FLENDER COUPLINGS

ARPEX

Operating instructions 8702 en
Edition 10/2017

ARS-8
Sizes 251-8 to 722-8

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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 2014/34/EU), those only for preventing material damage with a "STOP" sign.

WARNING! Imminent **explosion!**

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

WARNING! Imminent **personal injury!**

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

WARNING! Imminent **damage to the product!**

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

NOTE!

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

WARNING! Hot surfaces!

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

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

Qualified personnel

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

Proper use of Flender products

Observe also the following:

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

Trade marks

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

Exclusion of liability

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

Explanation regarding Machinery Directive 2006/42/EC

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

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GERMANY

Document number: 8702 en
℗ 10/2017 Subject to alterations

Contents

1. Technical data

The technical data set out in the following include the most important information on the coupling. These data together with the contractual agreements on the coupling determine the limits of its proper use.

The nominal torque values T_{KN} given in the tables below apply, if adhering to the following conditions:

- Daily operating cycle of up to 24 h
- During the starting operation or operation torque surges of up to 2 times the rated torque are permitted up to 5 times an hour.
- Operation within the specified alignment
- Operation over the temperature range of between - 20 °C and + 280 °C (ambient temperature and/or temperature of shaft ends).

STOP **For sustained faultfree operation the coupling must be designed with an application factor appropriate to the application. In the event of a change in operating conditions (output, speed, prime mover and driven machine) the design must always be checked.**

1.1 Dimensional survey ARPEX components

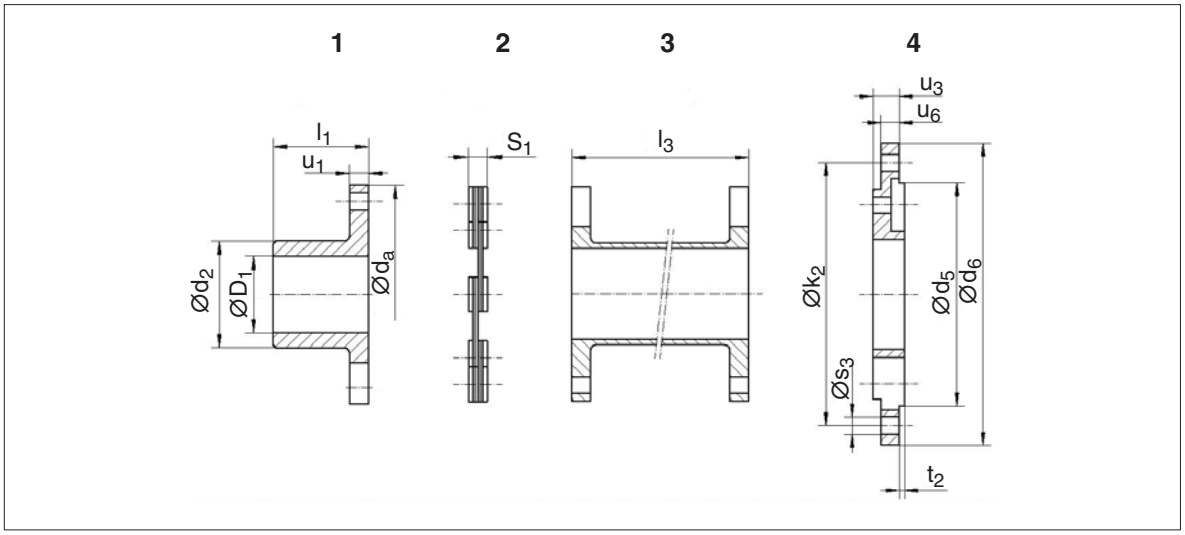

Fig. 1: Dimensional survey ARPEX components

1 Hub
2 Plate pack
3 **"H"** spacer
4 **"F"** flange

Table 1: Torques T_{KN}, speeds $n_{max.}$, dimensions of the ARPEX components

ARPEX coupling d_a Size	Rated torque T_{KN} [Nm]	Speed $n_{max.}$ 1/min	Hole D_1 max. [mm]	d_2 [mm]	d_5 j_6 [mm]	d_6 [mm]	k_2 [mm]	l_1 [mm]	S_1 [mm]	s_3 [mm]	t_2 [mm]	u_1 [mm]	u_3 [mm]	u_6 [mm]
251-8	**10000**	**4150**	**110**	**155**	**275**	**350**	**315**	**120**	**25**	**18**	**2.5**	**19**	**31.5**	**16.5**
285-8	**12500**	**3650**	**125**	**175**	**310**	**385**	**350**	**135**	**27**	**18**	**2.5**	**20**	**35.5**	**17.5**
314-8	**18500**	**3300**	**140**	**195**	**345**	**435**	**390**	**155**	**30**	**22**	**3**	**22**	**39**	**19**
372-8	**26500**	**2800**	**160**	**225**	**410**	**505**	**460**	**175**	**32**	**22**	**3**	**25**	**45**	**22**
407-8	**38000**	**2550**	**175**	**250**	**445**	**535**	**490**	**190**	**35**	**22**	**3**	**27**	**49**	**24**
442-8	**50000**	**2350**	**190**	**270**	**490**	**585**	**540**	**210**	**38**	**22**	**3**	**30**	**54**	**27**
487-8	**65000**	**2150**	**215**	**305**	**535**	**645**	**590**	**235**	**41**	**26**	**4**	**33**	**58**	**29**
522-8	**85000**	**2000**	**230**	**325**	**580**	**695**	**640**	**255**	**44**	**26**	**4**	**36**	**62**	**32**
572-8	**110000**	**1800**	**255**	**360**	**625**	**770**	**700**	**280**	**47**	**33**	**4**	**38**	**66**	**34**
602-8	**130000**	**1700**	**270**	**380**	**655**	**800**	**730**	**295**	**50**	**33**	**5**	**41**	**70**	**36**
667-8	**165000**	**1550**	**305**	**430**	**725**	**870**	**800**	**335**	**55**	**33**	**5**	**43**	**75**	**38**
722-8	**210000**	**1450**	**335**	**470**	**780**	**945**	**865**	**370**	**60**	**39**	**5**	**46**	**81**	**41**

1.2 Weights of the ARPEX components

Table 2: Weights of the ARPEX components for **"F"** flange and **"H"** spacer

ARPEX coupling Size	Hub [kg]	Plate pack [kg]	F-flange [kg]	H-spacer l_3 = 1000 mm [kg]	H-spacer per 100 mm tube [kg]
251-8	**11.7**	**5.5**	**12.8**	**46.9**	**4.3**
285-8	**16.5**	**8.0**	**17.1**	**53.3**	**4.7**
314-8	**22.8**	**10.3**	**24.0**	**77.1**	**6.9**
372-8	**35.9**	**15.8**	**37.9**	**93.5**	**8.0**
407-8	**48.6**	**19.7**	**46.0**	**114.5**	**9.8**
442-8	**62.4**	**25.5**	**60.6**	**142.6**	**12.2**
487-8	**87.1**	**32.3**	**79.4**	**166.2**	**13.7**
522-8	**106.6**	**39.7**	**99.6**	**197.1**	**16.4**
572-8	**141.9**	**51.9**	**129.1**	**246.9**	**20.4**
602-8	**166.3**	**62.5**	**151.6**	**288.3**	**23.5**
667-8	**236.7**	**77.6**	**193.4**	**337.0**	**26.1**
722-8	**304.8**	**98.5**	**241.9**	**381.4**	**29.6**

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 carrying out work on the coupling must have read and understood these instructions and must adhere to them. Flender accepts no responsibility for damage or disruption caused by disregard of these instructions.

The **"FLENDER coupling"** described in these instructions has been developed for stationary use in general engineering applications. Possible areas of use for couplings of this type include sewage treatment, excavators, chemical industry, printing machines, iron and steel industry, conveyor systems, crane systems, foodstuffs industry, paper machinery, pumps, cableways, ventilators, compressors, cement industry.

The coupling has been manufactured in accordance with the state of the art and is delivered in a condition for safe and reliable use. Any changes on the part of the user which may affect safety and reliability are prohibited. This applies equally to safety features designed to prevent accidental contact.

The coupling must be used and operated strictly in accordance with the conditions laid down in the contract governing performance and supply.
The coupling is designed only for the application described on the order-specific drawing of the coupling.
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.

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

Technical enquiries should be addressed to the following factory or to one of our customer services:

Flender GmbH
Schlavenhorst 100
46395 Bocholt

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

3. Safety instructions

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

3.1 Obligations of the user

- The operator must ensure that all persons involved in installation, operation, maintenance and repair have read and understood these operating instructions and comply with them at all times in order to:
  - avoid injury or damage,
  - ensure the safety and reliability of the coupling,
  - avoid disruptions and environmental damage through incorrect use.
- During transport, assembly, installation, demounting, operation and maintenance of the unit, the relevant safety and environmental regulations must be complied with at all times.
- The 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. The operation of the coupling must not be impaired by the safeguard.
- The drive unit must be shut down as soon as changes to the coupling are detected during operation.
- If the coupling is intended for installation in plant or equipment, the manufacturer of such plant or equipment must ensure that the contents of the present operating instructions are incorporated in his own instructions.
- Spare parts must be obtained from Flender (see section 11. "Spare parts, customer service").

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. After consulting Flender an expert is to be called in.

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:

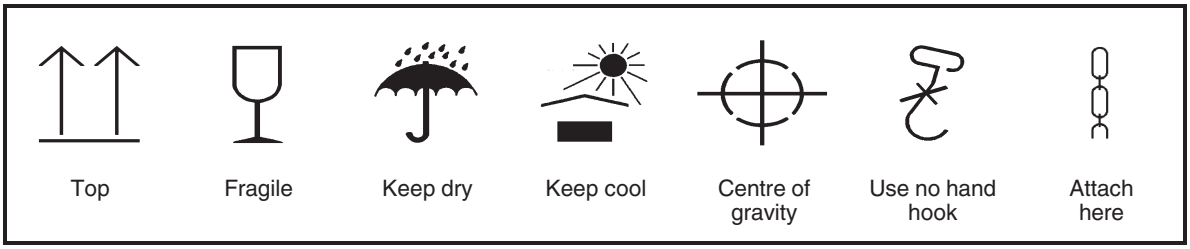

Fig. 2: Transport symbols

4.3 Storage of the coupling

4.3.1 Storage of the coupling parts

The coupling is delivered in a preserved condition and can be stored in a covered, dry place for up to 6 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).

4.3.2 Storage of the plate packs

Correctly stored packs retain their properties unchanged. Unfavourable storage conditions and improper treatment will negatively affect the physical properties of the plates packs. Such negative effects may be caused by e.g. the action of oxygen, ozone, extreme temperatures or solvents.

The storage area must be dry and free from dust. The plate packs must not be stored with aggressive chemicals, acids, alkalis, etc.

STOP **Damp storage rooms (air humidity highr than 65 %) are not suitable. Ensure that no condensation occurs.**

5. Technical description

5.1 General description

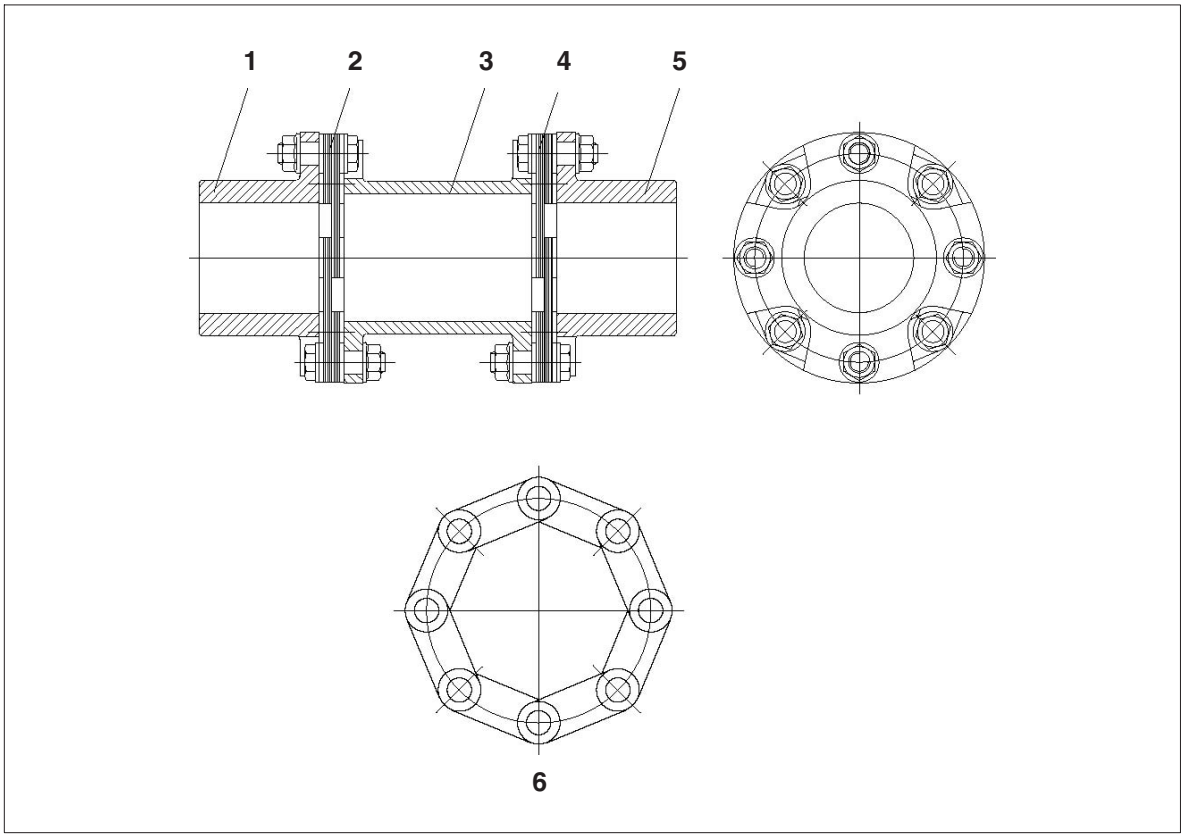

Fig. 3: Octogonal plate pack

1	Hub	4	Plate pack
2	Plate pack	5	Hub
3	Spacer	6	Octogonal plate pack

ARPEX couplings are all-steel couplings. The plate packs are arranged between the flanges of the coupling parts and the spacer and bolted to them alternately.

The individual plates are threaded onto a bush and clamped together with a clipped on, internally bevelled retaining ring. The retaining ring is held on by the expanded bush end, which lies against the angled face. Since all the nodes are so constructed, the plate pack forms a compact unit.

Through this arrangement of the plate packs the ARPEX coupling is torsion-resistant and transmits the torque without circumferential backlash.

ARPEX couplings in the **"ARS-8"** series, sizes 251-8 to 722-8 are designed with octogonal plate packs (see figure 3). Collar bolts with collar nuts connect plate pack to spacer and coupling-part flanges.

ARPEX couplings can be combined more or less as required thanks to a suitably constructed modular system.

The size designation of the coupling indicates the outside flange diameter (d_a) of the coupling in **mm**. This information is prefixed by a letter combination specifying the component parts of the coupling.

Example: ARS-8 NHN 314-8
Coupling with 2 hubs **(N)** and 1 "H" spacer **(H)** size 314-8 in the ARS-8 series

6. Fitting

☞ Observe the instructions in section 3. "Safety instructions".

6.1 General information on fitting

Fitting work must be done with great care by qualified specialist 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.

⚠ **Under no circumstances must welding work be done on the coupling or coupling components, as this will negatively affect the physical property of the coupling.**

Failure to observe these instructions may result in damage to the coupling. Danger to life from flying fragments.

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

6.2.1 Finished bore

- Remove preservative agent from coupling parts.

⚠ **Observe the manufacturer's instructions for handling the solvent.**

When machining the finished bore the parts must be carefully aligned. For the permissible radial and axial run-outs, refer to table 3. The parts must be fitted on the marked faces (⌜) (see figure 4).

STOP **The maximum permissible bore diameters are designed for drive-type fastenings without taper action to DIN 6885/1 and must not under any circumstances be exceeded.**

If other shaft-hub connections (such as splined hub profile, taper or stepped bore and drive-type fastenings with taper action) are to be used instead of the drive-type fastenings provided for, Flender must be consulted.

⚠ **Failure to observe these instructions may result in damage to the coupling. Danger to life from flying fragments.**

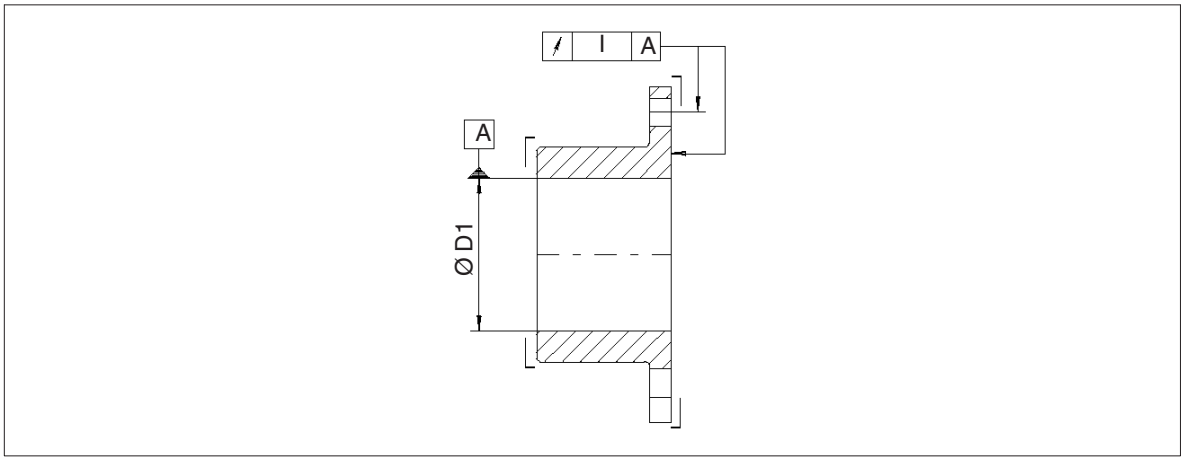

Fig. 4: Finished bore

Table 3: Permissible radial and axial run-outs

ARPEX coupling Size	Hole $D_{1\ max.}$ [mm]	Concentric running I [mm]	ARPEX coupling Size	Hole $D_{1\ max.}$ [mm]	Concentric running I [mm]
251-8	**110**	**0.052**	**487-8**	**215**	**0.063**
285-8	**125**	**0.052**	**522-8**	**230**	**0.070**
314-8	**140**	**0.052**	**572-8**	**255**	**0.070**
372-8	**160**	**0.057**	**602-8**	**270**	**0.070**
407-8	**175**	**0.063**	**667-8**	**305**	**0.080**
442-8	**190**	**0.063**	**722-8**	**335**	**0.080**

For drive by means of parallel keys the following fit pairs are prescribed for the bores (see table 4):

Table 4: Fit pairs

Type of fit	Shaft tolerance	Bore tolerances	
		Reversing operation	Setting-up operation
Interference fit with parallel-key connection	**h6**	**P7**	**N7**
	k6	**M7**	**H7**
	m6	**K7**	**H7**
	n6	**J7**	**H7**
	p6	**H7**	**F7**
Shrink fit without parallel-key connection	to customer specification	on request	on request

STOP **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 assigned fits may impair the shaft-hub connection.**

Failure to observe these instructions may result in damage to the coupling. Danger to life from flying fragments.

6.2.1.1 Parallel keyway

The parallel keyways must be designed to suit the available parallel keys. For parallel keyways the tolerance zone of the hub keyway width **ISO P9** must be adhered to.

6.2.2 Axial fastening

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

6.2.3 Set screws

To prevent damage to the shafts, the set-screw hole should be arranged on the parallel keyway.

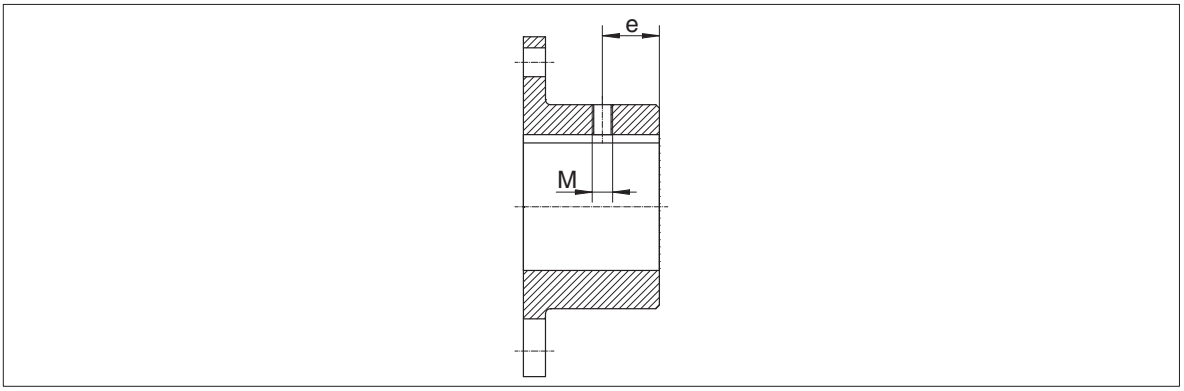

Fig. 5: Set screw

Table 5: Set-screw assignment

ARPEX coupling Size	max. thread [mm]	ARPEX coupling Size	max. thread [mm]
251-8	**M16**	**487-8**	**M24**
285-8	**M16**	**522-8**	**M24**
314-8	**M20**	**572-8**	**M24**
372-8	**M20**	**602-8**	**M24**
407-8	**M24**	**667-8**	**M24**
442-8	**M24**	**722-8**	**M24**

The following guidelines must be observed:
The set screws should be inserted in the centre of the hub core (see figure 5). If this option is not possible, care must be taken that the distance **(e)** is at least M x 1.5.
Use threaded studs with cup points to DIN 916 for set screws.

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

6.2.4 Balancing

Prebored couplings and/or prebored coupling parts are delivered unbalanced. It is recommended that these parts are balanced to suit the application after finish-boring (see DIN 740, DIN ISO 1940 part 1).

Balancing is normally done by drilling material away. To keep the amount of material to be removed to a minimum, a largest possible balance radius must be selected (see figure 6).

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

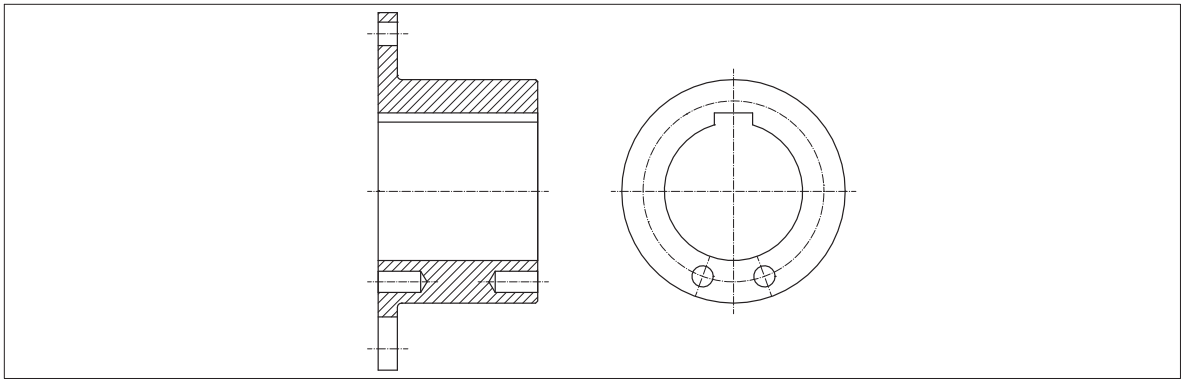

Fig. 6: Arrangement of the balancing bore with one-level balancing (balanced after machining the keyway)

6.3 Fitting the coupling parts in case of shaft-hub connection with parallel key

Before beginning assembly the fitting bores and contact surfaces for rings, nuts and close-fitting bolts (see item 6.10, "Fitting the plate packs) must be cleaned of rust-preventer. Likewise, the shaft ends must be carefully cleaned.

Observe the manufacturer's instructions for handling the solvent.

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

The shaft ends must not project from the inner sides of the hub. If necessary, the hubs can be adjusted to the length of the shaft by fitting spacers or spacer rings (see figure 7). Axial fastening can be effected by means of a set screw or end plate.

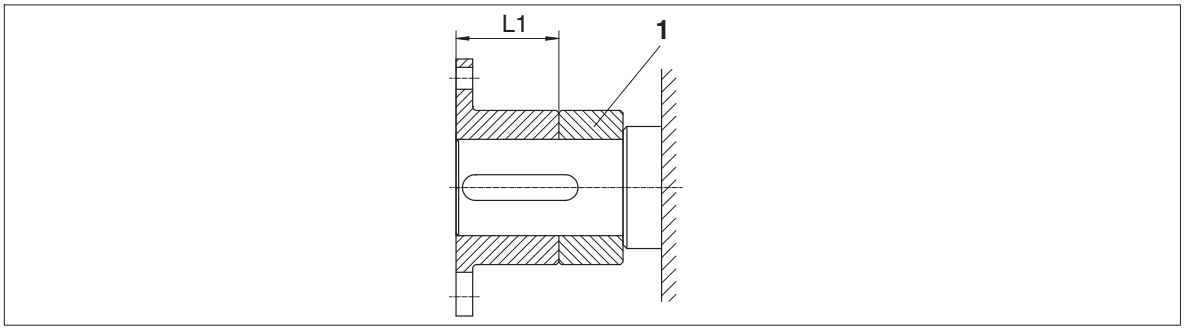

Fig. 7: Spacer ring

1 Spacer ring

The set screws should be tightened only with an Allen key to DIN ISO 2936, without extension tube.

Failure to observe these instructions may result in damage to the coupling.
Danger to life from flying fragments.

In case of hubs with a **parallel-key connection** fitting may be aided by slightly heating the coupling hubs (maximum 150 °C).

Take precautions to avoid burns from hot parts.
Wear suitable protective gloves.

Hubs with transition fits and heated hubs can be pulled onto the slightly oiled shaft end with the aid of a fitting device.

Screw threaded rod (the size of the thread depends on the shaft diameter) into the shaft end. Fit an appropriately sized washer over the threaded rod. By screwing on and tightening a nut the hub is pushed onto the shaft (see figure 8).

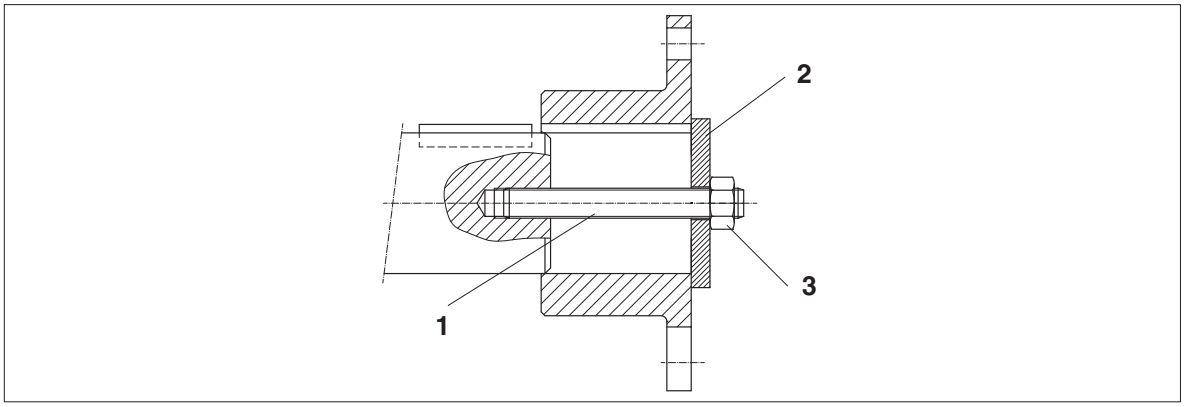

Fig. 8: Fitting the hub with threaded rod

1 Threaded rod
2 Washer
3 Nut

6.4 Demounting the shaft-hub connection with parallel key

If a coupling hub with parallel-key connection is to be pulled off the shaft, the plate packs must first be demounted. Then, if necessary, the end plate can be demounted or the set screw loosened. With the aid of a detaching device or by inserting a pulling-off device into the pulling-off holes provided – if these are required in the order – pull the hub off the shaft end (see figure 9).

In case of an interference fit the hub must, if necessary, be evenly slightly heated with a burner and carefully pulled off the shaft, using a detaching device.

Take precautions to avoid burns from hot parts.
Wear suitable protective gloves.

Check the demounted parts to see if they can be re-used and, if necessary, return them to Flender for repair.

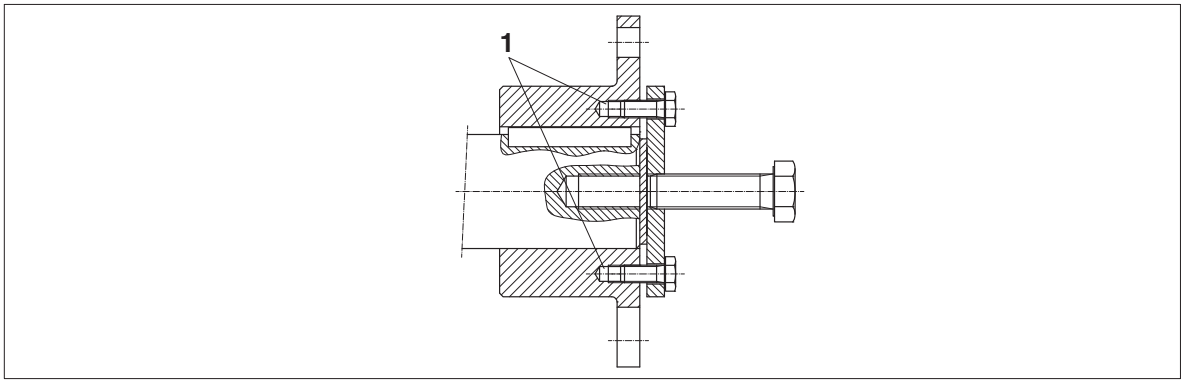

Fig. 9: Hub with tapped pulling-off holes

1 Pulling-off holes

6.5 Shrink connections

6.5.1 Fitting

Cylindrical shrink fits are joined by heating the outer part. To avoid premature sticking the join must be made **quickly** in a draughtfree room.

Care must be taken to keep transport distances short.

6.5.1.1 Aids

- Hot-air furnace or ring burner
- Crane with fast-lowering equipment (for vertical shaft)
- Cleaning agents, solvents, brushes, cleaning cloths

6.5.1.2 Preparation for joining

- The parts must be visually inspected.

The following points must be inspected:

  – bevel on shaft and hub bore

  – undamaged shrink-fit faces

  – undamaged threaded connections for hydraulic tools

- Using solvents, remove preservative from the parts to be joined.

Observe the manufacturer's instructions for handling the solvent.

- Inspect oil channels for free flow and thread lengths of the threaded connections.
- Heat hub evenly to the temperature specified by the customer.

Take precautions to avoid burns from hot parts.
Wear suitable protective gloves.

6.5.1.3 Joining

- Preferably stand shaft upright.
- Position heated hub on shaft straight, noting position of guide bevel.
- Smartly lower hub as far as the contact surface. Care must be taken that the hub is fitted straightly.
- Allow joined parts to cool down slowly to room temperature.
- After approx. 24 hours the parts may be subjected to stress.

Take precautions to avoid burns from hot parts.
Wear suitable protective gloves.

6.5.2 Demounting shrink connections

If a coupling hub with a cylindrical shrink fit is to be demounted, the plate packs and spacer must be demounted first.

If demounting in cold rooms, the shrink fit must be heated slightly.

6.5.2.1 Non-stepped shaft end

The coupling hubs must be provided with one or more oil channels, depending on length and design. The oil must be injected into the join by way of the oil connections the number of which corresponds to the number of oil pumps. Axial misalignment is achieved by means of a separate hydraulic press or mechanical pulling-off device.

6.5.2.2 Stepped shaft end

The coupling hubs are provided with at least one oil groove. A motor-driven pump must be connected to the point of transition from the smaller to the larger shaft diameter, because a large quantity of oil per unit of time is required. For the other oil connections a hand-operated oil pump will suffice. Axial displacement is effected by the pressure acting on the stage.

6.5.2.3 Oil viscosity of the compressed oil

Low-viscosity, pure mineral oil with a viscosity of 6 to 10 °E at 50 °C is best suited as compressed oil under normal conditions of temperature. If during demounting so much oil escapes that no pressure can be maintained, a thicker oil may be used.

6.6 **"V"** supports

The plate packs of an ARPEX coupling are axially flexible and, if the coupling is fitted vertically, cannot support the weight of the spacer. For this reason support disks which conduct the weight of the spacer as an axial force straight into the bearing of the machine can be used as an option and do not load the plate pack.

In such cases the spacers and connecting parts are already fitted at the factory with these support disks ready to function.

The support disks are adapted to suit the coupling combinations and fitted.

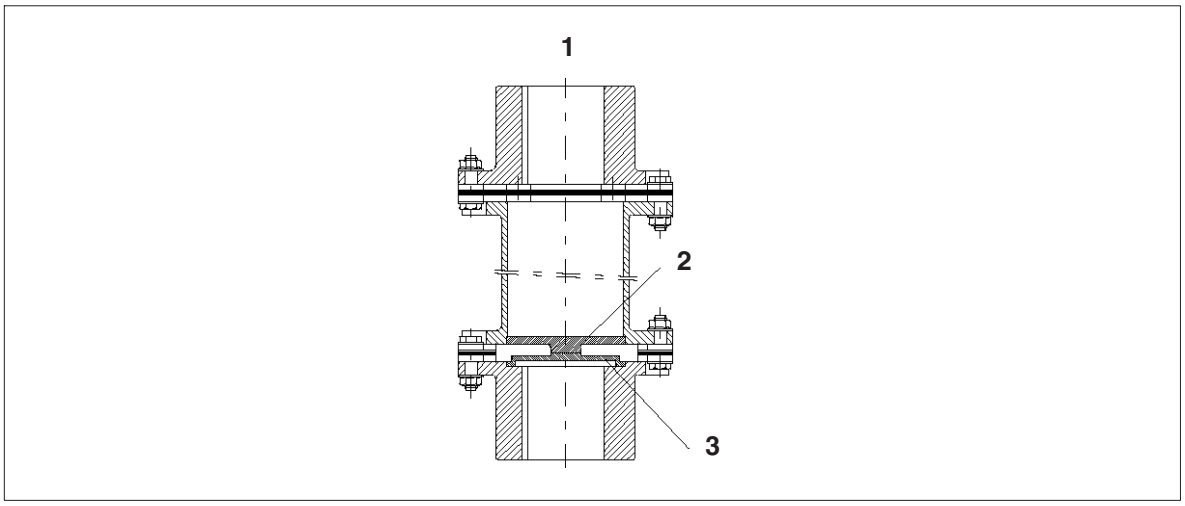

Fig. 10: "NHN" with **"V"** support

1 **"NHN"** with **"V"** support
2 Support disk, spacer
3 Support disk, hub

6.6.1 Fitting

If an **"N"** hub is to be fitted, the support disk fitted at the factory must be demounted. For this the three threaded studs must be unscrewed with an Allen key and the support disk removed.

Pull hub onto the shaft end (see item 6.3).

After fitting the hub insert the support disk into the hub, fasten and screw the three threaded studs back in again. Care must be taken that the support disk lies flat.

Failure to observe these instructions may result in damage to the coupling. Danger to life from flying fragments.

Afterwards lay the plate pack on the hub and place the spacer with the support disk fitted at the factory on the lower support disk, then insert the second plate pack and the close-fitting bolts and tighten (see item 6.10).

6.6.2 Demounting

Demount the spacer and plate packs in the reverse order. Unscrew the three studs and, using two forcing-off screws in the support disk, press out of the recess. If plate packs are replaced, the **"V"** support disks must be inspected and, if necessary, replaced.

6.7 **"F"** flange screw connection

6.7.1 Condition on delivery

"F" flanges are delivered ready-assembled as an individual part or with a spacer, as agreed.

6.7.2 Fitting

Before fitting the coupling parts must be carefully cleaned with a suitable cleaning agent.

Observe the manufacturer's instructions for handling cleaning agents.

- The "recess" (centering pin) and the contact face of the **"F"** flange must be inspected for damage and, if necessary, reworked.
- The "recess" connection must be joined accurately and carefully.
- The connecting screws must be tightened evenly one after the other with the specified tightening torque (see table 6). Care must be taken that the "recess" connection is straight.

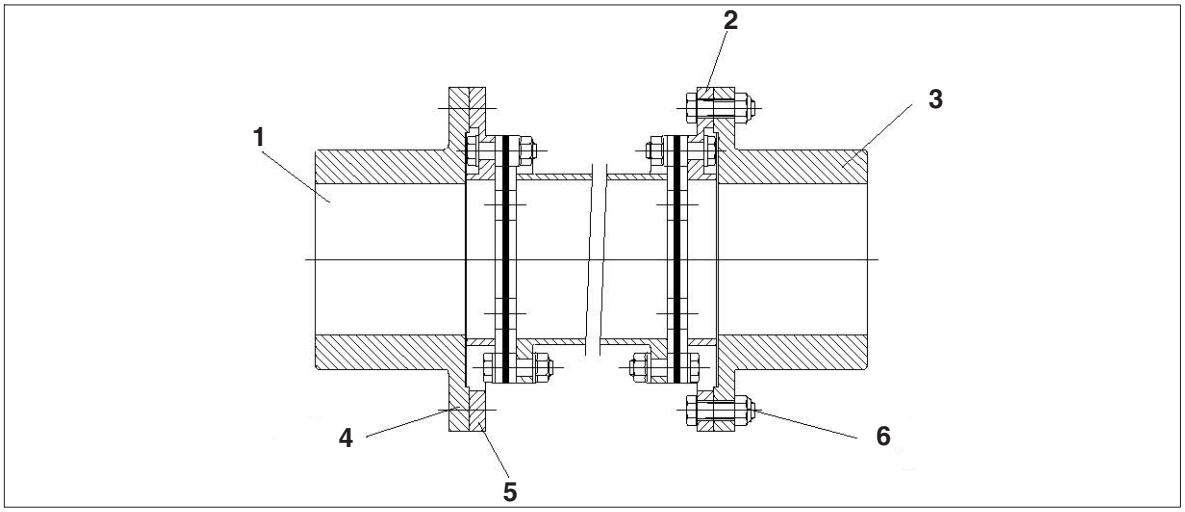

Fig. 11: **"C"** and **"F"** flange screw connection

1	Connection provided by the customer	4	Joint bolt
2	**"F"** flange	5	**"F"** flange
3	Connection provided by the customer	6	Joint bolt

Failure to observe these instructions may result in impairing the proper function of the coupling.

Table 6: Tightening torques of the connecting bolts

Hexagon-head bolt DIN EN 24017 / 8.8	Tightening torque [Nm]
M 16	**215**
M 20	**430**
M 24	**740**
M 30	**1500**
M 36	**2600**

6.8 Fitting of assembly-balanced couplings

On couplings which have been assembly-balanced each individual coupling component must be marked on the outside circumference of the flange with a four-digit number (see marking "AAAA" in Fig. 12). When assembling, care must be taken that only coupling parts having the same numbers on the outside circumference of the flange are bolted together.

After correct fitting the identical numbers of the parts must be arranged in line and be readable from one direction (see marking "AAAA" in Fig. 12).

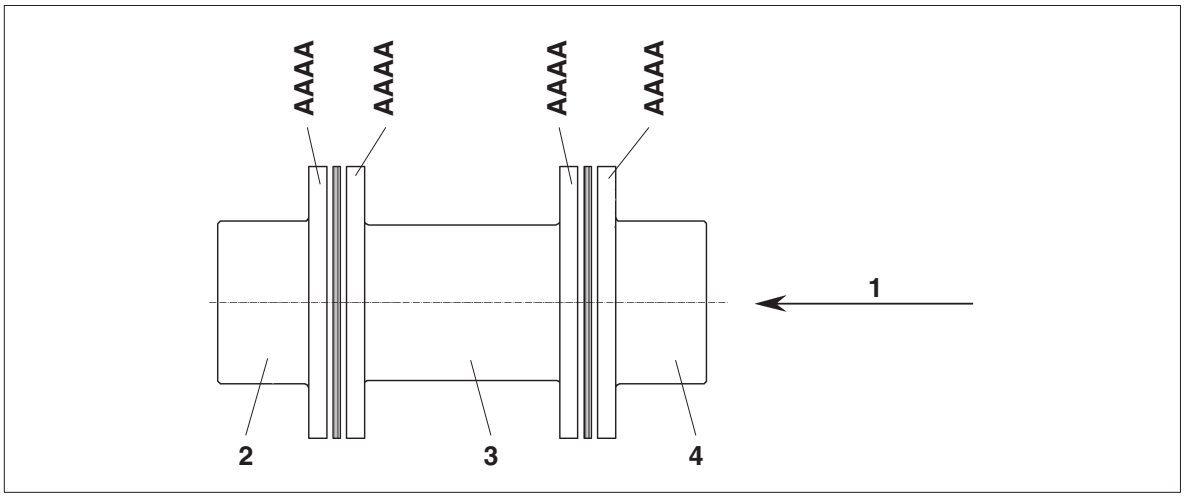

Fig. 12: Marking in case of assembly balancing

1	readable from here	3	Spacer
2	Hub 1	4	Hub 2

Failure to adhere to these instructions will result in impairment of the balancing quality of the coupling and possibly in vibration in the system.

6.9 Pushing the units together

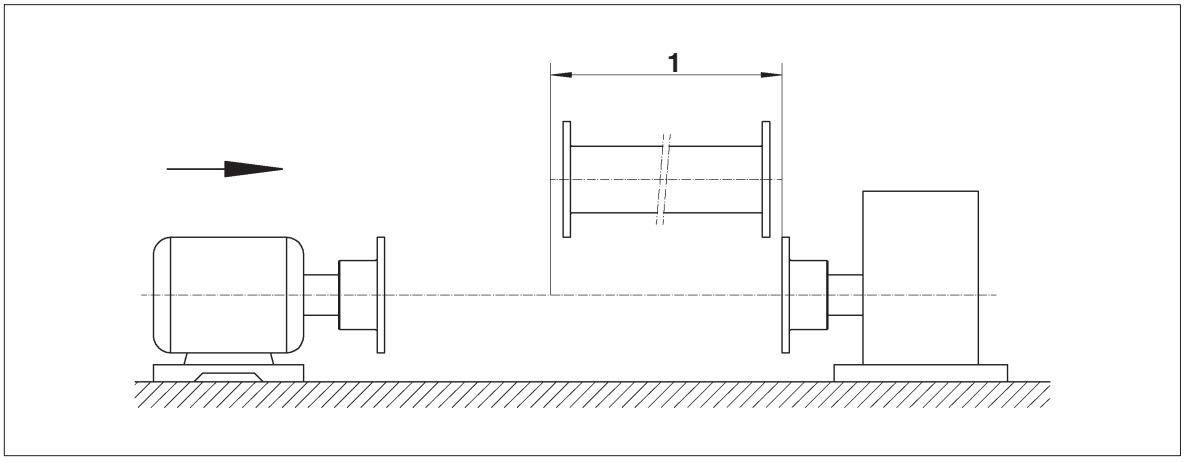

Fig. 13: Aligning the units

1 Distance "S_X" between shafts

Push the machines to be coupled towards each other until the shafts are the required distance apart (see Fig. 13).

Notice, Danger of squeezing. Wear safety gloves.

6.10 Fitting the plate packs

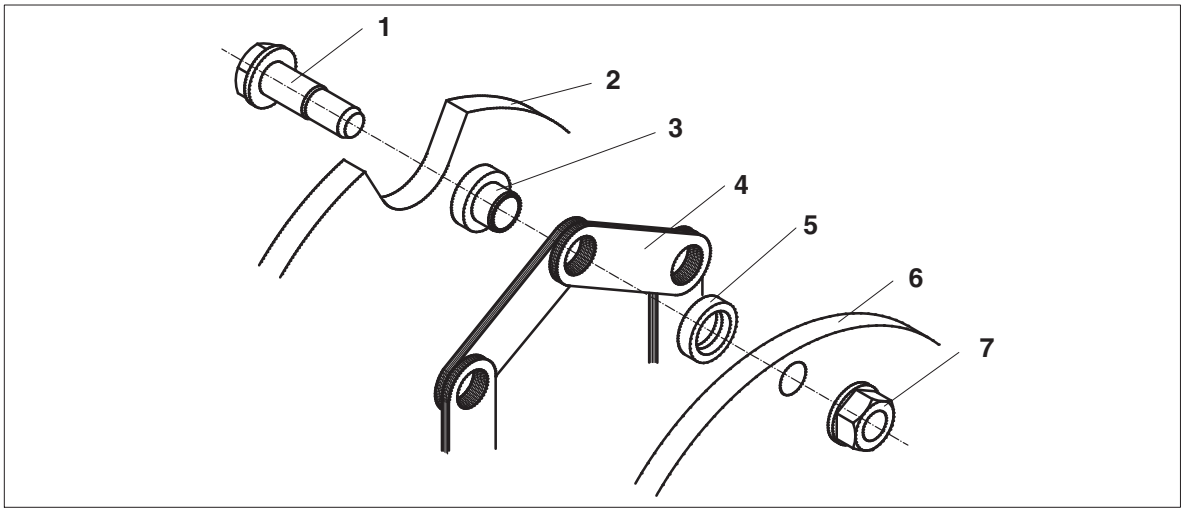

Fig. 14: Construction of an ARPEX screw connection point

1 Close-fitting collar bolt
2 ARPEX flange
3 Bush
4 Plates
5 Ring
6 ARPEX flange
7 Flanged nut

Note:
Plates, bushes and rings are delivered as a ready assembled, compact unit. In case of open-link design (possible from size 251-8 on) one bush and one ring are supplied loose. These must be inserted appropriately, when assembling (see Fig. 14).

6.10.1 Sizes 251-8 to 722-8 / rotation-angle method

6.10.1.1 Preparatory measures

Apply the special paste, which comes with the plate pack, to the contact surface of nut and bolt head and to the thread of the close-fitting bolt. The plate pack must be bolted **alternatingly** to the coupling parts so that the rings (Pos. 1, Fig. 15) are in contact with the ARPEX flange (Pos. 2). Preferably tighten the nuts so that they contact the flange (Fig. 15). If this is not possible for space reasons, assembly the other way round is also possible.

Pretension must be applied with the nut, the bolt head being locked to prevent the bolt turning. The torque-locking device must be braced on the flange to which the plate pack is bolted. Tighten the nuts one after the other to the prescribed tightening torque T_A (see table 7).

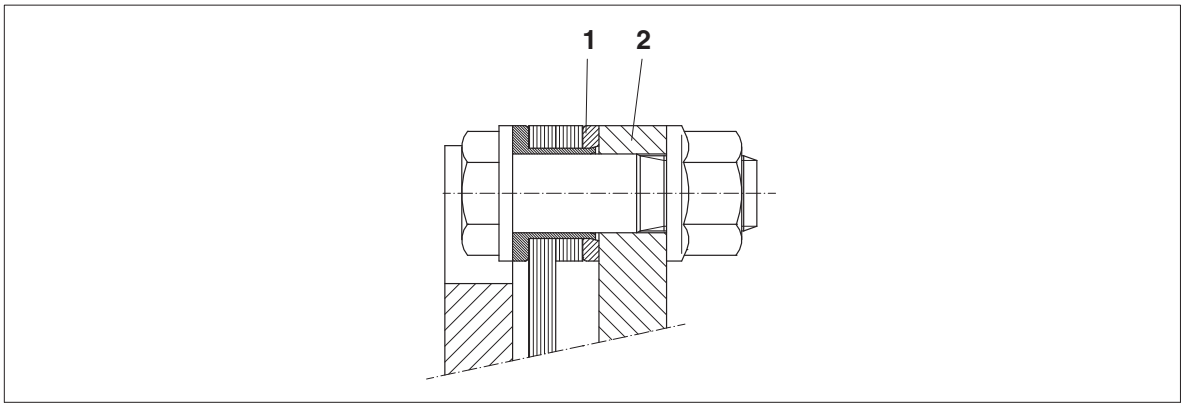

Fig. 15: Detailed view of the close-fitting screw connection

1 Ring
2 ARPEX flange

6.10.1.2 Pre-tensioning the close-fitting bolts

Tighten the nuts one after the other to the pre-tightening torque $\mathbf{T_0}$ (see table 7).

Mark a clearly visible zero position at any point on the nut collar and on the flange (see Fig. 17). It is recommended to choose a corner of the hexagon as zero position.

Starting from the zero position mark the rotation angle $\alpha/2$ and α [degree] or $\widehat{\alpha}/2$ and $\widehat{\alpha}$ (arc angle, see table 7) on the nut-collar circumference in a **counter-clockwise direction** (see Fig. 16).

Alternatively the rotation angle **(degree)** can also be transferred to the wrench socket (see Fig. 17), to avoid marking every single nut as described above.

Do not in any case copy the angles specified in table 7 (see Fig. 16) as arc angle; these values only relate to the nut-collar circumference!

Turn the nuts consecutively, starting from the zero position (marked on the flange) until the first angle mark $\alpha/2$ (on the socket wrench or on the nut collar) in the tightening direction.

In the second step turn the nuts until the second angle mark α.

Example: Size **442-8** thread **M36**
Thread greased with special paste, pre-tightening torque $\mathbf{T_0}$ **= 370 Nm**
Rotation angle = **75 degrees**
Arc angle = **46 mm**

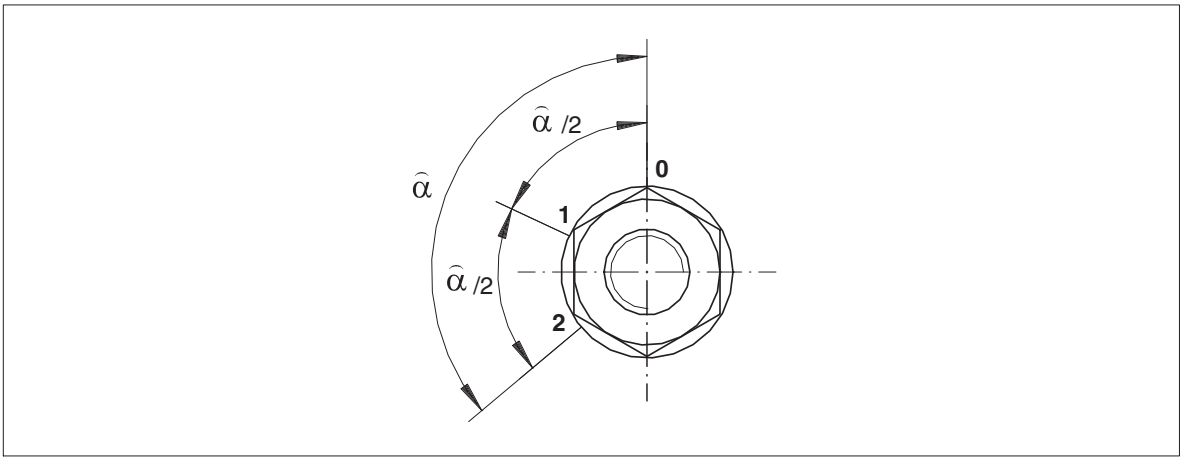

Fig. 16: Angle in **arc angle** at collar circumference of the nut

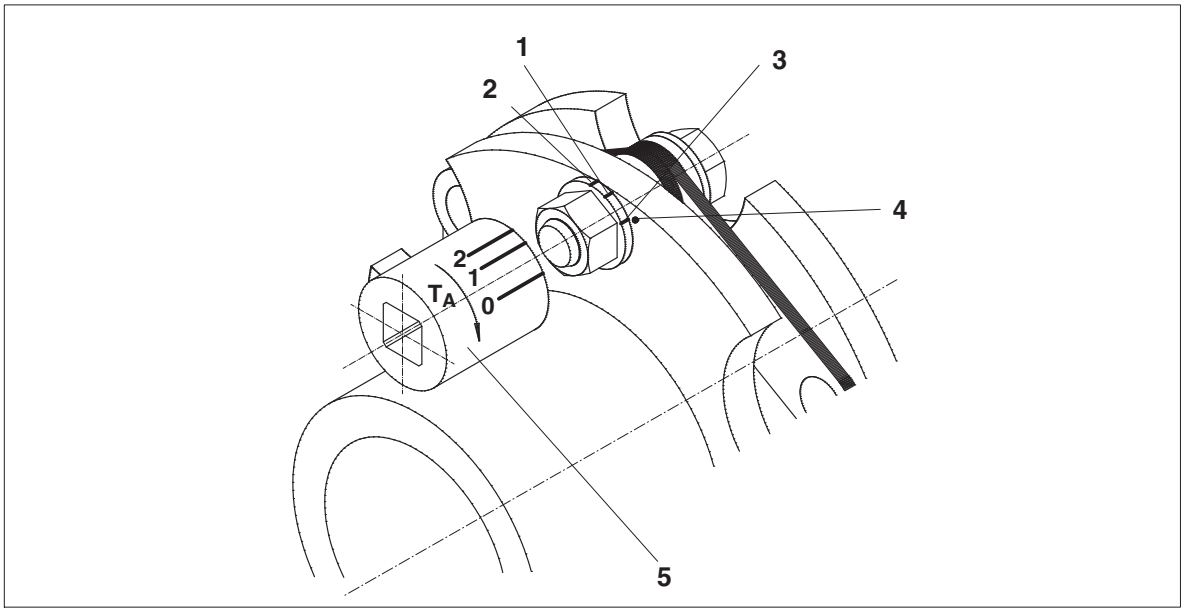

Fig. 17: Angle marks

1 First angle mark (= $\alpha/2$)
2 Second angle mark (= α)
3 Zero position
4 Mark the zero position on the flange (e.g. by punch mark)
5 Wrench socket

Failure to observe these instructions may result in impairing the proper function of the coupling.

6.10.1.3 Plate pack with integrated axial-backlash limiting device, sizes 251-8 to 722-8

Here, too, principally the same procedure applies as that described in item 6.10.1.

However, the following must be noted additionally:

The plate pack must be bolted to the coupling parts so that the star flange of the plate pack lies up against the flange of the coupling part, as otherwise proper function cannot be guaranteed.

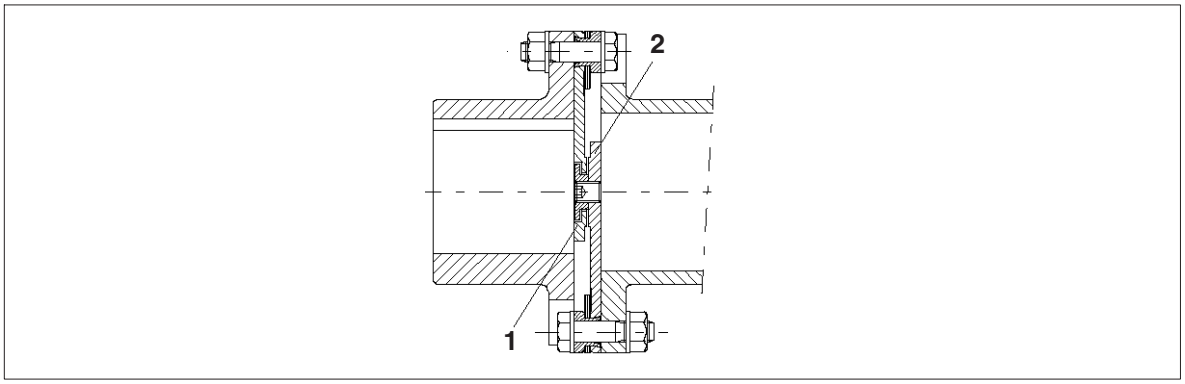

Fig. 18: Fitting the plate packs with integrated axial-backlash limitation

1 Star flange
2 Star flange

Failure to observe these instructions may result in impairing the proper function of the coupling.

6.11 Technical data for fitting plate packs

Table 7: Fitting data for plate-pack bolting (rotation-angle method)

ARPEX coupling	Thread	SW	Rotation-angle method						Remark
				Rotation angle			Arc angle		
			T_0	α	$\alpha/2$	Collar circum-ference	$\widehat{\alpha}$	$\widehat{\alpha}$ /2	
Size	[mm]	[mm]	[Nm]	[degree]	[degree]	[mm]	[mm]	[mm]	
251-8	**M 22**	**32**	**80**	**55°**	**27.5°**	**40**	**19**	**10**	**Pretensioning by angle of rotation** **Thread and contact surface of nut lubricated with special paste**
285-8	**M 24**	**36**	**100**	**50°**	**25°**	**45**	**20**	**10**	
314-8	**M 27**	**41**	**145**	**55°**	**27.5°**	**50**	**24**	**12**	
372-8	**M 30**	**46**	**205**	**50°**	**25°**	**60**	**26**	**13**	
407-8	**M 33**	**50**	**280**	**70°**	**35°**	**65**	**40**	**20**	
442-8	**M 36**	**55**	**370**	**75°**	**37.5°**	**70**	**46**	**23**	
487-8	**M 39**	**60**	**480**	**80°**	**40°**	**75**	**52**	**26**	
522-8	**M 42**	**65**	**610**	**85°**	**42.5°**	**80**	**59**	**30**	
572-8	**M 45**	**70**	**770**	**90°**	**45°**	**90**	**71**	**35**	
602-8	**M 48**	**75**	**940**	**95°**	**47.5°**	**95**	**79**	**39**	
667-8	**M 52**	**80**	**1150**	**75°**	**37.5°**	**100**	**65**	**33**	
722-8	**M 56**	**85**	**1460**	**85°**	**42.5°**	**110**	**82**	**41**	

6.12 Alignment

The couplings pick up positional errors in the shaft ends to be connected up to the values shown in item 6.13. During alignment the radial and angular misalignment of the shaft ends should be kept as small as possible.

Couplings with **two** plate packs support axial, radial and angular misalignment.
Couplings with **one** plate pack support only angular and axial misalignment.

When aligning machine parts, measure with a sliding caliper gauge the distance "S_1" (see Fig. 19 and table 8) between the coupling flanges at a number of measuring points. If the measured flange distances are within the range of values shown for $S_{1\ min.}$ / $S_{1\ max.}$ (see table 8), the machine parts are sufficiently precisely aligned.

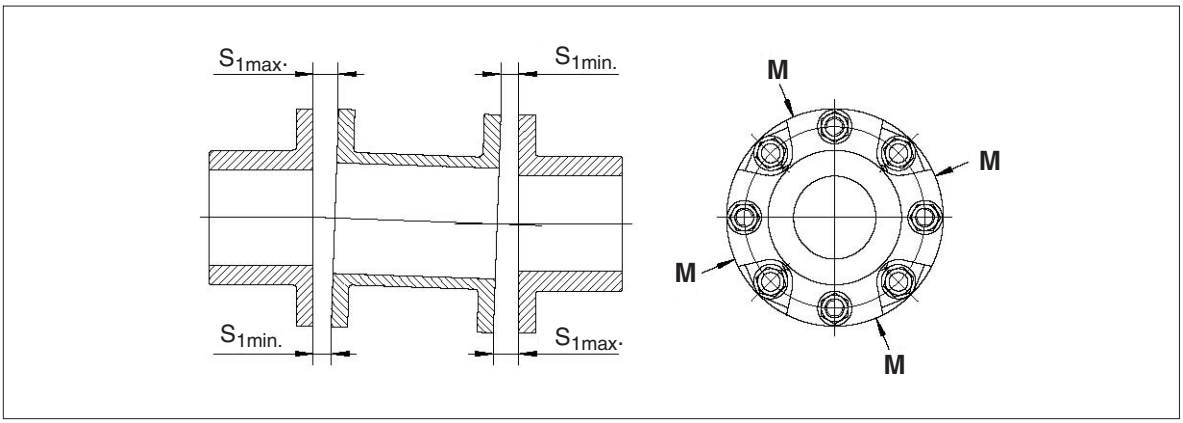

Fig. 19: Aligning the machine parts

S_1 = Distance between coupling flanges

$S_{1min.}$ = see table 8

$S_{1max.}$ = see table 8

M = Measuring point

The fitting misalignment must not exceed the values for $S_{1\ min.}$ and $S_{1\ max.}$ specified in table 8. It is however recommended to align the coupling as precisely as possible so as to have an additional margin for misalignment in operation.

Table 8: Permissible fitting misalignment

ARPEX coupling Size	S_1 min. [mm]	S_1 max. [mm]	ARPEX coupling Size	S_1 min. [mm]	S_1 max. [mm]
251-8	**24.6**	**25.4**	**487-8**	**40.3**	**41.7**
285-8	**26.6**	**37.4**	**522-8**	**43.2**	**44.8**
314-8	**29.6**	**30.4**	**572-8**	**46.2**	**47.8**
372-8	**31.5**	**32.5**	**602-8**	**49.1**	**50.9**
407-8	**34.4**	**35.6**	**667-8**	**54.0**	**56.0**
442-8	**37.4**	**38.6**	**722-8**	**58.9**	**61.1**

6.13 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 (such as expansion due to heat, shaft deflection, insufficiently rigid machine frames).

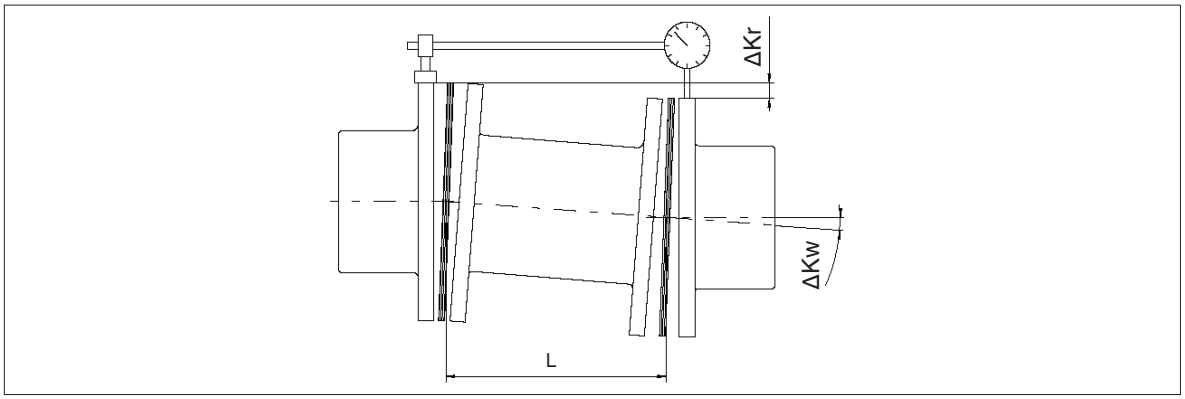

Fig. 20: Radial misalignment ΔKr / angular misalignment ΔKw

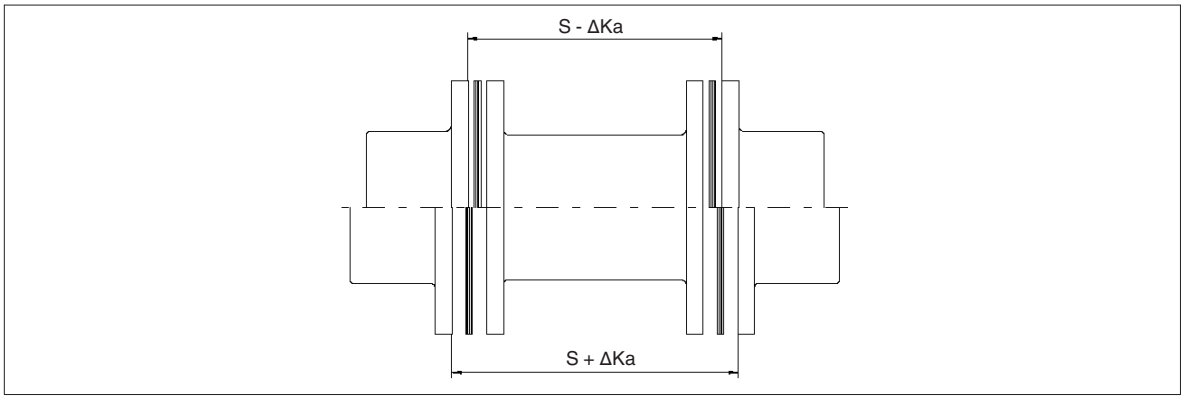

Fig. 21: Axial misalignment ΔKa

In table 9 the permissible angular and axial misalignments can be referred to as interdependent values; the values refer to **one** plate pack.

The specified values relate to the permissible total misalignment which may arise during operation, i.e. misalignments which have already arisen during fitting must be taken into consideration accordingly.

The permissible radial misalignment depends on the permissible angular misalignment and the distance between centres of the plate packs.

$$\Delta Kr = \tan \Delta Kw \times L$$

L = Distance between centres of the plate packs

L = "S_8" – "S_1"

Example for determining the permissible misalignment:

Required: permissible misalignment for an ARPEX coupling, type **"NHN 251-8"**, with a shaft distance of "S_8" = 1000 mm.

a) Maximum permissible angular misalignment = 0.4° at ΔKa = 0 mm
Maximum permissible axial misalignment = ± 2.1 mm (2 plate packs = 2 x 1.05 mm) at ΔKw = 0°

b) Maximum permissible axial misalignment at ΔKw = 0.2° = ± 1.06 mm (2 plate packs = 2 x 0.53 mm)

The corresponding permissible radial misalignment ΔKr with an angular misalignment of 0.2° is calculated as follows:

Distance between centres of the plate packs L = "S8" – "S1"
L = 1000 mm – 25 mm = 975 mm

ΔKr = tan (0.2°) x 975 mm = 3.40 mm

6.13.1 Permissible total misalignment as a function of axial and angular misalignment

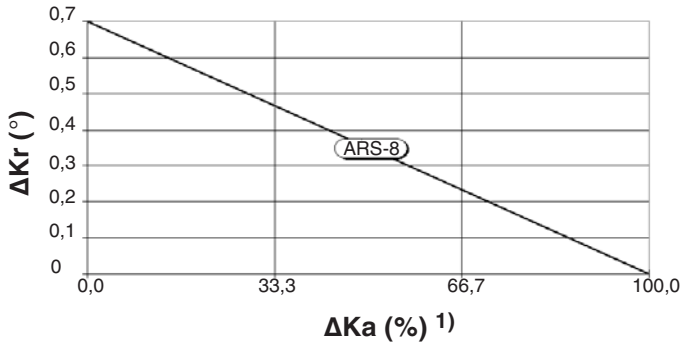

Fig. 22: Permissible total misalignment

1) Absolute value (see table 9)

The maximum permissible misalignment values must under no circumstances be exceeded during operation.

Failure to observe these instructions may result in damage to the coupling. Danger to life from flying fragments.

6.13.2 Axial and angular misalignment

The specified axial misalignment values ΔKa must be understood as permissible tolerance values of the nominal dimension "S_1" (see table 1).

Table 9: Permissible axial and angular misalignment

Size	Permissible axial misalignment ΔKa ± [mm]				
251-8	1.05	0.79	0.53	0.26	0.00
285-8	1.20	0.90	0.60	0.30	
314-8	1.32	0.99	0.66	0.33	
372-8	1.54	1.16	0.77	0.39	
407-8	1.71	1.28	0.86	0.43	
442-8	1.87	1.40	0.94	0.47	
487-8	2.14	1.61	1.07	0.54	
522-8	2.31	1.73	1.16	0.58	
572-8	2.45	1.84	1.23	0.61	
602-8	2.57	1.93	1.29	0.64	
667-8	3.04	2.28	1.52	0.76	
722-8	3.23	2.42	1.62	0.81	
	0.0°	0.1°	0.2°	0.3°	0.4°
	Permissible angular misalignment (°) ΔKw				

☞ Values apply to **one** plate pack.

7. Start-up

Observe the instructions in section 3. "Safety instructions".

7.1 Procedure before start-up

Before start-up the screw connections must be checked and, if necessary, re-tightened. The alignment and the distance dimension "S_1" (see tables 8 and 9) must also be checked and, if necessary, adjusted. Then fit the coupling guard to prevent unintentional contact!

Failure to observe these instructions may result in damage to the coupling. Danger to life from flying fragments.

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, the drive assembly must be switched off at once. The cause of the fault must be determined, using the fault table in section 9.

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

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

9. Faults, causes and remedy

☞ Observe the instructions in section 3. "Safety instructions".

9.1 General

The following malfunctions 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.

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

⚠ **When remedying faults and malfunctions, the coupling must always be taken out of service. Secure the drive unit to prevent it from being started up unintentionally. A notice should be attached to the ON switch stating clearly that work is in progress. We also refer to the relevant accident prevention regulations applying at the place of installation.**

9.2 Possible faults

Table 10: Faults, causes and remedy

Faults	Causes	Remedy
Sudden changes in the noise level and/or sudden vibrations.	Change in alignment.	Stop the installation. IIf necessary, rectify any cause of the changes in alignment (e.g. by fastening loose foundation bolts). Check wear; procedure as described in section 10.
	Plate breakage, torque transmission via close-fitting bolts.	Stop the installation. Demount coupling and remove remains of pack. Check and replace damaged coupling parts. Check alignment, adjust as necessary.

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.
We also refer to the relevant accident prevention regulations applying at the place of installation.

10.1 General

ARPEX couplings should be **visually inspected** during system maintenance inspections or **at least once a year**. Especial attention should be given to the condition of the plate packs. If individual plates or several plate series are broken, the plate pack affected must be replaced (see item 10.2). In such cases the coupling flanges must also be inspected for damage.

No further maintenance work is necessary.

10.2 Replacing plate packs

Only **original ARPEX plate packs** must be used for replacement in order to guarantee troublefree torque transmission and faultfree operation.

Normally, the plate packs can be replaced without moving the coupled machines. Excepted are combinations with **"F"** flanges and special solutions.

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

11. Spare parts, customer service

11.1 Spare-parts stockage

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

When ordering spare parts, always state the following:

Quantity, description, size if available, also drawing number and item number of the spare part in the spare parts list)

If coupling parts with finished bore and balancing are required, the following data must be stated additionally:

Finished bore, fitting tolerance, keyway and balancing quality

Order examples:	1 off	ARPEX hub, **"ARS-8"** series, size 285-8 with hole 100 H7 and keyway to standard DIN 6885-1, individual part dynamically balanced after cutting the keyway G 2.5 Speed 1000 1/min
	1 off	ARPEX plate pack, **"ARS-8"** series, size 285-8, complete

We guarantee only the genuine spare parts supplied by us. Non-genuine spare parts have not been tested or approved by us. They may alter technical characteristics of the coupling, thereby posing an active and/or passive risk to safety. Flender will assume no liability or guarantee for damage caused by non-genuine 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.

11.2 Addresses for ordering spare parts and customer service

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

FLENDER COUPLINGS

ARPEX
Operating instructions 8702 en
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