Installation and Operational Instructions for ROBA®-DS Couplings
Type 95_._ _ _ Sizes 16 – 2200 (B.9.7.ATEX.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.
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.

The product must be specially marked for use in areas where there is a danger of explosion.
The product will only be marked if it is ordered especially for an Ex-area.

Contents:

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Safety and Guideline Signs

DANGER

Immediate and impending danger, which can lead to severe physical injuries or to death.

CAUTION

Danger of injury to personnel and damage to machines.

Attention! Possible property damage can be the consequence.

Please Observe!
Guidelines on important points.

Guidelines on explosion protection

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 initial operation of the product until you have ensured that all applicable EU directives and 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.

DANGER

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

The ROBA®-DS coupling is permitted for use in areas where there is a danger of explosion.
For application in Ex-areas, please observe the special safety-related guidelines and directives. The product must be especially marked for this area.
The product will only be marked if it is ordered especially for an Ex-area.

User-implemented Protective Measures

- ❒ Cover all moving parts to protect against seizure, dust impacts or foreign body impact.
- ❒ Replace self-locking hexagon nuts when they become ineffective after frequent loosening and tightening.

To prevent injury or damage, only specialist personnel are allowed to work on the components. They must be familiar with the dimensioning, transport, installation, initial operation, maintenance and disposal according to the relevant standards and regulations.
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!

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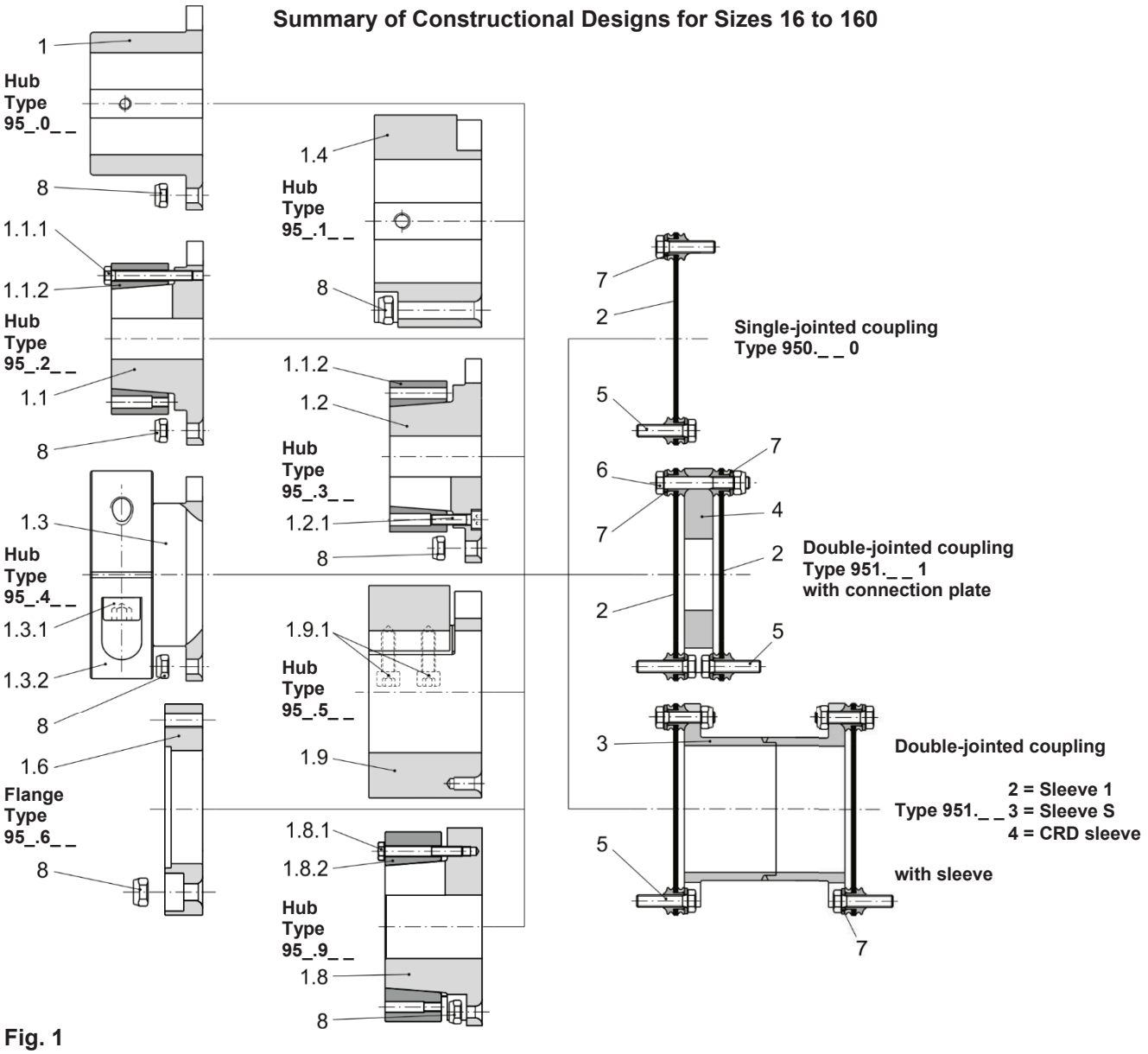

Fig. 1

Parts List (Sizes 16 – 160)

Only use *mayr*® original parts

Item	Name
1	Hub Type 95_.0_ _
1.1	Hub Type 95_.2_ _
1.1.1	Hexagon head screws for hubs Type 95_.2_ _
1.1.2	Shrink disk
1.2	Hub Type 95_.3_ _
1.2.1	Cap screws for hubs Type 95_.3_ _
1.3	Hub Type 95_.4_ _
1.3.1	Cap screw for hubs Type 95_.4_ _
1.3.2	Clamping ring
1.4	Hub Type 95_.1_ _
1.6	Flange Type 95_.6 _ _

Item	Name
1.8	Hub Type 95_.9_ _
1.8.1	Hexagon head screws for hubs Type 95_.9_ _
1.8.2	Shrink disk
1.9	Hub Type 95_.5_ _
1.9.1	Cap screw for hubs Type 95_.5_ _
2	Disk pack
3	Sleeve
4	Connection plate
5	Hexagon head screw
6	Hexagon head screw
7	Washer
8	Hexagon nut

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Summary of Constructional Designs for Sizes 180 to 2200

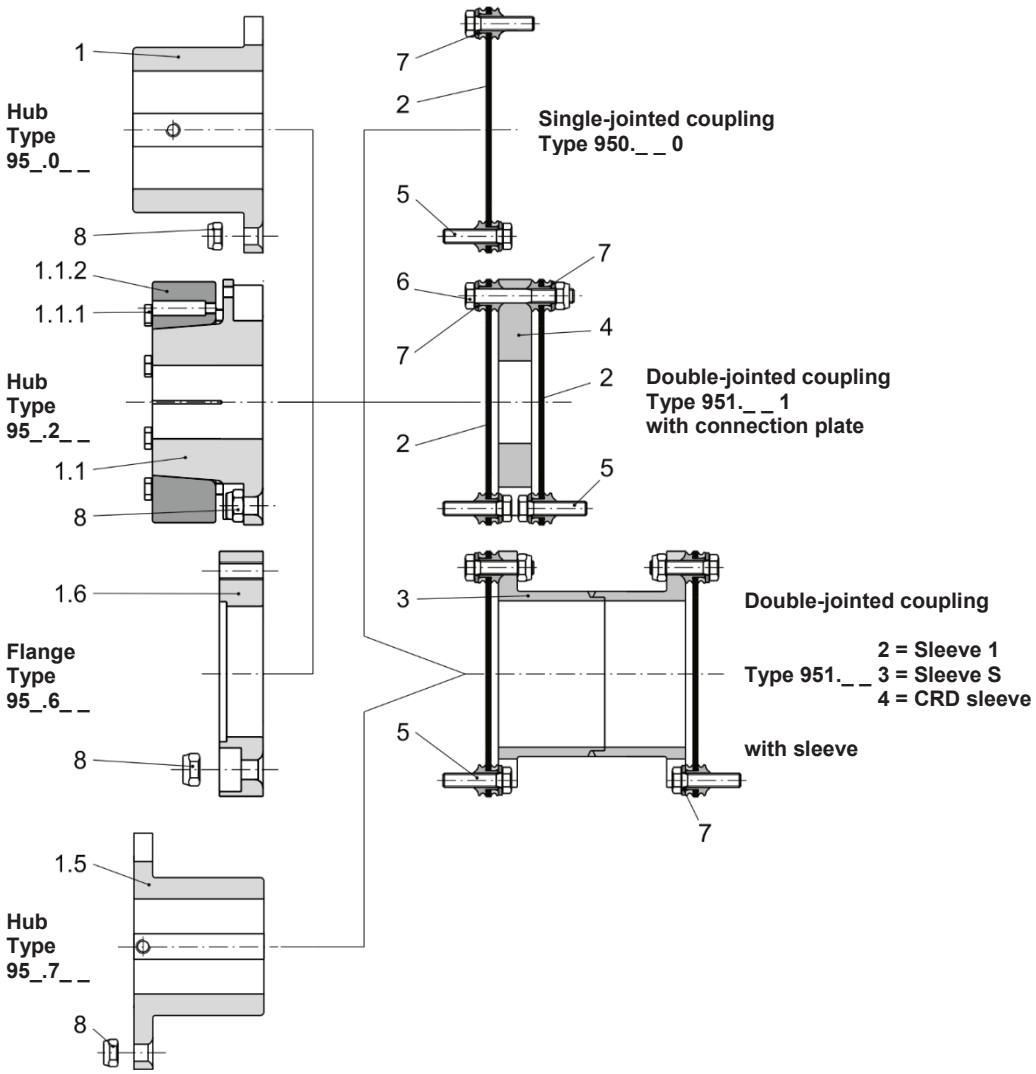

Fig. 2

Parts List (Sizes 180 – 2200)
Only use *mayr*® original parts

Item	Name
1	Hub Type 95_.0_ _
1.1	Hub Type 95_.2_ _
1.1.1	Hexagon head screws for hubs Type 95_.2_ _
1.1.2	Shrink disk
1.5	Hub Type 95_.7_ _
1.6	Flange Type 95_.6 _ _
2	Disk pack
3	Sleeve
4	Connection plate
5	Hexagon head screw
6	Hexagon head screw
7	Washer
8	Hexagon nut

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Table 1: Technical Data - Sizes 16 to 160 / Types 950._ _ _ and 951._ _ _ (Disk Pack HF)

ROBA®-DS Size		16	25	40	64	100	160
Coupling nominal torque T_{KN} valid for changing load direction as well as for max. permitted shaft misalignment	[Nm]	190	290	450	720	1000	1600
Coupling peak torque T_{KS} valid for unchanging load direction, max. load cycles ≤ 10^5	[Nm]	285	435	675	1080	1500	2400
Max. speed $n_{max.}$	[rpm]	13600	11800	10100	8500	7300	6200
Distance dimension "S"	[mm]	7.1 ±0.2	7.2 ±0.2	8.4 ±0.2	9.6 ±0.25	10 ±0.25	11.6 ±0.25
Axial displacement ΔK_a 1) Values refer to couplings with 2 disk packs. Only permitted as a static or virtually static value.	[mm]	±1.1	±1.3	±1.5	±1.8	±2.1	± 2.5
Radial misalignment ΔK_r for Type 951._ _ 1	[mm]	0.3	0.3	0.4	0.45	0.45	0.55
Radial misalignment ΔK_r for Type 951._ _ 2	[mm]	1.0	1.2	1.5	1.8	2.1	2.2
Radial misalignment ΔK_r for Type 951._ _ 3 1)	[mm]	$(H_S - S) \times 0.0174$					
Radial misalignment for single-jointed coupling		If there is only one disk pack, the shafts must be aligned precisely.					
Angular misalignment ΔK_w per disk pack 1)	[°]	1	1	1	1	1	1

1) For Type 951._ _4, the permitted shaft misalignments must be reduced to one-third of the Table values.

Table 2: Technical Data - Sizes 16 to 160 / Types 952._ _ _ and 953._ _ _ (Disk Pack HT)

ROBA®-DS Size		16	25	40	64	100	160
Coupling nominal torque T_{KN} valid for changing load direction as well as for max. permitted shaft misalignment	[Nm]	300	420	650	1100	1600	2600
Coupling peak torque T_{KS} valid for unchanging load direction, max. load cycles ≤ 10^5	[Nm]	450	630	975	1650	2400	3900
Max. speed $n_{max.}$	[rpm]	13600	11800	10100	8500	7300	6200
Distance dimension "S"	[mm]	4.6 ±0.2	5.0 ±0.2	6.1 ±0.2	8.0 ±0.25	8.6 ±0.25	9.2 ±0.25
Axial displacement ΔK_a 1) Values refer to couplings with 2 disk packs. Only permitted as a static or virtually static value.	[mm]	±0.8	±0.9	±1.1	±1.3	±1.5	±1.7
Radial misalignment ΔK_r for Type 953._ _ 1	[mm]	0.2	0.2	0.25	0.3	0.3	0.35
Radial misalignment ΔK_r for Type 953._ _ 2	[mm]	0.7	0.8	1	1.25	1.45	1.5
Radial misalignment ΔK_r for Type 953._ _ 3 1)	[mm]	$(H_S - S) \times 0.0122$					
Radial misalignment for single-jointed coupling		If there is only one disk pack, the shafts must be aligned precisely.					
Angular misalignment ΔK_w per disk pack 1)	[°]	0.7	0.7	0.7	0.7	0.7	0.7

1) For Type 953._ _4, the permitted shaft misalignments must be reduced to one-third of the Table values.

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Table 3: Technical Data - Sizes 180 to 2200

ROBA®-DS Size	180	300	500	850	1400	2200
Coupling nominal torque T_{KN} [Nm] valid for changing load direction as well as for max. permitted shaft misalignment	2100	3500	5800	9500	15000	24000
Coupling peak torque T_{KS} [Nm] valid for unchanging load direction, max. load cycles ≤ 10^5	3150	5250	8700	14250	22500	36000
Max. speed $n_{max.}$ [rpm]	7300	6200	5200	4400	3800	3300
Distance dimension "S" [mm]	11.2 ±0.25	11.2 ±0.25	12 ±0.25	14 ±0.25	16 ±0.25	17.8 ±0.25
Axial displacement ΔK_a 1) [mm] Values refer to couplings with 2 disk packs. Only permitted as a static or virtually static value.	±1.0	±1.2	±1.4	±1.6	±1.9	±2.2
Radial misalignment ΔK_r for Type 951._ _ 1 [mm]	0.25	0.25	0.35	0.4	0.5	0.55
Radial misalignment ΔK_r for Type 951._ _ 2 [mm]	1.2	1.25	1.35	1.7	2	2.6
Radial misalignment ΔK_r for Type 951._ _ 3 1) [mm]	$(H_S - S) \times 8.73 \times 10^{-3}$					
Radial misalignment for single-jointed coupling	If there is only one disk pack, the shafts must be aligned precisely.					
Angular misalignment ΔK_w per disk pack 1) [°]	0.5	0.5	0.5	0.5	0.5	0.5

1) For Type 951._ _4, the permitted shaft misalignments must be reduced to one-third of the Table values.

Table 4: Maximum Hub Bores - Sizes 16 to 160 [mm]

ROBA®-DS Size	16	25	40	64	100	160
d_{Pmax} Hub Type 95_.0 (1)	32	40	50	55	70	80
$d_{G\ max}$ Hub Type 95_.1 (1.4)	45	55	65	75	95	110
d_{Smax} Hub Type 95_.2/3 (1.1/2)	26	36	45	45	55	65
$d_{KR\ max}$ Hub Type 95_.4 (1.3)	35	40	45	55	68	80
d_{Rmax} Hub Type 95_.5 (1.9)	45	52	60	70	90	100
d_{SGmax} Hub Type 95_.9 (1.8)	45	52	60	70	90	100

Table 5: Maximum Hub Bores - Sizes 180 to 2200 [mm]

ROBA®-DS Size	180	300	500	850	1400	2200
d_{Pmax} Hub Type 95_.0 (1)	75	90	105	120	140	170
d_{Smax} Hub Type 95_.2/3 (1.1/2)	75	85	100	120	140	170
d_{Rmax} Hub Type 95_.5 (1.9)	55	70	85	95	110	130

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Table 6: Screw Tightening Torques - Sizes 16 to 160

ROBA®-DS Size	16	25	40	64	100	160
Hexagon head screws Item 1.1.1 (Hub Type 95_.2_ _)	M5x30	M5x35	M5x40	M6x45	M8x50	M8x55
Tightening torque [Nm]	6	6	8.5	10	25	25
Cap screws Item 1.2.1 (Hub Type 95_.3_ _)	M5x18	M5x18	M5x20	M6x20	M8x22	M8x25
Tightening torque [Nm]	6	6	8.5	10	25	25
Cap screws Item 1.3.1 (Hub Type 95_.4_ _)	M5x30	M5x35	M5x40	M6x45	M8x50	M8x55
Tightening torque [Nm]	6	6.5	8.5	14	25	32
Hexagon head screws Item 1.8.1 (Hub Type 95_.9_ _)	M5x30	M5x35	M5x40	M6x45	M8x50	M8x55
Tightening torque [Nm]	6	6.5	8.5	14	25	32
Cap screws Item 1.9.1 (Hub Type 95_.5_ _)	M6x25	M8x25	M10x35	M12x40	M12x45	M14x50
Tightening torque [Nm]	17.4	42	83	122	143	220
Hexagon head screws Item 5 Hexagon nut Item 8	M5x20	M5x20	M6x25	M8x30	M8x30	M10x40
Tightening torque [Nm]	8.5	8.5	14	35	35	69
Hexagon head screws Item 5 Hexagon nut Item 8 (for hub	M5x45	M5x50	M6x60	M8x70	M8x80	M10x90
Type 95_.1_ _) Tightening torque [Nm]	8.5	8.5	14	35	35	69
Hexagon head screws Item 5 Hexagon nut Item 8 (for hub	M5x18	M5x18	M6x22	M8x30	M8x30	M10x35
Type 95_.5_ _) Tightening torque [Nm]	8.5	8.5	14	35	35	69
Hexagon head screws Item 6 Hexagon nut Item 8	M5x32	M5x32	M6x40	M8x50	M8x50	M10x60
Tightening torque	8.5	8.5	14	35	35	69
Adjusting screws for hub Type 95_.0_ _ with hub bore	M5 ≤22 / M6 >22	M5 ≤22 / M6 >22	M6	M8	M10	M12
Tightening torque [Nm]	2 / 4.1	2 / 4.1	4.1	8.5	14	35
Adjusting screws for hub Type 95_.1_ _	M8	M8	M10	M10	M12	M12
Tightening torque [Nm]	8.5	8.5	14	14	35	35

Table 7: Screw Tightening Torques - Sizes 180 to 2200

ROBA®-DS Size	180	300	500	850	1400	2200
Hexagon head screws Item 1.1.1 (Hub Type 95_.2_ _)	M8x55	M8x60	M10x70	M12x80	M14x100	M14x120
Tightening torque [Nm]	25	35	56	93	144	196
Hexagon head screws Item 5 Hexagon nut Item 8	M10x40	M12x40	M16x50	M20x60	M24x70	M24x75
Tightening torque [Nm]	69	120	240	450	760	900
Hexagon head screws Item 6 Hexagon nut Item 8	M10x60	M12x65	M16x75	M20x95	M24x110	M24x120
Tightening torque	69	120	240	450	760	900
Adjusting screws for hub Type 95_.0_ _ with hub bore	M12 ≤ 65 / M10 > 65	M12	M12	M16	M16	M16
Tightening torque [Nm]	35 / 14	35	35	90	90	90
Adjusting screws for hub Type 95_.7_ _	M10	M12	M12	M16	M16	M16
Tightening torque [Nm]	14	35	35	90	90	90

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Table 8: Transmittable Torques on Clamping Ring Hubs (1.3)
- Dependent on Bore - Suitable for H7/h6 - Sizes 16 to 160

Bore	Size					
	16	25	40	64	100	160
Ø20	126	-	-	-	-	-
Ø22	138	199	-	-	-	-
Ø25	168	226	327	-	-	-
Ø28	201	253	366	523	-	-
Ø30	216	290	420	561	-	-
Ø32	230	325	470	598	785	-
Ø35	251	355	515	700	859	-
Ø38	-	386	559	798	932	-
Ø40	-	406	588	840	1050	1256
Ø45	-	-	661	945	1240	1413
Ø50	-	-	-	1050	1378	1680
Ø55	-	-	-	1155	1516	1940
Ø60	-	-	-	-	1654	2117
Ø65	**Attention!** Please observe the permitted coupling torques of the coupling size used.			-	1792	2293
Ø68				-	1874	2399
Ø70	-	-	-	-	-	2470
Ø80	-	-	-	-	-	2822

Table 9: Transmittable Torques on Clamping Hubs (1.9)
- Dependent on Bore - Suitable for H7/h6 - Sizes 16 to 160

Bore	Size					
	16	25	40	64	100	160
Ø20	183	-	-	-	-	-
Ø22	202	354	-	-	-	-
Ø25	229	402	604	-	-	-
Ø28	257	450	677	821	-	-
Ø30	275	483	725	880	-	-
Ø32	293	515	773	938	1102	-
Ø35	321	563	846	1026	1205	-
Ø38	348	611	918	1114	1309	-
Ø40	367	643	967	1173	1378	1839
Ø42	385	676	1015	1232	1447	1931
Ø45	412	724	1087	1319	1550	2069
Ø48	-	772	1160	1407	1653	2207
Ø50	-	804	1208	1466	1722	2299
Ø52		836	1257	1525	1791	2391
Ø55	-	-	1329	1613	1894	2529
Ø60	-	-	1450	1759	2066	2759
Ø65	-	-	-	1906	2239	2989
Ø68	-	-	-	1994	2342	3127
Ø70	-	-	-	2053	2411	3219
Ø75	-	-	-	-	2583	3449
Ø80	-	-	-	-	2755	3679
Ø85	**Attention!** Please observe the permitted coupling torques of the coupling size used.			-	2927	3909
Ø90				-	3100	4139
Ø95	-	-	-	-	-	4369
Ø100	-	-	-	-	-	4599

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Table 10: Transmittable Torques on Shrink Disk Hubs, Large (1.8) - Dependent on Bore - Suitable for H7/g6 - Sizes 16 to 160

Bore	Size 16	25	40	64	100	160
Ø25	339	-	-	-	-	-
Ø28	404	-	-	-	-	-
Ø30	448	-	-	-	-	-
Ø32	492	526	-	-	-	-
Ø35	558	602	-	-	-	-
Ø38	620	679	-	-	-	-
Ø40	659	730	873	-	-	-
Ø42	694	780	937	-	-	-
Ø45	738	851	1036	1268	-	-
Ø48	-	913	1132	1394	-	-
Ø50	-	948	1195	1480	-	-
Ø52	-	978	1255	1565	-	-
Ø55	-	-	1338	1691	2074	-
Ø60	-	-	1454	1890	2366	-
Ø65	-	-	-	2065	2658	3246
Ø70	-	-	-	2204	2943	3618
Ø75	**Attention!** Please observe the permitted coupling torques of the coupling size used.			-	3213	3991
Ø80				-	3458	4353
Ø85				-	3666	4695
Ø90	-	-	-	-	3828	5007
Ø100	-	-	-	-	-	5497

Table 11: Transmittable Torques on Shrink Disk Hubs (1.1/1.2) - Dependent on Bore - Suitable for H7/g6 - Sizes 16 to 2200

Bore	Size 16	25	40	64	100	160	180	300	500	850	1400	2200
Ø14	158	-	-	-	-	-	-	-	-	-	-	-
Ø16	186	-	-	-	-	-	-	-	-	-	-	-
Ø20	240	283	-	-	-	-	-	-	-	-	-	-
Ø22	269	320	-	-	-	-	-	-	-	-	-	-
Ø25	312	375	429	-	-	-	-	-	-	-	-	-
Ø28	-	428	495	-	-	-	-	-	-	-	-	-
Ø30	-	468	546	704	-	-	-	-	-	-	-	-
Ø32	-	509	600	769	-	-	-	-	-	-	-	-
Ø35	-	568	669	863	1057	-	-	-	-	-	-	-
Ø38	-	-	741	960	1176	-	-	-	-	-	-	-
Ø40	-	-	796	1031	1269	1783	-	-	-	-	-	-
Ø42	-	-	852	1104	1366	1919	2234	-	-	-	-	-
Ø45	-	-	932	1206	1500	2107	2453	-	-	-	-	-
Ø50	-	-	-	-	1692	2400	2794	3569	-	-	-	-
Ø55	-	-	-	-	1889	2680	3150	4024	-	-	-	-
Ø60	-	-	-	-	-	2967	3488	4500	5970	-	-	-
Ø65	-	-	-	-	-	3263	3835	5177	6629	-	-	-
Ø68	-	-	-	-	-	-	4072	5658	7108	-	-	-
Ø70	-	-	-	-	-	-	4255	6334	7500	10723	-	-
Ø75	-	-	-	-	-	-	4627	7348	8156	11719	-	-
Ø80	-	-	-	-	-	-	-	8453	8830	12750	17942	-
Ø85	-	-	-	-	-	-	-	9652	9523	13750	19444	-
Ø90	-	-	-	-	-	-	-	-	10234	14777	21000	-
Ø100	-	-	-	-	-	-	-	-	11542	16665	23683	29036
Ø110	-	-	-	-	-	-	-	-	-	18607	26442	32418
Ø120	**Attention!** Please observe the permitted coupling torques of the coupling size used.						-	-	-	20603	29279	35896
Ø130							-	-	-	-	32195	39471
Ø140							-	-	-	-	35191	43144
Ø150	-	-	-	-	-	-	-	-	-	-	-	46920
Ø160	-	-	-	-	-	-	-	-	-	-	-	50798
Ø170	-	-	-	-	-	-	-	-	-	-	-	54783

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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 (Type 950._ _0 and 952._ _0), and additionally for radial misalignments on double-jointed couplings (Type 951._ _ _ and 953._ _ _).
For Sizes 16 to 160, a distinction is made between a disk pack HT (high torque / Types 952._ _0 and 953._ _ _) and a disk pack HF (high flexibility / Types 950._ _0 and 951._ _ _). Please observe the Technical Data indicated in Tables 1 and 2.

State of Delivery

ROBA®-DS couplings are delivered completely manufacturer-assembled.
In special cases, the ROBA®-DS couplings are delivered in individual parts and pre-assembled units.

All screw connections must be checked or pre-tensioned during the final installation to a torque value according to Table 6 and Table 7.

Except for the disk pack (2), all parts are phosphated and therefore have a basic corrosion protection.
All hub designs are delivered finish bored.

The preferred bore tolerance is H7; deviating bores are possible (please contact the manufacturer).
The key hubs (Items 1, 1.4, 1.5 and 1.7) have a keyway acc. DIN 6885 sheet 1 or 3, as well as an adjusting screw for axial securement.

Temperature Resistance

Due to their all-steel design, ROBA®-DS couplings are temperature-resistant within a range from -40 °C up to +250 °C.

Storage

The couplings are delivered preserved and can be stored in dry rooms protected from the weather for 6 to 9 months.

Damp storage rooms are not suitable.
In order to exclude condensation, the relative air humidity should ideally total maximum 65 %.

Installation Position

ROBA®-DS couplings are designed for horizontal installation. In case of vertical or inclined installation, on long sleeves (sleeves S/CRD) the sleeve's own weight must be supported with a vertical support (Fig. 4). This vertical support including both centerings in the hub and in the sleeve is produced at the place of manufacture.

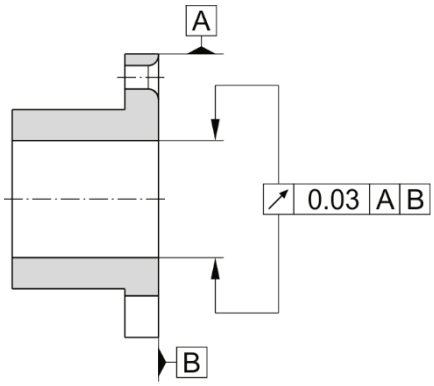

Fig. 3

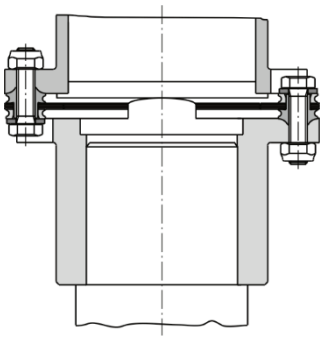

Fig. 4

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Guidelines on Hub Bore and Shaft

General Guidelines:

- ❑ The maximum bore diameter according to Table 4 or 5 may not be exceeded.
- ❑ 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.

  - Shrink disk hubs / clamping hubs: h6/g6

  - Key hubs:
  r6/s6 (alternating rotational direction),
  k6/n6 (one-way rotational direction)
- ❑ The recommended bore tolerances are to be produced using the position and tolerance width as references; at the same time, please keep to the shaft run-out and axial run-out tolerances of 0.03 mm (see Fig. 3).
- ❑ After producing the finish bore, please clean it using suitable cleaning agents.
- ❑ The shaft surfaces should be finely turned or ground (Ra = 0.8 µm).
- ❑ The required yield point for the shafts used is at least 350 N/mm² (St60, St70, C45, C60).

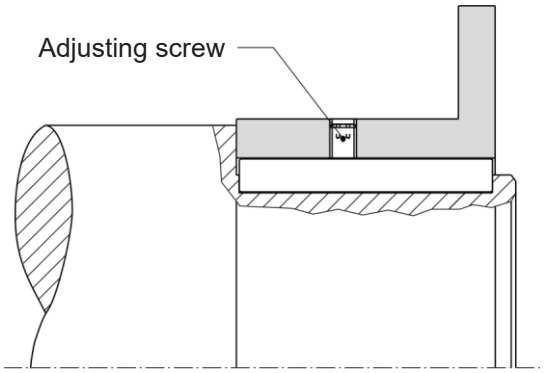

Fig. 5

Please observe the following when boring the hub with keyway
(Items 1 and 1.4) Types 95_.0_ _ and 95_.1_ _:

- ❑ The specified form (DIN 6885 sheet 1 or 3) and position of the keyway.

  Position of the keyway on Type:

  - 95_.0_ _ (Item. 1) aligned with a fixing hole.
  - 95_.1_ _ (Item 1.4) 25° offset to a fixing hole.

- ❑ For axial securement, please provide an additional adjusting screw (ISO 4029 - 45H) as an alternative to a press cover (see Figs. 4 and 5).
  The adjusting screw dimensions and tightening torques stated in Table 1 must be kept to.

Please observe the following when boring the shrink disk hubs (Items 1.1, 1.2 and 1.8) Types 95_.2_ _, 95_.3_ _ and 95_.9_ _:

- ❑ The shrink disk hubs are generally delivered greased and pre-assembled. For production of the finish bore, the shrink disk is de-installed and the hub is de-greased.
- ❑ Deburr the hubs, in particular in the area of the slots.
- ❑ Clean and re-grease the hubs in the shrink disk contact areas.
  Permitted grease: Klüber Alltemp QNB 50

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Hub Installation

The configuration of the different individual components can be seen in Fig. 1 and Fig. 2.

Hub Installation Types 95_.2_ _ / 95_.3_ _ / 95_.9 _ _ (Hubs with Shrink Disk)

- ❑ The force transmission of the shrink disk hubs (1.1/1.2/1.8) takes place using frictional locking. The contact surfaces between the shrink disk and the hub are greased manufacturer-side.
- ❑ The hub bores and the shaft ends must be completely grease-free during installation. Greasy or oily bores or shafts do not transmit the maximum coupling torque.
- ❑ Please make sure that the key sits securely for designs with keyway. Please see guideline under ATEX!
- ❑ The hub and the shrink disk (1.1.2/1.8.2) must be completely relaxed; if necessary, loosen the screws (1.1.1/1.2.1/1.8.1) by several thread turns.

a) Mount the hubs (1.1/1.2/1.8) onto the shafts using a suitable device and bring them into the correct position.

b) Tighten the tensioning screws (1.1.1/1.2.1/1.8.1) using a torque wrench evenly and **one after the other in 3 to max. 6 tightening sequences** to the torque stated in Table 1.

For de-installation:

a) Loosen all tensioning screws (1.1.1/1.2.1/1.8.1) in several sequences by several thread turns.

b) Screw out the tensioning screws located next to the tapped extracting holes and screw them into the tapped extracting holes up to their limits.

Please take the axial space requirements for the tensioning screws to be screwed into the tapped extracting holes into account (length of the hexagon head screws Item 1.1.1 / Item 1.8.1 in Table 1, page 4).

c) Tighten the tensioning screws (1.1.1/1.2.1/1.8.1) evenly and step-wise so that the shrink disk (1.1.2/1.8.2) is loosened from the hub.

Hub Installation Type 95_.5_ _ (Clamping Hubs)

- ❑ The hub bores and the shaft ends must be completely grease-free during installation. Greasy or oily bores or shafts do not transmit the maximum coupling torque.
- ❑ Please make sure that the key sits securely for designs with keyway. Please see guideline under ATEX!
- ❑ The clamping hub (1.9) must be completely relaxed; if necessary, loosen the screws (1.9.1) by several thread turns.

a) Mount the hubs (1.9) onto the shafts using a suitable device and bring them into the correct position.

b) Tighten the clamping screws (1.9.1) using a torque wrench to the torque stated in Table 1.

Hub Installation Types 95_.0_ _ / 95_.1_ _ (Hubs with Keyway)

- ❑ Mount the hubs (1/1.4) onto the shafts using a suitable device and secure them axially (Fig. 5). Axial securement takes place using a set screw (adjusting screw), which presses radially onto the key; or via a press cover and a screw, screwed into the shaft threaded center hole.
- ❑ The key must lie over the entire length of the hub.
- ❑ Please make sure that the key sits securely in the shaft. Please see guideline under ATEX!

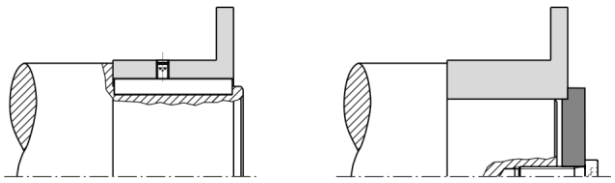

Fig. 6

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Coupling Installation (Figs. 1 and 6)

Only a thin oil film is permitted on the contact surfaces of the disk packs (Fig. 7, detail "X"). If applicable, thick layers of preservative must be removed before assembly.

The disk packs (2) are screwed together **alternately** with the hubs and the sleeve (3) or the connection plate (4) using lightly oiled hexagon head screws (5 and 6), washers (7) and hexagon nuts (8).

The hexagon nuts (8) or the hexagon head screws (5 and 6) must be tightened in several steps to their full tightening torque acc. Tables 6 or 7. Please see Table 14 for the respective tightening torques for each step.

Table 12

Step	Tightening torque for hexagon nuts (8) or hexagon head screws (5 and 6)
1	30 % of the nominal tightening torque
2	60 % of the nominal tightening torque
3	100 % of the nominal tightening torque

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

The disk pack (2) is always to be inserted in such a way that the collar bushing radius (part 2a, Fig. 6, detail “X”) lies in the hub grooves, the sleeve grooves or the connection plate grooves.

Due to the enlarged diameter of the shrink disks (1.8.2), please make sure that the installation sequence is suitable.
In this way, normal torque wrenches can be used for installation of the disk pack (2).

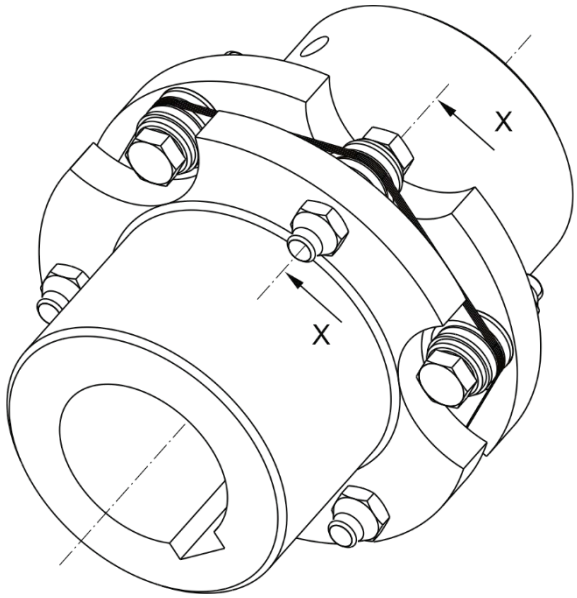

Fig. 7

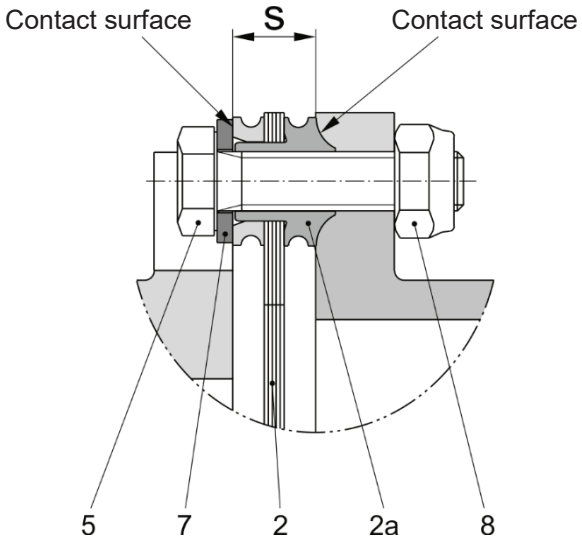

Fig. 7: Detail “X”

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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, the dimension “S” (Fig. 6, detail “X”, Table 1) must be maintained with aligned angular and radial shaft misalignments.

Permitted Shaft Misalignments

ROBA®-DS single-jointed couplings (Type 952._ _ _) compensate for angular and axial shaft misalignments.
ROBA®-DS double-jointed couplings (Type 953._ _ _) compensate for angular, axial and radial shaft misalignments (Fig. 8) 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. 7. The sum total of the actual misalignments in percent of the maximum value must not exceed 100 % (see example and Fig. 7).

Example:

ROBA®-DS, Size 40, Type 953.002
Axial displacement occurrence ΔK_a = 0.44 mm equals 40 % of the permitted maximum value ΔK_a = 1.1 mm.
Angular misalignment occurrence in the disk pack ΔK_w = 0.21° equals 30 % of the permitted maximum value ΔK_w = 0.7°.
=> permitted radial misalignment ΔK_r = 30 % of the maximum value ΔK_r = 1.0 mm => ΔK_r = 0.3 mm

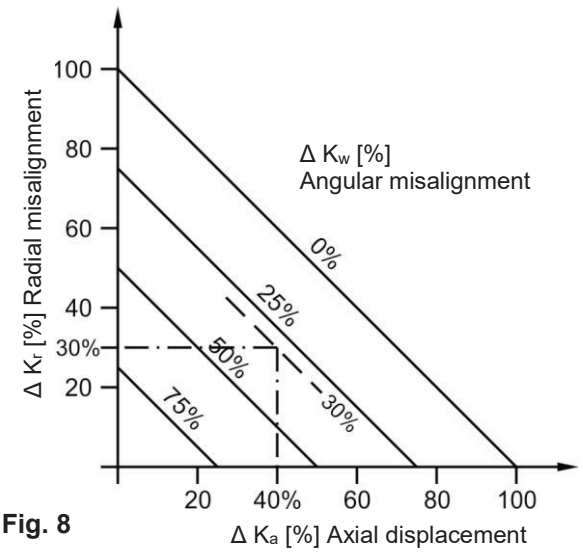

Fig. 8

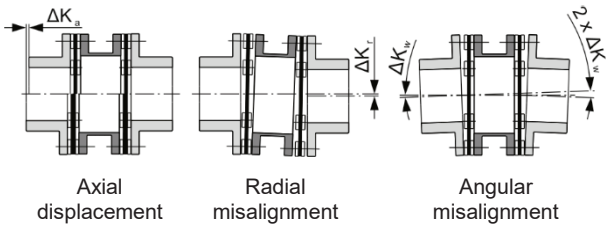

Fig. 9

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Coupling Dimensioning

$$T_{KN} \geq \frac{9550 \times P \times f_B}{n}$$

Definition of terms:

T_{KN} [Nm]	Coupling nominal torque
T_B [Nm]	Operating torque
T_S [Nm]	Operating peak torque
P [kW]	Drive machine nominal power
f_B [Nm]	Service factor acc. Table 13
n [rpm]	Drive machine nominal speed

Table 13

Service Factor f_B		Work Machine Load Class I	II	III
Drive machine	**Electromotor, turbine, hydraulic motor**	1.1	1.4	1.9
	Piston machine with more than 3 cylinders	1.4	1.7	2.2
	Piston machine with up to 3 cylinders	1.7	2.0	2.5

If the operating torque is known, the coupling nominal torque must be higher than the maximum occurring operating torque $T_{KN} > T_B$. Please also observe the height and type of start-up impacts or sporadic load impacts.
As individual events, these may not exceed the stated coupling peak torque $T_{KS} > T_S$. The max. number of impact occurrences over the entire coupling lifetime must not exceed pulsating 1 x 10e5 or alternating 1 x 10e4 .

In ATEX applications, no temperature factor must be taken into consideration as the maximum permitted ambient temperature is 80°C.

Table 14

Classification of Work Machines into Load Classes	
Construction machinery	
- Concrete blenders	II
- Chain conveyors	III
- Chain carriages	III
- Crushers	III
Chemical industry	
- Mixers (thick fluids)	II
- Mixers (thin fluids)	I
- Centrifuges	II
- Blenders	II
Fans / vents	II
Generators / convertors	
- Frequency converters	I
- Generators	II
Foodstuffs machines	
- Kneading machines	II
- Mills	III
- Packaging machines	II
Paper machines	III
Compressors	II
Conveyor systems	
- Conveyor belts	II
- Sloping elevators	III
- Goods elevators	II
- Passenger elevators	II
Wood / plastic processing	
- Planing machines	II
- Reciprocating saws	III
- Extruders	II
- Blenders	II
Crane systems	II
Metal processing	
- Punching / pressing	III
- Machine tools	II
Pumps	
- Centrifugal pump (thin fluids)	I
- Centrifugal pump (thick fluids)	II
- Pistons / plunger pumps	III
Textile machines	II
Washing machines	II

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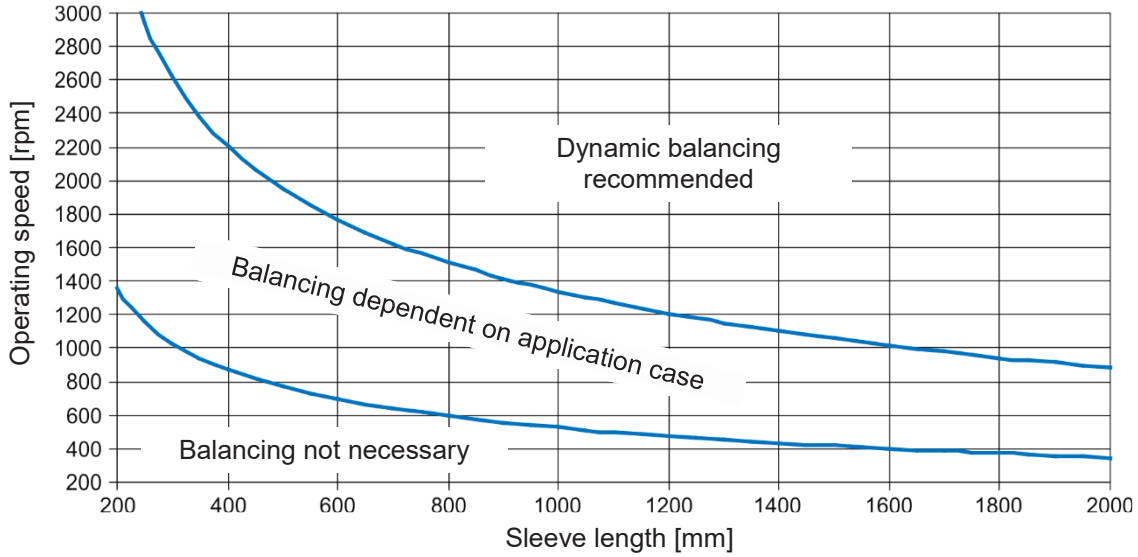
Balancing the Coupling

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 S/CRD (Diagram 2)
- ❑ Required balance quality

Diagram 1: Balancing Coupling with Sleeves S/CRD (Special Length)



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.
Diagram 1, therefore, only shows reference values as recommendations for balancing.
All parts of the ROBA®-DS couplings, except the sleeves S/CRD, are machined on all sides, and therefore lie in the range G6.3 acc. ISO DIN 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). However, for this option, the hubs must have a finish bore.

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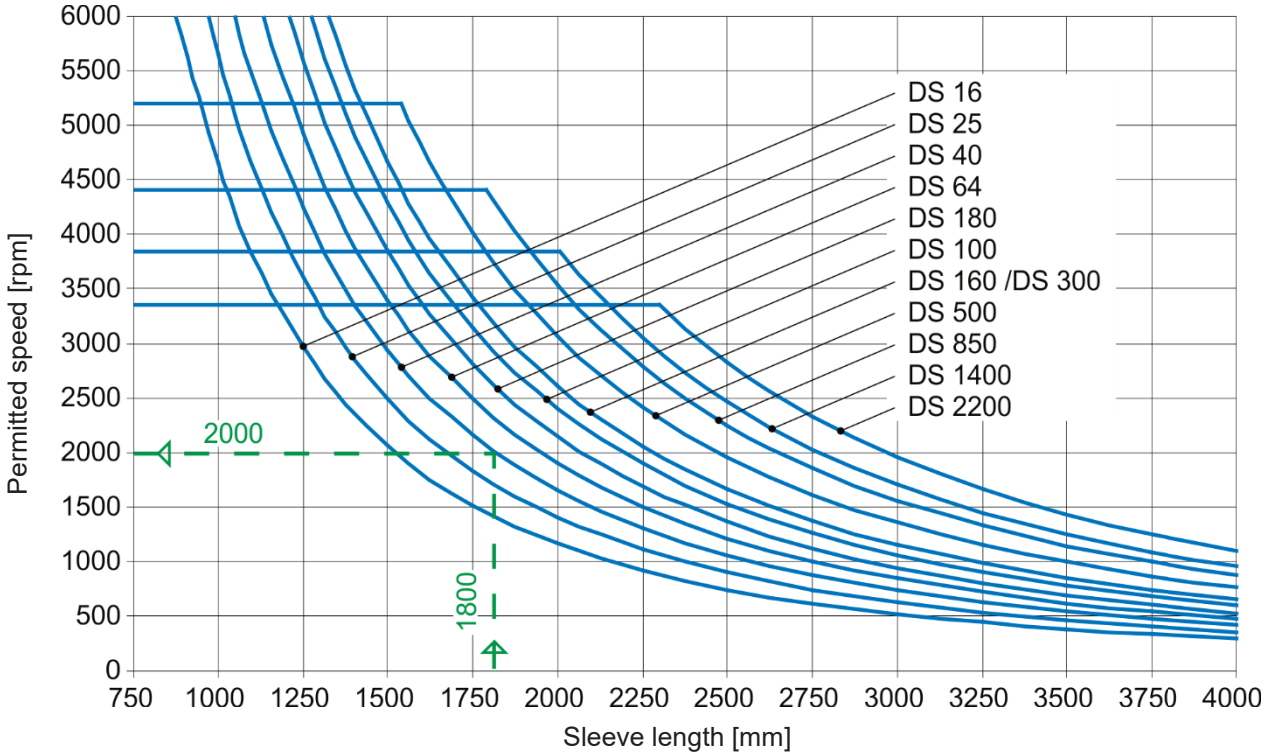
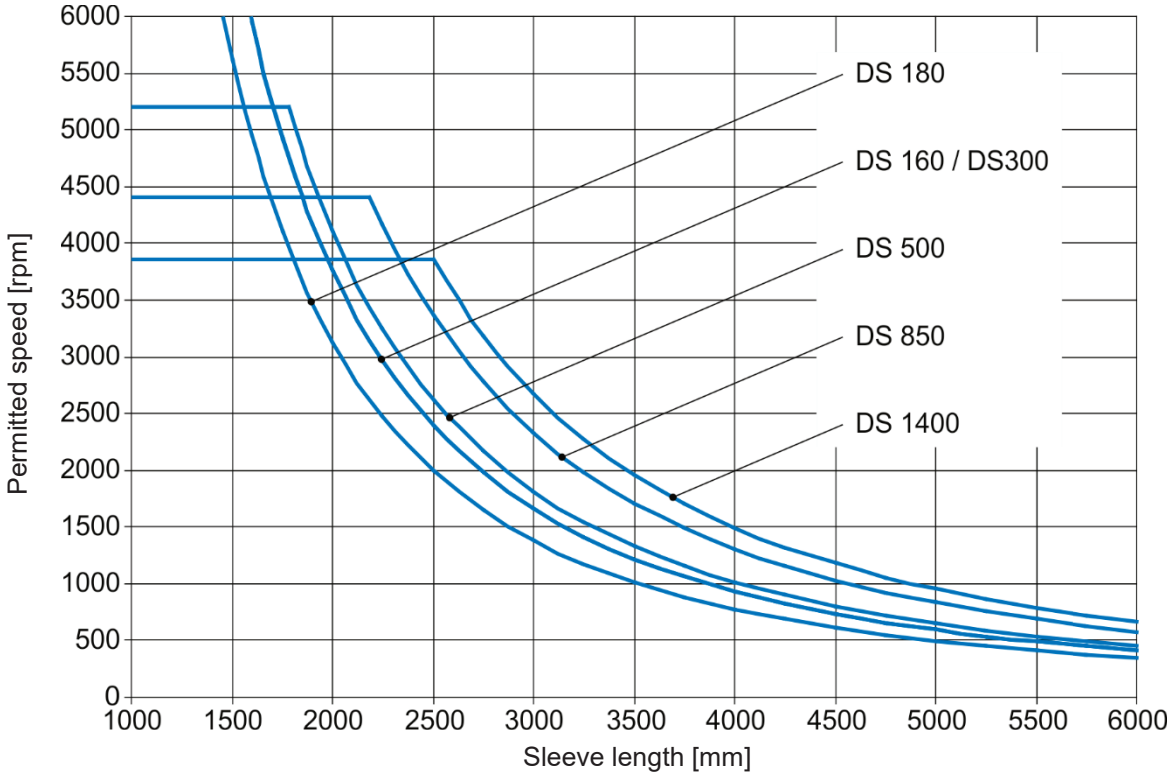
Diagram 2: Permitted Speeds (Bend-critical) for Sleeves S Type 95_._ _3



Example:
Size 40, sleeve length H_S = 1800 mm = > permitted speed 2000 rpm.

Diagram 3: Permitted Speeds (Bend-critical) for Sleeves CRD Type 95_._ _4



The coupling must be operated in the subcritical speed range.
Attention: When passing through the bend-critical speed (resonance), there is a danger of coupling destruction.

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Maintenance

ROBA®-DS couplings are largely 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.) Check the tightening torques produced **after 5 to 10 operating hours.**

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

4.) If no irregularities or wear are found during the maintenance and inspection interval defined in point 3.), 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)

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Guidelines and Directives for Operation in Ex Areas Where There is a Danger of Explosion

Classification of Ex Areas Where There is a Danger of Explosion and Permitted Types According to the Directive 2014/34/EU

For the implementation of the Directive, the ignition protection type “c” (constructional safety) has been applied in accordance with DIN EN ISO 80079-36/37/38 and the letter "h" has been recorded in the classification.

Key designs and flange designs:

Dimensioning according to the requirements shaft diameter, transmittable torque and operating conditions must be carried out. To do this, the corresponding user data must be known or the user must carry out the dimensioning in accordance with the valid calculation basis (e.g. DIN 6892) for key connections and the permitted voltage values common in mechanical engineering. For the calculation, a hub quality of Re = 400 N/mm² should be used. During initial operation, please make sure that the key is inserted correctly and that the coupling and the key are secured axially. According to the described coupling combinations and if the measures and guidelines described in the Installation and Operational Instructions are observed, the ROBA®-DS is suitable for use in areas where there is a danger of explosion according to the category:

CE Ex II 2G Ex h IIC T5 -30°C≤Ta≤+80°C Gb
II 2D Ex h IIIC T110°C -30°C≤Ta≤+80°C Db
I M2 Ex h I Mb

Permitted Types:
950.000 / 950.110 / 950.660 / 951.001 / 951.002 / 951.003 / 951.004 / 951.111 / 951.112 / 951.113 / 951.114 / 951.661 / 951.662 / 951.663 / 951.664 / 951.772 / 952.000 / 952.110 / 952.660 / 953.001 / 953.002 / 953.003 / 953.004 / 953.111 / 953.112 / 953.113 / 953.114 / 953.661 / 953.662 / 953.663 / 953.664
If the frictionally-locking hub types listed below are designed with additional key connections, they also accord with the category described here.

Designs with frictionally-locking shafts-hub connection:

These designs are in the standard design suitable for application in areas where there is a danger of explosion according to the category:

CE Ex II 3G Ex h IIC T5 -30°C≤Ta≤+80°C Gc
II 3D Ex h IIIC T110°C -30°C≤Ta≤+80°C Dc

Permitted Types:
950.220 / 950.230 / 950.440 / 950.550 / 950.990 / 951.221 / 951.222 / 951.223 / 951.224 / 951.231 / 951.232 / 951.233 / 951.234 / 951.441 / 951.442 / 951.443 / 951.444 / 951.551 / 951.552 / 951.553 / 951.554 / 951.991 / 951.992 / 951.993 / 951.994 / 952.220 / 952.230 / 952.550 / 952.990 / 953.221 / 953.222 / 953.223 / 953.224 / 953.231 / 953.232 / 953.233 / 953.234 / 953.551 / 953.552 / 953.553 / 953.554 / 953.991 / 953.992 / 953.993 / 953.994, as well as designs with shrink disk

The values specified in Tables 8 to 11 for transmittable torques for clamping hubs and shrink disk hubs must be observed.
For the bore diameters shown in Table 15, an additional keyway can be used in these designs for secure torque transmission. Furthermore, secure torque transmission is guaranteed if the respective customer-side application constellation is checked as to whether the torque transmission capability of the shaft-hub connection can be sufficiently guaranteed (at least 1.5 to the maximum torque on the system). This inspection must be repeated at regular intervals during maintenance work (see Maintenance).
In these conditions, coupling application is possible in the following areas:

CE Ex II 2G Ex h IIC T5 -30°C≤Ta≤+80°C Gb X
II 2D Ex h IIIC T110°C -30°C≤Ta≤+80°C Db X

The X at the end of the classification refers to the operating conditions for an inspection of the transmission reliability of the frictionally-locking shaft-hub connection.
Without this inspection, this classification is rendered invalid.

Table 15

Type	Bore [mm]	Size					
		16	25	40	64	100	160
95-.2-- 95-.-3-	d_{min}	14	20	25	30	35	40
	d_{max}	20	30	38	38	45	55
95-.9--	d_{min}	25	32	40	45	55	65
	d_{max}	38	45	52	60	80	90

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Guidelines and Directives for Operation in Ex Areas Where There is a Danger of Explosion

Conditions to Observe in Ex Areas Where There is a Danger of Explosion

For malfunction-free coupling operation, it is necessary to keep to the coupling characteristic values (Technical Data) indicated on pages 4 to 6.

For suitable coupling dimensioning (see page 15), please observe the following points:

a.) Coupling nominal torque
b.) Coupling peak torque
c.) Max. speed
d.) Max. misalignment compensation capability
e.) Ambient conditions
(see Temperature Resistance)
f.) Service factors (see Table 13 / page 15)

CAUTION

Operation outside of the indicated characteristic data is not permitted. There is a danger of coupling destruction.

Coupling dimensioning in accordance with the currently valid Installation and Operational Instructions is required for each application case.
Changed operating parameters in the system require an inspection of the coupling dimensioning.
Despite technical coupling dimensioning, system-dependent vibration excitations may occur during operation, which might lead to resonances and therefore to destructions on the ROBA®-DS coupling. On critical applications, the total load profile of the application must be run through during initial operation in order to confirm the suitability of the coupling in the application.
Operation in an overcritical speed range and in the resonance range is not permitted.

CAUTION

No transverse forces may be introduced into the coupling which the coupling cannot compensate through flexible compensation. Permitted misalignments are to be observed. Type 950. and 952. couplings cannot compensate for radial shaft misalignments. If these couplings are installed in an arrangement with radial misalignment, enormously high restoring forces are generated which affect the coupling and the coupling mounted parts, including the bearings. Danger of component destruction and danger of ignition.

Furthermore, coupling malfunctions must be expected if the Installation Guidelines are not observed. The data stated in these Installation and Operational Instructions must be observed.
All tightening torques must be observed.
After having reached the specified Maintenance and Inspection Intervals, the tightening torques must be inspected using a torque wrench. If the specified torques are not observed, component movements due to metal contact and therefore warming up and formation of sparks must be expected.
Constructional modifications of the coupling are not permitted.

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Guidelines and Directives for Operation in Ex Areas Where There is a Danger of Explosion

Initial Operation

All coupling components are made of steel.
If no stipulations regarding lacquering or other surface treatments have been made customer-side on order, the coupling surface is protected by a zinc-phosphate coating. The coupling must only be used in areas protected from the weather. Additional corrosion protection is required for use in the open air or if the device is subject to weather conditions. Severely corroded coupling components mean a danger of ignition.
The functional components of the coupling must not stick together as a result of paint or other sticky media, and electrostatic charges must not be caused (see DIN EN ISO 80079-36 6.7).
The connection components are untreated.

The ROBA®-DS coupling must be axially secured onto the input and output shaft. Correct securement must be checked before initial operation.
The shafts and keys must be positioned in the couplings so that the neighboring coupling parts do not contact each other (Fig. 10).

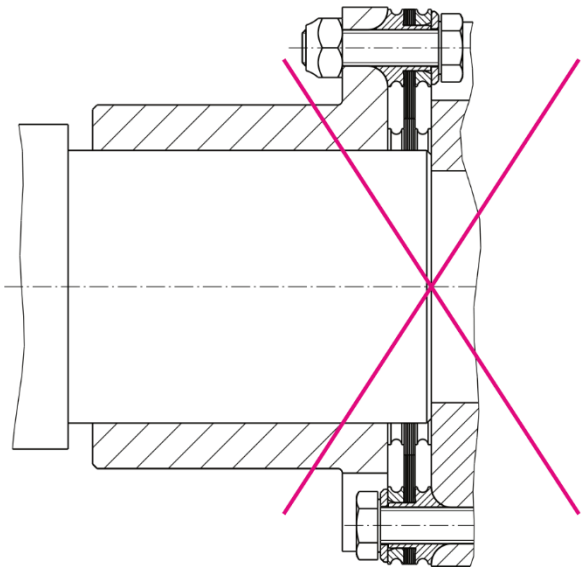

Fig. 10

In the key design, please secure the locking set screw with sealing lacquer, e.g. Loctite 243.
Layers of dust on the coupling or operation in piles of dust is not permitted.
The rotating coupling components must be protected against contact and against foreign body impacts.
Please mount a suitable cover onto the coupling.
The distance from the cover to the rotating components must be at least 5 mm.
The cover must be electrically conductible.
Covers made of aluminum are not permitted.

Maintenance and Inspection Intervals for Couplings in Ex Areas Where There is a Danger of Explosion

The maintenance and inspection intervals stated on page 18 must be maintained.

If wear or damages are detected, the affected components must be replaced immediately and the cause of the malfunction must be determined.
Causes of malfunctions could be:

a.) Excessive misalignment
b.) Excessive load (load alternations, start-up impacts, overload)
c.) Ambient influences

Wear or damage on the ROBA®-DS coupling manifest themselves as:

a.) Noise development
b.) Troubled running behavior, vibration occurrences
c.) Formation of cracks on the components
d.) Warming
e.) Loosening of the components
f.) Buckling of the disk packs
g.) Friction tracks

Should any irregularities occur, the system must be stopped independently of imminent maintenance and inspection intervals, and the cause of the malfunction must be determined using the Malfunctions / Breakdowns Table.

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Malfunctions / Breakdowns

Malfunction	Possible Causes	Danger Guidelines for Ex Areas	Solutions
Changes in running noise and / or vibration occurrence	Incorrect alignment, incorrect installation	Danger of ignition due to hot surfaces	1) Set the system out of operation 2) Find / resolve the cause of incorrect alignment 3) Check the coupling for wear
	Loose connecting screws, fretting corrosion under the screw head and on the disk pack	Danger of ignition due to hot surfaces	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	Danger of ignition due to hot surfaces and impact sparks	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
	Coupling braced in tensile direction due to incorrect assembly with installed vertical support through vibration contact between the pressure plate and the pressure lens	No danger of ignition	1) Set the system out of operation 2) Check the installation position
Disk pack breakage	Disk pack breakage due to high load impacts / overload	Danger of ignition due to sparks	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	Danger of ignition due to impact sparks	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	Danger of ignition due to impact sparks	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	Danger of ignition due to impact sparks	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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Declaration of Conformity

According to the EU Directive on the harmonisation of the laws of the Member States concerning devices and protective systems intended for use in areas where there is a danger of explosion (ATEX) 2014/34/EU, we:

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hereby declare that the product described in these Installation and Operational Instructions

ROBA®-DS all-steel coupling
Type 95_._ _ _ X
Sizes 16, 25, 40, 64, 100, 160, 180, 300, 500, 850, 1400, 2200

has been developed, constructed and produced by us in accordance with the EU Directive named above.

Deposit Receipt: EX9A 010376 0002

Notified Body number: 0123

Applied Standards, Regulations and Inspections (ASRI)

1 DIN EN 1127-1: 2011-10
Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology

2 DIN EN 1127-2: 2014-09
Explosive atmospheres - Explosion prevention and protection - Part 2: Basic concepts and methodology for mining

3 DIN EN ISO 80079-36: 2016-12
Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements

4 DIN EN ISO 80079-37: 2016-12
Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres
- Non-electrical type of protection constructional safety “c”, control of ignition sources “b”, liquid immersion “k”

5 DIN EN ISO 80079-38: 2017-10
Explosive atmospheres - Part 38: Equipment and components in explosive atmospheres in underground mines

Mauerstetten, June 2, 2023
Place / Date

Ferdinand Mayr, M. Sc.
(CEO)

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