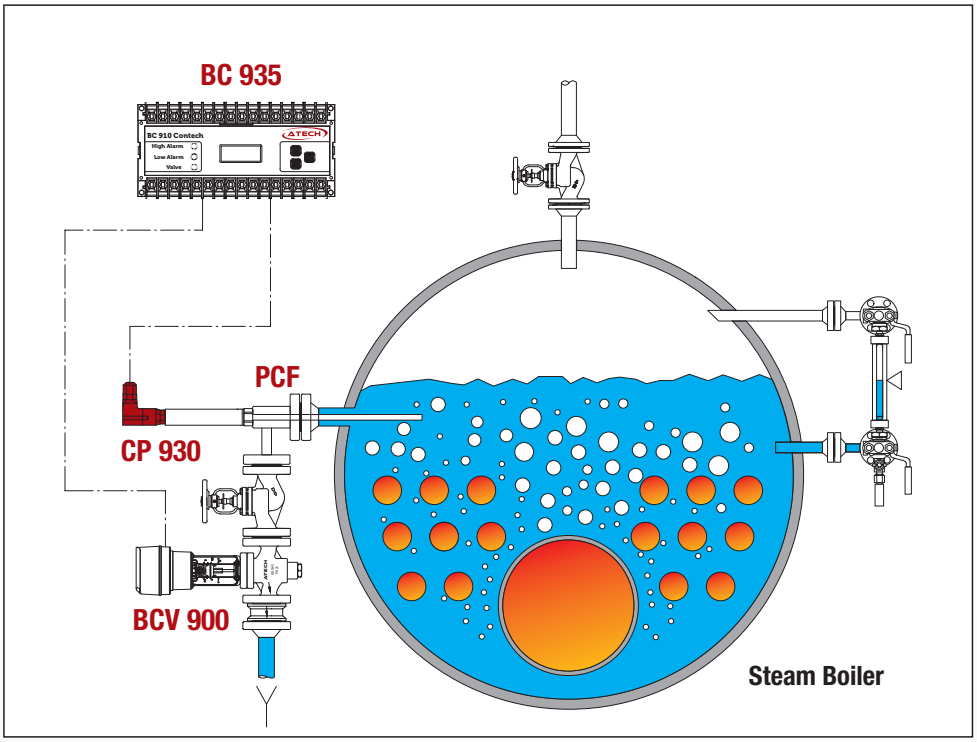
Technical Data

Nominal Pressure	:	PN 25 / PN 40
Max. Operating Temperature	:	220 °C / 238 °C
Max. Operating Pressure	:	18 bar / 32 bar
Probe Connection	:	1/2", BSP - Screwed
Probe Length	:	400 mm to 1.000 mm
Probe Operating Principle	:	Single pole
Valve Connection	:	DN 20, DN 25 or DN 40, Flanged
Actuator	:	Electric and spring return
Control Signals	:	Valve control relay and high TDS/conductivity alarm relay
Output	:	4-20 mA conductivity output signal and one relay for high TDS/conductivity alarm
Communications	:	Modbus - RS 485
Functions	:	Valve Test, Alarm Test

Atech reserves the right to make changes without prior notice.

BCS 935 CONTECH CONDUCTIVITY CONTROL (STANDARD MODEL)

Applications



When TDS is low, valve simply remains closed. No unnecessary losses, saves water treatment and chemical costs. Also it reduces water consumption and effluent disposal charges.

Types

BC 935 Controller

Type	Feature
BC 935	Contech Conductivity Blowdown Controller

CP 900 Conductivity Probe

Type	Length	Connection
CP 934	400 mm	1/2", Screwed, PN 40
CP 930	500 mm	1/2", Screwed, PN 40
CP 936	600 mm	1/2", Screwed, PN 40
CP 938	800 mm	1/2", Screwed, PN 40
CP 931	1.000 mm	1/2", Screwed, PN 40

BCV 900 Blowdown Control Valve

Type	Connection	Actuator Type
BCV 925-20	DN 20, Flanged, PN 25	BA900-H
BCV 925-25	DN 25, Flanged, PN 25	BA900-H
BCV 925-40	DN 40, Flanged, PN 25	BA900-S
BCV 940-20	DN 20, Flanged, PN 40	BA900-H
BCV 940-25	DN 25, Flanged, PN 40	BA900-H
BCV 940-40	DN 40, Flanged, PN 40	BA900-S

PC Probe Connection Flange

Type	Connection
PC F20x20	DN 20xDN 20-1/2", Flanged
PC F25x20	DN 25xDN 20-1/2", Flanged
PC F25x25	DN 25xDN 25-1/2", Flanged
PC F40x40	DN 40xDN 40-1/2", Flanged
PC F50x20	DN 50xDN 20-1", Flanged
PC F50x25	DN 50xDN 25-1", Flanged
PC F50x40	DN 50xDN 40-1", Flanged

BCS 945 CONTECH CONDUCTIVITY CONTROL (PROBE OUT OF THE BOILER)

BCS 945 Contech Conductivity Control System consist of BC 935 Contech Blowdown Controller, CP 910 Conductivity Probe and BCV 900 Blowdown Control Valve.

- Fully automatic control.
- Modbus RS 485 communication.
- Valve and Alarm Test.

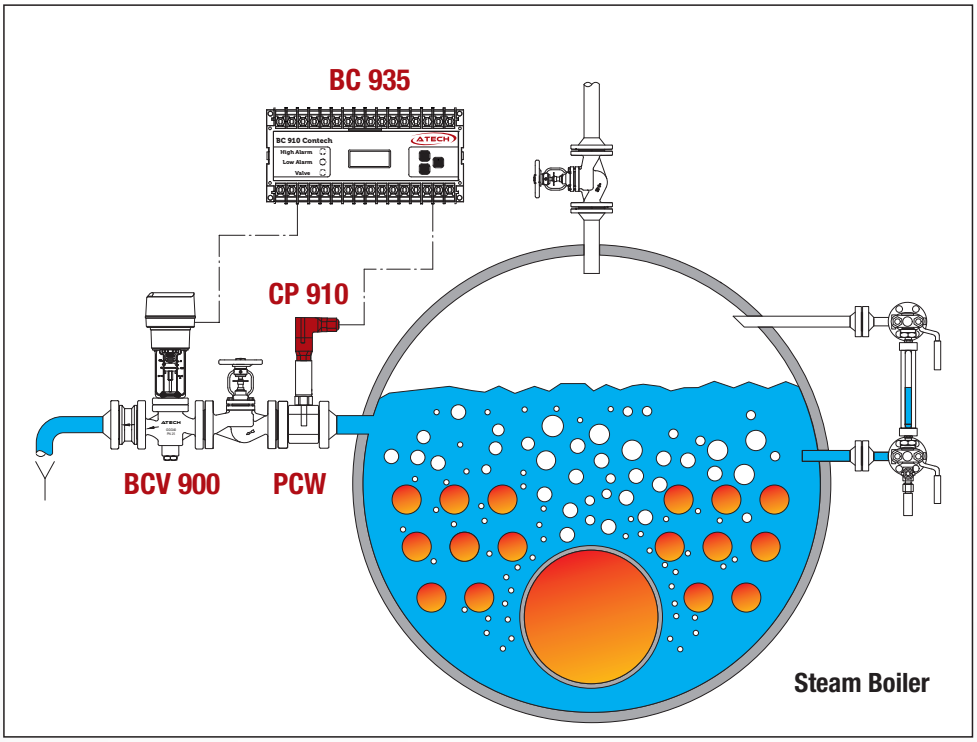
Technical Data

Nominal Pressure	:	PN 25 / PN 40
Max. Operating Temperature	:	220 °C / 238 °C
Max. Operating Pressure	:	18 bar / 32 bar
Probe Connection	:	1/2", BSP - Screwed
Prope Length	:	43,5 mm
Operating Principle	:	Single pole and tempwrature compensated
Valve Connection	:	DN 20, DN 25 veya DN 40, Flanged
Actuator	:	Electric and spring return
Control Signals	:	Valve control relay and high TDS/conductivity alarm relay
Output	:	4-20 mA conductivity output signal and one relay for high TDS/conductivity alarm
Communications	:	Modbus - RS 485
Functions	:	Valve Test, Alarm Test

Atech reserves the right to make changes without prior notice.

BCS 945 CONTECH CONDUCTIVITY CONTROL (PROBE OUT OF THE BOILER)

Applications



When TDS is low, valve simply remains closed. No unnecessary losses, saves water treatment and chemical costs. Also it reduces water consumption and effluent disposal charges.

Types

BC 935 Controller

Type	Feature
BC 935	Contech Conductivity Blowdown Controller

CP 900 Conductivity Probe

Type	Length	Connection
CP 910	43.5 mm	1/2", Screwed, PN 40

BCV 900 Blowdown Control Valve

Type	Connection	Actuator Type
BCV 925-20	DN 20, Flanged, PN 25	BA900-H
BCV 925-25	DN 25, Flanged, PN 25	BA900-H
BCV 925-40	DN 40, Flanged, PN 25	BA900-S
BCV 940-20	DN 20, Flanged, PN 40	BA900-H
BCV 940-25	DN 25, Flanged, PN 40	BA900-H
BCV 940-40	DN 40, Flanged, PN 40	BA900-S

PC Probe Sensor Chamber

Type	Connection
PC W20	DN 20-1/2", Wafer, PN 40
PC W25	DN 25-1/2", Wafer, PN 40
PC W40	DN 40-1/2", Wafer, PN 40

BCS 971 CONTECH CONDUCTIVITY & BOTTOM BLOWDOWN CONTROL (COMBI MODEL)

BCS 971 Contech Conductivity & Bottom Blowdown Control System consisst of BC 971 Combi Blowdown Controller, CP 930 Conductivity Probe , BCV 900 Blowdown Control Valve and BCV 700 Bottom Blowdown Control Valve.

This system offers a combination which controls two systems in one at the same time.

When TDS is low, valve simply remains closed. No unnecessary losses, saves water treatment and chemical costs. Also it reduces water consumption and effluent disposal charges.

It also provides a complete solution by controlling the bottom blowdown valve depending on time.

- Fully automatic TDS and bottom blowdown control combination.
- Modbus RS 485 communication.
- Valve and Alarm Test.

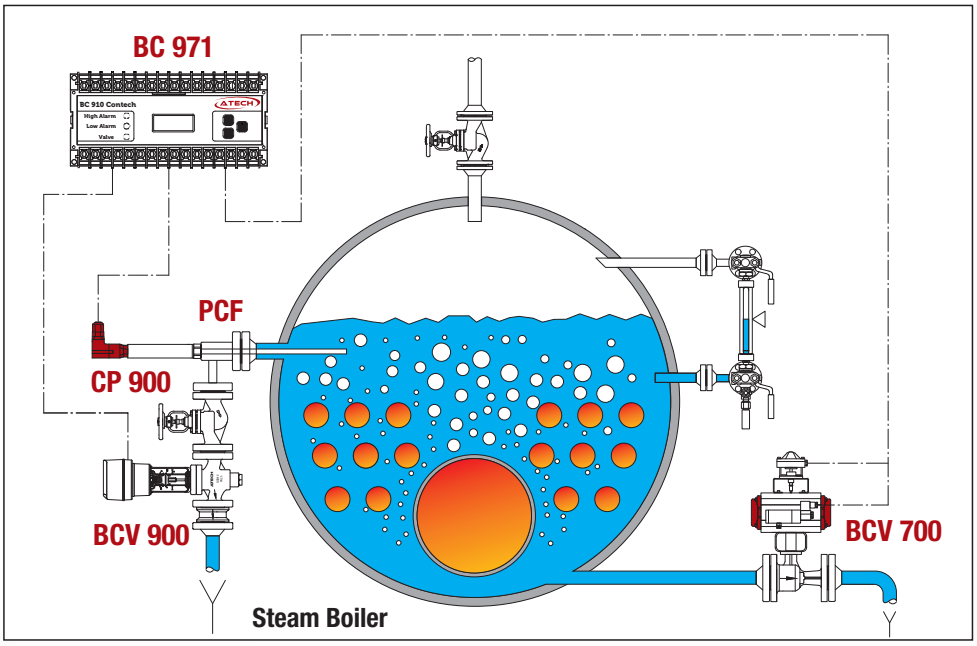
Technical Data

Nominal Pressure	:	PN 25 / PN 40
Max. Operating Temperature	:	220 °C / 238 °C
Max. Operating Pressure	:	18 bar / 32 bar
Probe Connection	:	1/2", BSP - Screwed
Probe Length	:	400 mm - 1.000 mm
Operating Principle	:	Single pole conductivity
Conductivity Blowdown Valve Connection	:	DN 20, DN 25 or DN 40, Flanged
Conductivity Blowdown Actuator	:	Electric and spring return
Bottom Blowdown Valve Connection	:	DN 25 - DN 50, Flanged
Bottom Blowdown Actuator	:	Pneumatic actuator and spring return
Control Signals	:	Valve control relay and high TDS/conductivity alarm relay,
Output	:	4-20 mA conductivity output signal and one relay for high TDS/conductivity alarm
Communications	:	Modbus - RS 485
Functions	:	Valve Test, Alarm Test

Atech reserves the right to make changes without prior notice.

BCS 971 CONTECH CONDUCTIVITY & BOTTOM BLOWDOWN CONTROL (COMBI MODEL)

Applications



In the BCS 971 Smart Combi Conductivity and Bottom Blowdown System, in addition to the standard conductivity sensor CP 930, the CP 950 conductivity sensor with built-in temperature sensor can also be used. Temperature compensation can be made in conductivity measurement with the CP 950 sensor.

Types

BC 971 Controller

Type	Feature
BC 971	Combi Conductivity and Bottom Blowdown

CP 900 Conductivity Probe

Type	Type	Length	Connection
CP 934	CP 954	400 mm	1/2", Screwed, PN 40
CP 930	CP 950	500 mm	1/2", Screwed, PN 40
CP 936	CP 956	600 mm	1/2", Screwed, PN 40
CP 938	CP 958	800 mm	1/2", Screwed, PN 40
CP 931	CP 951	1.000 mm	1/2", Screwed, PN 40

BCV 900 Blowdown Control Valve

Type	Connection	Actuator Type
BCV 925-20	DN 20, Flanged, PN 25	BA900-H
BCV 925-25	DN 25, Flanged, PN 25	BA900-H
BCV 925-40	DN 40, Flanged, PN 25	BA900-S
BCV 940-20	DN 20, Flanged, PN 40	BA900-H
BCV 940-25	DN 25, Flanged, PN 40	BA900-H
BCV 940-40	DN 40, Flanged, PN 40	BA900-S

PC F Probe Connection Flange

Type	Connection
PC F20x20	DN 20xDN 20-1/2", Flanged
PC F25x20	DN 25xDN 20-1/2", Flanged
PC F25x25	DN 25xDN 25-1/2", Flanged
PC F40x40	DN 40xDN 40-1/2", Flanged
PC F50x20	DN 50xDN 20-1", Flanged
PC F50x25	DN 50xDN 25-1", Flanged
PC F50x40	DN 50xDN 40-1", Flanged

BCV 700 Blowdown Control Valve

Type	Connection	Pressure	Actuator Type
BCV 7225	DN 25, Flanged	PN 25	PA7-075
BCV 7232	DN 32, Flanged		
BCV 7240	DN 40, Flanged		PA7-088
BCV 7250	DN 50, Flanged		
BCV 7425	DN 25, Flanged	PN 40	PA7-075
BCV 7432	DN 32, Flanged		
BCV 7440	DN 40, Flanged		PA7-088
BCV 7450	DN 50, Flanged		

Other Accessories

Type	Feature
LS 700	Limit Switch
YV-3/2	Namur

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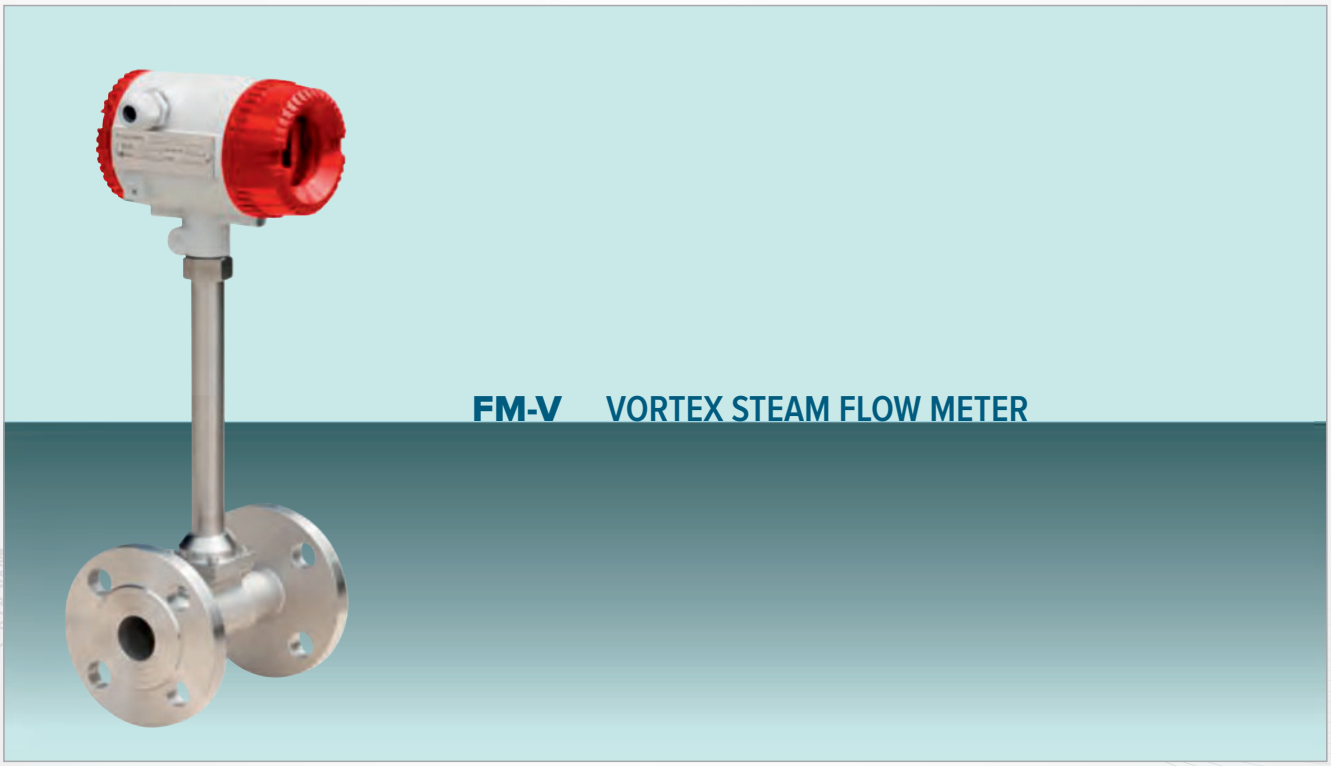
STEAM FLOW METER

STEAM BOILERS CONTROL MODULS

STEAM FLOW METER



FM-V VORTEX STEAM FLOW METER

The flowmeter is used to measure the rate of fluid or energy flow to allow the process to be controlled and so ensure that the end product is of the required quality.

A compact all in one solution, vortex technology is an excellent option for measuring saturated and superheated steam.

Simple to install and commission. The FM-V Vortex Flow Meter has an internal temperature sensor which provides full density compensation for saturated steam applications. For superheated steam, pressure transmitter can be fitted.

- Integrated pressure and temperature compensation.
- 4-20mA, pulse, RS 485 outputs.
- No moving parts, no abrasion, fully welded AISI 304 body.

Technical Data

Nominal Pressure	:	PN 16 (standard), PN 25 or PN 40 (optional)
Size	:	DN 25-DN 300
Connection	:	Wafer, Flanged
Body Material	:	AISI 304 (Standard), AISI 316 (Optional)
Compensation	:	Integrated temperature (Standart) and pressure (Optional)
Accuracy	:	±1.5% (Standard), ±1.0% (Optional)
Power Supply	:	12 VDC, 24 VDC
Communication	:	RS 485 / Modbus, Hart, Profitbus
Signal Output	:	4-20 mA (Standard), pulse (Optional)
Straight Pipe	:	Upstream ≥ 20D, Downstream ≥ 5D

Atech reserves the right to make changes without prior notice.

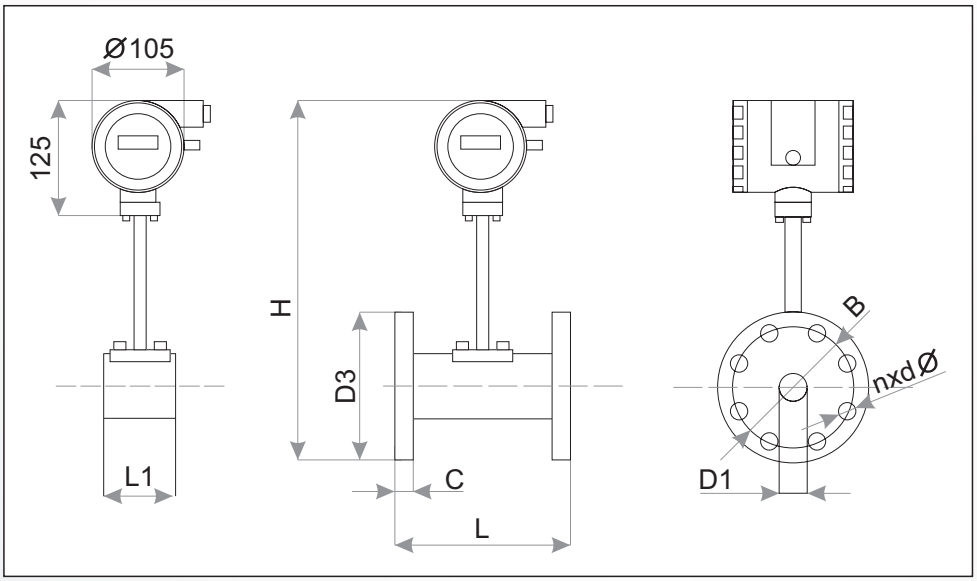
FM-V VORTEX STEAM FLOW METER

Saturated Steam Mass Flow Range

DN	Pressure (bar g)	1	2	3	4	5	6	7	8	9	10
25	Qmin	14	17	19	21	23	25	27	28	30	32
	Qmax	136	198	260	320	380	440	499	559	618	677
40	Qmin	32	38	44	48	53	57	60	64	67	70
	Qmax	400	498	649	801	951	1100	1249	1397	1544	1691
50	Qmin	52	64	73	81	88	95	100	107	112	117
	Qmax	667	826	1080	1335	1585	1834	2081	2328	2574	2814
65	Qmin	88	106	121	135	147	158	168	178	187	196
	Qmax	933	1320	1730	2135	2536	2934	3330	3724	4118	4510
80	Qmin	105	127	145	161	176	189	201	213	224	285
	Qmax	1400	1980	2596	3240	4015	4644	5270	5896	6520	7140
100	Qmin	175	212	242	269	293	315	336	335	374	391
	Qmax	2332	3300	4320	5400	6430	7320	8320	9310	10300	11280
125	Qmin	262	317	363	404	440	473	504	533	560	586
	Qmax	3500	4950	6490	8000	9510	11000	12500	14000	15440	16920
150	Qmin	350	423	484	538	586	631	672	711	747	781
	Qmax	4666	6600	8650	10680	12680	14670	16650	18620	20590	22545
200	Qmin	610	740	848	942	1026	1104	1176	1243	1308	1368
	Qmax	9330	13200	17300	21360	25360	29340	33300	37240	41180	44090

Simple to install and commission. The FM-V Vortex Flow Meter has an internal temperature sensor which provides full density compensation for saturated steam applications.
For superheated steam, pressure transmitter can be fitted.

Technical Drawing



Size	Flange Length	Wafer Length	Flange Outer	of Bolts Hole	Flange Thicknes	Bolt Hole Diameter	Hole No. Diameter
DN	L (mm)	L1 (mm)	D3 (mm)	B (mm)	C (mm)	d (mm)	N
25	170	95	115	68	14	19	4
40	190	109	150	78	16	19	4
50	190	109	165	102	16	19	4
65	220	117	185	122	18	19	4
80	220	122	200	138	18	19	8
100	240	132	220	158	18	19	8
125	260	146	250	188	20	23	8
150	280	170	285	212	22	23	8
200	300	200	340	268	22	23	12

TECHNICAL DATA

SATURATED STEAM TABLES

Guage Pressure		Absolute Pressure	Temperature	Specific Enthalpy			Specific Volume Steam (vg)
				Water (hf)	Evaporation (hfg)	Steam (hg)	
bar g	kPa	bar a	°C	kJ/kg	kJ/kg	kJ/kg	m³/kg
0	0	1,013	100,00	419,0	2257,0	2676,0	1,673
0,1	10	1,123	102,66	430,2	2250,2	2680,2	1,533
0,2	20	1,213	105,10	440,8	2243,4	2684,2	1,414
0,3	30	1,313	107,39	450,4	2237,2	2687,6	1,312
0,4	40	1,413	109,55	459,7	2231,3	2691,0	1,225
0,5	50	1,513	111,61	468,3	2225,6	2693,9	1,149
0,6	60	1,613	113,56	476,4	2220,4	2696,8	1,088
0,7	70	1,713	115,40	484,1	2215,4	2699,5	1,024
0,8	80	1,813	117,14	491,6	2210,6	2702,1	0,971
0,9	90	1,913	118,80	498,9	2205,6	2704,5	0,923
1	100	2,013	120,42	505,6	2201,1	2706,7	0,881
1,5	150	2,513	127,62	536,1	2181,0	2717,1	0,714
2	200	3,013	133,69	562,2	2163,1	2725,5	0,603
3	300	4,013	143,75	605,3	2133,4	2738,7	0,461
3,5	350	4,513	148,01	623,7	2119,9	2743,5	0,412
4	400	5,013	151,96	640,7	2108,1	2748,8	0,374
4,5	450	5,513	155,55	656,3	2096,7	2753,0	0,342
5	500	6,013	158,92	670,9	2086,0	2756,9	0,315
5,5	550	6,513	162,08	684,6	2075,7	2760,3	0,292
6	600	7,013	165,04	697,5	2066,0	2763,5	0,272
6,5	650	7,513	167,83	709,7	2056,8	2766,5	0,255
7	700	8,013	170,50	721,4	2047,7	2769,1	0,24
8	800	9,013	175,43	743,1	2030,9	2774,0	0,215
9	900	10,013	179,97	763,0	2015,1	2778,1	0,194
10	1000	11,013	184,13	781,6	2000,1	2781,7	0,177
11	1100	12,013	188,02	798,8	1986,0	2784,8	0,163
12	1200	13,013	191,68	815,1	1972,5	2787,6	0,151
13	1300	14,013	195,10	830,4	1959,6	2790,0	0,141
14	1400	15,013	198,35	845,1	1947,1	2792,2	0,132
15	1500	16,013	201,45	859,0	1935,0	2794,0	0,124
16	1600	17,013	204,38	872,3	1923,4	2795,7	0,117
17	1700	18,013	207,17	885,0	1912,1	2797,1	0,110
18	1800	19,013	209,90	897,2	1901,3	2798,5	0,105
19	1900	20,013	212,47	909,0	1890,5	2799,5	0,100
20	2000	21,013	214,96	920,3	1880,2	2800,5	0,0994
22	2200	23,013	219,65	941,9	1860,1	2802,0	0,0868
24	2400	25,013	224,02	962,2	1840,6	2803,1	0,0797
26	2600	27,013	228,15	981,6	1822,2	2803,8	0,0740
28	2800	29,013	232,05	999,7	1804,4	2804,4	0,0689
30	3000	31,013	235,78	1017,0	1787,0	2804,1	0,0645

TECHNICAL DATA

SATURATED STEAM PIPELINE CAPACITY (kg/h)

P (bar g)	v (m/s)	Pipe Size DN 15	20	25	32	40	50	65	80	100	125	150
		Nominal bore of the pipeline SHC 40 - (mm)										
		15,80	20,93	26,64	35,02	40,90	52,50	62,70	77,92	102,26	128,20	154,50
		Steam Capacity (kg/h)										
0,4	15	9	15	25	43	58	95	136	210	362	569	822
	25	14	25	41	71	97	159	227	350	603	948	1.369
	40	23	40	66	113	154	254	363	561	965	1.517	2.191
0,7	15	10	18	29	51	69	114	163	251	433	681	983
	25	17	30	49	85	115	190	271	419	722	1.135	1.638
	40	28	48	78	136	185	304	434	671	1.155	1.815	2.621
1	15	12	21	34	59	81	133	189	292	503	791	1.142
	25	20	35	57	99	134	221	315	487	839	1.319	1.904
	40	32	56	91	158	215	354	505	779	1.342	2.110	3.046
2	15	18	31	50	86	118	194	277	427	735	1.156	1.669
	25	29	51	83	144	196	323	461	712	1.226	1.927	2.782
	40	47	82	133	230	314	517	737	1.139	1.961	3.083	4.451
3	15	23	40	65	113	154	254	362	559	962	1.512	2.183
	25	38	67	109	188	256	423	603	931	1.603	2.520	3.639
	40	61	107	174	301	410	676	964	1.490	2.565	4.032	5.822
4	15	28	50	80	139	190	313	446	689	1.186	1.864	2.691
	25	47	83	134	232	316	521	743	1.148	1.976	3.106	4.485
	40	75	132	215	371	506	833	1.189	1.836	3.162	4.970	7.176
5	15	34	59	96	165	225	371	529	817	1.408	2.213	3.195
	25	56	98	159	276	375	619	882	1.362	2.347	3.688	5.325
	40	90	157	255	441	601	990	1.411	2.180	3.755	5.901	8.521
6	15	39	68	111	191	261	430	613	947	1.631	2.563	3.700
	25	65	114	184	319	435	716	1.022	1.578	2.718	4.271	6.167
	40	104	182	295	511	696	1.146	1.635	2.525	4.348	6.834	9.867
7	15	44	77	125	217	296	487	695	1.073	1.848	2.904	4.194
	25	74	129	209	362	493	812	1.158	1.788	3.080	4.841	6.989
	40	118	206	334	579	788	1.299	1.853	2.861	4.928	7.745	11.183
8	15	49	86	140	242	330	544	775	1.198	2.063	3.242	4.681
	25	82	144	233	404	550	906	1.292	1.996	3.438	5.403	7.802
	40	131	230	373	646	880	1.450	2.068	3.194	5.501	8.645	12.484
10	15	60	105	170	294	401	660	942	1.455	2.506	3.938	5.686
	25	100	175	283	490	668	1.101	1.570	2.425	4.176	6.563	9.477
	40	160	280	453	785	1.069	1.761	2.512	3.880	6.682	10.502	15.164
14	15	80	141	228	394	537	886	1.263	1.951	3.360	5.281	7.625
	25	134	235	380	657	896	1.476	2.105	3.251	5.600	8.801	12.708
	40	214	375	608	1.052	1.433	2.362	3.368	5.202	8.960	14.082	20.333

TECHNICAL DATA

PRESSURE AND TEMPERATURE SPECIFICATIONS FOR COMPONENTS

DIN 2401

Material		Pressure	Maksimum operating pressure (bar g) and temperature (°C) DIN 2401											
			- 10°C + 120°C	200°C	250°C	300°C	350°C	400°C	425°C	450°C	475°C	500°C	510°C	520°C
GG 25	0.6025	PN 16	16	13	11	10								
		PN 16	16	13	11	10	(9)							
GGG-40.3	0.7043	PN 25	25	20	18	16	(14)							
		PN 40	40	32	28	24	(21)							
		PN 16	16	14	13	11	10	8		(6)				
		PN 25	25	22	20	17	16	13		(10)				
		PN 40	40	35	32	28	24	21		(18)				
GP 240 GH	1.0619	PN 63	63	50	45	40	36	32	(30)	(28)				
C 22.8	1.0460	PN 100	100	80	70	60	56	50	(48)	(46)				
St 35.8	1.0460	PN 160	160	130	112	96	90	80	(75)	(70)				
S 355J2G3	1.0570	PN 250	250	200	175	150	140	125		(110)				
		PN 320	320	250	225	192	180	160	(150)	(140)				
		PN 400	400	320	280	240	225	200		(175)				
		PN 40				40	38	36	35	34	33	29	24	19
		PN 63				63	61	58	57	56	53	47	40	32
		PN 100				100	95	91	89	87	82	74	62	49
G 17 CrMo 5-5	1.7357	PN 160				160	153	146	142	138	132	118	100	79
13 CrMo 4-5	1.7335	PN 250				250	238	227	223	217	206	184	154	124
		PN 320				320	304	292	285	278	264	237	200	158
		PN 400				400	380	364	356	348	330	295	250	198

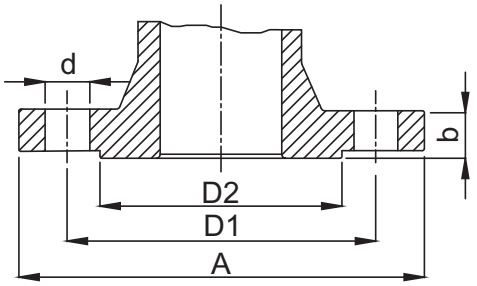
For ASTM Grup 2-1.1 Material

Temperature °C	Maksimum Operating Pressure (bar g)						
	ASA 150	ASA 300	ASA 400	ASA 600	ASA 900	ASA 1500	ASA 2500
- 28 to 30	19,6	51,1	68,1	102,1	153,2	255,3	425,5
50	19,2	50,1	66,8	100,2	150,4	250,6	417,7
100	17,7	46,6	62,1	93,2	139,8	233,0	388,3
150	15,8	45,1	60,1	90,2	135,2	225,4	375,6
200	13,8	43,8	58,4	87,6	131,4	219,0	365,0
250	12,1	41,9	55,9	83,9	125,8	209,7	349,5
300	10,2	39,8	53,1	79,6	119,5	199,1	331,8
325	9,3	38,7	51,6	77,4	116,1	193,6	322,6
350	8,4	37,6	50,1	75,1	112,7	187,8	313,0
375	7,4	36,4	48,5	72,7	109,1	181,8	303,1
400	6,5	34,7	46,3	69,4	104,2	173,6	289,3
425	5,5	28,8	38,4	57,5	86,3	143,8	239,7
450	4,6	23	30,7	56	69,0	115,0	191,7
475	3,7	17,4	23,2	34,9	52,3	87,2	145,3
500	2,8	11,8	15,7	23,5	35,3	58,8	97,9
538	1,4	5,9	7,9	11,8	17,7	29,5	49,2

Material	Forged	Casting
S-Si	A105	A216 / Gr.WCB
C Mn Si	A350 / Gr.LF2	---
C Mn Si V	A350 / Gr.LF6 Cl 1	---
3.1/2Ni	A350 / Gr.LF3	---

TECHNICAL DATA

FLANGE DIMENSIONS ACCORDING TO DIN NORMS (EN-1092-1 Welding Neck)



DN	Dimensions	PN 6	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100	PN 160
		DIN 2631	DIN 2632	DIN 2633	DIN 2634	DIN 2635	DIN 2635	DIN 2636	DIN 2638
15	A	80	95	95	95	95	105	105	105
	D1	55	65	65	65	65	75	75	75
	D2	40	45	45	45	45	45	45	45
	n x d	4x11	4x14	4x14	4x14	4x14	4x14	4x14	4x14
	b	12	14	16	16	16	20	20	20
20	A	90	105	105	105	105	130	130	140
	D1	65	75	75	75	75	90	90	100
	D2	50	58	58	58	58	58	58	58
	n x d	4x11	4x14	4x14	4x14	4x14	4x16	4x16	4x16
	b	14	18	18	18	18	22	22	24
25	A	100	115	115	115	115	140	140	140
	D1	75	85	85	85	85	100	100	100
	D2	60	68	68	68	68	68	68	68
	n x d	4x11	4x14	4x14	4x14	4x14	4x18	4x18	4x18
	b	14	18	18	18	18	24	24	28
32	A	120	140	140	140	140	155	155	195
	D1	90	100	100	100	100	110	110	145
	D2	70	78	78	78	78	78	78	78
	n x d	4x14	4x18	4x18	4x18	4x18	4x20	4x20	4x24
	b	14	18	18	18	18	24	24	30
40	A	130	150	150	150	150	170	170	170
	D1	100	110	110	110	110	125	125	125
	D2	80	88	88	88	88	88	88	88
	n x d	4x14	4x18	4x18	4x18	4x18	4x22	4x22	4x22
	b	14	18	18	18	18	26	26	34
50	A	140	185	165	165	165	180	195	195
	D1	110	145	125	125	125	135	145	145
	D2	90	122	102	102	102	102	102	102
	n x d	4x14	4x18	4x18	4x18	4x18	4x26	4x26	4x26
	b	14	18	18	18	18	26	28	36
65	A	160	200	185	185	185	205	220	220
	D1	130	160	145	145	145	160	170	170
	D2	110	138	122	122	122	122	122	122
	n x d	4x14	8x18	4x18	4x18	8x18	8c22	8x26	8x26
	b	14	20	18	22	22	26	30	40
80	A	190	220	200	200	200	215	230	230
	D1	150	180	160	160	160	170	180	180
	D2	128	158	138	138	138	138	138	138
	n x d	4x18	8x18	8x18	8x18	8x18	8x22	8x26	8x26
	b	16	20	20	24	24	30	34	44
100	A	210	250	220	235	235	250	265	265
	D1	170	210	180	190	190	200	210	210
	D2	148	188	158	162	162	162	162	162
	n x d	4x18	8x18	8x18	8x22	8x22	8x26	8x30	8x30
	b	16	20	20	24	24	32	36	50
125	A	240	250	250	270	270	295	315	315
	D1	200	210	210	220	220	240	250	250
	D2	178	188	188	188	188	188	188	188
	n x d	8x18	8x18	8x18	8x26	8x26	8x30	8x33	8x33
	b	18	22	22	26	26	34	42	60
150	A	265	285	285	300	300	345	355	355
	D1	225	240	240	250	250	280	290	290
	D2	202	212	212	218	218	218	218	218
	n x d	8x18	8x22	8x22	8x26	8x26	8x33	12x33	12x33
	b	18	22	22	28	28	36	48	68
200	A	320	340	340	360	375	415	430	430
	D1	280	295	295	310	320	345	380	380
	D2	258	268	268	278	285	285	285	285
	n x d	8x18	8x22	12x22	12x28	12x30	12x36	12x36	12x36
	b	20	24	24	30	34	48	60	78

TECHNICAL DATA

DIN 2448 SEAMLESS STEEL PIPE TABLE

Nominal	Outer	Standard Wall		Other Wall Thickness											
Size	Diameter	Thickness	Weight	1,8	2	2,3	2,6		3,2	3,6	4	4,5	5	5,6	6,3
inch	mm	mm	kg/m												
1/8	10,2	1,6	0,339	0,373	0,404	0,448	0,487								
1/4	13,5	1,8	0,519		0,567	0,635	0,699	0,758	0,813	0,879					
	16	1,8	0,630		0,691	0,777	0,859	0,937	1,01	1,10	0,879				
3/8	17,2	1,8	0,684		0,750	0,845	0,936	1,02	1,10	1,21	1,10	1,41			
	19	2	0,838			0,947	1,05	1,15	1,25	1,37	1,21	1,61	1,73		
	20	2	0,888			1,00	1,12	1,22	1,33	1,46	1,37	1,72	1,85		
1/2	21,3	2	0,952			1,08	1,20	1,32	1,43	1,57	1,46	1,86	2,01		
	25	2	1,13			1,29	1,44	1,58	1,72	1,90	1,57	2,28	2,47	2,68	2,91
	25,4	2	1,15			1,31	1,46	1,61	1,75	1,94	1,90	2,32	2,52	2,73	2,97
3/4	26,9	2,3	1,4				1,56	1,72	1,87	2,07	1,94	2,49	2,70	2,94	3,20
	30	2,6	1,76					1,94	2,11	2,34	2,07	2,83	3,08	3,37	3,68
	31,8	2,6	1,87					2,07	2,26	2,50	2,34	3,03	3,30	3,62	3,96
1	33,7	2,6	1,99					2,20	2,41	2,67	2,50	3,24	3,54	3,88	4,26
	38	2,6	2,27					2,51	2,75	3,05	2,67	3,72	4,07	4,47	4,93
1 1/4	42,4	2,6	2,55					2,82	3,09	3,44	3,05	4,21	4,61	5,08	5,61
	44,5	2,6	2,69					2,98	3,26	3,63	3,44	4,44	4,87	5,37	5,94
1 1/2	48,3	2,6	2,93					3,25	3,56	3,97	3,63	4,86	5,34	5,90	6,53
	51	2,6	3,10					3,44	3,77	4,21	3,97	5,16	5,67	6,27	6,94
	54	2,6	3,30					3,65	4,01	4,47	4,21	5,49	6,04	6,68	7,41
	57	2,9	3,87						4,25	4,74	4,47	5,83	6,41	7,10	7,88
2	60,3	2,9	4,11						4,51	5,03	4,74	6,19	6,82	7,55	8,39
	63,5	2,9	4,33						4,76	5,32	5,03	6,55	7,21	8,00	8,89
	70	2,9	4,80						5,27	5,90	5,32	7,27	8,01	8,89	9,90
	73	2,9	5,01						5,51	6,16	5,90	7,60	8,38	9,31	10,4
2 1/2	76,1	2,9	5,24						5,75	6,44	6,16	7,95	8,77	9,74	10,8
	82,5	3,2	6,26							7,00	6,44	8,66	9,56	10,6	11,8
3	88,9	3,2	6,76							7,57	7,00	9,37	10,3	11,5	12,8
	101,6	3,6	8,70								7,57	10,8	11,9	13,3	14,8
	108	3,6	9,27								10,3	11,5	12,7	14,1	15,8
4	114,3	3,6	9,83								10,9	12,2	13,5	15,0	16,8
	127	4	12,1									13,6	15,0	16,8	18,8
	133	4	12,7									14,3	15,8	17,6	19,7
5	139,7	4	13,4									15,0	16,6	18,5	20,7
	152,4	4,5	16,4										18,2	20,3	22,7
	159	4,5	17,1										19,0	21,2	23,7
6	168,3	4,5	18,2										20,1	22,5	25,2
	177,8	5	21,3											23,8	26,6
	193,7	5,6	26,0												29,1
8	219,1	6,3	33,1												
	244,5	6,3	37,0												
10	273	6,3	41,4												
12	323,9	7,1	55,5												
14	355,6	8	68,6												
16	406,4	8,8	86,3												
18	457	10	110												
20	508	11	135												
	559	12,5	168												
24	610	12,5	184												
	660	14,2	226												

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