

FLENDER COUPLINGS

FLUDEX

Operating instructions 4611 en
Edition 10/2017

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

Operating fluid: Water



FLENDER COUPLINGS

FLUDEX 4611 en

Operating instructions

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

Technical data

1

General notes

2

Safety instructions

3

Transport
and storage

4

Technical
description

5

Fitting

6

Start-up

7

Operation

8

Faults, causes
and remedy

9

Maintenance
and repair

10

Spare parts,
customer service

11

Declarations

12

Legal notes

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, those only for preventing material damage appear without a warning triangle. Depending on the level of hazard, the warning notes are shown in reverse order of seriousness, as follows.

 DANGER

means, that death or serious injury will result , if the appropriate preventive action is not taken.

 WARNING
--

means that death or serious injury may result , if the appropriate preventive action is not taken.

 CAUTION
--

means that a slight injury may result, if the appropriate preventive action is not taken.

NOTICE

means that material damage may result, if the appropriate preventive action is not taken.

Where there is more than one hazard level, 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:

 WARNING
--

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.

Note on the EC 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.

Symbols in these operating instructions



This symbol additionally indicates an imminent risk of explosion in the meaning of Directive 2014/34/EU.



This symbol additionally indicates an imminent risk of burns due to hot surfaces in the meaning of standard "DIN EN ISO 13732-1".

Contents

1.	Technical data	8
1.1	General data	8
1.2	Coupling version	9
2.	General notes	10
2.1	Introduction	10
2.2	Copyright	10
3.	Safety instructions	11
3.1	Obligations of the user	11
4.	Transport and storage	14
4.1	Scope of supply	14
4.2	Transport	14
4.3	Storage of the coupling	15
4.4	Storage area for a protracted period	15
5.	Technical description	16
5.1	General description "FG.", "FV." and "FVV." series	16
5.2	Construction of couplings	17
5.3	Marking of the coupling parts for use in potentially explosive areas	18
5.4	Conditions of use for FLUDEX couplings in potentially explosive areas	18
6.	Fitting	19
6.1	Instructions for machining the finished bore, for axial fastening, set screws and balancing	20
6.1.1	Finished bore	20
6.1.2	Parallel keyway	22
6.1.3	Axial securing	22
6.1.4	Set screws	23
6.1.5	Balancing	24
6.2	General information on fitting	25
6.3	Fitting the coupling parts	26
6.4	Alignment	29
6.5	Possible misalignments	30
6.5.1	Axial misalignment	30
6.5.2	Angular misalignment	30
6.5.3	Radial misalignment	30
6.5.4	Permissible shaft misalignment values for radial misalignment ΔK_{rperm} . and difference in gap dimension ΔS_{perm}	31
6.6	Assignment of tightening torques	31
7.	Start-up	32
7.1	Procedure before start-up	32
7.2	Fluid filling	32
7.2.1	Operating fluid	36
8.	Operation	37
8.1	General operating data	38

9.	Faults, causes and remedy	39
9.1	General	39
9.2	Possible faults	40
9.3	Incorrect use	41
9.3.1	Possible faults when selecting the coupling and/or coupling size	42
9.3.2	Possible faults when fitting the coupling	42
9.3.3	Possible faults in maintenance	43
10.	Maintenance and repair	44
10.1	Changing the operating fluid	45
10.2	Changing the shaft-sealing rings	46
10.3	Maintenance interval of the N-EUPEX add-on coupling	46
10.4	Replacement of the flexible elements	47
10.5	Disassembling the FLUDEX coupling	47
10.6	Demounting the FLUDEX coupling	49
10.7	Re-fitting the FLUDEX coupling	49
10.8	Re-fitting the FLUDEX coupling	50
10.9	Filling quantities for FLUDEX "FG." couplings, sizes 370, 490, 655 and 887	51
10.10	Filling quantities for FLUDEX "FG." couplings, sizes 425, 565 and 755	52
10.11	Filling quantities for FLUDEX "FV." couplings, sizes 370, 490, 655 and 887	53
10.12	Filling quantities for FLUDEX "FV." couplings, sizes 425, 565 and 755	54
10.13	Filling quantities for FLUDEX "FVV." couplings, sizes 370, 490, 655 and 887	55
10.14	Filling quantities for FLUDEX "FVV." couplings, sizes 425, 565 and 755	56
11.	Spare parts, customer service	57
11.1	Spare-parts and customer-service addresses	57
11.2	Spare-parts list of types "FGO", "FGD", "FGE", "FGM", "FVO", "FVD", "FVE", "FVM" and "FVVM"	58
12.	Declarations	60
12.1	EU declaration of conformity	60

1. Technical data

Enclosed with the coupling delivery and the documentation is an order-specific dimensioned drawing showing all the technical data necessary for fitting (see Fitting data field). The coupling can be fitted with the aid of these instructions **only in conjunction with the order-specific drawing of the coupling**.

The technical data to the FLUDEX couplings listed in these instructions are documented on the **order-specific drawing of the coupling** (see "Operating and Coupling Data" fields in figure 1) and in the current product catalogue and are available on request or can be accessed at any time on the Internet (see cover at back).

Because of customer-specific adaptations the standard design is frequently deviated from. The **technical data on the order-specific drawing of the couplings should always be followed with priority before** the data in the current product catalogue, therefore.

These data together with the contractual agreements on the coupling determine the limits of its proper use.

1.1 General data

This manual applies only to FLUDEX couplings in the "FGO", "FGD", "FGE", "FGM", "FVO", "FVD", "FVE", "FVM" and "FVVM" series, which are designed for operation with water or with a water emulsion.



DANGER

Risk of explosion

Risk of explosion when using unsuitable components in potentially explosive areas.
Use the coupling only for the approved zones and equipment groups. In case of doubt, contact Flender.



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.
In the event of a change in operating conditions (output, speed, prime mover and driven machine) the design must always be checked.



WARNING

Serious injury

Risk of serious injury through falling components or quenching.
Risk of damage to coupling parts when using unsuitable transport equipment.
When handling these products, use only lifting and handling equipment of sufficient load-bearing capacity.
Transport of the coupling must be carried out so as to avoid personal damage and damage to the coupling.

1.2 Coupling version

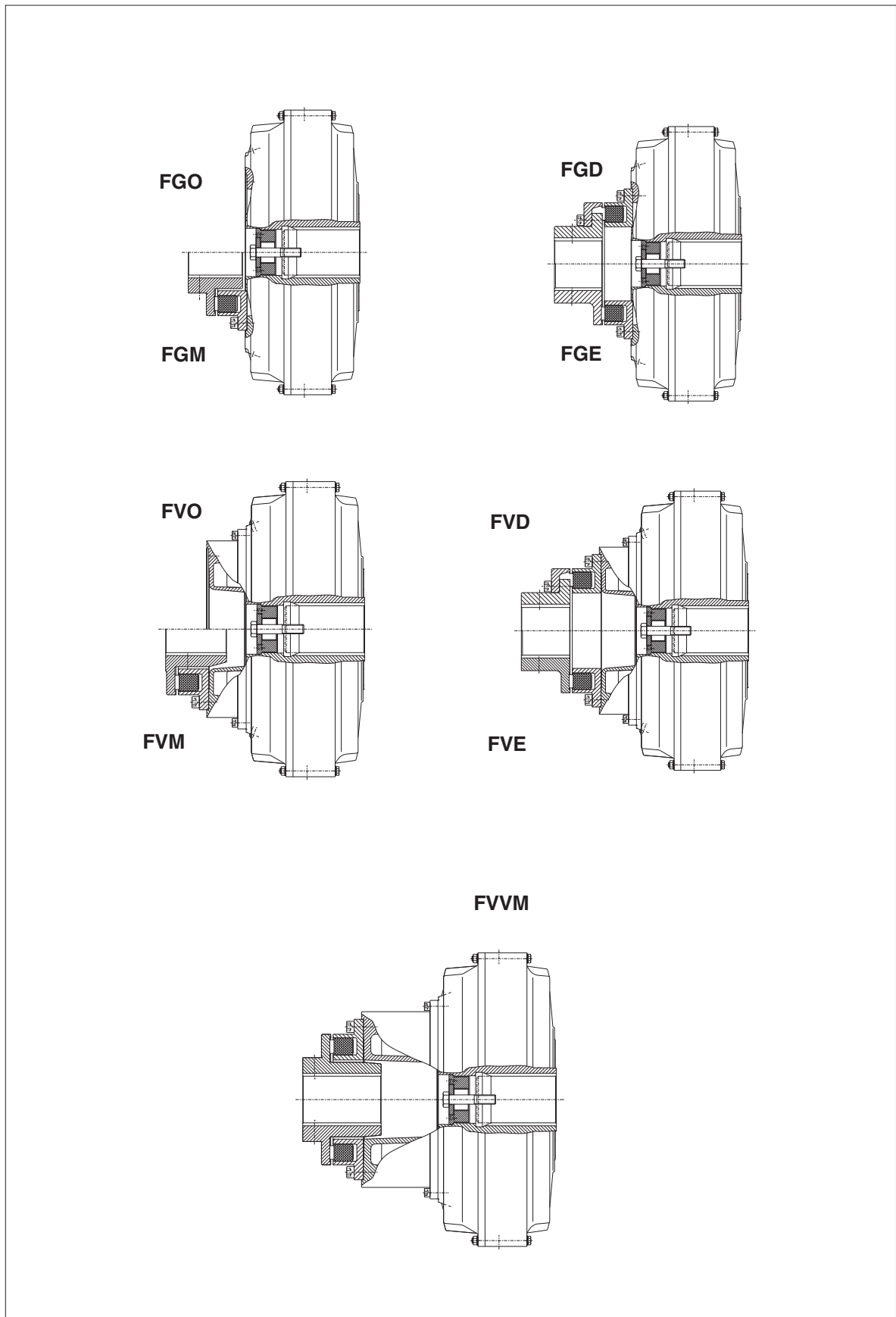


Fig. 1: Coupling types

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.



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.

- All persons carrying out work on the coupling must have read and understood these instructions and must adhere to them.
- Any changes on the part of the user are not permitted. This applies equally to safety features designed to prevent accidental contact.
- The coupling is designed only for the application specified in the order. Other operating conditions are regarded as incorrect.

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

The coupling has been manufactured in accordance with the state of the art and is delivered in a condition for safe and reliable use.

The coupling 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.

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

Observe the information in section 2, "General notes"!



DANGER

Risk of explosion

Risk of explosion when operating in potentially explosive areas.
Incorrect changes made to the coupling will create ignition sources.
Any changes on the part of the user are not permitted. This applies equally to safety features designed to prevent accidental contact. For the use in potentially explosive environments the protective equipment must comply at least with type of protection IP2X.



DANGER

Risk of explosion

Risk of explosion when using unsuitable components in potentially explosive areas. Use the coupling only for the approved zones and equipment groups. In case of doubt, contact Flender.



DANGER

Risk of explosion

Risk of explosion when operating in potentially explosive areas.
Damaged coupling modules and coupling parts are potential explosion hazards.
Use only undamaged coupling components. Operating the coupling with damaged coupling parts is not permitted in potentially explosive environments in accordance with Directive 2014/34/EU.

3.1 Obligations of the user

- The operator must ensure that everyone carrying out work on the coupling has read and understood these instructions and is adhering to them in every point in order to:
 - avoid injury or damage,
 - ensure the safety and reliability of the coupling,
 - avoid disruptions to operation and environmental damage through incorrect use.
- During transport, assembly, fitting, demounting, and maintenance of the unit, the relevant safety and environmental regulations must be complied with.
- The coupling may only be maintained and/or repaired by persons qualified for the work concerned (see "Qualified personnel" on page 3 of this manual).
- The outside of the coupling must not be cleaned with high-pressure cleaning equipment.
- All work must be carried out with great care and with due regard to safety.

WARNING

Serious injury

Risk of serious injury through incorrect handling of aluminium parts of the coupling.
The housing of the coupling is made aluminium.
The country-specific regulations regarding handling of aluminium must be taken into account.



DANGER

Danger to life through switched-on installation

Risk of being caught or drawn in by rotating and/or movable parts.

To carry out work on the coupling, the system must always be stopped. 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 on the coupling is in progress. The relevant accident prevention regulations at the place of installation apply as well.

At the same time the complete installation must be without load, so that no danger occurs during demounting operations.



WARNING

Serious injury

Risk of serious injury through contact with rotating components.

The coupling must be fitted with suitable safeguards to prevent any contact. The operation of the coupling must not be impaired by the safeguard. This also applies to test runs and when checking the direction of rotation.

This coupling must also be protected against spurting, hot operating fluid without substantially impairing the coupling ventilation. The fusible safety plug, the filler plug and the drain plug should remain accessible.



WARNING

Risk of serious injury through flying fragments

Coupling may burst.

The operating fluid to be used is specified in item 7.2.1.

The filling quantity is defined by the works in relation to the order, if the drive details are available.

Otherwise the filling quantity is selected from the table in the operating instructions.

FLUDEX couplings must not be filled up to more than 80 to 85 % of the total volume.

Higher filling quantities cause a sharp rise in pressure in the coupling, which may cause the coupling to burst.

Only the filling openings prescribed must be used for filling.

The instructions for use issued by the manufacturer of the operating fluid must be observed.



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.

If any malfunctions or changes are noticed during operation, the drive assembly must be switched off at once.

Note

If the coupling is fitted in plant or equipment, the manufacturer of such plant or equipment must ensure that the contents of the present instructions are incorporated in his own instructions.



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling through use of defective spare parts.

Flender guarantees only the genuine spare parts supplied by Flender.

Non-genuine spare parts have not been tested or approved by Flender. Non-genuine spare parts may alter technical characteristics of the coupling, thereby posing an active or passive risk to safety.

Flender will assume no liability or guarantee for damage caused by spare parts not supplied by Flender. The same applies to any accessories not supplied by Flender.

Note

Depending on national regulations, coupling parts and operating fluid have to be disposed of separately or separated for recycling.

The relevant safety and environmental regulations must be complied with.

4. Transport and storage

Observe the information 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 and/or missing parts must be reported to Flender in writing immediately.

The item is delivered ready for operation, without fluid filling. Each coupling is supplied with loose fusible safety plugs and a locking plate and a retaining screw, if provided.

Note

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

4.2 Transport

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 following symbols with their meanings are applied to the packaging and must be observed:

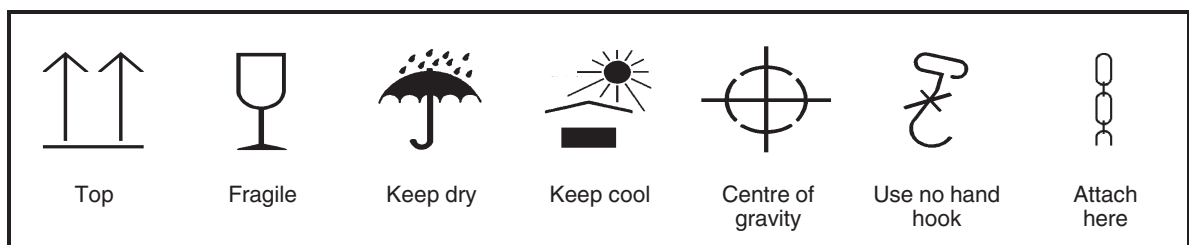


Fig. 2: Transport symbols



WARNING

Serious injury

Risk of serious injury through falling components or quenching.
Risk of damage to coupling parts when using unsuitable transport equipment.
When handling these products, use only lifting and handling equipment of sufficient load-bearing capacity.
Transport of the coupling must be carried out so as to avoid personal damage and damage to the coupling.

NOTICE

Material damage

Risk of material damage if not observing the packaging symbols.
The symbols marked on the packing must be observed.

4.3 Storage of the coupling

NOTICE

Risk of damage to the coupling through improper storage

Impairment of the physical properties of the coupling and/or coupling parts.

The storage area must be dry (air humidity less than 65 %) and free from dust. Ensure that no condensation occurs. Do not store with aggressive chemicals, acids, alkalis, etc.

If the coupling contains elastomer components, no ozone-generating equipment of any kind, such as fluorescent light sources, mercury vapour lamps or high-tension electrical equipment, must be allowed into the storage areas.

Storage of the coupling on suitable aids or in suitable containers.

Note

The coupling is delivered in a preserved condition and can be stored in a covered, dry place and free from dust for up to 3 months. If the unit is to be stored for a longer period, it should be treated with a long-term preservative agent (Flender must be consulted).

NOTICE

Damage to the coupling through damage to the flexible elements

Before cleaning the coupling parts and applying the long-term preservative agent, the flexible elements (12) in figure 3 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. 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.

NOTICE

Risk of damage to the coupling through improper storage

Risk of damage to the coupling through freezing of operating fluid.

In case of types provided for operation with water, the water or water emulsion must be drained off before storing at temperatures below 0 °C.

Frost hazard.

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.

NOTICE

Risk of damage to the coupling through improper storage

In case of types provided for operation with water, the water must be drained off before storing at temperatures below 0 °C.

Frost hazard.

5. Technical description

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

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

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.

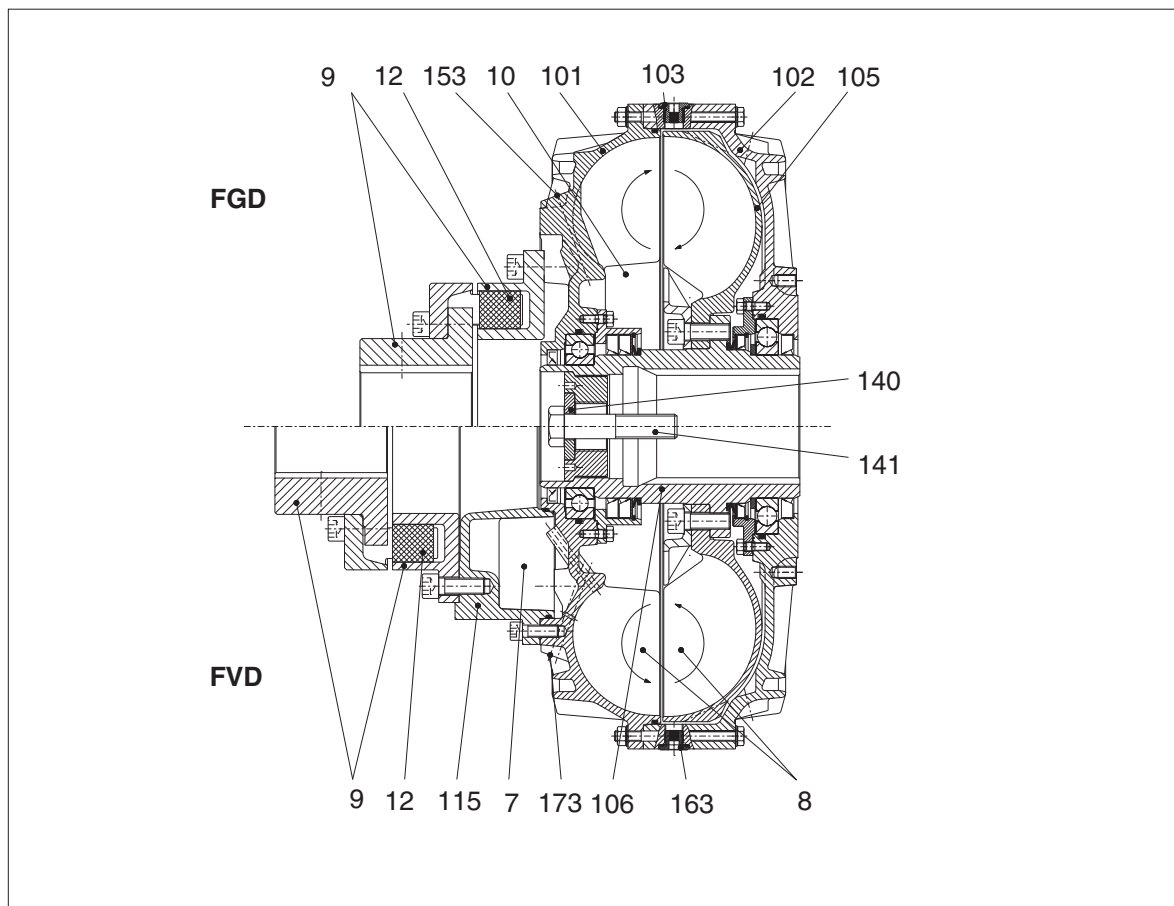


Fig. 3: General description "FG.", "FV." and "FVV." series

7	Prechamber	106	Hollow shaft
8	Working chamber	115	Prechamber
9	N-EUPEX add-on coupling	140	Locking plate
10	Stowage space	141	Retaining screw
12	Flexible element (N-EUPEX)	153	Filling plug (fusible safety plug)
101	Blade shell (outer wheel)	163	Screw plug (fusible safety plug)
102	Cover	173	Drain plug Prechamber
103	Fusible safety plug		
105	Bucket wheel (inner wheel)		

The FLUDEX coupling is a hydrodynamic fluid coupling. 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.", "FV." and "FVV." series are suitable for both directions of rotation. They can be fitted in a horizontal, angled or vertical position. In case of couplings of the "FV." and "FVV." series, 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 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 inside and the outside by shaft-sealing rings.

As an extension to the "FG" type (basic coupling), on the "FV" (prechamber coupling) and "FVV" types (coupling with enhanced prechamber), a prechamber (115) is added to the blade shell (101). It receives part of the fluid filling, when the coupling is stationary, and so reduces the effective amount of fluid in the working chamber (8) when starting. Thus the starting torque is considerably reduced. While the coupling is rotating, the fluid 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). In addition further openings (102) are provided in the cover in which fusible plugs have been inserted. During standstill of the coupling they serve for bleeding during filling and for checking the level of the operating fluid and for draining off the operating fluid.

The fusing temperature of the fusible safety screw is 110 °C for the water version, and the material used for the seals is Perbunan (for a maximum continuous operating temperature of 85 °C).

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".

The fusing temperature of the fusible safety plugs is stamped on their end faces, **the 110 °C plugs are also being marked yellow.**

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 fusible safety plug (103) remains in the coupling as an emergency safety device.

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" and "FVVM" 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.

5.3 Marking of the coupling parts for use in potentially explosive areas


Note

Couplings which do not have a CE marking must not be used in potentially explosive areas.

Couplings to be used in potentially explosive areas have the following marking:

Flender GmbH	CE		II 2G c b IIB T3 -30 °C ≤ Ta ≤ +50 °C
46393 Bocholt - Germany			II 2D c b T 160 °C -30 °C ≤ Ta ≤ +50 °C
FLENDER couplings FLUDEX <year built>			I M2 c b -30 °C ≤ Ta ≤ +50 °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 indication  is suited for the operating 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.**



DANGER

Risk of explosion

Risk of explosion in case of non-observance of the prescription relating to aluminium used below ground. 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 information in section 3, "Safety instructions"!



DANGER

Risk of explosion

Danger to life through ignition of any potentially explosive atmosphere while carrying out fitting work on the coupling.
Whilst fitting the coupling there must not be an explosible environment.

NOTICE

Damage to the coupling, damage to other components

Damage to the coupling, the bearings and the hollow shaft through incorrect pulling on.
The coupling parts must be fitted with the aid of suitable equipment to avoid damaging the hollow-shaft bearings through axial joining forces. Use suitable lifting gear.

WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or unauthorized welding work on the coupling or on coupling parts.
No welding work must be done on the coupling or coupling components.

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!

NOTICE

Damage to the coupling, damage to other components

Risk of damage to the coupling through incorrect rework.
Rework must be done considering the 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 reworking.

Note

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

6.1 Instructions for machining the finished bore, for axial fastening, set screws and balancing

6.1.1 Finished bore

- Remove preservative agent from coupling parts before machining.

⚠ CAUTION

Risk of corrosion burns through chemical substances

Avoid burns when working with corrosive cleaning agents.
Observe manufacturer's instructions for handling cleaning agents and solvents.
Wear suitable personal protective equipment (gloves, safety glasses).

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 standard "DIN ISO 286". The parts must be fitted on the marked faces (\square).

Note

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

NOTICE

Damage to the coupling, damage to other components

Risk of damage to the coupling through incorrect rework (e.g. bore diameter too large).
The maximum permissible bore diameters (see table 1) are designed for drive-type fastenings without taper action to standard "DIN 6885/1" and must not under any circumstances be exceeded. These 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 drive-type fastenings provided for, Flender must be consulted.
Drive-type fastenings with taper action are not permissible.

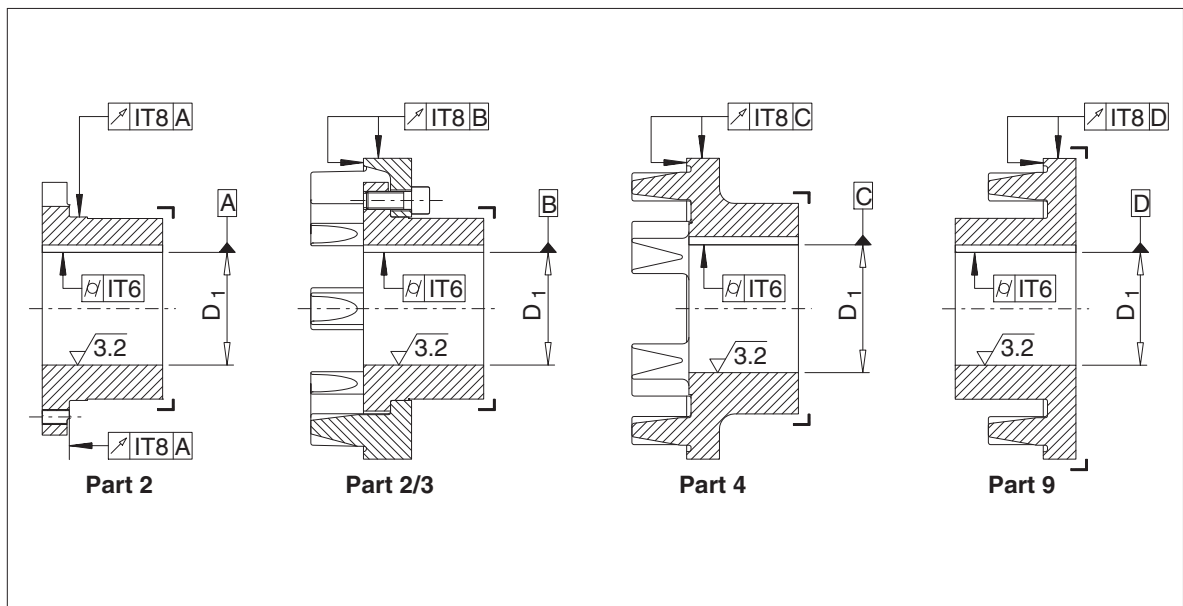


Fig. 4: Finished bore

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
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		165

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
	over 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

NOTICE**Damage to the coupling, damage to other components**

Risk of damage to the coupling through incorrect rework (e.g. incorrect fit assignment).

The assigned fits must be adhered to in each case.

Depending on the utilisation of the tolerance zones, the following items must be observed:

- Keep the play in the shaft-hub connection as low as possible.
- Keep the hub tension arising from the oversize within the permissible load limit.

Failure to adhere to the fit assignments may impair the shaft-hub connection.

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

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.

Note

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

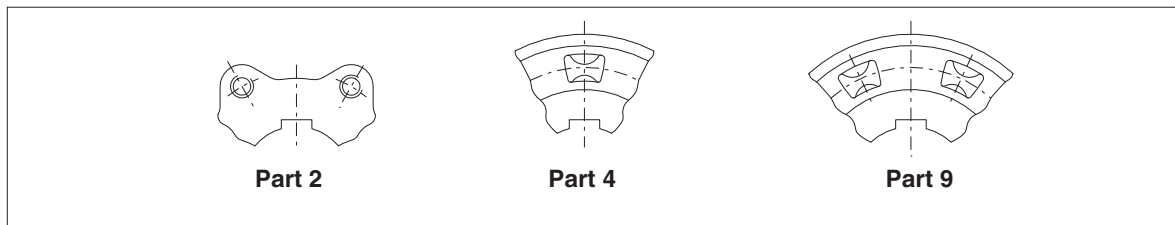


Fig. 5: Parallel keyway

6.1.3 Axial securing

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.

NOTICE

Damage to the coupling, damage to other components

Risk of damage to the coupling through incorrect rework (e.g. incorrect fit set-screw bore). To prevent damage to the shafts, the set-screw bore should be arranged on the parallel keyway. In exceptional cases the set screws must be offset 180° to the parallel keyway, if because of the diameter of the drilled hole and hub core too little material is left between the parallel keyway and the hub core.

6.1.4 Set screws

Set screws with cup points to standard "DIN 916" must be used for set screws.

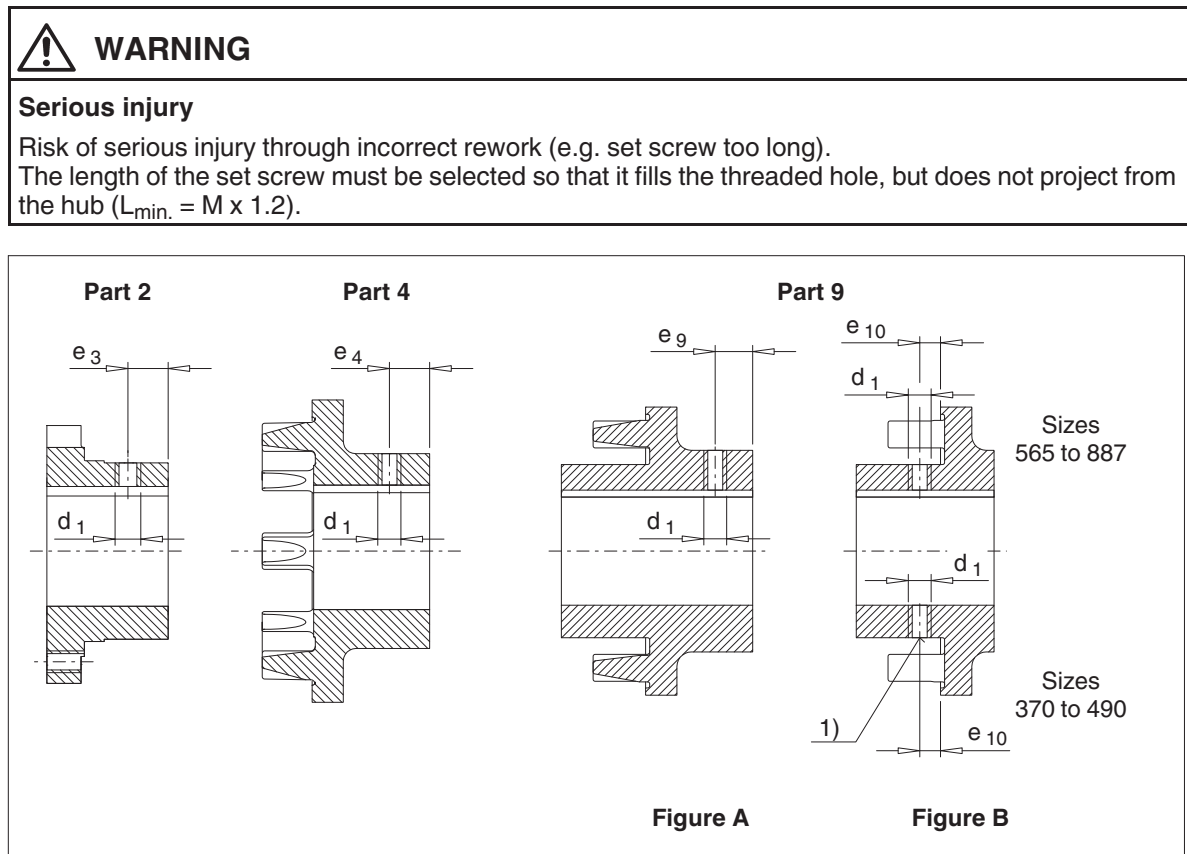


Fig. 6: Set screws

1) Set screw offset by approx. 180° relative to the keyway, arranged between the cams

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

FLUDEX Size	N-EUPEX Size	d ₁	Part 2 e ₃	Part 4 e ₄	Part 9 e ₉	Part 9 e ₁₀	Tightening torque of the set screws [Nm]
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			30	230

Note

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

Part 9: Sizes 370 to 490 acc. to fig. B:
Set screw offset by approx. 180° relative to the keyway, arranged between the cams.

6.1.5 Balancing

FLUDEX couplings are delivered balanced. The fluid coupling is G 6.3 balanced in two levels with fluid filled in (half-key balancing). If the add-on coupling has been fitted with finished bores, it is G 6.3 balanced in two levels (half-key balancing).

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

Balancing is normally done by drilling material away.



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or incorrect bore position and bore design.

Balancing bores must not affect the load-bearing capacity of the coupling parts.

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.

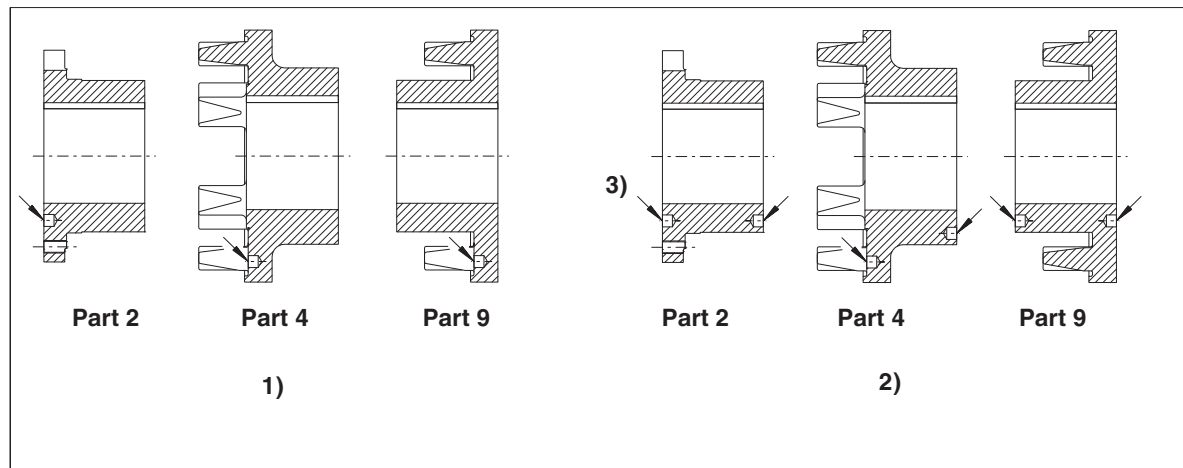


Fig. 7: Balancing

- 1) Arrangement of the balancing bore with one-level balancing
- 2) Arrangement of the balancing bore with two-level balancing
- 3) Balancing bore

6.2 General information on fitting

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

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.



DANGER

Risk of explosion

Risk of explosion when operating in potentially explosive areas.

The conductivity and coating thickness of the paint applied may give rise to electrostatic charges and are potential ignition sources.

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 standard "DIN EN 13463-1". Where coatings have a thickness < 200 µm, no electrostatic charge is to be expected. Where coatings are thicker than 200 µm, an electrostatic charge, e.g. by cleaning the coupling, must be avoided.

NOTICE

Damage to the coupling

Risk of damage to the shaft ends and/or parallel keys.

Unscrew the set screws from the coupling parts before fitting.

NOTICE

Damage to the coupling

Damage to the coupling and/or disruptions to operation through insufficient cleaning.

The surfaces to be joined must be absolutely clean and grease-free.



CAUTION

Risk of corrosion burns through chemical substances

Avoid burns when working with corrosive cleaning agents.

Observe manufacturer's instructions for handling cleaning agents and solvents.

Wear suitable personal protective equipment (gloves, safety glasses).

6.3 Fitting the coupling parts

Observe the following instructions:

- Carefully clean the flange surfaces and coupling parts.
- Apply a lubricant to the shaft ends.
- Before cleaning the N-EUPEX coupling parts with solvent the flexible elements (12) must be removed.



CAUTION

Risk of corrosion burns through chemical substances

Avoid burns when working with corrosive cleaning agents.
Observe manufacturer's instructions for handling cleaning agents and solvents.
Wear suitable personal protective equipment (gloves, safety glasses).

NOTICE

Damage to the coupling, damage to other components

Risk of damage to the coupling through fitting forces by way of the aluminium housing.
Under no circumstances must fitting forces be applied through the aluminium housing, to avoid damage to the coupling parts.
Always use suitable lifting equipment.

NOTICE

Damage to the shaft and the coupling parts

Damage caused by incorrect positioning of the coupling parts on press fits.
The information specified on the dimensioned drawing must be observed.



DANGER

Risk of explosion

Risk of explosion when exceeding the ignition temperature, when using a burner or similar equipment.
Burner and heated coupling parts form an explosion hazard; therefore a non-explosive environment must be ensured.

- Fit the FLUDEX coupling using locking plate (140) and spindle, until they come into contact with the shaft shoulder (see figure 8).
- After being pulled on, the FLUDEX coupling must be secured axially by means of a locking plate (140) and a retaining screw (141) or a set screw (see item 6.1.3).

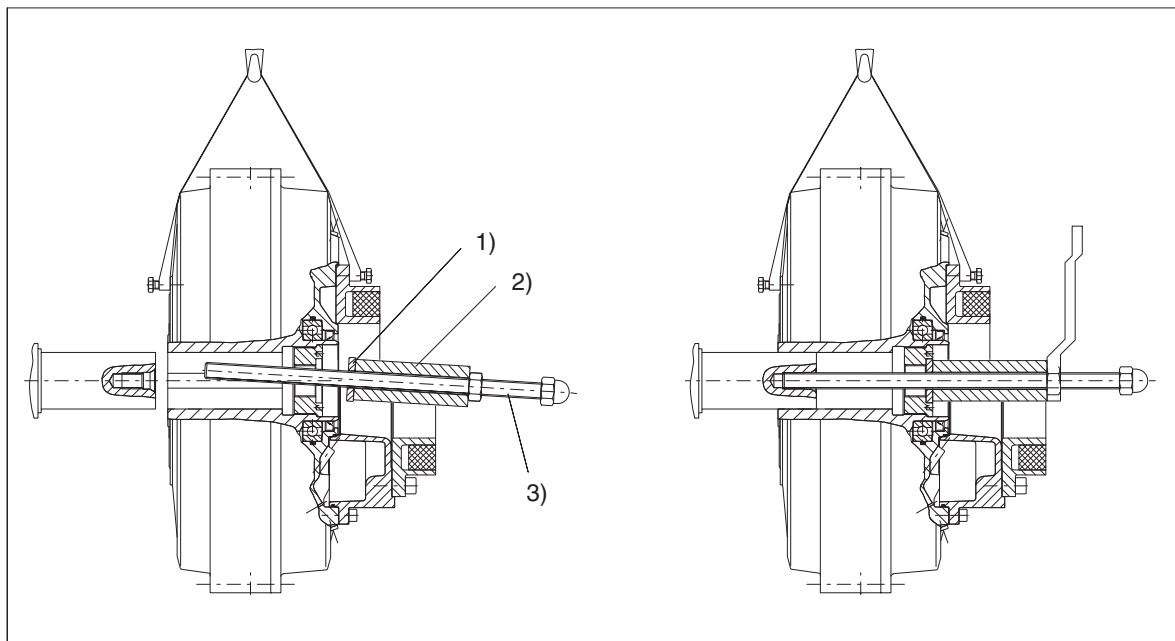


Fig. 8: Fitting the coupling parts

- 1) Locking plate (140)
- 2) Spacer
- 3) Spindle

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.



! WARNING

Risk of burns

Risk of serious injury through burns on hot surfaces (> 55 °C).
Wear suitable protective gloves and protective clothing.

- The N-EUPEX add-on coupling must be fitted pulling it over the entire length of the bore or until it comes into contact with the shaft shoulder.
- After fitting, axially secure the N-EUPEX add-on coupling by means of a locking plate or a set screw (see item 6.1.3).

Note

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

- Any dirt must be removed from the interior of the hollow shaft (106) and the corresponding area of the main coupling.
- On part 1 (1) the flexible elements (12) which have been removed must be refitted.
It must be ensured that the flexible elements (12) are 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.



WARNING

Serious injury

Risk of serious injury through falling components or quenching.

Damage to coupling parts when using unsuitable transport equipment.

When handling these products, use only lifting and handling equipment of sufficient load-bearing capacity.

Transport of the coupling must be carried out so as to avoid personal damage and damage to the coupling.

Dimension "S" must be adhered to. The tightening torques of the bolts parts 13 and 139 are to be checked (for tightening torques and distance dimension "S", see item 6.6 and section 1).



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or attachment of parts with important axial forces or bending moments acting on the coupling housing.

Before fitting components causing axial forces or bending moments in the coupling, Flender must be consulted.

⚠ WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.

The fitting misalignment must not be beyond the permissible range. It is however recommended to align the coupling as precisely as possible so as to have an additional margin for misalignment in operation.

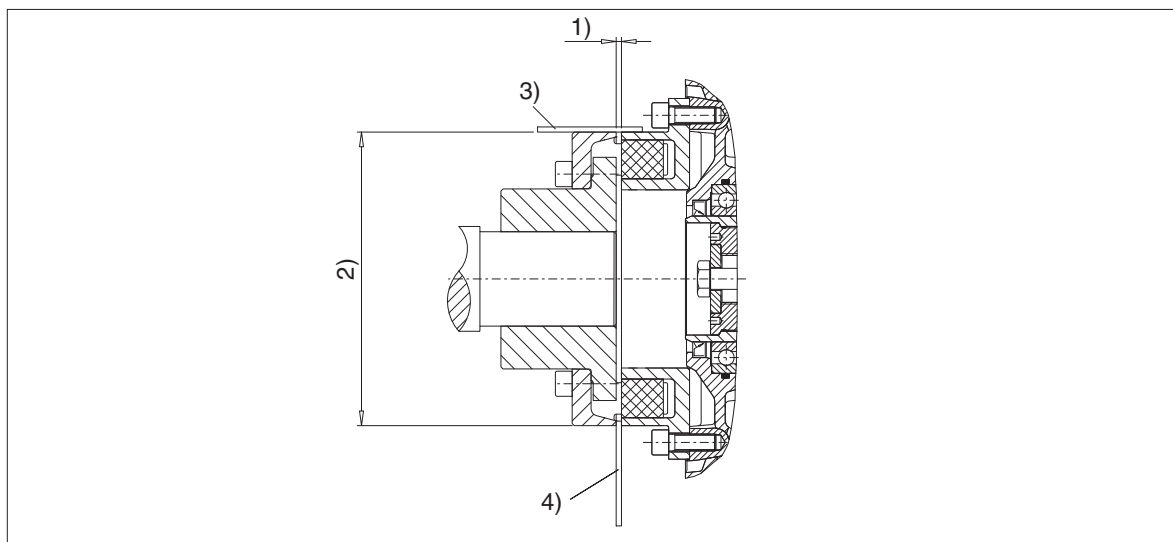


Fig. 9: Alignment

- 1) Coupling gap "S"
- 2) Diameter $d_1 = N\text{-EUPEX Size}$
- 3) Ruler
- 4) Feeler gauge

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.

Alignment has to be done in two axial planes arranged perpendicularly to each other. This can be done by means of a ruler (radial misalignment) and feeler gauge (angular misalignment), as shown in the illustration. Coupling gap "S" should be adhered to (see item 6.5.4).

The aligning accuracy can be increased by using a dial gauge.

To allow the shaft end to rotate freely, the drive train can be disconnected by releasing the screw connection, parts 2/3, and pulling part 3 back out of the sockets of the N-EUPEX coupling.

After re-joining the connection the tightening torque of the bolts (13) must be checked (see item 6.6).

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.

6.5 Possible misalignments

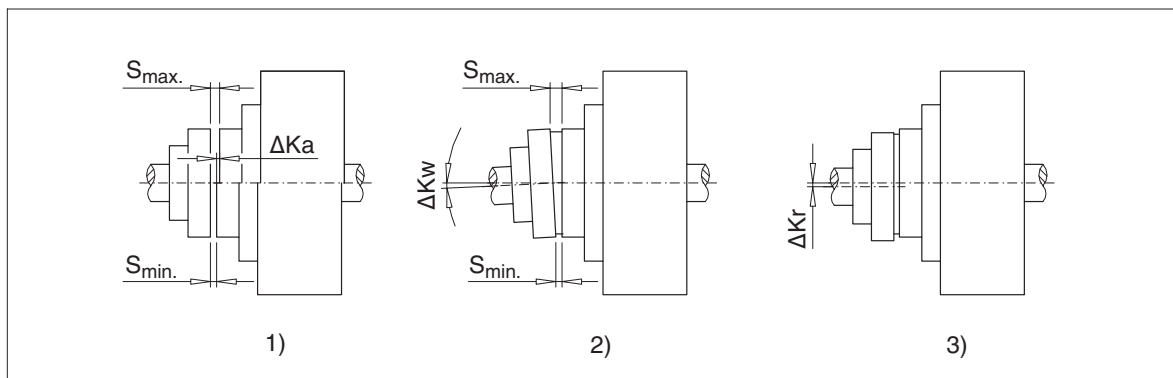


Fig. 10: Possible misalignments

- 1) Axial misalignment
- 2) Angular misalignment
- 3) Radial misalignment

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.).



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling. The fitting misalignment must not be beyond the permissible range. It is however recommended to align the coupling as precisely as possible so as to have an additional margin for misalignment in operation.

6.5.1 Axial misalignment

Axial misalignment ΔK_a (Fig. 10) of the coupling parts relative to one another is permissible within the "permissible deviation" for dimension "S" (see order-related title page).

6.5.2 Angular misalignment

The angular misalignment ΔK_w (Fig. 10) can usefully be measured as the difference in the gap dimension ($\Delta S = S_{\max.} - S_{\min.}$). 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:

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

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

6.5.3 Radial misalignment

For the permissible radial misalignment $\Delta K_{r \text{ perm.}}$ (Fig. 10) – 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
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		
887	440	1.3	1	0.7	0.7	0.6		

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
d₁ corresponds to N-EUPEX size in mm
Radial misalignment $\Delta K_{r_{perm}}$ in mm

Note

Angular and radial misalignment may occur simultaneously.

6.6 Assignment of tightening torques

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

FLUDEX Size	N- EUPEX Size	Tightening torque T_A and wrench width SW for screws Part number																	
		13		103/163		121		130/131		139		153		173		182		192	
		T_A Nm	SW mm	T_A Nm	SW mm	T_A Nm	SW mm	T_A Nm	SW mm	T_A Nm	SW mm	T_A Nm	SW mm	T_A Nm	SW mm	T_A Nm	SW mm	T_A Nm	SW mm
370	180	44	8	60	10	31	8	21	13	31	8	60	10	25	7	31	16	18,7	13
425	225	86	10	60	10	54	10	21	13	31	8	60	10	25	7	54	19	18,7	13
490	250	145	14	60	10	135	14	40	17	54	10	60	10	25	7	54	19	18,7	13
565	280	185	14	60	10	135	14	40	17	54	10	60	10	25	7	18,7	13	18,7	13
655	350	260	17	60	10	260	17	73	19	135	14	60	10	25	7	18,7	13	18,7	13
755	400	340	17	60	10	260	17	73	19	135	14	60	10	25	7	18,7	13	18,7	13
887	440	410	17	60	10	260	17	120	24	135	14	150	17	135	14	18,7	13	18,7	13

Note

Tightening torques apply to bolts with untreated surfaces which are not or only lightly oiled (coefficient of friction " μ " = 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 information in section 3, "Safety instructions"!

NOTICE

Damage to the coupling

Risk of damage to the coupling parts owing to not removing the transport lock.
Operation with the transport locks fitted is not permissible. All transport locks must be removed.

7.1 Procedure before start-up

NOTICE

Damage to the coupling

Risk of damage to the coupling through frozen operating fluid.
The ambient temperature must be above the freezing point of the operating fluid.
If the ambient temperature falls below this freezing point, the coupling must be brought up to operating temperature before operation.

These following items must be checked before the start-up.

- Correct seating of the flexible elements (12).
The flexible elements (12) must be flush with the the end face of the hub.
- Tightening of the set screws.
- Rectify the alignment and the distance dimension "S", if necessary.
- Check tightening torques of all the screw connections (see section 1 and section 6).

7.2 Fluid filling



DANGER

Risk of explosion

Risk of explosion when using unpermitted operating fluid below ground in potentially explosive areas.
Only specifically permitted operating fluids may be used for operation below ground. Follow the country-specific regulations.



WARNING

Serious injury

Risk of serious injury through wrong operating fluid and incorrect filling quantity of the coupling.
The operating fluid used and its quantity must correspond to the specifications in the operating manual.
The supplied instructions for use issued by the manufacturer of the operating fluid must be observed.



WARNING

Risk of burns

Risk of serious injury through burns on hot surfaces (> 55 °C).
Allow the coupling to cool down.
Wear suitable protective gloves and protective clothing.

! WARNING

Risk of scalding

Risk of serious injury through escaping hot operating fluid, when it is being changed.
Wear suitable protective gloves, protective glasses and protective clothing.
Allow the operating fluid to cool down.

The behaviour and the efficiency of the FLUDEX coupling are decisively affected by the quantity of the 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 unchanged load.

! WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.
The filling quantity is defined by the works in relation to the order, if the drive details are available. Otherwise the filling quantity is selected from the table in the operating instructions. FLUDEX couplings must not be filled up to more than 80 to 85 % of the total volume. Higher filling quantities cause a sharp rise in pressure in the coupling, which may cause the coupling to burst. The instructions for use enclosed by the operating fluid manufacturer must be observed. Only the filling openings prescribed must be used for filling.

The operation fluid should be filled in through a fine filter element (mesh width $\leq 30 \mu\text{m}$) on the filler plug (153), see figure 11. 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 / fusible safety 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.

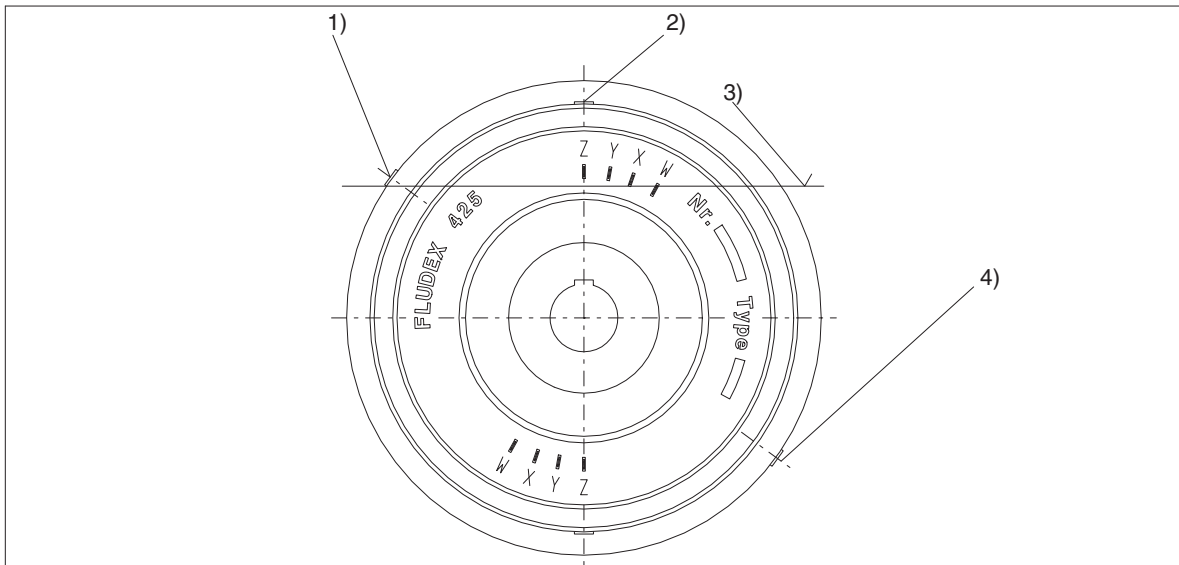


Fig. 11: Filling

- 1) Screw plug / fusible safety plug (163)
- 2) Filling plug (153)
- 3) maximum filling level
- 4) Fusible safety plug (103)

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 filling level. These can be marked on the coupling, and/or further markings can be added when the coupling is first filled with the correct filling quantity.

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

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

When changing the fluid take care that the old fluid has been drained completely. Draining the fluid is possible by way of the openings in the screw plug (163). Drain the residual fluid off the prechamber of the "FV" und "FVV" types additionally by way of the opening in the screw plug (173) in figure 19 in section 11.2.

- Check the coupling for leaktightness during a short test run.
Testing the leaktightness 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.



WARNING

Risk of serious injury through escaping operating fluid

Risk of serious injury through incorrectly tightened screw plugs.

After topping up the tightening torques specified in the manual must be adhered to. Perform a test run (with protective covering) with leaktightness test.

NOTICE

Material damage

Damage to the coupling possible.

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).

- Finally attach the coupling safeguard to prevent any accidental 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 will escape. The coupling safeguard 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 always be accessible.

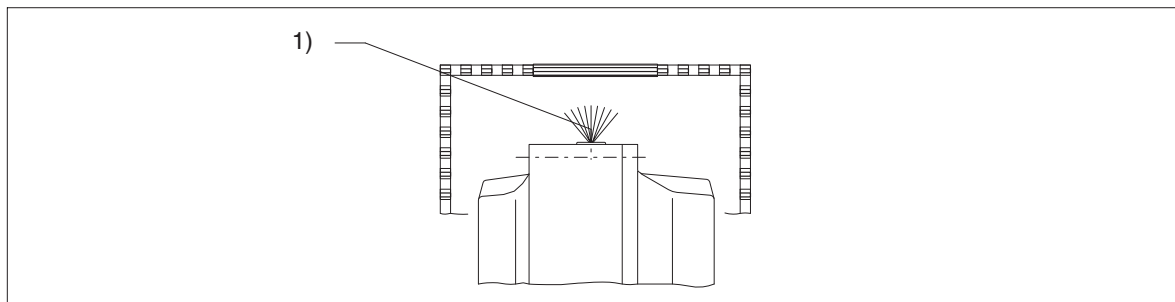


Fig. 12: Coupling safeguard

- 1) Fusible safety plug (103)



WARNING

Risk of serious injury through rotating components

Risk of serious injury through contact with rotating components.

The coupling must be fitted with suitable safeguards to prevent any contact. The operation of the coupling must not be impaired by the safeguard. This also applies to test runs and when checking the direction of rotation.

Protect the coupling against spurting, hot operating fluid without substantially impairing the coupling ventilation.

The fusible safety plug, the filler plug and the drain plug must remain accessible.



DANGER

Risk of explosion

Risk of explosion in case of non-observance of the prescription relating to aluminium used below ground. 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.



DANGER

Risk of explosion

Risk of explosion through use of wrong fusible safety plugs.

In couplings fit only fusible safety plugs, which are approved for the temperature class for use in potentially explosive areas.

7.2.1 Operating fluid

The fluid coupling must only be operated with water or a water emulsion. When using a water emulsion the following must be observed:

- Compatibility with the sealing material "NBR" (nitrile butadiene rubber).
- pH value 5 to 8

The fluid should be mixed with only a small quantity of salts and contain only a sufficiently small concentration of other additives. These requirements are normally met by drinking water.

Where orders are made without stating performance data, the filling quantity is not stamped on the coupling. In these cases, for operation with water or water emulsion, the filling quantity for the respective coupling size can be obtained from the filling-quantity tables in section 10, item 10.9 to item 10.14 dependent of the rotation speed and the output to be transmitted (e.g. the motor output).

NOTICE

Risk of damage to the coupling through improper storage

Risk of damage to the coupling through freezing of operating fluid.

In case of types provided for operation with water, the water or water emulsion must be drained off before storing at temperatures below 0 °C.

Frost hazard.




CAUTION

Risk of corrosion burns through chemical substances

Avoid burns when working with corrosive cleaning agents.

Observe manufacturer's instructions for handling cleaning agents and solvents.

Wear suitable personal protective equipment (gloves, safety glasses).

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): "  W".



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments from burst coupling owing to overpressure.

If water or water emulsion is used as operating fluid, only fusible safety plugs with a maximum fusing temperature of 110 °C are permitted to avoid high overpressure.

8. Operation

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



DANGER

Risk of explosion

Coupling with worn flexible elements (12) are potential explosion hazards.

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

WARNING

Hearing damage

Risk of hearing damage through noise emission.

In the case of sound-pressure levels > 80 dB(A) wear ear protectors.

WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments resulting from wrong design and/or insufficient operation factors.

In the event of a change in operating conditions (output, speed, change to the prime mover and driven machine) the design must unconditionally be checked.



DANGER

Risk of explosion

If the operating fluid spurts out, there is a risk of short circuiting.

Operating fluid may spurt out onto electrical equipment.

The operating fluid must not spurt out in the direction of electrical equipment.

8.1 General operating data

During operation of the coupling watch for the following:

- Changes in running noises (see item 9.2 in table 7)
- Sudden vibrations (see item 9.2 in table 7)

WARNING

Serious injury

Rotating components may cause injury during work on the still rotating coupling.

All work on the coupling must be carried out only when it is at a standstill. Secure the drive unit to prevent unintentional switch-on. A notice should be attached to the ON switch stating clearly that work on the coupling is in progress. The relevant accident prevention regulations at the place of installation apply as well.

WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.

If any malfunctions or changes are noticed during operation, the drive assembly must be switched off at once.

9. Faults, causes and remedy

Observe the information 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 component units must be included when tracing faults.

The coupling must run with little noise and vibration in all operating phases. Irregular behaviour must be treated as a fault requiring immediate remedy.



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.

- Any changes on the part of the user are not permitted. This applies equally to safety features designed to prevent accidental contact.
- The coupling is designed only for the application specified in the order. Other operating conditions are regarded as incorrect and must be contractually agreed. For any damage resulting therefrom only the user or operator of the machine or plant is responsible.



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.

If any malfunctions or changes are noticed during operation, the drive assembly must be switched off at once.

Note

Determine the cause of the fault, using the trouble-shooting table. If the cause cannot be identified and/or the unit repaired with the facilities available, you are advised to contact one of our customer-service offices for specialist assistance.



WARNING

Serious injury

Risk of serious injury or risk of damage to the coupling.

The relevant safety and environmental regulations must be complied with.

Note

Depending on national regulations, coupling and clutch components have to be disposed of separately or separated for recycling.

9.2 Possible faults

Table 7: Possible faults

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



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.
Only undamaged coupling parts must be used. In particular the teeth, holes, screw threads and joining and sealing surfaces must not be damaged.



DANGER

Risk of explosion

Risk of explosion when operating in potentially explosive areas through damage.
Damaged coupling modules and coupling parts are potential explosion hazards.
Use only undamaged coupling components. Operating the coupling with damaged coupling parts is not permitted in potentially explosive environments in accordance with Directive 2014/34/EU.

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 requirements in Directive 2014/34/EU can no longer be guaranteed.

Measurement and assessment of the wear condition of the N-EUPEX flexible elements (12) should be done 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 especial care.



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.
The coupling is designed only for the application specified in the order. Other operating conditions are regarded as incorrect and must be contractually agreed. For any damage resulting therefrom only the user or operator of the machine or plant is responsible.

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 being taken into consideration.
- The ambient temperature is not permissible. Observe section 5.
- 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 fitting 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 sides are being interchanged, i.e. their assignment to the specified drive direction 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 safeguard 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.
- Add-on parts are not designed in compliance with the Directive 2014/34/EU and are an explosion hazard.

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 fitted.
- Specified tightening torques are not being adhered to.
- Old or damaged N-EUPEX flexible elements (12) are being used.
- 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 information in section 3, "Safety instructions"!

DANGER

Danger to life through switched-on installation

Risk of being caught or drawn in by rotating and/or movable parts.

To carry out work on the coupling, the system must always be stopped. 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 on the coupling is in progress. The relevant accident prevention regulations at the place of installation apply as well.

At the same time the complete installation must be without load, so that no danger occurs during demounting operations.

WARNING

Serious injury

Rotating components may cause injury during work on the still rotating coupling.

All work on the coupling must be carried out only when it is at a standstill. Secure the drive unit to prevent unintentional switch-on. A notice should be attached to the ON switch stating clearly that work on the coupling is in progress. The relevant accident prevention regulations at the place of installation apply as well.

CAUTION

Risk of corrosion burns through chemical substances

Avoid burns when working with corrosive cleaning agents.

Observe manufacturer's instructions for handling cleaning agents and solvents.

Wear suitable personal protective equipment (gloves, safety glasses).

Note

During fitting work comply with the relevant safety and environmental regulations.

Sufficient room and tidiness and cleanliness must be ensured during fitting work.

WARNING

Risk of scalding

Risk of scalding immediately after switching off.

Never change the operating fluid immediately after operation.

Allow the coupling and operating fluid to cool down.



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling.

- The order of the described fitting steps must be adhered to.
- Adhere to specified tightening torques. Observe the instructions relating to cleaning and/or treatment of the bolts with auxiliary materials.
- No welding work must be done at all on the coupling.
- Only undamaged coupling parts must be used. In particular the teeth, holes, screw threads and joining and sealing surfaces must not be damaged.

10.1 Changing the operating fluid



WARNING

Risk of burns

Risk of serious injury through burns on hot surfaces (> 55 °C).
Wear suitable protective gloves and protective clothing.

NOTICE

Damage to the coupling

Damage to the coupling when topping up operating fluid.
Risk of burns immediately after switching off. Never change the operating fluid immediately after operation.
Allow the coupling and operating fluid to cool down.

The operating fluid must be changed in accordance with the specifications in table 8.

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 plug (163). The residual fluid in the prechamber of types **FV and FVV** is drained off through the screw plug (173).



WARNING

Serious injury

Risk of serious injury or risk of damage to the coupling.
The relevant safety and environmental regulations must be complied with.

Table 8: Operating temperatures, operating hours and years of use

Operating temperatures / special measures	maximum number of operating hours of the operating fluid	maximum number of operating years of the operating fluid
maximum 85 °C	8000	1

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

10.2 Changing the shaft-sealing rings

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. In order to keep maintenance-related disruptions to operation as few as possible, it is recommended to keep replacement parts in stock.

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



! DANGER

Risk of explosion

Risk of explosion when using the coupling without or with worn flexible elements (12) in potentially explosive areas.

The torsional backlash between the coupling parts must be checked after 3 months, then at least once a year. If the 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.

The flexible elements (12) can continue to be used up to a specified wear limit. To assess wear, the permitted torsional backlash, converted to the chord dimension ΔS_V on the outer coupling diameter, is shown in table 9. To obtain the dimension ΔS_V , one coupling part is rotated without torque as far as the stop and a mark applied to both sides (see figure 13). 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 9, the flexible elements (12) must be replaced.

NOTICE

Damage to the coupling through damage to the flexible elements

Damage to the coupling through damage to the flexible elements (12) possible.

The flexible elements must be replaced in sets.

Only identical flexible elements (12) may be used in one coupling.

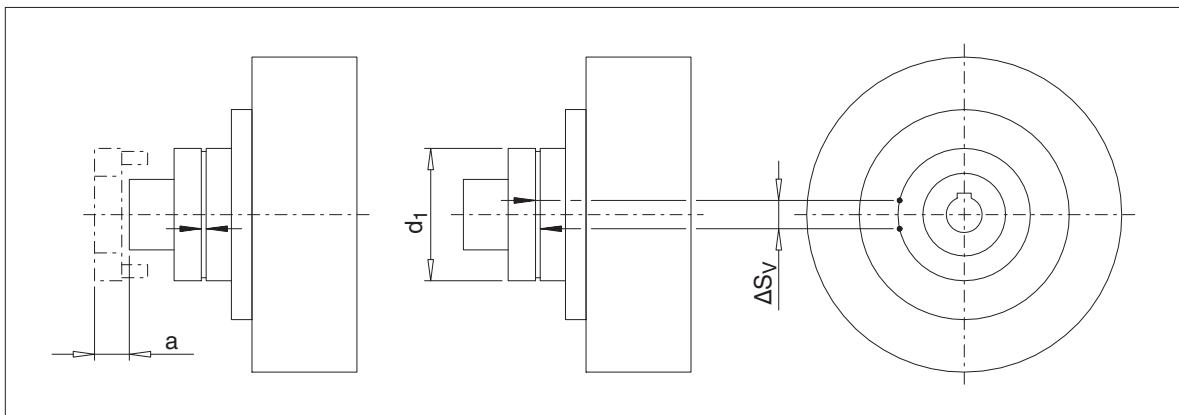


Fig. 13: Maintenance interval of the N-EUPEX add-on coupling

Table 9: Wear mark

FLUDEX Size	370	425	490	565	655	755	887
N-EUPEX Size [d_1]	180	225	250	280	350	400	440
Wear mark ΔS_V [mm]	8.0	9.0	10.0	11.5	11.5	13.0	14.0
Replacement space a [mm]	10	9	11	5	0	0	0

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" and "FVD" types, replacement of the flexible elements (12) is possible without moving the coupled machines, if the replacement space "a" (see table 9 and figure 13 in item 10.3) has been 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 detailed part designations, see section 11.



WARNING

Risk of burns

Risk of serious injury through burns on hot surfaces (> 55 °C).
Allow the coupling to cool down.
Wear suitable protective gloves and protective clothing.



WARNING

Risk of scalding

Risk of serious injury through escaping hot operating fluid, when it is being changed.
Wear suitable protective gloves, protective glasses and protective clothing.
Allow the operating fluid to cool down.



WARNING

Serious injury

Risk of serious injury through falling coupling parts.
Secure all coupling parts before undoing the clamping bolts.

- After moving the motor away remove the retaining screw (141) and locking plate (140).

Note

When pulling off the FLUDEX coupling, care must be taken that pulling-off forces are conducted only through the steel hollow shaft (106).

- Using a threaded spindle (figure 14) extract the FLUDEX coupling.
- Screw the spindle into the forcing-off thread (dimension G) of the sleeve (143) and turn forward as far as the shaft-stub end face and into the protective countersink in the centring thread (Figure 15).
- Apply a lubricant to the pressure surface and thread, to prevent the spindle from seizing.

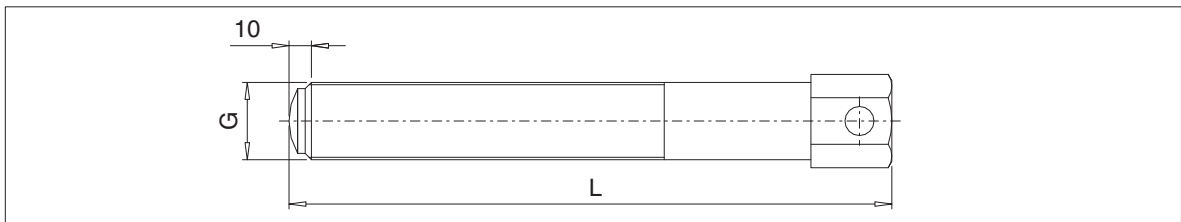


Fig. 14: Forcing-off spindle

Table 10: Dimensions of the threaded spindle and external cylinder thread

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	M100 x 2
Spindle length L [mm]	Type FG.	305	335	375	385	440	550
	Type FV.	345	390	440	470	530	650
	Type FVV.	385	445	500	555	655	840

- Support the spindle to prevent flexing and canting (see figure 15).
- Fasten the shaft stub to prevent it from rotating.
- Pull the coupling off the shaft stub by turning the spindle further into the forcing-off thread.

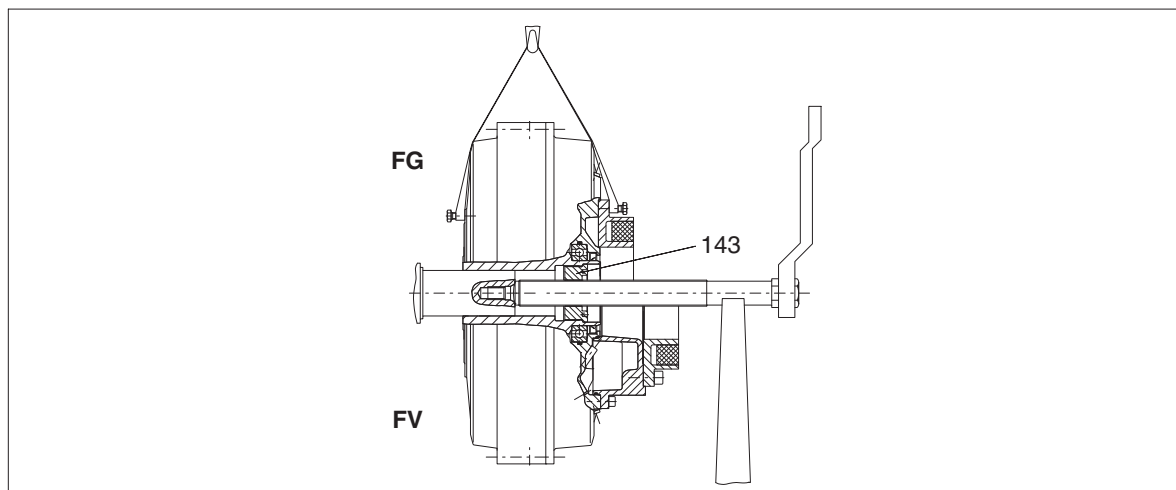


Fig. 15: Support of spindle

Depending on the size of the coupling, it is recommended that a hydraulic spindle or a hydraulic cylinder be used. Doing so the following procedure must be adhered to:

- Demount the threaded bush (143).
- Screw the hydraulic cylinder with a matching external cylinder thread "K" (see table 10) into the free mounting thread of the hollow shaft (106) (figure 16).
- Pull the coupling off the shaft hub by operating the hydraulic cylinder.

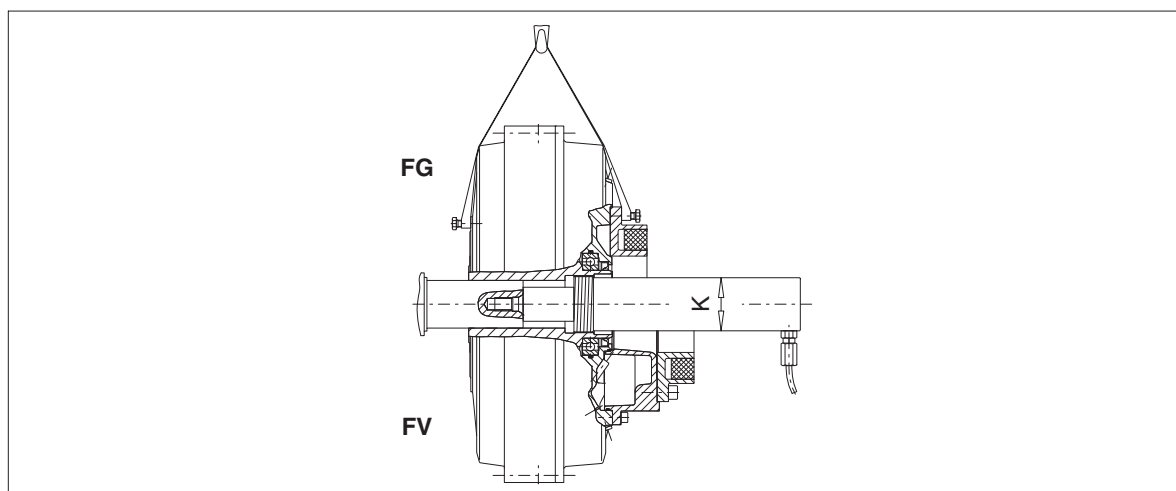


Fig. 16: Demounting the FLUDEX coupling using a hydraulic spindle or a hydraulic cylinder

10.6 Demounting the FLUDEX coupling

For detailed part designations, see section 11.

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

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

The housing parts of the main 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.

To pull off the shell and cover, a pressure spindle with a bridge and pulling screws must be applied as shown in figure 17. The pressure acts on the end face of the hollow shaft. The pulling screws are inserted in the flange threads of the shell or cover.

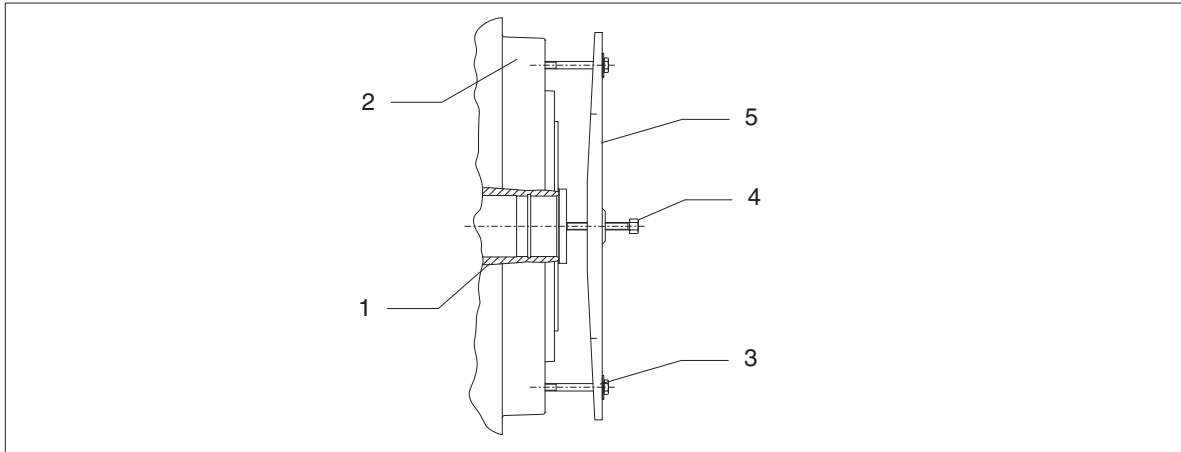


Fig. 17: Demounting the FLUDEX coupling

- | | | | |
|---|---------------|---|------------------|
| 1 | Hollow shaft | 4 | Pressure spindle |
| 2 | Shell (101) | 5 | Bridge |
| 3 | Drawing bolts | | |

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. The rolling bearings must be checked and may be used again if they are found to be in order.

10.7 Re-fitting the FLUDEX coupling

CAUTION

Risk of corrosion burns through chemical substances

Avoid burns when working with corrosive cleaning agents.
Observe manufacturer's instructions for handling cleaning agents and solvents.
Wear suitable personal protective equipment (gloves, safety glasses).

- Before re-fitting the residual old grease must be removed from all components.
- Grease the O-ring (114) lightly to assist assembly.
- Apply grease to both sides of the rolling bearings (109, 134) (for approved grease types, see table 11). Do not apply additional grease to the rooms between the rolling bearings (see figure 18).
- The shaft-sealing rings (111, 132, 183, 193, 199) are fitted with a grease filling between the dust and sealing lips (see figure 18).
- Fill the room above the spring completely with grease.

- 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.

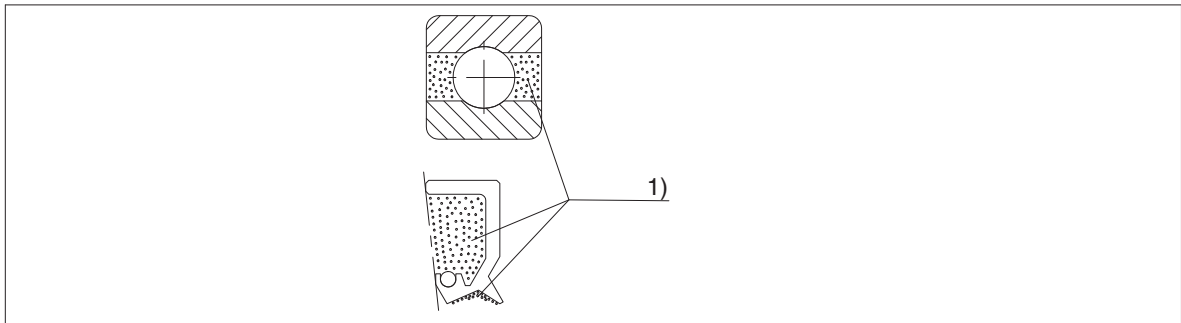




Fig. 18: Filling the rolling bearings and the shaft-sealing rings with grease

1) Grease filling (see also table 11)

- Seal the prechamber (115) of the "FV" und "FVV" series towards the blade shell (101) using the O-rings (117, 138).
- With bolts (130) and nuts (131), screw the shell (101) and cover (102) on the outer flange (see section 10.6) of the main coupling together (observe part marking).

Table 11: Approved grease types

Manufacturer		
Product	OPTITEMP PS2	AMBLYGON TA 15/2

The shell (part 101) can then be completely pre-assembled.

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 had been sealed with sealing thread before. Sealing threads must be lightly greased and laid, with the thread ends crossed over, in the channel round the relevant centring shoulder. The sealing surface must be undamaged.

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

10.8 Re-fitting 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 370, 490, 655 and 887

Approximative values for water or water emulsion

With drive via blade shell (101) (outer wheel), valid for $T_{max.} = 2 \times T_{nom.}$

Table 12: Filling quantities for FLUDEX "FG." couplings, sizes 370, 490, 655 and 887

Output kW	Speed 1/min									Size
	600	740	890	980	1180	1470	1770	2300	2950	
	Water or water-emulsion quantities in litres									
1.1	5.1	4.0								
2.2	6.3	5.2	4.3	3.7						
3.0	6.8	5.7	4.8	4.3	3.4					
4.0	11.5	6.2	5.2	4.8	3.8					
5.5	12.6	6.7	5.8	5.3	4.4					
7.5	14.0	11.5	6.3	5.8	4.9	3.8				
11	15.5	12.9	7.0	6.5	5.5	4.4	3.5			
15	17.0	14.2	12.0	7.1	6.1	4.9	4.0			
18	28.1	15.0	12.6	11.6	6.4	5.2	4.3			
22	29.9	15.8	13.5	12.3	6.7	5.5	4.7	3.4		
30	34.1	17.0	14.8	13.6	11.4	6.1	5.1	3.8		
37	36.9	28.8	15.6	14.5	12.2	6.5	5.5	4.3		
45	38.8	30.9	16.5	15.3	12.9	6.8	5.8	4.6		
55	40.6	33.7	27.6	16.1	13.8	7.2	6.2	4.9	3.6	
75	68.6	37.6	30.4	27.7	15.1	12.4	6.7	5.3	4.2	
90	72.0	39.3	32.8	29.2	15.8	13.1	11.0	5.7	4.5	
110	77.4	40.8	36.1	31.5	16.8	14.0	11.7	6.0	4.8	
132	83.9	67.5	37.7	34.4	27.8	14.7	12.4	6.4	5.1	
160	91.0	70.9	39.5	36.8	29.4	15.5	13.1	10.2	5.4	
200	96.4	76.5	40.8	38.9	32.1	26.2	14.1	11.0		
250	101.6	84.2	69.0	40.8	35.7	27.7	15.1	11.9		
315		92.1	73.7	68.0	38.0	29.6	25.5	12.7		
350		94.7	76.6	69.8	39.0	30.8	26.2			
400		97.8	81.1	72.5	40.2	32.6	27.1			
500		102.0	90.1	78.7	66.5	36.1	28.7			
600			94.3	85.6	69.5	37.8	30.6			
750			99.5	92.7	74.3	62.4				
900				97.1	79.8	65.3				
1100					87.6	68.5				
1300					92.5					

Note

With different operating fluids, drive via the inner gear or $T_{max.}$ not equal to $2.0 \times T_{nom.}$, observe changed filling quantities.

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

Approximative values for water or water emulsion

With drive via blade shell (101) (outer wheel), valid for $T_{max.} = 2 \times T_{nom.}$

Table 13: Filling quantities for FLUDEX "FG." couplings, sizes 425, 565 and 755

Output kW	Speed 1/min									Size
	600	740	890	980	1180	1470	1770	2300	2950	
	Water or water-emulsion quantities in litres									
1.1	5.8									
2.2	7.6	6.0								
3.0	8.4	6.9	5.4							
4.0	9.2	7.5	6.2	5.4						
5.5	10.0	8.3	7.0	6.3						
7.5	10.9	9.2	7.7	7.0	5.6					
11	19.3	10.1	8.7	7.9	6.6					
15	21.4	17.5	9.5	8.7	7.3	5.7				
18	22.5	18.5	10.0	9.2	7.8	6.2				
22	23.7	19.7	10.6	9.8	8.3	6.7	5.3			
30	25.9	21.8	18.3	10.6	9.1	7.4	6.0			
37	43.1	23.1	19.4	17.8	9.7	7.9	6.6			
45	45.9	24.2	20.7	18.9	10.2	8.4	7.1	5.2		
55	49.7	25.7	22.1	20.1	10.8	9.0	7.5	5.6		
75	56.4	44.0	23.9	22.2	18.7	9.8	8.3	6.4		
90	59.1	47.0	25.2	23.3	19.7	10.2	8.8	6.9		
110	62.0	51.2	42.1	24.5	21.1	17.1	9.3	7.3	5.5	425
132		55.5	44.2	26.0	22.3	18.2	9.8	7.8	5.9	
160		58.4	47.4	43.0	23.4	19.2	16.1	8.2	6.5	
200		61.5	52.3	46.2	24.8	20.6	17.3	8.8	7.0	
250			56.7	50.7	41.8	22.1	18.6	13.8		565
315			60.1	55.9	44.5	23.5	19.9	15.5		
400			62.5	59.4	48.8	40.0	21.6	16.9		
500				62.5	54.1	42.2	37.0			765
600					57.2	44.3	38.5			
750						48.1	40.7			
900						52.3				
1000						55.1				

Note

With different operating fluids, drive via the inner gear or $T_{max.}$ not equal to $2.0 \times T_{nom.}$, observe changed filling quantities.

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

Approximative values for water or water emulsion

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

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

Output kW	Speed 1/min									Size
	600	740	890	980	1180	1470	1770	2300	2950	
1.1	5.0									
2.2	6.4	5.1	3.9							
3.0	7.2	5.8	4.5	3.9						
4.0	7.9	6.4	5.2	4.5						
5.5	13.0	7.1	5.9	5.3	4.0					
7.5	14.6	7.9	6.5	5.9	4.7					
11	16.7	13.4	7.5	6.7	5.6	4.1				
15	18.6	15.0	12.1	7.5	6.2	4.8				
18	19.4	15.9	113.0	7.9	6.6	5.2	4.0			
22	32.0	17.1	14.1	12.6	7.1	5.6	4.3			
30	34.9	19.0	15.6	14.2	7.8	6.3	5.1			
37	37.6	31.0	16.9	15.2	12.4	6.7	5.6	3.9		
45	41.2	32.8	18.1	16.3	13.4	7.3	6.0	4.2		
55	45.8	34.7	19.1	17.6	14.4	7.7	6.4	4.7		
75	48.6	38.9	32.4	19.2	16.0	12.6	7.1	5.4		
90	76.6	42.6	34.0	31.4	17.2	13.6	10.4	5.8	4.1	370
110	81.2	46.6	36.3	33.2	18.4	14.6	11.7	6.2	4.5	
132	85.4	48.4	39.1	35.0	29.9	15.5	12.7	6.6	5.0	
160	91.0	75.5	43.0	37.5	31.5	16.6	13.7	9.5	5.4	490
180	95.6	78.0	45.9	39.5	32.7	17.4	14.3	10.0		
200	100.4	80.5	47.0	41.6	33.6	27.8	14.8	10.5		
250	112.9	85.6	73.4	46.4	35.9	29.8	16.0	12.0		
315	119.0	92.8	78.2	72.4	39.5	31.7	26.9	13.1		
350	120.0	97.1	80.0	74.3	41.6	32.7	27.8			655
400		103.7	83.6	77.0	44.7	33.9	29.1			
500		115.0	89.5	82.1	70.2	36.4	30.9			
600			96.4	86.4	74.0	39.2	32.6			887
750			107.9	93.8	78.7	64.8				
900				102.1	82.8	68.6				
1100					87.8	73.0				

Note

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

Approximative values for water or water emulsion

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

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

Output kW	Speed 1/min									Size
	600	740	890	980	1180	1470	1770	2300	2950	
	Water or water-emulsion quantities in litres									
2.2	7.6									425
3.0	8.6	6.4								
4.0	9.5	7.5								
5.5	10.6	8.5	6.5							
7.5	11.7	9.5	7.7	6.0						
11	20.2	10.8	8.9	8.0	6.1					
15	22.8	12.0	9.9	9.0	7.1					
18	24.2	19.1	10.6	9.6	7.8					
22	26.0	20.8	11.3	10.2	8.4	6.2				
30	29.0	23.3	18.8	11.4	9.4	7.3				
37	30.4	25.0	20.0	12.1	10.1	8.0	6.1			
45	48.0	26.9	22.0	19.7	10.9	8.6	6.6			
55	50.7	28.7	23.7	21.3	11.6	9.3	7.5			
75	56.3	46.4	26.4	23.8	19.3	10.3	8.5	5.9		
90	61.1	48.9	28.2	25.4	20.9	11.0	9.0	6.4		
110	67.8	51.7	29.9	27.4	22.4	16.6	9.7	7.1		
132	71.1	54.8	46.6	29.1	23.9	18.6	10.3	7.8		
160	72.7	59.5	49.2	45.4	25.5	20.1	15.3	8.4		
180	72.7	63.1	50.8	46.8	26.7	21.1	16.1	8.7		
200		66.7	52.3	48.3	27.8	21.9	17.0	9.1		
250		71.3	56.7	51.3	44.1	23.7	19.2			
315			63.3	55.4	46.9	25.7	21.1			
350			66.9	57.9	48.3	39.9	21.9			
400			70.0	61.7	50.1	41.5	23.1			
500				69.2	53.5	44.5	37.0			
600					57.4	46.7	39.7			
750						49.7	42.5			

Note

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

10.13 Filling quantities for FLUDEX "FVV." couplings, sizes 370, 490, 655 and 887

Approximative values for water or water emulsion

With drive via blade shell (101) (outer wheel), valid for $T_{max.} = 1.3 \times T_{nom.}$

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

Output kW	Speed 1/min									Size
	600	740	890	980	1180	1470	1770	2300	2950	
	Water or water-emulsion quantities in litres									
1.1	5.2									
2.2	6.9	5.4								
3.0	7.7	6.1	4.6							
4.0	8.5	6.8	5.5	4.6						
5.5	13.6	7.6	6.3	5.6	4.2					
7.5	15.5	8.5	7.0	6.3	4.8					
11	17.7	14.0	8.1	7.2	5.9	4.2				
15	19.9	15.8	8.8	8.1	6.6	4.9				
18	21.0	16.9	13.7	8.6	7.1	5.5	4.1			
22	34.2	18.2	14.8	13.2	7.6	6.0	4.5			
30	37.6	20.3	16.6	15.0	8.5	6.7	5.4			
37	40.3	33.2	17.9	16.2	13.0	7.2	5.9			
45	43.8	35.2	19.4	17.3	14.1	7.8	6.3	4.3		
55	48.8	37.3	20.7	18.7	15.2	8.4	6.8	4.8		
75	53.7	41.6	34.7	20.8	17.0	13.2	7.6	5.7		
90	78.0	45.3	36.6	33.6	18.2	14.3	10.7	6.1	4.2	370
110	82.7	50.6	38.9	35.8	19.7	15.4	12.0	6.6	4.7	
132	87.1	53.0	41.8	37.7	32.1	16.5	13.3	7.0	5.2	
160	92.3	76.9	45.8	40.1	33.8	17.7	14.4		5.7	
200	101.1	81.9	51.8	44.3	36.2	29.5	15.7	10.8		490
250	113.3	87.3	74.8	50.0	38.6	31.9	17.0	12.2		
315	122.9	93.9	79.5	73.3	42.2	34.0	28.5	13.7		
350	125.5	98.1	82.1	75.8	44.3	35.1	29.5	14.4		
400		104.2	85.3	78.4	47.6	36.5	30.9			655
500		117.3	91.0	83.8	70.9	39.1	33.1			
600			97.5	88.1	75.4	42.0	34.9			
750			108.3	94.9	80.0	65.3	37.3			
900				102.6	84.5	69.3				887
1100					89.4	74.2				
1300					94.6	77.7				

Note

With different operating fluids, drive via the inner gear or $T_{max.}$ not equal to $1.3 \times T_{nom.}$, observe changed filling quantities.

10.14 Filling quantities for FLUDEX "FVV." couplings, sizes 425, 565 and 755

Approximative values for water or water emulsion

With drive via blade shell (101) (outer wheel), valid for $T_{max.} = 1.3 \times T_{nom.}$

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

Output kW	Speed 1/min									Size
	600	740	890	980	1180	1470	1770	2300	2950	
Water or water-emulsion quantities in litres										
3.0	9.3	6.7								
4.0	10.4	7.8								
5.5	11.6	9.2	6.9							
7.5	13.0	10.4	8.2	6.9						
11	21.4	11.9	9.7	8.6	6.4					
15	24.4	13.3	10.9	9.8	7.4					
18	26.1	20.1	11.6	10.5	8.4					
22	28.0	22.0	12.6	11.2	9.1	6.5				
30	31.5	25.0	13.8	12.7	10.3	7.6				
37	33.6	26.9	21.7	13.6	11.1	8.6	6.4			
45	49.6	29.0	23.6	20.6	11.9	9.3	7.0			
55	52.6	31.3	25.5	22.8	12.9	10.1	7.8			
75	57.8	47.9	28.5	25.7	20.5	11.3	9.2			
90	62.4	50.5	30.7	27.4	22.1	12.1	9.8	6.7		
110	69.2	53.5	32.8	29.6	24.0	17.3	10.6	7.4		
132	74.8	56.5	48.1	31.6	25.8	19.3	11.3	8.3		
160	77.6	61.0	50.9	46.9	27.6	21.3	15.8	9.0		425
180	77.6	64.4	52.6	48.4	28.8	22.5	16.7	9.5		
200		68.0	54.2	49.9	30.1	23.5	17.6	9.9		
250		74.9	58.3	53.2	45.4	25.6	20.3	10.8		
315			64.6	57.0	48.4	27.7	22.5			
350			68.3	59.5	49.9	40.9	23.5			565
400			73.5	63.0	52.0	42.6	24.7			
500				70.8	55.3	45.9	37.1			755
600					59.0	48.2	40.7			
750						51.5	43.6			
900						54.2	46.4			

Note

With different operating fluids, drive via the inner gear or $T_{max.}$ not equal to $1.3 \times T_{nom.}$, observe changed filling quantities.

11. Spare parts, customer service

By stocking the most important spare parts on site you can ensure that the coupling is ready for use.

To order spare parts, refer to the spare-parts list.

We guarantee only the genuine spare parts supplied by us.



WARNING

Risk of serious injury through flying fragments

Risk of serious injury through flying fragments and/or risk of damage to the coupling through use of defective spare parts.

Flender guarantees only the genuine spare parts supplied by Flender.

Non-genuine spare parts have not been tested or approved by Flender. Non-genuine spare parts may alter technical characteristics of the coupling, thereby posing an active or passive risk to safety.

Flender will assume no liability or guarantee for damage caused by spare parts not supplied by Flender.

The same applies to any 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.

When ordering spare parts, always state the following:

- Part number and designation (see item 11.2), fusing temperature of the fusible safety plug
- Operating fluid: Water
- Type, size and order number (see section 1)
- Quantity

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 of types "FGO", "FGD", "FGE", "FGM", "FVO", "FVD", "FVE", "FVM" and "FVVM"

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

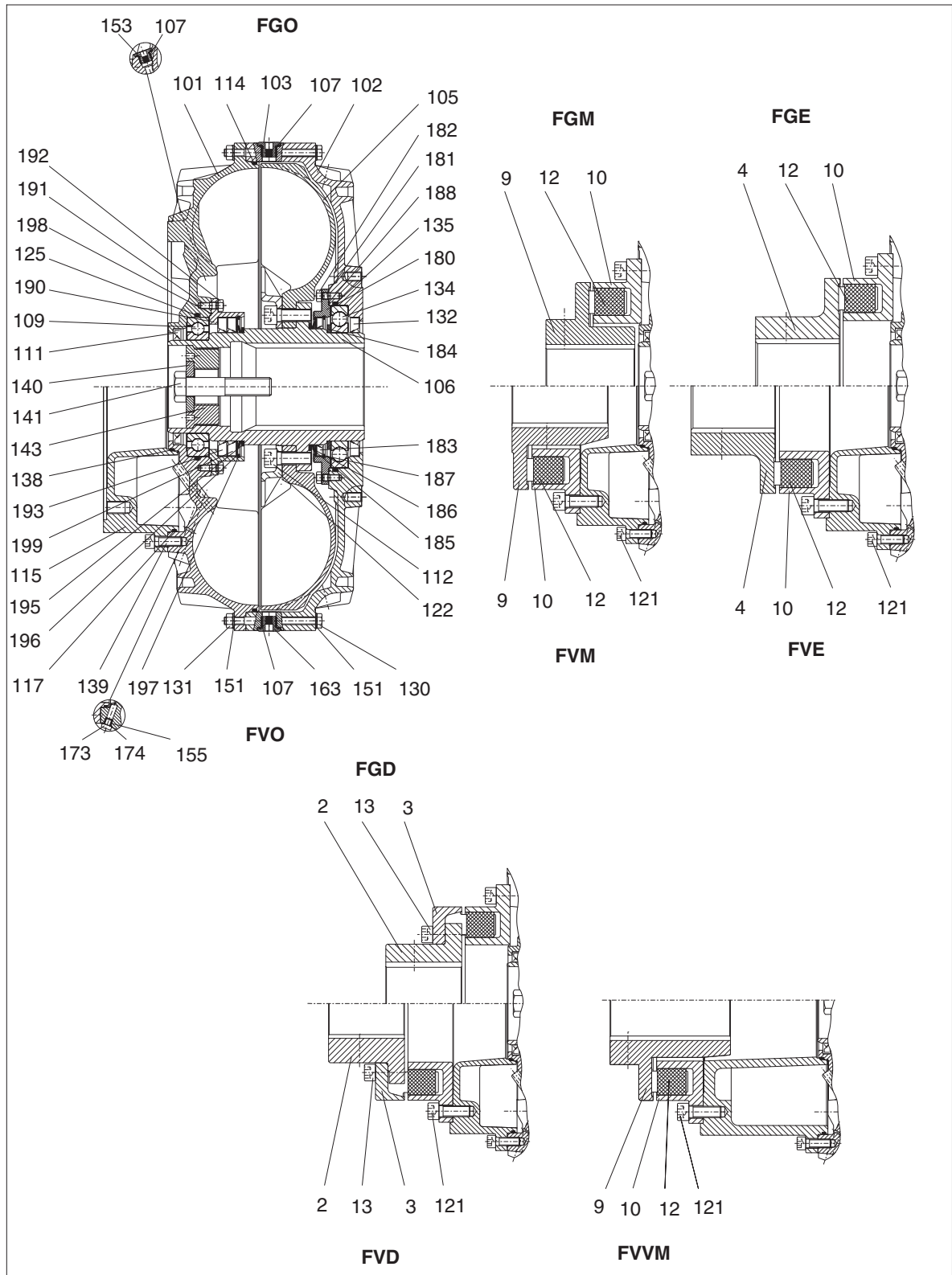


Fig. 19: Spare-parts drawing of types "FGO", "FGD", "FGE", "FGM", "FVO", "FVD", "FVE", "FVM" and "FVVM"

Table 18: Spare-parts list of types "FGO", "FGD", "FGE", "FGM", "FVO", "FVD", "FVE", "FVM" and "FVVM"

Part no.	Designation	Part no.	Designation	Part no.	Designation	
2	Part 2 (N-EUPEX)	121	Cheese-head bolt	174	Sealing ring	
3	Part 3 (N-EUPEX)	122	Stepped ring	A 180	Flange cover	
4	Part 4 (N-EUPEX)	125	O-ring	D 181	Screw stud	
9	Part 9 (N-EUPEX)	130	Hexagon-head bolt	182	Hexagon nut	
10	Part 10 (hub)	131	Hexagon nut	183	Shaft-sealing ring	C
12	Flexible elements (N-EUPEX)	132	Shaft-sealing ring	C 184	Ring	
13	Cheese-head bolt	134	Rolling bearing	D 185	V-ring	C
101	Blade shell	B 135	O-ring	D 186	Washer	
102	Cover	138	O-ring	C 187	Circlip	
103	Fusible safety plug	139	Cheese-head bolt	188	Sealing thread	C
105	Bucket wheel	A 140	Locking plate	190	Flange cover	
106	Hollow shaft	A 141	Retaining screw	191	Screw stud	
107	Threaded insert	B 143	Threaded bush	192	Hexagon nut	
109	Rolling bearing	D		193	Shaft-sealing ring	C
111	Shaft-sealing ring	C 151	Washer	195	V-ring	C
112	Cheese-head bolt	A 153	Filling plug (fusible safety plug)	196	Washer	
114	O-ring	C 155	Threaded insert	B 197	Circlip	
115	Prechamber	163	Screw plug (fusible safety plug)	198	Sealing thread	C
117	O-ring	C 173	Drain plug Prechamber	199	Shaft-sealing ring	C

A = subassembly hollow shaft (hollow shaft and bucket wheel available only as assembled and balanced unit)

B = subassembly shell

C = seal set

D = bearing set

12. Declarations

12.1 EU declaration of conformity



EU declaration of conformity

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

FLENDER COUPLINGSFLUDEX®
FGO, FGD, FGE, FGM, FVO, FVD, FVE, FVM, FVVM
Operating fluid: Water

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
EN 1710 : 2008

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.

Bocholt, 2017-10-01

Felix Henseler, Head of PD MD AP

Bocholt, 2017-10-01

Thomas Tebrügge / Head of PD MD AP COU BA

FLENDER COUPLINGS

FLUDEX

Operating instructions 4611 en

Edition 10/2017

[Flender GmbH](#)

Alfred-Flender-Straße 77

46395 Bocholt

GERMANY