167LP Pneum. Buoyancy Transmitter with Torque Tube for Liquid Level, Interface and Density

Measuring of liquid level, interface or density with displacer (Archimedes principle), and torque tube as transmitting element.

FEATURES

- Level transmission between vessel and transmitter by torque tube
- Applicable for service temperatures from –196 °C to +500 °C and pressures up to PN 250
- The span can be set over a 1:5 ratio
- A wide selection of materials facilitates service under corrosive conditions
- Material approval certificates acc. to EN 10204-3.1 available
- Various licenses in accordance with national regulations

TECHNICAL DATA

In accordance with standard DIN IEC 770, data refer to the sensor material Type 316L (1.4404)

Input

Measuring span ..... 3 [1] to 15 N
Density range [2] ..... 200 < ρ < 1600 kg/m^3
Standard lengths of
displacers [3] ..... 350 to 3000 mm
14 to 120 inch
Weight of displacer [4] ..... max. 25 N

Output ..... 0.2 to 1 bar / 3 to 15 psi /
20 to 100 kPa /
0.2 to1 kp/cm^2

Supply air ..... 1.4 ± 0.1 bar or 20 ± 1.4 psi

Operating conditions

Process temperature [5] [6] ..... –196 °C to +500 °C
Pressure rating
acc. to DIN ..... PN 16, 40, 63, 100, 160, 250
acc. to ANSI ..... Class 150, 300, 600, 900, 1500
with heating jacket [8] ..... wafer body
max. PN 160 / Class 900;
heating jacket PN 25,
heating with saturated steam
or thermal oils
Ambient temperature [9] ..... –40 to +90 °C
Relative humidity ..... ≤ 100 %
Condensation ..... permitted
Transportation and
storage temperature ..... –40 to +90 °C
Protection class ..... IP 55;
IP 65 with ECEP ET 2730

The device can be operated at a class D2 location in accordance with DIN IEC 654, part 1.

Transitional behavior

Relative error ..... ≤ 1%
Sensitivity ..... < 0.1 %
Ambient temperature
Influence ..... ≤ 0.2 %/10K
Process temperature
Influence ..... ≤ 0.1 %/10K
Supply air influence ..... ≤ 0.2 %/0.1 bar
Air consumption ..... ≤ 200 l/h
Air capacity ..... 1200 l/h
Load effect
(measured at 0.6 bar) ..... +3 % for 400 l/h exhausted flow
–3 % for 400 l/h delivered flow

Mounting

Mounting method ..... sandwich mounted
acc. to DIN ..... DN 80, DN 100
acc. to ANSI ..... 3 inch, 4 inch
Pneum. Connections ..... internal thread
DIN 45 141-Q 1/4-18 NPT

Materials

Material table see page 4

Wafer body ..... Carbon Steel 1.0460 (~ A105),
316L (1.4404) or
Hastelloy C
Wafer body with
heating jacket
Wafer body ..... Carbon Steel 1.0460 (~ A105),
316L (1.4404)
Heating jacket ..... Steel 1.0308 (A519-1020)
Torque tube ..... 316L (1.4404 / 1.4435),
Hastelloy C, Inconel 600 or
Monel
Displacer 204DE ..... 316L (1.4404 / 1.4435),
PTFE,
PTFE with 25% carbon or
Hastelloy C
Suspension 316L
(4404 / 1.4435 / 1.4436)
or Hastelloy C
Amplifier housing ..... Aluminum
(Alloy Al-AlSi12),
Polyurethane coated, blue

For Sour Gas applications according to NACE Standard MR-0175:
Wafer body 316L (1.4404)
Torque tube ..... Hastelloy C or Inconel 600

The material of the seal at the Torque tube bearing corresponds to the material of the head piece.

Weight

Head with transmitter housing
without heating jacket ..... 15 kg (Class 1500: 18.5 kg)
with heating jacket ..... 16 kg

1) Span 1 N possible on request
2) Density difference of media; other ranges on request
3) Lengths < 350 mm and > 3000 mm on request
4) For measurement of interface or density:
weight ≤ 25 N + buoyant force at lowest density

5) Dependent on material of the wafer body:
–10 ... 350 °C with Carbon Steel
–60 ... 400 °C with 316L, other temperature ranges on request
6) Ambient temperature must not exceed 50 °C at measuring module housing, when process medium or heating of medium exceed 300 °C
8) Available with amplifier to wafer body mounting direction “Right hand mounted” (Model Code R) only
9) –50 °C on request

SAFETY REQUIREMENTS

Explosion protection acc. to ATEX, Type AC 628

For use at Zone 0, group IIC (AC628B)
For use at Zone 0 for tanks or pipes

II 1/2 G c IIB + H2 + C2H2..... AC 628A
II 1/2 G c IIC..... AC 628B
II 2 G c IIC..... AC 628

CE Label

P.E.D.
97/23/EG Annex III Module D .....fulfilled
Explosion protection acc. to ATEX.....2014/34/EU

Comparison of Material

Code	Mat.	DIN	Remarks	equivalent to
P235G1TH P235GH	1.0305 1.0345	EN 10 216-2	VdTÜV - Wbl. 457	ASTM A 106 A
P250GH	1.0460	EN 10 273	VdTÜV - Wbl. 350/3	ASTM A 105
X6 CrNiMoTi 17 12 2	1.4571	DIN EN 10088-3	VdTÜV - Wbl. 411	AISI 316Ti
X2 CrNiMo 17 12 2	1.4404		VdTÜV - Wbl. 411	AISI 316L
X2 CrNiMo 18 14 3	1.4435		VdTÜV - Wbl. 411	
X3 CrNiMo 17 13 3	1.4436		VdTÜV - Wbl. 411	
NiMo 16 Cr 15 W	2.4819	17 744	equal to Hastelloy C276 VdTÜV - Wbl. 400	UNS N10276
NiCr 15 Fe	2.4816	17 742	Inconel 600 VdTÜV - Wbl. 305	UNS N06600
NiCr 22 Mo 9 Nb	2.4856	17 744	Inconel 625 VdTÜV 499	UNS N06625
NiCr 21 Mo	2.4858	17 744	Inconel 825 VdTÜV 432	UNS N08825
X 2 CrNiMoN 22 5 3	1.4462	EN 10222-5	Duplex VdTÜV 418	UNS S 31803
GD - AlSi 12	3.2582.05	17 007-4	Al – Die-casting	

Service Limits of wafer body PN 250 made of (material)

Max. operating pressure in bar at temperature in °C

1.0460

°C	–10 to 120	200	250	300	350		
bar	250	200	175	150	140	DIN	
bar	231	219	206	180	145	ANSI	

1.4404 / 1.4435 / 1.4571

°C	–196 to –10	–10 to +50	100	200	300	400	500	
bar	250	250	230	200	177	162	148	DIN
bar	248	248	211	178	158	145	138	ANSI

1.4462

°C	–10 to 50	100	150	200	250	280		
bar	250	225	209	194	184	178	DIN	
bar	260	234	218	201	191	185	ANSI	

Inconel 625

°C	–196 to 50	100	200	300	400	450		
bar	250	230	210	197	184	177	DIN	
bar	255	234	214	201	187	181	ANSI	

Inconel 825

°C	–10 to 50	100	200	300	400	450		
bar	250	216	187	176	164	159	DIN	
bar	260	224	195	183	171	165	ANSI	

Hastelloy C (2.4610 / 2.4819 / 2.4602)

°C	–196 to –10	50	100	200	300	400		
bar	250	250	233	209	200	184	DIN	
bar	260	260	243	217	209	192	ANSI	

MODEL CODES 167LP

Pneumatic Buoyancy Transmitter with Torque Tube for Liquid Level, Interface and Density	**167LP**							161116
Wafer Body with Indicator: (Flange Size & Pressure Rating)								
DN 70 PN500 (lens acc. to IG-Norm)	-70							
DN 80 PN 16-40 (available with Contact Face C)	-20							
DN 80 PN 16-160 (available with Contact Face U, N)	-21							
DN 80 PN 16-250 (available with Contact Face E, L)	-22							
DN 80 PN 250-400 (Lens acc. to DIN 2696)	-80							
DN 100 PN 16-160 (available with Contact Face U, N)	-23							
DN 100 PN 16-250 (available with Contact Face E, L)	-24							
DN 100 PN 16-40 (available with Contact Face C)	-25							
3-Inch ANSI Class 150	-31							
3-Inch ANSI Class 300/600/900	-32							
3-Inch ANSI Class 1500	-34							
4-Inch ANSI Class 150	-41							
4-Inch ANSI Class 300/600/900	-42							
4-Inch ANSI Class 1500	-44							
Wafer Body Contact Face:								
Type B1/B1 acc. to DIN EN 1092-1		C						
Type B2/B2 acc. to DIN EN 1092-1 (available with -22, -24)		E						
Type D/C (Groove / Tongue Face) acc. to DIN EN 1092-1 (av. with -21, -23) (a)		U						
Type D/D (Groove / Groove Face) acc. to DIN EN 1092-1 (avail. with -21, -23)		N						
Type L/L (Lens face / Lens Face) acc. to DIN 2696 (only with Option -4)		L						
Type L/L (Lens Face / Lens Face) acc. to IG Norm (High Pressure Version) (only with Option -4)		H						
Type RF/RF (Raised Face / Raised Face) per ANSI B16.5 (available with -31, -32, -34, -41, -42, -44)		R						
Type RJF/RJF (Ring Joint Face / Ring Joint Face) per ANSI B16.5 (available with -31, -32, -34, -41, -42, -44)		J						
Type SF/SF (Smooth Finish / Smooth Finish) (avail. with -31, -32, -34, -41, -42, -44)		S						
Wafer Body Material: (Process wetted)								
1.0460 (~A 105 Carbon Steel), application from –10 °C to 350 °C			K					
1.4404 (316L) or 1.4435 if Pressure Rating codes H1 and H2 selected, application from –60 °C to 400 °C			S					
2.4819 (Hastelloy C276), application from –196 °C to 400 °C			C					
Wafer Body Mounting Direction: (Amplifier to body)								
Right hand mounted				R				
Left hand mounted				L				
Torque Tube Material: (Process wetted)								
1.4404 (316)					S			
Hastelloy C					C			
2.4816 (Inconel 600)					I			
2.4375 (Monel K500)					M			
Signal Range:								
0.2 to1bar						1		
3 to15 psi						2		
20 to100 kPa						3		

(continued on next page)

MODEL CODES 167LP (continued)

OPTIONS:

Electrical Certificates

ATEX Zone 0: II 1/2 G c IIC Ga/Gb ..... -E
ATEX Zone 1: II 2 G c IIC Gb ..... -P

Certificates

EN 10204-2.1 Certificate of Compliance ..... -1
EN 10204-2.2 Specific Test Report (Calibration) ..... -2
EN 10204-3.1 Inspection Certificate of Process Wetted Metallic Material ..... -3
PED 97/23/EC additional unit verification, acc. to module F/G ..... -4
Comply with NACE Standard MR 0175
(available with Wafer Body Material Code S and Torque Tube Material Code C, I or M) ..... -6

Material Test

X-Ray or Isotope test for welding ..... -7
Dye Penetration Test ..... -8

Tag No. Labeling

Stainless Steel Label Fixed With Wire ..... -L

(c) Available with Contact Face E, N, R & S

DISPLACER 204DE

Typical Dimensions and Weights for Density Ranges $\Delta\rho$ 1)

Material	316L (1.4404 / 1.4435) 2)													PTFE / PTFE with 25 % C				Hastelloy C276			
Code	-S (PN 100)				-T 3) (PN 40 / 63)					-S (PN 250)				-S (PN 500)				-S (PN 100 / 160)			
	Density Range $\Delta\rho$																				
	250 to 1500 kg/m³				300 to 600 kg/m³					400 to 2000 kg/m³				200 to 1500 kg/m³				300 to 1500 kg/m³			
Len. L	∅ mm	Vol. cm³	Wei. N	PN bar	∅ mm	Vol. cm³	Wei. N	PN bar	ρ_{min} 4) kg/m³	∅ mm	Vol. cm³	Wei. N	PN bar	∅ mm	Vol. cm³	Wei. N	PN bar	∅ mm	Vol. cm³	Wei. N	PN bar
mm																					
350	60.3	1000	19	100	101.6	2840	38	40	460	42.4	500	18	250	62	1056	23	500	60.3	1000	18	100
500	48.3	920	17	100	88.9	3100	43	63	580	42.4	710	24	250	51	1021	23	500	48.3	920	19	100
750	42.4	1060	21	100	76.1	3410	44	63	545	33.7	670	21	250	42	1039	24	500	48.3	1370	27	100
1000	33.7	890	17	100	60.3	2855	41	63	545	26.9	570	18	250	35	961	21	500	33.7	890	19	100
1200	33.7	1070	20	100	60.3	3425	48	63	675	26.9	680	22	250	35	1153	25	500	33.7	1070	22	100
1500	26.9	850	16	100	51	3065	39	63	460	21.3	540	17	250	30	1060	24	500	26.9	850	18	160
1800	26.9	1020	19	100	42.4	2540	38	63	495	21.3	640	20	250	28	1107	25	500	26.9	1020	21	160
2000	26.9	1140	21	100	42.4	2825	41	63	565	21.3	710	22	250	25	981	22	500	26.9	1140	23	160
2500	21.3	890	20	100	38	2840	37	63	425	17.2	580	16	250	22,5	993	23	500	21.3	890	23	160
3000	21.3	1070	24	100	38	3400	45	63	575	17.2	700	23	250	20	942	22	500	21.3	1070	27	160
inch																					
14	60.3	1020	20	100	101.6	2885	38	40	455	42.4	510	18	250	62	1074	23	500	60.3	1020	18	100
32	42.4	1150	23	100	76.1	3700	47	63	595	33.7	730	23	250	42	1126	26	500	33.7	720	16	100
48	33.7	1090	20	100	60.3	3480	49	63	680	26.9	690	22	250	35	1171	26	500	33.7	1090	23	100
60	26.9	870	16	100	51	3115	40	63	465	21.3	540	18	250	30	1076	24	500	26.9	870	18	100
72	26.9	1040	19	100	42.4	2580	38	63	505	21.3	650	21	250	28	1124	26	500	26.9	1040	21	160
84	26.9	1210	22	100	42.4	3000	44	63	635	21.3	760	23	250	25	1046	24	500	26.9	1210	25	160
96	21.3	870	20	100	38	2765	37	63	420	17.2	570	16	250	22,5	968	22	500	21.3	870	23	160
120	21.3	1090	25	100	38	3455	46	63	595	17.2	710	24	250	20	957	22	500	21.3	1090	25	160

1) $\Delta\rho = \rho1 - \rho2$
$\rho1$ = density of lower medium
$\rho2$ = density of upper medium

2) Using displacer material 1.4571 can cause small deviations in diameter, volume and weight.

3) For measurement of interface or density, the max. density of the lower medium is 1350 kg/m³.

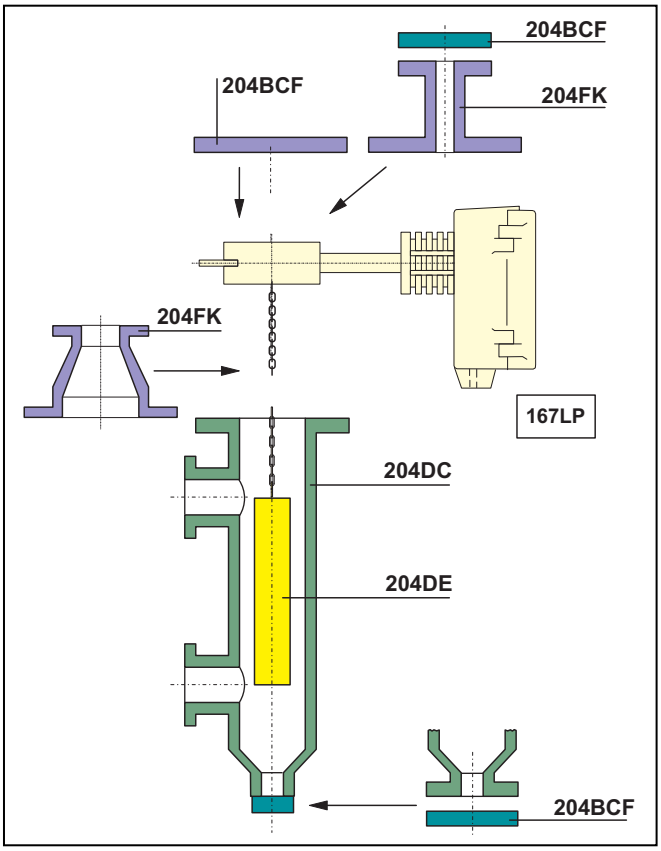
4) Min. density of the lower medium

If a Displacer Chamber is used, the difference between the diameter of the Displacer and the inside diameter of the Displacer Chamber must be at least 10 mm.

Lengths < 350 mm and > 3000 mm, and density ranges < 300 kg/m³ and > 2000 kg/m³ on request.

Accessories

For Displacer Chamber 204DC, Flange combination 204FK and Cover Flange Kit 204BCF see PSS EML0901, 204xx Accessories for Buoyancy Transmitter.



MODEL CODES 204DE

010318

Displacer for Buoyancy Transmitters from 2 N buoyancy up to 20 N 204DE

RANGE OF APPLICATION: (a)

Liquid Level - Media: Liquid / Gas or Air (Density difference = 250 kg/m³ to 2000 kg/m³) (= 9x10-3 lbm/in^3 to 72.2x10-3 lbm/in^3)			-S			
Interface Level / Density - Media: Liquid 1 / Liquid 2 (Density difference = 300 kg/m³ to 600 kg/m³) (= 10.8x10-3 lbm/in^3 to 22.7x10-3 lbm/in^3)	(g)(h)		-T			

DISPLACER MATERIAL:

1.4404 (316L)			S			
1.4541 (321)			H			
PTFE (not for applications in Zone 0)			P			
PTFE with 25% Carbon, for Zone0			O			
Hastelloy C276			X			
2.4856 (Inconel 625)	(e)		R			
2.4360 (Monel 400)	(e)		M			
3.7035 (Titan)	(e)		T			

PRESSURE RATING:

Up to PN 100 / Class 600				D		
Up to PN 160 / Class 900				E		
Up to PN 250 / Class 1500				F		
Up to PN 500 / Class 2500				G		

SUITABLE FOR FLANGE SIZE: (at top of vessel / chamber)

DN 50					0	
DN 70					1	
DN 80					2	
DN 100					3	
DN 150					4	
2 inch					5	
3 inch					6	
4 inch					7	
6 inch					8	

DISPLACER LENGTH "L": (inches are approx.)

for Displacer Material codes P, and O:

300 mm (12 inch) to 2000 mm (79 inch), with partition > 1000 mm						A
2001 mm (79 inch) to 4000 mm (157 inch), with partition points						B
4001 mm (157 inch) to 6000 mm (236 inch), with partition points						C
6001 mm (236 inch) to 8000 mm (315 inch), with partition points						D
8001 mm (315 inch) to 10000 mm (394 inch), with partition points						E
10001 mm (394 in) to 12000 mm (472 in), with partition points						F

for Displacer Material codes S, H, C, R, M, and T:

300 mm (12 in) to 3000 mm (118 in) without partitioning						K
3001 mm (118 in) to 6000 mm (236 in) One partition point						L
6001 mm (236 in) to 9000 mm (354 in) Two partition points						M
9001 mm (354 in) to 12000 mm (472 in) Three partition points						N
12001 mm (472 in) to 15000 mm (591 in) Four partition points						O

MATERIAL AND LENGTH OF THE SUSPENSION: (Length "b") (d)

1.4404 (316L) Standard length of Suspension	(b)					S1
1.4404 (316L) Customized Suspension Length	(c)					S2
1.4541 (321) Standard length of Suspension	(b)					H1
1.4541 (321) Customized Suspension Length	(c)					H2
Hastelloy C / Standard length of Suspension	(b)					C1
Hastelloy C / Customized Suspension Length	(c)					C2
2.4856 (Inconel 625) / Standard length of Suspension	(b)					I1
2.4856 (Inconel 625) / Customized Suspension Length	(c)					I2
2.4360 (Monel 400) / Standard length of Suspension	(b)					M1
2.4360 (Monel 400) / Customized Suspension Length	(c)					M2
3.7035 (Titan) / Standard length of Suspension	(b)					T1
3.7035 (Titan) / Customized Suspension Length	(c)					T2

(continued on next page)

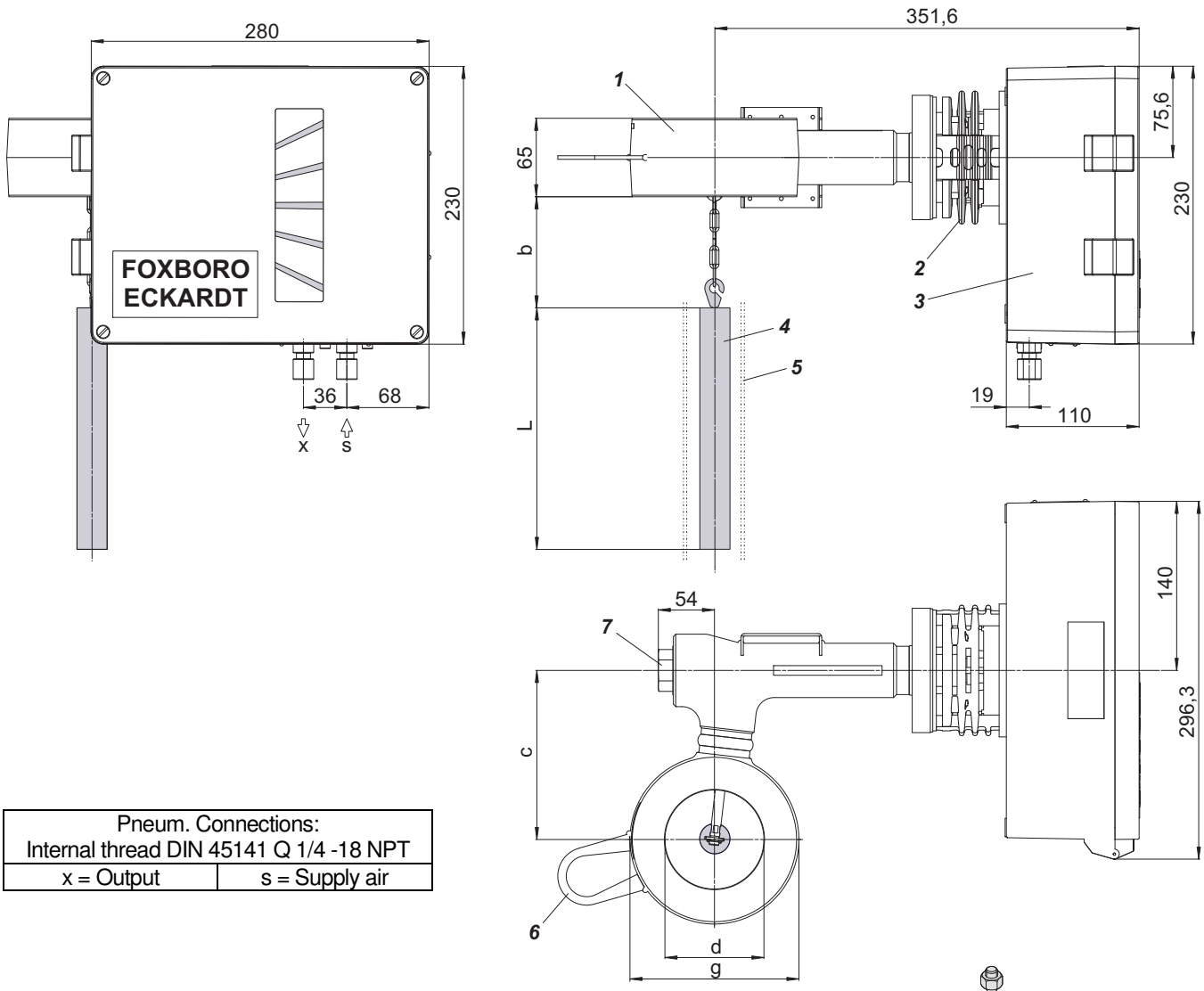
MODEL CODES 204DE (continued)

OPTIONS:

For application in Zone 0 (Additional grounding rope) (not available with Displacer Material: P)		-E
Damping Spring (Mat. 1.4310, max. 250 °C (482 °F))	(f)	-D
Damping Spring (Mat. HC, max 350 °C (662 °F))	(f)	-C
Density difference > 300 kg/m^3	(a)	-K
Tag No. Labeling – Stainless Steel Label Fixed with Wire (Text required)		-L
Certificates		
EN 10204-2.1 Certificate of Compliance		-1
EN 10204-3.1 Inspection Certificate of Process Wetted Metallic Material (not available with Displacer Material: P and O)		-3
PMI - Test (not available with Displacer Material: P and O)		-5

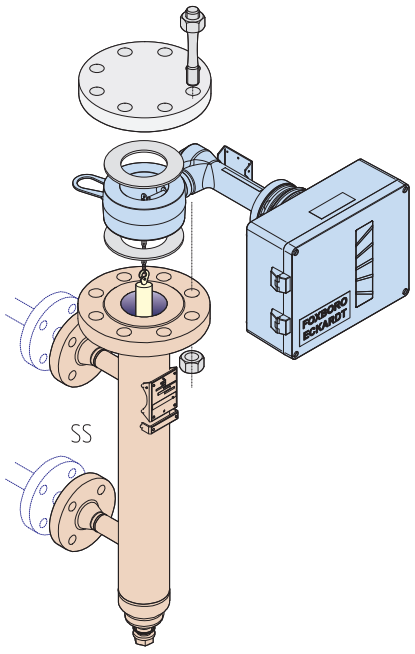
(a) Upper and Lower Medium Density required (at operating temperature)
(b) Only in connection with Model Code 204DC
(c) Exact length required (Contact face of flange to upper end of displacer)
(d) +/- 8 mm (+/- 0.3 inch)
(e) On ECEP request
(f) Required for 244LD with Option -G
(g) Consult factory if pressure rating is F or G
(h) Option K required

DIMENSIONS 167LP



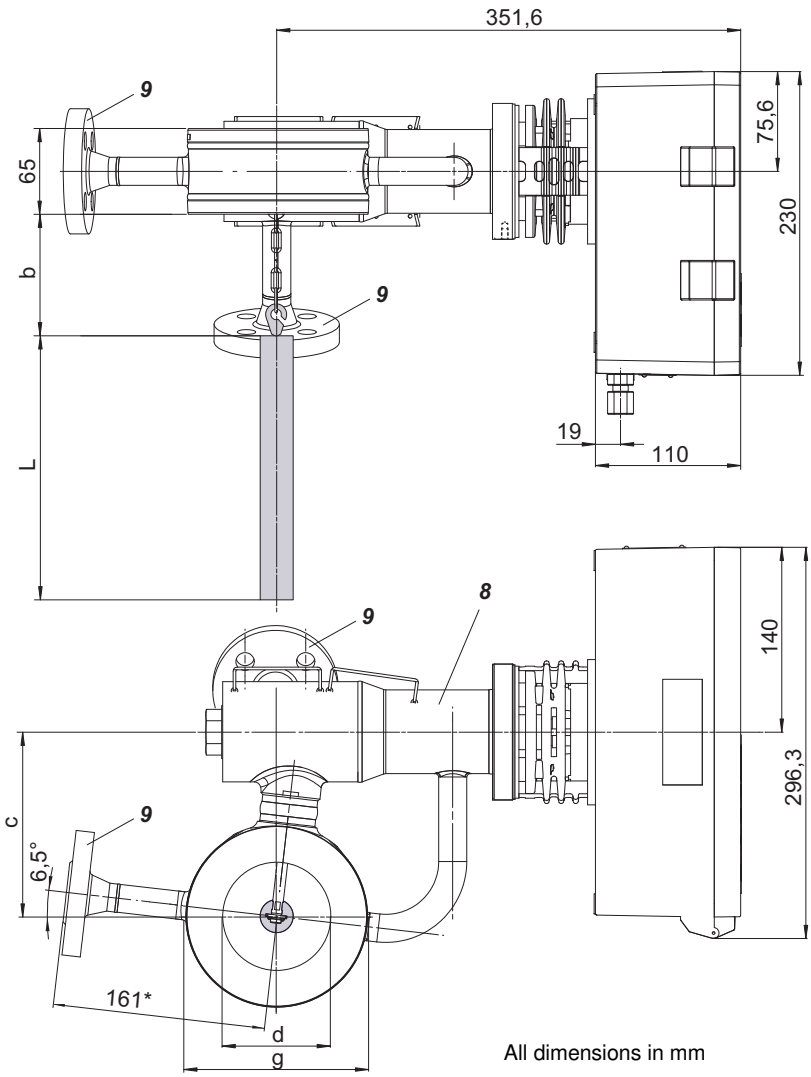
Pneum. Connections: Internal thread DIN 45141 Q 1/4 -18 NPT	
x = Output	s = Supply air

Version		Sealings	DN 80 / 3 inch			DN 100 / 4 inch		
	PN		c	d	g	c	d	g
DIN	16	Type E, DIN 2526 Type N, DIN 2512	140	82	138	160	102	162
	40							
	63							
	100							
	160	Type L, DIN 2696						
	250							
ANSI	150	Raised Face (RF), ANSI B16.5	140	82	133	160	102	162
	300				138			
	600							
	900	Ring Joint Face (RJF), ANSI B16.5			146			174
	1500			102	174			

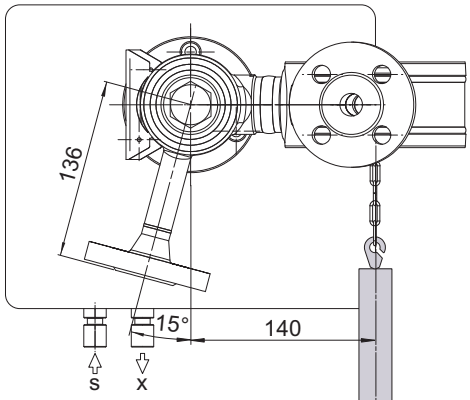


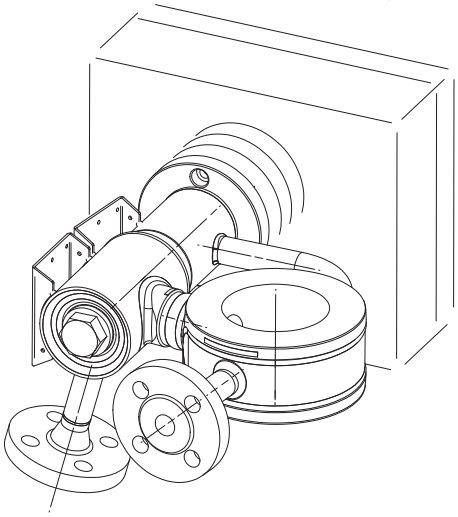
1 Head
2 Cooling Body
3 Transmitter housing
4 Displacer
5 Protective cage or tube for displacer to be supplied by customer, if process liquid is in turbulent conditions
6 Lifting hook***s***
7 Plug screw

DIMENSIONS 167LP with heating jacket



Front view see previous page

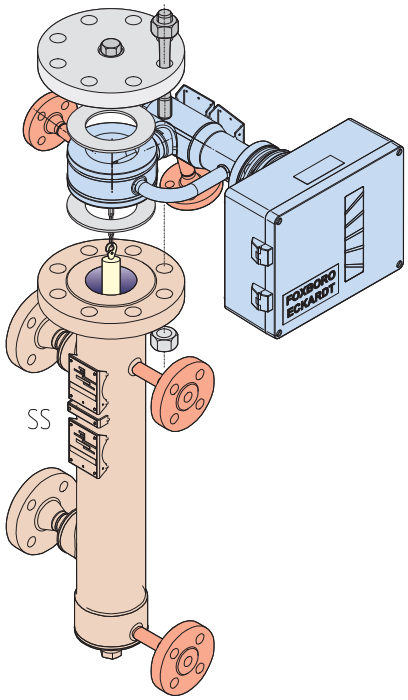




All dimensions in mm

* 164 @ RJF class 300-900
172 @ RJF class 1500

Version		Sealings	DN 80 / 3 inch			DN 100 / 4 inch		
	PN		c	d	g	c	d	g
DIN	16	Type E, DIN 2526 Type N, DIN 2512	140	82	138	160	102	162
	40							
	63							
	100							
	160	Type L, DIN 2696						
ANSI	150	Raised Face (RF), ANSI B16.5	140	82	133	160	102	162
	300				138			
	600							
	900	Ring Joint Face (RJF), ANSI B16.5			146			174



8 Heating jacket PN 25
9 Connection flanges for heating jacket DN 15, PN 25

Schneider Electric Systems USA, Inc.
38 Neponset Avenue
Foxboro, MA 02035
United States of America
http://www.schneider-electric.com

Global Customer Support
Inside U.S.: 1-866-746-6477
Outside U.S.:1-508-549-2424
https://pasupport.schneider-electric.com

DOKT 535 755 028 i01
FD-PSS-L-04-EN 0918