Balancing and Shut-off Valve

BOA-Control IMS

PN 16
DN 15-350
Flow Rate and Temperature Sensor

Flanged Ends

Type Series Booklet

KSB

Legal information/Copyright

Type Series Booklet BOA-Control IMS

KSB Aktiengesellschaft Pegnitz

Balancing and Measurement Valves

Balancing and Shut-off Valves

BOA-Control IMS

Main applications

- Hot-water heating systems
- Air-conditioning systems

Fluids handled

- Hot water for heating systems, with or without glycol (max. 50 %)
- Cold water for air-conditioning systems, with or without glycol (max. 50 %)
- The fluid handled should meet the requirements laid down in the technical instruction leaflet TCh 1466 of the German Association for Technical Supervision (VdTÜV).
- Not suitable for fluids containing mineral oils, steam or fluids liable to attack EPDM and cast iron, for example in open cooling circuits, or water containing oxygen.

Operating data

Operating properties

Characteristic	Value
Nominal pressure	PN 16
Nominal size	DN 15-350[1)]
Max. permissible pressure	16 bar
Max. permissible temperature	120 °C

Design details

Design

- Sensor (IP 54 plug) for flow rate and temperature measurement as well as nominal diameter identification
- Straight-way globe valve with slanted seat
- Non-rotating stem with protected, external thread
- Non-rising handwheel
- Locking device, travel stop, position indicator, throttling plug and insulating cap with anti-condensation feature as standard
- Compact throttling plug with EPDM coating as soft main and back seat
- Maintenance-free stem seal with EPDM profile ring
- Short face-to-face length to DIN EN 558/14 (DN 15-200)
- Exterior coating: blue RAL 5002
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Group 2.

Variants

- Lead-sealable cap (prevents unauthorised actuation) as assembly set
- Electric actuators (DN 15 to 200)

Body materials

Overview of available materials

Material	Material number	Temperature limit
EN-GJL-250	JL 1040	Up to 120 °C

Product benefits

- Integrated sensor for electronic flow rate and temperature measurement, independent of minimum differential pressures, also for permanent measurement using BOATRONIC M-420.
- One model for shut-off and throttling; also available as electrically actuated control valve (up to DN 200) with throttling plug with linear characteristic.
- Minimised pressure loss and high flow rates due to hydraulically favourable flow passage.
- Colour coded for reliable identification, no need to remove the valve insulation.
- Simple body design and anti-condensation feature (insulating cap DN 15-200) allow easy insulation, also for air-conditioning systems.
- Cost-effective transport and handling due to short face-to-face length and low weight.

Related documents

- Precise flow measurement requires the use of a BOATRONIC M-2, M-420 measuring computer.
- Flow characteristics 7112.41
- Operating manual 0570.88
- BOATRONIC M-2, M-420 operating manual 7134.8
- BOATRONIC M-2, M-420 quick-reference operating instructions 7134.81

1) DN 250-350: type BOA-H

On all enquiries/orders please specify

1. Type
2. Nominal pressure
3. Nominal size
4. Variants
5. Number of type series booklet

Measuring computer:

- BOATRONIC M-2: material No. 46000119
- BOATRONIC M-420: material No. 46000117

Pressure/temperature ratings

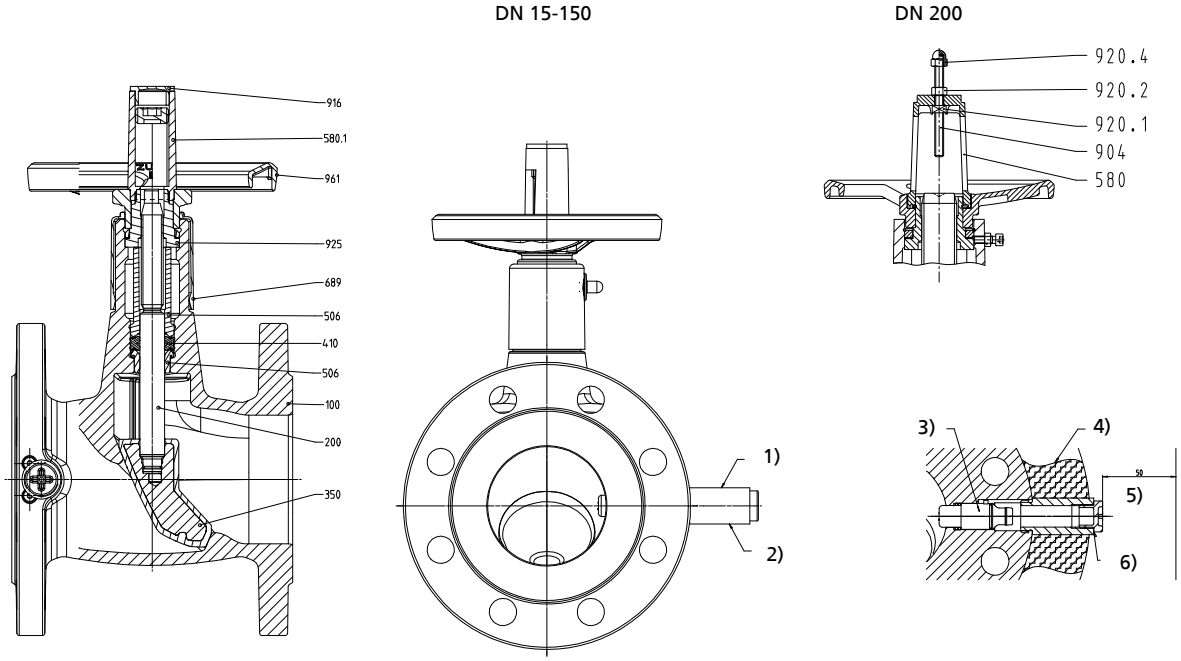
Test and operating pressures

Nominal pressure	Nominal size	Materials	Body pressure test	Leak test	Permissible operating pressures [2]	Permissible differential pressure	
			with water				
			P10, P11	P12	-10 to +120 °C		
PN	DN		[bar][3]	[bar][4]	[bar]	DN	Δp in bar
16	15-300	EN-GJL-250	24	17,6	16	250	9
	350	EN-GJS-400-18-LT			16	300/350	6

2) Static load
3) DIN EN 12266-1 (P10, P11)
4) DIN EN 12266-1 (P12, leakage rate A)

Materials

BOA-Control IMS, type BOA-Compact, DN 15-200

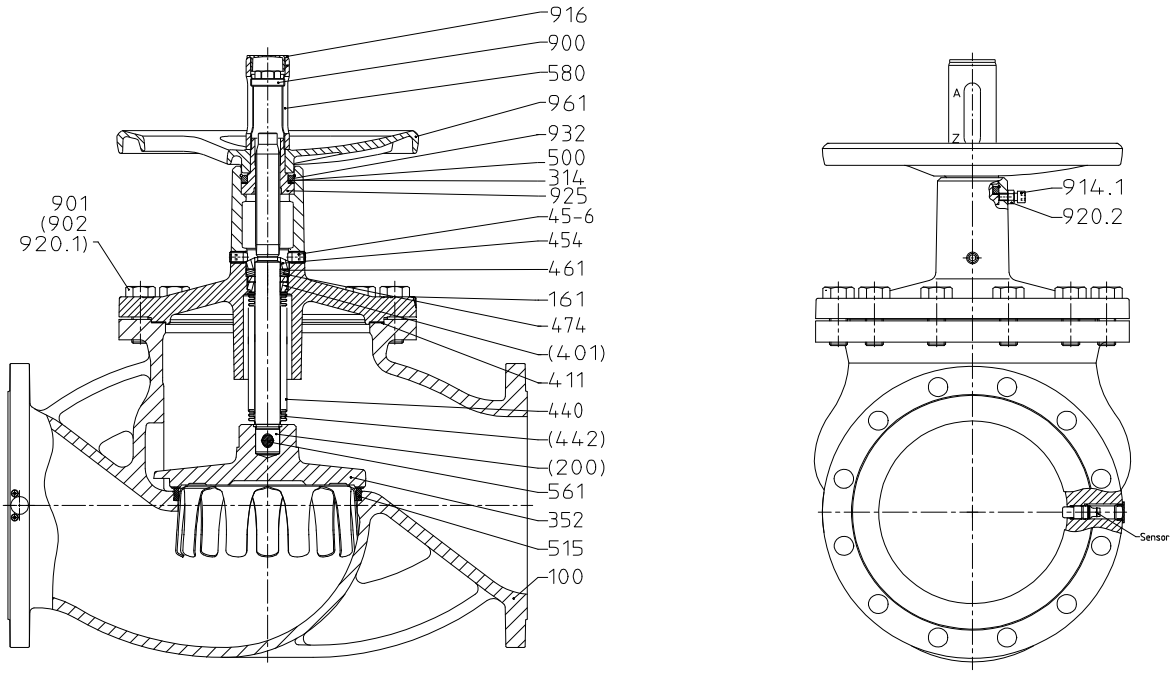


1)	Measurement tap access tube for insulated valves	2)	Set A, B or C (as accessories)	3)	Sensor
4)	Insulation	5)	Minimum distance from adjoining building structure	6)	Set A, B or C (access tube)

Overview of available materials

Part No.	Description	Material	Note
100	Body	EN-GJL-250 (JL1040)	
200	Stem	Stainless steel, min. 13 % chrome (Cr)	
350	Valve disc	Cast iron/EPDM	
410	Profile joint	Elastomer EPDM	
506	Retaining ring	Plastic	
		Galvanised steel	DN 200
580.1	Cap	Plastic, glass-fibre reinforced, impact-resistant	
689	Insulating cap	Plastic	
903	Travel stop	Galvanised steel	
904	Locking device	Galvanised steel	
916	Plug	Plastic	
925	Stem nut	Galvanised steel	
961	Handwheel	Aluminium, die-cast	
		Plastic, glass-fibre reinforced	DN 15-25
		Grey cast iron	DN 200
Sensor	Fitted in the body	PEEK	

BOA-Control IMS, type BOA-H, DN 250-350



Overview of available materials

Part No.		Description	DN	Material	Material number
100		Body	250-300	EN-GJL-250	JL1040
			350	EN-GJS-400-18-LT	JS1025
161		Bonnet	250-300	EN-GJL-250	JL1040
			350	EN-GJS-400-18-LT	JS1025
314		Thrust bearing		Stainless steel/PTFE	
352		Throttling plug		C22+N--NP	
411		Joint ring		CrNiSt/graphite	
440		Bellows set consisting of:			
	200	Stem		Stainless steel (min. 13 % Cr)	
	401	Weld ring		Stainless steel	
	442	Bellows		X 6 CrNiTi 18 10	1.4541
454		Stuffing box ring		Stainless steel	
45-6		Stuffing box screw		Galvanised steel	
461		Gland packing		Pure graphite	
474		Thrust ring		Stainless steel	
500		Ring		Galvanised steel	
515		Seat ring		Stainless steel	
561		Grooved pin		Steel	
580		Cap		Galvanised steel	
901		Hexagon head bolt		8.8 on EN-GJL-250 variant	
902		Stud		CK 35 V on EN-GJS-400-18-LT variant	
914		Socket head cap screw		Galvanised steel	
920.1		Hexagon nut		C 35 on EN-GJS-400-18-LT variant	
920.2		Hexagon nut		Galvanised steel	
925		Stem nut		Coated steel	
961		Handwheel		Grey cast iron	JL1030
Sensor		Fitted in the body		PEEK	

Technical data of BOATRONIC M-2, M-420

BOATRONIC M-2, M-420

Type		BOATRONIC M-2	BOATRONIC M-420
Power supply		1.5 volt batteries, 6 pcs., AA MIGNON	24 V DC ± 10 %
Output Q [m³/h]		Display Q in m³/h	Current output 4 - 20 mA (0 m/s = 4 mA) (2 m/s = 20 mA)
Output T (-10 to +120 °C)		Display T in °C	Current output 4 - 20 mA (-10 °C = 4 mA) (+120 °C = 20 mA)
Current requirement [mA]		80	95
Low voltage detection		7.2 V --> "bAt" is displayed	-
Terminals: output/power supply		- / 2 battery holder	Quick-connect terminals
Enclosure		IP 40 to EN 60529	IP 54 to EN 60529
Safety class		III	III
Shock test, drop from 1 m		Successful	Successful
In-service ambient temperature		5 to 50 °C	
In-storage ambient temperature		-20 to +50 °C	
Measuring range	Temperature	-10 to +120 °C	
	Flow rate	At velocities of 0.1 bis 2 m/s in the piping	
Measuring accuracy	Temperature	± 1.5 K	
	Flow rate	± 5 % of the measuring range limits for the respective nominal diameter	

Design

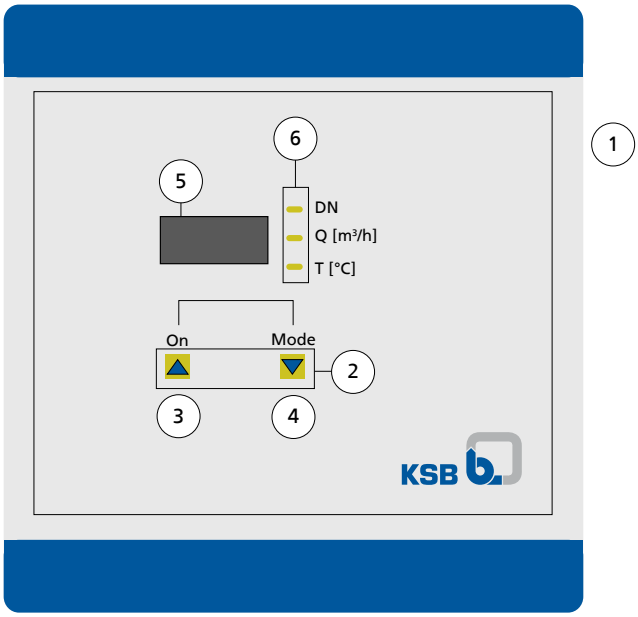
BOATRONIC is designed to be used with BOA-Control IMS valves to measure the flow rate and fluid temperature in heating systems and cold-water air-conditioning systems. BOATRONIC also indicates the nominal size of the BOA-Control IMS valve installed in the pipeline.

Overview of BOATRONIC models

Type	BOATRONIC M-2	BOATRONIC M-420
Function	▪ Short-term measurement ▪ Mobile device (battery-powered) ▪ Without output	▪ Permanent measurement ▪ Voltage supply: 24 V DC ▪ Current output 4-20 mA for Q and T

Configuration and function

For flow rate and temperature measurement, BOATRONIC must be connected to a BOA-Control IMS valve equipped with a calorimetric sensor. The plug on BOATRONIC is connected to the sensor. The sensor memory contains information on the BOA-Control IMS valve, which is transmitted to BOATRONIC. BOATRONIC M-2 is a mobile battery-powered device. BOATRONIC M-420 must be installed on site and connected to an additional power supply.



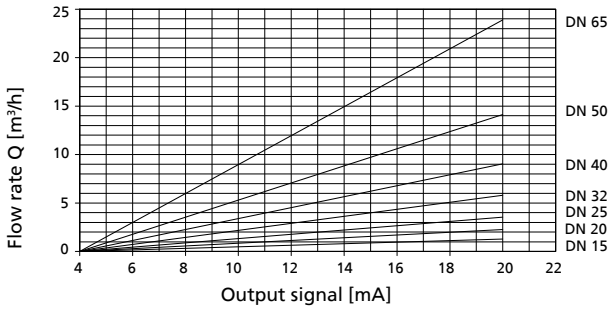
Display/indicator and operating elements

Elements	Key	Function/design
Toggle switch (BOATRONIC M-2 only)	①	For starting/stopping
Operating elements	②	Membrane keys
"ON" key	③	Programming and display of glycol settings
"Mode" key	④	Selection of reading to be shown Nominal size DN Flow rate m^3/h Temperature °C
Display/indicator elements	⑤ ⑥	Three-digit LED display Three yellow LEDs

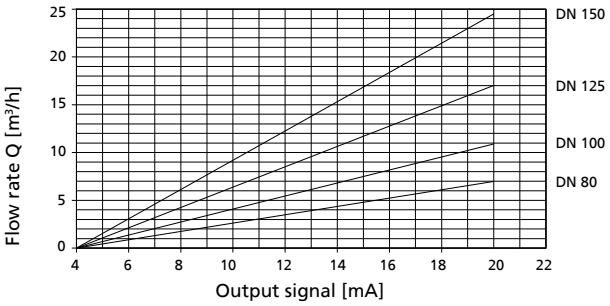
Characteristic curves of BOATRONIC M-420

Correlation between volume flow rate and output signal for BOATRONIC M-420

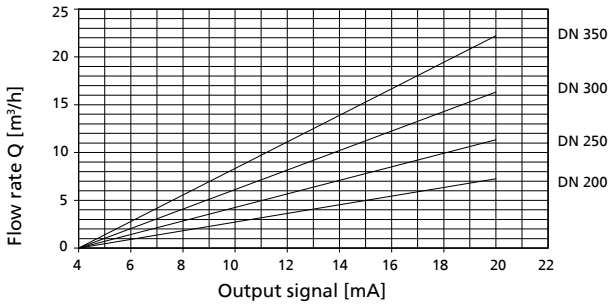
DN 15 to 65



DN 80 to 150



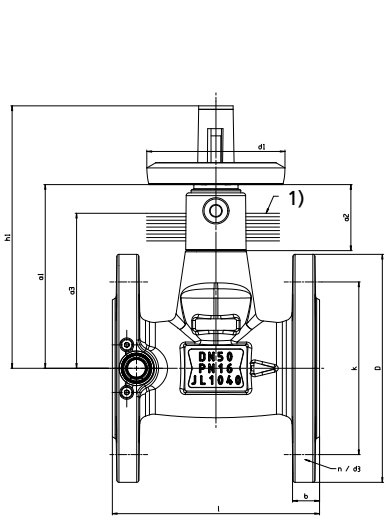
DN 200 to 350



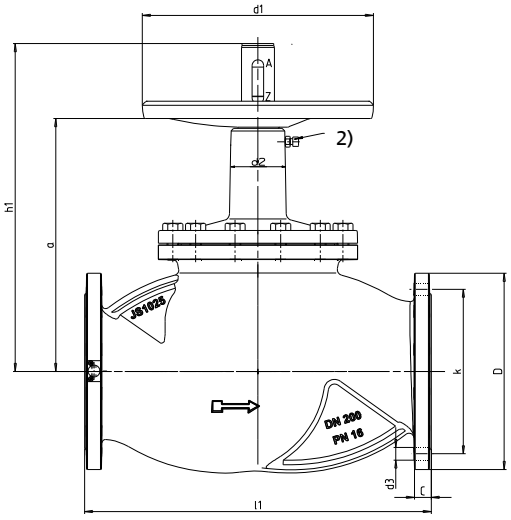
Data table

DN	[mA]	[m³/h]	[mA]	[m³/h]	[mA]	[m³/h]
15	4,8	0,06	10	0,48	20	1,27
20	4,8	0,11	10	0,85	20	2,26
25	4,8	0,18	10	1,33	20	3,53
32	4,8	0,29	10	2,17	20	5,79
40	4,8	0,45	10	3,39	20	9,05
50	4,8	0,71	10	5,30	20	14,14
65	4,8	1,19	10	8,96	20	23,89
80	4,8	1,81	10	13,57	20	36,19
100	4,8	2,82	10	21,21	20	56,55
125	4,8	4,42	10	33,13	20	88,36
150	4,8	6,36	10	47,71	20	127,23
200	4,8	11,31	10	84,82	20	226,19
250	4,8	17,67	10	132,54	20	353,43
300	4,8	25,45	10	190,85	20	508,94
350	4,8	34,64	10	259,77	20	692,72

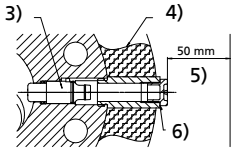
Dimensions

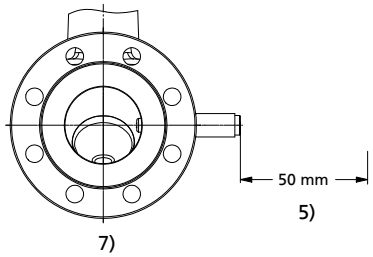


DN 15-200



DN 250-350





1)	Insulation boundary	2)	Shown offset by 90°	3)	Sensor	4)	Insulation
5)	Minimum distance from adjoining building structure	6)	Set A, B or C (access tube)	7)	With measurement tap access tube for insulated valves		

Dimensions in mm

PN	DN	l	h_1	d_1	d_2≈	a_1	a_2	D	k	n x d_3	b	[kg]
16	15	115	156	80	35	105	46	95	65	4 x 14	14	2,9
	20	120	156	80	35	105	46	105	75	4 x 14	16	3,6
	25	125	156	80	35	105	46	115	85	4 x 14	16	3,9
	32	130	179	100	35	122	46	140	100	4 x 19	18	5,7
	40	140	179	100	35	122	46	150	110	4 x 19	18	6,1
	50	150	189	100	43	131	46	165	125	4 x 19	20	8
	65	170	252	125	47	174	66	185	145	4 x 19	20	10,6
	80	180	252	160	52	185	76	200	160	8 x 19	22	14,1
	100	190	298	160	63	215	73	220	180	8 x 19	24	18,8
	125	200	373	200	85	270	115	250	210	8 x 19	26	32,1
	150	210	386	250	85	282	113	285	240	8 x 23	26	38,3
	200	230	693	315	136	434	174	340	295	12 x 23	30	68

Dimensions in mm

PN	DN	l	h_1	d_1	d_2≈	a	D	k	n x d_3	b	Weight [kg]
16	250	730	606	400	93	476	405	355	12 x 28	32	239
	300	850	660	400	93	530	460	410	12 x 28	32	343
	350	980	660	400	93	530	520	470	16 x 28	36	390

Mating dimensions - Standards

Face-to-face lengths:	DN 15-200: DIN EN 558/14, ISO 5752/14 DN 250-350: DIN EN 558 FTF-1, ISO 5752/1
Flanges:	DIN EN 1092-2, flange type 21
Flange facing:	DIN EN 1092-2, type B

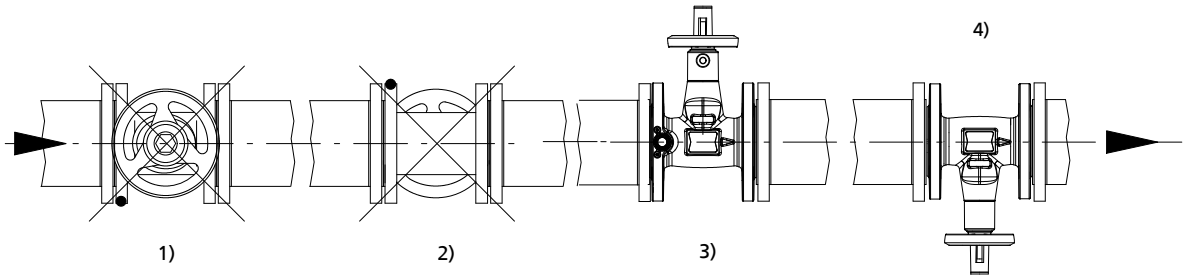
Installation instructions

Non-compliance with the following installation instructions may result in failure of the measuring functions!

For measuring purposes, the direction of the flow through BOA-Control IMS balancing and shut-off valves of the BOA-Compact series (DN 15-200) must correspond to the direction indicated by the arrow cast on the valve body. An alternating direction of flow is permissible for the shut-off function.

Flow through valve type BOA-H (DN 250-350) must be in the direction indicated by the arrow cast on the valve body.

Vertical installation:	For installation in vertical piping, no restrictions apply with regard to the installation position of the valves.
Horizontal installation:	For installation in horizontal piping, it is important to ensure that the sensor is permanently in contact with the fluid handled. For this reason, installation with "sensor on top" (air bubbles) or "sensor below" (deposits) is not allowed.



1)	Sensor below, handwheel in front. **Arrangement is not allowed.**	2)	Sensor on top, handwheel in back. **Arrangement is not allowed.**	3)	Sensor in front, handwheel on top.	4)	Sensor in back, handwheel below.

For optimum measuring accuracy, the following straight, minimum upstream stabilisation distances free from any sources of potential interference must be provided, irrespective of the installation position:

- At least 7 x DN between BOA-Control IMS and single sources of interference such as single 90° bends or open shut-off valves.
- At least 30 x DN between BOA-Control IMS and turbulence-producing elements such as pumps or control valves.

Installation in return line is recommended.

Any sources of potential interference in the upstream stabilisation area (such as, for example, immersion sensors or non-standardised sealing elements) must be avoided.

Any sources of interference must be assessed in accordance with EN ISO 5167-1, section 7.3 (previously DIN 1952, section 6).

A downstream stabilisation distance is not required!

Prior to valve mounting, use a clean cloth to remove any dirt from the sensor!

To avoid thermal damage to the sensor, welding work in the area of the pipe flanges must only be carried out after the valve has been removed.

When a valve of nominal size 250-350 is mounted with the bonnet pointing downwards, make sure the valve is fully open during flushing of the pipeline or similar procedures to prevent contamination of the bellows.

The connection cable of BOATRONIC to the sensor is 0.5 m long and must **not** be modified.

Accessories

- Measurement tap access tube for insulated valves
  Set A: 50 mm
  Set B: 85 mm
  Set C: 115 mm
- Lead-sealable cap (prevents unauthorised actuation) as assembly set

Selection of extension set depending on nominal size and insulation thickness

	Insulation thickness in mm				
DN	**0-10**	**11-20**	**21-30**	**31-40**	**41-50**
15/20	Set A [5)]	Set A	Set A	Set A	Set B
25	Set A	Set A [5)]	Set A	Set B	Set B
32/40	Set A	Set A [5)]	Set A	Set B	Set B
50	Set A	Set A	Set A [5)]	Set B	Set B
65/80	Set A	Set A	Set A	Set B [5)]	Set B
100	Set A	Set A	Set A	Set B	Set B [5)]
125	Set A	Set A	Set B	Set B	Set B [5)]
150	Set A	Set A	Set B	Set B	Set B [5)]
200	Set A	Set B	Set B	Set B	Set B [5)]
250	Set A	Set B	Set B	Set B	Set C [5)]
300	Set B	Set B	Set B	Set B	Set C [5)]
350	Set B	Set B	Set B	Set C	Set C [5)]

5) Insulation in accordance with German energy-saving regulations EnEV 2002 Annex 5

Chemical resistance chart

The information provided in this chemical resistance chart is based on experience, the Dechema lists as well as manufacturer information. Corrosion resistance is largely dependent on the operating conditions, temperatures and concentrations. Hydroabrasive wear in fluids containing solids is not covered in this list. All information provided herein, therefore, only serves as an orientation. Warranty claims may not be asserted on the basis of this list!

Chemical resistance chart for water[6)]

Fluid handled	Max. content	Max. temp.	
Bathing water (seawater)			✖
Brackish water			✖
Chlorinated water	0,6 mg/kg		✓
Deionised water (demineralised water)			✖
Distilled water			✖
Hot water for heating systems			✓
Condensate			○
Oil-free cooling water			○
Oil-containing cooling water			✖
Seawater			✖
Ozonised water	0,5 mg/kg		✓
Partly desalinated water			○
Thermal water			✖
Drinking water			✖
Fully desalinated water			✖

Chemical resistance chart for oils (aromatic content 5 mg/kg)

Fluid handled	Max. content	Max. temp.	
Vegetable oils			✖
Mineral oils			✖
Synthetic oils			✖
Petroleum			✖
Oil-water emulsion			✖
Kerosene			✖

Chemical resistance chart for refrigerants

Fluid handled	Max. content	Max. temp.	
Ammonium hydroxide	25 %	25 °C	✓
Glycol (ethylene glycol)			✓
Cold-water for air-conditioning systems	50 %	90 °C	✓
Inorganic cooling brine, ph 7,5 inhibited			✓

Chemical resistance chart for cleaning agents

Fluid handled	Max. content	Max. temp.	
Lye for bottle rinsers (e.g. P3)			✗
Lye for metal cleaning			✗

Chemical resistance chart for other fluids

Fluid handled	Max. content	Max. temp.	
Landfill gas			✗
Oil-containing compressed air			✗
Aqueous glycerine			✗
Carbon dioxide (gas)			✗
Carbon dioxide (aqueous solution)			✗
Oxygen O_2			✗

Key to the symbols

Symbol	Description
✓	The fluid handled is not normally aggressive toward the materials. Valve can be used if [6)] is observed.
✖	The fluid handled is aggressive toward the materials. Valve cannot be used.
✗	The fluid handled is not suitable for sensor measurement.
○	The material or valve can only be used under certain operating conditions. Please enquire accordingly stating the operating conditions such as concentration, temperature, pH value and composition of the fluid handled.

6) General criteria for water to be handled by valves made of non-alloyed materials: pH value 6.5 - 12; chlorides (Cl-) < 150 mg/kg; chlorine (Cl) < 0.6 mg/kg. Other factors to be considered: hardness, carbon dioxide content (CO_2), oxygen (O_2) and dissolved substances. Contact KSB if limits are exceeded!

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