

FLENDER FLUDEX® couplings

FNO, FNA, FND,
FNDB and FNDS

Operating instructions
BA 4602 en 04/2012



FLENDER couplings

SIEMENS

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Operating instructions

Translation of the original operating instructions

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Notes and symbols in these operating instructions

Note: The term "operating instructions" will in the following also be shortened to "instructions" or "manual".

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 or an "Ex" symbol (when applying Directive 94/9/EC), those only for preventing material damage with a "STOP" sign.



WARNING! Imminent explosion!

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



WARNING! Imminent personal injury!

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



WARNING! Imminent damage to the product!

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



NOTE!

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



WARNING! Hot surfaces!

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

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

Qualified personnel

The product or system to which these instructions relate may be handled only by persons qualified for the work concerned and in accordance with the instructions relating to the work concerned, particularly the safety and warning notes contained in those instructions. Qualified personnel must be specially trained and have the experience necessary to recognise risks associated with these products or systems and to avoid possible hazards.

Intended use of Siemens products

Observe also the following:



Siemens 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 Siemens. 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.

Trademarks

All designations indicated with the registered industrial property mark ® are registered trademarks of Siemens AG. Other designations used in these instructions 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 instructions 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 these instructions is regularly checked, and any necessary corrections are included in subsequent editions.

Note on the EC Machinery Directive 2006/42/EC

Siemens couplings in the "FLENDER couplings" product range must be treated as "components" in the sense of the EC Machinery Directive 2006/42/EC.

Therefore, Siemens needs not issue a declaration of incorporation.

Information on safe fitting, safe startup and safe operation can be found in this instructions manual; in addition the "warning-note concept" therein must be observed.

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1. Technical data

1.1 General data

These instructions apply generally to FLUDEX couplings of the "FN.." series.

1.2 Coupling versions

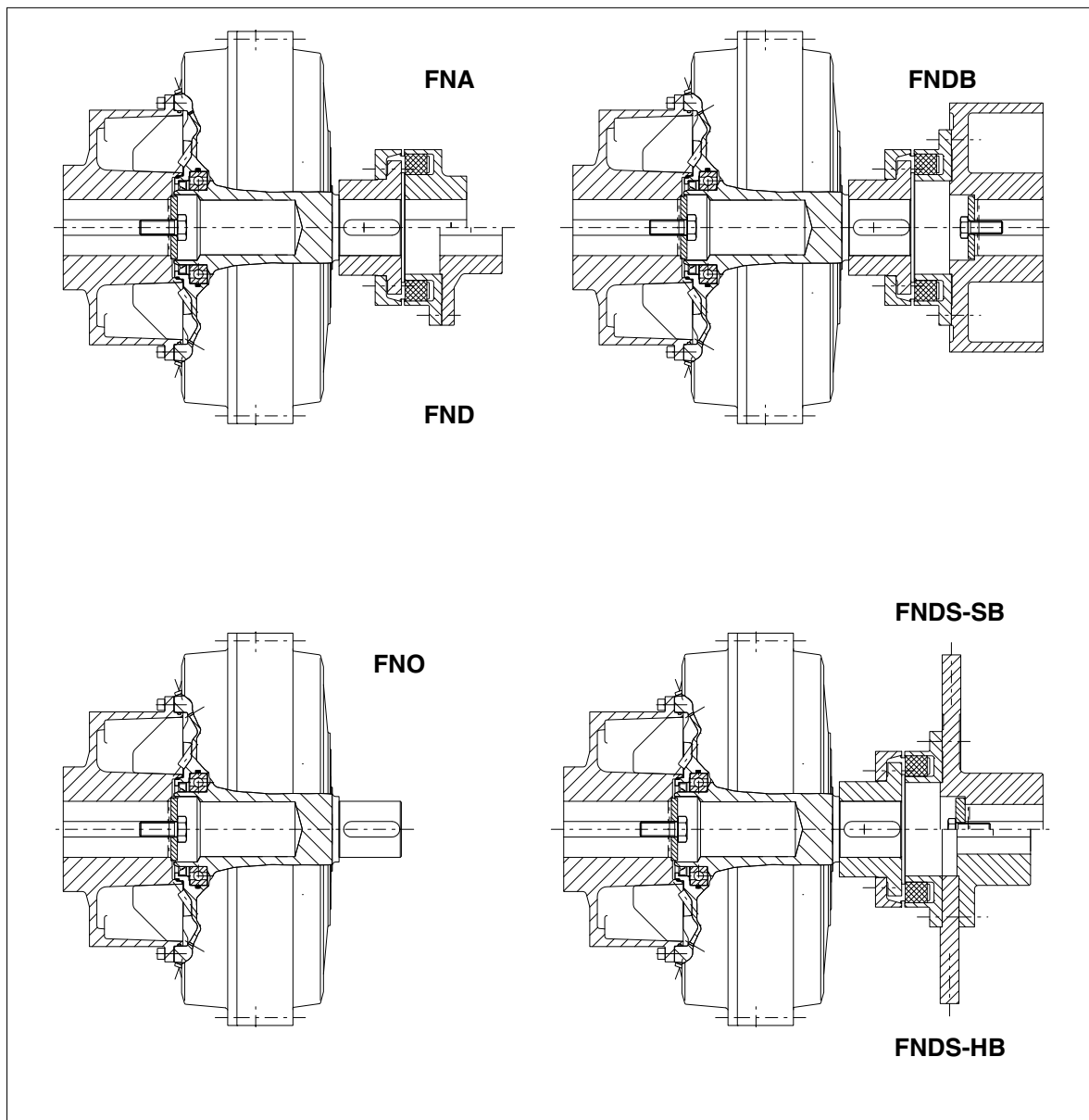


Fig. 1: Coupling types

1.3 Data relating specifically to the coupling

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

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

2. General notes

2.1 Introduction

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



All persons involved in the installation, operation, maintenance and repair of the coupling must have read and understood these operating instructions and must comply with them at all times. Siemens accepts no responsibility for damage or disruption caused by disregard of these instructions.

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

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

The coupling has been manufactured in accordance with the state of the art and is delivered in a condition for safe and reliable use. The coupling complies with the requirements in Directive 94/9/EC.

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

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

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

2.2 Copyright

The copyright to these instructions is held by **Siemens AG**.

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:

Siemens AG
Schlavenhorst 100
46395 Bocholt

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

3. Safety instructions



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

3.1 Obligations of the user

- The operator must ensure that all persons involved in installation, operation, maintenance and repair have read and understood these operating instructions and comply with them at all times in order to:
 - avoid injury or damage,
 - ensure the safety and reliability of the coupling,
 - avoid disruptions and environmental damage through incorrect use.
- During transport, assembly, installation, demounting, operation and maintenance of the unit, the relevant safety and environmental regulations must be complied with at all times.
- The housing of the FLUDEX coupling is made of aluminium (AC-Al-Si10Mg). Depending on the individual case, if necessary, further requirements must be taken into account when handling aluminium.
- The coupling may only be operated, maintained and/or repaired by persons qualified for the work concerned (see "Qualified personnel" on page 3 of this manual).
- All work must be carried out with great care and with due regard to safety.
- All work on the coupling must be carried out only when it is at a standstill. The drive unit must be secured against being switched on accidentally (e.g. by locking the key switch or removing the fuses from the power supply). A notice should be attached to the ON switch stating clearly that work is in progress.
- The coupling must be fitted with suitable safeguards to prevent accidental contact. This fixture must also offer protection against spurting hot operating fluid without substantially impairing the coupling ventilation. The fusible safety plugs and filling plugs should remain accessible.
- The use of suitable operating fluids (usually oil) is necessary for the operation of the coupling. The instructions for use enclosed by the operating fluid manufacturer must be observed.
- The drive unit must be shut down as soon as changes to the coupling are detected during operation.
- When the coupling is installed in plant or equipment, the manufacturer of such plant or equipment must ensure that the contents of the present operating instructions are incorporated in his own prescription, instructions and descriptions in his operating instructions.
- All spare parts must be obtained from Siemens.

4. Transport and storage

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

4.1 Scope of supply

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

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



The coupling in design in accordance with the Directive 94/9/EC is provided with the CE identification mark as described in section 5.

4.2 Transport



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



The coupling must be transported using suitable transport equipment only.

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

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

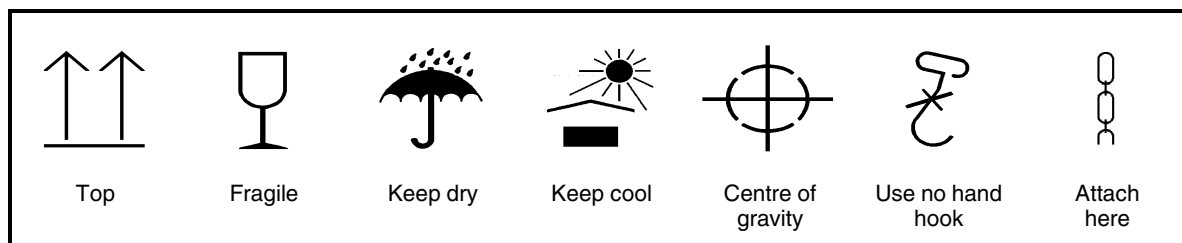


Fig. 2: Transport symbols

4.3 Storage of the coupling

Unless otherwise expressly agreed, the coupling is delivered in a preserved condition and can be stored in a covered, dry place for up to 3 months. If storage is provided for a protracted period, the unit should be treated with a long-term preservative agent on all outer surfaces with the exception of the aluminium housing (Siemens must be consulted).



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

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

4.4 Storage area for a protracted period

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



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

5. Technical description

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

5.1 General description "FN.." series

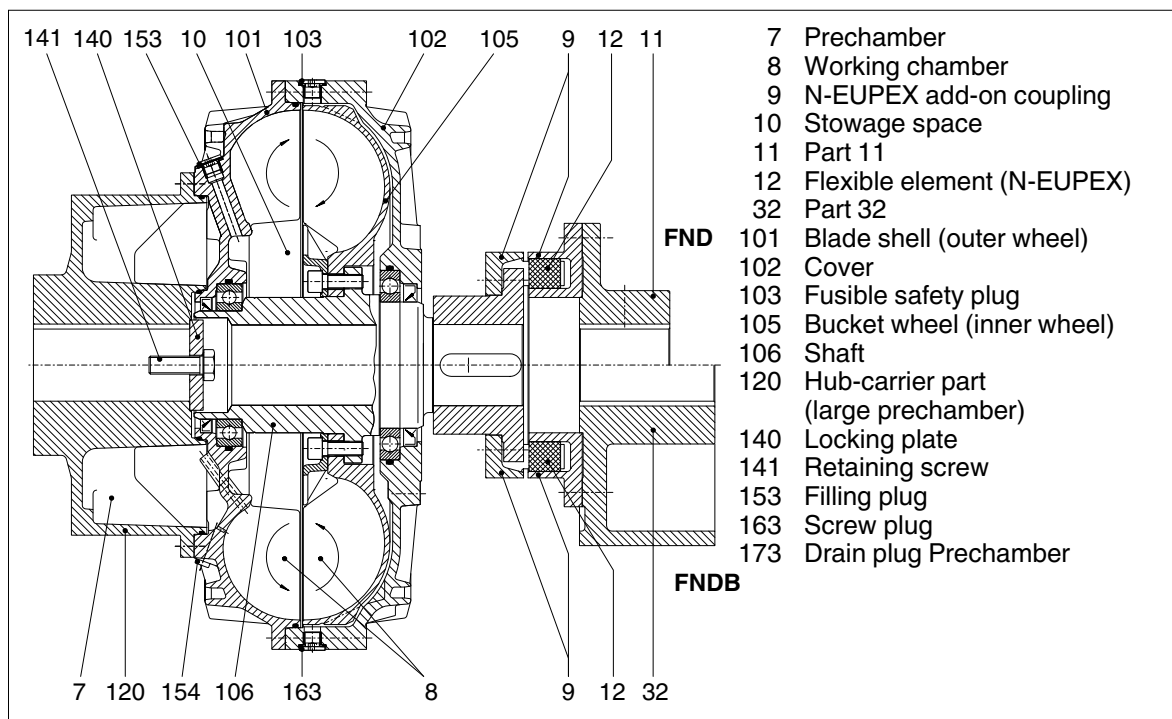


Fig. 3: General description "FN.." series

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

FLUDEX couplings of the "FN.." series are suitable for both directions of rotation. They can be fitted in a horizontal, angled or vertical position. In case of couplings fitted in a sharply angled or vertical position the hub-carrier part (120) (large prechamber) must be located at the bottom. The drive should preferably be directed via the hub-carrier part (120) to the outer wheel (blade shell 101) to enable the advantages of the prechamber (7) and the working chamber geometry to be utilised.

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

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

5.2 Construction of couplings

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

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

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

In case of the "FN.." series the hub-carrier part (120, carrier hub and large prechamber at the same time) must be attached to the blade shell (101). The prechamber (7) receives part of the oil filling, when the coupling is stationary, and so reduces the effective amount of oil in the working chamber (8) when starting. Thus the starting torque is considerably reduced.

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

For filling the coupling, two filling plugs (153) are located in filling channels offset by 180° (to prevent overfilling) in the blade shell (101). For this, two further holes, offset (approx. 60°) at the periphery, are provided in the cover (102) on the outside diameter of the coupling. In case of sizes 370 to 755 a fusible safety plug (103) and a screw plug (163) are fitted in these holes. In case of size 887 screw plugs (163) are located in both holes, the fusible safety plugs (2 x 103) are located next to the flange in the blade shell (101). The screw plugs (163) serve for ventilation during filling and for checking the oil level and draining off the operating fluid.

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



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

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

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

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

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

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

The type **FNO** includes only the components of the fluid coupling (without attachment) and incorporates a connecting shaft end on the output side. The types **FNA** and **FND** are couplings with an N-EUPEX coupling attached on the output side for connecting two shafts. Types **FNDB** and **FNDS** are FND couplings with brake drum or brake disk, the FNDS-SB being suitable for stopping and holding brakes, the FNDS-HB for holding brakes only.

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



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

5.3 Marking the coupling parts for explosion protection





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

Siemens AG CE  II 2 G c T3 D160 °C II B


D 46393 Bocholt CE  I M2

FLENDER couplings FLUDEX <year built> - 30 °C ≤ T_a ≤ + 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 marking  is suited for the service conditions specified in Directive 94/9/EC:

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



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



The FLUDEX coupling can be delivered with attached brake disk. The supplier of the subassembly is responsible for the construction of the brake disk in conformity to the guidelines. To be noted are, amongst other things, hazards from electrostatic charging and hot surfaces.

6. Fitting

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

The FLUDEX coupling is delivered preferably with finish-bored and grooved hubs.

At the customer's request Siemens also delivers unbored or prebored coupling parts.

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



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



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


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

6.1.1 Finished bore

- On part 1: Remove flexible elements.
- On part 11 FNDS-HB: Remove parts 8 and 10.
- On part 11; 32: Remove part 10.
- In case of hub-carrier part (120): Demount hub-carrier part (120) from the coupling, remove O-rings (117; 138) and retain them for re-use later.
- Remove preservative agent from coupling parts.



Observe manufacturer's instructions for handling solvent.

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

When machining the finished bore in the hub-carrier part (120), the axial run-out face of the outer flange must be finish-turned during the same clamping operation (cut rate 0.2 ± 0.1 mm).



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

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

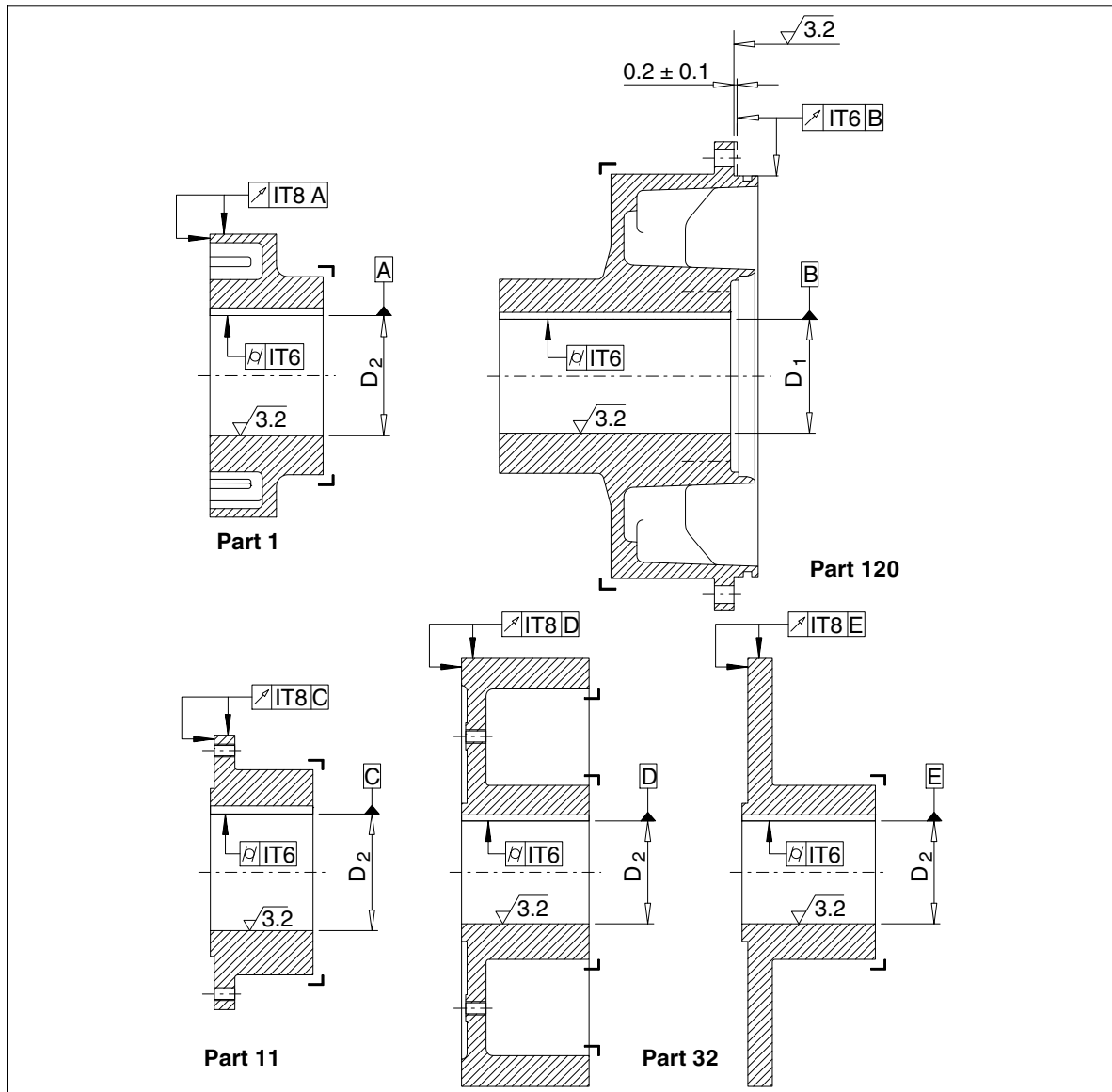


Fig. 4: Finished bore

Table 1: Maximum bores of the hub parts

FLUDEX Size	N-EUPEX Size	Maximum bore D ₁ Part 120	Maximum bore D ₂				
			Part 1 FNA	Part 11 FND	Part 11, 32 FNDS SB (32) / HB (11)	Part 32 (Brake disk) FNDB D x B	D ₂
370	180	80	75	70	80	315 x 118	80
	200		-	-		400 x 150	90
425	200	100	85	80	80	315 x 118	80
						400 x 150	90
490	225	110	90	90	90	400 x 150	90
	250		-	-		500 x 190	100
565	250	120	100	100	100	400 x 150	100
						500 x 190	110
655	315	135	120	110	100	500 x 190	110
						630 x 236	140
755	350	150	140	120	140	630 x 236	140
887	440	170	160	130	140	710 x 265	160

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

Table 2: Fit pairs

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



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

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



Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments! The coupling then becomes an explosion hazard.

6.1.2 Parallel keyway

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

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



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

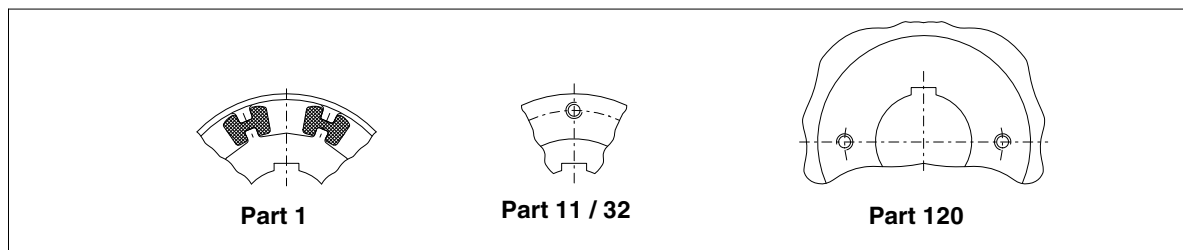


Fig. 5: Parallel keyway

6.1.3 Axial fastening

The hub-carrier part (120) and the brake drum or brake disk (32) are axially secured, preferably with a locking plate and retaining screw (for tightening torques, see table 3). Before turning the recess in the brake drum or brake disk (32), Siemens must be consulted.

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

For axially securing parts 1 and 11 always set screws must be used.

If the hub-carrier part (120) and brake drum or brake disk (32) have been manufactured with a larger bore, due to which the use of a locking plate is no longer possible, these parts too are secured axially with a set screw.

6.1.4 Set screws

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

The following guidelines must be observed!



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

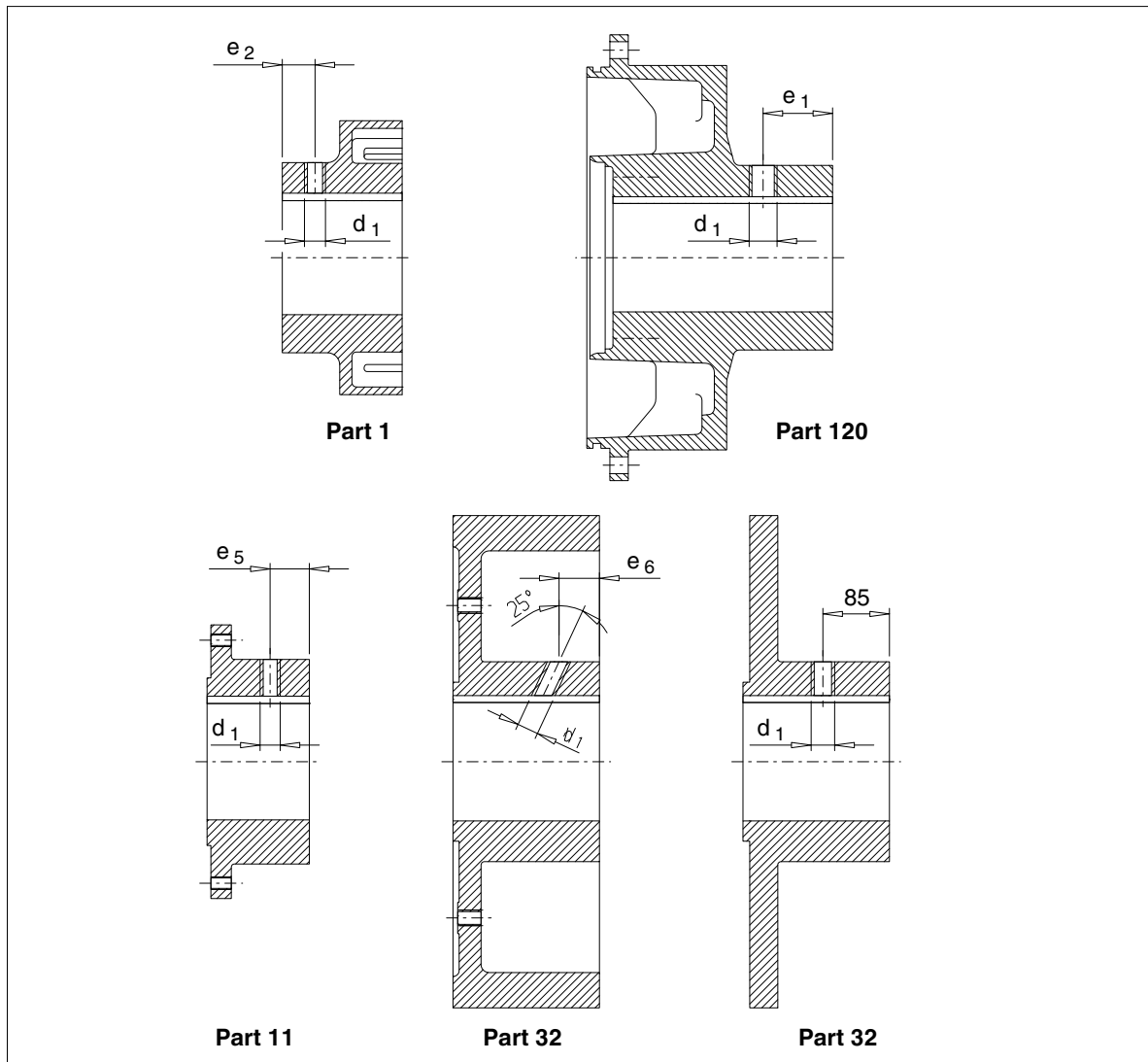


Fig. 6: Set screws

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

FLUDEX Size	N-EUPEX Size	d ₁ maximum	Part 120 e ₁	Part 1 e ₂	Part 11 e ₅	Part 32 e ₆	Tightening torque of the set screw [Nm]
370	180 200	M12	23	16	30	25	25
425	200	M12	25	20	40	25	25
490	225 250	M12	25	22	40	30	25
565	250	M16	23	24	50	50	70
655	315	M16	50	35	60	75	70
755	350	M20	40	40	70	75	130
887	440	M24	50	60	90	75	230



The set screws must always be positioned on the keyway.

6.1.5 Balancing

FLUDEX couplings with prebored hub-carrier part (120) are delivered balanced.

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

Balancing is normally done by drilling material away.

If one-level balancing is required on brake disk or brake drum (32), the material on the front end at the disk's bottom is to be removed. When two-level balancing the brake drum (32) or the brake disk (32) and part 11 should be balanced together with part 10, and part 11 of the FNDB-HB together with part 10 and the brake disk (8).



**On part 1 material must be removed from between the webs, the bottom must however not be drilled right through.
On part 32 the brake surface must not under any circumstances be damaged.**

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

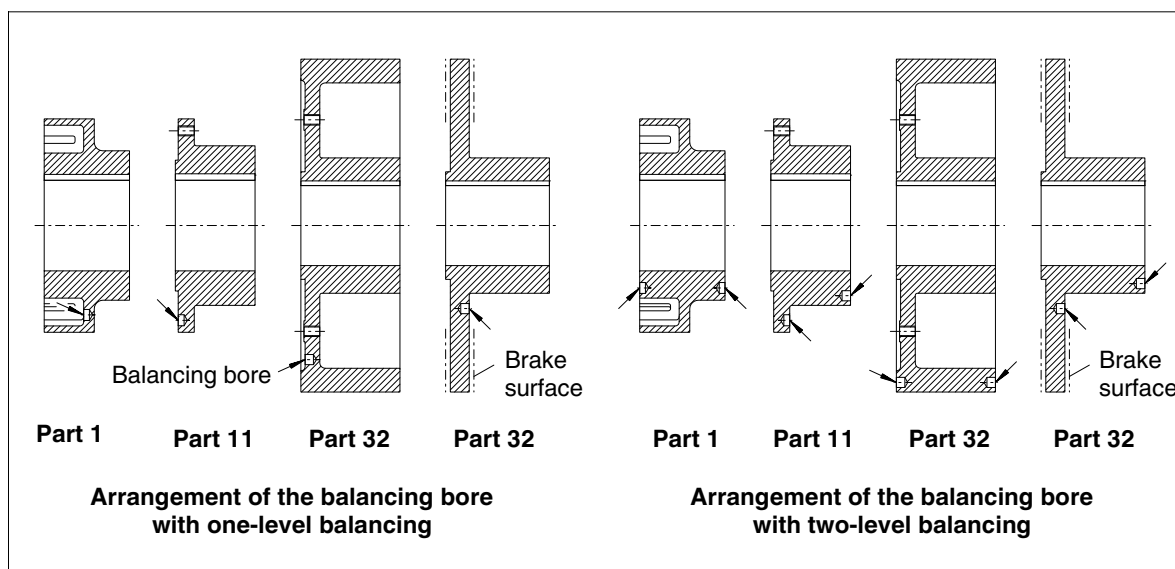


Fig. 7: Balancing

6.2 General information on fitting

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

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

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

Adequate lifting equipment must be available before beginning the fitting work.



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

6.3 Mounting the coupling parts

FN couplings are delivered with hub-carrier part (120) attached. If the delivery included the oil filling, the oil filling must be drained off before assembly is begun (see section 10, item 10.1).

After the screws (139) are undone, the hub-carrier part (120) must be demounted from the main coupling and the O-rings (117, 138) removed for re-use later.

The shaft ends, the brake surfaces and the coupling hubs must be carefully cleaned and a lubricant rubbed into the shaft ends. Before cleaning coupling part 1 with solvent the flexible elements must be removed.



Observe manufacturer's instructions for handling solvent.



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

Heating the 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.



Take precautions to avoid burns from hot parts!

The coupling hubs must be fitted using the entire length of the bore or until it comes into contact with the shaft shoulder.

After being pulled on, the coupling hubs must be secured axially by means of a locking plate and a retaining screw or a set screw (see item 6.1.3).



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



Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments! The coupling then becomes an explosion hazard.

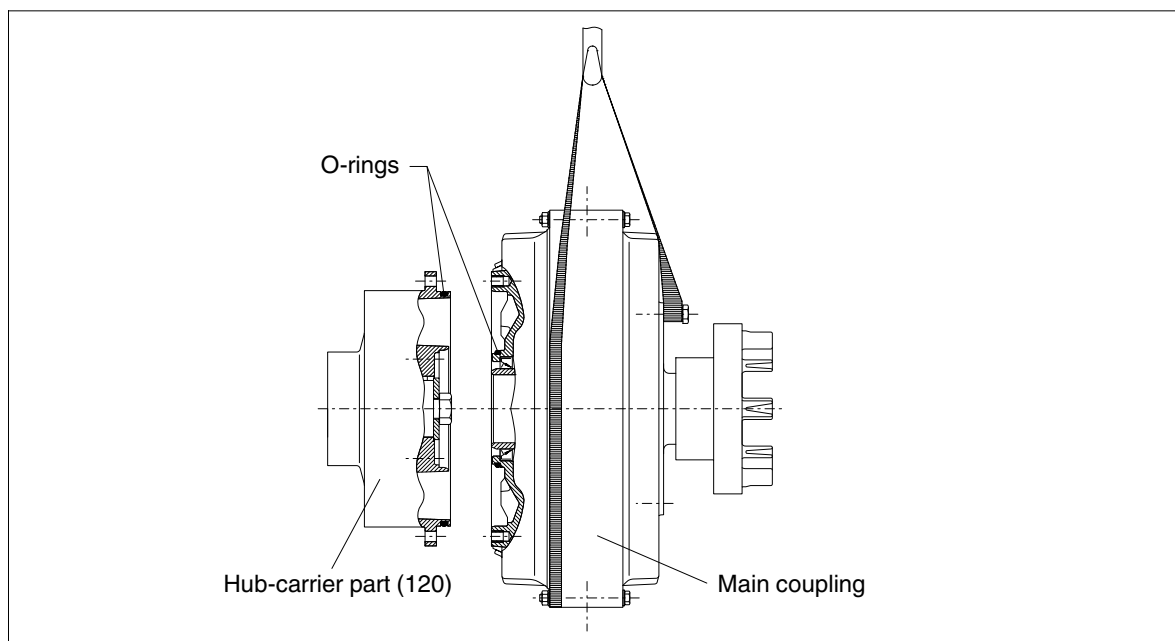


Fig. 8: Mounting the coupling parts

Before the main coupling is flange-fitted to the hub-carrier part (120), any dirt must be removed from the interior of the hub-carrier part (120) and the corresponding area of the main coupling and the O-rings (117, 138) lightly greased and inserted into their mounting grooves. The sealing and flange surfaces must be clean and undamaged.

To attach the main coupling to the hub-carrier part (120), the main coupling must be suspended in suitable lifting gear to ensure as coaxial and as straight a positioning on the centring projection of the hub-carrier part (120) as possible.

When flange-fitting, care must be taken that the O-rings (117, 138) and the sealing surfaces are not damaged. The flange may be attached by means of the screws (139). Care must be taken to ensure that the flange surfaces fit closely (for tightening torque of screws, see item 6.6).

On part 1 (1) 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.



Danger of squeezing!

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).



If components which conduct axial or bending forces into it are placed on the shaft of the FND coupling, Siemens must be consulted.

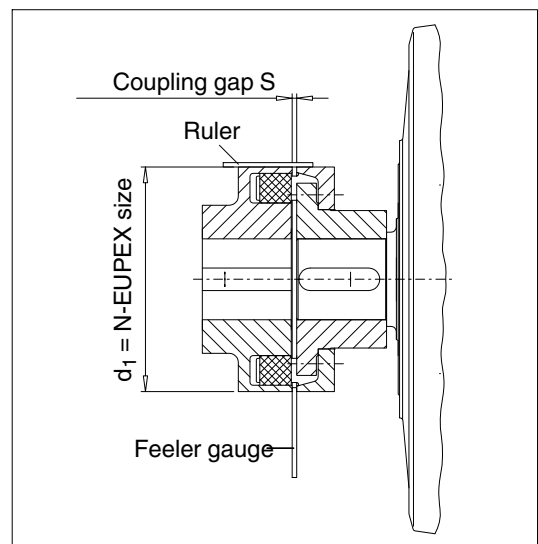
6.4 Alignment

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

When aligning, the radial and angular misalignment of the shaft ends must be kept as small as possible, because, other conditions being equal, this increases the service life of the flexible elements.

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

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



6.5 Possible misalignments

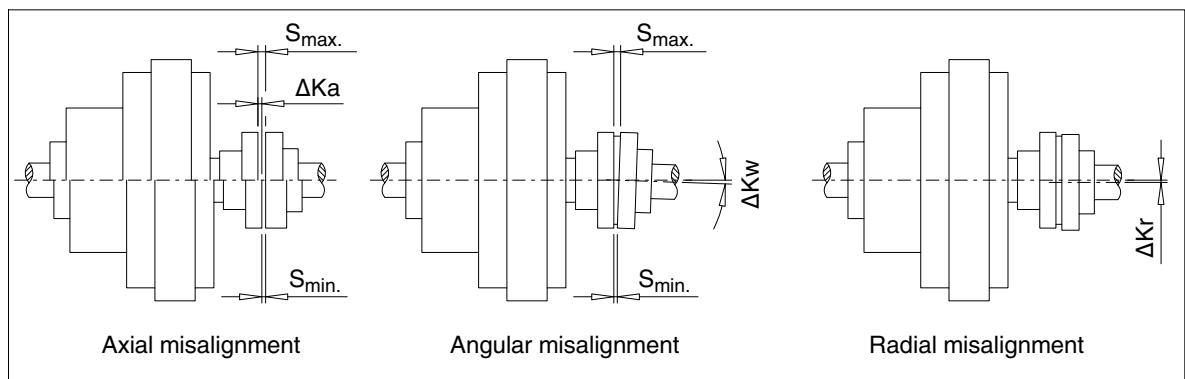


Fig. 9: Possible misalignments

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



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

6.5.1 Axial misalignment

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

6.5.2 Angular misalignment

The angular misalignment ΔK_w (Fig. 9) can usefully be measured as the difference in the gap dimension ($\Delta S = S_{max.} - S_{min.}$). 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:

$\Delta K_{w \text{ perm.}} \text{ in rad} = \frac{\Delta S_{\text{perm.}}}{d_1}$	$\Delta S_{\text{perm.}}$ see item 6.5.4.
$\Delta K_{w \text{ perm.}} \text{ in degrees} = \frac{180}{\pi} \times \frac{\Delta S_{\text{perm.}}}{d_1}$	d_1 corresponds to N-EUPEX size in mm

6.5.3 Radial misalignment

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

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

Values given in mm, rounded off

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

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
	200	0.8	0.55	0.45	0.4	0.3	0.3	0.2
425	200	0.8	0.55	0.45	0.4	0.3	0.3	0.2
490	225	0.8	0.55	0.5	0.4	0.35	0.3	0.25
	250	0.8	0.6	0.5	0.4	0.35	0.3	
565	250	0.8	0.6	0.5	0.4	0.35	0.3	
655	315	1	0.7	0.6	0.5	0.4	0.35	
755	350	1	0.8	0.6	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:

$\Delta K_{r \text{ perm.}} = \Delta S_{\text{perm.}} = \left(0.1 + \frac{d_1}{1000} \right) \times \frac{40}{\sqrt{n}}$	Coupling speed n in 1/min d_1 corresponds to N-EUPEX size in mm Radial misalignment $\Delta K_{r \text{ perm.}}$ in mm
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Angular and radial misalignment may occur simultaneously.

6.6 Assignment of tightening torques

Table 6: Assignment of tightening torques (for Part-No. refer to section 11)

FLUDEX Size	N-EUPEX Size	Tightening torque T_A and wrench width SW for screws Part-No.															
		13		103		110/142/163		23/24		130/131		139		153		173	
		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	75	19/27/10	49	8/16	21	13	31	8	75	10	25	7
	200	67.5	10	60	10	75	19/27/10	86	10/18	21	13	31	8	75	10	25	7
425	200	67.5	10	60	10	75	19/27/10	86	10/18	21	13	31	8	75	10	25	7
490	225	86	10	60	10	75	19/27/10	86	10/18	40	17	54	10	75	10	25	7
	250	145	14	60	10	75	19/27/10	210	14/24	40	17	54	10	75	10	25	7
565	250	145	14	60	10	75	19/27/10	210	14/24	40	17	54	10	75	10	25	7
655	315	200	14	60	10	75	19/27/10	210	14/24	73	19	135	14	75	10	25	7
755	350	260	17	60	10	75	19/27/10	410	17/30	73	19	135	14	75	10	135	14
887	440	410	17	60	10	75	19/27/10	410	17/30	120	24	135	14	300	17	135	14



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



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

7. Start-up

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

7.1 Procedure before start-up

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

7.2 Fluid filling



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

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



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

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



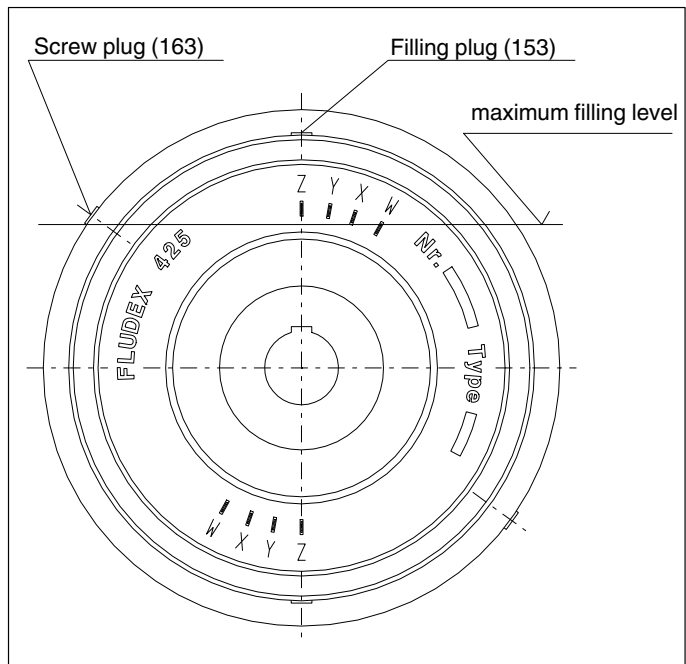
The quantity to be put into the coupling is determined in accordance with the order. The filling quantity in litres is stamped on the coupling and specified on the order-related title page.

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

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

In case of filling 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).

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



When changing the oil, care must be taken that the used oil is completely drained off. This can be done by way of the holes in the screw plug (163). Additionally, the residual oil in the prechamber must be drained off through the hole in the screw plug (173).

Table 7: Filling quantities in litres

Size		370	425	490	565	655	755	887
Filling position	W	5.4	8.4	12.9	20.4	31.7	45.9	76
	X	6.5	10.1	15.5	24.6	38.2	55.4	88
	Y	7.8	12.1	18.6	29.5	45.9	66.5	105
	Z	9.1	14.2	21.7	34.4	53.5	77.5	120

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



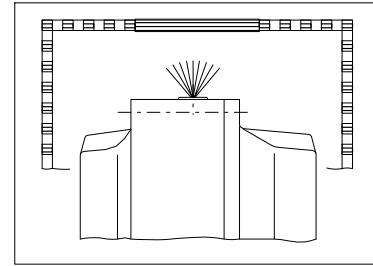
FLUDEX couplings must not lose any operating fluid, as this loss may result in a rise in slip and coupling temperature and ultimately to a fusing of the fusible safety plug (103).

Then finally fit the clutch guard to prevent unintentional contact.

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



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



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



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

7.2.1 Operating fluid: oil

In case of orders without performance data the filling quantity is not entered. In these cases, for operation with oil the filling quantity for the respective coupling size can be obtained from the filling quantity tables in section 10, item 10.9 and item 10.10 dependent on the speed and output to be transmitted (and possibly the motor output).








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

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



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

Table 8: Recommended oil grades

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



Observe manufacturer's instructions when handling the operating fluid!

7.2.2 Operating fluid: water or water emulsion



The coupling must be protected against freezing during standstill.



Observe manufacturer's instructions when handling the operating fluid!



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



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

8. Operation

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

8.1 General operating data

During operation of the coupling watch for:

- Changes in running noise
- Sudden vibrations



If any irregularities are noticed during operation, switch the drive assembly off at once. Determine the cause of the fault, using the table in section 9.

The trouble-shooting table contains a list of possible faults, their causes and suggested remedies.

If the cause cannot be identified or the unit repaired with the facilities available, you are advised to contact one of the Siemens customer-service offices for specialist assistance (see section 2).

9. Faults, causes and remedy

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

9.1 General

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

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

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



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



When remedying faults and malfunctions, the coupling must always be taken out of service.

**Secure the drive unit to prevent it from being started up unintentionally.
Attach a warning notice to the start switch!**

9.2 Possible faults

Table 9: Possible faults

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



If the torque is being transmitted with worn N-EUPEX flexible elements (12) and metal parts are consequently in contact, proper operation within the meaning of the explosion protection requirements or Directive 94/9/EC can no longer be guaranteed.

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

9.3 Incorrect use

Experience has shown that the following faults can result in incorrect use of the FLUDEX coupling. In addition to observing the other instructions in this manual, care must therefore be taken to avoid these faults. Directive 94/9/EC requires the manufacturer and user to exercise especial care.



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



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

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

- Important information for describing the drive and the environment are not communicated.
- System power too high.
- System speed too high or too low.
- Starting frequency too high.
- The ventilation of the coupling is inadequate.
- Chemically aggressive environment is not taken into consideration.
- The ambient temperature is not permissible. (See also section 5.)
- Machining of a finished bore with incorrect diameter and/or incorrect fit assignment (see section 6 and order-related title page).
- The transmission capacity of the shaft-hub connection is not appropriate to the operating conditions.

9.3.2 Possible faults when installing the coupling

- Components with transport or other damage are being fitted.
- When fitting coupling parts in a heated condition, already fitted N-EUPEX flexible elements (12) are being excessively heated.
- When attaching the main coupling to the hub-carrier part (120), the O-rings (117; 138) are not fitted.
- 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 protection does not comply with the guidelines to be applied. It considerably restricts ventilation of the coupling.
- Operating conditions are being changed without authorisation.
- Components are being fitted to the coupling which transmit excessive axial forces or bending moments to the coupling.
- Add-on parts are not designed in compliance with the Directive 94/9/EC 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 Siemens 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 instructions in section 3, "Safety instructions"!



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



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

10.1 Changing the operating fluid



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

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

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



Observe the environmental requirements in force!

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

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

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

10.2 Changing the shaft-sealing rings

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

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

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



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

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



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

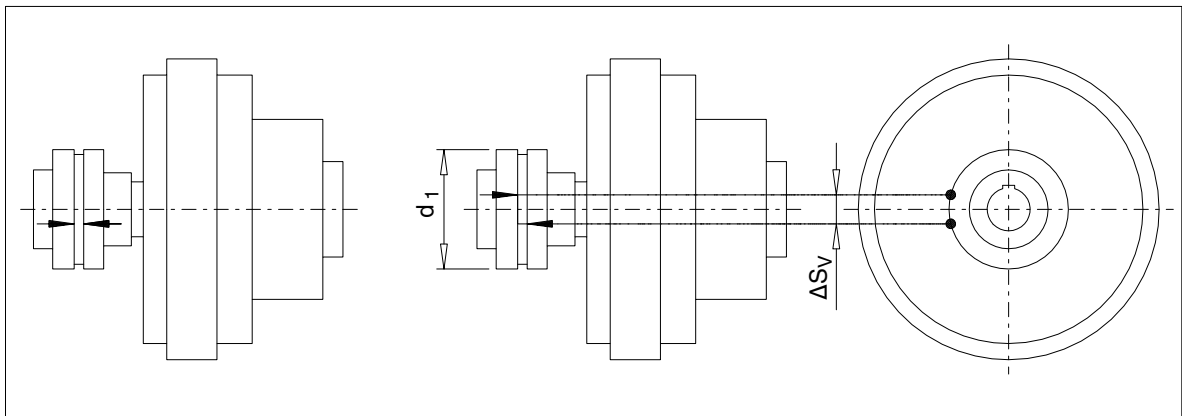


Fig. 10: Maintenance interval of the N-EUPEX add-on coupling

Table 11: Wear mark

FLUDEX size	370		425	490		565	655	755	887
N-EUPEX size [d_1]	180	200	200	225	250	250	315	350	440
Wear mark ΔS_V [mm]	8.0	8.5	8.5	9.0	10.0	10.0	10.5	11.5	14.0



If the above specified maintenance instructions are not adhered to, a correct operation within the meaning of the explosion-prevention requirements or Directive 94/9/EC can no longer be guaranteed. Use in potentially explosive areas is then not permitted.

10.4 Replacement of the flexible elements

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

The flexible elements (12) can be replaced without moving the coupled machines. After the screw connection part 2/3 is released, part 3 is shifted axially and turned towards part 2. The flexible elements (12) are now freely accessible.

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

10.5 Disassembling the FLUDEX coupling

For part designations, see section 11.



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

To demount the coupling, first, the screw connection (13) must be detached from part 2/3 and part 3 uncoupled axially. The motor with the main coupling can then be demounted radially or axially.



Before the main coupling is demounted from the hub-carrier part (120) all the operating medium must be drained off (see item 10.1).

In case of types FND, FNDB and FNDS the coupling can be demounted without having to move the coupled machines. For this, when the operating fluid has been drained off, part 3 must be uncoupled, the attaching position of part 10 marked, the screw connection (23) then released and part 10 demounted radially (see figure 11).

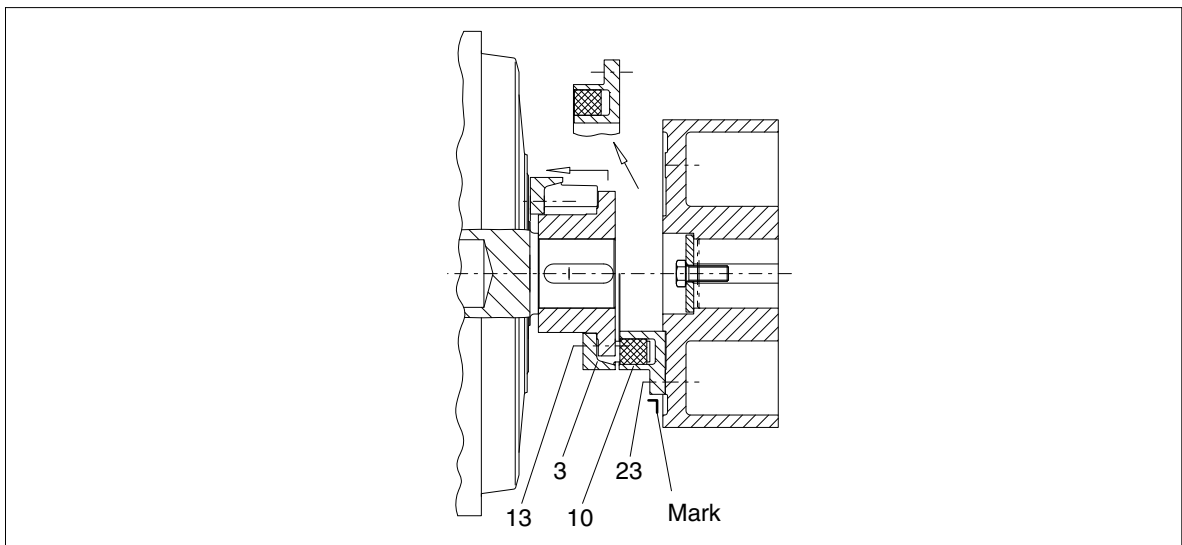


Fig. 11: Disassembling the FLUDEX coupling -a

The axial space thus obtained is sufficient to detach the main coupling axially from the hub-carrier part (120) and demounted radially. At the same time care must be taken that the O-rings (117; 138) are exposed (see figure 12).

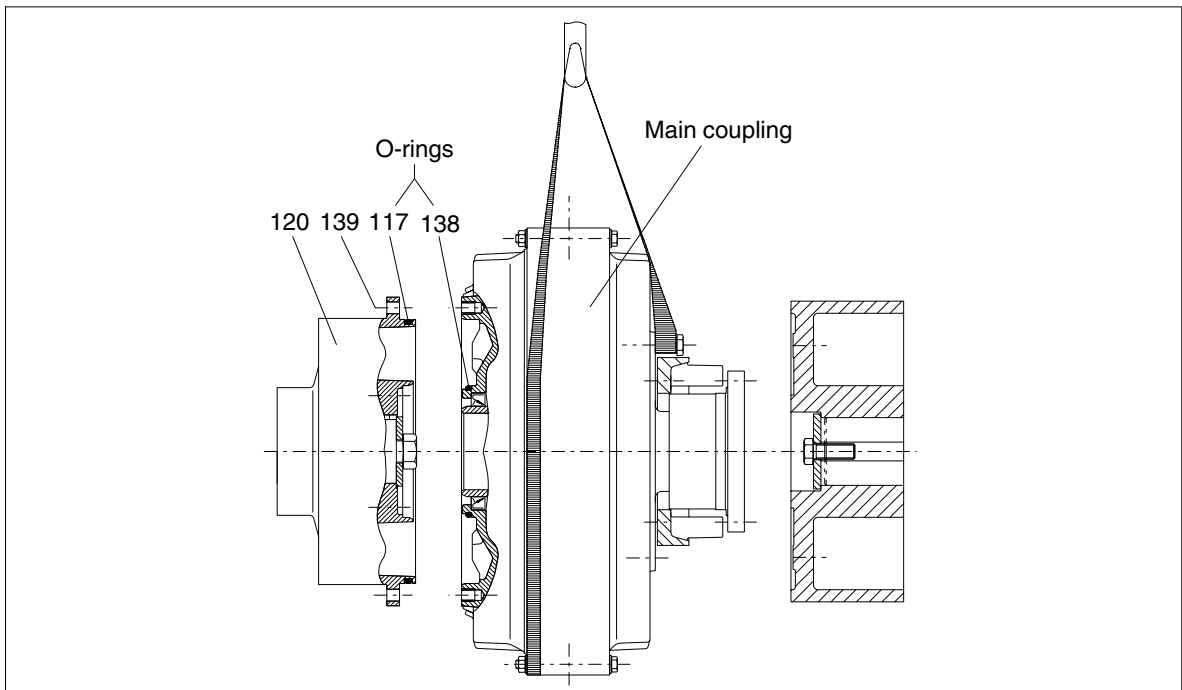


Fig. 12: Disassembling the FLUDEX coupling -b

The space between the shafts now suffices for the fitted hubs, if necessary, to be pulled off by means of commercially available tools after releasing the axial fixture. Located at the end-face side in the hub in the hub-carrier part (120) are 2 tapped holes set 180° apart, which may be used to insert drawing bolts (see figure 13).

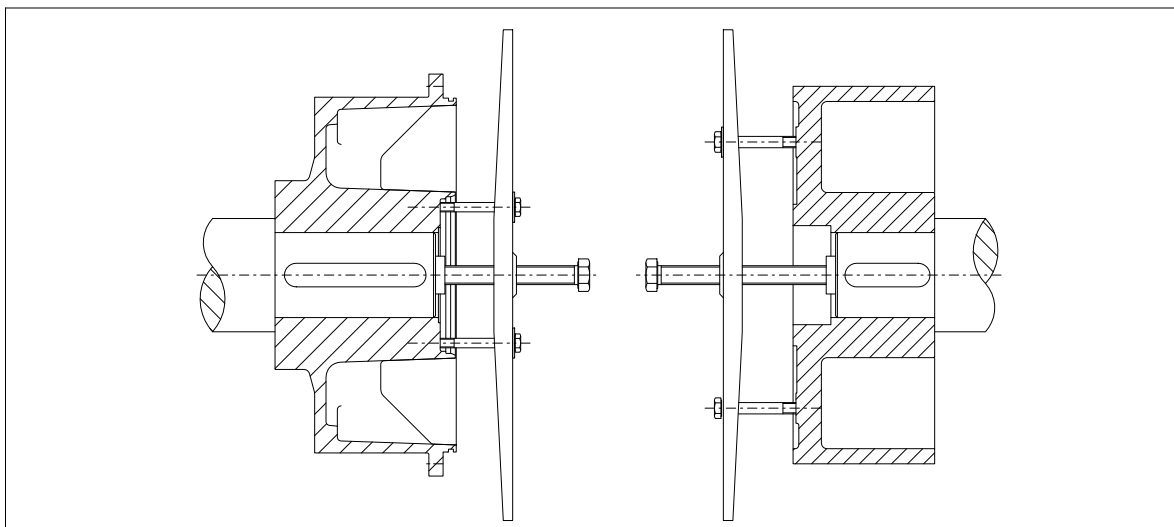


Fig. 13: Disassembling the FLUDEX coupling -c

10.6 Disassembling the FLUDEX coupling

For part designations, see section 11.

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

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

The housing parts of the 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.

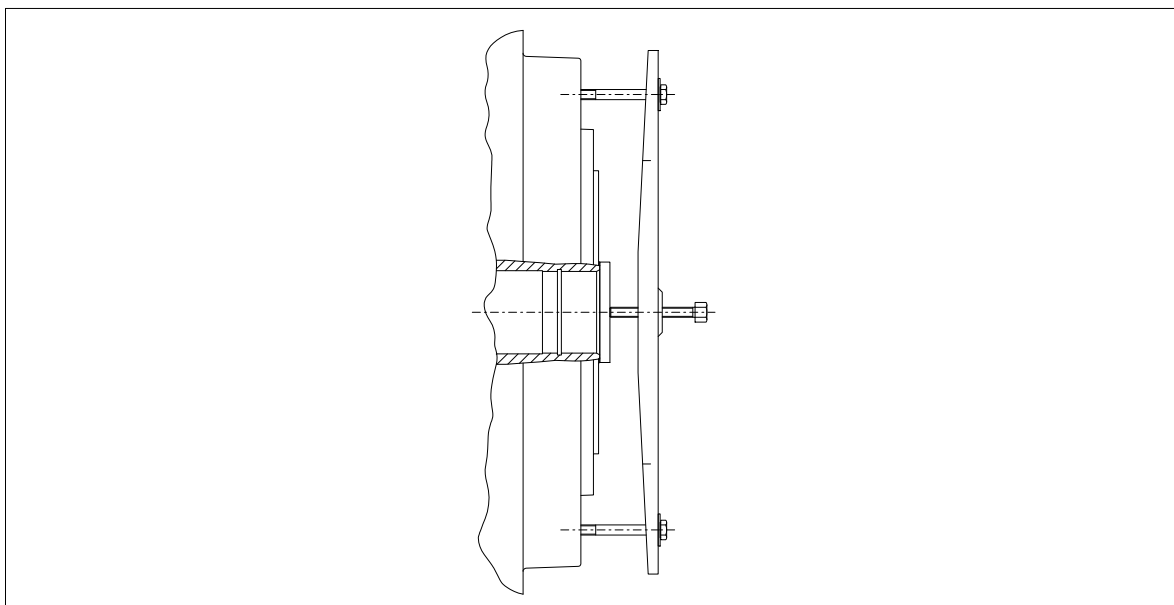


Fig. 14: Disassembling the FLUDEX coupling

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

10.7 Reassembling the FLUDEX coupling

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

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

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

10.8 Refitting the FLUDEX coupling

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

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

Guide values for VG 22/VG 32 mineral oil

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

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

Output kW	Speed 1/min											
	600	740	890	980	1180	1470	1770	2300	2950	3550		
Oil-filling quantities in litres												
1.1	5.6											
2.2	7.1	5.7										
3.0	7.9	6.4	5.1									
4.0	8.2	7.0	5.8	5.1								
5.5	14.4	7.8	6.5	5.9								
7.5	16.0	8.2	7.2	6.5	5.3							
11	18.2	14.7	8.2	7.4	6.2							
15	19.0	16.3	13.4	8.2	6.8	5.4						
18	33.5	17.3	14.4	12.9	7.2	5.8						
22	35.4	18.6	15.4	13.9	7.8	6.2	4.9					
30	38.5	19.0	17.0	15.5	12.5	6.9	5.7					
37	41.6	34.3	18.4	16.6	13.7	7.4	6.1	4.4				
45	45.0	36.2	19.0	17.7	14.7	7.9	6.6	4.7				
55	45.0	38.2	32.9	19.0	15.8	12.2	7.0	5.3				
75	76.5	43.0	35.8	33.1	17.4	14.0	7.8	6.0	4.3			
90	80.5	45.0	37.6	34.8	18.7	14.9	11.7	6.4	4.6			
110	85.2	45.0	40.1	36.7	31.8	16.0	13.1	6.8	5.1			
132	89.5	74.7	43.3	38.6	33.2	16.9	14.0	7.2	5.6	4.3		
160	95.6	80.0	45.0	41.5	35.0	18.1	15.0	10.7	6.0	4.7		
200	105.5	84.5	71.5	45.0	37.1	31.1	16.2	11.8	6.5	5.2		Size 370
250	110.0	89.7	76.9	45.0	39.7	33.0	17.4	13.2		5.8		
315		97.5	82.4	76.5	43.8	35.1	30.2	14.5				Size 490
350		102.1	84.6	78.4	45.0	36.1	31.2	15.0				
400		108.9	87.6	81.2	45.0	37.4	32.3					
500			94.1	86.1	73.3	40.2	34.2					Size 655
600			101.4	90.6	78.1	43.5	35.9					
750			110.0	98.5	82.9	66.9	38.2					
900				107.2	86.8	72.7						
1100					92.1	77.1						Size 887
1300					98.2	80.4						
1600						84.9						



With different operating fluids or $T_{max.}$ not equal to $1.3 \times T_{nom.}$, observe changed filling quantities!

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

Guide values for VG 22/VG 32 mineral oil

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

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

Output kW	Speed 1/min											
	600	740	890	980	1180	1470	1770	2300	2950	3550		
3.0	9.7											
4.0	10.7	8.6										
5.5	12.0	9.7										
7.5	12.5	10.7	8.8	7.7								
11	22.6	12.2	10.2	9.2								
15	25.2	12.5	11.2	10.2	8.3							
18	26.6	21.4	12.0	10.8	8.9							
22	28.6	23.1	12.5	11.6	9.6							
30	46.3	25.7	21.1	12.5	10.7	8.5						
37	48.6	27.5	22.9	20.5	11.4	9.2	7.1					
45	51.5	29.0	24.5	22.0	12.3	9.8	7.8					
55	54.0	29.0	26.1	23.7	18.7	10.5	8.6					
75	60.0	49.5	29.0	26.3	21.7	11.6	9.7	6.9				
90	65.0	52.0	29.0	27.9	23.2	12.4	10.3	7.4				
110	69.0	55.0	47.5	29.0	24.9	19.0	11.0	8.3				
132		58.5	50.0	46.4	26.3	20.9	11.7	8.9	6.6			
160		63.5	52.5	48.5	28.1	22.5	17.4	9.6	6.9			
180		67.5	54.0	50.0	29.0	23.4	18.4	10.0	7.2			
200		69.0	55.5	51.5	44.4	24.3	19.5	10.3	7.6			
250			60.5	54.5	47.0	26.2	21.6	16.0	8.6			
315			67.5	59.0	50.0	28.3	23.5	16.7	9.3			
350				62.0	51.5	43.1	24.4	17.4				
400				66.0	53.5	44.9	25.5	18.5				
500					57.0	47.5	40.7	20.8				
600					61.0	50.0	42.9	22.3				
750						53.0	45.9					
900						55.5	48.0					
1100							50.5					
1200							53.0					



With different operating fluids 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 and wearing parts on site you can ensure that the coupling is ready for use at any time.

When ordering spare parts, always state the following:

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

We guarantee only the original spare parts supplied by us.



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

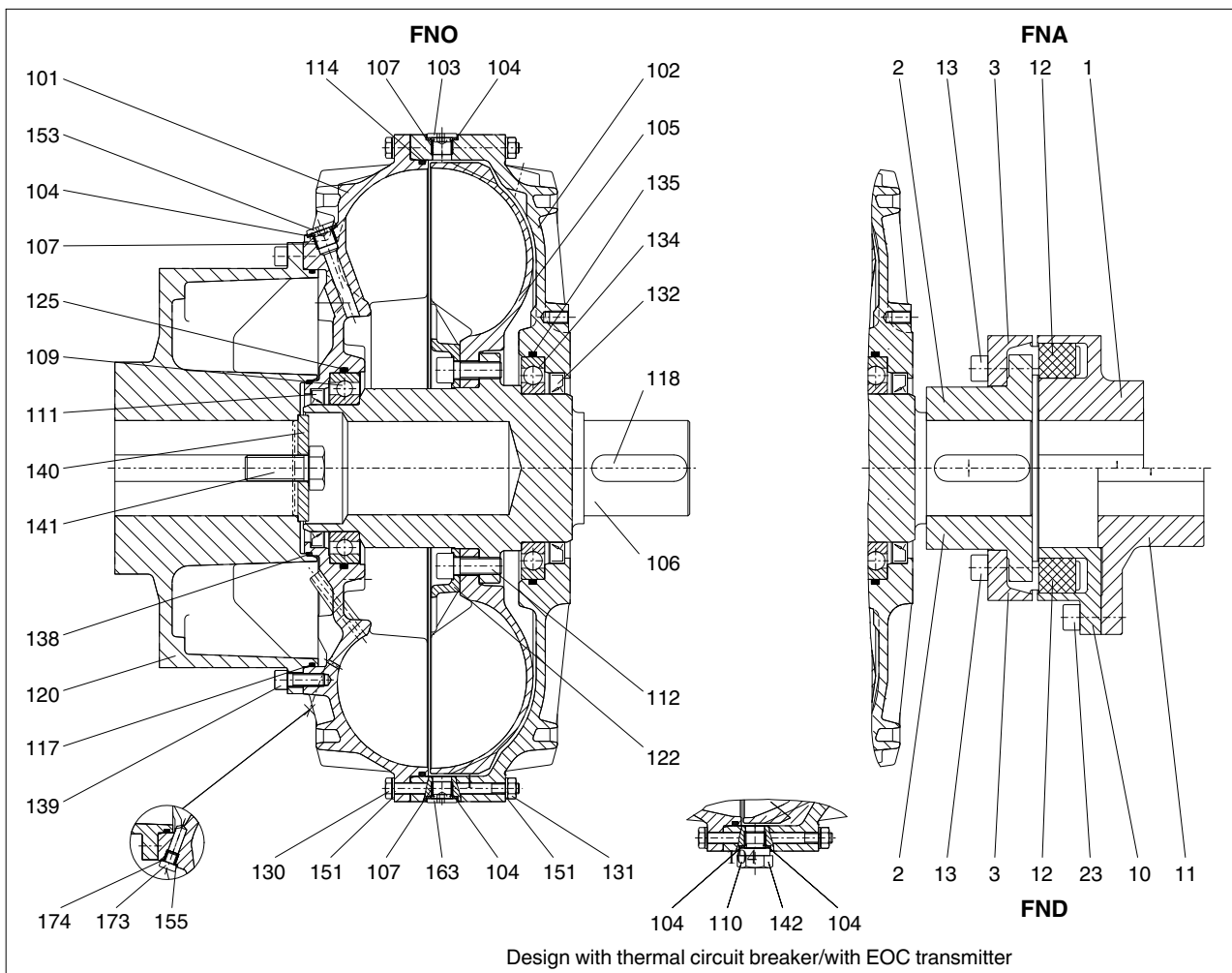
Please note that certain components often have special production and supply specifications and that we supply you with spare parts which comply fully with the current state of technical development as well as current legislation.

11.1 Spare-parts and customer-service addresses

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

11.2 Spare parts list, Types FNO, FNA, FND

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.



Part-No.	Designation	Part-No.	Designation	Part-No.	Designation
1	Part 1 (N-EUPEX)	106	Shaft	132	Shaft-sealing ring
2	Part 2 (N-EUPEX)	107	Threaded insert	134	Rolling bearing
3	Part 3 (N-EUPEX)	109	Rolling bearing	135	O-ring
10	Part 10 (N-EUPEX)	110	Thermal circuit-breaker	138	O-ring
11	Part 11	111	Shaft-sealing ring	139	Cheese-head bolt
12	Flexible elements (N-EUPEX)	112	Cheese-head bolt	140	Locking plate
13	Cheese-head bolt	114	O-ring	141	Retaining screw
23	Cheese-head bolt	117	O-ring	142	EOC transmitter
		118	Parallel key	151	Washer
101	Blade shell	120	Hub-carrier part	153	Filling plug
102	Cover	122	Stepped ring	155	Threaded insert
103	Fusible safety plug	125	O-ring	163	Screw plug
104	Sealing ring	130	Hexagon-head bolt	173	Drain plug (Prechamber)
105	Bucket wheel	131	Hexagon nut	174	Sealing ring

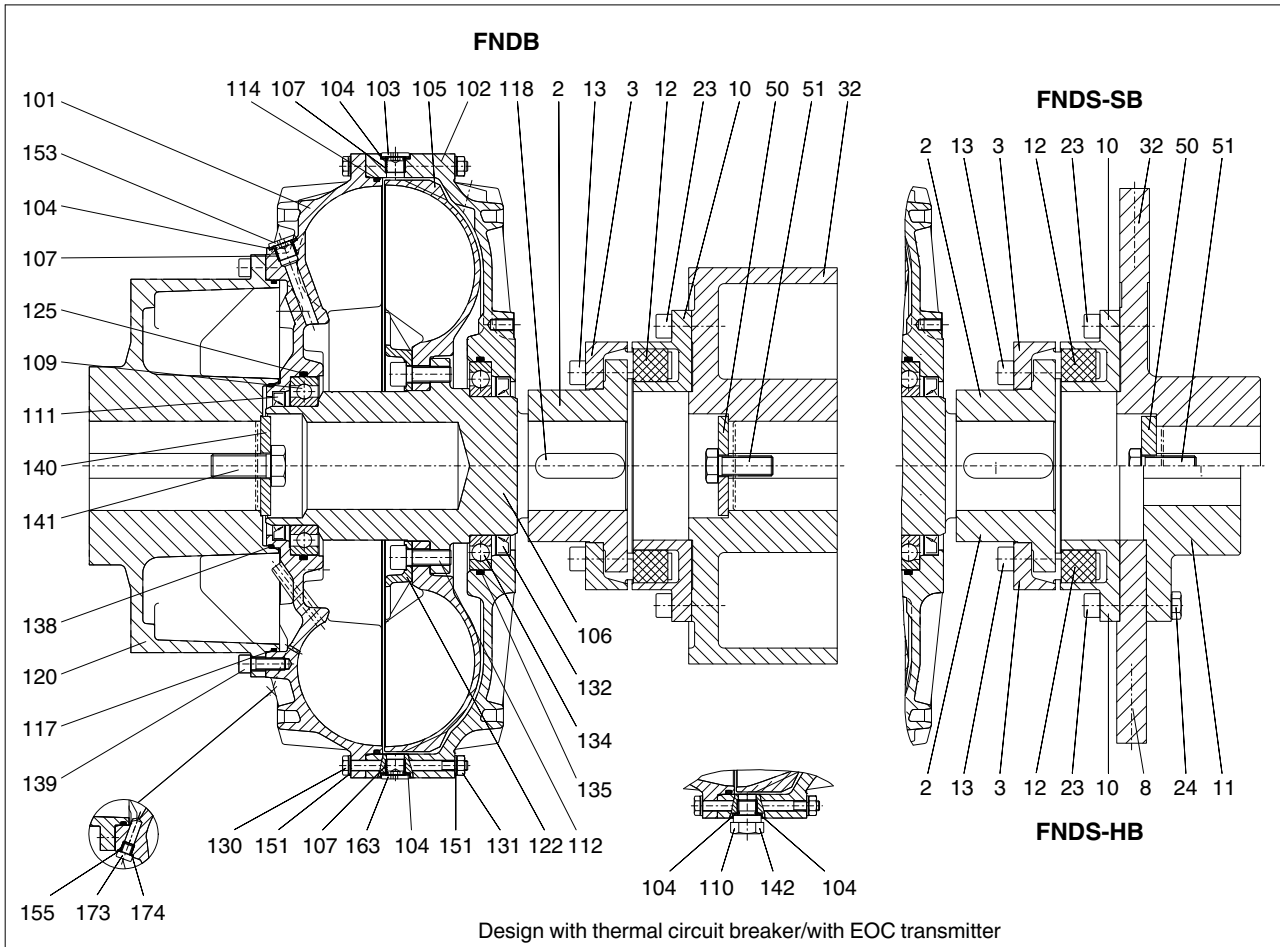
* When ordering, state fusing temperature of the fusible safety plug (stamped on the plug). The temperature specification serves to determine the sealing material (see also item 5.2).

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

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

11.3 Spare parts list, Types FNDB, FNDS

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.



Part-No.	Designation	Part-No.	Designation	Part-No.	Designation			
2	Part 2 (N-EUPEX)	104	Sealing ring	131	Hexagon nut			
3	Part 3 (N-EUPEX)	105	Bucket wheel	E**	132	Shaft-sealing ring	D*	
8	Brake disk	106	Shaft	G**	134	Rolling bearing	L	
10	Part 10 (N-EUPEX)	107	Threaded insert	E	135	O-ring	L	
11	Part 11	109	Rolling bearing	L	138	O-ring	D*	
12	Flexible elements (N-EUPEX)	110	Thermal circuit-breaker	*	139	Cheese-head bolt		
13	Cheese-head bolt	111	Shaft-sealing ring	D*	140	Locking plate		
23	Cheese-head bolt	112	Zylinderschraube	E	141	Retaining screw		
24	Hexagon-head bolt	114	O-ring	D*	142	EOC transmitter		
32	Brake drum / disk	117	O-ring	D*	151	Washer		
50	Locking plate	118	Parallel key		153	Filling plug		
51	Retaining screw	120	Hub-carrier part		155	Threaded insert	E	
101	Blade shell	G	122	Stepped ring	E	163	Screw plug	
102	Cover		125	O-ring	L	173	Drain plug (Prechamber)	
103	Fusible safety plug	*	130	Hexagon-head bolt		174	Sealing ring	

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

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

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

12. Declarations

12.1 EC declaration of conformity



EC declaration of conformity

within the meaning of EC Directive 94/9/EC of 23.03.1994 and the legal requirements laid down for its implementation

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

FLENDER FLUDEX® couplings FNO, FNA, FND, FNDB and FNDS

is in conformity with Article 1 and Article 8, Paragraph 1 b) ii) of Directive 94/9/EC and complies with the requirements of Directive 94/9/EC and the following standards:

DIN EN 1127-1 : 10-2011
DIN EN 13463-1 : 07-2009
DIN EN 13463-5 : 10-2011

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

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

Bocholt, 2012-04-30

A handwritten signature in black ink that reads 'Jansen'.

Andre Jansen (Director Engineering KUE)

Bocholt, 2012-04-30

A handwritten signature in black ink that reads 'N. Warning'.

Nicola Warning (Director Business Subsegment KU)

Further Information:

"FLENDER gear units" on the Internet

www.siemens.com/gearunits

"FLENDER couplings" on the Internet

www.siemens.com/couplings

Service & Support:

<http://support.automation.siemens.com/WW/view/en/10803928/133300>

Lubricants:

<http://support.automation.siemens.com/WW/view/en/42961591/133000>

Siemens AG
Industry Sector
Mechanical Drives
Alfred-Flender-Straße 77
46395 Bocholt
GERMANY

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