

Balancing and Shut-off Valve

BOA-Control/BOA-Control IMS

PN 16
DN 15-350
Flow Rate
and Temperature Sensors
Flanged Ends

Type Series Booklet



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Type Series Booklet BOA-Control/BOA-Control IMS

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Control and Measurement Valves

Balancing and Shut-off Valves to DIN/EN

BOA-Control/BOA-Control IMS



Main applications

- Hot-water heating systems
- Air-conditioning systems
- Cooling circuits

Fluids handled

- Hot water for heating systems, with or without glycol (max. 60 %)
- Cold water for air-conditioning systems, with or without glycol (max. 60 %)
- The fluid handled should meet the requirements to VdTÜV/AGFW TCh 1466 or VDI 2035.
- Fluids containing gas or air can only be measured with ultrasound technology to a limited extent. Proper venting of the systems is therefore essential.

Operating data

Operating properties

Characteristic	Value
Nominal pressure	PN 16
Nominal size	DN 15 - 350 ¹⁾
Max. permissible pressure	16 bar
Min. permissible temperature	-10 °C
Max. permissible temperature	+120 °C

Design details

Design

Valve:

- BOA-Control IMS complete with sensors for measuring flow rate and temperature
- BOA-Control prepared for attaching sensors for measuring flow rate and temperature
- Straight-way globe valve with slanted seat
- Non-rotating stem with protected, external thread
- Non-rising handwheel
- Locking device, travel stop, position indicator (in %), throttling plug and insulating cap with anti-condensation feature as standard
- Compact, EPDM-encapsulated throttling plug as soft main and back seat
- Maintenance-free stem seal with EPDM profile ring
- Face-to-face length to DIN EN 558/1
- 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.

Measuring computer:

- Measuring flow rate and temperature requires the use of a measuring computer.
- Mobile short-term measurement with battery-powered BOA-TRONIC MS
- Permanent measurement set-up with BOA-TRONIC MS-420 (24 V DC power supply)

Variants

- Lead-sealable cap (prevents unauthorised actuation) as assembly set
- Control valve with electric actuator (DN 15 to 200)

Body materials

Overview of available materials

Material	Material number	Nominal size
EN-GJL-250	5.1301	Up to DN 300
EN-GJS-400-18-LT	5.3103	DN 350

Product benefits

- Innovative ultrasound technology for electronic flow rate measurement independent of minimum differential pressures
- Equipped with additional temperature sensor
- One model for shut-off and control duties due to throttling plug with linear characteristic
- Direct and straightforward measurement
- Minimised pressure loss and high flow rates due to hydraulically favourable flow passage
- Ultrasonic measurement: no contact with fluid handled
- High functional reliability as measurement is little affected by sedimentation and contamination

¹⁾ DN 250-350: type BOA-H

- Simple body design and anti-condensation feature allow easy insulation, also for air-conditioning systems. Optional insulation shells available.
- Automatic identification of flow direction for optimised fault analysis
- Type series and nominal size can be identified reliably due to colour coding even on insulated valves; travel indicator scale provided

- Installation instructions "Accessories set for capped valves", 0570.811

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 MS: material No. 01624491
- BOATRONIC MS-420: material No. 01624492

Information/documents

- Flow characteristics 7112.41
- Operating manual 0570.88
- BOATRONIC MS, BOATRONIC MS-420 operating manual, 7134.8
- BOATRONIC MS, BOATRONIC MS-420 quick-reference operating manual, 7134.81

Pressure/temperature ratings

Test and operating pressures

Nominal pressure	Nominal size	Materials	Shell test	Leak test (seat)	Permissible operating pressures 2)
			With water to DIN EN 12266-1		
			P10, P11	P12, leakage rate A	-10 to +120 °C
PN	DN		[bar]	[bar]	[bar]
16	15-300	EN-GJL-250	24	17,6	16
	350	EN-GJS-400-18-LT			16

Valves from DN 250 can only be used for shut-off duties up to the differential pressures indicated below, even when handwheel levers are used!

Permissible differential pressures

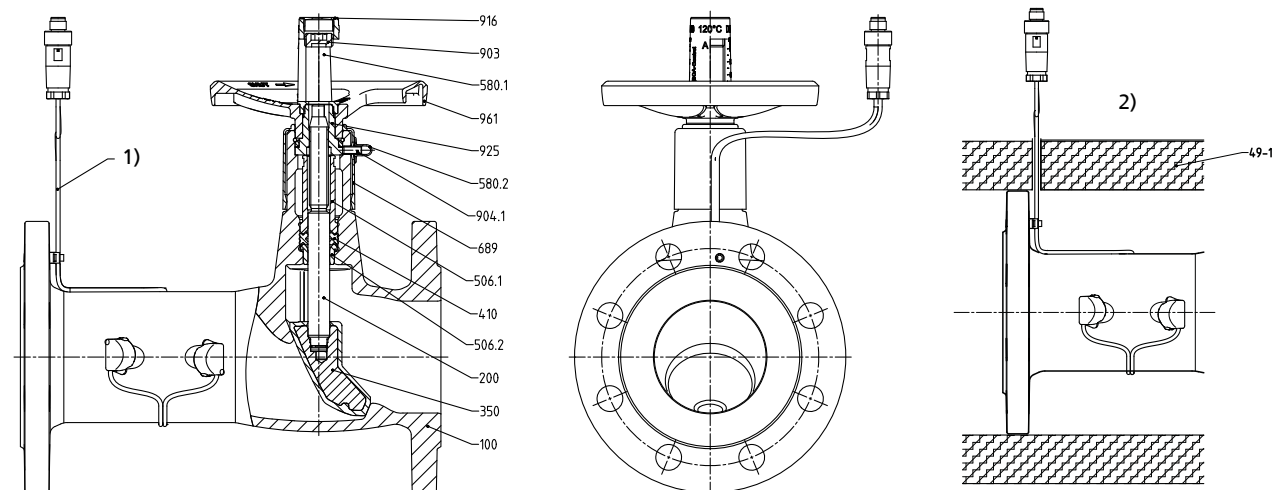
PN	DN	Δp in bar
16	250	9
	300/350	6

²⁾ Static load

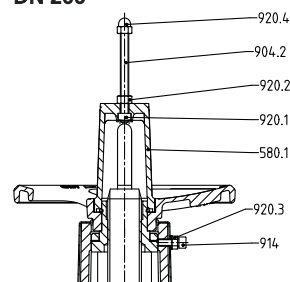
Materials

BOA-Control/BOA-Control IMS, type BOA-CL, DN 15-200

DN 15-150



DN 200

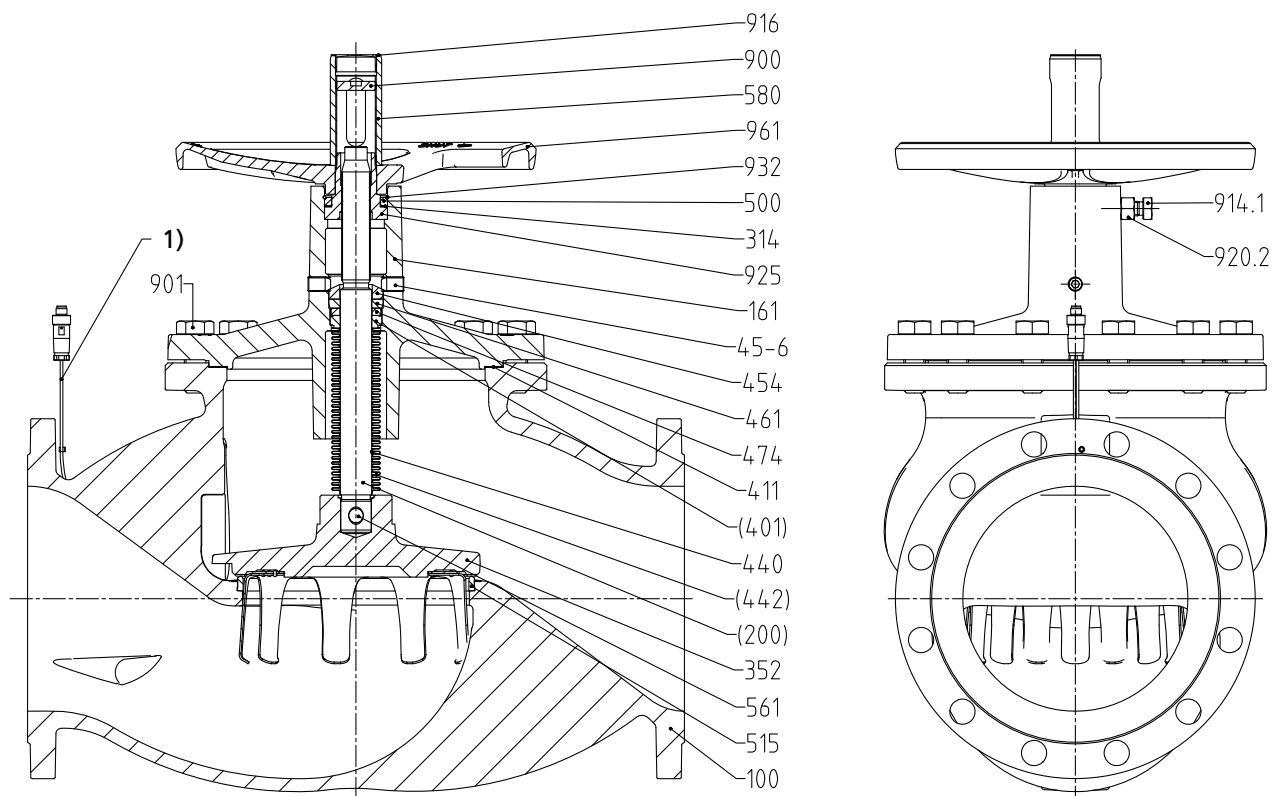


1)	Sensor set	2)	Insulation
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Parts list

Part No.	Description	Material	Note
49-1	Insulation shell		Accessory
100	Body	EN-GJL-250 (5.1301)	
200	Stem	Stainless steel, min. 13 % chrome (Cr)	
350	Valve disc	Cast iron/EPDM	
410	Profile seal	Elastomer EPDM	
506.1	Retaining ring, long	Plastic	
		Galvanised steel	DN 200
506.2	Retaining ring, short	Plastic	
		Galvanised steel	DN 200
580.1	Cap with travel scale	Plastic, glass-fibre reinforced, impact-resistant	
580.2	Protective cap	Plastic	
689	Insulation cap	Plastic	
903	Travel stop	Galvanised steel	
904.1	Locking device	Galvanised steel	
904.2	Travel stop	Galvanised steel	
914	Hexagon socket head cap screw	Galvanised steel	
916	Plug	Plastic	
920.1	Hexagon nut	Galvanised steel	
920.2	Hexagon nut	Galvanised steel	

Part No.	Description	Material	Note
920.3	Hexagon nut	Galvanised steel	
920.4	Hexagon nut	Galvanised steel	
925	Stem nut	Galvanised steel	
961	Handwheel	Plastic, glass-fibre reinforced, impact-resistant	DN 15-50
		Aluminium, die-cast	DN 65-150
		Grey cast iron	DN 200
	Sensor set	Plastic with ceramics	BOA-Control IMS only

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


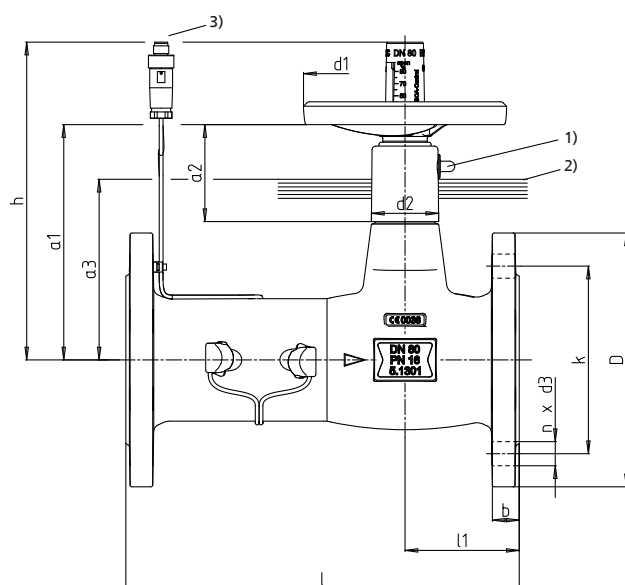
1)	Sensor set
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Parts list

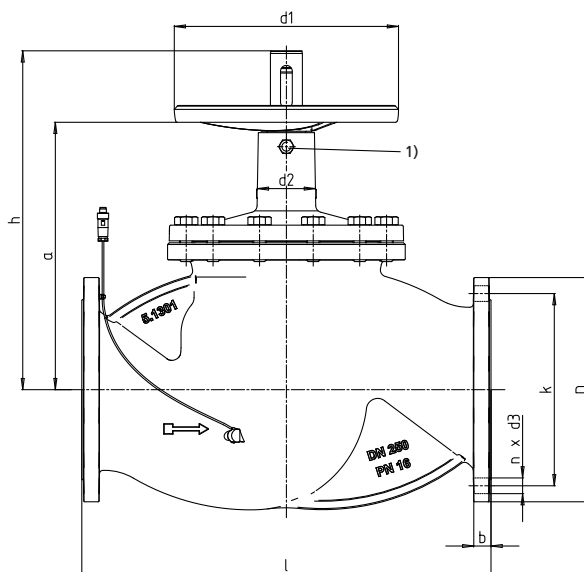
Part No.	Description	DN	Material	Material number
49-1	Insulation shell			Accessory
100	Body	250-300	EN-GJL-250	5.1301
		350	EN-GJS-400-18-LT	5.3106
161	Body bonnet	250-300	EN-GJL-250	5.1301
		350	EN-GJS-400-18-LT	5.3106
314	Thrust bearing		Stainless steel/PTFE	
352	Throttling plug		C22+N--NP	
411	Joint 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	
900	Screw		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	Hexagon socket head cap screw		Galvanised steel	
914.1	Hexagon socket head cap screw		Galvanised steel	
916	Plug		Plastic	
920.1	Hexagon nut		C 35 on EN-GJS-400-18-LT variant	

Part No.	Description	DN	Material	Material number
920.2	Hexagon nut		Galvanised steel	
925	Stem nut		Coated steel	
932	Circlip		Spring steel	
961	Handwheel		Grey cast iron	5.1300
	Sensor set		Plastic with ceramics	

Dimensions



DN 15-200



DN 250-350

1)	Shown offset by 90°	2)	Insulation boundary	3)	Sensor
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Dimensions in mm

PN	DN	l	l ₁	h	d ₁	d ₂	a ₁	a ₂	a ₃	D	k	n x d ₃	b	[kg]	Capped valve		
															h ₃	d ₄	a ₄
16	15	130	42,5	130	50	33	93	29	57,5	95	65	4 x 14	14	2,0	181,5	130	166
	20	150	48	130	50	33	93	29	62,5	105	75	4 x 14	16	2,4	181,5	130	166
	25	160	54,5	156	80	35	105	46	72,5	115	85	4 x 14	16	3,1	191,5	130	166
	32	180	65	178	100	43	122	46	85	140	100	4 x 19	18	5,0	205,0	130	166
	40	200	70	178	100	43	122	46	95	150	110	4 x 19	18	5,8	207,5	130	166
	50	230	75	189	100	43	133	46	107,5	165	125	4 x 19	20	7,6	218,5	130	166
	65	290	85	247	125	47	175	66	125	185	145	4 x 19	20	11,5	258,5	130	166
	80	310	90	251	160	52	186	76	140	200	160	8 x 19	22	14,5	330,5	170	210
	100	350	95	305	160	63	224	73	160	220	180	8 x 19	24	20,7	346,5	170	210
	125	400	125	371	200	85	271	115	175	250	210	8 x 19	26	31,7	431,0	220	270
	150	480	150	385	250	85	283	113	192,5	285	240	8 x 23	26	41,6	453,0	340	390
	200	600	180,5	697	315	136	434	175	220	340	295	12 x 23	30	90,7	597,0	340	390

Dimensions in mm

PN	DN	l	h	d ₁	d ₂	a	D	k	n x d ₃	b	[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:

Flanges:

Flange facing:

DIN EN 558/1, ISO 5752/1

DIN EN 1092-2, flange type 21

DIN EN 1092-2, type B

Installation instructions

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

For measuring purposes, the flow direction through BOA-Control/BOA-Control IMS balancing and shut-off valves of the BOA-CL 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 shut-off duty.

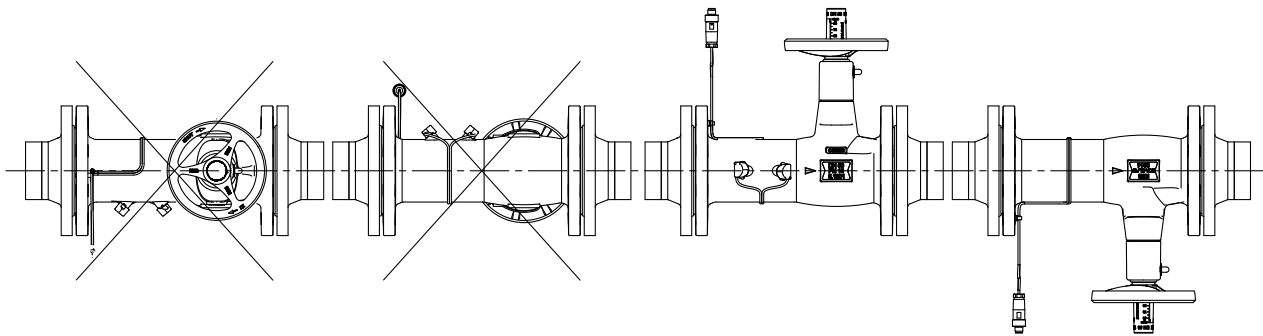
Flow through valve type BOA-H (DN 250-350) must be in the direction indicated by the arrow cast on the valve body.

Vertical installation:

For installation in vertical piping, no restrictions apply with regard to the installation position of the valves.

Horizontal installation:

Installation with the valve stem in horizontal position is not allowed, to prevent air bubbles or deposits in the measuring plane.



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.
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i 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 5 x DN between BOA-Control/BOA-Control IMS and single sources of interference such as single 90° bends or open shut-off valves
- At least 10 x DN between BOA-Control/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!

i To avoid thermal damage to the valve disc and sensors, welding work in the area of the pipe flanges may only be carried out after the valve has been removed.

i Valves of DN 250-350 should not be installed with the stem pointing downwards to prevent dirt deposits between the folds of the bellows which might cause valve failure.

i The length of the cables connecting the sensors to BOATRONIC must **not** be changed.

Accessories

- Insulation shells³⁾ for thermal insulation up to 130 °C with a thermal conductivity at 40 °C of 0.029 W/mk
Material: polyurethane
- Lead-sealable cap (prevents unauthorised actuation) as assembly set
- Mobile measuring computer BOATRONIC MS
- Stationary measuring computer BOATRONIC MS-420

³⁾ Insulation in accordance with German energy-saving regulations EnEV 2002 Annex 5

Technical data of BOATRONIC MS, BOATRONIC MS-420

BOATRONIC MS, BOATRONIC MS-420

Type		BOATRONIC MS	BOATRONIC MS-420
Power supply		1.5 volt batteries, 4 pcs, AA Mignon	24 V DC \pm 25 %
Output Q [m³/h]		Display Q in m³/h Alternatively in [l/s] or [l/min] OR V in [m/s]	Current output 4 - 20 mA (0 m³/h = 4 mA) (max. m³/h "depending on DN" = 20 mA)
Output T (-10 to +120 °C)		Display T in [°C], alternatively in [°F]	Current output 4 - 20 mA (-10 °C = 4 mA) (+120 °C = 20 mA)
Current requirement [mA]		150	190
Low voltage detection		Battery status icon flashes when battery is very low (7.2 V) 1. Under 10 % voltage, error F16: Measuring still possible 2. Under 5 % voltage, message "Please change batteries": No measurement possible 3. Under 1 % voltage, message "Low battery": Device switches off	-
Terminals: Output/power supply		-/2 battery holder	Spring-type
Enclosure		IP54 to EN 60529	IP54 to EN 60529
Safety class		III	III
Shock test, drop from 1 m		Passed	Passed
In-service ambient temperature		-20 to +50 °C	
In-storage ambient temperature		-20 to +50 °C	
Measuring range	Temperature	-10 to +120 °C	
	Flow velocity	0.1 to 4 m/s	
Measurement accuracy ⁴⁾	Flow rate	\pm 5 % of actual value	
Measurement cable	Sensor connection	1 m in length (cannot be changed)	

Design

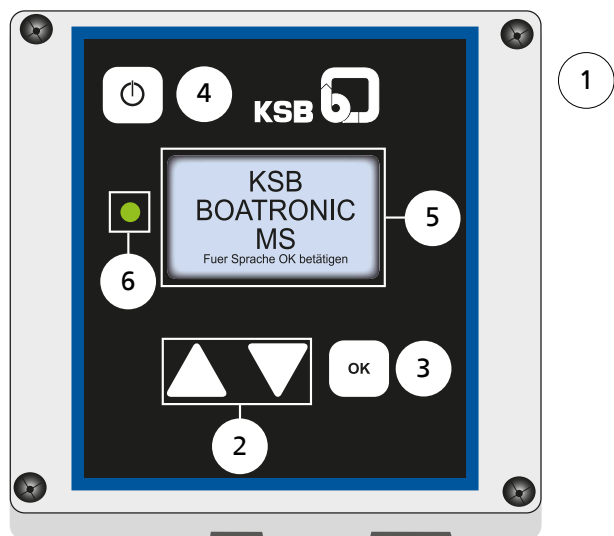
Overview of BOATRONIC models

Type	BOATRONIC MS	BOATRONIC MS-420
Function	<ul style="list-style-type: none"> For short-term measurement Mobile device (battery-powered) With USB interface for uploading and downloading data 	<ul style="list-style-type: none"> For permanent measurement set-up Voltage supply: 24 V DC Current output 4-20 mA/2-10 V for Q and T

⁴⁾ Applies to BOA-Control IMS with H₂O at 20 °C, $v \geq 0.5$ m/s with manual zero point calibration

Configuration and function

For flow rate and temperature measurement BOATRONIC must be connected to a BOA-Control or BOA-Control IMS balancing and shut-off valve. BOATRONIC is operated via a 3-key membrane keypad. A multi-line LCD display and multicolour LED provide the user with the requisite information.

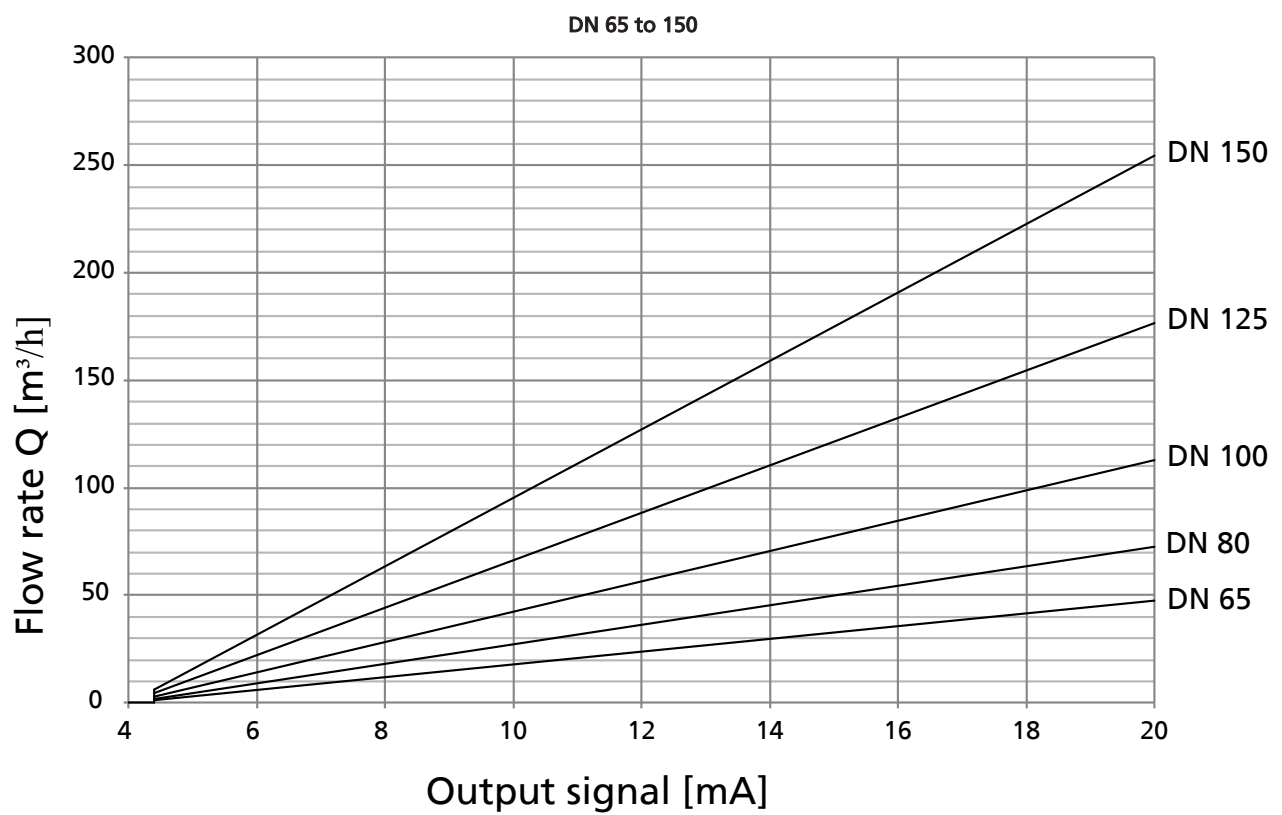
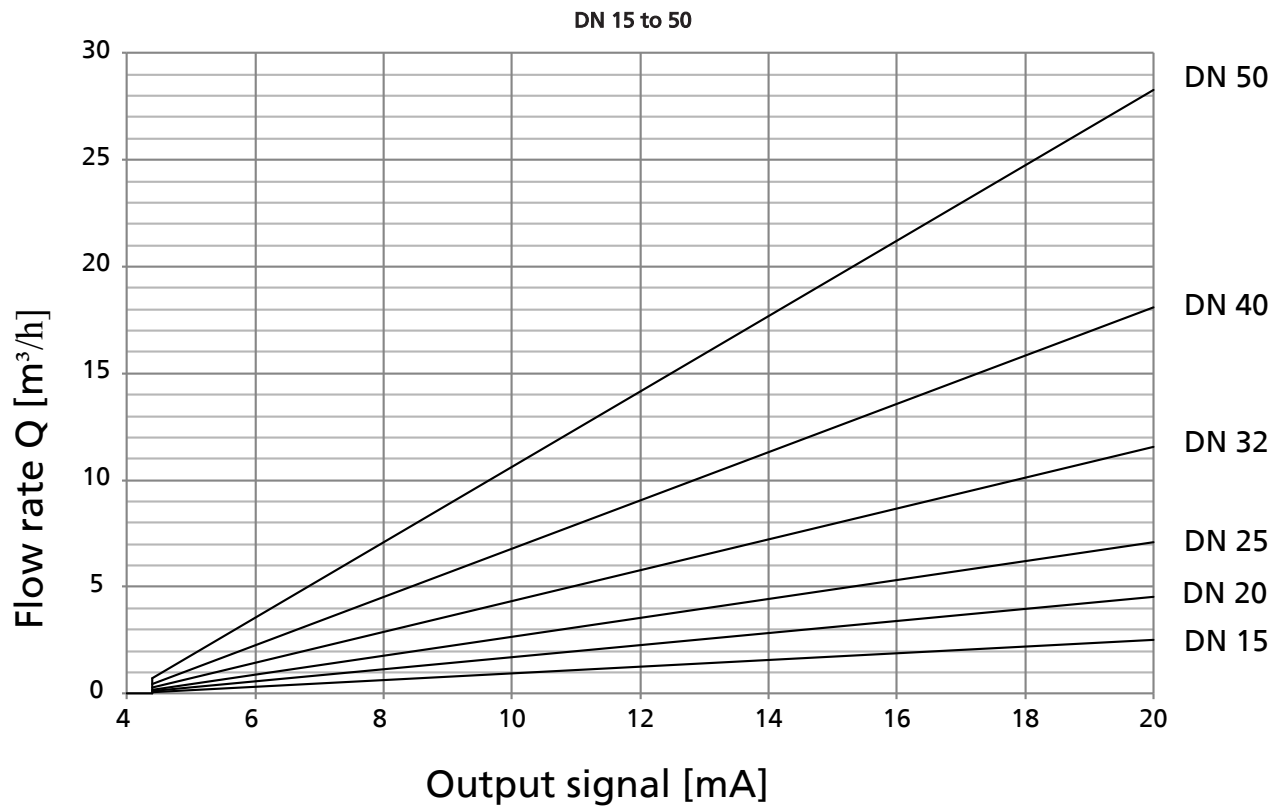


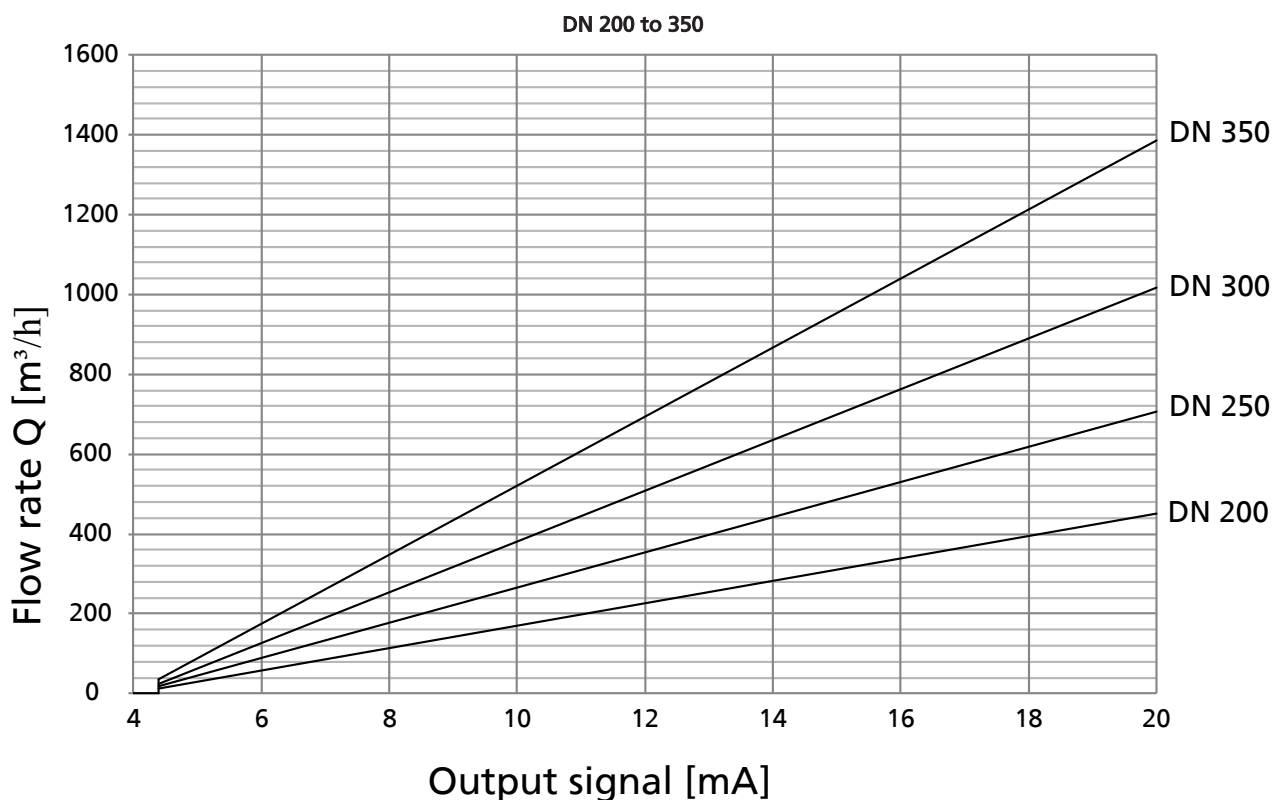
Display/indicator and operating elements

Elements	Key	Function/design
BOATRONIC front membrane	①	Membrane keypad with display/indicator elements
Direction keys	②	Selection of menu items
"OK" key	③	Confirmation of input/selection
"ON/OFF" key	④	Switching analysing unit ON/OFF Display backlighting ON/OFF
Display/indicator elements	⑤	Graphical LCD display
	⑥	Fault indication by red LED Measurement in progress by green LED

Characteristic curves of BOATRONIC MS-420

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





Data table

DN	[mA]	[m³/h]	[mA]	[m³/h]	[mA]	[m³/h]
15	4,4	0,06	12	1,27	20	2,54
20	4,4	0,11	12	2,26	20	4,52
25	4,4	0,18	12	3,53	20	7,07
32	4,4	0,29	12	5,79	20	11,58
40	4,4	0,45	12	9,05	20	18,10
50	4,4	0,71	12	14,14	20	28,27
65	4,4	1,19	12	23,89	20	47,78
80	4,4	1,81	12	36,19	20	72,38
100	4,4	2,83	12	56,55	20	113,10
125	4,4	4,42	12	88,36	20	176,71
150	4,4	6,36	12	127,23	20	254,47
200	4,4	11,31	12	226,19	20	452,39
250	4,4	17,67	12	353,43	20	706,86
300	4,4	25,45	12	508,94	20	1017,88
350	4,4	34,64	12	692,72	20	1385,44

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 water⁵⁾

Fluids 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)

Fluids handled	Max. content	Max. temp.	
Vegetable oils			✗
Mineral oils			✗
Synthetic oils			✗
Petroleum			✗
Oil-water emulsion			✗
Kerosene			✗

Chemical resistance chart for refrigerants

Fluids 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

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

Chemical resistance chart for other fluids

Fluids handled	Max. content	Max. temp.	
Landfill gas			✗
Oil-containing compressed air			✗
Aqueous glycerine			✗
Carbon dioxide (gas)			✗
Carbon dioxide (aqueous solution)			✗
Oxygen O ₂			✗

Symbols key

Symbol	Description
✓	The fluid handled is not normally aggressive toward the materials. Valve can be used if ⁵⁾ 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.

⁵⁾ 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 (CO₂), oxygen (O₂) and dissolved substances. Contact KSB if limits are exceeded!



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