RE 250 Variable Area Flowmeter

Product description

MECON
FLOW-CONTROL-SYSTEMS

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Contents

1 Device description

1.1 Intended use

The series RE 250 of flowmeters with a standard length of 250 mm (9.84 inch) and a completely metal design is suitable for measuring different liquids and gases in closed piping.

The robust design enables the operation in rough conditions also. Different types off langes, liners and float materials satisfy the requirements of the pharmaceutical and chemical Industries.

The devices are particulary suitable for the measurement of:

- Water
- Fluids
- Corrosion protection agents
- Lubricants
- Saturated and superheated steam
- Food and beverages
- Industrial gases

1.2 Certifications

CE marking

CE

The manufacturer certifies fort he device RE 250 the fulfilment of all statutory requirements oft he following EC directives by applying the CE marking:

- Pressure equipment directive 97/23/EG
- Low voltage directive 2006/95/EG *
- EMC-directive 89/336/EEC
- NAMUR recommendation NE21 *
- ATEX directive 94/9/EC **

(* Devices with electrical installations)
(** Devices for use in hazardous areas)

1.3. Float damping

A float damping is recommended:

- Generally for measuring gases
- Vibrations for the piping cannot avoided

It is also strongly recommended in case of:

- applications where air bubbles in the medium cannot be avoided
- predominating shock pressure in the piping, e.g. due to rapid throttling or shut-off
- turbulences, pulsations, etc. which could lead to vibrations to the flowmeter
- rapid pressure build-up in the piping .

3 Technical data

3.1 Classification

Classification in accordance with the Pressure Equipment Directive (PED) 97/23/EC

Process connection		Admissible media	Category
EN1092-1	ANSI B16.5		
DN 15	½"	Gases and fluids of fluid group 1	Art. 3.3
DN 20	¾ "	Gases and fluids of fluid group 1	Art. 3.3
DN 25	1"	Gases and fluids of fluid group 1	Art. 3.3
DN 32	1 ¼"	Gases and fluids of fluid group 1	III
DN 40	1 ½"	Gases and fluids of fluid group 1	III
DN 50	2"	Gases and fluids of fluid group 1	III
DN 65	2 ½"	Gases and fluids of fluid group 1	III
DN 80	3"	Gases and fluids of fluid group 1	III
DN 100	4"	Gases and fluids of fluid group 1	III
DN 125	5"	Gases and fluids of fluid group 1	III
DN 150	6"	Gases and fluids of fluid group 1	III

Tab 3.1 Classification in accordance with PED 97/23/EC

3.2 Technical data

General data

Range of application	Flow measurement of liquids and gases
Measuring principal	Flotation / Float measuring
Orientation	Vertical – flow direction from bottom to top

Measuring accuracy*

Directive	VDI / VDE 3513, sheet 2 (qG = 50%)
Liquids	G 1.6 (add. 0,2%** of URV for MEM/MEM-PPA)
Gases	G 2.5 (add. 0,2%** of URV for MEM/MEM-PPA)
Reproducibility	0,5% of URV (add. 0,1% for URV for MEM/MEM-PPA)

* A variation of the operating temperture to the considered temperature for the calibration process, will lead to a corresponding inherent error.

** For ambient temperatures < -20°C the measuring error will increase

Materials

		Type CF-S	Type EF-H	Type FF-P
Wetted parts		**Stainless steel**	**Hastelloy®**	**PTFE**
Flange	*<= DN25 (1")*	Stainless steel	Hastelloy®	Stainless steel
	> DN25 (1")		Hastelloy®/stainless	
Fitting	*<= DN25 (1")*	Stainless steel	Hastelloy®	Stainless steel with PTFE liner
	> DN25 (1")		Hastelloy®/stainless	
Float and Guide bracket		Stainless steel	Hastelloy®	PTFE
Display unit		Aluminium (optional stainless steel) with safety glass pane		

Operating conditions – all devices

Temperature				
		Type CF-S	***Type EF-H***	***Type FF-P***
Max. Medium temp. TS		-40 °C …+200 °C (opt. -80 °C …+350 °C)		-20 °C …+125 °C
Pressure (refer to chapter 3.4)				
		Typ CF-S	***Typ EF-H***	***Typ FF-P***
Max. Medium pressure PS	*DN15 – DN150:*	PN 160 (optional up to 400 bar)		PN 16
	½" – 6":	580 psi (optional up to 5800 psi)		232 psi
Min.operating pressure		> 2 x pressure loss (see measuring ranges)		
Climate classification		Weatherproof and / or non heated locations Class C in accordance with DIN IEC 654 Section 1		
Protection Class (DIN EN 60529)				
Display Unit		made of aluminium: IP65 made of stainless steell: IP66		

Temperaturen

Geräteversion	**Umgebungstemperatur***		**Lagertemperatur**	
	[°C]	**[°F]**	**[°C]**	**[°F]**
ohne elektrische Komponenten	-40 …+80	-40…+176	-40 …+80	-40…+176
mit Grenzwertschalter(n)	-40 …+65	-40…+149	-40 …+65	-40…+149
mit Stromausgang (4…20 mA)	-40 …+70	-40…+158	-40 …+70	-40…+158

***IMPORTANT!**

For applications in hazardous areas it is mandatory that the temperature class of the type examination certificate (protection type) will be regarded additionally.

For devices used in hazardous areas, addtional safety notes apply; please refer to the Ex documentation!

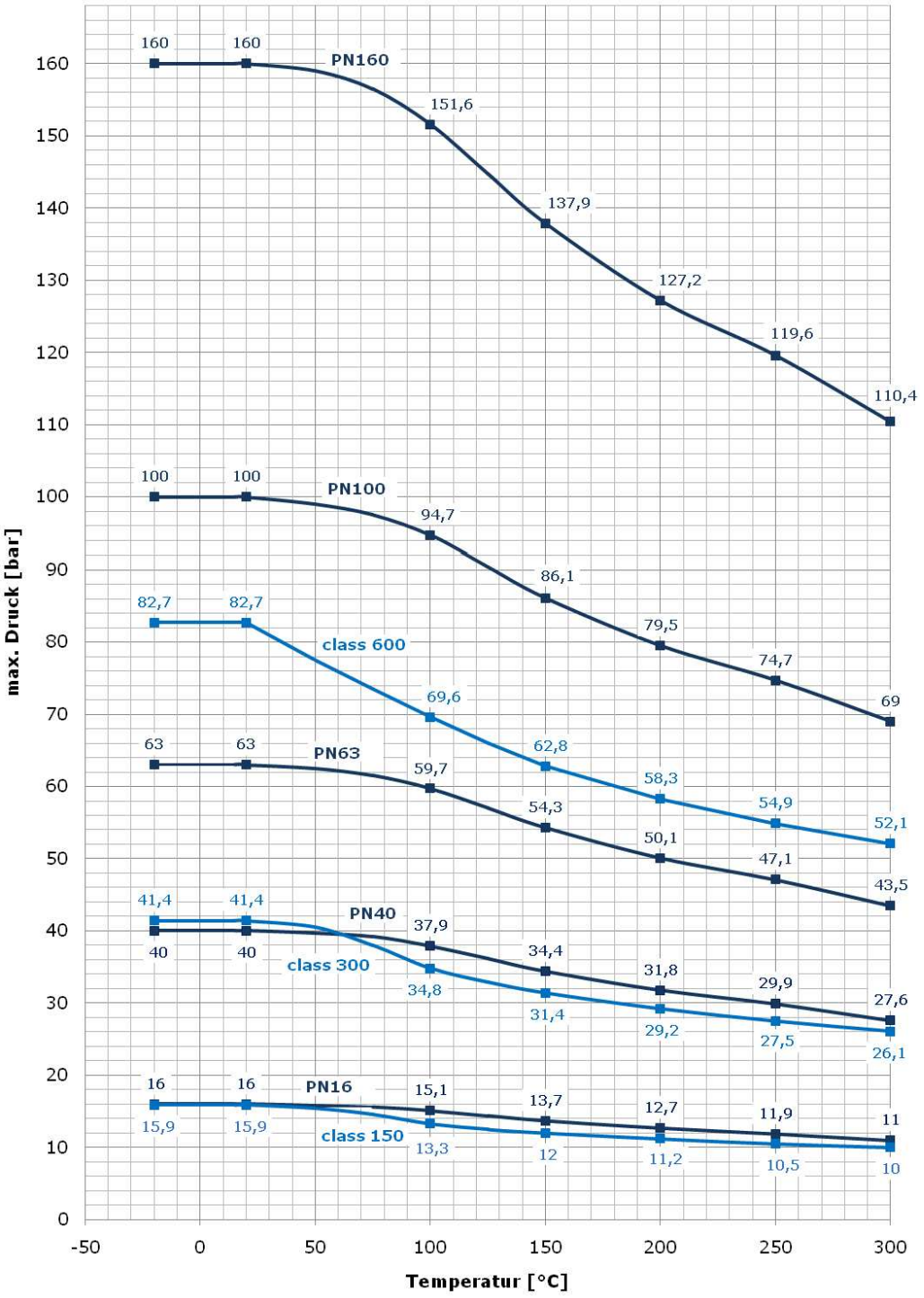
RE 250 with limit switch(es)

Cable gland	M20 x 1.5
Isolation (2 contacts)	Galvanic isolated
Terminal connection	2.5 mm²
Limit switch	SJ3.5-N-BU
Switching function	NAMUR, NC
Nominal voltage U_O	8.2 V DC (R_i ca. 1 kΩ)
Supply voltage	5 … 25 V DC

RE 250 with current output 4 … 20 mA

Cable gland	M20 x 1.5
Terminal connection	2.5 mm²
Auxiliary supply voltage U_B	14 V … 30 V DC
Measuring signal	4 … 20 mA = 0 … 100% flow value in 2-wire technology
Power supply influence	< 0.1 %
Max. external load R_B	680 Ω (30 V) $R_B = (U_B - 14V) / 22$ mA
Temperature influence	< 10 µA / K

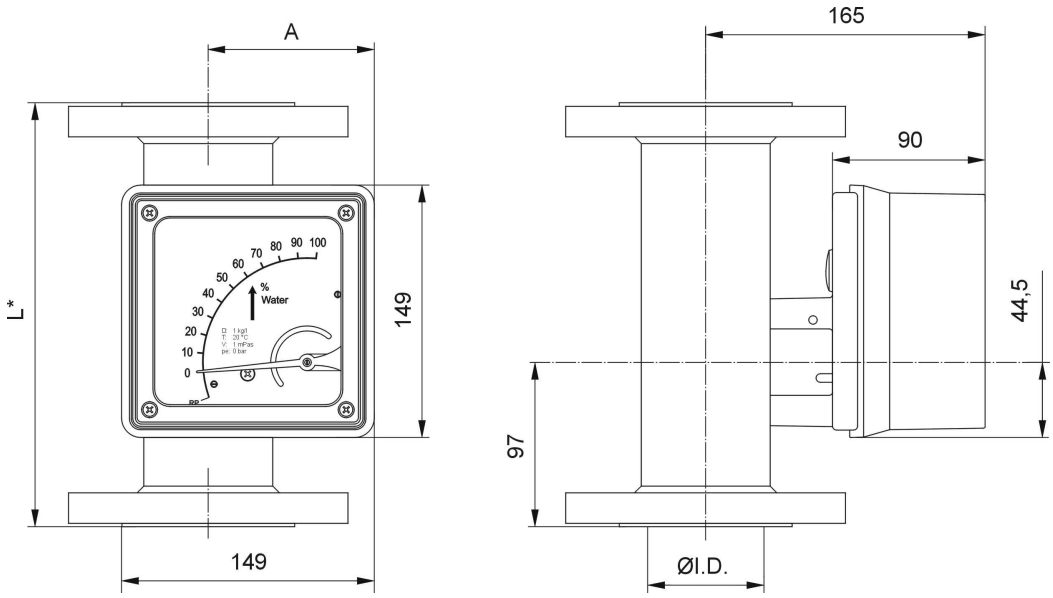
3.4 Pressure limits vs. temperature stainless steel



Tab 3.1 Maximum pressure PS vs. temperature TS

3.5 Dimensions and weights

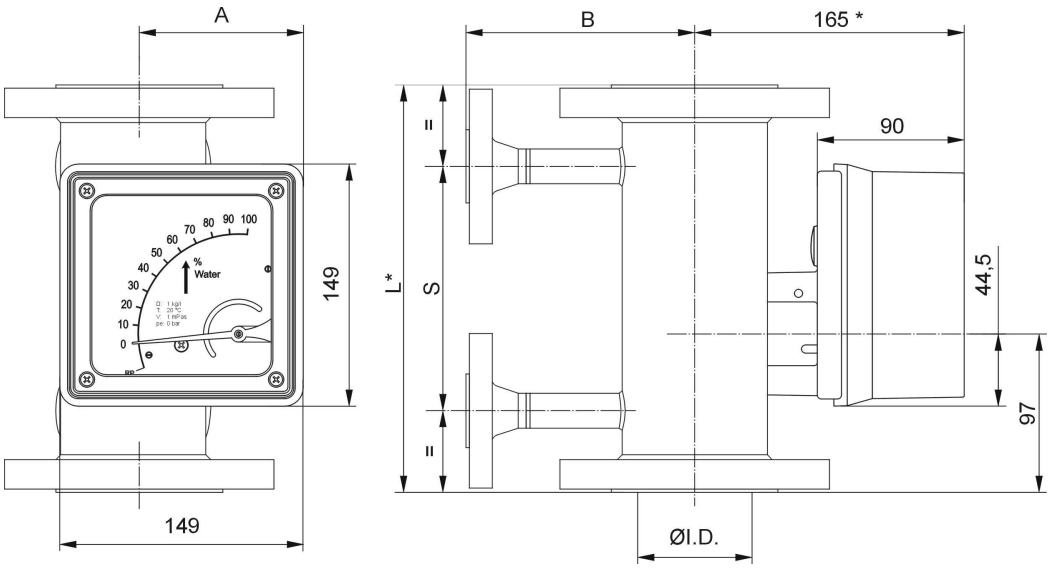
Standard version (Housing of display made of aluminium)



DN	ANSI	Ø I.D.	A	Weight
15	½"	26 (1,02)	74 (2,91)	3,0 (6,6)
20	¾"	26 (1,02)	74 (2,91)	3,0 (6,6)
25	1"	32 (1,26)	77 (3,03)	4,2 (9,3)
32	1 ¼"	32 (1,26)	77 (3,03)	5,2 (11,5)
40	1 ½"	46 (1,81)	88 (3,46)	6,0 (13,2)
50	2"	70 (2,76)	97 (3,82)	7,5 (16,5)
65	2 ½"	70 (2,76)	97 (3,82)	8,5 (18,7)
80	3"	102 (4,02)	113 (4,45)	13,0 (28,7)
100	4"	125 (4,92)	126 (4,96)	18,0 (39,7)
125	5"	125 (4,92)	126 (4,96)	22,0 (48,4)
150	6"	125 (4,92)	126 (4,96)	25,0 (55,0)

All Dimensions in mm (inch) weights in kg (lbs)

Heating jacket version

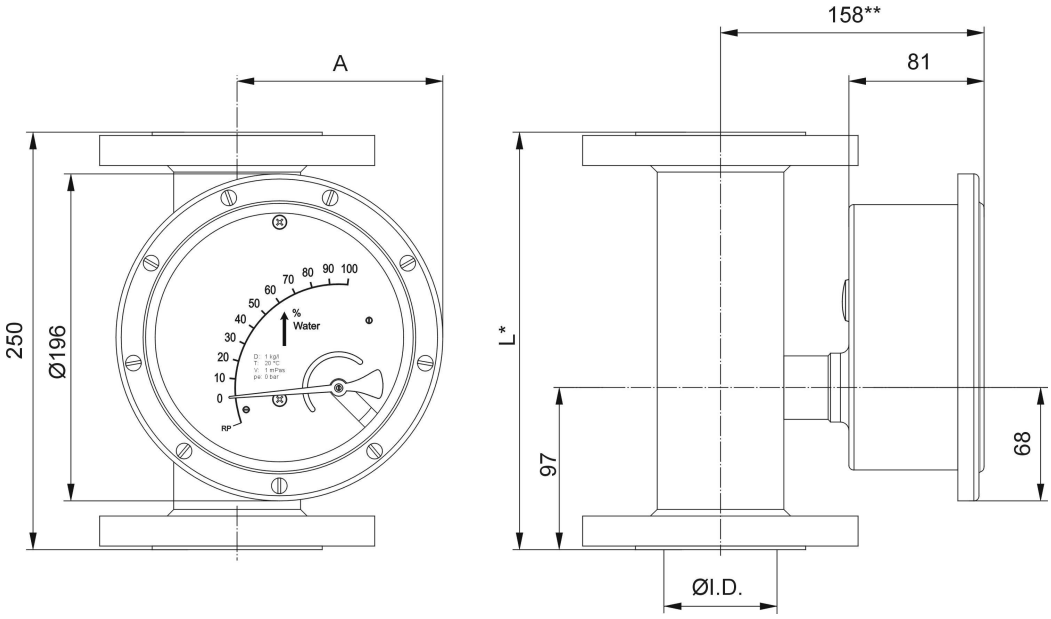


DN	ANSI	Ø I.D.	A	B	S	Weight
15	½"	26 (1,02)	74 (2,91)	110 (4,33)	150 (5,91)	4,7 (10,4)
20	¾"	26 (1,02)	74 (2,91)	110 (4,33)	150 (5,91)	4,7 (10,4)
25	1"	32 (1,26)	77 (3,03)	110 (4,33)	150 (5,91)	5,9 (13,0)
32	1 ¼"	32 (1,26)	77 (3,03)	110 (4,33)	150 (5,91)	6,9 (15,2)
40	1 ½"	46 (1,81)	88 (3,46)	130 (5,12)	150 (5,91)	7,8 (17,2)
50	2"	70 (2,76)	97 (3,82)	140 (5,51)	150 (5,91)	9,6 (21,1)
65	2 ½"	70 (2,76)	97 (3,82)	140 (5,51)	150 (5,91)	11,0 (24,2)
80	3"	102 (4,02)	113 (4,45)	160 (6,30)	150 (5,91)	16,0 (35,2)
100	4"	125 (4,92)	126 (4,96)	175 (6,89)	120 (4,72)	22,0 (48,4)
125	5"	125 (4,92)	126 (4,96)	175 (6,89)	120 (4,72)	26,0 (57,2)
150	6"	125 (4,92)	126 (4,96)	175 (6,89)	120 (4,72)	29,0 (63,8)

All Dimensions in mm (inch) weights in kg (lbs)

* For dimension **L** please refer to page 13.

Stainless steel version



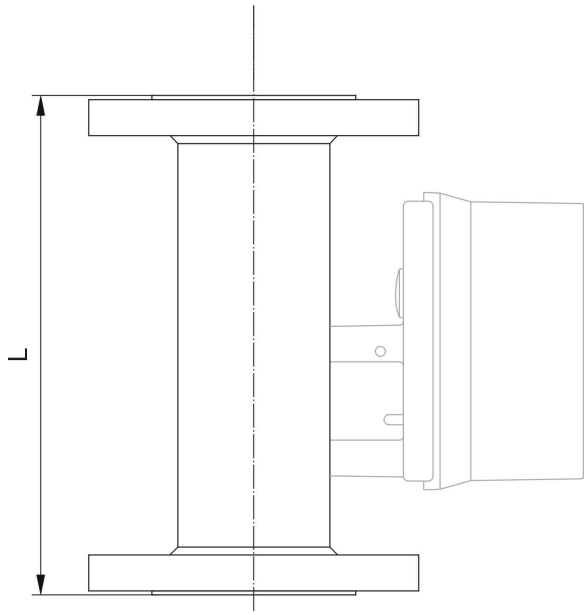
DN	ANSI	Ø I.D.	A	Weight
15	½"	26 (1,02)	103 (4,06)	3,1 (6,8)
20	¾"	26 (1,02)	103 (4,06)	3,1 (6,8)
25	1"	32 (1,26)	105 (4,13)	4,3 (9,5)
32	1 ¼"	32 (1,26)	105 (4,13)	5,3 (11,7)
40	1 ½"	46 (1,81)	115 (4,53)	6,1 (13,4)
50	2"	70 (2,76)	129 (5,08)	7,6 (16,7)
65	2 ½"	70 (2,76)	129 (5,08)	8,6 (18,9)
80	3"	102 (4,02)	145 (5,71)	13,1 (28,9)
100	4"	125 (4,92)	158 (6,22)	18,1 (39,9)
125	5"	125(4,92)	158 (6,22)	22,1 (48,6)
150	6"	125(4,92)	158 (6,22)	25,1 (55,2)

All dimensions in mm (inch) weights in kg (lbs)

* For dimension **L** please refer to page 13.

** Dimension will be 258mm for version with displaced display unit.

Mounting dimension L



Nom. Dia.	EN				Nom. Dia	ANSI		
	PN 16	PN 40	PN 63	PN 100		150 lbs	300 lbs	600 lbs
DN 15	◇	250	◇	250	½″	250	250	250
DN 20	◇	250	◇	250	¾″	250	250	250
DN 25	◇	250	◇	250	1″	250	250	250
DN 32	◇	250	◇	250	1 ¼″	250	250	250
DN 40	◇	250	◇	250	1 ½″	250	250	250
DN 50	◇	250	250	300	2″	250	250	300
DN 65	250	250	◇	◇	2 ½″	250	300	300
DN 80	250	250	◇	◇	3″	250	300	300
DN 100	250	250	◇	◇	4″	250	300	300
DN 125	250	300	◇	◇	5″	250	300	◇
DN 150	250	300	◇	◇	6″	250	300	◇

All dimensions in mm (inch) ◇ = not available

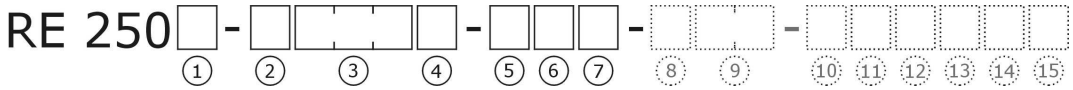
Devices with threaded connection:

Mounting dimension L: 300 mm

4 Description code

4.1 Individual part for versions CF-S (stainless steel) und EF-H (Hastelloy®)

The description code consists of the following elements:



① Flow tube

A	Nominal size flow tube DN 15
B	Nominal size flow tube DN 25
C	Nominal size flow tube DN 40
D	Nominal size flow tube DN 50
E	Nominal size flow tube DN 80
F	Nominal size flow tube DN 100

② Version

1	CF-S	wetted parts: stainless steel
2	EF-H	wetted parts: Hastelloy®

③ Process connections

Flanges

	EN1092-1	ANSI B16.5	Flow tube EN						Flow tube ANSI					
			A	B	C	D	E	F	A	B	C	D	E	F
Axx	DN 15	½ ”	●	●					●	○				
Bxx	DN 20	¾ ”	●	●	○				●	●				
Cxx	DN 25	1 ”	●	●	●				●	●	○			
Dxx	DN 32	1 ¼ ”	●	●	●	○			●	●	●			
Exx	DN 40	1 ½ ”	●	●	●	○			●	●	●	○		
Fxx	DN 50	2 ”	●	●	●	●			●	●	●	●		
Gxx	DN 65	2 ½ ”		●	●	●	○			●	●	●	○	
Hxx	DN 80	3”			●	●	●	○			●	●	●	
Jxx	DN 100	4”				●	●	●				●	●	●
Kxx	DN 125	5”					●	●					●	●
Lxx	DN 150	6”					●	●					●	●

Nominal size

● = available ○ = reduced scale raised face

xBx	PN 16	(EN 1092-1)	DN 65 - DN 150
xDx	PN 40	(EN 1092-1)	DN 15 - DN 150
xEx	PN 63	(EN 1092-1)	DN 50 - DN 150
xFx	PN 100	(EN 1092-1)	DN 15 - DN 150
xGx	PN 160	(EN 1092-1)	DN 15 - DN 150 (DN 20 + DN 32 not available)
xHx	150 lbs	(ASME B16.5)	½ ” – 6 ”
xJx	300 lbs	(ASME B16.5)	½ ” – 6 ”
xKx	600 lbs	(ASME B16.5)	½ ” – 6 ”

Pressure rating

xxA	B1	(EN 1092-1)	PN 16 / PN 40
xxB	B2	(EN 1092-1)	PN 63 / PN 100
xxC	Form D	(EN 1092-1)	DN 15 - DN 150
xxD	Form C	(EN 1092-1)	DN 15 - DN 150
xxG	Form RF	(ASME B16.5)	½ ” – 6 ”
xxH	Form FF	(ASME B16.5)	½ ” – 6 ”
xxJ	Form RTJ	(ASME B16.5)	1 ” – 6 ”

Flange form

③ Process connections (continued)

Txx	Innengewinde
x**T**x	DIN ISO 228
x**N**x	NPT ANSI B 1.20.1

	DIN ISO 228	ANSI B1.20.1	Flow tube EN A	B	C	D
xx**7**	G ¼	NPT ¼"	●			
xx**8**	G ⅜	NPT ⅜"	●			
xx**1**	G ½	NPT ½"	●	●	●	
xx**2**	G ¾	NPT ¾"	●	●	●	
xx**3**	G 1	NPT 1"	●	●	●	●
xx**4**	G 1 ¼	NPT 1 ¼"			●	●
xx**5**	G 1 ½	NPT 1 ½"			●	●
xx**6**	G 2	NPT 2"				●

● = available

④ Heating sheath

0	Without
1	With flange connection DN 15 DIN 2501 PN 40 in stainless steel
2	With flange connection DN 25 DIN 2501 PN 40 in stainless steel
3	With flange connection ½" ANSI B16.5 150 RF in stainless steel
4	With flange connection 1" ANSI B16.5 150 RF in stainless steel

⑤ Maximum range values / Measuring ranges

	Fluids [l/h]	Fluids [USgpm]	Gases [m³/h]	Gases [scfm]	Ratio	Pressure drop [mbar] A	B	C	D	E	F
1	5	0,022	0,15	0,088	1:10	40	◇	◇	◇	◇	◇
2	10	0,044	0,30	0,177	1:10	44	◇	◇	◇	◇	◇
3	16	0,07	0,48	0,283	1:10	40	◇	◇	◇	◇	◇
4	25	0,11	0,75	0,441	1:10	40	◇	◇	◇	◇	◇
5	40	0,18	1,3	0,765	1:10	40	◇	◇	◇	◇	◇
A	50	0,22	1,5	0,883	1:10	40	◇	◇	◇	◇	◇
B	70	0,31	2,1	1,24	1:10	40	◇	◇	◇	◇	◇
C	100	0,44	3,0	1,77	1:10	60	◇	◇	◇	◇	◇
D	160	0,70	4,6	2,71	1:10	60	◇	◇	◇	◇	◇
E	250	1,10	7,0	4,12	1:10	60	◇	◇	◇	◇	◇
F	400	1,76	11	6,47	1:10	70	◇	◇	◇	◇	◇
G	600	2,64	17	10,00	1:10	80	◇	◇	◇	◇	◇
H	1000	4,40	30	17,66	1:10	◇	60	◇	◇	◇	◇
J	1600	7,0	46	27,07	1:10	◇	70	◇	◇	◇	◇
K	2500	11,0	70	41,20	1:10	◇	100	50	◇	◇	◇
L	4000	17,6	110	64,74	1:10	◇	240	120	80	◇	◇
M	6000	26,4	170	100,0	1:10	◇	◇	180	90	◇	◇
N	10.000	44,0	290	170,7	1:10	◇	◇	◇	110	◇	◇
P	16.000	70,0	460	270,7	1:10	◇	◇	◇	230	70	◇
Q	20.000	88,0	550	323,7	1:10	◇	◇	◇	230	70	◇
R	25.000	110,0	700	412,0	1:10	◇	◇	◇	500	100	◇
S	40.000	176,0	1.100	647,4	1:10	◇	◇	◇	◇	350	120
T	50.000	220,0	1.350	794,6	1:10	◇	◇	◇	◇	350	120
U	60.000	264,0	1.700	1.000	1:10	◇	◇	◇	◇	◇	360
V	80.000	352,0	2.400	1.413	1:10	◇	◇	◇	◇	◇	600
W	100.000	440,0	3.000	1.766	1:10	◇	◇	◇	◇	◇	600

* devices for media with higher viscosity on request

◇ = not available

⑥ Measured medium

1	Water (η= 1 mPa·s, ρ = 1 kg/l)
2	Air (T = 0 °C, pe = 0 bar, η= 0.0181 mPa·s, ρ = 1,293 kg/m³)
3	Specify in plain text

⑦ Float damping

0	Without float damping
1	With float damping

4.2 Individual part for version FF-P (PTFE liner)

The description code consists of the following elements:

RE 250 □ - 3 □□□ 0 - □□ 0 - □□ □□ - □□ □□ □□ □□ □□ □□

① ③ ⑤ ⑥ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮

① Flow tube

A	Nominal size flow tube DN 15
B	Nominal size flow tube DN 25
C	Nominal size flow tube DN 40
D	Nominal size flow tube DN 50
E	Nominal size flow tube DN 80
F	Nominal size flow tube DN 100

③ Process connections

Nominal Size	EN1092-1	ANSI B16.5	Flow tube EN A	B	C	D	E	F	Flow tube ANSI A	B	C	D	E	F
Axx	DN 15	½ ″	●						●					
Cxx	DN 25	1 ″		●						●				
Exx	DN 40	1 ½ ″			●						●			
Fxx	DN 50	2 ″				●						●		
Hxx	DN 80	3″					●						●	
Jxx	DN 100	4″						●						●

Pressure rating				
x**B**x	PN 16 B1	(EN 1092-1)	DN 100	
x**D**x	PN 40 B1	(EN 1092-1)	DN 15 - DN 100	
x**H**x	150 lbs	(ASME B16.5)	½″ – 4″	
x**J**x	300 lbs	(ASME B16.5)	½″ – 4″	

Flange form			
xx**A**	B1	(EN 1092-1)	PN 16 / PN 40
xx**G**	Form RF	(ASME B16.5)	½″ – 4″

⑤ Maximum range values / Measuring ranges

	Fluids [l/h]	Fluids [USgpm]	Gases [m³/h]	Gases [mPa·s]	Ratio	Viscosity limits [mPa·s]	Pressure drop [mbar] A	B	C	D	E	F
C	100	0,44	3,0	1,77	1:10	≤ 1,0	60	60	◇	◇	◇	◇
D	160	0,70	4,6	2,71	1:10	1…3	60	60	◇	◇	◇	◇
E	250	1,10	7,0	4,12	1:10	1…3	60	60	◇	◇	◇	◇
F	400	1,76	11	6,47	1:10	1…3	70	70	◇	◇	◇	◇
G	600	2,64	17	10,00	1:10	1…5	80	80	◇	◇	◇	◇
H	1000	4,40	30	17,66	1:10	1…5	◇	60	◇	◇	◇	◇
J	1600	7,0	46	27,07	1:10	1…5	◇	70	◇	◇	◇	◇
K	2500	11,0	70	41,20	1:10	1…5	◇	100	50	◇	◇	◇
L	4000	17,6	110	64,74	1:10	1…8	◇	◇	120	80	◇	◇
M	6000	26,4	170	100,0	1:10	1…8	◇	◇	◇	90	◇	◇
N	10.000	44,0	290	170,7	1:10	1…8	◇	◇	◇	110	◇	◇
P	16.000	70,0	460	270,7	1:10	1…10	◇	◇	◇	230	70	◇
Q	20.000	88,0	550	323,7	1:10	1…10	◇	◇	◇	230	◇	◇
R	25.000	110,0	700	412,0	1:10	1…10	◇	◇	◇	◇	100	◇
S	40.000	176,0	1.100	647,4	1:10	1…15	◇	◇	◇	◇	◇	120

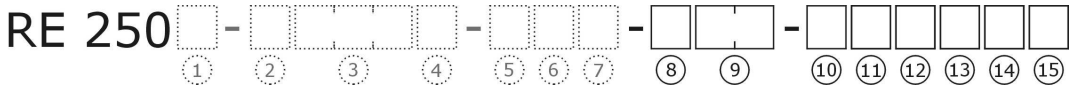
* devices for media with higher viscosity on request ◇ = not available

⑥ Measured medium

1	Water (η= 1 mPa·s, ρ = 1 kg/l)
2	Air (T = 0 °C, pe = 0 bar, η= 0.0181 mPa·s, ρ = 1,293 kg/m³)
3	Specify in plain text

4.3 Decription code – common part for all versions

The description code consists of the following elements:



⑧ Display Unit / Process temperature

0	Standard (aluminium)	– up to 200 °C for local display / 150 °C for electric. Output)
1	Standard (aluminium)	– with displaced display (extension made of stainless steel)
2	Stainless steel IP66	– up to 150 °C
3	Stainless steel IP66	– with displaced display

⑨ Outputs

A A	With local display
C J	With local display, 1 inductive contacts SJ 3,5N
C L	With local display, 2 inductive contacts SJ 3,5N
E A	With local display, electric remote sensor 4 - 20 mA
E L	With local display, electric remote sensor 4 - 20 mA, 2 inductive contacts SJ 3,5N
E J	With local display, electric remote sensor 4 - 20 mA, 1 inductive contact1 pulse output
F A	With HART protocol, 4–20mA
F L	With HART protocol, 4–20mA, 2 inductive contacts SJ 3,5N
F J	With HART protocol, 1 inductive contact, 1 pulse output
P A	With PROFIBUS PA interface

⑩ Certification of accuracy

0	Without calibration certificate
1	Certification of accuracy class (4.2.1)
2	With calibration report (5 calibration points)
3	With calibration report (10 calibration points)

⑪ Leak / pressure test

0	Without leak/pressure test
1	Pressure test acc. to EN 10204 with inspection certificate 3.1
2	Leak test acc. to EN 10204 with inspection certificate 3.1
3	Pressure test + leak test (acc. to EN 10204 with inspection certificate 3.1)

⑫ Material certificates

A	Without certificate
B	Certificate of Compliance with the order 2.1 according to DIN EN 10204
C	Inspection certificate 3.1 with material analysis (DIN EN 10204:2004) for wetted parts

⑬ Cleaning to factory standard

A	Without cleaning
B	Cleaning class VA – with marking: free from oil and grease
C	Cleaning class VA – with marking: free from oil, grease and silicone

⑭ Approvals

0	Without
1	Explosion protection – mechanical approval ATEX BVS 06 ATEX II2GDc
2	Explosion protection – mechanical and electrical (MEM/MEM-PPA) ATEX II2G EX ia IICT6

⑮ Marking

0	Without marking
1	Cardboard plate with a cable tie
2	Stainless steel plate (dimensions: 40 x 20mm)
3	Cardboard plate with cable tie + stainless steel plate (dimensions: 40 x 20 mm)