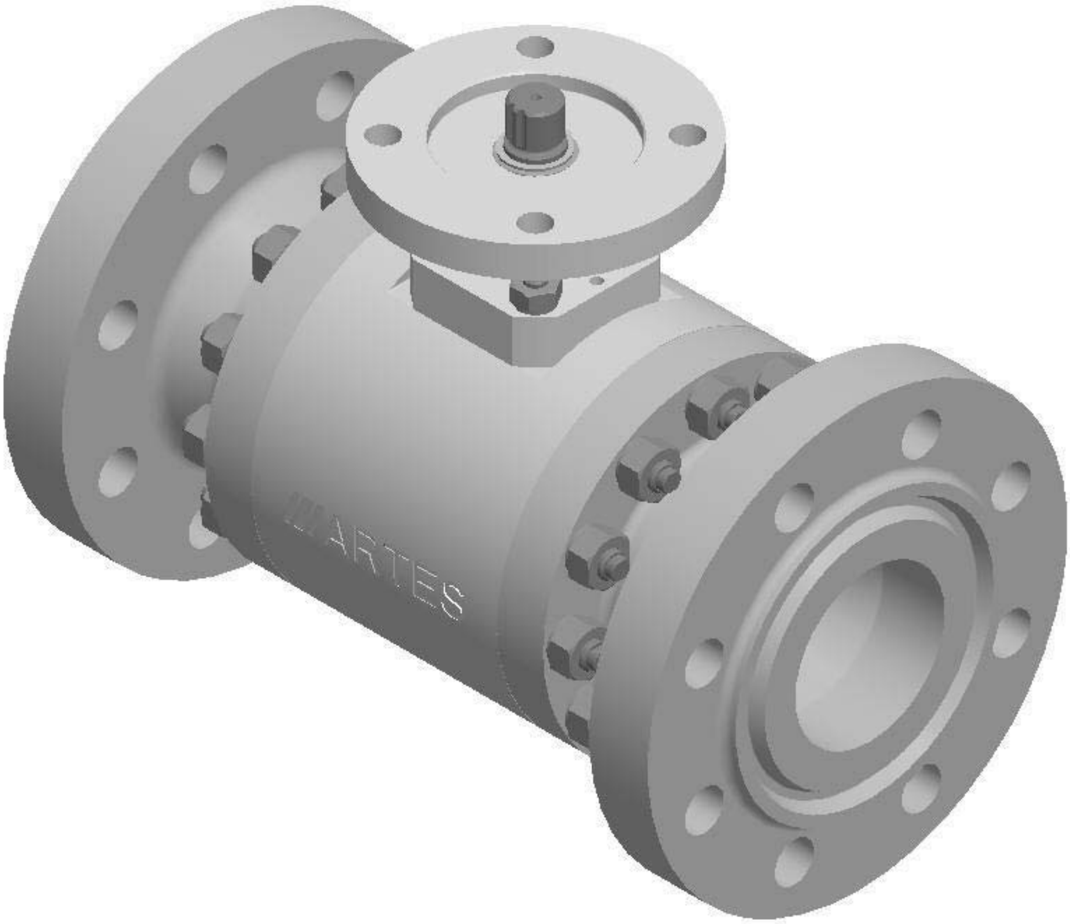
Control Ball Valve – Type G



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Application of the ARTES type G control ball valve

The control ball valve G is a control valve that has been specially designed for regulating pressures and quantities.
The construction allows for secure shut-off of the medium in addition to the control function.
The valve is primarily designed for use in the natural gas industry, the petrochemical industry, and for underground storage and solution mining companies.
A further application of this valve is for example for ash conveying.

Advantage of the turning valve compared to nozzle and control valves

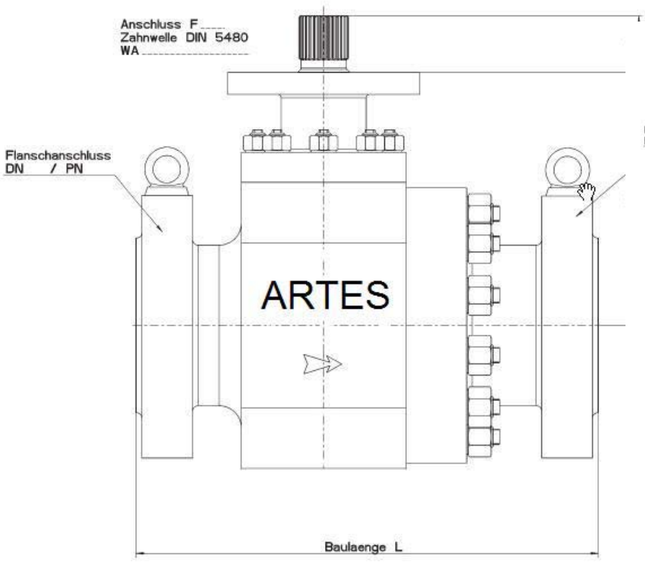
- Impermeability in passage
  - Shut-off by ball – seat ring system
- Impermeability to the outside
  - Gland packing: leak-proof, because no contamination can get drawn into the package
- No vibration cracking
  - No forces or torques act on the stem
- Cost advantage by drawn-in valves
  - The flow rate determines the valve size and not the connection's nominal width of the pipeline
- Controllability at lesser differential pressures
  - Straight flow trough permits a remaining pressure loss $\leq$ 0.2 bar at with consistent guarantee of the control performance
- Simple adjustments of control characteristics
  - Easy exchange of the control discs / possible even on site
- Low stockkeeping at user

Description and design of the ARTES control ball valve

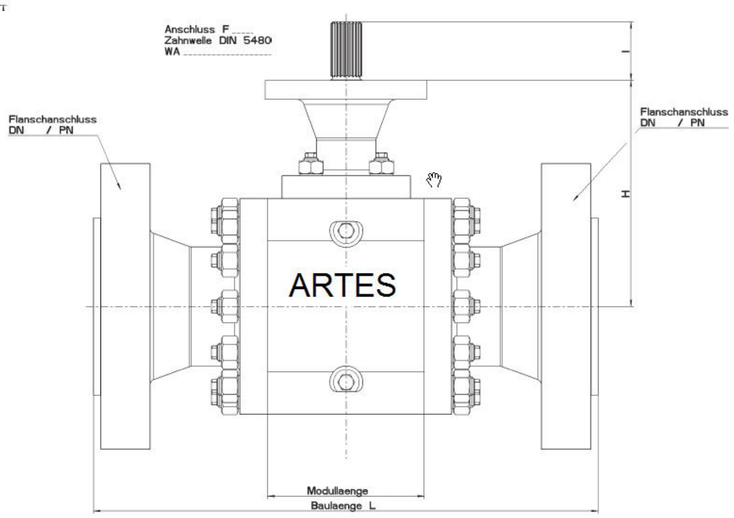
The control ball valve comes in a two- or three-part "split body" design.
The 3-part design contains all functionally relevant components in the module.
The housing connections are the connections of the module to the pipeline.
The housing connections and the module are connected by torque to yield bolts.
The connection to the pipeline is determined by the customer and can be done by flange or be welded on.
The design of the control ball valve G in the pressure level ≥ class 1500 is two-part.
The installed components are mounted then in the housing and in the housing connection.

The adapter to the drive is according to DIN / ISO 5211 and can therefore be combined with any type of drive. Electrical, pneumatic, hydraulic, or electro-hydraulic drives can be applied.

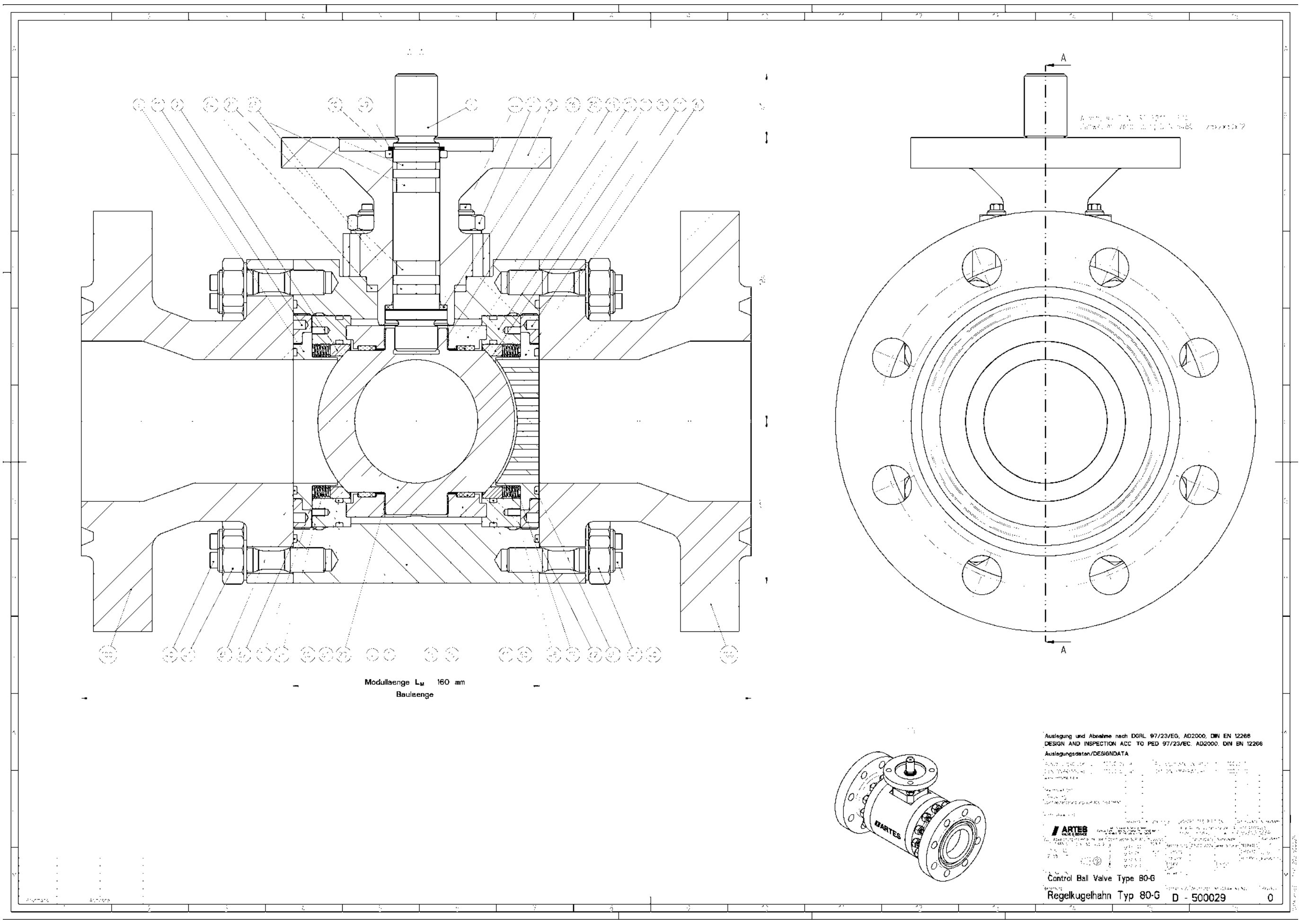
2-part design



3-part design



*The following cutaway shows the construction of the 3-part **ARTES** type G control ball valve*



The design of the control ball valve allows for a bi-directional flow.
The seat rings (9) seal metallically on the ball (4) and block off the medium.
The ball and the seat rings are coated with tungsten carbide.

The tungsten carbide is applied by a high-speed flame spraying process.
The wear resistance of the coating is so good that further processing can be done only by diamonds.
During operation the tungsten carbide coating guarantees a long service life so that the sealing by the valve can be ensured for a long operational period.

The leak rate A according to DIN/EN 12266-1 *(leak rate 1 according DIN 3230*) can be submitted in case this has been contracted.

The sealing function and the control function are separated.
Thus there is no wear on the seat during control operation.

The control disc is made of high-quality materials and is possibly protected against wear by plasma-nitriding or tungsten carbide coating.

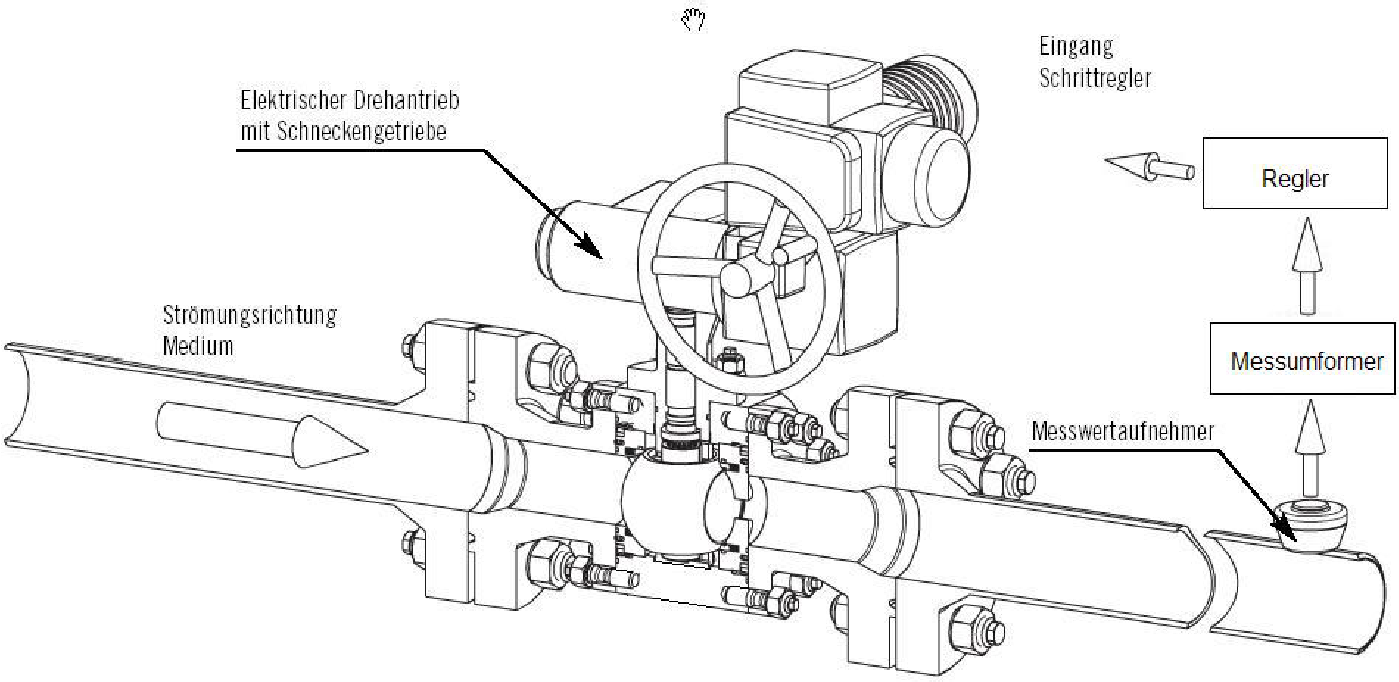
The number of control discs is determined by the operating conditions.
Two control discs are used in order to minimise the wear, prevent cavitation, or to lower noise emissions.

The seals used in the control ball valve G are O-rings made of Viton.
If other sealing materials are used because of media resistance and application temperatures, this will be noted in the valve data sheet.

Mode of operation of the pressure and flow control

A typical pressure/flow control is shown in the following illustration and is briefly described in the subsequent text.

The flow control is the same. The transducer is then a flow meter (differential pressure transmitters, ultrasonic meter, turbine flowmeter, etc.).



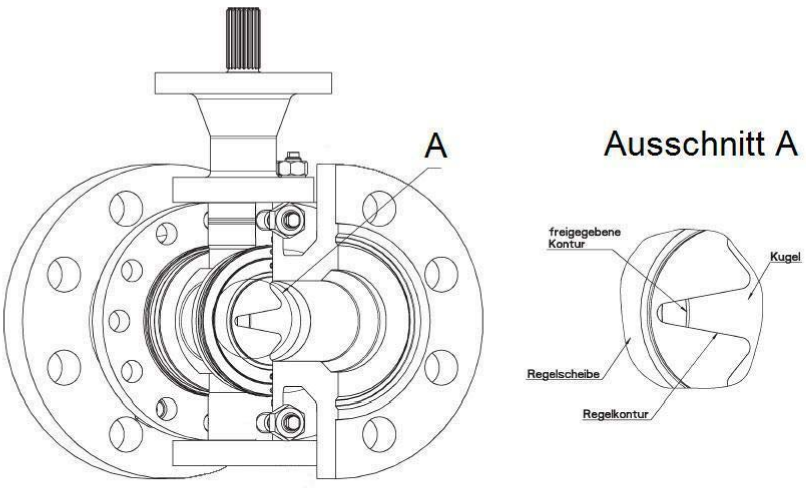
The control function of a control ball valve is basically no different from the control function of conventional control valves.

A pressure sensor records the ACTUAL pressure value and transmits it to the controller.

If the SETPOINT and ACTUAL values deviate, the actuator of the control ball valve is actuated.
Usually a *4 - 20 mA* control signal is used. The valve is closed at *4 mA*.
The actuator sets the control ball valve to the required position, in accordance with the change in the control signal.

By the turn of the ball the control contour in the control disc(s) is uncovered.
The appropriate control characteristic is applied to control the flow quantity in accordance with the requirements of the valve's characteristic curve and the pressure in the pipeline increases or decreases.

This process continues until the SETPOINT and ACTUAL pressure values match.

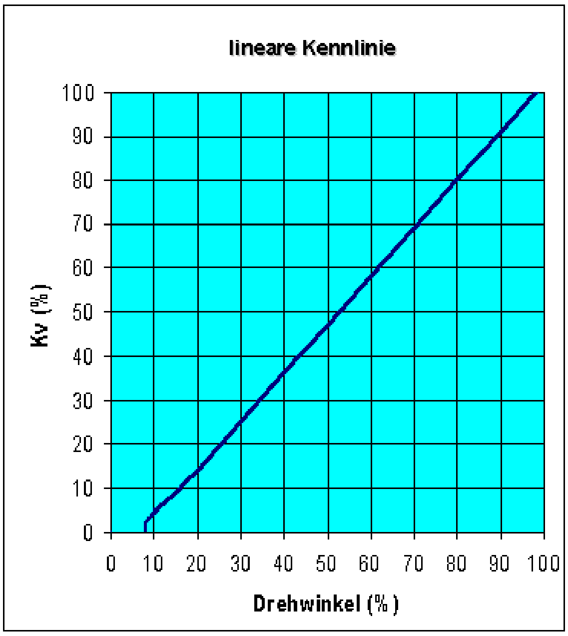


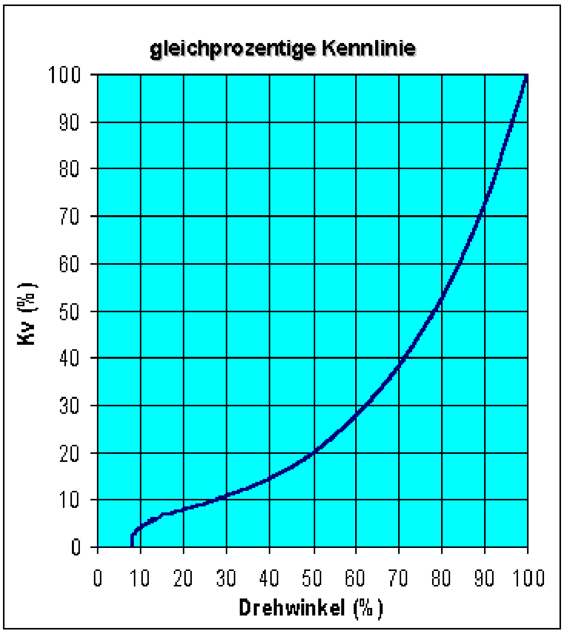
The 90° turn by the ball over the control disc(s) opens the control diameter and thus regulates the control function.

Characteristic curves

The mode of operation of a control valve is based on a specified opening of diameters depending on the control signal sent by the regulator. The control diameters are opened up depending on the lift of the valve according to the specified characteristic curve.
The curves are standardised in the valid regulations, e.g. VDI/VDE.

The control ball valve type G creates the standard defined characteristic curve or a specially designed one.
By the turn of the ball the control contour machined into the control disc is uncovered in the ball borehole.
The process is the same as the opening of the control diameter in the perforated cone of a lift valve.



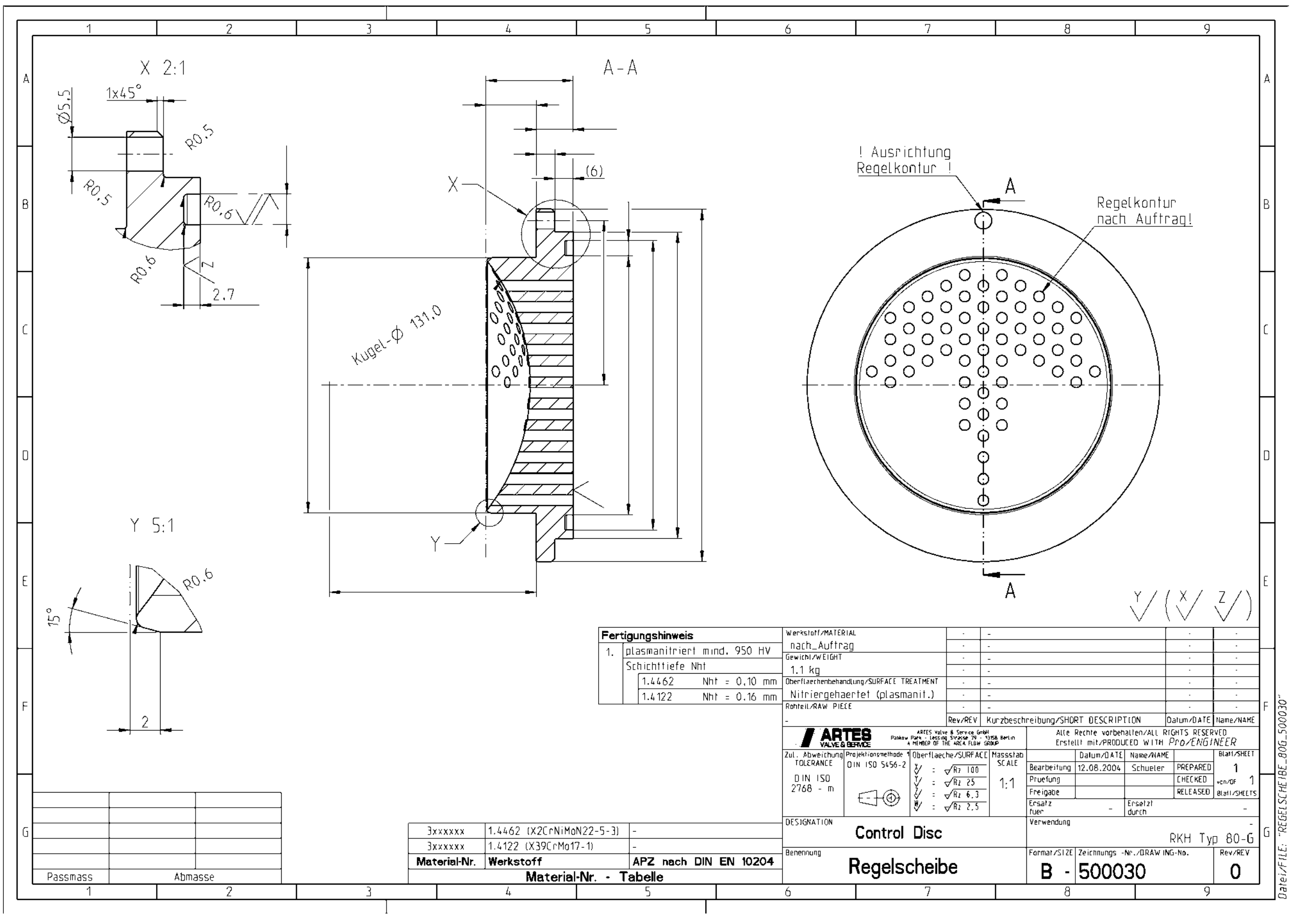


The filling characteristic curve is a typical special characteristic curve. Up to a defined opening, control is by a perforated control disc. Beyond this opening angle an open diameter is machined into the control disc. The advantage of this filling characteristic curve is the regulated throttling during filling after the switched line units and the negligible pressure loss during a fully opened valve.

The design makes it possible to easily adapt the flow rate and the control characteristics to changed operative parameters by replacing the control disc. This task can also be done on site.

For gaseous media or for cavitating operating conditions the control discs are always supplied as perforated control discs. This also minimises the wear and the noise.

The following diagram shows a perforated control disc with control characteristics of equal percentage.



Data sheet

	Regelarmatur						
1	Kunde:				ARTES-Nr.		
2	Anlage:				Pos.		
3	Einbauort:				Stückzahl:		
4	KKS Nr.						
5	**Rohrleitung**			Eintritt		Austritt	
6	Rohrleitung	Ø D x s	mm				
7	Rohrwerkstoff						
8	Schweißenden	Ø D x s	mm				
9	Flanschenden						
10	**Armaturenauslegung**			Eintritt		Austritt	
11	Nennweite	DN					
12	Nenndruck	PN					
12	Druck	bara					
13	Temperatur	°C					
14	Material						
15	**Betriebsbedingungen**		Lastfall	Lastfall	Lastfall	Lastfall	Lastfall
16	Medium:		1	2	3	4	5
17	Durchfluss	m^3/h					
18	Temperatur	°C					
19	Druck Ein	bara					
20	Druck Aus	bara					
21	Schalldruckpegel	dB(A)					
22	Kv Wert	m^3/h					
23	**Ventilausführung**		Regelkugelhahn-G				
24							
25	**Werkstoffe:**				**Ventilparameter:**		
26							
27	Gehäuse:	C22.8 oder glw.			Ø Sitz		mm
28	Spindel:	1.4122			Ø Spindel		mm
29	Sitzring:	1.4122 WCB			Drosselstufen:		
30	Kugel:	1.4122 WCB			Kvs Wert:		m^3/h
31	Regelscheibe:	1.4122 WCB			Kennlinie:		
32	Dichtungen:	Viton			delta p Antrieb		bar
33	Packung:	Viton			Baulänge:		mm
34	Dichtungsart:	metallisch / WCB					
35	**Abnahmen**		Druckgeräterichtlinie 97/23 EG CE Kennzeichen				
36			Anforderung nach:		AD-2000		
37			Leckrate:		0,05% vom Kvs Wert		
38	**Einbauvorschrift**						
39							
40	**Antrieb**						
41	Typ:						
42							
43							
44							
45							
46	**Bemerkungen**						
47							
48							
49							
50	Revision	0	1	2	3	4	5
51	Datum:						
52	Erstellt:	H.Roßmann					
53	Geprüft:	I. Mathes					

Spare/wear parts list

Item	Description	Material
9	Seat ring	1.4462 / 1.4122 tungsten carbide coated
4	Ball	1.4462 / 1.4122 tungsten carbide coated
6	Control disc	1.4122 / 1.4462 / 1.0460
15	Disc	PTFE % 25% carbon
16	Disc	PTFE % 25% carbon
21	Piston guide rings	Turcite
20	Slide bearing	Norglide
3	Stem	1.4122 / 1.4462
40+44	Threaded bolt	1.7709 / 1.7218
41+45	Nuts	1.7258 / 1.7218
	Gasket set	