

144LVD Intelligent Buoyancy Transmitter for Liquid Level, Interface and Density



The intelligent transmitter 144LVD is designed to perform continuous measurements for liquid level, interface or density of liquids in the process of all industrial applications. The measurement is based on the proven Archimedes buoyancy principle and thus extremely robust and durable. Measuring values can be transferred analog and digital. Digital communication facilitates complete operation and configuration via PC or control system. Despite high process pressure and corrosive liquids, the 144LVD measures with consistent reliability and high precision. For installations in contact with explosive atmospheres up to Zone 0, certificates are available. The 144LVD combines the abundant experience of FOXBORO ECKARDT with most advanced digital technology.

FEATURES

- Communication HART, FoxCom, PROFIBUS PA or FOUNDATION Fieldbus
- Conventional operation with local keys
- Easy adaptation to the measuring point without calibration at the workshop
- Backdocumentation of measuring point
- Continuous self-diagnostics
- Configurable safety value
- Software lock for local keys and reconfiguration
- Approved for SIL2 applications
- Simulation of analog output for loop-check
- Local display in %, mA or physical units
- Signal noise suppression by Smart Smoothing
- Linear or customized characteristic
- Process temperature from -50 °C to +120 °C
- Materials for use with aggressive media
- Micro sintermetal sensor technology
- Separate mounting of sensor and amplifier with remote amplifier mounting kit

TECHNICAL DATA

Data refer to the sensor material Type 316L (1.4404)

Explosion protection certificates must be observed!

Input / Output

Measuring ranges 50 mm to 50 m
upper and lower range value
continuously adjustable

Standard lengths of
Displacer (104DE) 350 .. 3000 mm, 14 .. 120 in;
further lengths on request

Weight of displacer ¹⁾ max. 40 N

Measuring span 2... 20 N contin. adjustable
(to 1 N on request)

Span ratio
Turn-down 1:1 .. 1:10 (1:20 on request)

Accuracy ²⁾ $\pm 0.2\%$; increased accuracy
with customized adjustment

Transfer function linear or customized with up
to 32 setpoints ³⁾

Configuration

- with local push buttons and LCD
- Digital (see communication ...)

Local display LCD 5 digits, configurable in
%, mA or phys. units

Load $R_{Bmax} = (U_S - 12V) / 23\text{ mA}$

Communication HART

Connection Two-wire system

Supply voltage U_S : 12 .. 42 V DC ⁶⁾, $V_{SS} < 1\%$

Current sink max. 23 mA

Signal range 4 .. 20 mA

Operating range 3.8 .. 21 mA

Digital communication HART Protocol, 1200 Baud

Hand held terminal usable

PC Software PC20 / ABO991

Hardware HART Modem MOD991 for PC

Min. load 250 Ω

Failure handling

Substitute value last value or safety value
Safety value 3.6 ... 23 mA, adjustable
Reset substitute value automatically or manual
Select messages Internal calibration failed,
Pressure peaks > 150 %,
Data access failed,
Over range > 110 %,
Ambient temp. out of limits,
Process temp. out of limits,
Measuring range invalid

Communication FoxCom

Connection Two-wire system

Supply voltage U_S : 12 .. 42 V DC ⁶⁾, $V_{SS} < 1\%$

Current sink max. 23 mA

Analog mode

Signal range 4..20 mA

Operating range 3.8 .. 21 mA

Digital mode

Digital communication FoxCom protocol, 4800 Baud

Hand held terminal usable

PC software PC20 / ABO991

Hardware FoxCom Modem für PC

Min. load 200 Ω

Output current approx. 12 mA constant

Failure handling

Substitute value safety value
Safety value 3.6 or 23 mA
Reset substitute value automatically or manual
after
ambient temp. out of limits or
process temp. out of limits
Select messages Pressure peaks > 150 % ⁴⁾,
Ambient temp. out of limits,
Process temp. out of limits

Communication PROFIBUS PA

Connection twisted and shielded two wire
cable acc.to recommendation
based on IEC 1158-2

Supply voltage U_S : 9 .. 32 V DC ⁵⁾, $V_{SS} < 1\%$

Operating current 10.5 mA \pm 0.5 mA
(base current)

Digital communication PROFIBUS PA protocol, acc.
to class B profile, EN 50170
and DIN 19245 part 4

Signal amplitude ± 8 mA

Fault current < 13 mA

Operating values according to IEC 1158-2

Bus connection Fieldbus interface based on
IEC 1158-2

Power supply Power supply is achieved dep-
endant on the application by
means of segment coupler

GSD file the actual file can be down-
loaded from our homepage

Configuration

Software PC20 for PC

Hardware PC- or PCMCIA-interfaces
from Softing

Control systems PROFIBUS PA compatible

Failure handling

Substitute value last value or safety value
Safety value adjustable $-110.. +110\%$ of out
Reset substitute value automatically or manual
Select messages

Internal calibration failed,
Sensor value out of range
Memory access failed
Measuring range out of sensor range
Ambient temp. out of limits,
Process temp. out of limits,
Measuring range invalid

1) For measurement of interface or density:
weight ≤ 25 N + buoyant force at lowest density

2) Accuracy acc. ANSI / ISA - S51.1 - 1979

3) Customized not with FoxCom

4) Reset of substitute value after pressure peaks automatically

5) With explosionproof device 9 .. 24 V

6) With explosionproof device 12 .. 30 V

Communication FOUNDATION Fieldbus

Connection	twisted and shielded two wire cable acc.to recommendation based on IEC 1158-2
Supply voltage U_S :	9 .. 32 V DC ¹⁾ , $V_{SS} < 1\%$
Operating current	10.5 mA \pm 0.5 mA (base current)
Digital communication	FF specification Rev. 1.4, Link-Master (LAS)
Signal amplitude	\pm 8 mA
Fault current	< 13 mA
Operating values	according to IEC 1158-2
Bus connection	Fieldbus interface based on IEC 1158-2
Power supply	Power supply is achieved dependant on the application by means of segment coupler
File	the actual file can be downloaded from our homepage
Configuration	
Software	National Instruments NI-FBUS Configurator
Hardware	FBUS interfaces from National Instruments (AT-FBUS and PCMCIA- FBUS)
Control systems	FOUNDATION Fieldbus H1 compatible
Failure handling	
Substitute value	last value or safety value
Safety value	adjustable -110.. +110 % of out
Reset substitute value	automatically or manual
Select messages	Internal calibration failed, Sensor value out of range Memory access failed Measuring range out of sensor range Ambient temp. out of limits, Process temp. out of limits, Measuring range invalid

Operating conditions ²⁾

Process temperature	-50 °C ... +120 °C
Pressure rating	
acc. to DIN	PN 16, 40, 63, 100, 160, 250, 400, 500 ³⁾
acc. to ANSI	Class 150, 300, 600, 900, 1500, 2500 ³⁾
Ambient temperature ^{4) 5)}	
without indicator	-40 °C ... +85 °C
with LCD indicator	-40 °C ... +70 °C ⁶⁾
Relative humidity	< 100%
Condensation	permitted
Transportation-storage temperature	-50 °C ... +85 °C
Protection	IP 66 (acc. DIN EN 60 529)

Operation condition effects

Ambient temperature	-10 °C ... +70 °C
Zero	< 0.1 % / 10 K ⁷⁾
Span	< 0.07 % / 10 K
Total	
	$(0.1 \frac{\text{max. sp.}}{\text{adjusted sp.}} \pm 0.07 \frac{\text{measured value}}{\text{adjusted sp.}}) \% / 10K$
	(sp. = measuring span)
< -10 °C / > +70 °C	twice the value
Process temperature	< 0.1 % / 10 K ⁷⁾
Operating pressure	< 0.2 % of upper measured value (with PN 500)

Transitional behavior

Dynamic behavior	
Damping (90%-time)	0 ... 32 s
Switch-on time	7 s
Step response (63%-time)	
with damping 0 s	250 ms
Update rate	10/s
Long term stability	< 0.2 % / 6 months at 20°C ⁷⁾
Noise suppression	
Common mode voltage	< AC 250 V _{eff}
Common mode rejection	120 dB
Series mode rejection	50 dB
Mains synchronization	50 Hz / 60 Hz
Filter	Smart Smoothing

1) With explosionproof device 9 .. 24 V

2) Not with all materials - see Table of Comparison of Materials page 7

3) With flange material HC max. PN 100 / Class 1500

4) Ambient temperature must not exceed 50°C at measuring module housing, when process medium or heating of medium exceed 300°C

5) -50 °C on request

6) Display invisible at temperatures less than -30 °C

7) For max. measuring span

Materials (Table of Comparison see page 6)

Sensor	
Measuring cell	316L (1.4404 / 1.4435) or Hastelloy C
Fill fluid	silicone oil
Filling volume	approx. 1 cm ³
Amplifier housing	Aluminium (Alloy No GD-AI Si 12), Polyurethan coated, or Stainless Steel 316L (1.4404)
Suspension	316L (1.4404 / 1.4435 / 1.4436) or Hastelloy C
Connection flange	see ModelCode page 8
Displacer 204DE	see ModelCode page 11
For Sour Gas applications according to NACE Standard MR0175-2003:	
Membrane or complete . .	
Measuring cell	Hastelloy C
Flange	316 (1.4404 / 1.4571)

Mounting

Mounting method	flange mounted
acc. DIN	DN 70, 80, 100
acc. ANSI	3 inch or 4 inch

Accessories for separate
mounting of amplifier remote amplifier mounting kit
Length of cable 3 m / 10 m

Weight

Transmitter	see table page 6
Displacer	see table page 10

Electrical connection

Cable entry thread M20x1.5 or 1/2-14 NPT
Cable gland and screwed sealing plug have to be ordered
separately under model code BUSG ...
For equipment in Ex d version, 1 screwed sealing plug
made of stainless steel is included in delivery.
Screw terminals wire cross-section up to 2.5 mm²
Test sockets Ø 2 mm

Electromagnetic compatibility EMC

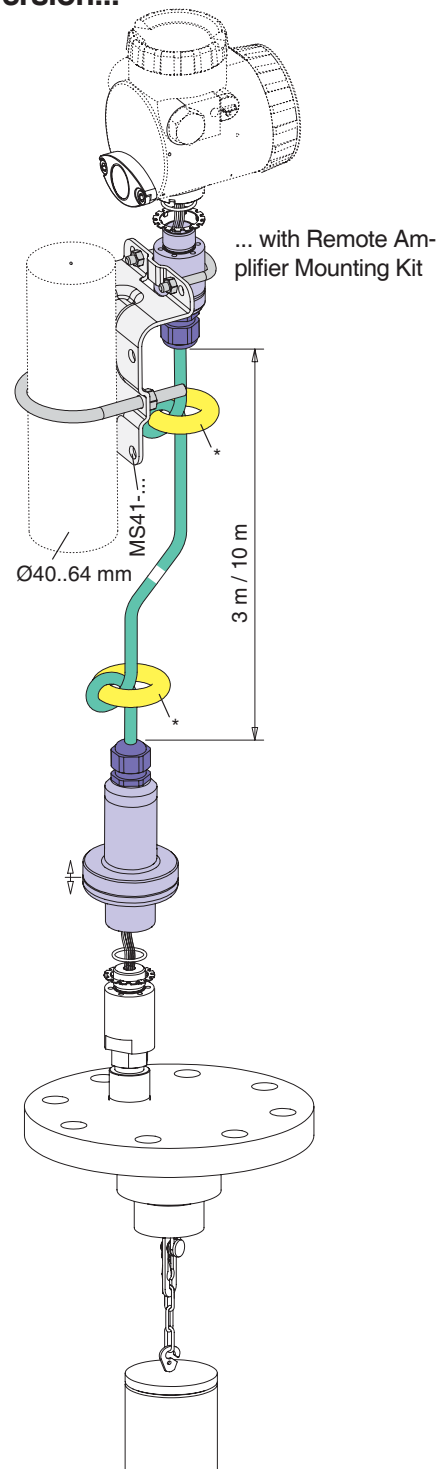
Operating conditions industrial environment
Immunity according to
EN 61326 (3/2002) fulfilled
Emission according to
EN 61326 (3/2002) fulfilled
EN 55011, May 2000,
Group 1, Class A fulfilled
EN 50081-2 fulfilled
NAMUR recommendation Ne21 Status Aug.1998 fulfilled

SAFETY REQUIREMENTS**CE Label**

Electromagnetic compatibility . . 89/336/EWG
Low-voltage regulation 73/23/EWG
Explosion protection 94/9/EG

Safety

According to EN 61010-1
(resp. IEC 1010-1) safety class III
Internal fuses none (or not replaceable by
customer)
External fuses Limitation of power supplies
for fire protection have to be observed due to EN 61010-1,
appendix F (resp. IEC 1010-1)

144LVD Version...

Electrical classification ATEX ^{2) 3)}**Intrinsic safe:**

AI 408	HART / FoxCom electronics ¹⁾	II 2 G EEx ia/ib IIC T4	PTB 01 ATEX 2168	Zone 1
AI 428	PA/FF electronics	II 2 G EEx ia IIC T4/T6	PTB 01 ATEX 2156	Zone 1
mounted with:				
AI 419 A	Sensor part 144LVD	II 1/2 G EEx ib/ia IIB T4..T6	PTB 01 ATEX 2044	Zone 0
AI 419 B1	Sensor part 144LVD	II 1/2 G EEx ib/ia IIC T4..T6	PTB 01 ATEX 2044	Zone 0
AI 419 B2	Sensor part 144LVD (CS ₂)	II 1/2 G EEx ib/ia IIC T4..T6	PTB 01 ATEX 2044	Zone 0

Explosion-proof:

AD 931	Housing for PA-FF-HART-FoxCom ¹⁾	II 2 G EEx d IIC T6	PTB 02 ATEX 1025 X	Zone 1
mounted with:				
AD 406 A	Sensor part 144LVD	II 2 G EEx d IIC T6..T4	PTB 02 ATEX 1025 X	Zone 1
AD 406 B	Sensor part 144LVD	II 2 G EEx d IIB T6..T4	PTB 02 ATEX 1025 X	Zone 1

Intrinsic safe and auxilliary protection:

AID421	Housing for HART ¹⁾	II 2 G EEx ia d IIC T6	PTB 0. ATEX 2011 X	Zone 1
mounted with:				
AD 406 A	Sensor part 144LVD	II 2 G EEx d IIC T6..T4	PTB 02 ATEX 1025 X	Zone 1
AD 406 B	Sensor part 144LVD	II 2 G EEx d IIB T6..T4	PTB 02 ATEX 1025 X	Zone 1

Zone 2:

AN 408	HART/FoxCom electronics ¹⁾	II 3 G EEx ia/ib IIC T4	Manufacturer's Declaration	Zone 2
AN 428	PA/FF electronics	II 3 G EEx ia IIC T4/T6	Manufacturer's Declaration	Zone 2
AT 408	HART/FoxCom electronics	II 3 D T135°C	Manufacturer's Declaration	Zone 22
AT 428	PA/FF electronics	II 3 D T85°C	Manufacturer's Declaration	Zone 22
mounted with:				
AI 419 A	Sensor part 144LVD	II 1/2 G EEx ib/ia IIB T4..T6	PTB 01 ATEX 2044	Zone 2
AI 419 B1	Sensor part 144LVD	II 1/2 G EEx ib/ia IIC T4..T6	PTB 01 ATEX 2044	Zone 2

Further National certificates

- Overfill protection according to WHG
- Bauteileprüfung von Wasserstand-Stetigreglern (VdTÜV Wasserstand 100)

International Certificates**FM Certification**

Intrinsically Safe / I, II, III / 1 / ABCDEFG / T4 Ta=85°C
 Nonincendive / I / 2 / ABCD / T4 Ta=85°C
 Special Protection / II / 2 / FG / T4 Ta=85°C
 Special Protection / III / 2 / T4 Ta=85°C
 Explosion proof / I / 1 / BCD / T6
 Dust-Ignitionproof / II, III / 1 / EFG / T6
 Type 4X
 Entity Parameters:
 V_{max}=30 V, I_{max}=150 mA, C_i=2,45 nF, L_i=0,14 mH

CSA Certification *

Class I, Div. 1, Groups C and D;
 Class II, Div. 1, Groups E, F and G;
 Class III, Div. 1;
 Type 4X

RUSSIAN "Intrinsic safety"**RUSSIAN "Explosionproof"****Belarus - Certificate Number 2176**

- Further protection types of on request -

1) Electrical data see EC Certificates of Conformity

2) With appropriate order only

3) National requirements have to be observed

TABLE OF MATERIALS

Comparison of Material

Code	Wnr	DIN	Remarks	equivalent to
C 21	1.0432	–	VdTÜV - Wbl. 399 (for ANSI flanges only)	ASTM A 105
C 22.8	1.0460	17 243	VdTÜV - Wbl. 350/3	ASTM A 576 - 1020
X6 CrNiMoTi 17 12 2	1.4571	17 440		~ ASTM Typ 316Ti
X2 CrNiMo 17 13 2	1.4404			ASTM Typ 316L
X2 CrNiMo 18 14 3	1.4435			
X5 CrNiMo 17 13 3	1.4436			
NiMo 16 Cr 15 W	2.4819	17 744	equivalent to Hastelloy C-276 VdTÜV - Wbl. 400	UNS N 12 276
GD - AISi 12	3.2582.05	17 007	Al - Diecasting	

Service Limits

Nominal pressure	C 22.8 (~ A 105)		316 / 316L (1.4404 / 1.4571) Hastelloy C		
	Max. operating pressure in bar at temperature in °C				
	-50 ... -10 ¹⁾	-10 ... +120	-50 ... -10	-10 ... +50	+120
PN 16 DIN 2633	12	16	16	16	16
PN 40 DIN 2635	30	40	40	40	35
PN 63 DIN 2636	48	64	63	63	57
PN 100 DIN 2637	73	98	100	100	95
PN 160 DIN 2638	120	160	160	160	142
PN 250 DIN 2628	187	250	250	250	230
PN 400 DIN 2627	300	360	400	400	368
PN 500 HD-Norm	375	500	500	500	460
Class 150	14	16	19	18	16
Class 300	38	46	49	49	42
Class 600	76	92	99	99	84
Class 900	114	139	160	160	142
Class 1500	191	231	248	248	211
Class 2500	300	360	400	400	350

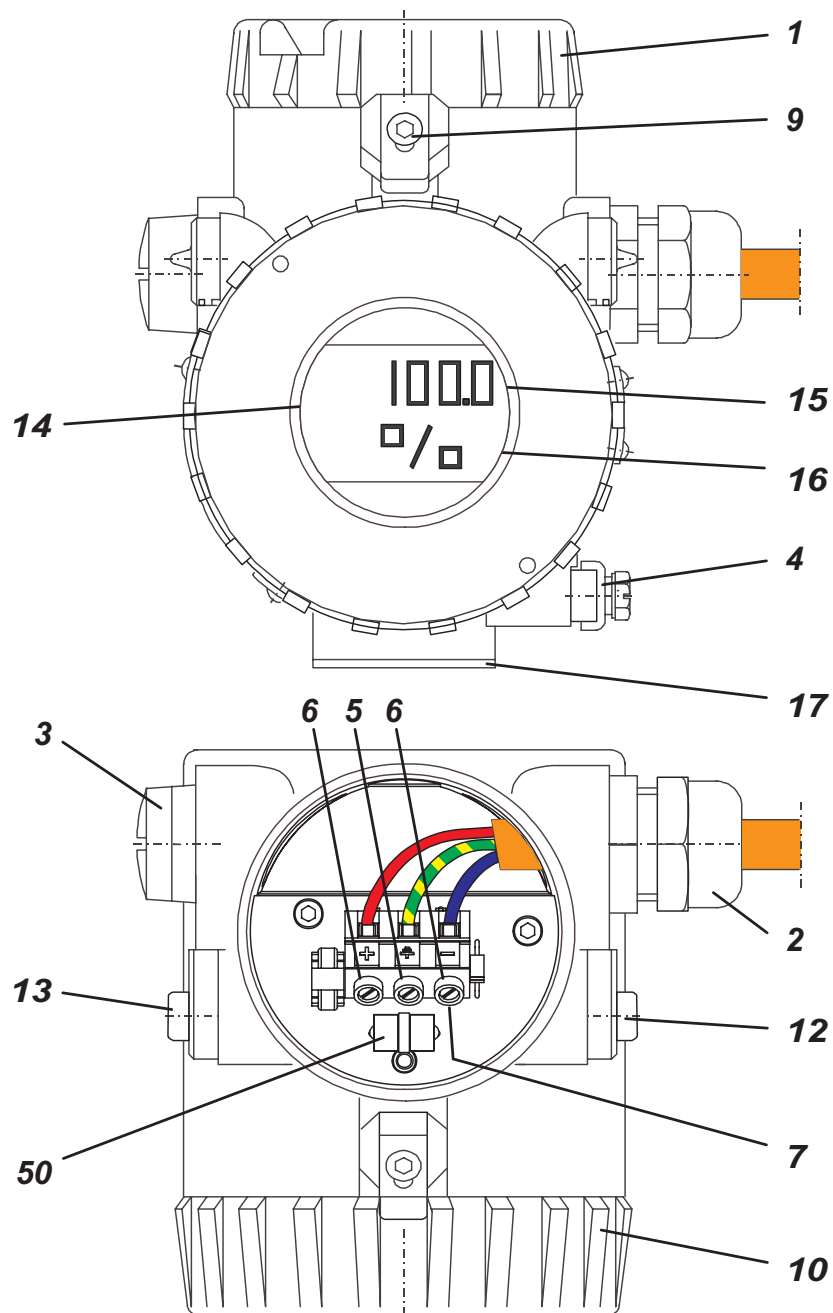
Table of Weights

Transmitter, without displacer	Weight [kg]													
	PN								Class					
	16	40	63	100	160	250	400	500	150	300	600	900	1500	2500
DN 80 / 3 inch	8	8	9	12	14	20	41	–	6	9	11	16	32 ²⁾	50 ²⁾
DN 100 / 4 inch	7	9,5	12	12	20	32	70	–	10	14	21	27	35	63
DN 70	–	–	–	–	–	–	–	28 ²⁾	–	–	–	–	–	–

1) Process temperatures < -10 °C with C 22.8 on request only

2) adapter included

CONNECTIONS, OPERATIONAL ELEMENTS



1 Cover for terminal compartment

2 Cable gland

3 Plug, interchangeable by Pos. **2**

4 External ground connection

5 Internal ground connection

6 Terminals (+ / -)

7 Test sockets Ø 2 mm integrated in terminals

9 Security lock for EEx d version

10 Cover for amplifier housing (with local display)

12 Local key for lower range value / zero

13 Local key for upper range value / damping

14 LCD indicator

15 Measuring variable

16 Engineering unit

17 Bottom housing cover

50 Overvoltage protection (if present)

MODEL CODES 144LVD

Intelligent Buoyancy Transmitter	144LVD	010808
Flange Size & Pressure Rating:		
DN 80, PN 16/40	-11	
DN 80, PN 63	-12	
DN 80, PN 100	-13	
DN 80, PN 160	-14	
DN 80, PN 250	-15	
DN 80, PN 400	-16	
DN 100, PN 16	-21	
DN 100, PN 40	-22	
DN 100, PN 63	-23	
DN 100, PN 100	-24	
DN 100, PN 160	-25	
DN 100, PN 250	-26	
DN 100, PN 400	-27	
3-Inch, ANSI Class 150	-31	
3-Inch, ANSI Class 300	-32	
3-Inch, ANSI Class 600	-33	
3-Inch, ANSI Class 900	-34	
3-Inch, ANSI Class 1500 (a).	-35	
3-Inch, ANSI Class 2500 (a).	-36	
4-Inch, ANSI Class 150	-41	
4-Inch, ANSI Class 300	-42	
4-Inch, ANSI Class 600	-43	
4-Inch, ANSI Class 900	-44	
4-Inch, ANSI Class 1500	-45	
4-Inch, ANSI Class 2500	-46	
IG-Norm DN 70, PN 500 (a)(c).	-51	
Flange Contact Face:		
Type B1, DIN EN 1092-1 (with -11, -21, -22)	A	
Type B2, DIN EN 1092-1 (with -11 to -15, -21 to -26)	B	
Type D, DIN EN 1092-1 (with -11 to -15, -21 to -26)	D	
Type C, DIN EN 1092-1 (with -11 to -15, -21 to -26)	G	
Type F, DIN EN 1092-1 (with -11 to -15, -21 to -26)	I	
Type E, DIN EN 1092-1 (with -11 to -15, -21 to -26)	K	
Type C, Raised Face DIN 2526 (with -11, -21 and -22)	C	
Type E, Raised Face DIN 2526 (w. -12, -13, -23, -24)	E	
Type N, Groove DIN 2512 (with -11 to -14, -21 to -25)	N	
Type F, Tongue DIN 2512 (with -11 to -14, -21 to -25)	F	
Form L, Lense, DIN 2696 (with -14 to -16, -25 to -27)	L	
Form L, Lense, High Pressure Standard (with -51)	H	
Form RJF Ring Joint Face ANSI B16.5 (w. -31 to -46)	J	
Type SF(RF); RA 125 microinch (w. -31- -35, -41 - -45)	S	
Type LM Large Male according to ANSI B16.5 (with -31 to -36 and -41 to -46)	M	
Type LF Large Female according to ANSI B16.5 (with -31 to -36 and -41 to -46)	O	
Type LT Large Tongue according to ANSI B16.5 (with -31 to -36 and -41 to -46)	P	
Type LG Large Groove according to ANSI B16.5 (with -31 to -36 and -41 to -46)	Q	
Type ST Small Tongue according to ANSI B16.5 (with -31 to -36 and -41 to -46)	T	
Type SG Small Groove according to ANSI B16.5 (with -31 to -36 and -41 to -46)	U	
Flange Material (Process wetted):		
Carbon Steel 1.0460 (~A 105) (with FLANGE SIZE 51: 1.7258 (34CrMo5))	K	
316 (1.4571 / 1.4404)	S	
14462 DUPLEX	N	
Hastelloy C (not with Contact Face N, F, L, H & J) (available with -11 to -13, -21 to -24, -31 to -33 and -41 to -43)	C	
Sensor Material:		
316L 1.4435 / 1.4404 (not with Flange Material Code C)	S	
Diaphragm Hastelloy C, Sensor Body 316L (1.4571 / 1.4404) (Not with Flange Material Code C) (f)	N	
Hastelloy C	C	

MODEL CODES 144LVD (continued)

Sensor O-Ring Materials & Temperature Limits:								
Metal sealing, material as sensor	M							
Maximum Weight of the Displacer:								
Less than 39.2 N (4 kg)	A							
Electrical Classification:								
ATEX intrinsic safe - Zone 0 - IIB T4 (with HART) (not Flange Contact Faces H, L and J)								0B4
ATEX intrinsic safe - Zone 0 - IIC T4 (with HART) (not Flange Contact Faces H, L and J)								0C4
ATEX intrinsic safe - Zone 0 - IIB T6 (with PROFIBUS or FOUNDATION Fieldbus) (not Flange Contact Faces H, L and J)								0B6
ATEX intrinsic safe - Zone 0 - IIC T6 (with PROFIBUS or FOUNDATION Fieldbus) (not Flange Contact Faces H, L and J)								0C6
ATEX intrinsic safe - Zone 1 - IIC T4 (with HART)								1C4
ATEX intrinsic safe - Zone 1 - IIB T6 (with HART)								1B6
ATEX intrinsic safe - Zone 1 - IIC T6 (with HART, PROFIBUS or FOUNDATION Fieldb)								1C6
ATEX intrinsic safe - Zone 2 - IIC T4 (with HART)								2C4
ATEX intrinsic safe - Zone 2 - IIC T6 (with PROFIBUS or FOUNDATION Fieldbus)								2C6
ATEX explosion proof - Zone 1 - IIB T6								D1B
ATEX explosion proof - Zone 1 - IIC T6								D1C
FM Nonincendive (g)								NFM
FM Explosionproof								FDZ
CSA Explosionproof								CDZ
FM Intrinsically Safe (g)								FAA
CSA Intrinsically Safe (g)								CAA
GOST-R HART Intrinsically Safe T4								GAA
GOST-R HART Intrinsically Safe T6								GA6
GOST-R Profibus oder Fieldbus Intrinsically Safe T6								
GOST-R Explosionproof T6								GDZ
For General Purpose Areas, Not Explosionproof								ZZZ
Amplifier Housing:								
Housing AI, with operating buttons and external push buttons								P
Housing 316L, Without External Pushbuttons (not with Electr. Class NFM, FDZ, CDZ)								S
Cable Entry:								
M20x1.5 Without Cable Gland								M1
1/2-14 NPT Without Cable Gland								N1
Communication:								
HART								H
FoxCom Adjustment Analog (4-20 mA)								F
PROFIBUS PA								P
FOUNDATION Fieldbus								B
Options:								
LCD Indicator (required for Amplifier Housing P & S)								-A
Remote Amplifier Mounting Kit (3 m), Mounted (b)								-R
Remote Amplifier Mounting Kit (10m), Mounted (b)								-B
Assembly parts of flange connection: consisting of bolt, nuts, 1 gasket. Seals material acc. to equipment flange, and for raised face spiral-wound and with groove flange graphitic gasket. (Material Bolts and nuts A2 for non carbon steel, GA for carb (d)								-P
Tag No. Labeling								
Stainless Steel Label Fixed With Wire								-L
Stainless Steel Label Fixed On Amplifier								-F
National Certificates								
Overfill Protection Per WHG Environmental Pollution								-V
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
Certificate for SIL2 - applications								-Q
Comply with NACE Standard MR-0175 (only with Flange Material S and Diaphragm C or N) (i)								-6
(a) With adapter								
(b) Not available with Electrical Classification FDZ, CDZ, D1B, D1C, 1B6, 1C6, GA6, GDZ								
(c) Not with FLANGE MATERIAL C								
(d) Pending								
(f) Not available with NFM, FDZ, CDZ, FAA, CAA								
(g) Not with Communication P, B								
(i) Restrictions concerning the limit of application for the used materials are considering (NACE Standard MR-0175/2003, or ISO 15156-3)								

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 C									
Code	-S (PN 100)				-T ³⁾ (PN 40 / 63)				-S (PN 250)				-S (PN 500)				-S (PN 100 / 160)							
Len. L	Density Range $\Delta\rho$																							
	250 ... 1500 kg/m ³					100 ... 600 kg/m ³					400 ... 2000 kg/m ³					200 ... 1500 kg/m ³					300 ... 1500 kg/m ³			
mm	\varnothing mm	Vol. cm ³	Wei. N	PN bar	\varnothing mm	Vol. cm ³	Wei. N	PN bar	ρ_{min} ⁴⁾ kg/m ³	\varnothing mm	Vol. cm ³	Wei. N	PN bar	\varnothing mm	Vol. cm ³	Wei. N	PN bar	\varnothing mm	Vol. cm ³	Wei. N	PN bar			
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			

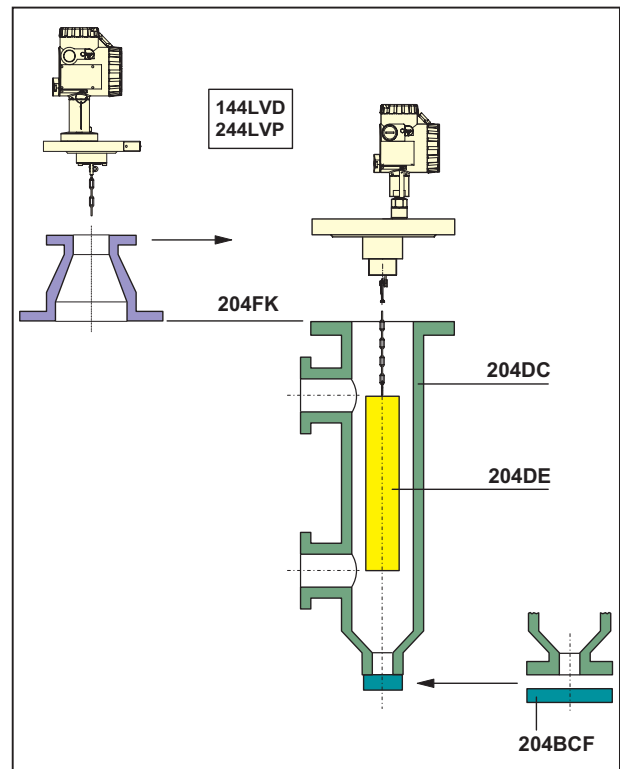
- $\Delta\rho = \rho_1 - \rho_2$
 ρ_1 = density of lower medium
 ρ_2 = density of upper medium
- Using displacer material 1.4571 can cause small deviations in diameter, volume and weight.
- For measurement of interface or density, the max. density of the lower medium is 1350 kg/m³.
- Min. density of 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 < 100 kg/m³ and > 2000 kg/m³ on request.

Accessories

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



MODEL CODES 204DE

Displacer for Buoyancy Transmitters, from 2 N up to 20 N		204DE								010608
RANGE OF APPLICATION:										
Liquid Level - Media: Liquid / Gas or Air										
(Density difference = 250 kg/m ³ to 2000 kg/m ³) -S										
Interface Level / Density - Media: Liquid 1 / Liquid 2										
(Density difference = 100 kg/m ³ to 600 kg/m ³) -T										
DISPLACER MATERIAL:										
316L (1.4404 / 1.4435 / 1.4571) S										
PTFE P										
PTFE with 25% Carbon O										
Hastelloy C C										
Inconel 600 (2.4816) I										
Monel 400 (2.4360) M										
Titan (3.7035) 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 in) to 2000 mm (79 in) without partitioning A										
2001 mm (79 in) to 4000 mm (157 in) One partition point B										
4001 mm (157 in) to 6000 mm (236 in) Two partition points C										
6001 mm (236 in) to 8000 mm (315 in) Three partition points D										
8001 mm (315 in) to 10000 mm (394 in) Four partition points E										
10001 mm (394 in) to 12000 mm (472 in) Five partition points F										
For Displacer Material codes S, C, I, 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)										
316L / 1.4404 / Standard length of Suspension (b) S1										
316L / 1.4404 / Customized Suspension-Length (c) S2										
Hastelloy C Standard length of Suspension (b) C1										
Hastelloy C Customized Suspension-Length (c) C2										
Inconel Standard length of Suspension (b) I1										
Inconel Customized Suspension-Length (c) I2										
Monel Standard length of Suspension (b) M1										
Monel Customized Suspension-Length (c) M2										
Titan Standard length of Suspension (b) T1										
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. 1.4301, max. 250°C (482°F)) . . (f)	-D
Damping Spring (Mat. HC, max. 350°C (662°F)) . . (f)	-C
Degreased	-O
Tag No. Labeling with 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 Material.	-3
PMI - Test	-5

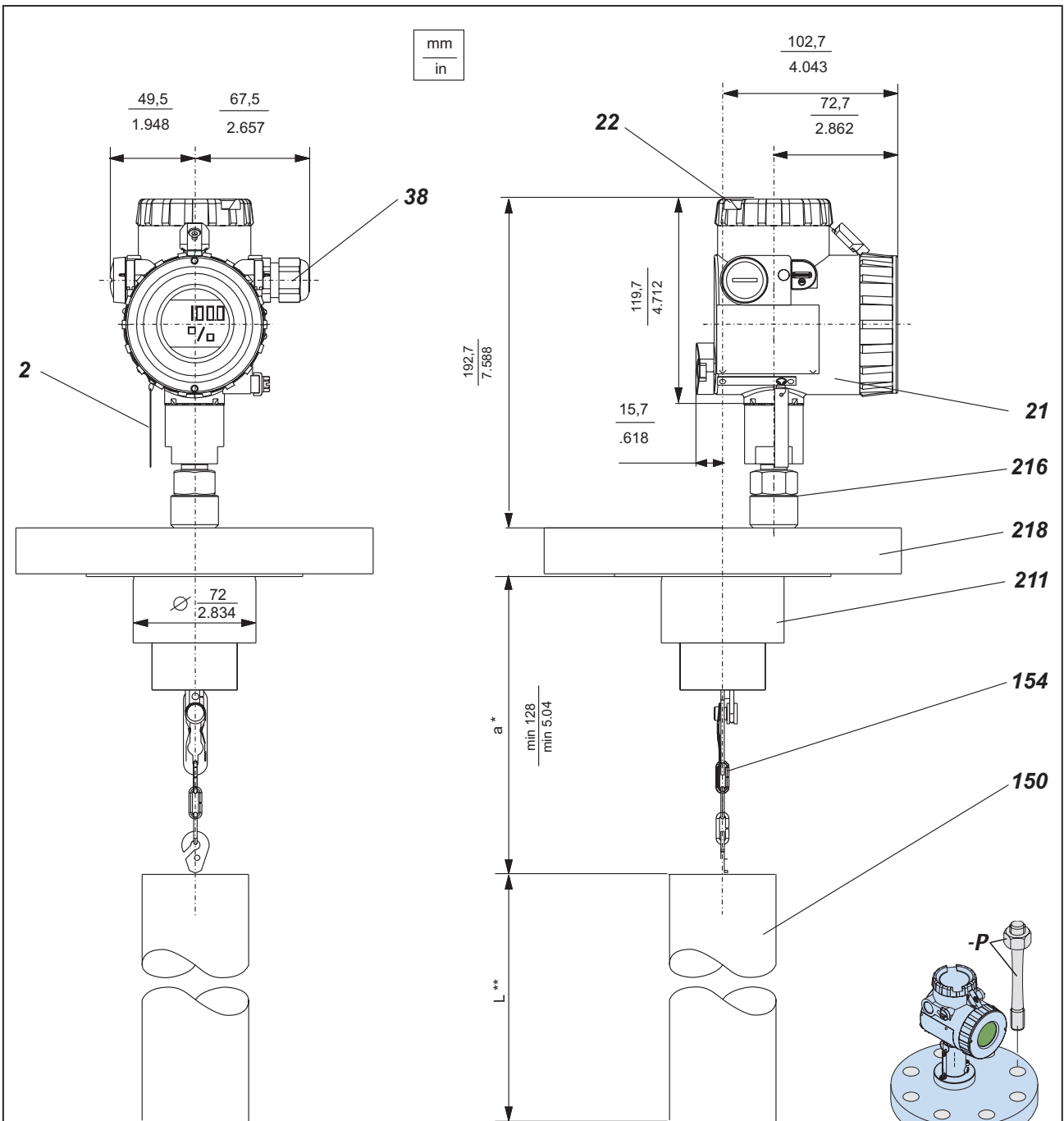
- (a) Upper and Lower Medium Density required (at operating temp.)
- (b) Only in connection with Model Code 204DC
- (c) Exact length required (Contact face of flange to upper end of displacer)
- (d) All +/- 8mm (0.3 inch)
- (e) Pending
- (f) Required for 244LD Version B and Option -G

Suspension Length (Required)☐
 Displacer Length (Required)☐WITH (Displacer Length "L":30)
 Lower Density (Required)☐
 Upper Density (Required)☐
 Tag No. Labeling -L (Required)☐WITH (Optional Features:L)
 Tag No. Labeling -S (Required)☐WITH (Optional Features:S)
 Used w. Transmitter (Required)☐
 Choose One from list
 144LD; 144LVD; 244LD; 244LVP; 167LP; 134LD; 134LVD; 114LI
 Electrical Classification (Required)☐
 Choose One from list
 no Zone 0, Zone 0

Dimensions

Without adapter

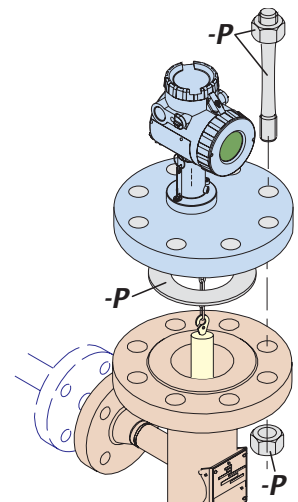
DN 80 and 100 up to PN 400, 3 inch up to Class 900 and 4 inch up to Class 2500



- 22** Connecting compartment cover
- 38** Cable entry with screwed gland
- 21** Amplifier housing
- 216** Disconnection of sensor from the amplifier or for the connection of the remote amplifier mounting kit (for remote amplifier mounting)
- 218** Connection flange (as per DIN / ANSI)
- 211** Measuring cell
- 154** Suspension
- 150** Displacer 204DE
- 2** Steel label with Tag.No.

-P Mounting parts for flange connection, ModelCode Option -P

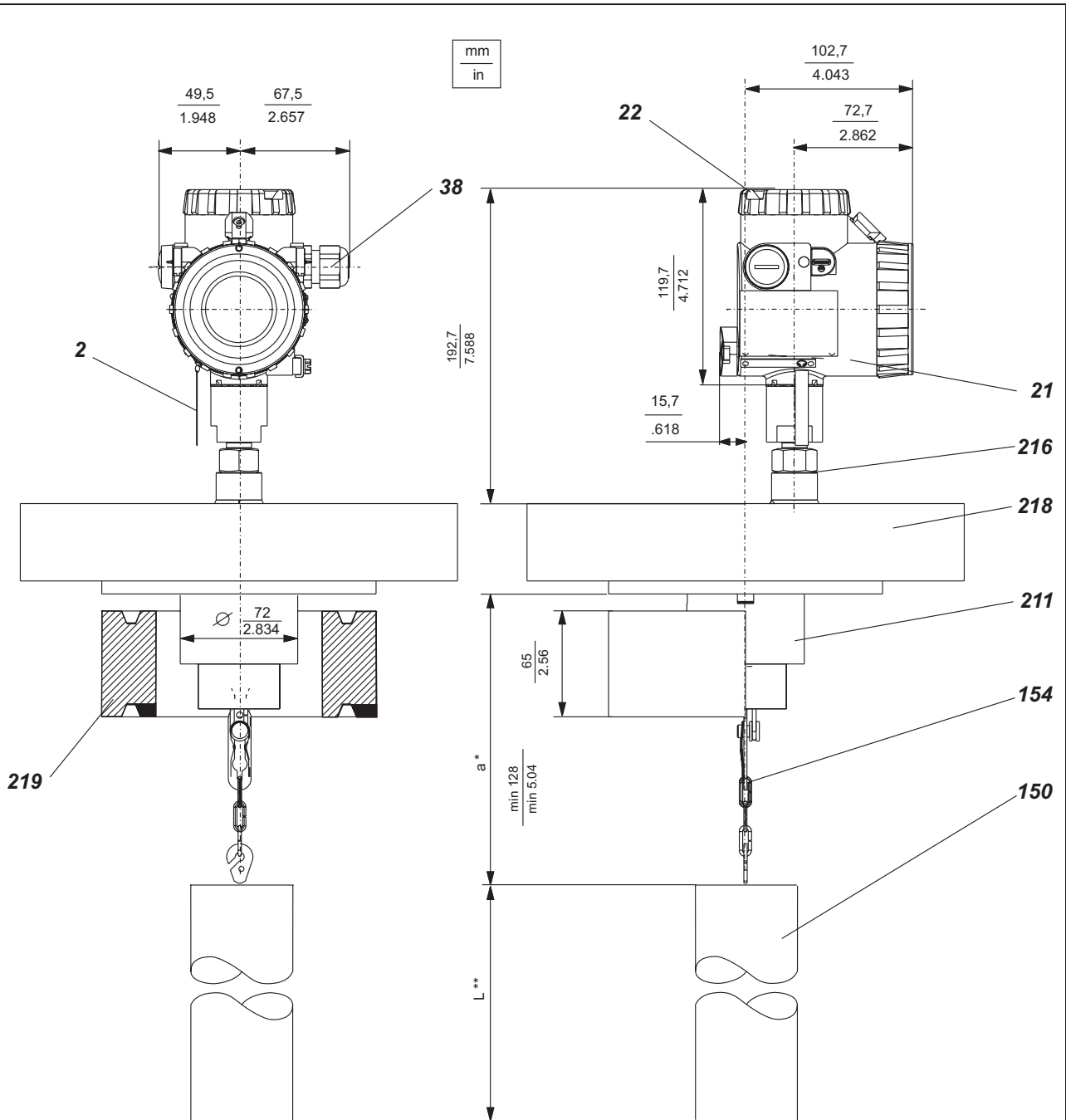
* Suited to the dimensions of FOXBORO ECKARDT - displacer, other lengths on request



Dimensions (continued)

With Adapter

DN 70, PN 500, 3 inch Class 1500 and 3 inch Class 2500



- 22** Connecting compartment cover
- 38** Cable entry with screwed gland
- 21** Amplifier housing
- 216** Disconnection of sensor from the amplifier or for the connection of the remote amplifier mounting kit (with remote amplifier mounting)
- 218** Connection flange (as per DIN / ANSI)
- 211** Measuring cell
- 154** Suspension
- 150** Displacer 204DE
- 2** Steel label with Tag.No
- 219** Adapter

* Suited to the dimensions of FOXBORO ECKARDT - displacer, other lengths on request.

** L (measuring range) see table page 10.

Product Specifications for Intelligent Transmitters

PSS EMP0610 A-(en)	141GP	Intelligent Gauge Pressure Transmitter<R>
PSS EMP0620 A-(en)	142AP	Intelligent Absolute Pressure Transmitter
PSS EMP0630 A-(en)	143DP	Intelligent d/p Transmitter
PSS EML0610 A-(en)	144LD	Intelligent Buoyancy Transmitter with Torque Tube for Liquid Level, Interface and Density
PSS EML0710 A-(en)	244LD	Intelligent Buoyancy Transmitter with Torque Tube for Liquid Level, Interface and Density
PSS EML1610 A-(en)	144LVD	Intelligent Buoyancy Transmitter for Liquid Level, Interface and Density
PSS EML1710 A-(en)	244LVP	Intelligent Buoyancy Transmitter for Liquid Level, Interface and Density
PSS EML2610 A-(en)	144FP	Intelligent d/p Transmitter for Liquid Level, Interface and Density - Flange mounted
PSS EML0901 A-(en)	204..	Accessories for Buoyancy Transmitters
PSS EMO0100 A-(en)		Accessories for Devices with HART-Protocol

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