

**Please read the Installation and Operational Instructions carefully  
and follow them accordingly.**

Ignoring these instructions may lead to malfunctions or to coupling failure, resulting in damage to other parts.

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## Declaration of Conformity

A conformity evaluation for the applicable EU directives has been carried out for this product. The conformity evaluation is set out in writing in a separate document and can be requested if required. It is forbidden to start use of the product until the machine or system into which it should be built is operating in accordance with all applicable EU directives. 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.

## 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.



### Danger!

#### This warning applies if:

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

#### User-implemented Protective Measures

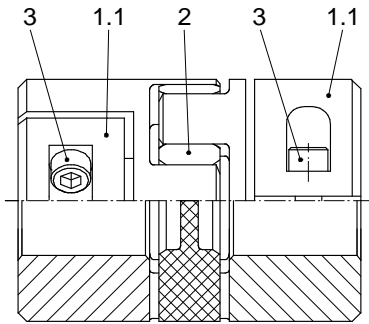
- Cover moving parts to protect against seizure, dust or foreign body impact.

**To prevent injury or damage, only professionals and suitably qualified personnel should work on the devices, following the relevant standards and directives. Please read the Installation and Operational Instructions carefully before installing and operating the device.**

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

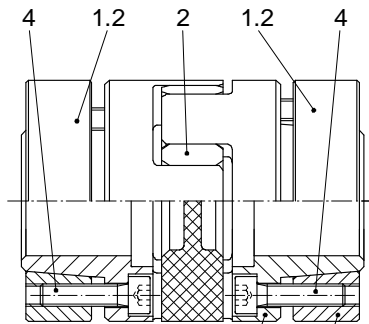
# Installation and Operational Instructions for ROBA®-ES Couplings Type 940. . . . Sizes 14 - 65

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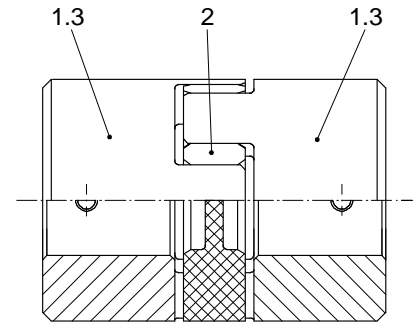
Type 940.00.  
ROBA®-ES with clamping hubs

**Fig. 1**



Type 940.11.  
ROBA®-ES with shrink disk

**Fig. 2**



Type 940.22.  
ROBA®-ES with keyway

**Fig. 3**

## Parts List (Only use *mayr*® original parts)

1.1 Clamping hub	2 Elastomeric Element	3 Socket set screw for clamping hub
1.2 Shrink disk hub assembly	98 Sh A (red)	4 Socket set screw for shrink disk hub
1.2a Shrink disk	92 Sh A (yellow)	
1.2b Shrink disk hub	80 Sh A (blue)	
1.3 Hub with keyway	64 Sh D (green)	

## Safety and Guideline Signs



**Danger!**  
Danger of injury to personnel and damage to machines.



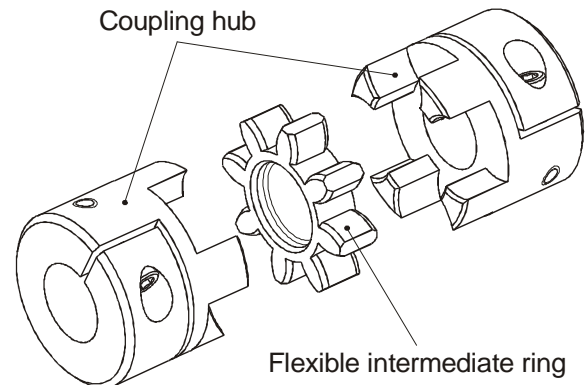
**Please Observe!**  
Guidelines on important points.



**Please Observe!**  
According to German notation, decimal points in this document are represented with a comma (e.g. 0,5 instead of 0.5).

## State of Delivery

ROBA®-ES couplings are delivered manufacturer-assembled (Please check state of delivery). Depending on size or Type, ROBA®-ES coupling hubs are made of aluminium or steel. The flexible, star-shaped intermediate ring (elastomeric element) is pressed into specially designed jaws (Fig. 5) under light pre-tension.



**Fig. 4**

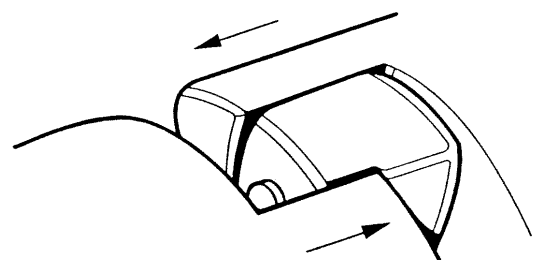
## Function – Application

ROBA®-ES stands for: flexible (E), backlash-free (S) shaft coupling. It consists of two coupling hubs and a flexible, star-shaped intermediate ring (elastomeric element) Figs. 1 – 4.

ROBA®-ES couplings are specially designed for backlash-free operation at comparatively high speeds.

ROBA®-ES couplings are mainly used in measurement and regulation technology as well as in control and process technology.

ROBA®-ES couplings are shaft-shaft connections for flexible backlash-free torque transmission in high dynamic servo drives.



**Fig. 5**

# Installation and Operational Instructions for ROBA®-ES Couplings Type 940. \_ \_ \_ . \_ Sizes 14 - 65

(B.9.6.GB)

Table 1: Technical Data for Type 940.\_22.\_ (Fig. 3)

Size	14	19	24	28	38	42	48	55	65
Min. bore [mm]	6	6	8	10	12	14	20	20	38
Max. bore [mm]	15	24	28	38	45	55	60	70	80
Max. speed [rpm]	19000	14000	10600	8500	7100	6000	5600	5000	4600
Adjusting screw thread (see Fig. 10)	M4	M5	M5	M6	M8	M8	M8	M10	M10
Adjusting screw tightening torques [Nm]	1,5	2	2	4,1	8,5	8,5	8,5	20	20

Table 2: Technical Data for Type 940.\_00.\_ (Fig. 1)

Size	14	19	24	28	38	42	48	55	65										
Min. Bore [mm]	6	10	15	19	20	28	35	40	45										
Max. Bore [mm]	15	20	28	35	45	50	55	70	80										
Max. speed [rpm]	19000	14000	10600	8500	7100	6000	5600	5000	4600										
Socket set screw thread	M3	M6	M6	M8	M8	M10	M12	M12	M14										
Socket set screw tightening torques [Nm]	1,4	10	10	25	25	70	120	120	200										
<b>Preferred bores on clamping hubs and respective transmittable torques [Nm] on clamping hubs frictional locking with shaft tolerance k6</b>																			
Size	Ø 6	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12	Ø 14	Ø 15	Ø 16	Ø 19	Ø 20	Ø 22	Ø 24	Ø 25	Ø 28	Ø 30	Ø 32	Ø 35
14	2,5	3,0	3,4	3,8	4,2	4,7	5,1	6,0	6,4	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	23	25	27	32	34	36	43	45	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	34	36	43	45	50	54	57	63	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	79	83	91	100	104	116	124	133	145
38	-	-	-	-	-	-	-	-	-	-	-	83	91	100	104	116	124	133	145
42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	208	228	248	280
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	350
55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Size	Ø 38	Ø 40	Ø 42	Ø 45	Ø 48	Ø 50	Ø 52	Ø 55	Ø 58	Ø 60	Ø 62	Ø 65	Ø 68	Ø 70	Ø 72	Ø 75	Ø 78	Ø 80	
14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
38	158	166	174	187	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
42	315	340	365	404	442	470	-	-	-	-	-	-	-	-	-	-	-	-	
48	390	420	455	505	560	600	640	705	-	-	-	-	-	-	-	-	-	-	
55	-	340	365	405	435	465	490	525	570	600	625	665	700	740	-	-	-	-	
65	-	-	-	545	590	630	662	710	764	800	840	900	954	990	1032	1095	1158	1200	

# Installation and Operational Instructions for ROBA®-ES Couplings Type 940. \_ \_ \_ . \_ Sizes 14 - 65

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Table 3: Technical Data for Types 940.\_11.P and 940.\_11.F (Fig. 2) – Steel design

Size	14-32	19-37.5	19	24-50	24	28	38	42	48	55	65
Min. bore [mm]	6	10	10	15	15	19	20	28	35	40	45
Max. bore [mm]	14	16	20	24	28	38	45	50	60	70	75
Bore acc. DIN 69002 [mm]	14	16	19	24	25	35	-	-	-	-	-
Max. speed [rpm]	28000	21000	21000	15500	15500	13200	10500	9000	8000	6300	5600
Clamping screw thread	4 x M3	6 x M4	6 x M4	4 x M5	4 x M5	8 x M5	8 x M6	4 x M8	4 x M8	4 x M10	4 x M12
Clamping screw tightening torques [Nm]	1,3	3,0	3,0	6,0	6,0	6,0	10	25	30	52	90

Size	Preferred bores on clamping hubs and respective transmittable torques [Nm] on clamping hubs frictional locking with shaft tolerance k6																	
	Ø 6	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 14	Ø 15	Ø 16	Ø 17	Ø 18	Ø 19	Ø 20	Ø 22	Ø 24	Ø 25	Ø 28	Ø 30
14-32	7	9	11	13	15	17	25	-	-	-	-	-	-	-	-	-	-	-
19-37,5	-	-	-	-	26	30	45	50	60	-	-	-	-	-	-	-	-	-
19	-	-	-	-	33	38	55	61	67	73	78	84	88	-	-	-	-	-
24-50	-	-	-	-	-	-	-	45	50	54	60	65	70	85	112	-	-	-
24	-	-	-	-	-	-	-	56	62	68	74	81	87	100	120	125	135	-
28	-	-	-	-	-	-	-	-	-	-	-	141	153	177	203	216	256	282
38	-	-	-	-	-	-	-	-	-	-	-	-	197	228	261	279	332	368
42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300	350
48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Size	Ø 32	Ø 35	Ø 38	Ø 40	Ø 42	Ø 45	Ø 48	Ø 50	Ø 52	Ø 55	Ø 58	Ø 60	Ø 62	Ø 65	Ø 68	Ø 70	Ø 72	Ø 75
14-32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19-37,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24-50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	308	343	373	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	405	460	513	547	577	617	-	-	-	-	-	-	-	-	-	-	-	-
42	400	500	600	680	730	790	850	880	-	-	-	-	-	-	-	-	-	-
48	-	450	500	600	720	850	1000	1180	1270	1353	1428	1471	-	-	-	-	-	-
55	-	-	-	723	814	946	1085	1187	1284	1436	1585	1682	1795	1943	2100	2207	-	-
65	-	-	-	-	-	1402	1596	1731	1873	2095	2308	2420	2570	2750	2989	3157	3306	3550

# Installation and Operational Instructions for ROBA®-ES Couplings Type 940. \_ \_ \_ . \_ Sizes 14 - 65

(B.9.6.GB)

Table 4: Technical Data for Type 940\_11.A (Fig. 2) – Aluminium design

Size	14	19	24	28	38
Min. bore [mm]	6	10	15	19	20
Max. bore [mm]	14	20	28	38	45
Max. speed [rpm]	28000	21000	15500	13200	10500
Clamping screw thread	4 x M3	6 x M4	4 x M5	8 x M5	8 x M6
Clamping screw tightening torques [Nm]	1,3	3,0	6,0	6,0	10

Size	Preferred bores on clamping hubs and respective transmittable torques [Nm] on clamping hubs frictional locking with shaft tolerance k6																							
	ø 6	ø 7	ø 8	ø 9	ø 10	ø 11	ø 14	ø 15	ø 16	ø 17	ø 18	ø 19	ø 20	ø 22	ø 24	ø 25	ø 28	ø 30	ø 32	ø 35	ø 38	ø 40	ø 42	ø 45
14	7	9	11	13	15	17	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	33	38	55	61	67	73	78	84	88	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	56	62	68	74	81	87	100	120	125	135	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	141	153	177	203	216	256	282	308	343	373	-	-	-
38	-	-	-	-	-	-	-	-	-	-	-	-	197	228	261	279	332	368	405	460	513	547	577	617

Table 5: Torques

This concerns measurement torques. For exact dimensioning, please observe the transmittable torques of the respective shaft-hub connections as well as the design calculation for the most recent ROBA®-ES catalogue.

Size	Torque Type 940. _ _ _ . _							
	Elastomeric element hardness 80 Sh A (blue)		Elastomeric element hardness 92 Sh A (yellow)		Elastomeric element hardness 98 Sh A (red)		Elastomeric element hardness 64 Sh D (green)	
	T <sub>KN</sub> [Nm]	T <sub>K max</sub> [Nm]	T <sub>KN</sub> [Nm]	T <sub>K max</sub> [Nm]	T <sub>KN</sub> [Nm]	T <sub>K max</sub> [Nm]	T <sub>KN</sub> [Nm]	T <sub>K max</sub> [Nm]
14	4	8	8	16	13	26	16	32
19	5	10	10	20	17	34	21	42
24	17	34	35	70	60	120	75	150
28	46	92	95	190	160	320	200	400
38	-	-	190	380	325	650	405	810
42	-	-	265	530	450	900	560	1120
48	-	-	310	620	525	1050	655	1310
55	-	-	410	820	685	1370	825	1650
65	-	-	900	1800	1040	2080	-	-

Only available as Type 940\_11.P

14-32	4	8	8	16	13	26	16	32
19-37,5	4	8	8	16	14	28	17	34
24-50	12	24	25	50	43	86	54	108

# Installation and Operational Instructions for ROBA®-ES Couplings Type 940. \_ \_ \_ . \_ Sizes 14 - 65

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**Table 6: Permitted Misalignment Values**

Size	Shaft misalignments								
	Axial	Radial				Angular			
	$\Delta K_a$ 80/92/98 Sh A 64 Sh D [mm]	$\Delta K_r$ 80 Sh A [mm]	$\Delta K_r$ 92 Sh A [mm]	$\Delta K_r$ 98 Sh A [mm]	$\Delta K_r$ 64 Sh D [mm]	$\Delta K_w$ 80 Sh A [°]	$\Delta K_w$ 92 Sh A [°]	$\Delta K_w$ 98 Sh A [°]	$\Delta K_w$ 64 Sh D [°]
14	1,0	0,21	0,15	0,09	0,06	1,1	1,0	0,9	0,8
19	1,2	0,15	0,10	0,06	0,04	1,1	1,0	0,9	0,8
24	1,4	0,18	0,14	0,10	0,07	1,1	1,0	0,9	0,8
28	1,5	0,20	0,15	0,11	0,08	1,3	1,0	0,9	0,8
38	1,8	-	0,17	0,12	0,09	-	1,0	0,9	0,8
42	2,0	-	0,19	0,14	0,10	-	1,0	0,9	0,8
48	2,1	-	0,21	0,16	0,11	-	1,0	0,9	0,8
55	2,2	-	0,24	0,17	0,12	-	1,0	0,9	0,8
65	2,6	-	0,25	0,18	-	-	1,0	0,9	-
Only available as Type 940_11.P									
14-32	1,0	0,21	0,15	0,09	0,06	1,1	1,0	0,9	0,8
19-37,5	1,2	0,15	0,10	0,06	0,04	1,1	1,0	0,9	0,8
24-50	1,4	0,18	0,14	0,10	0,07	1,1	1,0	0,9	0,8

**Table 7: Spring Rigidities**

Size	Static Torsional Spring Rigidity				Dynamic Torsional Spring Rigidity				Static Radial Torsional Spring Rigidity			
	$C_{T \text{ stat.}}$ 80 Sh A [Nm/rad.]	$C_{T \text{ stat.}}$ 92 Sh A [Nm/rad.]	$C_{T \text{ stat.}}$ 98 Sh A [Nm/rad.]	$C_{T \text{ stat.}}$ 64 Sh D [Nm/rad.]	$C_{T \text{ dyn.}}$ 80 Sh A [Nm/rad.]	$C_{T \text{ dyn.}}$ 92 Sh A [Nm/rad.]	$C_{T \text{ dyn.}}$ 98 Sh A [Nm/rad.]	$C_{T \text{ dyn.}}$ 64 Sh D [Nm/rad.]	$C_r$ 80 Sh A [Nm/mm]	$C_r$ 92 Sh A [Nm/mm]	$C_r$ 98 Sh A [Nm/mm]	$C_r$ 64 Sh D [Nm/mm]
14	50	80	120	230	120	240	300	730	180	300	470	960
19	350	820	900	1400	1050	1800	2200	4200	700	1200	2100	2700
24	820	2300	3700	4500	1300	4800	7600	10800	800	1900	2800	4200
28	1300	3800	4200	7000	2200	6800	10100	17200	950	2100	3500	4900
38	-	5600	7400	9000	-	11900	19900	30500	-	2900	4800	5600
42	-	9800	13800	15000	-	20500	31100	64900	-	4100	5400	6900
48	-	12000	15100	28500	-	22800	44900	102800	-	4500	6200	8200
55	-	Available on demand		-	Available on demand		-	Available on demand		-	Available on demand	
65	-	Available on demand		-	-	Available on demand		-	-	Available on demand		-
Only available as Type 940_11.P												
14-32	50	80	120	230	120	240	300	730	180	300	470	960
19-37,5	280	660	720	1120	840	1440	1760	3360	560	960	1680	2160
24-50	600	1700	2700	3300	1000	3600	5700	8100	600	1500	2100	3200

# Installation and Operational Instructions for ROBA®-ES Couplings Type 940. \_ \_ \_ . \_ Sizes 14 - 65

(B.9.6.GB)

## Elastomeric Elements (2)

The elastomeric elements (2) are the central element of the ROBA®-ES coupling. They define the area of application via the permitted torque, rigidity, damping and misalignment values and the performance of the shaft connection.

By using a new polyurethane material and a special injection method, a high degree of dimensional stability and uniformity in the toothing of the elastomeric element (2) is achieved. The elastomeric elements are available in different shore hardnesses (see Table 8).

The teeth on the elastomeric element (2) are chamfered laterally, which eases blind installation.

## Elastomeric Elements - Agent Resistance (2)

The elastomeric elements (2) are very resistant against

- pure mineral oils (lubricating oils)
- waterproof greases.

They have similar resistance against fuels such as

- standard petrol
- diesel
- kerosene.

Damage can occur due to longer influence of

- alcohols
- aromatic fuels (super petrol).

The elastomeric element material used is resistant to hydrolysis. In contrast to other polyurethane materials, water (also sea water) does not cause any substantial changes in the mechanical characteristics even after many years of contact. However, hot water reduces the mechanical rigidity.

Please contact the manufacturer in case of contact with special agents or radiation.

## Elastomeric Elements (2) - Temperature Resistance

The ambient temperatures present during operation have a considerable effect on the torque, the rigidity or the damping behaviour of the coupling. The permitted temperature ranges (according to Table 8) are to be kept to.

## General Installation Guidelines

The bores of the coupling hubs have an H7 tolerance in shrink disk and keyway designs or an F7 tolerance in clamping hub design in standard production. We recommend a k6 tolerance\* for the shafts. The surface of the shafts should be finely turned or ground ( $R_a = 0,8 \mu\text{m}$ ).

In case of customer-side bores, please observe the shaft run-out tolerance 0,05 to "A" (see Fig. 6).

The bores or shafts **must not be oiled or greased** when installing the coupling with clamping hubs (1.1) or shrink disk hubs (1.2).

(\* Please contact the manufacturer for other shaft tolerances.)

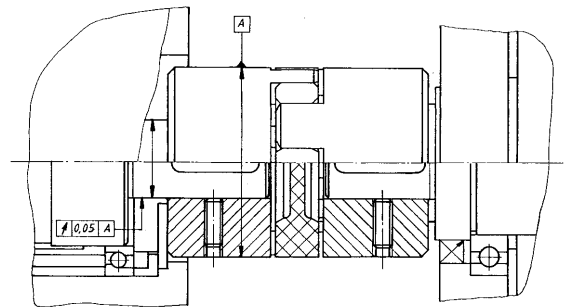


Fig. 6

ROBA®-ES  
with keyway

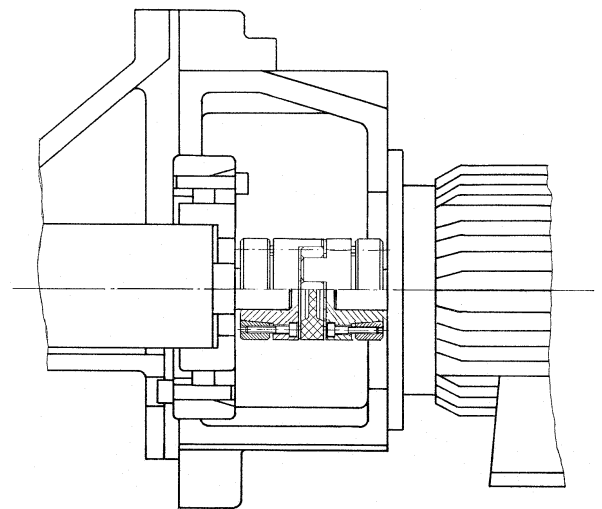


Fig. 7

ROBA®-ES  
with shrink disk hubs

Table 8: Elastomeric Element Hardnesses and Permitted Temperature Ranges

Elastomeric element hardness [Shore]	Colour	Permitted temperature range	
		Permanent temperature	Max. temporary temperature
80 Sh A	Blue	-50 up to +80 °C	-60 up to +120 °C
92 Sh A	Yellow	-40 up to +90 °C	-50 up to +120 °C
98 Sh A	Red	-30 up to +90 °C	-40 up to +120 °C
64 Sh D	Green	-30 up to +100 °C	-40 up to +140 °C

# Installation and Operational Instructions for ROBA®-ES Couplings Type 940. \_ \_ \_ . \_ Sizes 14 - 65

(B.9.6.GB)

## Installation

Due to their optimised construction, the ROBA®-ES coupling provides customers with the possibility of attaching the coupling axially after the hubs have been installed on the input or output shafts.

Subsequent screwing procedures and complex housing constructions become unnecessary.. (see Installation Examples Figs. 6, 7 and 11).



### Please Observe!

ROBA®-ES couplings with steel hubs and steel shrink disks are coated with a zinc phosphation, which provides corrosion protection. All other components are untreated.

For both steel and aluminium hubs, the bores or shafts have to be degreased before installing the coupling Types:

**with clamping hubs 940.\_00.\_**

**with shrink disk hubs 940.\_11.\_**

**Greasy or oily bores or shafts do not transmit the indicated transmittable torque  $T_R$  specified on order.**

## Installation of the Coupling Halves (Hubs)

### Installation of the Coupling Clamping Hubs

Type 940.\_00.\_ (Fig. 8)

- Push the coupling hubs (1.1) using a suitable device onto both shaft ends, and bring them into the correct position.
- Tighten the clamping screw (3) using a torque wrench evenly to the required torque acc. Table 2.

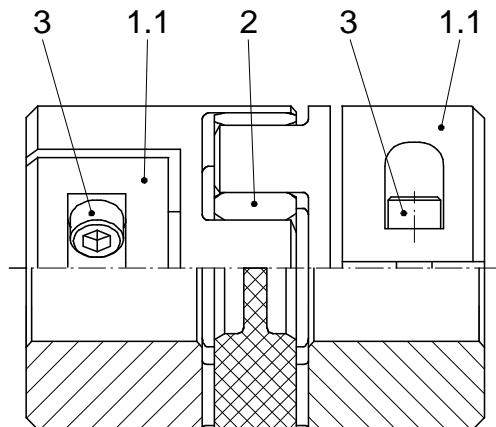


Fig. 8

### Installation of the Coupling Hubs with Keyway

Type 940.\_22.\_ (Fig. 10)

In order to dimension the shaft-hub connection or to inspect the permitted contact pressure per unit area of the keyway, the calculation procedure acc. DIN 6892 usual in mechanical engineering is to be applied.

For calculation, please take the yield point as  $R_p 0,2$  for aluminium 200 N/mm<sup>2</sup> and for steel 350 N/mm<sup>2</sup>.

- Push the coupling hubs (1.3) using a suitable device onto both shaft ends and bring them into the correct position.
- Secure the hubs (1.3) axially (see also Installation Example Fig. 6). Axial securement takes place via a set screw (adjusting screw / Fig. 10).
- The key must lie over the entire length of the hub.

## Installation of the Coupling Shrink Disk Hubs

Type 940.\_11.\_ (Fig. 9)

- The contact surfaces of the cone shrink disk (1.2b) or cone shrink disk hub (1.2a) are greased manufacturer-side.
- Push the coupling hubs (1.2) using a suitable device onto both shaft ends and bring them into the correct position.
- Tighten the clamping screws (4) until they are lying lightly up against their receptor part.
- Tighten the clamping screws stepwise and crosswise (in 3 to max. 6 tightening turns) evenly using a torque wrench to the required tightening torque according to Tables 3 or 4 (dependent on Type).

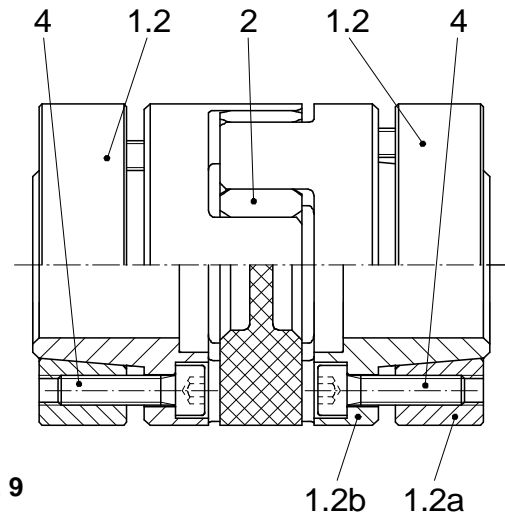


Fig. 9

## De-installation

- Loosen all clamping screws (4) by several tightening turns.
- Screw out the clamping screws next to the tapped extracting holes, and screw them into the tapped extracting holes up to their limits.
- Tighten the clamping screws (4) stepwise evenly. In this way, the clamping ring (1.2b) is forced away from the shrink disk hub (1.2a) (Fig. 9).

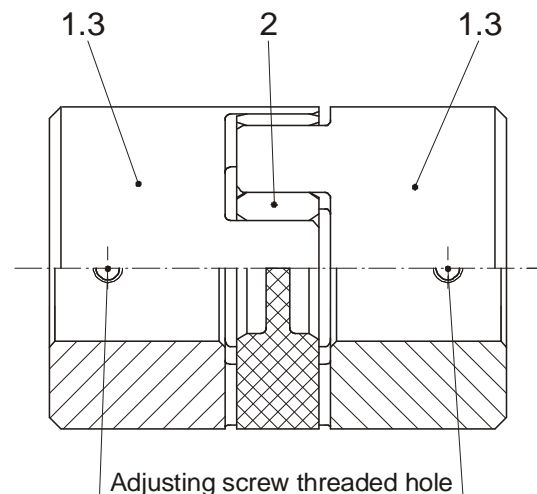


Fig. 10

# Installation and Operational Instructions for ROBA®-ES Couplings Type 940. \_ \_ \_ . \_ Sizes 14 - 65

(B.9.6.GB)

## Joining Both Coupling Hubs

Due to the pre-tension on the flexible elastomeric element (2), an axial installation force must be produced (Fig. 5) when the coupling hubs are joined (1.1-1.3). The force required can be reduced by lightly greasing the elastomeric element.



**Please Observe!**  
Use PU-compatible lubricants (e. g. Vaseline or HP 222)!



**Please Observe!**  
After joining both coupling parts, no axial pressure must be placed on the elastomeric element (2).  
Keep to distance dimension "E" acc. Fig. 11 and Table 9!

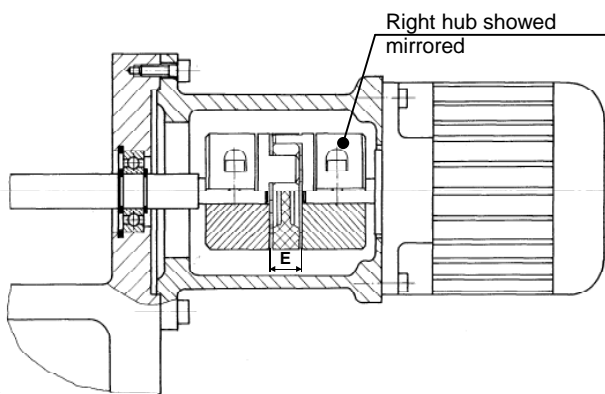


Fig. 11 ROBA®-ES with clamping hub

Table 9:  
Tightening Torques und Distance Dimension "E"

ROBA®-ES Size	Tightening torques		Distance dimension "E" (Fig. 11) [mm]
	socket set screws (Item 3, Fig. 1) [Nm]	clamping screws (Item 4, Fig. 2) [Nm]	
14	1,4	1,3	13
19	10	3	16
24	10	6	18
28	25	6	20
38	25	10	24
42	70	25	26
48	120	30	28
55	120	52	30
65	200	90	35

## Shaft Misalignments

ROBA®-ES couplings are capable of compensating for radial, axial and angular shaft misalignments (Fig. 13), without losing their resistance to backlash.

However, the permitted shaft misalignments shown in Table 6 may not simultaneously reach their maximum value. If more than one kind of misalignment takes place simultaneously, they influence each other. Therefore, each permitted alignment value (see Fig. 12) is dependent on another. The sum total of the actual misalignments in percent of the maximum value must not exceed 100 %.

The permitted shaft misalignments shown in Table 6 refer to coupling operation at nominal torque, an ambient temperature of +30 °C and an operating speed of 1500 rpm. In other or more extreme coupling conditions, please contact the manufacturers.

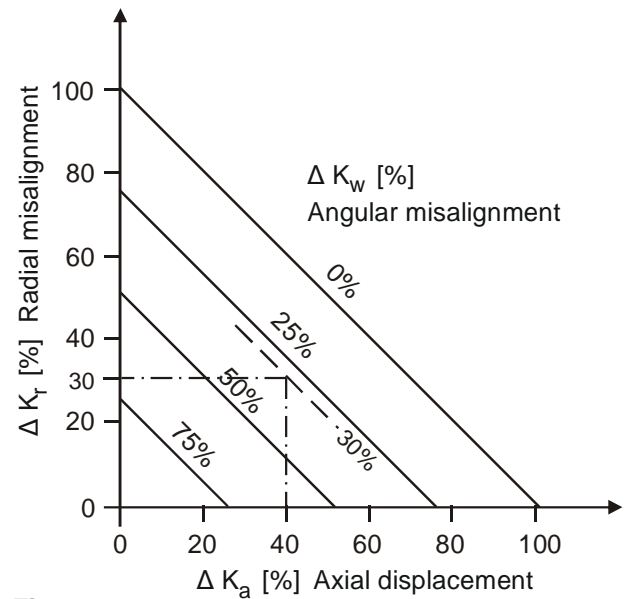


Fig. 12

## Coupling Alignment

An exact coupling alignment greatly increases the lifetime of the clutch and reduces the load on the shaft bearings. In particularly high speed drives, we recommend the use of an alignment device (e.g. laser). Normally however, it is sufficient to align the coupling using a straight edge at two vertical levels next to each other.

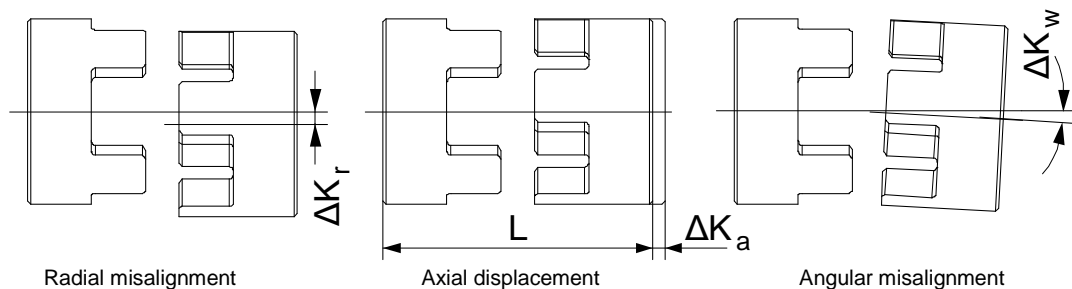


Fig. 13 Radial misalignment Axial displacement Angular misalignment

## Balancing

### Key hubs (1.3) and clamping hubs (1.1):

The key hubs (1.3) and clamping hubs (1.1) rotate at maximum speed with a circumferential speed of 30 m/s. They are not balanced in the standard process.

### Shrink disk hub(1.2):

The shrink disk hubs (steel and aluminium) (1.2) maintain a balance quality of  $G = 6,3$  without being balanced up to speed  $n_G$  (equals c. 30 m/s). Over this speed, balancing is recommended. The hubs are balanced individually. The diagram (Fig. 14) gives reference values for balancing the coupling, which we recommended you use.

The running smoothness of a machine or system is not dependent on the balance quality of the coupling, but rather on many parameters such as rigidity or distance to the adjoining bearing. For this reason there are no fixed regulations as to the conditions for which a coupling should be balanced.

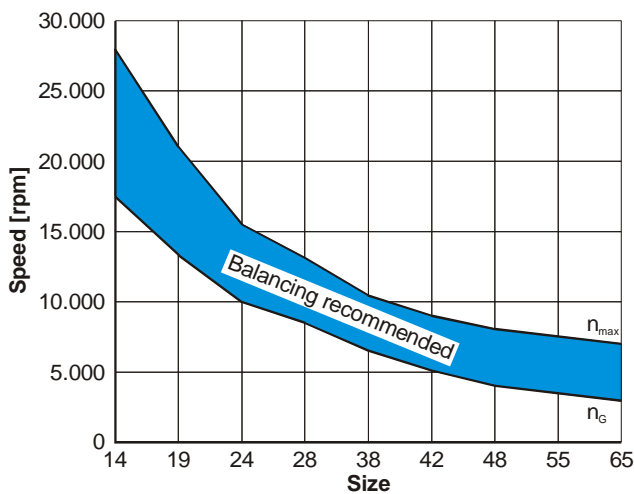


Fig. 14 Diagram: Balancing the Shrink Disk Hubs

## Suitable Coupling Dimensioning

For malfunction-free function of the coupling, please keep to the given coupling characteristic values (Technical Data) in the most recent applicable catalogue. Suitable coupling dimensioning according to the applicable ROBA®-ES catalogue is necessary for malfunction-free and wear-free operation.

Large shaft misalignments, in particular with high speeds and an alternating overall load configuration with high frequency, strain and heat up the elastomer material. Unpermittedly high load configuration, unpermittedly high speeds and unpermitted shaft misalignments can destroy the coupling.

For suitable coupling dimensioning (see calculation in the most recent applicable ROBA®-ES catalogue), please observe the following points:

- Coupling nominal torque
- Coupling peak transient torque
- Max. speed
- Max. shaft misalignments
- Ambient conditions (see most recent applicable ROBA®-ES catalogue)
- Service factors (see most recent applicable ROBA®-ES catalogue)



### Danger!

Any operation outside the given characteristic data is not allowed. Danger of coupling destruction.

The number and type of start-up impacts must be taken into account according to the catalogue during coupling dimensioning. Furthermore, elastomer heating may occur due to speed resonance. This must also be taken into account according to the catalogue during coupling dimensioning. Changed operating parameters in the system require a renewed inspection of the coupling dimensioning. The maximum given ambient temperatures are to be kept to. Exceeding the permitted ambient temperatures means a danger of elastomer destruction.

# Installation and Operational Instructions for ROBA®-ES Couplings Type 940. \_ \_ \_ . \_ Sizes 14 - 65

(B.9.6.GB)

## Maintenance

Please keep to the following maintenance and inspection intervals:

- 1.) Visual check, inspection of the installation parameters (misalignment and tightening torques), running behaviour of the coupling **before initial operation**.
- 2.) Visual check, torsional backlash and elastomer wear, inspections of misalignment and tightening torques, running behaviour of the coupling **after 1000h or after max. 3 months**.
- 3.) If no irregularities or wear are found during the second maintenance and inspection interval, all further inspection intervals can be carried out under unchanged operating parameters **after 4000 operating hours or after max. 12 months**.

### Elastomer wear limit :

No abraded particles are allowed on the Elastomeric element (2), as the ROBA®-ES is a backlash-free coupling. The gap between two jaws must be filled with the elastomer, with no room for backlash. You should not be able to insert a feeler gauge with a thickness of 0,1 mm (Fig. 15).

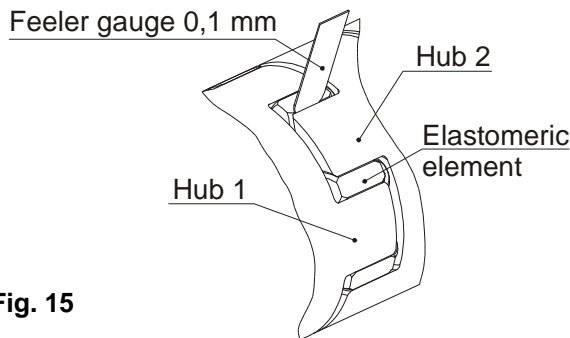


Fig. 15

If wear or damage is discovered, the affected parts must be replaced immediately and the cause of the malfunction is to be found.

Malfunction causes could be:

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

Wear or damage on the ROBA®-ES coupling becomes apparent by:

- a.) Noise development
- b.) Disturbed running, vibrations
- c.) Crack formation on the components
- d.) Heating
- e.) Loosened components
- f.) Friction marks



### Danger!

For any irregularities, independent of the regular maintenance and inspection intervals, the system is to be stopped and the cause of malfunction is to be found using the Table Malfunctions / Breakdowns

## Disposal

### All steel components:

Steel scrap (Code No. 160117)

### All aluminium components:

Non-ferrous metals (Code No. 160118)

### Elastomere:

Plastics (Code No. 160119)

## Malfunctions / Breakdowns

Malfunctions	Possible causes	Solution
Changes in running noise and / or vibration occurrence	Incorrect alignment	<ol style="list-style-type: none"> <li>1) Set the system out of operation</li> <li>2) Find and solve the cause of incorrect alignment (e. g. loose foundation screws, motor securement breakage, warmth expansion of system components, changes in the coupling installation dimension "E")</li> <li>3) Check the coupling for wear</li> </ol>
	Wear on the elastomeric element, temporary torque transmission due to metal contact	<ol style="list-style-type: none"> <li>1) Set system out of operation</li> <li>2) Dismantle the coupling and remove the remains of the elastomeric element</li> <li>3) Check the coupling parts and replace them if damaged</li> <li>4) Insert a new elastomeric element, install coupling parts</li> <li>5) Check the alignment and correct if necessary</li> </ol>
	Loose clamping screws and socket set screws or locking set screw for axial hub securement	<ol style="list-style-type: none"> <li>1) Set system out of operation</li> <li>2) Check the coupling alignment</li> <li>3) Tighten the clamping and socket set screws for axial securement of the hubs to the specified torque, or tighten the locking set screw and paint it with thread locking solution against self-loosening</li> <li>4) Check the coupling for wear</li> </ol>

## Malfunctions / Breakdowns

Malfunctions	Possible causes	Solutions
Cam breakage	Wear on the elastomeric element, torque transmission due to metal contact	<ol style="list-style-type: none"> <li>1) Set system out of operation</li> <li>2) Replace the entire coupling</li> <li>3) Check the alignment</li> </ol>
	Cam breakage due to high impact energy / overload / excessively high shaft misalignments	<ol style="list-style-type: none"> <li>1) Set system out of operation</li> <li>2) Replace the entire coupling</li> <li>3) Check the alignment</li> <li>4) Find the cause of overload</li> </ol>
	Operating parameters do not match the coupling performance	<ol style="list-style-type: none"> <li>1) Set system out of operation</li> <li>2) Check the operating parameters and select a suitable coupling (please observe the installation space)</li> <li>3) Install a new coupling</li> <li>4) Check the alignment</li> </ol>
	Operational mistakes due to coupling characteristic data being exceeded	<ol style="list-style-type: none"> <li>1) Set system out of operation</li> <li>2) Check coupling dimensioning</li> <li>3) Replace the entire coupling</li> <li>4) Check the alignment</li> <li>5) Train operating personnel</li> </ol>
Premature wear on the elastomeric element	Incorrect alignment	<ol style="list-style-type: none"> <li>1) Set system out of operation</li> <li>2) Find and solve the cause of incorrect alignment (e. g. loose foundation screws, motor securement breakage, warmth expansion of system components, changes in the coupling installation dimension "E")</li> <li>3) Check the coupling for wear</li> </ol>
Premature wear on the elastomeric element	e.g. Contact with aggressive liquids / oils, ozone influences, excessively high ambient temperature etc., which lead to physical changes in the elastomeric element	<ol style="list-style-type: none"> <li>1) Set system out of operation</li> <li>2) Dismantle the coupling and remove the remains of the elastomeric element</li> <li>3) Check the coupling parts and replace them if damaged</li> <li>4) Insert a new elastomeric element, install coupling components</li> <li>5) Check the alignment and correct if necessary</li> <li>6) Make sure that further physical changes to the elastomeric element can be ruled out.</li> </ol>
	The ambient or contact temperatures permitted for the elastomeric element are exceeded (see Table 8)	<ol style="list-style-type: none"> <li>1) Set system out of operation</li> <li>2) Dismantle the coupling and remove the remains of the elastomeric element</li> <li>3) Check the coupling parts and replace them if damaged</li> <li>4) Insert a new elastomeric element, install coupling components</li> <li>5) Check the alignment and correct if necessary</li> <li>6) Check the ambient or contact temperature and regulate them (if necessary, use other elastomeric element materials)</li> </ol>
Premature wear on the elastomeric element (material liquidation inside the elastomeric element toothing)	Drive vibrations	<ol style="list-style-type: none"> <li>1) Set system out of operation</li> <li>2) Dismantle the coupling and remove the remains of the elastomeric element</li> <li>3) Check the coupling parts and replace them if damaged</li> <li>4) Insert a new elastomeric element, install the coupling components</li> <li>5) Check the alignment and correct if necessary</li> <li>6) Find the cause of vibration (if necessary, use an elastomeric element with a lower or higher shore hardness)</li> </ol>



### Please Observe!

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.