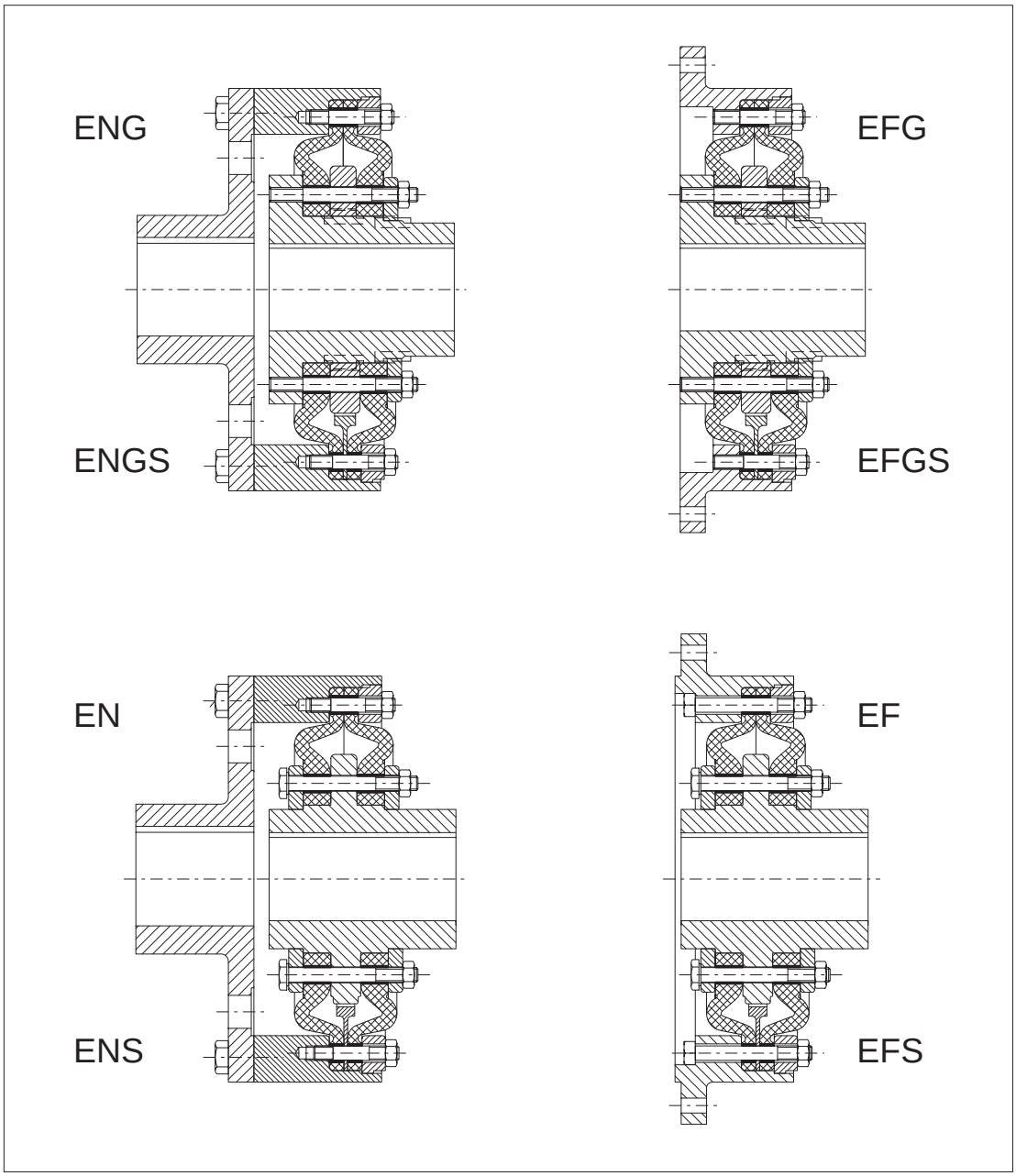
Operating Instructions

BA 3300 EN 01.04

Elastic **ELPEX** Couplings
Types **ENG, ENGS, EFG, EFGS,**
EN, ENS, EF and **EFS**



FLENDER

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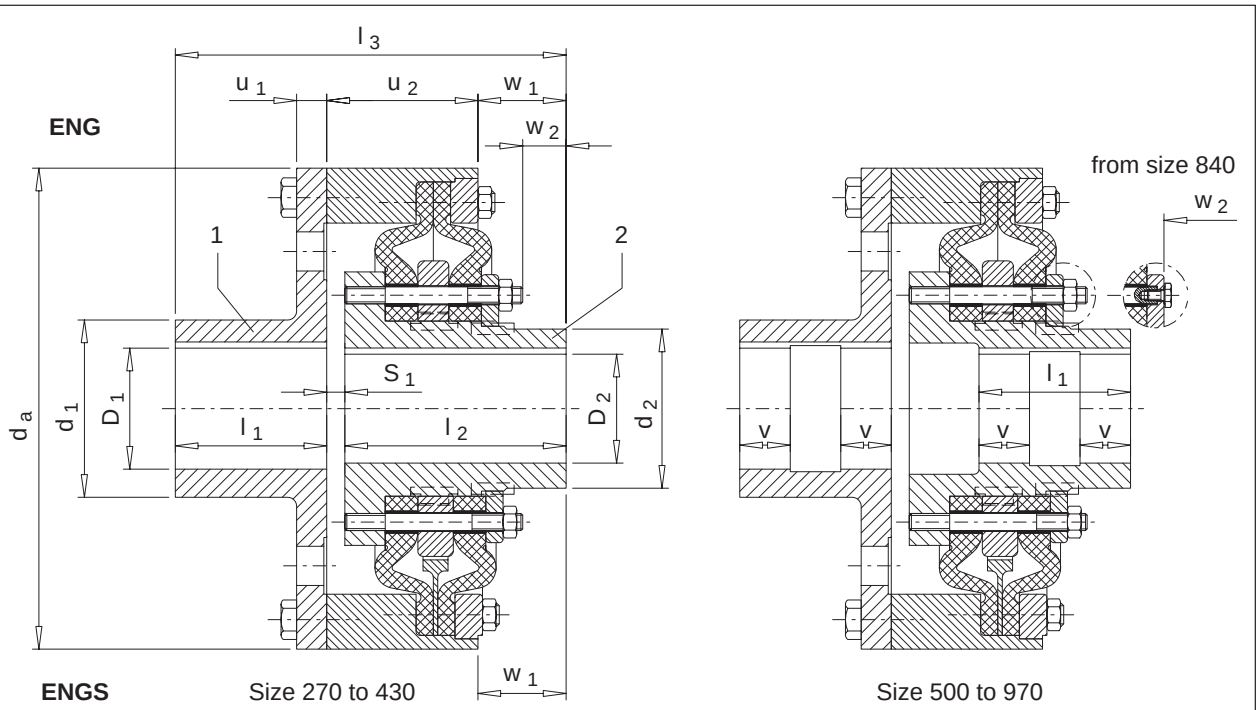
Contents

1. Technical data

Caution! **If a dimensioned drawing has been made out for the coupling, the data in this drawing must be given priority. The user of the system must make the dimensioned drawing available.**

1.1 Geometric data of types ENG and ENGS



Size	Bore 1) D 1 from mm	D 1 to mm	D 2 from mm	D 2 to mm	d a mm	d 1 mm	d 2 mm	l 1 mm	l 2 mm	l 3 mm	u 1 mm	u 2 mm	S 1 mm	w 1 mm	w 2 mm	v mm	Mass moment of inertia 2) 3) Exterior parts ENG kgm²	Exterior parts ENGS kgm²	Interior parts ENG kgm²	Interior parts ENGS kgm²	Weight 2) ENG kg	Weight 2) ENGS kg
270	45	80	45	70	270	128	94	80	155	245	14	86.0	10	79.0	42	–	0.21	0.23	0.038	0.038	32	33
320	55	100	55	85	320	160	115	100	180	286	16	97.5	6	88.5	48	–	0.49	0.53	0.086	0.086	55	57
375	65	115	65	105	375	184	143	120	205	335	18	111.8	10	103.2	62	–	1.0	1.1	0.22	0.22	87	90
430	75	130	75	120	430	208	165	140	235	383	22	126.0	8	117.0	68	–	2.0	2.2	0.39	0.39	125	130
500	90	150	90	150	500	240	202	160	260	432	25	139.7	12	132.3	80	–	3.9	4.2	0.88	0.88	195	200
590	100 140	140 180	100	170	590	224 288	230	190	310	510	28	162.7	10	157.3	95	–	8.2 8.4	8.9 9.1	1.80	1.80	280 310	290 320
690	110 140 180	140 180 210	110	200	690	224 288 336	278	220	350	580	32	175.6	10	184.4	102	70	16.3 16.8 16.9	17.8 18.3 18.4	3.90	3.90	390 410 425	410 430 445
840	140 180	180 220	140	240	840	288 352	342	280	395	685	42	231.0	10	174.0	105	90	49.0 50.0	54.0 55.0	11.50	11.50	760 790	800 830
970	160 200 240 280	200 240 280 320	160	280	970	320 384 448 512	390	350	505	867	70	277.0	12	230.0	137	110	104 106 110 115	4)	27	4)	1365 1410 1460 1520	4)

Table 1.1: Dimensions and weights of types ENG and ENGS

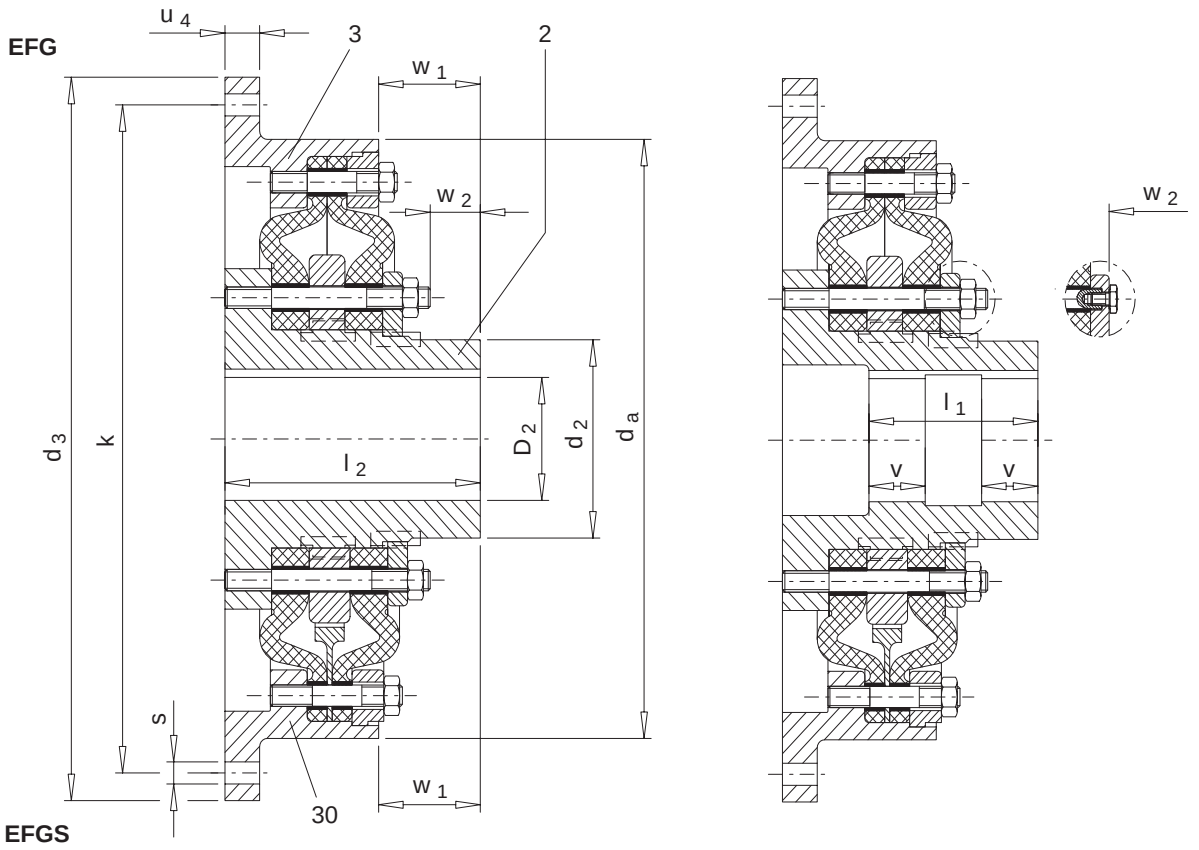
1) Hub-centre recess $D_{1/2}$ +1 mm

2) Weights and mass moments of inertia apply to mean bores

3) External parts are all parts connected to the external fixing point of the elastic rings, including the associated elastic ring portions.
Internal parts are all parts connected to the internal fixing point of the elastic rings, including the associated elastic ring portions.

4) Weights and mass moments of inertia on request or acc. to dimensioned drawing

1.2 Geometric data of types EFG and EFGS



Size	Bore 1) D 2 from mm	to mm	d a mm	d 2 mm	l 1 mm	l 2 mm	w 1 mm	w 2 mm	v mm	Flanged connection 2) SAE J620d or DIN 6288 Size	d 3 mm	k mm	s mm	Number	u 4 mm	Mass moment of inertia 3) 4) Exterior parts EFG kgm²	EFGS kgm²	Interior parts EFG kgm²	EFGS kgm²	Weight 3) EFG kg	EFGS kg
270	45	70	270	94	–	155	79.0	42	–	14	466.7	438.2	13	8	12	0.47	0.49	0.038	0.038	28	29
320	55	85	320	115	–	180	88.5	48	–	16	517.5	489.0	13	8	14	0.87	0.90	0.086	0.086	45	47
375	65	105	375	143	–	205	103.2	62	–	18	571.5	542.9	17	6	16	1.54	1.61	0.022	0.022	69	73
430	75	120	430	165	–	235	117.0	68	–	21	673.5	641.4	17	12	20	3.43	3.58	0.39	0.39	106	111
500	90	150	500	202	160	260	132.3	80	–	21	673.5	641.4	17	12	20	3.96	4.26	0.88	0.88	158	163
590	100	170	590	230	190	310	157.3	95	–	24	733.5	692.2	21	12	24	7.0	7.73	1.8	1.8	208	218
690	110	200	690	278	220	350	184.4	102	70	850	890	850	17	32	24	14.7	16.2	3.9	3.9	291	311
840	140	240	840	342	280	395	174	105	90	1060	1105	1060	21	32	30	45.7	50.5	11.5	11.5	561	601
970	160	280	970	390	350	505	230	137	110	1320	1385	1320	31	24	35	130	5)	27	5)	1111	5)

Table 1.2: Dimensions and weights of types EFG and EFGS

1) Hub-centre recess D_2 + 1 mm

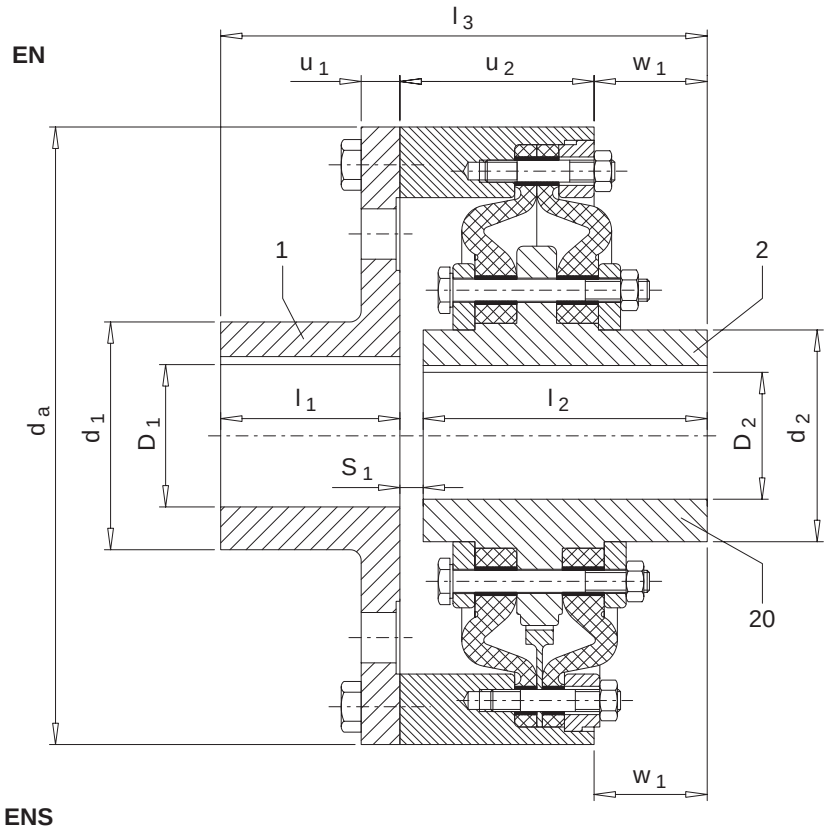
2) Alternative flanged connection dimensions on request of acc. to dimensioned drawing

3) Weights and mass moments of inertia apply to mean bores

4) External parts are all parts connected to the external fixing point of the elastic rings, including the associated elastic ring portions.
Internal parts are all parts connected to the internal fixing point of the elastic rings, including the associated elastic ring portions.

5) Weights and mass moments of inertia on request or acc. to dimensioned drawing

1.3 Geometric data of types EN and ENS



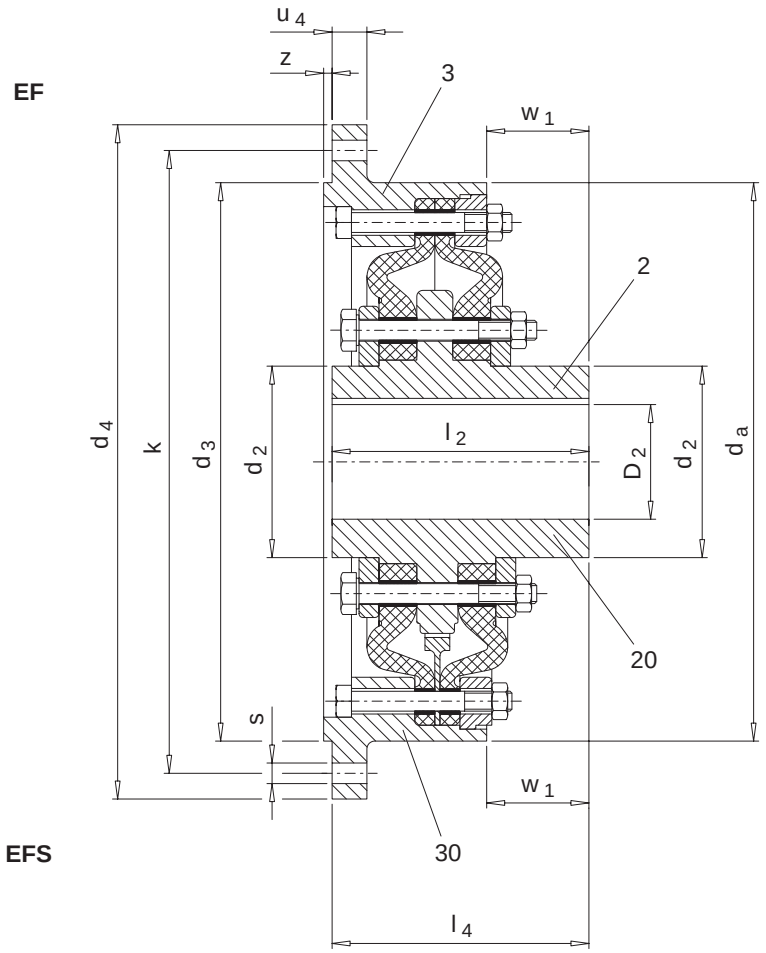
Size	Bore				d_a	d_1	d_2	l_1	l_2	l_3	u_1	u_2	S_1	w_1	Mass moment of inertia 1) 2)				Weight 1)	
	D_1		D_2												Exterior parts		Interior parts			
	from mm	to mm	from mm	to mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	EN kgm^2	ENS kgm^2	EN kgm^2	ENS kgm^2	EN kg	ENS kg
140	20	45	20	32	140	72	48	50	60	114	8	43.0	4	21.0	0.0098	0.010	0.001	0.0013	4.9	5.1
180	25	55	25	42	180	88	64	60	80	144	9	53.5	4	30.5	0.030	0.033	0.0035	0.0038	9.3	9.6
220	35	65	35	55	220	104	83	70	100	176	11	68.0	6	38.0	0.083	0.085	0.013	0.013	17	17.5
270	45	80	45	65	270	128	98	80	125	211	14	86.0	6	45.0	0.230	0.24	0.033	0.035	31	33
320	55	100	55	80	320	160	120	100	140	246	16	97.5	6	48.5	0.5	0.53	0.07	0.075	51	53
375	65	115	65	100	375	184	150	120	160	288	18	111.8	8	56.2	1.1	1.2	0.18	0.19	81	84
430	75	130	75	115	430	208	172	140	180	328	22	126.0	8	62.0	2.1	2.2	0.33	0.35	120	125
500	90	150	90	140	500	240	210	160	200	368	25	139.7	8	68.3	4.1	4.4	0.75	0.8	180	190

Table 1.3: Dimensions and weights of types EN and ENS

1) Weights and mass moments of inertia apply to mean bores

2) External parts are all parts connected to the external fixing point of the elastic rings, including the associated elastic ring portions.
Internal parts are all parts connected to the internal fixing point of the elastic rings, including the associated elastic ring portions.

1.4 Geometric data of types EF and EFS



Size	Bore D 2 from mm	Bore D 2 to mm	d a mm	d 2 mm	l 2 mm	l 4 mm	w 1 mm	Flanged connection d 3 j6 mm	d 4 mm	k mm	s mm	Number	u 4 mm	z mm	Mass moment of inertia 1) 2) Exterior parts EF kgm²	Exterior parts EFS kgm²	Interior parts EF kgm²	Interior parts EFS kgm²	Weight 1) EF kg	Weight 1) EFS kg
140	20	32	140	48	60	64	21.0	140	176	160	9	6	6	3	0.0085	0.0088	0.0010	0.0013	3.3	3.4
180	25	42	180	64	80	84	30.5	180	232	210	11	6	8	3	0.030	0.032	0.0035	0.0038	6.5	6.9
220	35	55	220	83	100	106	38.0	220	268	245	11	8	10	4	0.075	0.078	0.013	0.015	12.5	13.0
270	45	65	270	98	125	131	45.0	270	325	300	14	8	12	4	0.14	0.18	0.033	0.035	21	22.5
320	55	80	320	120	140	146	48.5	320	392	360	18	8	14	5	0.45	0.48	0.07	0.075	34	36
375	65	100	375	150	160	168	56.2	375	448	415	18	8	16	5	0.88	0.93	0.18	0.19	53	57
430	75	115	430	172	180	188	62.0	430	515	475	22	8	20	5	1.7	1.8	0.33	0.35	78	82
500	90	140	500	210	200	208	68.3	500	585	545	22	10	20	5	3.1	3.3	0.75	0.80	115	125

Table 1.4: Dimensions and weights of types EF and EFS

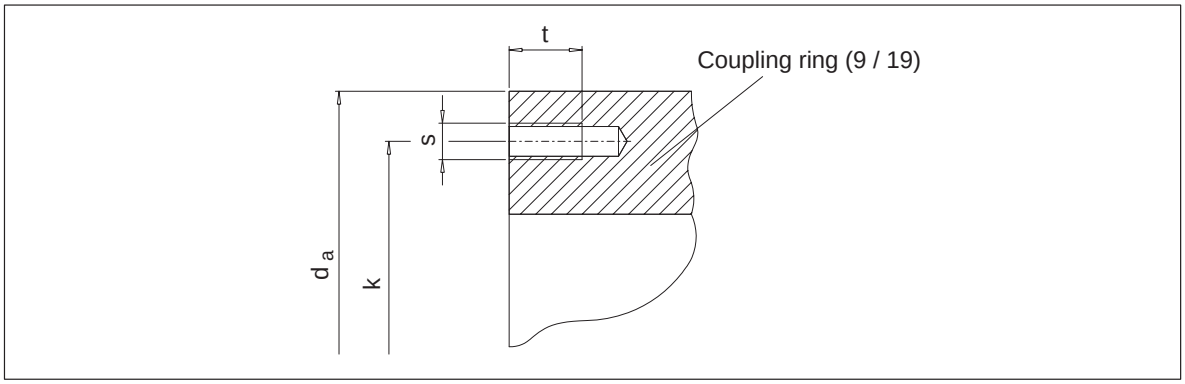
1) Weights and mass moments of inertia apply to mean bores

2) External parts are all parts connected to the external fixing point of the elastic rings, including the associated elastic ring portions.
Internal parts are all parts connected to the internal fixing point of the elastic rings, including the associated elastic ring portions.

1.5 Connecting dimensions for flanges, brake disks etc.

ELPEX couplings of types ENG, ENGS, EN and ENS can also be ordered without coupling part 1.

Flanges, brake disks etc can then be screwed directly on the coupling ring using existing threaded bores. The design of the screw connection must be checked by the customer. FLENDER recommend the use of screws of min. quality class 8.8.



Size	d_a h8 mm	k mm	s	t mm	Number
140	140	120	M 8	13	6
180	180	158	M 10	16	6
220	220	196	M 10	16	8
270	270	244	M 12	18	8
320	320	288	M 16	24	8
375	375	342	M 16	24	8
430	430	390	M 20	30	8
500	500	460	M 20	30	10
590	590	542	M 24	36	10
690	690	642	M 24	36	12
840	840	780	M 30	46	12
970	950	880	M 36	53	15

Table 1.5: Connecting dimensions for flanges, brake disks etc.

1.6 Performance data

Size	Rated torque	Maximum torque	Fatigue torque	Speed n_{max}		Axial spring rigidity	Radial spring rigidity	dynamic torsional stiffness C_{Tdyn}				
	T_{KN}	T_{Kmax}	T_{KW}	GG	Steel	C_a	C_r	1x T_{KN}	0.75x T_{KN}	0.5x T_{KN}	0.25x T_{KN}	0x T_{KN}
	Nm	Nm	Nm	1/min	1/min	N/mm	N/mm	Nm/rad	Nm/rad	Nm/rad	Nm/rad	Nm/rad
140 -1	100	300	40	4900		130	170	1400	1100	890	520	
-2	160	480	64			160	190	2250	1800	1400	830	
180 -1	250	750	100	3800		250	310	3300	2750	2150	1250	450
-2	400	1200	160			300	350	5300	4300	3400	2000	700
220 -1	560	1680	224	3100		380	450	7500	6200	4900	2800	950
-2	800	2400	320			430	510	10500	8900	7000	4000	1350
270 -1	1120	3360	448	2500	4250	570	690	15000	12500	10000	5700	1850
-2	1600	4800	640			660	770	22000	18500	14500	8300	2800
320 -1	2240	6720	896	2150	3600	680	810	30000	25500	20000	11500	4000
-2	2800	8400	1120			780	910	38000	32000	25000	14500	4900
375 -1	3550	10650	1420	1800	3100	850	1010	50000	42000	32000	18000	5800
-2	4500	13500	1800			970	1130	63000	53000	41000	22500	7500
430 -1	5600	16800	2240	1600	2650	1020	1210	77000	63000	48000	26000	7000
-2	7100	21300	2840			1160	1350	97000	79000	61000	34000	10500
500 -1	9000	27000	3600	1350	2300	1230	1460	125000	97000	73000	41000	14000
-2	11200	33600	4480			1410	1630	155000	120000	90000	50000	16500
590 -1	14000	42000	5600	1150	2000	1510	1790	190000	145000	110000	62000	19500
-2	18000	54000	7200			1710	1990	240000	185000	140000	79000	29000
690 -1	22400	67200	8960	980	1650	1820	2150	295000	230000	175000	98000	33500
-2	28000	84000	11200			2060	2390	365000	285000	215000	120000	41000
840 -1	35500	106500	14200	820	1350	2270	2680	540000	420000	315000	175000	57000
-2	45000	135000	18000			2570	2990	685000	535000	400000	220000	75000
970 -1	71000	213000	28400	710	1180	2670	3160	910000	680000	520000	290000	100000
-2	90000	270000	36000			3020	3510	1100000	880000	640000	350000	130000

damping coefficient Ψ = 1.1

Resonance factor V_R = 5.7

The performance data are valid for:

- max. 25 starts per hour
- daily operating cycle of up to 24 h
- operation within the specified alignment
- Operation in the temperature range -30 °C to +80 °C in the immediate vicinity of the coupling

Caution!

For sustained faultfree operation the coupling must be designed with an safety factor S_S and temperature factor S_ϑ appropriate to the application. In the event of a change in operating conditions (e.g. output, speed, starting frequency, changes to the prime mover and driven machine) the design must always be checked (see item 1.6.1).

1.6.1 Determination of the coupling size

It is to be selected from the coupling series the coupling to which applies:

$T_{KN} \geq T_N \times S_S \times S_\vartheta$

T_{KN} = Rated coupling torque
T_N = Rated system torque - rated drive torque acting on the coupling
S_S = 1.4 for small coefficients of cyclic variation (eg. diesel-motor generator drive)
S_S = 1.6 for large coefficients of cyclic variation (eg. diesel-motor compressor drive)
S_ϑ = Temperature factor

The temperature in the immediate vicinity of the coupling must be applied.

T_U	from -40 °C to +40 °C	from +40 °C to +60 °C	from +60 °C to +70 °C	from +70 °C to +80 °C
S_ϑ	1	1.25	1.4	1.6

Table 1.6.1: Temperature factor S_ϑ

During starting or operation torque impulses up to 25 times per hour are permissible. The following applies:

$T_{Kmax} \geq T_{max} \times S_\vartheta$

T_{Kmax} = Maximum coupling torque
T_{max} = Maximum system torque - peak drive torque acting on the coupling
S_ϑ = Temperature factor

The following must apply to the alternating torques occurring during operation:

$T_{KW} \geq T_W \times S_f \times S_\vartheta$

T_{KW} = Fatigue torque load on the coupling
T_W = Alternating torque load on the coupling
S_ϑ = Temperature factor

$S_f = \sqrt{\frac{f_{Err}}{10Hz}}$ for $f_{Err} > 10$ Hz

$S_f = 1.0$ for $f_{Err} \leq 10$ Hz

f_{Err} = excitation frequency of the alternating torque load in Hz

Caution! **When selecting the coupling, the permissible maximum speed and the permissible maximum bore must also be taken into consideration.**

Caution! **The shaft displacement values specified in section 6, item 6.4.4, must not be exceeded.**

2. General notes

2.1 Introduction

These Operating Instructions (BA) are an integral part of the coupling delivery and must be kept in its vicinity for reference at all times.

Caution! **All persons involved in the installation, operation, maintenance and repair of the coupling must have read and understood these Operating Instructions and must comply with them at all times. We accept no responsibility for damage or disruption caused by disregard of these Instructions.**

The **"Coupling"** described in these operating instructions has been developed for stationary use in general engineering applications. The coupling serves to transmit power and torque between two shafts or flanges connected by this coupling.

The coupling is designed only for the application described in section 1, "Technical data". Other operating conditions must be contractually agreed.

The coupling described in these Instructions reflects the state of technical development at the time these Instructions went to print.

In the interest of technical progress we reserve the right to make changes to the individual assemblies and accessories which we regard as necessary to preserve their essential characteristics and improve their efficiency and safety.

2.2 Copyright

The copyright to these Operating Instructions (BA) is held by **FLENDER AG.**

These Operating Instructions (BA) must not be wholly or partly reproduced for competitive purposes, used in any unauthorised way or made available to third parties without our agreement.

Technical enquiries should be addressed to the following works

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or to one of our customer-service addresses. A list of our customer-service addresses is given in section 11, "Spare parts, customer-service addresses".

3. Safety notes

3.1 Proper use

- The coupling has been manufactured in accordance with the state of the art and is delivered in a condition for safe and reliable use. Any changes on the part of the user which may affect safety and reliability are prohibited. This applies equally to safety features designed to prevent accidental contact.
- The coupling must be used and operated strictly in accordance with the conditions laid down in the contract governing performance and supply.

3.2 Obligations of the user

- The operator must ensure that all persons involved in installation, operation, maintenance and repair have read and understood these Operating Instructions (BA) and comply with them at all times in order to:

  – avoid injury or damage,

  – ensure the safety and reliability of the coupling,

  and

  – avoid disruptions and environmental damage through incorrect use.

- During transport, assembly, installation, dismantling, operation and maintenance of the unit, the relevant safety and environmental regulations must be complied with at all times.
- The coupling must be operated, maintained or repaired only by authorised, duly trained and qualified personnel.
- All work must be carried out with great care and with due regard to safety.
- All work on the gear unit must be carried out only when it is at a standstill.
  The drive unit must be secured against being switched on accidentally (e.g. by locking the key switch or removing the fuses from the power supply). A notice should be attached to the ON switch stating clearly that work is in progress.
- The coupling must be fitted with suitable safeguards to prevent accidental contact. The operation of the coupling must not be impaired by the safeguard.
- The drive unit must be shut down as soon as changes to the coupling are detected during operation.
- If the coupling is intended for installation in plant or equipment, the manufacturer of such plant or equipment must ensure that the contents of the present Operating Instructions are incorporated in his own instructions.
- All spare parts must be obtained from FLENDER.

3.3 Warnings and symbols used in these Instructions

This symbol indicates safety measures which must be observed to avoid **personal injury.**

Caution! This symbol indicates safety measures which must be observed to avoid **damaging the coupling.**

Note: This symbol indicates general **operating instructions** which are of particular importance.

4. Handling and storage

4.1 Scope of supply

The products supplied are listed in the despatch papers. Check immediately on receipt to ensure that all the products listed have actually been delivered. Parts damaged during transport or missing parts must be reported in writing immediately.

ELPEX couplings are supplied with finished bore and in pre-assembled condition.

4.2 Handling

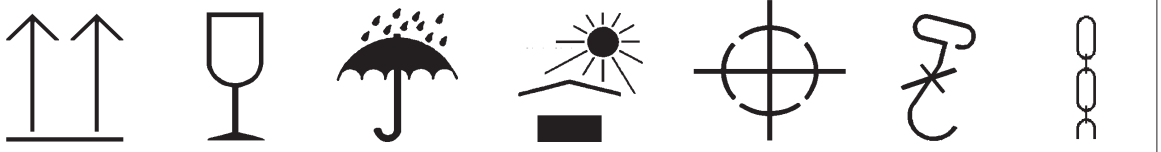
When handling FLENDER products, use only lifting and handling equipment of sufficient load-bearing capacity!

Note: The coupling must be transported using suitable transport equipment only.

Different forms of packaging may be used depending on the size of the coupling and method of transport. Unless otherwise agreed, the packaging complies with the **HPE Packaging Guidelines.**

The symbols marked on the packaging must be observed at all times. These have the following meanings:

bild-transport



This way up | Fragile | Keep dry | Keep cool | Centre of gravity | Use no hand hook | Attach here

4.3 Storage

4.3.1 Storage of the coupling parts

Unless otherwise expressly agreed, the coupling is delivered in a preserved condition and can be stored in a covered, dry place for up to 3 months. If the coupling is to be stored for a protracted period, it should be treated with a long-term preservative agent (FLENDER must be consulted).

Caution! **Before cleaning the coupling parts and applying the long-term preservative agent, the elastic ring (5) must be covered. The eleastic ring (5) must not come in contact with solvents.**

4.3.2 Storage of the elastic rings

4.3.2.1 General

Correctly stored elastic rings (5) retain their properties unchanged for up to five years. Unfavourable storage conditions and improper treatment will negatively affect the physical properties of the elastic rings (5). Such negative effects may be caused by e.g. the action of ozone, extreme temperatures, light, moisture, or solvents.

The elastic rings must be laid flat with the bead pointing upwards. The matching halves must not be separated.

4.3.2.2 Storage area

The storage area must be dry and free from dust. The elastic rings (5) must not be stored with chemicals, solvents, motor fuels, acids, etc. Furthermore, they should be protected against light, in particular direct sunlight and bright artificial light with a high ultraviolet content.

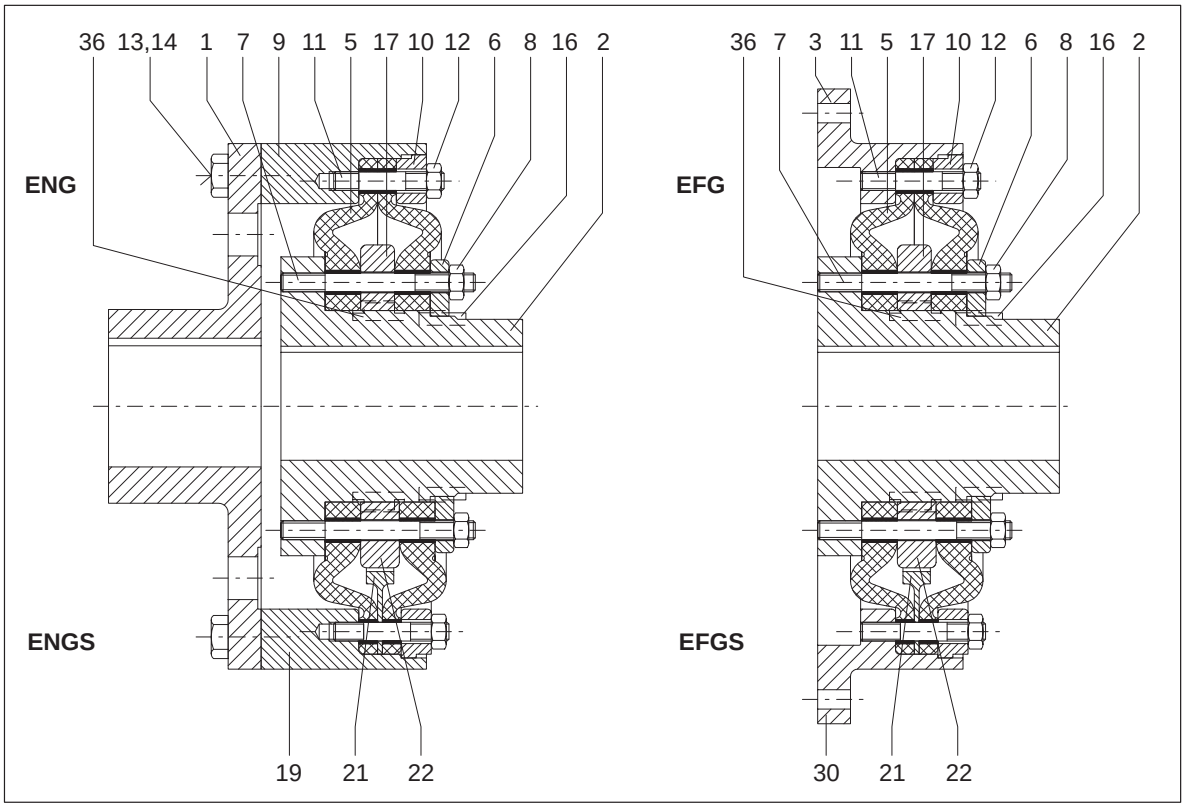
Caution! **The storage areas must not contain any ozone-generating equipment, e.g. fluorescent light sources, mercury vapour lamps, high-voltage electrical equipment. Damp storage areas are unsuitable. Ensure that no condensation occurs. The most favourable atmospheric humidity is below 65 %.**

5. Technical description

5.1 General description

ELPEX couplings are highly elastic, torsional-vibration-insulating couplings.
They are suitable for connecting machines and can compensate for important shaft misalignment. The restorative forces set up are low and can be determined with the specified axial and radial rigidities (see section 1).
Because of the friction connection of the elastic rings (5) in the metal parts the coupling is free of torsional backlash.

5.2 Types ENG / ENGS and EFG / EFGS



On types ENG and ENGS the elastic rings (5) connect part 1 (1) to part 2 (2) via the coupling ring (9/19). Part 1 (1) is flange-mounted to the coupling ring (9/19) with hexagon head screws (14) and centred with two parallel pins (13).

On types EFG and EFGS the elastic rings (5) connect part 3 (3) / part 30 (30) to part 2 (2).

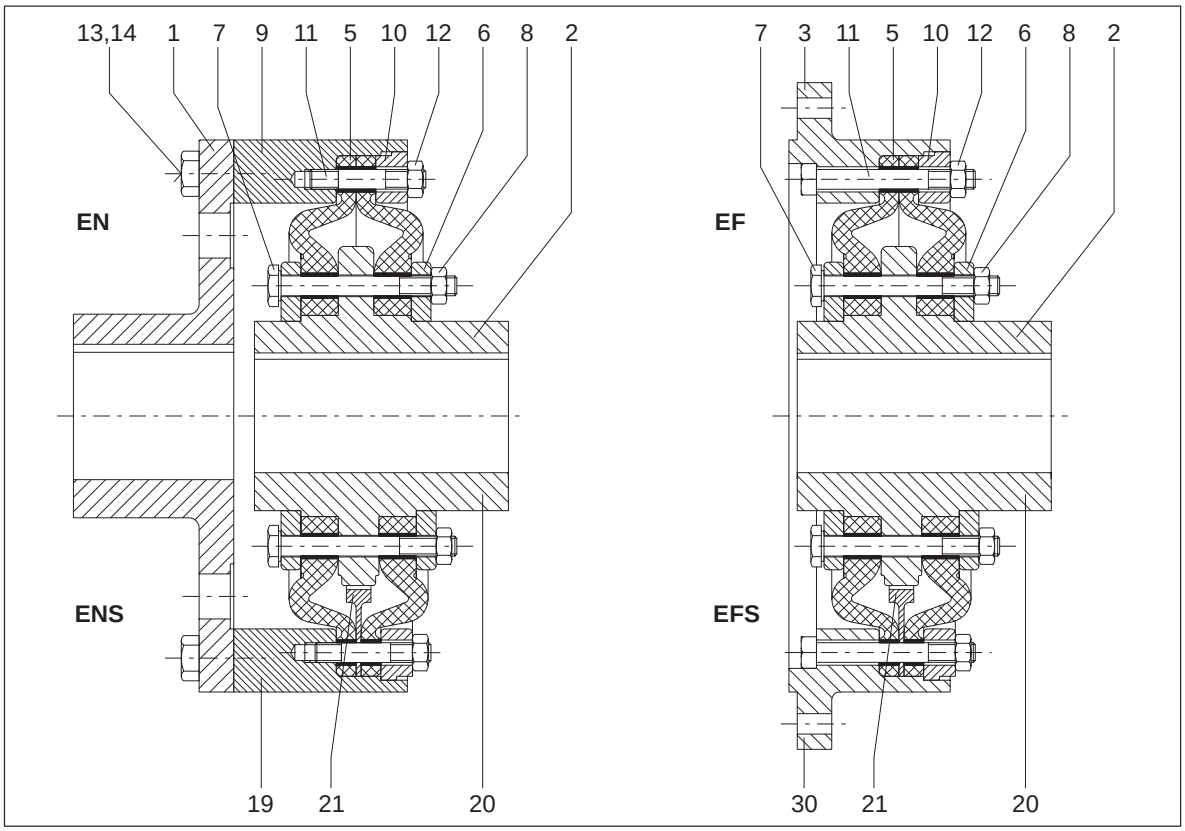
The elastic rings (5) are fastened in the groove in the coupling ring (9/19) / of part 3 (3) / 30 (30) by a retaining ring (10), set screws (11) and nuts (12). Fastening on part 2 (2) is done by clamping between the raised flange of part 2 (2) and the retaining ring (6), using set screws (7) and nuts (8).

The retaining ring (17) / stop ring (22) between the two elastic rings (5) is also in two parts, enabling the fitting and demounting of the split elastic rings (5) to be carried out without moving the coupled machines.

Types ENGS and EFGS are fitted with a fail-safe device. The stop rings (21; 22) are provided with cams engaging in one another which come into contact with one another only if a maximum torque is well exceeded or if the elastic rings (5) are irreparably damaged. This fail-safe device enables emergency operation with a limited torque.

Types ENG and ENGS are also available without part 1 (1) and can be flange-mounted direct (see section 1, item 1).

5.3 Types EN / ENS and EF / EFS



On types EN and ENS the elastic rings (5) connect part 1 (1) to part 2 (2) / 20 (20) via the coupling ring (9/19). Part 1 (1) is flange-mounted to the coupling ring (9 /19) with hexagon head screws (14) and centred with two parallel pins (13).

On types EF and EFS the elastic rings (5) connect part 3 (3) / 30 (30) to part 2 (2) / 20 (20).

The elastic rings (5) are fastened in the groove in the coupling ring (9/19) / of part 3 (3) / 30 (30) by a retaining ring (10), set screws (11) and nuts (12). Fastening on part 2 (2) / 20 (20) is done by clamping between the raised flange of part 2 (2) / 20 (20) and the retaining ring (6), using set screws (7) and nuts (8).

Types ENS and EFS are fitted with a fail-safe device. Part 20 (20) and the stop ring (21) are provided with cams engaging in one another which come into contact with one another only if a maximum torque is well exceeded or the elastic rings (5) are irreparably damaged. This fail-safe device enables emergency operation with a limited torque.

Types EN and ENS are also available without part 1 (1) and can be flange-mounted direct (see section 1, item 1).

5.4 Description of the elastic rings

ELPEX couplings up to size 220 are provided with single-part and from size 270 to size 690 with two-part elastic rings (5). These are arranged with the part surfaces offset by 90° relative to one another. From size 840 up the elastic rings are in four parts (4 x 90°).

The elastic rings (5) are made of natural rubber into which the double-thread inlays for transmitting the torque have been vulcanised. The elastic rings (5) are available in two designs, which differ in the number of double-thread inlays vulcanised in. This enables two different torques to be transmitted per size. This distinction is indicated by -1 or -2 in the size designation.

6. Assembly

6.1 Instructions for applying the finished bore and fitting the axial retaining means, set screws and balancing

6.1.1 Finish bore

ELPEX couplings are supplied with finished bore and with fitted keyway.

6.1.2 Axial fastening

Axial securing of the coupling halves is effected by means of set screws or end plates.

Set screws with cup points to DIN 916 must be used when replacing the set screws.

The length of the set screw must be selected so that it fills the threaded hole, but does not project from the hub.
($L_{min.}$ = set screw diameter x 1.2)

Set screw size	M 5	M 6	M 8	M 10	M 12	M 16	M 20	M 24	M 30
Tightening torque T_A	3	4	8	15	25	70	130	230	470

Table 6.1.2: Tightening torques of the set screws

6.1.3 Balancing

ELPEX coupling are executed to customer specifications or in accordance with half parallel keyway agreement (DIN ISO 8821) with balancing quality G16 (DIN ISO 1940).

6.2 General information on installation

During assembly, the ”Safety Instructions” in Section 3 must be observed.

Assembly and installation work must be done with great care by trained and qualified personnel.

As early as during the planning phase it must be ensured that sufficient space is available for installation and subsequent care and maintenance work.

Adequate lifting equipment must be available before beginning the installation and assembly work.

6.3 Mounting the coupling parts

ELPEX coupling are assembled ready for installation. For fitting the coupling parts with types ENG / ENGS and EN / ENS screws (14) must be undone.

Prior to starting the fitting, the wooden parts for supporting the elastic rings (5) must be removed and the shaft ends as well as the coupling parts thoroughly cleaned.

Note manufacturer’s instructions for handling solvent.

If necessary, heating part 1 (1) (to max. + 150 °C) will facilitate fitting. Part 2 (2) / 20 (20) may only be heated up to a max. temperature of + 80 °C due to the elastic ring (5) screwed on it.

Take precautions to avoid burns from hot components!

Caution!

The coupling parts must be fitted with the aid of suitable equipment to avoid damaging the shaft bearings through axial joining forces.
Always use suitable lifting equipment.

The coupling parts must be fitted completely on the shaft, while the shaft ends must not project from the inner sides of the hub.

Allow coupling parts (1; 2; 20) to cool down to approx. + 30 °C.

Axial securing is effected by means of the set screw or end plate.

Caution! **Tightening the set screws to a tightening torque in accordance with item 6.1.2.**

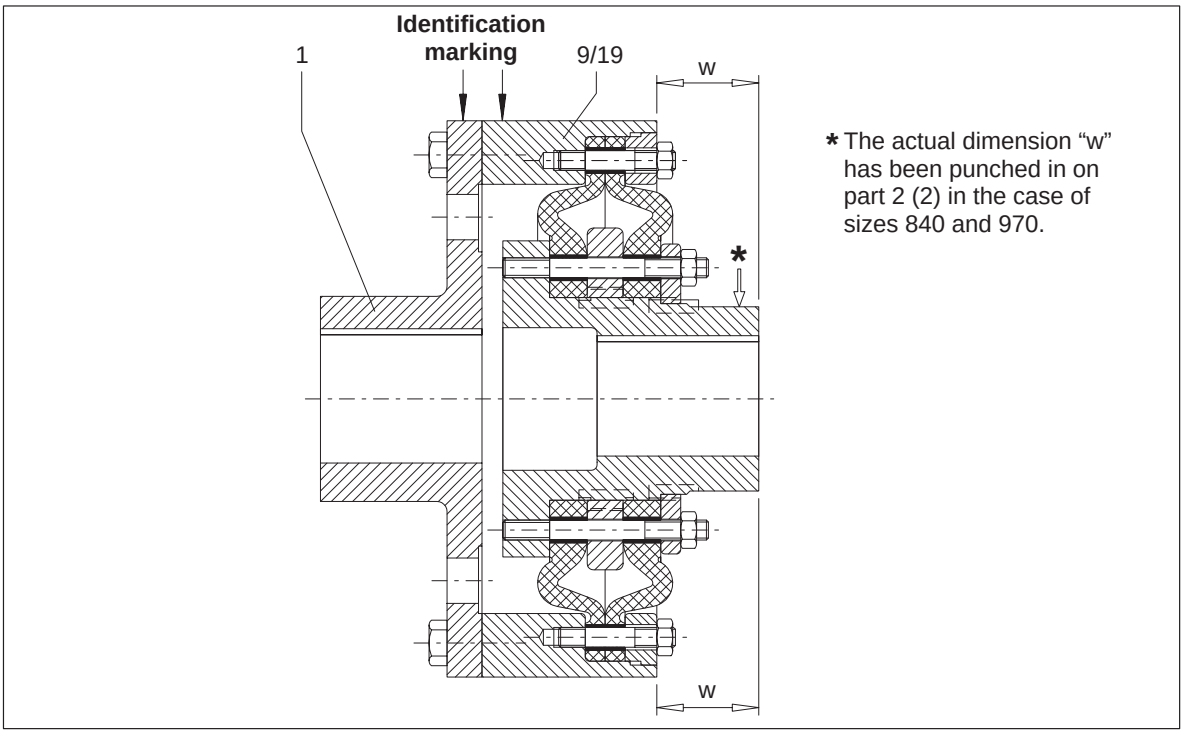
Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments!

Move together the machines to be coupled.

Danger of squeezing!

The axial reference dimension w must be observed (see item 6.4.4).

Caution! **In the case of ENG / ENGS and EN / ENS the markings on the coupl (1) and on the coupling ring (9/19) must be observed.**



Place the screws (14) and tighten slightly. Knock in the parallel pins (13) displaced relative to one another by 180° and tighten the screws (14) (for tightening torque, see item 6.5).

6.4 Alignment

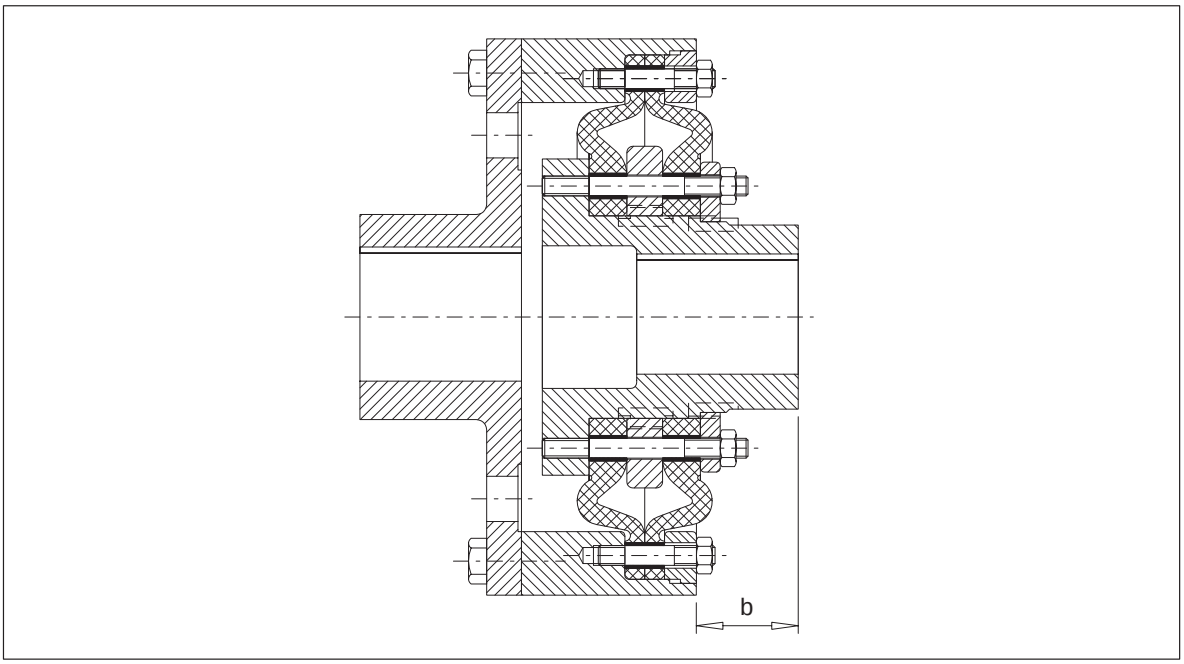
The couplings pick up positional errors in the shaft ends to be connected up to the data shown in item 6.4.4.
When aligning, the radial and angular misalignment of the shaft ends must be kept as small as possible, because, other conditions being equal, this increases the service life of the elastic rings (5).

Alignment is best done in the following order:

1. angular alignment
2. radial alignment
3. axial alignment

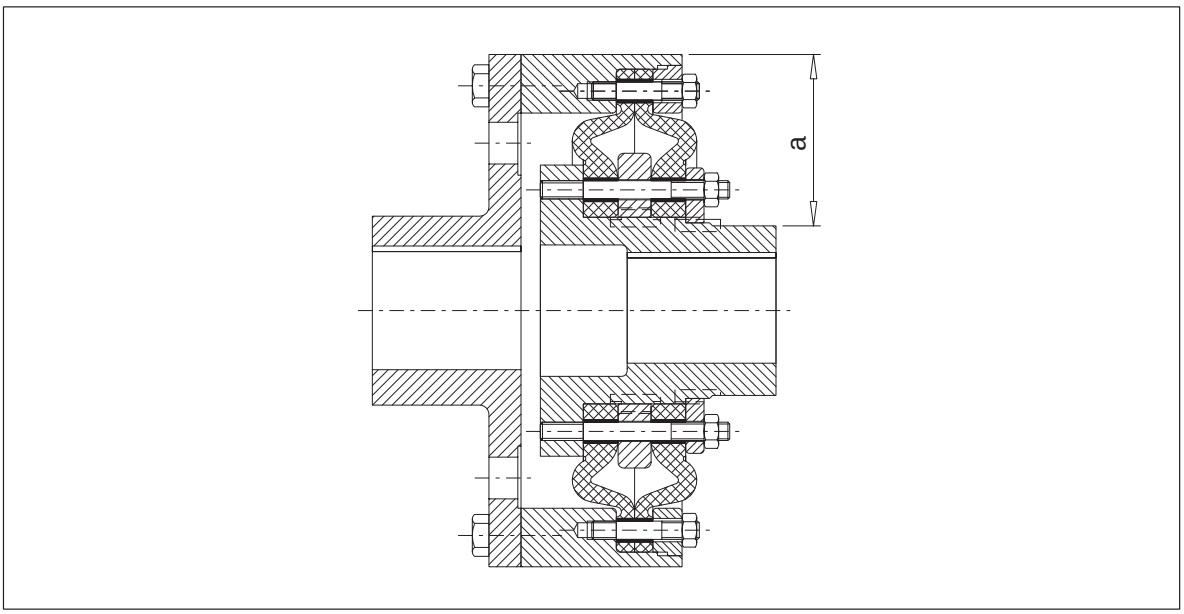
6.4.1 Angular misalignment

- Measuring dimension b (see figure) on several circumferential points.
- Maximum and minimum values b max and b min are to be recorded.
- In accordance with 6.4.4 applies: $\Delta W \geq b_{max} - b_{min}$



6.4.2 Radial misalignment

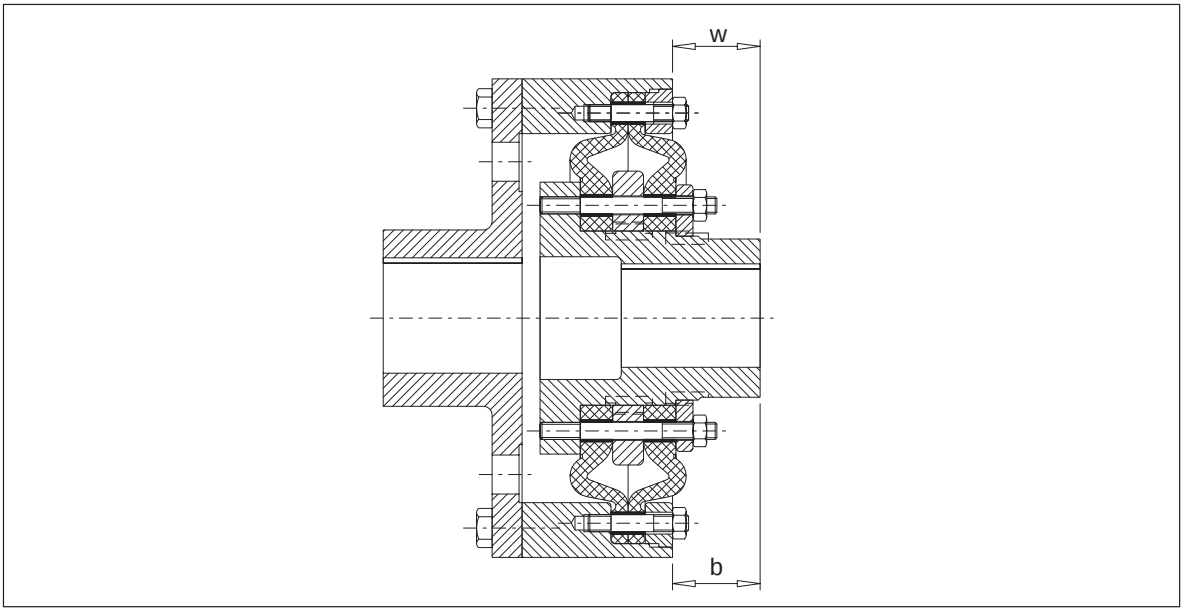
- Measuring dimension a (see figure) on several circumferential points.
- Maximum and minimum values a max and a min are to be recorded.
- In accordance with 6.4.4 applies: $\Delta K_{Rperm} \geq \frac{a_{max} - a_{min}}{2}$



6.4.3 Axial misalignment

- Measuring dimension b (see figure) on several circumferential points.
- Maximum and minimum values b max and b min are to be recorded.
- The following must apply: $w_{min} < b_{min}$ $w_{max} > b_{max}$

$w_{min} = w - \Delta Ka$ and $w_{max} = w + \Delta Ka$ are specified on item 6.4.4.



6.4.4 Permissible shaft misalignment values

Size	max. perm. shaft misalignment									Reference dimension w	
	radial		angular		axial						
						ENG, ENGS, EFG, EFGS		EN, ENS, EF, EFS		ENG, ENGS, EFG, EFGS	EN, ENS, EF, EFS
	ΔKr	$\Delta Kr_{max.}$	ΔKw	ΔW	ΔKa	w_{min}	w_{max}	w_{min}	w_{max}		
	conti-nuous	short-time				w – ΔKa	w + ΔKa	w – ΔKa	w + ΔKa		
	mm	mm	°	mm	mm	mm	mm	mm	mm	mm	mm
140	1.0	2.0	0.2	0.5	1.0	–	–	20.0	22.0	–	21.0
180	1.4	3.0	0.2	0.6	1.4	–	–	29.1	31.9	–	30.5
220	1.8	3.5	0.2	0.7	1.8	–	–	36.2	39.8	–	38.0
270	2.2	4.5	0.2	0.9	2.2	76.8	81.2	42.8	47.2	79.0	45.0
320	2.6	5.0	0.2	1.1	2.6	85.9	91.1	45.9	51.1	88.5	48.5
375	3.0	6.0	0.2	1.3	3.0	100.2	106.2	53.2	59.2	103.2	56.2
430	3.4	7.0	0.2	1.5	3.4	113.6	120.4	58.6	65.4	117.0	62.0
500	3.8	7.5	0.2	1.7	3.8	128.5	136.1	64.5	72.1	132.3	68.3
590	4.2	8.5	0.2	2.0	4.2	153.1	161.5	–	–	157.3	–
690	4.6	9	0.2	2.4	4.6	179.8	189.0	–	–	184.4	–
840	5.0	10	0.2	2.9	5.0	w – 5	w + 5	–	–	*	–
970	5.5	11	0.2	3.4	5.5	w – 5.5	w + 5.5	–	–	*	–

Table 6.4.4: Assignment of the shaft misalignment values

1) e.g. during starting and switch processes

* The actual dimension “w” has been punched in on part 2 (see item 6.3).

6.5 Assignment of tightening torques

Size	Tightening torques T_A		
	Part no. 8 Nm	Part no. 12 Nm	Part no. 13 Nm
140	4.5	4.5	25
180	7.5	7.5	49
220	18	18	49
270	35	18	86
320	35	35	210
375	55	55	210
430	55	55	410
500	130	55	410
590	130	130	710
690	250	130	710
840	250	250	1450
970	435	435	2530

Table 6.5: Assignment of tightening torques

Note: Tightening torques apply to screws with untreated surfaces which are not or only lightly oiled (coefficient of friction $\mu = 0.14$). The use of lubricant paint or the like, which affects the coefficient of friction μ, is not permitted.

Note: The tightening torques of the set screws are specified in item 6.1.2.

7. Start-up

7.1 Procedure before start-up

Before starting up, check the tightness of the set screws, check and, if necessary, adjust the alignment and the distance dimension w, and check the specified tightening torques of all the screw connections (see section 6).

Caution! **Then fit the coupling guard to prevent unintentional contact.**

8. Operation

8.1 General operating data

During operation of the coupling watch for:

– changes in running noise

– sudden shocks

Caution! **If any irregularities are noticed during operation, switch the drive assembly off at once. Determine the cause of the fault, using the table in section 9.**
This table contains a list of possible faults, their causes and suggested remedies.
If the cause cannot be identified or the unit repaired with the facilities available, you are advised to contact one of our customer-service offices for specialist assistance (see section 11.).

9. Faults, causes and remedy

9.1 General

The following irregularities can serve as a guide for fault tracing.

Where the system is a complex one, all the other component units must be included when tracing faults.

The coupling must run with little noise and without vibration in all operating phases. Irregular behaviour must be treated as a fault requiring immediate remedy.

Caution! **FLENDER will not be bound by the terms of the guarantee or otherwise be responsible in cases of improper use of the coupling, modifications carried out without FLENDER's agreement, or use of spare parts not supplied by FLENDER.**

⚠ **When remedying faults and malfunctions, the gear unit must always be taken out of service.**
Secure the drive unit to prevent it from being started up unintentionally.
Attach a warning notice to the start switch!

9.2 Possible faults

Malfunctions	Causes	Remedy
Sudden changes in the noise level and/or sudden vibrations.	Change of alignment.	take the system out of service. if necessary, rectify causes of alignment change (e.g. tighten loose foundation bolts). Check and, if necessary, adjust alignment (see section 6). Wear check, procedure as described in section 10.
	Elastic rings (5) worn.	take the system out of service. Demount coupling and remove remains of elastic rings (5). Check and replace damaged coupling parts Place new elastic rings (5); use associated halves only. Assembly of coupling according to section 6. and section 7.

Table 9.2: Possible faults

9.3 Incorrect use

Experience has shown that the following faults can result in incorrect use of the ELPEX coupling. In addition to observing the other instructions in this BA, care must therefore be taken to avoid these faults.

⚠ **Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments!**

Caution! **Incorrect use of the ELPEX coupling can result in damage to the coupling.**

Caution! **Coupling damage may result in stoppage of the drive and the entire system.**

9.3.1 Possible faults when selecting the coupling or coupling size

- Important information for describing the drive and the environment will not be communicated to others.
- System torque too high.
- System speed too high.
- Application factor not correctly selected.
- Chemically aggressive environment not taken into consideration.
- The ambient temperature is not permissible. See also section 1.
- Finished bore with unpermissible diameter (Section 1).
- The transmission capacity of the shaft-hub connection is not appropriate to the operating conditions.

9.3.2 Possible faults when installing the coupling

- Components with transport or other damage are being fitted.
- When mounting coupling parts in a heated condition, already mounted ELPEX elastic rings (5) are being inadmisisbly heated.
- The shaft diameter is outside the specified tolerance range.
- Coupling parts are being interchanged, i.e. their assignment to the specified shaft is incorrect.
- Prescribed tightening torques are not being adhered to.
- Alignment or shaft misalignment values do not match the operating instructions.
- The coupled machines are not correctly fastened to the foundation, so a shifting of the machines e.g. through loosening of the foundation screw connection is causing excessive displacement of the coupling parts.
- ELPEX elastic rings (5) are not being correctly positioned.
- Operating instructions are being changed without authorisation.

9.3.3 Possible faults in maintenance

- Maintenance intervals are not being adhered to.
- Original FLENDER ELPEX elastic rings (5) are not being used.
- Old or damaged ELPEX elastic rings (5) are being used.
- Elastic ring halves are used, which do not match.
- Leakage in the vicinity of the coupling is not being identified and as a result chemically aggressive media are damaging the coupling.

10. Maintenance and repair

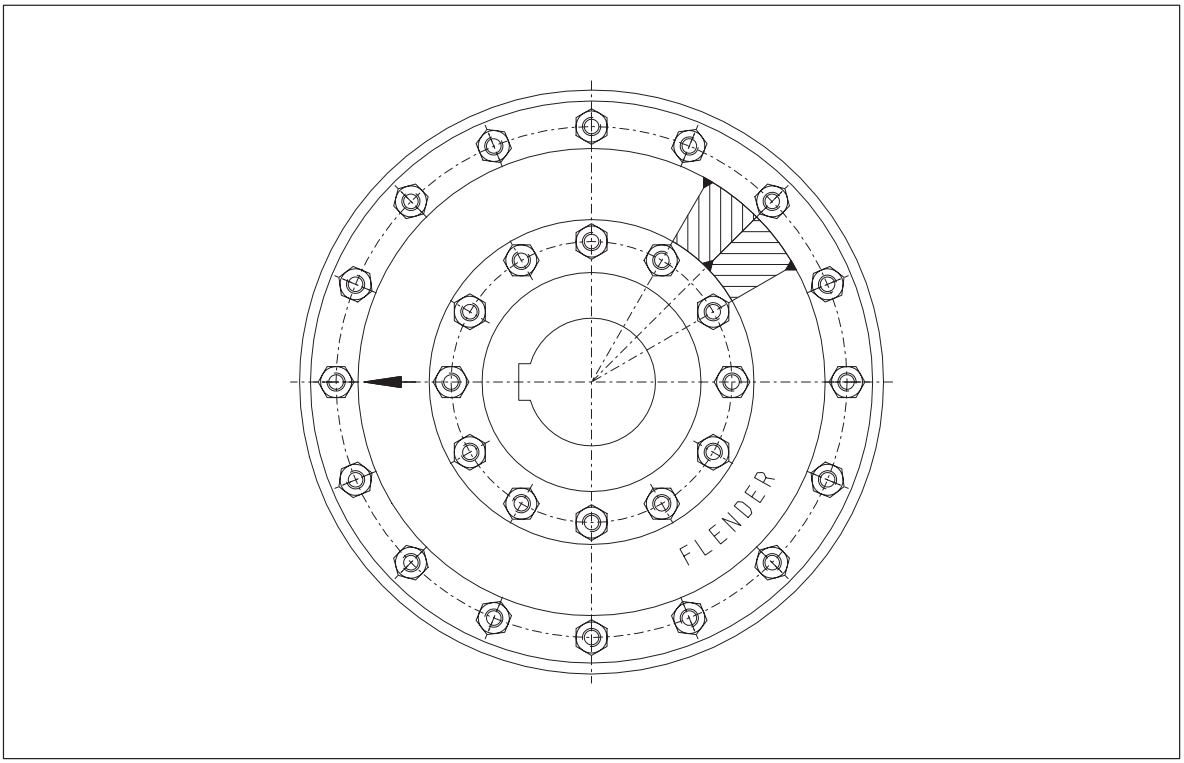
All work on the gear unit must be carried out only when it is at a standstill. The drive unit must be secured against being switched on accidentally (e.g. by locking the key switch or removing the fuses from the power supply). A notice should be attached to the ON switch stating clearly that work is in progress.

10.1 Maintenance

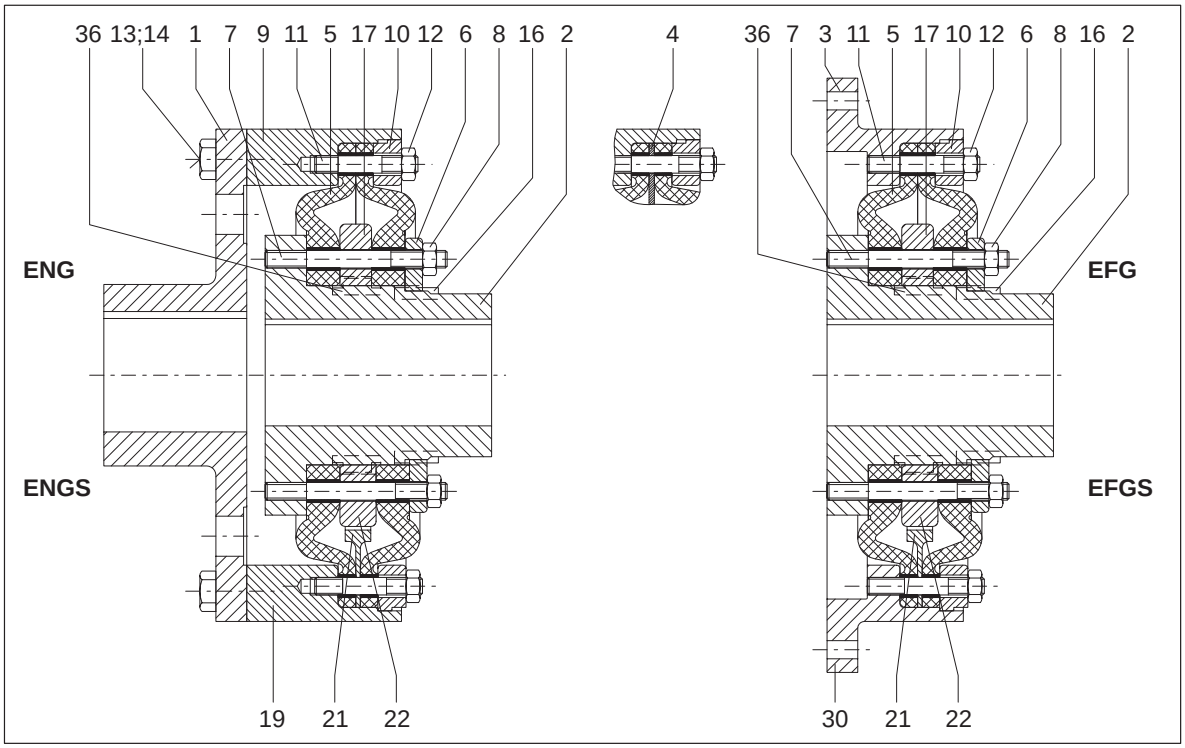
During maintenance of the machine installation in which the ELPEX coupling has been incorporated, the externally situated elastic ring (5) is to be visually inspected. Dismounting is nor necessary to this purpose.

Cracks in the rubber surface do not affect the functionability and service life of the elastic ring (5), as the torque is mostly transmitted by the embedded double-thread inlays.

The functionability of the ELPEX coupling can be checked only by the torsional displacement between the in- and output side. Three triangles have been applied to the elastic ring (5) (see illustration). If the inner triangle is inside the zone enclosed by the two outer triangle,s the coupling is fully functionable. As soon as the inner triangle is to the right or left of this zone, the elastic rings (5) must be replaced.



10.2 Replacement of the elastic rings on types ENG / ENGS and EFG / EFGS



Only **original ELPEX elastic rings** must be used for replacement for the elastic ring (5) in order to guarantee troublefree torque transmission and faultfree operation.

Note: The elastic rings (5) can be replaced without the need of moving the coupled machines.

After removal of the nuts (8; 12) the retaining rings (6; 10) can be removed up to the hub end (if possible even further). Pull back and remove the now exposed elastic ring (5). Remove the two-part retaining ring (17) / two-part stop ring (22). On sizes 840 and 970 of types ENG and EFG remove the adaptor ring (4) and place with the retaining rings (6; 10). On type ENGS pull out the stop ring (21) and place with the retaining rings (6; 10). Remove parallel key (36). Pull back anbd remove the elastic ring (5).

Before reassembly clean the area for mounting the elastic rings (5) and check the parallel pins (7; 11) for firm seating. If necessary, resecure with Loctite (e.g. Loctite Type 242). Clean and degrease screws carefully. Allow grease solvent to evaporate.

Assembly takes place with the new elastic rings (5) in reverse order and by observing the following points.

Caution! **Before fitting the second half of the elastic ring (5) care must be taken that the two arrows marking the hole on the outer fixing point are located one above the other (see item 10.1).**

On types ENGS and EFGS care must be taken that the cams on the outer stop ring (21) are centred precisely between the cams on the inner stop ring (22).

Both on the inner and on the outer fixing point first screw on as far as possible by hand only two of the nuts (8; 12), displaced at 180° relative to each other. Then screw on all the other nuts (8; 12) likewise as far as possible by hand.

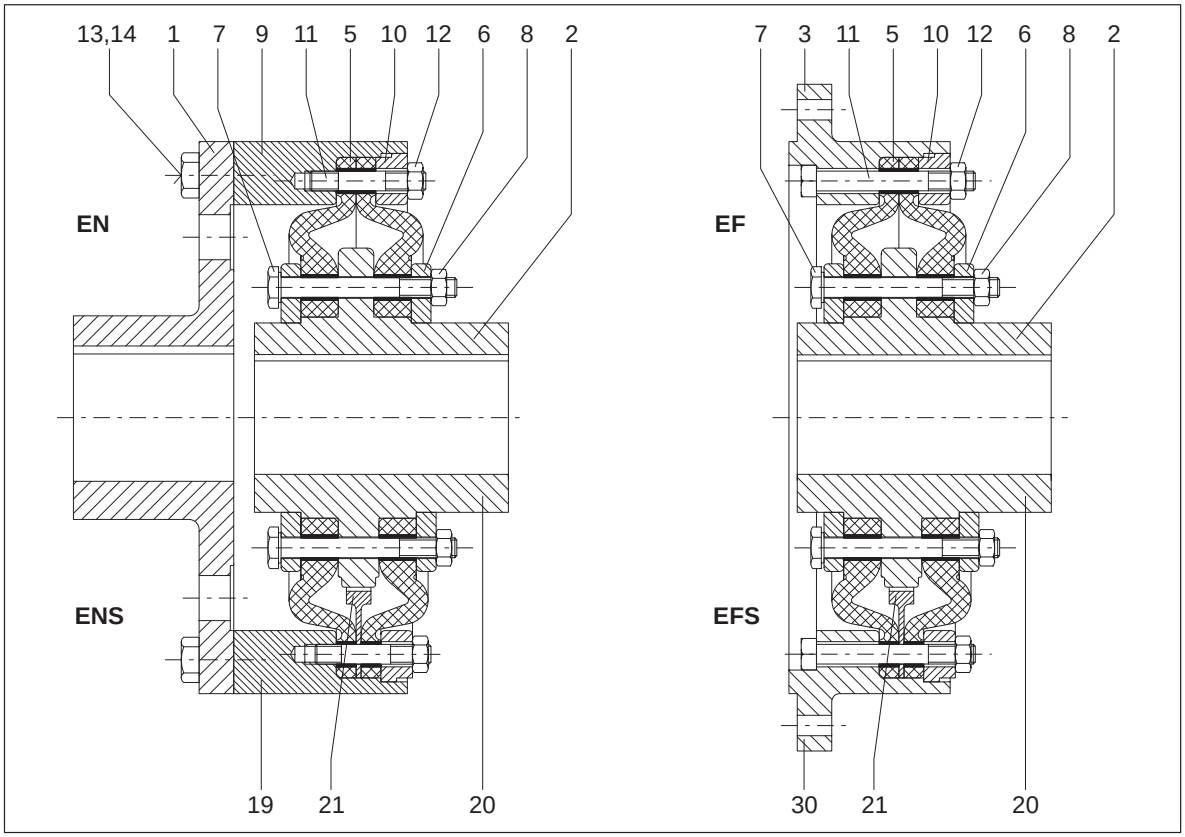
Tighten the nuts (8; 12) in turn (not crosswise) with the spanner. Each individual nut (8; 12) must not be turned further than a quarter-turn.
If the force to be applied is sensibly greater, bring the retaining rings (6; 10) into contact with the offset ring surfaces. Now tighten all the nuts (8; 12) in accordance with the tightening torques (see section 6, item 6.5).

Caution!

After 24 hours the elastic rings (5) will have bedded down. At the end of this time undo one nut (8; 12), apply Loctite 242 at one point on the threaded pin and retighten the nut to the prescribed torque (see section 6, item 6.5).
This operation must be repeated for all nuts (8; 12).

For re-assembly, the instructions in section 6, ”Assembly”, and section 7, ”Start-up”, must be carefully observed.

10.3 Replacement of the elastic rings on types EN / ENS and EF / EFS



Only **original ELPEX elastic rings** must be used for replacement for the elastic ring in order to guarantee troublefree torque transmission and faultfree operation.

Note: The coupled machines must be shifted to enable the elastic rings (5) to be replaced. Up to size 220 part 2 (2)/20 (20) must be pulled off the shaft to enable the single-part elastic rings (5) to be replaced.

After the nuts (12) have been removed, the retaining ring (10) must be located on the shaft and part 2 (2) / 20 (20) pulled out of the coupling ring (9/19) or part 3 (3) / 30 (30).

After the nuts (8) and screws (7) are undone the retaining rings (6) can be removed or located on the shaft. From size 270 up the split elastic rings (5) can be removed. Up to size 220 part 2 (2) / 20 (20) must be removed from the shaft to enable the elastic rings (5) to be replaced.

Before reassembly clean the area for mounting the elastic rings (5). Check the set screws (11) in the coupling ring (9/ 19) for firm seating. If necessary, resecure with Loctite (e.g. Loctite 242). Clean and degrease screws carefully. Allow grease solvent to evaporate.

Assembly begins by scrrewing together the inner fixing point. Pull flexible ring (5) and a retaining ring (6) onto the short side of the hub of coupling part 2 (2) / 20 (20).

On types ENS and EFS lay the outer stop ring (21) on the elastic ring (5). Care must be taken here that the cams of the outer stop ring (21) are centred precisely between the cams of the hub (20).

Then pull the second elastic ring (5) and retaining ring (6) onto the long side of the hub of coupling part 2 (2) / 20 (20).

Caution! **Before fitting the second half of the elastic ring (5) care must be taken that the two arrows marking the hole on the outer fixing point are located one above the other (see item 10.1).**

Insert two screws (7) offset at about 180° relative to one another and screw the nuts on as far as possible by hand. The fit the other screws (7) and screw the nuts (8) on as far as possible by hand. If part 2 (2) / 20 (20) has been pulled off the shaft, it must be remounted in accordance with the instructions in section 6.

On types EF and EFS insert into part 3 (3) / 30 (30) two screws (11) offset by 180° relative to one another.

Lay coupling part 2 (2) / 20 (20) with the attached parts in the corresponding groove in coupling ring (9/19) or part 3 (3) / 30 (30) and insert the retaining ring (10). Screw on as far as possible by hand two nuts (12) offset by 180° relative to one another. On types EF and EFS fit the remaining bolts (11).

Then screw on all the other nuts (12) likewise as far as possible by hand.

Tighten the nuts (8; 12) in turn (not crosswise) with the spanner. Each individual nut must not be turned further than a quarter-turn.
If the force to be applied is sensibly greater, bring the retaining rings (6; 10) into contact with the offset ring surfaces. Now tighten all the nuts (8; 12) in accordance with the tightening torques (see section 6, item 6.5).

Caution! **After 24 hours the elastic rings (5) will have bedded down. At the end of this time undo one nut (8; 12), apply Loctite 242 at one point on the threaded pin and retighten the nut to the prescribed torque (see section 6, item 6.5).**
This operation must be repeated for all nuts (8; 12).

For re-assembly, the instructions in section 6, ”Assembly”, and section 7, ”Start-up”, must be carefully observed.

11. Spare parts, customer-service addresses

By stocking the most important spare and wearing parts on site, you can ensure that the coupling is ready for use at any time.

When ordering spare parts, always state the following:

– Original order no.

– Part no. (see section 11.1.)

– Description / size

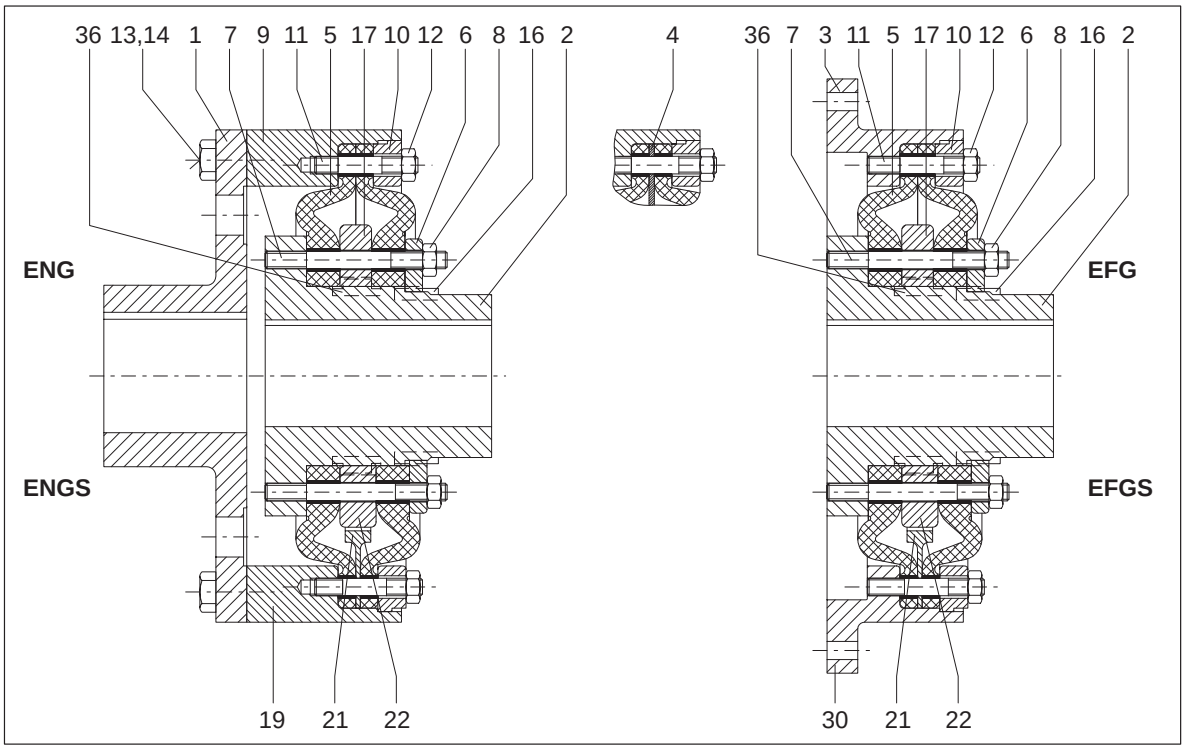
– Quantity

We guarantee only the original spare parts supplied by us.

Caution! **Please note that spare parts and accessories not supplied by us have not been tested or approved by us. The installation or use of such products may therefore impair essential characteristics of the coupling under certain circumstances and so pose an active or passive hazard. FLENDER will assume no liability or guarantee for damage caused by spare parts and accessories not supplied by FLENDER.**

Please note that certain components often have special production and supply specifications and that we supply you with spare parts which comply fully with the current state of technical development as well as current legislation.

11.1 Spare parts list of types ENG, ENGS, EFG, EFGS



Part no.	Description	ENG	ENGS	EFG	EFGS
1	Part 1	x	x		
2	Part 2	x	x	x	x
3	Part 3			x	
4	Adaptor ring 1)	x		x	
5	Elastic ring	x	x	x	x
6	Retaining ring	x	x	x	x
7	Screw stud 2)	x	x	x	x
8	Hexagon nut 2)	x	x	x	x
9	Coupling ring	x			
10	Retaining ring	x	x	x	x
11	Screw stud 3)	x	x	x	x
12	Hexagon nut 3)	x	x	x	x
13	Parallel pin	x	x		
14	Hexagon head screw	x	x		
16	Parallel key	x	x	x	x
17	Split retaining ring	x		x	
19	Coupling ring		x		
21	Stop ring		x		x
22	Split stop ring		x		x
30	Part 30				x
36	Parallel key 4)	x	x	x	x

Table 11.1: Spare parts list

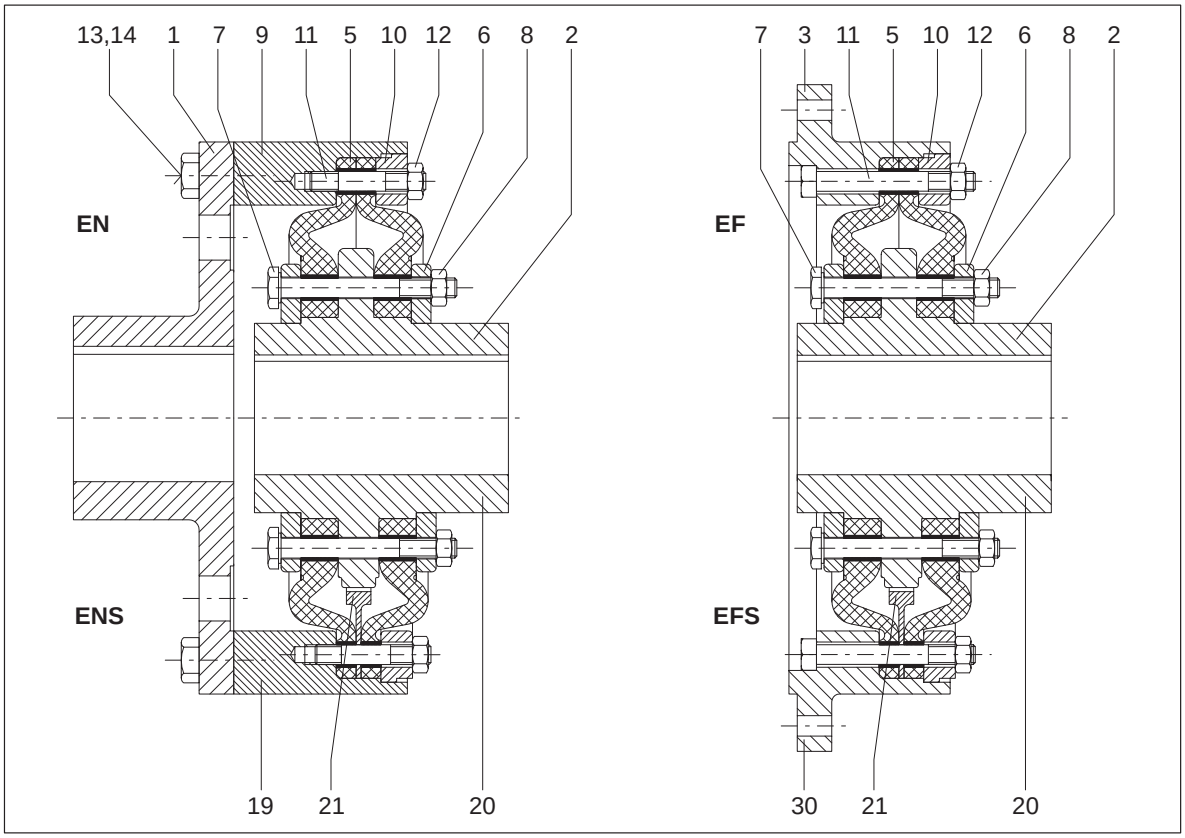
1) availabe only with sizes 840 and 970

2) Instead of screw studs / hexagon nuts, bolts / hexagon screws are used in the case of sizes 840 and 970.

3) Instead of screw studs / hexagon nuts, hexagon screws / cylinder pins are used in case of size 970.

4) available only up to and including size 690

11.2 Spare parts list of types EN, ENS, EF, EFS



Part no.	Description	EN	ENS	EF	EFS
1	Part 1	x	x		
2	Part 2	x		x	
3	Part 3			x	
5	Elastic ring	x	x	x	x
6	Retaining ring	x	x	x	x
7	Hexagon head screw	x	x	x	x
8	Hexagon nut	x	x	x	x
9	Coupling ring	x			
10	Retaining ring	x	x	x	x
11	Screw stud Hexagon head screw	x 1)	x 1)	 x	 x
12	Hexagon nut	x	x	x	x
13	Parallel pin	x	x		
14	Hexagon head screw	x	x		
19	Coupling ring		x		
20	Part 20		x		x
21	Stop ring		x		x
30	Part 30				x

Table 11.2: Spare parts list

1) Instead of the screw studs, cylinder pins are used in case of sizes 140, 180 and 220.

11.3 Spare-part and customer service addresses

When ordering spare parts or requesting the services of our specialist engineers, please apply first to FLENDER AG.

FLENDER Germany

A. FRIEDR. FLENDER AG
46393 Bocholt - Tel.: (0 28 71) 92-0 - Fax: (0 28 71) 92 25 96
E-mail: contact@flender.com • www.flender.com
Shipping address: Alfred - Flender - Strasse 77 - 46395 Bocholt

A. FRIEDR. FLENDER AG - Kupplungswerk Mussum
Industriepark Bocholt - Schlavenhorst 100 - 46395 Bocholt - Tel.: (0 28 71) 92 28 68 - Fax: (0 28 71) 92 25 79
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12. Declaration by the manufacturer

Declaration by the manufacturer

in accordance with EC Engineering Guideline 98/37/EC, Appendix II B

We hereby declare that the

Elastic **ELPEX** Couplings
Types **ENG, ENGS, EFG, EFGS,**
EN, ENS, EF and **EFS**

described in these Operating Instructions are intended for incorporation in a machine, and that it is prohibited to put them into service before verifying that the machine into which they are incorporated complies with the EC Guidelines (original edition 98/37/EC including any subsequent amendments thereto).

This Manufacturer's Declaration takes into account all the unified standards (inasmuch as they apply to our products) published by the European Commission in the Official Journal of the European Community.

Bocholt, 2004-01-05

Signature (person responible for products)