

Liquid Level, Density, or Interface

The following chapter contains reduced Product Specifications of the instruments:

- 244LD** LevelStar Buoyancy Transmitter with Torque Tube
for Liquid Level, Interface and Density
- 244LVP** LevelStar Buoyancy Transmitter
for Liquid Level, Interface and Density
- 167LP** Pneumatic Buoyancy Transmitter with Torque Tube
for Liquid Level, Interface and Density
- 204xx** Accessories for Buoyancy Transmitters

For detailed technical specifications visit our homepage www.foxboro-eckardt.com or ask your local distributor for the requested Product Specifications PSS.

244LD LevelStar Buoyancy Transmitter with Torque Tube for Liquid Level, Interface and Density

- Communication HART, PROFIBUS PA or FOUNDATION Fieldbus
- Configuration via FDT-DTM
- 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 SIL applications
- Simulation of analog output for loop-check
- Local full graphic display in %, mA or physical units
- Signal noise suppression by Smart Smoothing
- Linear or customized characteristic
- Process temperature from -196°C to +500°C
- Materials for use with aggressive media
- Micro sintermetal sensor technology
- Separate mounting of sensor and amplifier with remote amplifier mounting kit



The buoyancy transmitter 244LD LevelStar 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 extreme temperatures, high process pressure and corrosive liquids, the 244LD LevelStar measures with consistent reliability and high precision. For installations in contact with explosive atmospheres up to Zone 0, certificates are available.

For complete specifications, refer to Product Specification Sheet PSS EML 0710 G-(en).

Input

Measuring span 2 to 20 N contin. adjustable

Measuring ranges 50 mm to 50 m

Density range $100 < \rho < 2000 \text{ kg/m}^3$

Displacer 204DE

Standard length 350 to 3000 mm
(14 to 120 inch)

Weight of displacer max. 25 N

Characteristic linear oder customized with up to 32 setpoints

Output

HART, 4 to 20 mA

Lower range value continuously adjustable within the measuring limits

Turn-down 1:1 to 1:20

Signal range 4 to 20 mA/20 to 4 mA

Operating range 3.8 to 20.5 mA

Admissible load $R_{L \text{ max.}} = \frac{U_S - 12V}{0.023 \text{ A}}$
(U_S = supply voltage)

Accuracy $\pm 0.2 \%$

Transfer function linear

Communication HART

Connection Two-wire system

Supply voltage U_S $> 12 \text{ V} + R_b \cdot 0.025 \text{ A}$, $< 42 \text{ V}$
($< 30 \text{ V}$ with ex.proof device)

Current sink max. 23 mA

Signal range 4 to 20 mA

Operating range 3.8 to 20.5 mA (acc. NE43)

Digital communication HART Protocol, 1200 Baud

Communication PROFIBUS PA/F.Fieldbus

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

Supply voltage U_S 9 to 32 V dc, $V_{SS} \leq 1\%$

Operating current 10.5 mA ± 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

Operating conditions

- Process temperature-196°C to +500°C
- Pressure rating
 - acc. DINPN 16, 40, 63, 100, 160, 250
 - acc. ANSIClass 150, 300, 600, 900, 1500
 - with heating jacket.wafer body, max. PN 250/
Class 1500; heating jacket
PN 40 / Class 300, heating with
saturated steam or thermal oils
- Ambient temperature . . . -40°C to +70°C
- Relative humidityup to 100%
- Condensationpermitted
- Transportation
 - storage temperature . . .-40°C to +85°C
 - Protection class.IP 66 (acc. DIN 40 050)

How to Order – Specify model number 244LD LevelStar

Wafer Body Material (Process Wetted)

- Carbon Steel 1.0460 (~A 105), application from -10°C to +350°C-K
- 1.4404 equivalent to 316L / 1.4435, application from -60°C to +400°C
(material is 1.4435 when Wafer Body Pressure Rating codes H1 and H2 selected)-S
- 1.4404 equivalent to 316L / 1.4435, application from -196°C to +400°C
(material is 1.4435 when Wafer Body Pressure Rating codes H1 and H2 selected)-U
- 1.4404 equivalent to 316L / 1.4435, application from -60°C to +500°C
(material is 1.4435 when Wafer Body Pressure Rating codes H1 and H2 selected)-T
- Duplex – 1.4462, application from -10°C to +280°C (no PED Certification)-N
- Inconel 625 – 2.4856, application from -10°C to +450°C (no PED Certification)
- Inconel 825 – 2.4858, application from -10°C to +450°C (no PED Certification)^(P)-I
- Hastelloy C – 2.4811, application from -196°C to +400°C.-C

Torque Tube Material (Process Wetted)

- 1.4404 equivalent to 316L S
- Hastelloy C C
- Inconel 600 – 2.4816. I
- Monel K500 – 2.4375 M

Wafer Body Flange Size

- DN70 (available with Wafer Body Material S, U, T, and Torque Tube Material S and C). 0
- DN80 1
- DN100 2
- 3-Inch 3
- 4-Inch 4

Wafer Body Pressure Rating & Contact Face

- PN40 (PN16 to PN40) B1/B1 (Contact Face DIN EN 1092-1)^(a) B1
- PN250 (PN16 to PN250) B2/B2 (Contact Face DIN EN 1092-1)
(Draft DIN EN 1092 1:2005 04)^(a) B2
- PN250 (PN16 to PN250) D/C (Contact Face DIN EN 1092-1)
(Draft DIN EN 1092 1:2005 04)^{(a)(r)} DC
- PN250 (PN16 to PN250) D/D (Contact Face DIN EN 1092-1)
(Draft DIN EN 1092 1:2005 04)^(a) DD
- PN250 (PN16 to PN250) F/F (Contact Face DIN EN 1092-1)
(Draft DIN EN 1092 1:2005 04)^(a) FF
- PN250 (PN16 to PN250) F/E (Contact Face DIN EN 1092-1)
(Draft DIN EN 1092 1:2005 04)^{(a)(s)} FE

Wafer Body Pressure Rating & Contact Face (continued)

| | |
|---|----|
| PN250 (PN16 to PN250) L/L (Contact Face DIN 2696) ^(a) | L1 |
| PN400 L/L Lense (Contact Face DIN 2696) ^{(k)(n)} | H1 |
| PN500 L/L Lense (IG-Norm High Pressure Version) ⁽ⁱ⁾⁽ⁿ⁾ | H2 |
| ANSI Class 150 RF/RF ^(b) | R1 |
| ANSI Class 900 (300/600/900) RF/RF ^(b) | R2 |
| ANSI Class 1500 RF/RF ^(b) | R3 |
| ANSI Class 150 SF/SF ^(b) | S1 |
| ANSI Class 900 (300/600/900) SF/SF ^(b) | S2 |
| ANSI Class 1500 SF/SF ^(b) | S3 |
| ANSI Class 150 RJF/RJF ^(b) | J1 |
| ANSI Class 900 (300/600/900) RJF/RJF ^(b) | J2 |
| ANSI Class 1500 RJF/RJF ^(b) | J3 |
| ANSI Class 300 to 1500, Form LF/LM ^(b) | LM |
| ANSI Class 300 to 1500, Form LF/LF ^(b) | LF |
| ANSI Class 300 to 1500, Form LG/LT ^(b) | LT |
| ANSI Class 300 to 1500, Form LG/LG ^(b) | LG |
| ANSI Class 150, Form SG/ST ^(b) | GT |
| ANSI Class 300 to 1500, Form SG/ST ^(b) | ST |
| ANSI Class 150, Form SG/SG ^(b) | GG |
| ANSI Class 300 to 1500, Form SG/SG ^(b) | SG |

Wafer Body Mounting Direction (Amplifier to body)

| | |
|--|---|
| Right Hand mounted | R |
| Right Hand mounted w/heating jacket – connecting flanges B1 / DN15, PN40 (DIN EN 1092-1) ^{(m)(o)} | A |
| Right Hand mounted w/heating jacket – connecting flanges B1 / DN25, PN40 (DIN EN 1092-1) ^{(m)(o)} | B |
| Right Hand mounted w/heating jacket – connecting flanges B2 / DN15, PN40 (DIN EN 1092-1) ^{(m)(o)} | C |
| Right Hand mounted w/heating jacket – connecting flanges B2 / DN25, PN40 (DIN EN 1092-1) ^{(m)(o)} | D |
| Right Hand mounted w/heating jacket – connecting flanges RF/SF, 1/2 in, Class 300 ^{(m)(o)} | E |
| Right Hand mounted w/heating jacket – connecting flanges RF/SF, 1 in, Class 300 ^{(m)(o)} | F |
| Right Hand mounted w/heating jacket – connecting flanges RJF, 1/2 in, Class 300 ^{(m)(o)} | G |
| Right Hand mounted w/heating jacket – connecting flanges RJF, 1 in, Class 300 ^{(m)(o)} | H |
| Left Hand mounted | L |
| Left Hand mounted w/heating jacket – connecting flanges B1 / DN15, PN40 (DIN EN 1092-1) ^{(m)(o)} | M |
| Left Hand mounted w/heating jacket – connecting flanges B1 / DN25, PN40 (DIN EN 1092-1) ^{(m)(o)} | N |
| Left Hand mounted w/heating jacket – connecting flanges B2 / DN15, PN40 (DIN EN 1092-1) ^{(m)(o)} | O |
| Left Hand mounted w/heating jacket – connecting flanges B2 / DN25, PN40 (DIN EN 1092-1) ^{(m)(o)} | P |
| Left Hand mounted w/heating jacket – connecting flanges RF/SF, 1/2 in, Class 300 ^{(m)(o)} | S |
| Left Hand mounted w/heating jacket – connecting flanges RF/SF, 1 in, Class 300 ^{(m)(o)} | T |
| Left Hand mounted w/heating jacket - connecting flanges RJF, 1/2 in, Class 300 ^{(m)(o)} | U |
| Left Hand mounted w/heating jacket - connecting flanges RJF, 1 in, Class 300 ^{(m)(o)} | V |

Version

| | |
|---|---|
| Base VERSION – TRANSSTAR (244LD) | B |
| Base VERSION – LEVELSTAR (244LD) ^{(c)(q)} | N |
| Base (B) + Displacer (244LD + 204DE) | S |
| Base (N) + Displacer (244LD + 204DE) ^{(c)(q)} | T |
| Base (B) + Displacer + Displacer Camber + Flange combination + Flange (244LD + 204DE + 204DC + 204FK + 204BCF) ^(h) | C |
| Base (N) + Displacer + Displacer Camber + Flange combination + Flange (244LD + 204DE + 204DC + 204FK + 204BCF) ^{(c)(q)} | D |

Cable Entry

| | |
|--------------------------------------|---|
| M20x1.5 without cable gland | M |
| 1/2-14 NPT without cable gland | N |

Communication

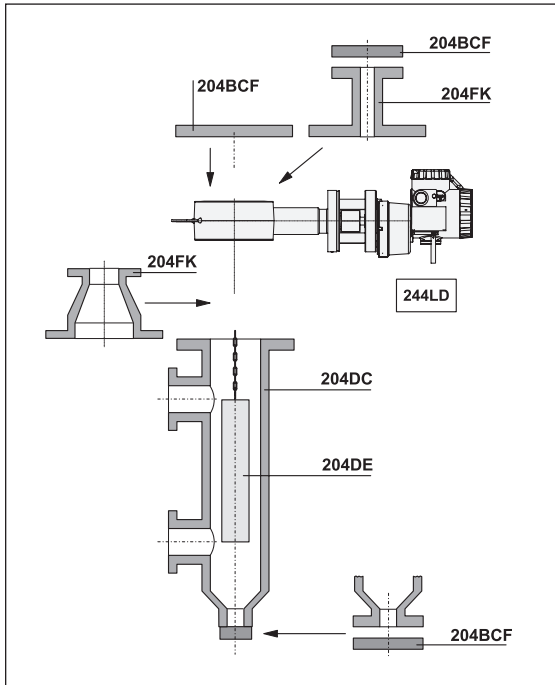
| | |
|------------------------------|---|
| HART | H |
| PROFIBUS-PA | P |
| FOUNDATION Fieldbus H1 | B |



Electrical Classification

| | |
|---|------|
| ATEX intrinsic safe, Zone 0, IIC T4 (HART) ^(d) | .0C4 |
| ATEX Intrinsic safe, Zone 0, IIC T6 (HART) Zone 0, IIC T6 (PROFIBUS or FOUNDATION Fieldbus) ^(d) | .0C6 |
| ATEX intrinsic safe, Zone 1, IIC T4 (HART)..... | .1C4 |
| ATEX intrinsic safe, Zone 1, IIC T6 (HART)..... | .1C6 |
| ATEX intrinsic safe, Zone 2, IIC T4 (HART)..... | .2C4 |
| ATEX intrinsic safe, Zone 2, IIC T6 (PROFIBUS or FOUNDATION Fieldbus)..... | .2C6 |
| ATEX explosionproof, Zone 0, IIC T6 ^(d) | .D0C |
| ATEX explosionproof, Zone 1, IIC T6 | .D1C |
| FM Nonincendive, HART PROFIBUS or FOUNDATION Fieldbus ^(c) | .NFM |
| FM Explosionproof | .FDZ |
| CSA Explosionproof | .CDZ |
| FM Intrinsically Safe, HART PROFIBUS or FOUNDATION Fieldbus ^(c) | .FAA |
| CSA Intrinsically Safe ^(c) | .CAA |
| GOST-R intrinsically safe, T4 (HART) ^(u) | .GA4 |
| GOST-R intrinsically safe, T6 ^(u) | .GA6 |
| GOST-R explosion proof, Zone 1 – IIC T6 ^(u) | .GDZ |
| GOST-R intrinsically Safe, Zone 0 – IIC T6 (HART) ^(x) | .GA0 |
| GOST-R intrinsically Safe, Zone 1 – IIC T6 (HART) ^(x) | .GA1 |
| GOST-R intrinsically Safe, Zone 2 – IIC T6 (HART) ^(x) | .GA2 |
| GOST-R explosion proof, Zone 0 – IIC T6 ^(x) | .GD0 |
| GOST-R explosion proof, Zone 1 – IIC T6 ^(x) | .GD1 |
| NEPSI Intrinsically Safe, T4 (HART) | .NA4 |
| NEPSI Intrinsically Safe, T6 | .NA6 |
| NEPSI Explosionproof, Ex d IIC T4-T6 | .NDZ |
| For General Purpose Areas, Not Explosionproof | .ZZZ |

Overview Accessories



For Displacer Element 204DE, Displacer Chamber 204DC, Flange combination 204FK, Flange Kit 204BCF see 204xx or Product Specifications PSS EML0901 A-(en), 204. Accessories for Buoyancy Transmitter.

Optional Features

Housing Complete Stainless Steel without external Pushbuttons (not available with Wafer Body Material codes K) -H
 Remote Amplifier Mounting Kit (3m), Mounted^(e) -R
 Remote Amplifier Mounting Kit (10m), Mounted^(e) -B

Tag No. Labeling

Stainless Steel Label Fixed With Wire -L
 Stainless Steel Label Fixed On Amplifier -F

National Certificates

TA-Luft -K
 ABSA (Canada) -A
 Germanischer Lloyd^(a) -G

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 Material -3
 PED 97/23/EC additional unit verification, according to module F/G
 (Not available with Wafer Body Material codes N and I) -4
 Comply With NACE Standard MR-0175 (available with Torque Tube Material I, M or C)^(g)
 with Wafer Body Material codes S, U, T, N, I, C
 with Wafer Body Material codes K, L, O, P -6
 SIL 2 Certificate^(q) -Q

Material Test

X-Ray And Isotope Test For Weldings -7
 Dye Penetration Test -8
 PMI - Test -5

Subassemblies

Torque Tube for selected code (244LD-*****-W) -W
 Amplifier for selected code (244LD-*****-X) -X
 Complete Sensor for selected code (244LD-*****-Y) -Y
 Wafer body for selected code (244LD-*****-Z) -Z

Notes

- a Available with Wafer Body Flange Size 1 or 2
- b Available with Wafer Body Flange Size 3 or 4
- c Pending
- d Not available with Wafer Body Pressure Rating & Contact Face codes L1, J1, J2, J3, H1, H2, DD
- e Not available with Electrical Classification FDZ, CDZ, 0C6, D0C, D1C, GDZ, NDZ or Optional Features -H
- g Restrictions concerning the limit of application for the used materials are to considering (NACE Standard MR-0175/2003, bzw. ISO 15156-3)
- h Pending, order separately at this time.
- i Available with Wafer Body Flange Size 0
- k Available with Wafer Body Flange Size 1
- m Not available with Wafer Body Flange Size code 4 with Wafer Body Pressure Rating code J3
- n Not available with Wafer Body Material codes K, L, O, P, N, I, C or Torque Tube Material codes I and M
- o Not available with Wafer Body Material codes K, L, O, P, U, N, I, C
- p on request
- q Available with HART
- r D at top
- s F at top
- u Not applicable with Version N, T, D
- v Pending Electrical Classifications FDZ, CDZ, GA4, GA8, GDZ
- x Available with version N, T, D



244LVP LevelStar Buoyancy Transmitter for Liquid Level, Interface and Density

- Communication HART (4-20 mA)
- Configuration via FDT-DTM
- Multilingual full text graphic LCD
- IR communication as a standard
- Conventional operation with local keys
- Easy adaptation to the measuring point without calibration at the workshop
- Backdocumentation of measuring point
- Configurable safety value
- Software lock against unauthorized operation
- Simulation of analog output for loop-check
- Local display in %, mA or physical units
- Signal noise suppression by Smart Smoothing
- Continuous self-diagnostics
- Linear or customized characteristic
- Process temperature from -50°C to $+150^{\circ}\text{C}$
- Static pressure up to PN 40
- Micro sintermetal sensor technology



The buoyancy transmitter 244LVP LevelStar 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. The 244LVP LevelStar measures with consistent reliability and high precision. For installations in contact with explosive atmospheres up to Zone 0, certificates are available.

For complete specifications, refer to Product Specification Sheet PSS EML1710 G-(en).

Input/Output

- Measuring span 2 to 20 N, continuously adjustable
- Measuring ranges 0-50 mm to 0-3 m, cont. adjustable
- Density range $100 < \rho < 2000 \text{ kg/m}^3$
- Displacer (204DE)
- Standard length 350 to 3000 mm,
14 to 120 inch
- Weight of displacer max. 25 N
- Characteristic linear or customized with up to
32 setpoints
- Span ratio
- Turn-down 1:1 to 1:10 (1:20 on request)
- Accuracy $\pm 0.2\%$; increased accuracy with
customized adjustment
- Transfer function linear or customized with up to 32
setpoints
- Configuration
 - Digital via communication
 - Digital via IrCom as a standard
 - With local push buttons and LCD
- Local display multilingual, full graphic LCD,
configurable in %, mA or phys.
units, & messages in clear text
- Load $R_{B\max} = (U_S - 12\text{V})/24 \text{ mA} -$
100 Ohm

Communication HART

- Connection Two-wire system
- Supply voltage U_S 12 to 42 V dc, $V_{pp} < 1\%$
- Current sink max. 24 mA
- Signal range 4 to 20 mA
- Operating range 3.8 to 20.5 mA (NE43)
- Digital communication HART Protocol, 1200 Baud
- Handheld Terminal HT 375/475
- PC Software WINxx and FDT/DTM
- Hardware HART Modem
- Min. load 250 Ohms
- Failure handling
- Substitute value last value or safety value
- Safety value 3.6 to 23 mA, adjustable

Operating conditions

- Process temperature -50°C to $+150^{\circ}\text{C}$
- Pressure rating
- acc. to DIN PN 40
- acc. to ANSI Class 150, 300
- Ambient temperature -40°C to $+85^{\circ}\text{C}$
- Relative humidity up to 100%
- Condensation permitted
- Transportation
- storage temperature -50°C to $+85^{\circ}\text{C}$
- Protection IP 66 (acc. DIN EN 60 529)

How to Order – Specify model number 244LVP

Flange Material (Process wetted)

| | | | | | | | |
|--|----|--|--|--|--|--|--|
| 1.4571 (316Ti)..... | -S | | | | | | |
| Titan 3.7025 / 3.7035 ^(h) | -T | | | | | | |

Sensor Material (Process wetted)

| | | | | | | | |
|--|---|--|--|--|--|--|--|
| 316L / 1.4435 / 1.4404..... | S | | | | | | |
| Titan 3.7025 / 3.7035 ^(h) | T | | | | | | |

Flange Size

| | | | | | | | |
|-------------|--|--|--|--|--|--|---|
| DN50..... | | | | | | | 5 |
| DN80..... | | | | | | | 8 |
| 2-Inch..... | | | | | | | 2 |
| 3-Inch..... | | | | | | | 3 |

Flange Pressure Rating & Contact Face

| | | | | | | | |
|---|--|--|--|--|--|--|----|
| PN16 to PN40, B1 (DIN EN1092-1) ^(a) | | | | | | | B1 |
| PN16 to PN40, B2 (DIN EN1092-1) ^(a) | | | | | | | B2 |
| PN16 to PN40, D (DIN EN1092-1) ^(a) | | | | | | | D1 |
| ANSI Class 150, RF RF/SF (RF125) ^(b) | | | | | | | R1 |
| ANSI Class 300, RF RF/SF (RF125) ^(c) | | | | | | | R2 |
| ANSI Class 150, RJF ^{(b)(g)} | | | | | | | J1 |
| ANSI Class 300, RJF ^{(c)(g)} | | | | | | | J2 |

Version

| | | | | | | | |
|-----------|--|--|--|--|--|--|---|
| Base..... | | | | | | | B |
|-----------|--|--|--|--|--|--|---|

Cable Entry

| | | | | | | | |
|-------------------------------------|--|--|--|--|--|--|---|
| M20x1.5 Without Cable Gland..... | | | | | | | M |
| 1/2-14 NPT Without Cable Gland..... | | | | | | | N |

Communication

| | | | | | | | |
|-----------|--|--|--|--|--|--|---|
| HART..... | | | | | | | H |
|-----------|--|--|--|--|--|--|---|

Electrical Classification

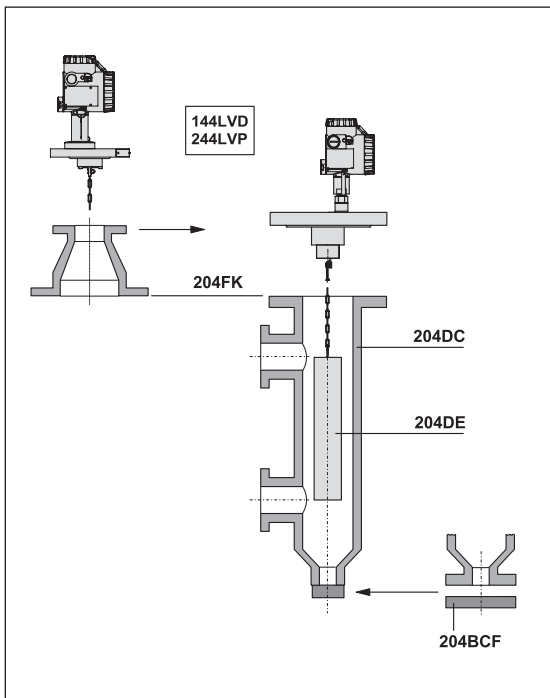
| | | | | | | | | |
|---|--|--|--|--|--|--|--|------|
| ATEX intrinsic safe, Zone 1 – IIC T4..... | | | | | | | | 1C4 |
| ATEX intrinsic safe, Zone 1 – IIC T6..... | | | | | | | | 1C6 |
| ATEX intrinsic safe, Zone 2 – IIC T4..... | | | | | | | | 2C4 |
| ATEX intrinsic safe, Zone 1 – IIB T6..... | | | | | | | | D1B |
| ATEX explosion proof, Zone 1 – IIC T6..... | | | | | | | | D1C |
| FM Nonincendive..... | | | | | | | | NFM |
| FM explosion proof ^{f(d)(m)} | | | | | | | | FDZ |
| GOST-R intrinsically safe, Zone 1 – IIC T6..... | | | | | | | | GA1 |
| GOST-R intrinsically safe, Zone 2 – IIC T6..... | | | | | | | | GA2 |
| GOST-R explosion proof, Zone 1 – IIC T6..... | | | | | | | | GD1 |
| Nepsi intrinsically safe T6 ^(d) | | | | | | | | NA6 |
| Nepsi explosion proof ^(d) | | | | | | | | NDZ |
| Brasil intrinsically safe T6 ^(d) | | | | | | | | BA6 |
| Brasil explosion proof ^{f(d)} | | | | | | | | BDZ |
| CSA explosion proof ^{f(d)(m)} | | | | | | | | CDZ |
| FM Intrinsically Safe..... | | | | | | | | FAA |
| CSA intrinsically safe ^{(d)(m)} | | | | | | | | CAA |
| For General Purpose Areas, not explosion proof..... | | | | | | | | .ZZZ |

Optional Features

| | |
|--|----|
| Housing Complete Stainless Steel Without External Push buttons..... | -H |
| Tag No. Labeling | |
| Stainless Steel Label Fixed With Wire | -L |
| Stainless Steel Label Fixed On Amplifier..... | -F |
| 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 |
| Comply With NACE Standard MR-01-75 ^{(e)(f)} | -6 |
| EN 10204-3.1, Inspection Certificate Of Process Wetted Material with Copy of Original individual Material certificate | -9 |
| SIL 2 Certificate..... | -Q |

Notes

- a Available with Flange Size 5 or 8
- b Available with Flange Size 2 or 3
- c Available with Flange Size 3
- d Pending
- e Only with Sensor Material N
- f Restrictions concerning the limit of application for the used materials are considerable (NACE Standard MR-0175/2003, or ISO 15156-3)
- g Not with Electrical Classification 0B4 and 0C4
- h On request
- i Only with Electrical Classification 1 C4, 1C6, D1B, D1C, 2C4, GA1, GA2, GD1, NA6, NDZ, BA6, BDZ, ZZZ
- k Pending for Version N 1C6, 1B6
- m Only Version B



Required Tags

- Calibrated Range
- Ranges: 0 to 100% or
 - 0 to 2kg or
 - 0 to 19.6N or
 - 0 to 2 kgf
- Span Limits: 10 to 100% or
- 0.2 to 2 kg or
 - 2 to 19.6 N or
 - 0.2 to 2 kgf
- Lower Density: user input
 Upper Density: user input
 Tag No. Labeling S: user input
 Tag No. Labeling L: user input
 Tag No. Labeling F: user input

Overview Accessories

For Displacer 204DE, Displacer Chamber 204DC, Flange combination 204FK, Flange Kit 204BCF see 204xx, or Product Specifications PSS EML0901 A-(en), 204.. Accessories for Buoyancy Transmitter.

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

This transmitter is designed to perform measurements for liquid level, interface and density of liquids. The measurement is based on the Archimedes buoyancy principle.

For complete specification, refer to Product Specification Sheet PSS EML0110 A-(en)



- Level transmission between vessel and transmitter by torque tube
- Applicable for service temperatures from -196°C to $+400^{\circ}\text{C}$ 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 to EN 10204-3.1 available
- Various licences in accordance with national regulations
- Licensed for use on sea ships in the Germanische Lloyd class, or on other structures classified by Germanische Lloyd

Input

| | | |
|--------------------------------------|-----------|--|
| Measuring span | | .3 to 15 N |
| Density range | | $100 < \rho < 1600 \text{ kg/m}^3$ |
| Standard lengths of displacers 204DE | | .350 to 3000 mm 14 to 120 inch |
| Weight of displacer | | max. 25 N |
| Output | | .0.2 to 1 bar/3 to 15 psi/20 to 100 kPa/0.2 to 1 kp/cm ² |
| Supply air | | $1.4 \pm 0.1 \text{ bar}$ or $20 \pm 1.4 \text{ psi}$ |

Transitional Behavior

| | | |
|-----------------------------------|-----------|--|
| Relative error | | <1% |
| Sensitivity | | <0.1% |
| Ambient temperature influence | | <0.2%/10 K |
| Process temperature influence | | <0.1%/10 K |
| 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 |

Operating conditions

| | | |
|--|-----------|--|
| Process temperature | | -196°C to $+400^{\circ}\text{C}$ |
| Pressure rating | | |
| acc. to DIN | | PN 16, 40, 63, 100, 160, 250 |
| acc. to ANSI | | Class 150, 300, 600, 900, 1500 |
| with heating jacket | | wafer body max. PN 160/Class 900; heating jacket PN 25, heating with saturated steam or thermal oils |
| Ambient temperature | | -40 to $+90^{\circ}\text{C}$ |
| Relative humidity | | <100% |
| Condensation | | permitted |
| Transportation and storage temperature | | -40 to $+90^{\circ}\text{C}$ |
| Protection class | | IP 55 (acc. to DIN 40 050) |

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

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 $\frac{1}{4}$ -18 NPT |

How to Order – Specify model number 167LP

Wafer Body with Indicator (Flange Size and Pressure Rating)

| | |
|---|-----|
| DN80 PN16-40 (available with Contact Face C) | -20 |
| DN80 PN16-160 (available with Contact Face U, N) | -21 |
| DN80 PN16-250 (available with Contact Face E, L) | -22 |
| DN100 PN16-160 (available with Contact Face U, N) | -23 |
| DN100 PN16-250 (available with Contact Face E, L) | -24 |
| DN100 PN16-40 (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 C/C Raised Face (Rz 40 - 160) Per DIN 2526 (available with -20, -25) | .C |
| Type E/E Raised Face (Rz 0 - 16) Per DIN 2526 (available with -22, -24) | .E |
| Type N/F (Grove) Per DIN 2512 (available with -21, -23) | .U |
| Type N/N (Grove) Per DIN 2512 (available with -21, -23) | .N |
| Type L/L DIN 2696 (available with -22, -24) | .L |
| Type RF/RF Raised Face Per ANSI B16.5 (available with -31, -32, -34, -41, -42, -44) | .R |
| Type RJF/RJF Ring Joint Face Per ANSI B16.5 (available with -31, -32, -34, -41, -42, -44) | .J |
| Type SF/SF Smooth Finish (125 microinch) (available with -31, -32, -34, -41, -42, -44) | .S |

Wafer Body Material (Process Wetted)

| | |
|---------------------------------------|----|
| Carbon Steel 1.0460 (A-105) | .K |
| 1.4404 (316L) | .S |
| Hastelloy C | .C |

Wafer Body Mounting Direction (Transmitter on body)

| | |
|------------------------------|----|
| Right Hand Mounted | .R |
| Left Hand Mounted | .L |

Torque Tube Material (Process Wetted)

| | |
|--------------------------------------|----|
| 316 (1.4571/1.4404/1.4435) | .S |
| Hastelloy C | .C |
| Inconel 600 | .I |
| Monel | .M |

Signal Range

| | |
|---|---|
| 0.2 To 1.0 bar | 1 |
| 3 To 15 psi | 2 |
| 20 To 100 kPa | 3 |
| 0.2 To 1.0 kp/cm ² | 4 |

Optional Features

Oil Damping-D

Electrical Certificates

ATEX – II 1/2 G c IIC (Zone 0) for media AI, All, B^(c)-E

ATEX – II 2 G c IIC (Zone 1) for media AI, All, B-P

Overfill Protection Per WHG For Environmental Pollution Fluids^(e)-V

Certificates

EN 10204-2.1-1

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, according to module F/G-4

Comply with NACE Standard MR-01-75 (available with Wafer Body Material Code S
and Torque Tube Material Code C, I or M only)-6

Material Test

X-Ray And Isotope Test For Weldings-7

Dye Penetrate Test-8

Tag No. Labeling

Stainless Steel Label Fixed With Wire-L

Notes

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

e Not available with Wafer Body -33, -34, -43 & -44

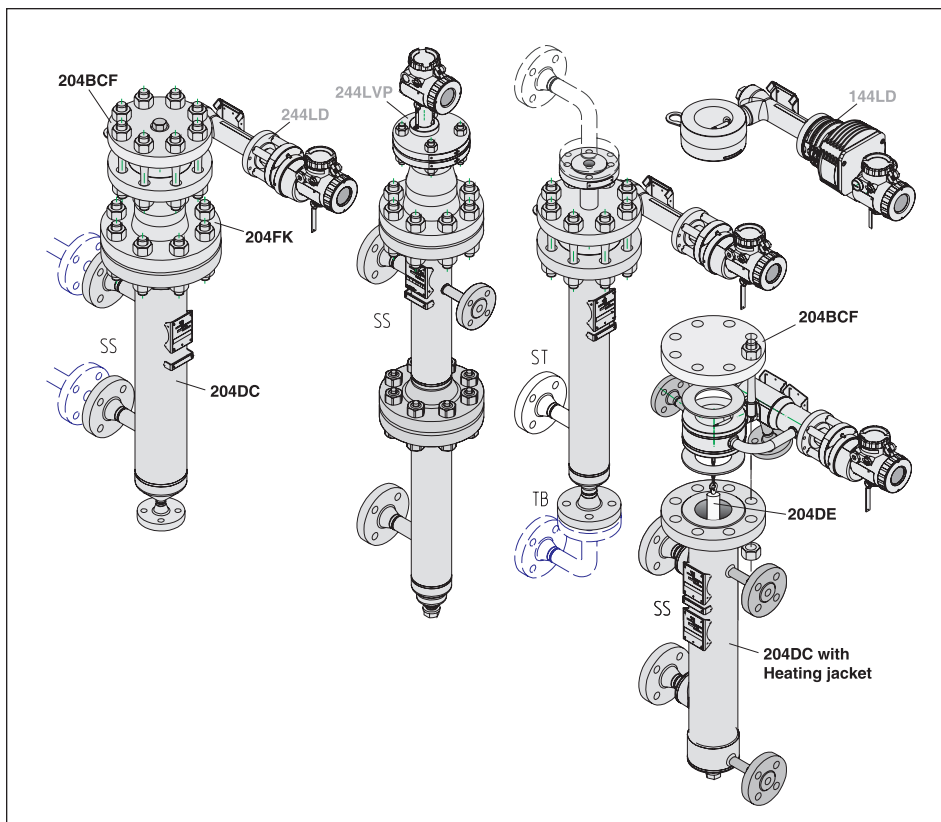
204xx Accessories for Buoyancy Transmitter



Buoyancy transmitters to measure liquid level, interface and density are used for open or closed vessels or containers. They can be mounted directly on top of the vessel, or if the application requires, on a side mounted cage. Depending on application and vessel design various installation accessories and the applicable displacer have to be selected.

For complete specification, refer to Product Specification Sheet PSS EML0901 A-(en)

- Universally applicable for all FOXBORO ECKARDT buoyancy transmitters with displacers
- Standards according to DIN and ANSI
- Various connections, dimensions and materials
- Displacers with custom dimensions and material
- Certification according to "Pressure Equipment Directive" (PED)
- Certified as part of an overfill protection according to WHG
- Certified for use in Zone 0



204DE Displacer element
 204DC Displacer chamber
 204FK Flange combination kit
 204BCF Flange kit

**How to Order – Specify model Displacer Element 204DE
Displacer for Buoyancy Transmitters from 2N buoyancy up to 20N**

Range of Application^(a)

| | |
|---|---------|
| Liquid Level – Media: Liquid/Gas or Air (Density difference = 9×10^3 lbm/in ³ to 72.2×10^3 lbm/in ³) (Density difference = 250 kg/M ³ to 2000 kg/M ³) |-S |
| Interface Level/Density – Media: Liquid 1/Liquid 2 (Density difference = 3.6×10^3 lbm/in ³ to 22.7×10^3 lbm/in ³) |-T |

Displacer Material

| | |
|--------------------------------------|---------|
| 316L (1.4404 / 1.4435 / 1.4571) | S |
| PTFE (not for application in Zone 0) | P |
| PTFE With 25% Carbon | O |
| Hastelloy C | C |
| Inconel 600 (2.4816) | J |
| Monel 400 (2.4360) | M |
| Titan (3.7035) | T |

Pressure Rating

| | |
|-------------------------|---------|
| Up to PN 100/Class 600 | D |
| Up to PN160/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)

| | |
|--------|---------|
| DN50 | 0 |
| DN70 | 1 |
| DN80 | 2 |
| DN100 | 3 |
| DNI50 | 4 |
| 2 inch | 5 |
| 3 inch | 6 |
| 4 inch | 7 |
| 6 inch | 8 |

Displacer Length "L" (inches are approximate)

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 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) | J1 |
| Inconel Customized Suspension Length ^(c) | J2 |
| Monel Standard length of Suspension ^(b) | M1 |
| Monel Customized Suspension Length ^(b) | M2 |
| Titan Standard length of Suspension ^(b) | T1 |
| Titan Customized Suspension Length | T2 |



Optional Features

| | |
|--|----|
| 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

| | |
|--|----|
| 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 0) | -3 |
| PMI – Test (not available with Displacer Material: P and 0) | -5 |

Notes

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

Tags

Length "b": required for Material & Suspension Length codes S2, C2, 12, M2, T2

Press. Rating Chamber: required for Material & Suspension Length codes S2, C2,12, M2, T2

List = PN16; PN40; PN63; PN100; PN160; PN250; PN400; PN500; Cl.150; Cl.300; Cl.600; Cl.900; Cl.1500; Cl.2500

Length "L": required

- 300 to 2000 mm or 11.81 to 78.74 in – for Displacer Length code A
- 2001 to 4000 mm or 78.78 to 157.48 in – for Displacer Length code B
- 4001 to 6000 mm or 157.52 to 236.22 in – for Displacer Length code C
- 6001 to 8000 mm or 236.26 to 314.96 in – for Displacer Length code D
- 8001 to 10000 mm or 315 to 393.70 in – for Displacer Length code E
- 10001 to 12000 mm or 393.74 to 472.44 in – for Displacer Length code F
- 300 to 3000 mm or 11.81 to 118.11 in – for Displacer Length code K
- 3001 to 6000 mm or 118.15 to 236.22 in – for Displacer Length code L
- 6001 to 9000 mm or 236.26 to 354.33 in – for Displacer Length code M
- 9001 to 12000 mm or 354.37 to 472.44 in – for Displacer Length code N
- 12001 to 15000 mm or 472.48 to 590.55 in – for Displacer Length code 0

Lower Density: required; select kg/m³ or lbm/in³

Upper Density: required; select kg/m³ or lbm/in³

Static Pressure (actual): required

- 1 to 100 bar; -14.5 to 600 psig – for Pressure Rating code D
- 1 to 160 bar; -14.5 to 900 psig – for Pressure Rating code E
- 1 to 250 bar; -14.5 to 1200 psig – for Pressure Rating code F
- 1 to 500 bar; -14.5 to 2500 psig – for Pressure Rating code G

Tag No. Labeling: required with Optional Feature codes -L and -S

Use with Transmitter: required List = 144LD; 144LVD; 244LD; 244LVP; 167LP

DISPLACER CHAMBER 204DC
 Displacer chambers are offered in four vessel mounting arrangements. The length L between the connection flanges corresponds to the displacer element length. For use as a part of an overfill protection the same length of displacer element and chamber is required.

| Connection | 144LVD 244LVP | 144LD 244LD 167LP |
|---------------------|------------------|-------------------------|
| Side-Side | yes | yes |
| Side-Bottom | yes | yes |
| Side-Top | no | yes |
| Top-Bottom | no | yes |
| with heating jacket | yes | yes |

**Materials,
 Pressure Ratings,
 Flange Sizes,
 Contact Faces,
 Pipe Sizes,
 Drain Types:** Flange, Screw, Pipe piece for welding
Heating Jacket
 see Model Codes on the following pages

Displacer chamber 204DC; Connections

| without heating jacket | | | | with heating jacket |
|--|---------------|------------|--------------|---------------------|
| Side – Side | Side – Bottom | Side – Top | Top – Bottom | e.g. Side – Side |
| | | | | |
| <p>1 Connecting flange #1 to transmitter (See model code: Flange size & pressure rating) 2 Process connection flange #2 (See model code: Flanges to vessel) 3 Drain flange #3 4 Drain plug #4 5 Flange combination 204FK (only 244LD or 167LP) 7 Connection flange for heating jacket DN 15, PN 40, DIN 2135, max. working pressure 25 bar / 362 psi 8 Flushing connector</p> <p>L = Length of displacer element = max. span</p> | | | | |



How to Order – Specify model Displacer Chamber 204DC

Allows the pneumatic and Electronic Buoyancy Transmitters to be easily mounted to a wide array of tanks and vessels

Mounting Type (Flanges to Vessel)

| | |
|--|-----|
| Side - Side | -SS |
| Side - Bottom | -SB |
| Side - Top (not for LVD and LVP) | -ST |
| Top - Bottom (not for LVD and LVP) | -TB |

Material

| | |
|---|----|
| Carbon Steel – Flanges 1.0460; – Pipes 1.0345 (application from -10° C to 350° C) | .K |
| 1.4571 (316 TO (application from -60° C to 400° C) | .E |
| 1.4571 (316 Ti) (application from -196° C to 400° C) | .F |
| 1.4571 (316 Ti) (application from -60° C to 500° C) | .G |
| 1.4404 (316 L) (application from -60° C to 400° C) | .S |
| 1.4404 (316 L) (application from -196° C to 400° C) | .U |
| 1.4404 (316 L) (application from -60° C to 500° C) | .T |
| 1.4541 (application from -60° C to 400° C) | .H |
| 1.4541 (application from -196° C to 400° C) | .Q |
| 1.4541 (application from -60° C to 500° C) | .J |
| DUPLEX – 1.4462 (application from -10° C to 280° C) | .N |
| INCONEL 600 – 2.4816 (application from -10° C to 450° C) | .R |
| INCONEL 825 – 2.4858 (application from -10° C to 450° C) | .I |
| Hastelloy C (application from 196° C to 400° C) | .C |

Pressure Rating

| | |
|------------------|----|
| PN16 | .A |
| PN40 | .B |
| PN63 | .C |
| PN100 | .D |
| PN160 | .E |
| PN250 | .F |
| Class 150 | .I |
| Class 300 | .J |
| Class 600 | .K |
| Class 900 | .L |
| Class 1500 | .M |

Flange Size (to transmitter)

| | |
|--------------------------------|---|
| DN50 ^(h) | 0 |
| DN80 ^(d) | 1 |
| DN100 ^(d) | 2 |
| DN150 ^{(c)(e)} | 3 |
| 2 inch ^(g) | 4 |
| 3 inch ^(f) | 5 |
| 4 inch ^(f) | 6 |
| 6 inch ^{(c)(g)} | 7 |

Contact Face (Transmitter Mounting Flange)

| | |
|---|----|
| Type B1 according DIN EN 1092-1 ^(h) | .M |
| Type B2 according DIN EN 1092-1 ⁽ⁱ⁾ | .O |
| Type C according DIN EN 1092-1 ^(d) | .P |
| Type D according DIN EN 1092-1 ^(d) | .Q |
| Type L Lens according D1N2696 ^(k) | .L |
| Type RF/SF (RA = 125 µm) Face according ANSI B16.5 ^(f) | .R |
| Type RJF Ring Joint Face according ANSI B16.5 ^(f) | .J |
| Type E Spigot according DIN EN 1092-1 ^(d) | .X |
| Type F Recess according DIN EN 1092-1 ^(d) | .Y |
| Type LM Large Male according ANSI B16.5 ^(f) | .W |
| Type LF Large Female according ANSI B16.5 ^(f) | .Z |
| Type LT Large Tongue according ANSI B16.5 ^(f) | .A |
| Type LG Large Groove according ANSI B16.5 ^(f) | .B |
| Type ST Small Tongue according ANSI B16.5 ^(f) | .G |
| Type SG Small Groove according ANSI B16.5 ^(f) | .H |

Flange Size/Pipe Size (to Vessel)

| | |
|---|----|
| DN15 ^(d) | A1 |
| DN15 Connection pipe 60 mm extended ^(d) | A2 |
| DN25 ^(d) | C1 |
| DN25 Connection pipe 60 mm extended ^(d) | C2 |
| DN40 ^(d) | D1 |
| DN40 Connection pipe 60 mm extended ^(d) | D2 |
| DN50 ^{(d)(v)} | E1 |
| DN50 Connection pipe 60 mm extended ^{(d)(v)} | E2 |
| ½-inch ^(f) | G1 |
| ½-inch Connection pipe 60 mm extended ^(f) | G2 |
| 1-inch ^(f) | H1 |
| 1-inch Connection pipe 60 mm extended ^(f) | H2 |
| 1½-inch ^(f) | I1 |
| 1½-inch Connection pipe 60 mm extended ^(f) | I2 |
| 2-inch ^{(f)(v)} | J1 |
| 2-inch Connection pipe 60 mm extended ^{(f)(v)} | J2 |

Contact Face (Flanges to Vessel)

| | |
|--|----|
| Type B1 according DIN EN 1092-1 ^(h) | .M |
| Type B2 according DIN EN 1092-1 ⁽ⁱ⁾ | .O |
| Type C according DIN EN 1092-1 ⁽ⁱ⁾ | .P |
| Type D according DIN EN 1092-1 ⁽ⁱ⁾ | .Q |
| Type L Lens according D1N2696 ^(k) | .L |
| Type RF/SF (RA = 125 microinch) Face according ANSI B16.5 ^(f) | .R |
| Type RJF Ring Joint Face according ANSI B16.5 ^(f) | .J |
| Type E Spigot according DIN EN 1092-1 ⁽ⁱ⁾ | .X |
| Type F Recess according DIN EN 1092-1 ⁽ⁱ⁾ | .Y |
| Type LM Large Male according ANSI B16.5 ^(f) | .W |
| Type LF Large Female according ANSI B16.5 ^(f) | .Z |
| Type LT Large Tongue according ANSI B16.5 ^(f) | .A |
| Type LG Large Groove according ANSI B16.5 ^(f) | .B |
| Type ST Small Tongue according ANSI B16.5 ^(f) | .G |
| Type SG Small Groove according ANSI B16.5 ^(f) | .H |
| Pipe piece for welding | .S |

Drain (Flange, Screw, Pipe Piece for Welding)

| | |
|--|----|
| DN15 ^{(d)(u)} | .A |
| DN20 ^{(u)(e)} | .B |
| DN25 ^{(d)(u)} | .C |
| DN40 ^{(d)(u)} | .D |
| DN50 ^{(d)(u)} | .E |
| ½-inch ^{(f)(u)} | .F |
| ¾-inch ^{(f)(u)} | .G |
| 1-inch ^{(f)(u)} | .H |
| 1½-inch ^{(f)(u)} | .I |
| 2-inch ^{(f)(u)} | .J |
| G ¾ female thread ^(u) | .K |
| ¾-14NPT female thread ^(u) | .L |
| Without ^(t) | .U |

Drain Contact face

| | |
|--|----|
| Type B1 according DIN EN 1092-1 ^{(h)(s)(u)} | .M |
| Type B2 according DIN EN 1092-1 ^{(i)(s)(u)} | .O |
| Type C according DIN EN 1092-1 ^{(i)(s)(u)} | .P |
| Type D according DIN EN 1092-1 ^{(i)(s)(u)} | .Q |
| Type L Lens according DIN2696 ^{(k)(s)(u)} | .R |
| Type RF/SF (RA = 125 microinch) Face according ANSI B16.5 ^{(f)(s)(u)} | .L |
| Type RJF Ring Joint Face according ANSI B16.5 ^{(f)(s)(u)} | .J |
| Type E Spigot according DIN EN 1092-1 ^{(i)(s)(u)} | .X |
| Type F Recess according DIN EN 1092-1 ^{(i)(s)(u)} | .Y |
| Type LM Large Male according ANSI B16.5 ^{(f)(s)(u)} | .W |
| Type LF Large Female according ANSI B16.5 ^{(f)(s)(u)} | .Z |
| Type LT Large Tongue according ANSI B16.5 ^{(f)(s)(u)} | .A |
| Type LG Large Groove according ANSI B16.5 ^{(f)(s)(u)} | .B |
| Type ST Small Tongue according ANSI B 16.5 ^{(f)(s)(u)} | .G |
| Type SG Small Groove according ANSI B16.5 ^{(f)(s)(u)} | .H |
| Pipe piece for welding ^{(m)(u)} | .S |
| with female thread ^{(n)(u)} | .T |
| without ^(t) | .U |

Type of Arrangement

| | |
|---|---|
| Standard | X |
| Additional partition point with Bolts and Nuts, Spiralgasket Steel/Graphite Flange Face (acc Transmitter Mounting Flange): Flanges acc. DIN EN – Form B1 resp. B2 Flanges acc. ANSI – Form RF/SF | A |
| Additional partition point with Bolts and Nuts, Spiralgasket 1.4571/Graphite Flange Face (acc Transmitter Mounting Flange): Flanges acc. DIN EN – Form B1 resp. B2 Flanges acc. ANSI – Form RF/SF | C |
| Additional partition point with Bolts and Nuts, Spiralgasket Hastelloy C/Graphite Flange Face (acc Transmitter Mounting Flange): Flanges acc. DIN EN – Form B1 resp. B2 Flanges acc. ANSI – Form RF/SF | D |
| With heating jacket made of 1.4571 (316Ti); 1.4404 (316L) – connecting flanges B1/DN15, PN40 (DIN EN 1092-1) | 6 |
| With heating jacket made of 1.4571 (316Ti); 1.4404 (316L) – connecting flanges B1/DN25, PN40 (DIN EN 1092-1) | 7 |
| With heating jacket made of 1.4571 (316Ti); 1.4404 (316L) – connecting flanges B2/DN15, PN40 (DIN EN 1092-1) | 8 |

Type of Arrangement (continued)

| | |
|--|----|
| With heating jacket made of 1.4571 (316Ti); 1.4404 (316L) – connecting flanges B2/DN25, PN40 (DIN EN 1092-1) | .9 |
| With heating jacket made of 1.4571 (316Ti); 1.4404 (316L) – connecting flanges RF/SF, ½ in, class 300 | S |
| With heating jacket made of 1.4571 (316Ti); 1.4404 (316L) – connecting flanges RF/SF, 1 in, class 300 | T |
| With heating jacket made of 1.4571 (316Ti); 1.4404 (316L) – connecting flanges RJF, ½ in, class 300 | U |
| With heating jacket made of 1.4571 (316Ti); 1.4404 (316L) – connecting flanges RJF, 1 in, class 300 | V |

Chamber for Length of Displacer “L” (indicate exact measure of L when ordering)

For Code SS “L” = Distance between center of flanges to Vessel

For length range

| | |
|--|---|
| “L” >300 mm to 1000 mm (>12 inch to 40 inch) | A |
| “L” >1000 mm to 2000 mm (>40 inch to 79 inch) | B |
| “L” >2000 mm to 3000 mm (>79 inch to 118.5 inch) | C |
| “L” >3000 mm to 4000 mm (>118.5 inch to 157.5 inch) ^(w) | D |
| “L” >4000 mm to 5000 mm (>157.5 inch to 197 inch) ^(w) | E |
| “L” >5000 mm to 6000 mm (>197 inch to 236 inch) ^(w) | F |

Optional Features

| | |
|---|----|
| Unit Degreased (no Material Factor) | -O |
| Corrosion addition 2-3 mm ^(o) | -Z |
| Drain valve with welding tap and ¾-NPT female ^(p) | -V |
| Drain valve with welding tap and ¾-NPT male ^(p) | -W |
| Additional flushing connector on top DN15 or ½” (contact face same as flange to vessel) | -X |
| Additional flushing connector on top DN25 or 1” (contact face same as flange to vessel) | -Y |

Tag No. Labeling:

| | |
|--|----|
| Stainless Steel Label fixed with wire (no Material-Factor) | -L |
|--|----|

Certificates:

| | |
|--|----|
| EN 10204-2.1 Certificate of Compliance (no Material-Factor) | -1 |
| EN 10204-3.1 Inspection Certificate of process wetted metallic material (no Material-Factor) | -3 |
| PED 97/23/EC additional unit verification, according to Module F/G (no Material-Factor) ^(q) | -4 |
| Comply with NACE Standard MR-01-75 (requires Option -3) (no Material-Factor) ^{(x)(y)(z)} | -6 |
| Wasserstand 100 (no Material-Factor) ^(r) | -9 |

Material Tests:

| | |
|--|----|
| X-Ray & Isotope test for weldings (no Material-Factor) | -7 |
| Dye penetrate test (no Material-Factor) | -8 |
| PMI - Test (no Material-Factor) | -5 |

Notes

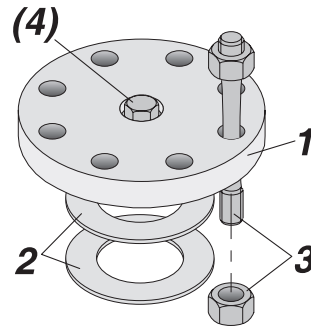
- a pending
- c Not with TYPE OF ARRANGEMENT: 6, 7, 8, 9, S, T, U, V
- d Not with PRESSURE RATING CODE: I, J, K, L, M
- e Not with PRESSURE RATING CODE: D, E, F, I, J, K, L, M
- f Not with PRESSURE RATING CODE: A, B, C, D, E, F
- g Not with PRESSURE RATING CODE: A, B, C, D, E, F, K, L, M
- h Not with PRESSURE RATING CODE: C, D, E, F, I, J, K, L, M
- i Not with PRESSURE RATING CODE: A, B, I, J, K, L, M
- k Not with PRESSURE RATING CODE: A, B, C, D, I, J, K, L, M
- m Available with DRAIN: A, B, C, F, G, H
- n Available with DRAIN: K & L
- o Not available with MATERIAL CODE E, F, G, 5, U, T, H, 0, J, N, I, R, C
- p Available with DRAIN CONTACT FACE S
- q Restrictions concerning the limit of application for the used materials are considering (NACE Standard MR 0175/2003, bzw. ISO 15156)
- r Available with Mounting Type Code SS, ST and Drain Code B, C, G, H
- s Not available with DRAIN; K & L
- t Not with MOUNTING TYPE: -SS, -ST
- u Not with MOUNTING TYPE: -B, -TB
- v Not with FLANGE SIZE (to Transmitter) 0 or 4
- w With TYPE OF ARRANGEMENT A, B, C or D
- x Not with MATERIAL K or L
- y With MATERIAL K or L
- z Price for carbon steel is for amount of one chamber. For more amounts contact factory.

COVER FLANGE KIT
 The cover flange kit is necessary for the sandwich type torque tube transmitters 244LD and 167LP.
 Two seals, studs and nuts are included. Vent plug is optional.

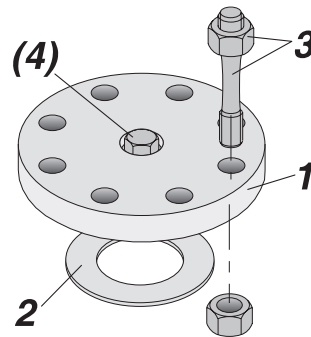
BLIND FLANGE KIT
 The Blind Flange kit is required to close both the drain flange and the top mounted flange combination, if no other additional equipment is connected.
 One seal, studs and nuts are included. Vent plug is optional.

**Material,
 Flange Size,
 Pressure Rating,
 Contact Face,
 Gaskets,
 Bolts and Nuts**

see Model Codes on the following pages



- Notes**
 1 Flange
 2 Gaskets
 3 Bolts and nuts
 4 Venting plug with G 3/4 A (DIN ISO 228) or 1/2 NPT



How to Order – Specify model Cover Flange Kit 204BCF (Flange, Gasket, Nuts and Bolts)

Material

| | |
|--|----|
| Carbon Steel 1.0460/P250GH (A-105) (application from -60° C to 460 ° C) ^(d) | -K |
| 16Mo3 (1.5415) (application from -10° C to 500 ° C) ^(d) | -O |
| 1.4571 (316 Ti) (application from 200° C to 500 ° C) ^(d) | -E |
| 1.4404 (316L) (1.4435 with FLANGE SIZE 15.16 and CONTACT FACE H) (application from -200° C | -S |
| 1.4541 (application from -200° C bis 500 ° C) ^(d) | -H |
| 1.4462 (DUPLEX) (application from -10° C bis 280 ° C) ^(d) | -N |
| 1.4816 (INCONEL 600) (application from -10° C bis 450 ° C) ^(d) | -R |
| 1.4858 (INCONEL 825) (application from -10° C bis 450 ° C) ^(d) | -I |
| Hastelloy C (application from -200° C bis 450 ° C) ^(d) | -C |

Flange Size

| | |
|--|-----|
| DN15 ^(b) | .11 |
| DN20 (not for PRESSURE RATING E, F, G, H) ^(b) | .12 |
| DN25 | .13 |
| DN50 | .14 |
| DN70 | .15 |
| DN80 | .16 |
| DN100 | .17 |
| 1/2-inch ^(b) | .18 |
| 3/4-inch ^(b) | .19 |
| 1-inch | .20 |
| 2-inch | .21 |
| 3-Inch | .22 |
| 4-Inch | .23 |

Pressure Rating

| | |
|---|----|
| PN 16 (with FLANGE SIZE -11,-12, -13, -14, -16, -17) | .A |
| PN 40 (with FLANGE SIZE -11, -12, -13, -14, -16, -17) | .B |
| PN 63 (with FLANGE SIZE -14, -16, -17) | .C |
| PN 100 (with FLANGE SIZE -11, -13, -14, -16, -17) | .D |
| PN 160 (with FLANGE SIZE -11, -13, -14, -16, -17) | .E |
| PN 250 (with FLANGE SIZE -11, -13, -14, -16, -17) | .F |
| PN 400 (with FLANGE SIZE -16) ^(b) | .G |
| PN 500 (with FLANGE SIZE -15) ^(b) | .H |
| Class 150 (with FLANGE SIZE -18 to -23) | .I |
| Class 300 (with FLANGE SIZE -18 to -23) | .J |
| Class 600 (with FLANGE SIZE -18 to -23) | .K |
| Class 900 (with FLANGE SIZE -18 to -23) | .L |
| Class 1500 (with FLANGE SIZE -18 to -23) | .M |

Contact Face

| | |
|---|----|
| Type B1 according DIN EN 1092-1 (available with pressure rating A, B) | .M |
| Type B2 according DIN EN 1092-1 (available with pressure rating A to G) | .O |
| Type C according DIN EN 1092-1 (available with pressure rating A to G) | .P |
| Type D according DIN EN 1092-1 (available with pressure rating A to G) | .Q |
| Type E Spigot according DIN EN 1092-1 (available with pressure rating A to G) | .X |
| Type F Recess according DIN EN 1092-1 (available with pressure rating A to G) | .Y |
| Type L (available with pressure rating D, E, F, G) | .L |
| Type L Lens High pressure (available with IG- Standard for PRESSURE RATING H and Lens acc. DIN 2596with NENNDRUCK G) | .H |
| Type RF/SF (available with pressure rating I to M) – RF Raised Face per ANSI B16.5 | .R |
| Type RJF (available with pressure rating I to M) – RJF Ring Joint Face per ANSI B16.5 by flange size -18 and -19 and pressure rating "I" not with contact face "J" | .J |
| Type LM Large Male according ANSI B16.5 | .W |
| Type LF Large Female according ANSI B16.5 | .Z |
| Type LT Large Tongue according ANSI B16.5 | .A |
| Type LG Large Groove according ANSI B16.5 | .B |
| Type ST Small Tongue according ANSI B16.5 | .G |
| Type SO Small Groove according ANSI B16.5 | .U |

Gaskets^(c)

| | |
|---|----|
| Graphite ^{(d)(g)} | .G |
| Carbon Steel ^(d) | .K |
| 16Mo3 ^(d) | .O |
| 1.4571 (316 Ti) ^(d) | .E |
| 1.4404 (316 L) ^(d) | .S |
| 1.4541 ^(d) | .H |
| 1.4462 (DUPLEX) ^(d) | .N |
| 1.4816 (INCONEL 600) ^(d) | .R |
| 1.4858 (INCONEL 825) ^(d) | .I |
| Hastelloy C ^(d) | .C |
| Without gasket with CONTACT FACE H | .X |

Bolts and Nuts

| | |
|--|---|
| Bolts (long) with reduced shank and nuts for transm. sandwich mounting a. product temp. > -10° C (Steel) ^(f) | 1 |
| Bolts (long) with reduced shank and nuts for transm. sandwich mounting a. product temp. > -196° C (SS) ^(f) | 2 |
| Bolts (short) with reduced shank and nuts for flange connection and product temp. > -10° C (Steel) ^(h) | 3 |
| Bolts (short)with reduced shank and nuts for flange connection and product temp. > 1 96°C (SS) ^(h) | 4 |

Optional Features

| | |
|------------------------------|----|
| Cleaned by oil and fat | -O |
| Vent Plug G ¾ | -A |
| Vent Plug NPT ¾..... | -B |

Tag No. Labeling

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

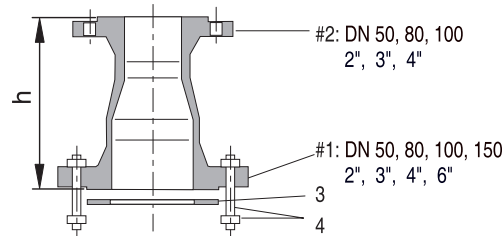
Certificates

| | |
|--|----|
| EN 10204-2.1, Certificate Of Compliance | -1 |
| EN 10204-3.1, Inspection Certificate Of Process Wetted Metallic Material | -3 |
| Comply With NACE Standard MR-0175 ^(a) | -6 |

Notes

- a Restrictions concerning the limit of application for the used materials are considering (NACE Standard MR 0175/2003, resp. ISO 15156)
- b Not with OPTION -A, -B
- c Spiral gaskets including Graphite
- d Not CONTACT FACE H
- f Flange size -15, -16, -17, -22, -23 only
- h Not FLANGE SIZE 15
- k Only GASKET: G
- l Not released

For flange mounting
e.g. top mounting on chambers or vessels



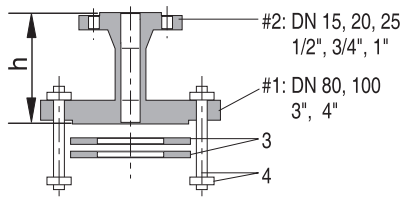
FLANGE COMBINATION 204FK

The flange combination is used, if

- displacer chamber with Side-Top (-ST) or Top-Bottom (-TB) design is applied to a torque tube transmitter Model 244LD or 167LP
- a transmitter is mounted on a DN 50 (2 inch) or DN 150 (6 inch) flange connection
- the cover flange is to be taken off for service without removing the transmitter.

The flange combination will be supplied with gaskets, bolts and nuts for connection to the transmitter.

For sandwich mounted transmitters
e.g. top-bottom or top-side chambers



- 1 Flange size #1
- 2 Flange size #2
- 3 Gaskets
- 4 Bolts and nuts

Materials,

Flange Size #1,

Flange Size #2,

Static Pressure Rating,

Contact Face

see Model Codes on the following pages

Model Codes 204FK

How to Order – Specify model Cover Flange Combination 204FK (Includes Gaskets, Nuts & Bolts)

Material

| | |
|---|----|
| Carbon Steel – Flanges 1.0460 (P25OGH); – Pipes 1.0345 (P235GH) application from -10° C to 350° C | -K |
| 1.4571 (316 Ti) application from -60° C to 400° C | -E |
| 1.4571 (316 Ti) application from -196° C to 400° C | -F |
| 1.4571 (316 Ti) application from -60° C to 500° C | -G |
| 1.4404 (316 L) application from -60° C to 400° C | -S |
| 1.4404 (316 L) application from -196° C to 400° C | -U |
| 1.4404 (316 L) application from -60° C to 500° C | -T |
| 1.4541 application from -60° C to 400° C | -H |
| 1.4541 application from -196° C to 400° C | -Q |
| 1.4541 application from -60° C to 500° C | -J |
| DUPLEX – 1.4462 application from -10° C to 280° C | -N |
| INCONEL 600 – 2.4816 application from -10° C to 450° C | -R |
| INCONEL 825 – 2.4858 application from -10° C to 450° C ^(e) | -I |
| Hastelloy C application from -196° C to 400° C | -C |

Pressure Rating

| | |
|----------------------|---|
| PN16 | A |
| PN40 | B |
| PN63 | C |
| PN100 | D |
| PN160 | E |
| PN250 | F |
| Class 150 | I |
| Class 300 | J |
| Class 600 | K |
| Class 900 | L |
| Class 1500 | M |

Flange Size #1

| | |
|---|---|
| DN50 (with PRESSURE RATING A, B, C, D, E, F) | 0 |
| DN80 (with PRESSURE RATING A, B, C, D, E, F) | 1 |
| DN100 (with PRESSURE RATING A, B, C, D, E, F) | 2 |
| DN150 (with PRESSURE RATING A, B, C, D, E, F) | 3 |
| 2 Inch (with PRESSURE RATING I, J, K, L, M) | 4 |
| 3 Inch (with PRESSURE RATING I, J, K, L, M) | 5 |
| 4 Inch (with PRESSURE RATING I, J, K, L, M) | 6 |
| 6 Inch (with PRESSURE RATING I, J, K, L, M) | 7 |

Contact Face #1

| | |
|--|---|
| Type B1 according DIN EN 1092-1 only with PRESSURE RATING A,B. | M |
| Type B2 according DIN EN 1092-1 only with PRESSURE RATING A,B,C,D,E,F | O |
| Type C according DIN EN 1092-1 only with PRESSURE RATING A,B,C,D,E,F | P |
| Type D according DIN EN 1092-1 only with PRESSURE RATING A,B,C,D,E,F | Q |
| Type E Spigot according DIN EN 1092-1 only with PRESSURE RATING A,B,C,D,E,F | X |
| Type F Recess according DIN EN 1092-1 only with PRESSURE RATING A,B,C,D,E,F | Y |
| Type L Lens according DIN2696 only with PRESSURE RATING D,E,F | L |
| Type RF/SF (RA = 125 µm) according ANSI 1316.5 only with PRESSURE RATING I,J,K,L,M | R |
| Type RJF Ring Joint Face according ANSI B16.5 only with PRESSURE RATING I,J,K,L,M | J |
| Type LM Large Male according ANSI B16.5 only with PRESSURE RATING I,J,K,L,M. | W |
| Type LF Large Female according ANSI B16.5 only with PRESSURE RATING I,J,K,L,M | Z |
| Type LT Large Tongue according ANSI B16.5 only with PRESSURE RATING I,J,K,L,M. | A |
| Type LG Large Groove according ANSI B16.5 only with PRESSURE RATING I,J,K,L,M. | B |
| Type ST Small Tongue according ANSI B16.5 only with PRESSURE RATING I,J,K,L,M. | G |
| Type SG Small Groove according ANSI B16.5 only with PRESSURE RATING I,J,K,L,M. | U |

Flange Size #2

| | |
|--|---|
| DN15 (with flange size #1 1 and 2) | A |
| DN20 (with flange size #1 1 and 2) not PRESSURE RATING E,F | B |
| DN25 (with flange size #1 1 and 2) | C |
| DN50 (with flange size #1 0, 1, 2 and 3) | D |
| DN80 (with flange size #1 0, 1, 2 and 3) | E |
| DN100 (with flange size #1 0, 1, 2 and 3) | F |
| ½-inch (with flange size #1 5 and 6) not PRESSURE RATING I with CONTACT FLANGE J | H |
| ¾-inch (with flange size #1 5 and 6) not PRESSURE RATING I with CONTACT FLANGE J | I |
| 1-inch (with flange size #1 5 and 6) | J |
| 2-inch (with flange size #1 4, 5, 6 and 7) | K |
| 3-inch (with flange size #1 4, 5, 6 and 7) | L |
| 4-inch (with flange size #1 4, 5, 6 and 7) | M |

Contact Face #2

| | | |
|---|---|---|
| Type B1 according DIN EN 1092-1 | with PRESSURE RATING A, B | M |
| Type B2 according DIN EN 1092-1 | with PRESSURE RATING A, B, C, D, E, F | O |
| Type C according DIN EN 1092-1 | with PRESSURE RATING A, B, C, D, E, F | P |
| Type D according DIN EN 1092-1 | with PRESSURE RATING A, B, C, D, E, F | Q |
| Type E Spigot according DIN EN 1092-1 | with PRESSURE RATING A, B, C, D, E, F | X |
| Type F Recess according DIN EN 1092-1 | with PRESSURE RATING A, B, C, D, E, F | Y |
| Type L Lens according DIN2696 | with PRESSURE RATING D, E, F | L |
| Type RF/SF (RA = 125 µm) according ANSI B16.5 | with PRESSURE RATING I, J, K, L, M | R |
| Type RJF Ring Joint Face according ANSI B16.5 | with PRESSURE RATING I, J, K, L, M | J |
| Type LM Large Male according ANSI B16.5 | with PRESSURE RATING I, J, K, L, M | W |
| Type LF Large Female according ANSI B 16.5 | with PRESSURE RATING I, J, K, L, M | Z |
| Type LT Large Tongue according ANSI B 16.5 | with PRESSURE RATING I, J, K, L, M | A |
| Type LG Large Groove according ANSI B16.5 | with PRESSURE RATING I, J, K, L, M | B |
| Type ST Small Tongue according ANSI B16.5 | with PRESSURE RATING I, J, K, L, M | G |
| Type SG Small Groove according ANSI B 16.5 | with PRESSURE RATING I, J, K, L, M | U |

Gaskets for Flange Size #1

| | |
|---|---|
| Graphite with CONTACT FACE #1 P, Q, A, B, G, U..... | G |
| Carbon Steel ^(b) | K |
| 1.4571 (316 Ti) ^(b) | E |
| 1.4404 (316 L) ^(b) | S |
| 1.4541 ^(b) | H |
| 1.4462 (DUPLEX) ^(b) | N |
| 1.4816 (INCONEL 600) ^(b) | R |
| 1.4858 (INCONEL 825) ^{(b)(e)} | I |
| Hastelloy C ^(b) | C |

Bolts and Nuts

| | |
|---|---|
| Steel Bolts (long) with reduced shank, nuts and 2 gaskets for transm. sandwich mounting. Product temp. > -10° C for FLANGE SIZE #1 1, 2, 5 and 6..... | 1 |
| SS Bolts (long) with reduced shank, nuts and 2 gaskets for transm. sandwich mounting. Product temp. > -196° C for FLANGE SIZE #1 1, 2, 5 and 6..... | 2 |
| Steel Bolts (short) with reduced shank, nuts and #1 gasket for flange connection. Product temp. > -10° C for FLANGE SIZE D 0 to 7 with FLANGE SIZE #2 D, E, F, K, L, M..... | 3 |
| Steel Bolts (short) with reduced shank, nuts and #1 gasket for flange connection. Product temp. > -196° C for FLANGE SIZE D 0 to 7 with FLANGE SIZE #2 D, E, F, K, L, M..... | 4 |

Optional Features

| | |
|-----------------------------|----|
| Oxygen Service cleaned..... | -O |
|-----------------------------|----|

Tag. No. Labeling

| | |
|--|----|
| Stainless steel label fixed with wire..... | -L |
|--|----|

Certificates

| | |
|---|----|
| EN 10204-2.1..... | -1 |
| EN 10204-3.1..... | -3 |
| PED 97/23/EC additional unit verification, according to module F/G..... | -4 |
| Comply with NACE standard MR-0175 ^(a) | -6 |

Material Test

| | |
|--|----|
| PMI Test..... | -5 |
| X-Ray and Isotope test for weldings..... | -7 |
| Dye penetrate test..... | -8 |

Notes

- a Restrictions concerning the limit of application for the used materials are considering (NACE Standard MR 0175/2003, bzw. ISO 15156)
- b Spiralgaskets including Graphite (d) for PRESSURE RATING I, J, K, D, L, M
- d Not Contact Face H
- e Flange Size -15, -16, -17, -22, -23 only