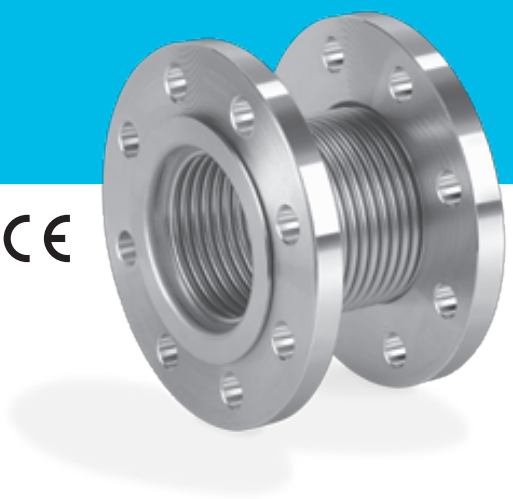
Stainless steel bellows unit EKO
Stainless steel flexible tube ES

Technical Information · GB
11.3 Edition 11.08

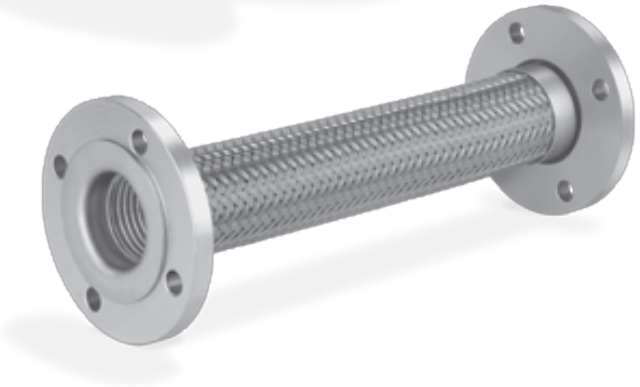


Stainless steel bellows unit EKO

- Fault-free machine operation due to absorption of thermal and pressure expansions
- High bursting resistance due to multiple-layer bellows
- Axial and lateral movement absorption

Stainless steel flexible tube ES

- Protection from material fatigue thanks to vibration absorption
- Long service life due to use of stainless steel
- Angular and lateral movement absorption
- Compensation for installation tolerances due to optional lengths
- Reduces structure-borne noise thus improving noise levels



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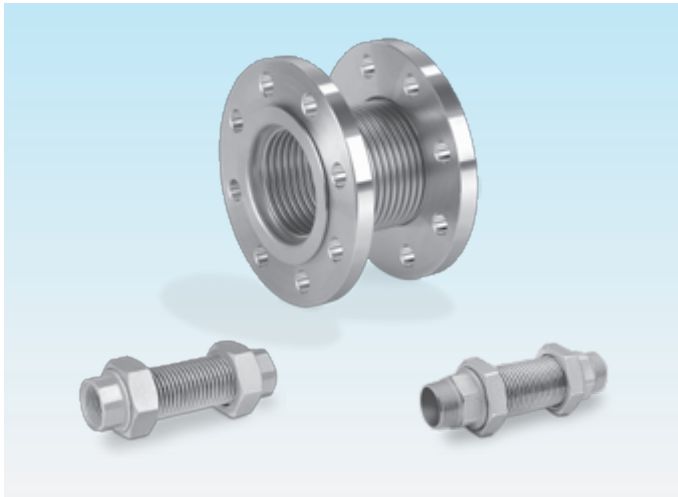
= To be continued



Stainless steel bellows units with threaded and flanged connections

1 Application

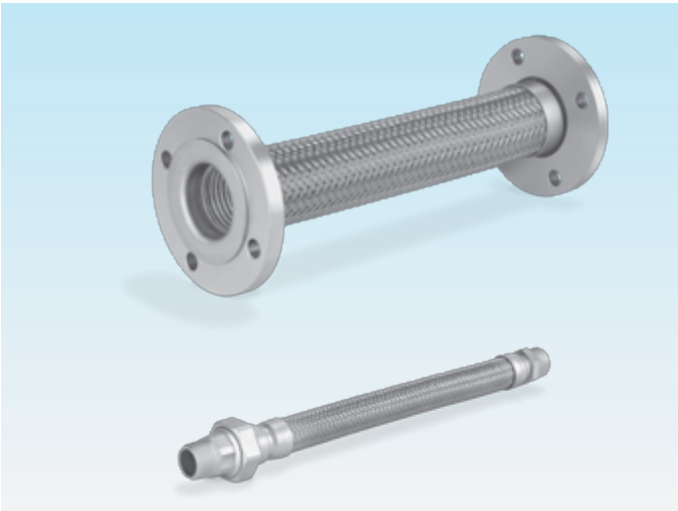
1.1 EKO

The stainless steel bellows unit EKO is designed for stress-free and safe pipe installation and to prevent transmission of vibration in gas, air and water installations.

The stainless steel bellows unit EKO can compensate for thermal and pressure expansions in pipelines, disengage elastically-mounted units from the systems to which they are connected and compensate elastically for relative movements between system parts. This results in reduced forces and moments at the connections. The stainless steel bellows unit with its hot-galvanised flange permits the use of landfill gas.

Stainless steel bellows units EKO can optionally be supplied with an integrated restricting orifice for adjusting the gas and air flow rate for gas burners.

The stainless steel bellows unit EKO..R can withstand high temperatures. The EKO..F, EKO..FZ can withstand high temperatures (HTB) in conjunction with flange seals of type WL-HT. The HTB flange seals are available as accessories.



Stainless steel flexible tubes with threaded and flanged connections

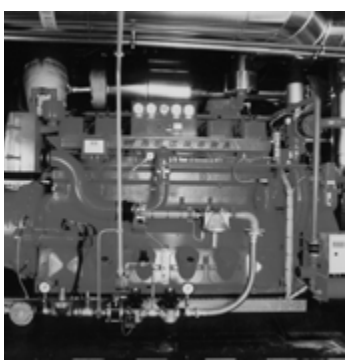
1.2 ES

The stainless steel flexible tube ES is designed for stress-free and flexible connection of devices and pipes and to prevent transmission of vibration in gas, air and water installations.

The stainless steel flexible tube ES can absorb vibrations with a high frequency and low amplitude, e.g. in fuel pipes, reduce structure-borne noise in pipelines, for example, compensate for inaccuracies in installation between units and serve as a flexible pipe element on presses, for example. It can be fitted in places where no fixed points can be located.

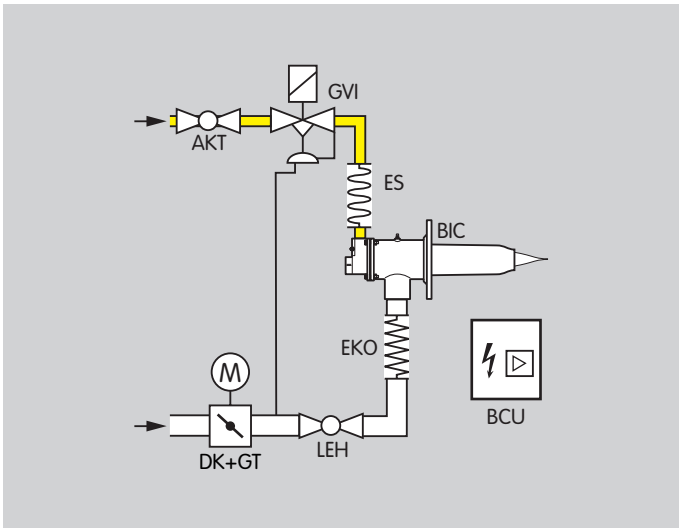
The stainless steel flexible tube ES is optionally available in any length.

Stainless steel flexible tubes in the supply lines of buildings



Stainless steel flexible tubes on gas engine supply lines

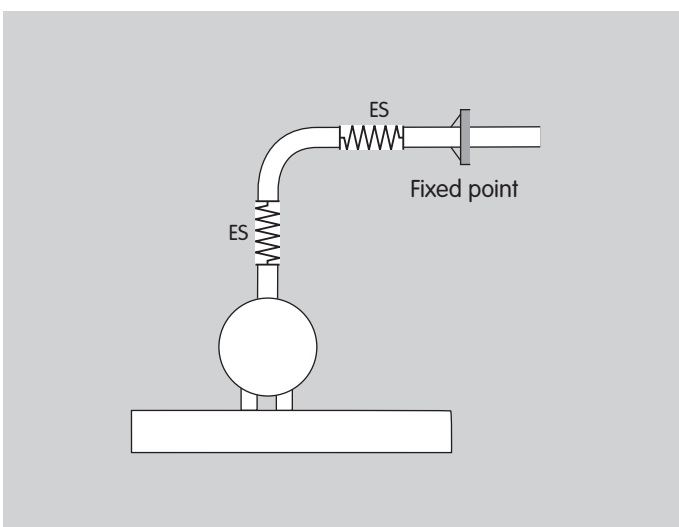
Stainless steel flexible tubes and bellows units at the kiln in the brickworks



1.3 Examples of application

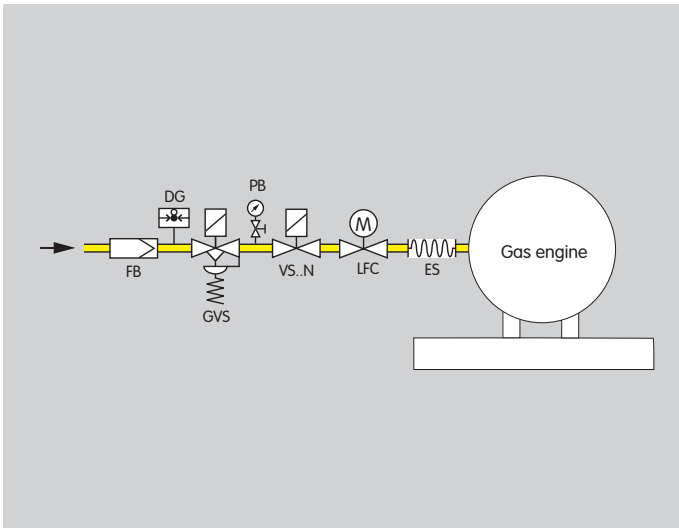
1.3.1 Gas and air supply to a drying kiln

Pressure and temperature factors from the burner influence the gas and air supply. The stainless steel flexible tube and bellows unit compensate for the pressure and thermal expansion in the pipelines. They ensure that the process is runs without any problem.



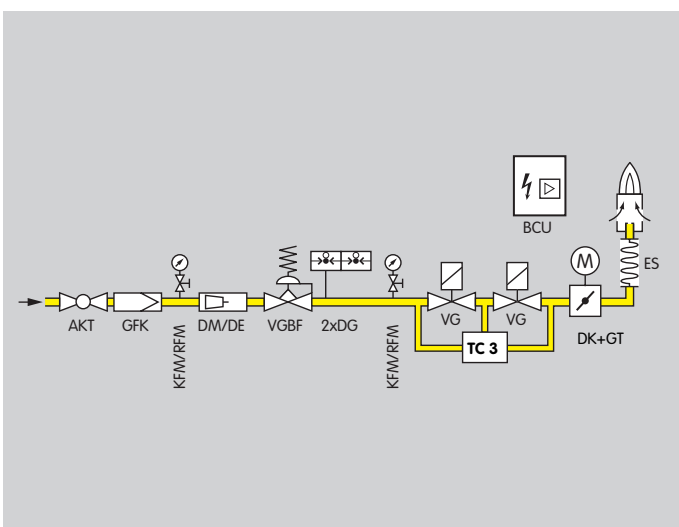
1.3.2 Exhaust gas system on a compressor

Two stainless steel flexible tubes mounted at right angles in the exhaust gas pipe reduce vibrations on all sides which the unit causes on the connected pipe.



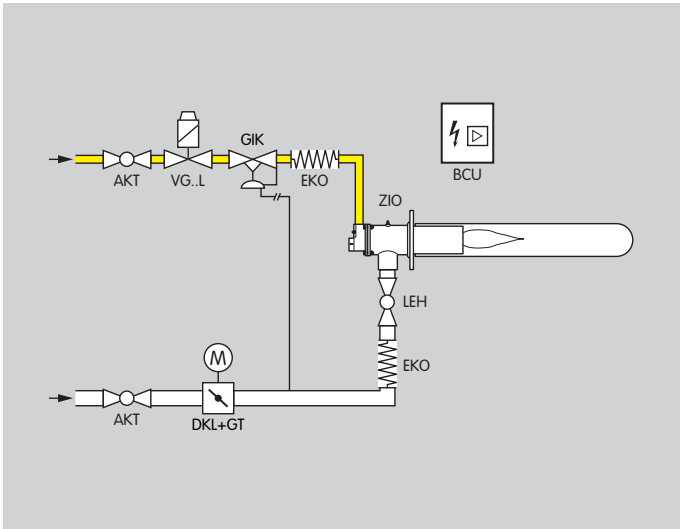
1.3.3 Fuel pipes on a gas engine

When a gas engine is connected to the fuel pipes, installation tolerances can occur at the connection points. The simple way to compensate for these is with stainless steel flexible tubes.



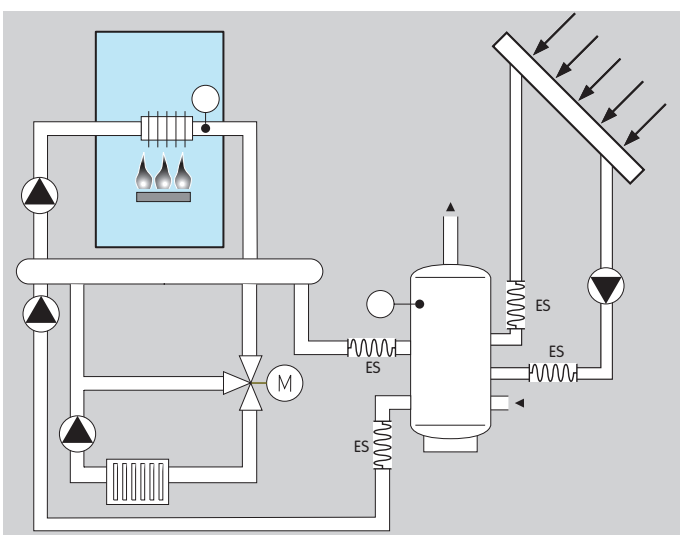
1.3.4 Gas pressure control and measurement system

The stainless steel flexible tube offers an effective and cost-efficient solution for protecting gas lines, on thermal flue air purification systems for instance, against thermal expansion. It reduces structure-borne noise in the pipeline.



1.3.5 Gas and air supply to an aluminium smelting furnace

Pressure and temperature factors influence the gas and air supply. The stainless steel bellows units compensate for the pressure and thermal expansion in the pipelines. Stainless steel bellows units EKO..10P are specially designed to suit the Kromschröder ZIO burner for a high burner output at low operating pressure.



1.3.6 Pipes on a heating and solar system

The pipes between the collector, boiler and storage tank are adapted to the building architecture. Stainless steel flexible tubes are used to compensate favourably for inaccuracies in installation.

2 Certification

CE

– DIN-DVGW tested and registered.

Type	DVGW test mark	Test based on
EKO..RI, EKO..RA	NG-4504AS3148	DIN 30681
EKO..F100P, EKO..F-Z	NG-4504AR3924	DIN 30681
ES	NG-4601AR0759	DIN 3384

– For all gases according to DVGW Code of Practice G 260 Air and Water.

3 Selection

3.1 Stainless steel bellows unit with threaded connection EKO..R

	RI	RA
EKO 15	●	●
EKO 20	●	●
EKO 25	●	●
EKO 32	●	●
EKO 40	●	●
EKO 50	●	●

Order example

EKO 25RA

3.1.1 Type code Stainless steel bellows unit with threaded connection EKO..R

Code	Description
EKO	Stainless steel bellows unit
15, 20, 25, 32, 40, 50	nominal diameter
RI	Rp internal thread
RA	R external thread

Overall length – see Technical data.

3.2 Stainless steel bellows unit with flanged connection EKO..F

	F	10P	100P	-Z
EKO 25	●			●
EKO 32	●			●
EKO 40	●			●
EKO 50	●			●
EKO 65	●			●
EKO 80	●			●
EKO 100	●			●
EKO 125	●			●
EKO 150	●			●
EKO 200	●		●	●
EKO 250	●	●		
EKO 350	●	●		

Order example

EKO 200F100P

3.2.1 Type code Stainless steel bellows unit with threaded connection EKO..F

Code	Description
EKO	Stainless steel bellows unit
25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 350	nominal diameter
F	Flange with hole pattern according to PN 10, p_e max. 10 bar
10P	Flange with hole pattern according to PN 16, p_e max. 1 bar
100P	Flange with hole pattern according to PN 16, p_e max. 16 bar
-Z	Hot-galvanised

Overall length – see Technical data.

3.3 Stainless steel flexible tube ES

	RA	F	500	800	1000
ES 8	●		●	●	●
ES 10	●		●	●	●
ES 16	●		●	●	●
ES 20	●		●	●	●
ES 25	●		●	●	●
ES 32	●		●	●	●
ES 40	●		●	●	●
ES 50	●		●	●	●
ES 65		●	●	●	●
ES 80		●	●	●	●
ES 100		●	●	●	●

Order example

ES 32RA800

3.3.1 Type code Stainless steel flexible tube ES

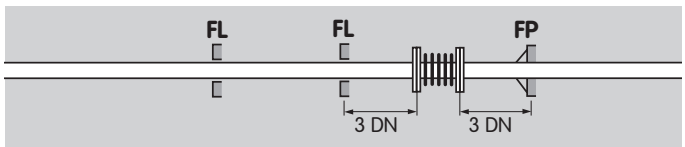
Code	Description
ES	Stainless steel flexible tube
8, 10, 16, 20, 25, 32, 40, 50, 65, 80, 100	nominal diameter
RA	R external thread
F	Flange to EN 1092-1
500, 800, 1000	Length [mm]*

** Other lengths on request*

4 Project planning information

If the stainless steel bellows unit EKO or the stainless steel flexible tube ES are used with external aggressive media acting on them, we recommend using additional protection, e.g. a heat shrink tube.

4.1 EKO

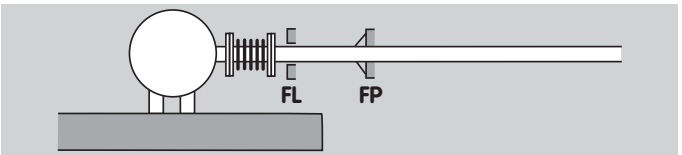


Only install one stainless steel bellows unit between two fixed points or guide bearings.

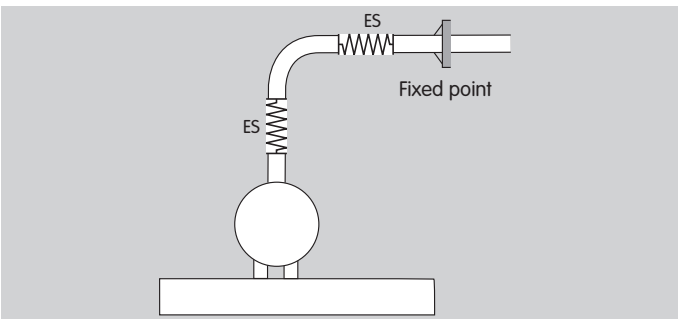
Distance between the bellows unit and the fixed point **FP** or guide bearing **FL** ≤ 3 DN

Provide fixed points at the ends of pipe sections, which can absorb the axial compression force, the adjustment force of the bellows unit and the friction force of the guide bearings.

Dynamic stressd
A = angular, **L** = lateral – see Technical data, Dimensions EKO..R oder Dimensions EKO..F.



Vibration absorption: Install the bellows unit as close to the vibrating unit as possible to avoid additional movements. Attach the pipeline immediately downstream of the bellows unit, independent of the vibrating unit, using a guide bearing **FL** or a fixed point **FP**.



In the event of vibrations in all directions, install a second bellows unit at a right angle to the first one.

Ensure a sufficiently good stand for the vibrating unit in order to absorb the axial compression force.

Maximum vibration amplitude ≤ 5 to 10 % of the movement absorption – see Technical Data, Dimensions EKO..R or Dimensions EKO..F.

Determine the initial stress for the expansion or compression to be expected:

$$V = D \times \left(0.5 - \frac{t_E - t_{min}}{t_{max} - t_{min}}\right)$$

V = Initial stress [mm],
D = Expansion of pipeline [mm],
t_E = Installation temperature [°C],
t_{min} = Min. operating temperature [°C],
t_{max} = Max. operating temperature [°C].

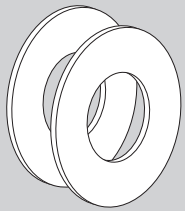
Positive initial stress = expand bellows unit,
negative initial stress = compress bellows unit.

Define the installation space on the basis of the overall length of the bellows unit:

$$L_E = B_L \pm V$$

L_E = Installation space
B_L = Overall length
V = Initial stress.

When a restricting orifice is used – see Accessories – the overall length is increased by 3 mm.



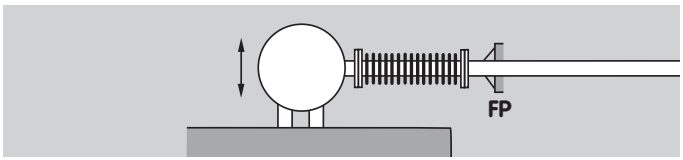
WL-HT

EKO..F

High temperature bearing in conjunction with WL-HT type flange seal – see Accessories.

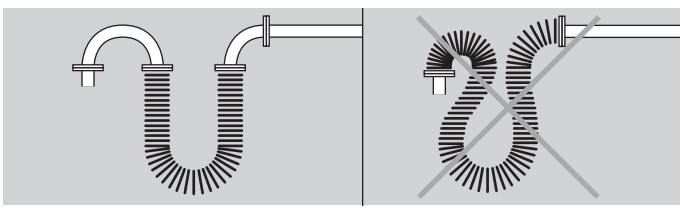
4.2 ES

Avoid torsion load on the stainless steel flexible tube.

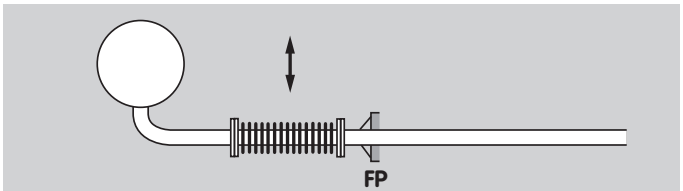


For expansion and vibration absorption, attach the pipeline directly downstream of the stainless steel flexible tube using a fixed point **FP**.

Note the minimum bending radius for one-off or frequent movement – see dimensions ES.

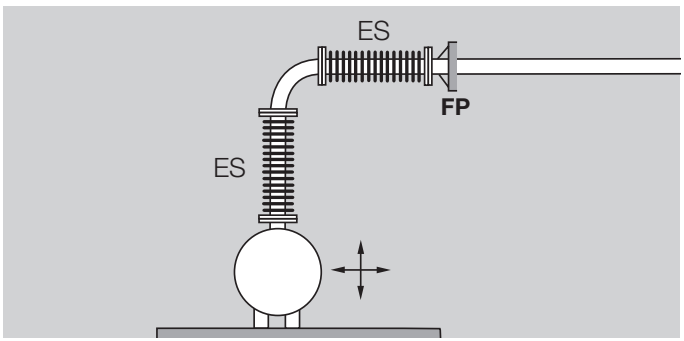


Impermissible bending immediately downstream of the connection element can be avoided by using rigid pipe bends.



Always install the stainless steel flexible tube at right angles to the direction of movement.

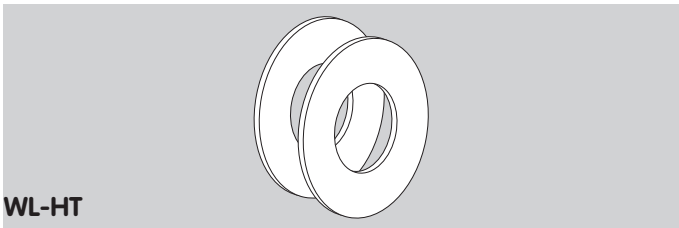
Note distance to the wall or floor.



In the event of vibrations in all directions, install a second stainless steel flexible tube at a right angle to the first one.

5 Accessories

5.1 Flange seal WL-HT



WL-HT

EKO..F, EKO..FZ can only withstand high temperatures conjunction with WL-HT type flange seal for the inlet and outlet

Flange seal	Order no.
WL-HT DN 25	03352221
WL-HT DN 32	03352222
WL-HT DN 40	03352223
WL-HT DN 50	03352224
WL-HT DN 65	03352225
WL-HT DN 80	03352226
WL-HT DN 100	03352227
WL-HT DN 125	03352228
WL-HT DN 150	03352229
WL-HT DN 200	03352220

5.2 Restricting orifice

Restricting orifices made of V2A steel can be supplied for stainless steel bellows units EKO if required. Please ask us for a quotation.

6 Technical data

Media: natural gas, LPG (gaseous), air and water; other gases on request.

EKO

The pressure loss at the EKO is approximately twice as high as that of a smooth pipe of the same length.

Stainless steel bellows 1.4571.

EKO..R

Clamping rings made of stainless steel 1.4301,
fittings made of galvanised malleable cast iron
REINZ-AFM 34 seal to DIN 3535-6, flat-sealing,
resistant to high temperatures (HTB).

Operating temperature:
Air: -20 to +250°C,
Gas: -20 to +250°C,
Water: 0 to +100°C.
Short-term temperature peaks of up to 300°C are admissible.

Max. inlet pressure p_e:
Air and water: 10 bar,
Gas: 5 bar.
Observe the maximum allowable inlet pressure for dynamic stress and increased temperature – see Reduction factors.

EKO..F

Bellows and flange made of stainless steel :
1.4571 up to DN 100, 1.4541 > DN 100.

Operating temperature:
Air: -20 to +500°C,
Gas: -20 to +150°C,
Water: 0 to +100°C.
Short-term temperature peaks of up to 300°C are admissible.

Max. inlet pressure p_e: 10 bar,
EKO 250F10P, EKO 350F10P: 1 bar.
Observe the maximum allowable inlet pressure for dynamic stress and increased temperature – see Reduction factors.

EKO..F cold-galvanised, EKO..FZ hot-galvanised.
High temperature bearing only in conjunction with
WL-HT type flange seals Type WL-HT – see Accessories.

ES

The pressure loss is approximately twice as high as that of a smooth pipe of the same length. When installed in a 90° bend, it increases at maximum by a factor of 2

Material: stainless steel corrugated tube made of 1.4541, stainless steel sheathing made of 1.4301.

ES..RA

Connection sleeves DN 8 to DN 25 on both sides, made of machining steel 1.0718, from DN 32 made of steel 1.0037.

Connection:
1 x external thread, conically sealing,
1 x hexagon nipple and external thread to EN 10226-1.

Fittings hard-soldered with silver solder up to DN 25, welded from DN 32.

Loose screw attachment parts made of galvanised malleable cast iron or cast steel.

Permissible operating temperature:
Air, Gas and Water: -10 to +300°C.

Max. inlet pressure p_e:
Air and Water: 16 bar,
Gas: 4 bar.

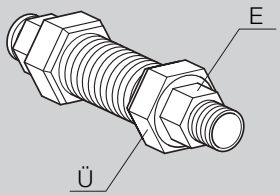
Observe the maximum allowable inlet pressure for dynamic stress and increased temperature – see Reduction factors.

ES..F

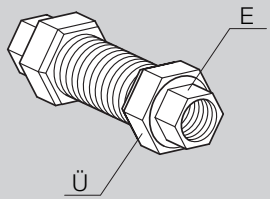
Welding flange made of stainless steel 1.4541,
(loose flange made of steel, galvanised,
PN 16 to DIN EN 1092-1).

Max. inlet pressure p_e:
Air, Gas and Water: 16 bar,
Observe the maximum allowable inlet pressure for dynamic stress and increased temperature – see Reduction factors.

6.1 Dimensions EKO..R



EKO..RA

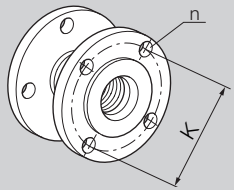


EKO..RI

Type	Connection		Connector A/F [mm]		Number of screws	Movement absorption ± [mm]			Overall length (± 2 mm) [mm]	Weight [kg]
	DN		Ü*	E*	n	Δ axial	Δ angular	Δ lateral		
EKO 15RA	15	R ½	41	26	–	12	50	8	157	0.41
EKO 20RA	20	R ¾	50	32	–	14	45	7	173	0.68
EKO 25RA	25	R 1	55	38	–	15	40	8	194	0.91
EKO 32RA	32	R 1¼	67	48	–	15	35	8	215	1.27
EKO 40RA	40	R 1½	75	54	–	17	35	9	240	1.71
EKO 50RA	50	R 2	90	66	–	21	30	10	270	2.46
EKO 15RI	15	Rp ½	41	26	–	12	50	8	125	0.39
EKO 20RI	20	Rp ¾	50	32	–	14	45	7	135	0.66
EKO 25RI	25	Rp 1	55	38	–	15	40	8	150	0.72
EKO 32RI	32	Rp 1¼	67	48	–	15	35	8	165	1.00
EKO 40RI	40	Rp 1½	75	54	–	17	35	9	190	1.40
EKO 50RI	50	Rp 2	90	66	–	21	30	10	210	2.05

Ü = union nut, E* = insert.*

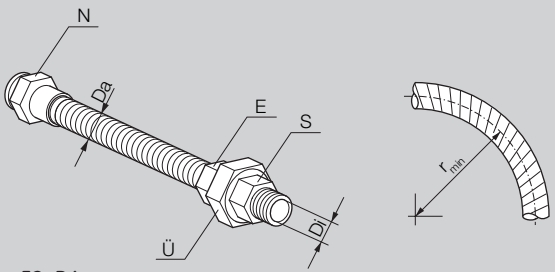
6.2 Dimensions EKO..F



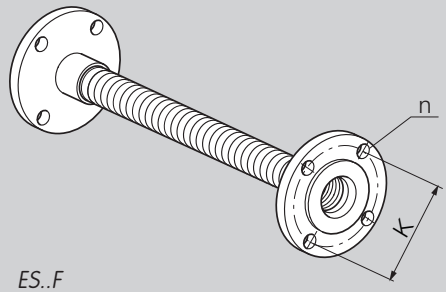
EKO..F

Type	Connection		Hole circle [mm]	Number of screws	Movement absorption ± [mm]			Overall length (± 2 mm) [mm]	Weight [kg]
	DN	Hole pattern	K	n	Δ axial	Δ angular	Δ lateral		
EKO 25	25	PN 16	85	4	7	18	1.5	60	2.30
EKO 32F	32	PN 16	100	4	8	17	2	65	3.42
EKO 40F (Z)	40	PN 16	110	4	12	18	2	75	3.95
EKO 50F (Z)	50	PN 16	125	4	12	18	2.5	95	4.80
EKO 65F (Z)	65	PN 16	145	4	17	18	3.5	110	5.90
EKO 80F (Z)	80	PN 16	160	8	20	18	3.5	125	7.20
EKO 100F (Z)	100	PN 16	180	8	20	16	4.5	150	7.82
EKO 125F (Z)	125	PN 16	210	8	22.5	14	4.1	175	11.30
EKO 150F (Z)	150	PN 16	240	8	28	16.5	7	200	13.00
EKO 200F (Z)	200	PN 10	295	8	40	16	7.5	240	17.30
EKO 200F100P	200	PN 16	295	12	40	16	7.5	240	16.70
EKO 250F10P	250	PN 16	355	12	36	13	4.2	190	17.7
EKO 350F10P	350	PN 16	470	16	30	9	2	168	28.7

6.3 Dimensions ES



ES..RA



ES..F

Type	Connection		Screw connector A/F [mm]				Hole circle	Number of screws	Tube diameter		Minimum bending radius r_{min} [mm]	Nominal bending radius r_n [mm]	Weight
	DN [mm]		N*	E*	Ü*	S*	K [mm]	n	Di [mm]	Da [mm]	One-off bending	Frequent bending	[kg]
ES 8RA	8	R ¼	14	13	28	19	–	–	8.3	13.7	32	120	0.32
ES 10RA	10	R 3/8	19	16	32	22	–	–	10.2	15.7	38	130	0.40
ES 16RA	16	R ½	22	19	41	26	–	–	16.2	23.3	58	160	0.63
ES 20RA	20	R ¾	27	26	50	32	–	–	20.2	28.3	70	170	0.92
ES 25RA	25	R 1	36	32	55	38	–	–	25.5	34.2	85	190	1.34
ES 32RA	32	R 1¼	46	46	67	48	–	–	34.2	43.0	105	260	1.87
ES 40RA	40	R 1½	50	55	75	54	–	–	40.1	52.0	130	300	2.37
ES 50RA	50	R 2	60	65	90	66	–	–	50.4	62.6	160	320	3.41
ES 65F	65	DN 65	–	–	–	–	145	4	65.3	81.2	200	460	8.24
ES 80F	80	DN 80	–	–	–	–	160	8	80.2	98.0	240	660	10.51
ES 100F	100	DN 100	–	–	–	–	180	8	100.0	119.4	290	750	11.73

6.4 Reduction factors EKO, ES

Pressure pulsation, pressure surges, pressure fluctuations, frequent movements, vibrations and high temperatures reduce the max. permissible inlet pressure.

To calculate the permissible inlet pressure:

$$p_e = p_{max} \times k_d \times k_t$$

p = permissible inlet pressure [bar]

p_{max} = max. inlet pressure [bar]

k_d = dynamic reduction factor

k_t = temperature reduction factor

6.4.1 Dynamic reduction factor k_d

	Slight, slow movement; no vibration	Frequent, uniform movement; vibrations	Rhythmic and surge-type movement; strong vibrations
Stationary or slow and uniform flow	1	0.80	0.40
Pulsating and non-uniform flow	0.80	0.63	0.32
Rhythmic and surge-type flow	0.32	0.20	On request

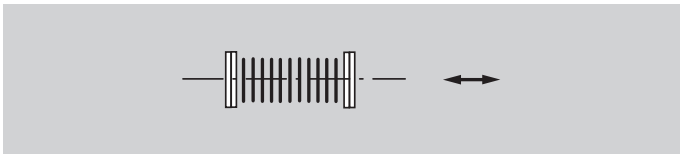
6.4.2 Temperature moderating factor k_t

Temperature °C	EKO/ES from DN 125 material 1.4541	EKO up to DN 100 material 1.4571
20	1.00	1.00
50	0,93	0,92
100	0,83	0,80
150	0,78	0,76
200	0,74	0,72
250	0,70	0,68
300	0,66	0,64
350	0,64	0,62
400	0,62	0,60
450	0,60	0,59
500	0,59	0,58
550	0,58	0,58

7 Maintenance cycles

The stainless steel bellows unit EKO and the stainless steel flexible tube ES require little servicing.

8 Glossary

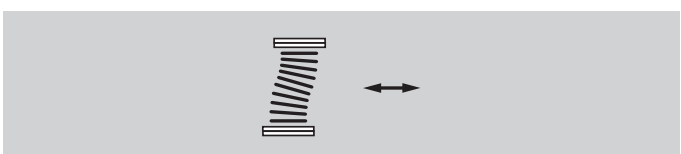


8.1 Axial movement

The movement of the stainless steel bellows unit or stainless steel flexible tube is absorbed in the axial direction.

8.2 Angular movement

The movement absorption of the stainless steel bellows unit or stainless steel flexible tube takes place at a certain angle.



8.3 Lateral movement

The movement of the stainless steel bellows unit or stainless steel flexible tube is absorbed laterally.

8.4 Relative movement

The relative movement is the movement of one body in relation to another.

8.5 Vibration amplitude

The vibration amplitude is the largest excursion of a vibration from the compressed to the extended bellows unit.

Feedback

Finally, we are offering you the opportunity to assess this "Technical Information (TI)" and to give us your opinion, so that we can improve our documents further and suit them to your needs.

Clarity

- ○ Found information quickly
- ○ Searched for a long time
- ◉ Didn't find information
  What is missing? fghmgmghhm
- ○ No answer

Comprehension

- ○ Coherent
- ○ Too complicated
- ○ No answer

Scope

- ○ Too little
- ○ Sufficient
- ○ Too wide
- ○ No answer

Use

- ☐ To get to know the product
- ☐ To choose a product
- ☑ Planning
- ☐ To look for information

Navigation

- ○ I can find my way around
- ○ I got "lost"
- ○ No answer

My scope of functions

- ○ Technical department
- ○ Sales
- ○ No answer

Remarks

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