



High Performance Valves



General Catalogue

03/2016

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_1 Company Description



TECartec is a worldwide represented engineering and manufacturing company, founded on innovative solutions and high quality products to critical applications.

Our main goal, is to create extraordinary value for our customers through innovative solutions created by our competent team and a solid relationship to our partners and clients.

At our manufacturing site and company headquarter in Oranienburg, Germany, we handle the value adding processes ourselves, in our CNC equipped production, to manufacture world class products in favor of our customers and a dynamic, demanding market. TEC artec stands for quality, reliability and high performance.

_1 Company Description



Our competent team gains knowledge and experiences to develop and manufacture industrial auxiliary equipment primarily in the range of power plants, gas and oil as well as in the petro chemistry area.

Flow behavior, surge loads, high pressures, extreme temperatures and aggressive media are symbolizing TEC artec as manufacturer for the high product requirements and enormous responsibility.

The permanent proximity to the customer and keen insight for national and international markets ensure constant new developments. Innovative products and patents ready for the market have been realized. We guarantee consistent high quality due to the continuous expansion of the value chain in our production and the in-house quality assurance. The expansion of a worldwide sales and dealer network supplements our global presence.

As a competent manufacturer in a demanding and critical market, we take our responsibility to comply with norms and standards seriously. Therefore we are certified according to PED 97/23/EC, DIN EN ISO 3834-2.



With the membership of the [AVK Group](#), the company has a strategic partner with which we market our high quality and innovative products worldwide and use the synergies of the group in the sales and purchasing areas. The AVK Group, with its more than 77 companies worldwide, is supplying more than 80 countries with products and services via own sales companies, agents, distributors and license holders. This global network permits close cooperation with our customers and end users, ensuring a high level of service and customer satisfaction. The AVK Group employs more than 3.200 people and performs a net sales of more than 500 million Euro.

_2 Ball Valve



artec shut-off and control valve

Soft and metal seated

DN 25 - 500	PN 16 - 250	Tmax. 650°C	product label
			artec-N

metal seated

DN 25 - 600	PN 100 - 420	Tmax. 200°C	artec-P
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ceramic seated

DN 25 - 200	PN 6 - 16	Tmax. 140°C	artec-K
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variTEC shut-off and control valve

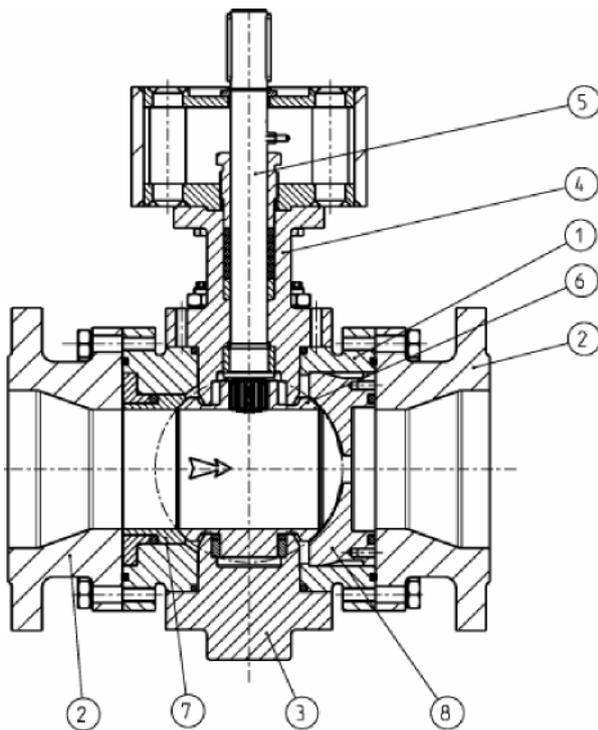
Soft and metal seated

DN 25 - 500	PN 10 - 250	Tmax. 200°C	variTEC
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_2 Ball Valve – artec-N



Three-part control ball valve with soft and metallic sealing
 DN 15 to 400 / PN 10 to 64 (1/2" - 20" / Class 150 - 400)



Design features

- Three-part housing
- Control characteristic, linear or equal-percentage
- Tightly sealing on both sides
- Shaft secure against blowing out
- Trunnion-mounted ball
- Zero maintenance shaft seal via Viton O-rings

	Materials
1. Housing	C22.8
2. Housing connection	C22.8
3. Plain bearing half liner	C22.8
4. Packing housing	C22.8
5. Selector Shaft	1.4122
6. Ball	1.4122
7. Valve seat	1.4122
8. Control disk	1.4122

Technical Data

Nominal diameter: DN 15 to 400
 Pressure ratings: PN 10 to 64
 Temperatures : - 10°C to 650 °C

Testing

100% testing of the valve, documented with serial number and test certificate as per EN 10204

Your order should contain the following information:

- Nominal diameter
- Nominal pressure
- Temperature
- Medium
- Control characteristic
- Actuation type
- Pipe connection

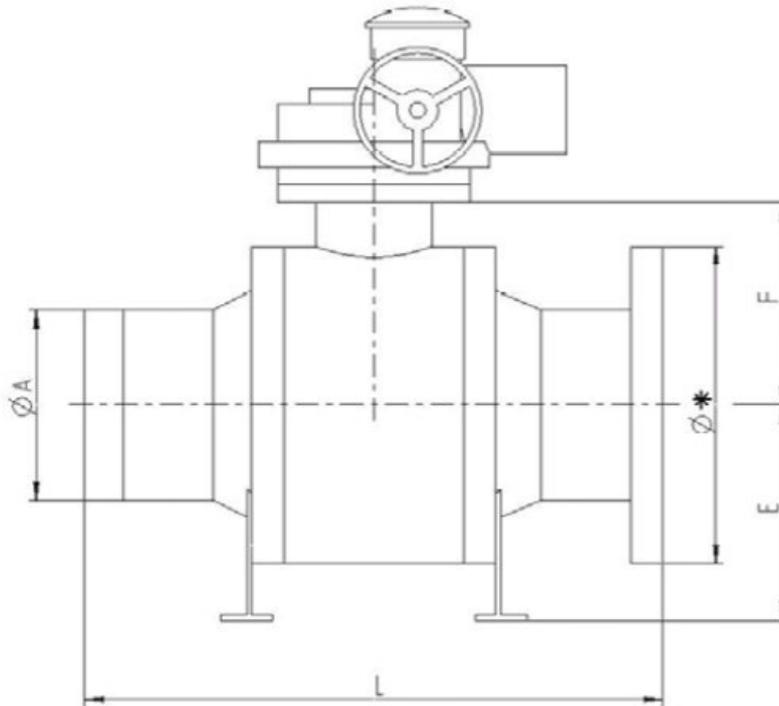
Design variants

- Actuation: - Manual Actuation
 - With attachment flange DIN ISO 5211
 - Electric drive
 - Pneumatic drive
- Flange connection or welding socket piece
- Housing full welded
- Installation under ground because of PUR-coating
- Spindle extension
- Control and drainage pipe line with blow-out

Soft sealed with PTFE insert in the valve seat Pure metallic sealed plasma nitrided or with a wear resistant wolfram carbide coating of ball and valve seat

Other material variants are possible

_2 Ball Valve – artec-N

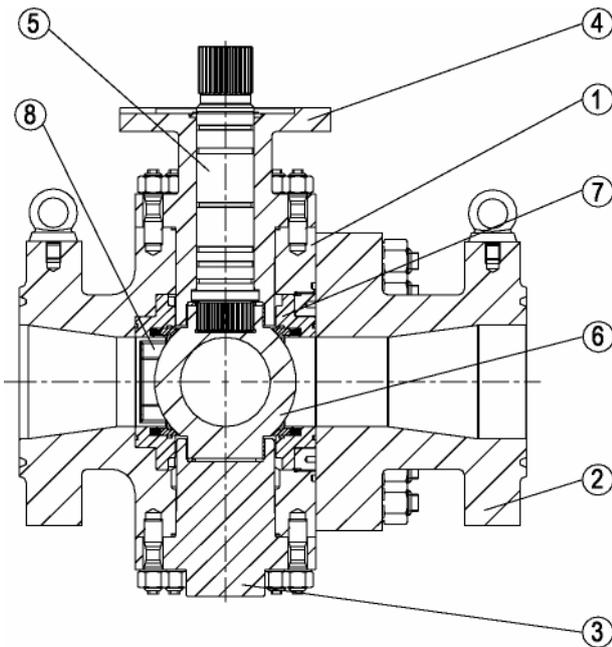


DN	Size	PN	E	F	L	Weight
			mm	mm	mm	kg
15	½"	64	105	220	210	10
20	¾"	64	105	220	230	15
25	1"	64	105	220	230	20
32	1¼"	64	105	220	260	25
40	1½"	64	130	220	260	30
50	2"	64	130	220	300	40
65	2½"	64	190	302	340	50
80	3"	64	190	302	380	80
100	4"	64	237	320	430	100
125	5"	64	237	320	500	150
150	6"	64	358	393	550	300
200	8"	64	358	393	650	800
250	10"	64	596	653	775	1000
300	12"	64	596	653	900	1300
350	14"	64	596	653	-	-
400	16"	64	596	653	-	-

_2 Ball Valve – artec-P



Three-part control ball valve with metallic sealing
DN 25 to 500 / PN 10 to 250 (1" - 20" / Class 150 - 1500)



Design features

- Three-part housing
- Control characteristic, linear or equal-percentage
- Tightly sealing on both sides
- Open for flow on both sides
- Shaft secure against blowing out
- Trunnion-mounted ball
- Zero maintenance shaft seal via Viton O-rings
- Double Block and Bleed
- Double Piston Effect

Materials

	Materials
1. Housing	C22.8
2. Housing connection	C22.8
3. Plain bearing half liner	C22.8
4. Packing housing	C22.8
5. Selector Shaft	1.4122
6. Ball	1.4122 / Tungsten carbide
7. Valve seat	1.4122 / Tungsten carbide
8. Control disk	1.4122

Technical Data

Nominal diameter: DN 15 to 40
Pressure ratings: PN 10 to 250
Temperatures : -60°C to 650

Testing

100% testing of the valve, documented with serial number and test certificate as per EN 10204

Your order should contain the following information:

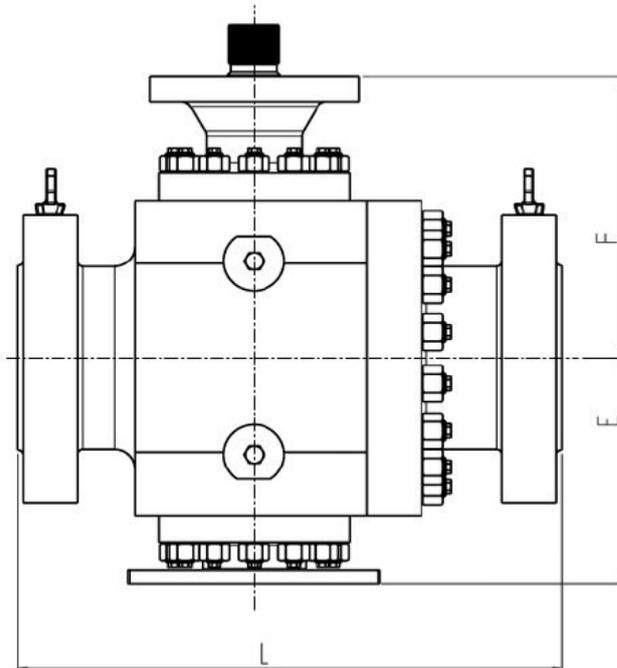
- Nominal diameter
- Nominal pressure
- Temperature
- Medium
- Control characteristic
- Actuation type
- Pipe connection

Design variants

- Actuation: - Manual Actuation
 - With attachment flange DIN ISO 5211
 - Electric drive
 - Pneumatic drive
- Flange connection or welding socket piece
- Housing full welded
- Installation under ground because of PUR-coating
- Spindle extension
- Control and drainage pipe line with blow-out

Other material variants are possible

_2 Ball Valve – artec-P



PN 100

DN	Size	L / RF	L / BW	A	E	F	Weight	Weight
		mm	mm	mm	mm	mm	RF/kg	BW/kg
150	6"	559	559	152	237	249	208	152
200	8"	660	660	203	277	297	378	295
250	10"	787	787	254	314	337	560	420
300	12"	838	838	305	355	378	824	663
350	14"	889	889	337	381	400	1080	923
400	16"	991	991	387	427	448	1714	1434
450	18"	1092	1092	438	460	492	2120	1830
500	20"	1194	1194	489	500	538	2664	2250

PN 250

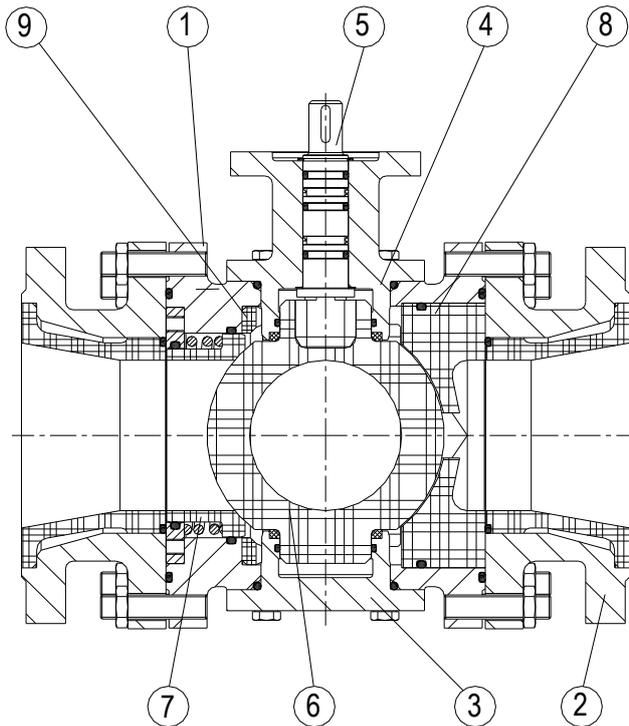
DN	Size	L / RF	L / BW	A	E	F	Weight	Weight
		mm	mm	mm	mm	mm	RF/kg	BW/kg
150	6"	705	705	146	333	300	400	330
200	8"	832	832	194	388	350	735	615
250	10"	991	991	241	446	427	1120	925
300	12"	1130	1130	289	503	470	1550	1300
350	14"	1257	1257	318	569	522	1915	1600
400	16"	1384	1384	362	629	598	2350	1950
450	18"	1537	1537	407	680	650	3300	2750
500	20"	1664	1664	454	725	692	4455	3715

_2 Ball Valve – artec-K



Three-part ceramic control ball valve

DN 25 to 500 / PN 10 to 250 (1" - 20" / Class 150 - 1500)



Design features

- Three-part housing
- Control characteristic, linear or equal-percentage
- Tightly sealing on both sides
- Open for flow on both sides
- Shaft secure against blowing out
- Trunnion-mounted ball
- Zero maintenance shaft seal via Viton O-rings
- Double Block and Bleed
- Double Piston Effect

	Materials
1. Housing	1.4462
2. Housing connection	1.4462
3. Plain bearing half liner	1.4462
4. Packing housing	1.4462
5. Selector Shaft	1.4462
6. Ball	Al ₂ O ₃
7. Valve seat	Al ₂ O ₃
8. Control disk	Al ₂ O ₃
9. Body insert	Al ₂ O ₃

Technical Data

Nominal diameter: DN 25 to 30
Pressure ratings: PN 10 to 16
Temperatures : - 10°C to 140 °C

Testing

100% testing of the valve, documented with serial number and test certificate as per EN 10204

Your order should contain the following information:

- Nominal diameter
- Nominal pressure
- Temperature
- Medium
- Control characteristic
- Actuation type
- Pipe connection

Design variants

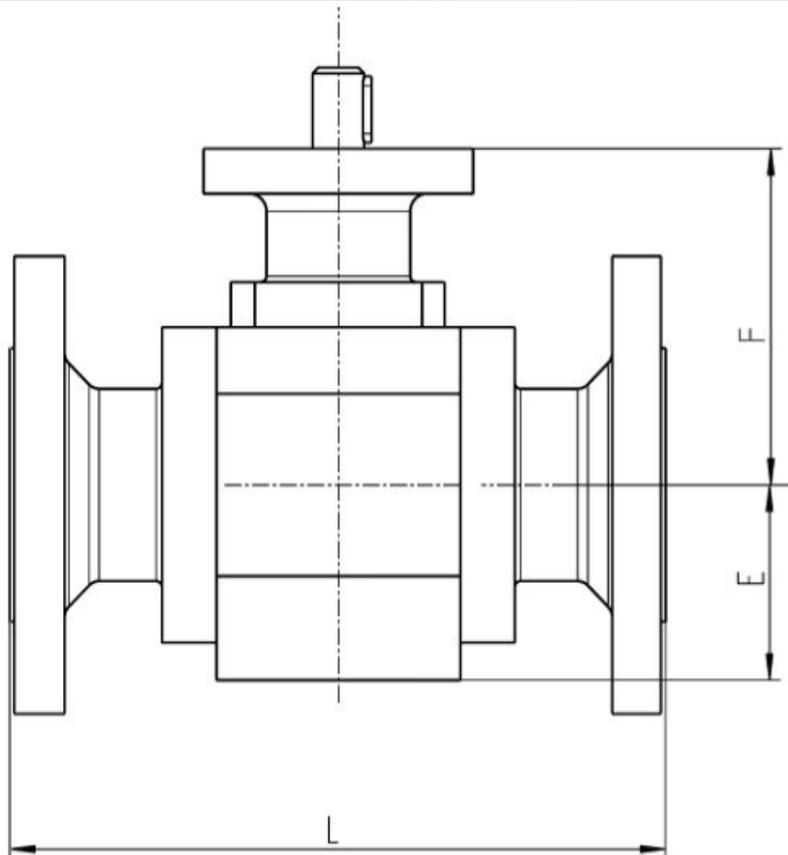
- Actuation: - Manual Actuation
 - With attachment flange DIN ISO 5211
 - Electric drive
 - Pneumatic drive
- Flange connection or welding socket piece
- HALAR coating

Other material variants are possible

e.g. zirconium oxide

Druck/Temperaturdiagramm

_2 Ball Valve – artec-K

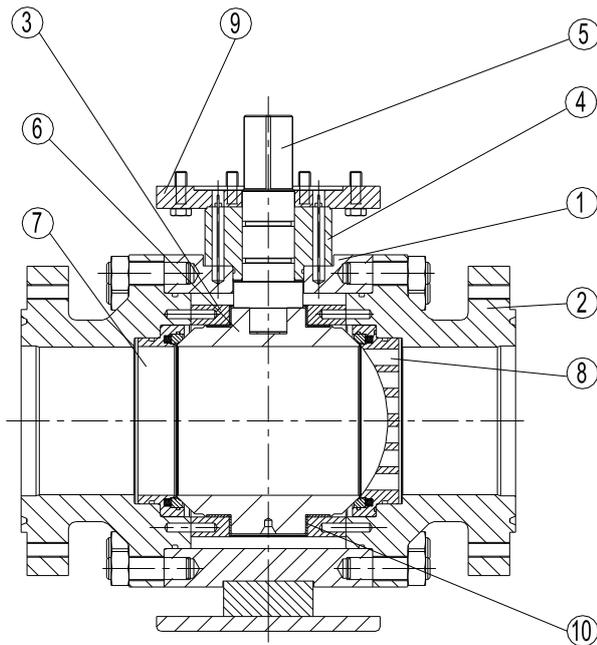


DN	Size	PN	E	F	L	Weight
			mm	mm	mm	kg
15	1/2"	16	50	112	130	5
20	3/8"	16	50	112	150	8
25	1"	16	50	112	160	12
32	1 1/4"	16	50	112	180	17
40	1 1/2"	16	75	110	200	25
50	2"	16	75	110	230	34
65	2 1/2"	16	95	157	290	45
80	3"	16	95	157	310	56
100	4"	16	128	189	350	70
125	5"	16	128	189	400	85
150	6"	16	194	260	480	140
200	8"	16	194	260	600	190
250	10"	16	194	260	730	
300	12"	16	194	260	850	

_2 Ball Valve - variTEC



Three-part control and shut off ball valve with soft and metallic sealing
 DN 25 to 500 / PN 10 to 250 (1" - 20" / Class 150 - 1500)



Design features

- Three-part housing
- Control characteristic, linear or equal-percentage
- Tightly sealing on both sides
- Open for flow on both sides
- Shaft secure against blowing out
- Trunnion-mounted ball
- Zero maintenance shaft seal via Viton O-rings
- Double Block and Bleed
- Double Piston Effect

	Materials
1. Housing	C22.8
2. Housing connection	C22.8
3. Plain bearing half liner	C22.8
4. Packing housing	C22.8
5. Selector Shaft	1.4122
6. Ball	1.4122
7. Valve seat	1.4122
8. Control disk	1.4122
9. Connection flange	C22.8
10. DU-Bearing	DU

Technical Data

Nominal diameter: DN 25 to 500
 Pressure ratings: PN 10 to 250
 Temperatures : - 60°C to 200 °C

Testing

100% testing of the valve, documented with serial number and test certificate as per EN 10204

Your order should contain the following information:

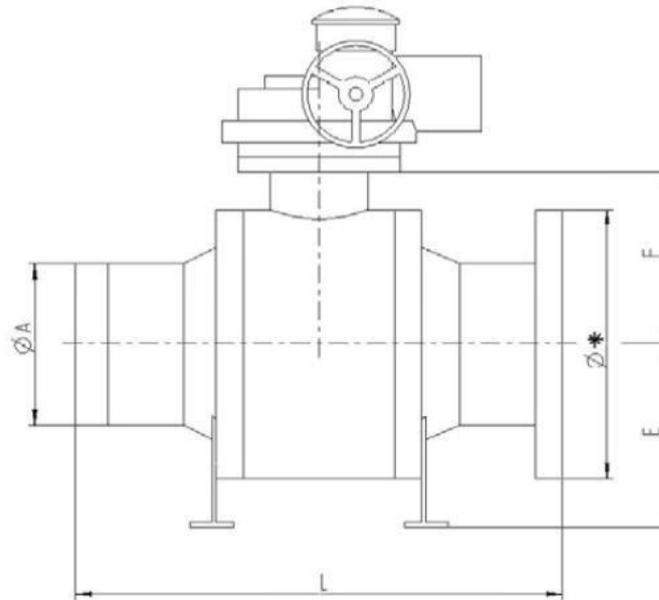
- Nominal diameter
- Nominal pressure
- Temperature
- Medium
- Control characteristic
- Actuation type
- Pipe connection

Design variants

- Actuation: - Manual Actuation
 - With attachment flange DIN ISO 5211
 - Electric drive
 - Pneumatic drive
- Flange connection or welding socket piece
- Housing full welded
- Installation under ground because of PUR-coating
- Spindle extension
- Control and drainage pipe line with blow-out

Other material variants are possible

_2 Ball Valve - variTEC



PN 100

DN	Size	L / RF	L / BW	A	E	F	Weight	Weight
		mm	mm	mm	mm	mm	RF/kg	BW/kg
150	6"	559	559	152	237	249	208	152
200	8"	660	660	203	277	297	378	295
250	10"	787	787	254	314	337	560	420
300	12"	838	838	305	355	378	824	663
350	14"	889	889	337	381	400	1080	923
400	16"	991	991	387	427	448	1714	1434
450	18"	1092	1092	438	460	492	2120	1830
500	20"	1194	1194	489	500	538	2664	2250

PN 250

DN	Size	L / RF	L / BW	A	E	F	Weight	Weight
		mm	mm	mm	mm	mm	RF/kg	BW/kg
150	6"	705	705	146	333	300	400	330
200	8"	832	832	194	388	350	735	615
250	10"	991	991	241	446	427	1120	925
300	12"	1130	1130	289	503	470	1550	1300
350	14"	1257	1257	318	569	522	1915	1600
400	16"	1384	1384	362	629	598	2350	1950
450	18"	1537	1537	407	680	650	3300	2750
500	20"	1664	1664	454	725	692	4455	3715

_2 Ball Valve – General Description



Usage

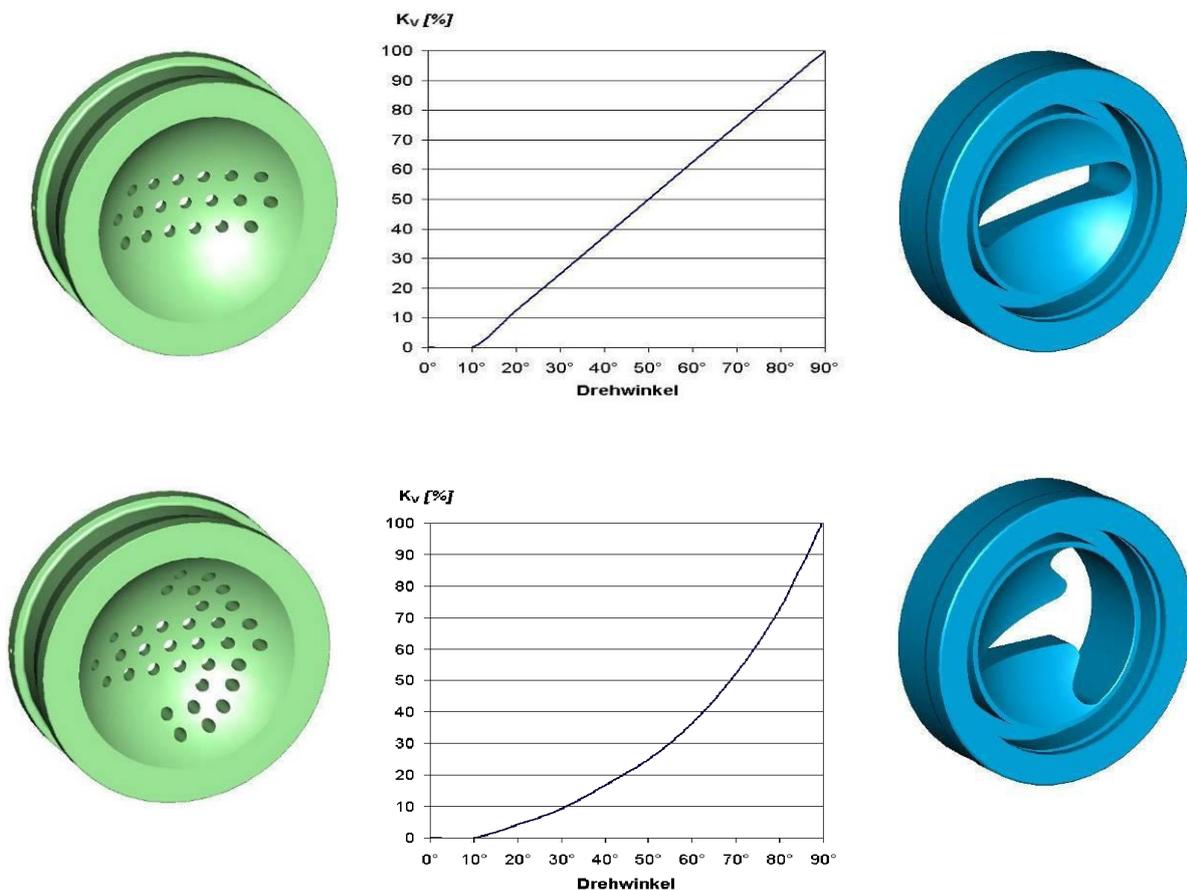
The variTEC ball valves mainly used in power plants, in oil and gas area, in refining and chemical process engineering. It is intended, for pipe flow control of the medium to be completely open or completely shut off.

Shut-off function

Through rotation of the ball by 90 ° to the end position valve is in opened or closed position, the flow is in its full section blocked or unblocked.

Control function

The regulation of the pressure and / or the quantity is realized by rotation of the spindle, the ball, as well as the shape of the regulating wheel. Through the rotational movement of Spindle between 0 and 90° bore of the ball defines cross section for the flowing medium. The control characteristic is linear by the shape of the opening cross-section (e.g. linear or equal percentage) is determined by regulating discs and the desired operating requirements.



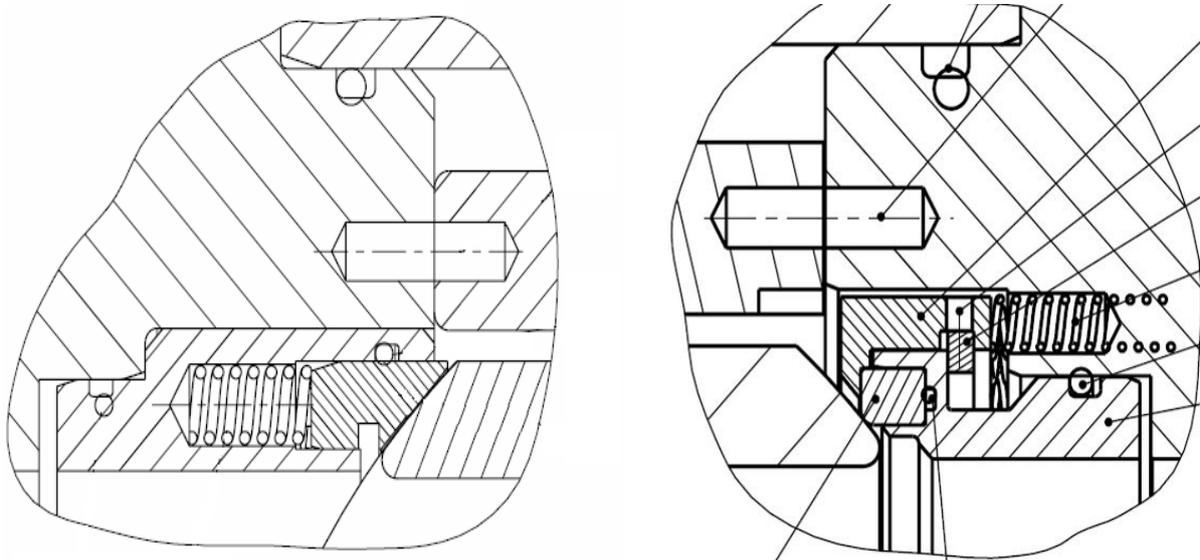
_2 Ball Valve – General Description

Sealing against atmosphere

The housing and the spindle are sealed by graphite rings or O-rings.

Passage gasket

The variTEC-ball valve gaskets can be soft, metal, ceramic, primary metal or secondary soft. About two independently functioning seat rings or disks right and left of the sphere are installed in the housing connection and they are the main seal. These rings are pressed against the ball by compression springs.



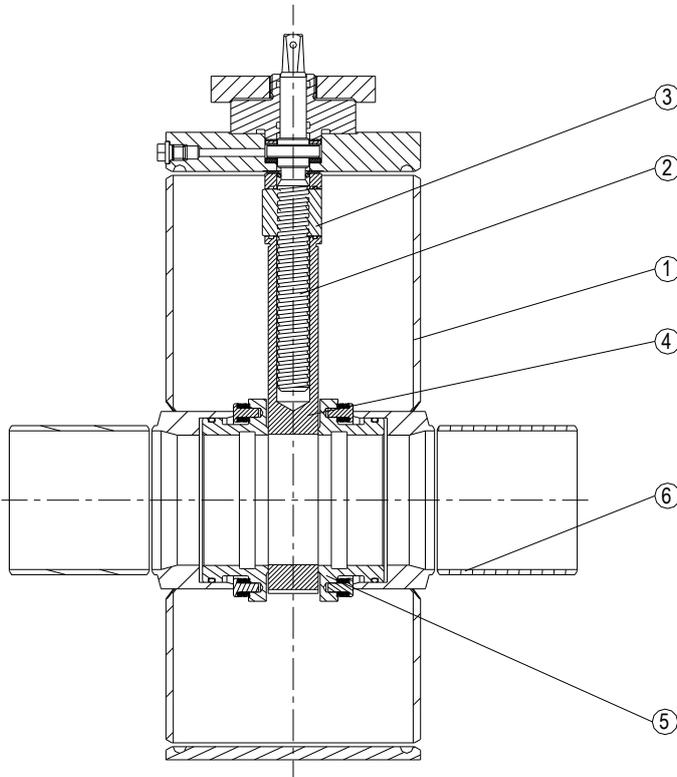
Comparison control ball valve with control valve

The ball valve has a shut-off across the sphere, in a so-called seat ring system. What makes the control ball valve special is that it has a stuffing box. This package ensures reliable tightness, since no impurities can be drawn into the package. It is also a clear price advantage by the fed fittings midsection. The Kvs value and / or the connected nominal size of the pipeline determine the size of the valve. A straight through flow allows a permanent pressure loss of about 0.2 bar at a constant guarantees good quality control.

TECgate natural gas gate valve

General Description			product label
Pure metallic sealed without oil			
DN 80 - 400	PN 4 - 100	Tmax. 70 °C	TECgate
Rotary slide valve			
DN 25 - 50	PN 4 - 100	Tmax. 70 °C	TECgate - D
Pure metallic sealed with 1 or 2 blowouts (rotary slide valve)			
DN 80 - 400	PN 4 - 100	Tmax. 70°C	TECgate - ABL
Branch or slider valve groups			
DN 80 - 400	PN 4 - 100	Tmax. 70°C	TECgate - ASG

Shut-off and control slide valve with metallic sealing, without oil filling
DN 50 to 400 / PN 4 to 100



Design features

- Fully welded housing
- Metallic sealing
- Open for flow on both sides
- Housing interior **without** oil filling
- Tightly sealing
- No frictional wear during moving of the sliding plate
- with back seal, replacing of the spindle seal is possible while under pressure (patented)
- Double block and bleed

	Material
1. Housing	P235GH
2. Spindle	X20Cr13
3. Spindle nut	CuA110Fe3Mn2F60
4. Slider plate	P235GH hardened
5. Valve seat	P235GH hardened
6. Connection parts	P235GH

Technical Data

Nominal diameter: DN 80 to 400
(DN500 and DN600 upon request)

Pressure ratings: PN 4 to 100

Temperatures: -10°C to +70 °C

DVGW-Admission

Tests

100% testing of the valve, documented with serial number and test certificate as per EN 10204

Your order should contain the following information:

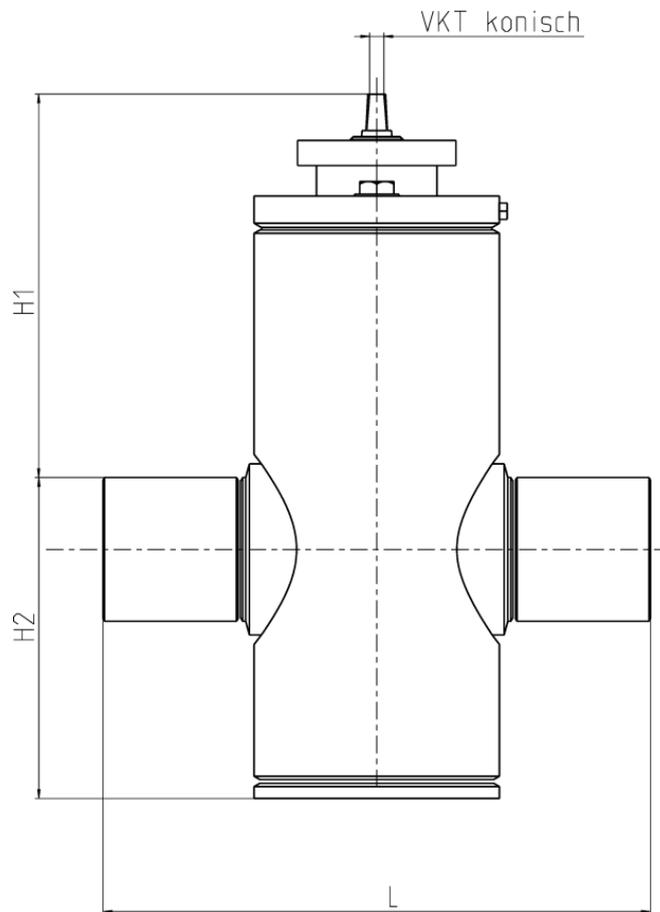
- Nominal diameter
- Nominal pressure
- Temperature
- Medium
- Pipe connection piece shape
- Pipe cover

Design variants

- Actuation: - Manual Actuation
- With attachment flange DIN ISO 5211
 - Electric drive
 - Pneumatic drive
- With flanges or welding socket pieces
- With PE welding socket pieces
- Dirt protection
- Isolation respectively ground protection plate
- Complete PUR-coating for Installation under ground

Other material variants are possible

Dimension sheet:

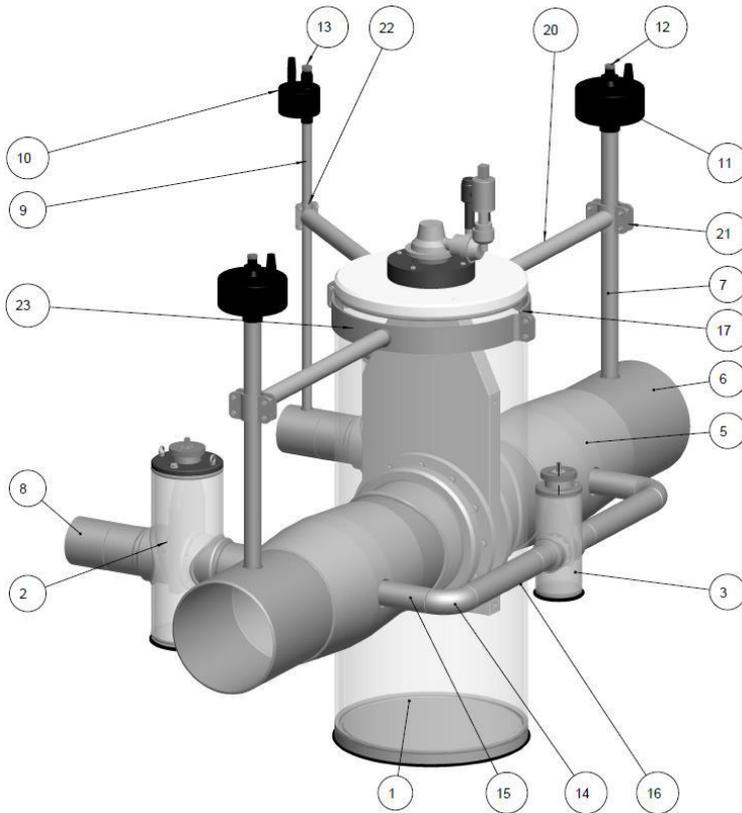


DN	PN	L	H1	H2	VKT	Weight	U/Hub
			mm	mm		kg	
80	4-25	356	268	198	17,3	59	20
80	40-100	356	268	205	17,3	85	20
100	4-25	432	305	255	17,3	105	25
100	40-100	432	293	282	19,3	119	21
150	4-25	559	350	368	17,3	186	30
150	40-100	559	420	390	24,3	268	30
200	4-25	660	473	526	24,3	312	38
200	40-100	660	780	545	Drive	582	131
250	4-25	787	559	599	24,3	580	40
250	40-100	787	950	610	Drive-	730	160
300	4-25	838	696	752	24,3	706	48
300	40-100	838	932	782	Drive	1259	335
400	4-25	991	960	954	Drive	1195	214
400	40-100	991	1135	970	Drive	1908	380

_3 Gate Valve – TECgate ASR



Branch or gate valve cross
DN 50 to 400 PN 4 to 100



Design features

- Complete manufacturing upon customers requests
- Consists of pure metallic sealed shut-off slide valves TECgate

Technical data

Nominal diameter: DN 50 to 400
(DN500 and DN600 upon request)

Pressure ratings: PN 4 to 100

Temperatures: -10 C° to +70 °C

Tests

100% testing of the valve, documented with serial number and test certificate as per EN 10204

Your order should contain the following information:

- Nominal diameter
- Nominal pressure
- Temperature
- Medium
- Pipe connection piece shape
- Pipe cover

Design variants

- Actuation:
 - Manual Actuation
 - With attachment flange DIN ISO 5211
 - Electric drive
 - Pneumatic drive
- With flanges or welding socket pieces
- With PE welding socket pieces
- Dirt protection
- Isolation respectively ground protection plate
- Complete PUR-coating for Installation under ground

Other material variants are possible

General

Valves in gas distribution systems are important shut off and regulate systems with high requirements concerning safe working and reliability. The wide transport- and delivery networks are managed with use of one-plate-sliders with coplanar locking plates, which are full-welded.

The elementary construction of the slider is simple:

The main slider case parts are a welded construction, case base and top, which are welded with the main case, welding connections for pipelines, "standing" interior acceptance spindles and corrosion protection for subsurface installation. The closing part of the slider is a coplanar, persistent slider plate. The acceptance spindle is controlling the plate. The opening position is reached, when the drilling has the same direction as the pipe axis. The sealing systems are usually made of elastomeric rings (also used as connection rings) or metallic sealing rings. The slider case is normally equipped with oil filling, if metallic rings are used.

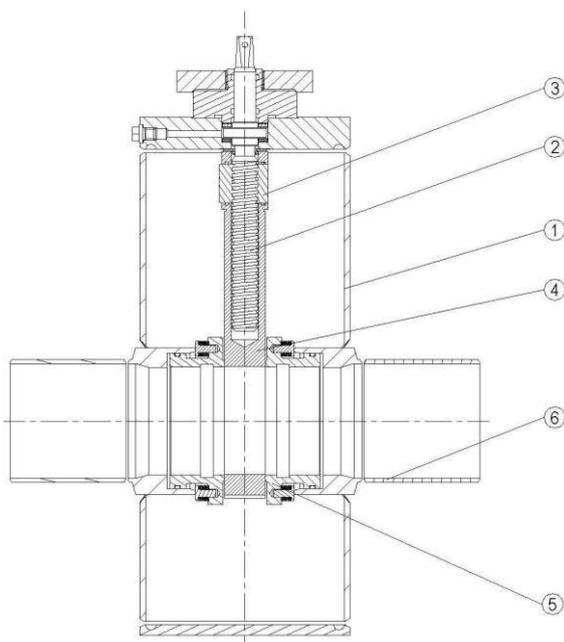
Non-oil-filled gas gate valves TECgate of TEC artec

The gas gate valve **TECgate** do not need an oil filling in a pure metallic sealing system to provide a long-lasting, secure lock up function. This product solves with brand-new, innovative equipment all important sealing requirements to pipe clean products, like domestic gas, biogas etc. The advantages of the crack-free, metallic sealing are visibly for every user, without any of the disadvantages of an oil filling. Because of that the unavoidable, slow and sneaky contamination in the pipelines is impossible. But there are other reasons, like piping both, oil and gas through the pipeline. This technique causes oil pollution because of penetrating oil and other reasons:

- Oil is remaining at the sealing rings with every use of the slider plate,
- Oil leakage into the pipelines in the case of a pressure loss in the pipes (pressure variation because of high gas reduction)

The demounting of a slider is not ever controllable, so an environmental contamination is possible.

An expensive disposal of used oil is not necessary and the slider is way much lighter.



Referring to metallic sealing the functional surface of the slider is in opening and closing position and as far as possible protected from dirt and pollution while operating. The sealing surfaces keep undamaged and the slider can refer to his sealing function in a safety way. By moving the slider into the closing or opening position the slider plate glides into the working position with permanent contact to the sealing elements. Spring elements clamping the sealing rings to both sides, so that they were pressed with constant power towards the surface of the slider plate. The compressive strength of the slider is warranted from both pipeline directions. In closing position the elastic force and additional the force as a result of the compressive of the product, as sealing force onto the secondary side of the slider is working. The slide is absolutely gas tight to both sides (leakage rate A).

The sealing surfaces of the slider plate and the sealing rings are made of noncorrosive layers with high hardness and finish. With help of modern surface engineering, to

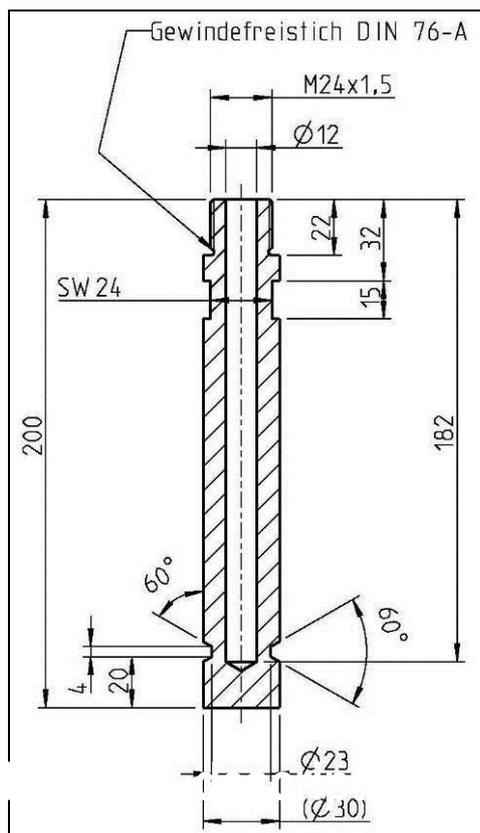
example mechanical micro-lapping of plate surfaces and sealing ring borders the excellent results of the slider

functions are guaranteed. All advantages of the metallic sealing are given without the disadvantages of a system with oil filling.

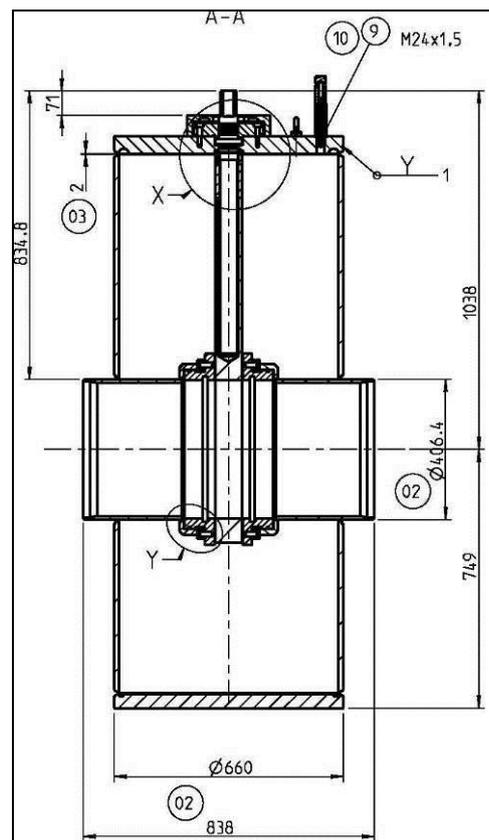
Double-block-and-bleed-test

To pass a block-and-bleeding-test the slider can be modified with this innovative equipment.

The predefined standardised modifications are designed to screw a pipeline connection piece into the slider-top. A concave fillet weld between the connection piece and the case top will assure gas proofness. The connection piece in delivery status is in closing position and completely PUR-coated. If there is a need to connect a bleeding pipe or testing pipe to the connection piece, the PUR-coat can be removed and the upper part of the connection piece can be disconnected at the predefined slot. After this the connection piece opened to the case interior. The following pipeline could be welded onto the connection piece or it could be connected with a sleeve with concave fillet welds. The bleeding or testing pipe will be – as far as the local space of the street cap is available - built under the street cap with an acceptance square of the installation set and completed with a closing armature (stop-cock, rotary slide valve).



Picture 2: Test connection piece



Picture 3: TECgate DN400/PN25 with test pipe

The advance of a “double-block-and-bleed” – test contains 2 points:

- The impermeability of the slider can be tested for every single seat. This requires a pipeline at normal pressure opposite to the tested seat.

- While construction works the slider case can bleed in a controlled way through a blow gun. The case of a gas escape in the passageway is impossible. That is a very important fact for the safety of the factory employees.

The “double-block-and-bleed”- test cannot be used with an oil filled slider, because of the escape of oil (as oil foam) from the slider case while testing, caused by the saturation of the used oils with domestic gas.

Other characteristics/advantages/options

In opening position of the slider the drilling of the plate has the same direction as the pipe axis, because of that it is “pigable”.

The pipeline connection parts are prepared to weld them onto the slider. Connections to PE – pipes or muff connections can also be prepared.

In the area of the cover a back seal was added. The spindle seal consist of O-rings and the change is possible with working pressure.

Equipment with “exhaust lines” is available. The usage as spot drilling armature or the alternate to use it as wastage armature is possible.

The manual operating of the slider over the standing spindle is done with the water proofed subsurface installation. If there are large nominal diameters reduction gears are inserted.

The slider is upgradable with built-up muffs (DIN ISO 5211), produced for electric and pneumatic drives.

The safety of no corrosion is given, because the whole set is coated with polyurethane for subsurface installation.

The denomination zone lasts from DN 80 to DN 400, the pressure zone lasts from PN 4 to PN 100.

The DVGW accepted the slider in a prototype check till PN 25. The slider will also be tested to 100 % before delivering it to the customer. Control documents are available with serial number and test certificate according to EN 10204 (PN 25 with APZ. EN 10204 – 3.2)

The model of the “TECgate” one-plate-slider has shown his functionality in many operations. A lot of German gas supply companies where delivered, proofing qualifies are available.

The oil filled model TECgate – O – is also available.

_4 Steam conversion



Desuperheater

			product label
DN 25 – 65 / DN80	PN 25 – 400	Tmax. 580°C	TECtemp
DN 25 – 65 / DN80	PN 25 – 400	Tmax. 750°C	TECtemp HT

Motive steam nozzle

DN 25 – 65	PN 40 – 320	Tmax. 600°C	TECsteam
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Steam conversion

DN 50 – 2000	PN 25 – 630	Tmax. 580°C	TECpress
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Decision criteria between TECtemp and TECsteam

Desuperheater – technical description

Motive steam nozzle – technical description

Steam conversion – technical description

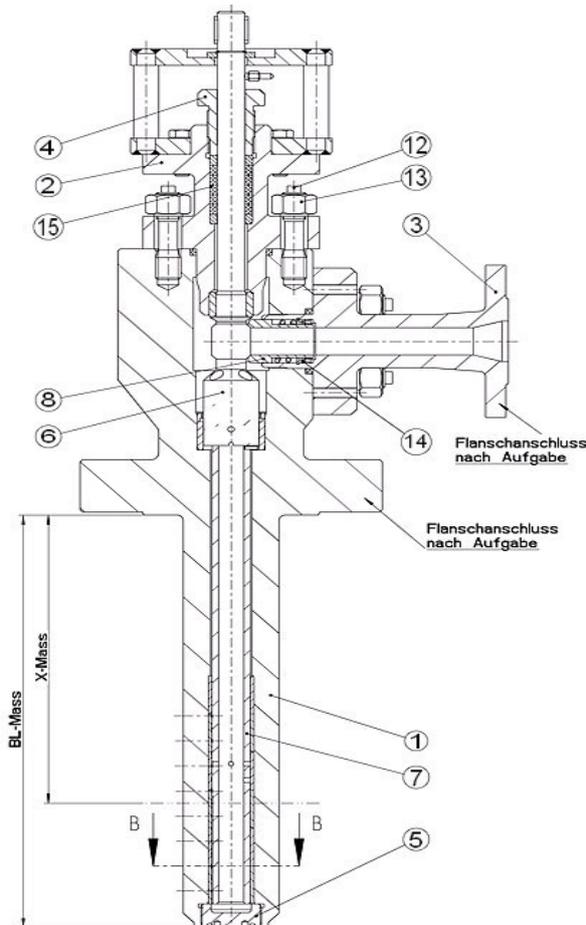
_4 Steam conversion - Desuperheater



Desuperheater TECtemp

Cooling water: DN25 to DN65 PN 25 to 400

Steam: DN80 PN 25 to 400



Design features

- Very good, micro-fine atomization
- Very precise control characteristic
- Characteristic curve linear, equal-percentage or customer-specific
- Tightly sealing injection water connection
- Multi-stage design is possible
- Variable connection options
- Low pressure loss at small differential pressures
- Simple nozzle changing
- Single- or multi-part housing is possible

	Material
1. Housing	1.7380 / 1.4903
2. Packing housing	1.7380
3. Cooling water connection	1.7380
4. Sealing screw	1.4541
5. Locking screw	1.7380
6. Spindle upper part	1.4122 hardened
7. Spindle lower part	1.4301 / 1.4057
8. Valve seat	1.4122 hardened
12. Screw bolts	1.7709
13. Hex nut	1.7258
14. Seal ring	PTFE + 10%Ekonal
15. Seals	Pure graphite

Applications

Temperature: $T_{max} = 580^{\circ}C$

Pipe diameter: as of DN150

Connections: Cooling water: to DN65, PN25 – 400

Steam: DN80, PN25 - 400

Range ability to 50:1

Kv value: $\geq 0.01 m^3/h$

Design variants

- Actuation: Electric
Pneumatic
Hydraulic

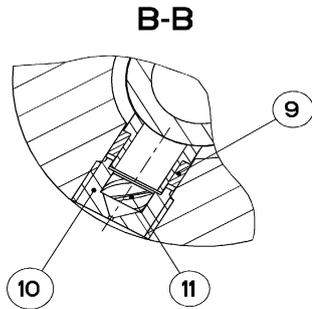
-Connections: Flanges
Welding socket pieces

Other material variants are possible

Tests

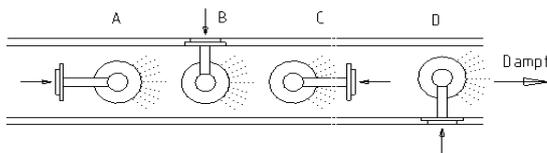
100% testing of the valve, documented with serial number and test certificate as per EN 10204

Injection nozzle cutaway

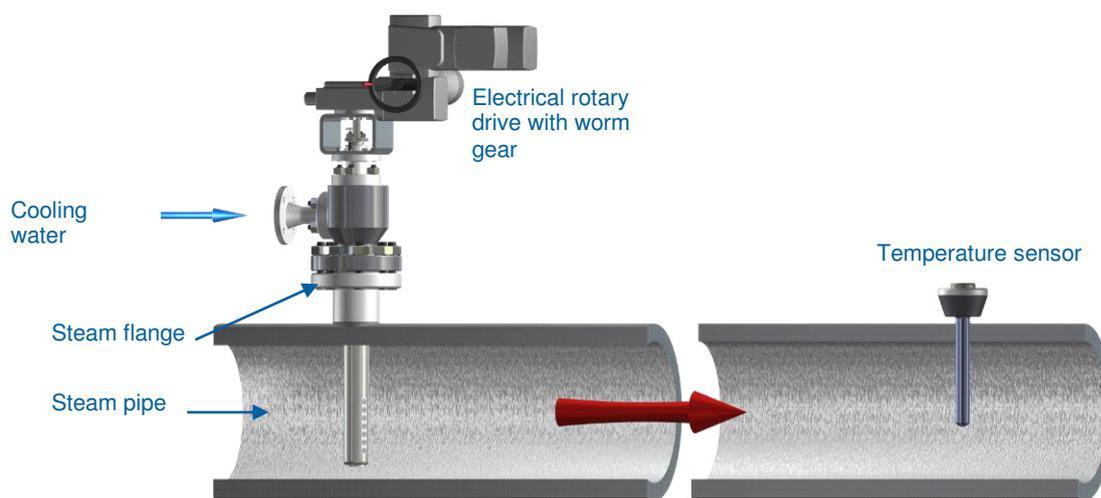
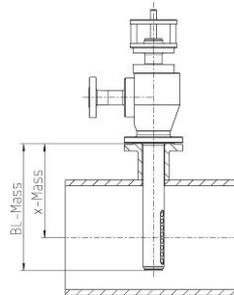


	Materials
9. Bush	1.4122
10. Injection nozzle	1.4122 hardened
11. Swirl insert	1.4541

Possible positions of the cooling water connection



x-dimension max.1400



Principle drawing of the injection control circuit

_4 Steam conversion - Desuperheater



Desuperheater TECtemp HT

Cooling water: DN25 to DN65 PN 25 to 400

Steam: DN80 PN 25 to 400



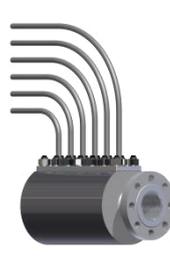
TECtemp HT



HT L

HT R

HT V



Design features

- Very good, micro-fine atomization
- Very precise control characteristic
- Characteristic curve linear, equal-percentage or customer-specific
- Tightly sealing injection water connection
- Multi-stage design is possible
- Variable connection options
- Low pressure loss at small differential pressures
- Simple nozzle changing
- Single- or multi-part housing is possible

Please request for detailed Information

Ausführungsvarianten

- Betätigung: elektrisch
pneumatisch
hydraulisch
- Anschlüsse: Flansche
Einschweißenden

Andere Werkstoffvarianten möglich

Applications

Temperature: $T_{max} = 750^{\circ}C$

Pipe diameter: as of DN50

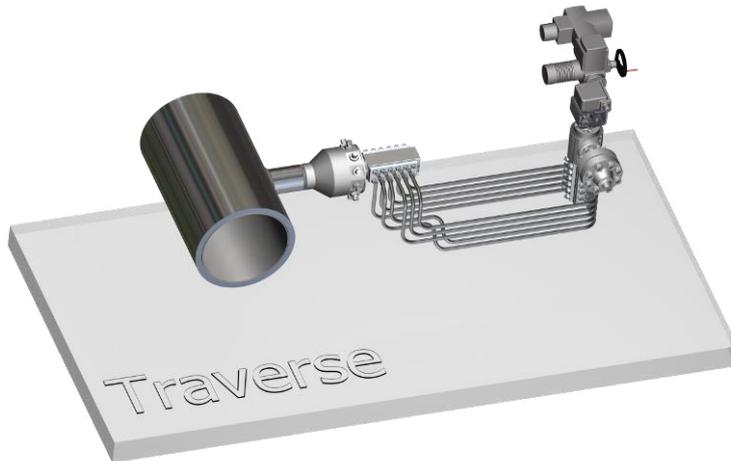
Connections: Cooling water: to DN85, PN25 – 400
Steam: DN80, PN25 - 400

Range ability to 2500:1

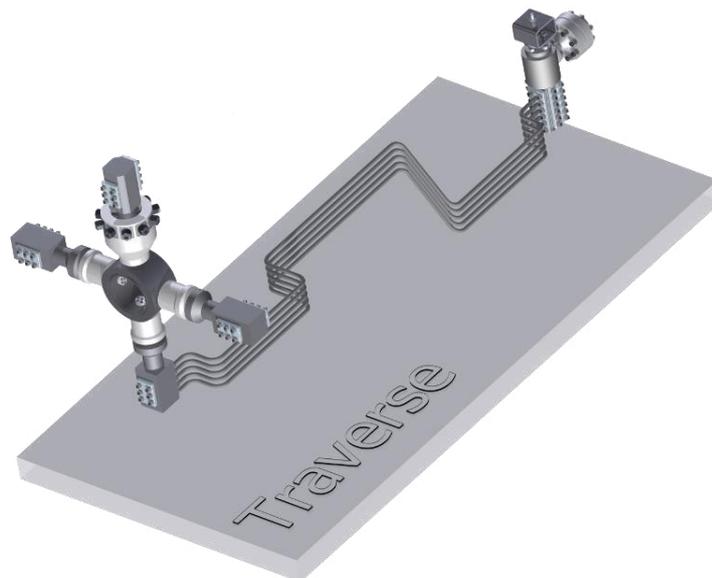
Kv – value: $\geq 0,01m^3/h$

Tests

100% testing of the valve, documented with serial number and test certificate as per EN 10204



TECtemp HT L – multi nozzle lance desuperheater



TECtemp HT R – multi nozzle ring desuperheater



TECtemp HT V – multi nozzle venture desuperheater

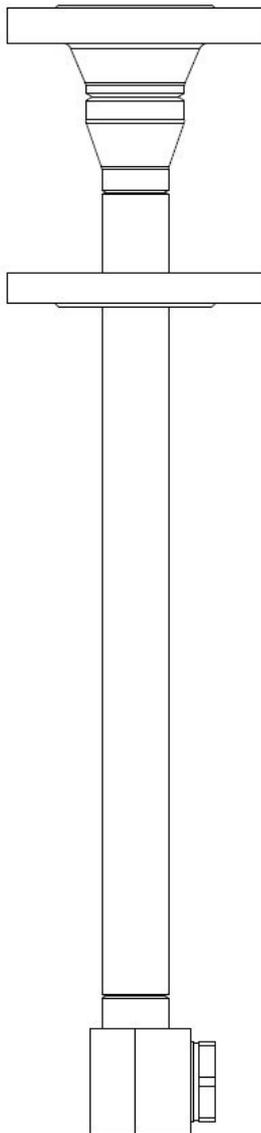
_4 Steam conversion – Fixed Nozzle Desuperheater



Desuperheater TECtemp FN

Cooling water: DN25 to DN100 PN 25 to 400

Steam: DN80 to DN150 PN 25 to 400



Design features

- Good, micro-fine atomization
- Very precise control characteristic over control valve
- Characteristic curve linear, equal-percentage or customer-specific in control valve
- Variable connection options
- Simple nozzle changing
- Single- or multi-part housing is possible

	Material
1 .Housing	1.1541 / 1.7335
6. Spindle upper part	1.4122 hardened

Applications

Temperature: $T_{max} = 580^{\circ}C$

Pipe diameter: as of DN150

Connections: Cooling water: up to DN100, PN25 – 400

Steam: up to DN150, PN25 – 400

Range ability to 6:1

Kv value: $\geq 0,01m^3/h$

Design variants

-Connections: Flanges
Welding socket
pieces

Other material variants are possible

Tests

100% testing of the valve, documented with serial
number and test certificate as per EN 10204

_4 Steam conversion – Description Desuperheater



Application

The injection system is predestined for installation in steam lines and in combination with control valves for steam temperature regulation in power plants, waste incineration plants, chemical plants, etc.

Proper use

The **desuperheater** is intended exclusively for allowing the temperature regulation of steam and hot gasses through the injection of water. Any other or additional use is considered improper use.

Function description

The desuperheater is an injection system that allows extremely fine dosing of the injection volume for temperature regulation of steam and hot gasses through injection of water. With a special nozzle triggering control and the use of nozzles (see image 1.1) with upstream swirl inserts (see image 1.2), it is possible to continuously atomise the water to micro-fineness.

The regulation of the flow volume takes place via individual control of nozzles that are adapted to the respective operating conditions. The sequence of the nozzle triggering is defined by the design. It begins in the area of the pipe axis.

One decisive advantage is the low pressure loss within the valve so that with small differential pressures between the steam (hot gas) and the water, the full differential pressure is in effect at the sequentially triggered nozzles.

At high differential pressures, the ball / valve seat system (see image 1.3) is used as a choke valve. This minimises wear problems. In this system, an integrated control ball valve functions as the main shut-off.

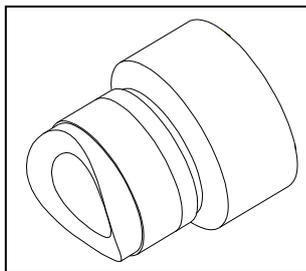


Image 1.1
Injection nozzle
assembled

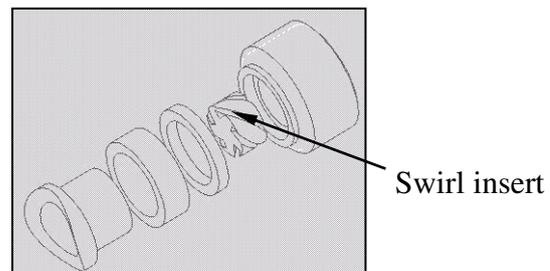
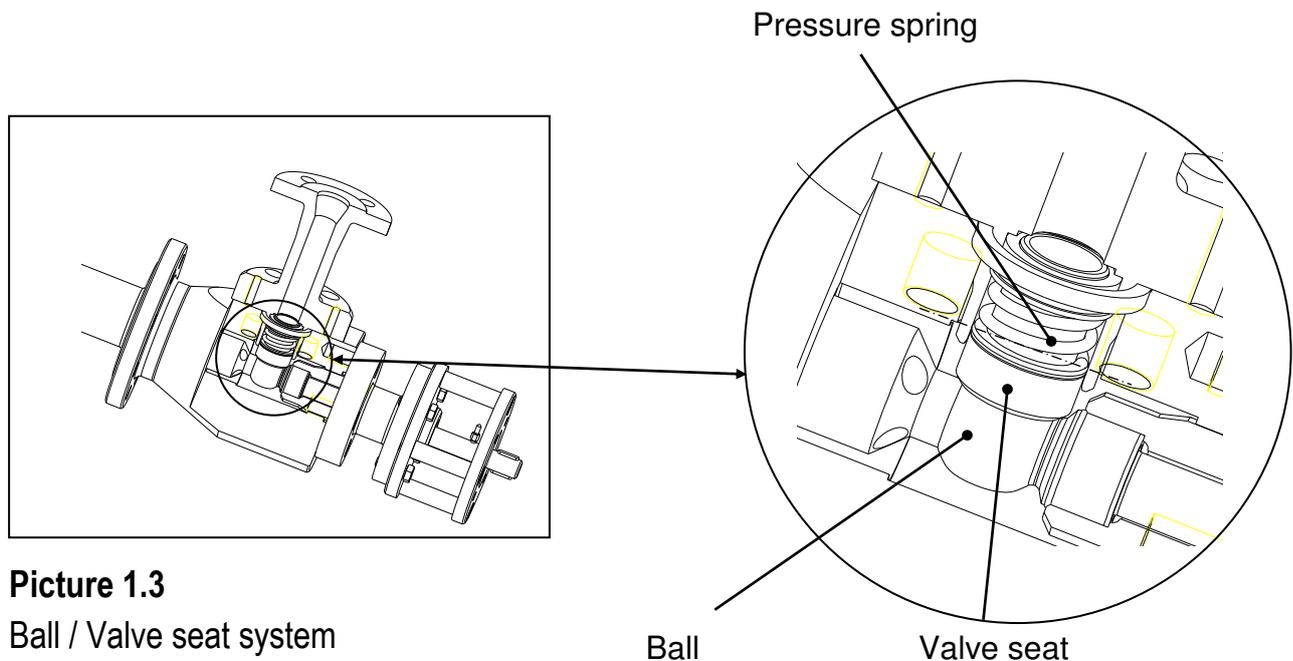


Image 1.2
Blow-up of the injection nozzle

_4 Steam conversion – Description Desuperheater



Picture 1.3
Ball / Valve seat system

Control process:

The temperature sensor behind the desuperheater sends a modified steam temperature to the controller. The controller sends the signal to the part-turn valve actuator or control drive, which then turns the spindle by the required angle. The inflowing water is released to the nozzle by the previously defined control characteristic.

Other regulation methods, such as cascade regulation or enthalpy regulation, etc., can also be used depending on the system. It is recommended to consult with TEC artec GmbH, if necessary.

The desuperheater is also available as a weld-on variant, whereby we recommend mounting the pipe elastically with respect to the cooling water connection to allow for cleaning of the valve without welding work.

We also recommend the installation of a screen in the cooling water line to protect the valuable choke components from foreign bodies and extend the service life.

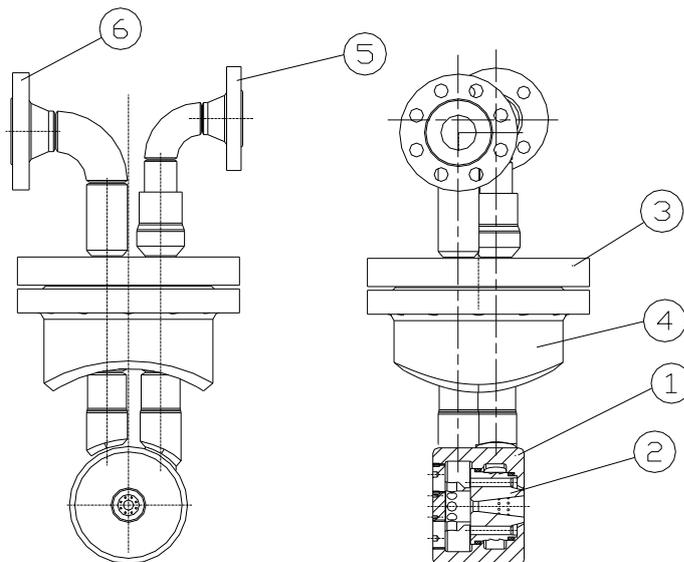
_4 Steam conversion – Motive Steam Nozzle



Steam temperature regulator with motive steam nozzle

Cooling water: DN25 to DN65 PN 40 to 320

Steam: DN25 to DN65 PN 40 to 320



Design features

- European patent
- Mixing motive steam nozzle inside
- No motive steam volume regulation required
- Fine atomization of cooling water
- No protective jacket inside of the pipeline required

	Materials
1. Housing	1.7380
2. Nozzle body	1.7380
3. Cover flange	1.7380
4. Steam flange	1.7380
5. Steam-inlet	1.7380
6. Water-inlet	1.7380

Technical data

Nominal diameter of steam connection: DN 25 to 65
 Nominal diameter of water connection: DN 25 to 65
 Pressure ratings: PN 25 to 400
 Temperatures: 750°C

Tests

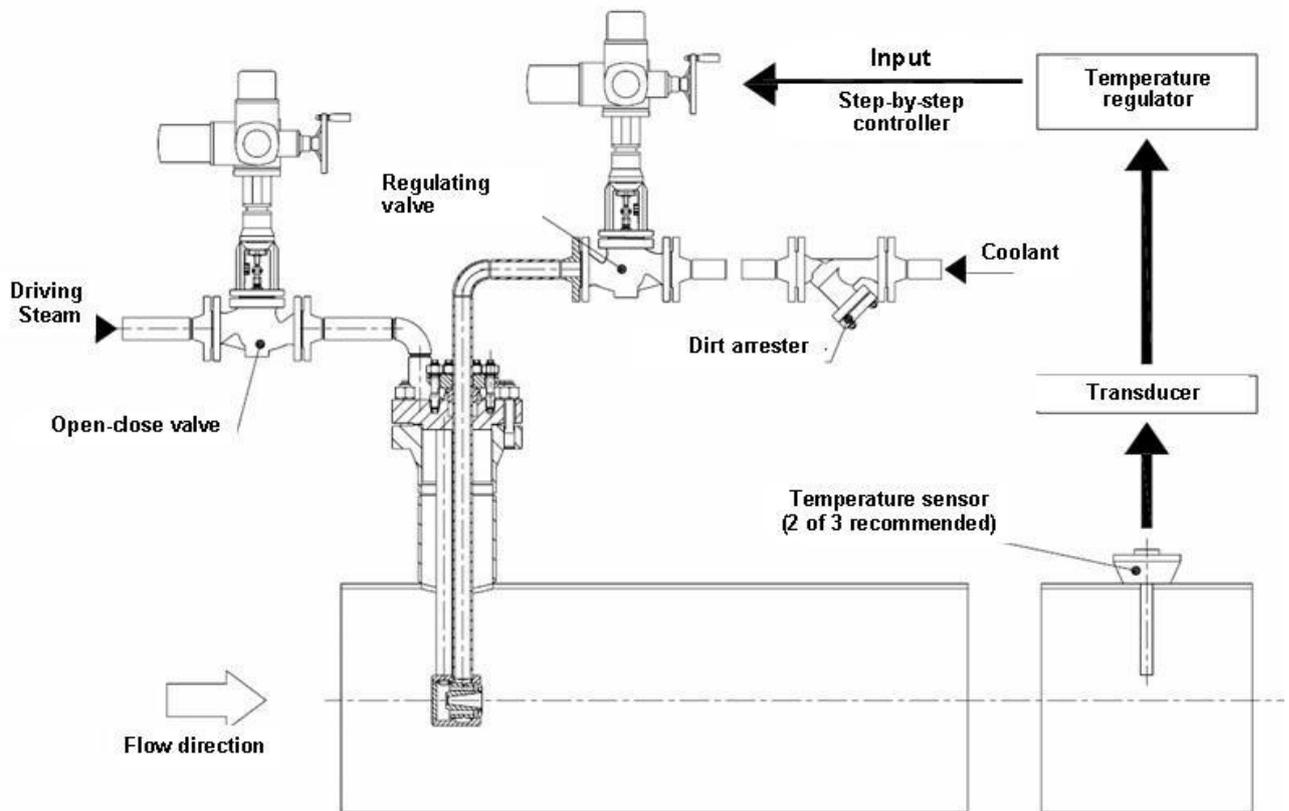
100% testing of the valve, documented with serial number and test certificate as per EN 10204

Other material variants are possible

_4 Steam conversion – Motive Steam Nozzle

Design variants

	Dimension	TDD Value 1	TDD Value 2
max. Kv-value (water)	m ³ /h	7,7	42,8
max. Kv-value (steam)	m ³ /h	12	32
max. nozzle diameter	mm	18	30
Dimension of internal steam pipeline	oD x Wt	33,7 x 3,6	42,4 x 4,5
Dimension of external steam pipeline	oD x Wt	48,3 x 4,5	48,3 x 4,5
Dimension of water pipeline	oD x Wt	42,4 x 4,5	76,1 x 5,6
max. water holes	number x diameter	6 x 6	12 x 10
Steam channels	number x diameter	8 x 8	8 x 16
Inner diameter of cover flange	mm	150	280

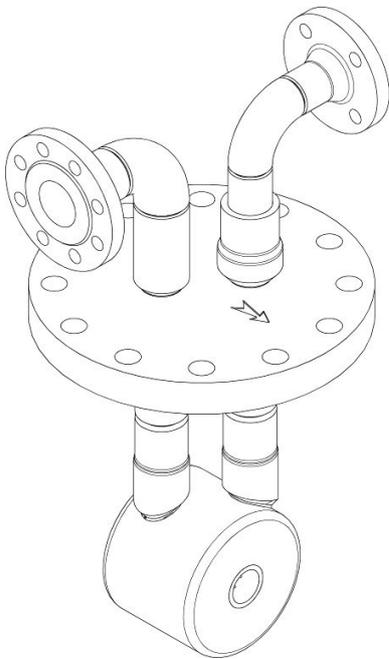


_4 Steam conversion – Description

Motive steam Nozzle



TECsteam – Motive steam nozzle Size 2



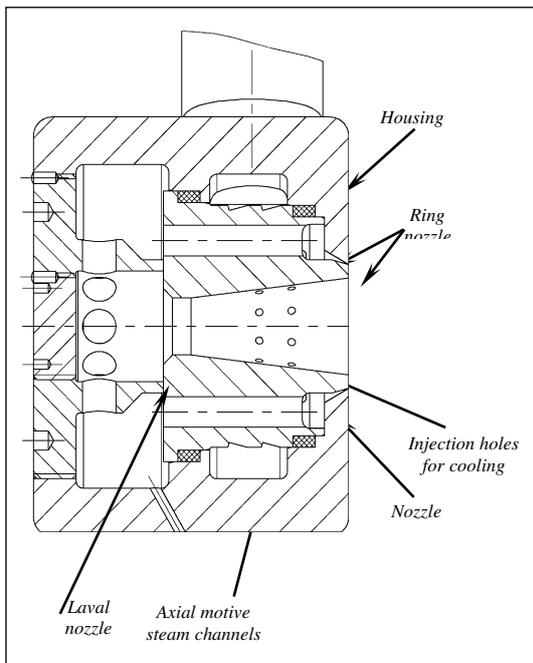
The **TECsteam motive steam nozzle** is used in combination with a control valve for cooling of steam or hot gasses in power plants, waste incineration systems, chemical plants, etc.

The temperature control takes place via the injection and vaporisation of water in the steam or hot gas flow, whereby the water is very finely atomised with the help of motive steam. The **TECsteam motive steam nozzle** is designed as a motive steam nozzle with internal mixing. In this design, the injection water is injected into the motive steam within the nozzle.

The design of the motive steam nozzle takes place according to the required application parameters.

The motive steam is taken from the high pressure steam system and supplied to the **motive steam nozzle** via a high-pressure pipeline. A motive steam shut-off valve is installed in this line, which opens when required. Regulation of the motive steam shut-off valve is not required because the required motive steam volume is

designed for the maximum load case. In partial load situations, the motive steam volume is over dimensioned.



The injection water is supplied to the **motive steam nozzle** via an additional pipeline. A control valve is built into this line that regulates the injection water volume according to the required parameters.

The motive steam enters into the housing at the perimeter and is redirected by 90° at the entrance into the nozzle body. The nozzle is designed as a *Laval nozzle* with an opening angle of 14°. Because the flow speed behind the narrowest flow cross section continues to increase with a *Laval nozzle*, the injection holes for the cooling water are situated as far downstream as possible in order to achieve the highest possible steam speed in an area.

Approx. 1/3 of the motive steam volume is supplied to the outer ring nozzle via axial channels. This ring stream encompasses the

water-steam mixture of the *Laval nozzle* with uncooled steam. This serves to protect the pipeline against contact by water droplets, which would result in thermal shock problems. As a result, no protective jacket for the pipeline is required with this design.

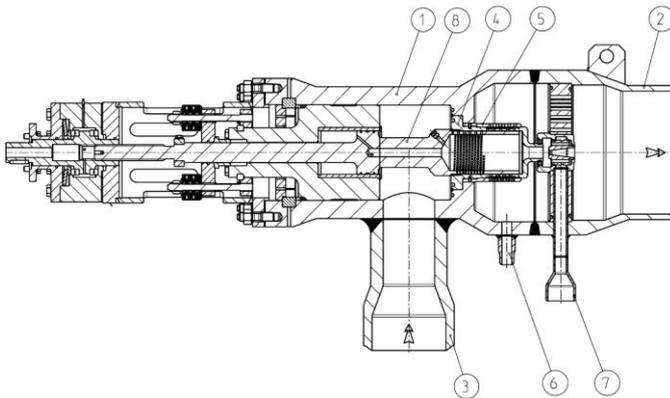
_4 Steam conversion – Turbine Bypass



Steam converter for subcritical pressure reduction

Inlet: DN 100 to 500 / PN 25 to 630

Outlet: DN 150 to 2000 / PN 25 to 250



Design features

- Actuator for 2 independent control variables: pressure / temperature
- Pressure regulation subcritical in all load ranges
- Multi-stage reduction with elaborately designed choke elements
- Homogenization of the hot steam flow through downstream perforated disks
- Temperature reduction with motive steam nozzle (depicted variant)
- Temperature reduction with injection cooler also possible
- Subcritically regulated pressure release

Applications

DN 100-500 inlet

DN 150-2000 outlet

Material: C22.8; 16Mo3;
13CrMo4-5;
10CrMo9-10
X20CrMoV12-1;
X10CrMoVNb91

Temperature: $T_{\max} = 580^{\circ}\text{C}$

Materials

1. Housing (example)	1.4903 (P91)
2. Outlet	1.7380
3. Inlet	1.4903
4. Perforated basket I	1.4903
5. Perforated basket II	1.4903
6. Drain connection	1.4903
7. Inlet of cooling water	1.4903
8. Spindle with perforated cone	1.4922

Tests

100% testing of the valve, documented with serial number and test certificate as per EN 10204

Design variants

- Actuation: Electric
Pneumatic
Hydraulic
- Connections: Flanges
Welding socket pieces
- Upon request: Installation dimensions

Other material variants are possible

_4 Steam conversion – Description

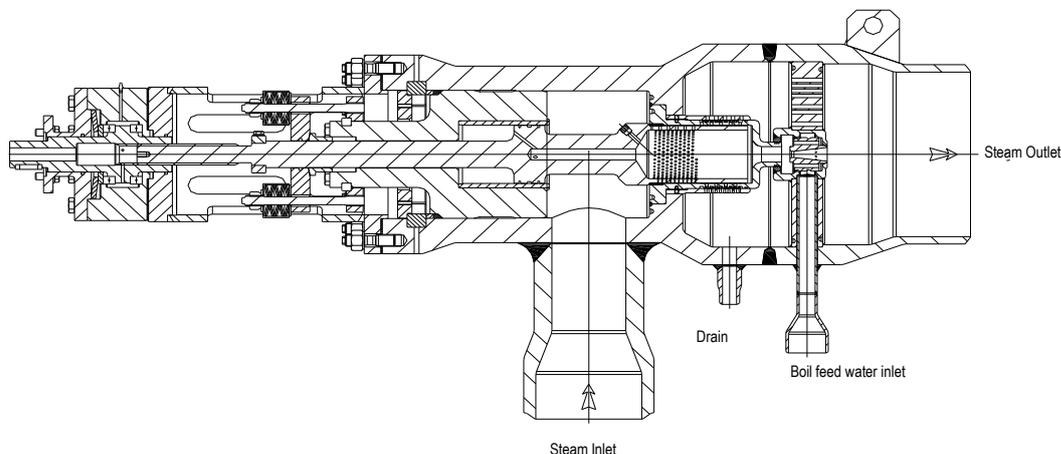
Turbine Bypass

Function

The TECpress steam converter station is an actuator that regulates two independent control values. Through localised separation of flow regulation / pressure regulation with pressure and temperature reduction, disturbance variables can be neutralised, allowing a more precise regulation of the individual parameters.

The basis of the TECpress steam converter station is achieved through the combination of the TECpress control valve and the TECtemp injection cooler or the TECsteam motive steam cooler.

Due to its special design, the pressure reduction in the TECpress control valve is subcritical in all load ranges. In accordance with the operating conditions, this is made possible by a combination of perforated cone, perforated basket, choke disks and perforated disks at the exit, guarantying the required noise level.



The valve housing is made of forged steel. The inlet and outlet of the valve can be delivered both as weld-on and flanged variants. For welding connections to the pipeline, coordination of the material pairing with the customer takes place in order to prevent the welding of mixed compounds on site as far as possible. In order to prevent damage to the internal fitting, an integrated screen is recommended.

If the perforated cone is moved out of the seat by the drive, the first holes of the perforated cone sequence are opened up.

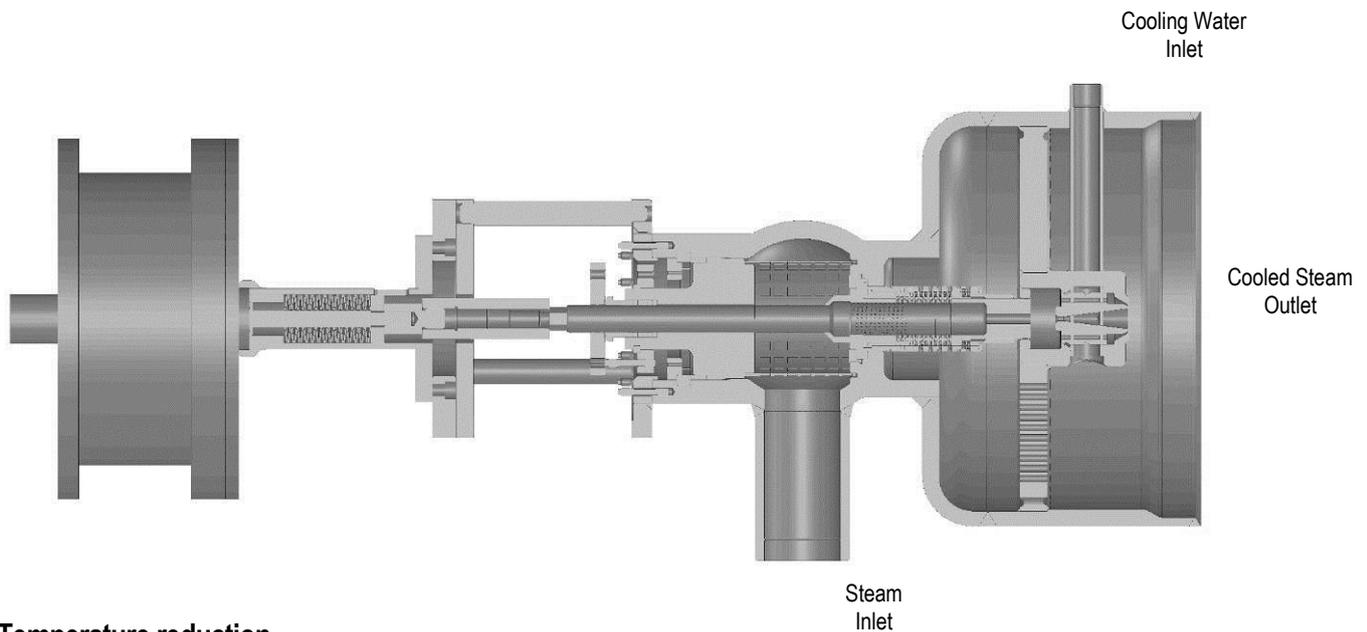
The continuous pressure relief of the hot steam takes place via defined flow cross sections in the perforated cone, perforated basket and choke disks. The spindle lift distance determines the opened cross section in the perforated cone and perforated baskets here.

The flowing medium is reduced through multi-stage regulation by multiple elaborately designed choke elements. The choke elements are designed according to the specified operating conditions. The downstream perforated disks cause the homogenisation of the hot steam flow.

In accordance with the laws of thermodynamics, the pressure-relieved medium exhibits a specific temperature that can be reduced to a desired temperature by the TECtemp desuperheater or the TECsteam motive steam cooler.

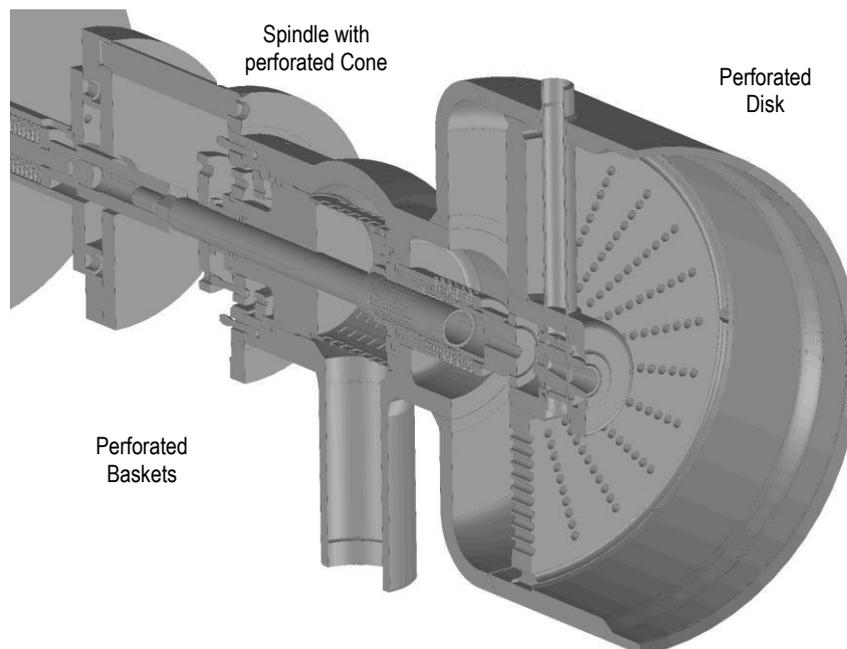
_4 Steam conversion – Description

Turbine Bypass



Temperature reduction

In the TECtemp desuperheater, the rotational movement of the spindle opens an integrated ball valve system, allowing the cooling water to reach the respectively triggered nozzles with swirl insert via a hollow spindle with defined hole sequence. Through separate triggering of the individual nozzles with upstream swirl inserts, the cooling water is atomised to micro-fineness even at small differential pressures between the cooling water and the hot steam. This prevents the formation of condensate, eliminating thermal shock effects on the valve parts or pipe walls. In connection with a conventional injection water control valve, the TECsteam motive steam nozzle offers an extension to the steam conditioning. Short outflow zones and temperatures near the saturated steam limit can be mastered even at low steam pressures through the use of motive steam for micro-fine water atomisation.



Steam converter with integrated Motive steam nozzle and 4 pressure reduction stages

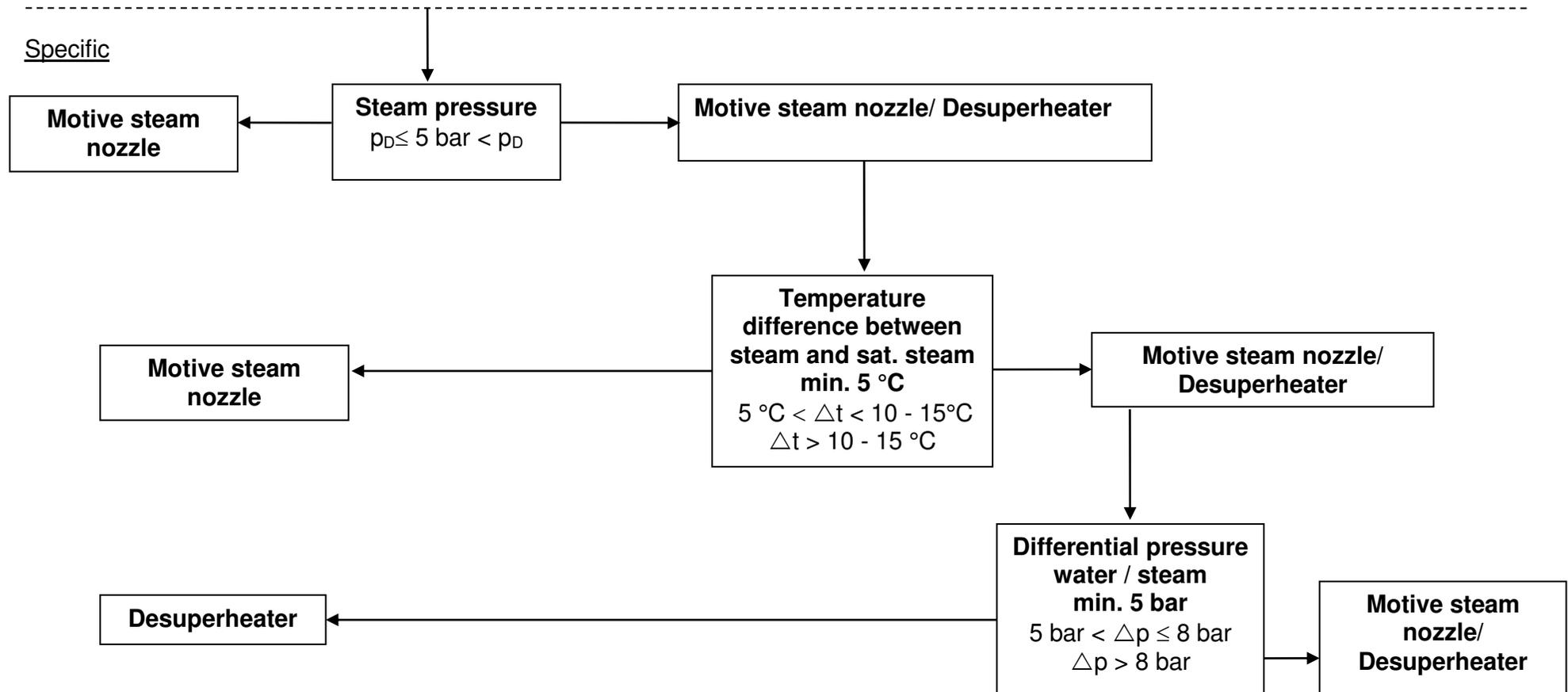
_4 Steam conversion – Decision Criterium for Steam cooling

General

For the motive steam nozzle, motive steam with a pressure of at least 2 times the steam pressure must be available.

The outflow zone is shorter with the motive steam nozzle than with the desuperheater.

Specific



_5 Control Valve



TECvent Control valve

Metallic sealed

DN 50 - 600

PN 25 – 630

Tmax. 850°C

product label

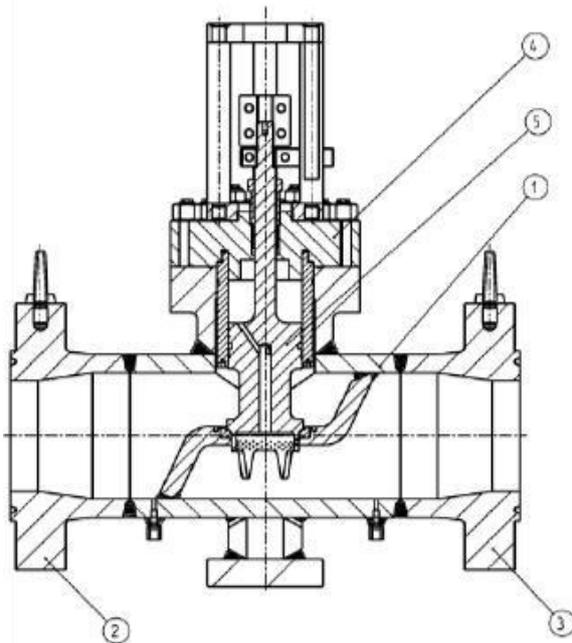
TECvent

TECvent – Technical description

_5 Control Valve - TECvent

Connecting passage valve for subcritical pressure regulation

DN 50 to 500 / PN 25 to 630 (2" - 20" / Class 150 - 4500)



Design features

- Different interior for subcritical regulated pressure relaxation
- Multi-stage reduction possible with perforated disks

	Materials
1. Housing (example)	1.4903 (P91)
2. Inlet	1.4903
3. Outlet	1.4903
4. Packing housing	1.4903
5. Spindle with perforated disk	1.4922

Tests

100% testing of the valve, documented with serial number and test certificate as per EN 10204

Design variants

- Actuation: Electric
Pneumatic
Hydraulic
- Connecting passage form
- Vertex-Form
- Z-form
- Connections: Flanges
Welding socket pieces
- Upon request: Installation dimensions

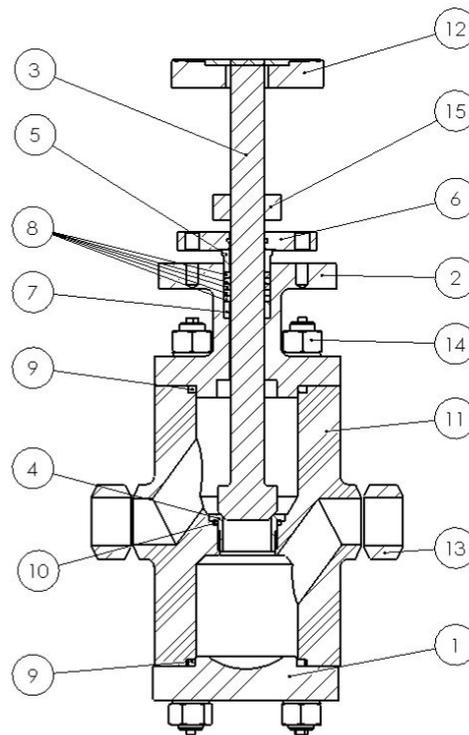
Other material variants are possible

_5 Control Valve - TECvent

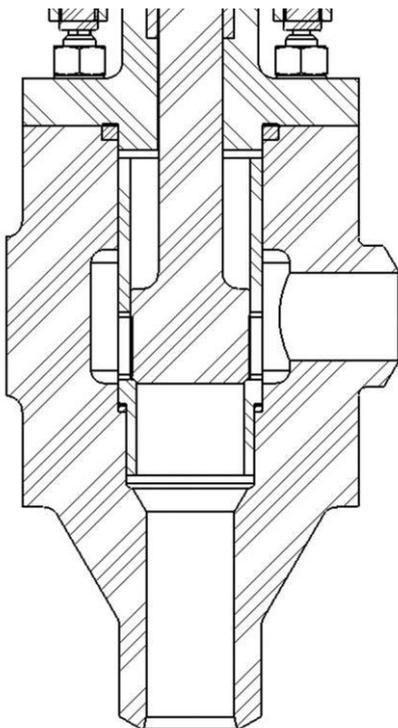
Shut off and control valves

Inlet: DN 25 to 500 / PN 25 to 630

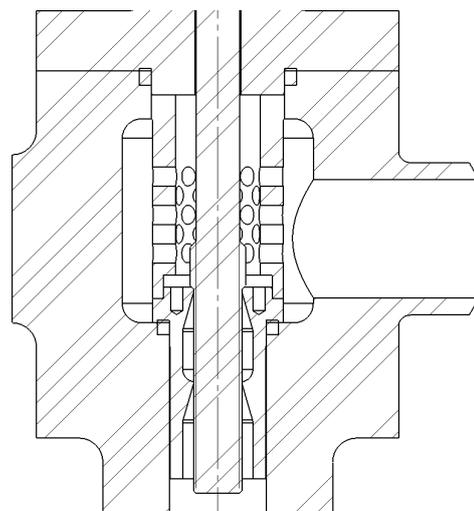
Outlet: DN 25 to 2000 / PN 25 to 630



Globe valve with shut off or control function



Angle valve with 1-step control function



Angle valve with 3-step control function

The TECvent control valve is an actuator used for pressure reduction even at higher differential pressures. The basic design is in principle identical in every control valve. The design of the actual pressure reduction is adapted to the specific application conditions. Due to its special design, the pressure reduction in the valve is subcritical in all load ranges. The pressure reduction of the media begins with the lifting of the spindle. If the perforated cone is lifted away from the seat, the first holes of the perforated cone of the spindle are opened for relieving the seat. The continuous relieving of the medium takes place via defined flow cross sections in the perforated basket. The spindle lift distance determines the amount of cross section opened in the perforated basket.

At high differential pressures in the valve, it can be necessary to equip the cone with a pressure relief due to the required drive forces. In the pressure tapping, the admission pressure is fed through the spindle on the back side of the cone.

During operation, the control valves are always in an open position, and in the closed position there is no absolute seal. The regulation VDI 2174/4 permits defined values as leak flow.

3-way valves

The design of the 3-way valve corresponds to that of a single-seat full-way valve.

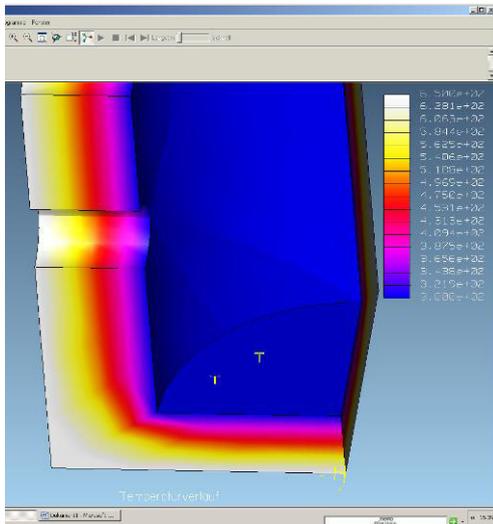
For mixed valves, the media to be mixed are supplied via two valve inlets and discharged via one outlet. For distribution valves, the medium is distributed over two outputs via one inlet.

Corner valve

These should only be used in places where the arrangement of the pipeline requires it. They are recommended when high pressure gradients should be achieved through choking. In these cases, the cone is subject to flow in the closing direction in order to protect the housing from the energetic stream.

TECengineering stands for development and advancement of industrial valves and industrial facilities, for thermodynamically calculations and calculations of stability of the valves.

Planning and Constructions



Due to permanent educations our highly trained employees are always up to date concerning materials, standardizations, guidelines and the calculation of pressure tanks. Furthermore there is a real close employment relationship with companies like MOT and because of that; our costumers will get an ideal support.

Valve assembly

Planing, production and delivery of different kinds of valve assemblies and industrial facilities for supply lines will accompanied by us for the whole period of the project.

Advantages for our costumers are e.g.:

- reductions of costs and a reductions of the construction period
- factory acceptance test in our plant
- ribbon corrosion coating

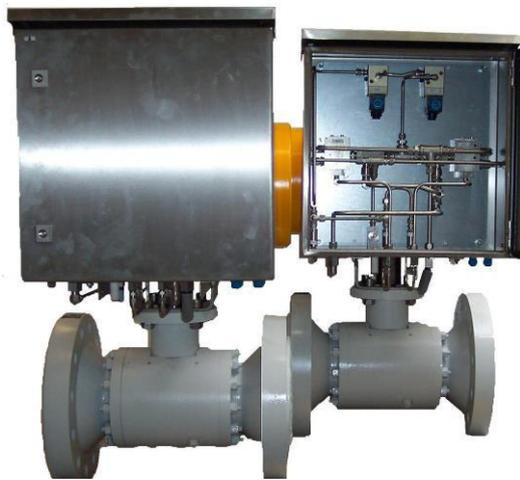


Gate-gate-valve-combination DN400

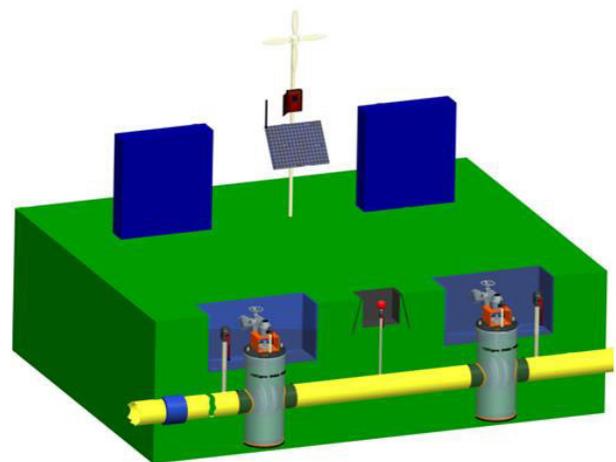
Drive concepts

Besides the production of high class industrial valves, we offer our costumers valves, which are fully automatic. Valves which should be installed in unexploited areas could be provide with completely autarchic working drive and measuring systems.

Energy supply ensued via solar or wind energy. The data transfer ensued secured via GPRS. With pneumatically control interfaces will be redundant safety-related-control functions guaranteed. One possible purpose for this kind of control is a safety valve for turbines. These valves protect the turbines through controlled reduction of the steam pressure over a defined period. The drive concepts are useable independently from the kind of the valves.



Safty-control-ball-valve



decentralized [autarchic](#) Slide-gate-valve-combination

Valve reconstructions and modifications

A further benefit for our costumers is the long time experience of our management and employees in areas like construction, production and maintenance of industrial valves.

TEC artec uses its more than 25 years of experiences in the field of production of control ball valves for modifications for our own and foreign valves. This could be e.g. reconstruction of a soft sealing control ball valve to a metal sealing control ball valve. We are capable of the modification of existing sealing systems for new applications as well.

TECserv includes technical engineering, development and refurbishing of valves.

Whether in the oil industry, chemical industry, petrochemicals, gas technology or power plants, TEC artec GmbH would like to work with you to finally solve the problems that may have plagued you for some time and continuously generate costs.

The qualified service employees perform repairs, emergency repairs and maintenance work on TEC artec valves and all other industrial and control valves.

Even though TEC artec GmbH and your employees cannot bypass the laws of physics and chemistry, we still address the problems and create solutions. Solutions that will satisfy you and can save you significant amounts of money.

Please send requests to:

Mr. Zimmermann

<mailto:axel.zimmermann@tec-artec.de>

Tel: +49 (0) 3301-2032-76

Let's take a look at a refurbishing of a ball valve DN 500 model PSA:



Ball valve
Condition as delivered



Preparation for pressure
and functionality test
(before disassembly)



Ball condition
after
disassembling



Ball condition
after surface
polishing



New coating
for ball



Housing parts de-layered for usage over ground



End and pressure tests



Ball valves coated new for usage over ground

_8 Spare Parts



Orders for spare parts and complete valves are processed rapidly and carefully.
Please fill out the spare parts list for every spare parts order and provide the following data:

Spare parts offer / order

To: TEC artec valves GmbH & Co.KG

From:

Am Heidering 7a
D-16515 Oranienburg

Tel.: +49 (0) 33 01 / 2032 - 60

Fax: +49 (0) 33 01 / 2032 - 71

Tel.:

Fax:

The following information can be found on the type plate of the valve:

Factory no. of the
valve:

Type:

Nominal diameter
(DN):

Pressure rating (PN):

- We request an offer for the following spare parts or wearing parts
- We are placing an order for the following spare parts or wearing parts

Item	Designation	Qty.

Date / Signature

Take advantage of our services, from consulting to engineering and the manufacturing of complex systems. In addition to our selection of TEC artec standard series, we offer a wide range of valve and system engineering variants for diverse applications.

The processing of complete projects is performed in cooperation with our partners from all associated fields

- **mechanical engineering**
- **system engineering**
- **pipeline engineering**
- **environmental technology**

Drive and Automation Technology

TECartec valves can be equipped with a wide range of drives. Various attachment systems and couplings are available for this purpose.

The drives must be capable of realising a rotation angle of at least 90° or a lifting movement. The technical data of the drive are based on the operating data of the system and are defined accordingly at TEC artec valves GmbH & Co.KG.

The torque and travel limit switches are configured at the factory. A change to the configured torque must be confirmed by TEC artec valves GmbH & Co.KG.

The technical description with installation, connection and configuration instructions for the electrical, pneumatic and/or hydraulic drive will be provided to you along with the documentation for the valves.

The following drive and accessory manufacturers are given preference:

- Auma
- Drehmo
- El-o-matic
- Festo
- ABB
- Hydac
- PCI
- Rotork
- Siemens
- Samson
- Danfoss

_10 General Terms and Conditions



General

1. All deliveries, services, quotations and other contractual deliverables shall be made exclusively based on these general terms and conditions. Future general terms and conditions shall be the basis of the contractual relationship even if they are not expressly agreed again. General terms and conditions and purchase conditions of the contract partner of TEC artec shall not be valid even if TEC artec does not expressly oppose them. This also applies for all future business relationships.
2. All individual contractual agreements in writing take precedence whereby these general terms and conditions retain their validity insofar as they do not contradict the individual contractual agreements. TEC artec shall retain the title and copyright for cost estimates, drawings and other documentation. Any type of infringement shall result in legal action for damages.
3. TEC artec expressly points out that information in the descriptions, documentation and illustrations about characteristics of the object of the contract are only approximately authoritative and that these expressly do not represent any assured characteristics. The assurance of any characteristic shall only be effective if it is made expressly in writing as such by TEC artec.

Quotation and conclusion of contract

1. Quotations are developed according to the documentation submitted to TEC artec and are subject to confirmation and are not binding until the binding order placement. The quotations made by TEC artec are based on the submitted documentation. Any conclusion of contract shall not take place until the written order confirmation from TEC artec. This shall also apply for any ancillary and modification agreements.
2. Quotations from TEC artec are only permitted to be used for specifications with agreement from TEC artec. In this case, TEC artec shall be reimbursed for the reasonable costs incurred by it for the development of the project if the order is allocated to a third party.
3. Drawings from TEC artec must be checked by the contractual partner for the design options both technically and for the required installation dimensions. In the event of any discrepancies, TEC artec must be notified immediately, otherwise TEC artec cannot be held responsible or accountable for any incorrect manufacture. Order cancellations after conclusion of contract will not be accepted by TEC artec.

Passing of the risk

1. The risks associated with the object of the contract pass to the Customer with the shipment of the goods. If the shipment is delayed or impossible without any fault of TEC artec, the risk passes to the Customer with the notification of readiness for collection. This always applies if collection by the contractual partner is agreed. If the delay is based on any duty to collaborate of the Customer (e.g. call-off not in good time, acceptance declined), TEC artec shall be entitled after unsuccessful setting of an appropriate deadline to store the goods at the cost of the Customer. The object of the contract is thus deemed as accepted. TEC artec can also take the required measures and make the delivery or withdraw from the non-fulfilled part of the contract or demand compensation for damages at its own discretion. Other rights of TEC artec shall not be affected by this.
2. If the Customer does not finally accept the object of the contract ordered by him, TEC artec shall be entitled to claim compensation of 50% of the contract price whereby the Customer reserves the right to prove lower damage and TEC artec reserves the right to prove higher damage.

Price and payment

1. The prices are ex-works and do not include ancillary costs such as VAT, packaging, customs, insurance etc. All prices are net prices.
2. The payment of each delivery or service shall be made according to the agreed conditions, otherwise the payment shall be made immediately in cash without deduction after notification of the readiness for shipment. Discount or other reduction will not be granted. The payment is not deemed to have been made until the amount is unconditionally at the disposal of TEC artec. Payments shall be made without any costs for TEC artec.
3. TEC artec shall be entitled, despite any provision of the Customer to the contrary to first apply payments to older debts of the Customer. If costs and interest have already been incurred, TEC artec shall be entitled to first offset the payment against the costs, then against interest and finally against the primary debt.
4. In the case of payment arrears, legal persons under public law or public law funds shall pay interest on arrears at 8% above the base rate. TEC artec may demonstrate and demand higher damage compensation.
5. TEC artec shall be entitled to require payments in advance or suitable securities up to 100% of the order value. This right is never linked to any conditions. If the Buyer / Customer does not meet such claims within a statutory deadline, TEC artec can withdraw completely or partially from the contract.
6. The Buyer is only entitled to offset, retain or reduce payment even if defects or counter claims are claimed if the counter claims have been legally established or are undisputed.
7. TEC artec reserves the right in the case of payment arrears to claim further compensation for delay even if it exceeds the loss of interest mentioned under item 4.
8. Any returns occurring during the performance of the contract must be agreed in advance with TEC artec. Returns for which TEC artec is not responsible must be made carriage-paid. TEC artec shall be entitled in the event of return to invoice 40% of the goods value, however at least € 1,500.00 as processing fee. The Customer retains the right to demonstrate a lower processing cost.

Delivery time

1. Delivery deadlines commence with conclusion of the contract, however not before provision of the documentation and approvals to be provided by the Buyer / Customer.
2. The delivery deadline is complied with if the deliverable has left the premises of TEC artec or if the readiness for shipment has been notified to the Buyer before expiration. If the Buyer / Customer exceeds the call-off deadline, TEC artec shall be entitled after unsuccessful expiry of a subsequent deadline of two weeks to withdraw completely or partially from the contract or to claim damage compensation due to breach of duty,

10 General Terms and Conditions



- due to delay of the performance or instead of the performance. The delivery deadline shown in the order confirmation requires fulfilment of the contractual obligations of the Buyer / Customer. If re-orders / changes are required by the latter, the delivery deadline is extended accordingly.
3. In the event of force majeure such as revolt, strike, lock-out or in the event of the occurrence of unforeseeable obstructions outside the control of TEC artec such as business disruptions or other events caused by any supplier, the delivery deadline shall be extended appropriately. This also applies if the obstructions have occurred during an already present delay. If the hindrance last longer than three months, the Supplier is entitled after setting a subsequent deadline of at least four weeks to withdraw from the not yet fulfilled part of the contract.
 4. Insofar as TEC artec is responsible for the non-compliance with binding agreed deadlines and dates, the Buyer shall be entitled to claim compensation for delay of 0.5% for each completed week of the delay, however in total up to maximum 5% of the net invoice value of the deliveries and / or services concerned by the contract. Any further claims shall be excluded unless the delay is at least based on gross negligence. TEC artec shall be entitled to make partial deliveries and perform partial services at any time.
 5. TEC artec does not make any supply guarantee.

Retention of Title

1. Until the fulfilment of all obligations of the Buyer / Customer to TEC artec for any legal reason now or in the future including the obligation to honour cheques accepted by TEC artec, TEC artec shall retain the title to the object of the contract.
2. The Buyer / Customer shall neither give third parties a lien on the goods nor assign them as security during the period of the retention of title. This particularly applies for storage assignments. The Buyer / Customer shall actively ensure that is sufficiently made known to his collateral takers.
3. While the retention of title exists, any sale or assignment of the goods requires the previous written agreement of TEC artec. In the case of infringement, claims against third parties of the Buyer / Customer shall be deemed as already assigned at conclusion of the contract to TEC artec. The assignment applies in the same way as for the case that the retained goods have previously been processed by the Buyer / Customer or if they have been sold to multiple customers.
4. If the Buyer / Customer acts contrary to the contract, particularly with regard to arrears of payment or if any legal insolvency proceedings for the assets of the Buyer are opened or applied for, TEC artec shall be entitled to take back the goods subject to retention and the Buyer shall be obligated to surrender them. The assertion of any right of retention shall be excluded. In this respect, TEC artec has a special right of withdrawal from the contract. The Buyer / Customer shall bear all costs arising from the taking back. TEC artec shall be entitled without prejudice to the payment obligation of the Buyer to dispose of the taken back goods as best as possible in free sale. Sales proceeds will then be offset after deduction of of costs incurred by TEC artec to the still open claim.
5. However, the assertion of the right of retention by TEC artec is not deemed as withdrawal from the contract. This must be declared separately by TEC artec if it should happen.
6. If the goods are delivered abroad, the above regulation shall apply provided this is authorised according to the law for the area where the delivery item is located. If the law prescribes any particular form of the justification of the right of retention or even any registration, the Buyer / Customer shall be obligated to submit the necessary declarations required for observance of the form and for the registration. If the foreign law permits the retention of title, it is deemed as agreed.

Warranty

1. If any delivery or service is defective, TEC artec shall at its discretion rectify the defect by reworking or to deliver an item free of defects. If the reworking is unsuccessful twice or it is not economically feasible, the Buyer / Customer shall be entitled to withdraw from the contract or to reduce his payment obligation accordingly. The discovery of obvious defects must be notified immediately in writing; in the case of not recognisable or hidden

defects, these must be notified in writing immediately after their discovery. TEC artec shall be liable to the same extent as for the original object of the contract in the event of reworking and subsequent deliveries. For new deliveries, the warranty period commences again, however only for the scope of the new delivery. A warranty is made for new, manufactured items. The warranty period shall be 24 months from delivery to our contractual partner. §§ 377, 378 HGB (German Commercial Code) continue to be applicable.

2. TEC artec expressly states that wear is no defect. The same applies for defects occurring due to defective maintenance.
3. The warranty for bought-in parts such as drive components is valid according to the manufacturer standard.

Limitation of liability

The liability of TEC artec shall be limited to damage which has been caused by itself or its vicarious agents attributable to gross negligence or intent. This is not applicable for the death, physical injury or damage to health of the Buyer / Customer. Unless legally permitted, liability is excluded in all other respects.

Place of performance and jurisdiction

1. The place of performance is Oranienburg. The law of the Federal Republic of Germany applies to these terms and conditions of business and to the complete legal relationships between the Buyer / Customer and TEC artec.
2. The exclusive jurisdiction for all direct or indirect disputes arising from the contractual relationship, also for bill of exchange and cheque processes, is Neuruppin for traders, legal persons under public law or public law special funds. The same jurisdiction applies if the Buyer / Customer has no general domestic jurisdiction, relocates his domicile or usual residence abroad after conclusion of the contract or his domicile or usual place of residence is not known at the time of bringing an action. However, TEC artec shall also be entitled to bring legal action against the Buyer at any other applicable jurisdiction for this.

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Transfer of rights and obligations

Transfer of rights and obligations from contracts between the Buyer / Customer and TEC artec require the previous written agreement of TEC artec to be effective. Possible claims of TEC artec are only permitted to be assigned to third parties with the previous written agreement of TEC artec.

Provisions for the sale of consumer goods

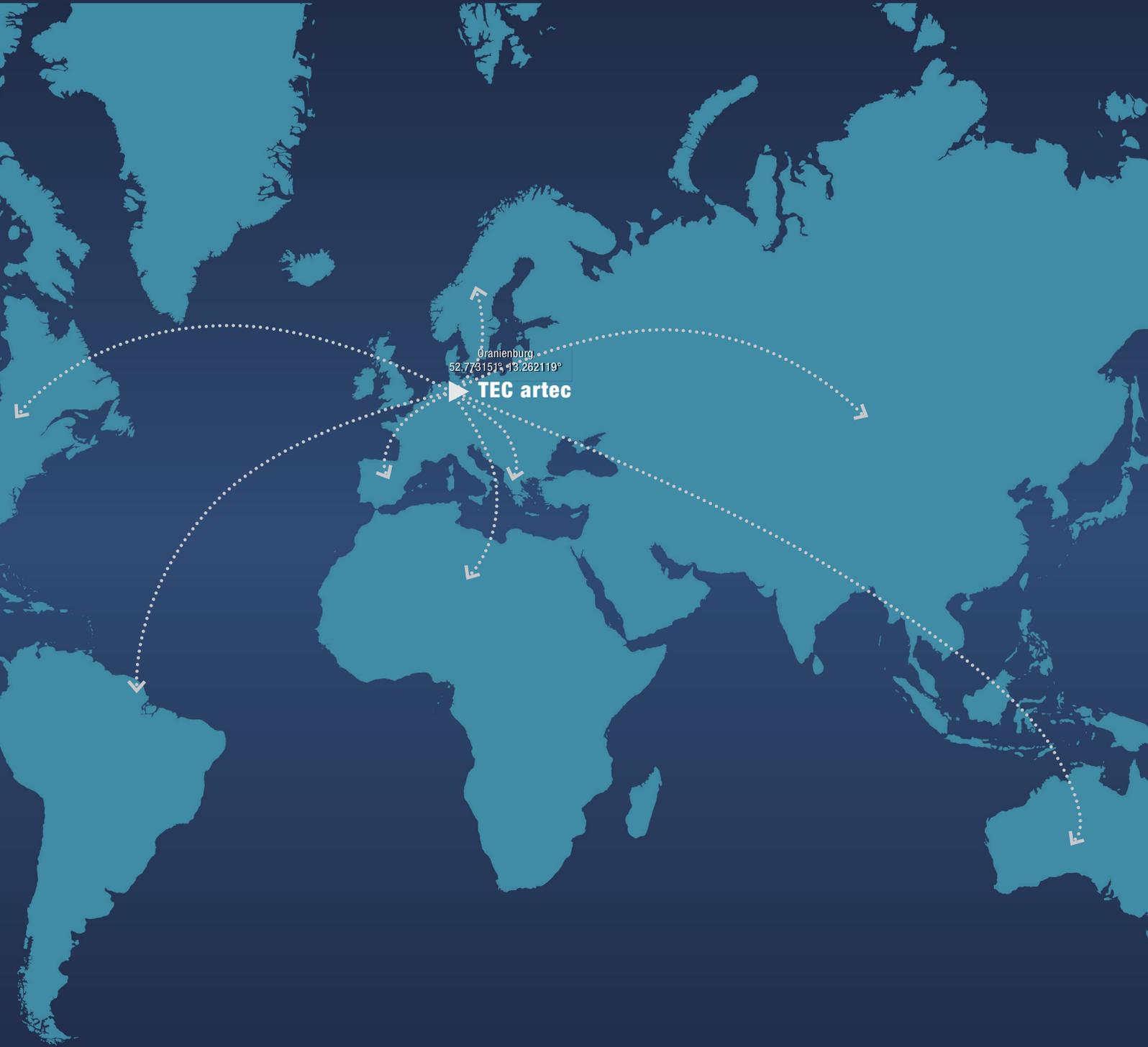
Recourse claims from companies are recognised within the scope of the provisions of § 478 BGB (German Civil Code) insofar as any defect attributable to TEC artec is actually present and insofar as our warranty period has not yet expired. The contract partner shall actively ensure that TEC artec is immediately completely informed about any possible claim. TEC artec has the right, at its own discretion and expense, to settle the claims of the consumer or company whether through subsequent fulfilment, reduction or rectification without regard to intermediate dealers. Contract partners of TEC artec must immediately relinquish to TEC artec or procure all required documents so that claims by consumers and dealers can be settled as quickly as possible. This is not related to any acknowledgement on the part of TEC artec.

Ineffectiveness of any condition

If any provision of these terms and conditions or any provision within the framework of other agreements is or becomes invalid, the validity of all other provisions or individual agreements shall not be affected. In this case, each contract party can require the agreement of an effective provision which most closely approximates the commercial and legal intention of the ineffective provision.

Date of these General Terms and Conditions: 28/10/2013

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TEC artec GmbH

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