Installation and Operational Instructions for ROBA®-DS Couplings Type 956. _ _ _ Sizes 2200 – 11000

(B.9.7.3.EN)

Please read these Operational Instructions carefully and follow them accordingly!
Ignoring these Instructions may lead to malfunctions or to coupling failure, resulting in damage to other parts.

Contents

Safety Regulations

These Installation and Operational Instructions (I + O) are part of the coupling delivery.
Please keep them handy and near to the coupling at all times.

It is forbidden to start use of the product until you have ensured that all applicable EU directives, directives for the machine or system into which the product has been installed have been fulfilled.
At the time these Installation and Operational Instructions go to print, the ROBA®-DS couplings accord with the known technical specifications and are operationally safe at the time of delivery.
Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion. This statement is based on the ATEX directive.

CAUTION

- ❒ If the ROBA®-DS couplings are modified.
- ❒ The relevant standards for safety and / or installation conditions are ignored.

User-implemented Protective Measures

- ❒ Cover all moving parts to protect against seizure, dust or foreign body impact.

To prevent injury or damage, only professionals and specialists should work on the devices, following the relevant standards and directives. Please read the Installation and Operational Instructions carefully prior to installation and initial operation of the device.

These Safety Regulations are user hints only and may not be complete!

Safety and Guideline Signs

CAUTION

Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

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Exemplary Illustration of the ROBA®-DS Coupling Sizes 2200 – 11000
with flange, sleeve and hub

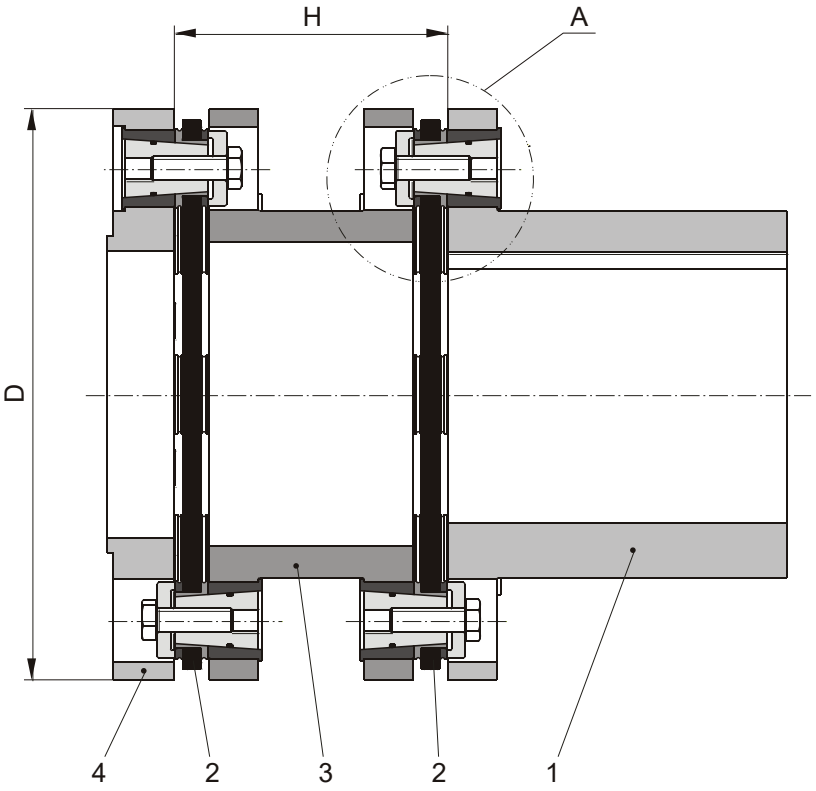

Fig. 1

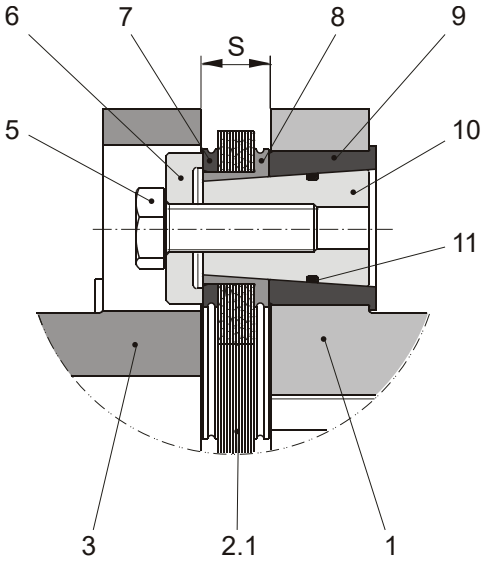

Fig. 1a: Detail A

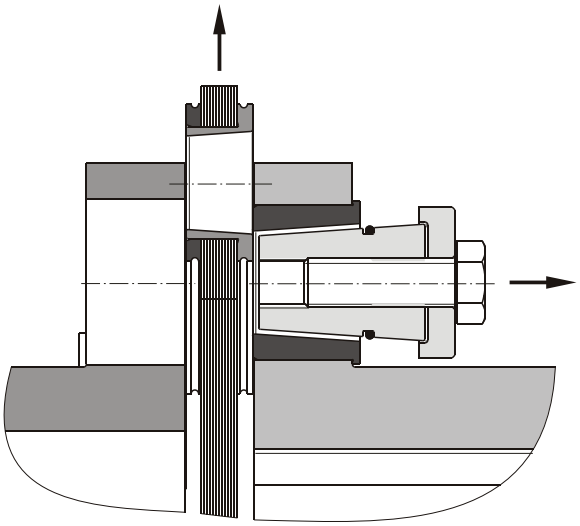

Fig. 2

Parts List

Only use *mayr*® original parts

1	Hub
2	Disk pack
2.1	Disks
3	Sleeve
4	Flange
5	Hexagon head screw
6	Press cover
7	Ring
8	Collar bushing
9	Cone bushing
10	Cone bolt
11	O-ring

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Table 1: Technical Data

ROBA®-DS Size			2200	3300	5000	7300	11000
Coupling nominal torque valid for unchanging load direction as well as for max. permitted shaft misalignment	T_{KN}	[kNm]	22	33	50	73	110
Coupling alternating torque valid for changing load direction as well as for max. permitted shaft misalignment	T_{KW}	[kNm]	14.7	22.0	33.3	48.7	73.3
Coupling peak torque valid for unchanging load direction max. load cycles ≤ 10^5	T_{KS}	[kNm]	44	66	100	146	220
Distance dimension	S	[mm]	17.8 ± 0.25	19.0 ± 0.25	23.0 ± 0.25	24.2 ± 0.25	26.5 ± 0.25
Axial displacement Values refer to couplings with 2 disk packs. Only permitted as a static or virtually static value.	ΔK_a	[mm]	1.6	1.7	2.1	2.3	2.3
Angular misalignment per disk pack	ΔK_w	[°]	0.4	0.4	0.4	0.4	0.3
Radial misalignment for double-jointed couplings	ΔK_r	[mm]	(H - S) x 6.98 x 10^{-3}				(H - S) x 5.24 x 10^{-3}
Radial misalignment for single-jointed couplings			If there is only one disk pack, the shafts must be aligned precisely.				
Outer diameter	D	[mm]	290	332	378	431	492
Max. speed [1] valid if the outer diameter D is not exceeded	n_{max}	[rpm]	3600	3100	2700	2400	2100
Hexagon head screw (Item 5 Tightening torque		[Nm]	M14x40 196	M16x40 300	M16x50 300	M18x50 420	M18x50 420
Adjusting screws for key hubs (Fig. 3) Tightening torque		[Nm]	M10 / 14	M16 / 90	M12 / 35	M16 / 90	M16 90	M16 90	M16 90

1) On double-jointed couplings, the critical bending speed of the respective sleeve must be taken into consideration additionally.

Function – Application

ROBA®-DS couplings are shaft connections for torsionally rigid, backlash-free torque transmission. At the same time they compensate for angular misalignments and axial displacements on single-jointed couplings, and additionally for radial misalignments on double-jointed couplings.

State of Delivery

The ROBA®-DS couplings are delivered in individual parts and pre-assembled units.

The disk pack (2) assembly is assembled at the place of manufacture. The disk pack (2) assembly consists of disks (2.1), collar bushings (8) and rings (7).
The insertion of the cone bushings (9) into the respective attachment parts (hubs (1), sleeves (3) or flanges (4)) is carried out at the place of manufacture.

All screw connections must be pre-tensioned during the final installation to a torque value according to Table 1.

Except for the disk pack (2), all parts are phosphated and therefore have a basic corrosion protection.

Temperature Resistance

Due to their all-steel design, ROBA®-DS couplings are temperature-resistant up to +250 °C.
At temperatures over +200 °C, it might be necessary to replace the O-rings (11) when carrying out installation again.

Installation Position

ROBA®-DS couplings are designed for horizontal installation. In case of vertical or inclined installation, on heavy sleeves the sleeve's own weight must be supported with a vertical support. This vertical support is produced at the place of manufacture.

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Shaft-Hub Connection

The torque values stated in Table 1 do not necessarily apply to the shaft-hub connection. For the shaft-hub connection, a strength verification must be carried out depending on the shaft design and the application using appropriate calculation methods (e.g. DIN 6892 for key hubs). For the hubs, a yield point of 2 75 N/mm² and a tensile strength of 560 N/mm² can be used for the calculation.

Guidelines on Hub Bore and Shaft

- The hub bores are usually produced with tolerance H7. The required shaft tolerance depends on the hub type used as well as on the basic overall load configuration.
- The shaft surfaces should be finely turned or ground (Ra = 0.8 µm).

Hub Installation

Hubs with external shrink disks

- The force is transmitted via frictional locking. Therefore, the hub bores and the shaft ends must be completely oil and grease-free during installation. Greasy or oily bores or shafts reduce the transmittable torque.
- The shafts must not have a keyway.
- Mount the hubs onto the shafts using a suitable device, bring them into the correct position and mount the shrink discs following the Installation Instructions available separately (Installation Instructions for shrink discs of the types TAS 30.. / TAS 52..).

Hubs with Keyway

- Mount the hubs onto the shafts using a suitable device and secure them axially (Fig. 3). Axial securement takes place using a set screw (adjusting screw), which presses radially onto the key (tightening torques acc. Table 1, page 3); or via a press cover and a screw, screwed into the shaft threaded centre hole.
- The key must lie over the entire length of the hub.

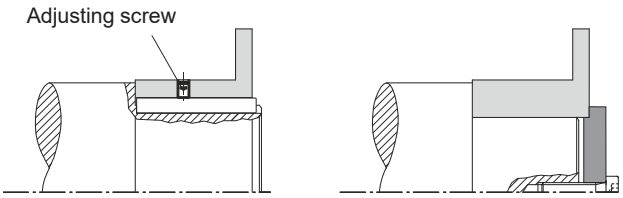

Fig. 3

Coupling Installation

The conical exterior surface of the cone bolts (10) (including the O-rings (11)) must be greased with “Klüber Altemp Q NB 50”.

The disk packs (2) are **mutually** connected with the hubs (1), the sleeve (3) or the flanges (4) via the cone bolts (10); they are screwed together via the lightly oiled hexagon head screws (5) and press covers (6) (Fig. 1a).

The hexagon head screws (5) must be tightened in several steps to their full tightening torque acc. Table 1. Please see Table 2 for the respective tightening torques for each step.

Table 2

Step	Tightening torques for hexagon head screws (5)
1	30 % of the nominal tightening torque
2	60 % of the nominal tightening torque
3	100 % of the nominal tightening torque

The hexagon head screws (5) on each connection side must be tightened **cross-wise**.

The disk pack (2) must not under any circumstances be distorted when applying the pre-tension force.

In principle, the disk pack (2) is inserted in a way so that the press covers (6) press onto the rings (7) of the disk pack (2). The press covers (6) do **not** press onto the collar bushings (8). See Fig. 1a, page 2.

When inserting the press cover (6), please make sure that the installation direction is correct. See Fig. 1a, page 2.

For de-installation of the disk pack (2), the hexagon head screw (5) is screwed out and together with the press cover (6) screwed into the cone bolt (10) on the opposite side.
When doing this, please make sure that the installation direction of the press cover (6) is correct; see Fig. 2, page 2.
This loosens the cone bolt (10) and it can be pulled back axially.

Then, the disk pack (2) can be removed radially (Fig. 2, page 2).

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Coupling Alignment

Exact coupling alignment reduces the reaction forces and therefore increases the lifetime of the coupling and the shaft bearing.
In most of the applications, coupling alignment using a straight edge in two levels vertical to each other is sufficient.
However, we recommend alignment of the coupling (of the shaft ends) using a dial gauge or laser on drives operating at very high speeds.
In order to prevent axial distortion of the disk packs, dimension "S" (Fig. 1a: Detail A on page 2, and Table 1 on page 3) must be maintained with aligned angular and radial shaft misalignments.

Permitted Shaft Misalignments

- ROBA®-DS single-jointed couplings compensate for angular and axial shaft misalignments;
- ROBA®-DS double-jointed couplings compensate for angular, axial and radial shaft misalignments (Fig. 5) without losing their backlash-free function. However, the permitted shaft misalignments indicated in Table 1 must not simultaneously reach their maximum value.
- If more than one kind of misalignment takes place simultaneously, they influence each other. This means that the permitted misalignment values are dependent on one another, see Fig. 4. The sum total of the actual misalignments in percent of the maximum value must not exceed 100 % (see example and Fig. 4).

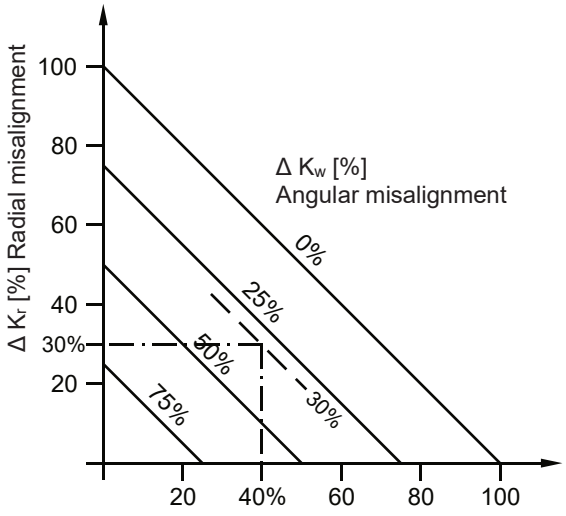

Fig. 4

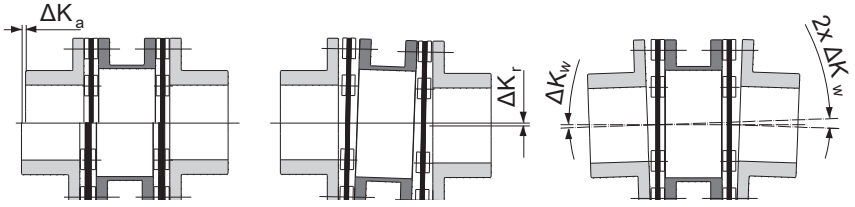

Fig. 5 Axial displacement | Radial misalignment | Angular misalignment

Balancing the Coupling

In most applications, balancing the ROBA®-DS coupling is not necessary. In general, the following points are crucial when deciding whether the coupling needs balancing:

- ❑ Circumferential speed of the coupling
- ❑ Length of the sleeves
- ❑ Required balance quality

Smooth running of the machine is not only ensured by the coupling balance quality, but is also influenced by parameters such as rigidity and distance to the adjacent bearings as well as by the sensitivity and mass of the entire construction.

All parts of the ROBA®-DS couplings, except special sleeves, are machined on all sides, and therefore lie in the range G 6.3 acc. DIN ISO 1940 at medium speeds (1500 rpm).

If higher demands are placed on the balance quality, it is possible to balance individual parts or even the entire installed coupling (on request).

Example (see Table 1 on page 3 and Fig. 4):

ROBA®-DS Size 5000, double-jointed coupling, dimension H = 300 mm

=> **Axial displacement** occurrence ΔK_a = 0.84 mm equals **40 %** of the permitted maximum value ΔK_a = 2.1 mm

=> **Angular misalignment** occurrence in the disk pack ΔK_w = 0.12° equals **30 %** of the permitted maximum value ΔK_w = 0.4°

=> **Permitted radial misalignment** ΔKr = **30 %** of the maximal value $\Delta K_r = (H - S) \times 6.98 \times 10^{-3}$ = 1.94 mm
=> ΔK_r = 0.58 mm

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Maintenance

ROBA®-DS couplings are mainly maintenance-free.

The following maintenance and inspection intervals are to be maintained:

1.) Visual inspection, inspection of the installation parameters (misalignment and tightening torques) and the coupling running behaviour **before initial operation.**

2.) Visual inspection, torsional backlash, inspection of the misalignment and the tightening torques, coupling running behaviour **after 1000 h, at the latest after 3 months.**

3.) If no irregularities or wear are found during the second maintenance and inspection interval, further inspection intervals can, with unchanged operating parameters, take place **after 4000 operating hours or after maximum 12 months.**

In extreme coupling ambient or operating conditions, the maintenance and inspection intervals should be shortened.

Disposal

All steel components:
Steel scrap (Code No. 160117)
O-rings
Plastic (Code No. 160119)

Malfunctions / Breakdowns

Malfunction	Possible Causes	Solutions
Changes in running noise and / or vibration occurrence	Incorrect alignment, incorrect installation	1) Set the system out of operation 2) Find / resolve the cause of incorrect alignment 3) Check the coupling for wear
	Loose connecting screws, minor fretting corrosion under the screw head and on the disk pack	1) Set the system out of operation 2) Check the coupling parts and replace if damaged 3) Tighten the connecting screws to the specified torque 4) Check the alignment and correct if necessary
	Tensioning and clamping screws or locking set screw for axial hub securement are loose	1) Set the system out of operation 2) Check the coupling alignment 3) Tighten the tensioning and clamping screws for axial hub securement to the required torque or tighten the locking set screw and secure it against self-loosening using sealing lacquer 4) Check the coupling for wear
Disk pack breakage	Disk pack breakage due to high load impacts / overload	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the disk packs 3) Check the coupling parts and replace if damaged 4) Find the cause of overload and remove it
	Operating parameters are not appropriate for the coupling performance	1) Set the system out of operation 2) Check the operating parameters and select a suitable coupling (observe installation space) 3) Install a new coupling 4) Check the alignment
	Incorrect operation of the system unit	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the disk packs 3) Check the coupling parts and replace if damaged 4) Train and advise operating personnel
Disk packs / connecting screws cracks or breakage	Drive vibrations	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the disk packs 3) Check the coupling parts and replace if damaged 4) Check the alignment and correct if necessary 5) Find the cause of vibration and remove it

mayr® will take no responsibility or guarantee for replacement parts and accessories which have not been delivered by *mayr*®, or for damage resulting from the use of these products.

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