

Welcome

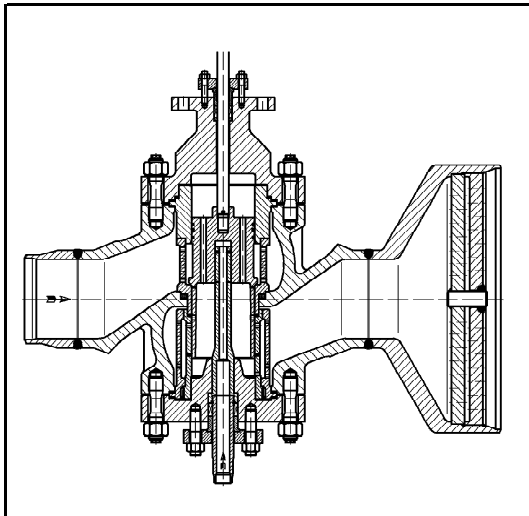


... to the HORA world

Holter Regelarmaturen GmbH & Co. KG



► 1. Company Presentation



► 2. Products and Application

Location



HORA

Holter Regelarmaturen GmbH & Co. KG

Helleforthstr. 58-60

33758 Schloß Holte-Stukenbrock

North Rhine-Westfalia (NRW)

Germany

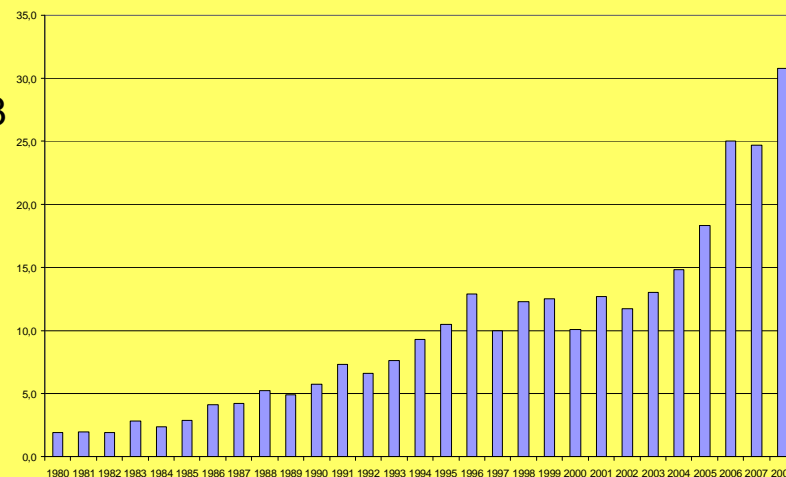
<http://www.hora.de>



Main sales figures



Turnover PT
+25% in 2008



Export

Business Unit PowerTechnology	> 60%
Business Unit Building + Automation	15%

to 47 different countries (2002)

Facts & Figures



Site 37,000 m² (400,000 ft²)
Office area 2,100 m² (23,000 ft²)
Production and stock area 7,500 m² (81,000 ft²)

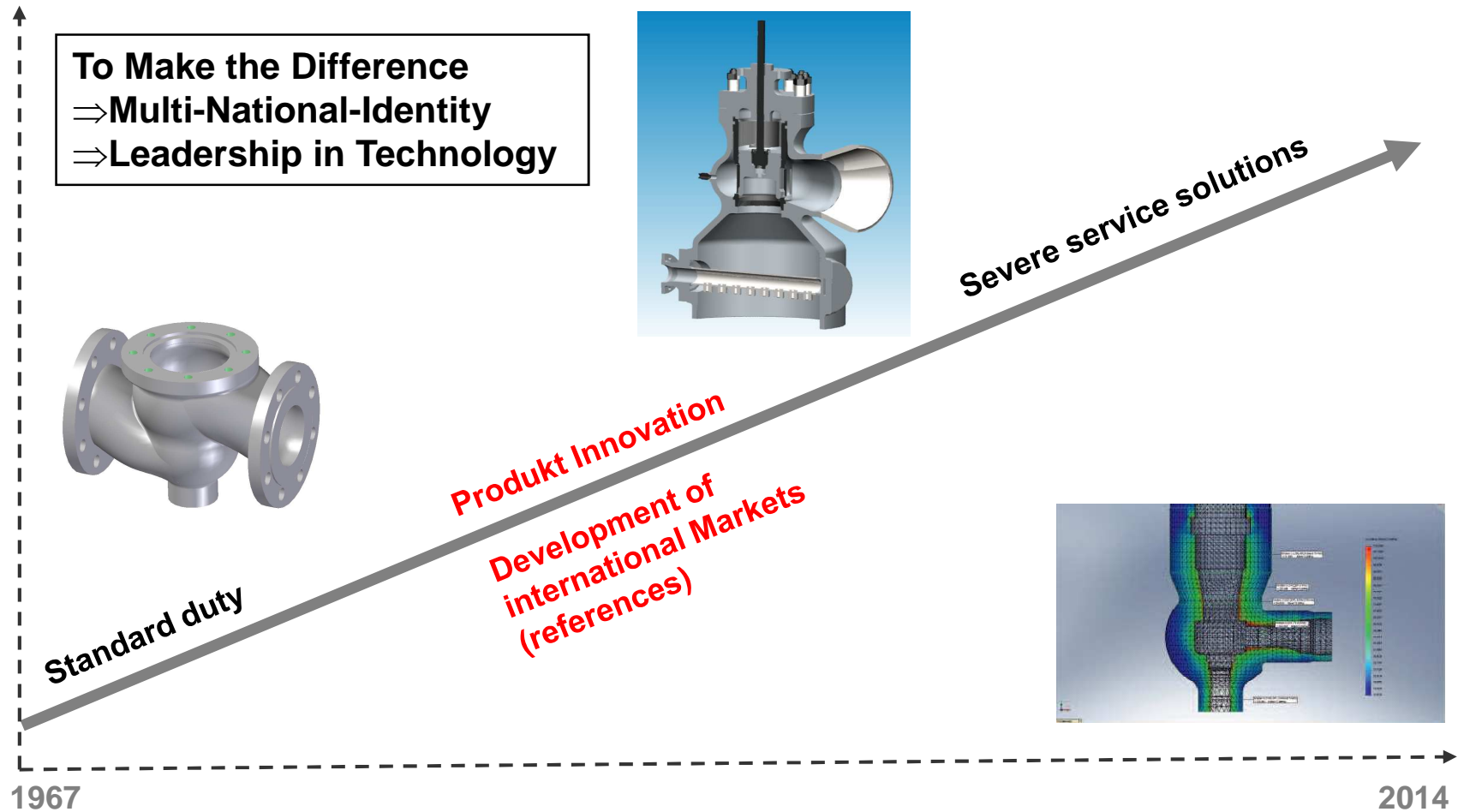
All activities at one location.

founded 1967
by Georg Dresselhaus
(1928 - 1995)
100% shareholder Dr. Dieter Dresselhaus
equity capital quota > 40%
Workforce > 250 employees

**One company – two business units
Power Technology - Building & Automation**

HORA Power Technology: Way of success

Sales

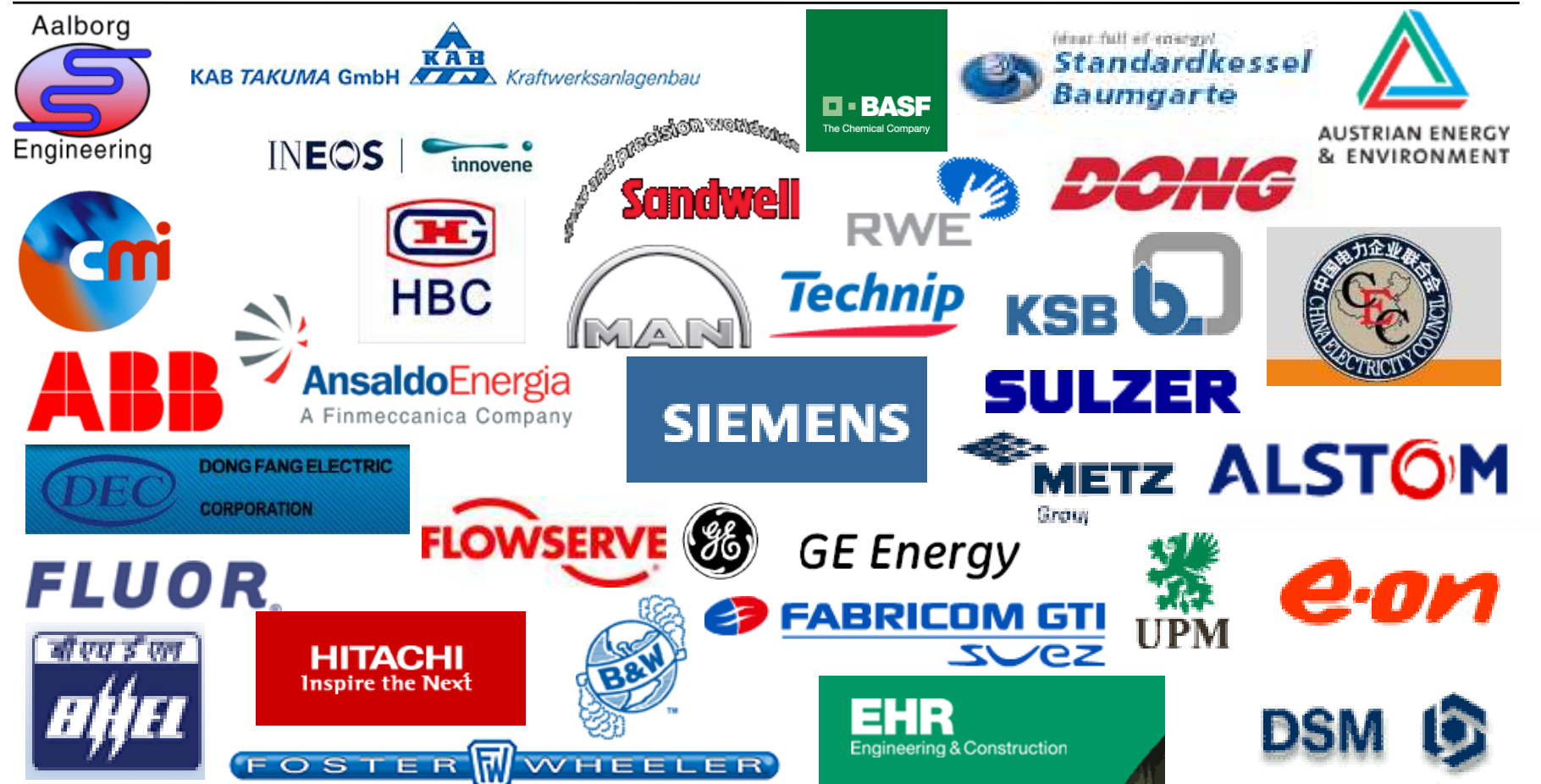


International partners - Power Technology



Australia, Austria, Belgium, Bulgaria, Canada, China, Czechia, Denmark, Estonia, Finland, Greece, Hungary, Italy, India, Japan, Luxembourg, Mexico, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Spain, South Africa, Sweden, Switzerland, Taiwan, Turkey, United Kingdom, USA

Major references - Power Technology



90% thermal power plant business

Quality management



- Quality management

EN ISO 9001:2000
KTA 1401
QSP 4a

certified by

TÜV Cert since 1993
Siemens since 1995

- Management manual

German / English
process oriented

CE Conformity approval for all electric HORA actuators

- Self-developed intranet-based system
for handling returns & rejects

Approvals / Certifications

Specification	Institute	
EN ISO 9001	TÜV CERT, Hanover / Sachsen Anhalt	Quality management system
KTA 1401, QSP 4a	VGB / Siemens	Approval for German nuclear industry
TRD 201	TÜV, Hanover / Sachsen Anhalt	Approval for German steam boiler regulations
AD-HP0	TÜV, Hanover / Sachsen Anhalt	Approval for German pressure vessels regulations
EN 729-2	TÜV, Hanover / Sachsen Anhalt	Quality requirements for welding
EN 288-1	TÜV, Hanover / Sachsen Anhalt	Approval in accordance with EU / welding procedures
EN 287-1	TÜV, Hanover / Sachsen Anhalt	Approval in accordance with EU / welder test
97 / 23 / EG	TÜV, Hanover / Sachsen Anhalt	Full quality assurance acc. to PED module H
AD-A2 / TRD 421	RW TÜV, Essen	European type-test approval for safety-valves
90 / 396 / EWG	DVGW, Bonn	European regulation for gas equipment
GOST - R	SGS Control, Hamburg	Russian consumer protection directive in the CIS
GGTN	Russian Labor, St. Petersburg	Product certification
ASME/ANSIB16.34	RW TÜV, Essen	Delivery acc. to American National Standard f. valves
UC-920/1	UDT, Poland	Approval for turbine bypass valves to Poland
Nr U-19/1	UDT, Poland	Approval for severe service valves to Poland

Testing facilities



Cv and valve characteristic testing facility
according to EN 60534-2-3:1998



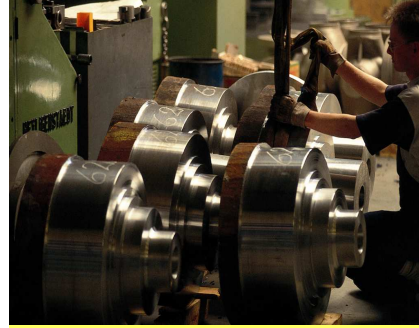
5 Pressure testing facilities

- up to DN 1500 (60")
- up to 1000 bar (14500 psi)

Production facilities



welding equipment



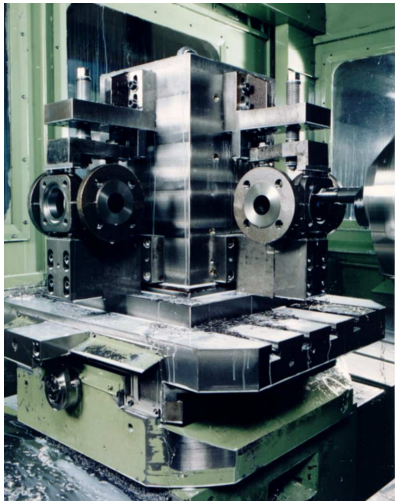
CNC lathe



2 horizontal boring machines



8 paternoster stores



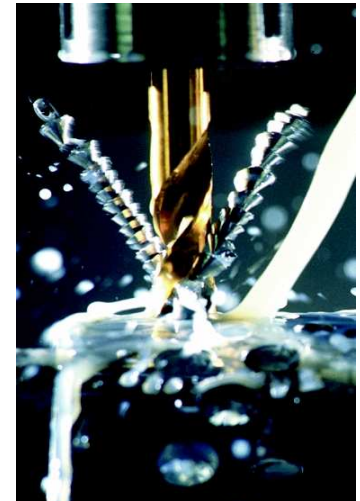
3 complex CNC working centres



manual lathe

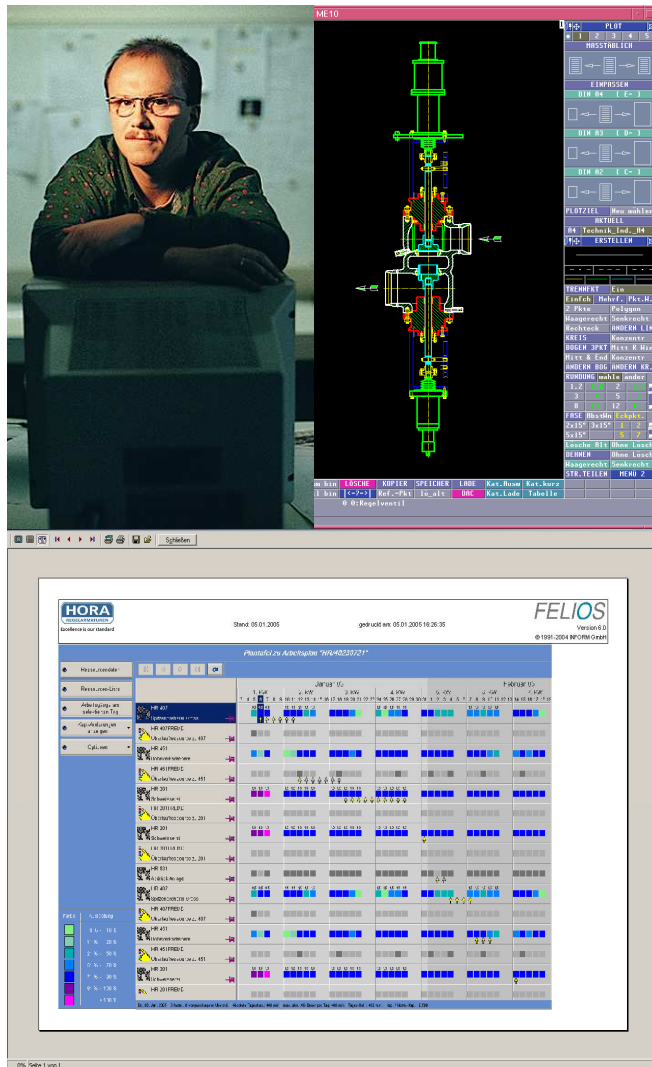


material stock



5 vert. machining centres

Information technology as a strategic tool



CAD

Computer Aided Design

EDM

Engineering Data Management

Animation

Visualization of product function

CFD

Computational Fluid Dynamics

ERP

Enterprise Resource Planning

APS

Advanced Planning+Scheduling

CRM

Customer Relationship Management

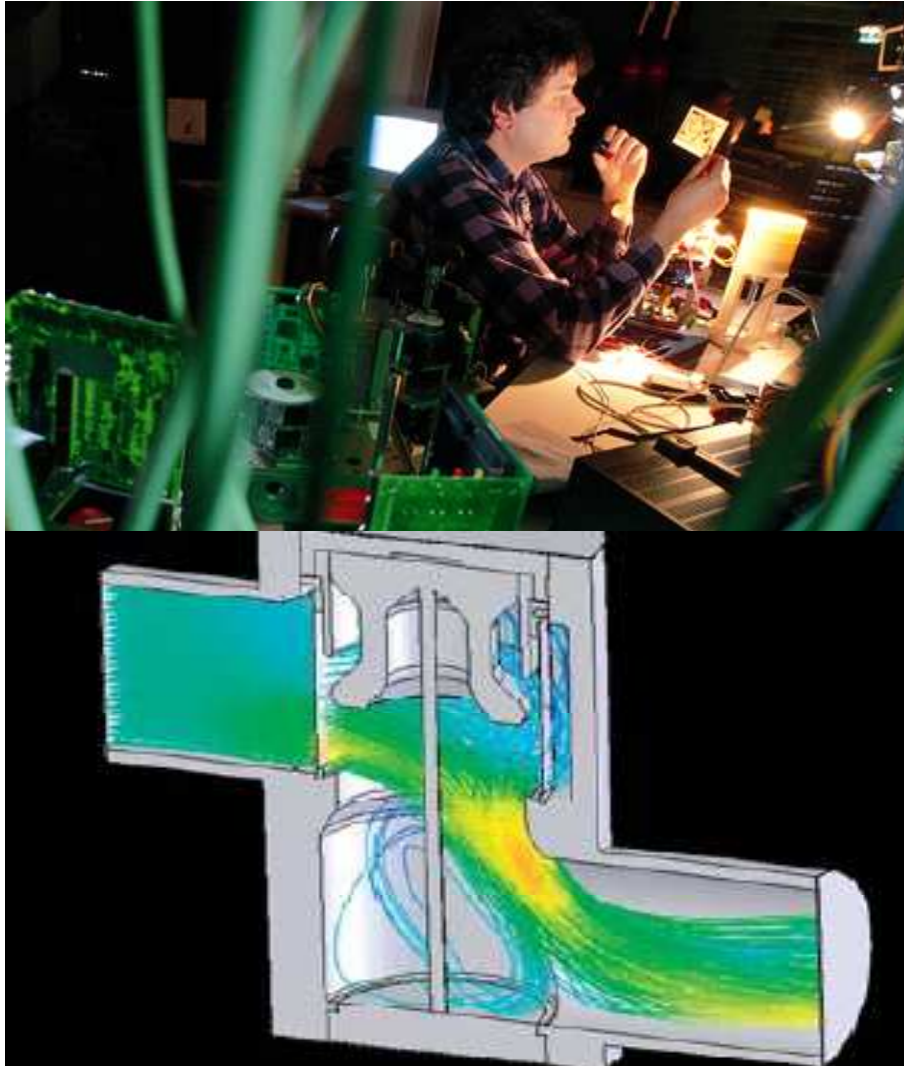
Intranet

Information system, data base



HORA-Animation

Research and Development



**All HORA products
are our own development.**

- Continuous R&D and utilization of the most up to date engineering tools
- National and international patents
- Cooperation with customers, research institutes and universities.
- Meeting the ever-changing needs of our customer

HORA service department

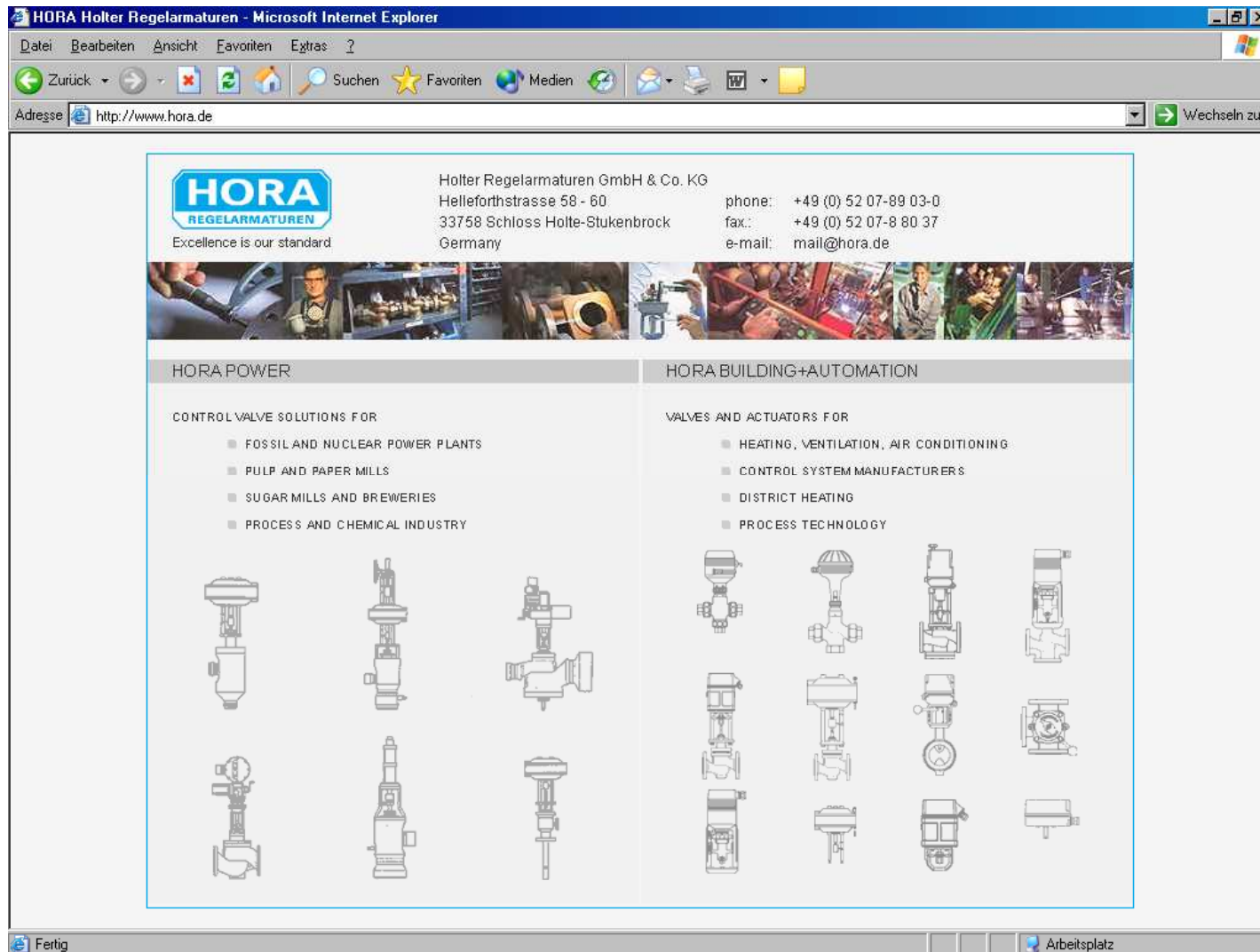


- Service life analysis
- Process data analysis
- Spare parts stockholding
- Preventative Maintenance
- Modernization – retrofits, modifications, upgrades
- Commissioning
- Training



Training Center

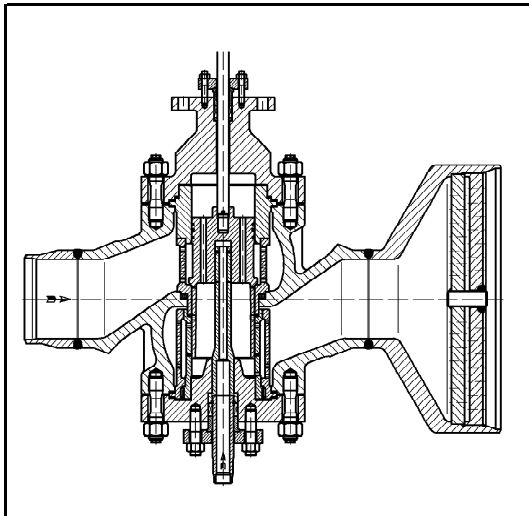




Holter Regelarmaturen GmbH & Co. KG

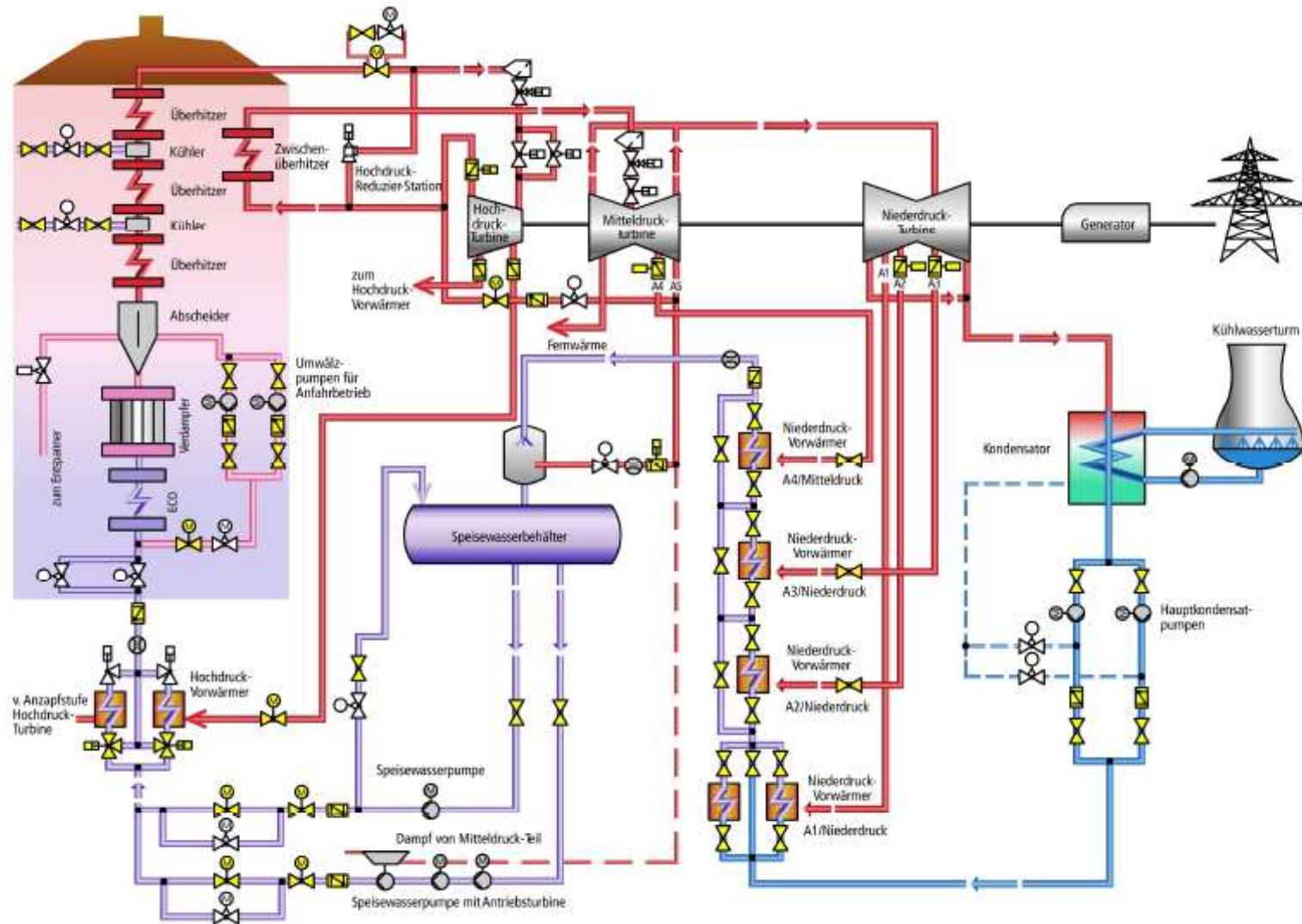


► 1. Company Presentation

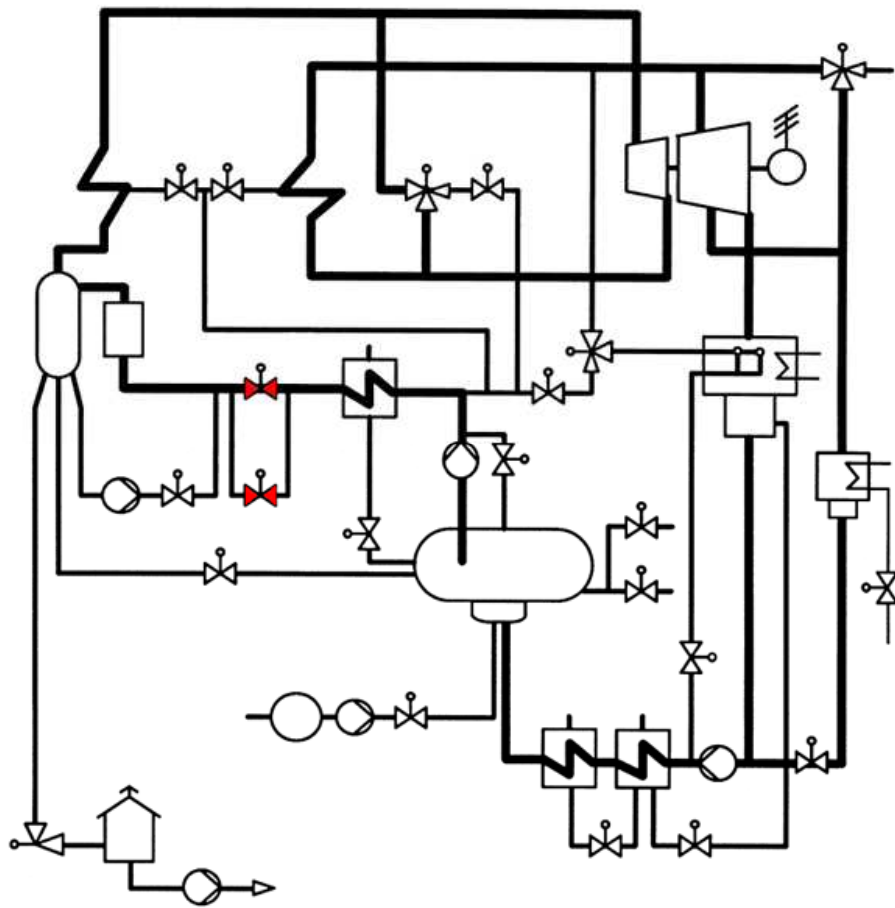


► 2. Products and Application

HORA - control valves for industry and power plants



HORA - control valves for industry and power plants



Feed water control

Pressure reducing & desuperheating

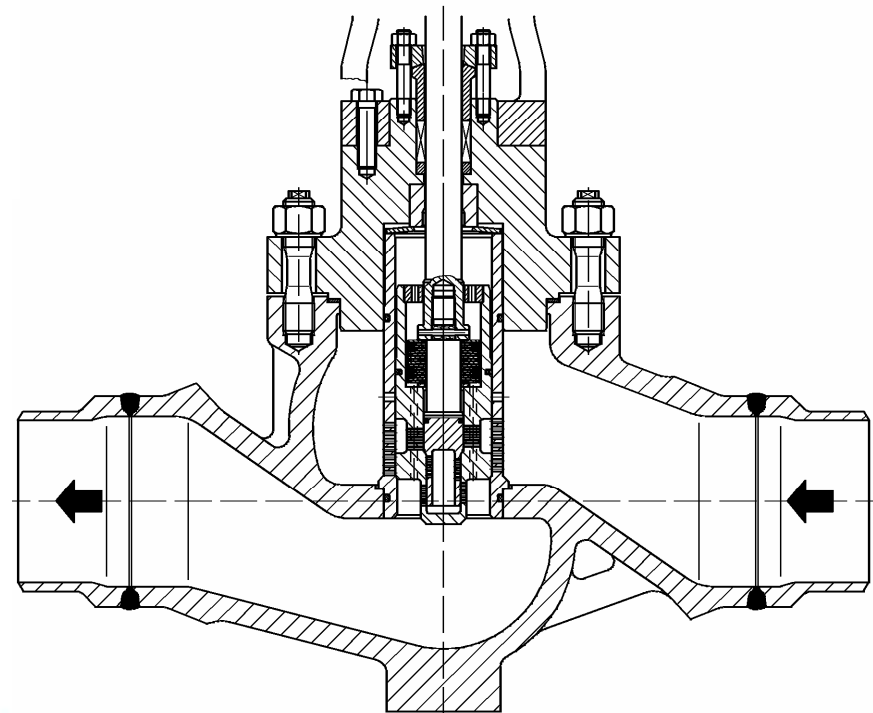
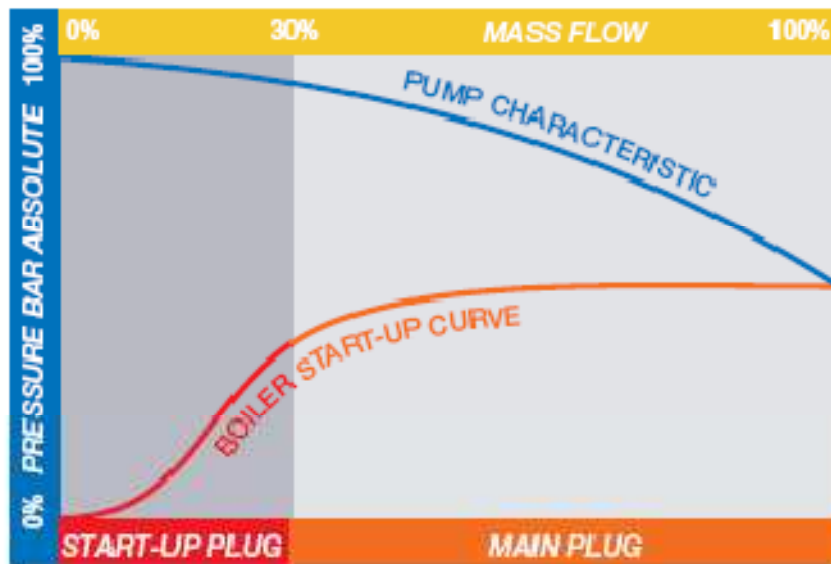
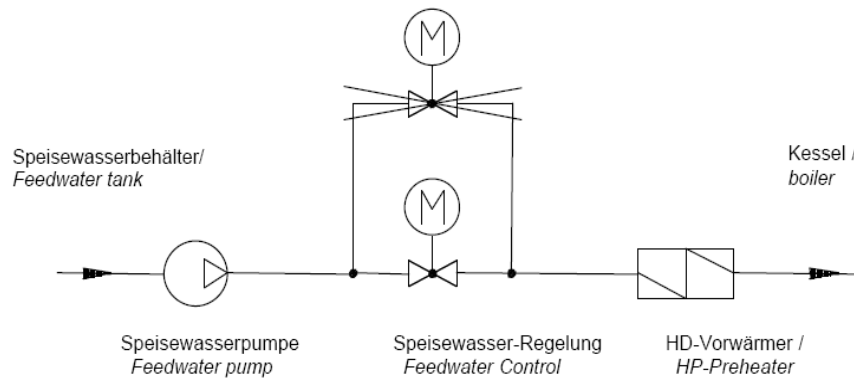
Pump protection

Special applications

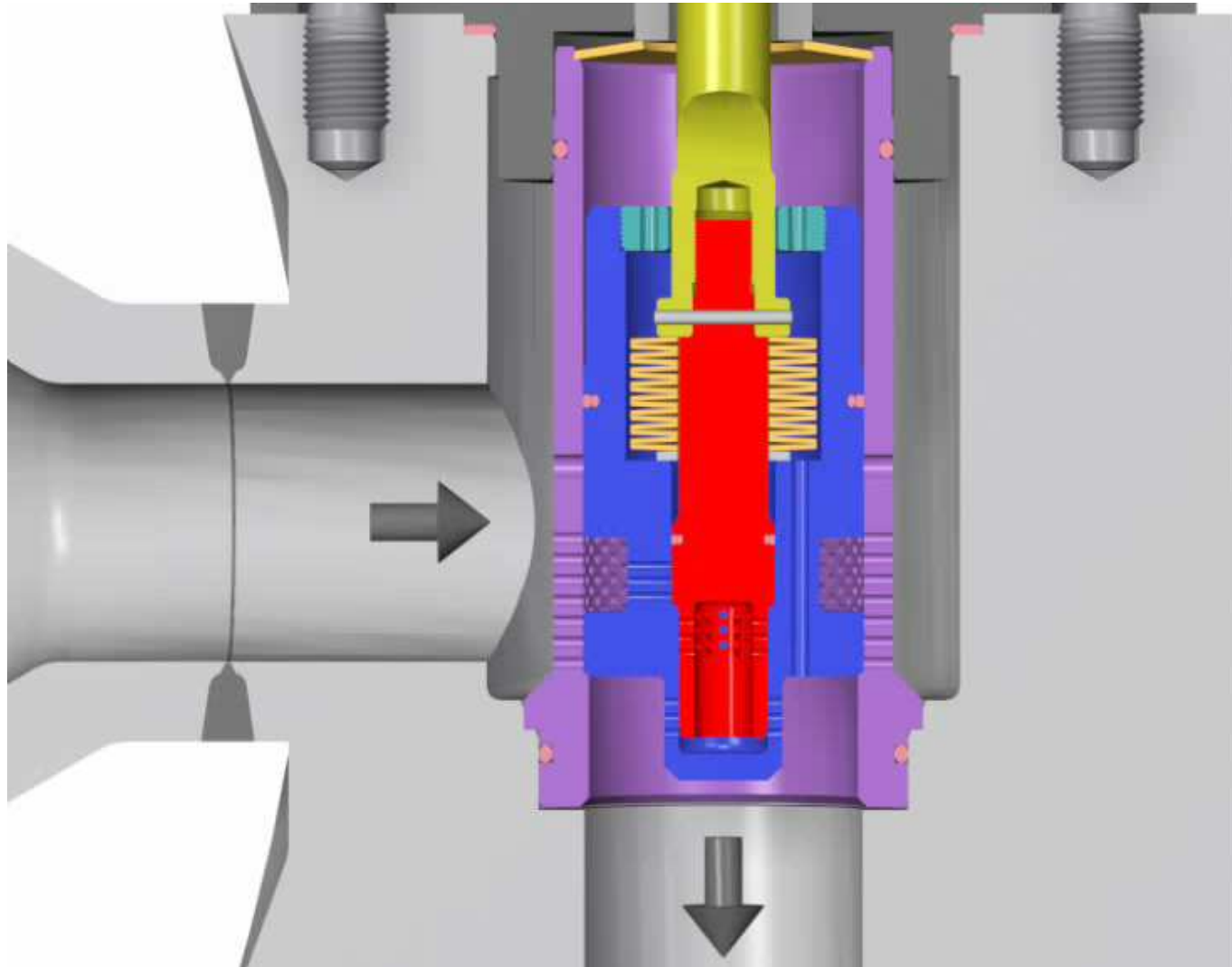
Control valves

Actuators

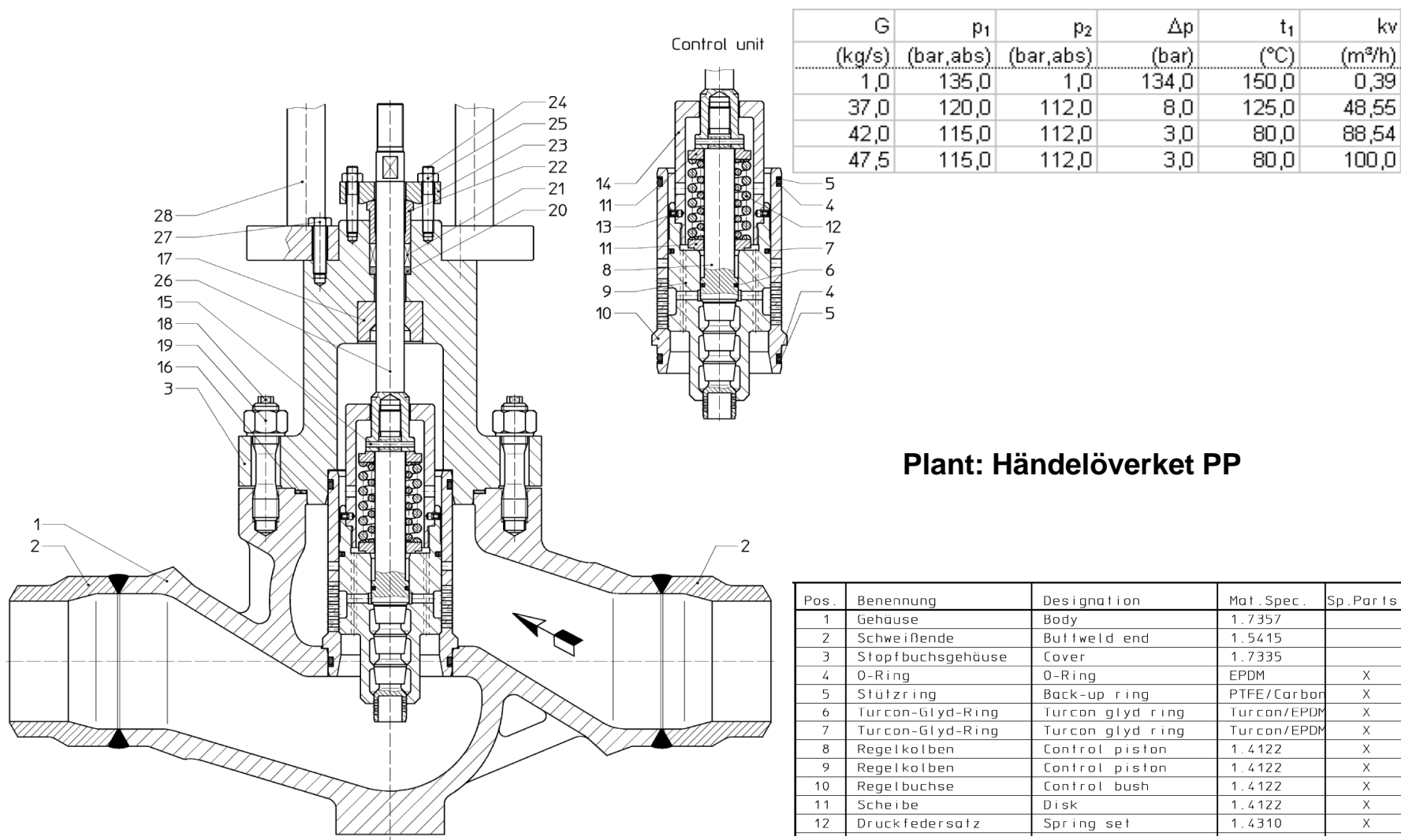
Combined feed water control valve



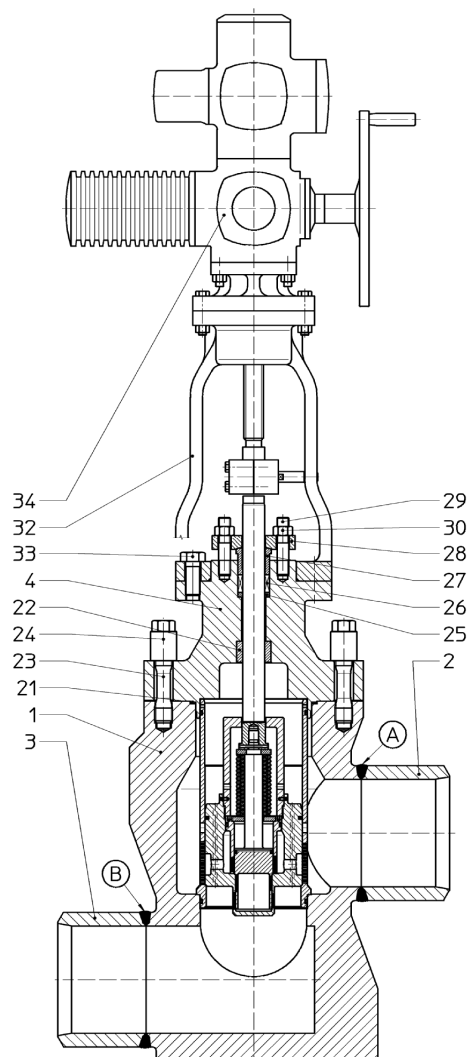
Combined feed water control valve



Combined feed water control valve



Combined feed water control valve

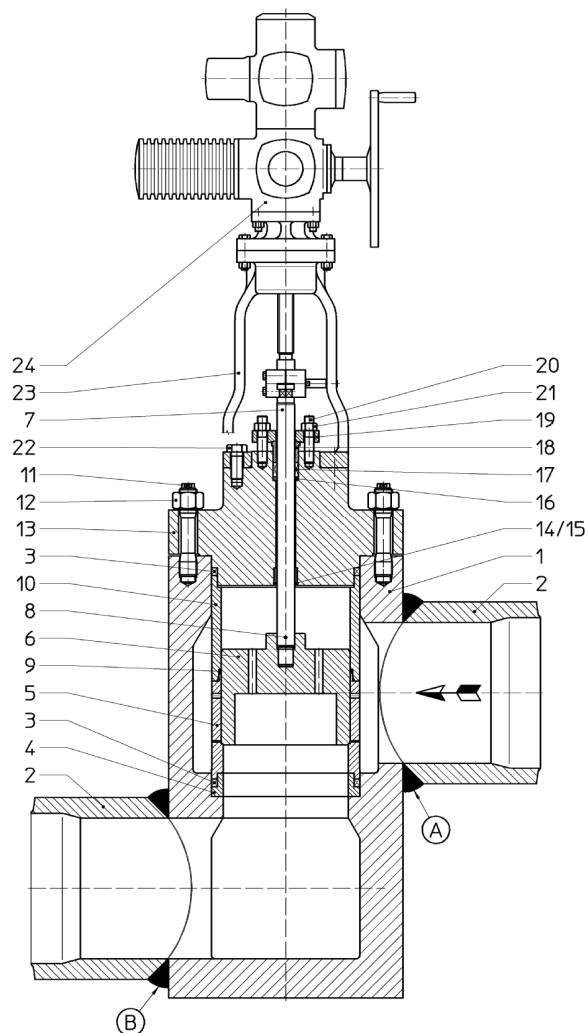


load conditions:	G	p ₁	p ₂	t ₁	kv
	(kg/s)	(bar,abs)	(bar,abs)	(°C)	(m³/h)
1	216,1	130,1	128,1	147,4	573,2
2	247,0	142,9	140,3	152,0	576,0
3	30,9	100,0	4,3	122,7	12,9
4	117,3	100,0	4,4	122,7	48,8
5	61,7	100,0	57,0	122,7	34,9

Plant: Kogan Creek 750 MW Super Critical PP

Pos.	Designation	Piece No.	Mat. Spec.	ASME Mat. Spec.	Sp. Parts
1	Body	1	1.6368	---	
2	Buttweld end	1	1.6368	---	
3	Buttweld end	1	1.6368	---	
4	Cover	1	1.6368	---	
5	O-Ring	2	EPDM	---	X
6	Back-up ring	2	PTFE/Carb.	---	X
7	Turcon glyd ring	1	Turc /EPDM	---	X
8	Turcon glyd ring	1	Turc /EPDM	---	X
9	Control piston	1	1.4122	min 13% Cr	X
10	Control piston	1	1.4122	min 13% Cr	X
11	Control insertion	1	1.4122	min 13% Cr	X

Main feed water control valve

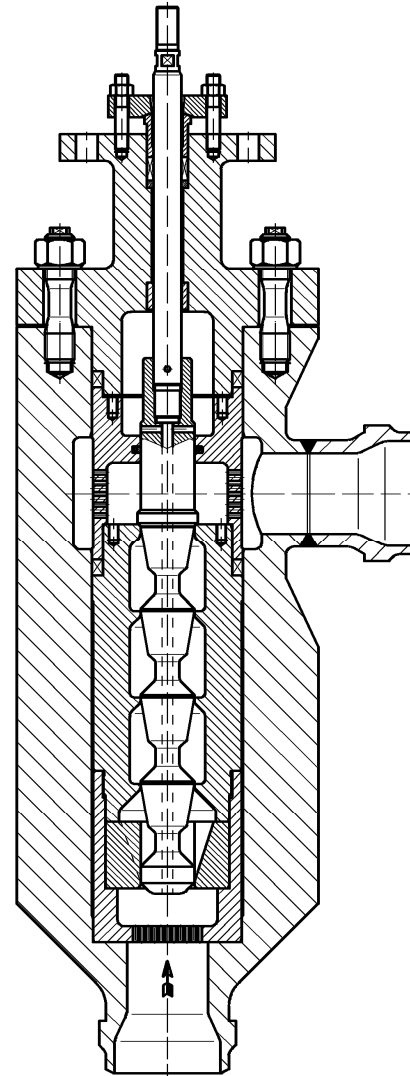
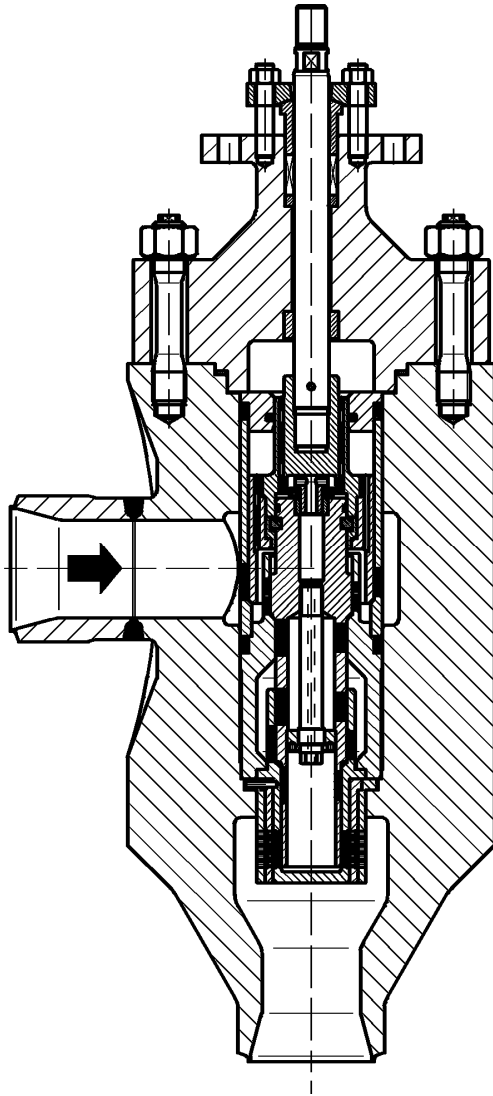


load conditions:		G	p ₁	p ₂	t ₁	kv
		(kg/s)	(bar,abs)	(bar,abs)	(°C)	(m³/h)
1		617,4	310,6	308,9	189,0	1819,8
2		680,2	324,1	322,1	189,0	1848,5
3		185,2	122,2	122,0	142,1	1549,3
4		401,3	235,8	214,1	171,0	327,4

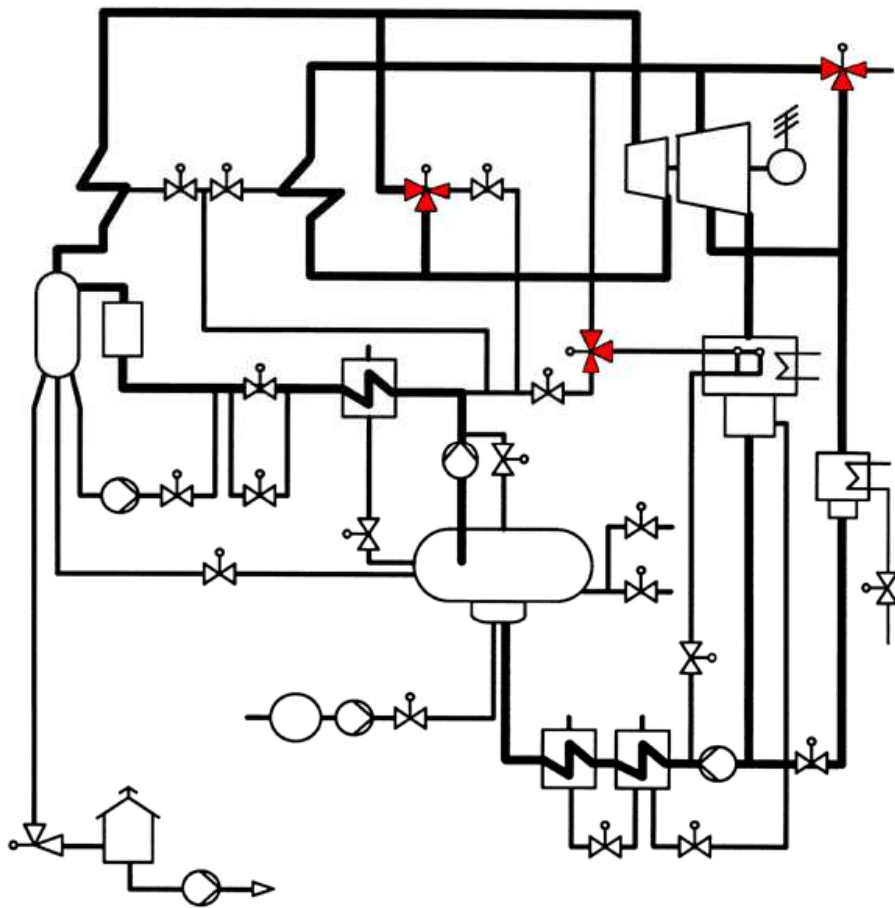
Plant: Kogan Creek 750 MW Super Critical PP

Pos.	Designation	Piece No.	Mat. Spec.	ASME Mat. Spec.	Sp. Parts
1	Z-body	1	1.6368	---	
2	Welding end	2	1.6368	---	
3	Sealing cap	2	1.4541/Gr.	---	X
4	Seat ring	1	1.4122	min. 13% Cr	X
5	Perforated cage	1	1.4122	min. 13% Cr	
6	Plug	1	1.4057	min. 13% Cr	X
7	Valve stem	1	1.4122	min. 13% Cr	X
8	Cylindrical pin	1	1.4305	min. 13% Cr	X
9	Turcon-variseal-ring	1	T24S	---	X
10	Guide bushing	1	1.4122	min. 13% Cr	X

Start-up feed water control valve



HORA - control valves for industry and power plants



Feed water control

Pressure reducing & desuperheating

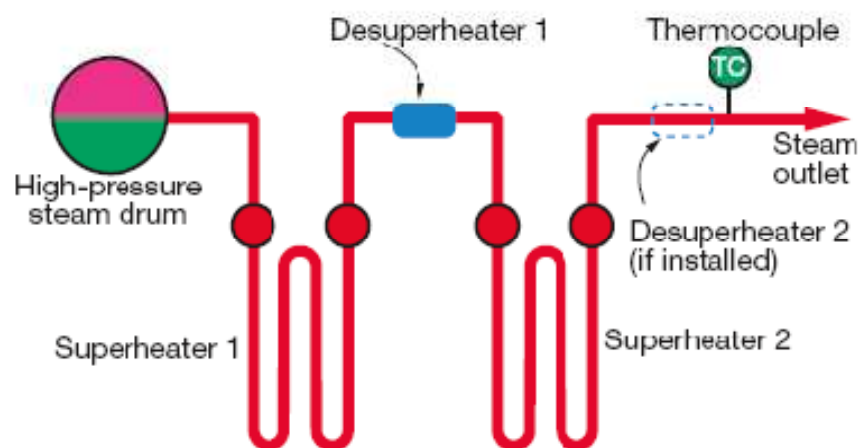
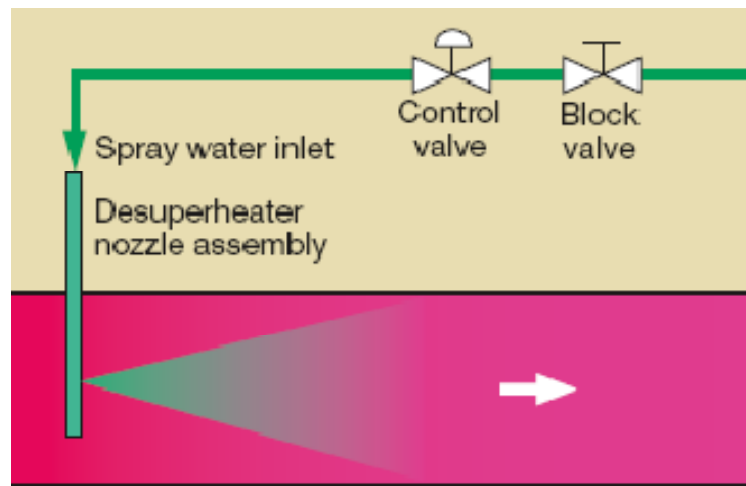
Pump protection

Special applications

Control valves

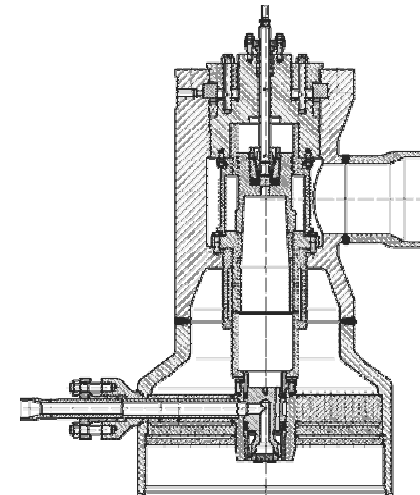
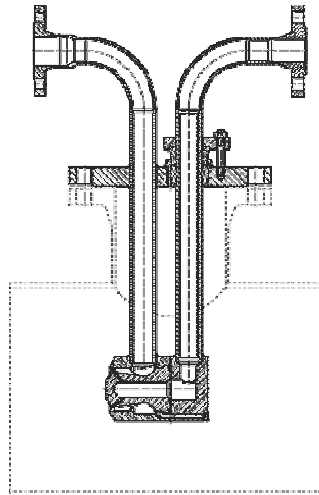
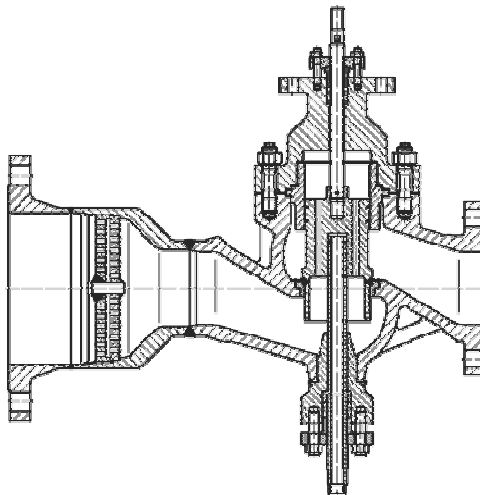
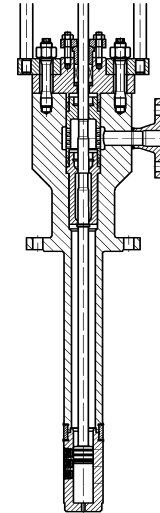
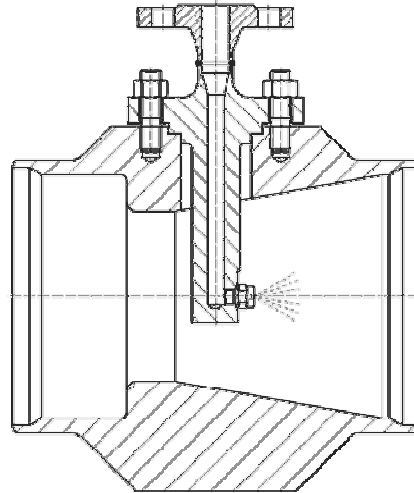
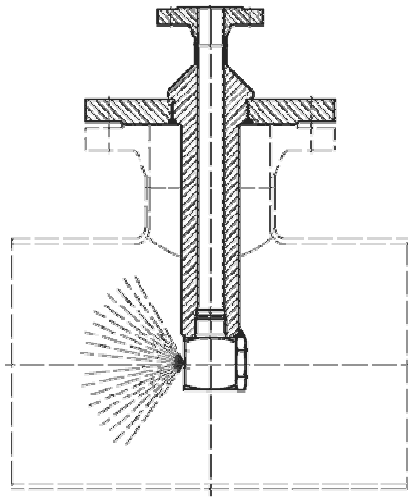
Actuators

Fundamentals of desuperheating

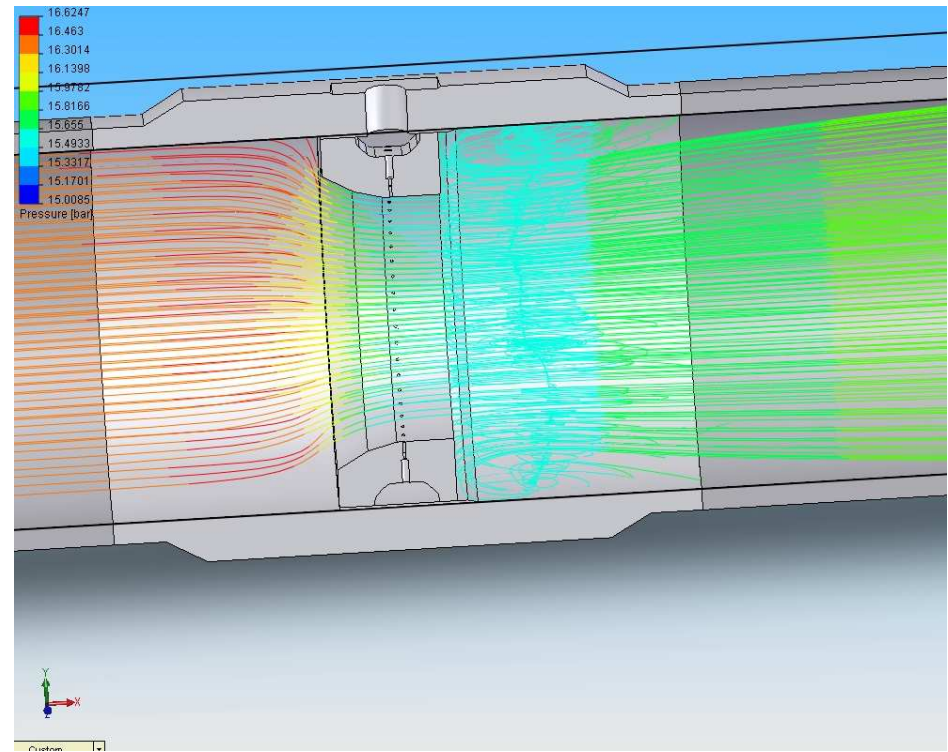
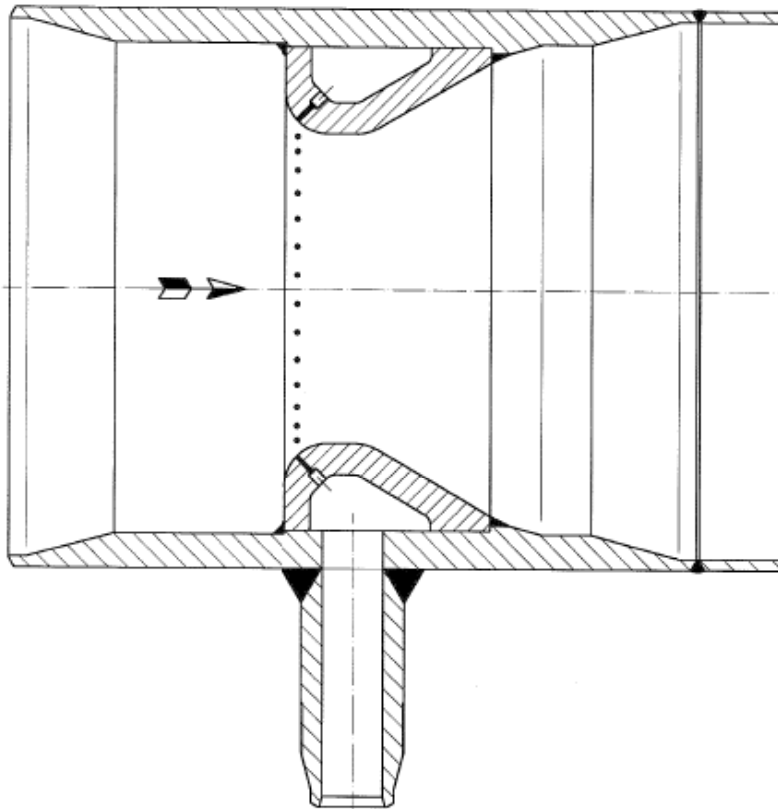


- Small Water Droplets (Fine Atomization)
 - Even distribution of droplets into steam
 - Injection at high velocity and turbulence point
 - High water temperature (low surface tension)
-
- High Rangeability
 - Tight Shut-Off Design
 - Operation near saturation
 - Short Distance to temperature sensor
 - High cycling operation

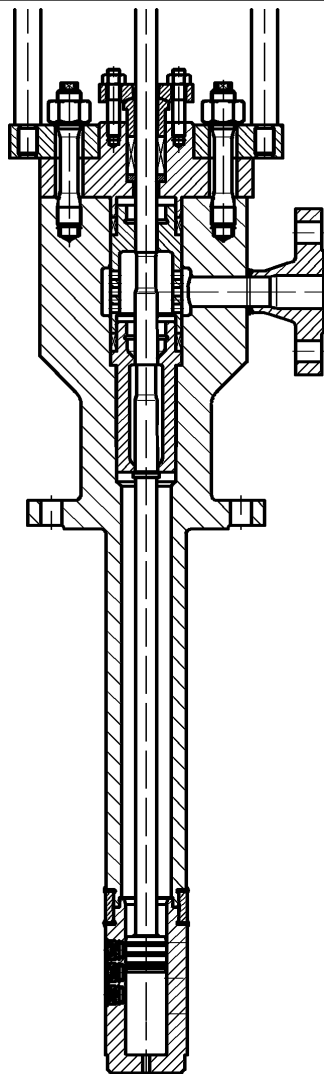
HORA solutions: tailor made, cost effective and reliable



Venturi type Desuperheater



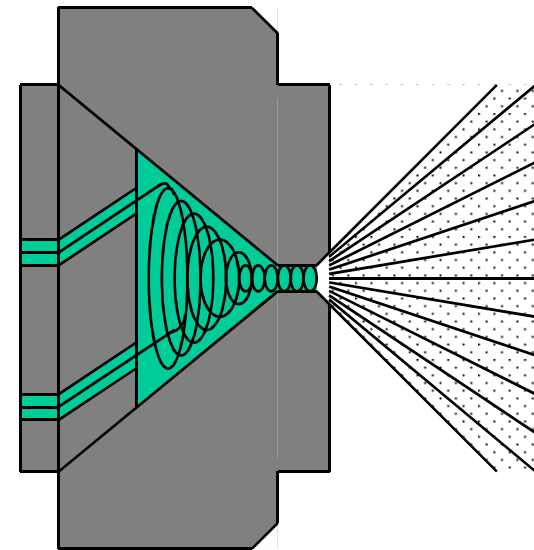
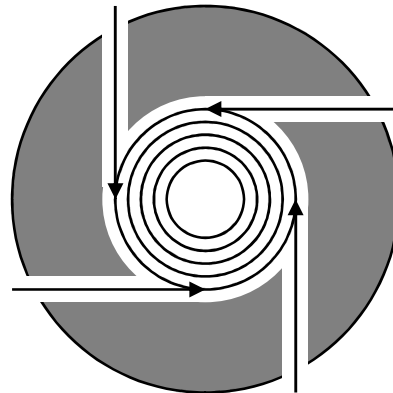
Multi-nozzle spray type desuperheater



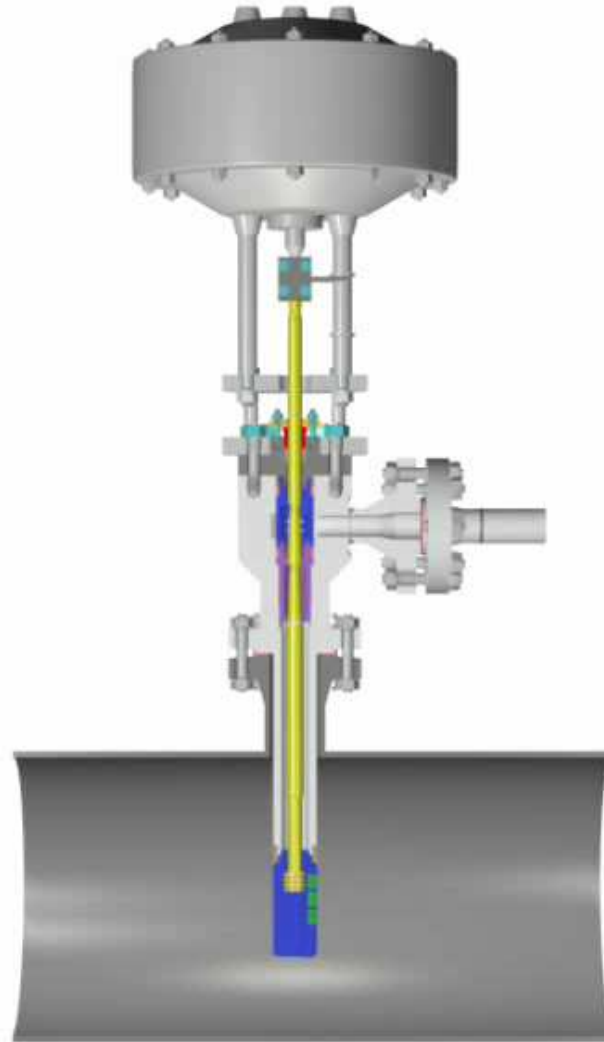
The patented HORA multi-nozzle spray type desuperheater offers a extended life and and improves the system Performance.

- One piece forging, free of welded steam line connection, experiences no cracking under severe conditions.
- Cascaded stem enables to control higher pressure drops avoiding nozzle erosion
- Seat position above steam pipe, outside heat affected zone to ensure proper shut-off.

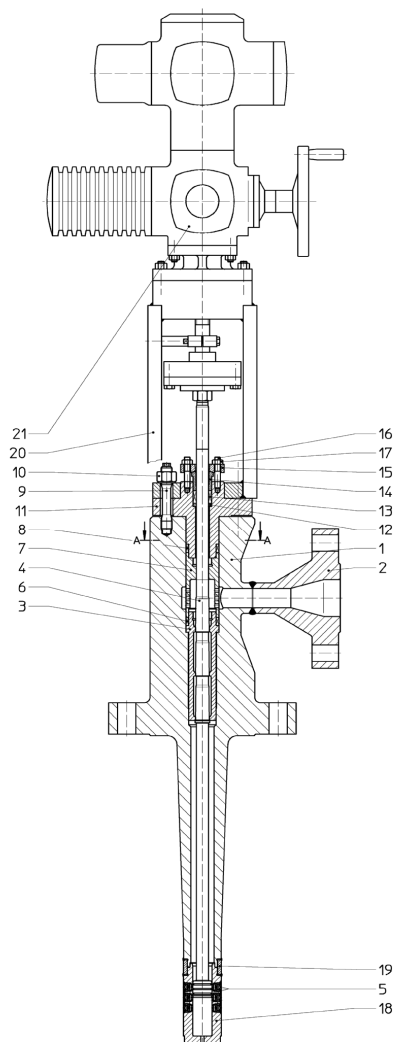
Multi-nozzle spray type desuperheater



Multi-nozzle spray type desuperheater



HRH Desuperheater

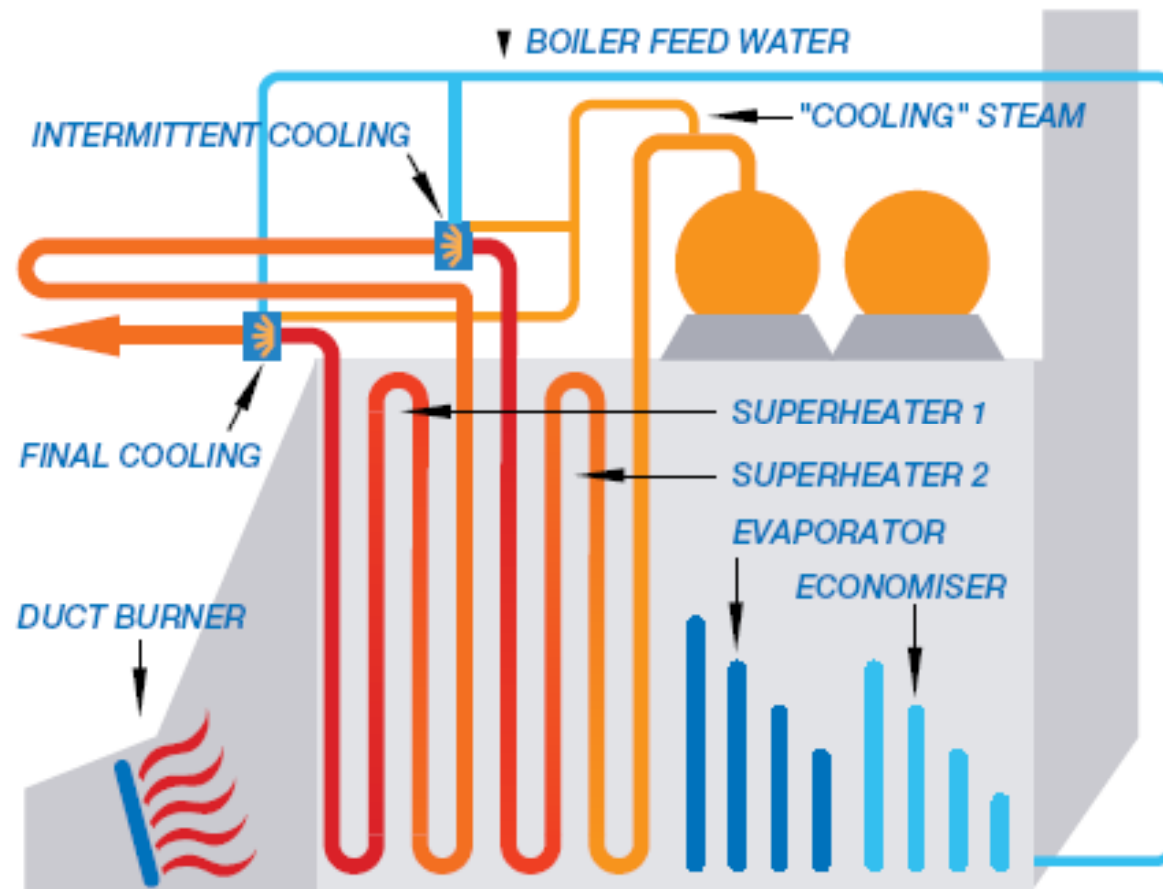


load conditions:		steam:					water:			
		G	p ₁	p ₂	t ₁	t ₂	G	p	t	kv
		(t/h)	(bar,abs)	(bar,abs)	(°C)	(°C)	(t/h)	(bar,abs)	(°C)	(m³/h)
		725,0	49,0	49,0	550,0	530,0	14,4	220,0	280,0	1,3

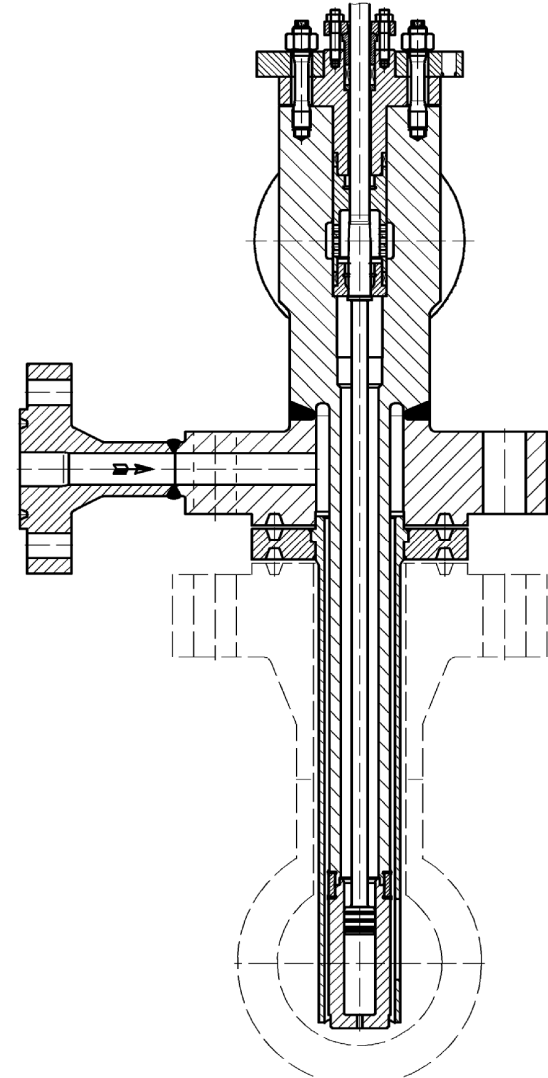
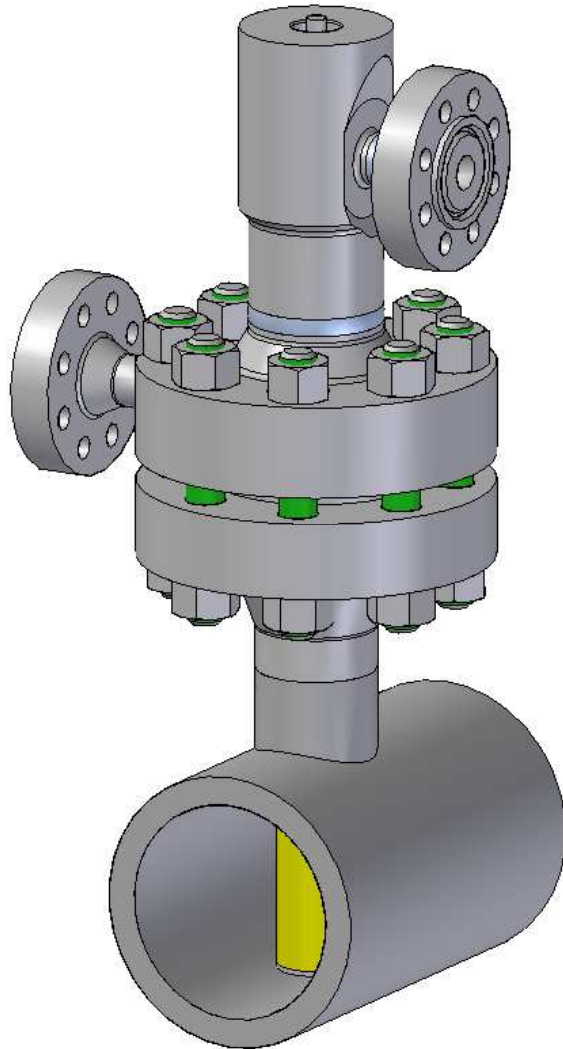
Plant: E.ON – Maasvlakte PP

8	stuffing box packing	graphite	X
7	cage	1.4922	
6	stuffing box packing	graphite	X
5	piston ring	1.4923	X
4	parabolic plug	1.4922	X
3	seat	1.4922	X
2	flange	1.4903	
1	housing	1.4903	
Pos.	Designation	Mat. Spec.	Spare Parts

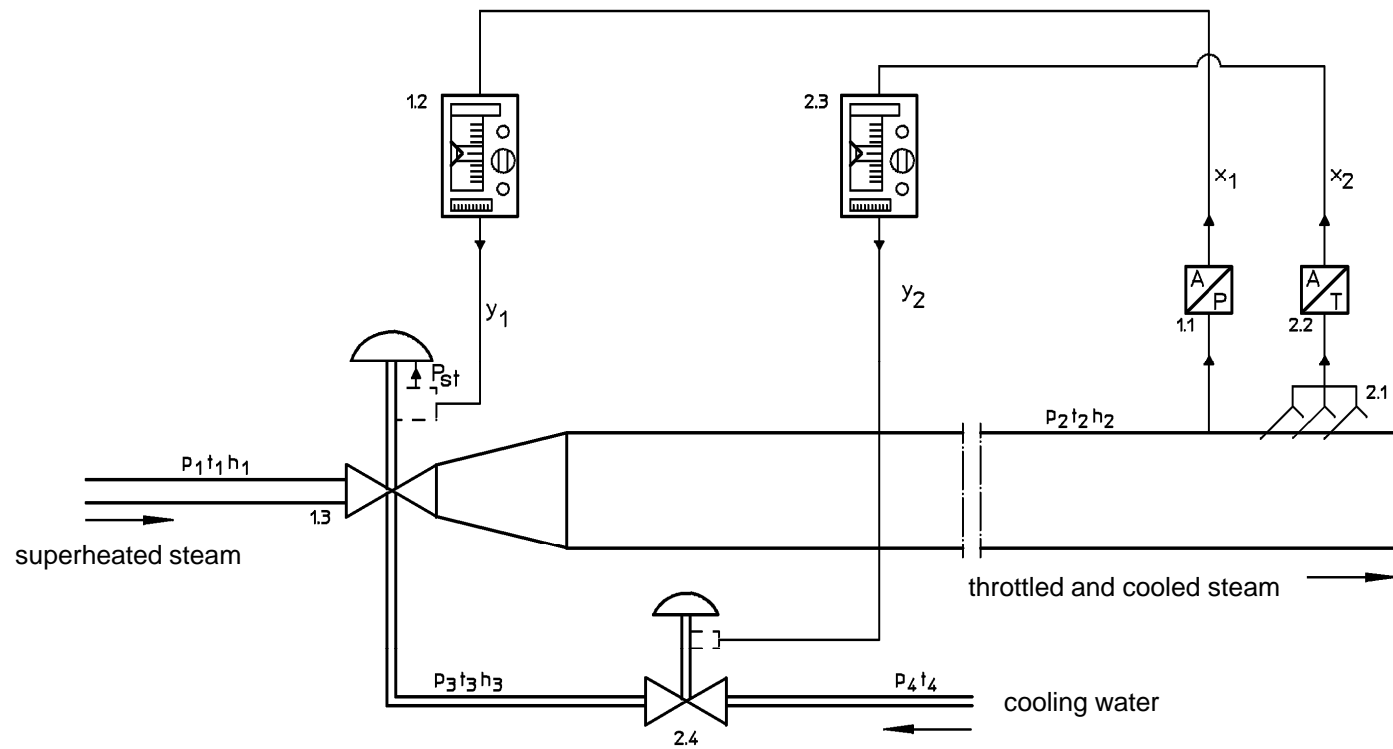
Final desuperheater - Cooled Cooler



Final desuperheater - Cooled Cooler



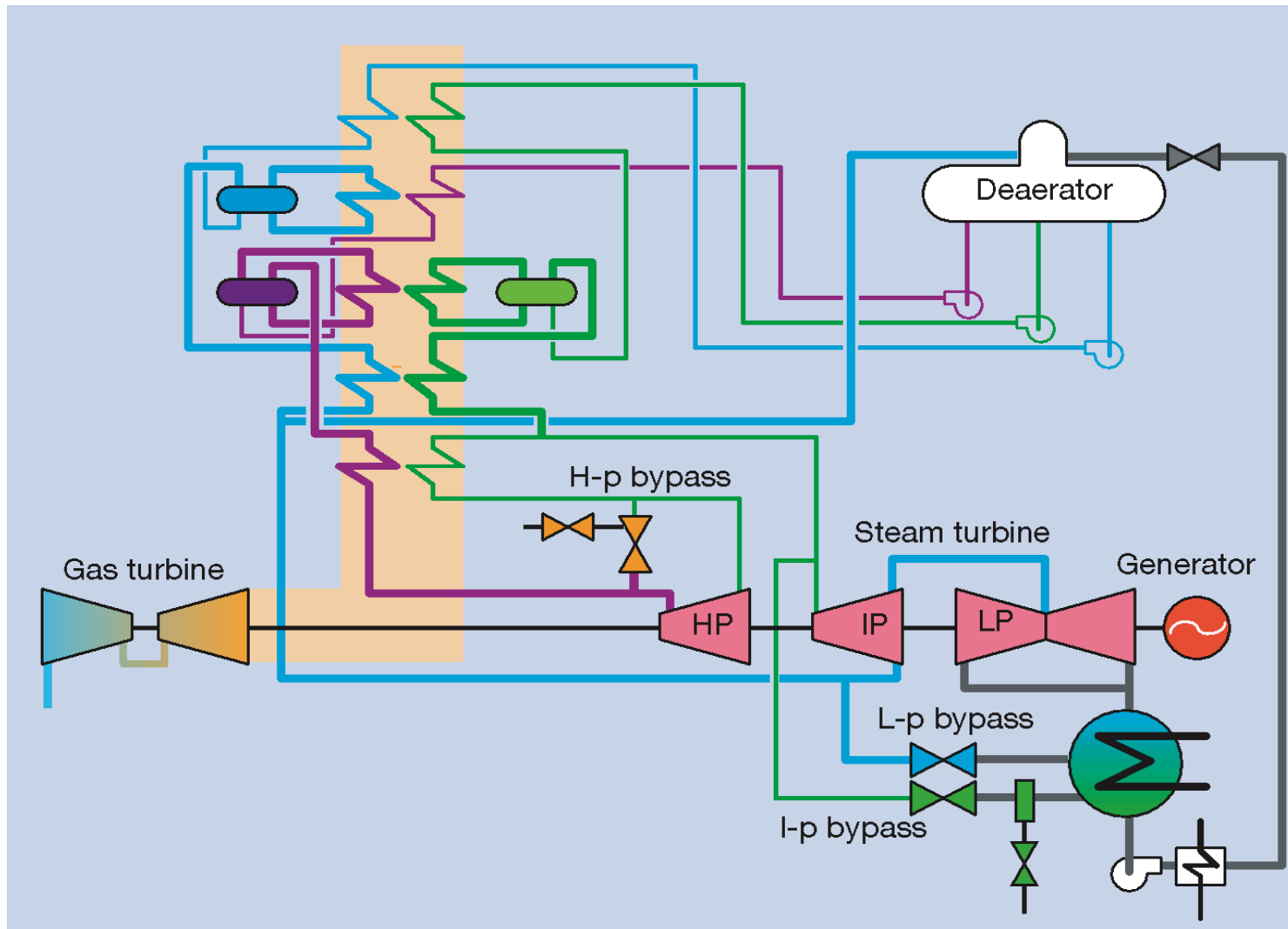
Steam conditioning valve (PRDS)



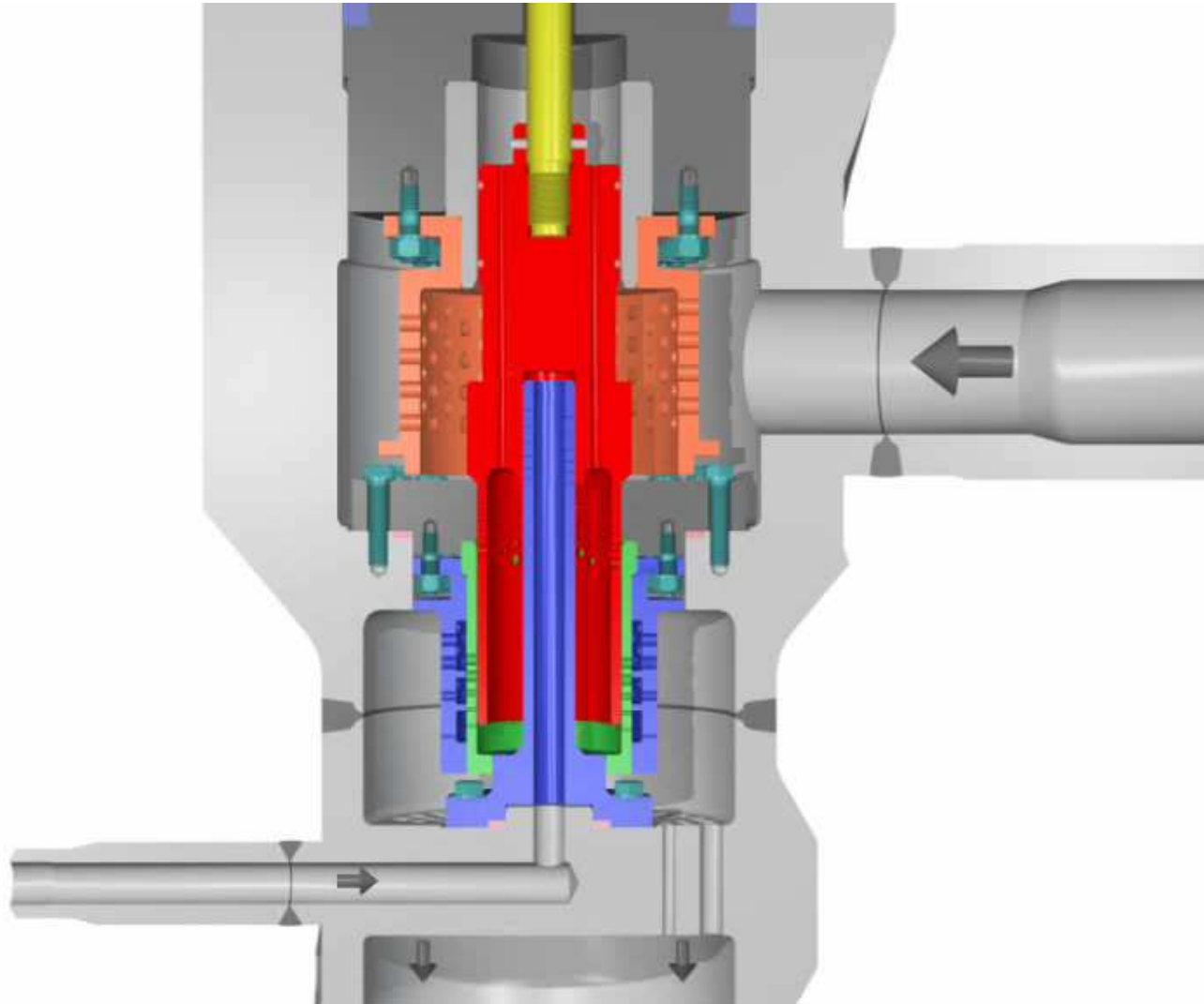
1. Pressure control
- 1.1 Transmitter
- 1.2 Controller
- 1.3 Steam conditioning valve

2. Temperature control
- 2.1 Temperature
- 2.2 Transmitter
- 2.3 Controller
- 2.4 Spray water control valve

Bypass Valves in a typical combined cycle plant



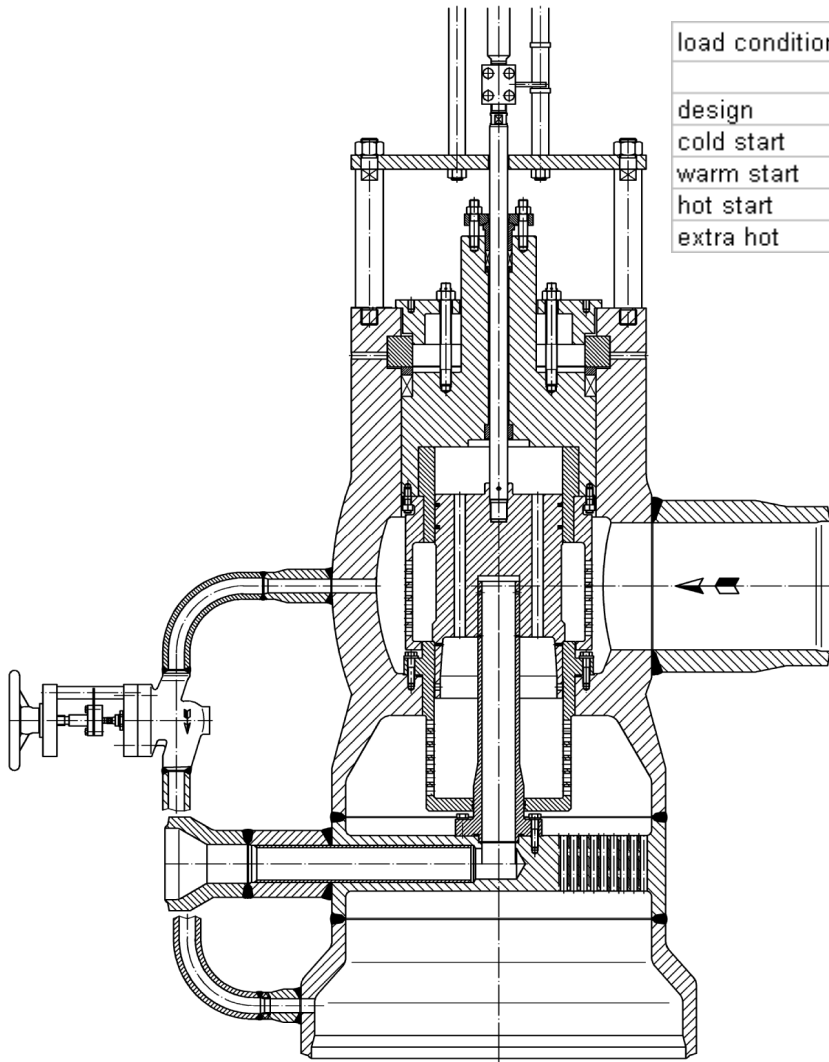
Steam conditioning valve (PRDS)



PRDS – Pressure drop, Water/ Steam ratio



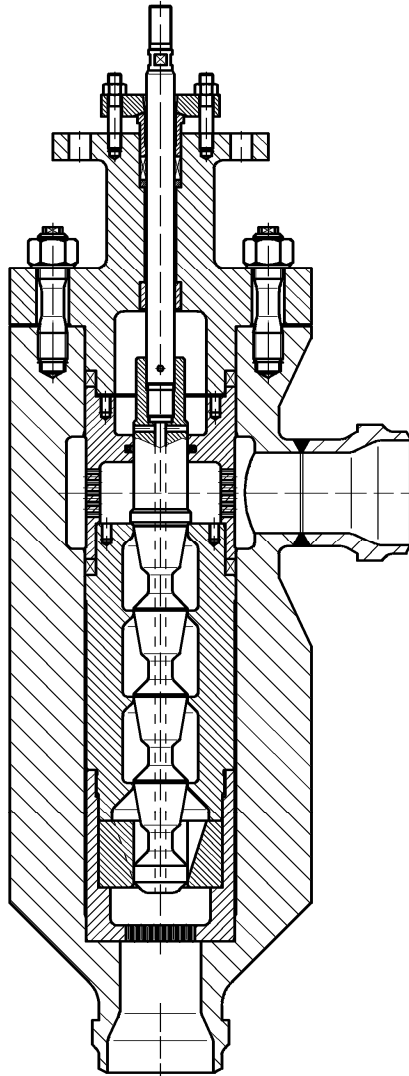
HP Turbine Bypass Valve (600 MW Super Critical PP)



load conditions:	G	p ₁	p ₂	Δp	t ₁	t ₂	kv
	(t/h)	(bar,abs)	(bar,abs)	(bar)	(°C)	(°C)	(m³/h)
design	781,0	254,0	49,14	204,86	576,0	342,0	370,62
cold start	128,0	89,2	12,1	77,1	360,0	220,0	148,75
warm start	278,0	89,2	12,1	77,1	400,0	230,0	336,67
hot start	332,0	89,2	12,1	77,1	450,0	240,0	420,49
extra hot	332,0	89,2	12,1	77,1	495,0	260,0	435,84



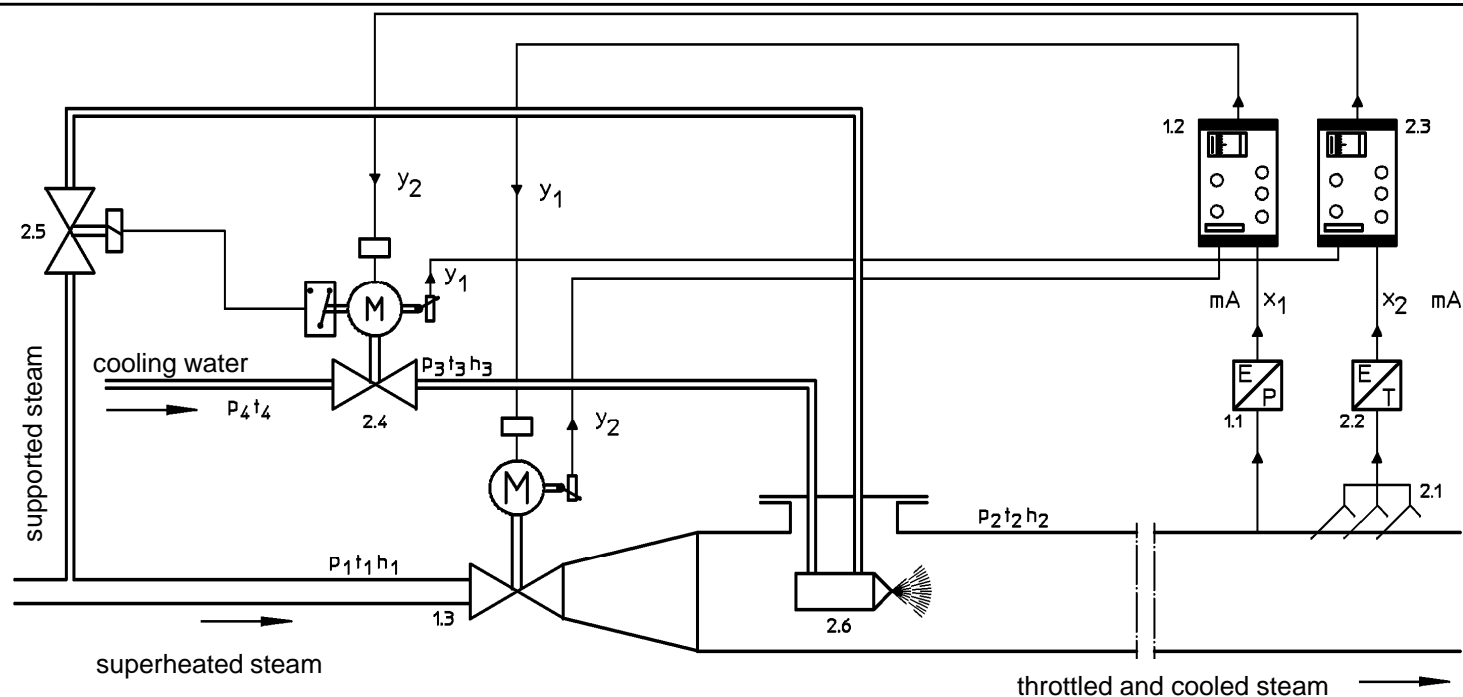
HP Turbine Bypass Spraywater Valve (600 MW)



load conditions:	G	p ₁	p ₂	t ₁	kv
	(t/h)	(bar,abs)	(bar,abs)	(°C)	(m³/h)
design	124,37	305,58	153,0	185,0	10,72
cold start	7,07	240,0	63,7	111,0	0,55
warm start	23,4	240,0	63,7	111,0	1,83
hot start	47,29	239,5	63,7	111,0	3,7
extra hot	63,29	238,84	63,7	189,0	5,27



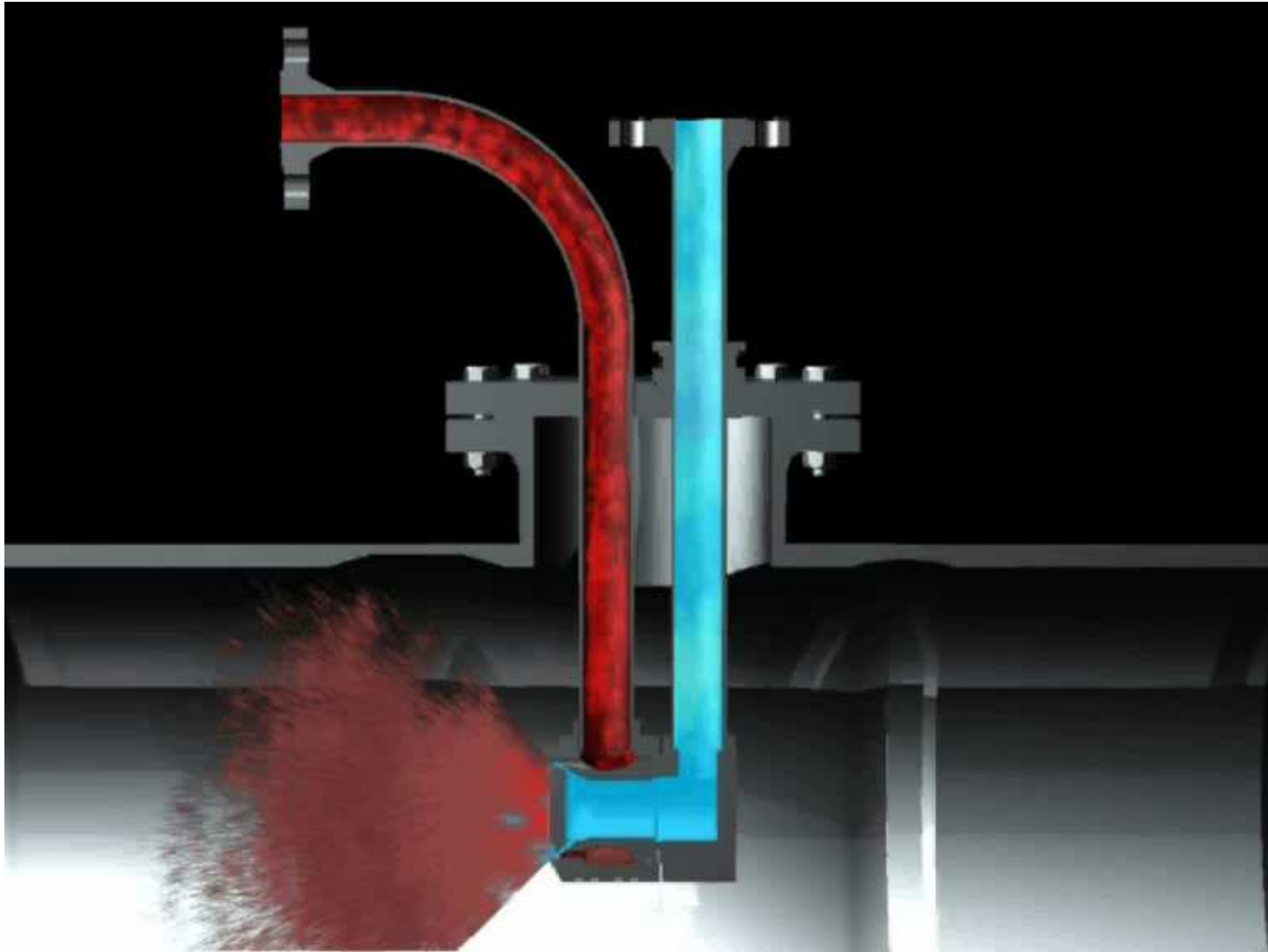
PRV with steam assisted desuperheater



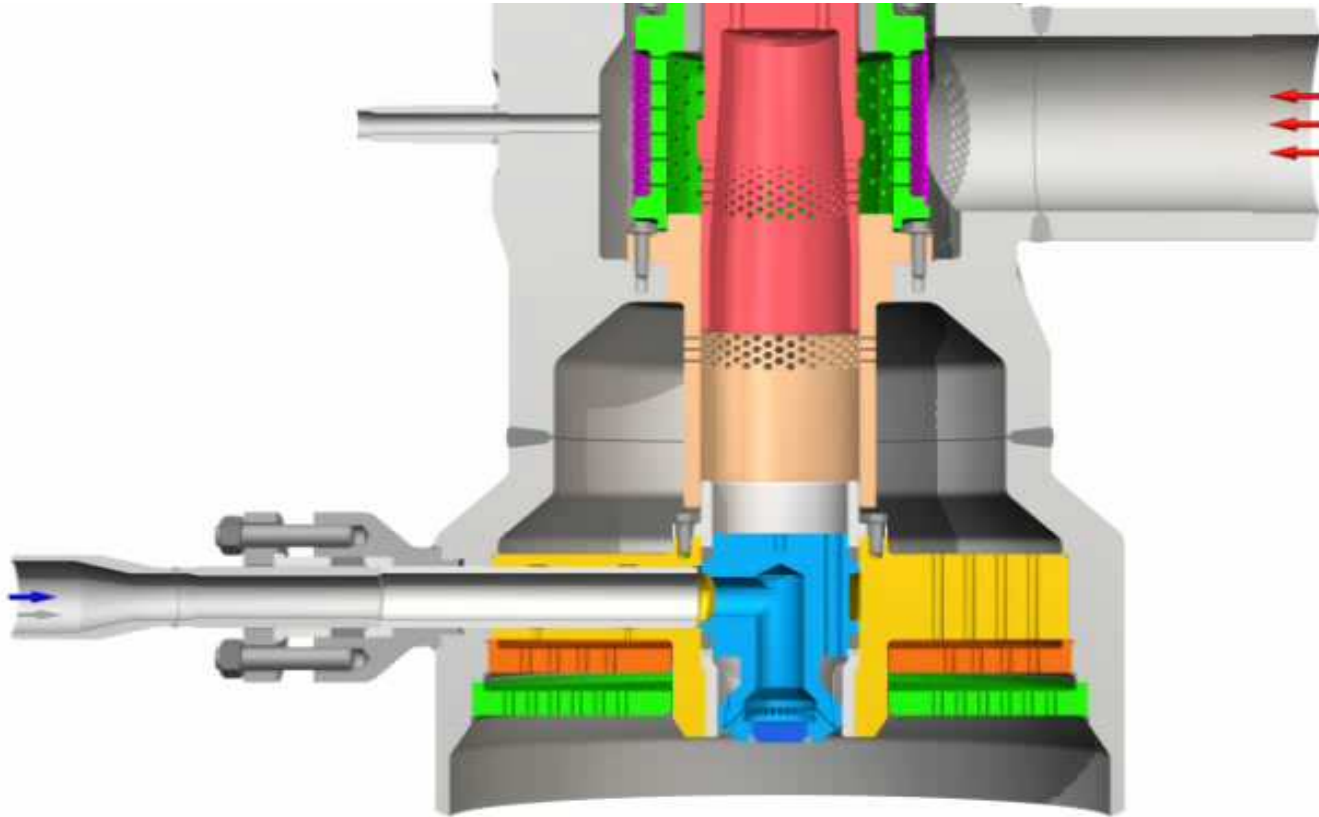
1. Pressure control
- 1.1 Transmitter
- 1.2 Controller
- 1.3 Steam pressure reducing valve

2. Temperature control
- 2.1 Temperature sensor
- 2.2 Transmitter
- 2.3 Controller
- 2.4 Spray water control valve
- 2.5 Steam shut-off valve
- 2.6 Steam assisted desuperheater

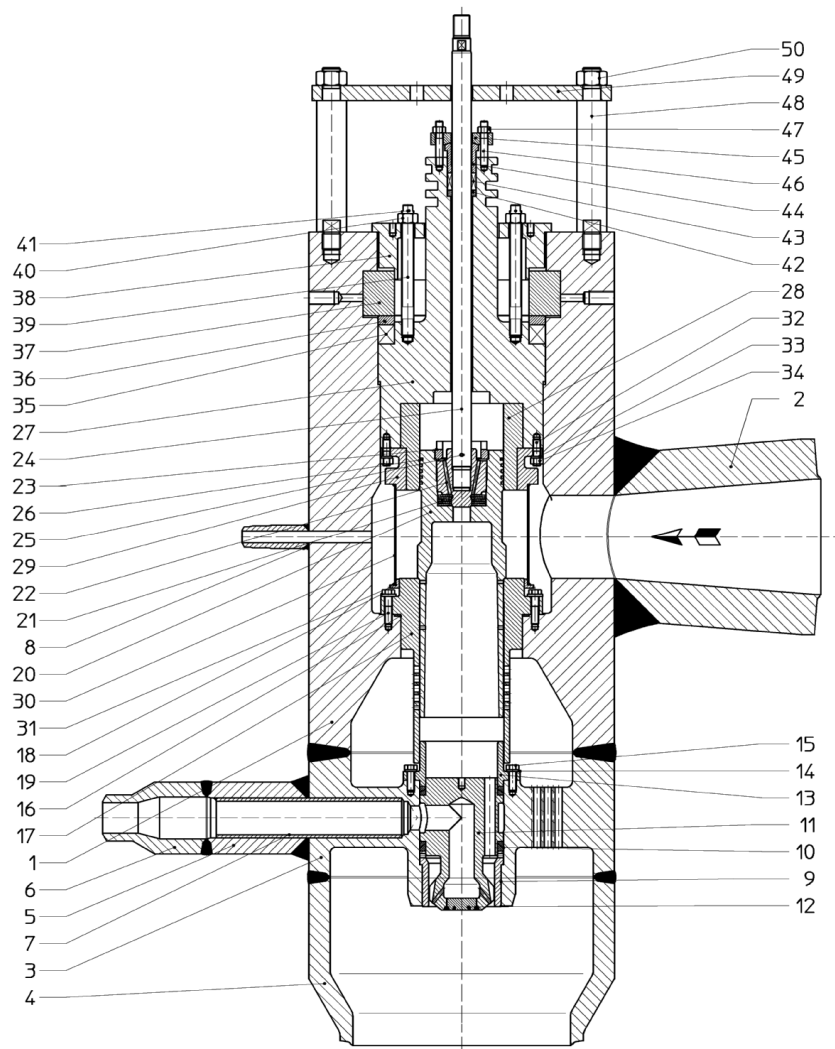
Steam assisted desuperheater (atomizer)



Steam conditioning valve with integrated atomizer



HP Turbine Bypass Valve

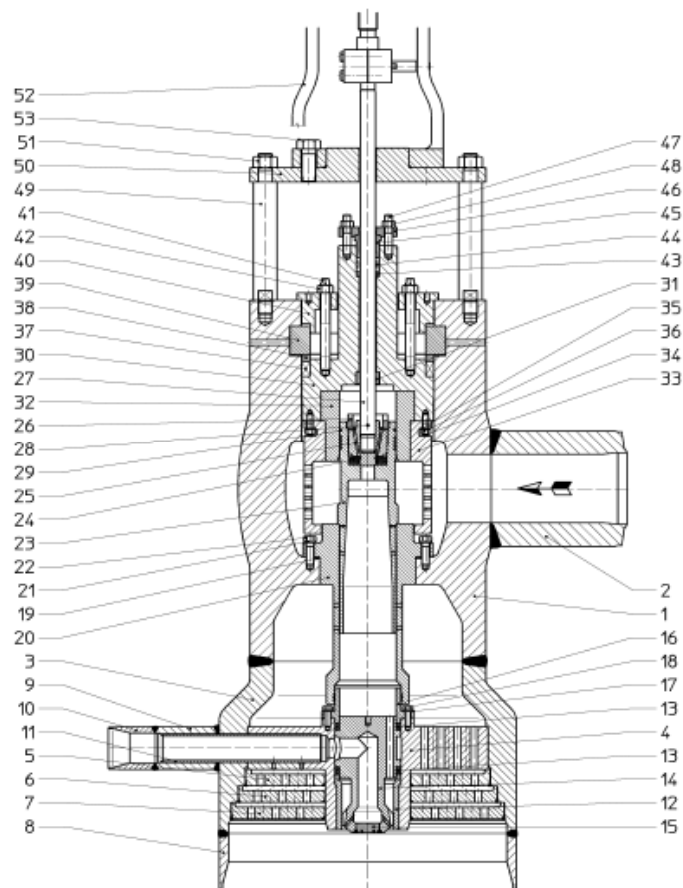


G	p ₁	p ₂	Δp	t ₁	t ₂	kv
(t/h)	(bar,abs)	(bar,abs)	(bar)	(°C)	(°C)	(m³/h)
300,0	151,0	13,0	138,0	380,0	230,0	203,39
300,0	121,0	13,0	108,0	380,0	268,0	258,25
150,0	86,0	13,0	73,0	380,0	309,0	185,0
300,0	150,0	26,0	124,0	600,0	375,0	249,54
250,0	121,0	26,0	95,0	600,0	375,0	258,89

Plant: Shanghai Waigaoqiao PP Unit III
Super Super Critical 1000 MW

Positon	Designation	Material
1	Body	1.4903
2	Welded end	1.4903
3	Perforated disk	1.4903
4	Funnel	1.7383
5	Injection connection	1.7383

HP Turbine Bypass Valve

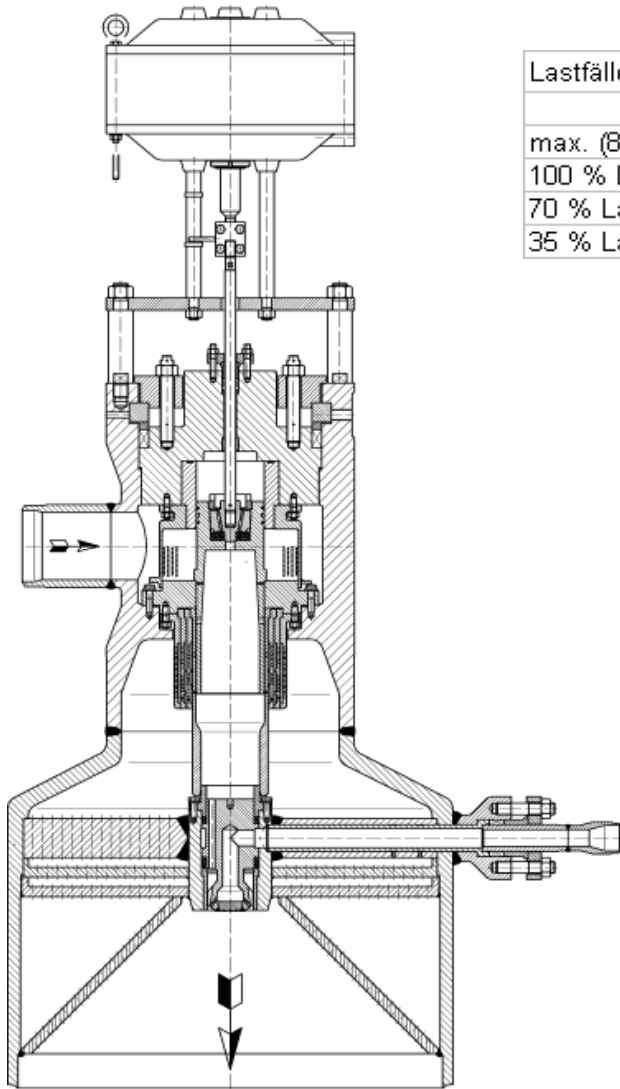


load conditions:	G	p ₁	p ₂	t ₁	t ₂	kv
	(t/h)	(bar abs)	(bar abs)	(°C)	(°C)	(m³/h)
design	269,5	262,5	6,0	610,0	160,0	126,71
cold	67,5	85,3	6,0	520,0	160,0	94,475
warm	90,0	85,3	6,0	530,0	160,0	126,86
hot	90,0	85,3	6,0	540,0	160,0	127,75
extra hot	90,0	85,3	6,0	560,0	160,0	129,5

Plant: Ying Kou 2 x 600 MW Super Super Critical PP

Pos.	Benennung	Designation	Mat. Spec.
1	Eck-Gehäuse	Body	A182 F92
2	Schweißende	Butt weld end	A182 F92
3	Trichter	Funnel	A182 F92
4	Lochscheibe	Perforated disk	1.7380
5	Lochscheibe	Perforated disk	1.7380
6	Lochscheibe	Perforated disk	1.7380
7	Lochscheibe	Perforated disk	1.7380
8	Schweißende	Butt weld end	1.7380

HP Turbine Bypass Station (Biomass Plant)



Lastfälle:	G	p ₁	p ₂	Δp	t ₁	t ₂	kv
	(kg/s)	(bar,abs)	(bar,abs)	(bar)	(°C)	(°C)	(m³/h)
max. (85+x% Hub)	21,35	73,0	0,7	72,3	468,0	94,3	129,2
100 % Last	18,7	73,0	0,68	72,32	468,0	93,3	111,2
70 % Last	13,8	73,0	0,4	72,6	468,0	91,2	80,4
35 % Last	6,8	41,0	0,3	40,7	425,0	90,6	68,3

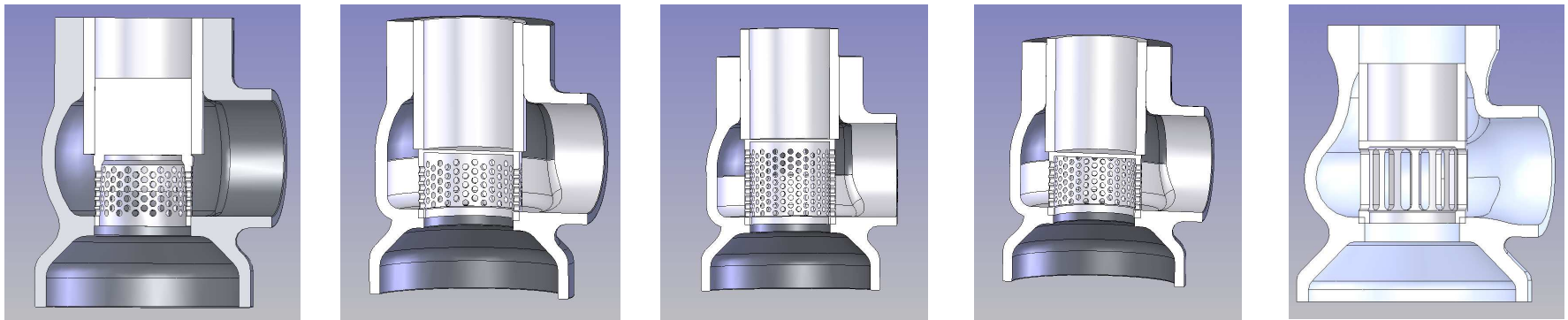
Plant: E.ON - BMHKW Zolling / Landesbergen



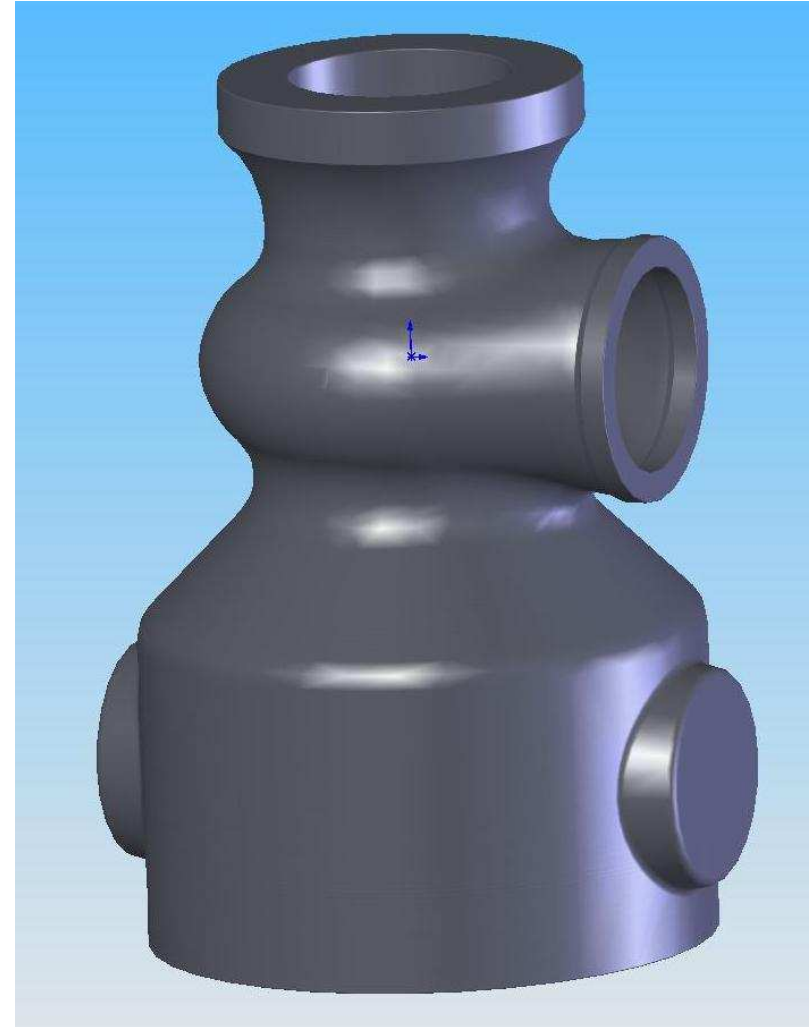
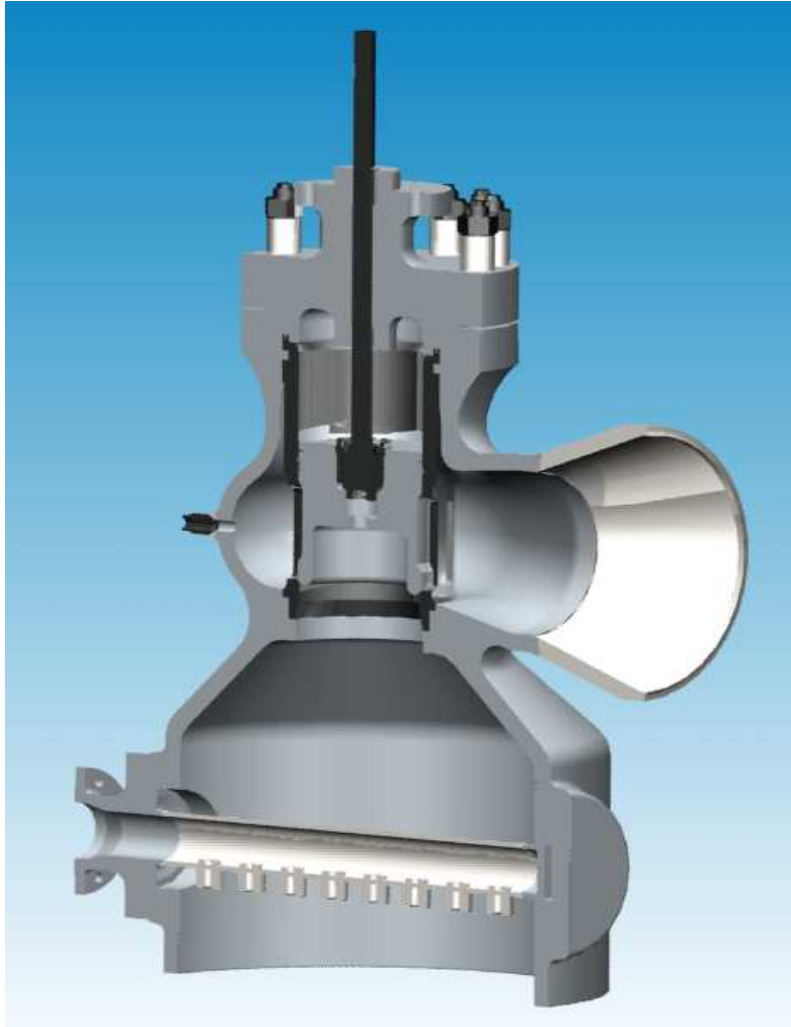
LP Turbine Bypass Valve

Optimization of valve design based on customer specific data by using latest software
(R&D time minimized)

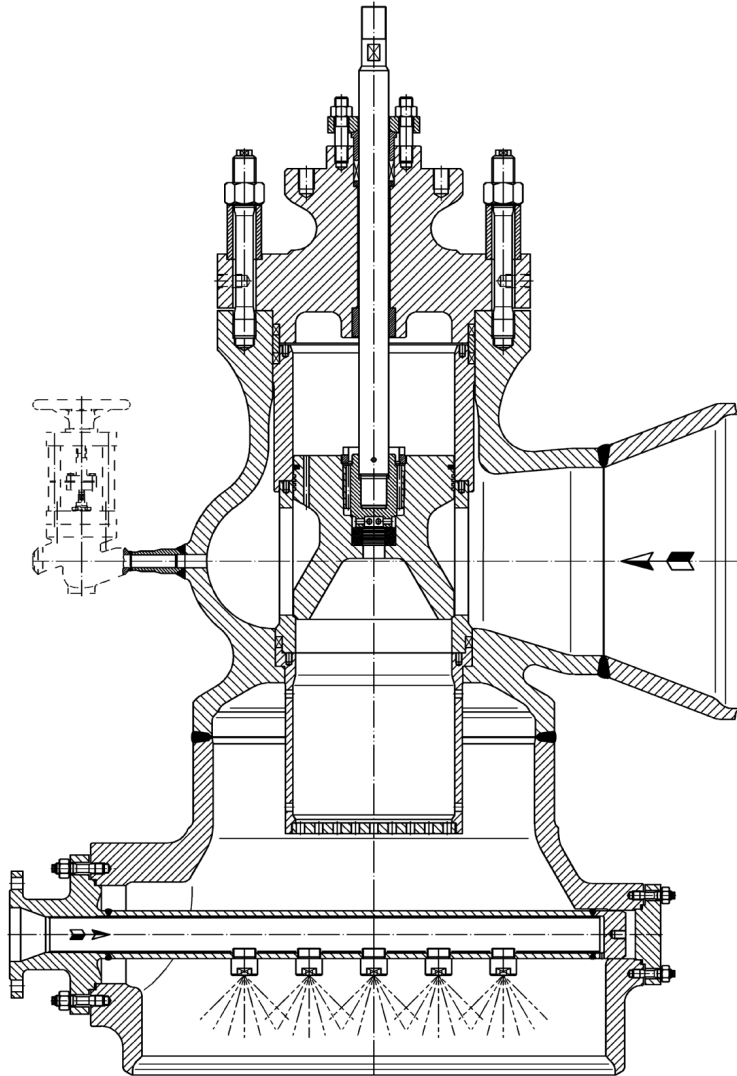
- 3D Modeling - Flow Path contouring of valve body
- FEM Analysis - Stress and Seismic analysis
- Computational Fluid Dynamics (CFD) – Flow capacity optimization



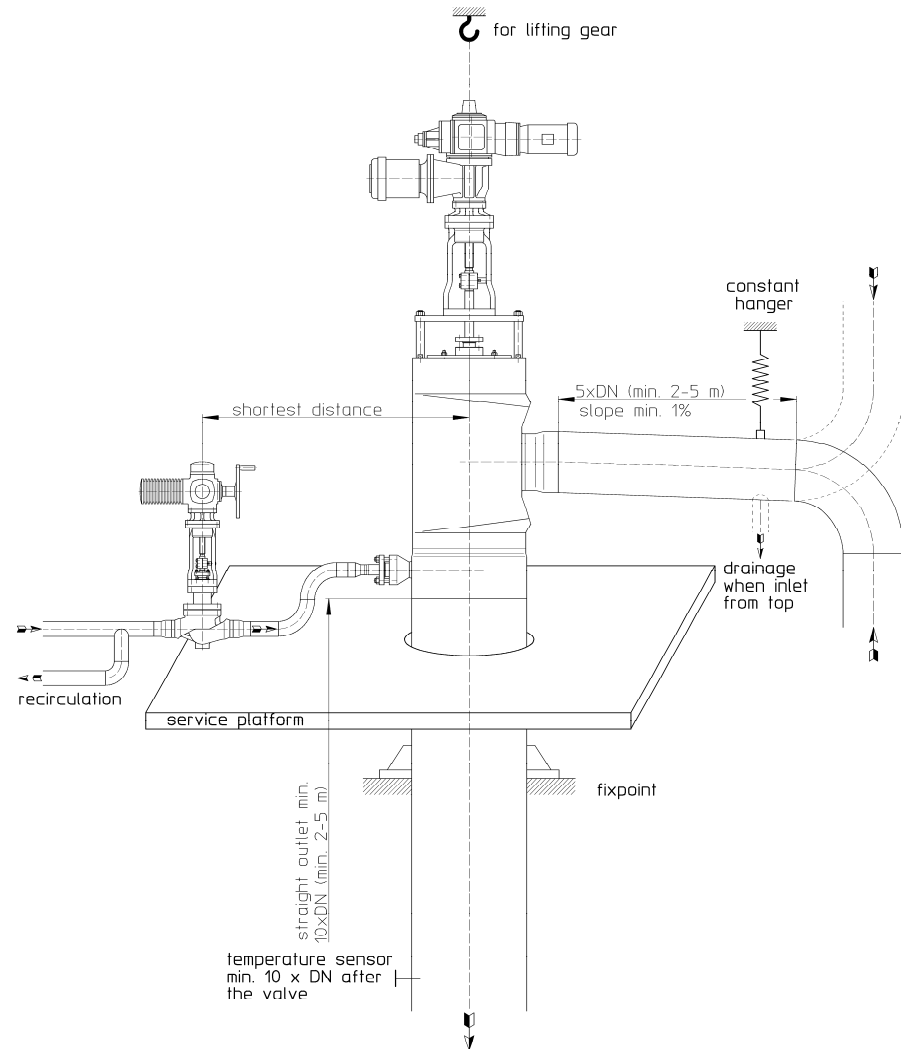
LP Turbine Bypass Valve



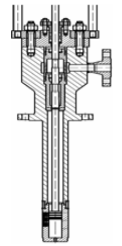
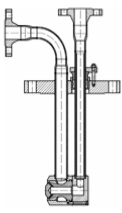
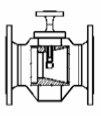
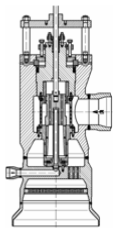
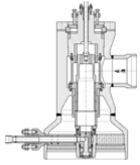
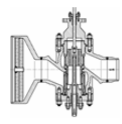
LP Turbine Bypass Station



TBS-Installation Guide



HORA Desuperheater for all applications

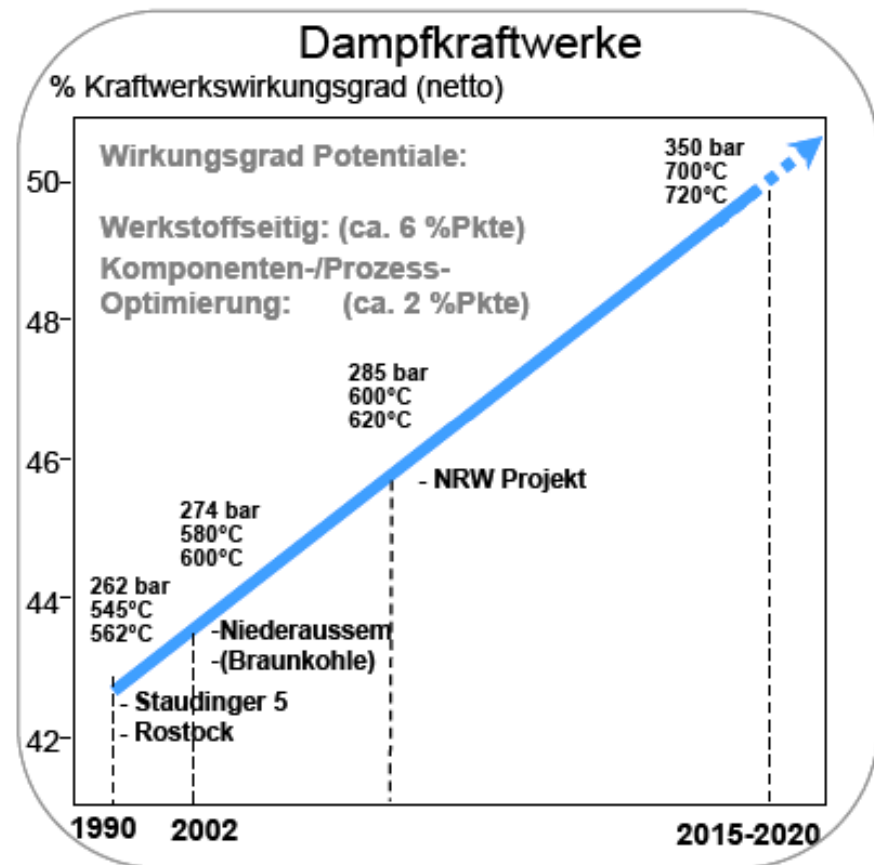
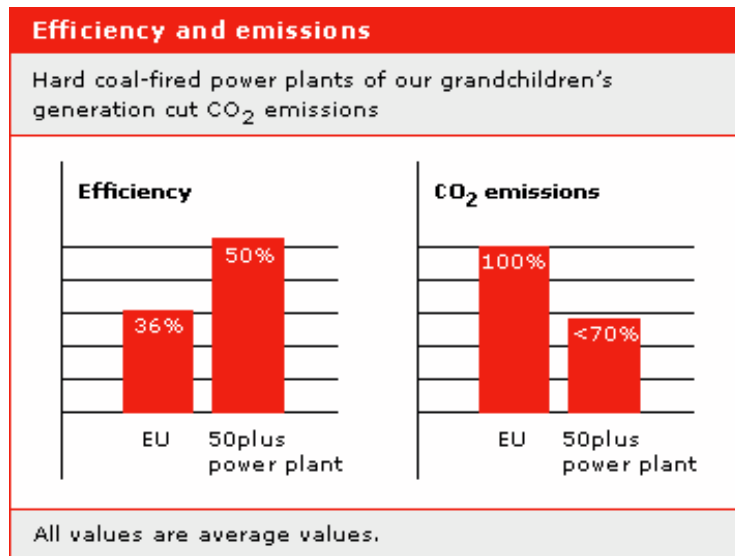
						
	Desuperheater			Steam conditioning valves		
Series	Desuperheater Multiple Nozzle	Desuperheater Steam Assist	Desuperheater Venturi Type	Steam Conditioning Valve Orifice Tube	Steam Conditioning Valve Steam Assist	Steam Conditioning Valve Orifice Tube
Description	Spray Type Desuperheater	Steam Assisted Desuperheater	Venturi Type Desuperheater	Steam Conditioning Valve with proportional water injection	Steam Conditioning Valve with integrated Atomizer unit	Steam Conditioning Valve with proportional water injection
Nozzle type	Variable Multi Nozzle	Fixed	Fixed	Variable orifice tube	Fixed	Variable orifice tube
Body style	Angle	Angle	Globe	Globe/Angle	Angle	Globe
Standard End Connection	Flanged	Flanged / BW	Flanged / BW	Flanged / BW	Flanged / BW	Flanged / BW
Turn-Down Ratio	40:1 (on spray water flow)	15:1	5:1	≥ 40:1	≥ 40:1	≥ 40:1
Type of Atomizing	Differential Pressure	Kinetic Energy of Steam	Differential Pressure	Differential Pressure and Turbulence	Kinetic Energy of Steam and Turbulence	Differential Pressure and Turbulence
Minimum Outlet Temperature	Saturation + 10° F	Saturation + 5° F	Saturation + 15° F	Saturation + 5° F	Saturation + 5° F	Saturation + 5° F
Cooling water capacity	≥ 50,000 lbs/hour	≥ 160,000 lbs/hour	-	By specification	≥ 160,000 lbs/hr	By specification
Required cooling water pressure	Line pressure + 115 to 1885 psi	Line pressure + 60 psi or greater	Line pressure + 75 psi or greater	1/2 Upstream pressure + 145 psi or greater	Downstream pressure + 60 psi or greater	1/2 Upstream pressure + 145 psi or greater
Control Accuracy	6° F	5° F	10° F	3° F	5° F	3° F
ANSI Class Range	600-2500	150-2500	150-2500	150-1500 (2500)	150-1500 (2500)	150-900 (1500)
Leakage Class depend on design	III - V	III - V	III - V	III - V	III - V	III - V
Steam Piping Size	≥ 6 inches	≥ 8 inches	≥ 2 inches	≥ 2 inches	≥ 8 inches (Downstream)	≥ 2 inches
Requested Steam Velocity	≥ 33 ft/sec	≥ 24 ft/sec	≥ 33 ft/sec	by specification	≥ 24 ft/sec (Downstream)	by specification
Distance to temperature sensor	≥ 30 ft	≥ 30 ft	≥ 30 ft	≥ 15 ft	≥ 30 ft	≥ 15 ft
Typical Application	Middle load variation, Process steam, Turbine extraction	Set point temperature near to saturation, Condenser Dump	Small load variation, no rapid temperature change	Big load variation, high reliable TC, HP Turbine Bypass	Process Steam with High Water to Steam Ratio, LP Turbine Bypass	Big load variation, high reliable TC, HP Turbine Bypass
System Components	Steam Control Valve Desuperheater Temperature Controller Isolation Valve	Steam Control Valve Desuperheater Spray Water Control Valve Temperature Controller Steam On/Off Valve	Steam Control Valve Desuperheater Spray Water Temperature Controller	Steam Conditioning Valve Spray Water Control Valve Temperature Controller Pressure Controller	Steam Conditioning Valve Spray Water Control Valve Temperature Controller Pressure Controller	Steam Conditioning Valve Spray Water Control Valve Temperature Controller Pressure Controller

The indicated performance data are a function of the complete system and have to be confirmed for each application.

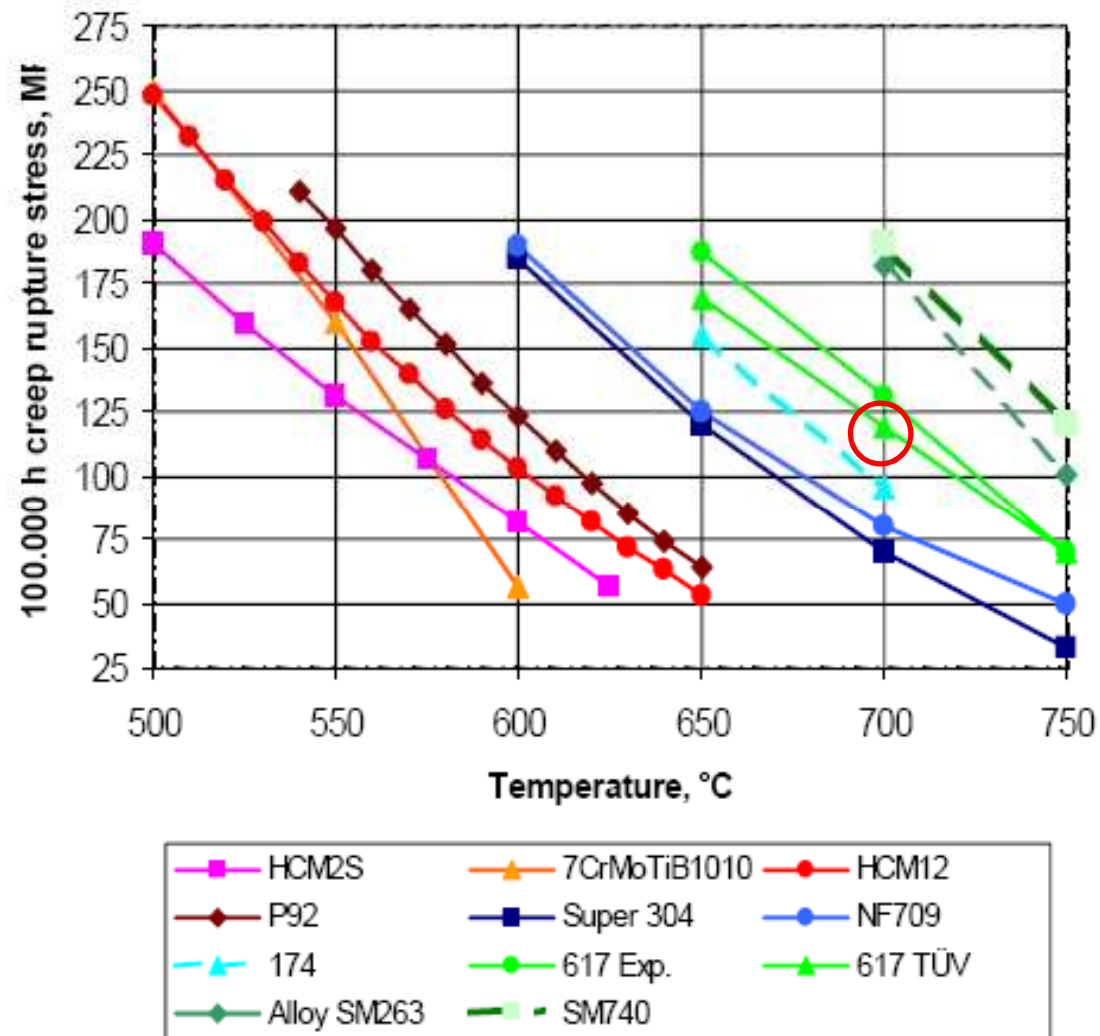
HORA: We build the future

A key challenge today is to move to a secure, competitive and clean energy mix.

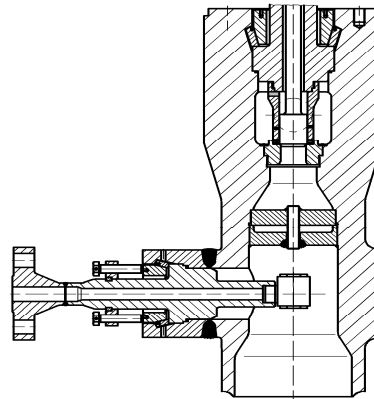
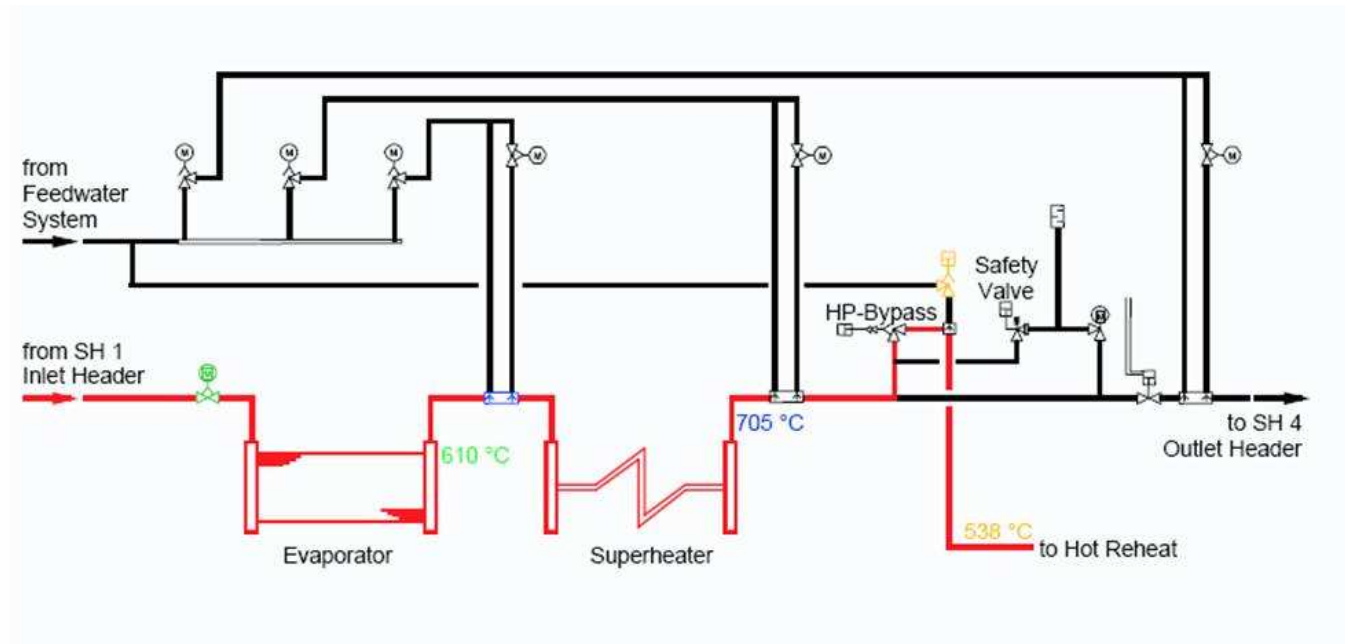
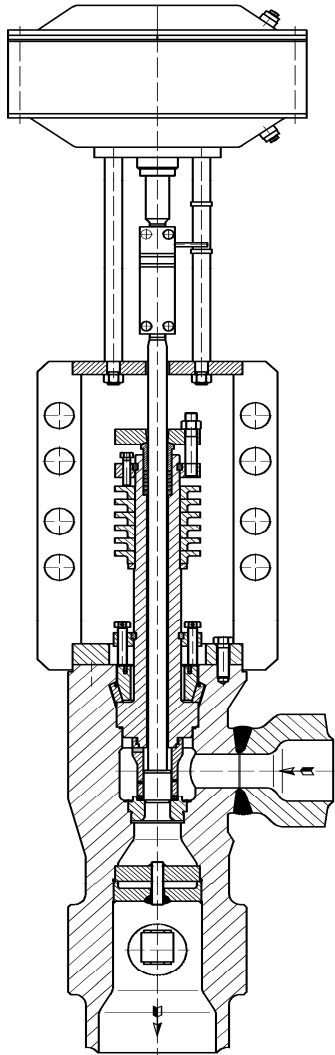
Emission cuts can be achieved by **increasing the efficiency with higher steam parameter** of the plants.



Material Selection



COMTES700: Building the future



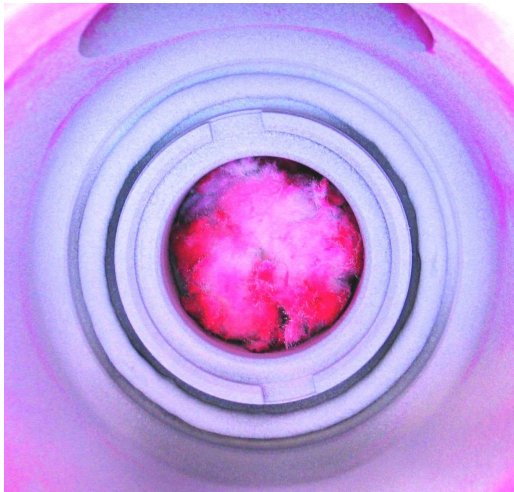
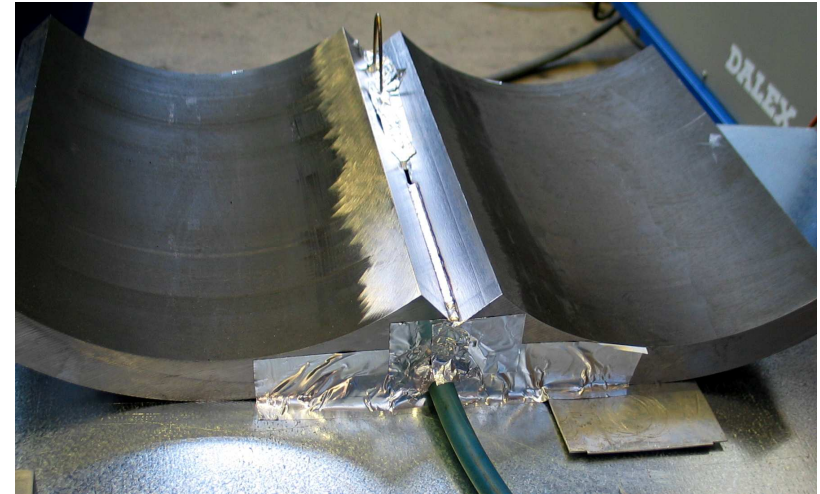
Plant: E.ON - Scholven Unit F

- DN: 100/150 (4"/6")
- T1: 705°C (1300°F)
- P1: 212bar (3075psi)
- T2: 538°C (1000°F)
- P2: 43bar (625psi)
- G_{Steam} : 15,6 kg/s

COMTES700: Qualification and Testing



Welder Skill test



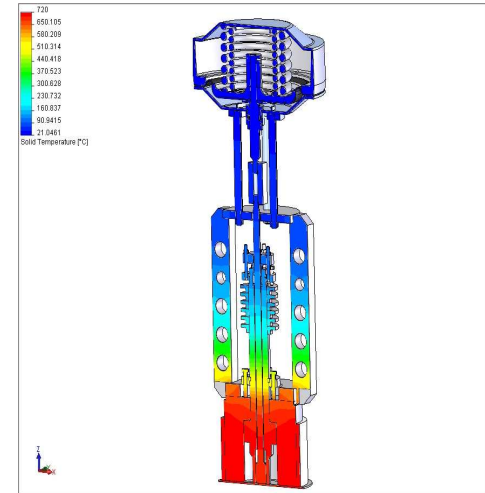
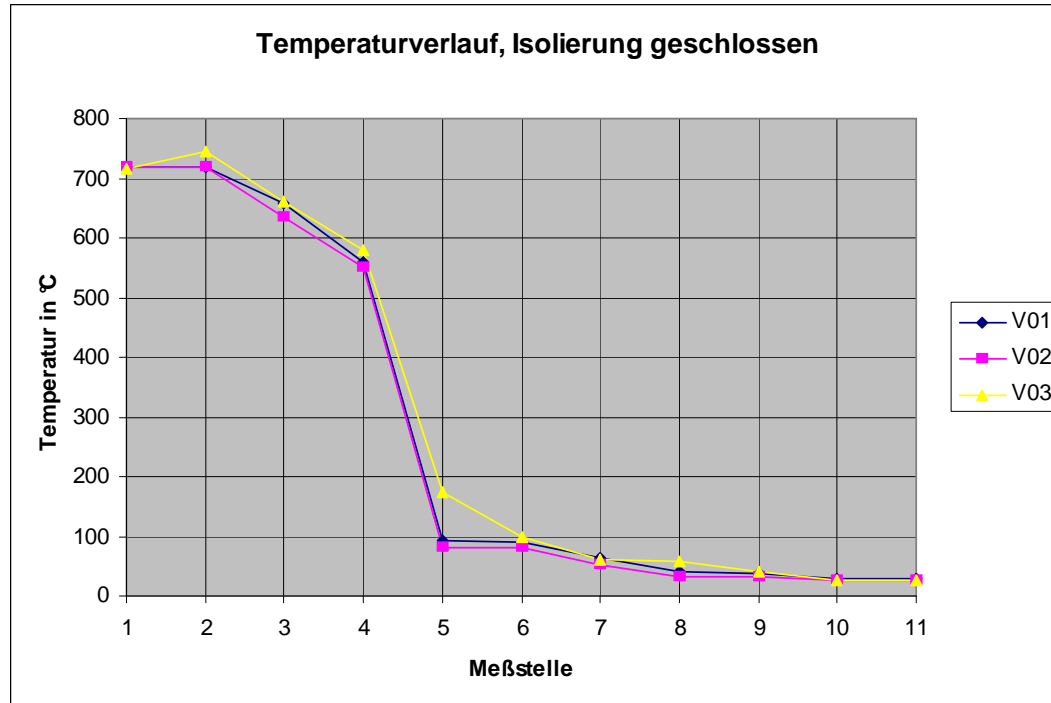
Dye penetration test (PT)

Radiographic test (RT)



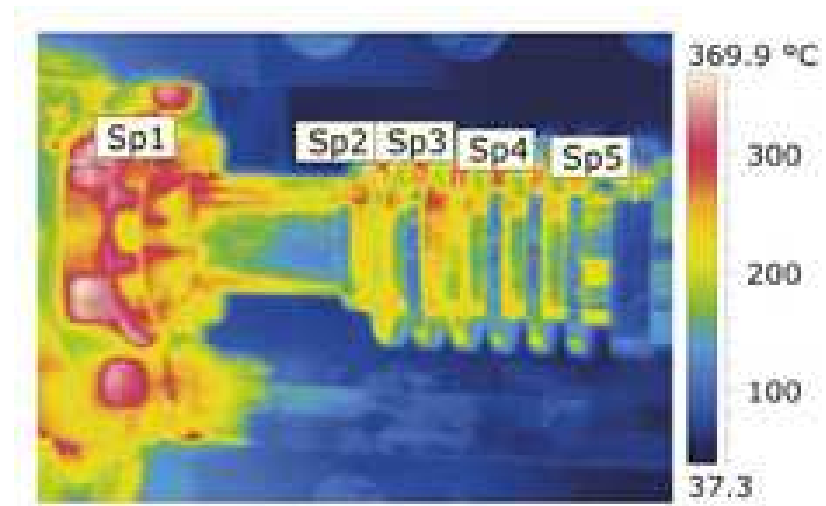
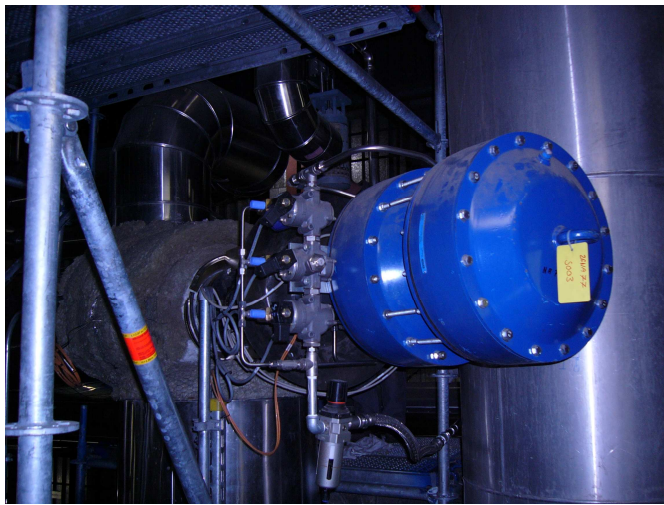
COMTES700: Test Programme in-house

- Thermal Characteristic in actuating drive area
- Temperature measurement at spindle top
- Thermal characteristic of valve body

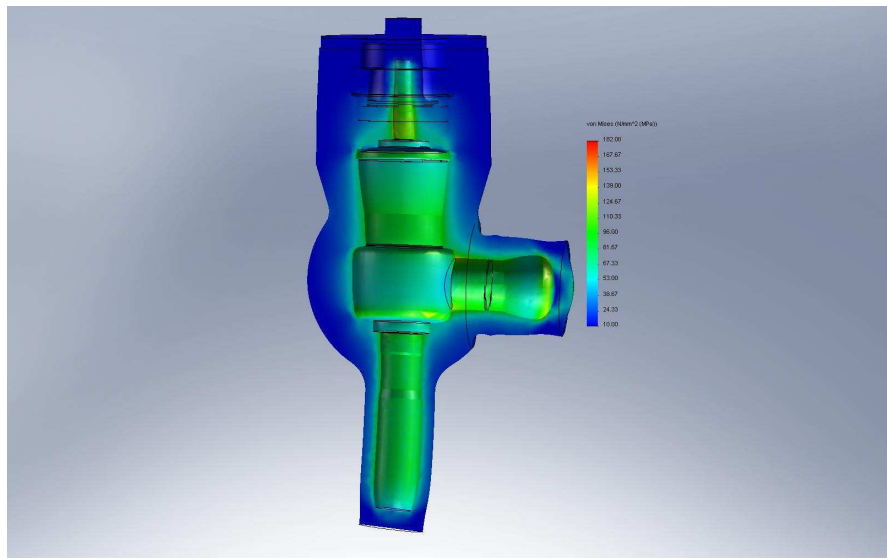
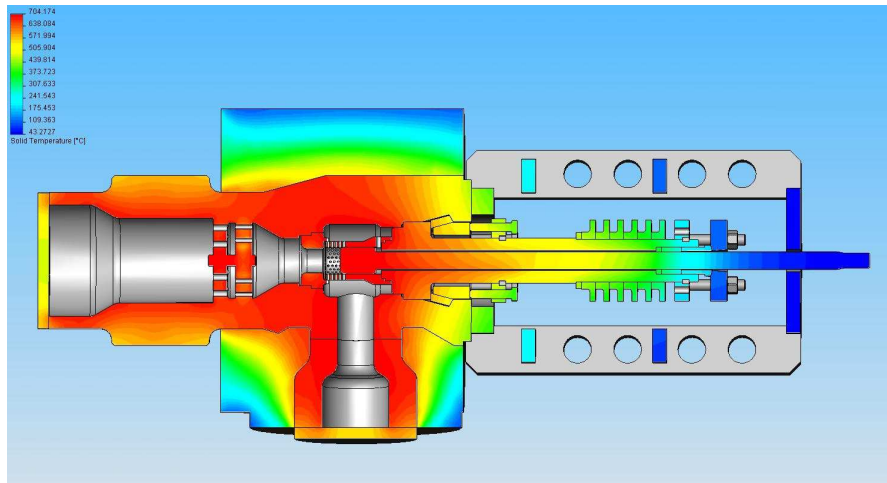


COMTES700: Test Programme onsite

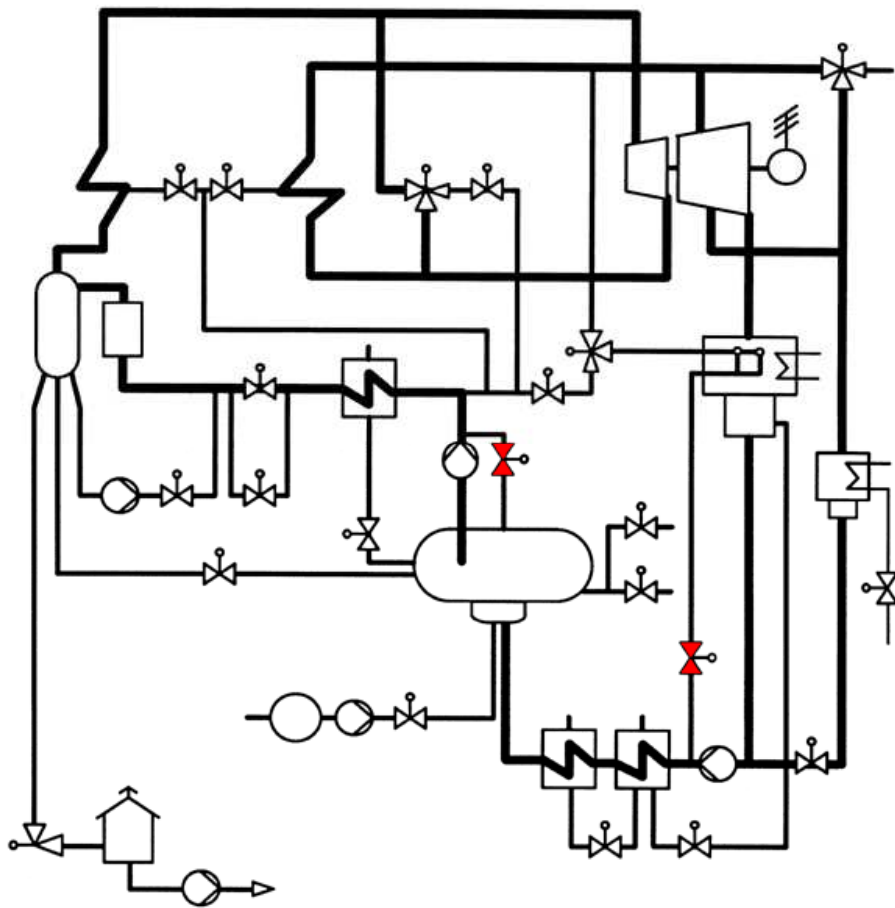
- Investigation of dynamic loaded plug edge and body seat and its wearing behavior and lifetime
- Investigation of dynamic loaded sealing between spindle and cover in terms of wearing, leakproof and lifetime



Project 50+



HORA - control valves for industry and power plants



Feed water control

Pressure reducing & desuperheating

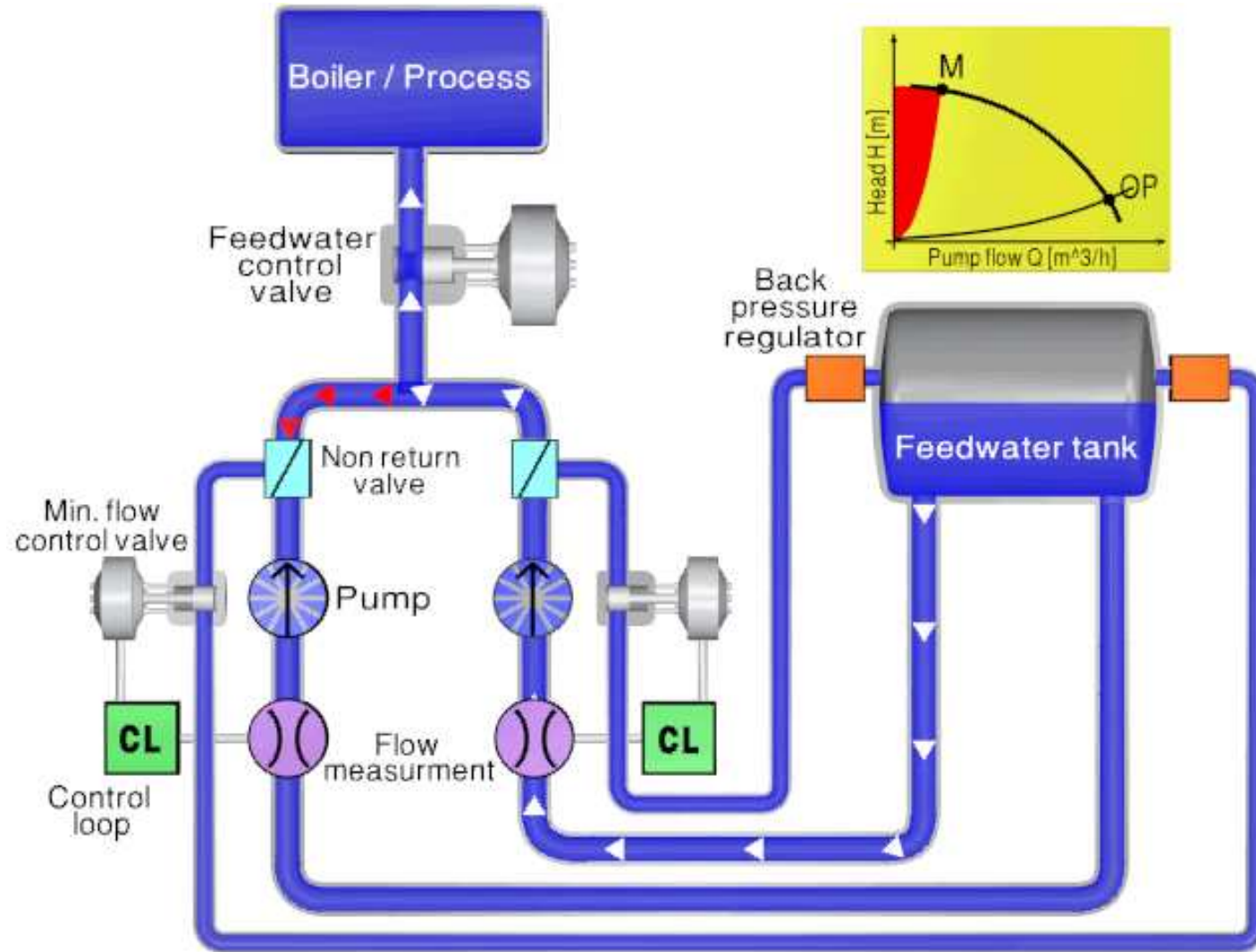
Pump protection

Special applications

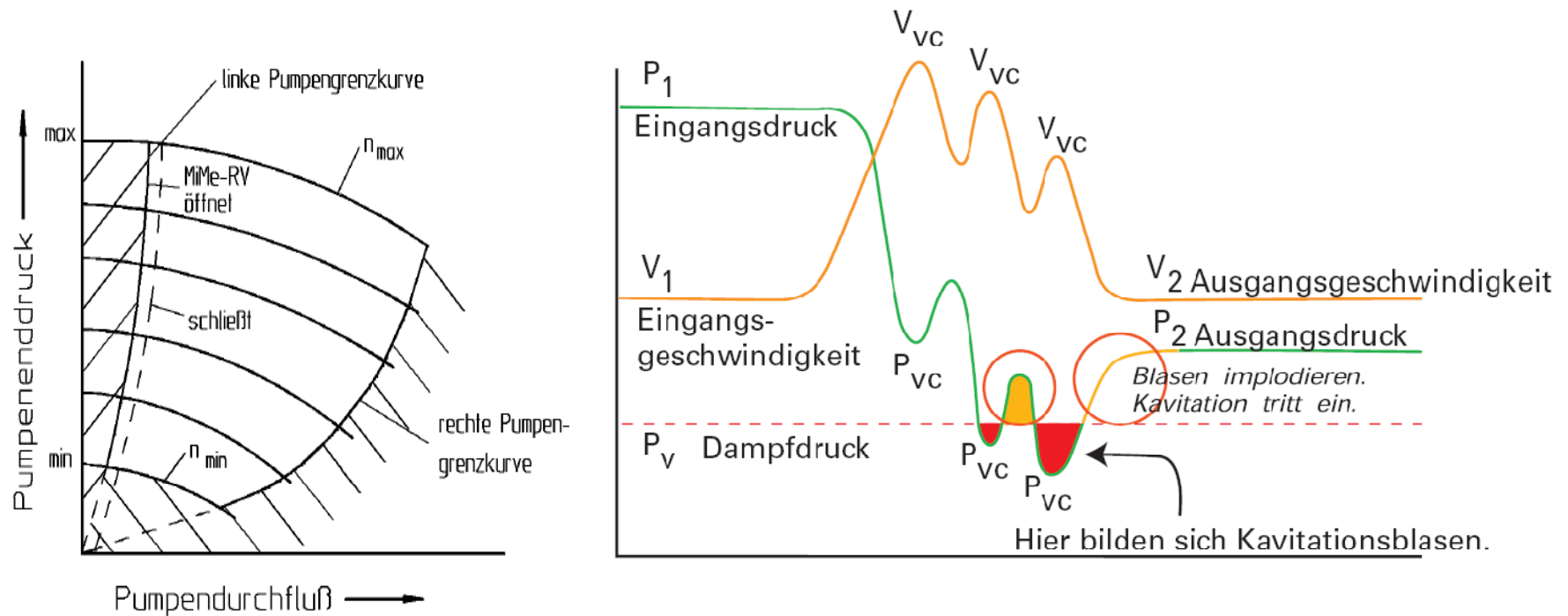
Control valves

Actuators

Pump protection

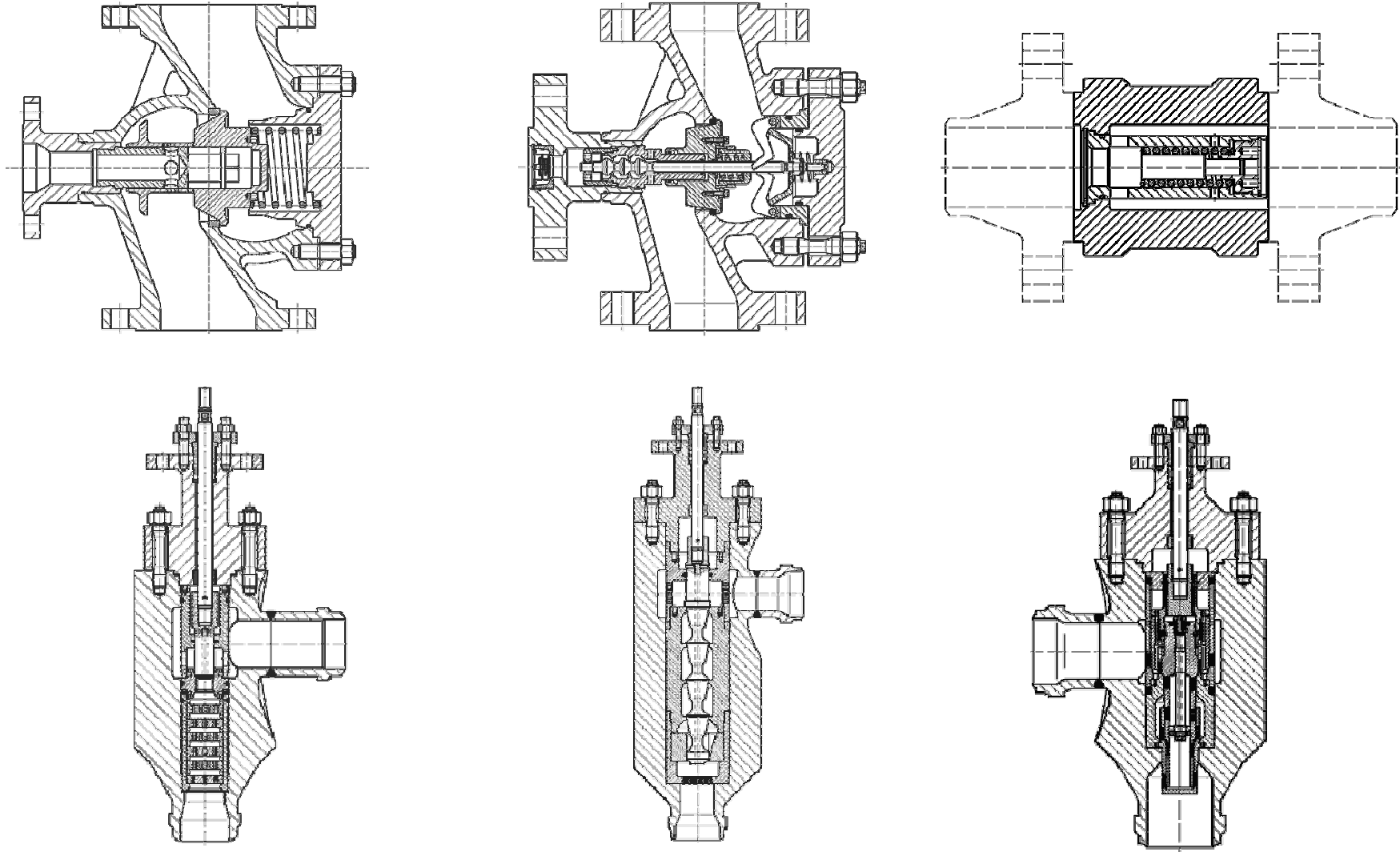


Pump protection - Anti-Cavitation trim

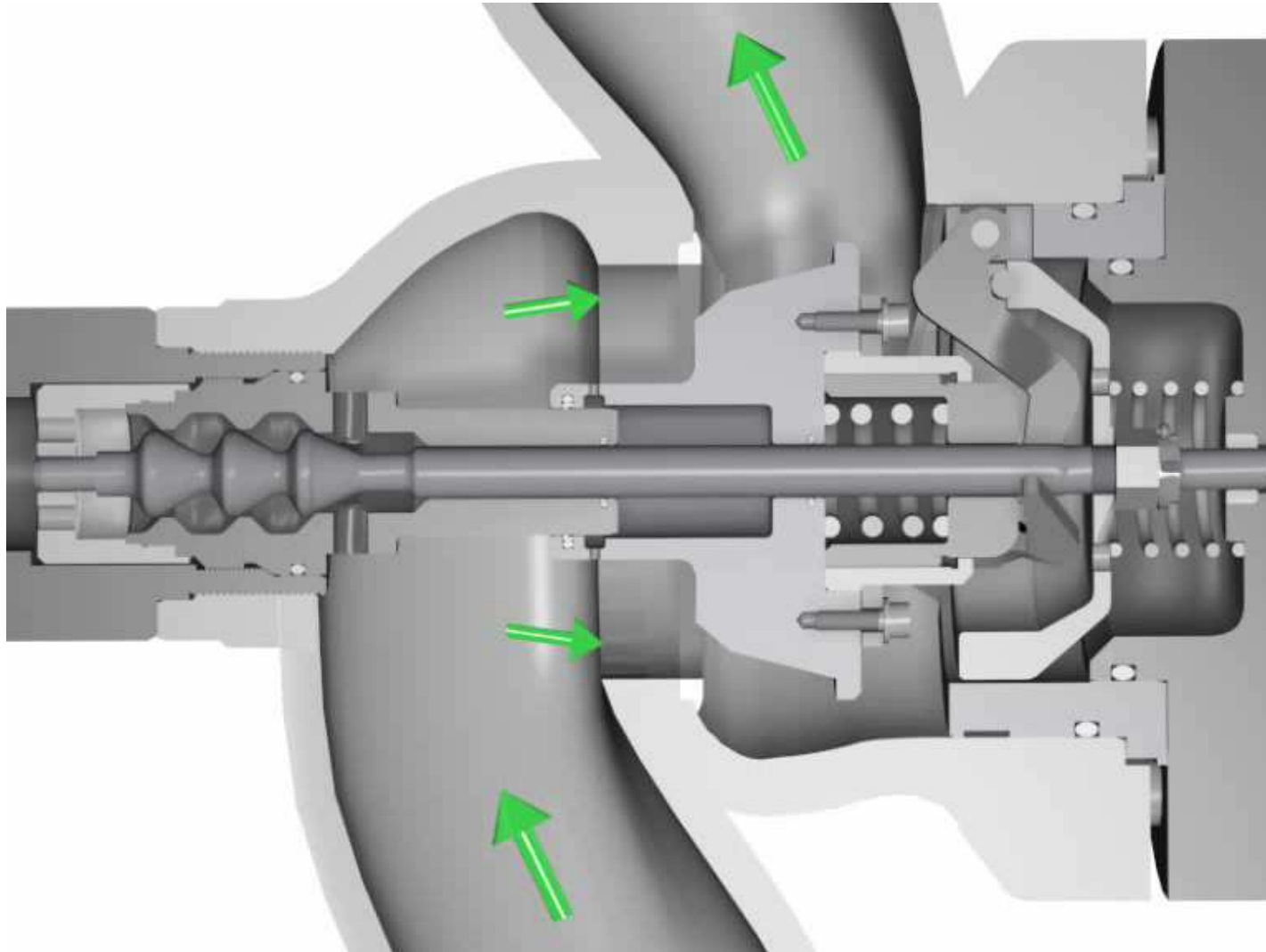


Cavitation occurs when the water pressure reduces below vapour pressure (p_v) and subsequently recovers above the vapour pressure. This results in small steam bubbles called cavities. Subsequently these cavities collapse causing severe erosion damage. In order to handle this severe service a correct valve design is required.

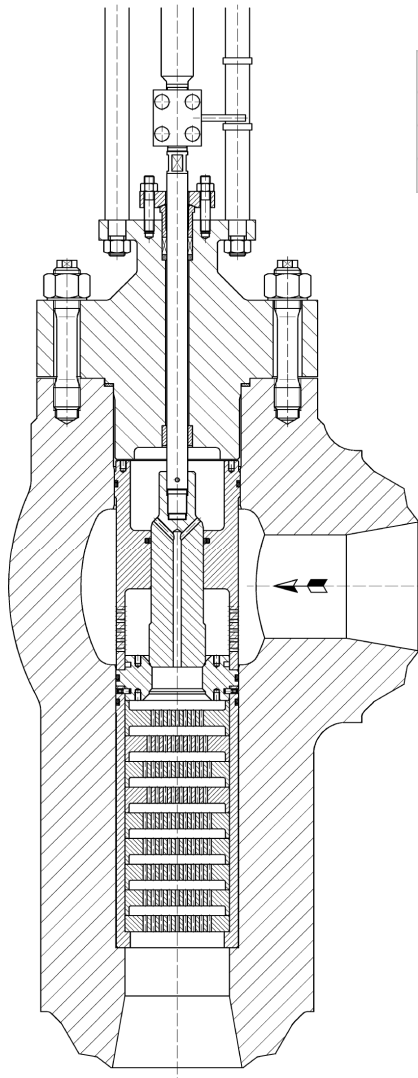
HORA Pump protection: automatic, on-off, controlled



HP - Automatic recirculation valve (PSG-N)

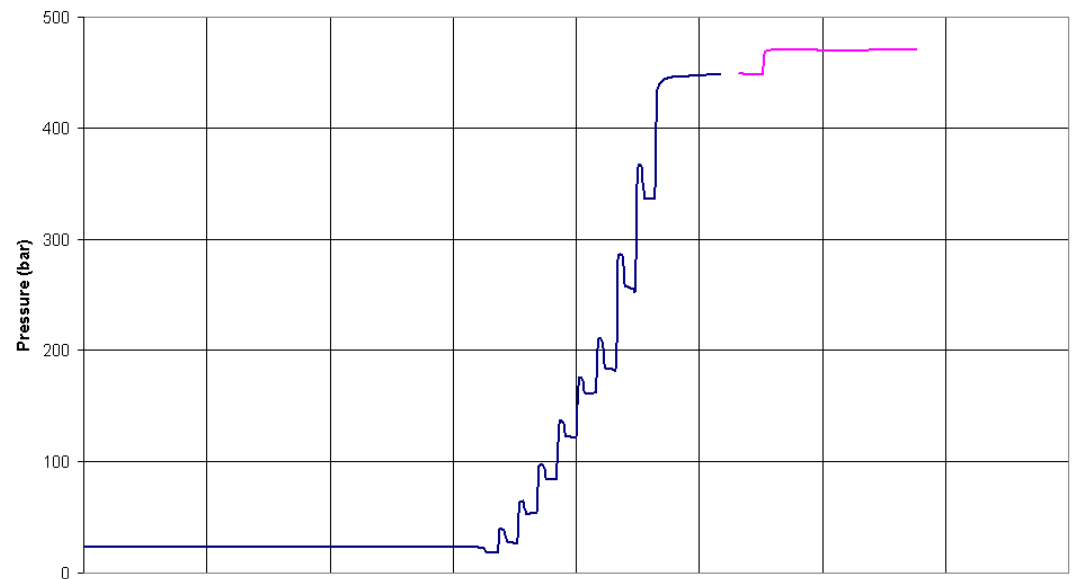


HP - Minimum flow on/off valve

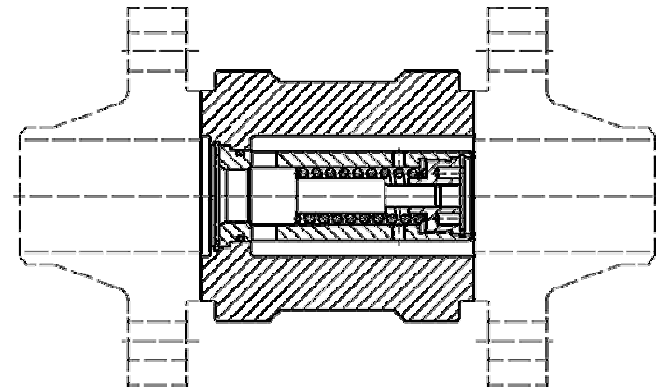
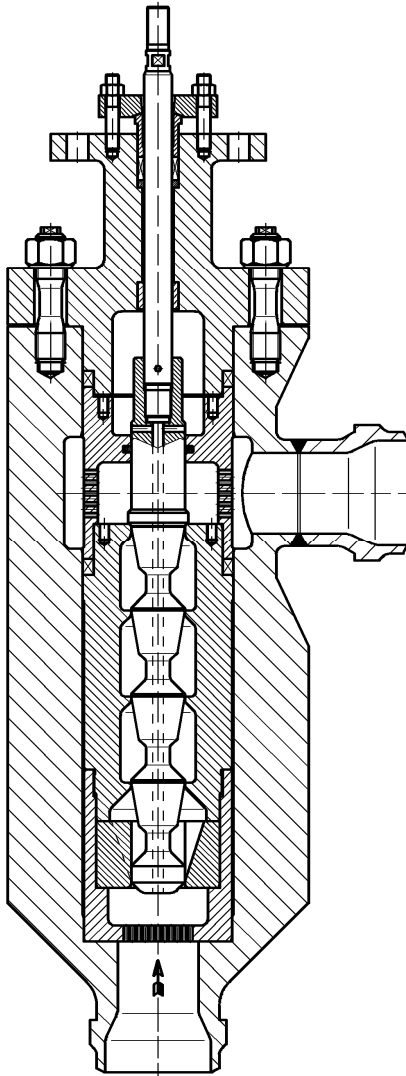


load conditions:	Q	p ₁	p ₂	Δp	t ₁	t ₂	kv
	(m³/h)	(bar,abs)	(bar,abs)	(bar)	(°C)	(°C)	(m³/h)
hot	228,0	470,2	23,9	446,3	186,0	194,0	10,13
cpld	228,0	523,4	13,0	510,4	20,0		10,08

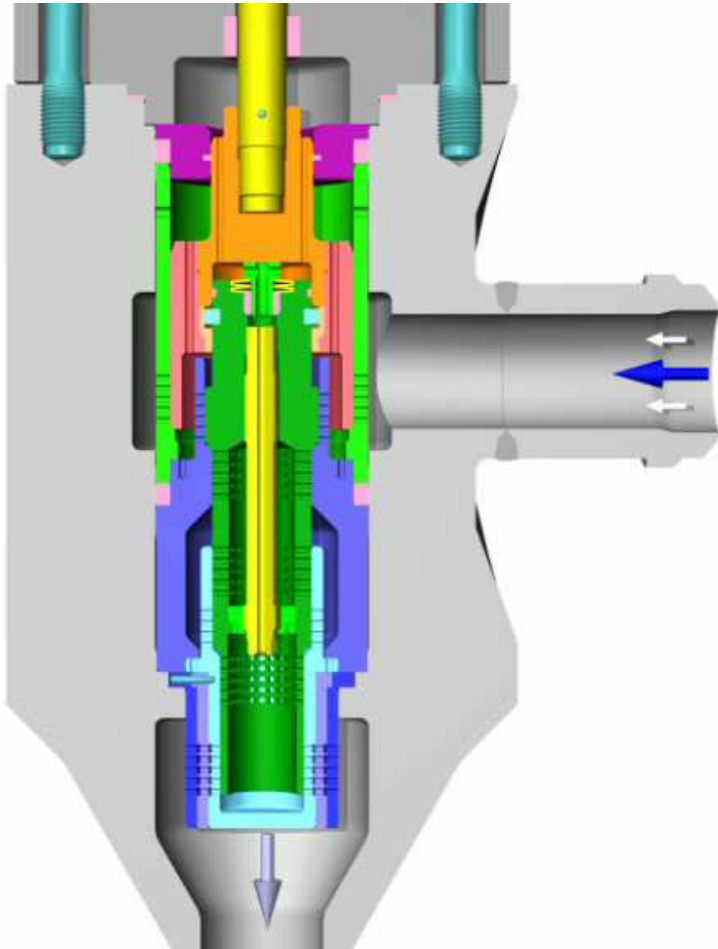
Plant: SIPAT 3 x 660 MW Super Critical PP



HP - Minimum flow control valve



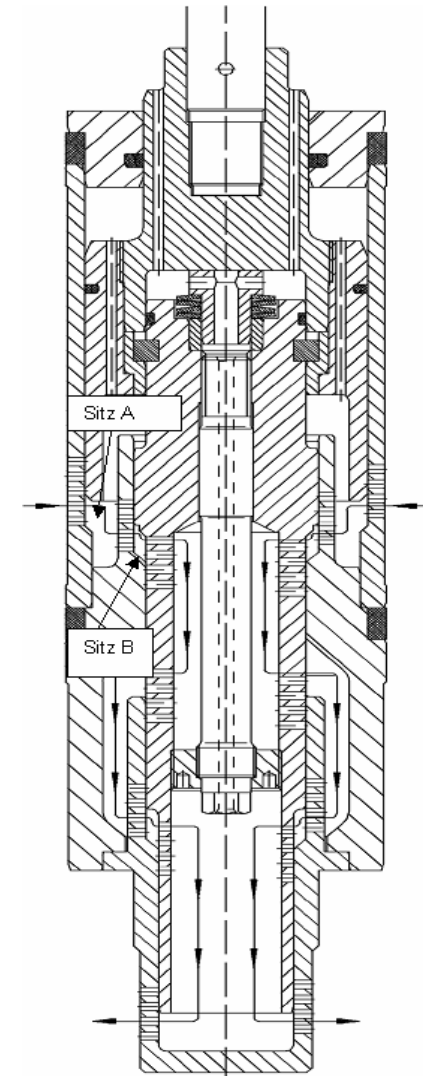
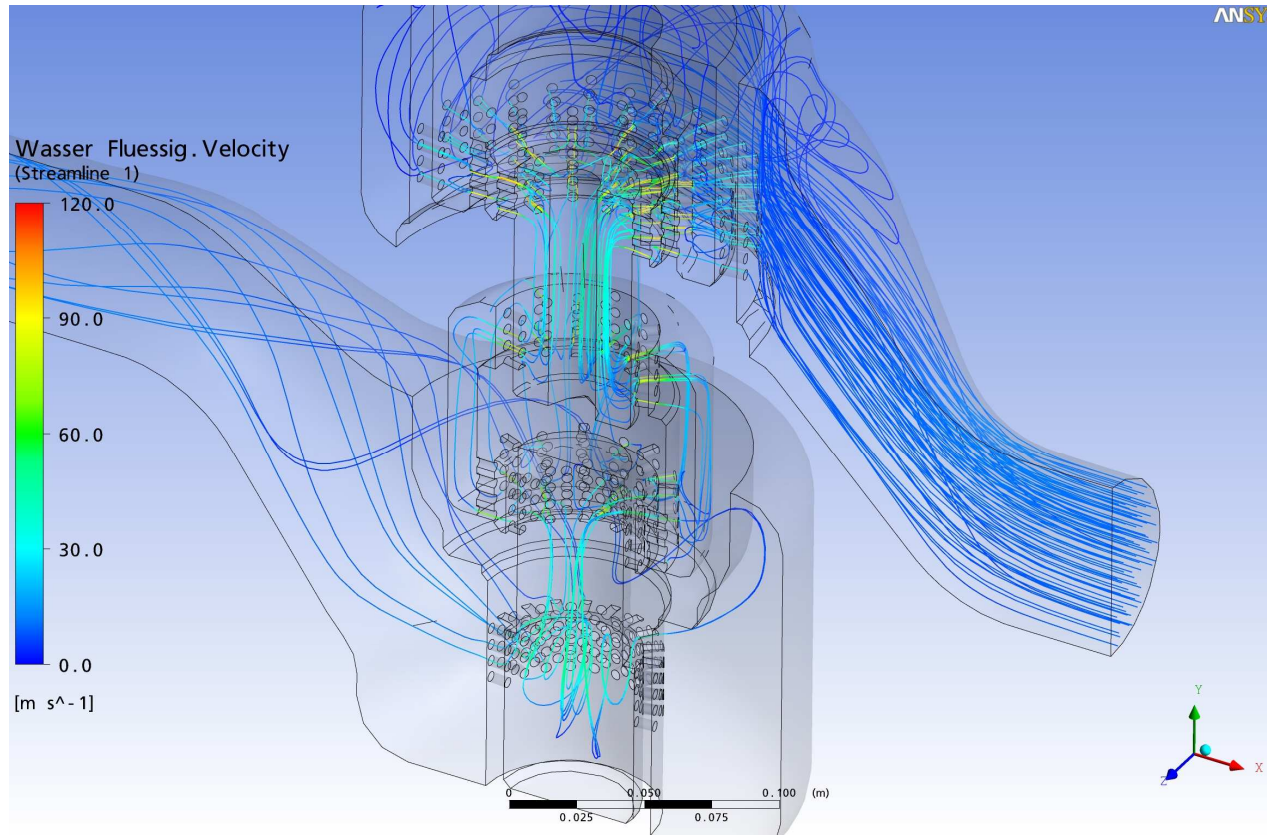
HP - Minimum flow control valve



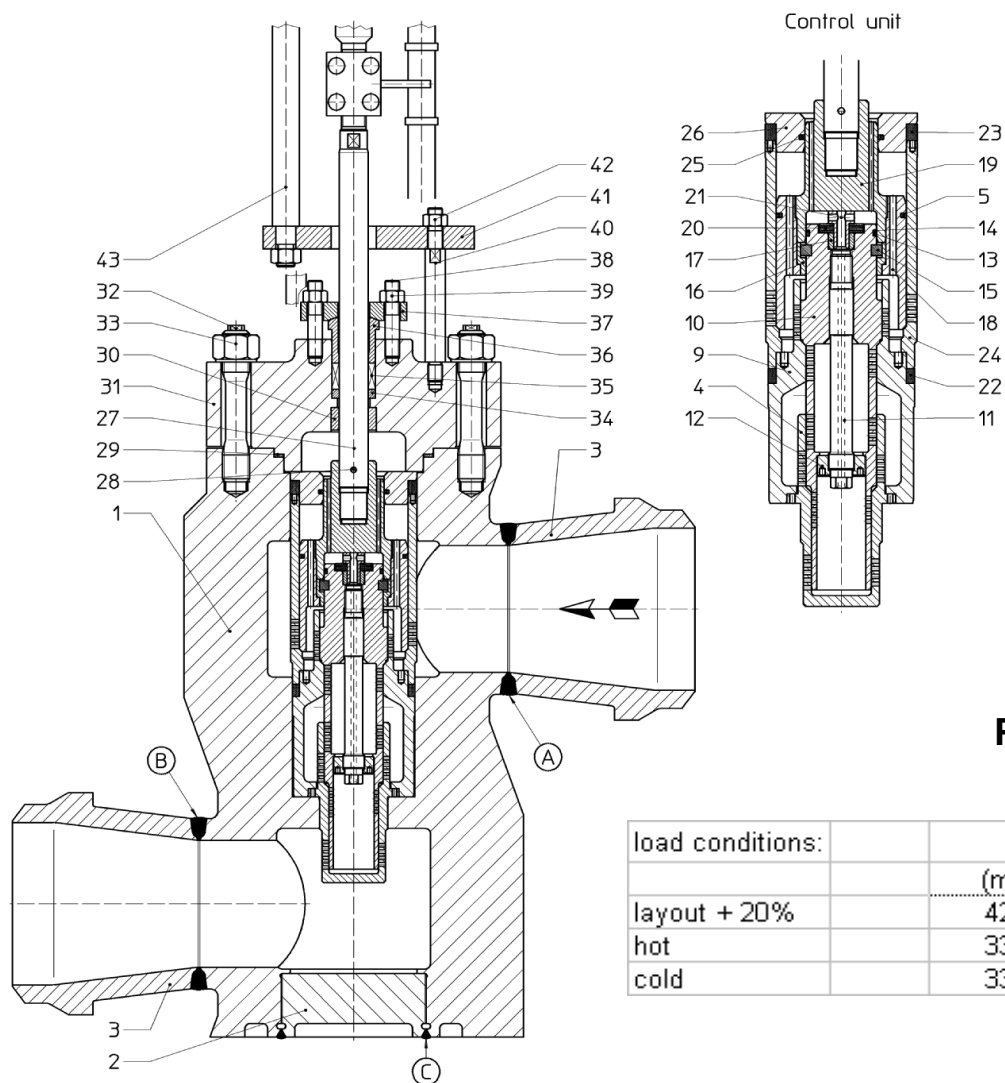
The patented HORA multi-stage MFCV is developed to eliminate the potentially erosive effects of cavitation.

- Velocity control by up to 11 controlled stages
- Plug seating face protected, located outside the high velocity flow prior to the control holes being exposed.
- Area increase through the trim resulting in lower Δp in the outlet stages and thereby eliminating cavitation.

HP - Minimum flow control valve



HP - Minimum flow control valve

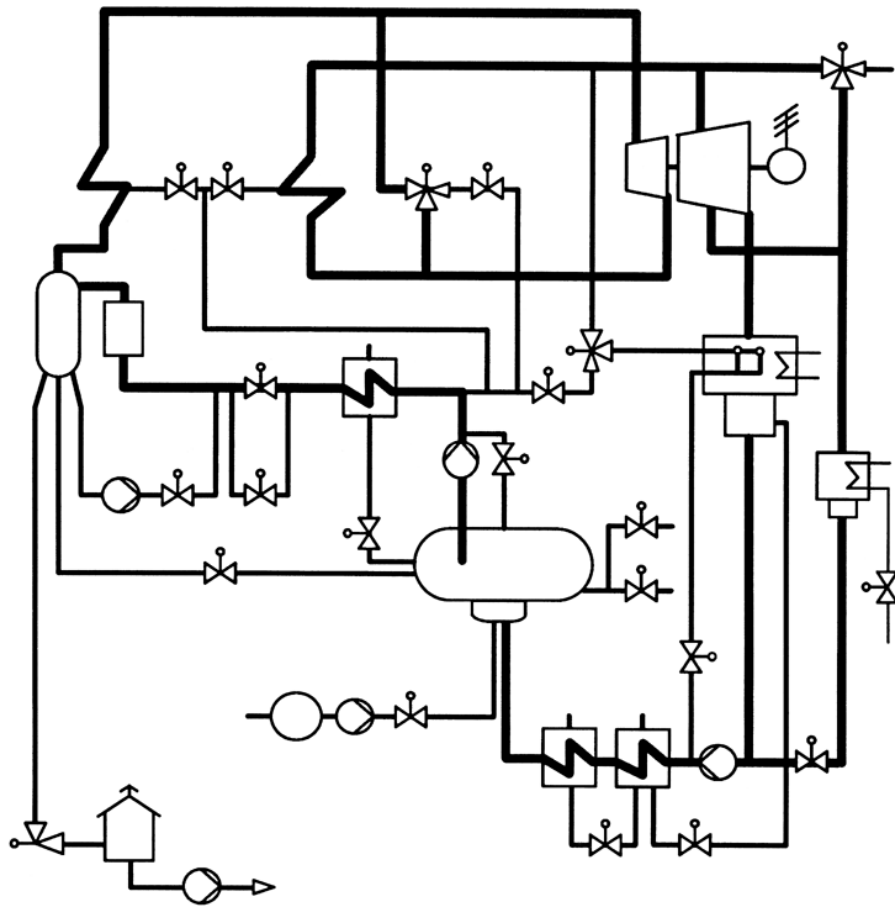


Designation	Mat. Spec.	Sp. Parts
Body	1.5415	
Cover	1.5415	
Buttweld end	1.6368	
Control bush.	1.4122	X

Plant: Shuaibah III PP

load conditions:	Q	p ₁	p ₂	Δp	t ₁	kv
	(m ³ /h)	(bar, abs)	(bar, abs)	(bar)	(°C)	(m ³ /h)
layout + 20%	420,0	276,6	18,6	258,0	153,7	24,14
hot	330,0	281,0	17,6	263,4	153,7	19,44
cold	330,0	307,4	12,6	294,8	20,0	19,18

HORA - control valves for industry and power plants



Feed water control

Pressure reducing & desuperheating

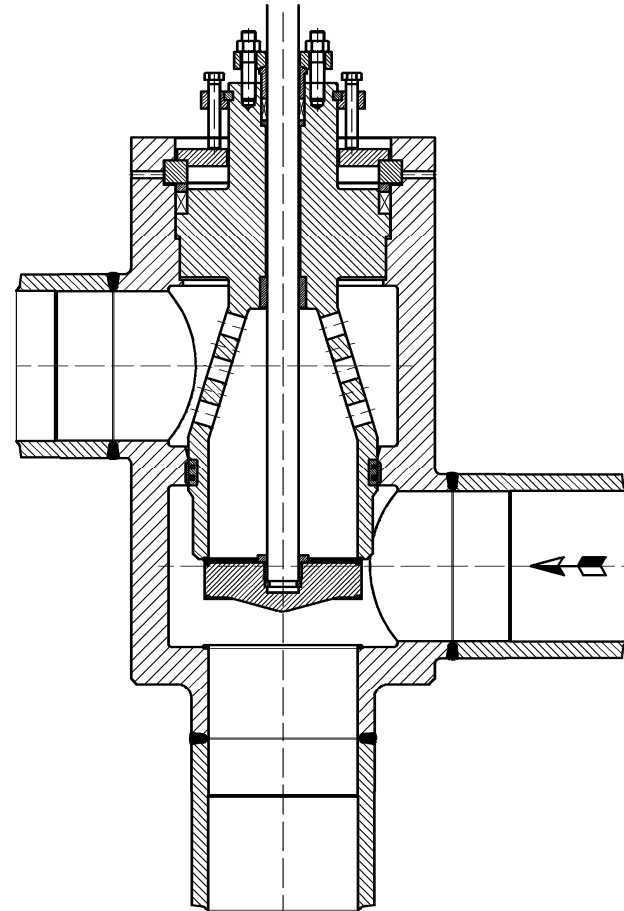
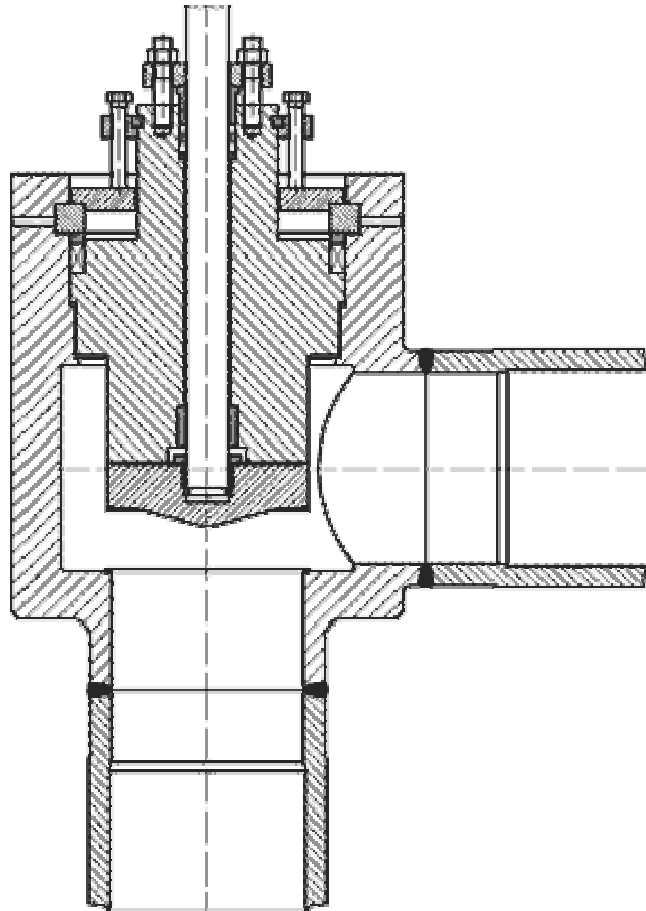
Pump protection

Special applications

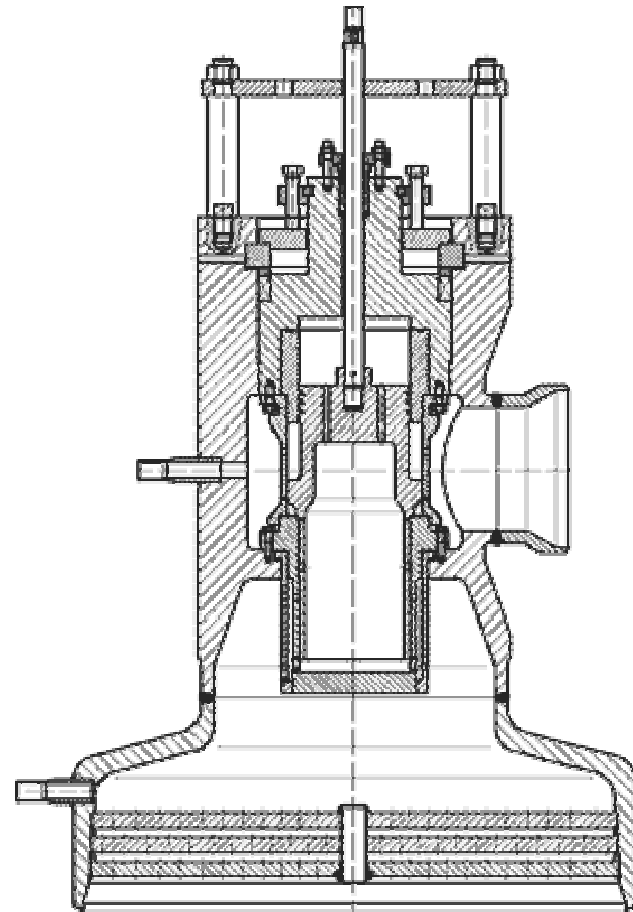
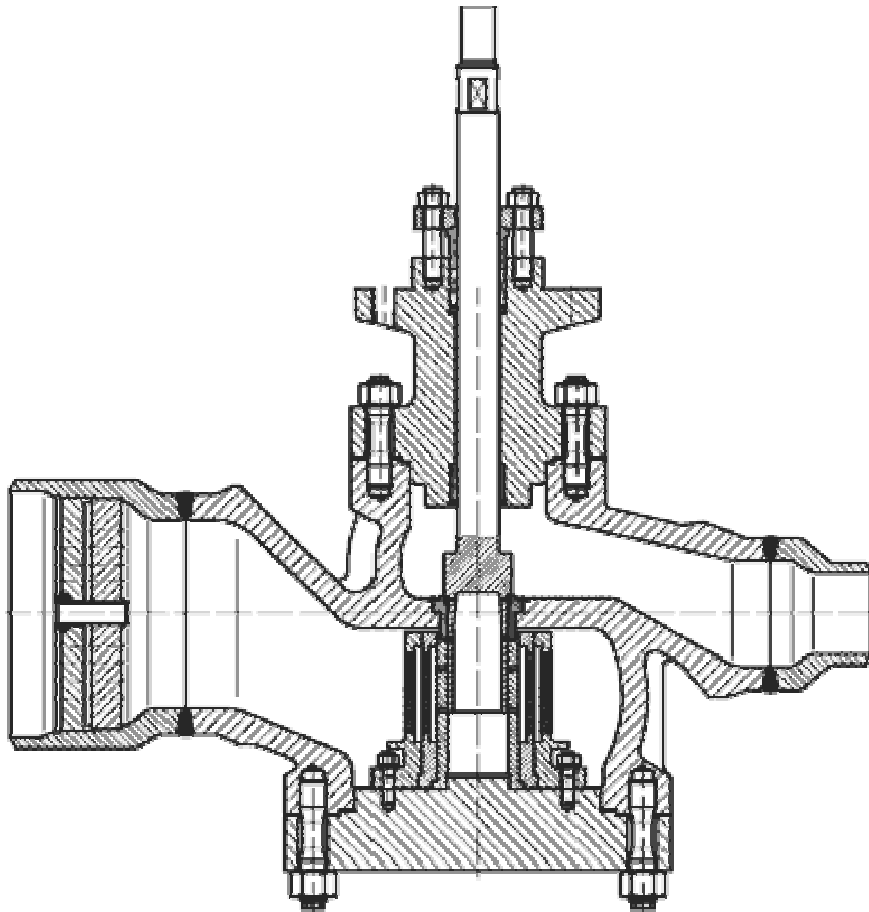
Control valves

Actuators

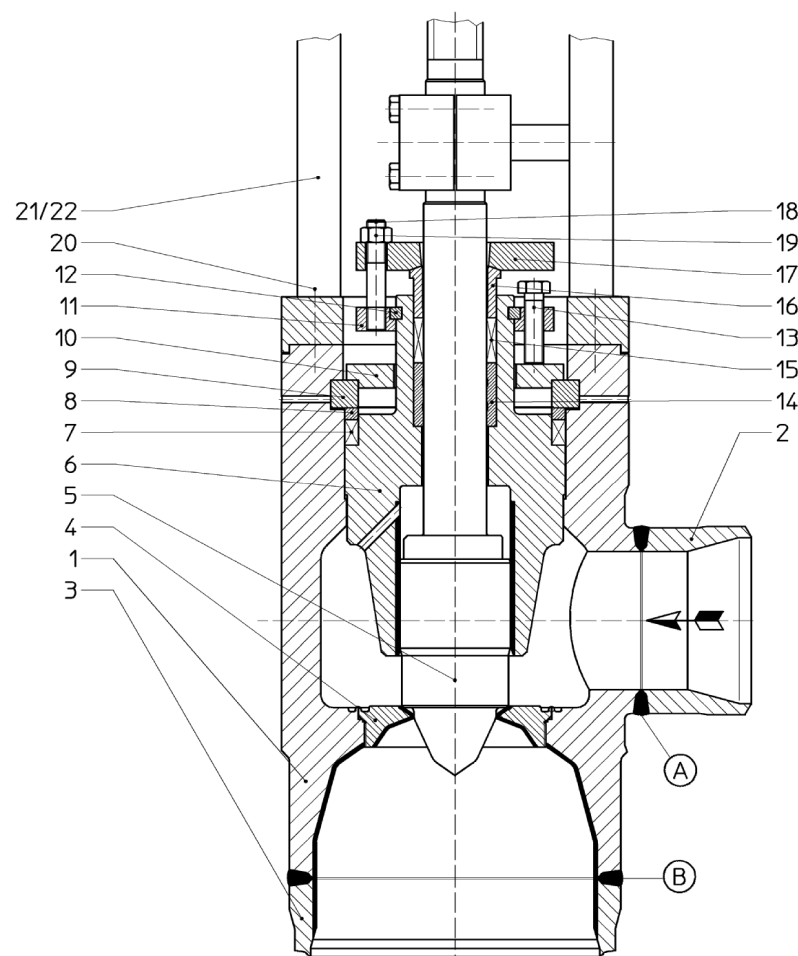
HP - Preheater quick closing valve



Steam vent valve



Drain Valves (Water Vessel Discharge)

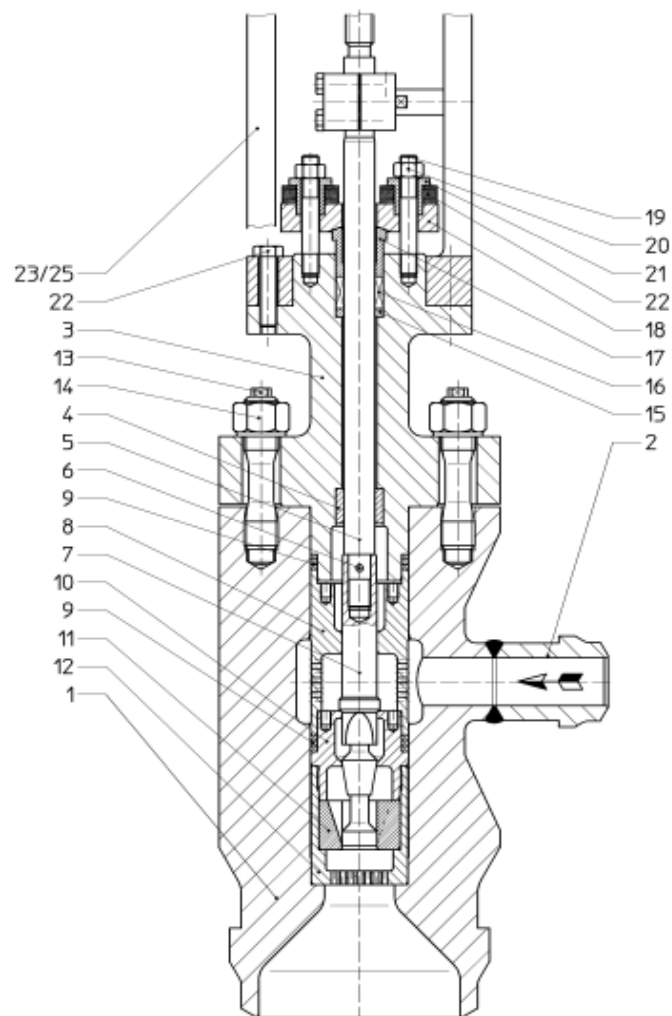


load conditions:	G	p ₁	p ₂	t ₁	kv
	(kg/s)	(bar,abs)	(bar,abs)	(°C)	(m³/h)
1 bar Vessel	67,09	5,5	1,0	100,0	136,05
20 bar Vessel	118,99	24,0	1,0	213,0	218,49
140 bar Vessel	87,45	142,9	1,0	336,45	72,84
180 bar Vessel	76,1	182,6	1,0	356,54	55,35

Plant: STEAG - Iskenderun 2 x 605 MW Super Critical

Pos.	Benennung	Designation	Mat. Spez.	Sp. Parts
1	Eck-Gehäuse	body	1.6368	
2	Schweißende	butt weld end	1.6368	
3	Schweißende	butt weld end	1.5415	
4	Ventilsitz	seat	1.4571	
5	Parabolkegel	plug	1.4122	X
6	Stopfbuchsgehäuse	bonnet	1.6368	
7	Verschlussdeckeldi	sealing cap	1.4541/gr.	X
8	Druckring	pressure ring	1.6368	
9	Ring geteilt	split ring	1.6368	

Drain Valves

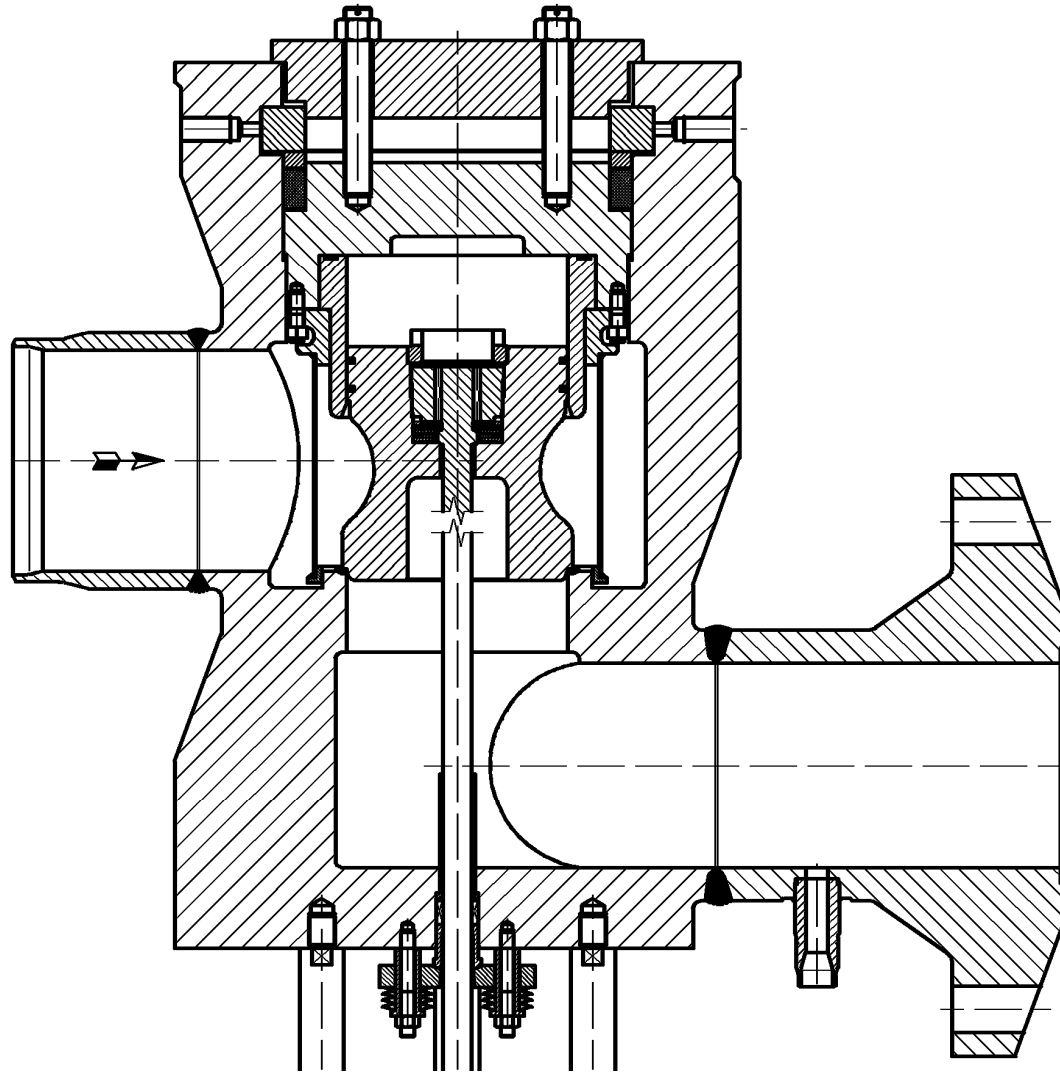


load conditions:	G	p ₁	p ₂	Δp	t ₁	kv
	(kg/s)	(bar,abs)	(bar,abs)	(bar)	(°C)	(m³/h)
max.	1,68	175,0	1,0	174,0	352,0	1,23
Norm.	0,72	80,0	1,0	79,0	293,0	0,84
min.	0,34	40,0	1,0	39,0	249,0	0,61

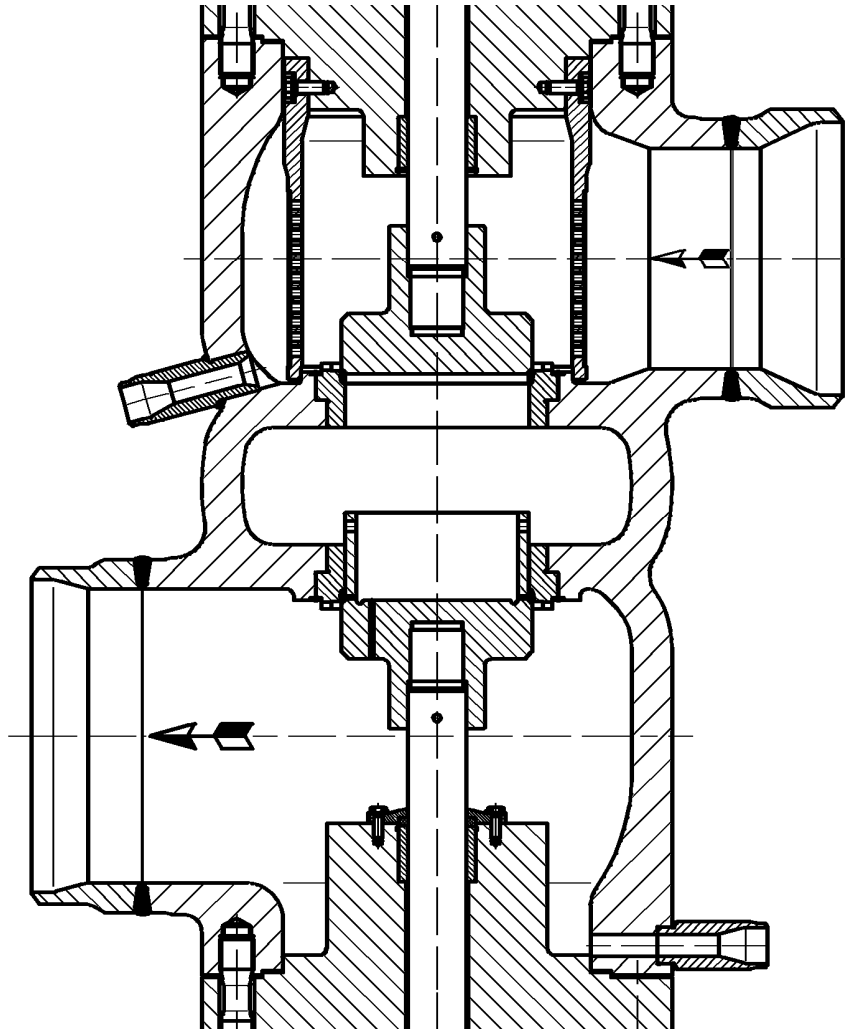
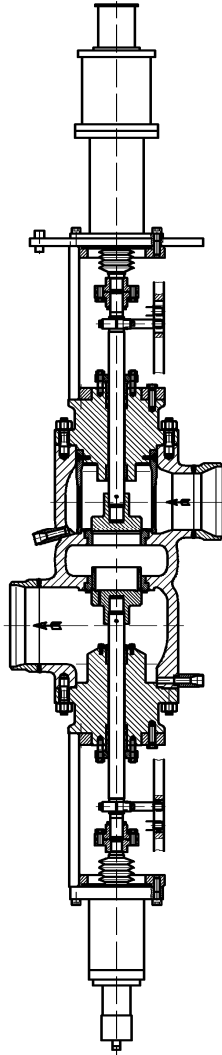
Plant: ESB – Moneypoint PP

Pos.	Benennung	Designation	Mat. Spec.	Sp. Parts
1	Eck-Gehäuse	Body	1.7383	
2	Schweißende	Bullweld end	1.7380	
3	Stopfbuchendeckel	Bonnet	1.7383	
4	Führungsbuchse	Guide bush	1.4922	
5	Spindel	Valve stem	1.4922	X
6	Zylinderstift	Cylindrical pin	1.4923	X
7	Koscodekegel	Costode plug	1.4922	X
8	Druckring	Pressure ring	1.4922	

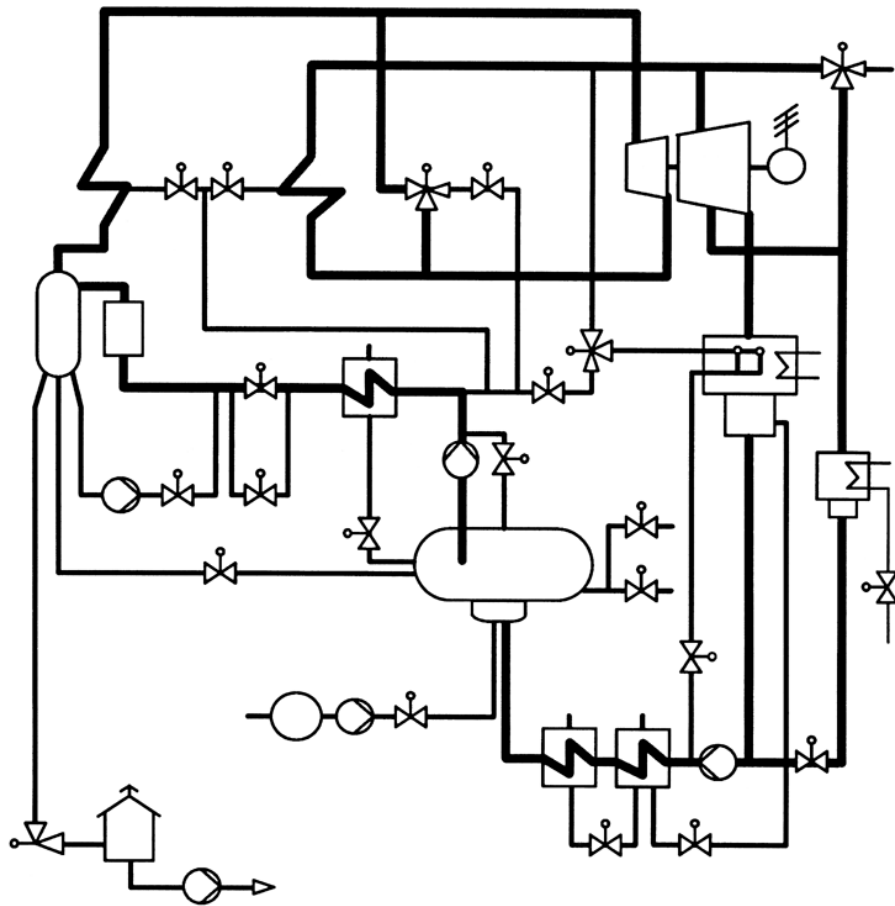
Turbine quick closing valve



Turbine bypass stop and control valve



HORA - control valves for industry and power plants



Feed water control

Pressure reducing & desuperheating

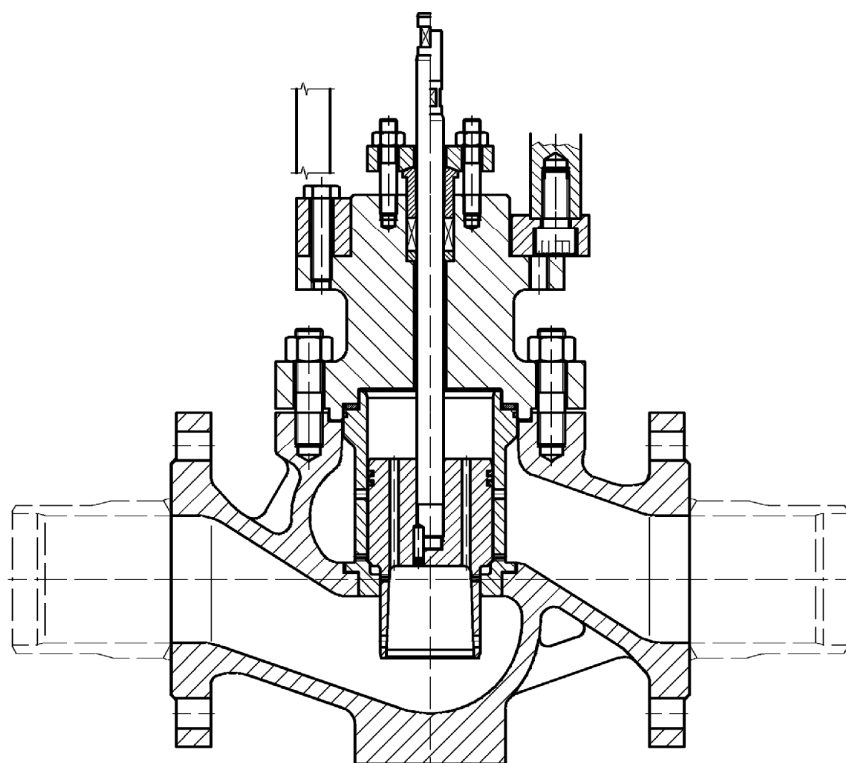
Pump protection

Special applications

Control valves

Actuators

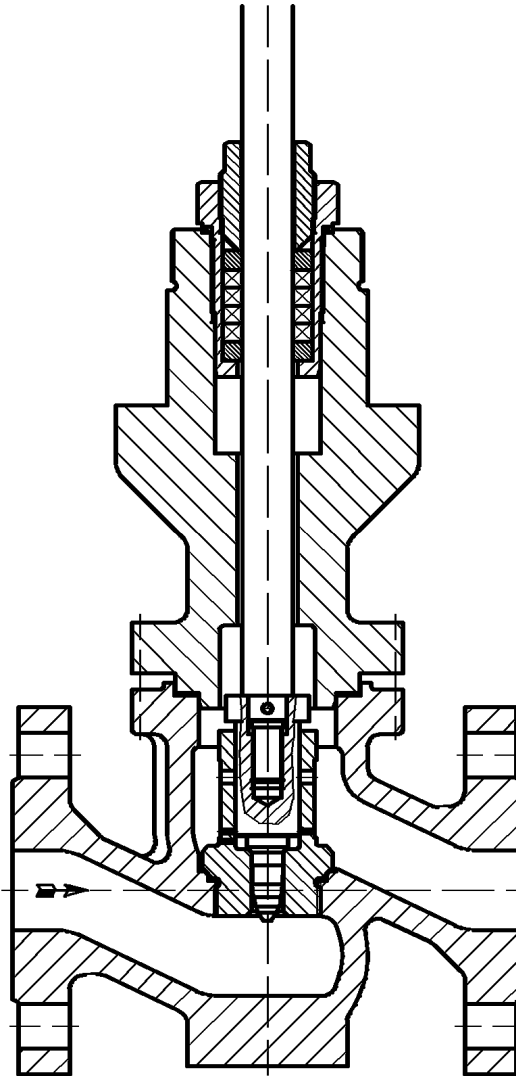
Globe/ Angle cage guided valves



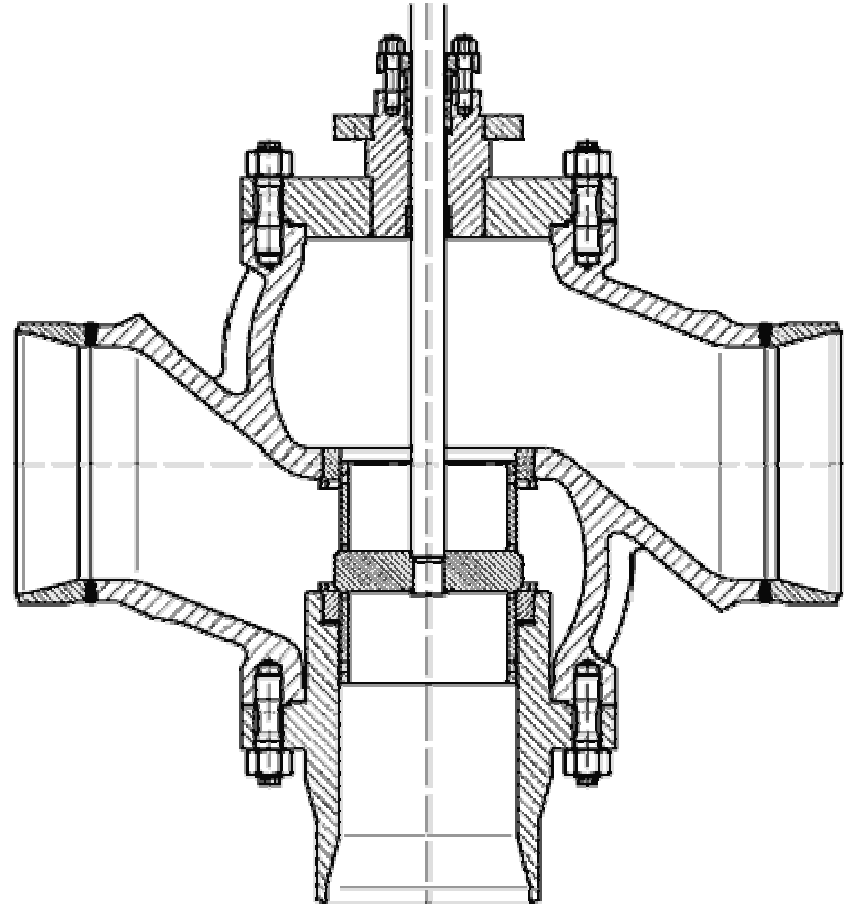
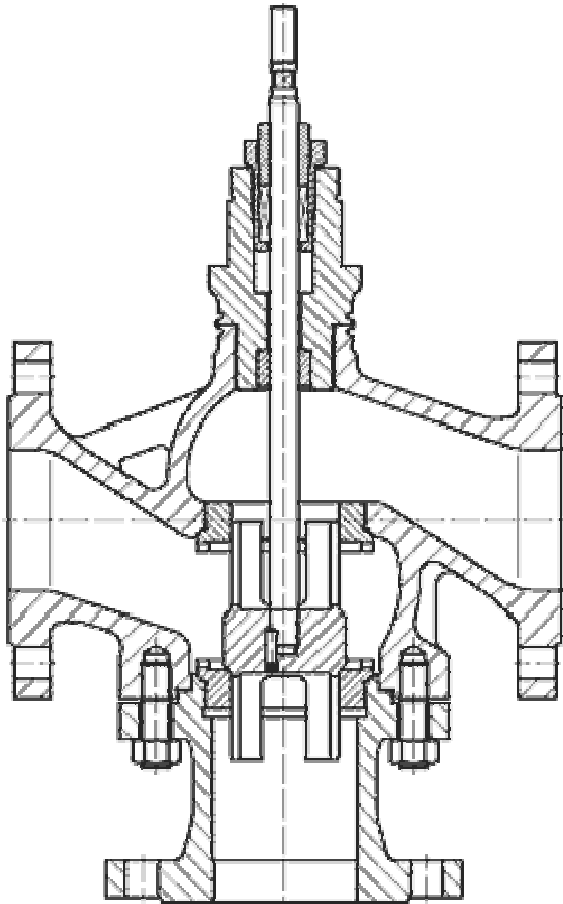
The HORA series 88/89 range of cage guided control valves is the universal and core product for various application.

- BY CFD streamlined flow passages to optimize capacity.
- Modular construction with a range of all different connections. (ASME, DIN)
- Large variation of trim designs. (cv-value, multi-/ stage, un-/ balanced, characterized trim, ...)
- Trim components clamped in for easy maintenance from the top

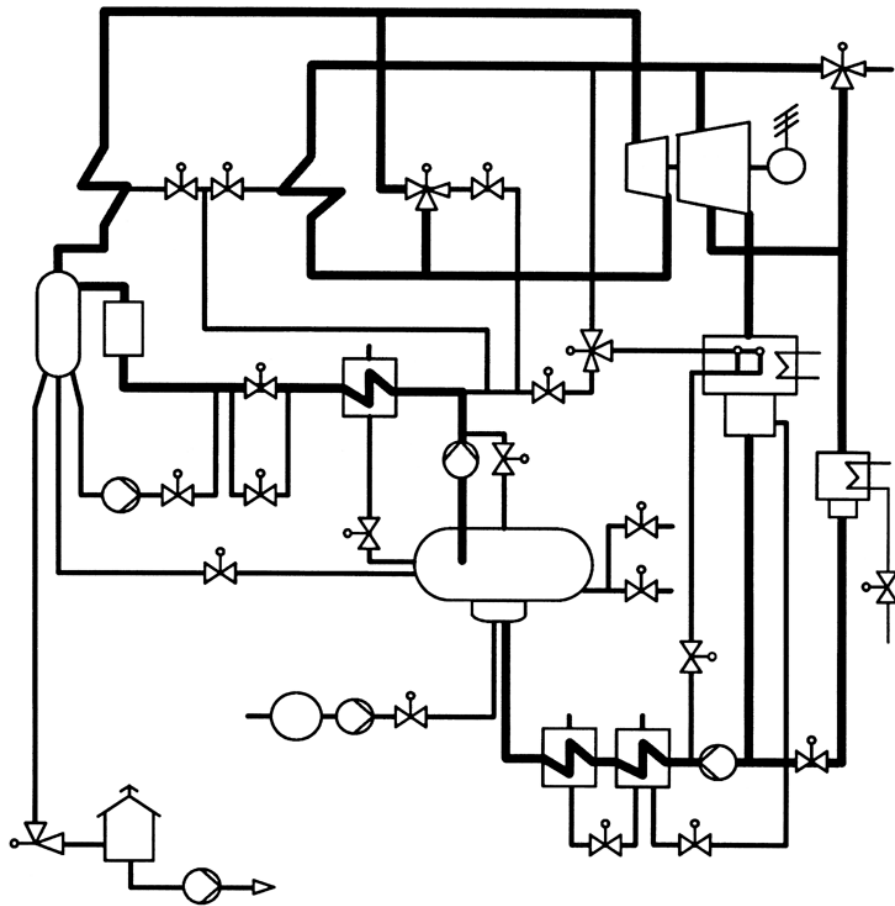
Low-flow valve



3-way valve



HORA - control valves for industry and power plants



Feed water control

Pressure reducing & desuperheating

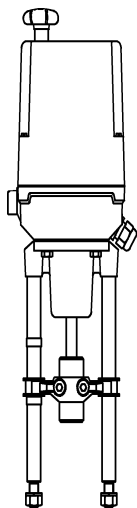
Pump protection

Special applications

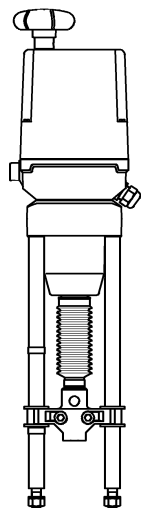
Control valves

Actuators

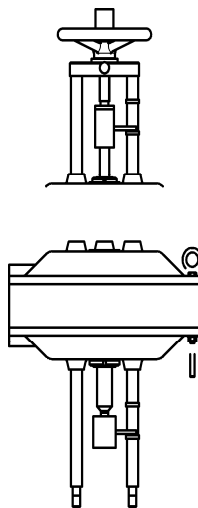
Actuators



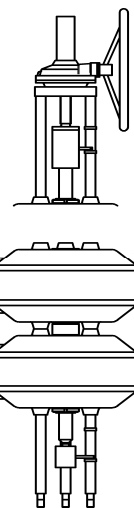
M 203 / 453



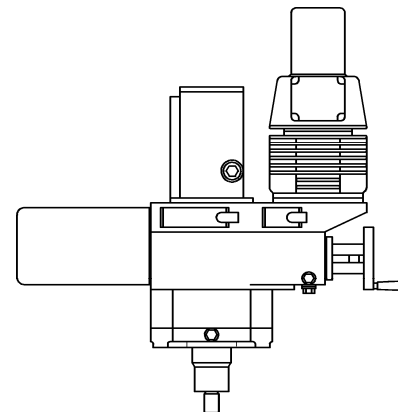
M 803 / 1003 / 1203



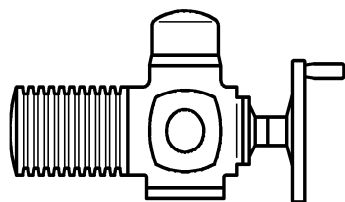
PA 160 – 1080



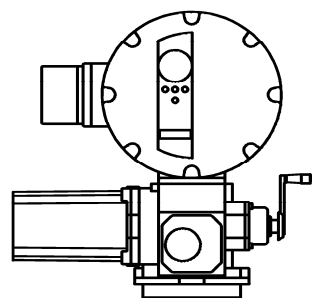
PA 2160



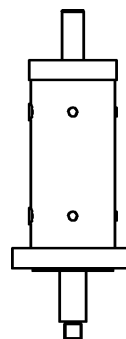
Electr. lin. act. attachment
ABB



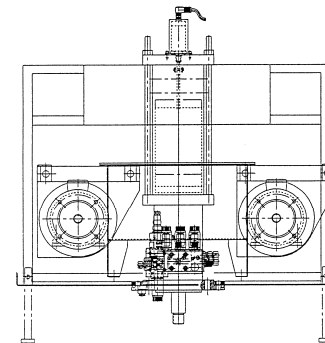
Electric quarter-turn actuator
AUMA



Electr. quarter-turn actuator
SIPOS

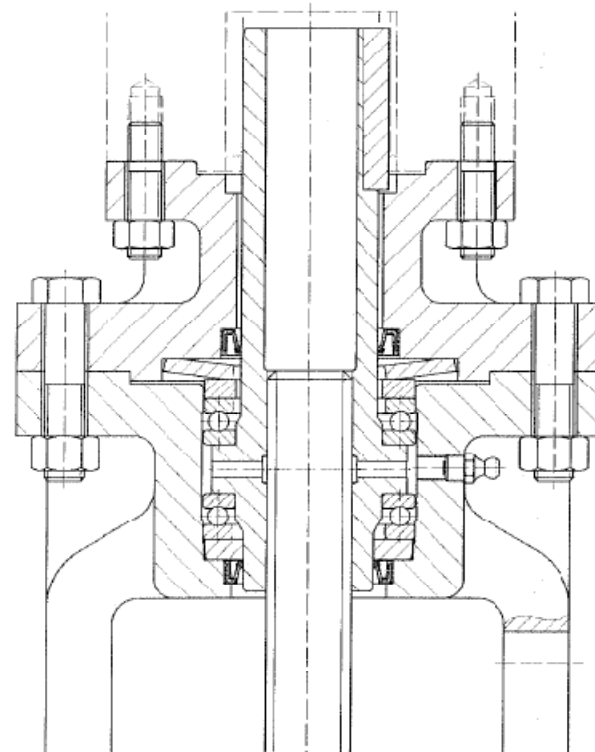
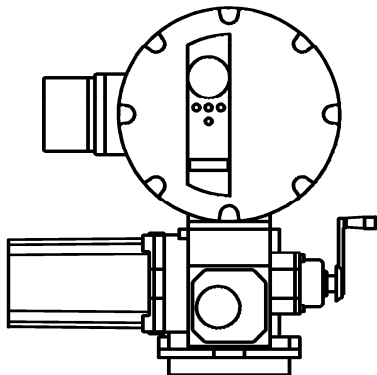
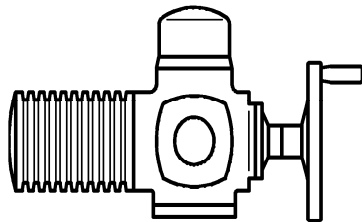


Hydraulic cylinder

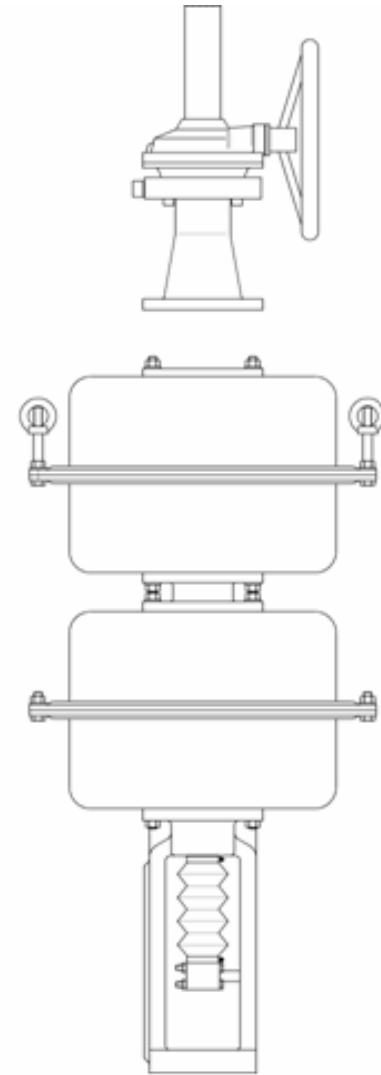
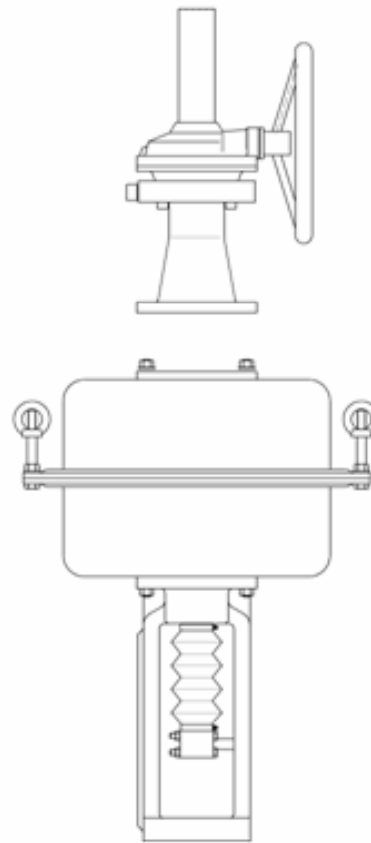
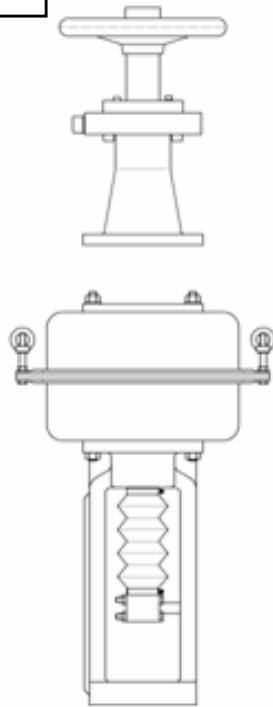
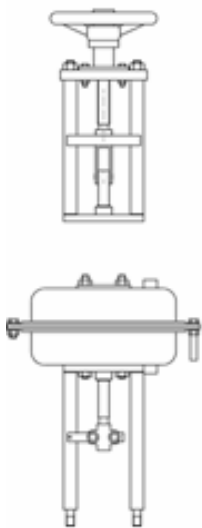
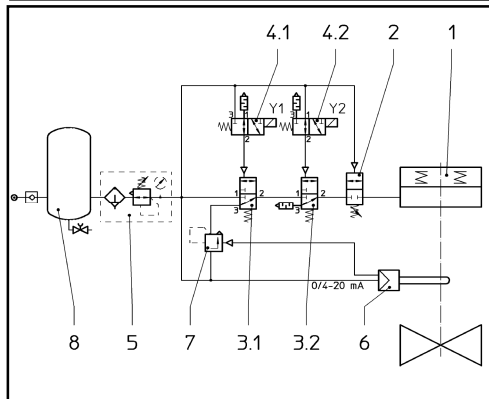


Hydraul. - compact actuator

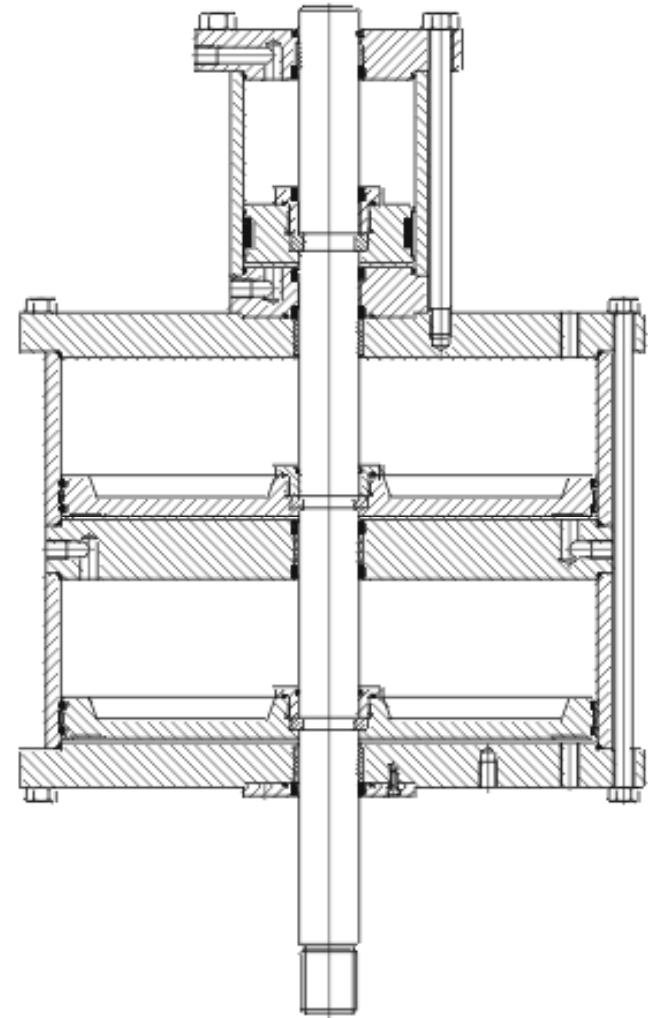
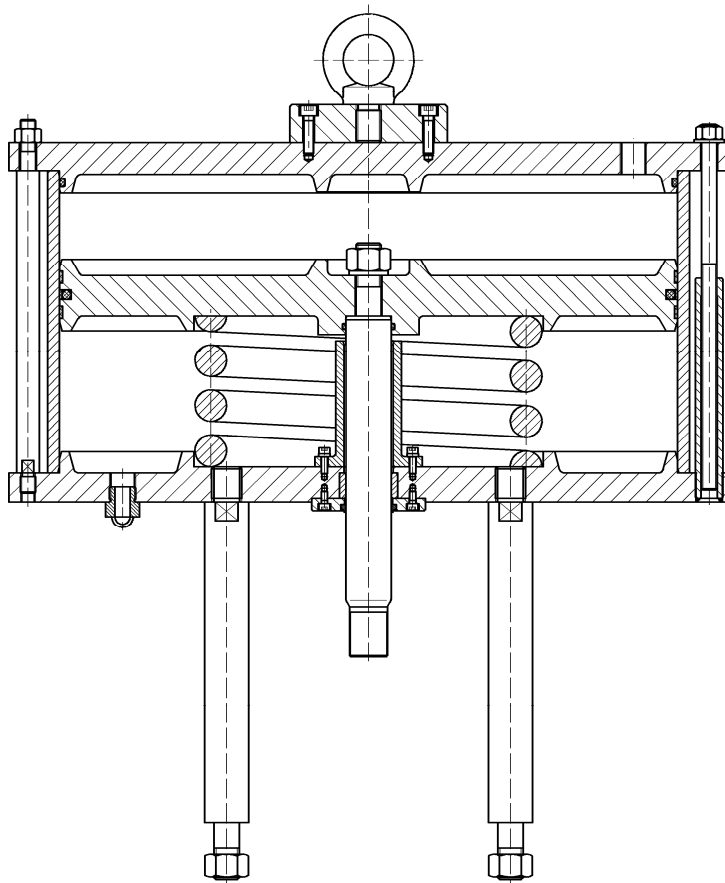
Electric Actuators



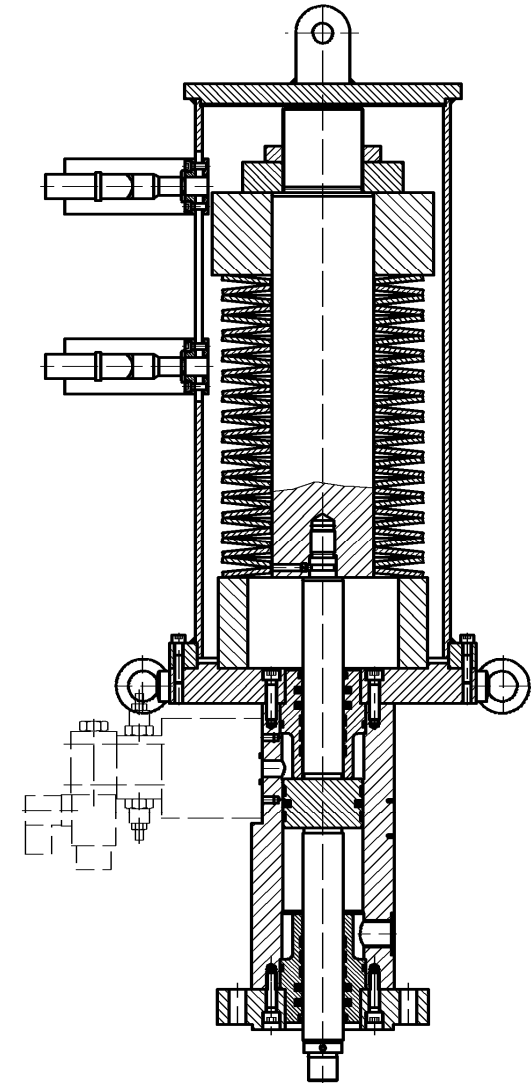
Pneumatic diaphragm actuator



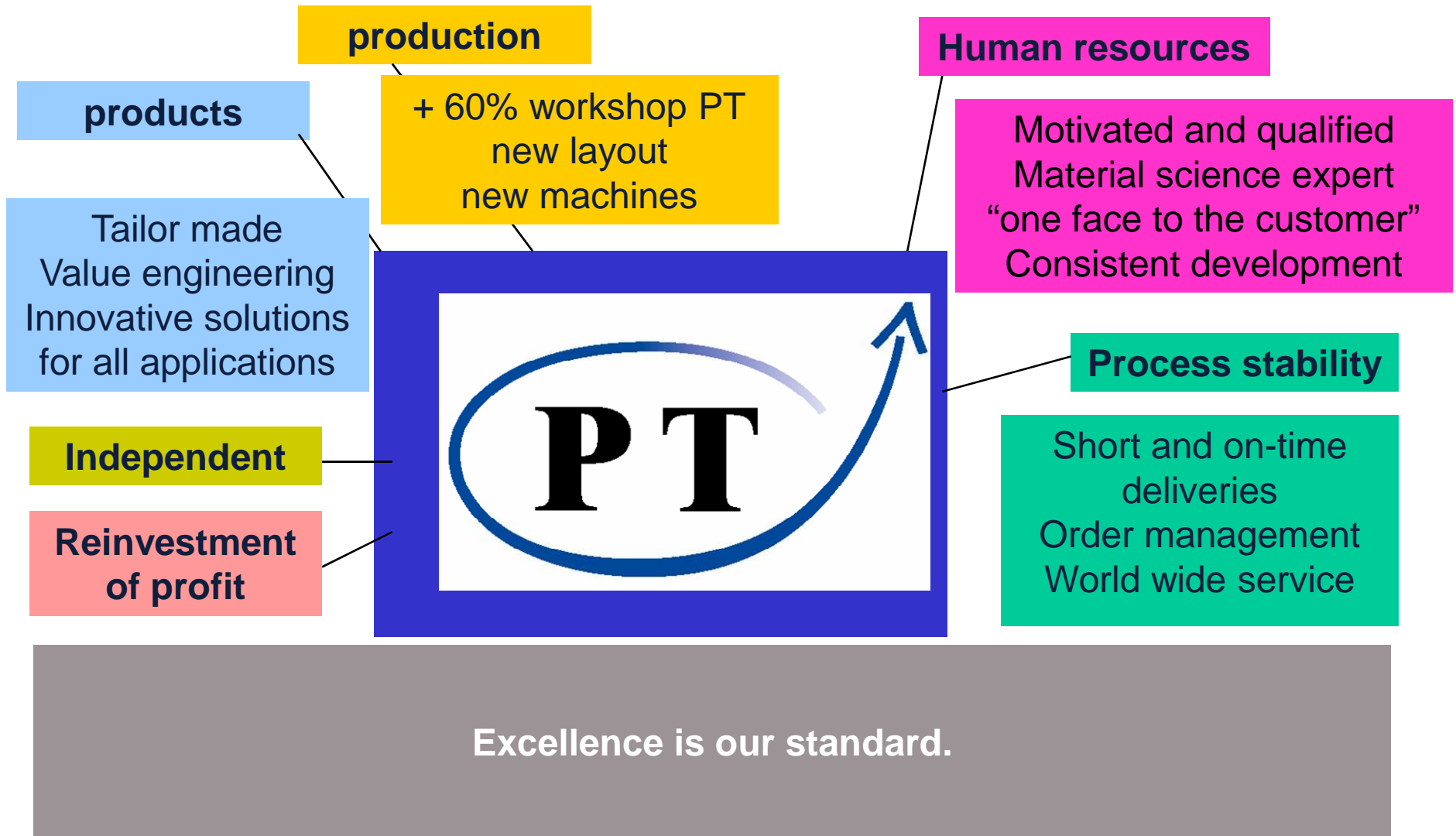
Pneumatic piston actuator



Hydraulic Actuation System



HORA-PT: Factors of success



Thank you ...



For further information don't hesitate to contact us.

... for your attention.

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