



Power Generation Industry

Solutions to improve your plant performance



Engineering steam performance

Delivering value to you

GESTRA has more than 100 years of experience as a steam solution provider.

We focus daily on the customer needs by providing a high level technical support and a comprehensive set of solutions and reliable products aimed to optimise your plant performance.

Our solutions are designed to maximise the profitability and competitiveness of your assets by delivering the following values:

› Flexibility

State of the art solutions that allow your plant to adapt to variable and fluctuating conditions

› Productivity

Extremely reliable solutions that will reduce downtime

› Energy saving

Engineered solutions that will help reduce Opex and CO₂ footprint

› Maintenance reduction and ease of maintainability

Highly robust and reliable solutions can reduce your maintenance activities



COAL



GAS
(Combined Cycle)



NUCLEAR



**WASTE TO
ENERGY**



BIOMASS

More than 45 years experience in trouble shooting of severe service applications in the steam and water cycles.

We comply with ISO 9001, ISO 14001, OHSAS and we can provide products according to:

- › ASME
- › Pressure Equipment Directive PED
- › AD2000-HP0
- › ATEX IECEx Management Systems
- › Functional Safety Management System SIL
- › EAC
- › CRN
- › KTA1401
- › 100% production product testing on all products



How can we support you?

Providing solutions

Our expert sales engineers will support you throughout the entire process of improving your water, steam and condensate loop by selecting the best fit solution according to your needs and plant specifications.

Outstanding quality, reliability, ease of maintenance

State of the art technology products and solutions not only will enhance the plant performance but will also reduce downtime and relevant maintenance activities.

Engineered solutions and best in class products

Our products are engineered and manufactured in Germany. Close and effective relationships with universities and powergen associations grant a continuous development and improvement of our products. With an extensive and proven record of successful installations operated for years without failures we can deliver high value to our customers.



Delivering you value

Flexibility

- › Fossil fuel power plants, designed for operating at base load, are now called to generate adapting to **variable loads** and considerable fluctuations.
- › Power plants must be able to **start up** and **shut down** over short periods of time, run at minimum load and rapidly change generation output.
- › Quicker start ups require minimum boiler depressurisation, **efficient** condensate drainage, **reliable** spraywater control valves.
- › **Zero leakage tight shut-off** control valves with specifically engineered trims able to handle extremely severe conditions and **effective steam traps** become a must.



Productivity

- › The increasing importance of renewables causes the electricity demand from conventional power plants to be quite **variable**.
- › Fossil fuel power plants are more and more called to **frequently start up** and **shut down**, hence effective operational hours are decreasing and equipments are subject to more **stressful conditions**.
- › Power plants must be as **productive** as possible when called in operation hence **reducing downtime** due to equipment failures becomes critical.
- › **Zero leakage tight shut-off** and **wear resistant** desuperheating spraywater control valves **eliminate** the risk of **thermal shocks** in the steam loop as well as allow a proper steam temperature control.



Energy saving

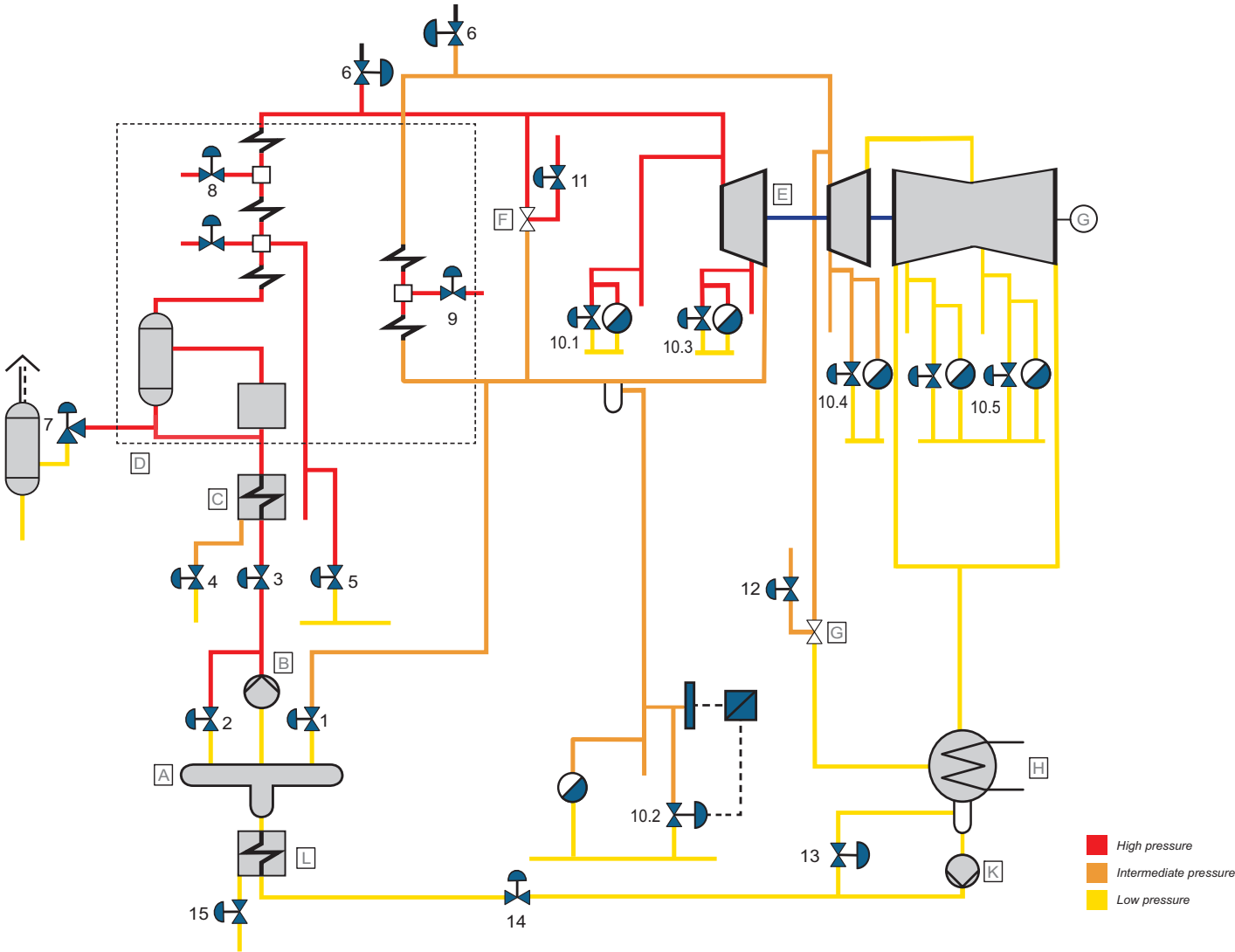
- › The increased number of start ups requires a strict **control of the losses** in the steam-water loop.
- › **Minimizing** high value steam losses such as flash steam to atmosphere not only will reduce **water replenishment** and relevant treatment **costs** but also will have a positive impact on **CO₂ footprint** enhancing plant **efficiency**.
- › **Zero leakage tight shut-off drain** valves and effective steam traps become a must.



Maintenance reduction and ease of maintainability

- › Power plants flexibility and productivity are highly influenced by equipment **reliability**.
- › **High** degree of **reliability** reduces **maintenance costs** and avoids unforeseen **downtime**.
- › **Robust** and **wear resistant valves** require **less maintenance** and at the same time a quick change trim design reduces maintenance time.

Optimising your plant performance



	Application	Pressure [bar]	Temperature [°C]
A	Feedwater tank 1 Heating system valve	~50	~400
B	Main feedwater pump 2 Feedwater leak-off valve 3 Feedwater control valve	up to 560 up to 560	~220 ~220
C	High pressure pre-heater 4 Condensate drain control valve	20-60	~300
D	Boiler plant 5 Boiler drain valve Soot-blower warm-up valve Soot-blower steam valve Boiler circulation control valve 6 Boiler vent valve 7 Start-up pot drain valve 8 High pressure spray attemperator valve 9 Intermediate pressure spray attemperator valve	up to 330 ~50 up to 330 180-330 up to 330 180-330 ~280 ~50	up to 620 300-350 550 ~250 up to 620 ~450 ~220 ~220
E	Turbine plant 10.1 Live steam drainage 10.2 Cold reheat line drainage 10.3 High pressure turbine drainage 10.4 Intermediate pressure turbine drainage 10.5 Low pressure turbine drainage	up to 330 ~50 up to 330 ~60 <20	up to 620 ~400 up to 620 up to 620 <400
F	High pressure bypass station 11 Spray injection valve	up to 350	~220
G	Intermediate pressure bypass station 12 Spray injection valve	up to 250	~220
H	Condenser		
K	Condensate pump 13 Condensate leak-off valve 14 Condensate control valve	10-25 10-25	~30 ~30
L	Low pressure preheater 15 Condensate drain control valve	~0.4-5	~30

Severe service applications for water and steam

Spray water control (8, 9, 11, 12)

These valves control the water flow required to keep the steam temperature of the superheater/reheater at the requested steam turbine set point. Water from the feedwater pump is mostly in the range from 50 to 280 bar. High pressure drop across the valve requires anti-cavitation trims. Accurate control performance is requested to keep the steam temperature set point. **Zero leakage tight shut-off** valves avoid thermal shock in the steam piping and turbine bypass stations.

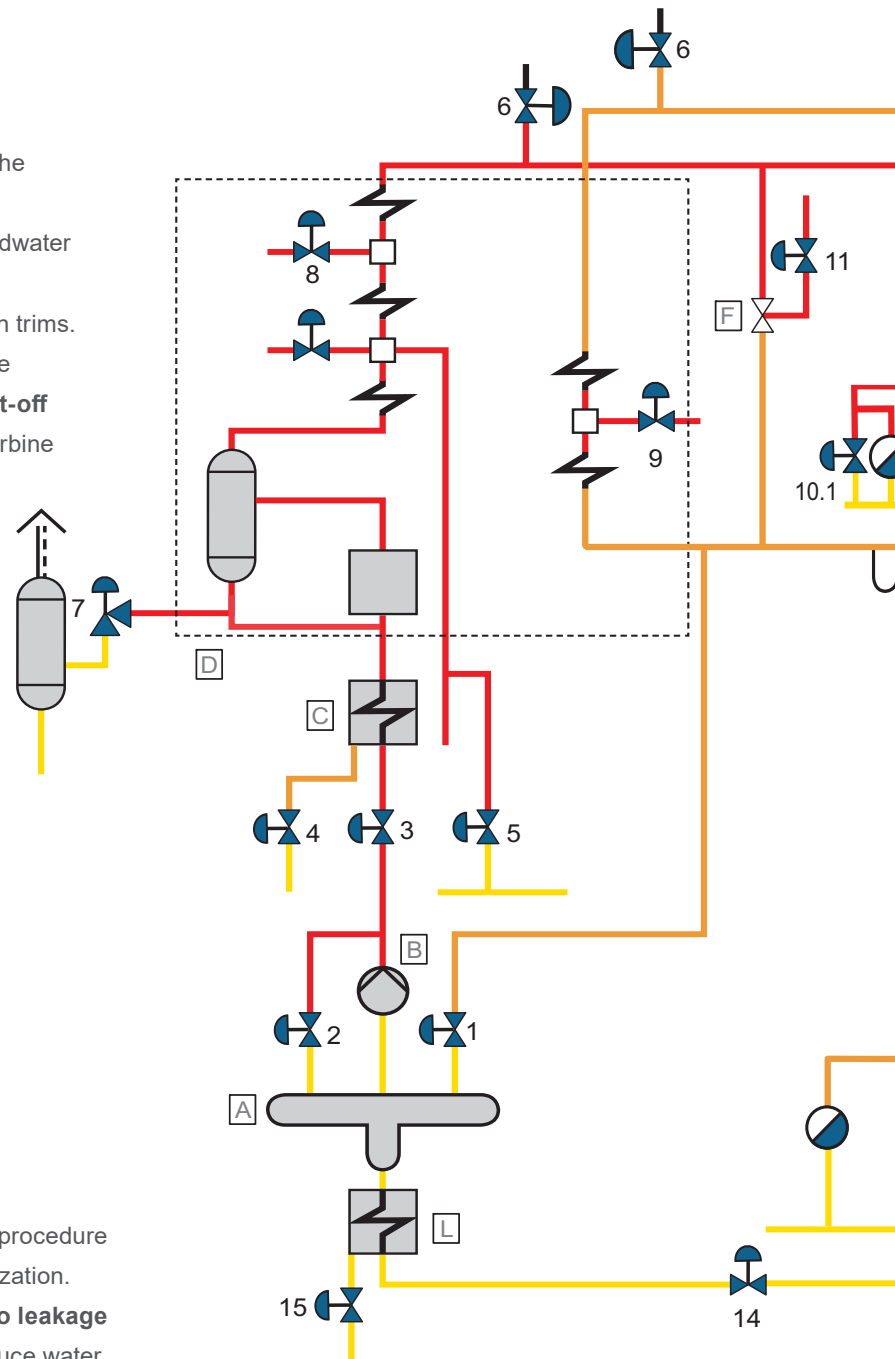
Feedwater pump recirculation (2)

This is one of the toughest and most important application in a power plant: This valve operates mostly during the boiler start up to protect the feed pump against cavitation damages. Differential pressure can reach 500 bar hence a special anti-cavitation trim is requested.

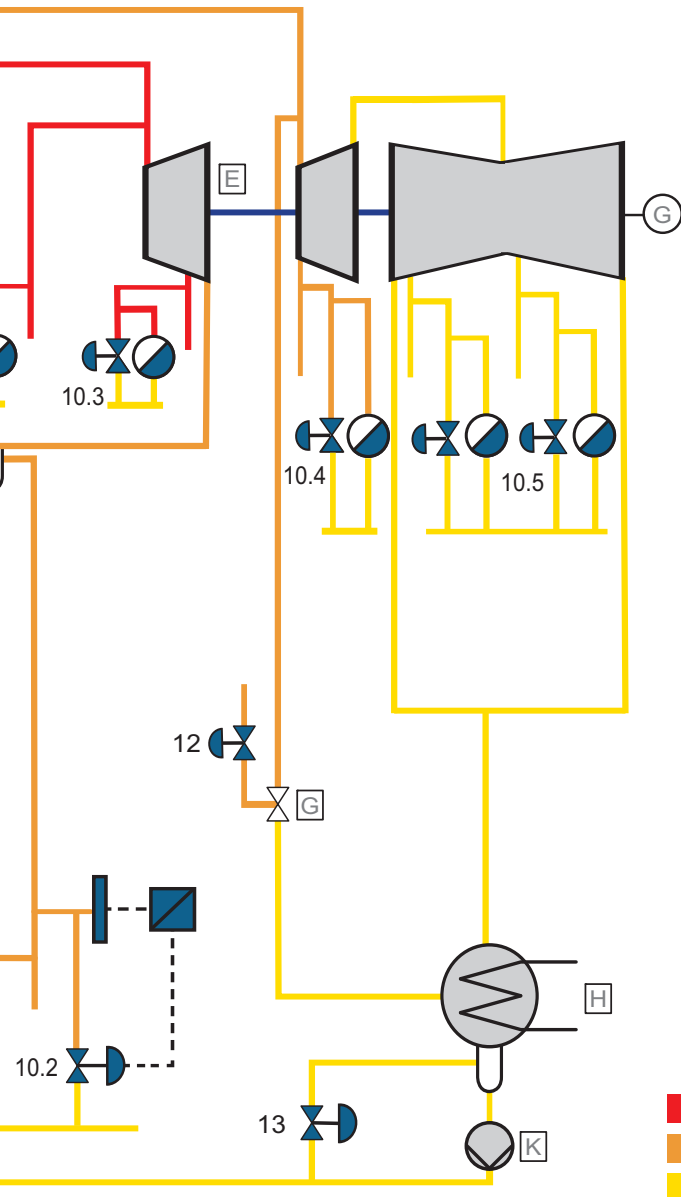
A **zero leakage tight shut-off valve** avoids energy losses.

Boiler vent valves (6)

These valves operate mostly during the plant start up procedure but also have a safe function in case of boiler pressurization. They handle high steam flow rates hence must be **zero leakage tight shut-off** in order to avoid energy losses and reduce water replenishment.



Severe service applications for flashing water

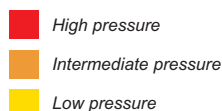


Blow down, drain and warm up (4, 5, 7, 10, 15)

These valves operate during the plant start up procedure. They handle flashing condensate coming from boiler, steam lines and the turbine. Specific trim design and special erosion proof materials are used to handle the 2-phase flow at high differential pressures (up to 220 bar). **Zero leakage tight shut-off** valves avoid energy losses, reduce water replenishment and allow quicker hot start ups. Effective steam traps contribute to energy saving drainage.

Controlled drainage with probes (10)

In nuclear power stations drain valves are continuously in operation since handling saturated/wet steam. In fossil fuel power stations cold reheat lines must be completely drained in order to avoid waterhammer and damages to reheaters. Level probes detect condensate and provide the signal to open and close the drain valves. They can also provide a fail safe function in order to grant the drainage. Specific trim design and special erosion proof materials are needed to handle the 2-phase flow during operation.



GESTRA solutions for severe service applications

ZK valves

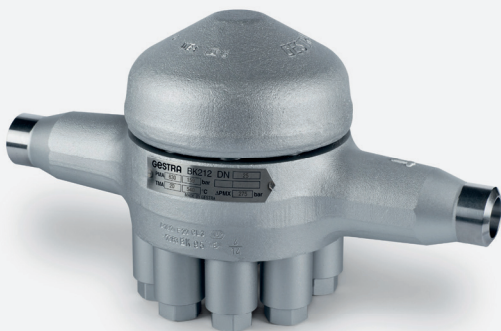
ZK valves with radial multi-stage nozzle

- › Pressure rating up to PN 630/Cl2500
- › Max. differential pressure up to 560 bar
- › Materials 1.0460/A105 up to 1.4903/F91
- › Metal to metal zero leakage tight shut-off
- › Combined isolation and control valve
- › Quick change trim
- › Suitable for electric, pneumatic and hydraulic actuators
- › Adjustable Kvs (Cv) values and characteristics ensure high flexibility
- › Low noise



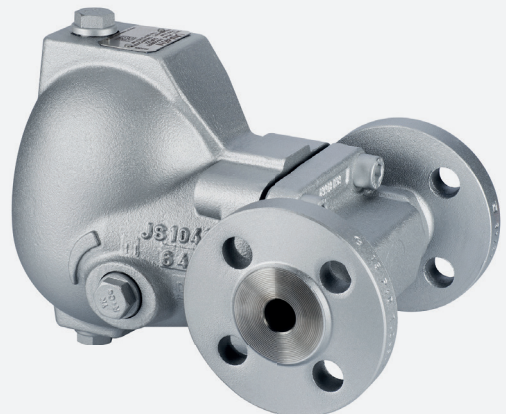
Steam traps

BK thermostatic steam traps



- › No steam losses
- › Energy efficient
- › High reliability

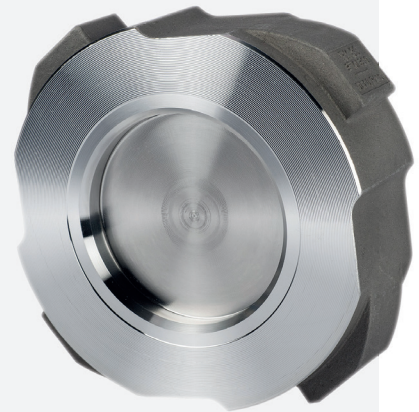
UNA float steam traps



Non-return valves

Wafer type RK and BB dual plate

- › Energy efficient
- › High reliability
- › Minimum pressure losses
- › Long service life



Level probes

NRG level probes

- › Up to PN 320
- › Max. temp. up to 550°C
- › Capacitive measurement system - SIL 2 safety rating according IEC61508
- › Small HMI for easier setup and calibration
- › Plug and socket connection and preconfigured cable available for faster installation





GESTRA AG

Münchener Str. 77 • 28215 Bremen • Germany Tel. +49 421 3503-0 info@de.gestra.com
P.O. Box 10 54 60 • 28054 Bremen • Germany Fax +49 421 3503-393 www.gestra.com
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