

FLENDER COUPLINGS

FLUDEX

Operating instructions 4601 en
Edition 10/2017

FGO, FGD, FGE, FGM, FVO, FVD, FVE, FVM



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Operating instructions

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Warning note concept

This manual comprises notes which must be observed for your personal safety and for preventing material damage. Notes for your personal safety are marked with a warning triangle or an "Ex" symbol (when applying Directive 2014/34/EU), those only for preventing material damage with a "STOP" sign.



WARNING! Imminent explosion!

The notes indicated by this symbol are given to prevent **explosion damage**. Disregarding these notes may result in serious injury or death.



WARNING! Imminent personal injury!

The notes indicated by this symbol are given to prevent **personal injury**. Disregarding these notes may result in serious injury or death.



WARNING! Imminent damage to the product!

The notes indicated by this symbol are given to prevent **damage to the product**. Disregarding these notes may result in material damage.



NOTE!

The notes indicated by this symbol must be treated as general **operating information**. Disregarding these notes may result in undesirable results or conditions.



WARNING! Hot surfaces!

The notes indicated by this symbol are made to prevent **risk of burns due to hot surfaces** and must always be observed. Disregarding these notes may result in light or serious injury.

Where there is more than one hazard, the warning note for whichever hazard is the most serious is always used. If in a warning note a warning triangle is used to warn of possible personal injury, a warning of material damage may be added to the same warning note.

Qualified personnel

The product/system to which this documentation relates may be handled only by **persons qualified** for the work concerned and in accordance with the documentation relating to the work concerned, particularly the safety and warning notes contained in those documents.

Qualified personnel must be specially trained and have the experience necessary to recognise risks associated with these products and to avoid possible hazards.

Proper use of Flender products

Observe also the following:



Flender products must be used only for the applications provided for in the catalogue and the relevant technical documentation. If products and components of other makes are used, they must be recommended or approved by Flender. The faultfree, safe operation of the products calls for proper transport, proper storage, erection, assembly, installation, start-up, operation and maintenance. The permissible ambient conditions must be adhered to. Notes in the relevant documentations must be observed.

Trade marks

All designations to which the registered industrial property mark ® is appended are registered trademarks of Flender GmbH. Other designations used in this document may be trademarks the use of which by third parties for their own purposes may infringe holders' rights.

Exclusion of liability

We have checked the content of the document for compliance with the hard- and software described. Nevertheless, variances may occur, and so we can offer no warranty for complete agreement. The information given in this document is regularly checked, and any necessary corrections are included in subsequent editions.

Explanation regarding Machinery Directive 2006/42/EC

The couplings described here are "components" in accordance with the Machinery Directive and do not require a declaration of incorporation.

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1. Technical data

1.1 General data

These instructions apply generally to FLUDEX couplings of the "FG." and "FV." series.

1.2 Coupling versions

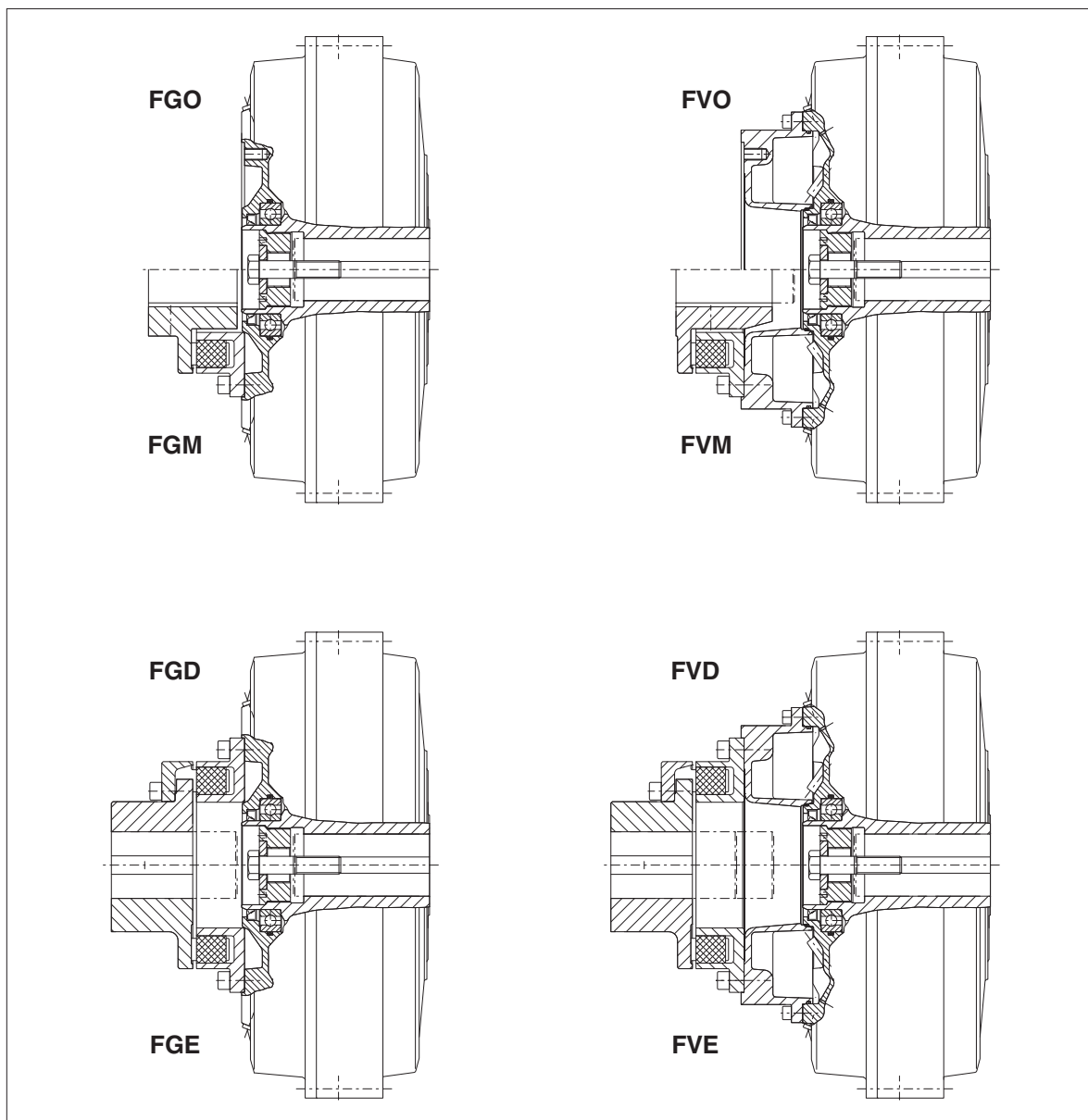


Fig. 1: Coupling types

1.3 Data relating specifically to the coupling

The order-specific data relating to a delivery are, if known in case of an order, listed on the title order-related page. In this case this title page diverges from that published on the Internet. The contents of the operating instructions are, however, in this case identical.

The order number serves as the coupling's ident number. This number appears on the coupling in light raised relief.

2. General notes

2.1 Introduction

These instructions are an integral part of the delivery of the coupling and must be kept in its vicinity for reference at all times.



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. Flender accepts no responsibility for damage or disruption caused by disregard of these instructions.

The "**FLENDER coupling**" described in these instructions has been developed for stationary use in general engineering applications.

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

The coupling has been manufactured in accordance with the state of the art and is delivered in a condition for safe and reliable use. It complies with the requirements in Directive 2014/34/EU.

The coupling must be used and operated strictly in accordance with the conditions laid down in the contract governing performance and supply agreed by Flender and the customer.

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 is held by Flender.

These instructions 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 factory or to one of our customer services:

Flender GmbH
Schlavenhorst 100
46395 Bocholt

Tel.: +49 (0)2871 / 92-0
Fax: +49 (0)2871 / 92-2596

3. Safety instructions



Any changes on the part of the user are not permitted. This applies equally to safety features designed to prevent accidental contact.

3.1 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 and comply with them at all times in order to:
 - avoid injury or damage,
 - ensure the safety and reliability of the coupling,
 - avoid disruptions and environmental damage through incorrect use.
- During transport, assembly, installation, demounting, operation and maintenance of the unit, the relevant safety and environmental regulations must be complied with at all times.
- The housing of the FLUDEX coupling is made of aluminium (AC-Al-Si10Mg). Depending on the individual case, if necessary, further requirements must be taken into account when handling aluminium.
- The coupling may only be operated, maintained and/or repaired by persons qualified for the work concerned (see "Qualified personnel" on page 3 of this manual).
- All work must be carried out with great care and with due regard to safety.
- All work on the coupling 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. This fixture must also offer protection against spurting hot operating fluid without substantially impairing the coupling ventilation. The fusible safety plugs and filling plugs should remain accessible.
- The use of suitable operating fluids (usually oil) is necessary for the operation of the coupling. The instructions for use enclosed by the operating fluid manufacturer must be observed.
- The drive unit must be shut down as soon as changes to the coupling are detected during operation.
- When the coupling is installed 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 prescription, instructions and descriptions in his operating instructions.
- All spare parts must be obtained from Flender.

4. Transport and storage

Observe the instructions in section 3, "Safety instructions"!

4.1 Scope of supply

The products supplied are listed in the dispatch papers. Check 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.

The equipment is delivered ready for operation, depending upon an order with or without fluid filling. Couplings filled with operating medium are marked by a label ("...L, HLP 32 DIN 51524/2, operating oil already put in") in the vicinity of the filling hole. Delivered separately with every coupling is a fusible safety plug (depending on design also a thermal circuit breaker) with sealing rings, a locking plate and a retaining screw, if provided for.



The coupling in design in accordance with the Directive 2014/34/EU is provided with the CE identification mark as described in section 5.

4.2 Transport



When transporting the unit, use only lifting and handling equipment of sufficient load-bearing capacity!



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 packing must be observed at all times. These have the following meanings:

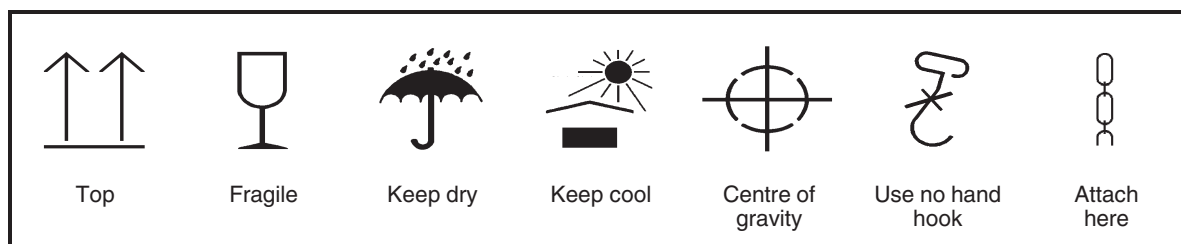


Fig. 2: Transport symbols

4.3 Storage of the coupling

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 storage is provided for a protracted period, the unit should be treated with a long-term preservative agent on all outer surfaces with the exception of the aluminium housing (Flender must be consulted).



Before cleaning the coupling and applying the long-term preservative agent, any flexible elements of the N-EUPEX add-on coupling must be removed. The shaft-sealing rings must not come into contact with solvents.

Correctly stored couplings retain their properties unchanged for up to five years. Unfavourable storage conditions and improper treatment of the flexible elements and/or seals will negatively affect their physical properties. Such negative effects may be caused by e.g. the action of oxygen, ozone, extreme temperatures, light, moisture, or solvents.

4.4 Storage area for a protracted period

The storage area must be dry and free from dust. The couplings must not be stored with chemicals, solvents, motor fuels, acids, etc. Furthermore, the flexible elements and seals should be protected against light, in particular direct sunlight and bright artificial light with a high ultraviolet content.



The storage areas must not contain any ozone-generating equipment, such as 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

Observe the instructions in section 3, "Safety instructions"!

5.1 General description "FG." and "FV." series

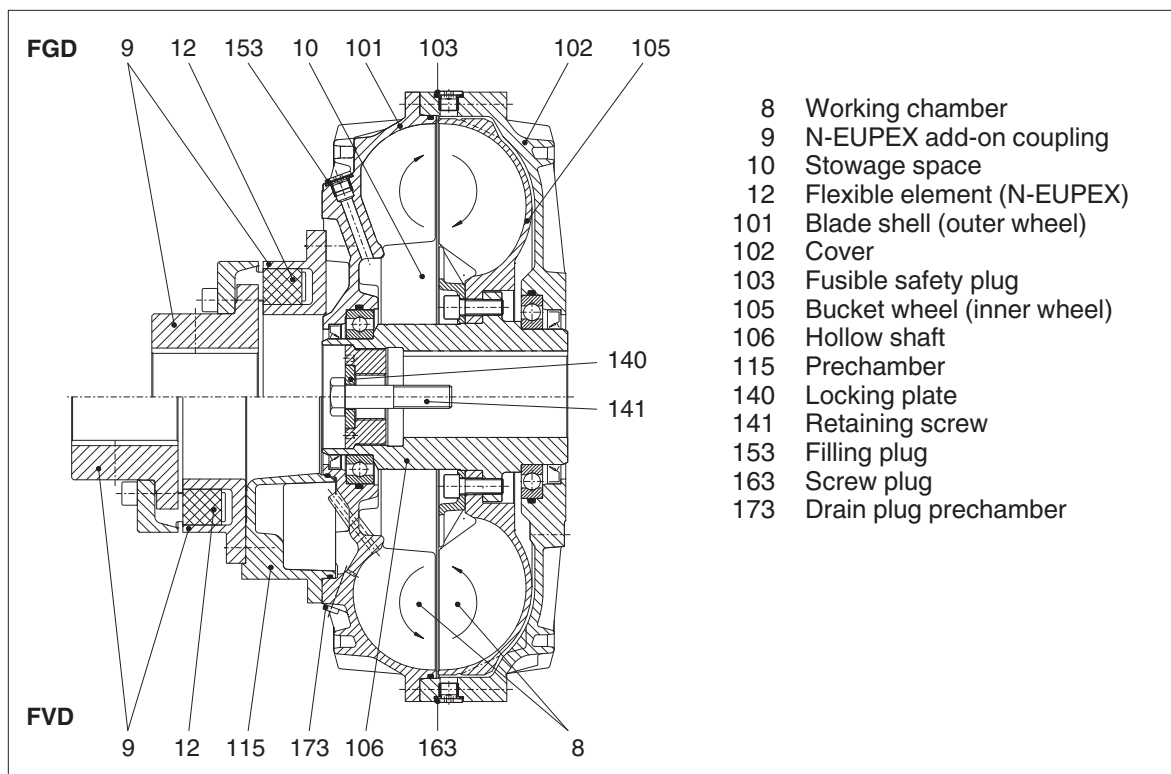


Fig. 3: General description "FG." and "FV." series

The FLUDEX coupling is a hydrodynamic fluid coupling working on the Föttinger principle. The coupling parts on the in- and output side are not connected to one another mechanically. The torque is transmitted by the fluid flowing in the coupling and conducted via radial blades. During continuous operation very low rotary speed slip occurs.

FLUDEX couplings of the "FG." and "FV." series are suitable for both directions of rotation. They can be fitted in a horizontal, angled or vertical position. In case of type FV couplings in a sharply angled or vertical mounting position the prechamber must be located below. The drive should preferably take place via the add-on coupling (9) and the prechamber (115) to the external wheel (blade shell 101) to enable the advantages of the prechamber (115) and the working chamber geometry to be utilised.

If locked or overloaded by the driven machine, the coupling heats up until the fusing temperature of the safety fuse is reached.

When the safety fuse fuses, the operating fluid escapes and the drive motor is disconnected from the driven machine. To prevent the operating fluid spurting out, electronically or mechanically controlled thermal monitoring equipment (see separate operating instructions) can be used.

5.2 Construction of couplings

FLUDEX couplings are made up of a few, robust parts.

The inner rotor includes the hollow shaft (106), on which the bucket wheel (105) is mounted. The outer housing comprises the cover (102) and the blade shell (101), which are connected via a screwed flange connection.

The outer housing and the inner rotor are double-mounted one inside the other and sealed towards the outside by shaft-sealing rings.

As an extension to the FG type (basic coupling), on the FV types (prechamber coupling) a prechamber (115) is added to the blade shell (101). It receives part of the oil filling, when the coupling is stationary, and so reduces the effective amount of oil in the working chamber (8) when starting. Thus the starting torque is considerably reduced.

While the coupling is rotating, the oil in the prechamber flows back into the working chamber through small holes time-dependently, so that in continuous operation the entire filling is effective.

For filling the coupling, two filling plugs (153) are located in filling channels offset by 180° (to prevent overfilling) in the blade shell (101). For this, two further holes, offset (approx. 60°) at the periphery, are provided in the cover (102) on the outside diameter of the coupling. In case of sizes 297 to 755 a fusible safety plug (103) and a screw plug (163) are fitted in these holes. In case of size 887 screw plugs (163) are located in both holes, the fusible safety plugs (2 x 103) are located next to the flange in the blade shell (101). The screw plugs (163) serve for ventilation during filling and for checking the oil level and draining off the operating fluid.

In the standard design the fusing temperature of the fusible safety screw is 140 °C, and the material used for the seals is Perbunan (for a maximum continuous operating temperature of 85 °C). As an extended standard (for continuous operating temperatures of up to 110 °C and/or synthetic oil), the coupling can be fitted with seals made of Viton. In this case a fusible safety plug with a fusing temperature of 160 °C is used in the coupling.



Couplings to be used in potentially explosive areas are designed with the fusible safety plugs (103) permitted for the temperature class.

The fusing temperature of the fusible safety plugs is stamped on their end faces, the **140 °C plugs also being marked red**, the **160 °C plugs green**.

For applications where frequent faults or locking of the drive may occur it is recommended that a thermal monitoring system be provided. This will prevent the operating fluid from escaping and being lost and the environment from being polluted and endangered. The transmitter (EOC system) or the thermal circuit breaker (mechanical switching equipment) is screwed into the outer circumference in place of the screw plug (163). The fusible safety plug (103) remains in the coupling as an emergency safety device.

A thermal circuit breaker with a fusing temperature of 110 °C can be used on a coupling with Perbunan seals and a 140 °C fusible safety plug.

A thermal circuit breaker with a fusing temperature of 140 °C can be used on a coupling with Viton seals and a 160 °C fusible safety plug.

A 160 °C fusible safety plug can be used with an EOC system (transmitter release temperature of 125 °C), including with Perbunan seals.

The types **FGO** and **FVO** include only the components of the fluid coupling (without attachment) and incorporate a connection flange point on the output side. The types **FGD/FGE/FGM/FVD/FVE/FVM** are couplings with N-EUPEX coupling added-on on the input side for connecting two shafts.

In the flexible N-EUPEX add-on coupling the H-shaped Perbunan flexible elements are delivered in a standard Shore hardness of 80.



Coupling with worn flexible elements (12) (for wear mark ΔS_v , see section 10) must not be operated in potentially explosive areas.

5.3 Marking the coupling parts for explosion protection



Couplings which are intended for use in potentially explosive areas must bear the following marking:

Flender GmbH



II 2G c b IIB T3 $-30\text{ °C} \leq T_a \leq +50\text{ °C}$

46393 Bocholt - Germany





II 2D c b T 160 °C $-30\text{ °C} \leq T_a \leq +50\text{ °C}$

FLENDER couplings FLUDEX <year built>



I M2 c b $-30\text{ °C} \leq T_a \leq +50\text{ °C}$

Marking of the fusible safety plug: 

The N-EUPEX add-on coupling must have  stamped on the hub parts.

5.4 Conditions of use for FLUDEX couplings in potentially explosive areas

The coupling with fusible safety plug with marking  is suited for the service conditions specified in Directive 2014/34/EU:

- Equipment group II (use above ground) temperature class T3 of category 2 and 3 for areas where there are explosible gas, vapour, mist, air mixtures as well as for areas where dust can form explosible atmospheres.
- Equipment group I (underground applications) of the category M2



If it is to be used below ground in potentially explosive areas, the coupling, which is made of aluminium, must be provided with a robust casing to preclude the risk of ignition from e.g. friction, impact or friction sparks. The depositing of heavy metal oxides (rust) on the coupling housing must be precluded by the casing or other suitable precautions.

6. Fitting

Observe the instructions in section 3, "Safety instructions"!

The FLUDEX coupling is delivered exclusively with a finish-bored and grooved hollow shaft (106).

At the customer's express request Flender also delivers unbored or prebored coupling parts for the N-EUPEX add-on coupling.

The necessary refinishing must be carried out in strict compliance with the following specifications and with particular care!



Responsibility for carrying out the refinishing is borne by the customer. Flender will accept no guarantee claims arising from unsatisfactory refinishing!



Couplings with CE marking for use in potentially explosive areas are delivered exclusively with finish-bored hubs.


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

6.1.1 Finished bore

- Remove preservative agent from coupling parts.



Observe manufacturer's instructions for handling solvent.

When machining the finished bore the parts must be carefully aligned. For the permissible radial and axial runout errors and the permissible cylindricity tolerances, see DIN ISO 286. The parts must be fitted on the marked faces ().



In case of part 2/3, part 4 and part 9 great caution is necessary owing to the rotating cams.



The maximum permissible bore diameters (see table 1) are designed for drive-type fastenings without taper action to DIN 6885/1 and must not under any circumstances be exceeded. The finish-machined bores must be 100 % checked with suitable measuring equipment.

If other shaft-hub connections (e.g. taper or stepped bore) are to be used instead of the flanged sleeve connections provided, Flender must be consulted.
Drive-type fastenings with taper action are not permissible.

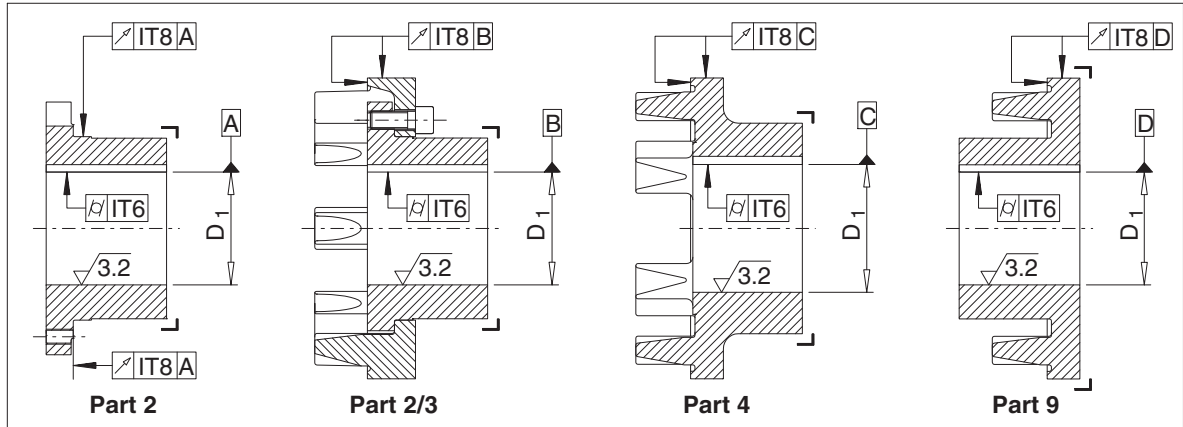


Fig. 4: Finished bore

Table 1: Maximum bores of the N-EUPEX add-on coupling

FLUDEX Size	N-EUPEX Size	Maximum bore D_1		
		Part 2 Part 2/3	Part 4	Part 9
297	125	45	55	
342	140	50	60	
370	180	65	75	70
425	225	85	90	85
490	250	95	100	90
565	280	105	110	100
655	350	140		140
755	400	150		150
887	440	160		

For drive by means of parallel keys the following fit pairs are prescribed for the bores:

Table 2: Fit pairs

Selection of fit	Bore D ₁		Shaft tolerances	Bore tolerances
	> mm	up to mm		
Shaft tolerance to FLENDER standard		25	k6	H7
	25	100	m6	
	100		n6	
Shaft tolerance to DIN 748/1		50	k6	H7
	50		m6	
System "standard shaft"		50	h6	K7
	50			M7
		all	h8	N7



The assigned fits must be adhered to in order, on the one hand, to keep the play in the shaft-hub connection as low as possible, depending on utilisation of the tolerance zones, or, on the other, to keep the hub tension arising from the oversize within the permissible load limit. Failure to adhere to the fits may impair the shaft-hub connection.

If the tolerance values of the shafts deviate from those in table 2, Flender must be consulted.



Failure to observe these instructions may result in breakage of the coupling.

Danger from flying fragments!

The coupling then becomes an explosion hazard.

6.1.2 Parallel keyway

The parallel keyways must be designed in accordance with standard DIN 6885/1. If the keyway geometry deviates, Flender must be consulted. Taper keys or nose keys (gib headed keys) are not permissible.

The parallel keyways must be designed to suit the available parallel keys. For parallel keyways the tolerance zone of the hub keyway width **ISO JS9** must be adhered to.



The parallel keyway must be machined as shown in the illustration.

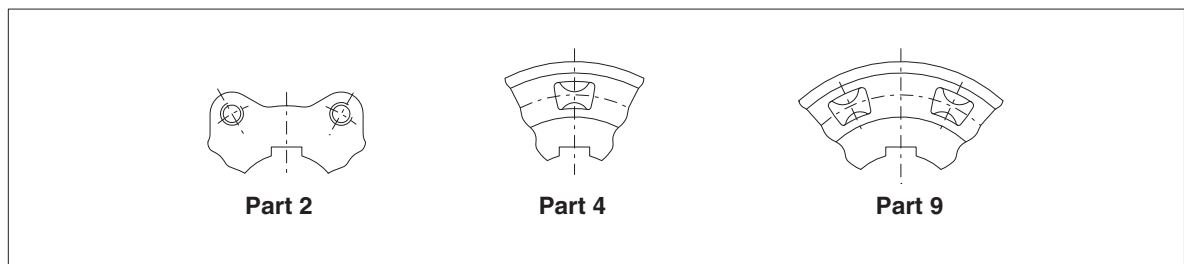


Fig. 5: Parallel keyway

6.1.3 Axial fastening

The hollow shaft (106) of the FLUDEX coupling is secured axially with a locking plate (140) and retaining screw (141) (included in delivery) (for tightening torques, see table 3).

Table 3: Tightening torques of the retaining screws

Retaining-screw thread	M6	M8	M10	M12	M16	M20	M24	M30
Tightening torque [Nm]	10	25	49	86	160	300	500	800

A set screw or end plate must be provided to secure the N-EUPEX add-on coupling axially. If end plates are used, Flender must be consulted with regard to machining the recesses in the coupling parts.

6.1.4 Set screws

Hexagon socket set screws with cup points to DIN 916 must be used for set screws.

The following guidelines must be observed!



The length of the set screw must be selected so that it fills the threaded hole, but does not project from the hub ($L_{min.} = d_1 \times 1.2$).

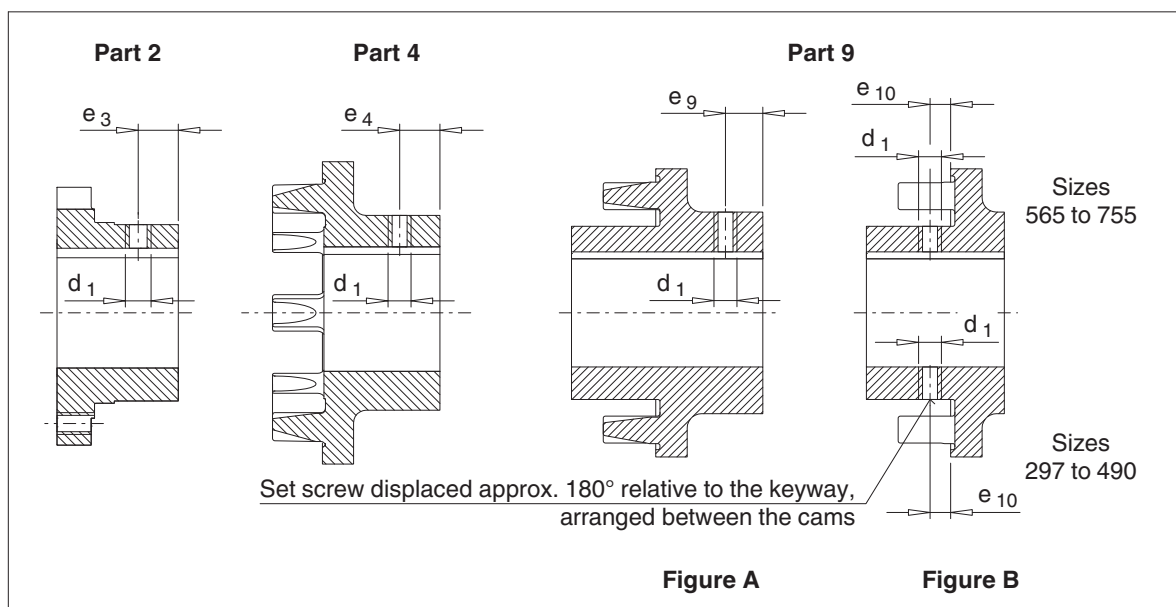


Fig. 6: Set screws

Table 4: Set-screw assignment and tightening torques of the set screws

FLUDEX size	N-EUPEX size	d_1	e_3	e_4	e_9	e_{10}	Tightening torque of the set screw [Nm]
297	125	M8	12	20		12	8
342	140	M8	15	22		15	8
370	180	M12	30	32	20	15	25
425	225	M12	35	40	25	20	25
490	250	M16	40	45	25	20	70
565	280	M16	45	45	25	25	70
655	350	M20	60			30	130
755	400	M20	70			30	130
887	440	M24	80				230



The set screws must always be positioned on the keyway. An exception are the following coupling parts:

Part 9: Sizes 297 to 490 acc. to fig. B: Set screw displaced approx. 180° relative to the keyway, arranged between the cams.

6.1.5 Balancing

FLUDEX couplings are delivered balanced.

Prebored N-EUPEX add-on couplings are delivered unbalanced. It is recommended that these parts are balanced to suit the application after finish-boring (see DIN ISO 1940 and DIN 740/2), but to minimum balancing quality G16.

Balancing is normally done by drilling material away.



On part 4 and part 9 the material must be removed from the end face between the cams. Sufficient space must be left between the balancing hole and the cam to avoid weakening the cam connection.

Since the coupling part 3, the cam part, is always in a balanced condition, the coupling part 2 can be balanced individually or together with the fitted part 3.

Finish-bored couplings and/or coupling parts are balanced according to the customer's specifications.

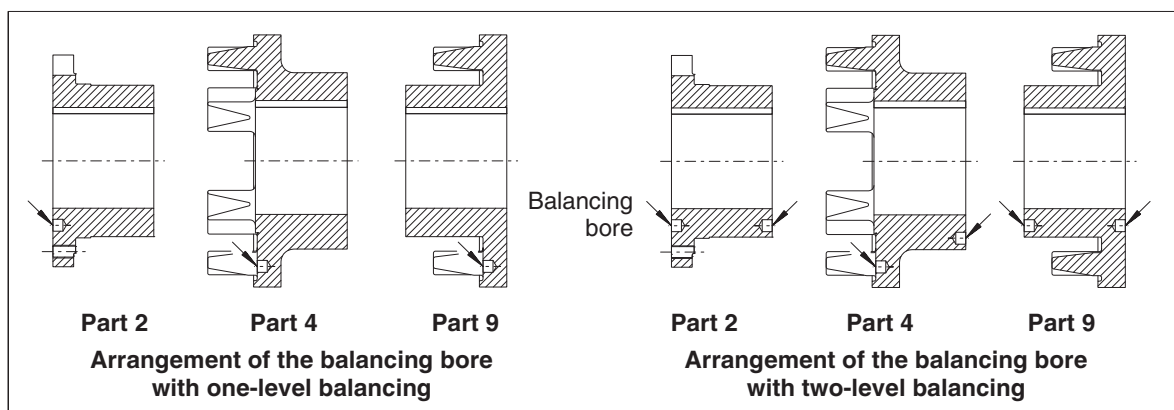


Fig. 7: Balancing

6.2 General information on fitting

During fitting, the "Safety Instructions" in section 3 must be observed.

Fitting 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 fitting work.



If coated couplings are used in potentially explosive areas, the requirements made of the conductivity of the coating and the limitation on the thickness of the coat applied must be observed in accordance with EN 13463-1. Where coatings have a thickness less than 200 µm, no electrostatic charge is to be expected. Where coatings are thicker than 200 µm, an electrostatic charge of the coupling must be avoided.

6.3 Mounting the coupling parts

Before beginning installation, the shaft ends, the flange surfaces, and the coupling parts must be carefully cleaned and the shaft ends rubbed with a lubricant. Before cleaning the N-EUPEX coupling parts with solvent the flexible elements must be removed.



Observe manufacturer's instructions for handling solvent.



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 FLUDEX coupling must be pulled on by means of a locking plate (140) and a spindle, as shown in the figure. The coupling must be pulled on until it rests against the shaft shoulder.



Under no circumstances must fitting forces be applied through the coupling housing.

After being pulled on the FLUDEX coupling must be secured axially by means of a locking plate (140) and a retaining screw (141) (see item 6.1.3).

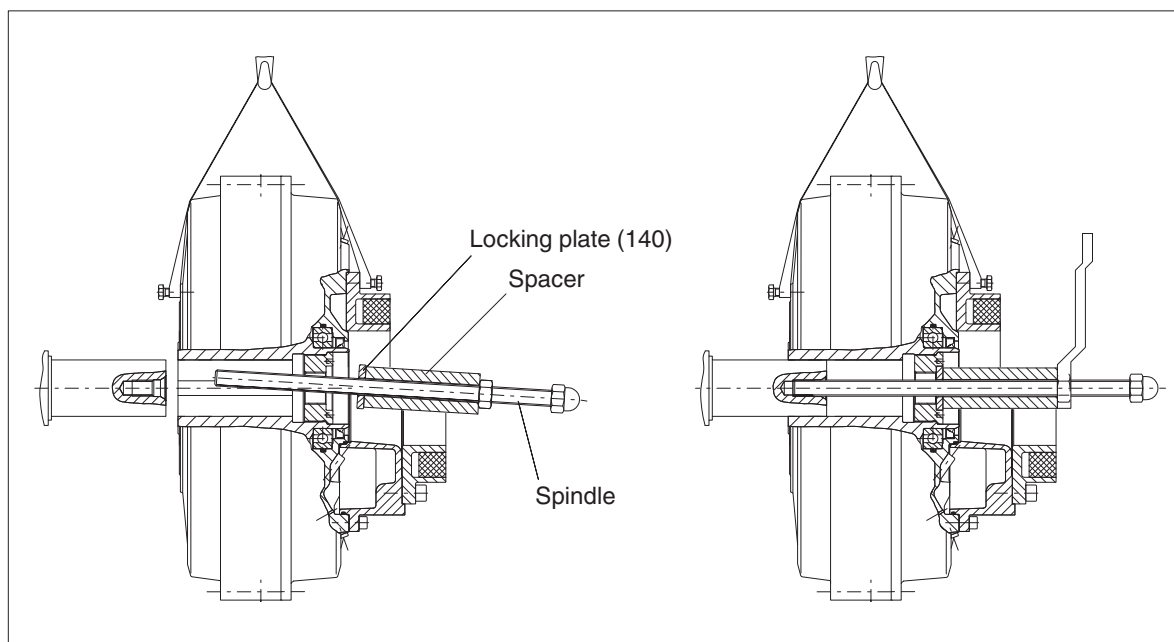


Fig. 8: Mounting the coupling parts

If necessary, heating the N-EUPEX coupling hubs (to maximum + 150 °C) may facilitate fitting. With temperatures over + 80 °C the flexible elements must be removed from the coupling part 1 before heating. Before fitting coupling part 2 the part 3 must be fitted on the shaft.



Take precautions to avoid burns from hot parts!

The N-EUPEX add-on coupling must be fitted using the entire length of the bore or until it comes into contact with the shaft shoulder. Axial securing is effected by means of the set screw or end plate.



Tightening the set screws to the tightening torque specified in item 6.1.4.



Failure to observe these instructions may result in breakage of the coupling.

Danger from flying fragments!

The coupling then becomes an explosion hazard.

Remount the removed flexible elements. It must be ensured that the flexible elements are absolutely of identical size and have identical markings. The coupling parts must be only at a maximum temperature of + 80 °C.

Move together the machines to be coupled.



Danger of squeezing!

Dimension "S" must be adhered to. The tightening torques of the bolted connections of part 2/3 is to be checked (for tightening torques and distance dimension "S" see item 6.6 and section 1).



If the FLUDEX coupling is screwed to components which conduct axial forces or bending moments into the coupling, Flender must be consulted.

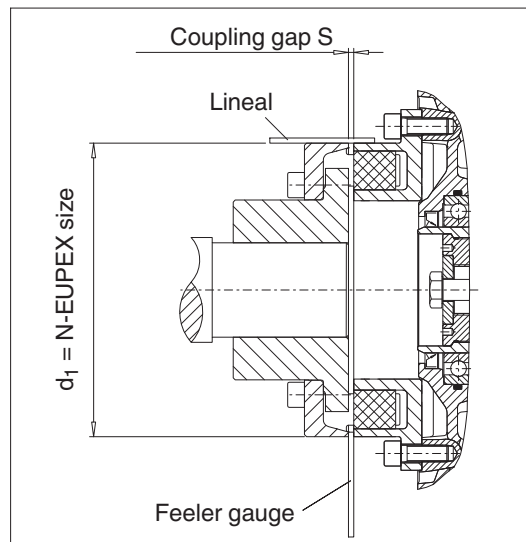
6.4 Alignment

FLUDEX couplings in combination with the flexible N-EUPEX add-on coupling absorb positional deviations of the shaft ends to be connected up to the values shown in item 6.5.

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 flexible elements.

The alignment must be checked once more with the foundation bolts of the motor and gear unit/driven machine tightened.

Any shaft misalignment through heating during operation must be taken into account as far as possible.



6.5 Possible misalignments

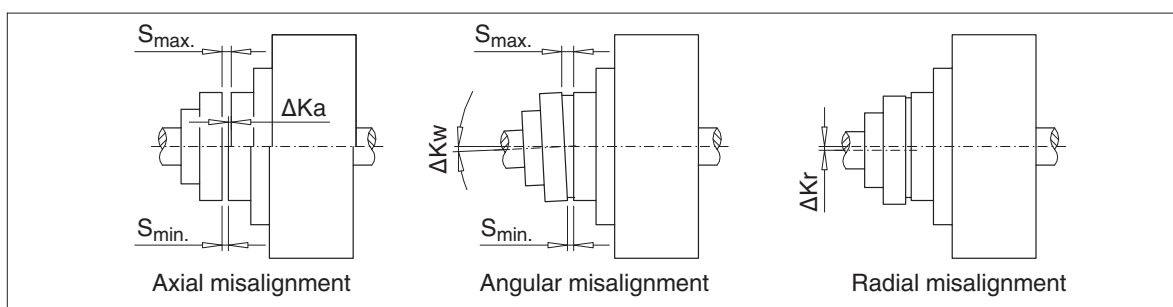


Fig. 9: Possible misalignments

Misalignments of the coupling parts in relation to each other can be caused by inaccurate alignment during assembly, but also by actual operation of the equipment (expansion due to heat, shaft deflection, insufficiently rigid machine frames, etc.).



The following maximum permissible misalignments must by no means be exceeded during operation.

6.5.1 Axial misalignment

Axial misalignment ΔK_a (Fig. 9) of the coupling parts relative to one another is possible within the "permissible deviation" for dimension "S" (see order-related title page).

6.5.2 Angular misalignment

The angular misalignment ΔK_w (Fig. 9) can usefully be measured as the difference in the gap dimension "S" ($\Delta S = S_{\max.} - S_{\min.}$). For the permissible values for the difference in the gap dimension, refer to item 6.5.4.

If required, the permissible angular misalignment ΔK_w can be calculated as follows:

$$\Delta K_{w \text{ perm.}} \text{ in rad} = \frac{\Delta S_{\text{perm.}}}{d_1} \quad \Delta S_{\text{perm.}} \text{ see item 6.5.4.}$$

$$\Delta K_{w \text{ perm.}} \text{ in degree} = \frac{180}{\pi} \times \frac{\Delta S_{\text{perm.}}}{d_1} \quad d_1 \text{ corresponds to N-EUPEX size in mm}$$

6.5.3 Radial misalignment

For the permissible radial misalignment $\Delta K_{r \text{ perm.}}$ (Fig. 9) – depending on the operating speed –, refer to item 6.5.4.

6.5.4 Permissible shaft-misalignment values for radial misalignment $\Delta K_{r_{perm}}$ and difference in gap dimension ΔS_{perm} .

Values given in mm, rounded off

Table 5: Permissible shaft-misalignment values for radial misalignment $\Delta K_{r_{perm}}$ and difference in gap dimension ΔS_{perm} .

FLUDEX size	N-EUPEX size	Coupling speed in 1/min								
		250	500	750	1000	1500	2000	3000	4000	5000
297	125	0.5	0.4	0.3	0.25	0.25	0.2	0.15	0.15	0.1
342	140	0.6	0.4	0.35	0.3	0.25	0.2	0.2	0.15	
370	180	0.6	0.5	0.4	0.35	0.3	0.25	0.2		
425	225	0.8	0.55	0.5	0.4	0.35	0.3	0.25		
490	250	0.8	0.6	0.5	0.4	0.35	0.3			
565	280	1	0.7	0.6	0.5	0.4	0.35			
655	350	1	0.8	0.6	0.6	0.5				
755	400	1.2	0.9	0.7	0.6	0.5				

The numerical values of the table can be calculated as follows:

$$\Delta K_{r_{perm}} = \Delta S_{perm} = \left(0.1 + \frac{d_1}{1000}\right) \times \frac{40}{\sqrt{n}}$$

Coupling speed n in 1/min
 d_1 corresponds to N-EUPEX size in mm
 Radial misalignment $\Delta K_{r_{perm}}$ in mm



Angular and radial misalignment may occur simultaneously.

6.6 Assignment of tightening torques

Table 6: Assignment of tightening torques (for part nos. refer to section 11)

FLUDEX size	N-EUPEX size	Tightening torque T_A and wrench width SW for screws															
		Part no.															
		13		103		110/142/163		121		130/131		139		153		173	
		T_A	SW	T_A	SW	T_A	SW	T_A	SW	T_A	SW	T_A	SW	T_A	SW	T_A	SW
		Nm	mm	Nm	mm	Nm	mm	Nm	mm	Nm	mm	Nm	mm	Nm	mm	Nm	mm
297	125	17.5	6	60	10	75	19/27/10	18.7	6	8	10			25	7		
342	140	29	8	60	10	75	19/27/10	31	8	21	13			75	10		
370	180	44	8	60	10	75	19/27/10	31	8	21	13	31	8	75	10	25	7
425	225	86	10	60	10	75	19/27/10	54	10	21	13	31	8	75	10	25	7
490	250	145	14	60	10	75	19/27/10	135	14	40	17	54	10	75	10	25	7
565	280	185	14	60	10	75	19/27/10	135	14	40	17	54	10	75	10	25	7
655	350	260	17	60	10	75	19/27/10	260	17	73	19	135	14	75	10	25	7
755	400	340	17	60	10	75	19/27/10	260	17	73	19	135	14	75	10	135	14
887	440	410	17	60	10	75	19/27/10	260	17	120	24	135	14	300	17	135	14



Tightening torques apply to bolts 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.



The tightening torques of the set screws are specified in item 6.1.4.

7. Start-up

Observe the instructions in section 3, "Safety instructions"!

7.1 Procedure before start-up

Before starting up check the flexible elements for correct seating, i.e. the flexible elements must sit flush with the end face of the hub, and the set screws for tightness, check and, if necessary, adjust the alignment and the gap dimension "S" and check all screw connections for the specified tightening torques (see section 1 and section 6).

7.2 Fluid filling



Only specifically permitted operating fluids may be used for operation below ground.

The behaviour and the efficiency of the FLUDEX coupling is decisively affected by the quantity of operating fluid put in. As the filling increases, so does the transmitting capacity of the coupling, and the motor load during starting and the maximum overload torque on the coupling rises. Operating slip decreases with the identical load.



FLUDEX couplings must not be filled up to more than 80 to 85 % of the total volume (limited by the overfill safety system). As a result of the higher temperature-dependent volume expansion of the operating fluid compared with the aluminium housing higher filling results in a sharp rise in pressure in the coupling, which can result in the coupling being irreparably damaged before the fusing temperature of the fusible safety plug (103) is reached.

The operating fluid must be put in at the filling plug (153). Only these filling holes are provided with a filling channel, which offers protection against accidental overfilling. To better ventilate the inner chamber, the screw plug (163) inserted in the outer flange, or the second fusible safety plug (103), should be unscrewed. It is set at an appropriate angle so that, in the event of imminent overfilling, the excess can escape there.

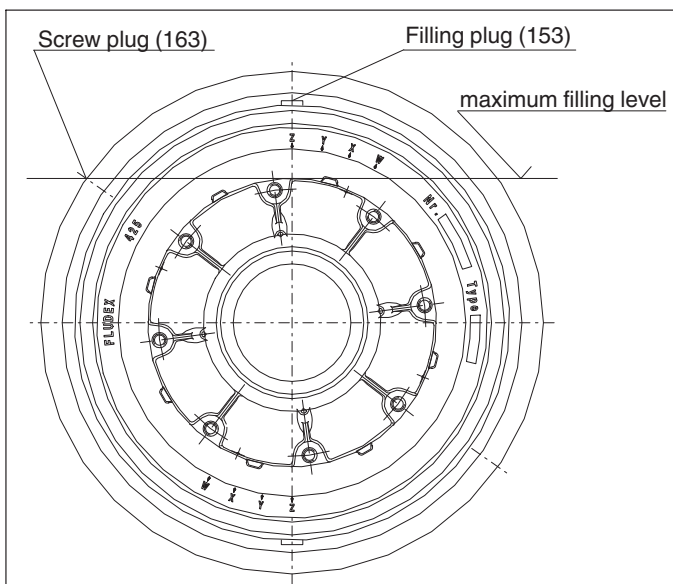


The quantity to be put into the coupling is determined in accordance with the order. The filling quantity in litres is stamped on the coupling and specified on the order-related title page.

Marking lines with assigned letters "W" to "Z" have been cast in raised relief on the coupling housing to assist filling the coupling and checking the oil level.

When filling and/or checking the filling level the mark with the required filling quantity (in case of intermediate values the corresponding intermediate position) must be turned to the top position (12 o'clock).

In case of filling above the filling plug (153) the coupling is filled with the required quantity, if the filling level has reached the lip of the hole for the screw plug (163).



For the filling quantities to be assigned to the marks "W to Z", please see table 7.

When changing the oil, care must be taken that the used oil is completely drained off. This can be done by way of the screw plug (163). In case of FV coupling the residual oil in the prechamber must also be drained off by way of the opening in the screw plug (173).

Table 7: Filling quantities in litres

Size	370		425		490		565		655		755		887		
	FG.	FV.	FG.	FV.	FG.	FV.	FG.	FV.	FG.	FV.	FG.	FV.	FG.	FV.	
Filling position	W	4.1	4.9	6.3	7.5	9.8	11.9	15.0	18.6	23.5	28.9	36.0	43.4	69	73
	X	4.9	6.0	7.4	9.1	11.5	14.4	17.7	22.4	27.6	34.9	42.3	52.4	78	84
	Y	5.6	7.2	8.5	10.9	13.2	17.3	20.3	26.9	31.7	41.9	48.6	62.9	90	99
	Z	6.5	8.4	9.8	12.7	15.3	20.1	23.4	31.4	36.6	48.9	56.1	73.4	101	113

After filling tighten filling plug (153) and screw plug (163)/fusible safety plug (103) (for tightening torques, see section 6, item 6.6) and check coupling for leaktightness by carrying out a short test run. This may be done by holding a clean piece of paper parallel to the turning axis and close to the rotating surface envelope of the coupling. Any operating fluid spurting out will be visible on the paper.



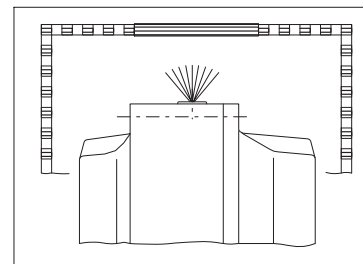
FLUDEX couplings must not lose any operating fluid, as this loss may result in a rise in slip and coupling temperature and ultimately to a fusing of the fusible safety plug (103).

Then finally fit the clutch guard to prevent unintentional contact.

Faults in the drive (e.g. locking of the output side) may result in the coupling overheating. If the fusing temperature of the fusible safety plug is reached, the insert will melt and the hot operating fluid (oil, water) escape. The coupling protection must therefore be so designed as to also guarantee protection against operating fluid spurting out without appreciably impairing the ventilation of the coupling. The fusible safety plugs (103) and the filling plugs (153) should be accessible.



Rotating parts must be secured by the purchaser against accidental contact. The coupling protection must also protect against spurting hot operating fluid without appreciably impairing ventilation (see also information on the coupling).



If it is to be used below ground in potentially explosive areas, the coupling, which is made of aluminium, must be provided with a robust casing to preclude the risk of ignition from e.g. friction, impact or friction sparks. The depositing of heavy metal oxides (rust) on the coupling housing must be precluded by the casing or other suitable precautions.



Couplings to be used in potentially explosive areas are designed with the fusible safety plugs (103) permitted for the temperature class. The coupling is marked with the temperature class of the fusible safety plug (103). It must be ensured that the drive shuts off not later than 5 minutes after the fusible safety plug (103) is fused.

7.2.1 Operating fluid: oil

In case of orders without performance data the filling quantity is not entered. In these cases, for operation with oil the filling quantity for the respective coupling size can be obtained from the filling quantity tables in section 10, item 10.9 to item 10.12 independently of the speed and output to be transmitted (and possibly the motor output).



The filling quantity tables in section 10 apply solely to oil fillings.

HL or HLP hydraulic oils to DIN 51524 Part 1 and Part 2 of the VG 22 or VG 32 ISO viscosity classes must be used as operating fluid.



The oil quality and purity determine the useful life of FLUDEX bearings and shaft-sealing rings.

Table 8: Recommended oil grades

Company					Mobil		
Designation	Aral Degol BG 32	BP Energol HL 22 + HLP 22		TORQUE FLUID N 45	Mobil DTE 22	Shell Tegula ÖI 32	Rando-Oil 32
	Aral Vitam GF 22	BP Energol HL 32 + HLP 32	Hyspin DSP22 + DSP32	TERESSO 32	Mobil DTE 24	Shell Tellus ÖI 22	Torque-Fluid 32
	Aral Vitam GF 32	BP Energol HLP-D 32	Tribol 943 AW22 + AW32	NUTO H 22	Mobil Vactra Oil Light	Shell Tellus ÖI C22	
		BP Bartran 32		NUTO H 32	Mobilfluid 125		



Observe manufacturer's instructions when handling the operating fluid!

7.2.2 Operating fluid: water or water emulsion



The coupling must be protected against freezing during standstill.



Observe manufacturer's instructions when handling the operating fluid!



Not every FLUDEX coupling is suitable for use with water or water emulsion as an operating fluid. FLUDEX couplings designed for water fillings are marked as follows in the area of the filling plug (153): " Y W ".



If water or water emulsion is used as operating fluid, only fusible safety plugs with a maximum fusing temperature of 110 °C are permitted. At a higher fusing temperature excessive strain is put on the coupling housing by the operating fluid vapour pressure.

8. Operation

Observe the instructions in section 3, "Safety instructions"!

8.1 General operating data

During operation of the coupling watch for:

- Changes in running noise
- Sudden vibrations



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.

The trouble-shooting 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 the Flender customer-service offices for specialist assistance (see section 2).

9. Faults, causes and remedy

Observe the instructions in section 3, "Safety instructions"!

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.



Flender will not be bound by the terms of the guarantee or warranty or otherwise be responsible in cases of improper use of the coupling, modifications on the coupling carried out without the agreement of Flender, or use of spare parts not supplied by Flender.



When remedying faults and malfunctions, the coupling 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

Table 9: Possible faults

Faults	Possible causes	Remedy
Sudden changes in the noise level and/or sudden vibrations.	Change in alignment. Flexible elements (12) worn.	Stop the installation. Rectify any cause of the changes in alignment (e.g. by fastening loose foundation bolts). Check and, if necessary, adjust the alignment; refer to section 6. Check wear, procedure as described in section 10. Stop the installation. Demount coupling and remove remains of flexible elements (12). Check and replace damaged coupling parts. Flexible elements (12) must be changed in sets; use only identical N-EUPEX flexible elements (12). Fitting of coupling according to section 6 and section 7.
No torque transmission.	The fusible safety plugs have fused through overheating or locking and the fluid is escaping from the coupling.	Stop the installation. Rectify the cause of the overheating or locking. Rectify the cause of the overheating or locking. Refill the coupling as described in section 7.



If the torque is being transmitted with worn N-EUPEX flexible elements (12) and metal parts are consequently in contact, proper operation within the meaning of the explosion protection requirements or Directive 2014/34/EU can no longer be guaranteed.

Measurement and assessment of the wear condition of the N-EUPEX flexible elements (12) in accordance with section 10.

9.3 Incorrect use

Experience has shown that the following faults can result in incorrect use of the FLUDEX coupling. In addition to observing the other instructions in this manual, care must therefore be taken to avoid these faults. Directive 2014/34/EU requires the manufacturer and user to exercise special care.



Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments! Through incorrect use the coupling may become an explosion hazard.



Incorrect use of the FLUDEX coupling can result in damage to the coupling. Coupling damage may result in stoppage of the drive and the entire system.

9.3.1 Possible faults when selecting the coupling and/or coupling size

- Important information for describing the drive and the environment are not communicated.
- System power too high.
- System speed too high or too low.
- Starting frequency too high.
- The ventilation of the coupling is inadequate.
- Chemically aggressive environment is not taken into consideration.
- The ambient temperature is not permissible. (See also section 5.)
- Machining of a finished bore with incorrect diameter and/or incorrect fit assignment (see section 6 and order-related title page).
- 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 fitting coupling parts in a heated condition, already fitted N-EUPEX flexible elements (12) are being excessively heated.
- The shaft diameter is beyond the specified tolerance range.
- Coupling parts are being interchanged, i.e. their assignment to the specified direction of drive is incorrect.
- Specified axial fixtures are not fitted.
- Specified tightening torques are not being adhered to.
- Alignment / shaft-misalignment values do not match the operating instructions.
- An incorrect operating fluid and/or an incorrect quantity of operating fluid is being put in.
- The coupled machines are not correctly fastened to the foundation, and as a result shifting of the machines e.g. through loosening of the foundation-screw connection is causing excessive displacement of the coupling parts.
- N-EUPEX flexible elements (12) are being omitted or incorrectly positioned.
- The coupling protection does not comply with the guidelines to be applied. It considerably restricts ventilation of the coupling.
- Operating conditions are being changed without authorisation.
- Components are being fitted to the coupling which transmit excessive axial forces or bending moments to the coupling.

9.3.3 Possible faults in maintenance

- Maintenance intervals are not being adhered to.
- An incorrect operating fluid and/or an incorrect quantity of operating fluid is being put in.
- No genuine Flender spare parts are being used.
- Specified tightening torques are not being adhered to.
- Old or damaged N-EUPEX flexible elements (12) are being fitted.
- Fusible safety plugs (103) with an unsuitable fusing temperature are being used.
- 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

Observe the instructions in section 3, "Safety instructions"!



All work on the coupling 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.



**Risk of burns after switching off!
Allow the FLUDEX coupling to cool down sufficiently before beginning work!**

10.1 Changing the operating fluid



**Never change the operating fluid immediately after operation!
There is a risk of scalding!
Allow the coupling and the operating fluid to cool down!**

The operating fluid must be changed in accordance with the specifications in table 10.

When changing the operating fluid, care must be taken that the old operating fluid is completely drained off. This can be done through the holes in the fusible safety plugs (103) or through the holes in the screw plugs (163). In case of FV design the residual oil in the prechamber is drained by way of the screw plug (173).



Observe the environmental requirements in force!

Table 10: Operating temperatures, operating hours and years of use

Operating temperature / Special measures	maximum operating hours	maximum years of use
maximum 80 °C	10 000	5
maximum 95 °C or frequent temperature peaks exceeding 100 °C: use of Viton seals necessary	5000	2
above 95 °C only suitable synthetic oils permitted use of Viton seals necessary	According to the specifications of the operating-fluid manufacturer	According to the specifications of the operating-fluid manufacturer

Different operating conditions and changing frequencies are permitted with the agreement of the operating fluid manufacturer.

10.2 Changing the shaft-sealing rings

Shaft-sealing rings are wearing parts subjected to relatively low stresses in the coupling. On couplings which are filled with oil no maintenance interval need be adhered to.

On couplings which are filled with water the shaft-sealing rings of the inner seal must be replaced after 12 000 operating hours or after 2 years of operation. We recommend also replacing the other seals and rolling bearings at the same time.

10.3 Maintenance interval of the N-EUPEX add-on coupling



The torsional backlash between the two coupling parts must be checked after three months, then at least once a year.

If an increased coupling backlash does not impair the operation of the coupling, the flexible elements (12) can continue to be used up to a specified wear limit before being replaced. To assess wear, the permitted torsional backlash, converted to the chord dimension ΔS_V on the outer coupling diameter, is shown in table 11. To obtain the dimension ΔS_V , one coupling part is rotated without torque as far as the stop and a mark applied to both side (see figure 10). If the coupling part is rotated in the opposite direction of rotation as far as the stop, the marks move apart. The distance between the marks is the chord dimension ΔS_V . If the dimension ΔS_V exceeds the value in table 11, the flexible elements (12) must be replaced.



The flexible elements must be replaced in sets. Only identically marked flexible elements must be used.

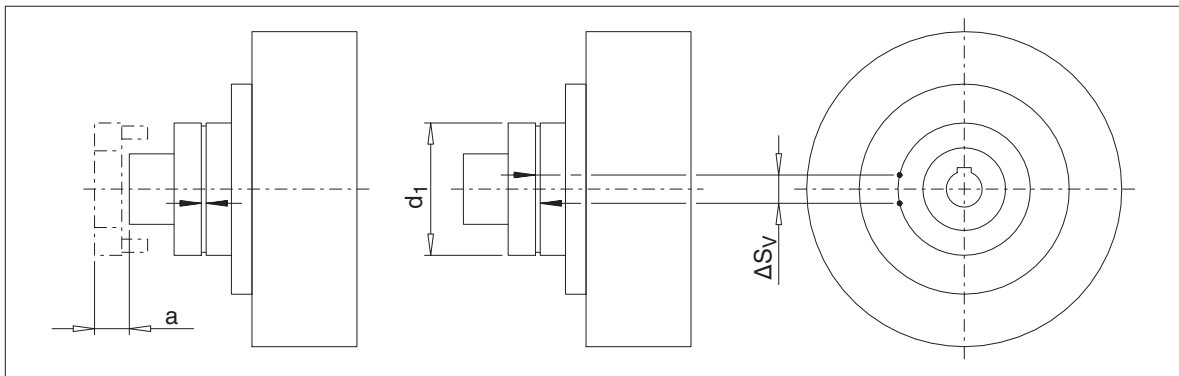


Fig. 10: Maintenance interval of the N-EUPEX add-on coupling

Table 11: Wear mark

FLUDEX size	297	342	370	425	490	565	655	755	887
N-EUPEX size [d ₁]	125	140	180	225	250	280	350	400	440
Wear mark ΔS_V [mm]	8.0	8.0	8.0	9.0	10.0	11.5	11.5	13.0	14.0
Replacement space a [mm]	11	16	10	9	11	5	0	0	0



If the above specified maintenance instructions are not adhered to, a correct operation within the meaning of the explosion-prevention requirements or Directive 2014/34/EU can no longer be guaranteed. Use in potentially explosive areas is then not permitted.

10.4 Replacement of the flexible elements

Only **original N-EUPEX flexible elements** must be used for replacement to guarantee troublefree torque transmission and faultfree operation.

On the FGD/FVD design replacement of the flexible elements (12) is possible without moving the coupled machines, if the replacement space "a" (see table 11 and figure 10) is allowed for. After the screw connection part 2/3 is released, part 3 is shifted axially and turned towards part 2. The flexible elements (12) are now freely accessible.

For re-fitting, the instructions in section 6, "Fitting", and section 7, "Start-up", must be carefully observed.

10.5 Disassembling the FLUDEX coupling

For part designations, see section 11.



Risk of burns after switching off!
Allow the FLUDEX coupling to cool down sufficiently before beginning work!

10.5.1 Disassembling sizes 297 and 342

After moving the motor away the retaining screw (141) and locking plate (140) are first removed and then the locking ring (124) demounted. When pulling off the FLUDEX coupling, care must be taken that pulling-off forces are conducted only through the steel hollow shaft (106).

The coupling is best pulled off with the aid of a special detaching device as shown in figure 11. The spindle with the pulling-off nut is inserted so that the collar (D) of the pulling-off nut is located behind the recess for the locking ring (124) (Fig. 12). To prevent the spindle seizing, the pressure surface and the thread must be treated with a lubricant (e.g. Molykote).

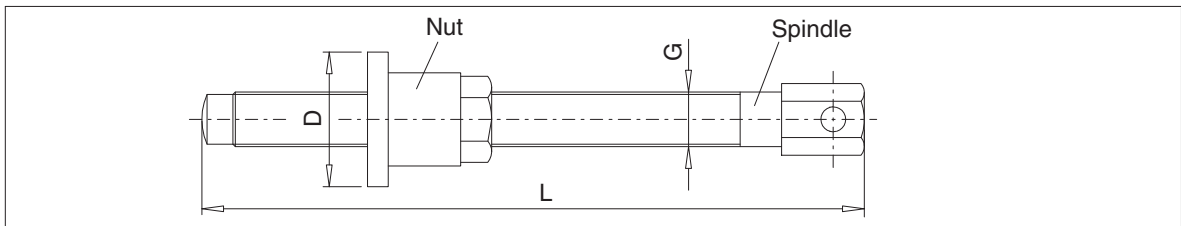


Fig. 11: Disassembling sizes 297 and 342 - a

Table 12: Dimensions of the threaded spindle and pulling-off nut, sizes 297 to 342

Size	297	342
Spindle thread G (DIN 228/1)	G 1/2	G 3/4
Nut collar D_{H8} [mm]	45	55
Spindle length L [mm]	305	280

The locking ring (124) is refitted and the spindle turned forward as far as the shaft stub end face and into the safety countersink in the centring thread. Care must be taken that the nut collar rests evenly against the locking ring.

To prevent flexing and canting, the spindle should be supported as shown.

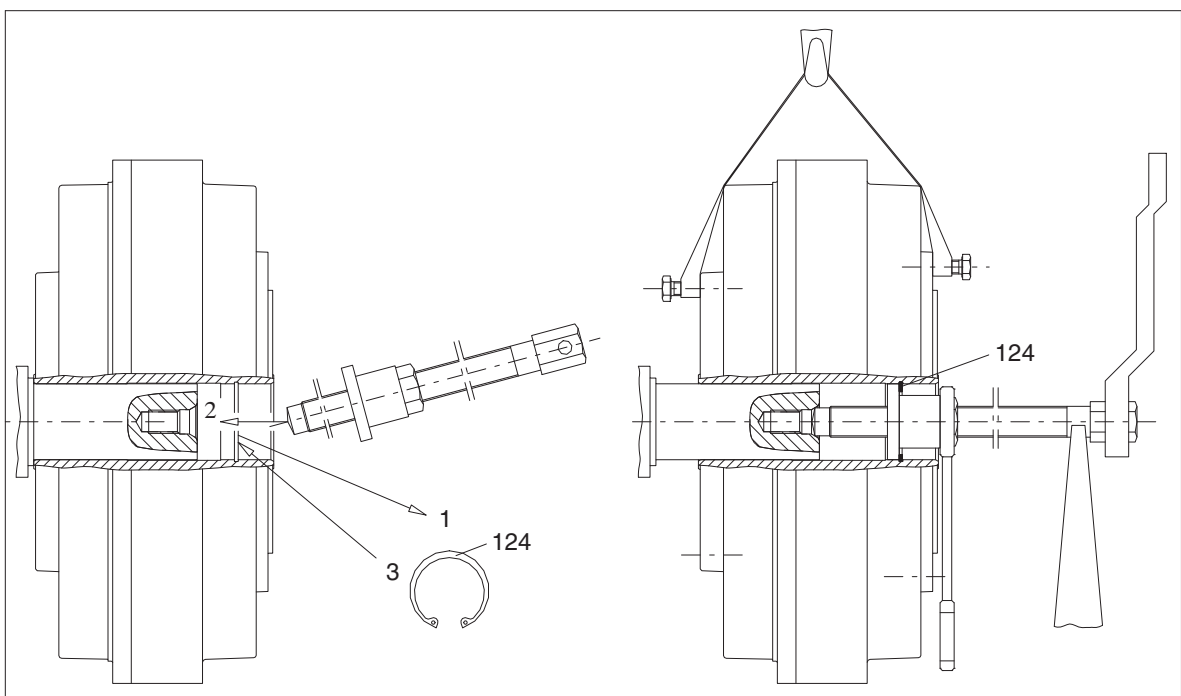


Fig. 12: Disassembling sizes 297 and 342 - b

The coupling is pulled off the shaft stub by turning the spindle further into the forcing-off thread and bracing the nut.

10.5.2 Disassembling sizes 370 to 887

After moving the motor away the retaining screw (141) and locking plate (140) are first removed. When pulling off the FLUDEX coupling, care must be taken that pulling-off forces are conducted only through the steel hollow shaft (106).

The coupling is normally pulled off with the aid of a threaded spindle, as shown in figure 13 a. The spindle is screwed into the forcing-off thread (dimension G) of the sleeve (143) and turned forward as far as the shaft stub end face and into the protective countersink in the centring thread (Figure 13 b). To prevent the spindle seizing, the pressure surface and the thread must be treated with a lubricant (e.g. Molykote).

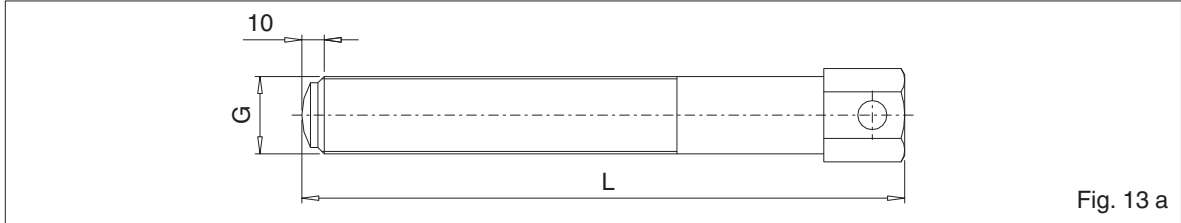


Fig. 13 a

Fig. 13: Disassembling sizes 370 to 887 - a

Table 13: Dimensions of the threaded spindle and external cylinder threads, sizes 370 to 887

Size	370	425	490	565	655	755	887
Spindle thread G (DIN 228/1)	G 1	G 1	G 1	G 1 1/2	G 1 1/2	G 1 1/2	G 1 1/2
External cylinder thread K	M68 x 2	M68 x 2	M68 x 2	M100 x 2	M100 x 2	M100 x 2	M135 x 2
Spindle length L [mm]	Type FG	285	315	355	385	440	550
	Type FV	325	370	420	470	530	650

To prevent flexing and canting, the spindle should be supported as shown.

The coupling is pulled off the shaft stub by turning the spindle further into the forcing-off thread and bracing the nut. The shaft stub must be fastened to prevent it from rotating.

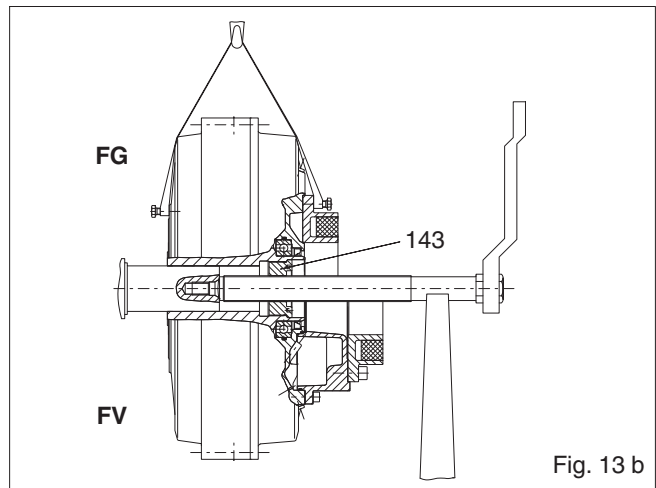


Fig. 13 b

Depending on the size of the coupling, it is recommended that a hydraulic spindle or a hydraulic cylinder be used, as described in the following.

After demounting the threaded bush (143) a hydraulic cylinder with a matching external cylinder thread "K" (see table 13) can be screwed into the free mounting thread of the hollow shaft (106) (figure 13 c).

The coupling can then be pulled off the shaft stub by operating the hydraulic cylinder.

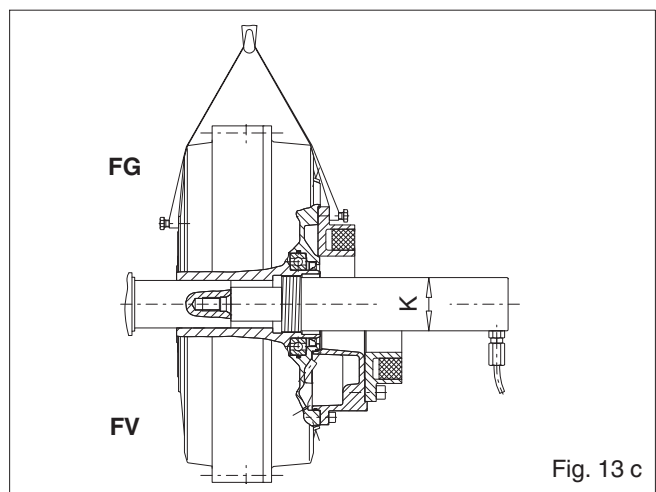


Fig. 13 c

10.6 Disassembling the FLUDEX coupling

For part designations, see section 11.

FLUDEX couplings should as far as possible be repaired at the manufacturer's works.

Before disassembly the housing parts must be marked on the flange in their positions relative to one another.

The housing parts of the coupling, the shell (101) and the cover (102) are joined at the outer flange by screws (130) and nuts (131). For disassembly these screws must first be removed.

Prior to disassembling the prechamber (115) its add-on position is to be marked.

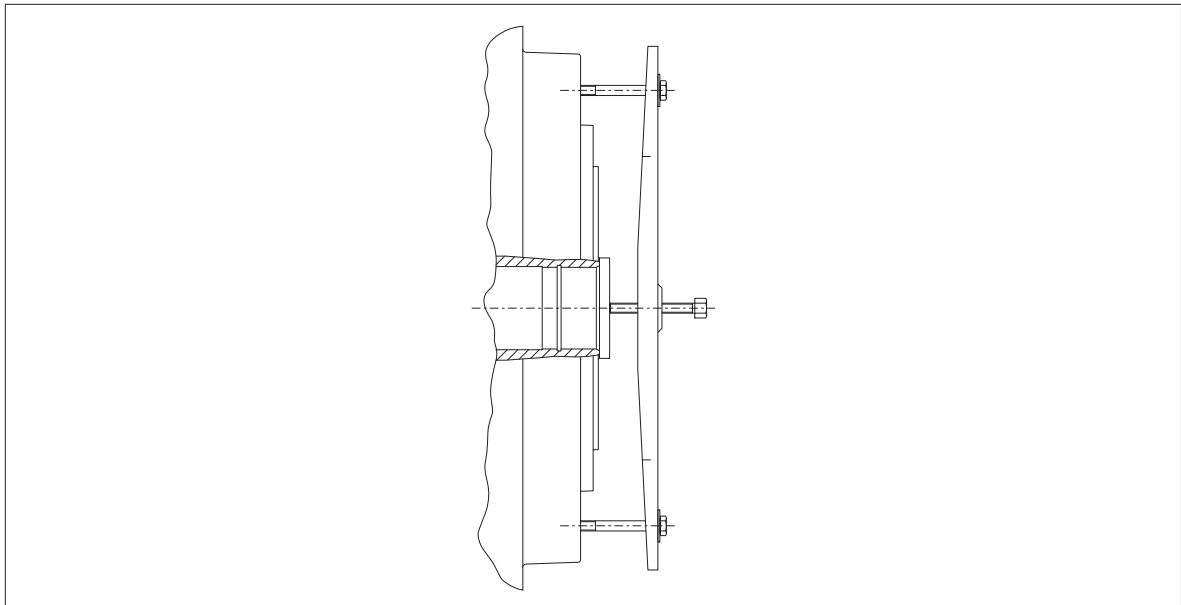


Fig. 14: Disassembling the FLUDEX coupling

To pull off the shell and cover, a pressure spindle with a bridge and pulling screws must be applied as shown in figure 14. The pressure acts on the end face of the steel hollow shaft. The pulling screws are inserted in the flange threads of the shell or cover. After the shell and cover are pulled off, the internal parts (rolling bearings, shaft-sealing rings, etc.) will be accessible. The sealing elements should be replaced every time the coupling is disassembled.

10.7 Reassembling the FLUDEX coupling

Reassembly is carried out in the reverse order (note part marking). The O-ring (114) must be lightly greased to assist assembly. The shaft-sealing rings (111; 132) are fitted with a grease filling between the dust and sealing lips. Likewise, on the design with an additional Fey laminar ring seal the space between the shaft-sealing ring and the plates and the plate-mounting groove in the shaft must be filled with grease.

The prechamber (115) is to be sealed using the O-rings (117, 138) in relation to the blade shell (101).

After the old sealing thread has been removed and the sealing surfaces have been cleaned, a fresh sealing thread must be applied to places on the flange which have been sealed with sealing thread. The sealing thread must be placed in a circular form at the place provided on the sealing surface and with the thread ends crossed over. The sealing surface must be undamaged and may be lightly greased for better positioning of the sealing thread.

For tightening torques for screw connections, see section 6, item 6.6.

10.8 Refitting the FLUDEX coupling

For re-fitting, the instructions in section 6, "Fitting", and section 7, "Start-up", must be carefully observed.

10.9 Filling quantities for FLUDEX "FG." couplings, sizes 297, 370, 490, 655 and 887

Guide values for VG 22/VG 32 mineral oil

With drive via blade shell (101) (outer wheel), valid for $T_{max.} = 2.0 \times T_{nom.}$

Table 14: Filling quantities for FLUDEX "FG." couplings, sizes 297, 370, 490, 655 and 887

Output kW	Speed 1/min										
	600	740	890	980	1180	1470	1770	2300	2950	3550	
	Oil-filling quantities in litres										
0.75	3.7	3.2									
1.1	4.2	3.5	3.1								
2.2	6.4	4.2	3.6	3.4							
3.0	7.0	5.9	3.9	3.6	3.2						
4.0	7.2	6.4	4.2	3.9	3.4						
5.5	13.0	6.9	6.0	4.2	3.7	3.2					
7.5	14.4	7.2	6.5	6.0	4.0	3.4					
11	15.9	13.3	7.2	6.7	5.7	3.7	3.3				
15	17.0	14.7	12.4	7.2	6.2	4.0	3.5				
18	17.0	15.4	13.1	12.0	6.5	4.2	3.6	3.1			
22	31.1	16.2	14.0	12.7	6.9	5.7	3.8	3.2			
30	35.9	17.0	15.2	14.1	11.8	6.3	5.3	3.4	2.9		
37	37.9	29.9	16.1	14.9	12.6	6.6	5.7	3.6	3.1	2.7	Size 297
45	39.7	32.3	17.0	15.7	13.4	7.0	6.0	3.7	3.2	2.8	
55	40.0	35.5	28.4	16.6	14.3	11.6	6.4	5.0	3.3	3.0	
75	70.5	38.7	31.7	28.5	15.5	12.7	6.9	5.5	4.3	3.2	
90	74.7	40.0	34.4	30.4	16.3	13.5	11.4	5.9	4.6	3.3	Size 370
110	81.0	40.0	37.0	33.0	27.3	14.4	12.1	6.2	4.9	4.0	
132	88.2	69.3	38.8	36.0	28.6	15.1	12.8	6.5	5.2	4.4	
160	93.5	73.3	40.0	37.8	30.6	15.9	13.6	10.6	5.5	4.7	
200	98.0	79.8	67.0	39.9	33.7	26.9	14.6	11.4	6.0	5.0	Size 490
250	98.0	88.7	70.9	40.0	36.8	28.4	15.4	12.2		5.4	
315		94.7	76.6	69.8	39.0	30.8	26.2	13.1			Size 655
350		97.2	80.0	71.8	39.9	32.2	26.9	13.6			
400		98.0	85.1	75.2	64.5	34.2	27.8				Size 887
500		98.0	92.4	82.5	68.1	37.1	29.7				
600			96.9	90.1	71.5	38.8	31.9				
750			98.0	95.3	77.3	64.0	35.4				
900				98.0	83.7	67.0					Size 887
1100					91.1	70.4					
1300					95.2	74.2					
1600						80.6					



With different operating fluids, drive via the inner gear or $T_{max.}$ not equal to $2 \times T_{nom.}$, observe changed filling quantities!

10.10 Filling quantities for FLUDEX "FG." couplings, sizes 342, 425, 565 and 755

Guide values for VG 22/VG 32 mineral oil

With drive via blade shell (101) (outer wheel), valid for $T_{max.} = 2.0 \times T_{nom.}$

Table 15: Filling quantities for FLUDEX "FG." couplings, sizes 342, 425, 565 and 755

Output kW	Speed 1/min										
	600	740	890	980	1180	1470	1770	2300	2950	3550	
	Oil-filling quantities in litres										
1.1	5.5	4.8									
2.2	6.6	5.6	4.9								
3.0	8.7	5.9	5.3	5.0							
4.0	9.5	6.5	5.6	5.3							
5.5	10.3	8.7	6.0	5.7	5.0						
7.5	10.9	9.5	6.6	6.1	5.4						
11	19.9	10.5	9.1	6.6	5.8	5.1					
15	22.0	10.9	9.8	9.1	6.3	5.4					
18	23.2	19.1	10.3	9.6	6.6	5.6	5.0				
22	24.3	20.3	10.9	10.1	8.6	5.9	5.2				
30	42.0	22.4	18.9	10.9	9.5	6.4	5.6	4.7			
37	44.4	23.7	20.1	18.5	10.0	8.2	5.8	4.9			
45	47.7	24.9	21.5	19.5	10.5	8.8	6.1	5.1	4.3		
55	52.0	25.5	22.8	20.8	17.5	9.3	7.8	5.4	4.5		
75	58.0	45.6	24.6	22.9	19.3	10.1	8.6	5.7	4.9	4.2	Size 342
90	60.5	49.1	25.5	23.9	20.4	10.7	9.2	7.2	5.1	4.4	
110	61.0	54.0	43.2	25.5	21.8	17.7	9.7	7.6	5.3	4.7	
132		57.0	45.8	42.1	23.0	18.7	10.1	8.1	6.3	4.9	Size 425
160		60.0	49.5	44.3	24.0	19.8	16.7	8.6	6.8		
200		61.0	55.0	48.1	25.5	21.4	17.9	9.2	7.3		
250			58.5	53.5	42.9	22.8	19.2	14.6	7.8		Size 565
315			61.0	57.5	46.2	24.2	20.6	16.1			
400			61.0	61.0	51.0	41.0	22.2	17.4			
500				61.0	56.0	43.3	37.8	18.7			Size 755
600					59.0	46.0	39.5				
750						50.5	41.7				
900						55.0	43.7				
1000							45.2				



With different operating fluids, drive via the inner gear or $T_{max.}$ not equal to $2 \times T_{nom.}$, observe changed filling quantities!

10.11 Filling quantities for FLUDEX "FV." couplings, sizes 370, 490, 655 and 887

Guide values for VG 22/VG 32 mineral oil

With drive via blade shell (101) (outer wheel), valid for $T_{max.} = 1.5 \times T_{nom.}$

Table 16: Filling quantities for FLUDEX "FV." couplings, sizes 370, 490, 655 and 887

Output kW	Speed 1/min										
	600	740	890	980	1180	1470	1770	2300	2950	3550	
	Oil-filling quantities in litres										
1.1	5.3										
2.2	6.7	5.5									
3.0	7.4	6.1	5.0								
4.0	8.0	6.6	5.6	5.0							
5.5	13.8	7.4	6.2	5.6							
7.5	15.2	8.0	6.8	6.2	5.1						
11	17.4	14.1	7.7	7.1	5.9						
15	18.5	15.6	13.0	7.7	6.5	5.2					
18	31.6	16.6	13.8	12.5	6.9	5.5					
22	33.2	17.7	14.8	13.4	7.3	5.9	4.8				
30	36.5	18.5	16.3	14.9	12.3	6.5	5.5				
37	39.9	32.4	17.5	15.9	13.3	7.0	5.9	4.2			
45	44.0	34.0	18.5	17.0	14.1	7.5	6.2	4.6			
55	44.0	36.2	31.0	18.1	15.1	12.0	6.7	5.1			
75	75.8	41.4	33.6	31.2	16.7	13.5	7.4	5.7	4.2		
90	80.0	44.0	35.4	32.7	17.7	14.3	11.6	6.1	4.5		
110	84.3	44.0	38.2	34.5	29.9	15.2	12.6	6.4	5.0	4.1	Size 370
132	89.2	74.6	41.6	36.7	31.3	16.2	13.5	6.9	5.4	4.2	
160	96.3	78.7	44.0	39.8	32.9	17.3	14.4	10.4	5.7	4.6	
180	101.8	81.3	44.0	42.1	33.9	17.9	14.9	11.0	6.0	4.9	
200	107.0	83.6	72.1	44.0	34.9	29.4	15.4	11.7	6.2	5.1	
250	107.0	89.5	76.3	44.0	37.9	31.1	16.7	12.8		5.5	
315		98.5	81.5	75.6	42.1	33.0	28.6	13.9			Size 490
350		103.6	83.7	77.7	44.0	33.9	29.5	14.4			
400		107.0	86.9	80.5	68.4	35.3	30.4				Size 655
500		107.0	94.5	85.3	73.8	38.4	32.3				
600			102.9	90.6	77.3	41.8	33.8				
750			107.0	99.6	81.9	67.8	36.2				
900				107.0	86.0	72.7					Size 887
1100					92.3	76.2					
1300					99.3	79.8					
1600						84.0					



With different operating fluids, drive via the inner gear or $T_{max.}$ not equal to $1.5 \times T_{nom.}$, observe changed filling quantities!

10.12 Filling quantities for FLUDEX "FV." couplings, sizes 425, 565 and 755

Guide values for VG 22/VG 32 mineral oil

With drive via blade shell (101) (outer wheel), valid for $T_{max.} = 1.5 \times T_{nom.}$

Table 17: Filling quantities for FLUDEX "FV." couplings, sizes 425, 565 and 755

Output kW	Speed 1/min										
	600	740	890	980	1180	1470	1770	2300	2950	3550	
	Oil-filling quantities in litres										
3.0	9.1										
4.0	9.9	8.1									
5.5	11.1	9.0									
7.5	12.0	9.9	8.3	7.4							
11	21.4	11.3	9.4	8.6							
15	23.7	12.0	10.4	9.5	7.8						
18	25.2	20.5	11.1	10.1	8.4						
22	27.0	21.9	11.7	10.8	9.0						
30	45.0	24.2	20.1	11.8	9.9	7.9					
37	47.5	26.0	21.7	19.5	10.7	8.6	6.7				
45	50.0	27.7	23.1	21.0	11.3	9.2	7.5				
55	53.0	28.0	24.6	22.5	18.3	9.7	8.1				
75	59.5	48.5	27.4	24.8	20.7	10.8	9.0	6.5			
90	65.5	50.5	28.0	26.5	22.0	11.4	9.5	7.1			
110	67.0	54.0	46.4	28.0	23.4	18.7	10.2	7.8			
132		58.0	48.7	45.1	24.9	19.9	10.9	8.4	6.1		
160		63.5	51.0	47.4	26.7	21.4	16.8	8.9	6.6		
180		67.0	53.0	49.0	27.6	22.2	18.0	9.3	6.9		
200		67.0	55.0	50.0	43.7	23.0	18.9	9.6	7.3		Size 425
250			60.5	53.5	46.0	24.7	20.6	14.7	8.0		
315			67.0	58.5	49.0	26.8	22.3	16.1	8.7		
350			67.0	61.5	50.0	42.4	23.0	16.8			
400				66.0	52.0	44.0	24.0	18.1			Size 565
500				67.0	56.5	46.5	40.0	19.9			
600					61.0	49.0	42.1	21.2			
750						51.5	45.0				
900						55.0	47.0				Size 755
1100							49.5				



With different operating fluids, drive via the inner gear or $T_{max.}$ not equal to $1.5 \times T_{nom.}$, observe changed filling quantities!

11. Spare parts, customer service

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:

- Part no. and designation (see item 11.2), and, if applicable, fusing temperature of the fusible safety plug
- Type, size and order number (see section 1, item 1.3)
- Quantity

We guarantee only the original spare parts supplied by us.



Please note that spare parts and accessories not supplied by us have not been tested or approved by us. The installation and/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 non-genuine spare parts and accessories.

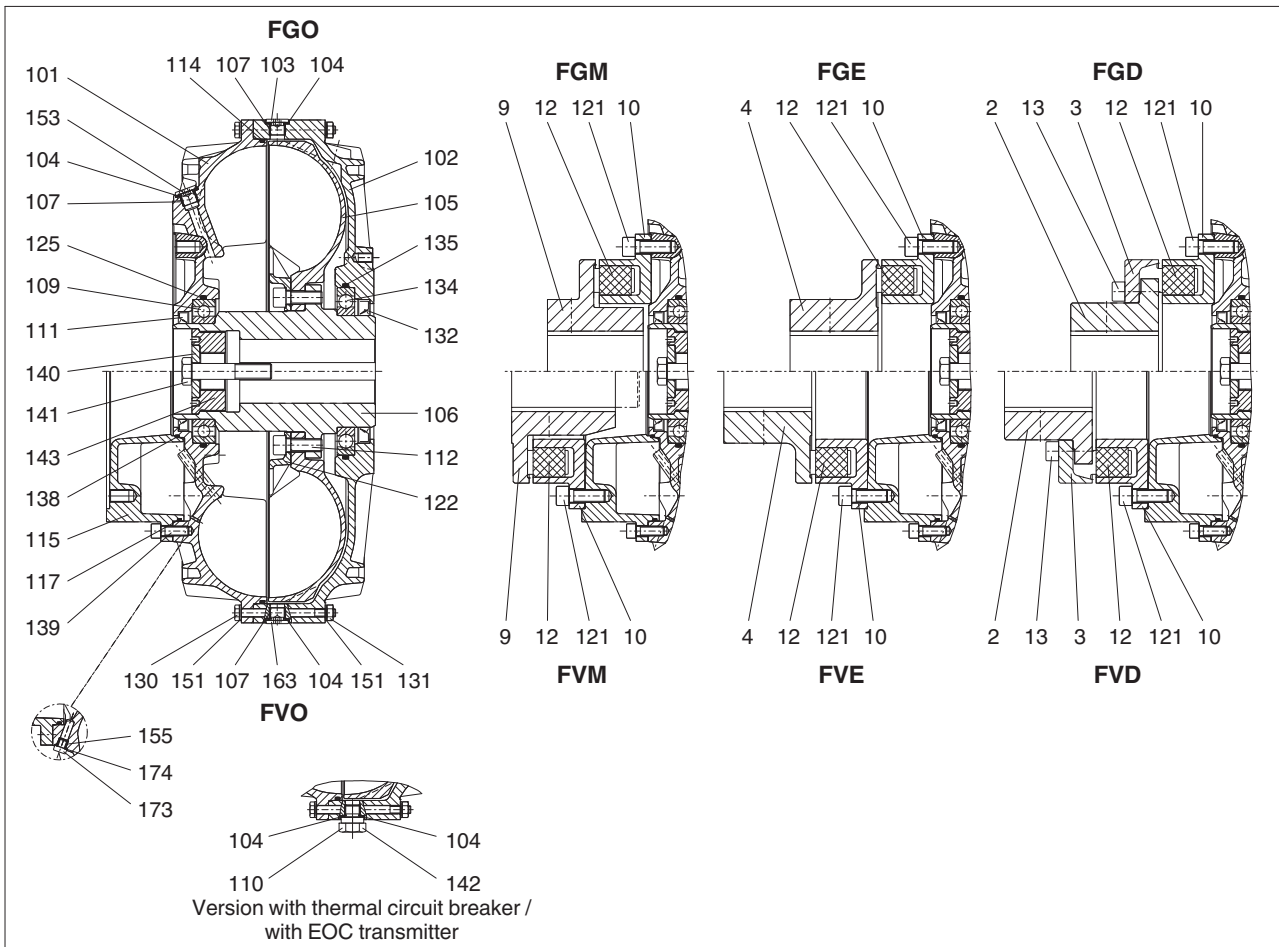
Please note that certain components often have special production and supply specifications and that we supply you with spare parts which comply fully with the current state of technical development as well as current legislation.

11.1 Spare-parts and customer-service addresses

When ordering spare parts or requesting a service specialist, please contact Flender first (see section 2, "General notes").

11.2 Spare parts list Types FGO, FGD, FGE, FGM, FVO, FVD, FVE, FVM

When ordering spare parts, please quote the order number of the original delivery. The order number is stamped on the coupling (bucket) and specified on the order-related title page.



Part no.	Designation	Part no.	Designation	Part no.	Designation			
2	Part 2 (N-EUPEX)	107	Threaded insert	E	134	Rolling bearing	L	
3	Part 3 (N-EUPEX)	109	Rolling bearing	L	135	O-ring	L	
4	Part 4 (N-EUPEX)	110	Thermal circuit-breaker	*	138	O-ring	D*	
9	Part 9 (N-EUPEX)	111	Shaft-sealing ring	D*	139	Cheese-head bolt		
10	Part 10 (N-EUPEX)	112	Cheese-head bolt	E	140	Locking plate		
12	Flexible elements (N-EUPEX)	114	O-ring	D*	141	Retaining screw		
13	Cheese-head bolt	115	Prechamber		142	EOC transmitter		
		117	O-ring	D*	143	Threaded bush		
101	Blade shell	G	121	Cheese-head bolt	151	Washer		
102	Cover		122	Ring	E	153	Filling plug	
103	Fusible safety plug	*	125	O-ring	L	155	Threaded insert	E
104	Sealing ring		130	Hexagon-head bolt		163	Screw plug	
105	Bucket wheel	E**	131	Hexagon nut		173	Drain plug (prechamber)	
106	Hollow shaft	G**	132	Shaft-sealing ring	D*	174	Sealing ring	

* When ordering, state fusing temperature of the fusible safety plug (stamped on the plug). The temperature specification serves to determine the sealing material (see also item 5.2).

** Hollow shaft and bucket wheel available only as assembled and balanced unit.

G = subassembly E = part of a subassembly D = part of the seal set L = part of the bearing set

12. Declarations

12.1 EU declaration of conformity



EU declaration of conformity

The manufacturer, Flender GmbH, D - 46395 Bocholt, Germany, declares that the equipment described in these operating instructions:

FLENDER COUPLINGS FLUDEX® FGO, FGD, FGE, FGM, FVO, FVD, FVE, FVM

is in conformity with Article 1 and Article 13, Paragraph 1 b) ii) of Directive 2014/34/EU and complies with the requirements of Directive 2014/34/EU and the following standards:

EN 1127-1 : 2011
EN 13463-1 : 2009
EN 13463-5 : 2011

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Directive 2014/34/EU OJ L 96, 29.03.2014, p.309-356 (effective from 20.04.2016, 00:00 a.m.)
Directive 94/9/EC OJ L 100, 19.04.1994, p.1-29 (effective until 19.04.2016, 12.00 p.m.)

The technical documentation has been delivered to the body named below:

DEKRA EXAM GmbH, 44727 Bochum, Germany, code number: 0158.

A handwritten signature in black ink, appearing to read 'Felix Henseler'.

Bocholt, 2017-10-01

Felix Henseler, Head of PD MD AP

A handwritten signature in blue ink, appearing to read 'Thomas Tebrügge'.

Bocholt, 2017-10-01

Thomas Tebrügge / Head of PD MD AP COU BA

FLENDER COUPLINGS

FLUDEX

Operating instructions 4601 en

Edition 10/2017

[Flender GmbH](#)

Alfred-Flender-Straße 77

46395 Bocholt

GERMANY