

SMART RELIABLE FLOW CONTROL SOLUTIONS



Control valves | Actuators Sensors | Electronic components | Actuators Regulators

EQUIPMENT FOR THERMAL AND REFRIGERATION SYSTEMS

Applications where RTK products are used

- Power plant technology
- Heating / cooling systems for water, steam, thermal oil
- Heat transfer media
- Refrigeration systems
- Process technology
- Petro chemical



Specialist for control valves...

For nearly 40 years, we have been helping our clients with our core competence in all imaginable applications of control technology. Because one thing is clear: **as an RTK customer you'll get more.** With our high-quality products, we offer you **security**, with all our experience, we can assist in the **optimization of control circuits.**

We don't see ourselves as valve sellers, we're control engineers through and through. That is why we are engaged with everything to do with control valves. We're also perfectly at home with **actuators, sensors and controllers.**

Obviously we want to earn your trust and maintain it over many years. That's why, the competence of our employees has top priority. We educate, promote, and support. Because a long-standing cooperation thrives on trust, competence and reliability.

RTK delivers quality. Made in Germany.

You know us as a specialist for control valves, but we have so much more to offer. More than 3000 colleagues are ready to help you worldwide. From ball valves to turbine bypass stations, in our group of companies we deal with high-quality products for oil & gas, power station, industrial, and process applications. Take advantage of this unique situation and discover our world.

SMART VALVES AND ACTUATORS

Made in Germany



What makes us so successful?

No matter in what area, we take ideas seriously and implement the good suggestions of our employees and customers. All in-house processes are regularly questioned in internal workshops and, where necessary, optimized – without the need for pressure from "Mounted on top". Customer workshops give us insight into the world of our customers and often result in new products or variants.

Tradition

No matter how often we question things and modify processes, one thing will never change: we want to manufacture reliable and durable products for our customers – products that meet a high-level industry standard and provide many years of trouble-free operation. New products are extensively checked and tested, modern production facilities with a high degree of vertical integration give us flexibility and control over quality.

Innovation

Now, we're back to good ideas again. Whether it's a valve calculation program, automated manufacturing processes, product configurators (through which we can design, assemble and supply hundreds of thousands of product variants), fully automated test systems for control valves or even products with a certain "something" – concepts that today are industry standards often had their origins in Kornwestheim.

Reliability

Our well-trained employees are able to respond to the needs of our customers. The most important indicators receive interdepartmental evaluation everyday. This allows us to respond quickly and easily to any unforeseen circumstances. Because at the end, we want to keep what we promise.

Thoroughness

Whether in sales, construction, production planning or purchasing – here, you'll find specialists at work. When you receive an offer from RTK, you'll see that we have thoroughly engaged ourselves with the inquiry in hand. Operating data is tested and questioned, valves are carefully designed and a clear offer is produced that our customers can work with.

We deliver quality

OUR SERVICE

Competent, reliable and fast



Commissioning

- We help with commissioning our equipment
- Support during commissioning of the entire system
- Tuning of control circuits and control systems
- Troubleshooting and error handling support



Spare parts supply

System safety has the highest priority. That's why we manufacture reliable, long-lasting equipment. Never the less, if you do need a spare part, then of course you will find it available at short notice.

- Original spare parts
- Same day dispatch of standard parts
- Customised spare part kits for preventive maintenance
- Expert advice



Inspection of plant and inventory analysis

- We have a close look at your system
- Recording of operating parameters and normal conditions of use
- Realisation of your system-specific wishes and expectations

Take advantage of our complete SAVE offer

Regular inspection and maintenance

- Review of the components according to predetermined specifications
- Maintenance and optimization of components
- Documentation of all work carried out

and all at a fixed price.

Repair and overhaul

- On-site repairs are offered as standard
- Repairs and creation of an in-factory quote
- Complete functional test of all components
- Renewed warranty on maintained units
- We also repair other brands
- Pick-up and drop-off service

Quality management

Tests and approvals

- DIN EN ISO-9001-2015
- Druckgeräterichtlinien (PED) 97 / 23EG Modul H / H1, CE0036
- DIN CERTCO
- TA-Luft
- Vd-TÜV Wasserstand 100
- DVGW
- ATEX Konformitätserklärung, 94 / 9 / EG
- TR TS (EAC)
- LR- Lloyd's Register
- DNV-GL
- BV-Bureau Veritas
- RINA-Registro Italiano Navale
- ABS-American Bureau of Shipping
- China Compulsory Product Certificate (CCC)



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CONTROL VALVES

- Electric and pneumatic control valves (heat control)
- Electric and pneumatic control valves (refrigeration)
- Shut-off valves
- Three way control valves
- Flow-control silencers
- RTK – Heavy duty control valves
- Electric control valves with fail closed unit
- Steam converting valves
- Multi nozzle lancer desuperheaters
- Feed-water control valves with re-circulation connection
- Continuous blow down valves
- Bottom blow down valves
- Valves for discharge / re-circulation control



MV 5211



PV 6221

Electric series

With electric actuators
REact 15E
REact 30E/DC

Pneumatic series

With pneumatic actuators
ST 6115
ST 6135

**With
Bellows seal**

Electric series	Pneumatic series	With Bellows seal
MV 5211	PV 6211	–
MV 5214	PV 6214	yes
MV 5221	PV 6221	–
MV 5224	PV 6224	yes
MV 5231	PV 6231	–
MV 5234	PV 6234	yes

Technical data

	DIN	ANSI
Nominal diameter	DN 15 ... 100	NPS ½ ... 4
Nominal pressure	PN 16 ... 160	CL 150 ... 900
Body materials	EN-GJL-250 (PN 16) EN-GJS-400-18-LT (PN 16; 25) GP240GH (PN 16 ... 160) G17CrMo5-5 (PN 63 ... 160) GX5CrNiMo19-11-2 (PN 16 ... 40) Other materials available on request	SA216 WCB SA351 CF8M SA217 WC6 SA217 WC9
Flanges	According to DIN 2501; EN 1092-1 and EN 1092-2 Different flanges on request	According to ASME B16.5 RF und RTJ
Butt Weld ends	According to DIN 3239 – part 1 or EN 12627 Edge form DIN 2559-21 (Others on request) End connection P235GH for body material GP-240 GH End connection 13CrMo4-5 for body material G 17 CrMo 5-5	According to ASME B16.5
Further End Connections	Threaded NPT according to ASME B16.11 Socket Weld Ends according to ASME B16.11 Class 3000	
Stem packing	Chevron rings PTFE-graphite (max. +250 °C) Stuffing box pure graphite (max. +530 °C medium dependent) Bellows seal with safety stuffing box (max. +350 °C PN 100 up to DN 40) Stem packing with DVGW-Approval (max. 6 bar, +60 °C) Stem packing for oxygen with BAM approval (max. +50 °C)	
Trim variations	Shut-off plug 1.4122, 1.4122 hardened, stellite Parabolic plug 1.4122, 1.4122 hardened, stellite, Ferro Titanium V-port plug 1.4122, 1.4122 hardened, stellite 1.4408 Perforated plug 1.4122, 1.4122 hardened Mixing- / Diverting plug 1.4122, 1.4408 Soft seat PTFE graphite PTFE graphite Seat 1.4571 (AISI 316Ti), stellite Stem 1.4571 (AISI 316Ti) Quick Change Seat Ring one/two stage (Retainer SA487 CA6NM) According to NACE MR0175 / MR0103 Other materials available on request	(open-close) (equal% / linear) (equal% / linear) (equal% / linear) (linear)
Version for refrigerants	Chevron packing rings NBR (-60 °C to +100 °C) Chevron rings PTFE-graphite (-60 °C to +250 °C) Seals (gaskets) suitable for refrigerants Bellows seal with safety stuffing box Stem heater with glycerine cup, free from non-ferrous metals Bonnet studs and nuts in stainless steel Epoxy coating Flanges with groove nach EN 1092-1 (DIN 2512)	
Seat leakage	According DIN EN 1349 Class IV (metal to metal) Class IV-S2 (lapped in metal to metal) Class VI (soft seat with PTFE-Graphite max. +200°C)	According to ANSI / FCI 70-2 Class IV Class V (optional) Class VI
Max. press / temp.	According to DIN EN 1092	ASME B16.34
Approvals	DGRL (CE), DVGW, ATEX (für PV...), DNV-GL, RINA, ABS, TR TS (EAC), CRN, CCC	



MV 5174

Electric series

With electric actuator REact 15E	With Bellows seal
MV 5174	yes

Motorized control valves for mixing and diverting (up to DN 65) used for thermal oil and other process liquids

- Three-way design with shortened B-flange
- Long life chambered bellows seal with twist lock
- Actuator can be turned as desired for simple operating and cabling

Technical data

Nominal diameter	DN 50 und 65	
Nominal pressure	PN 16	
Body material	EN-GJS-400-18-LT	
Flanges	According to DIN EN 1092-2 Different flanges on request	
Stem packing	Metal bellows seal with safety stuffing box	(max. +350 °C)
Trim variations	Mixing plug 1.4122 Bellows + Stem 1.4571 Seat 1.4571 Other materials available on request	(linear) (AISI 316 Ti) (AISI A316 Ti)
Seat leakage	According to DIN EN 1349, Class IV	
Approvals	DGRL (CE), CCC	



REact

MV 5274

PV 6274

Electric series

With electric actuators
REact 15E
REact 30E/DC

MV 5271

MV 5274

Pneumatic series

With pneumatic actuators
ST 6115
ST 6135

PV 6271

PV 6274

**With
Bellows seal**

–

yes

Technical data

Nominal diameter	DN 20 ... 100	
Nominal pressure	PN 16, 25	
Body materials	EN-GJL-250	(max. PN 16)
	EN-GJS-400-18-LT	(max. PN 25)
Flanges	Connection according to DIN 2501 Facing DIN 2526 Form C Connection according to DIN EN 1092 Different flanges on request	
Stem packing	Chevron rings PTFE-graphite	(max. +250 °C)
	Bellows seal with safety stuffing box	(max. +350 °C)
Trim variations	Mixing plug 1.4122 / 1.4408	(linear)
	Stem + Seat 1.4571	
	Other materials available on request	
Seat leakage	According DIN EN 1349 Class IV (metal to metal) Class IV-S2 (lapped in metal to metal)	
Approvals	DGRL (CE), ATEX (für PV...), TR TS (EAC), CCC	

**Electric series**

With electric actuators
REact 60E/DC
REact 100E/DC

MV 5311
MV 5314
MV 5321
MV 5324
MV 5331
MV 5334

Pneumatic series

With pneumatic actuators
ST 6160

PV 6311
PV 6314
PV 6321
PV 6324
PV 6331
PV 6334

With
Bellows seal

–
yes
–
yes
–
yes

With
Bellows seal
PN100

–
yes
–
–
–
–

Technical data

	DIN	ANSI
Nominal diameter	DN 15 ... 150	NPS ½ ... 6
Nominal pressure	PN 16 ... 160	CL 150 ... 900
Body materials	EN-GJL-250 (PN 16) EN-GJS-400-18-LT (PN 16; 25) GP240GH (PN 16 ... 160) G17CrMo5-5 (PN 63 ... 160) GX5CrNiMo19-11-2 (PN 16 ... 40) Other materials available on request	SA216 WCB SA351 CF8M SA217 WC6 SA217 WC9
Flanges	According to DIN 2501; EN 1092-1 and EN 1092-2 Different flanges on request	According to ASME B16.5
Butt weld ends	According to DIN 3239 – part 1 or EN 12627 Edge form DIN 2559-21 (Others on request) End connection P235GH for body material GP-240 GH End connection 13CrMo4-5 for body material G 17 CrMo 5-5	According to ASME B16.5
Further End Connections	Threaded NPT according to ASME B16.11 Socket Weld Ends according to ASME B16.11 Class 3000	
Stem packing	Chevron rings PTFE-graphite (max. +250 °C) Stuffing box pure graphite (max. +530 °C medium dependent) Bellows seal with safety stuffing box (max. +350 °C PN 100 up to DN 40) With TA-Luft (max. +400 °C) Stem packing with DVGW-Approval (6 bar, max. +60 °C) Stem packing for oxygen with BAM approval (max. +50 °C)	
Trim variations	Shut-off plug 1.4122, 1.4122 hardened, stellite Parabolic plug 1.4122, 1.4122 hardened, stellite, Ferro Titanium V-port plug 1.4122, 1.4122 hardened, stellite 1.4408 Perforated plug 1.4122, 1.4122 hardened Mixing- / Diverting plug 1.4122, 1.4408 Balanced plug PTFE graphite Soft seat PTFE-graphite 1.4571 (AISI 316Ti), stellite Seat 1.4571 (AISI 316Ti), stellite Stem 1.4571 (AISI 316Ti) Quick Change Seat Ring one/two stage (Retainer SA487 CA6NM) According to NACE MR0175 / MR0103 Other materials available on request	(Quick opening) (equal% / linear) (equal% / linear) (equal% / linear) (linear) (equal% / linear)
Version for refrigerants	Chevron packing rings NBR (-60 °C to +100 °C) Chevron rings PTFE-graphite (-60 °C to +250 °C) Seals (gaskets) suitable for refrigerants Bellows seal with safety stuffing box Stem heater with glycerine cup, free from non-ferrous metals Bonnet studs and nuts in stainless steel Epoxy coating Flanges with groove	
Seat leakage	According DIN EN 1349 Class IV (metal to metal) Class IV-S2 (lapped in metal to metal) Class VI (soft seat with PTFE-Graphite max. +200°C)	According to ANSI / FCI 70-2 Class IV Class V (optional) Class VI
Max. press / temp.	According to DIN EN 1092	ASME B16.34
Approvals	DGRL (CE), DVGW, TA-Luft, ATEX (für PV...), DNV-GL, RINA, ABS, TR TS (EAC), CRN, CCC	

REFlex



MV 5411



MV 5421



PV 6411

Electric series

With electric actuators
ST 5106
ST 5116

Electric series	Pneumatic series	With Bellows seal
MV 5411	PV 6411	–
MV 5414	PV 6414	yes
MV 5421	PV 6421	–
MV 5424	PV 6424	yes
MV 5431	PV 6431	–
MV 5434	PV 6434	yes

Pneumatic series

With pneumatic actuators
ST 6175

With
Bellows seal

Technical data

	DIN	ANSI
Nominal diameter	DN 40 ... 400	NPS 1 ½" ... 12"
Nominal pressure	PN 16 ... 160	Class 150 ... 900
Body materials	EN-GJL-250 (PN 16) EN-GJS-400-18-LT (PN 16; 25) GP240GH (PN 16 ... 160) G17CrMo5-5 (PN 63 ... 160) GX5CrNiMo19-11-2 (PN 16 ... 40) Other materials available on request	SA216 WCB SA351 CF8M SA217 WC6 SA217 WC9
Flanges	According to DIN 2501; EN 1092-1 and EN 1092-2 Different flanges on request	According to ASME B16.5 RF und RTJ
Butt weld ends	According to DIN 3239 – part 1 or EN 12627 Edge form DIN 2559-21 (Others on request) End connection P235GH for body material GP-240 GH End connection 13CrMo4-5 for body material G 17 CrMo 5-5	According to ASME B16.5
Further End Connections	Threaded NPT according to ASME B16.11 Socket Weld Ends according to ASME B16.11 Class 3000	
Stem packing	Chevron rings PTFE-graphite (max. +250 °C) Stuffing box pure graphite (max. +530 °C medium dependent) Bellows seal with safety stuffing box (max. +350 °C PN 100 up to DN 40) Stem packing with DVGW-Approval (6 bar, max. +60 °C) Stem packing for oxygen with BAM approval (max. +50 °C)	
Trim variations	Shut-off plug 1.4122, 1.4122 hardened, stellite Parabolic plug 1.4122, 1.4122 hardened, stellite, Ferro Titanium V-port plug 1.4122, 1.4122 hardened, stellite 1.4408 Perforated plug 1.4122, 1.4122 hardened Mixing- / Diverting plug 1.4122, 1.4408 Soft seat PTFE graphite Seat 1.4571 (AISI 316Ti), stellite Stem 1.4571 (AISI 316Ti) Quick Change Seat Ring one/two stage (Retainer SA487 CA6NM) According to NACE MRO175 / MRO103 Other materials available on request	(Quick opening) (equal% / linear) (equal% / linear) (equal% / linear) (linear)
Version for refrigerants	Chevron packing rings NBR (-60 °C to +100 °C) Chevron rings PTFE-graphite (-60 °C to +250 °C) Seals (gaskets) suitable for refrigerants Bellows seal with safety stuffing box Stem heater with glycerine cup, free from non-ferrous metals Bonnet studs and nuts in stainless steel Epoxy coating Flanges with groove according to EN 1092-1 (DIN 2512)	
Seat leakage	According DIN EN 1349 Class IV (metal to metal) Class IV-S2 (lapped in metal to metal) Class VI (soft seat with PTFE-Graphite max. +200°C)	According to ANSI / FCI 70-2 Class IV Class V (optional) Class VI
Max. press / temp.	According to DIN EN 1092	ASME B16.34
Approvals	DGRL (CE), DVGW, TA-Luft, ATEX (für PV...), DNV-GL, RINA, ABS, TR TS (EAC), CRN, CCC	



SL Type-B

SL-Type

For liquid media

**For gases
and vapours**

SL Type A

SL Type B

Flow-control silencer / expansion after control valves to reduce noise after choked flow of gases and vapours. In order to largely suppress cavitation / evaporation in liquid media and sound reduction.

- Suitable for operating temperatures up to +530 °C
- System of two to four throttle plates
- Including pipe expansion
- Supplied ready to fit including the connecting elements

Technical data

Inlet and outlet

PN 40 ... 160, Class 300 ... 900
Different nominal pressure ranges for inlet and outlet on request

Materials

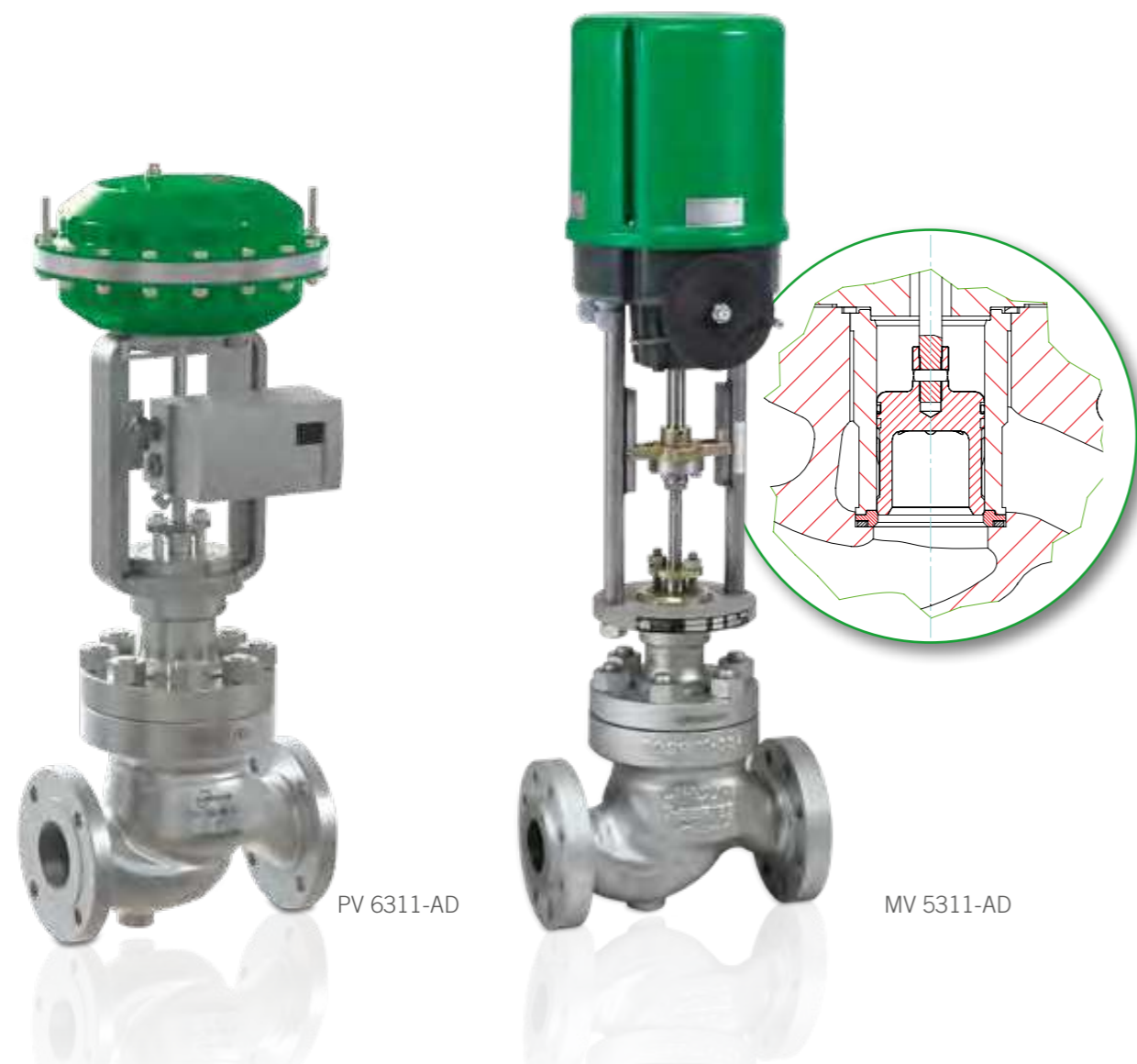
P250GH	(PN 40 ... 160)
Equivalent to A105	(Class 300 ... 900)
1.4571	(PN 40 ... 160)
Equivalent to A316Ti	(Class 300 ... 900)
13CrMo4-5	(PN 63 ... 160)
Equivalent to A355	(Class 600 ... 900)
Other materials available on request	

Flanges

Connection to EN 1092 form B1
Connection to ASME B 16.5

Approvals

DGRL (CE)



PV 6311-AD

MV 5311-AD

Electric series**With electric actuators**

ST 5113
ST 5114
ST 5106
ST 5116

MV 5311-AD

MV 5411-AD

Pneumatic series**With pneumatic actuators**

ST 6135
ST 6160
ST 6175

PV 6311-AD

PV 6411-AD

All-purpose cage guided globe control valve

- High flow capacities provide larger flow area, reduced body velocity and pressure loss
- Yoke lock nut guarantees easy disassembly
- Hardened / Stainless steel trim provides twice the service life of 316 stainless trim
- Cup seal with three times the wear surface of competitive valves for long lasting leak tight seal
- Multiple cage options for maximum versatility
- Balanced plug design provides smooth high pressure control
- Ultra compact actuators install in tight spaces
- Tighter shut-off design provides exceptional performance up to Class VI
- Compact actuators can easily be installed in tight spaces

Technical data

Body Assembly	Style: Single seated, top entry bolted bonnet, globe style body, cage guided balanced plug	
Nominal diameter	NPS 2 ... 16	
Nominal pressure	CL 150 ... 1500	NPS 2 ... 8
	CL 150 ... 600	NPS 10 ... 16
Body material	Carbon steel, ASTM A216 Gr WCC Chrome moly, ASTM A217 Gr WC9 Stainless steel, ASTM Gr CF8M	
Butt weld ends	RF, RTJ, BWE (NPT, SWE only for NPS 2)	
Stem packing	PTFE V-Rings	(-29 °C to +230 °C)
	Laminated graphite	(-29 °C to +566 °C)
Trim Types	Standard, Les-Cav I+II, Les-Sonic I+II	
Flow Characteristics	Equal percentage, Linear	
Trim Materials	Martensitic (series 400) / austenitic (series 300) Standard and high temperature versions	
Trim Sizes	Full port, 80 %, 60 % and 40 % reduced Custom, contact application engineering	
Kvs values	24 – 2666 m ³ / h	
Plug Seal Materials	C300 spring loaded seal with Inconel spring Class IV or V	(max. +300 °C)
	Double carbon-graphite seal rings Leakage Class IV	(max. +538 °C)
Shutoff Class	According ANSI / FCI 70-2	
	Standard trim Leakage Class V	(-29 °C to +300 °C)
	Leakage Class IV	(-29 °C to +427 °C)
	Standard trim Leakage Class IV	(-29 °C to +538 °C)
Actuators	Spring and diaphragm pneumatic actuator 280, 530 or 1000 cm ² actuator Spring closed or spring open Electric actuator Optional: piston, double acting / spring return	

REact



MV 5300

Electric series

With electric actuators	Actuators
MV 52 ... Approved by German Technical Inspectorate	REact 30 ST 6151-5 REact 60 ST 6151-5
MV 53 ...	REact 60 ST 6151-6 REact 100 ST 6151-6
MV 54 ...	ST 5106 ST 6152-1 ST 5116 ST 6152-1

Fail close unit for motorized valves MV 52 ... / MV 53 ... / MV 54 ... series 2 way or 3 way design

- Approved by German Technical Inspectorate DIN EN 14597:2012-09 as safety functional device for steam and water in heating systems.
(Valid only in combination with ST 6151-5)
- Valve closes on loss of power
- Closes smoothly even at large differential pressures
- Adjustable closing time for ST 6152-1
- Automatic return to normal operation possible

Technical data

	DIN	ANSI	
Nominal diameter	DN 15 ... 100	NPS ½ ... 4	(Series MV 52 ...)
	DN 15 ... 150	NPS ½ ... 6	(Series MV 53 ...)
	DN 40 ... 250	NPS 1½ ... 10	(Series MV 54 ...)
Nominal pressure	PN 16 ... 160	CL 150 ... 900	
Stem packing	Chevron rings PTFE-graphite		(max. +250 °C)
	Bellows seal with safety stuffing box		(max. +300 °C)
Trim variations	V-port plug		(equal% / linear)
	Perforated plug		(equal% / linear)
Seat leakage	According DIN EN 1349		According to ANSI / FCI 70-2
	Class IV (metal to metal)		Class IV
	Class IV-S2 (lapped in metal to metal)		Class V (optional)
	Class VI (soft seat with PTFE-Graphite max. +200 °C)		Class VI



Electric series

With electric actuators
REact 60E/DC
REact 100E/DC
ST 5106
ST 5116

MV 5351

MV 5451

Pneumatic series

With pneumatic actuators
ST 6160
ST 6175

PV 6351

PV 6451

Steam-converting valves used to reduce the steam pressure while simultaneously cooling the steam.

- Steam pressure reduction and cooling in one unit
- Low-noise Perforated plug
- Water injection from below
- Wide control range
- Optimized control characteristic with adapted trim for steam and water



PV 6451

Technical data

Nominal diameter	DN 40 ... 250	
Nominal pressure	PN 16 ... 100	
Body materials	GP240GH	(PN 16 ... 100)
	G17CrMo5-5	(PN 63 ... 100)
Flanges	According to DIN 2501; EN 1092-1 and EN 1092-2 Different flanges on request	
Stem packing	Chevron rings PTFE-graphite	(max. +250 °C)
	Stuffing box pure graphite	(max. +530 °C)
Trim variations	Perforated plug 1.4122, 1.4122 hardened Stem + Seat 1.4571 Stellited seat Other materials available on request	(equal% / linear)
Seat leakage	According to DIN EN 1349 Class IV (metal to metal) Class IV-S2 (lapped in metal to metal)	
Max. press / temp.	According to DIN EN 1092	
Approvals	DGRL (CE) ATEX (für PV...), TR TS (EAC), CCC	



MDK 5351

PDK 6351

Electric series

With electric actuators
ST 5106
ST 5116

MDK 5351

MDK 5451

Pneumatic series

With pneumatic actuators
ST 6175

PDK 6351

PDK 6451

REcool

Injection cooler – Desuperheated steam cooler

- Variable control characteristics
- Precise steam temperature control
- Variable turndown ratio 10 :1 / 25:1
- Excellent atomising characteristic at ΔP water/steam of minimum 10 bar at minimum. Steam velocity of 10 m/s.
- Max. ΔP Water/Steam upto 100 bar. No additional control valve is required.
- Tight shut-off, without any leakage
- High reliability due to simple parts and minimum wear

Technical data

Body materials	15Mo3 (~ ASTM A182 F1) 13CrMo (~ ASTM A182 F12) Inner parts made of min.13% chromium steels
Flanges	Cooling water inlet flange DN 25 / 40 / 50 (PN 25 ... PN 400) Mounting flange DN 80 / 100 (PN 25 ... PN 400) Connection Optionsly in DIN or ANSI (On request) Minimum inside pipe diameter on mounting flange 76 mm

Description of function In cases where, steam conditioning valves are only of limited use or can no longer be used in the event of a subcritical steam pressure reduction requiring steam cooling, due to very small or very large water requirement (more than 25 % of the steam quantity) and/or where very large differences between the operating condition exist. In such cases, the steam temperature is controlled by injecting finely atomized cooling water into the steam flow by injection cooler of the series PDK 6X51 / MDK 5X51 after the steam pressure has been reduced. This brings the steam to the desired value (at least 5 K above the saturated steam temperature).

In the nozzle chambers, the cooling medium is accelerated and starts to rotate by means of a twist insert, so that a very finely atomized spray cone is created when it is discharged into the steam piping. This guarantees a very good mixing of the cooling medium with the hot steam flow and ensures an optimum cooling effect. By using several twist nozzles (the necessary number is adapted to the operating data) a very good and precise steam temperature control is achieved for the planned operating states between the minimum and maximum mass flow of hot steam that is to be cooled.

The valve seat is positioned directly upstream from the nozzle head which completely prevents any undesired dripping due to its tight connection with the control piston. The control piston is lapped tightly into the seat during production.

REFlex



REact

MV 5391

Electric series

With electric actuators

REact 30E/DC
REact 60E/DC
REact 100E/DC

MV 5291

MV 5391

Control valve for steam boiler feed-water control systems

- Boiler-feed pump securely protected against falling below the minimum flow rate
- Adjustable re-circulation flow rate
- Perforated plug for feed-water control
- Boiler steam ratings 5 ... 50 t/h

Technical data

	DIN	ANSI
Nominal diameter	DN 25 ... 80	NSP 1 ... 3
Nominal pressure	PN 40	CL 150 CL 300
Body materials	1.0619 / 1.4408	SA216 WCB SA351 CF8M
Stem packing	Chevron rings PTFE-graphite	(bis +250 °C)
Trim variations	Perforated plug for feed-water and re-circulation (DN 40, DN 50, DN 65 re-circulation adjustable) 1.4122, 1.4122 hardened	
Seat leakage	According to DIN EN 1349 Class IV (metallisch dichtend)	According to ANSI / FCI 70-2 Class IV
Max. medium Temperature	+200 °C	
Max. press / temp.	According to DIN EN 1092	According to ASME B16.34
Approvals	DGRL (CE), ATEX (für PV...), TR TS (EAC), CCC	



Electric series

With electric actuators
REact 15 E

MV 5291-D

MV 5291-V

Pneumatic series

With pneumatic actuators
ST 6135

PV 6291-D

PV 6291-V

Motorized control valves for continuous blow down of steam boilers.

- Two-way design with (V) / without (D) sample valve
- Durable execution
- Hardened plug and seat for low wear operation
- body material GP-240-GH
- Parabolic plug with linear characteristic for exact dosing of blow down flow rate

Technical data

	DIN	ANSI
Nominal diameter	DN 15, 20, 25, 40	NPS ½, ¾, 1 und 1½
Nominal pressure	PN 40	CL 300
Body material	GP-240-GH	SA 216 WCB
Stem packing	Chevron rings PTFE-graphite	(bis +250 °C)
Trim variations	Parabolic plug	
Seat leakage	According to DIN EN 1349 Class IV (metal to metal)	According to ANSI / FCI 70-2 Class IV
Max. press. / temp.	According to DIN EN 1092	According to ASME B16.34
Approvals	DGRL (CE), ATEX (für PV...), CCC	



Pneumatic series

With pneumatic actuator
ST 6135

PV 6291

PV 6291-E

With Handwheel

HV 6291

Bottom blowdown valves for steam boilers

- Maintenance free stem packing
- Clear flow through valve
- Protection of stem packing by back sealing
- Easy replacement of plug
- Reduced susceptibility to water hammer due to bonnet having a smaller cross sectional area
- Guided plug which reduces plug vibration
- Supplied with high quality B7A grooved gaskets

Technical data

	Two-way design		Angle form
	DIN	ANSI	DIN
Nominal diameter	DN 20 ... 65	NPS ¾ ... 2 ½	DN 20 ... 50
Nominal pressure	PN 40	CL 300	PN 63 ... 160
Body material	GP240GH	SA 216 WCB	GP240GH, Others on request
Stem packing	Chevron rings PTFE-graphite	(max. +250 °C)	Chevron rings PTFE-graphite (max. +290 °C)
Trim variations	Shut-off plug Stem + Seat 1.4571		Shut-off plug Stem + Seat 1.4571 Stellite
Mounting position	Any		
Max. press / temp.	According to DIN EN 1092		According to ASME B16.34
Options	Solenoid valve with control unit for bottom blowdown valve		
Function HV 6291	The bottom blowdown valve is operated by hand lever The valve closes automatically when the lever is released The valve can be blocked in the open position		
Function PV 6291	The air supply must not exceed 6 bar The bowdown valve must be quickly + fully opened		
Approvals	DGRL (CE), ATEX (für PV...), CCC		

REFlex

Electric series

With electric actuators

REact 30E/DC
REact 60E/DC
REact 100E/DC

MV 5241

MV 5341

Pneumatic series

With pneumatic actuators

ST 6135
ST 6160

PV 6241

PV 6341



REact

MV 5341

Control valves for discharge / re-circulation used for water- or air-cooled condensers

- Three-way design
- Kvs value adjustable in gate B
- Plug can be rotated 80°
- Vacuum-resistant on re-circulation side
- Re-circulation plug assy cavitation resistant

Technical data

Nominal diameter	DN 50 ... 150	
Nominal pressure	PN 16 ... 40	
Body materials	EN-GJS-400-18-LT	(max. PN 25)
	GP240GH	(max. PN 40)
	GX5CrNiMo19-11-2	(max. PN 40)
Flanges	According to DIN 2501; EN 1092-1 and EN 1092-2 Different flanges on request	
Stem packing	Chevron rings PTFE-graphite	(max. +250 °C)
	Stuffing box pure graphite	(max. +530 °C medium dependent)
	With "TA-Luft" (MV 5341)	(max. +400 °C)
Trim variations	Diverting plug to control flow / re-circulation	(linear)
	Stem + Seat 1.4571	
	Parabolic plug 1.4122	
	Perforated plug 1.4122, 1.4122 hardened	
	Other materials available on request	
Seat leakage	According to DIN EN 1349 Class IV (metal to metal)	
Max. press / temp.	According to DIN EN 1092	
Approvals	DGRL (CE), ATEX (für PV...), CCC	

ACTUATORS

- Electric actuators
- Pneumatic actuators





REact

REact 15

Series

REact 15E- 038

REact 15 DC

Electric actuator for modulating control and shut/off valves with brushless 24VDC motor technology (REdrive)

- operated by 3-term-step controllers or analogue signals 0/4-20 mA, 0/2..10V
- force switches for both directions
- limit switch for one direction, spindle retracted
- protection rating IP 65
- valve position indicator
- manual control
- optional accessories available

Options:

- Spring clamp connection terminals
- 2 freely selectable limit switches
- Anti condensation heater
- Feedback potentiometer
- Feedback transducer 2 or 3-Wire
- Digital valve positioner

Technical data

Type	REact 15 E		REact 15 DC		
	Operating force	1,5 kN			
Closing force	1,7 kN				
Stroke	max. 35 mm				
Speed	0,38 mm/s		0,28 mm/s	0,38 mm/s	0,57 mm/s 1,14 mm/s
Power draw	13,2 VA		4,5 W	5 W	6,2 W 8,6 W
Isolation class	B				
Motor voltage	24 V AC-50/60 HZ	115 V AC-50/60 HZ	230 VAC -50/60 HZ	24 VDC	
Motor rating standard	S1				
Limit switches	1 switch				
Protection rating	IP 65, DIN VDE 0470				
Ambient temperature	-20 °C bis +70 °C				
Mounting position	beliebig, jedoch Antrieb nicht nach unten hängend				
Gear lubricant	Divinol Fett Central, NIGI Klasse 0				
Cable glands	3 x M16				
Weight	4,2 kg				
Optional accessories					
2 additional limit switch	2 additional circuit board is necessary Contact rating 5 A, 250 V				
Potentiometer	1 kΩ 2 kΩ 5 kΩ				
Position indicator	REtrans4W, 3-wire	0(4) – 20 mA			
	REtrans2W, 2-wire	0 – 10 V			
Digital positioner	REpos				
	Input	0(4) – 20 mA bzw. 0(2) – 10 V			
	Output	0(4) – 20 mA bzw. 0(2) – 10 V			
Heater	24 V / 3 W				



REact

REact 30

Series

REact 30E- 028

REact 30E- 074

REact 30E- 112

REact 30 DC

Electric actuator for control and shut/off valves with brushless 24 VDC motor technology (REdrive)

- 3-point step control
- Separate force and limit switches for both directions
- Four speed settings as standard | DC
- Protection rating IP 65
- Valve position indicator
- Manual hand wheel
- Electrical connections via plug/socket connectors
- CE marking

Options:

- Power pack, input: 90-264 V 50/60 Hz | DC
- Heater
- Speeds individually pre-settable | DC
- Potentiometer
- Position indicator, 2 or 3-wire
- Positioner with display
- Bus system (Profibus DP, CANopen)
- Process controller integrated in cover
- Hydraulic system for fail-safe control

Technical data

Type	REact 30 E			REact 30 DC			
Operating force	2,8 kN						
Closing force	3,0 kN						
Stroke	max. 40 mm						
Speed	0,28 mm/s	0,74 mm/s	1,12 mm/s	0,2 mm/s	0,28 mm/s	0,42 mm/s	0,84 mm/s
Power draw	12 VA	27 VA	46 VA	9 W	10 W	13 W	21 W
Motor voltage	24 VAC, 115 V, 230 V, 50/60 Hz*			24 VDC			
Isolation class	B						
Motor rating standard	S1- 100%						
Limit switches	2 x force switch, 2 x switches Rating 4 A, 250 V 2 adjustable switches Rating max. 4 A, 250 V						
Protection rating	IP 65, DIN EN 60529			IP 65, DIN VDE 0470			
Ambient temperature	-20 °C bis +70 °C*						
Mounting position	beliebig, jedoch Antrieb nicht nach unten hängend						
Gear lubricant	Divinol Fett F 14 EP, NLGI Klasse						
Cable glands	4 x M 20						
Weight	4,5 kg						

*If you use the power supply (NG2450) the max. ambient temperature is -10°C till +60°C

Optional accessories

Potentiometer	max. 2	1 kΩ, 2 kΩ, 5 kΩ
Position indicator	REtrans4W, 3-wire	0(4) – 20 mA, 0(2) – 10 V
	REtrans2W, 2-wire	4 – 20 mA
REpos / digital positioner with display	REpos	
	Input	0(4) – 20 mA bzw. 0(2) – 10 V
	Output	0(4) – 20 mA bzw. 0(2) – 10 V
REpos with Profibus DP REpos with CAN-Open		
Heater	12-36 V – 3W/6W, 110-230V - 3 W / 6 W	
Power pack	See air resistant variant Input: 90-264 V 50/60 Hz Ausgang: 24VDC	
Process controller		
Supplementary equipment	NRTL(Nationally Recognized Testing Laboratory)-Certification for USA & Canada	

Additional options on request



REact 60

REact

Series

REact 60E-030
REact 60E-045
REact 60E-090
REact 60E-170
REact 60 DC

Electric actuator for control and shut/off valves with brushless 24 VDC motor technology (REdrive)

- 3-point step control
- Separate force and limit switches for both directions
- Four speed settings as standard | DC
- Low height due to adaption spindle
- Protection rating IP 65
- Valve position indicator
- Manual hand wheel
- Electrical connections via plug/socket connectors
- CE marking

Options:

- Power pack, input: 90-264 V 50/60 Hz | DC
- Heater
- Speeds individually pre-settable | DC
- Potentiometer
- Position indicator, 2 or 3-wire
- REpos positioner with display
- Bus system (Profibus DP, CANopen)
- Process controller integrated in cover
- Hydraulic system for fail-safe control

Technical data

Type	REact 60 E				REact 60 DC			
Operating force	6,0 kN							
Stroke	max. 60 mm							
Speed	0,3 mm/s	0,45 mm/s	0,9 mm/s	1,7 mm/s	0,2 mm/s	0,3 mm/s	0,45 mm/s	0,9 mm/s
Power draw	27 VA	46 VA	46 VA	79 VA	11,5 W	12,5 W	18 W	27 W
Motor voltage	24 VAC, 115 V, 230 V, 50/60 Hz				24 VDC			
Isolation class	B							
Motor rating standard	S1 100%	S1 100%	S1 100%	S3 50%	S1 100%			
Force switches	2, directly wired							
Limit switches	2, directly wired							
Additional limit switches	2, rating 4 A, 250 V							
Protection rating	IP 65, DIN EN 60529							
Ambient temperature	-20 °C bis +70 °C*							
Mounting position	Any, except upside down							
Gear lubricant	Divinol Fett Central, NIGI grade 0							
Cable glands	4 x M 20							
Weight	6,7 kg							

*If you use the power supply (NG2450) the max. ambient temperature is -10°C till +60°C

Optional accessories

Potentiometer	max. 2	1 kΩ, 2 kΩ, 5 kΩ
Position indicator	REtrans4W, 3-wire	0(4) – 20 mA, 0(2) – 10 V
	REtrans2W, 2-wire	4 – 20 mA
REpos / digital positioner with display	REpos	
	Input	0(4) – 20 mA, 0(2) – 10 V
	Output	0(4) – 20 mA, 0 – (2)10 V
REpos with bus system CAN-Open		
REpos /with Profibus DP		
Heater	12-36 V – 3W/6W, 110-230V - 3 W / 6 W	
Power pack	Eingang: 90-264V 50/60Hz Ausgang: 24VDC	
Process controller	1-channel PID process controller	
Supplementary equipment	NRTL(Nationally Recognized Testing Laboratory)-Certification for USA & Canada	

Sea air resistant variant

Additional options on request



REact

REact 100

Series

REact 100E-030
REact 100E-045
REact 100E-090
REact 100 DC

Electric actuator for control and shut/off valves with brushless 24 VDC motor technology (REdrive)

- 3-point step control
- Separate force and limit switches for both directions
- Four speed settings as standard | DC
- Low height due to adaption spindle
- Protection rating IP 65
- Valve position indicator
- Manual hand wheel
- Electrical connections via plug/socket connectors
- CE marking

Options:

- Power pack, input: 90-264 V 50/60 Hz | DC
- Heater
- Speeds individually pre-settable | DC
- Potentiometer
- Position indicator, 2 or 3-wire
- REpos positioner with display
- Bus system (Profibus DP, CANopen)
- Process controller integrated in cover
- Hydraulic system for fail-safe control

Technical data

Type	React 100 E			REact 100 DC			
	Operating force	10 kN					
Stroke	max. 80 mm						
Speed	0,3 mm/s	0,45 mm/s	0,9 mm/s	0,2 mm/s	0,3 mm/s	0,45 mm/s	0,9 mm/s
Power draw	27 VA	46 VA	81 VA	18 W	21 W	28 W	41 W
Motor voltage	24 VAC, 115 V, 230 V, 50/60 Hz			24 VDC			
Isolation class	B						
Motor rating standard	S1 100%	S1 100%	S3 50%	S1 100%			
Force switches	2, directly wired						
Limit switches	2, directly wired						
Additional limit switches	2, rating 4 A, 250 V						
Protection rating	IP 65, DIN EN 60529						
Ambient temperature	-20 °C bis +70 °C*						
Mounting position	Any, except upside down						
Gear lubricant	Divinol Fett Central, NIGI grade 0						
Cable glands	4 x M 20						
Weight	6,7 kg						

*If you use the power supply (NG2450) the max. ambient temperature is -10°C till +60°C

Optional accessories

Potentiometer	max. 2	1 kΩ, 2 kΩ, 5 kΩ
Position indicator	REtrans4W, 3-Leiter	0(4) – 20 mA, 0(2) – 10 V
	REtrans2W, 2-Leiter	4 – 20 mA
REpos / digital positioner with display	REpos	
	Input	0(4) – 20 mA, 0(2) – 10 V
	Output	0(4) – 20 mA, 0(2) – 10 V
REpos with bus system CAN-Open	1-channel PID process controller	
REpos /with Profibus DP		
Heater	12-36 V – 3W/6W, 110-230V - 3 W / 6 W	
Power pack	Eingang: 90-264V 50/60Hz Ausgang: 24VDC	
Process controller		
Supplementary equipment	NRTL(Nationally Recognized Testing Laboratory)-Certification for USA & Canada Sea air resistant variant	

Additional options on request

Series

REact 30DC-PoP



REactDC-PoP

Electric 3kN actuator for control valves with emergency power supply REepac03

Characteristics REact 30DC PoP

- 24 V BLDC Motor technology
- Advanced motor electronic REdrive^{ecu}
- 3-point step operation
- Separate force and limit switches
- Four speed settings as standard
- Protection rating IP 65, NEMA 4X
- Valve position indicator
- Manual hand wheel
- Electrical connections via plug/socket connectors

Characteristics REepac03

- SuperCap technology
- maintenance free
- backup speed:
 - 1.1mm/sec. REact30 DC PoP low version
 - 3.1mm/sec. REact30 DC PoP high version
- max travel range: 40mm
- actuator spindle retracted or extended selectable via DIP switch
- life cycle: > 500 000 Cycles
- charging time : 60 sec/ max charge
- power supply: 24Vdc/ 4A
- degree of protection: IP65
- ambient temperature -20°C upto70°C

Options:

- Power pack input: 90-264 V 50/60 Hz
Out 24V dc
- anti condensation heater
- Potentiometer
- Position indicator, 2 or 3-wire
- Positioner with display
- Bus system (Profibus DP, CAN open)
- NRTL-Certification for USA & Canada
- Sea air resistant variant

Technical data

Type	REact 30DC-PoP			
Operating force	2,8 kN			
Closing force	3,0 kN			
Stroke	max. 40 mm			
Speed low type	0,2 mm/s	0,28 mm/s	0,42 mm/s	0,84 mm/s
Speed high type	0,6 mm/s	0,74 mm/s	1,12 mm/s	2,24 mm/s
Power draw low/high	9 / 26 W	10 / 33 W	13 / 43 W	21 / 48 W
Motor voltage	24VDC			
Isolation class	B			
Motor rating standard	S1-100%			
Force switches	2, directly wired			
Wegschalter	2, directly wired			
Additional limit switches	2, rating 4 A, 250 V			
Protection rating	IP 65, DIN VDE 0470 / NEMA 4X			
Ambient temperature	-20°C...70°C*			
Mounting position	any, except upside down			
Gear lubricant	Divinol Fett F 14 EP, NLGI grade			
Cable glands	4 x M 20			
Weight	4,5 kg			

*If you use the power supply (NG2450) the max. ambient temperature is -10°C till +60°C

Optional accessories

Potentiometer	Max. 2	1 kΩ, 5 kΩ, 10 kΩ
Position indicator	REtrans4W, 3-Leiter	0(4) – 20 mA, (0)2..10 V
	REtrans2W, 2-Leiter	0(4) – 20 mA, 2..10 V
Digital positioner with display	REpos input	(0)4..20mA,(0)2..10V
	output	(0)4..20mA,(0)2 10V

CAN-Bussystem CANopen

REpos with Profibus DP

Heater 12-36 V – 3W/6W, 110-230V - 3 W / 6 W

Power pack Input: 90-264V 50/60Hz Output:24VDC

NRTL-Certification

Additional options on request



Series

 REacTron 30DC

 REacTron 60DC

 REacTron 100DC

Electric actuator for control valves with integrated single loop PID controller

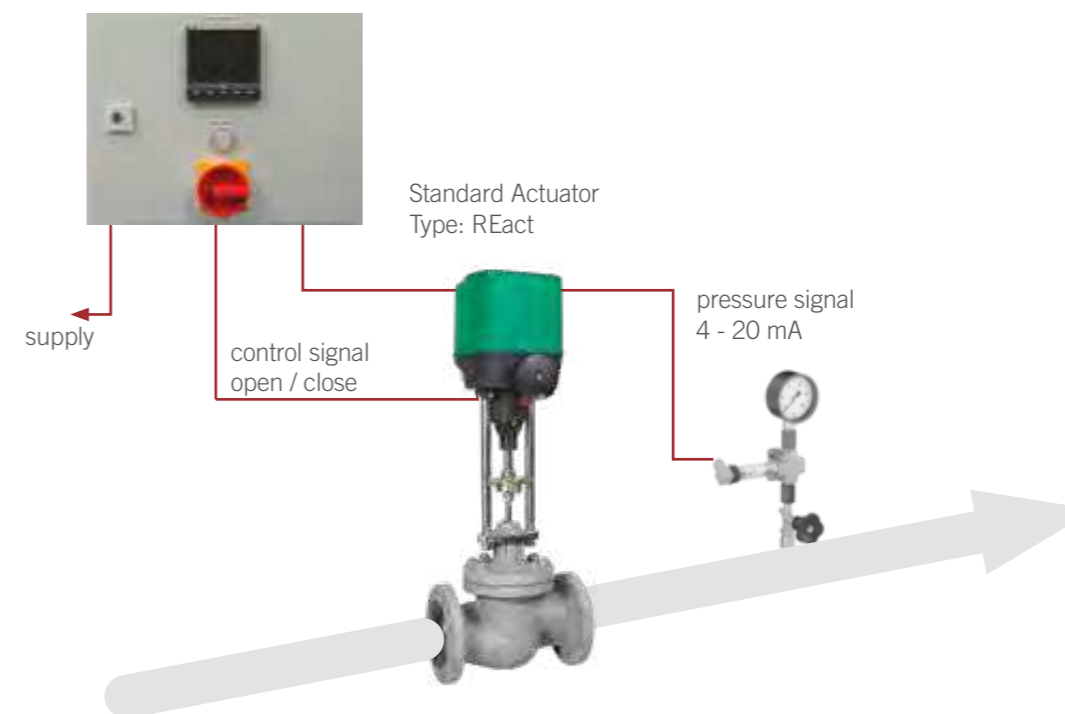
- single loop PID controller type : Qube
- power supply: 24V dc
- Input: mA, V, PT100, TC (free selectable)
- Output: 3-point step
- degree of protection: IP65
- ambient temperature : 0-50°C
- power unit : In 115/230Vac out 24Vdc
- prewired connectors

Options (optional Ausstattung):

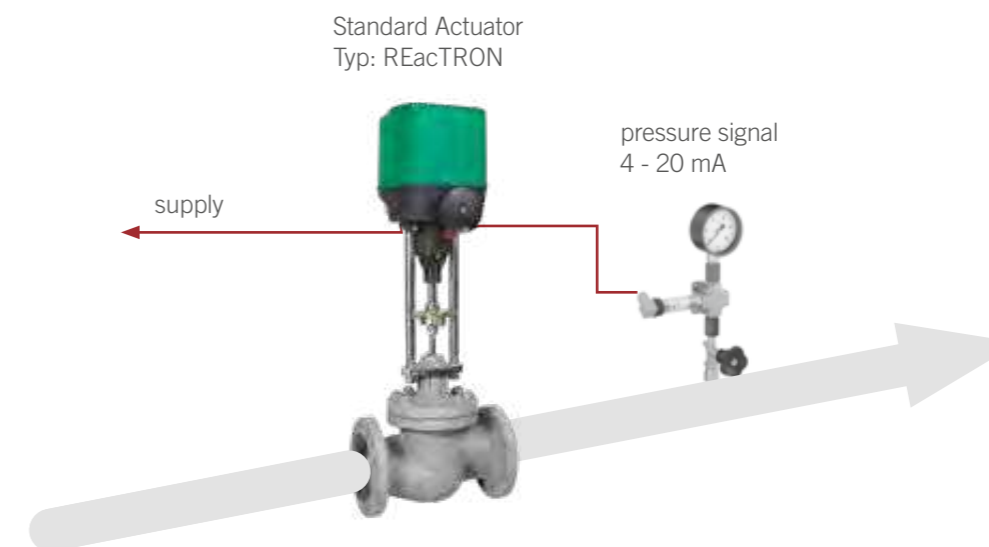
- interface RS485 Modbus (on request)
- RElog (starting up device for emergency closing unit)
- approval: NRTL

Application

Standard solution for a single loop PID process control



Low cost solution REacTron -> reduced material and costs





ST 5106

Series

ST 5106-20
ST 5106-60
ST 5106-61
ST 5116-20
ST 5116-60

Electric actuator for control and on / off valves

- Control via 3 point step
- Open and closed limit switches
- 2 freely selectable limit switches (only ST 5106)
- Handwheel
- Protection rating IP 65
- Mechanical stroke indicator

Options:

- Anti condensation heater
- Feedback potentiometer
- Feedback transducer 2 or 3-Wire
- Digital valve positioner
- Bus system (Profibus DP, CANopen)
- Hydraulic fail closed unit
- 3 Phase hybrid motor starter

Technical data

Type ST 5106	-20	-60	-61
Operating force	15 kN		
Stroke	Max. 80 mm		
Speed	0.3 mm/s	0.9 mm/s	1.8 mm/s
Power consumption	180 VA	180 VA	180 VA
Brake approx.	–	–	30 VA
Motor voltage	3~400 V 50 / 60 Hz* / 1~230 V 50 / 60 Hz* / 115 V		
Type ST 5116	-20	-60	
Operating force	20 kN		
Stroke	Max. 80 mm		
Speed	0.3 mm/s	0.85 mm/s	
Power consumption	180 VA		
Brake approx.	–	–	
Motor voltage	3~400 V 50 / 60 Hz*		
Motor rating standard	Switching frequency short term 2 pro sec. 50 % ED / 50 HZ 25 % ED / 60 HZ		
Force switches	2 Limit switches Contact rating max. 6 A, 250 V		
Protection rating	IP 55, DIN VDE 0470		
Ambient temperature	-20 °C to +60 °C		
Mounting position	Any, except upside down		
Cable glands	3 x M 20		
Weight	22 kg		

*For operation at 60 Hz the speed and power consumption increased by 20 %

Options

Limit switches	2 freely selectable Contact rating max. 6.5 A, 250 V	
Feedback potentiometer or Tandem version	Max. 2	1 kΩ, 5 kΩ, 10 kΩ
Feedback transducer	MU 4522, 3-Wire MU 4524, 2-Wire	0(4) – 20 mA 0(4) – 20 mA
Digital valve positioner	RE 3447 + Hybrid-Starter** Input Output	0(4) – 20 mA respectively 0(2) – 10 V 0(4) – 20 mA
CAN-Bus system CANopen	BS 4591	
Profibus DP	BS 4581	
Anti condensation heater	24 V, 115 V, 230 V, 8 W	

** Hybrid-Starter
3 phase hybrid motor starter with electronic reversing contactor (needed for three phase actuators in combination with digital valve positioner RE 3447)

Other options available on request



Series

ST 6115	120 cm ²
ST 6135	280 cm ²
ST 6160	530 cm ²

Special applications

ST 6135.B6-__-C5-M
ST 6135.B6-__-OX
ST 6160.A6-__-C5-M
ST 6160.A6-__-OX

Pneumatic actuators for control and on/off valves

- Approved by German Technical Inspectorate (TÜV) as safety functional device for steam and water in heating systems.
- Spring closed or open
- Max. stroke 60 mm
- Max. air supply 6 bar
- Max. actuating force 10 kN
- Direct mounting of positioner with internal air supply
- Special applications possible
 - C5-M Marine air resistant
 - OX For oxygen as operating medium

Technical data

Type	ST 6115		ST 6135		ST 6160	ST 6160	
	.A6-3S	.C6-4S	.B6-2G	.B6-6G	.A6-6G	.C6-3G	.C6-7G
Diaphragm area	120 cm ²		280 cm ²		530 cm ²	530 cm ²	
Spring range (bar)	0.9 ... 2.0	0.8 ... 2.4	0.2 ... 1.0	0.8 ... 3.0	0.8 ... 2.8	0.3 ... 1.3	0.7 ... 3.0
Stroke	20 mm	25 mm	35 mm		40 mm	60 mm*	
Operating pressure (bar)	Min. 2.2 Max. 6	Min. 2.6 Max. 6	Min. 1.2 Max. 6	Min. 3.2 Max. 6	Min. 3.0 Max. 6	Min. 1.5 Max. 6	Min. 3.2 Max. 6
Actuator volume	0.4 L _N		1.7 L _N		2.8 L _N	3.6 L _N	
Ambient temperature	-40 °C to +80 °C					-20 °C to +80 °C	
Coating	Acrylic						
Weight	3 kg		5 kg		12.5 kg	14 kg	
Connection	¼" NPT Female thread						
Mounting position	Any						

*50 mm for direction of action « open »; spring range reduced

Options

Handwheel	Mounted on top	
Limit switches	Contact rating max. 6 A, 400 V Protection IP 65	
3 / 2-solenoid valve	24 V DC, 24 V, 115 V, 230 V 50 / 60 Hz, EEx The safety function according to DIN EN 14597:2005-12 is only possible in combination with a solenoid valve which fulfills the requirements of the Mounted on top mentioned directive.	
Positioners		
SRP 981	0.2 ... 1.0 bar	max. 6 bar
SRI 990	4 – 20 mA	2-Wire
SR 6136 (Sipart)	4 – 20 mA	2 / 3 / 4-Wire
SR TZIDC	4 – 20 mA	2-Wire
SR 1000 L	4 – 20 mA	2-Wire
SR 3300	4 – 20 mA	2-Wire

Other options available on request

Important note

The actuator needs in conjunction with the approval DIN EN 14597:2012-09 for failure free service, dry oil free instrument air

- Particle size 30 µm
- Pressure dewpoint 20 K under ambient temperature



Series

ST 6175.B6-__ 1000 cm²

ST 6175.C6-__ 1000 cm²

Pneumatic actuators for control and on/ off valves

- Actuating force max. 40 kN
- Spring closed or open
- Stroke max. 60 mm / 100mm
- Max air supply 6 bar

Technical data

Type	.B6-2S	.B6-3D	.B6-5D	.B6-7D	.C6-3S	.C6-3D	.C6-5D	.C6-7D
Diaphragm area	1000 cm ²							
Spring range (bar)	0.3 ... 0.9	0.7 ... 2.1	1.2 ... 3.4	1.6 ... 4.7	0.5 ... 1.4	0.8 ... 2.1	1.4 ... 3.4	1.9 ... 4.7
Actuating force spring closed, closed position	3 kN	7 kN	12 kN	16 kN	5 kN	8 kN	14 kN	19 kN
Actuating force spring open, open position	40 kN	32 kN	21 kN	10 kN	38 kN	32 kN	21 kN	10 kN
Stroke	60 mm				100 mm			
Operating pressure (bar)	Min. 1.1 Max. 6	Min. 2.3 Max. 6	Min. 3.6 Max. 6	Min. 4.9 Max. 6	Min. 1.6 Max. 6	Min. 2.3 Max. 6	Min. 3.6 Max. 6	Min. 4.9 Max. 6
Actuator volume	0.8 ... 5.8 L _N				0.8 ... 9 L _N			
Ambient temperature	-40 °C to +80 °C							
Coating	Acrylic							
Weight	35 kg	37 kg	39 kg	41 kg	45 kg	48 kg	54 kg	60 kg
Connection	3/8" NPT Female thread							
Mounting position	Any							
Options								
Handwheel	Mounted on top							
Limit switches	Contact rating max. 6 A, 400 V Protection IP 65							
3 / 2 way solenoid valve	24 V DC, 24 V, 115 V, 230 V 50 / 60 Hz, EEx							
Solenoid valve	The safety function according to DIN EN 14597:2005-12 is only possible in combination with a solenoid valve which fulfills the requirements of the Mounted on top mentioned directive.							
Positioners								
SRP 981	0.2 ... 1.0 bar		max. 6 bar					
SRI 990	4 – 20 mA		2-Wire					
SR 6136 (Sipart)	4 – 20 mA		2 / 3 / 4-Wire					
SR TZIDC	4 – 20 mA		2-Wire					
SR 1000 L	4 – 20 mA		2-Wire					
SR 3300	4 – 20 mA		2-Wire					

Other options available on request

Important note The actuator needs in conjunction with the approval DIN EN 14597:2012-09 for failure free service, dry oil free instrument air

- Particle size 30 µm
- Pressure dewpoint +20 °C under ambient temperature



REGULATORS

- Pressure regulators
- Excess pressure regulators



DM 613

Series

DM 613

Pressure reducing regulators for controlling the downstream pressure p_2 , applicable for liquids, steam and gases up to 130 °C. The regulator closes when the downstream pressure rises.

- Self-operated proportional regulator without auxiliary energy
- Globe valve with flanges single seat unbalanced / single seat balanced
- Set points from 0,02 bar...10 bar
- External control connection

Technical Data

Nominal diameter	DN 15 ... 100
Nominal pressure	PN 16 ... 40
Body materials	GP240GH
Flanges	According to EN 1092-1 Different flanges on request
Trim variations	Contoured plug (linear) Plug + Stem 1.4404
Approvals	Druckgeräterichtlinie 2014/68/EU TR CU 032 and TR CU 10 Technischer Überwachungsverein (TÜV), Germanischer Lloyd (GL), Lloyds Register of Shipping (LR), Bureau Veritas (BV), Det Norske Veritas (DNV), Registro Italiano Navale, American Bureau of Shipping (ABS)
Options	Various diaphragm and seal materials suitable for your medium Enclosed spring chamber Leakage line connection for toxic or hazardous media Special versions on request



Series

DM 652
up to DN 50
DM 664
up to DN 65-100

Pressure reducing regulators for controlling the downstream pressure p_2 , applicable for liquids, steam and gases up to 190 °C. The regulator closes when the downstream pressure rises.

- Self-operated proportional regulator without auxiliary energy
- Globe valve with flanges single seat unbalanced / single seat balanced
- Set points from 0,02 bar...10 bar
- External control connection
- Easy installation
- DM 664 only up to 130 °C (not only steam)

Technical Data

Nominal diameter	DN 15 ... 100
Nominal pressure	PN 16 ... 40
Body materials	GP240GH 1.4404
Flanges	According to EN 1092-1 Different flanges on request
Trim variations	Contoured plug (linear) Plug + Stem 1.4404 Seat 1.4542
Approvals	Druckgeräterichtlinie 2014/68/EU TR CU 032 und TR CU 10 Technischer Überwachungsverein (TÜV), Germanischer Lloyd (GL), Lloyds Register of Shipping (LR), Bureau Veritas (BV), Det Norske Veritas (DNV), Registro Italiano Navale, American Bureau of Shipping (ABS)
Options	Various diaphragm and seal materials suitable for your medium Enclosed spring chamber Leakage line connection for toxic or hazardous media



DM 604

Series

 DM 604

Pressure reducing regulators for controlling the downstream pressure p_2 , applicable for liquids, steam and gases up to 250 °C. The regulator closes when the downstream pressure rises.

- Self-operated proportional regulator without auxiliary energy
- Globe valve with flanges single seat unbalanced / single seat balanced
- Set points from 0,02 bar...10 bar
- External control connection

Technical Data

Nominal diameter	DN 15 ... 100
Nominal pressure	PN 16 ... 40
Body materials	GP240GH 1.4404
Flanges	EN 1092-1 Andere Flanschbearbeitung auf Anfrage
Trim variations	Contoured plug (linear) Plug + Stem 1.4404 Seat 1.4542
Seat leakage	DIN EN 60534-4
Approvals	Druckgeräterichtlinie 2014/68/EU TR CU 032 and TR CU 010 Technischer Überwachungsverein (TÜV), Germanischer Lloyd (GL), Lloyds Register of Shipping (LR), Bureau Veritas (BV), Det Norske Veritas (DNN), Registro Italiano Navale, American Bureau of Shipping (ABS)
Options	Free of oil and grease for oxygen Various diaphragm materials Enclosed spring chamber Leakage line connection for toxic or hazardous media



UV 4.1

Series

 UV 4.1

Pressure reducing regulators for controlling the downstream pressure p_1 , applicable for liquids, steam and gases up to + 200 °C. The regulator closes when the downstream pressure rises.

- Self-operated proportional regulator without auxiliary energy
- Globe valve with flanges single seat unbalanced / single seat balanced
- Set points from 0,02 bar...10 bar
- External control connection
- Easy installation

Technical Data

Nominal diameter	DN 15 ... 100
Nominal pressure	PN 16 ... 40
Body materials	GP240GH 1.4404
Flanges	According to DIN 2501; EN 1092-1 Different flanges on request
Kegelform	Contoured plug (linear) Plug + Stem 1.4404 Seat 1.4542
Approvals	Druckgeräterichtlinie 2014/68/EU TR CU 032 und TR CU 10 Technischer Überwachungsverein (TÜV), Germanischer Lloyd (GL), Lloyds Register of Shipping (LR), Bureau Veritas (BV), Det Norske Veritas (DNV), Registro Italiano Navale, American Bureau of Shipping (ABS)
Optionen	Various diaphragm and seal materials suitable for your medium Enclosed spring chamber Leakage line connection for toxic or hazardous media Special versions on request

The image shows a close-up of industrial machinery. In the foreground, there are three manual stop valves with green plastic handwheels. These valves are mounted on a metal frame. Below them, there are several rows of blue handwheels for other valves, arranged in a perspective that recedes into the background. The machinery is complex, with various pipes, bolts, and mechanical components visible. The background is a plain, light-colored wall.

**MANUAL STOP VALVES
WITH BELLOWS SEAL
STRAINERS**



HV 8014

Series

 HV 8014

 HV 8214

Manual stop valves for water, steam, air, thermal oil and other neutral, non aggressive fluids up to +400 °C.

- High Kvs-values (favorable Zeta-values)
- High seat tightness
- External threaded stem
- No rising handwheel
- Detachable stroke indicator
- Maintenance free

Technical data

Nominal diameter	DN 15 ... 200
Nominal pressure	PN 16, 25, 40
Body materials	EN-GJS-400-18-LT GP240GH
Flanges	Form C according to DIN 2526
Stem packing	Bellows seal (TA-Luft) with safety stuffing box
Plug form	Shut-off plug
Seat tightness	Leakage rate 1 DIN 3230 – part 3
Max. press / temp.	According to DIN EN 1092-1/-2
Options	Soft seat (max. +200 °C) Regulating plug (HV 8214) Flanges with groove Stroke limitation locking device



SF 8090

Series

 SF 8090

Strainers are used to protect plants and their components from solid debris. Suitable for water, steam, air, thermal oil and other neutral and non aggressive fluids up to +350 °C.

- Sieve made of stainless steel
- High Kvs-values (favorable Zeta-values)
- Easy to remove sieve for cleaning
- with drain plug

Technical data

Nominal diameter	DN 15 ... 200
Nominal pressure	PN 16, 25, 40
Body materials	EN-GJS-500-7 (GGG 50) GP240GH
Flanges	Form C according to DIN 2526
Max. press / temp.	According to DIN EN 1092
Options	Flanges with groove Fine sieve With screw plug for pressure gauge connection



SENSORS

- RTD Temperature probes
- Level sensors
- Electronic pressure-measuring station
- Power supply



Series

Screw in RTD Temperature probes

WT 1102-1	1 x PT100 / 160 mm
WT 1102-2	1 x PT100 / 250 mm
WT 1102-3	2 x PT100 / 160 mm
WT 1102-4	2 x PT100 / 250mm
WT 1102-MU	4 – 20 mA

Push in RTD Temperature probes for air measurement

WT 1104-1	1 x PT100 / to 400 mm
WT 1104-2	1 x PT100 / to 400 mm
WT 1104-4	2 x PT100 / to 1000 mm
WT 1104-MU	4 – 20 mA

Screw in RTD Temperature probes

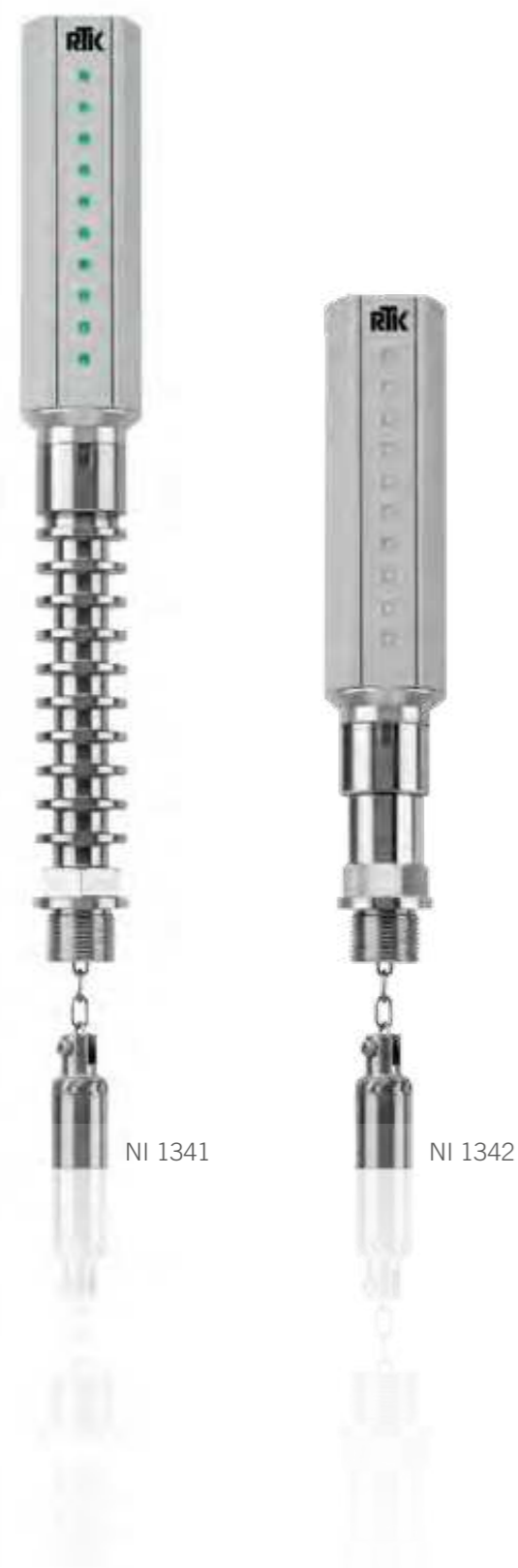
Screw in RTD Temperature probes for standard applications are typically used for measuring temperatures of liquids or gases in pipelines or containers. They offer fast response time and come complete with stainless steel thermowell.

Measuring Insert	PT100 / temperature probe DIN EN60751 Class B	
Electrical Connection	2-Wire	
Process Connection	Thermowell, stainless steel 1.4571	
Temperature	-40 °C to +400 °C	
Pressure	PN max. 40 bar static	
Thread	G ½"	1.4571
Connection Head	Protection	IP 54
	Form	B / Aluminium
	Temperature	-40 °C to +85 °C (WT 1102-MU)
Design	2-Wire	Transducer
WT 1102-MU	Output	4 – 20 mA
	Please state required measuring range.	

Push in RTD Temperature probes for air measurement

With perforated brass thermowell and sliding stop flange

Measuring Insert	PT100 / Temperature probe DIN EN60751 Class B	
Electrical Connection	2-Wire	
Process Connection	Thermowell, brass	
Temperature	-40 °C to +400 °C	
Pressure	PN max. 40 bar static	
Thread	G ½"	1.4571
Connection Head	Protection	IP 54
	Form	B / Aluminium
	Temperature	-40 °C to +85 °C (WT 1104-MU)
Design	2-Wire	Transducer
WT 1104-MU	Output	4 – 20 mA
	Please state required measuring range.	



NI 1341

NI 1342

Series

NI 1341

- For thermal and refrigeration applications

NI 1342

- Shortened design
- For thermal and refrigeration applications

Standard version

- TÜV component tested WR. 12-416
- Electronic measurement system: Analogue technology, suitable for nuclear facilities
- Version available with shock, vibration or earthquake tests on request.
- Measuring range from 150 to 4000 mm
- Good temperature stability
- Excellent measuring precision
- LED trend display
- Connection thread G1

Technical data

Nominal pressure	PN 40 / PN 100	
Temp. max.	+238 °C (Medium)	PN 40
	+280 °C (Medium)	PN 100
Pressure max.	32 bar at +238 °C	(PN 40)
	40 bar at +20 °C	(PN 40)
	63 bar at +280 °C	(PN 100)
	100 bar at +20 °C	(PN 100)
Temperature range		
NI 1341	-60 °C to +280 °C (Medium)	
NI 1342	-20 °C to +70 °C (Medium)	
Materials	Wet parts	Stainless steel 1.4541
	Housing	Aluminium AlMgSi0, 5F25
	Connector	Polyamid PA
Electrical data	Output	4 – 20 mA, 3-Wire
	Load, max.	220 Ω
	Display	10 LEDs per 10 % steps
	Supply-voltage Standard	24 V DC / 100 mA
	Supply-voltage CAN-open	24 V DC / 250 mA
	Power consumption Standard	ca. 80 mA
	Protection rating	IP 65
	Ambient temperature	-20 °C to +70 °C
Options	Field bus interface	CAN-open
Operation	The level is determined by the weight of the displacer, which is located in the medium. The weight depends on the buoyancy therefore on the specific weight and the level. The buoyancy of the displacer, depending on level and density of the liquid, is measured with a spring balance and inductively transformed in a 4 ... 20 mA signal. To be able to calibrate the level sensor, the density of the liquid must be known. If used with strongly agitated fluids it is recommended that the level sensor be installed outside the vessel, for this a reference vessel with connection flanges should be used.	
Application	<ol style="list-style-type: none"> 1. Level measuring with LED display per 10 % steps and remote transmission with 4-20 mA output signal 2. Level-dependent pump regulation in combination with switch-gear SG 2411, SG 2431 3. Continuous level control with electronic controllers RE 3452, RE 3453 RE3472 and motor valve, series MV 5000 	



DR 1226

Series

DR 1226
DR 1226-K

Electronic pressure-measuring station for use in heating and refrigeration systems, suitable for gases and liquids

- Piezoresistive
- Measuring range up to 60 barg • Power supply 12 ... 30 V DC
- With pressure gauge
- Two-Wire system
- Protection rating IP 54

Technical data

Function A piezoresistive pressure sensor produces a pressure-proportional bridge voltage. This voltage is normalised to the corresponding measuring range and is given as a 4 – 20 mA signal.

Supply-voltage 12 ... 30 V DC

Output 4 – 20 mA

Load Max. 400 Ω

Protection rating IP 54 / 65

Accuracy Class 1

Ambient temperature -20 °C to + 60 °C

Dimensions 380 x 146 x 96 mm

Compression strength Short-time 1.3 pressure range

Vacuum resistance High-vacuum

Material

DR 1226 GK-CuZn38A

DR 1226-K Stainless steel 1.4541



NG 1534

Series

NG 1534

Switched mode AC/DC power supply

- Wide input range 85 ... 264 V AC
85 ... 375 V DC
- Output: 24 V DC / 24 W
- Short-circuit-proof
- Compliance with:
IEC / EN60950 EN50178
UL / cUL60950, UL508C
- DIN top hat rail assembly
- Ambient temperature -10 °C to +70 °C
- Protection rating IP 20



ELECTRIC COMPONENTS

- Digital controllers
- Analog controllers
- Electric switch gears



RE 3172

Series

¼ DIN 96 x 96

RE 3172

RE 3472

RE 3672

RE 3972

On request

¼ DIN 96 x 96

⅛" DIN 48 x 96

RE 3173

RE 3172-M

RE 3473

RE 3472-M

RE 3673

RE 3672-M

RE 3973

RE 3972-M

RE 3173-M

RE 3473-M

RE 3673-M

RE 3973-M

Digital controllers with PID control RE3072/73

free configurable as:

- 3-term-step-controller for driving electric actuators e.g. RTK actuators series ST 5100

or

- Continuous controller for driving pneumatic actuators with positioner e.g.: RTK series SR 6136 , SR 6137

Inputs:

- Feedback potentiometer from actuator
- External set point

Additional RE3073/RE3073M

- Programmer function
- Second analogue/digital output

On request

- Interface RS485 or Profibus DP

Technical data

Typ	RE 3172 RE 3172-M	RE 3472 RE 3472-M	RE 3173 RE 3173-M	RE 3473 RE 3473-M	RE 3672 RE 3672-M	RE 3972 RE 3972-M	RE 3673 RE 3673-M	RE 3973 RE 3973-M
Input	PT100	0(4)-20 mA	PT100	0(4)-20 mA	PT100	0(4)-20 mA	PT100	0(4)-20 mA
Output	3-point step				0(4)-20 mA			
Additional outputs	2 Alarm contacts 1 Measuring transducer SP, PV				3 Alarm contacts			
Regulations for electrical apparatus	Directives 73 / 23 / EEC as amended by directives 93 / 68 / EEC EN61010-1:93 + A2:95							
Regulations for electromagnetic compatibility	Directives 89 / 336 / EEC as amended by directives 92 / 13 / EEC							
Regulations for RF emissions	EN61000-6-3:2001 for residential environments EN61000-6-4:2001 for industrial environments							
Regulation for HF immunity	EN61000-6-2:2001 for industrial equipment and systems							
Power supply	Standard On request			100-240 V AC / 50-60 Hz 24 V DC / 50-60 Hz				
Power consumption	Max. 3 VA							
Protection rating	Rear terminal block Housing Front			IP20 IP00 IP65				
E-connection	Screw terminal / 1 mm ²							
Housing	Switchboard mounting			96 (48) x 96 x 110 mm				
Ambient temperature	0 °C to +50 °C							
Humidity	Max. 95 % rel							
Approvals	CE, UL and cUL							



RE 3304

Series

 RE 3304

Electronic 3-term step-controllers with PI-control

- For driving electric actuators
- Set point selection by manual controllers
- Indication of actual value
- Integrated power supply for transducer 24 VDC
- Switches for limiting values
- Manual and automatic operation
- Component mark
TÜV.WRS(WR).91-355 for application in boiler feed controls

Technical data

Power supply	115 AC / 230 V AC ca. 10 VA
Input resistance	50 Ω
Input	4 – 20 mA
Output as power supply for the transducer	e.g. NI 1341 24 V DC / 80 mA
Ambient temperature	-10 °C to +40 °C
Housing	Plastic case 144 x 72 x 165 mm for switch board mounting
Controlled variable	Level
Transducer	NI 1341 / 42
Set point range	0 to 100 %
Sensitivity	Adjustable from 1 to 10 %
Proportional band	Adjustable from 10 to 100 %
Protection rating	IP20
Operation	Set value and measured value are compared in a voltage comparator. The difference between the two values causes switching pulses which are transmitted to the control valve via mutually interlocked contacts. Simultaneous to the circuit of the relay, proportional band-capacitors are loaded nearly linear, and a saw-tooth impulse opposed to the difference of actual value and set value. The value of this proportional band impulses its increasing and fall time, are adjustable at the adjustments Xp, Tr, Ty. Two indicator lamps show whether The regulator has reached its final opened or closed position. Two integrated switches for limit values can be connected on demand, indicator lamps show whether the level is >NW<, >middle level<, or >HW<.



SG 2431

Series

SG 2431

Electronic limit switch

- Input
Motor voltage 0(4) – 20 mA or
Voltage 0(2) – 10 V
- Output
2 x relays (Changer)
- Contact status indication via LED
- Actual value indication via bar graph display
- Limit value adjustment via front side pushbuttons
- Additional functions such as:
Hysteresis, window, On / off-delay, alarm,
inverse operation
- Galvanic 3-way-isolation (up to 4 kV)

Technical data

Connection	A.C. voltage	230 V AC / 10 mA
Input	Load independent DC Motor voltage Ri or DC voltage Ri Temperature error Actual value indication	0(4) – 20 mA ca. 100 Ω 0(2) – 10 V DC ca. 100 kΩ < 30 ppm / °C By bar graph display Up to 100 % green, from 100 % yellow over 110% red LED
	Status indication	Relays A and B
Directive	MV 2004 / 108 / EG	
Low Voltage Directive	MV 2006 / 95 / EG	
Output	2 x relays Changeover contact Contact life cycle Mech. Life cycle	+250 V AC / max. 8 A resistive load 10 ⁵ Cycles (8 A) 30 x 10 ⁶ Cycles
Ambient conditions	Storage temperature Operating temperature Isolation voltage:	-40 °C max. +70 °C 0 °C max. +55 °C < 4 kV In / output < 4 kV power supply
Mounting details	Housing for top hat rail Protection rating Mounting rail fixed Width Weight	IP20 Housing / IP10 Clamps According to EN 50022-35 22.5 mm 160 g
Operation	The limit switch SG 2431 is used to control limit values of standardized Motor voltage or voltage signals. Due to the two output relays with one potential free change over contact, two switching functions can be realized. The switching status of the operated relay is indicated by the LED display. The switching point can be adjusted by the front side push buttons and the effective relay direction by the slide switch on the side. Applications include: Threshold switching, supervisory relay, pump control, positioning element control of final signals.	



OTHERS

- General information 5000 - 7010
- Product description tables
- Certificates
- Delivery conditions

Parabolic plug / Kvs values (m³/h)

EN DN	ANSI NPS	Seat (mm)																			
		4	8	12	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	
15	½"	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		0.25	1	2.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		0.5	1.7	2.7	3.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	¾"	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		0.25	1	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		0.5	1.7	3.7	4.2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	1"	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		0.25	1	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		0.5	1.7	4	5.2	7.5	9.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		0.25	1	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		0.5	1.7	4.4	6.3	9.4	11	15	-	-	-	-	-	-	-	-	-	-	-	-	-
40	1.5"	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		0.25	1	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		0.5	1.7	4.4	6.8	11	15	19	24	-	-	-	-	-	-	-	-	-	-	-	-
50	2"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		-	1	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	1.7	4.4	6.8	12	18	24	30	37	-	-	-	-	-	-	-	-	-	-	-
65	2.5"	-	-	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		-	-	4.4	6.8	12	19	28	37	47	63	-	-	-	-	-	-	-	-	-	-
80	3"	-	-	-	6.8	12	19	31	45	58	79	95	-	-	-	-	-	-	-	-	
100	4"	-	-	-	-	12	19	31	48	70	99	120	148	-	-	-	-	-	-	-	
125	-	-	-	-	-	-	19	31	48	75	118	150	187	231	-	-	-	-	-	-	
150	6"	-	-	-	-	-	-	48	75	127	179	234	292	333	-	-	-	-	-	-	
200	8"	-	-	-	-	-	-	-	75	127	193	280	366	420	592	-	-	-	-	-	
250	10"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	847	-	-	-	-	
		-	-	-	-	-	-	-	-	127	193	302	438	527	747	926	-	-	-	-	
300	12"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	977	-	-	-	-	
		-	-	-	-	-	-	-	-	-	193	302	466	565	813	1126	1333	-	-	-	-
400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1455	-	-	-	-	
		-	-	-	-	-	-	-	-	-	-	-	680	1208	1753	2110	2290	2371	-	-	-
Stroke (mm)		25						30			35		35	50	60	80	80	100	100	120	

* for MV 54 ... Stroke 50 mm

Perforated plug / Kvs values (m³/h)

EN DN	ANSI NPS	Seat (mm)																		
		12	15	20	25	32	40	50	65	80	100	125	150	200	200	250	250	300	350	400
15	½"	1.6	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	¾"	1.7	2.7	4.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	1"	1.7	2.7	4.8	7.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	-	1.7	2.7	4.8	7.6	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	1.5"	1.7	2.7	4.8	7.6	12	19	-	-	-	-	-	-	-	-	-	-	-	-	-
50	2"	1.7	2.7	4.8	7.6	12	19	29	-	-	-	-	-	-	-	-	-	-	-	-
65	2.5"	-	-	4.8	7.6	13	19	30	49	-	-	-	-	-	-	-	-	-	-	-
80	3"	-	-	-	7.6	13	20	30	52	74	-	-	-	-	-	-	-	-	-	-
100	4"	-	-	-	7.6	13	20	30	52	78	116	-	-	-	-	-	-	-	-	-
125	-	-	-	-	-	13	20	30	52	78	122	181	-	-	-	-	-	-	-	-
150	6"	-	-	-	-	-	20	30	52	78	122	190	261	-	-	-	-	-	-	-
200	8"	-	-	-	-	-	-	30	52	78	122	190	273	403	465	-	-	-	-	-
250	10"	-	-	-	-	-	-	-	52	78	122	190	273	413	486	682	726	-	-	-
300	12"	-	-	-	-	-	-	-	-	78	122	190	273	413	486	725	785	1054	-	-
400	-	-	-	-	-	-	-	-	-	-	-	273	413	486	725	785	1100	1491	1861	-
Stroke (mm)		25				30			40	50	60	80	80	100	80	100	100	120	150	

V-port plug / Kvs values (m³/h)

EN DN	ANSI NPS	Seat (mm)																	
		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400		
20	¾"	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	1"	-	7.5	9.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	9.4	11	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	1.5"	-	11	15	19	24	-	-	-	-	-	-	-	-	-	-	-	-	-
50	2"	-	-	18	24	30	37	-	-	-	-	-	-	-	-	-	-	-	-
65	2.5"	-	-	19	28	37	47	63	-	-	-	-	-	-	-	-	-	-	-
80	3"	-	-	-	31	45	58	79	95	-	-	-	-	-	-	-	-	-	-
100	4"	-	-	-	-	48	70	99	120	148	-	-	-	-	-	-	-	-	-
125	-	-	-	-	-	-	75	118	150	187	231	-	-	-	-	-	-	-	-
150	6"	-	-	-	-	-	-	127	179	234	292	333	-	-	-	-	-	-	-
200	8"	-	-	-	-	-	-	-	193	280	366	420	592	-	-	-	-	-	-
250	10"	-	-	-	-	-	-	-	-	-	-	-	-	847	-	-	-	-	-
		-	-	-	-	-	-	-	127	193	302	438	527	747	926	-	-	-	-
300	12"	-	-	-	-	-	-	-	-	-	-	-	-	977	-	-	-	-	-
		-	-	-	-	-	-	-	-	193	302	466	565	813	1126	1333	-	-	-
400	-	-	-	-	-	-	-	-	-	-	-	-	-	1455	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	680	1208	1753	2110	2290	2371	-	-	-
Stroke (mm)		15						25	30	35	40	60	80	100	100	120			

Shut-off plug / Kvs values (m³/h)

EN DN	ANSI NPS	Seat (mm)																		
		8	12	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	
15	½"	1.7	2.7	3.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20	¾"	1.7	3.7	4.2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
25	1"	1.7	4	5.2	7.5	9.2	-	-	-	-	-	-	-	-	-	-	-	-	-	
32	-	-	4.4	6.3	9.4	11	15	-	-	-	-	-	-	-	-	-	-	-	-	
40	1.5"	-	-	6.8	11	15	19	24	-	-	-	-	-	-	-	-	-	-	-	
50	2"	-	-	-	12	18	24	30	37	-	-	-	-	-	-	-	-	-	-	
65	2.5"	-	-	-	-	19	28	37	47	63	-	-	-	-	-	-	-	-	-	
80	3"	-	-	-	-	-	31	45	58	79	95	-	-	-	-	-	-	-	-	
100	4"	-	-	-	-	-	-	48	70	99	120	148	-	-	-	-	-	-	-	
125	-	-	-	-	-	-	-	-	75	118	150	187	231	-	-	-	-	-	-	
150	6"	-	-	-	-	-	-	-	-	127	179	234	292	333	-	-	-	-	-	
200	8"	-	-	-	-	-	-	-	-	-	193	280	366	420	592	-	-	-	-	
250	10"	-	-	-	-	-	-	-	-	-	-	302	438	527	747	926	-	-	-	
300	12"	-	-	-	-	-	-	-	-	-	-	-	466	565	813	1126	1333	-	-	
400	-	-	-	-	-	-	-	-	-	-	-	-	-	680	1208	1753	2110	2290	2371	
Stroke (mm)		15										25	30	35	40	60	80	100	100	120

Two stage parabolic plug / Kvs values (m³/h)

EN DN	Seat (mm)			
	4	8	12	15
15	-	0.7	1.5	-
	-	1.2	2.0	2.4
20	-	0.7	1.8	-
	-	1.2	2.9	4.0
25	-	0.7	1.8	-
	-	1.2	2.9	4.0
32	-	0.7	1.8	-
	-	1.2	3.3	4.5
40	-	0.7	1.8	-
	-	1.2	3.3	5.0
50	-	0.7	1.8	-
	-	1.2	3.3	5.0
65	-	-	1.8	-
	-	-	3.3	5.0
Stroke (mm)	25			

Mixing plug / Kvs values (m³/h)

EN DN	ANSI NPS	Stroke (mm)	Seat (mm)	Kvs (m³/h)
20	-	15	32	6
25	1"		32	9.2
32	-		32	15
40	1.5"		40	24
50	2"		50	37
65	2.5"		65	63
80	3"	25	80	95
100	4"	30	100	148
125	-	35	125	231
150	6"	40	150	333
200	8"	60	200	592
250	10"	80 / 60*	250	926 / 847*
300	12"	100	300	1333
400	-	120	400	2371

Diverting plug / Kvs values (m³/h)

EN DN	ANSI NPS	Stroke (mm)	Seat (mm)	Kvs (m³/h)
20	-	15	25	4.2
25	1"		25	7.5
32	-		25	11
40	1.5"		32	19
50	2"		40	30
65	2.5"		50	47
80	3"	-	65	79
100	4"	25	80	120
125	-	30	100	187
150	6"	35	125	292
200	8"	40	150	420
250	10"	60	200	747
300	12"	80	250	1126** / 625***
400	-	120	320	2110** / 1250***

*Stroke 60 mm for valves with bellows seal

** Port A *** Port B

Two stage perforated plug / Kvs values (m³/h)

EN DN	Seat (mm)																	
	15	20	25	32	40	50	65	80	100	125	150	200	200	250	250	300	350	400
40	-	3.5	5.5	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	-	3.5	5.5	8.5	13.5	-	-	-	-	-	-	-	-	-	-	-	-	-
65	-	3.5	5.5	9.3	13.5	21	-	-	-	-	-	-	-	-	-	-	-	-
80	-	-	5.5	9.3	14.3	21	37	-	-	-	-	-	-	-	-	-	-	-
100	-	-	5.5	9.3	14.3	21	37	55	-	-	-	-	-	-	-	-	-	-
125	-	-	-	9.3	14.3	21	37	55	86	-	-	-	-	-	-	-	-	-
150	-	-	-	-	14.3	21	37	55	86	135	-	-	-	-	-	-	-	-
200	-	-	-	-	-	21	37	55	86	135	195	-	-	-	-	-	-	-
250	-	-	-	-	-	-	37	55	86	135	195	293	345	-	-	-	-	-
300	-	-	-	-	-	-	-	55	86	135	195	293	345	515	555	-	-	-
400	-	-	-	-	-	-	-	-	-	-	195	293	345	515	555	780	1055	-
Stroke (mm)	25			30			40	50	60	80	80	100	80	100	100	120	150	

Closing pressures control valves and on / off valves – Electric actuators

Seat (mm)		4 ... 12	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	
REact 15	Shut-off pressure (bar)	40	40	25	15	8	5	2.5	1.0	-	-	-	-	-	-	-	-	-	-
	Mixing / V-port plug	•	•	•	•	•	•	•	•	-	-	-	-	-	-	-	-	-	-
	Parabolic plug	•	•	•	•	•	•	•	•	-	-	-	-	-	-	-	-	-	-
	Perforated plug	•	•	•	•	•	•	•	•	-	-	-	-	-	-	-	-	-	-

Seat (mm)		4 ... 12	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	
REact 30	Shut-off pressure (bar)	40	40	40	40	25	16	10	6	4	3	-	-	-	-	-	-	-	-
	Mixing / V-port plug	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-	-	-	-
	Parabolic plug	•	•	•	•	•	•	•	•	•	• ¹⁾	-	-	-	-	-	-	-	-
	Perforated plug	•	•	•	•	•	•	•	•	-	-	-	-	-	-	-	-	-	-

Seat (mm)		4 ... 12	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
REact 60	Shut-off pressure (bar)	40	40	40	40	40	40	25.5	15.1	9.9	6.4	4.1	2.8	-	-	-	-	-
	Mixing / V-port plug	•	•	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-
	Parabolic plug	•	•	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-
	Perforated plug	•	•	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-

Seat (mm)		4 ... 12	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
REact 100	Shut-off pressure (bar)	40	40	40	40	40	40	40	27.1	17.9	11.5	7.3	5.1	-	-	-	-	-
	Mixing / V-port plug	•	•	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-
	Parabolic plug	•	•	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-
	Perforated plug	•	•	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-

Seat (mm)		4 ... 12	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
ST 5106	Shut-off pressure (bar)	-	-	-	-	-	40	40	40	27.9	17.8	11.4	7.9	4.5	2.9	-	-	-
	Mixing / V-port plug	-	-	-	-	-	•	•	•	•	•	•	•	•	•	-	-	-
	Parabolic plug	-	-	-	-	-	•	•	•	•	•	•	•	•	•	-	-	-
	Perforated plug	-	-	-	-	-	•	•	•	•	•	•	•	•	•	-	-	-

• The points show the possible valve + actuator combinations
 — The line shows the limits for valves with bellows seal
 1) Stroke 35 mm for series MV 52 ... / 53

Material pressure / Temperature ratings

Operating limits according to DIN EN 1092-1:2008 / DIN EN 1092-2:1997

PN	Material	Max. pressure in bar at temperature (°C)																	
		-10	100	150	200	250	300	350	400	425	450	500	510	520	530				
16	EN-GJL-250 (0.6025)	16	16	14	13	11	10	-	-	-	-	-	-	-	-	-	-	-	-
	EN-GJS-400-18-LT (0.7043)	16	16	16	15	14	13	11	-	-	-	-	-	-	-	-	-	-	-
	GP240GH (1.0619)	16	15	14	13	12	11	10	9	-	-	-	-	-	-	-	-	-	-
	GX5CrNiMo19-11-2 (1.4408)	16	16	14.5	13	12.5	11.5	11*	10.5*	-	-	-	-	-	-	-	-	-	-
25	EN-GJS-400-18-LT (0.7043)	25	25	24	23	22	20	18	-	-	-	-	-	-	-	-	-	-	-
	GP240GH (1.0619)	25	23	22	19	18	17	16	15	-	-	-	-	-	-	-	-	-	-
	GX5CrNiMo19-11-2 (1.4408)	25	25	23	21	20	18	18*	17*	-	-	-	-	-	-	-	-	-	
40	GP240GH (1.0619)	40	40	39	38	36	32	28	22	-	-	-	-	-	-	-	-	-	-
	GX5CrNiMo19-11-2 (1.4408)	40	40	36	33.5	31.5	29.5	28.5*	27*	-	-	-	-	-	-	-	-	-	
	GX5CrNiMoNb19-11-2 (1.4581)	40	40	39	37	35	33	32	31	31	30	30	30	30	30	30	30	30	
63	GP240GH (1.0619)	63	59	55	52	48	43	40	37	-	-	-	-	-	-	-	-	-	
	G17CrMo5-5 (1.7357)	63	63	63	63	63	63	60	57	55	53	41	35	28	23	-	-	-	
	GX5CrNiMo19-11-2 (1.4408)	63	63	57	53	50	47	45*	43*	-	-	-	-	-	-	-	-	-	
	GX5CrNiMoNb19-11-2 (1.4581)	63	63	62	59	56	52	51	49	49	48	47	47	47	47	47	47	47	
100	GP240GH (1.0619)	100	93	88	83	76	69	64	60	-	-	-	-	-	-	-	-	-	
	G17CrMo5-5 (1.7357)	100	100	100	100	100	100	95	90	87	84	65	55	45	37	-	-	-	
	GX5CrNiMo19-11-2 (1.4408)	100	100	91	84	79	74	71*	68*	-	-	-	-	-	-	-	-	-	
	GX5CrNiMoNb19-11-2 (1.4581)	100	100	98	93	88	83	80	78	76	76	75	74	74	74	74	74	74	
160	GP240GH (1.0619)	160	160	141	130	112	96	90	80	-	-	-	-	-	-	-	-	-	
	G17CrMo5-5 (1.7357)	160	160	160	160	160	160	153	146	142	139	118	100	79	62	-	-	-	

The values are rounded
 * Exclusion of intercrystalline corrosion (no acids or acid-containing fluids)

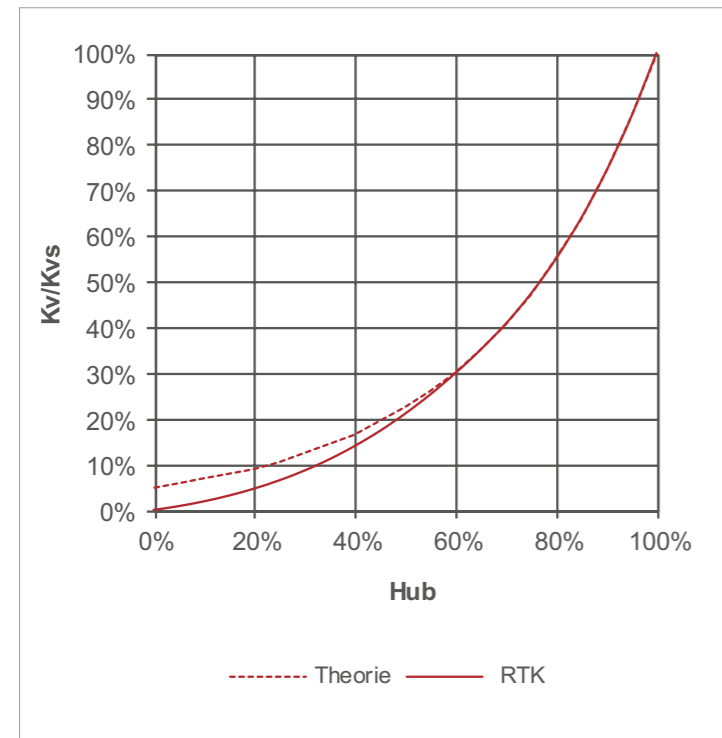
Operating limits according to ASME B16.34:1996

Class	Material	Max. pressure in bar at temperature (°C)														
		-29	40	95	150	205	260	315	345	375	400	425	455	480	510	530
#150	A 216 WCB	20	20	18	16	14	12	10	8.5	7.5	6.5	5.5	-	-	-	-
#300		50	50	47	45	44	42	38	37	37	35	28	-	-	-	-
#600		100	100	93	90	87	82	75	74	73	69	56	-	-	-	-
#900		150	150	140	135	131	124	113	111	110	104	85	-	-	-	-
#150	A 351 CF8M	20	20	16	15	13	11	9	8	7	6	5.5	4	3.5	2.5	1
#300		50	50	43	38	35	33	31	30	29	29	29	29	28	26	24
#600		100	100	85	77	71	66	62	61	60	59	58	57	57	53	48
#900		150	150	128	116	106	98	93	92	90	88	87	86	86	80	72
#600	A 217 WC9	100	100	100	100	97	92	83	81	78	73	70	67	62	52	36
#900		150	150	150	150	146	137	125	121	117	110	105	100	93	78	54

The values are rounded

Plug characteristics for control valves

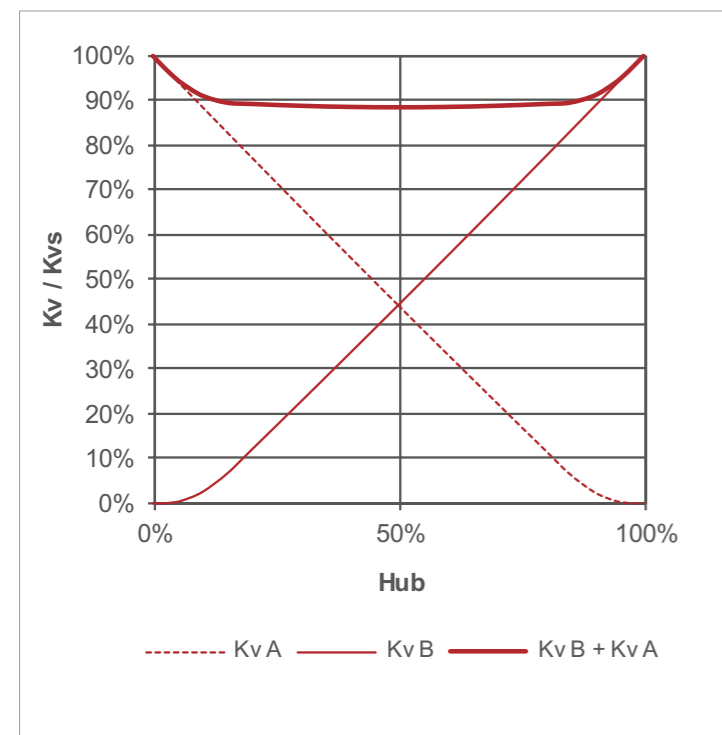
Equal percentage characteristic



The thick Continuous "equal percentage" line is a characteristic for practical use in industrial applications, which is continuously reduced to zero for small strokes. This characteristic allows suitable control even at small values.

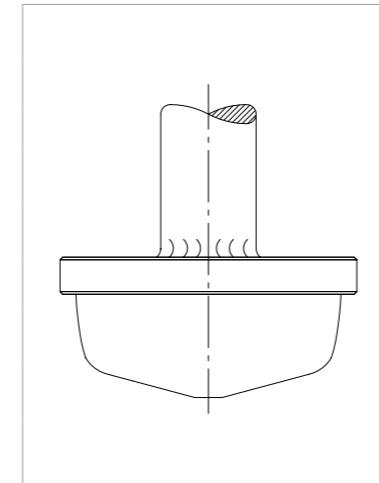
If not especially requested, in different version control valves are manufactured with this special "equal percentage" characteristic (see diagram characteristic RTK).

Linear Characteristic



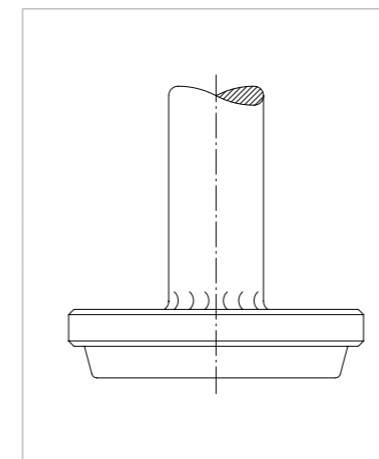
KvB Two-way valve
KvB + KvA Three-way valve

Plug types for 2-way valves



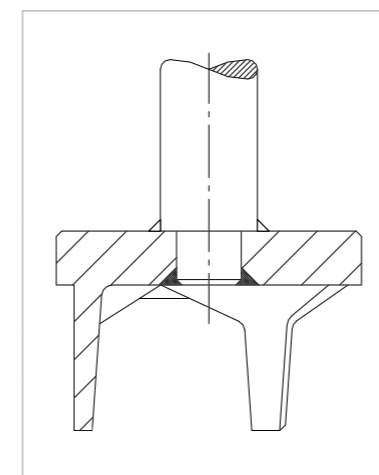
Parabolic plug

Characteristic	Linear / equal percentage
Materials	1.4122 Ferro titanium
Sealing	Metallic tight
Flow direction	Flow to open / flow to close
Rangeability	30:1 (max. 50:1)
Leakage	Class IV acc. to DIN EN 1349 / ANSI / FCI 70-2
Application	All kinds of media, especially for small Kvs valves



Shut-off plug

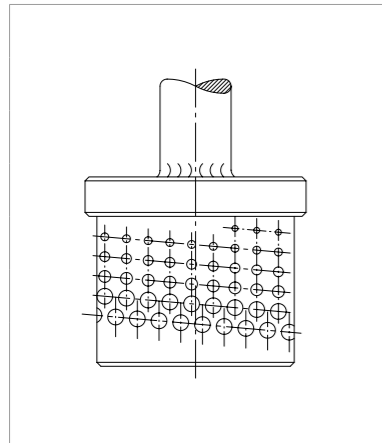
Characteristic	Quick opening
Material	1.4122
Sealing	Metallic tight
Flow direction	Flow to open / flow to close
Leakage	Class III according to DIN 3230 Class IV according to DIN EN 1349 / ANSI / FCI 70-2
Application	All kinds of media



V-port plug

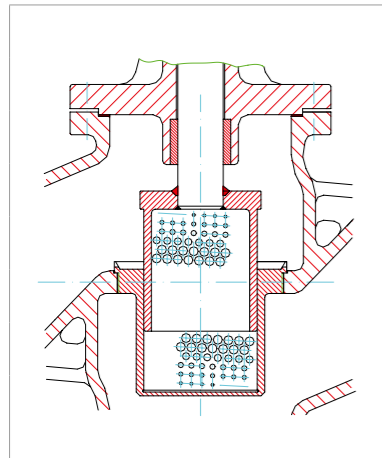
Characteristic	Linear
Material	1.4122
Sealing	Metallic tight
Flow direction	Flow to open / flow to close
Rangeability	30:1
Leakage	Class IV according to DIN EN 1349 / ANSI / FCI 70-2
Application	All kinds of media

Plug types for 2-way valves



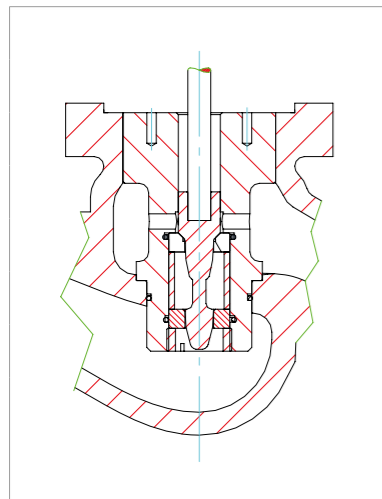
Perforated plug

Characteristic	Linear / equal percentage
Material	1.4122
Sealing	Metallic tight
Flow direction	Flow to open / flow to close
Rangeability	30:1 (max. 40:1)
Leakage	Class IV according to DIN EN 1349 / ANSI / FCI 70-2
Application	All kinds of media and noise reduction



Two-stage perforated plug

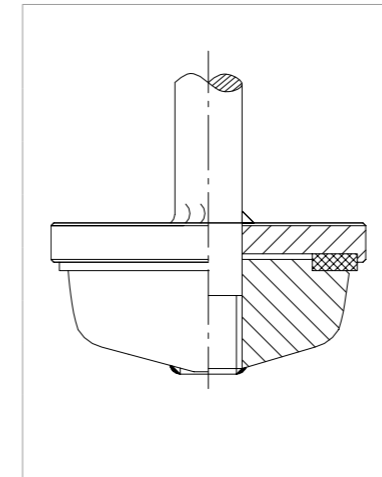
Characteristic	Linear / equal percentage
Material	1.4122
Sealing	Metallic tight
Flow direction	Flow to open / flow to close
Rangeability	30:1 (max. 40:1)
Leakage	Class IV according to DIN EN 1349 / ANSI / FCI 70-2
Application	All kinds of media and high difference pressures



Two-stage parabolic plug

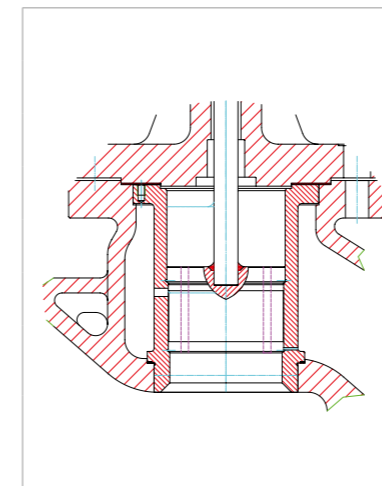
Characteristic	Linear / equal percentage
Material	1.4122
Sealing	Metallic tight
Flow direction	Flow to open / flow to close
Rangeability	30:1 (max. 40:1)
Leakage	Class IV according to DIN EN 1349 / ANSI / FCI 70-2
Application	All kinds of media and high difference pressures

Plug types for 2-way valves



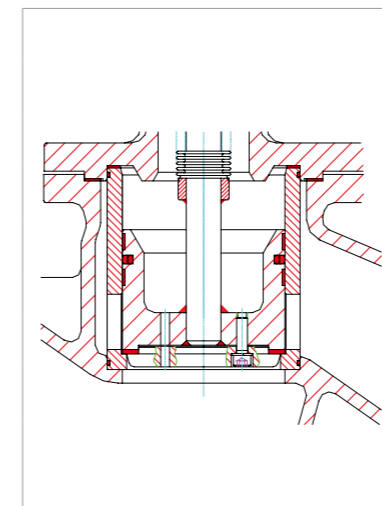
Option with soft sealing for parabolic plug, shut-off plug and V-port plug (example parabolic plug)

Characteristic	Linear / equal percentage / Quick opening
Material	1.4122
Sealing	Soft seal PTFE-graphite
Flow direction	Flow to open / flow to close
Leakage	Class I according to DIN 3230 Class VI according to DIN EN 1349 / ANSI / FCI 70-2
Application	All kinds of medium up to +200 °C with tight shut-off



Perforated plug, balanced valves

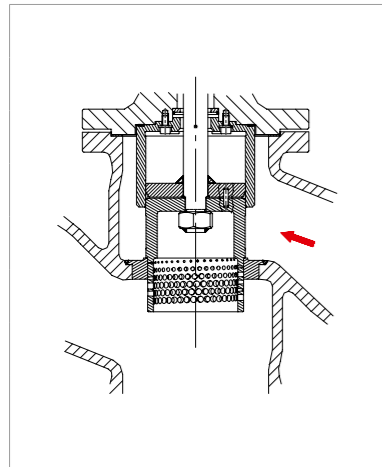
Characteristic	Linear / equal percentage
Material	1.4122
Sealing	Metallic tight
Flow direction	Flow to close
Rangeability	30:1 (max. 40:1)
Leakage	0,05 % of Kvs value according to DIN EN 1349 / ANSI / FCI 70-2
Application	All kinds of media Minimization of actuating forces



Balanced On / Off plug

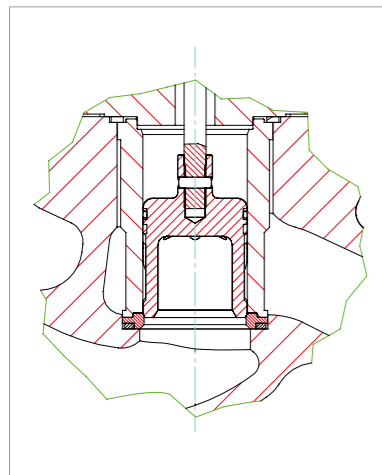
Characteristic	On / Off
Material	1.4122
Sealing	Soft seal tight PTFE-graphite
Flow direction	Flow to close
Leakage	Class III according to DIN 3230 Class IV according to DIN EN 1349 / ANSI / FCI 70-2
Temperature	Max. +150 °C
Application	All kinds of media Minimization of actuating forces

Plug types for 2-way valves



Balanced plug

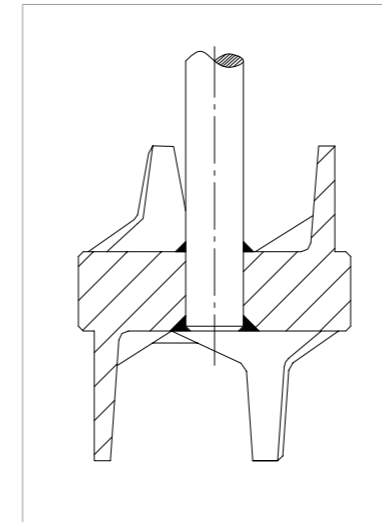
Characteristic	Linear / equal percentage
Material	1.4122
Sealing	Metallic tight
Flow direction	Flow to open
Leakage	Class IV according to DIN EN 1349 / ANSI / FCI 70-2
Temperature	Max. +530 °C
Application	All kinds of media Minimization of actuating forces



Balanced trim for RTK heavy duty valves

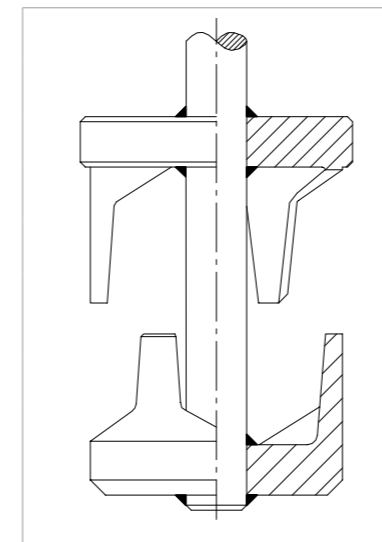
Characteristic	Standard Trim	Linear / Equal Percentage
	Les-Cav	Linear
	Les-Sonic	Linear
Material	Standard	410 Stainless steel (DIN equivalent 1.4006)
	Option	316 Stainless steel (DIN equivalent 1.4571) CA6NM Hi-temp (DIN equivalent 1.4313)
Sealing	C300 Spring loaded seal with Inconel spring (up to +300 °C)	
Rangeability	30:1	
Leakage	Standard Trim	Class IV (-20 °C to +427 °C) Class V (-20 °C to +300 °C)
	High Temp Trim	Class IV (-20 °C to +538 °C)
Application	All types of gases, steam, water and other liquids Les-Cav cage used to prevent valve trim damage due to valve cavitation Les-Sonic cage effectively reduces noise at the source	

Plug types for 3-way valves



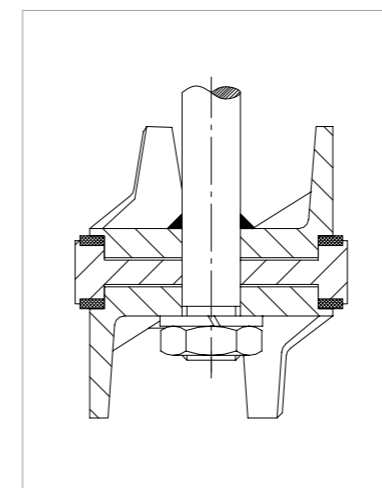
Mixing plug

Characteristic	Linear / linear
Material	1.4122
Sealing	Metallic tight
Rangeability	30:1 (max. 50:1)
Leakage	Class IV according to DIN EN 1349 / ANSI / FCI 70-2
Application	Three way valves with mixing function (standard design)



Diverting plug

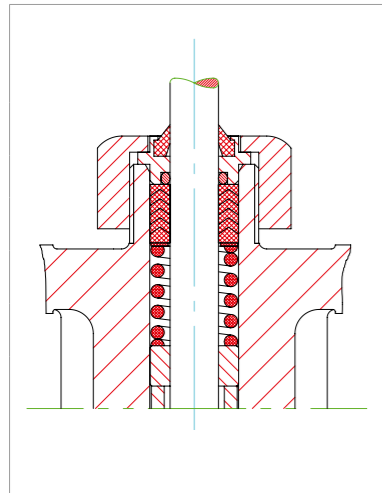
Characteristic	Linear / linear
Material	1.4122
Sealing	Metallic tight
Rangeability	30:1
Leakage	Port A Class IV according to DIN EN 1349 / ANSI / FCI 70-2
	Port B 0,1 % of Kvs
Application	Three way valves with diverting function



Mixing plug with soft seal

Characteristic	Linear / linear
Material	1.4122
Sealing	Soft seal tight PTFE-graphite
Rangeability	30:1 (max. 50:1)
Leakage	Class I according to DIN 3230 Class VI nach DIN EN 1349 / ANSI / FCI 70-2
Application	Three way valves with mixing function up to +200 °C with tight shut-off

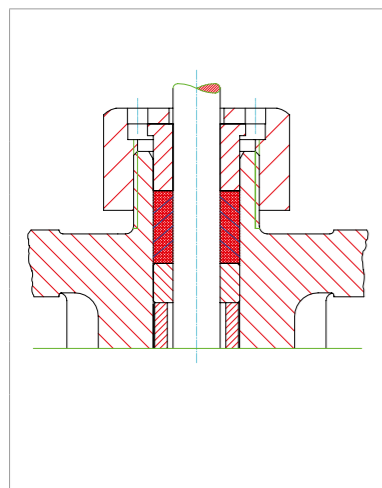
Stem packings



PTFE-graphite stem packing

Maintenance free chevron rings with pre stressed spring

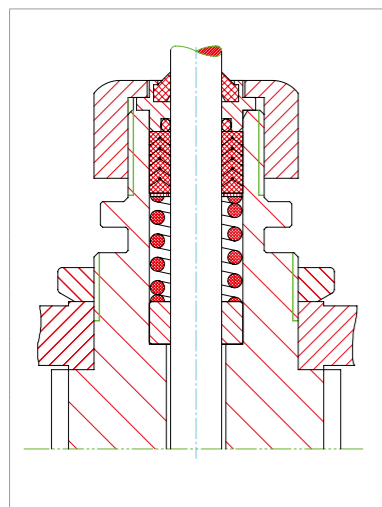
Material	PTFE-graphite
Temperature	-10 °C to max. +250 °C (-60 °C for K-Version)
Pressure	Max. 40 bar
Friction	[kp] = 3 x Stem diameter (mm)
Application	All kinds of media



Graphite stem packing

Pure flexible graphite rings and two anti extrusion inconel wire reinforced flexible graphite rings

Material	Graphite
Temperature	-10 °C to max. +530 °C (medium dependent) (-60 °C for K-Version)
Pressure	Max. 40 bar
Friction	[kp] = 10 x Stem diameter (mm)
Application	All kinds of media

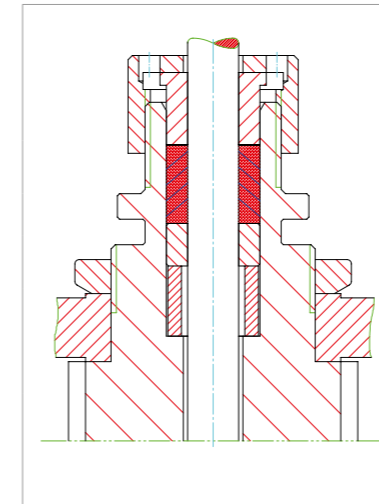


PTFE-graphite stem packing

Maintenance free chevron rings with pre stressed spring, bonnet with cooling ribs

Material	PTFE-graphite
Temperature	-10 °C to max. +250 °C (-60 °C for K-Version)
Pressure	Max. 160 bar
Friction	[kp] = 3 x Stem diameter (mm)
Application	All kinds of media

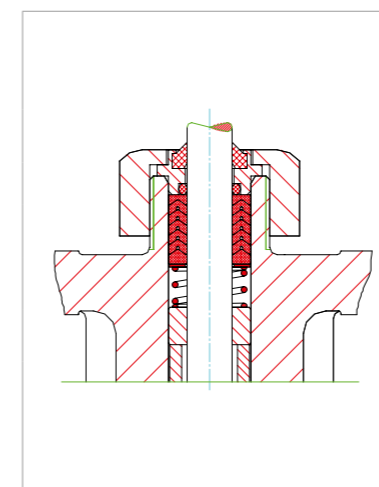
Stem packings



Graphite stem packing

Pure flexible graphite rings and two anti extrusion inconel wire reinforced flexible graphite rings, bonnet with cooling ribs

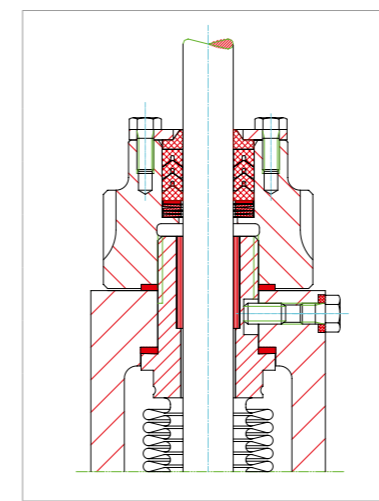
Material	Graphite
Temperature	-10 °C to max. +530 °C (medium dependent) (-60 °C for K-Version)
Pressure	Max. 160 bar
Friction	[kp] = 10 x Stem diameter (mm)
Application	All kinds of media



Stem packing with DVGW approval

Maintenance free chevron rings with pre stressed spring

Material	NBR
Temperature	-10 °C to max. +60 °C (-60 °C for K-Version)
Pressure	Max. 6 bar
Friction	[kp] = 2 x Stem diameter (mm)
Application	Natural gas

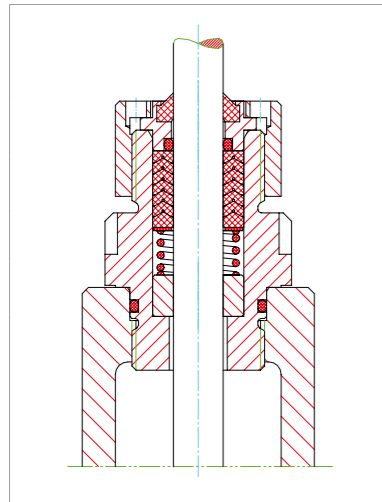


Bellows seal with stem packing for refrigerants

Maintenance free metal bellows stem seal with safety packing

Material	1.4571
Temperature	-60 °C to +350 °C
Pressure	Max. 25 bar
Friction	[kp] = 1 x Stem diameter (mm)
Application	All kinds of media

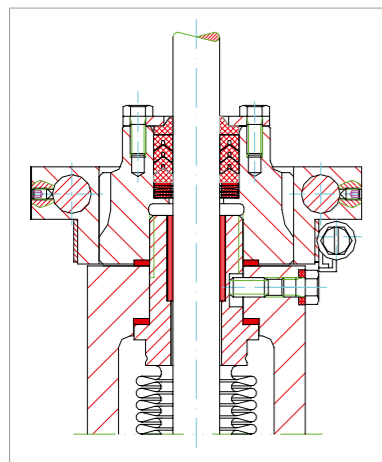
Stem packing



Chloroprene stem packing

Maintenance free chevron rings with pre stressed spring

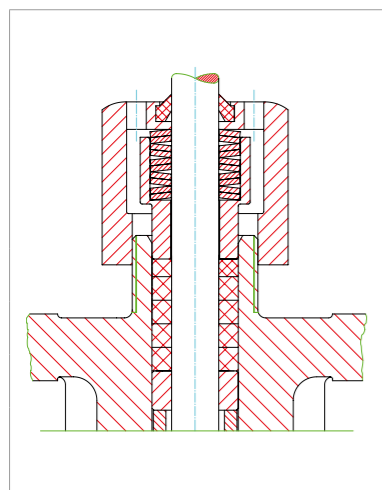
Material	NBR
Temperature	-60 °C to +150 °C
Pressure	Max. 40 bar
Friction	[kp] = 2 x Stem diameter (mm)
Application	Refrigerants



Bellows seal with stem packing for refrigerants

Maintenance free metal bellows stem seal with safety packing

Material	1.4571
Temperature	-60 °C to +350 °C
Pressure	Max. 25 bar
Friction	[kp] = 1 x Stem diameter (mm)
Application	Refrigerants

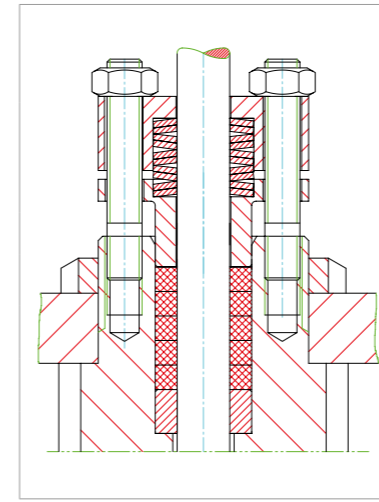


Stem packing with "TA-Luft" approval

Carbon fiber packing with pre stressed disc spring

Material	Carbon fiber fibrous web PTFE, aramid fibrous web
Temperature	-10 °C to max. +250 °C (- 60 °C for K-Version)
Pressure	Max. 40 bar
Friction	[kp] = 10 x Stem diameter (mm)
Application	Chemical industry

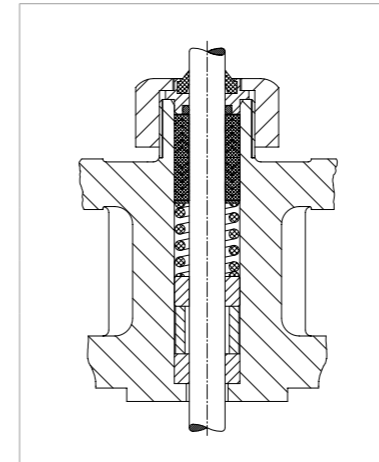
Stem packing



Stem packing with "TA-Luft" approval

Carbon fiber packing with pre stressed disc spring

Material	Carbon fiber, Pure graphite Special fibrous web
Temperature	-10 °C to max. +400 °C (-60 °C for K-Version)
Pressure	Max. 40 bar
Friction	[kp] = 30 x Stem diameter (mm)
Application	Chemical Industry

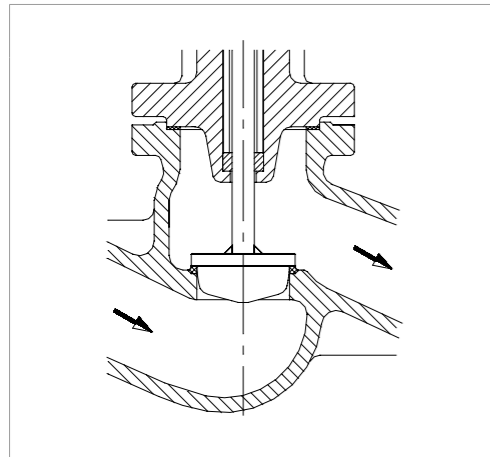


PTFE-graphite stem packing

2 sets of maintenance free chevron rings with pre stressed spring

Material	PTFE-graphite
Temperature	Max. +250 °C
Pressure	Max. 40 bar
Friction	[kp] = 6 x Stem diameter (mm)
Application	All kinds of media Suitable for vacuum application

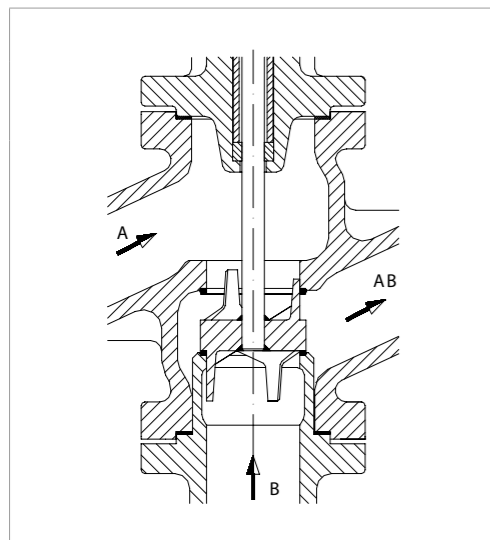
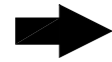
Types of valves



Two way valve

Application

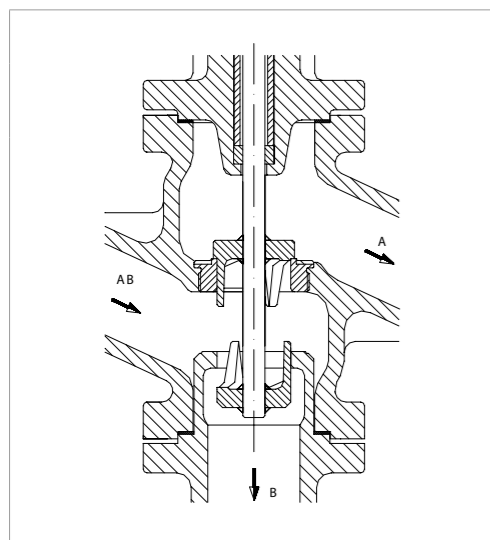
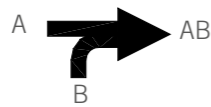
Shut-off, control of flow, pressure, ...



Mixing Valve

Application

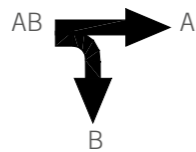
Mixing two flows, bypass for heat exchangers



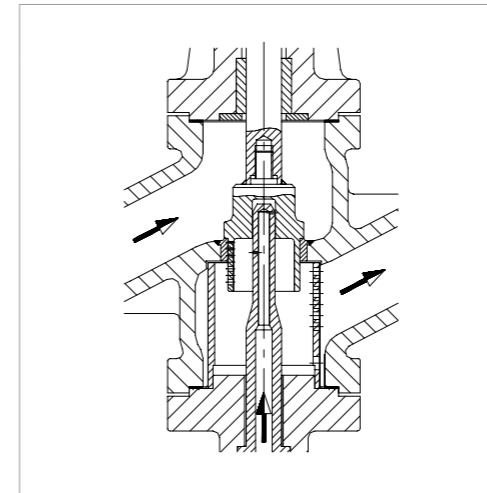
Diverting valve

Application

Diverting two flows, bypass for heat exchangers



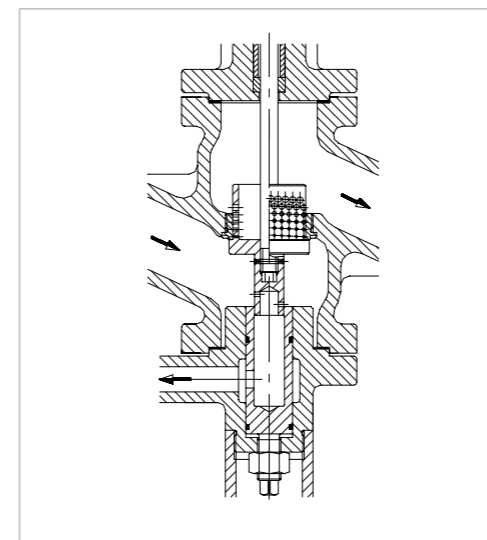
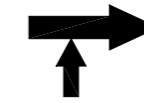
Types of valves



Desuperheating valve

Application

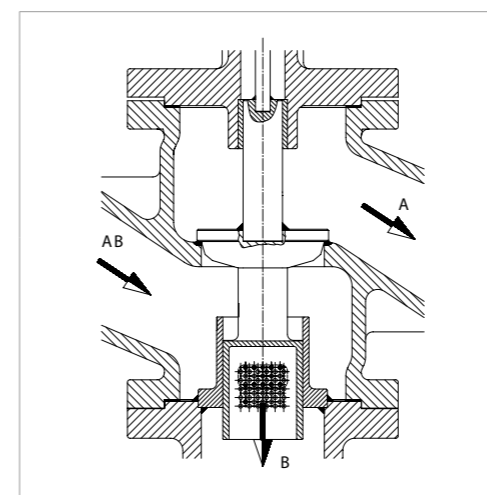
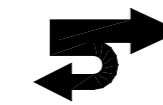
Pressure reducing and steam cooling by water injection



Feed water control valve with re-circulation connection

Application

Control of flow rate with re-circulation connection to protect the pump from falling below the minimum flow rate



Control valves for controlling discharge/re-circulation

Application

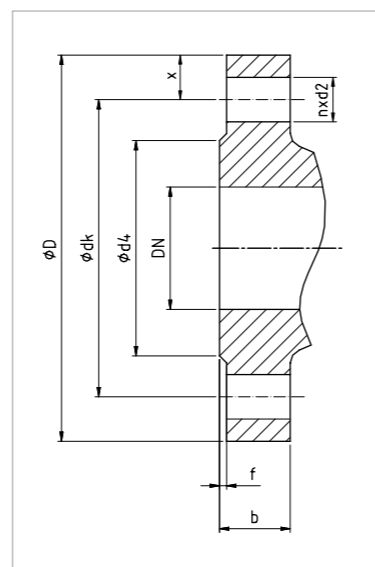
Diverting in two flows
Control of discharge/circulation in water- or air-cooled condensers, with adjustable Kvs value in port B



Flange Dimensions

Dimensions in mm according to DIN EN 1092 as well as ASME / ANSI 16

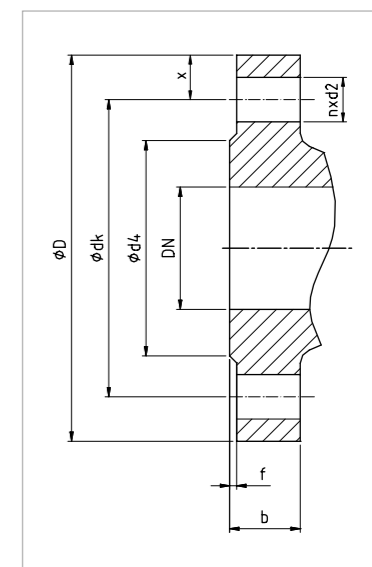
DN	PN / Class	D	b	f	dk	d4	d2	n	Ph.	x
15	16	95	14	2	65	45	14	4	M12	15
	25	95	16	2	65	45	14	4	M12	15
	40	95	16	2	65	45	14	4	M12	15
½"	#150	89	11	1.6	60	35	16	4	½"	14.5
	#300	95	14	1.6	67	35	16	4	½"	14
20	16	105	16	2	75	58	14	4	M12	15
	25	105	18	2	75	58	14	4	M12	15
	40	105	18	2	75	58	14	4	M12	15
¾"	#150	98	13	1.6	70	43	16	4	½"	14
	#300	117	16	1.6	83	43	19	4	⅝"	17
25	16	115	16	2	85	68	14	4	M12	15
	25	115	18	2	85	68	14	4	M12	15
	40	115	18	2	85	68	14	4	M12	15
1"	#150	108	14	1.6	79	51	16	4	½"	14.5
	#300	124	18	1.6	89	51	19	4	⅝"	17.5
32	16	140	16	2	100	78	18	4	M16	20
	25	140	18	2	100	78	18	4	M16	20
	40	140	18	2	100	78	18	4	M16	20
1 ¼"	#150	117	16	1.6	89	64	16	4	½"	14
	#300	133	19	1.6	98	64	19	4	⅝"	17.5
40	16	150	16	3	110	88	18	4	M16	20
	25	150	18	3	110	88	18	4	M16	20
	40	150	18	3	110	88	18	4	M16	20
1 ½"	#150	127	18	1.6	98	73	16	4	½"	14.5
	#300	156	21	1.6	114	73	22.2	4	¾"	21
50	16	165	18	3	125	102	18	4	M16	20
	25	165	20	3	125	102	18	4	M16	20
	40	165	20	3	125	102	18	4	M16	20
2"	#150	152	19	1.6	121	92	19	4	⅝"	15.5
	#300	165	22	1.6	127	92	19	8	⅝"	19
65	16	185	18	3	145	122	18	4	M16	20
	25	185	22	3	145	122	18	8	M16	20
	40	185	22	3	145	122	18	8	M16	20
2 ½"	#150	178	22	1.6	140	105	19	4	⅝"	19
	#300	190	25	1.6	149	105	22	8	¾"	20.5



Flange Dimensions

Dimensions in mm according to DIN EN 1092 as well as ASME / ANSI 16

DN	PN / Class	D	b	f	dk	d4	d2	n	Ph.	x
80	16	200	20	3	160	138	18	8	M16	20
	25	200	24	3	160	138	18	8	M16	20
	40	200	24	3	160	138	18	8	M16	20
3"	#150	190	24	1.6	152	127	19	4	⅝"	19
	#300	210	29	1.6	168	127	22	8	¾"	21
100	16	220	20	3	180	158	18	8	M16	20
	25	235	24	3	190	162	22	8	M20	22.5
	40	235	24	3	190	162	22	8	M20	22.5
4"	#150	229	23	1.6	190	158	19	8	⅝"	19.5
	#300	254	32	1.6	200	158	22	8	¾"	27
125	16	250	22	3	210	188	18	8	M16	20
	25	270	26	3	220	188	26	8	M24	25
	40	270	26	3	220	188	26	8	M24	25
150	16	285	22	3	240	212	22	8	M20	22.5
	25	300	28	3	250	218	26	8	M24	25
	40	300	28	3	250	218	26	8	M24	25
6"	#150	280	25	1.6	241	216	22	8	¾"	19.5
	#300	318	36	1.6	270	216	22	12	¾"	24
200	16	340	24	3	295	268	22	12	M20	22.5
	25	360	30	3	310	278	26	12	M24	25
	40	375	34	3	320	285	30	12	M27	27.5
8"	#150	343	28	1.6	299	270	22	8	¾"	22
	#300	381	41	1.6	330	270	25	12	⅞"	25.5
250	16	405	26	3	355	320	26	12	M24	25
	25	425	32	3	370	335	30	12	M27	27.5
	40	450	38	3	385	345	33	12	M30	32.5
10"	#150	406	30	1.6	362	324	25	12	⅞"	22
	#300	445	48	1.6	387	324	28	16	1"	29
300	16	460	28	4	410	378	26	12	M24	25
	25	485	34	4	430	395	30	16	M27	27.5
	40	515	42	4	450	410	33	16	M30	32.5
12"	#150	483	32	1.6	432	381	25	12	⅞"	25.5
	#300	521	51	1.6	450	381	32	16	1 ⅛"	35.5

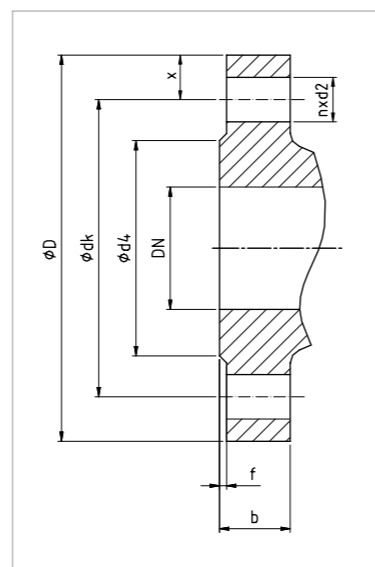


Flange Dimensions

Dimensions in mm according to DIN EN 1092 as well as ASME / ANSI 16

DN	PN / Class	D	b	f	dk	d4	d2	n	Ph.	x
400	16	580	32	4	525	490	30	16	M27	27.5
	25	620	40	4	550	505	36	16	M33	35
	40	660	50	4	585	535	39	16	M36	37.5
16"	#150	596	36	1.6	540	470	29	16	1"	28
	#300	648	57	1.6	571	470	35	20	1 1/4"	38.5

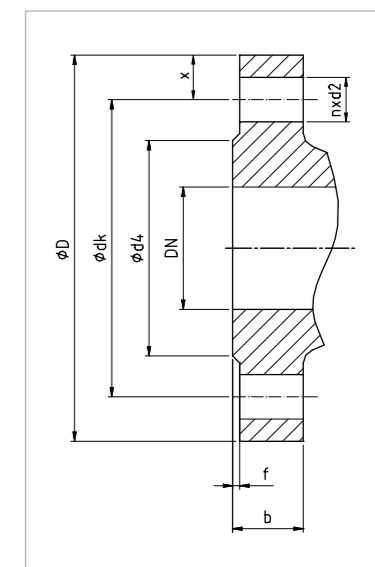
15	63	105	20	2	75	45	14	4	M12	15
	100	105	20	2	75	45	14	4	M12	15
	160	105	20	2	75	45	14	4	M12	15
1/2"	#600	95	21	6.4	67	35	16	4	1/2"	14
	#900	121	29	6.4	83	35	16	4	3/4"	19
25	63	140	24	2	100	68	18	4	M16	20
	100	140	24	2	100	68	18	4	M16	20
	160	140	24	2	100	68	18	4	M16	20
1"	#600	124	24	6.4	89	51	19	4	5/8"	17.5
	#900	149	35	6.4	102	51	25	4	7/8"	23.5
40	63	170	26	3	125	88	22	4	M20	20
	100	170	26	3	125	88	22	4	M20	22.5
	160	170	26	3	125	88	22	4	M20	22.5
1 1/2"	#600	156	29	6.4	114	73	22.2	4	3/4"	21
	#900	178	38	6.4	124	73	29	4	1"	27
50	63	180	26	3	135	102	22	4	M20	22.5
	100	195	28	3	145	102	26	4	M24	25
	160	195	30	3	145	102	26	4	M24	25
2"	#600	165	32	6.4	127	92	19	8	5/8"	19
	#900	216	45	6.4	165	92	25	8	7/8"	25.5
65	63	205	26	3	160	122	22	8	M20	22.5
	100	220	30	3	170	122	26	8	M24	25
	160	220	34	3	170	122	26	8	M24	25
2 1/2"	#600	190	35	6.4	149	105	22	8	3/4"	20.5
	#900	244	48	6.4	190	105	29	8	1"	27
80	63	215	28	3	170	138	22	8	M20	22.5
	100	230	32	3	180	138	26	8	M24	25
	160	230	36	3	180	138	26	8	M24	25



Flange Dimensions

Dimensions in mm according to DIN EN 1092 as well as ASME / ANSI 16

DN	PN / Class	D	b	f	dk	d4	d2	n	Ph.	x
3"	#600	210	38	6.4	168	127	22	8	3/4"	21
	#900	267	45	6.4	203	127	32	8	7/8"	32
100	63	250	30	3	200	162	26	8	M24	25
	100	265	36	3	210	162	30	8	M27	27.5
4"	#600	273	45	6.4	216	158	25	8	7/8"	28.5
	#900	292	51	6.4	235	158	32	8	1 1/8"	28.5
125	63	295	34	3	240	188	30	8	M27	27.5
	100	315	40	3	250	188	33	8	M30	32.5
150	160	315	44	3	250	188	33	8	M30	32.5
	63	345	36	3	280	218	33	8	M30	32.5
150	100	355	44	3	290	218	33	12	M30	32.5
	160	355	50	3	290	218	33	12	M30	32.5
6"	#600	355	54	6.4	292	216	28	12	1"	31.5
	#900	381	62	6.4	318	216	32	12	1 1/8"	31.5
200	63	415	42	3	345	285	36	12	M33	35
	100	430	52	3	360	285	36	12	M33	35
	160	430	60	3	360	285	36	12	M33	35
8"	#600	419	62	6.4	351	270	32	12	1 1/8"	34
	#900	470	70	6.4	394	270	38	12	1 3/8"	38
250	63	470	46	3	400	345	36	12	M33	35
	100	505	60	3	430	345	39	12	M36	37.5
	160	515	68	3	430	345	42	12	M39	37.5
10"	#600	508	70	6.4	432	324	34	16	1 1/4"	38
	#900	546	76	6.4	470	324	38	16	1 3/8"	38
300	63	530	52	4	460	410	36	16	M33	35
	100	585	68	4	500	410	42	16	M39	42.5
	160	585	78	4	500	410	42	16	M39	42.5
12"	#600	559	73	6.4	489	381	34	20	1 1/4"	35
	#900	610	86	6.4	533	381	38	20	1 3/8"	38.5



Series Overview

Series	Act. force	Stem diameter	Valve series 2-way valve	3-way valve	Possible actuators
MV 5200	1,5 kN	12 mm	MV 5210	MV 5220	REact 15 (1,5 kN) / REact 30 (2,8 Kn)
	3 kN	12 mm		MV 5230	REact 15 (1,5 kN) / REact 30 (2,8 Kn)
				MV 5270	REact 15 (1,5 kN) / REact 30 (2,8 Kn)
MV 5300	6 - 10 kN	12 mm	MV 5310	MV 5320	ST 5113 (6 kN)
				MV 5330	ST 5114 (10 kN) Actuators from other manufacturers
MV 5400	10 - 56 kN	32 mm	MV 5410	MV 5420	ST 5106 (15 kN)
				MV 5430	ST 5116 (20 kN) Actuators from other manufacturers
MV 5900	> 56 kN	60 mm	MV 5910	MV 5920	Actuators from other manufacturers
	< 80 kN			MV 5930	

Series Overview

Series	Act. force	Stem diameter	Valve series 2-way valve	3-way valve	Possible actuators
MV 5200-K	1,5 kN	12 mm	MV 5210-K	MV 5220-K	REact 15 (1,5 kN) / REact 30 (2,8 Kn)
	3 kN	12 mm		MV 5230-K	REact 15 (1,5 kN) / REact 30 (2,8 Kn)
				MV 5270-K	REact 15 (1,5 kN) / REact 30 (2,8 Kn)
MV 5300-K	6 - 10 kN	12 mm	MV 5310-K	MV 5320-K	REact 60 (6 kN)
				MV 5330-K	REact 100 (10 kN) Actuators from other manufacturers
MV 5400-K	10 - 56 kN	32 mm	MV 5410-K	MV 5420-K	ST 5106 (15 kN)
				MV 5430-K	ST 5116 (20 kN) Actuators from other manufacturers
MV 5900-K	> 56 kN	60 mm	MV 5910-K	MV 5920-K	Actuators from other manufacturers
	< 80 kN			MV 5930-K	

Type Code

MV 5 Actuator	2 Actuating force	1 Type of valve	1 Stem packing
5: electric (MV)	2: 3 kN	1: 2-way valve	1: Stuffing box - PTFE / graphite - Pure graphite - Packing acc. "TA Luft" - Gas-packing (acc. to DVGW) 4: Bellows seal - With safety stuffing box - Additionally with leakage monitoring
	3: 6 - 10 kN	2: 3-way mixing valve	
	4: 10 - 56 kN	3: 3-way diverting valve	
	9: > 56 kN	4: 3-way valve for regulation flow/circulation	
	< 80 kN	5: Steam-converting valve 7: 3-way mixing valve with shortened B-flange 9: Valves for special applications - Continuous blow down valve - Bottom blow down valve - Valve with re-circulation connection	

Type Code

MV 5 Actuator	2 Actuating force	1 Type of valve	1 Stem packing	-K Version for refrigerants
5: electric (MV)	2: 3 kN	1: 2-way valve	1: Stuffing box - PTFE / graphite - Pure graphite - Packing acc. "TA Luft" - Gas-packing (acc. to DVGW) 4: Bellows seal - With safety stuffing box - Additionally with leakage monitoring	- Without nonferrous metals - Studs and nuts of stainless steel - Gaskets compatible for refrigerants - Acrylic coating
	3: 6 - 10 kN	2: 3-way mixing valve		
	4: 10 - 56 kN	3: 3-way diverting valve		
	9: > 56 kN			
	< 80 kN			

Series Overview

Series	Effec. area / Act. force	Stem diameter	Valve series 2-way valve	3-way valve	Possible actuators
P6200	120 cm ² 280 cm ² < 10 kN	12 mm	PV 6210	PV 6220 PV 6230 PV 6270	ST 6115 ST 6135
PV 6300	530 cm ² < 10 kN	12 mm	PV 6310	PV 6320 PV 6330	ST 6160 Actuators from other manufacturers
PV 6400	1000 cm ² < 56 kN	32 mm	PV 6410	PV 6420 PV 6430	ST 6175 Actuators from other manufacturers
PV 6900	> 56 kN < 80 kN	60 mm	PV 6910	PV 6920 PV 6930	Actuators from other manufacturers

Series Overview

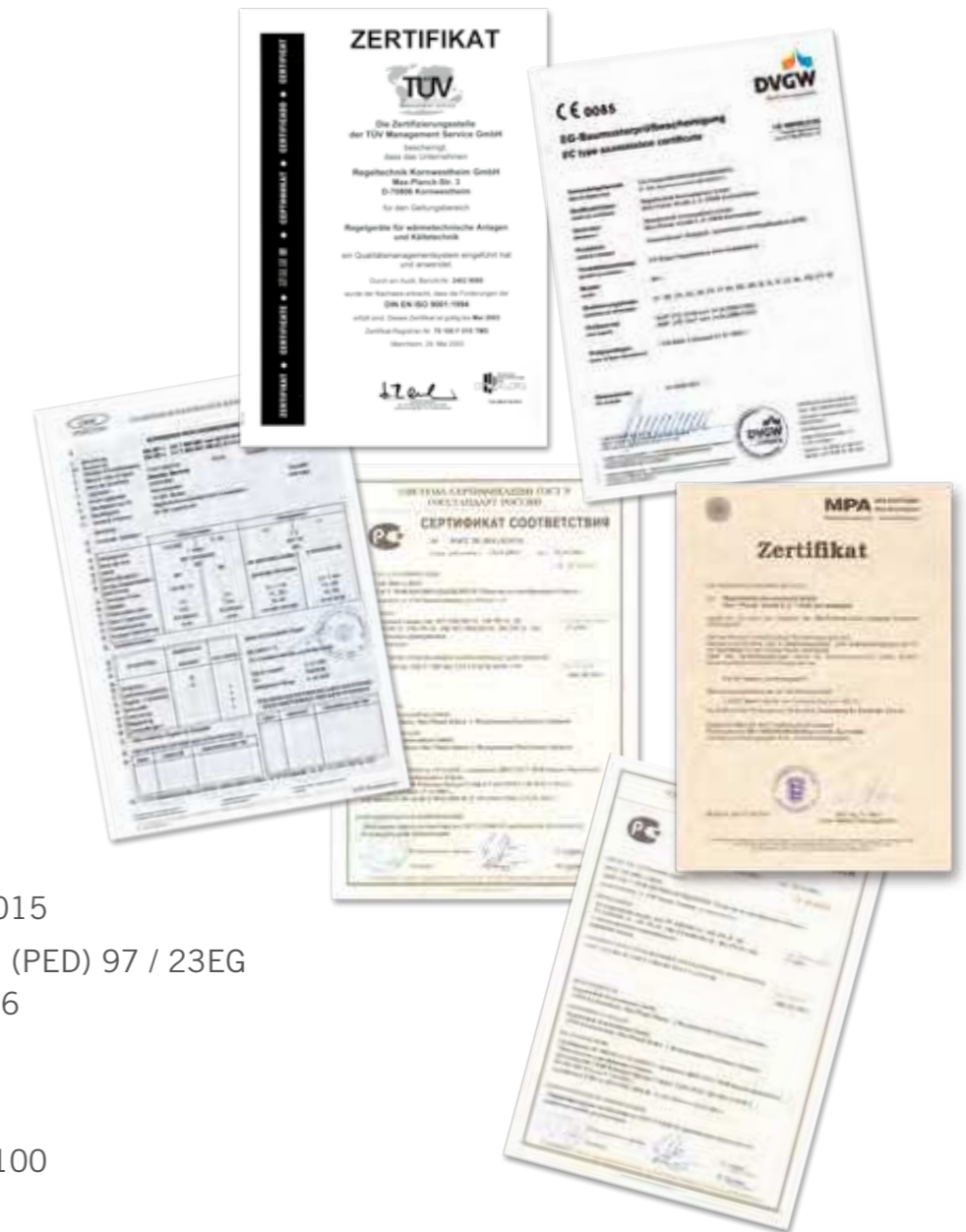
Series	Effec. area / Act. force	Stem diameter	Valve series 2-way valve	3-way valve	Possible actuators
P6200-K	120 cm ² 280 cm ² < 10 kN	12 mm	PV 6210-K	PV 6220-K PV 6230-K PV 6270-K	ST 6115 ST 6135
PV 6300-K	530 cm ² < 10 kN	12 mm	PV 6310-K	PV 6320-K PV 6330-K	ST 6160 Actuators from other manufacturers
PV 6400-K	1000 cm ² < 56 kN	32 mm	PV 6410-K	PV 6420-K PV 6430-K	ST 6175 Actuators from other manufacturers
PV 6900-K	> 56 kN < 80 kN	60 mm	PV 6910-K	PV 6920-K PV 6930-K	Actuators from other manufacturers

Type Code

PV 6 Actuator	2 Effec. area / Act. force	1 Type of valve	1 Stem packing
6: pneumatic (PV)	2: 120 / 280 cm ² < 10 kN 3: 530 cm ² < 10 kN 4: 1000 cm ² < 56 kN 9: > 56 kN < 80 kN	1: 2- way valve 2: 3-way mixing valve 3: 3-way diverting valve 4: 3-way valve for regulation flow/circulation 5: Steam-converting valve 7: 3-way mixing valve with shortened B-flange 9: Valves for special applications - Continous blow down valve - Bottom blow down valve - Valve with re-circulation connection	1: Stuffing box - PTFE / graphite - Pure graphite - Packing acc. "TA Luft" - Gas-packing (acc. to DVGW) 4: Bellows seal - With safety stuffing box - Additionally with leakage monitoring

Type Code

PV 6 Actuator	2 Effec. area / Act. force	1 Type of valve	1 Stem packing	-K Version for refrigerants
6: pneumatic (PV)	2: 120 / 280 cm ² < 10 kN 3: 530 cm ² < 10 kN 4: 1000 cm ² < 56 kN 9: > 56 kN < 80 kN	1: 2-way valve 2: 3-way mixing valve 3: 3-way diverting valve	1: Stuffing box - PTFE / graphite - Pure graphite - Packing acc. "TA Luft" - Gas-packing (acc. to DVGW) 4: Bellows seal - With safety stuffing box - Additionally with leakage monitoring	- Without nonferrous metals - Studs and nuts of stainless steel - Gaskets compatible for refrigerants - Acrylic coating



- DIN EN ISO-9001-2015
- Druckgeräterichtlinien (PED) 97 / 23EG
Modul H / H1, CE0036
- DIN CERTCO
- TA-Luft
- Vd-TÜV Wasserstand 100
- DVGW
- ATEX Konformitätserklärung, 94 / 9 / EG
- TR TS (EAC)
- LR- Lloyd's Register
- DNV-GL
- BV-Bureau Veritas
- RINA-Registro Italiano Navale
- ABS-American Bureau of Shipping
- China Compulsory Product Certificate (CCC)

1. General/Area of application

- a) Our sales and delivery terms are exclusively valid. We do not acknowledge contrary terms or conditions deviating from our sales and delivery terms of the orderer, unless we agreed to their validity explicitly in writing. Our sales and delivery terms are also valid if we perform delivery to the orderer without reservation with knowledge of contrary terms or conditions deviating from our sales and delivery conditions.
- b) All agreements that are made between us and the orderer for the performance of this contract are to be recorded in this contract in writing.
- c) These sales and delivery conditions are exclusively valid for the business transactions between companies.

2. Offer, conclusion of contract, written form

- a) Our general statements, specifically in price lists and brochures are subject to confirmation and non-binding.
- b) Agreements require our written confirmation to become legally valid. Only our order confirmation is decisive for the extent of the delivery. Later supplements, modifications, or other additional agreements require written confirmation to become valid.
- c) We reserve property rights and copyrights to the illustrations, calculations and other documents. They may not be made accessible to third parties.
- d) The documents relating to the offer like illustrations, drawings, measurement and weight specifications are only approximate unless explicitly termed binding.

3. Prices

- a) Insofar no deviating agreements exist in the order confirmation, our prices are applicable „ex factory“, including loading in the factory, excluding packaging, freight, and transport insurance. These are billed separately.
- b) The legal value added tax is not included in our prices. It is listed separately on the bill at the legal amount on the day of billing.

4. Payment

- a) Our bills are to be paid within 14 days after invoice date minus 2 % early payment discount, or within 30 days without any discount.
- b) If the orderer comes under delay of payment we bill the legal interest for delay of 8 percentage points over the basic interest rate of the European Central Bank. If we are able to prove a higher interest for delay, we are authorized to enforce it.
The orderer is authorized to prove us that we did not have any or a significantly lower damage as a consequence of the payment delay.
- c) Rights of retention and offsetting are only admissible for the orderer if his opposing claims have been legally determined, indisputable, or acknowledged by us. We are not obliged to perform further deliveries prior to the payment of due invoices, we also reserve the right to interrupt the manufacture of parts from other contracts of orderers under delay of payment.

5. Delivery time

- a) The beginning of the stated delivery time requires the clarification of all technical questions as well as the receipt of a possibly agreed down payment.
- b) If the orderer sets us an adequate grace period with threat of denial after we have already come under delay, he is authorized to withdraw from the contract after fruitless expiration of this grace period. Damage compensation claims due to non-fulfilment to the amount of the foreseeable damage are only admissible to the orderer if the delay was based on intention or gross negligence. Apart from that the damage compensation liability is limited to 50 % of the occurred damage.
- c) The adherence of our delivery obligation requires the timely and proper fulfilment of the obligations of the orderer.
- d) If the orderer comes under delay of acceptance or if he violates other obligations of contribution we have the right to demand the damage occurred to us including possible additional expenditures. In this case the risk of accidental loss or an accidental worsening of the purchase object is transferred to the orderer at the time at which he comes under delay of acceptance.

6. Transfer of risk

- a) Insofar the order confirmation does not state anything else, shipment purchase is agreed upon. The risk is transferred to the orderer with the dispatch of the delivery parts. This is also valid for partial deliveries, also if the supplier has assumed other services like for example the shipping costs or delivery and set-up.
- b) By request of the orderer the shipment is insured against burglary, damage by breakage, transport, fire, and water damage and other insurable risks.

7. Retention of title

- a) We reserve the property rights and the right of disposal to the purchase object up to the receipt of all payments from the delivery contract and previously concluded contracts. Cheque and draft demands as well as demands from Motor voltage invoices or Motor voltage account are included. If a draft liability for us is founded in association with the payment, this retention of title does not become void before our utilization from the draft is excluded.
- b) Prior to the full balance of our previously stated demands the orderer may continue to use the delivered products in the framework of a proper business operation, unless an assignment prohibition was or is agreed upon for the claims assigned to us in advance in lit. f) with third parties. Prior to that pledging or assignment as security is prohibited and reselling is only allowed to resellers in common business transaction under the condition that the reseller receives payment from his customer and forwards it to us immediately. Possible costs of interventions are carried by the orderer.
- c) In case of pledging, confiscation or other orders and interference of third parties the orderer is to inform us immediately.
- d) If the orderer behaves opposing to the contract, specifically in case of delay of payment we are authorized to retrieve after payment reminder, and the orderer is obliged to hand out the goods.
- e) The enforcement of the retention of title and the pledging of the delivery object by us are not regarded as a withdrawal from the contract.
- f) The orderer already now assigns all demands amounting to the percentual amount of our invoice including VAT with all additional rights to us that arise to him from the reselling towards customers or third parties. This is also valid in the case that the orderer ceases a purchase price demand he is entitled to by the reselling in a Motor voltage account agreed with the customer or third parties. We accept this assignment.
- g) In case of association with a property or mobile objects of third parties and the working or processing in the framework of a factory contract, the orderer already now assigns the wage demand and /or the occurring co-ownership part amounting to our percentual invoice amount including VAT for the processed goods under retention of title to us. We accept the assignment.
- h) The orderer is hereby authorized to collect the Mounted on top assigned demands in the framework of the proper business transaction himself, insofar he forwards the incoming amounts to us immediately. The allowance to collect the assigned demands becomes void with delay of payment, initiation of insolvency proceedings or a cheque or draft objection.
- i) If the realized value of the security existing for us exceeds our claims by more than 10% alone because of this regulation for retention of title or together with other securities, we are obliged to release securities of our choice insofar as the orderer demands this.
- j) We are authorized to insure the purchased object against burglary, fire, water, and other damages on costs of the orderer, insofar the orderer has not by proof taken out insurance himself.
- k) The application for the initiation of insolvency proceedings authorizes us to withdraw from the contract and to demand the immediate return of the de-livery object.

8. Liability for defects of the delivery (warranty)

We are liable as follows for material and legal defects of the delivery under exclusion of further claims under reservation of item 9:

Material defects

- a) All defects that come about to be defective due to a circumstance prior to the transfer of risk are to be improved or delivered again by our choice. We are to be informed of the determination of such defects immediately in writing. Replaced parts become our property.
- b) The orderer is to give us the time and opportunity after information to perform all improvements and supplementary deliveries we find necessary, otherwise we are released from the liability of the resulting consequences. Only in urgent cases of danger of the operational safety and the prevention of unrelationally large damages, whereas we are to be informed immediately, the orderer has the right to eliminate the defect himself or through third parties, and to demand compensation for the necessary expenditures.
- c) From the immediate costs accruing through the improvement reps. supplementary delivery we carry the costs of the supplementary piece including shipping free border – insofar the defect claim proves to be admissible– as well as the adequate costs for instalment and removal, further within Germany, in case this can be adequately demanded depending on the situation of the single case, the costs of the possibly required assemblymen and auxiliary personnel. Apart from that the orderer carries the costs. Replaced parts are transferred into our property.
- d) The manufacturer is authorized to withdraw from the contract in the framework of the legal regulations if we – under consideration of the legal regulations for exceptions – let an adequate grace period for the improvement or replacement delivery due a material damage expire fruitlessly. If the defect is only insignificant, the orderer only has the right to reduce the contract price. The right of reduction of the contract price remains excluded otherwise.
- e) No warranty is assumed specifically in the following cases: Inadequate or improper usage, faulty assembly resp. start up by the orderer or third parties, natural wear, faulty or negligent treatment, improper maintenance, inadequate operating agents, chemical, electro chemical or electrical influences, insofar they are not our responsibility.
- f) If the orderer or a third party improves improperly, no liability is given on part of the orderer for the resulting consequences. The same is valid for changes on the delivery object without prior consent of the orderer.
- g) If parts or material for processing or as supplement to the processing of an order are delivered by the orderer, no receipt inspection for non-apparent faults is conducted if not otherwise agreed.

Legal faults:

- h) If the usage of the delivery object leads to the violation of trade protection rights or copyrights, we will procure the basic right for further usage on cost of the orderer or modify the delivery object in a way acceptable for the orderer so that the violation of the trademark protection right no longer exists.
- i) If this is not possible under commercially adequate conditions in an adequate term, the orderer is allowed to resign from the contract. We are al-so allowed to resign from the contract under the previously stated conditions.
- j) Beyond that we will release the orderer from indisputable or legally determined claims of the involved trademark protection right owners.
- k) Our obligations stated in lit. h) are conclusive with reservation of the item 9 in the case of trademark protection and copyright violation. They are only existent if
 - the orderer informs us immediately of enforced trademark protection or copyright violations,
 - the orderer supports us in the defence of enforced claims to an adequate extent respectively enables us to conduct the modification measures according to lit. i).
 - all defence measures including settlement regulations remain reserved,
 - the legal defect is not based on an instruction of the orderer and
 - the legal violation was not caused by the orderer modifying the delivery object by himself or used it in a manner contrary to the contract.

9. Liability

- a) If material delivered by the orderer becomes damaged or unusable at our location, specifically in the working /processing or repair, we are only liable if the damage was caused by gross negligence, however only to an amount of 10% of the processing value, insofar unlimited liability is not legally required.
- b) If the delivery object cannot be used according to contract by our fault due to neglect or faulty execution of suggestions and consulting prior to or after the conclusion of the contract or by the violation of other contractual additional obligations – especially instruction for operation and maintenance of the delivery object – the regulations of item 8) and 9a) are valid for further claims of the orderer.
- c) For damages that did not occur on the delivery object itself we are for legal reasons only liable for
 - intention
 - gross negligence of the owner, the organs, or managing employees,
 - in case of culpable violation of life, body, health,
 - in case of defects that we have maliciously concealed or whose absence we have guaranteed,
 - in case of faults of the delivery object, insofar liability is given according to the product liability law for persons or material damage on privately used objects.
- d) In case of culpable violation of essential contract obligations we are also liable for gross negligence of non-managing employees or slight negligence, in the latter case limited to the contract typical, reasonably foreseeable damage.
- e) Further claims are excluded.

10. Our damage compensation claim in case of non-fulfilment of the orderer

we are authorized to demand damage compensation due to non-fulfilment. The minimum damage to be compensated is a lump sum of 15 % on fittings and on other devices 10% of the purchase price. The damage amount is to be increased or decreased if we prove a higher or the orderer proves a lower damage.

11. Statute of limitations

All claims of the orderer – for whatever legal reasons – come under the statute of limitations in 12 months. The legal terms are applicable to intentional or malicious behaviour in case of claims according to the product liability law.

12. Other regulations

- a) The contract remains binding in its other regulations even in case of legal invalidity of single clauses. This is not applicable if the maintenance of the contract would pose to be an unreasonable hardship for one party.
- b) Should a regulation be or become void in whole or part, the contract partners will promptly make effort to achieve the commercial success strived for with the void regulation by another legally admissible manner.
- c) The court responsible for our company is the place of jurisdiction for all disputes arising from the contractual relationship. We are also authorized to file lawsuit at the location of the orderer.
- d) German law for the legal relationships of national parties among each other is exclusively applicable for all legal relationships between the orderer and us. The application of the uniform UN convention on the international sale of goods or other conventions concerning the right of goods purchase is excluded.

