



# Variable Area Flow Meter for Horizontal and Vertical Installation **BGF**

## Technical Data Sheet



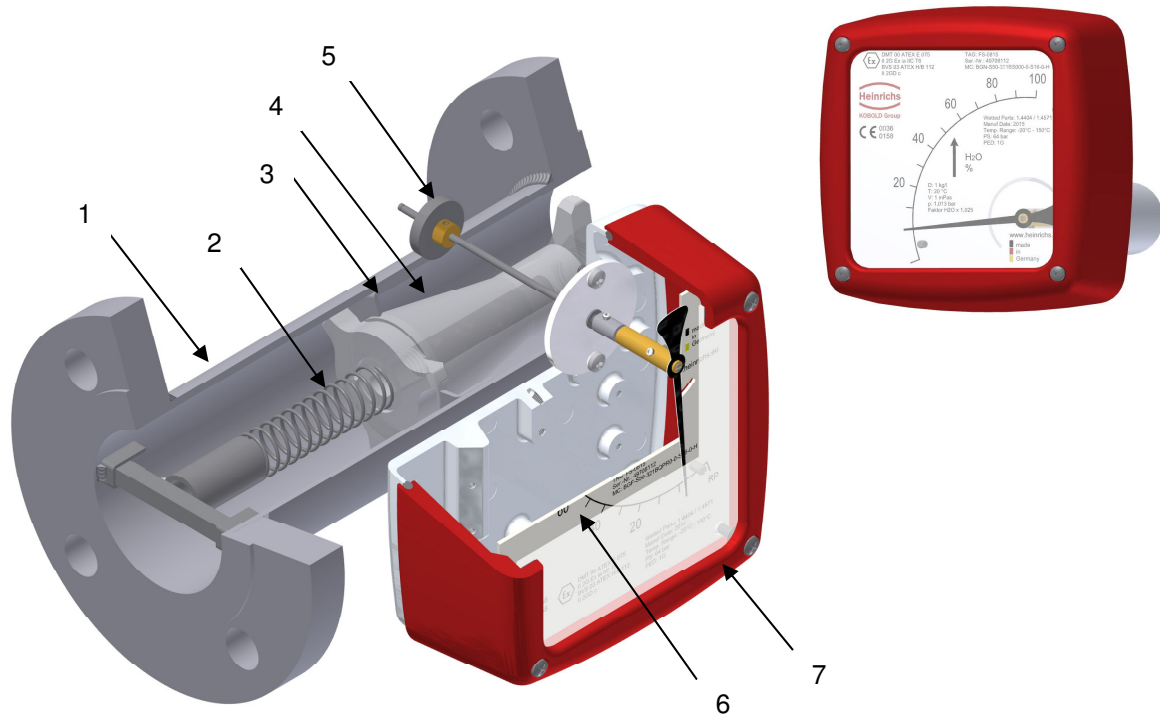
- Extremely robust through star guiding system instead of guiding rod
- Flow metering of liquids, gases and steam
- Outstanding clear meter reading through 90° arranged scale
- Electrical transmitter with HART®, PROFIBUS-PA® or Fieldbus Foundation®
- Suitable for the installation in safety related applications acc. to SIL

## Function

The measuring element(1) consists of a sharp-edged measuring ring(3) and a conical measuring body(4) with a compression spring(2).

If a medium flows with sufficient velocity through the measuring ring(3), the position of the measuring body(4) will be shifted until the flow force and the measuring body plus the spring tension establish equilibrium.

The position of the measuring body in the measuring ring serves as the measure of the flow and is converted to a rotary motion by the permanent magnet embedded in the measuring body through a magnetic coupling system(5). It is then transmitted to the scale(6) inside the indicator housing(7) and the additional electrical equipment.



## Application

The BGF instrument is suitable for the flow measurement of liquid or gaseous and also steam fluids in pipe. Indicated will be the actual flow in volume or mass per time.

Applications: flow measurement, dosing, monitoring, adjusting and control of liquid and gaseous products.

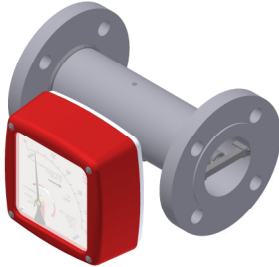
The meter design makes it ideal for processes under difficult and rough operating conditions. The devices are available with additional electrical equipment for process monitoring and control.

- A large variety of wetted materials
- Very safe magneto-resistive signal transmission
- Applicable for high pressure applications and high temperature processes
- Excellent heat tracing technology (option)
- Double eddy current damping (option)
- Back flow stop (option)
- Differential pressure flow regulator (option)



## Model versions / variants

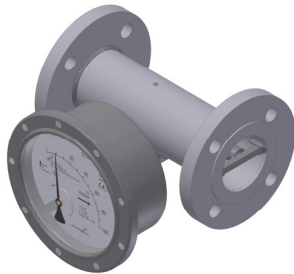
### Aluminum Indicator



Optimized aluminum indicator.  
Large and well arranged scale with 90° angle for optimal reading.  
Rounded edges and rims ensure a smooth draining of liquids after wet contact. A special anodization and paint finish makes the indicator housing also suitable for outdoor use.

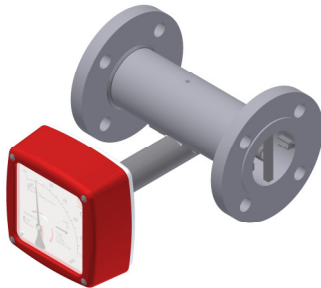
Process connections: Flange, thread, clamp, weld ends

### Stainless steel indicator



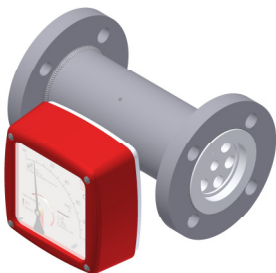
Stainless steel indicator  
with IP 67 protection for extreme applications.  
Large and well arranged scale with 90° angle for optimal reading.  
Round design ensures a smooth draining of liquids after wet contact. Salty and rough environments e.g. off-shore applications do not show any problem.

### High temperature version for up to 350 °C with displaced indicator



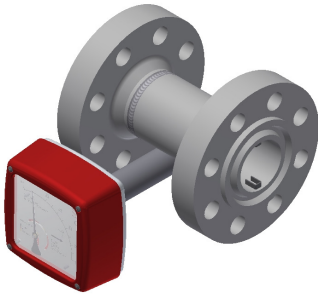
Displaced indicator for process temperatures up to 350 °C.  
For very high or very low process temperatures the indicator will be displaced from the measuring pipe.  
The use of limit switches or transmitters are without limitations.

### Instrument lining / Special materials



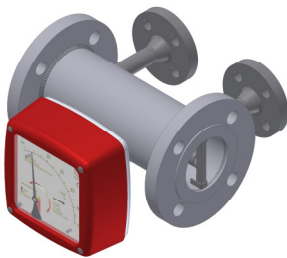
PTFE lining for highest chemical resistance..  
Wetted parts made of Hastelloy or Monel.  
Through the unique design of the measuring pipe with cylindrical pipe and conical float the meters can be made from various special materials. This allows the use in special areas and / or highly corrosive process applications e.g. for acid and lye

### High Pressure Applications



Through the unique structure of the measuring fitting with cylindrical measuring pipe and conical float, the units can be produced with thick walled pipes. This enables the use in high pressure applications for which other measuring instruments are not available e.g. sour gas, tunnel drill machine lubrication

### Instruments with heating jacket



The cylindrical measuring pipe allows a double wall design with heating jacket for e.g. steam, hot water or thermal oil. This enables the meter being used for extremely difficult fluids or applications. The heating jacket connections will be produced acc. customer demand.



## Technical data:

### Fitting

Wetted parts:

Measuring pipe st.st. 1.4404 (316 L) / 1.4571 (316 TI), spring st.st. 1.4571  
Measuring pipe PTFE PTFE, spring Hastelloy C22  
Special materials on request

Process connection:

Flanges acc. EN 1092-1, ASME B16.5,  
JIS, NPT, threaded connections,  
Special connection on request

Nominal pressure:

(BGF-S)  
(BGF-P)

PN 40, ASME CI150 / 300 (standard)  
PN 16, ASME CI150 (standard)  
higher pressure ratings on request , max. 400 bar

Process temperature:

(BGN-S/H)  
(BGN-P)

-40°C ..... +350°C  
-40°C ..... +125°C

Ambient temperature:

-40°C .... +80°C (without electrical equipment)  
-40°C .... +65°/70°C (with electrical equipment)

Protection:

IP 65 / IP 67 (EN60529)

### Indicator

Aluminum IP 65  
st.st. IP 67

### Limit switches

max. 2 pcs inductive limit switches  
max. 2 pcs inductive limit switches in safety technology  
max. 2 pcs SPDT micro switches

### Electrical transmitter:

ES c/w HART-protocol  
ES c/w HART-protocol and 2 NAMUR-contact  
ES c/w HART-protocol and 1 NAMUR-contact / 1 pulse output  
ES c/w Profibus-PA®  
ES c/w HART-Protocol und totalizer module  
ES c/w Foundation FIELDBUS®

Power supply:

14 - 30 VDC, (reverse polarity protected)

Output signals:

passive, galvanically isolated

Analog output:

4-20 mA

Binary output 1 and 2:

$U_i=30\text{ V}$ ,  $I_i=20\text{ mA}$ ,  $P_i=100\text{ mW}$

Binary input:

totalizer reset (only for ES c/w totalizer module)

Ambient temperature:

-40°C .... +70°C

Protection:

IP 20 (EN60529)

### Measuring Accuracy

(BGN-S/P)

± 2% of actual value qG 50% acc. VDI/VDE 3513-2 for local display  
± 0,2% additional error for transmitter ES

Repeatability

± 0,5 %

## Measuring ranges

Measuring range chart BGF									
DN <sup>4)</sup> EN1092- 1	ASME <sup>4)</sup> B16.5- 2003	Fitting S... st.st. P... PTFE H... Hastelloy	Meas.- Range- Code	Meas. range water (1000 kg/m <sup>3</sup> ; 1 mPas)		Meas. range air (1.013 bar abs., 20°C) <sup>3)</sup>		Press. loss (mbar)	Notes
15	1/2"	S15	H	10 - 100	l/h	0,3 - 3	m <sup>3</sup> /h	110	<sup>1)</sup>
		S15	I	16 - 160	l/h	0,5 - 4,6	m <sup>3</sup> /h	110	<sup>1)</sup>
20	3/4"	S15	J	25 - 250	l/h	0,7 - 7,0	m <sup>3</sup> /h	110	<sup>1)</sup>
25	1"	S15	K	40 - 400	l/h	1,0 - 11	m <sup>3</sup> /h	110	<sup>1)</sup>
32	1 1/4"	S15	L	60 - 600	l/h	1,7 - 17	m <sup>3</sup> /h	120	<sup>1)</sup>
15	3/4"	S25	M	100 - 1000	l/h	3 - 30	m <sup>3</sup> /h	90	<sup>1)</sup>
20	1"	S25	N	160 - 1600	l/h	4 - 46	m <sup>3</sup> /h	105	<sup>1)</sup>
25	1 1/4"	S25	P	250 - 2500	l/h	7 - 70	m <sup>3</sup> /h	130	<sup>1)</sup>
32	1 1/2"	S25	Q	400 - 4000	l/h	11 - 110	m <sup>3</sup> /h	240	<sup>1)</sup>
40	1 1/2"	S40	P	250 - 2500	l/h	7 - 70	m <sup>3</sup> /h	75	<sup>1)</sup>
		S40	Q	400 - 4000	l/h	11 - 110	m <sup>3</sup> /h	110	<sup>1)</sup>
		S40	R	600 - 6000	l/h	17 - 170	m <sup>3</sup> /h	130	<sup>1)</sup>
		S40	S	1000-10000	l/h	29-290	m <sup>3</sup> /h	?	<sup>1)</sup>
50 65	2"	S50	Q	400 - 4000	l/h	11 - 110	m <sup>3</sup> /h	100	<sup>2)</sup>
		S50	R	600 - 6000	l/h	17 - 170	m <sup>3</sup> /h	110	<sup>2)</sup>
		S50	S	1000 - 10000	l/h	29 - 290	m <sup>3</sup> /h	120	<sup>2)</sup>
		S50	T	1600 - 16000	l/h	46 - 460	m <sup>3</sup> /h	130	<sup>2)</sup>
		S50	U	2500 - 25000	l/h	70 - 700	m <sup>3</sup> /h	200	<sup>2)</sup>
80	3"	S80	T	1600 - 16000	l/h	46 - 460	m <sup>3</sup> /h	110	<sup>2)</sup>
		S80	U	2500 - 25000	l/h	70 - 700	m <sup>3</sup> /h	130	<sup>2)</sup>
		S80	V	4000 - 40000	l/h	110 - 1100	m <sup>3</sup> /h	200	<sup>2)</sup>
		S1H	W	6000 - 60000	l/h	170 - 1700	m <sup>3</sup> /h		<sup>2)</sup>

<sup>1)</sup> Measuring body made from PTFE or st.st.

<sup>2)</sup> Measuring body made from PP, PTFE or st.st.

<sup>3)</sup> On atmospheric pressure at the inlet and outlet a measurement is not possible. The indicated values are for orientation. For gases the inlet pressure shall be 2-3 times of the indicated pressure loss of the instrument.

<sup>4)</sup> Restriction for units with PTFE-lining

Reference conditions: acc IEC 770:

Water 20°C, air 1,013 bar abs.

## Certification and Approvals

Hazardous area approvals:

DMT 00 ATEX E 075 / PTB 99 ATEX 2219 / ZELM 03 ATEX 0128

Protection class: w/o electrical equipment

⊗ II 2GD

c/w limit switches

⊗ II 2G Ex ia IIC T6 / II 1D Ex iaD 20 T108

c/w electrical transmitter ES

⊗ II 2G Ex ia IIC T6

Explosion Directive

94/9/EG, Explosion Protection Directive 94/9/EC

EN 13463-1 Non-electrical equipment for potentially explosive atmospheres

EN 60079-0 General requirements

EN 60079-11 Intrinsic safety „i“

EN 60079-27 Fieldbus intrinsically safe concept FISCO

Electro magnetic compatibility:

EMC Directive 2004/108/EC

EN 61000-6-2:2011 immunity industrial environment

EN 61000-6-3:2011 emission residential, commercial

EN 55011:2011 Group 1 Class B, ISM ratio-frequency equipment

EN61326-1:2013 EMC requirements

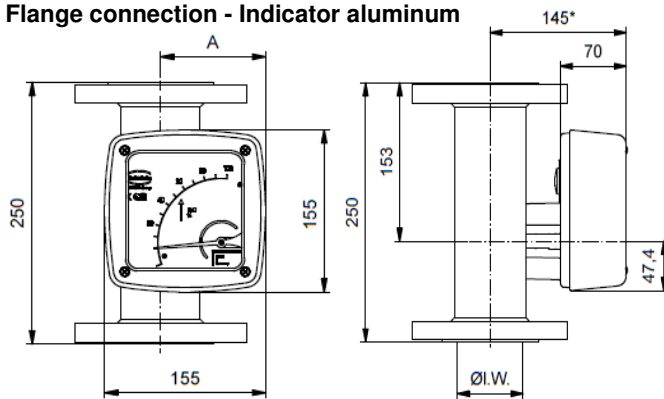
CE-marking:

Ex-guide line 94/9/EG

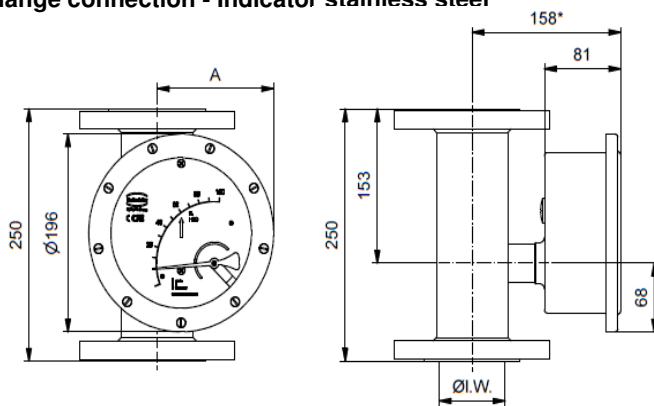


## Dimensions

### Flange connection - Indicator aluminum



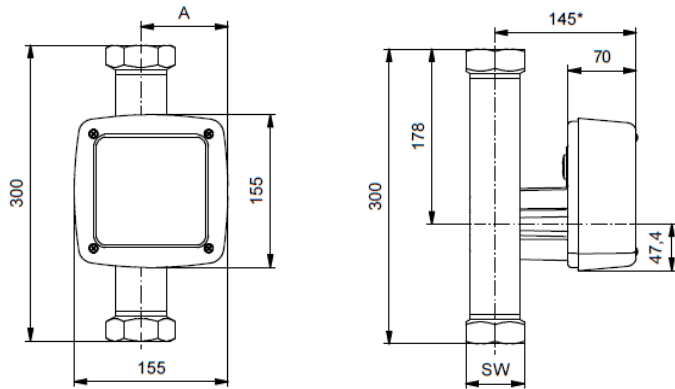
### Flange connection - Indicator stainless steel



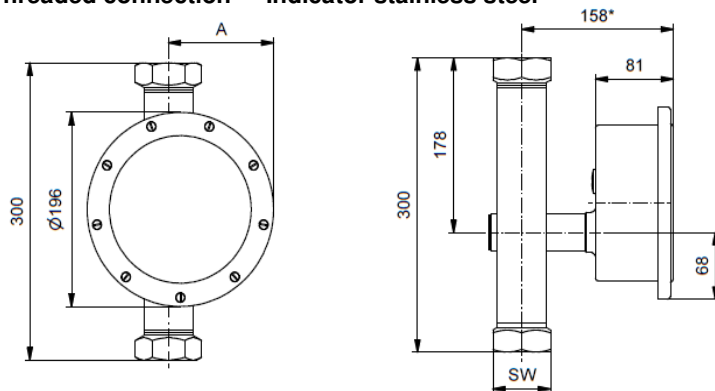
\* =+100 mm at displaced indicator

Fitting	DN / ASME	PN / CL bar / lbs	Ø I. W. (mm)	st.st.-indicator A (mm)	Aluminum indicator A (mm)
S15	15 / 1/2"	40 / (150/300)	26	99,5	77,0
S25	25 / 1"	40 / (150/300)	32	102,6	80,1
S40	40 / 1 1/2"	40 / (150/300)	46	110,4	87,9
S50	50 / 2"	40 / (150/300)	70	123,4	100,9
S80	80 / 3"	40 / (150/300)	102	139,7	117,4

**Threaded connection - Indicator aluminum**



**Threaded connection - Indicator stainless steel**



Fitting	NPT(f) / G(f) (in)	PN (bar)	SW	st.st.-indicator A (mm)	Aluminum indicator A (mm)
S15	1/4-3/8-1/2-3/4	40	36	99,5	77,0
S25	1/4-3/8-1/2-3/4	40	36	102,6	80,1
S40	3/4-1-1 1/4	40	60	110,4	87,9
S50	1 1/4-1 1/2-2	40	80	123,4	100,9

More information on BGF series can be found in the instruction manuals BGF\_BA\_xx\_en  
Änderungen vorbehalten.





## Modell Code

BGF -	Material		
S	Stainless Steel, process temperature ≤ 350°C		
P	Stainless Steel, Wetted Parts PTFE, process temperature ≤ 125°C, process pressure max. 16 bar (not for size "H5" available)		
	Nominal Device-Size	Measuring Range-Code	
15	1/2"	Measuring ranges see table	H-L
25	1"	Measuring ranges see table	M-Q
40	1 1/2"	Measuring ranges see table	P-S
50	2"	Measuring ranges see table	Q-U
80	3"	Measuring ranges see table	T-W
(15)	<b>Flange connections</b>		
	305B	DN15 PN40 Form B1 DIN EN 1092-1	203R 1" Class 150 RF ASME B16.5-2003
	3A5B	DN20 PN40 Form B1 DIN EN 1092-1	223R 1" Class 300 RF ASME B16.5-2003
	309B	DN25 PN40 Form B1 DIN EN 1092-1	204R 1 1/4" Class 150 RF ASME B16.5-2003
	309D	DN25 PN40 Form D DIN EN 1092-1	224R 1 1/4" Class 300 RF ASME B16.5-2003
	313B	DN32 PN40 Form B1 DIN EN 1092-1	406R 15A 10K RF JIS B2220
	313D	DN32 PN40 Form D DIN EN 1092-1	407R 15A 16K RF JIS B2220
	201R	1/2" Class 150 RF ASME B16.5-2003 (reduced face)	406F 15A 10K FF JIS B2220
	221R	1/2" Class 300 RF ASME B16.5-2003 (reduced face)	407F 15A 16K FF JIS B2220
	202R	3/4" Class 150 RF ASME B16.5-2003	
	222R	3/4" Class 300 RF ASME B16.5-2003	
	<b>Thread connections (installation length: 300mm, float not removable)</b>		
	4000	G1/4" female thread	6030 1/2" NPT(f)
	4010	G3/8" female thread	6040 3/4" NPT(f)
	4020	G1/2" female thread	6832 DN25 TriClamp ISO 2852
	4030	G3/4" female thread	6830 DN25 TriClamp DIN 32676
	6010	1/4" NPT(f)	6630 RD52x1/6" DIN11851
	6020	3/8" NPT(f)	
	(25)	<b>Flange connections</b>	
305B		DN15 PN40 Form B1 DIN EN 1092-1 (reduced face)	204R 1 1/4" Class 150 RF ASME B16.5-2003
3A5B		DN20 PN40 Form B1 DIN EN 1092-1 (reduced face)	224R 1 1/4" Class 300 RF ASME B16.5-2003
309B		DN25 PN40 Form B1 DIN EN 1092-1	205R 1 1/2" Class 150 RF ASME B16.5-2003
309D		DN25 PN40 Form D DIN EN 1092-1	225R 1 1/2" Class 300 RF ASME B16.5-2003
313B		DN32 PN40 Form B1 DIN EN 1092-1	416R 25A 10K RF JIS B2220
313D		DN32 PN40 Form D DIN EN 1092-1	417R 25A 16K RF JIS B2220
202R		3/4" Class 150 RF ASME B16.5-2003 (reduced face)	416F 25A 10K FF JIS B2220
222R		3/4" Class 300 RF ASME B16.5-2003 (reduced face)	417F 25A 16K FF JIS B2220
203R		1" Class 150 RF ASME B16.5-2003	
223R		1" Class 300 RF ASME B16.5-2003	
<b>Thread connections (installation length: 300mm, float not removable)</b>			
4000		G1/4" female thread	6030 1/2" NPT(f)
4010		G3/8" female thread	6040 3/4" NPT(f)
4020	G1/2" female thread	6842 DN25 TriClamp ISO 2852	
4030	G3/4" female thread	6840 DN25 TriClamp DIN 32676	
6010	1/4" NPT(f)	6640 RD52x1/6" DIN11851	
6020	3/8" NPT(f)		
(40)	<b>Flange connections</b>		
	317B	DN40 PN 40 Form B1 DIN EN 1092-1	426R 40A 10K RF JIS B2220
	317D	DN40 PN 40 Form D DIN EN 1092-1	427R 40A 16K RF JIS B2220
	205R	1 1/2" 150 lbs RF ASME B16.5-2003	426F 40A 10K FF JIS B2220
	225R	1 1/2" 300 lbs RF ASME B16.5-2003	427F 40A 16K FF JIS B2220
	<b>Thread connections (installation length: 300mm, float not removable)</b>		
	4030	G3/4" female thread	6060 1-1/4" NPT(f)
	4040	G1" female thread	6862 DN50 TriClamp ISO 2852
	4050	G1-1/4" female thread	6860 DN50 TriClamp DIN 32676
	6040	3/4" NPT(f)	6660 RD78x1/6" DIN 11851
6050	1" NPT(f)		
(50)	<b>Flange connections</b>		
	321B	DN50 PN40 Form B1 DIN EN 1092-1	207R 2 1/2" Class 150 RF ASME B16.5-2003
	321D	DN50 PN40 Form D DIN EN 1092-1	227R 2 1/2" Class 300 RF ASME B16.5-2003
	325B	DN65 PN16 Form B1 DIN EN 1092-1	431R 50A 10K RF JIS B2220
	325D	DN65 PN16 Form D DIN EN 1092-1	432R 50A 16K RF JIS B2220
	326B	DN65 PN40 Form B1 DIN EN 1092-1	431F 50A 10K FF JIS B2220
326D	DN65 PN40 Form D DIN EN 1092-1	432F 50A 16K FF JIS B2220	



	<b>206R</b>	2" Class 150 RF ASME B16.5-2003			
	<b>226R</b>	2" Class 300 RF ASME B16.5-2003			
	<b>Thread connections (installation length: 300mm, float not removable)</b>				
	<b>4050</b>	G1-1/4" female thread	<b>6060</b>	1-1/4" NPT(f)	
	<b>4060</b>	G1-1/2" female thread	<b>6070</b>	1-1/2" NPT(f)	
	<b>4070</b>	G2" female thread	<b>6080</b>	2" NPT(f)	
	<b>Flange connections</b>				
	<b>330B</b>	DN80 PN16 Form B1 DIN EN 1092-1	<b>209R</b>	3½" Class 150 RF ASME B16.5-2003	
	<b>330D</b>	DN80 PN16 Form D DIN EN 1092-1	<b>229R</b>	3½" Class 300 RF ASME B16.5-2003	
(80)	<b>331B</b>	DN80 PN40 Form B1 DIN EN 1092-1	<b>441R</b>	50A 16K FF JIS B2220	
	<b>331D</b>	DN80 PN40 Form D DIN EN 1092-1	<b>442R</b>	50A 16K FF JIS B2220	
	<b>208R</b>	3" Class 150 RF ASME B16.5-2003	<b>441F</b>	50A 16K FF JIS B2220	
	<b>228R</b>	3" Class 300 RF ASME B16.5-2003	<b>442F</b>	50A 16K FF JIS B2220	
	<b>Measuring ranges (Water 20°C, 1 mPas)</b>				
		<b>H</b>	10 - 100 l/h		
		<b>I</b>	16 - 160 l/h		
		<b>J</b>	25 - 250 l/h		
		<b>K</b>	40 - 400 l/h		
		<b>L</b>	60 - 600 l/h		
	<b>M</b>	100 - 1000 l/h			
	<b>N</b>	160 - 1600 l/h			
	<b>P</b>	250 - 2500 l/h			
	<b>Q</b>	400 - 4000 l/h			
	<b>R</b>	600 - 6000 l/h			
	<b>S</b>	1000 - 10000 l/h			
	<b>T</b>	1600 - 16000 l/h			
	<b>U</b>	2500 - 25000 l/h			
	<b>V</b>	4000 - 40000 l/h			
	<b>W</b>	6000 - 60000 l/h			
	<b>Magnet bearer</b>				
	<b>K</b>	Standard PP bis 80 °C			
	<b>P</b>	81 - 125 °C PTFE			
	<b>S</b>	stainless steel			
	<b>Flow direction</b>				
	<b>O</b>	Top to bottom			
	<b>L</b>	Left to right			
	<b>R</b>	Right to left			
	<b>U</b>	Bottom to top			
	<b>Heating / cooling</b>				
	<b>0</b>	without heating / Cooling			
	<b>1</b>	Heating / cooling, connection EO12 mm		(stainless steel)	
	<b>2</b>	Heating / cooling, connection DN15, PN 40		(stainless steel)	
	<b>3</b>	Heating / cooling, connection ½" Class 150 ANSI		(stainless steel)	
	<b>4</b>	Heating / cooling, connection ½" NPT (F)		(stainless steel)	
	-	<b>Certificates</b>			
	<b>0</b>	without			
	<b>1</b>	Certificate of compliance with the order 2.1			
	<b>2</b>	Test report 2.2			
	<b>B</b>	Inspection certificate 3.1 with material certificate (DIN EN 10204:2004)			
	<b>C</b>	Inspection certificate 3.2 with material certificate (DIN EN 10204:2004)			
	<b>N</b>	Material certificate NACE			
	-	<b>Display</b>			
	<b>S</b>	Standard display housing, Process temperature ≤ 150°C for electrical output, Process temperature ≤ 200°C for local indication			
	<b>V</b>	Standard display housing forward advanced, process temperature ≤ 350°C			
	<b>E</b>	Stainless steel display housing IP67, working temperature ≤ 150°C			
	<b>H</b>	Stainless steel display housing IP67 forward advanced, process temperature ≤ 350°C			
	<b>T</b>	Standard display housing with pressure compensation, Process temperature ≤ 150°C for electrical output, Process temperature ≤ 200°C for local indication			
	<b>W</b>	Standard display housing with pressure compensation forward advanced, process temperature ≤ 350°C			
	<b>Scale</b>				
	<b>1</b>	%-Scale (Water)			
	<b>2</b>	Measuring range-Scale (Water)			
	<b>F</b>	Double-scale (acc. customer preference)			
	<b>4</b>	%-Scale (Media)			
	<b>5</b>	Measuring range-Scale (Media)			
	<b>Switches / electrical output</b>				



<b>0</b>	ohne
<b>1</b>	1 x inductive switch, Type SJ 3,5 N
<b>2</b>	2 x inductive switch, Type SJ 3,5 N
<b>3</b>	1 x inductive switch, Type SJ 3,5 SN (safety design)
<b>4</b>	2 x inductive switch, Type SJ 3,5 SN (safety design)
<b>6</b>	Transmitter ES with HART-protocol, 4-20 mA, EEx ia
<b>7</b>	Transmitter ES with HART-protocol, 4-20 mA, EEx ia / 2x NAMUR-switch
<b>8</b>	Transmitter ES with HART-protocol, 4-20 mA, EEx ia / 1x NAMUR-switch, 1x pulse output
<b>9</b>	Transmitter ES with Profibus PA, EEx ia
<b>C</b>	1 x microswitch
<b>D</b>	2 x microswitch
<b>E</b>	1 x inductive switch, Type SB 3,5-E2, three wire
<b>F</b>	2 x inductive switch, Type SB 3,5-E2, three wire
<b>G</b>	1 x induktiver Grenzkontakt NCB2-12GM40-Z0
<b>I</b>	Transmitter ES with HART-protocol and counter module
<b>K</b>	Transmitter ES with Foundation Fieldbus
-	<b>Accessories</b>
<b>0</b>	without
<b>X</b>	special (separate specification necessary)
-	<b>Design</b>
<b>H</b>	Heinrichs
<b>K</b>	Kobold