D110x (B/E/C/M/R/K/L)

NB 20 – NB 1200

- **Type D110x** (B/E/C/M/R/K/L)
  without vacuum support ring
- **Type D111x** (B/E/C/M/R/K/L)
  with internal vacuum support ring
- **Type D112x** (B/E/C/M/R/K/L)
  with embedded vacuum support ring

Type key ▶ page 20

D1 1 0 M

- M → Tie rod variant
- 0 → Support ring variant
- 1 → Number of arches
- D1 → Type

Lateral expansion joint with one arch

Design: Hydrodynamic, single-arch rubber bellows with self-sealing rubber bulges and swivel backing flanges with support collar and tie rods
Optionally with vacuum support ring

Nominal diameters: NB 20 to NB 1200, intermediate sizes possible

Installation length: Standard L_E = 130 to 350 mm (▶ page 208–210)
Other installation lengths on request

Pressure: Depending on the nominal diameter up to 25 bar
Vacuum-proof up to 0.8 bar absolute, with vacuum support ring up to 0.05 bar absolute
Design in accordance with Pressure Equipment Directive PED 97/23/EC

Movement: For lateral movements (▶ page 208–210)
Installation gap tolerances possible in the context of axial compression and extension

Stiffness rate: Lateral stiffness rates (▶ page 279)

Application:
Cooling water systems, desalination plants, drinking water supply, plant construction, e. g. in pipelines, on pumps, as dismantling joints, on condensers and vessels

CE PED 97/23/EC · KTW · FDA · Ω <10⁵ Ohm · EX · TÜV DIN 4809 (Standard sizes) · Shipbuilding certification (Standard sizes)

Rubber bellows

Rubber grades			Carrier
up to 100 °C:	EPDM	Cooling water, hot water, seawater, acids, dilute chlorine compounds	Nylon fabric Polyester fabric Kevlar fabric Glass fibre fabric, Steel mesh
	EPDM, drinking water approved	Drinking water	
	EPDM, white, food grade	Foodstuffs	
	EPDM, abrasion-resistant	Abrasive materials, Water-sand extraction	
	EPDM, insulating	Electrical systems construction	
	IIR	Hot water, acids, bases, gases	
	CSM	Strong acids, bases, chemicals	
	NBR	Oils, petrol, solvents, compressed air	
	NBR, bright, food grade	Oil, fatty foods	
up to 80 °C:	CR	Cooling water, slightly oily water, seawater	
up to 70 °C:	NR	Abrasive materials	
up to 150 °C:	HNBR	Oils, petrol, solvents, compressed air	
up to 180 °C:	FPM	Corrosive chemicals, petroleum distillates	
up to 200 °C:	Silicon (Q)	Air, saltwater atmosphere	
	Silicon (Q), white, food grade	Foodstuffs, medical technology	
PTFE lining:	For severe chemical attacks. Take the restriction of the listed movement into account (▶ page 208–210)		

Flanges

Design: Single-part swivel backing flanges with support collar, clearance holes, groove to accommodate the rubber bulges and holder for tie rods (control unit B, E, C, M)

Single-part round backing swivel flanges with support collar, clearance holes, groove to accommodate the rubber bulges and control unit plates (control unit type R, K, L)

Flange norms: DIN, ANSI, AWWA, BS, JIS, special measurements (▶ page 280)

Materials:
Carbon steel: 1.0038 (S235JRG2)
1.0570 (S355J2G3)
Stainless steel: 1.4301 (X5CrNi18-10)
1.4571 (X6CrNiMoTi17-12-2)
Aluminium: AlMg3
Other materials on request

Coating: Primed, hot-dip galvanised, special paint

Optional accessories

Protective hood: UV protection cover
Ground protective cover
Fire protection cover
(▶ page 50)

Flow liners: Cylindrical flow liner
Conical flow liner
Telescoping flow liner
(▶ page 49)

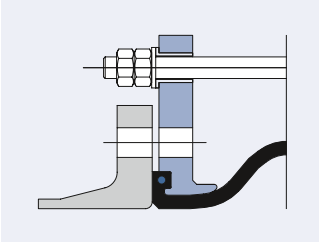
Tie rods

Example:
Type D111M

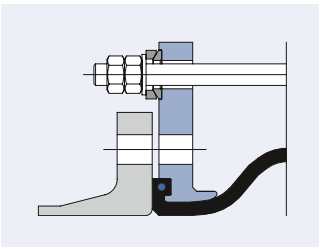
Design: Dimensioning according to design pressure (test pressure) based on the Pressure Equipment Directive

Materials: Carbon steel in strength class 8.8 or stainless steel

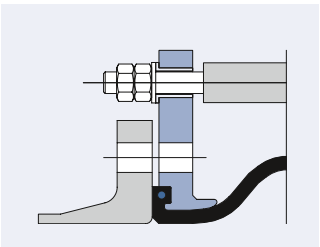
Coating: Spherical bearings and ball disks PTFE-coated
Tie rods galvanised or hot-dip galvanised



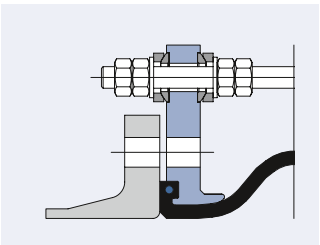
Type D110B
Tie rods mounted outside in rubber bushing to accommodate reaction forces in the event of pressure (up to NB 300)



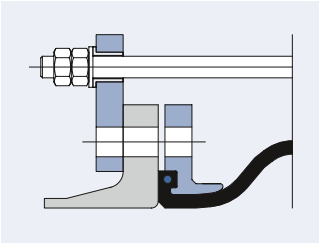
Type D110E
Tie rods mounted outside in spherical bearings and ball disks to accommodate the reaction forces in the event of pressure



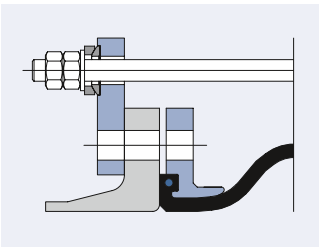
Type D110C
Tie rods mounted outside in rubber bushing and inside in the thrust limiter to accommodate stresses in the event of pressure and vacuum (up to NB 300)



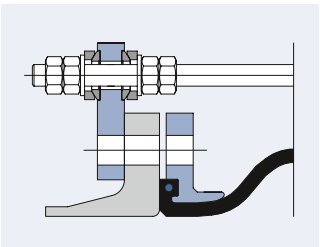
Type D110M
Tie rods mounted outside and inside in spherical bearings and ball disks to accommodate the reaction forces in the event of pressure and vacuum



Type D100R
Control unit plates: Tie rods mounted outside in rubber bushing to accommodate reaction forces in the event of pressure (up to NB 300)



Type D100K
Control unit plates: Tie rods mounted outside in spherical bearings and ball disks to accommodate the reaction forces in the event of pressure



Type D100L
Control unit plates:Tie rods mounted outside and inside in spherical bearings and ball disks to accommodate the reaction forces in the event of pressure and vacuum

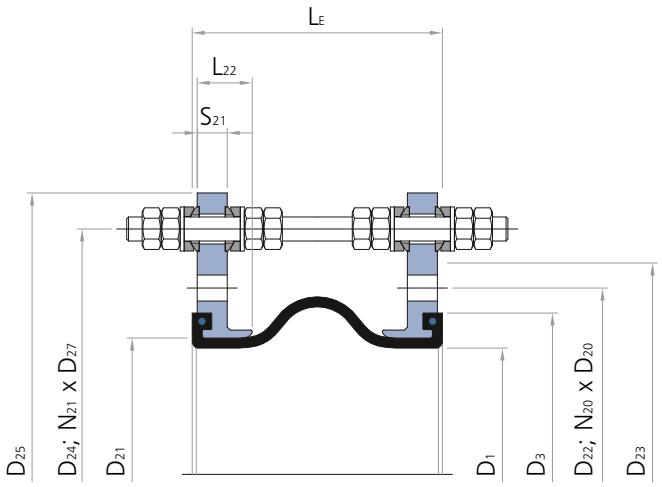
Support rings

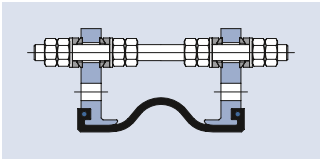
TYPE		Vacuum support ring	Pressure	Movement
D110x (B/E/C/M/ R/K/L)		Without	Depending on the nominal diameter up to 25 bar, for vacuum up to 0.8 bar absolute	▶ page 208
D111x (B/E/C/M/ R/K/L)		Vacuum support ring spiral (1.4310) up to NB 300, vacuum support ring starting at NB 350 Medium contact, inside the arch apex	Depending on the nominal diameter up to 25 bar, for vacuum up to 0.05 bar absolute	▶ page 209
D112x (B/E/C/M/ R/K/L)		No medium contact, embedded into the arch apex of the rubber bellows starting at NB 200	Depending on the nominal diameter up to 25 bar, for vacuum up to 0.05 bar absolute	▶ page 210

Materials

Stainless steel:	1.4301 (X5CrNi18-10) 1.4539 (X1NiCrMoCu25-20-5) 1.4571 (X6CrNiMoTi17-12-2)	Other materials on request
Carbon steel:	1.0570 (S355J2G3) rubber coated	

Planning help D110M





D110x (B/E/C/M/R/K/L)

▶ without vacuum support ring

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Installation length (L_E) at design pressure

NB	up to 10 bar L_E = 130 mm					up to 10 bar L_E = 150 mm					up to 10 bar L_E = 175 mm				
	higher pressures on request														
	Movement				A	Movement				A	Movement				A
	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²
20	30	30	30	0	17										
25	30	30	30	0	17										
32	30	30	30	0	17										
40	30	30	30	0	18										
50	30	30	30	0	32										
65	30	30	30	0	53										
80	30	30	30	0	85	30	30	30	0	85					
100	30	30	30	0	128	30	30	30	0	128					
125	30	30	30	0	187	30	30	30	0	187					
150	30	30	30	0	259	30	30	30	0	259					
200	30	30	30	0	410						30	30	30	0	409
250	30	30	30	0	596						30	30	30	0	599
300	30	30	30	0	822						31	10	17	0	903
350											31	10	17	0	1,134
400											31	10	17	0	1,521
450											31	10	17	0	1,878
500											31	10	17	0	2,290
600											31	10	16	0	3,187
700											31	10	16	0	4,312
800											31	10	16	0	5,555
900											31	10	16	0	6,910
1000											31	10	16	0	8,462
1100											31	10	15	0	10,171
1200											31	10	15	0	12,037

Installation length (L_E) at design pressure

NB	up to 10 bar L_E = 200 mm					up to 10 bar L_E = 250 mm					up to 10 bar L_E = 275 mm				
	higher pressures on request														
	Movement				A	Movement				A	Movement				A
	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²
200	40	20	26	0	564	44	20	29	0	573	44	20	29	0	573
250	40	20	26	0	799	44	20	28	0	809	44	20	28	0	809
300	30	30	30	0	822	44	20	27	0	1,081	44	20	27	0	1,081
350	50	30	30	0	907	44	20	27	0	1,333	44	20	27	0	1,333
400	50	30	30	0	1,018	44	20	27	0	1,750	44	20	27	0	1,750
450	40	20	25	0	2,116	40	20	30	0	1,801	44	20	26	0	2,132
500	50	30	30	0	1,692	44	20	26	0	2,570	44	20	26	0	2,570
600	50	30	30	0	3,078	44	20	26	0	3,515	44	20	26	0	3,515
700	40	20	24	0	4,669	50	30	30	0	4,019	50	30	30	0	4,019
800	40	20	23	0	5,958	50	30	30	0	5,436	44	20	25	0	5,986
900	40	20	23	0	7,359	44	20	25	0	7,390	44	20	25	0	7,390
1000	40	20	23	0	8,958	44	20	25	0	8,992	44	20	25	0	8,992
1100	40	20	23	0	10,715	44	20	24	0	10,751	44	20	24	0	10,751
1200	40	20	22	0	12,628	44	20	24	0	12,668	44	20	24	0	12,668

Installation length (L_E) at design pressure

NB	up to 10 bar L_E = 300 mm					up to 10 bar L_E = 350 mm				
	higher pressures on request									
	Movement				A	Movement				A
	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²
200	53	31	37	0	707	69	43	49	0	897
250	53	31	36	0	968	69	43	48	0	1,188
300	53	31	36	0	1,263	69	43	48	0	1,514
350	53	31	35	0	1,534	69	43	47	0	1,810
400	53	31	35	0	1,979	69	43	46	0	2,290
450	53	31	34	0	2,384	69	43	46	0	2,725
500	53	31	34	0	2,846	69	43	45	0	3,217
600	53	31	33	0	3,837	69	43	45	0	4,266
700	53	31	33	0	5,064	69	43	44	0	5,555
800	53	31	33	0	6,404	69	43	43	0	6,955
900	50	30	30	0	6,706	69	43	43	0	8,462
1000	50	30	30	0	8,231	69	43	43	0	10,171
1100	53	31	32	0	11,310	69	43	42	0	12,037
1200	53	31	31	0	13,273	69	43	42	0	14,061

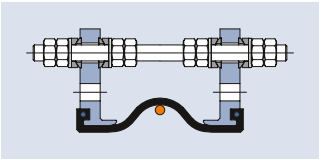
Recommended sizes
Additional possible sizes

Reduction of movement for expansion joints with PTFE lining:
axial compression: -33 %; axial extension: -66 %; lateral displacement: -50 %.
In the event of lateral displacement and simultaneous axial extension (due to installation gap tolerance) the above movements are reduced (▶ page 29).
For larger movements see type U120x.

Individual fabrication possible

D111x (B/E/C/M/R/K/L)

▶ with internal vacuum support ring



Installation length (L_E) at design pressure

NB	up to 10 bar L_E = 130 mm					up to 10 bar L_E = 150 mm					up to 10 bar L_E = 175 mm				
	higher pressures on request														
	Movement				A	Movement				A	Movement				A
	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²
20	30	10	20	0	17										
25	30	10	20	0	17										
32	30	10	20	0	17										
40	30	10	20	0	18										
50	30	10	20	0	32										
65	30	10	20	0	53										
80	30	10	20	0	85	30	10	20	0	85					
100	30	10	20	0	128	30	10	20	0	128					
125	30	10	20	0	187	30	10	20	0	187					
150	30	10	20	0	259	30	10	20	0	259					
200	30	10	20	0	410						30	10	20	0	409
250	30	10	20	0	596						30	10	20	0	599
300	30	10	20	0	822						31	3	11	0	903
350											31	3	11	0	1,134
400											31	3	11	0	1,521
450											31	3	11	0	1,878
500											31	3	11	0	2,290
600											31	3	11	0	3,187
700											31	3	11	0	4,312
800											31	3	10	0	5,555
900											31	3	10	0	6,910
1000											31	3	10	0	8,462
1100											31	3	10	0	10,171
1200											31	3	10	0	12,037

Installation length (L_E) at design pressure

NB	up to 10 bar L_E = 200 mm					up to 10 bar L_E = 250 mm					up to 10 bar L_E = 275 mm				
	higher pressures on request														
	Movement				A	Movement				A	Movement				A
	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²
200	40	7	17	0	564	44	7	19	0	573	44	7	19	0	573
250	40	7	17	0	799	44	7	18	0	809	44	7	18	0	809
300	30	10	20	0	822	44	7	18	0	1,081	44	7	18	0	1,081
350	50	10	20	0	907	44	7	18	0	1,333	44	7	18	0	1,333
400	50	10	20	0	1,018	44	7	18	0	1,750	44	7	18	0	1,750
450	40	7	16	0	2,116	40	10	20	0	1,801	44	7	17	0	2,132
500	50	10	20	0	1,692	44	7	17	0	2,570	44	7	17	0	2,570
600	50	10	20	0	3,078	44	7	17	0	3,515	44	7	17	0	3,515
700	40	7	16	0	4,669	50	30	30	0	4,019	50	10	20	0	4,019
800	40	7	15	0	5,958	50	30	30	0	5,436	44	7	17	0	5,986
900	40	7	15	0	7,359	44	7	16	0	7,390	44	7	16	0	7,390
1000	40	7	15	0	8,958	44	7	16	0	8,992	44	7	16	0	8,992
1100	40	7	15	0	10,715	44	7	16	0	10,751	44	7	16	0	10,751
1200	40	7	15	0	12,628	44	7	16	0,7	12,668	44	7	16	0	12,668

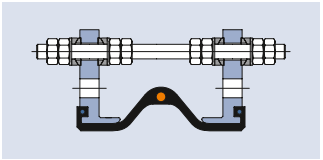
Installation length (L_E) at design pressure

NB	up to 10 bar L_E = 300 mm					up to 10 bar L_E = 350 mm				
	higher pressures on request									
	Movement				A	Movement				A
	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²
200	53	10	24	0	707	69	14	33	0	897
250	53	10	24	0	968	69	14	32	0	1,188
300	53	10	24	0	1,263	69	14	31	0	1,514
350	53	10	23	0	1,534	69	14	31	0	1,810
400	53	10	23	0	1,979	69	14	31	0	2,290
450	53	10	23	0	2,384	69	14	30	0	2,725
500	53	10	22	0	2,846	69	14	30	0	3,217
600	53	10	22	0	3,837	69	14	29	0	4,266
700	53	10	22	0	5,064	69	14	29	0	5,555
800	53	10	22	0	6,404	69	14	29	0	6,955
900	50	10	20	0	6,706	69	14	28	0	8,462
1000	50	10		0	8,231	69	14	28	0	10,171
1100	53	10	21	0	11,310	69	14	28	0	12,037
1200	53	10	21	0	13,273	69	14	28	0	14,061

Recommended sizes
Additional possible sizes

Reduction of movement for expansion joints with PTFE lining:
axial compression: -33 %; axial extension: -0 %; lateral displacement: -25 %.
In the event of lateral displacement and simultaneous axial extension (due to installation gap tolerance) the above movements are reduced (▶ page 29).
For larger movements see type U121x.

Individual fabrication possible



D112x (B/E/C/M/R/K/L)

▶ with embedded vacuum support ring

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Installation length (L_E) at design pressure

NB	up to 10 bar L_E = 130 mm					up to 10 bar L_E = 150 mm					up to 10 bar L_E = 175 mm				
	higher pressures on request														
	Movement				A	Movement				A	Movement				A
	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²
20															
25															
32															
40															
50															
65															
80															
100															
125															
150															
200											30	10	20	12,0	409
250											30	10	20	12,0	599
300											31	3	11	1,1	903
350											31	3	11	1,0	1,134
400											31	3	11	0,9	1,521
450											31	3	11	0,8	1,878
500											31	3	11	0,7	2,290
600											31	3	11	0,6	3,187
700											31	3	11	0,5	4,312
800											31	3	10	0,4	5,555
900											31	3	10	0,4	6,910
1000											31	3	10	0,3	8,462
1100											31	3	10	0,3	10,171
1200											31	3	10	0,3	12,037

Installation length (L_E) at design pressure

NB	up to 10 bar L_E = 200 mm					up to 10 bar L_E = 250 mm					up to 10 bar L_E = 275 mm				
	higher pressures on request														
	Movement				A	Movement				A	Movement				A
	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²
200	40	7	17	4,0	564	44	7	19	4,0	573	44	7	19	4,0	573
250	40	7	17	3,2	799	44	7	18	3,2	809	44	7	18	3,2	809
300	30	10	20	12,0	822	44	7	18	2,7	1,081	44	7	18	2,7	1,081
350	50	10	20	8,0	907	44	7	18	2,3	1,333	44	7	18	2,3	1,333
400	50	10	20	8,0	1,018	44	7	18	2,0	1,750	44	7	18	2,0	1,750
450	40	7	16	1,8	2,116	40	10	20	2,5	1,801	44	7	17	1,8	2,132
500	50	10	20	8,0	1,692	44	7	17	1,6	2,570	44	7	17	1,6	2,570
600	50	10	20	8,0	3,078	44	7	17	1,3	3,515	44	7	17	1,3	3,515
700	40	7	16	1,1	4,669	50	30	30	8,0	4,019	50	10	20	8,0	4,019
800	40	7	15	1,0	5,958	50	30	30	8,0	5,436	44	7	17	1,0	5,986
900	40	7	15	0,9	7,359	44	7	16	0,9	7,390	44	7	16	0,9	7,390
1000	40	7	15	0,8	8,958	44	7	16	0,8	8,992	44	7	16	0,8	8,992
1100	40	7	15	0,7	10,715	44	7	16	0,7	10,751	44	7	16	0,7	10,751
1200	40	7	15	0,7	12,628	44	7	16	0,7	12,668	44	7	16	0,7	12,668

Installation length (L_E) at design pressure

NB	up to 10 bar L_E = 300 mm					up to 10 bar L_E = 350 mm				
	higher pressures on request									
	Movement				A	Movement				A
	mm	mm	±mm	±°	cm²	mm	mm	±mm	±°	cm²
200	53	10	24	5,7	707	69	14	33	8,0	897
250	53	10	24	6,4	968	69	14	32	6,4	1,188
300	53	10	24	5,3	1,263	69	14	31	5,3	1,514
350	53	10	23	4,6	1,534	69	14	31	4,6	1,810
400	53	10	23	4,0	1,979	69	14	31	4,0	2,290
450	53	10	23	3,6	2,384	69	14	30	3,6	2,725
500	53	10	22	3,2	2,846	69	14	30	3,2	3,217
600	53	10	22	2,7	3,837	69	14	29	2,7	4,266
700	53	10	22	2,3	5,064	69	14	29	2,3	5,555
800	53	10	22	2,0	6,404	69	14	29	2,0	6,955
900	50	10	20	5,0	6,706	69	14	28	1,8	8,462
1000	50	10	20	5,0	8,231	69	14	28	1,6	10,171
1100	53	10	21	1,5	11,310	69	14	28	1,5	12,037
1200	53	10	21	1,3	13,273	69	14	28	1,3	14,061

Recommended sizes
Additional possible sizes

Reduction of movement for expansion joints with PTFE lining:
axial compression: -0 %; axial extension: -0 %; lateral displacement: -0 %.
In the event of axial extension and simultaneous lateral displacement the above movements are reduced (▶ page 29).
For larger movements see type D122x or D125x.

Individual fabrication possible

Lateral expansion joints, type U111M
for the power plant of an aluminium oxide mill
NB 1300 to NB 2700, +9/-1 bar