TRASCO® ES: “0” BACKLASH COUPLINGS

sit DRIVE SOLUTIONS

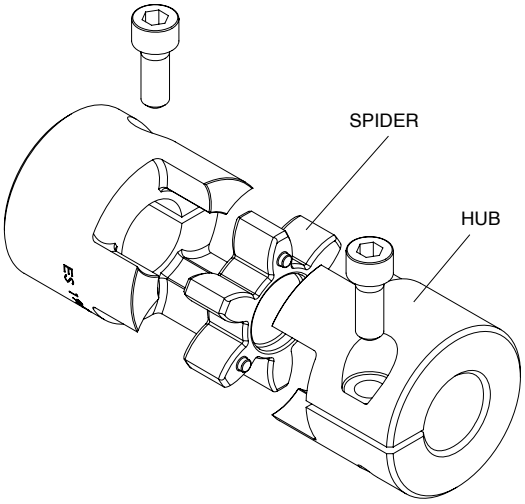
TRASCO® ES

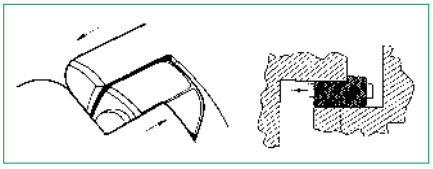
TRASCO® ES: “0” backlash couplings

TRASCO® ES is our zero backlash coupling designed to compensate for misalignment and vibration dampening for indexing applications. The compact design of TRASCO® ES makes it the right choice for all precise motion applications.

Description

The TRASCO® ES consists of two hubs, which are either made of high-strength aluminum (up to the 38/45 size) or steel (from size 42) that are connected with an elastic element.
The precise dimensional characteristics of TRASCO® ES are obtained through our accurate machining process.
The special compound polyurethane elastic element, developed through extensive research and laboratory testing, is made through a press-forming process which guarantees high dimensional accuracy.
The element is available in 4 different hardnesses: **80 Sh. A (blue), 92 Sh. A (yellow), 98 Sh. A (red), 64 Sh. D (green).**
Coupling performance depends on the type of element selected (see “**Technical characteristics**”).
Other element hardnesses are available upon request to meet special operating conditions, such as high temperatures and/or high torques, and for providing a high degree of vibration dampening capability. Please contact our Engineering Office for help in selecting the appropriate element hardness.
Note: It is possible to have aligned keyways upon inquiry.





Operation

When the polyurethane element is installed in its special seats between the hubs, it becomes precompressed, thereby providing the zero backlash feature which characterizes the transmission performance of this coupling.
With zero backlash, the coupling remains torsionally rigid within the range of the precompression load, but does permit the absorption of radial, angular, and axial misalignments as well as undesired vibrations.
The significantly wide precompressed area of the flexible element keeps the contact pressure against the elastic element low. Therefore, the element teeth can be overloaded many times without undergoing any wear or taking a permanent set.

Advantages

The TRASCO® ES coupling provides the following advantages:

- **"zero-backlash" motion transmission**
- **dampening** (up to 80%) **of vibrations** from motor shaft
- **low heat and electrical conductivity**
- **easy and fast installation**
- **perfect balance** (A & AP type)
- **low moment of inertia** (due to compact design and types of materials used).

Main applications

TRASCO® ES couplings are most frequently used with:

- servomotors
- robotics
- sliding tables
- spindle controls for drilling and grinding mandrels
- ball-bearing screws

Operating Temperature Range

The operating temperature range for the TRASCO® ES depends on the type of element. For the **92° Sh. A (yellow), the range is between -40 and +90 °C, and for the 98° Sh.A (red), the range is between -30 and +90 °C.** Peak temperatures as high as 120 °C can be tolerated for brief instances. High operating temperatures can cause the elastic element to lose a considerable amount of elasticity, thus substantially lowering the torque handling capacity.
Therefore, when selecting a coupling, the operating temperature must be carefully considered (see "**Technical characteristics**").

ATEX Directive 2014/34/EU

It is possible to ask for specific certification for use in hazardous area according to EC standard **94/9/EC**. TRASCO® ES couplings are available with specific mounting/operating instruction manual and conformity. For information, please contact our technical office.

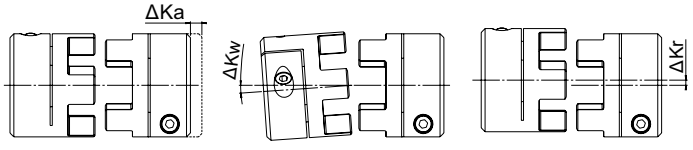
Technical characteristics

The following technical characteristics apply to all types of TRASCO® ES couplings. When using the M, A and AP versions, check the torque values given in the table against the allowable hub transmission values for the respective versions given in the pertinent sections. TRASCO® ES couplings can withstand axial, radial, and angular misalignment. Even after operating for an extended period with a misalignment, there is still zero backlash because the elastic element is only stressed by pressure loads. When an application causes a high degree of misalignment, a double flexing type coupling can be provided which avoids the formation of reaction forces. Please contact our Engineering Office.

Size	Spider hardness	Performances		Spider stiffness			Misalignments		
	Shore color	T_{KN} [Nm]	T_{Kmax} [Nm]	C_T statics [Nm/rad]	C_T dynamics [Nm/rad]	Cr radial [N/mm]	ΔKa [mm]	ΔKr [mm]	ΔKw [°]
7	80 Sh A (blue)	0,7	1,4	8	26	114	0,6	0,15	1,1
	92 Sh A (yellow)	1,2	2,4	14	43	219	0,6	0,10	1,0
	98 Sh A (red)	2	4	22	69	421	0,6	0,10	0,9
9	80 Sh A (blue)	1,8	3,6	16	52	125	0,8	0,20	1,1
	92 Sh A (yellow)	3	6	29	95	262	0,8	0,15	1,0
	98 Sh A (red)	5	10	55	155	518	0,8	0,10	0,9
	64 Sh D (green)	6	12	75	225	740	0,8	0,08	0,8
12	80 Sh A (blue)	3	6	85	250	275	0,9	0,20	1,1
	92 Sh A (yellow)	5	10	165	480	470	0,9	0,15	1,0
	98 Sh A (red)	9	18	240	720	845	0,9	0,08	0,9
	64 Sh D (green)	12	24	330	980	1200	0,9	0,05	0,8
14	80 Sh A (blue)	4	8	60	180	153	1,0	0,21	1,1
	92 Sh A (yellow)	8	15	115	344	336	1,0	0,15	1,0
	98 Sh A (red)	13	25	170	513	604	1,0	0,09	0,9
	64 Sh D (green)	16	32	235	702	856	1,0	0,06	0,8
19/24	80 Sh A (blue)	5	10	370	1120	740	1,2	0,15	1,1
	92 Sh A (yellow)	10	20	820	1920	1260	1,2	0,10	1,0
	98 Sh A (red)	17	34	990	2350	2210	1,2	0,06	0,9
	64 Sh D (green)	21	42	2500	3800	2970	1,2	0,04	0,8
24/28	80 Sh A (blue)	17	34	860	1390	840	1,4	0,18	1,1
	92 Sh A (yellow)	35	70	2.300	5.130	1.900	1,4	0,14	1,0
	98 Sh A (red)	60	120	3.700	8.130	2.940	1,4	0,10	0,9
	64 Sh D (green)	75	150	5.000	11.000	3.700	1,4	0,07	0,8
28/38	80 Sh A (blue)	46	92	1.370	2.350	990	1,5	0,20	1,1
	92 Sh A (yellow)	95	190	3.800	7.270	2.100	1,5	0,15	1,0
	98 Sh A (red)	160	320	4.200	10.800	3.680	1,5	0,11	0,9
	64 Sh D (green)	200	400	10.000	20.000	4.400	1,5	0,08	0,8
38/45	80 Sh A (blue)	95	190	3.000	6.100	1.400	1,8	0,22	1,1
	92 Sh A (yellow)	190	380	5.600	12.000	2.900	1,8	0,17	1,0
	98 Sh A (red)	325	650	8.140	21.850	5.040	1,8	0,12	0,9
	64 Sh D (green)	405	810	25.000	40.000	6.500	1,8	0,09	0,8
42	80 Sh A (blue)	130	270	4.500	9.600	1.950	2,0	0,24	1,1
	92 Sh A (yellow)	265	530	9.800	20.500	4.100	2,0	0,19	1,0
	98 Sh A (red)	450	900	15.180	34.200	5.940	2,0	0,14	0,9
	64 Sh D (green)	560	1.120	37.000	70.000	7.300	2,0	0,10	0,8
48	80 Sh A (blue)	150	300	5.500	11.200	2.100	2,1	0,27	1,1
	92 Sh A (yellow)	310	620	12.000	22.800	4.500	2,1	0,23	1,0
	98 Sh A (red)	525	1.050	16.600	49.400	6.820	2,1	0,16	0,9
	64 Sh D (green)	655	1.310	57.000	100.000	8.300	2,1	0,11	0,8
55	80 Sh A (blue)	200	400	6.000	11.000	1.500	2,2	0,28	1,1
	92 Sh A (yellow)	410	820	13.000	23.100	3.200	2,2	0,24	1,0
	98 Sh A (red)	685	1.370	24.000	63.400	7.100	2,2	0,17	0,9
	64 Sh D (green)	825	1.650	100.000	130.000	9.200	2,2	0,12	0,8
65	92 Sh A (yellow)	625	1.250	23.500	35.000	6.410	2,6	0,25	1,0
	98 Sh A (red)	900	1.800	48.000	71.500	6.620	2,6	0,18	0,9
	64 Sh D (green)	1.040	2.080	118000	19000	8850	2,6	0,13	0,8
75	98 Sh A (red)	1.920	3.840	79.150	150.450	8.650	3,0	0,21	0,9
	64 Sh D (green)	2.400	4.800	182.000	315.000	12.000	3,0	0,15	0,8

All the technical data in the catalogue are valid for rotation speeds of 1500 rpm and a working temperature of 30 °C.
For linear speed over 30 m/s, dynamic balancing is recommended.

Misalignments



Axial Radial Angular

T_{KN}	Coupling nominal torque	Nm
T_{Kmax}	Coupling maximum torque	Nm
C_T	Torsional rigidity	Nm/rad
C_r	Radial stiffness	N/mm
ΔK_a	Maximum axial misalignment	mm
ΔK_r	Maximum radial misalignment	mm
ΔK_w	Maximum angular misalignment	°

Selection in according to DIN 740.2

The coupling must be chosen so the applied working loads do not exceed the allowable values whatever the working conditions are.

1. Check the load with respect to the nominal torque
The nominal coupling torque must be greater than or equal to the nominal torque of the drive machine for all working temperatures.

$$T_{KN} \geq T_N \cdot S_\theta \cdot S_D$$

2. Check the load with respect to the torque peak values
The maximum coupling torque must be greater than or equal to the torque peaks that occur during operation for all working temperatures.

$$T_{KN} \geq T_S \cdot S_\theta \cdot S_D + T_N \cdot S_\theta$$

Motor-side peaks: $T_S = T_{AS} \cdot \frac{1}{m+1} \cdot S_Z$

Driven-side peaks: $T_S = T_{LS} \cdot \frac{m}{m+1} \cdot S_Z$

Or, in case of sporadic peaks: $T_{Kmax} \geq T_S \cdot S_\theta \cdot S_D + T_N \cdot S_\theta$

If the peak does not cover the nominal T_N, contribution, the $T_N\ S_\theta$ factor can be disregarded.

Calculation coefficients

S_θ = Temperature factor

T (°C)	-30 °C / +30 °C	+40 °C	+60 °C	+80 °C
S_θ	1	1,2	1,4	1,8

S_D = Torsional rigidity factor

Tooling machines	Positioning system	Speed and angular acceleration indicator
2-5	3-8	10 ≥

Starting frequency factor

S/h	< 20	< 60	< 120	< 180	< 240	> 240
S_z	1	1,2	1,4	1,6	1,8	2

m = Mass factor = $\frac{J_A}{J_L}$

Example of selection

Application

Servomotor driving a recirculating ball screw on a machine tool

Nominal torque	T_N	= 10,0 Nm	Shock type	S_D	= 3
Peak torque	T_{AS}	= 22,0 Nm	Table moment of inertia	J_3	= 0,0038 kg · m²
Rpm	n	= 3.000 1/min	Driven shaft	dc	= 20 mm h6 (without keyway)
Moment of inertia	J_1	= 0,0058 kg · m²	Motor shaft	dm	= 24 mm h6 (without keyway)
Temperature	T	= +40 °C			

Selection

24/28 "A" type TRASCO® ES coupling with "Red" elastic element (98 Sh. A)

Standard coupling torque:	T_{KN}	= 60 [Nm]
Maximum torque:	T_{Kmax}	= 120 [Nm]
Hub Moment of Inertia:	J_2	= 0,000135 [kg · m²]
Couple Transmitted by taper locking ring:	T_{cal}	= 92 [Nm] bore 20 [mm] 113 [Nm] bore 24 [mm]

Load check

$$T_N \cdot S_\theta \cdot S_D = 10 \cdot 1{,}2 \cdot 3 = 36{,}0 \text{ [Nm]}$$

$$T_{KN} > 36{,}0 \text{ Nm} < T_{cal}$$

$$m = \frac{J_A}{J_L} \qquad J_A = J_1 + J_2 \qquad J_L = J_3 + J_2 \qquad m = 1{,}5$$

$$T_S = T_{AS} \cdot \frac{1}{m+1} \cdot S_z = 22{,}0 \cdot \frac{1}{1{,}5+1} \cdot 1{,}5 = 13{,}2 \text{ [Nm]}$$

$$T_S \cdot S_D \cdot S_\theta = 13{,}2 \cdot 3 \cdot 1{,}2 = 47{,}52 \text{ [Nm]}$$

$$T_{KN} > 47{,}52 \text{ Nm} < T_{cal}$$

T_{KN}	Coupling nominal torque	Nm
T_K	Motor-side nominal torque	Nm
T_{Kmax}	Coupling maximum torque	Nm
T_S	Motor peak torque	Nm
T_{AS}	Driver-side peak torque	Nm
m	Mass factor	Nm
J_A	Motor-side inertia	kgm²
J_L	Driven-side inertia	kgm²
S_Z	Start frequency factor	
S_θ	Temperature factor	
S_D	Temperature factor	
T_{Cal}	Hub-shaft connection maximum torque	Nm

TRASCO® ES executions

FINISHED BORE HUBS EXECUTION

GESF execution

From size 7 to 9.
Hub execution with finish bores, and two setscrew.

GESF C execution

From size 14.
Hub execution with finish bore,

CLAMP HUBS EXECUTION

GESM execution

Clamping hub execution.

GESM...C execution

Clamping hub execution with double slot and keyway.

GESMC execution

Compact clamping hub execution.

GES2M execution

Split clamping hub execution for radial assembly of the coupling torque depends on bore diameter.

SHRINK DISC EXECUTION

GESA execution

Execution with locking ring. This execution is suitable for high speed and high torque. Screws mounting from spider side. Transmissible torque depends on bore diameter.

GESAP execution

Execution with locking ring with high machining accuracy: design suitable for application on spindles according to DIN 69002.

TRASCO® ES zero backlash copulings - GESP e GESF execution solid or bore hub

SIT coupling hubs are available from stock with either solid hub or with finished bores of standard shaft diameters. The setscrews of our finished bore execution are positioned 120 degrees from each other with one positioned 180 degrees from the keyway. Both the solid hub and bored hub coupling are generally available from stock for quick delivery. **Approved according to ATEX Directive.**
Note: It is possible to have aligned keyways upon inquiry.

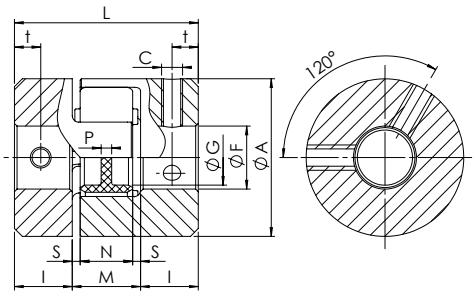


Fig. 1

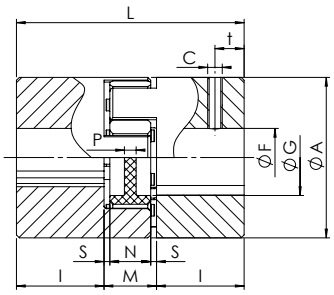


Fig. 2

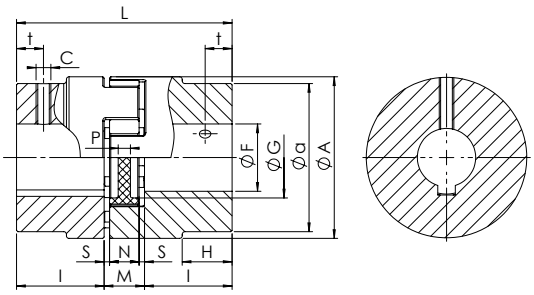


Fig. 3

Size	F min [mm]	F max [mm]	Mozzo W [kg]	Mozzo J [kgm²]	n_{max} [rpm]
ALUMINUM HUBS					
7	3	7	0,003	0,085 x 10^{-6}	40.000
9	4	10	0,008	0,48 x 10^{-6}	28.000
12	4	12	0,015	1,5 x 10^{-6}	22.000
14	4	16	0,019	2,7 x 10^{-6}	19.000
19/24	6	24	0,066	20,4 x 10^{-6}	14.000
24/28	8	32	0,140	74,5 x 10^{-6}	10.600
28/38	10	38	0,253	200,3 x 10^{-6}	8.500
38/45	12	45	0,455	400,6 x 10^{-6}	7.100
STEEL HUBS					
42	14	55	2,000	2.246 x 10^{-6}	6.000
48	20	60	2,520	3.786 x 10^{-6}	5.600
55	25	70	4,100	9.986 x 10^{-6}	5.000
65	25	80	5,900	18.352 x 10^{-6}	4.600
75	30	95	6,900	27.402 x 10^{-6}	3.700

A [mm]	G [mm]	H-a [mm]	L [mm]	l [mm]	M [mm]	N [mm]	S [mm]	P [mm]	c	M_S [Nm]	t [mm]	Fig.
ALUMINUM HUBS												
14	-	-	22	7	8	6	1,0	6,0	M3	0,3	3,5	1
20	7,2	-	30	10	10	8	1,0	2,0	M3	0,3	5	1
25	8,5	-	34	11	12	10	1,0	3,0	M4	1,5	5	1
30	10,5	-	35	11	13	10	1,5	2,0	M4	1,5	5	2
40	18	-	66	25	16	12	2,0	3,5	M5	2	10	2
55	27	-	78	30	18	14	2,0	4,0	M5	2	10	2
65	30	-	90	35	20	15	2,5	5,2	M6	4	15	2
80	38	-	114	45	24	18	3,0	5,6	M8	10	15	2
STEEL HUBS												
95	46	-	126	50	26	20	3,0	5,6	M8	10	20	2
105	51	-	140	56	28	21	3,5	6,0	M8	10	25	2
120	60	-	160	65	30	22	4,0	9,0	M10	17	20	2
135	68	-	185	75	35	26	4,5	8,3	M10	17	20	2
160	80	53-135	210	85	40	30	5,0	8,3	M10	17	25	3

Bore tolerance: H7 - JS9 (DIN 6885/1) keyway

Hub **GESF 24/28 F20**

GESP: solid hub
GESF: bore + keyway + set-screw

Size

F...: bore diameter

Spider **AES 24/28 R**

TRASCO® ES spider

Size

B: 80 Sh A (blue) - G: 92 Sh A (yellow)
R: 98 Sh A (red) - V: 64 Sh D (green)

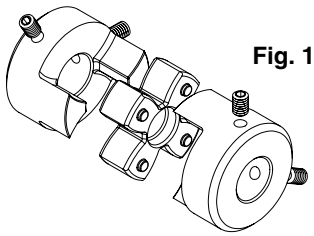


Fig. 1

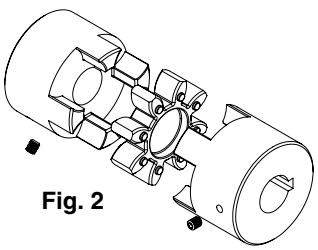


Fig. 2

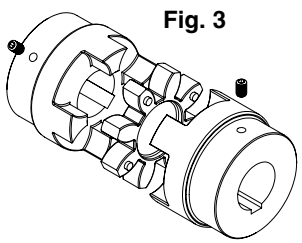
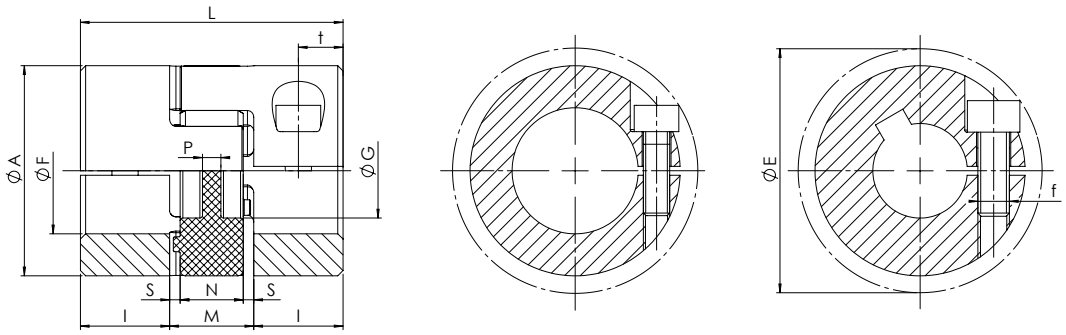


Fig. 3

M_S	Screw tightening torque	Nm
W	Weight	kg
J	Moment of inertia	kgm²
n_{max}	Maximum rpm	rpm

TRASCO® ES zero backlash copulings - GESM C compact execution with clamp hubs

Compact version with reduced overall length. They guarantee the same performances as the normal version with reduced overall dimensions. **Approved according to ATEX Directive. Note:** It is possible to have aligned keyways upon inquiry.



Size	F min [mm]	F max [mm]	f	M_S [Nm]	n_{max} [rpm]	A [mm]	L [mm]	I [mm]	M [mm]	N [mm]	S [mm]	P [mm]	t [mm]	E [mm]
ALUMINUM HUBS														
7	3	7	M2	0,6	40.000	14	18	5	8	6	1,0	6	2,5	16,6
9	4	10	M2,5	1,0	28.000	20	24	7	10	8	1,0	2	3,5	21,3
12	4	12	M3	1,4	22.000	25	26	7	12	10	1,0	3	3,5	26,2
14	6	16(1)	M4	2,9	19.000	30	32	9,5	13	10	1,5	2	4,8	30,5
19/24	10	24(1)	M6	11,0	14.000	40	50	17	16	12	2,0	3,5	8,5	45,0(1)
24/28	10	32	M6	11,0	10.600	55	54	18	18	14	2,0	4	9,0	57,5
28/38	14	35	M8	25,0	8.500	65	62	21	20	15	2,5	5,2	10,5	69,0
38/45	18	45	M10	49,0	7.100	80	76	26	24	18	3,0	5,6	13,0	86,0

(1) Size 14 up to bore Ø screw 12 M4, over screw M3. size 19/24 up to bore Ø 20 screw M6, over screw M5 (Ø E= 46,7 mm)

Size	Recommended **M** coupling Type Hub Bore Dia. [mm] and Transmissible Torque [Nm], valid for shaft tolerances k6																										
	3	4	5	6	7	8	9	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45
7	0,8	0,9	1,0	1,0	1,1																						
9		2,1	2,2	2,3	2,5	2,6	2,7	2,8																			
12		3,4	3,6	3,8	3,9	4,1	4,3	4,4	4,6	4,8																	
14				7,4	7,7	8,0	8,3	8,6	8,9	9,2	5,8	6,0	6,1														
19/24								25,8	26,5	27,1	28,5	29,2	29,9	31,2	31,9	32,6	25,4	26,3									
24/28								23	25	27	32	34	36	41	43	45	50	54	57	63	68	72					
28/38											58	62	66	75	79	83	91	100	104	116	124	133	145				
38/45														119	125	132	145	158	165	184	198	211	230	250	263	277	296

Hub **GESMC 24/28 F22**

GESMC: hub TRASCO® ES execution with clamp hubs - compact execution

Size

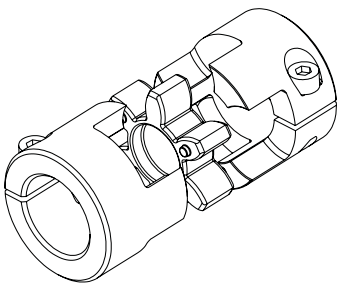
F...: bore diameter

Spider **AES 24/28 R**

TRASCO® ES spider

Size

B: 80 Sh A (blue) - G: 92 Sh A (yellow)
R: 98 Sh A (red) - V: 64 Sh D (green)



n_{max}	Maximum rpm	rpm

TRASCO® ES zero backlash copulings - GESM execution with clamp hubs

It allows quick and secure fastening with no shaft-hub play. It is important to observe the tightening torque (Ms) of the screw shown in the table when using the keyless version, and check the torque transmissible by the clamp as a function of the shaft diameter (as well as the coupling size) shown in the table on the next page. Hubs with or without keyway and compact version with reduced overall length are available as standard. **Compliant with ATEX Directive. Note:** It is possible to have phase slots on request.

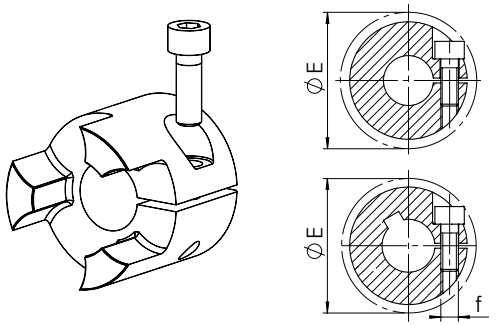


Fig. 1

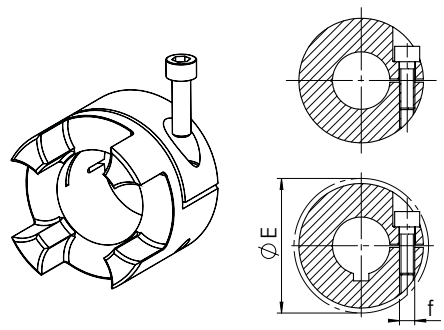


Fig. 2

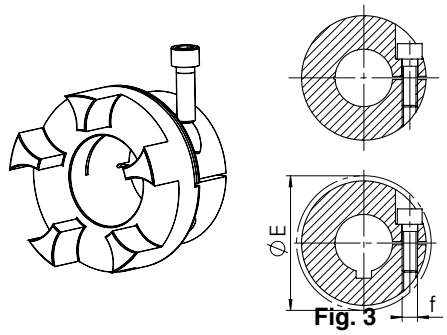
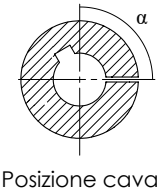


Fig. 3



Keyway position

Fig.3

Size	F min [mm]	F max [mm]	f	M_S [Nm]	Hub		n_{max} [rpm]
					W [kg]	J [kgm²]	
ALUMINUM HUBS							
7	3	7	M2	0,35	0,003	0,085 x 10^{-6}	40.000
9	4	10	M2,5	0,75	0,007	0,42 x 10^{-6}	28.000
12	4	12	M3	1,4	0,015	1,4 x 10^{-6}	22.000
14	6	16	M3	1,4	0,018	2,6 x 10^{-6}	19.000
19/24	10	24(1)	M5	11	0,071	18,1 x 10^{-6}	14.000
24/28	10	32	M6	11	0,156	74,9 x 10^{-6}	10.600
28/38	14	38	M8	25	0,240	163,9 x 10^{-6}	8.500
38/45	18	45	M8	25	0,440	465,5 x 10^{-6}	7.100
STEEL HUBS							
42	25	50	M10	70	2,100	3.095 x 10^{-6}	6.000
48	25	55	M12	120	2,900	5.160 x 10^{-6}	5.600
55	35	70	M12	120	4,000	9.737 x 10^{-6}	5.000
65	40	80	M14	190	5,800	17.974 x 10^{-6}	4.600
75	40	80	M16	295	8,100	29.304 x 10^{-6}	2.950

(1) Size 19/24 up to hole 20 screw M6, beyond screw M5 (E= 46.7 mm)
Size 7 to 19/24: single-cut execution.
Size 24/28 to 65: double-cut execution.

Keyway position α	A [mm]	G [mm]	H-a [mm]	L [mm]	I [mm]	M [mm]	N [mm]	S [mm]	P [mm]	t [mm]	E [mm]	Fig.
ALUMINUM HUBS												
-	14	-	-	22	7	8	6	1,0	6	4	15,0	1
-	20	7,2	-	30	10	10	8	1,0	2	5	23,4	1
180°	25	8,5	-	34	11	12	10	1,0	3	5	27	1
180°	30	10,5	-	35	11	13	10	1,5	2	5,5	32,2	1
120°	40	18	-	66	25	16	12	2,0	3,5	12	45,7(1)	1
90°	55	27	-	78	30	18	14	2,0	4	12	57,5	2
90°	65	30	-	90	35	20	15	2,5	5,2	13,5	72,6	2
90°	80	38	-	114	45	24	18	3,0	5,6	16	83,3	2
STEEL HUBS												
-	95	46	-	126	50	26	20	3,0	5,6	20	78,8	2
-	105	51	-	140	56	28	21	3,5	6	21	108,0	2
-	120	60	-	160	65	30	22	4,0	9	26	122,0	2
-	135	68	-	185	75	35	26	4,5	8,3	27,5	139,0	2
-	160	80	53-135	210	85	40	30	5,0	8,3	30	147,5	3

Hole tolerance: F7
Keyway tolerance for keyway JS9.
Keyway seat according to DIN 6885/1 and UNI 6604.

M_S	Screw tightening torque	Nm
W	Weight	kg

J	Moment of inertia	kgm²
n_{max}	Maximum rpm	rpm

Hub **GESM 48 F50**

GESM: TRASCO® ES hub with clamp hubs

Size

F...: bore diameter
F...C: bore diameter and keyway

Spider **AES 48 R**

TRASCO® ES spider

Size

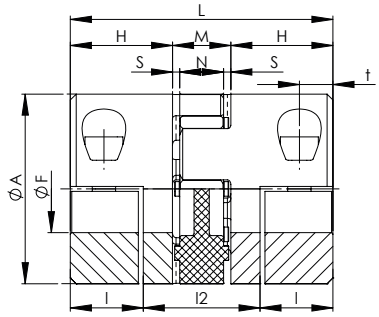
B: 80 Sh A (blue) - G: 92 Sh A (yellow)
R: 98 Sh A (red) - V: 64 Sh D (green)

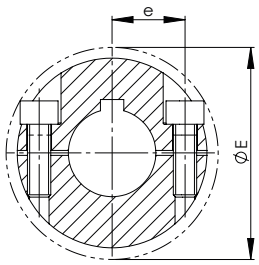
Using hub execution **M** without keyway, the maximum transmissible torque is the minor between the clamp-hub transmissible torque and the value stated in the section "**Technical characteristics**".

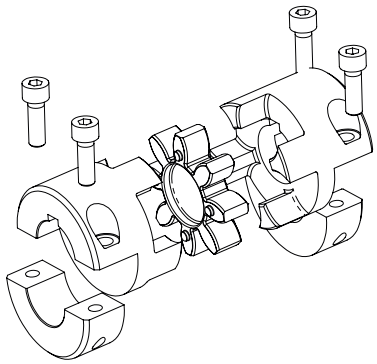
Size	Recommended **M** coupling Type Hub Bore Dia. [mm] and Transmissible Torque [Nm], valid for shaft tolerances k6																																		
	3	4	5	6	7	8	9	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	60	65	70	75	80
7	0,9	1,0	1,0	1,1	1,2																														
9		2,1	2,3	2,4	2,5	2,6	2,7																												
12		4,1	4,2	4,4	4,6	4,8	5,0	5,2	5,4	5,5																									
14			5,0	5,2	5,4	5,5	5,7	5,9	6,1	6,3	6,7	6,8	7,0																						
19/24								28	29	29	31	31	32	34	34	35	30	32																		
24/28								24	27	29	34	37	39	44	46	49	54	59	61	68	73	78														
28/38											58	62	66	75	79	83	91	100	104	116	124	133	145													
38/45												62	66	75	79	83	91	100	104	116	124	133	145	158	166	174	187									
42																139	153	167	174	195	209	223	243	264	278	292	313	334	348						
48																			254	285	305	326	356	387	407	428	458	489	509	560					
55																						326	356	387	407	428	458	489	509	560	611	662	713		
65																							488	530	558	586	628	670	697	767	837	907	976	1046	1116
75																									769	808	865	923	961	1057	1154	1250	1346	1442	1538

TRASCO® ES zero backlash copulings - GES2M execution with clamp hubs

Split clamping hub execution for radial assembly of the coupling torque depends on bore diameter. **Compliant with ATEX Directive.**
Note: It is possible to have aligned keyways upon inquiry.







Size	F min [mm]	F max [mm]	f	M_S [Nm]	Hub W [kg]	Hub J [kgm²]	n_{max} [rpm]
ALUMINUM HUBS							
14	5	16	M3	1,3	0,025	$4,6 \times 10^{-6}$	12.700
19/24	8	20	M6	10	0,078	$2,0 \times 10^{-6}$	9.550
24/28	10	28	M6	10	0,160	$76,3 \times 10^{-6}$	6.950
28/38	14	38	M8	25	0,240	$176,3 \times 10^{-6}$	5.850
38/45	18	45	M8	25	0,470	$503,9 \times 10^{-6}$	4.750
42	22	50	M10	49	0,750	$1.121,7 \times 10^{-6}$	4.000
48	22	55	M12	86	1,08	$1.870,4 \times 10^{-6}$	3.600

A [mm]	H [mm]	I [mm]	I2 [mm]	L [mm]	M [mm]	N [mm]	S [mm]	E [mm]	t [mm]	e [mm]
ALUMINUM HUBS										
30	18,5	14,5	21	50	13	10	1,5	32	7,5	11,5
40	25	17,5	31	66	16	12	2	47	8,0	14,5
55	30	22	34	78	18	14	2	57	10,5	20,0
65	35	25	40	90	20	15	2,5	73	11,5	25,0
80	45	33	48	114	24	18	3	84	15,5	30,0
95	50	36,5	53	126	26	20	3	94	18,0	36,0
105	56	39,5	61	140	28	21	3,5	105	18,5	36,0

Size	Recommended **M** coupling Type Hub Bore Dia. [mm] and Transmissible Torque [Nm], valid for shaft tolerances k6																											
	5	6	7	8	9	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55
14	2,8	3,3	3,9	4,4	5,0	5,6	6,1	6,7	7,8	8,3	8,9																	
19/24				18	20	23	25	27	32	34	36	41	43	45														
24/28						23	25	27	32	34	36	41	43	45	50	54	57	63										
28/38									58	62	66	75	79	83	91	100	104	116	124	133	145	158						
38/45										62	66	75	79	83	91	100	104	116	124	133	145	158	166	174	187			
42														132	145	158	165	184	198	211	230	250	263	277	296	316	329	
48															212	231	241	270	289	308	337	366	385	404	433	462	481	529

Hub **GES2M 28/38 F24**

GES2M: TRASCO® ES hub with clamp hubs

Size

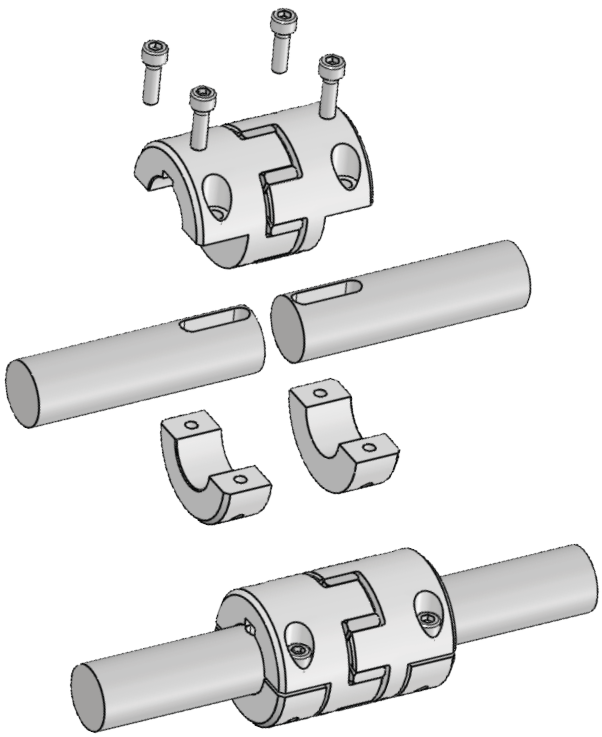
F...: bore diameter

Spider **AES 28/38 R**

TRASCO® ES spider

Size

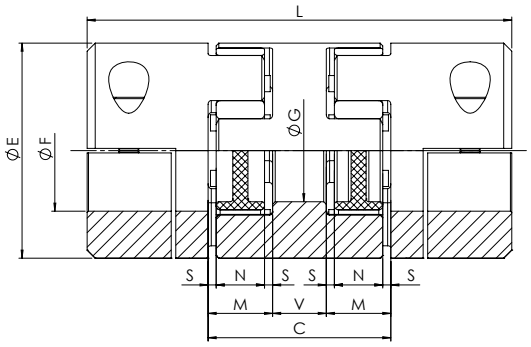
B: 80 Sh A (blue) - G: 92 Sh A (yellow)
R: 98 Sh A (red) - V: 64 Sh D (green)



M_S	Screw tightening torque	Nm
W	Weight	kg
J	Moment of inertia	kgm²
n_{max}	Maximum rpm	rpm

TRASCO® ES zero backlash copulings - GESS execution double cardanic execution

This execution allows higher misalignments. The 2 spiders allow a high vibration dampening providing a decrease in drive noise and longer life of related components (ex. bearings). The intermediate element is made of aluminum alloy and may be used in combination **with any type of hub execution. Note:** It is possible to have aligned keyways upon inquiry.



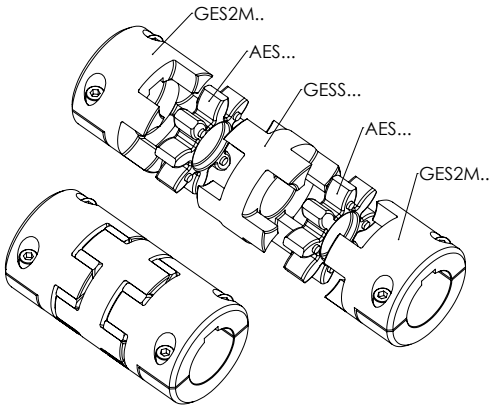
Size	Fa max* [mm]			E [mm]	C [mm]	L [mm]			V [mm]	M [mm]	S [mm]	N [mm]	G [mm]
	GESF	GESM	GES2M			GESF	GESM	GES2M					
	ALUMINUM HUBS					**ALUMINUM GESS**							
7	7	7	-	14	20	34	34	-	4	8	1	6	–
9	10	10	-	20	25	45	45	-	5	10	1	8	–
14	16	16	16	30	34	56	56	71	8	13	1,5	10	–
19/24	24	24	20	40	42	92	92	92	10	16	2	12	18
24/28	32	32	32	55	52	112	112	112	16	18	2	14	27
28/38	38	38	38	65	58	128	128	128	18	20	2,5	15	30
38/45	45	45	45	80	68	158	158	158	20	24	3	18	38
	ALUMINUM HUBS					**ALUMINUM GESS**							
42	55	50	50	95	74	174	174	174	22	26	3	20	46
48	60	55	55	105	80	192	192	192	24	28	3,5	21	51
55	70	70	-	120	88	218	218	-	28	30	4	22	60
65	80	80	-	135	102	252	252	-	32	35	4,5	26	68

* The max bore depends on the type of hub used.

Spacer element	**GESS**	**24**

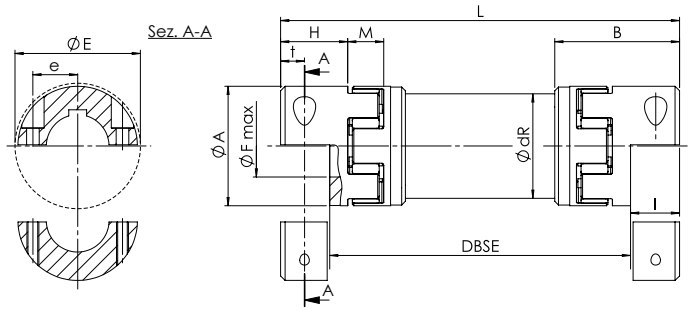
GESS: spacer element

Size: 24/28



TRASCO® ES zero backlash copulings - GES LR3 execution with intermediate shaft

Ideal execution for long distance shaft connections. Torque transmission is zero backlash. It is used in applications such as automatic machines, lifting machines, palletizing machines, and handling machines. Designed for length up to 4 m without bearing support (depending on rotation speed). The double slot execution, allows spider mounting and replacement without driver/driven machine displacement. All aluminum alloy for a very low inertia. **Note:** It is possible to have aligned keyways upon inquiry.



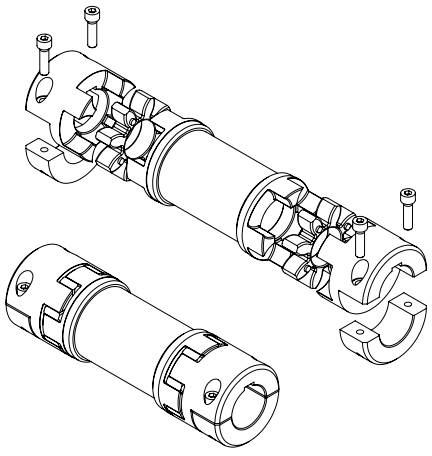
Size	Dimensions finished bores		Clamping		Moment of inertia [10^{-3} · kgm²] with d_{max} hub 1			Torsional rigidity
	d_{min} [mm]	d_{max} [mm]	Screws DIN 4762-8.8	M_S [Nm]	Hub J1	Hub 2 J2	Albero J3	C_T [Nm/rad]
14	5	16	M3	1,34	0,00406	0,00238	0,091	893
19/24	8	20	M6	10	0,02002	0,01304	0,329	3244
24/28	10	28	M6	10	0,07625	0,04481	0,0693	6632
28/38	14	38	M8	25	0,17629	0,1095	1,199	11814
38/45	18	45	M8	25	0,50385	0,2572	2,972	29290
42	22	50	M10	49	1,12166	0,5523	4,560	44930
48	22	55	M12	86	1,87044	1,1834	9,251	91158

A [mm]	H [mm]	l [mm]	B [mm]	M [mm]	DBSE min. [mm]	L [mm]	E [mm]	t [mm]	e [mm]	dR [mm]
30	18,5	14,5	36	13	72	DBSE + 29	32	7,5	11,5	27
40	25	17,5	49	16	98	DBSE + 35	47	8,0	14,5	40
55	30	22	59	18	121	DBSE + 44	57	10,5	20	50
65	35	25	67	20	137	DBSE + 50	73	11,5	25	60
80	45	33	83,5	24	169	DBSE + 66	84	15,5	30	70
95	50	36,5	93	26	180	DBSE + 73	94	18,0	36	80
105	56	39,5	103	28	202	DBSE + 79	105	18,5	36	100

Size	Recommended **M** coupling Type Hub Bore Dia. [mm] and Transmissible Torque [Nm], valid for shaft tolerances k6																												
	5	6	7	8	9	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	55
14	2,8	3,3	3,9	4,4	5,0	5,6	6,1	6,7	7,8	8,3	8,9																		
19/24				18	20	23	25	27	32	34	36	41	43	45															
24/28						23	25	27	32	34	36	41	43	45	50	54	57	63											
28/38									58	62	66	75	79	83	91	100	104	116	124	133	145	158							
38/45										62	66	75	79	83	91	100	104	116	124	133	145	158	166	174	187				
42														132	145	158	165	184	198	211	230	250	263	277	296	316	329		
48															212	231	241	270	289	308	337	366	385	404	433	462	481	529	529

Coupling configurator

Coupling code	Item	Type	Execution	Bore diameter	Order example
GESLR38/45	*Hub 1*	GES2M	F-C	F....	GES2M38/45F35
	Anello 1	AES	B-G-R-V	-	AES38/45V
	Distance between shaft DBSE				*DBSE= 1200 mm*
	Anello 2	AES	B-G-R-V	-	AES38/45V
	Hub 2	GES2M	F-C	F....	GESM38/45F35

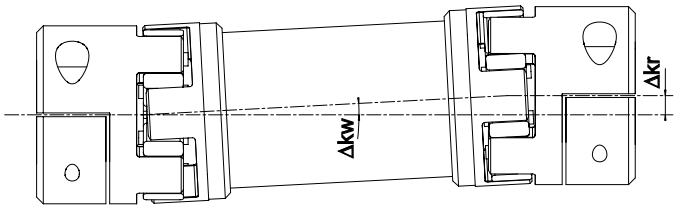


M_S	Screw tightening torque	Nm
J	Moment of inertia	kgm²
C_T	Torsional rigidity	Nm/rad

Technical data for intermediate shaft couplings

Size	Misalignment	
	Axial ΔKa [mm]	Angular ΔKw [°]
14	1,0	0,9
19/24	1,2	0,9
24/28	1,4	0,9
28/38	1,5	0,9
38/45	1,8	0,9

Angular misalignment = 0,9° for spider



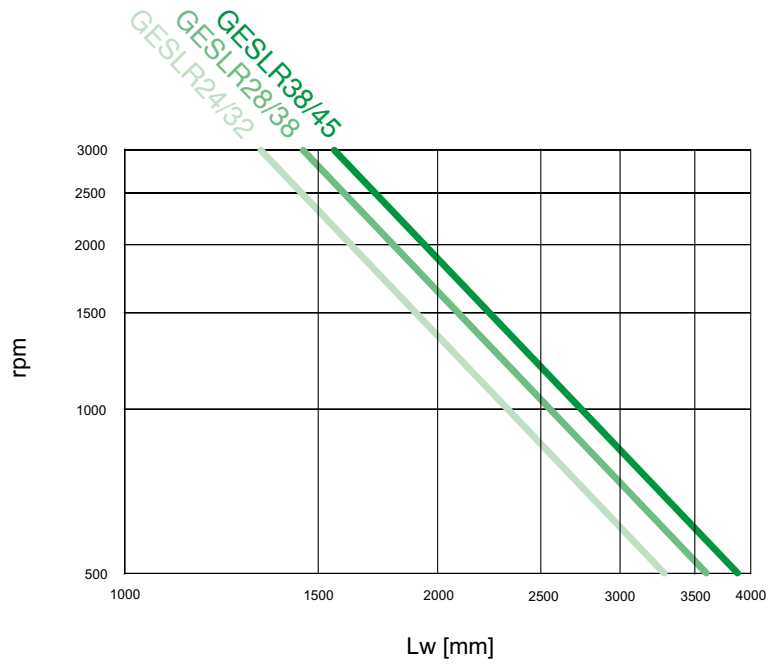
Radial misalignment

$\Delta Kr = (L_z - 2 \cdot H - M) \cdot \tan(\Delta Kw)$ [mm]

$$C_{Tot} = \frac{1}{2 \cdot \frac{1}{C_{T\,anello}} + \frac{L_{allunga}}{C_{T\,allunga}}} \text{ [Nm/rad]}$$

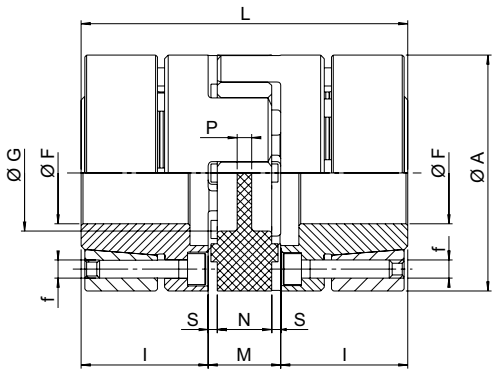
$$L_{allunga} = \frac{L_{zw} - 2 \cdot L}{1000} \text{ [mm]}$$ with Lzw = total coupling length

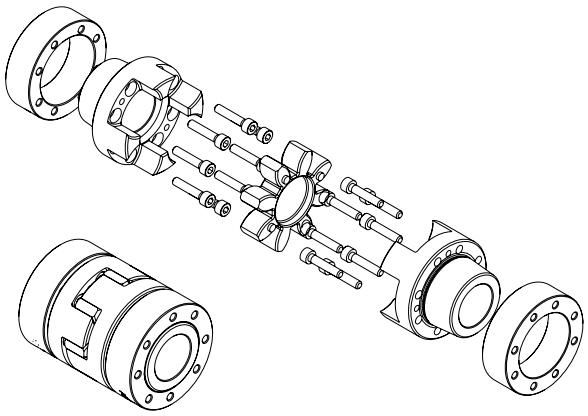
Selection diagram GES LR3 coupling



TRASCO® ES zero backlash copulings - GESA execution shrink disc execution

This type of coupling provides excellent kinetic uniformity. Furthermore, the absence of keys or set screws makes it a well-balanced coupling and greatly facilitates installation and removal. An exact radial/axial positioning is easy for those applications which require it. The absence of keyways also avoids fretting corrosion and backlash between the shaft and the hub. This is the ideal type of coupling for applications requiring precision and/or high rotational speeds. **Compliant with ATEX Directive.**
Note: It is possible to have aligned keyways upon inquiry.





Size	F min [mm]	F max [mm]	f	Screws for locking elements	M_S [Nm]	Hub W [kg]	Hub J [kgm²]	n_{max} [rpm]
ALUMINUM HUBS AND STEEL LOCKING ELEMENT								
14	6	14	M3	4	1,3	0,049	7 x 10-6	28.000
19/24	10	20	M4	6	2,9	0,120	30 x 10-6	21.000
24/28	15	28	M5	4	6,0	0,280	135 x 10-6	15.500
28/38	19	38	M5	8	6,0	0,450	315 x 10-6	13.200
38/45	20	45	M6	8	10,0	0,950	960 x 10-6	10.500
STEEL HUBS AND LOCKING ELEMENT								
42	28	50	M8	4	35,0	2,300	3.150 x 10-6	9.000
48	35	60	M8	4	35,0	3,080	5.200 x 10-6	8.000
55	35	65	M10	4	71,0	4,670	10.300 x 10-6	6.300
65	40	70	M12	4	120,0	6,700	19.100 x 10-6	5.600

A [mm]	G [mm]	L [mm]	I [mm]	M [mm]	N [mm]	S [mm]	P [mm]
ALUMINUM HUBS AND STEEL LOCKING ELEMENT							
30	10,5	50	18,5	13	10	1,5	2,0
40	18	66	25	16	12	2,0	3,5
55	27	78	30	18	14	2,0	4,0
65	30	90	35	20	15	2,5	5,2
80	38	114	45	24	18	3,0	5,6
STEEL HUBS AND LOCKING ELEMENT							
95	46	126	50	26	20	3,0	5,6
105	51	140	56	28	21	3,5	6,0
120	60	160	65	30	22	4,0	9,0
135	68	185	75	35	26	4,5	8,3

Size	Recommended **A** coupling Type Hub Bore Dia. [mm] and Transmissible Torque [Nm], valid for shaft tolerances k6																								
	Ø10	Ø11	Ø14	Ø15	Ø16	Ø17	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55	Ø60	Ø65	Ø70
14	10	12	22																							
19/24	42	46	60	65	69	74	79	84	88																	
24/28				66	72	77	82	87	92	102	113	118	135													
28/38								175	185	205	225	235	266	287	308	339	373									
38/45									255	283	312	326	367	398	427	471	515	545	577	620						
42													420	460	500	563	627	670	714	790	850	880				
48																557	612	649	687	744	801	840	932	1033		
55																	986	1112	1140	1185	1284	1412	1420	1652	1680	1691
65																		1531	1580	1772	1840	1960	2049	2438	2495	2590

Bore tolerances: H7.
For sizes 55 and 65 the shrinking ring depends on the diameter of the hole to be made. For further information please contact our Technical Department.
When using the coupling with hub in execution **A**, the maximum torque (transmissible by the shrink disk) will be the lower of that indicated in the table below and that indicated in the "**Technical characteristics**" section.

Hub **GESA 48 F45**

GESA: TRASCO® ES hub shrink disc execution

Size

F...: bore diameter

Spider **AES 48 R**

TRASCO® ES spider

Size

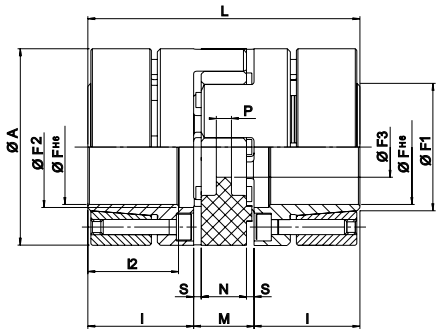
B: 80 Sh A (blue) - G: 92 Sh A (yellow)
R: 98 Sh A (red) - V: 64 Sh D (green)

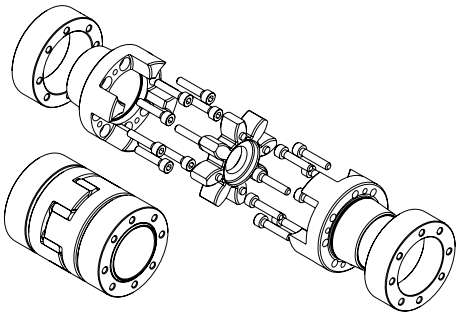
M_S	Screw tightening torque	Nm
W	Weight	kg

J	Moment of inertia	kgm²
n_{max}	Maximum rpm	rpm

TRASCO® ES zero backlash copulings - GESAP execution shrink disc execution according to DIN 69002

Precision “zero-backlash” coupling designed for multi spindle devices on machine tools or controls with reduced mass, such as short center spindles, multi-centers primary spindles in work stations, or joined to high speed bearings with limited tolerance range. It is suitable for very high speeds of rotation (up to speeds of 50 m/s). **Note:** It is possible to have aligned keyways upon inquiry.





Size	F [mm]	M_S [Nm]	Hub		n_{max} [rpm]
			W [kg]	J [kgm²]	
STEEL HUBS AND LOCKING ELEMENT					
14	14	1,89	0,080	11 x 10^{-6}	28.000
19/24 - 37,5	16	3,05	0,160	37 x 10^{-6}	21.000
19/24	19	3,05	0,190	46 x 10^{-6}	21.000
24/28-50	24	4,90	0,330	136 x 10^{-6}	15.500
24/28	25	8,50	0,440	201 x 10^{-6}	15.500
28/38	35	8,50	0,640	438 x 10^{-6}	13.200
38/45	40	14,00	1,320	1.325 x 10^{-6}	10.500
42	42	35,00	2,230	3.003 x 10^{-6}	9.000
48	45	35,00	3,090	5.043 x 10^{-6}	8.000
55	50	71,00	4,740	10.020 x 10^{-6}	6.300

A [mm]	L [mm]	l [mm]	l2 [mm]	M [mm]	N [mm]	S [mm]	P [mm]	F1 [mm]	F2 [mm]	F3 [mm]
STEEL HUBS AND LOCKING ELEMENT										
32	50	18,5	15,5	13	10	1,5	2,0	17	17	8,5
37,5	66	25	21	16	12	2,0	3,5	20	19	9,5
40	66	25	21	16	12	2,0	3,5	23	22	9,5
50	78	30	25	18	14	2,0	4,0	30	29	12,5
55	78	30	25	18	14	2,0	4,0	32	30	12,5
65	90	35	30	20	15	2,5	5,2	42	40	14,5
80	114	45	40	24	18	3,0	5,6	49	46	16,5
92	126	50	45	26	20	3,0	5,6	54	55	18,5
105	140	56	50	28	21	3,5	6,0	65	60	20,5
120	160	65	58	30	22	4,0	9,0	65	72	22,5

Spindle size	TRASCO® ES AP	98 Sh. A		64 sh. D	
		T_{KN} [Nm]	T_{Kmax} [Nm]	T_{KN} [Nm]	T_{Kmax} [Nm]
25 x 20	14	12,5	25	16	32
32 x 25	19/24 - 37,5	14	28	17	34
32 x 30	19/24	17	34	21	42
40 x 35	24/28 - 50	43	86	54	108
50 x 45	24/28	60	120	75	150
63 x 55	28/38	160	320	200	400

Bore tolerance: H6

Hub **GESAP 48 F45**

GESAP: TRASCO® ES hub shrink disc execution

Size

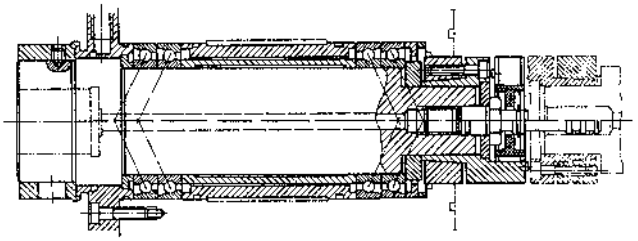
F...: bore diameter

Spider **AESP 48 R**

Spider for TRASCO® ES “AP” execution

Size

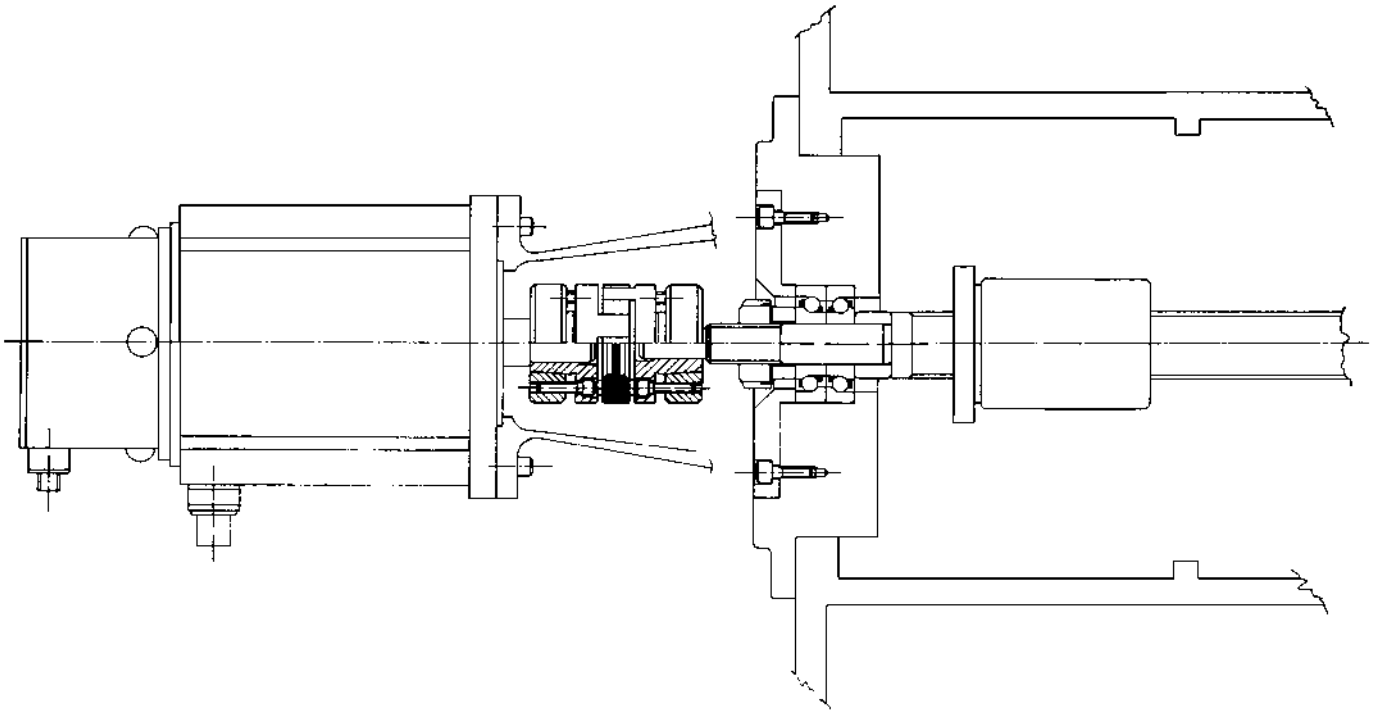
R: 98 Sh A (red)
V: 64 Sh D (green)

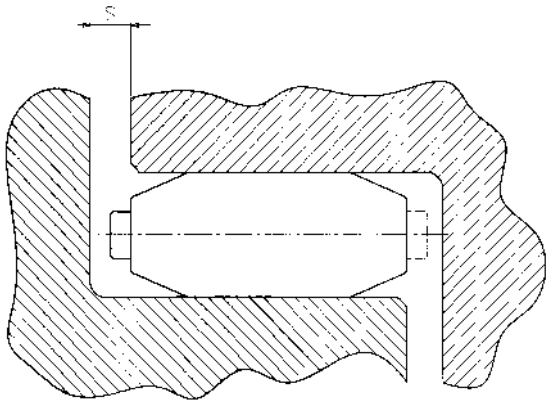


M_S	Screw tightening torque	Nm
W	Weight	kg
J	Moment of inertia	kgm²
n_{max}	Maximum rpm	rpm

Installation and maintenance

1. Carefully clean the shafts
2. Insert the hubs onto shafts being connected. With the M, A and AP versions, be sure to tighten the screws with the Ms torque value given in the catalogue. Be careful with the A and AP versions to tighten the screws uniformally and crosswise to the recommended torque
3. Position the element in one of the two coupling hubs
4. Fit together the two coupling halves, making sure the “s” dimension is properly observed. This must be done to insure proper elastic element function and long service life, as well as to assure the coupling is properly insulated electrically





With the A and AP versions, mounting the hubs can be facilitated by lubricating the shaft contact surfaces with an oil, but do not use a molybdenum bisulphide based oils. When mounting the TRASCO® ES coupling an axial thrust is generated which disappears when the mounting has been completed to avoid putting axial loads on the bearings. Lubrication of the elastic element will reduce the amount of axial force required during installation.

Note: All rotating parts must be guarded.