COMPACT AND BACKLASH FREE.

single-position
multi-position
load holding
full disengagement

TORQUE LIMITERS

SERIES SK + ES | 0.1 – 2,800 Nm

R+W®
COUPLING TECHNOLOGY

THE ULTIMATE COUPLING FROM 0.1 – 2,800 Nm

www.rwcouplings.com

optional stainless steel

single-position
multi-position
load holding
full disengagement

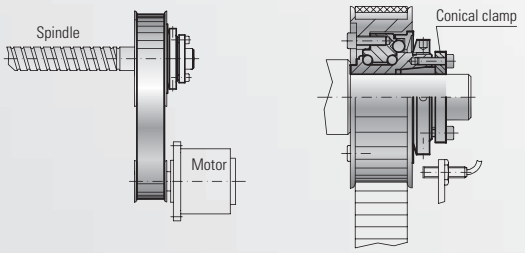
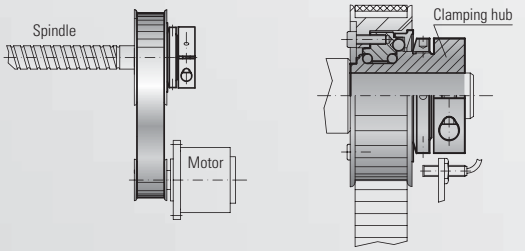
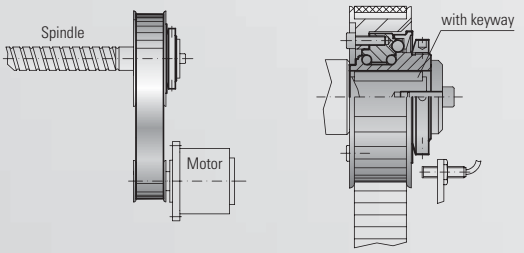
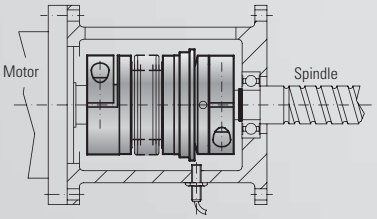
BACKLASH-FREE TORQUE LIMITERS

Areas of application

- Machine tools
- CNC machining centers
- Woodworking machines
- Automation equipment
- Textile machinery
- Industrial robots
- Sheet metal processing machines
- Printing + Converting machinery
- Servo + DC motor drives

Features

- Precise overload protection
- Absolutely backlash-free and torsionally rigid (R+W patented principle)
- Compact, simple design
- Disengagement detection is achieved through indexing ring movement
- Low residual friction following disengagement
- Low moment of inertia
- Disengagement within msecs

MODELS	FEATURES	POSSIBLE APPLICATIONS
SK 1 	**With conical clamp or clamping hub** ■ Integral bearings for timing belt pulley or sprocket ■ Compact, simple design ■ Adjustable settings	 see pages 6-7
SKN 	**With clamping hub for indirect drives** ■ Integral bearing for timing belt pulley or sprocket ■ Compact, simple design ■ Adjustable settings ■ Frictional clamping hub ■ Simple assembly	 see pages 8-9
SKP 	**With keyway connection for indirect drives** ■ Integral bearings for timing belt pulley or sprocket ■ Compact, simple design ■ Adjustable settings	 see pages 10-11
SK 2 	**With clamping hub for direct drives** ■ Easy assembly ■ Low moment of inertia ■ Compact ■ Compensates for shaft misalignment ■ Adjustable settings	 see page 12

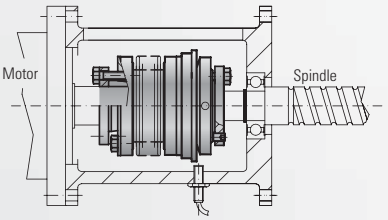
single-position
multi-position
load holding
full disengagement

MODELS	FEATURES	POSSIBLE APPLICATIONS

SK 3

With conical clamp connection for direct drives

- High clamping forces
- High degree of operational dependability
- Compensates for shaft misalignment
- Adjustable settings

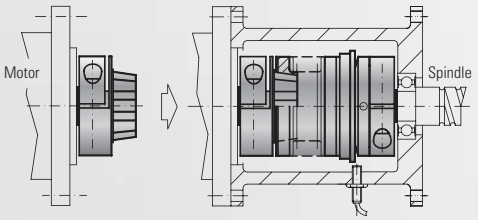


see page 13

SK 5

With clamping hub, press-fit version for direct drives

- Easy mounting and dismounting
- Electrically and thermally insulated
- Compensates for shaft misalignment
- Adjustable settings

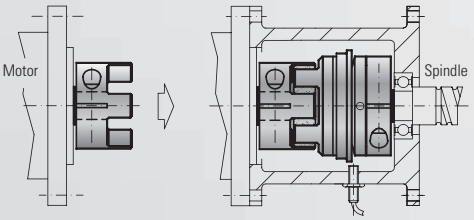


see pages 14-15

ES 2

With clamping hub for direct drives

- Easy assembly
- Damps vibrations
- Compensates for shaft misalignment
- Adjustable settings

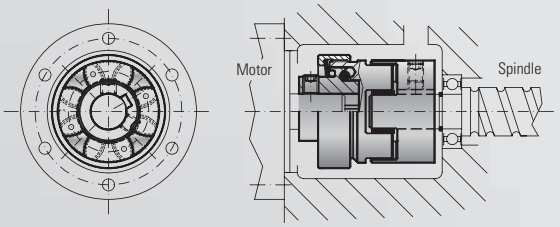


see pages 16-17

ESL

Torque limiter „Economy Class“

- Cost effective
- Compact
- Multi-position



see page 18

EEx

For use in explosive environments

- EEx availabe for the entire product range
- for the hazardous areas 1/21 and 2/22 the SERVOMAX EEx Elastomer couplings are registered according to the directive ATEX 95a

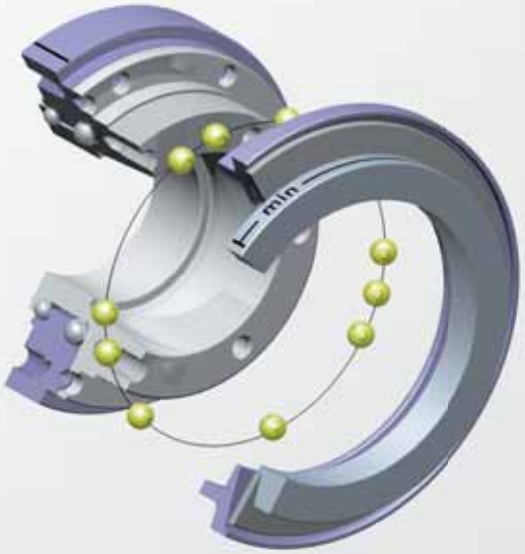
see page 19

optional stainless steel

OVERVIEW

BACKLASH-FREE TORQUE LIMITERS FROM R+W

Single-position re-engagement



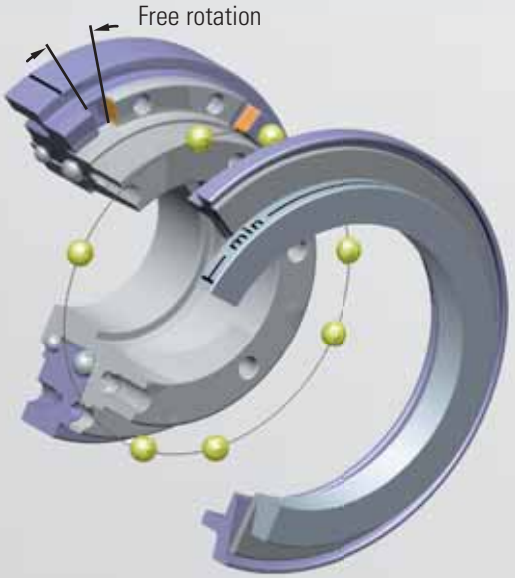
Standard version

- After the overload has been removed, the coupling will re-engage precisely 360 ° from the original disengagement position.
- Signal at overload
- Suitable for use in machine tools, packaging machinery, automation systems and other applications requiring precise timing.

Every model in this catalog is available in all 4 versions.

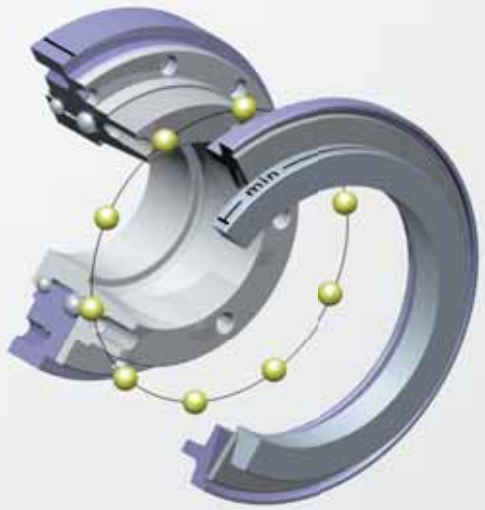
Load holding Version

- Mechanical overload detection device
- In the event of a torque overload, the drive and driven elements are not fully separated and are only allowed limited rotation.
- Guaranteed to hold the load and signal an overload.
- Automatic engagement after the torque level has dropped.
- Signal at overload to detect with mechanical switch or proximity sensor.
- Suitable for use on presses, load lifting equipment or on any applications where the drive and driven elements cannot be disengaged.



POSSIBLE FUNCTION SYSTEMS

Multi-position re-engagement



- Coupling re-engages at multiple set angular intervals.
- Immediate availability of the machine as soon as the overload has been removed.
- Signal at overload with mechanical switch or proximity sensor
- Standard engagement every 60°
- Re-engagement after 30, 45, 90 or 120 degrees available upon request

LIMITERS

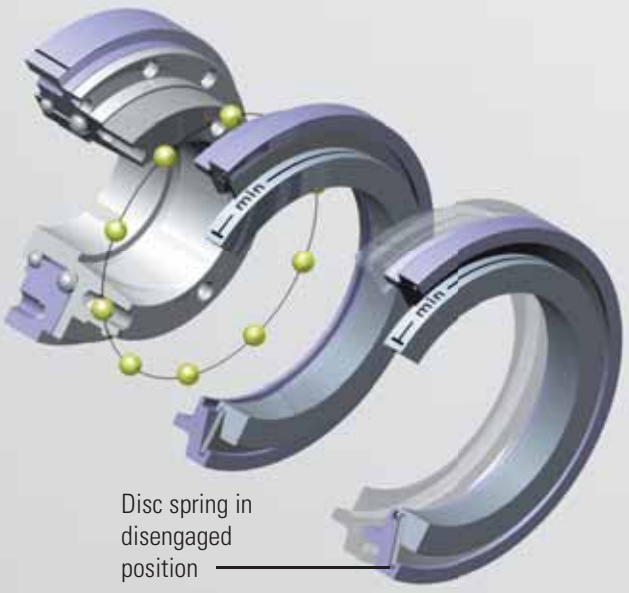
Full disengagement

Note:

Coupling can be disengaged manually.

Please contact R+W.

- Permanent separation of drive and driven elements in the event of a torque overload.
- Signal at overload with mechanical switch or proximity sensor
- No residual friction
- Rotating elements slow down freely
- Coupling can be re-engaged manually (Engagement every 60°); other engagement intervals optional
- For use in high speed applications



Disc spring in disengaged position

optional stainless steel

single-position
multi-position
load holding
full disengagement

Pulley not included.

MODEL **SK1**

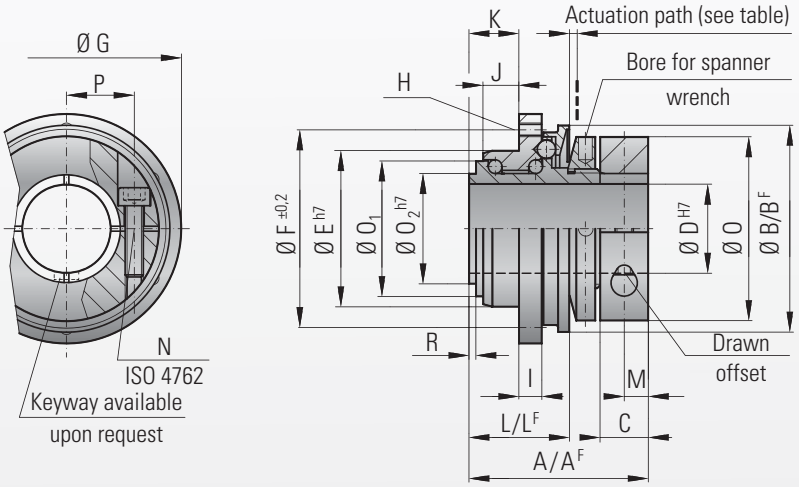
Production monitored Type Testet

BACKLASH FREE TORQUE LIMITER

with conical clamp connection

Miniature Design Series 1.5 - 10

Standard clamping hub



Material:
High strength, hardened steel

Design:
Model SK1 from 1.5 - 10 Nm with clamping hub
Model SK1 von 15 - 2,800 Nm with conical clamp
Absolutely backlash free through the frictional clamping connection

Temperature range:
-30 to +120° C

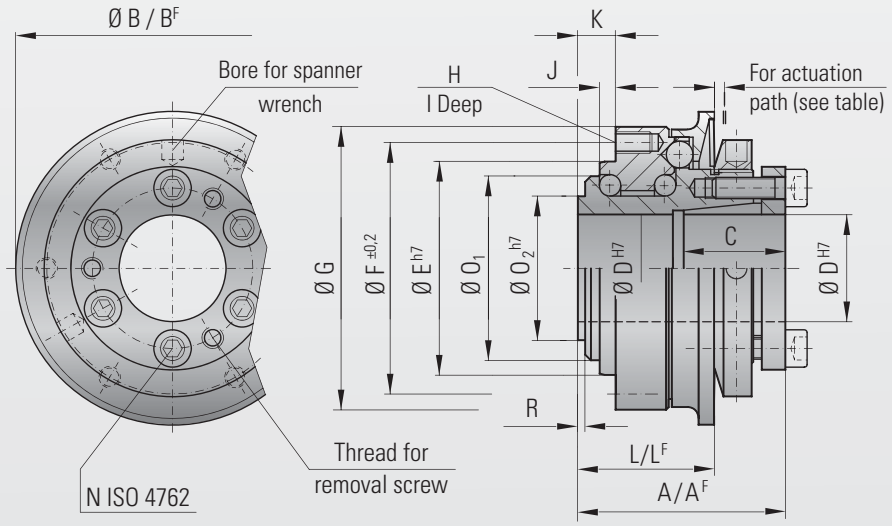
Service life:
Maintenace free when operated within the technical specifications

Fit tolerance:
Tolerance between hub and shaft 0.01 - 0.05 mm

Optional sealed version for food-grade applications (see page 26)

Design Series 15-2500

Standard conical clamp



Optional ATEX

Certified under the ATEX 95a directive for the hazardous zones 1/21 and 1/22

Ordering specifications

SK1 / 10 / W / 14 / 4 / 2-6 / xx

- Model
- Series
- Version
- Bore Ø D H7
- Disengagement torque Nm
- Adjustment range Nm
- e.g. stainless steel

All data is subject to change without notice.

Possible versions

W = Single-position engagement
D = Multi-position engagement
G = Load holding
F = Full disengagement

For the maximum permissible radial load capacity for all SK 1 models, see installation instructions on page 22/23

single-position
multi-position
load holding
full disengagement

Production monitored
Type Testet

Miniature Design

MODEL SK 1			Series													
			1.5	2	4.5	10	15	30	60	150	200	300	500	800	1500	2500
Adjustment range available from - to (approx. values)	(Nm)	T_{KN}	0.1-0.6 0.4-1 0.8-2	0.2-1.5 0.5-2.2 1.5-3.5	1-3 2-4.5 3-7	2-6 4-12 7-18	5-15 12-25 20-40 35-70	5-20 10-30 20-60 50-100	10-30 25-80 50-115	20-70 45-150 80-225	30-90 60-160 140-280 250-400	100-200 150-240 220-440	80-200 200-350 320-650	400-650 500-800 650-950	600-800 700-1200 1000-1800	1500-2000 2000-2500 2300-2800
Adjustment range available from - to (approx. values) ("F" Version)	(Nm)	T_{KN}	0.3-0.8 or 0.6-1.3	0.5-2	2.5-4.5	2-5 4-10 8-15	7-15	8-20 or 16-30	10-30 20-40 30-60	20-60 40-80 80-150	80-140 or 130-200	120-180 160-300 300-450	50-150 100-300 250-500	200-400 or 450-850	1000-1250 or 1250-1500	1400-2200 or 1800-2700
Overall length	(mm)	A	23	28	32	39	40	50	54	58	63	70	84	95	109	146
Overall length ("F" Version)	(mm)	A^F	23	28	32	39	40	50	54	58	66	73	88	95	117	152
Actuation ring Ø	(mm)	B	23	29	35	45	55	65	73	92	99	120	135	152	174	242
Actuation ring Ø, ("F" Version)	(mm)	B^F	24	32	42	51.5	62	70	83	98	117	132	155	177	187	258
Clamping fit length	(mm)	C	7	8	11	11	19	22	27.5	32	32	41	41	49	61	80
Inner diameter from Ø to Ø H7	(mm)	D	4-8	4-12	5-14	6-20	8-22	12-22	12-29	15-37	20-44	25-56	25-56	30-60	35-70	50-100
Pilot diameter h7	(mm)	E	14	22	25	34	40	47	55	68	75	82	90	100	125	168
Bolt-hole circle diameter ± 0,2	(mm)	F	22	28	35	43	47	54	63	78	85	98	110	120	148	202
Flange outside diameter -0,2	(mm)	G	26	32	40	50	53	63	72	87	98	112	128	140	165	240
Thread		H	4x M2	4x M2.5	6x M2.5	6x M3	6x M4	6x M5	6x M5	6x M6	6x M6	6x M8	6x M8	6x M10	6x M12	6x M16
Thread depth	(mm)	I	3	4	4	5	6	8	9	10	10	10	12	15	16	24
Centering length -0,2	(mm)	J	2.5	3.5	5	8	3	5	5	5	5	6	9	10	13.5	20
Distance	(mm)	K	5	6	8	11	8	11	11	12	12	15	21	19	25	34
Distance	(mm)	L	11	15	17	22	27	35	37	39	44	47	59	67	82	112
Distance ("F" Version)	(mm)	L^F	11.5	16	18	24	27	37	39	41.5	47	51.5	62	75	94	120
Distance		M	3.5	4	5	5										
Screw ISO 4762		N	1x M 2.5	1x M 3	1x M 4	1x M 4	6x M4	6x M5	6x M5	6x M6	6x M6	6x M8	6x M8	6x M10	6x M12	6x M16
Tightening torque	(Nm)		1	2	4	4.5	4	6	8	12	14	18	25	40	70	120
Outside diameter clamp ring Ø	(mm)	O	20	25	32	40										
Diameter	(mm)	O_1	13	18	21	30	35	42	49	62	67	75	84	91	112	154
Diameter h7	(mm)	O_2	11	14	17	24	27	32	39	50	55	65	72	75	92	128
Distance between centers	(mm)	P	6.5	8	10	15										
Distance	(mm)	R	1	1.3	1.5	1.5	2.5	2.5	2.5	2.5	3	3	4	4	4.5	6
Moment of inertia	(10^{-3} kgm²)	J_{ges}	0.01	0.02	0.05	0.07	0.15	0.25	0.50	1.60	2.70	5.20	8.60	20	31.5	210
Approx. weight	(kg)		0.03	0.065	0.12	0.22	0.4	0.7	1.0	1.3	2.0	3.0	4.0	5.5	10	28
Actuation path	(mm)		0.7	0.8	0.8	1.2	1.5	1.5	1.7	1.9	2.2	2.2	2.2	2.2	3.0	3.0

A^F, B^F, L^F = Full disengagement version

optional stainless steel

single-position
multi-position
load holding
full disengagement

Pulley not included.

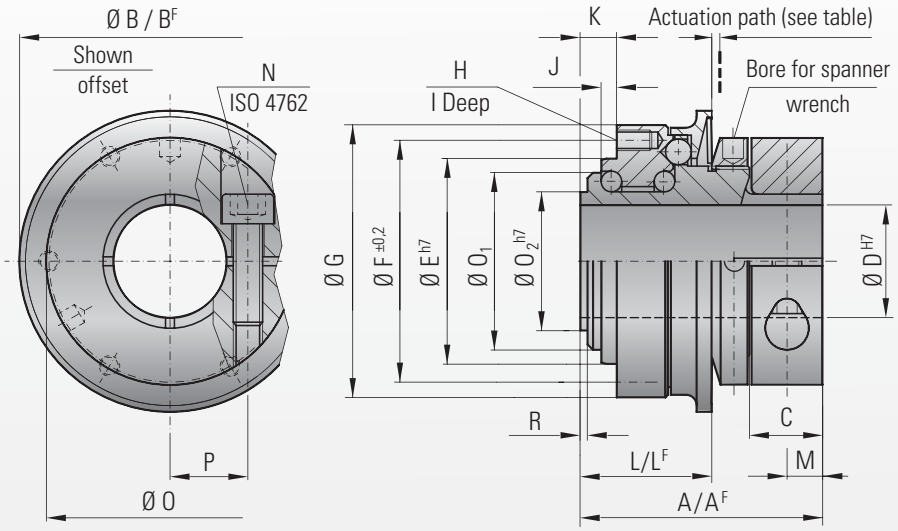
MODEL **SKN**

Production monitored Type Testet

BACKLASH FREE TORQUE LIMITER

with clamping hub

Series 5 - 1800 Nm



Material:
Torque limiting portion: high-strength, hardened steel
Clamping hub: up to series 500, aluminium;
from series 800, steel

Design:
With clamping hub and 1 radial screw ISO 4762
Absolutely backlash free through frictional clamping connection

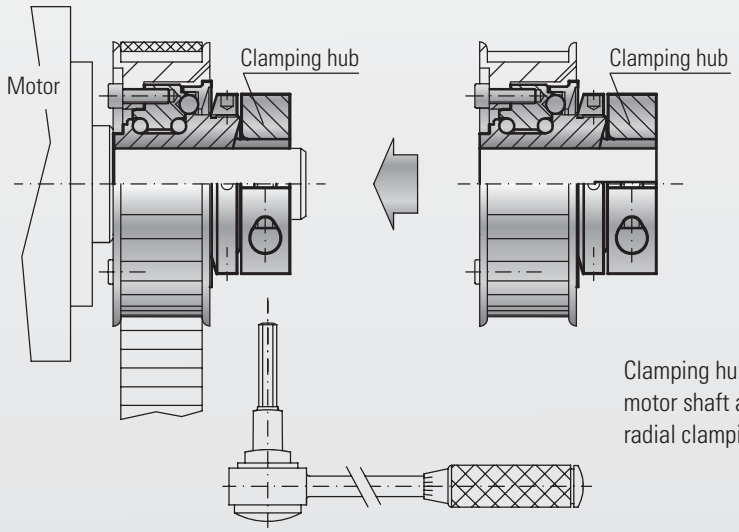
Temperature range:
-30 to +120° C

Service life:
Maintenance free when operated within the technical specifications

Fit tolerance:
Tolerance between hub an shaft 0.01 - 0.05 mm

Optional sealed version for food-grade applications (see page 26)

Easy mounting and dismounting



Clamping hub mounts on the motor shaft and tightens via a radial clamping screw.

Option ATEX

Certified under the ATEX 95a directive for the hazardous zones 1/21 and 1/22

Ordering specifications

SKN / 60 / W / 20 / 60/25-80 / xx

- Model
- Series
- Version
- Bore Ø D H7
- Disengagement torque Nm
- Adjustment range Nm
- e.g. stainless steel

All data is subject to change without notice.

Possible versions

W = Single-position engagement
D = Multi-position engagement
G = Load holding
F = Full disengagement

For the maximum permissible radial load capacity for all SKN models, see installation instructions on page 22/2

single-position
multi-position
load holding
full disengagement

Production monitored
Type Testet

MODEL SKN			15	30	60	150	200	300	500	800	1500
Adjustment range available from - to (approx. values)	(Nm)	T_{KN}	5-10 or 8-20	10-25 or 20-40	10-30 or 25-80	20-70 45-150 80-180	30-90 60-160 120-240	100-200 150-240 200-320	80-200 200-350 300-500	400-650 500-800 600-850	600-800 700-1200 1000-1800
Adjustment range available from - to (approx. values) ("F" Version)	(Nm)	T_{KN}	7-15	8-20 or 16-30	10-30 20-40 30-60	20-60 40-80 80-150	80-140 or 130-200	120-180 or 160-300	50-150 100-300 250-500	200-400 or 450-800	1000-1250 or 1250-1500
Overall length	(mm)	A	47	59	65	71	80	84	101	115	145
Overall length ("F" Version)	(mm)	A^F	47	59	65	71	83	87	107	130	160
Actuation ring Ø	(mm)	B	55	65	73	92	99	120	135	152	174
Actuation ring Ø ("F" Version)	(mm)	B^F	62	70	83	98	117	132	155	177	187
Clamping fit length	(mm)	C	13.5	16	20	23	26	26	30	35	46
Inner diameter from Ø to Ø H7	(mm)	D	12-22	14-25.4	16-32	19-40	24-44	30-56	35-60	40-62	50-72
Inner Diameter from Ø to Ø H7 with keyway	(mm)	D	8-19	12-25.4	12-30	15-38	20-44	25-50	25-58	30-60	35-72
Pilot diameter h7	(mm)	E	40	47	55	68	75	82	90	100	125
Bolt-hole circle diameter ± 0,2	(mm)	F	47	54	63	78	85	98	110	120	148
Flange outside diameter -0,2	(mm)	G	53	63	72	87	98	112	128	140	165
Thread		H	6xM4	6xM5	6xM5	6xM6	6xM6	6xM8	6xM8	6xM10	6xM12
Thread depth	(mm)	I	6	8	9	10	10	10	12	15	16
Centering length -0,2	(mm)	J	3	5	5	5	5	6	9	10	13.5
Distance	(mm)	K	8	11	11	12	12	15	21	19	25
Distance	(mm)	L	27	35	37	39	44	47	59	67	82
Distance ("F" Version)	(mm)	L^F	27	37	39	41.5	47	51.5	62	75	94
Distance		M	6.5	7.5	9.5	11	13	13	14.5	18	22.5
Screw ISO 4762		N	M5	M6	M8	M10	M12	M12	M14	M16	M20
Tightening torque	(Nm)		8	15	40	70	120	130	210	270	500
Clamp ring Ø	(mm)	O	49	55	67	85	94	110	121	134	157
Diameter	(mm)	O_1	35	42	49	62	67	75	84	91	112
Diameter h7	(mm)	O_2	27	36	39	50	55	65	72	75	92
Distance between centers	(mm)	P	17.5	19	23.5	30	32.5	39	43.5	45	52
Distance	(mm)	R	2.5	2.5	2.5	2.5	3	3	4	4	4.5
Moment of inertia	(10^{-3} kgm²)	J_{ges}	0.15	0.25	0.50	1.60	2.70	5.20	8.60	20	31.5
Approx. weight	(kg)		0.4	0.7	1.0	1.3	2.0	3.0	4.0	5.5	10
Actuation path	(mm)		1.5	1.5	1.7	1.9	2.2	2.2	2.2	2.2	3.0

A^F, B^F, L^F = Full disengagement version

optional stainless steel

single-position
multi-position
load holding
full disengagement

Production monitored Type Testet

MODEL **SKP**

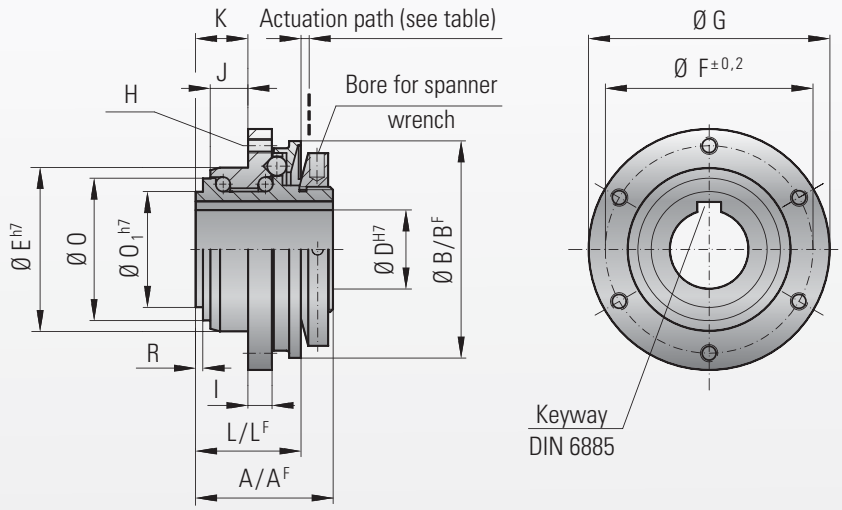
Pulley not included.

BACKLASH FREE TORQUE LIMITER

With pure keyway connection

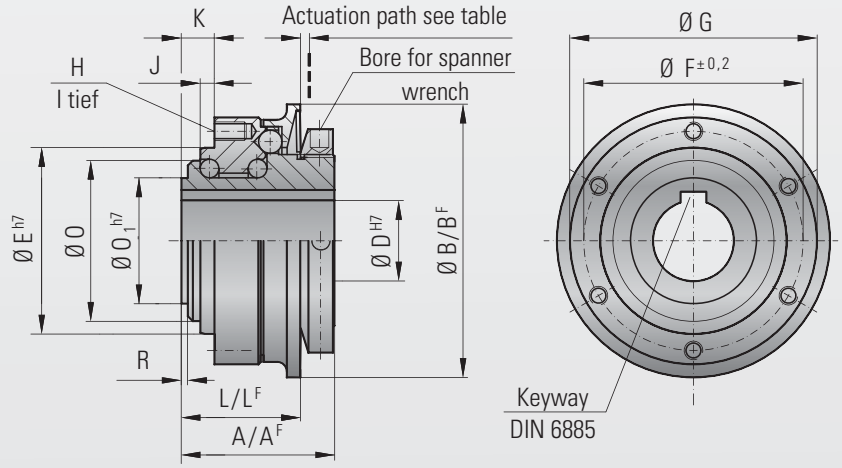
Miniature series 1.5 - 10

With pure keyway connection



Series 15-2500

With pure keyway connection



Material:
High-strength, hardened steel

Design:
Pure keyway connection
Torque limiting element is backlash free

Temperature range:
-30 to +120° C

Service life:
Maintenance free when operated within the technical specifications

Fit tolerance:
Tolerance between hub and shaft 0.01 – 0.05 mm

Optional sealed version for food-grade applications (see page 26)

Option ATEX

Certified under the ATEX 95a directive for the hazardous zones 1/21 and 1/22

Ordering specifications

SKP / 10 / W / 14 / 4 / 2-6 / xx

- Model
- Series
- Version
- Bore Ø D H7
- Disengagement torque Nm
- Adjustment range Nm
- e.g. stainless steel

All data is subject to change without notice.

Possible versions

W = Single-position engagement (standard)
D = Multi-position engagement
G = Load holding
F = Full disengagement

For the maximum permissible radial load capacity for all SKP models, see installation instructions on page 22/23

optional stainless steel

single-position
multi-position
load holding
full disengagement

Production monitored
Type Testet

Miniature Design

MODEL SKP			Series													
			1.5	2	4.5	10	15	30	60	150	200	300	500	800	1500	2500
Adjustment range available from - to (approx. values)	(Nm)	T_{KN}	0.1-0.6 0.4-1 0.8-2	0.2-1.5 0.5-2.2 1.5-3.5	1-3 2-4.5 3-7	2-6 4-12 7-18	5-15 12-25 20-40 35-70	5-20 10-30 20-60 50-100	10-30 25-80 50-115	20-70 45-150 80-225	30-90 60-160 140-280 250-400	100-200 150-240 220-440	80-200 200-350 320-650	400-650 500-800 650-950	600-800 700-1200 1000-1800	1500-2000 2000-2500 2300-2800
Adjustment range available from - to (approx. values) ("F" Version)	(Nm)	T_{KN}	0.3-0.8 or 0.6-1.3	0.5-2	2.5-4.5	2-5 4-10 8-15	7-15	8-20 or 16-30	10-30 20-40 30-60	20-60 40-80 80-150	80-140 or 130-200	120-180 160-300 300-450	50-150 100-300 250-500	200-400 or 450-850	1000-1250 or 1250-1500	1400-2200 or 1800-2700
Overall length A	(mm)	A	15.5	20	22	28	34	43	46	48.5	54	57	71.5	80	93	135
Overall length A ("F" Version)	(mm)	A^F	15.5	20	22	28	34	43	46	48.5	57	60	75	91	110	141
Actuation ring Ø	(mm)	B	23	29	35	45	55	65	73	92	99	120	135	152	174	242
Actuation ring Ø, ("F" Version)	(mm)	B^F	24	32	42	51.5	62	70	83	98	117	132	155	177	187	258
Bore Diameter from Ø to Ø H7	(mm)	D	4-8	4-10	5-12	6-16	8-19	12-25.4	12-30*	15-38	20-44	25-50	25-58	30-60	35-73	50-95
Pilot diameter h7	(mm)	E	14	22	25	34	40	47	55	68	75	82	90	100	125	168
Bolt-hole circle diameter ± 0,2	(mm)	F	22	28	35	43	47	54	63	78	85	98	110	120	148	202
Flange outside diameter -0,2	(mm)	G	26	32	40	50	53	63	72	87	98	112	128	140	165	240
Thread		H	4xM2	4xM2.5	6xM2.5	6xM3	6xM4	6xM5	6xM5	6xM6	6xM6	6xM8	6xM8	6xM10	6xM12	6xM16
Thread depth	(mm)	I	3	4	4	5	6	8	9	10	10	10	12	15	16	24
Centering length -0,2	(mm)	J	2.5	3.5	5	8	3	5	5	5	5	6	9	10	13.5	20
Distance	(mm)	K	5	6	8	11	8	11	11	12	12	15	21	19	25	34
Distance	(mm)	L	11	15	17	22	27	35	37	39	44	47	59	67	82	112
Distance ("F" Version)	(mm)	L^F	11.5	16	18	24	27	37	39	41.5	47	51.5	62	75	94	120
Diameter	(mm)	O	13	18	21	30	35	42	49	62	67	75	84	91	112	154
Diameter h7	(mm)	O_1	11	14	17	24	27	32	39	50	55	65	72	75	92	128
Distance	(mm)	R	1	1.3	1.5	1.5	2.5	2.5	2.5	2.5	3	3	4	4	4.5	6
Moment of inertia	(10^{-3} kgm²)	J_{ges}	0.01	0.02	0.05	0.07	0.15	0.25	0.50	1.60	2.70	5.20	8.60	20	31.5	210
Approx. weight	(kg)		0.03	0.065	0.12	0.22	0.4	0.7	1.0	1.3	2.0	3.0	4.0	5.5	10	28
Actuation path	(mm)		0.7	0.8	0.8	1.2	1.5	1.5	1.7	1.9	2.2	2.2	2.2	2.2	3.0	3.0

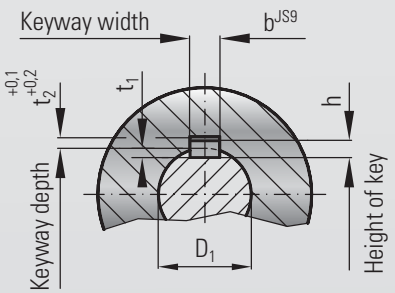
A^F, B^F, L^F = Full disengagement version

*Ø 30 with flat keyway, keyway depth (t_2) 2.8 + 0.2

Keyway according to the DIN 6885 Standard

D_1 from / to	6 8	8 10	10 12	12 17	17 22	22 30	30 38	38 44	44 50	50 58	58 65	65 75	75 85	85 95	95 110
b^{JS9}	2	3	4	5	6	8	10	12	14	16	18	20	22	25	28
h	2	3	4	5	6	7	8	8	9	10	11	12	14	14	16
t_1	1.2	1.8	2.5	3	3.5	4	5	5	5.5	6	7	7.5	9	9	10
t_2 $^{+0,1\ /\ +0,2}$	1	1.4	1.8	2.3	2.8	3.3	3.3	3.3	3.8	4.3	4.4	4.9	5.4	5.4	6.4

Imperial dimension keyways also available.



optional stainless steel

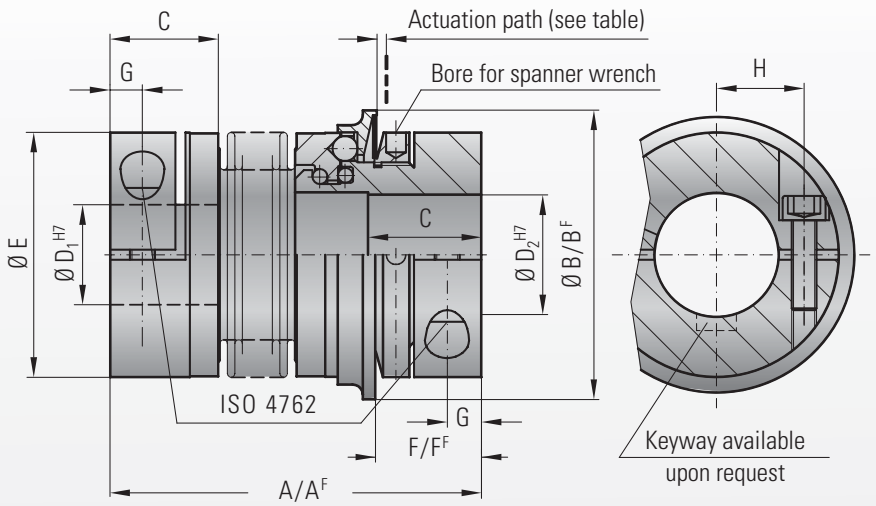
single-position
multi-position
load holding
full disengagement

Production monitored
Type Testet

MODEL **SK2**

BACKLASH FREE TORQUE LIMITER

with clamping hub



Material:
Bellows made of highly elastic stainless steel
Torque limiter section: High strength hardened steel
Hub material: up to series 80 aluminium from series up 150 steel

Design:
With clamping hub and 1 radial screw ISO 4762
Absolutely backlash free through frictional clamping connection

Temperature range:
-30° C to +100° C

Service life:
Maintenance free when operated within the technical specifications

Fit tolerance:
Tolerance between hub and shaft 0.01 – 0.05 mm

Ordering specifications: see page 15

Optional sealed version for food-grade applications (see page 26)

Optional ATEX Certification (see page 19)

Model SK 2		Series											
		1.5	2	4.5	10	15	30	60	80	150	200	300	500	800	1500
Adjustment range available from - to (approx. values) (Nm)	T_{KN}	0.1-0.6 0.4-1 0.8-1.5	0.2-1.5 or 0.5-2	1-3 or 3-6	2-6 or 4-12	5-10 or 8-20	10-25 or 20-40	10-30 or 25-80	20-70 or 30-90	20-70 45-150 80-180	30-90 60-160 120-240	100-200 150-240 200-320	80-200 200-350 300-500	400-650 500-800 650-850	650-800 700-1200 1000-1800
Adjustment range available from - to (approx. values) ("F" Version) (Nm)	T_{KN}	0.3-0.8 or 0.6-1.3	0.5-2	2.5-4.5	2-5 or 5-10	7-15	8-20 or 16-30	20-40 or 30-60	20-60 or 40-80	20-60 40-80 80-150	80-140 or 130-200	120-180 or 160-300	60-150 100-300 250-500	200-400 or 450-800	1000-1250 or 1250-1500
Overall length (mm)	A	42	46 51	57 65	65 74	75 82	87 95	102 112	115 127	116 128	128 140	139 153	163 177	190	223
Overall length, ("F" Version) (mm)	A^F	42	46 51	57 65	65 74	75 82	87 95	102 112	117 129	118 130	131 143	142 156	167 181	201	232
Actuation ring Ø (mm)	B	23	29	35	45	55	65	73	92	92	99	120	135	152	174
Actuation ring Ø (ful disengagement) (mm)	B^F	24	32	42	51.5	62	70	83	98	98	117	132	155	177	187
Fit length (mm)	C	11	13	16	16	22	27	31	35	35	40	42	51	48	67
Inner diameter from Ø to Ø H7 (mm)	D_1/D_2	3-8	4-12	5-14	6-20	10-26	12-30	15-32	19-42	19-42	24-45	30-60	35-60	40-75	50-80
Outer diameter of coupling (mm)	E	19	25	32	40	49	55	66	81	81	90	110	123	134	157
Distance (mm)	F	12	13	15	17	19	24	28	31	31	35	35	45	50	63
Distance ("F" Version) (mm)	F^F	11.5	12	14	16	19	22	29	31	30	33	35	43	54	61
Distance (mm)	G	3.5	4	5	5	6.5	7.5	9.5	11	11	12.5	13	17	18	22.5
Distance between centers (mm)	H	6	8	10	15	17	19	23	27	27	31	39	41	2x48	2x55
ISO 4762 screws	I	M2.5	M3	M4	M4	M5	M6	M8	M10	M10	M12	M12	M16	2xM16	2xM20
Tightening torque (Nm)		1	2	4	4.5	8	15	40	50	70	120	130	200	250	470
Approx. weight (kg)		0.035	0.07	0.2	0.3	0.4	0.6	1.0	2.0	2.4	4.0	5.9	9.6	14	21
Moment of inertia (10^{-3} kgm²)	J_{ges}	0.01	0.01 0.01	0.02 0.02	0.06 0.07	0.10 0.15	0.27 0.32	0.75 0.80	1.80 1.90	2.50 2.80	5.10 5.30	11.5 11.8	22.8 23.0	42.0	83.0
Torsional stiffness (10^3 Nm/rad)	C_T	0.7	1.2 1.3	7 5	9 8	20 15	39 28	76 55	129 85	175 110	191 140	420 350	510 500	780	1304
Lateral ± (mm)	max. values	0.15	0.15 0.20	0.20 0.25	0.20 0.30	0.15 0.20	0.20 0.25	0.20 0.25	0.20 0.25	0.20 0.25	0.25 0.30	0.25 0.30	0.30 0.35	0.35	0.35
Angular ± (degrees)	max. values	1	1 1.5	1.5 2	1.5 2	1 1.5	1 1.5	1 1.5	1 1.5	1 1.5	1.5 2	1.5 2	2 2.5	2.5	2.5
Lateral spring stiffness (N/mm)		70	40 30	290 45	280 145	475 137	900 270	1200 420	920 255	1550 435	2040 610	3750 1050	2500 840	2000	3600
Actuation path (mm)		0.7	0.8	0.8	1.2	1.5	1.5	1.7	1.9	1.9	2.2	2.2	2.2	2.2	3

A^F, B^F, F^F = Full disengagement version

(smaller sizes on request)

optional stainless steel

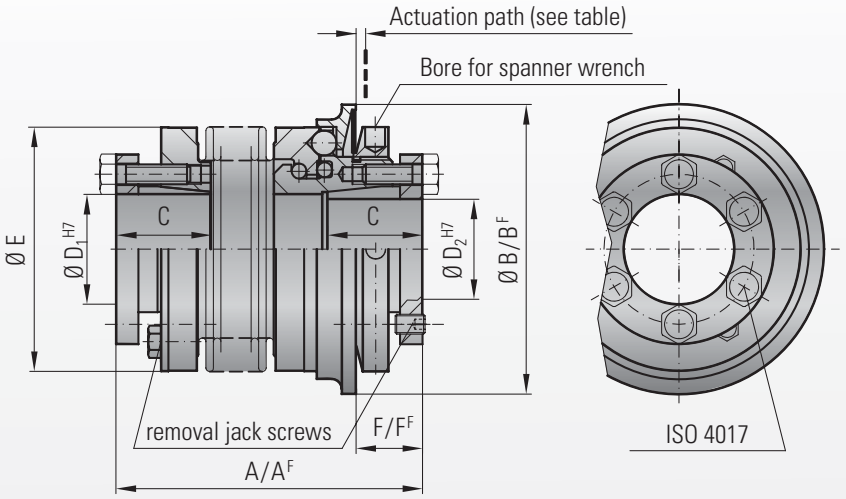
single-position
multi-position
load holding
full disengagement

Production monitored Type Testet

MODEL **SK3**

BACKLASH FREE TORQUE LIMITER

with tapered conical connection



Material:
Bellows made of highly elastic stainless steel
Torque limiter section: High strength hardened steel
Hub material: Steel

Design:
With tapered conical clamp and removal jack screws.

Absolutely backlash free through frictional clamping connection

Temperature range:
-30 to +100° C

Service life:
Maintenance free when operated within the technical specifications

Fit tolerance:
Tolerance between hub and shaft 0.01 – 0.05 mm

Ordering specifications: see page 15

Optional sealed version for food-grade applications (see page 26)

Optional ATEX Certification (see page 19)

Model SK 3			Series																			
			15		30		60		150		200		300		500		800		1500		2500	
Adjustment range available from (approx. values)	(Nm)	T_{KN}	5-10 or 8-20		10-25 or 20-40		10-30 or 25-80		20-70 45-150 80-200		30-90 60-160 140-280		100-200 150-240 220-400		80-200 200-350 300-500		400-650 500-800 600-900		650-850 700-1200 1000-1800		1500-2000 2000-2500 2300-2800	
Adjustment range available from (approx. values) ("F" Version)	(Nm)	T_{KN}	7-15		8-20 or 16-30		20-40 or 30-60		20-60 40-80 80-150		80-140 or 130-200		120-180 or 160-300		60-150 100-300 250-500		200-400 or 450-800		1000-1250 or 1250-1500		1400-2200 or 1800-2700	
Overall length	(mm)	A	62	69	72	80	84	94	93	105	99	111	114	128	123	136	151		175		246	
Overall length ("F" Version)	(mm)	A^F	62	69	72	80	84	94	93	105	102	114	117	131	127	140	151		184		252	
Actuation ring Ø	(mm)	B	55		65		73		92		99		120		135		152		174		243	
Actuation ring Ø ("F" Version)	(mm)	B^F	62		70		83		98		117		132		155		177		187		258	
Fit length	(mm)	C	19		22		27		32		32		41		41		49		61		80	
Inner diameter from Ø to Ø H7	(mm)	D_1/D_2	10-22		12-23		12-29		15-37		20-44		25-56		25-60		30-60		35-70		50-100	
Outer diameter of coupling	(mm)	E	49		55		66		81		90		110		123		133		157		200	
Distance	(mm)	F	13		16		18		19		19		23		25		31		30		34	
Distance ("F" Version)	(mm)	F^F	13		14		17		18		17		20		22		20		26		31	
6x ISO 4017		I	M4		M5		M5		M6		M6		M8		M8		M10		M12		M16	
Tightening torque	(Nm)		4		6		8		12		14		18		25		40		70		120	
Approx. weight	(kg)		0.3		0.4		1.2		2.3		3.0		5.0		6.5		9.0		16.3		35	
Moment of inertia	(10^{-3} kgm²)	J_{ges}	0.10	0.15	0.28	0.30	0.75	0.80	1.90	2.00	2.80	3.00	5.50	6.00	11.0	12.8	20		42		257	
Torsional stiffness	(10^3 Nm/rad)	C_T	20	15	39	28	76	55	175	110	191	140	420	350	510	500	780		1304		3400	
Lateral	± (mm)	max. values	0.15	0.20	0.20	0.25	0.20	0.25	0.20	0.25	0.25	0.30	0.25	0.30	0.30	0.35	0.35		0.35		0.35	
Angular	± (degrees)		1	1.5	1	1.5	1	1.5	1	1.5	1.5	2	1.5	2	2	2.5	2.5		2.5		2.5	
Lateral spring stiffness	(N/mm)		475	137	900	270	1200	380	1550	435	2040	610	3750	1050	2500	840	2000		3600		6070	
Actuation path	(mm)		1.5		1.5		1.7		1.9		2.2		2.2		2.2		2.2		3		3	

A^F, B^F, F^F = Full disengagement version

(smaller sizes upon request)

optional stainless steel

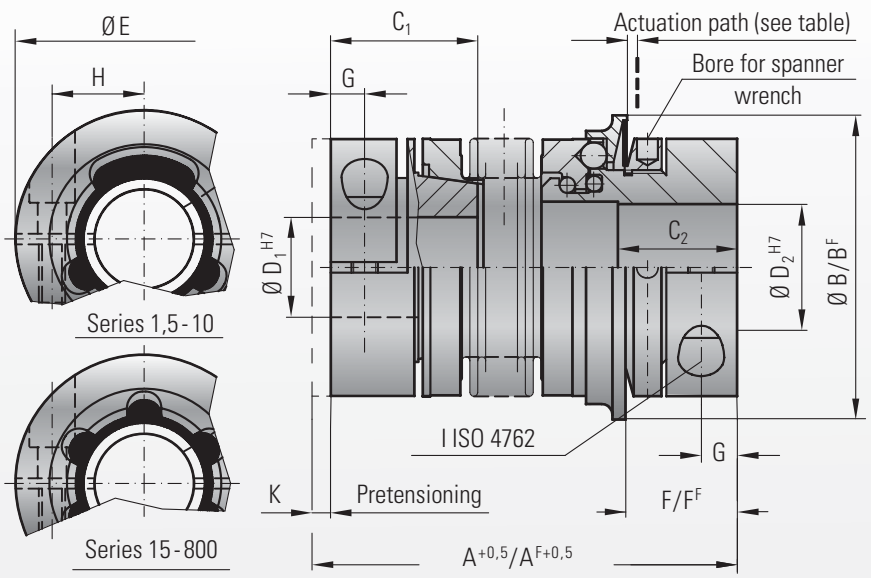
single-position
multi-position
load holding
full disengagement

MODEL **SK5**

Production monitored Type Testet

BACKLASH FREE TORQUE LIMITER

blind-mate version, with clamping hub



Material:
Bellows: stainless steel
Torque limiting portion: high-strength, hardened steel
Hub material: series 80 and below: aluminum; series 150 and up: steel

Design:
With clamping hub and 1 radial screw ISO 4762
Absolutely backlash free through frictional clamping connection

Temperature range:
-30 to +100° C

Service life:
Maintenance free when operated within the technical specifications

Fit tolerance:
Tolerance between hub and shaft 0.01 – 0.05 mm

Ordering specifications: see page 15

Optional sealed version for food-grade applications (see page 26)

Optional ATEX Certification (see page 19)

MODEL SK 5		Series																			
		1.5	2		4.5		10		15		30		60		80		150		300		500		800
Adjustment range available from - to (approx. values) (Nm)	T_{KN}	0.1-0.6 0.4-1 0.8-1.5	0.2-1.5 or 0.5-2		1-3 or 3-6		2-6 or 4-12		5-10 or 8-20		10-25 or 20-40		10-30 or 25-80		20-70 or 30-90		20-70 or 45-150		100-200 150-240 200-320		80-200 200-350 300-500		400-650 500-800 650-850
Adjustment range available from - to (approx. values) ("F" Version) (Nm)	T_{KN}	0.3-0.8 or 0.6-1.3	0.5-2		2.5-4.5		2-5 or 5-10		7-15		8-20 or 16-30		20-40 or 30-60		20-60 or 40-80		80-150		120-200 or 160-300		60-150 100-300 250-500		200-400 or 450-800
Overall length +0,5 inserted (mm)	A	44	48	54	60	68	70	79	76	83	89	97	105	115	115	127	116	128	143	157	166	180	196
Overall length +0,5 inserted ("F" Version) (mm)	A^F	44	48	54	60	68	70	79	76	83	89	97	105	115	117	129	118	130	146	160	170	184	207
Actuation ring Ø (mm)	B	23	29		35		45		55		65		73		92		92		120		135		152
Actuation ring Ø ("F" Version) (mm)	B^F	24	32		42		51.5		62		70		83		98		98		132		155		177
Clamping fit length C_1/C_2 (mm)	C_1/C_2	14/11	16/13		19/16		21/16		28/22		33/27		39/31		43/35		43/35		52/42		61/52		74/48
Bore Diameter from Ø to Ø H7 (mm)	D_1	3-8	4-12		5-16		5-20		8-22		10-25		12-32		14-38		14-38		30-56		35-60		40-62
Bore Diameter from Ø to Ø H7 (mm)	D_2	3-8	4-12		5-14		5-20		8-26		10-30		12-32		14-42		14-42		30-60		35-60		40-75
Outer diameter (mm)	E	19	25		32		40		49		55		66		81		81		110		123		134
Distance (mm)	F	12	13		15		17		19		24		28		31		31		35		45		50
Distance ("F" Version) (mm)	F^F	11.5	12		14		16		19		22		29		31		30		36		43		54
Distance (mm)	G	3.5	4		5		5		6.5		7.5		9.5		11		11		13		17		18
Distance between centers (mm)	H	6	8		10		15		17		19		23		27		27		39		41		2x48
ISO 4762 screws	I	M2.5	M3		M4		M4		M5		M6		M8		M10		M10		M12		M16		2xM16
Tightening torque (Nm)		1	2		4		4.5		8		15		40		50		70		130		200		250
Pretensioning, approx. (mm)	K	0.1 -0.5	0.2 - 0.7		0.2 - 0.7		0.2 - 1.0		0.2 - 1.0		0.5 - 1.0		0.5 - 1.0		0.5 - 1.0		0.5 - 1.0		0.5 - 1.5		0.5 - 2.0		0.5 - 2.0
Axial recovery of coupling max. (N)		4	8	5	15	10	25	30	20	12	50	30	70	45	48	32	82	52	157	106	140	96	200
Approx. weight (kg)		0.038	0.07		0.2		0.3		0.4		0.6		1.4		2		2.4		5.9		9.6		15
Moment of inertia (10^{-3} kgm²)	J_{ges}	0.01	0.01	0.01	0.02	0.02	0.06	0.07	0.10	0.15	0.27	0.32	0.75	0.80	1.80	1.90	2.50	2.80	6.50	7.00	13.0	17.0	50
Torsional stiffness (10^3 Nm/rad)	C_T	0.7	1.2	1.3	7	5	8	7	12	10	18	16	40	31	68	45	90	60	220	190	260	250	390
Lateral ± (mm)	max. values	0.15	0.15	0.20	0.20	0.25	0.20	0.30	0.15	0.20	0.20	0.25	0.20	0.25	0.20	0.25	0.20	0.25	0.25	0.30	0.30	0.35	0.35
Angular ± (degrees)		1	1	1.5	1.5	2	1.5	2	1	1.5	1	1.5	1	1.5	1	1.5	1	1.5	1.5	2	2	2.5	2.5
Lateral spring stiffness (N/mm)		70	40	30	290	45	280	145	475	137	900	270	1200	420	920	290	1550	435	3750	1050	2500	840	2000
Actuation path (mm)		0.7	0.8		0.8		1.2		1.5		1.5		1.7		1.9		1.9		2.2		2.2		2.2

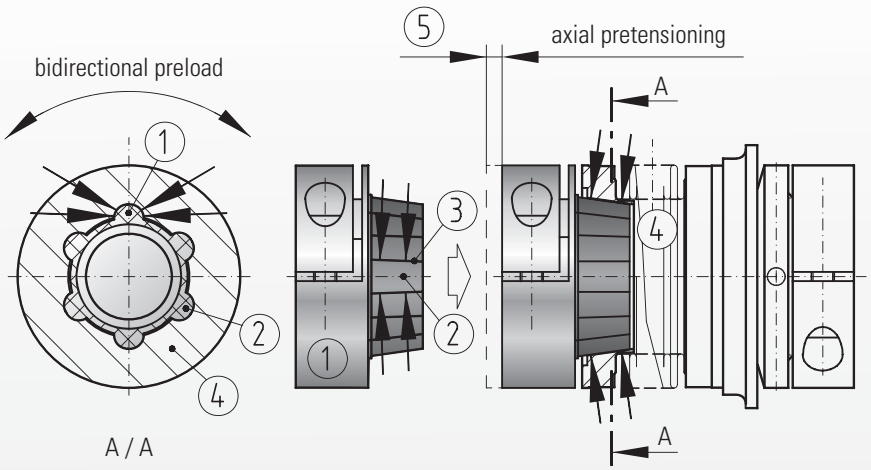
A^F, B^F, F^F = Full disengagement version

optional stainless steel

single-position
multi-position
load holding
full disengagement

Production monitored Type Testet

blind-mate version, with clamping hub



Design details

Six self-centering, tapered drive projections (2) have been formed into the taper segment, which has been molded onto an aluminium hub (1).

The six projections are configured conically in a longitudinal direction (3). The mating-piece consists of a metal bellows with a tapered female element (4).

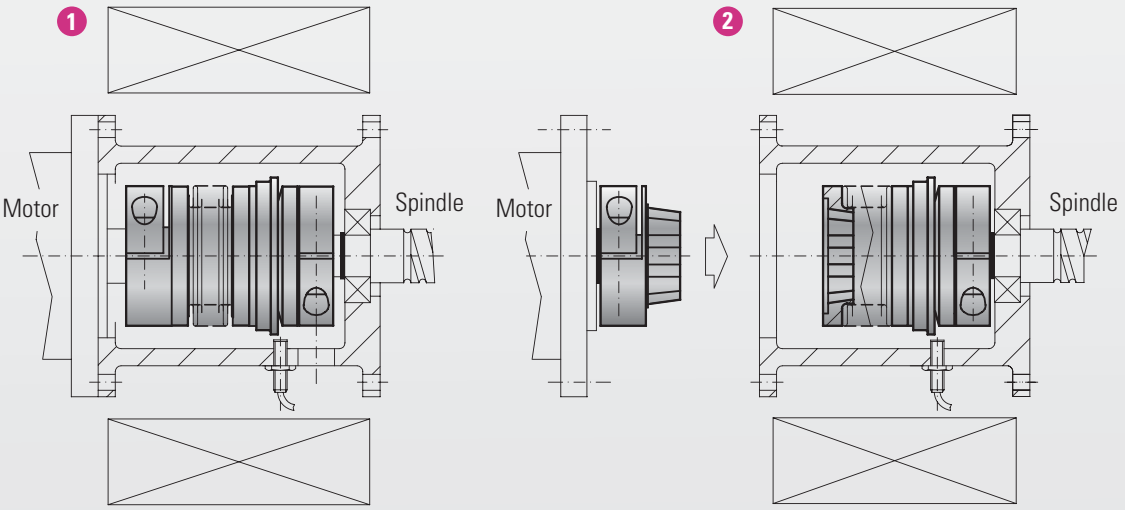
Absolutely backlash-free torque transmission is ensured due to the axial pretensioning (5) of the metal bellows during mounting. This slight pretensioning has no negative influence on the operation of the metal bellows or on the shaft bearing.

Possible applications for backlash-free, press-fit torque limiter SK 5

❶ Applications with limited accessibility. The dismounting of a single-piece coupling is too labor intensive.

❷ The **press fit design** allows the motor or gearbox unit to be removed by simply pulling it out when servicing is required.

Dismounting the coupling is possible **without loosening** the hub fastening screws. Therefore, clamping screw access holes are not required.



Ordering specifications

Required information for models SK 2, SK 3 and SK 5

SK2 / 60 / 102 / D / 16 / 19 / 25/10-30/XX

- Model
- Series
- Overall length (mm)
- Version
- Bore Ø D1 H7
- Bore Ø D2 H7
- Disengagement torque (Nm)
- Adjustment range (Nm)
- e.g. stainless steel

All data is subject to change without notice.

Possible versions

W = Single-position engagement (standard)
D = Multi-position engagement
G = Load holding
F = Full disengagement

optional stainless steel

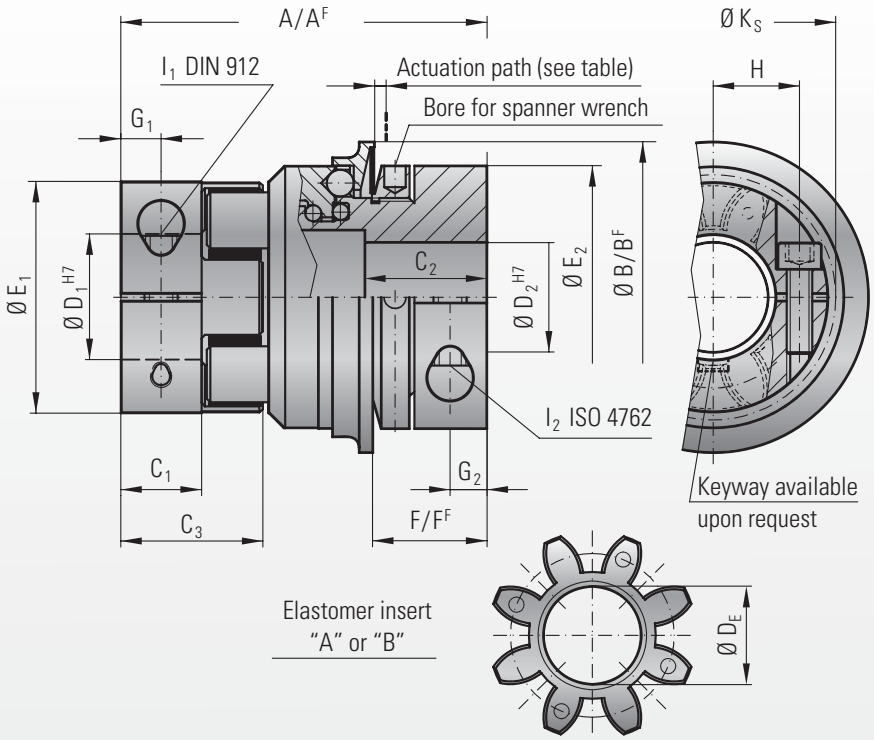
single-position
multi-position
load holding
full disengagement

MODEL **ES2**

Production monitored
Type Testet

BACKLASH FREE TORQUE LIMITER

with clamping hubs



Material:
Torque limiting portion: high-strength, hardened steel with rust protection (oxidized)
Clamping hub D_1: up to series 450: high-strength aluminum; series 800: steel
Clamping hub D_2: up to series 60: high-strength aluminum; series 150 and up: steel
Elastomer insert: precision molded, wear-resistant, thermally stable polymer

Design:
Two coupling hubs concentrically machined with concave driving jaws
One side with an integrated torque limiter
Available in single-position, multi-position, load holding, and full disengagement versions.

Temperature range:
See table below

Fit tolerance:
Tolerance between hub and shaft 0.01 – 0.05 mm

Optional sealed version for food-grade applications (see page 26)

Optional ATEX Certification (see page 19)

Ordering specifications

ES2 / 10 / A / W / 14 / 12 / 8 /4-12 / XX

- Model
- Series
- Type Elastomer insert
- Function system
- Bore Ø D1 H7
- Bore Ø D2 H7
- Disengagement torque Nm
- Adjustment range Nm
- Non-standard e.g. Stainless steel

All data is subject to change without notice.

Possible versions

W = Single-position re-engagement (standard)
D = Multi-position re-engagement
G = Load holding
F = Full disengagement

Specification of the Elastomer inserts

Type	Shore hardness	Color	Material	Relative damping (ψ)	Temperature range	Features
A	98 Sh A	red	TPU	0.4 - 0.5	-30°C to +100°C	high damping
B	64 Sh D	green	TPU	0.3 - 0.45	-30°C to +120°C	high torsional stiffness
D	65 Sh D	black	TPU	0.3 - 0.45	-10°C to +70°C	electrically conductive

The values of the relative damping were determined at 10 Hz and +20˚C.

Model ES			Series															
			5		10		20		60		150		300		450		800	
Elastomer type			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Static torsional stiffness	(Nm/rad)	C_T	150	350	260	600	1140	2500	3290	9750	4970	10600	12400	18000	15100	27000	41300	66080
Dynamic torsional stiffness	(Nm/rad)	C_{Tdyn}	300	700	541	1650	2540	4440	7940	11900	13400	29300	23700	40400	55400	81200	82600	180150
lateral	± (mm)	Max. values	0.08	0.06	0.1	0.08	0.1	0.08	0.12	0.1	0.15	0.12	0.18	0.14	0.2	0.18	0.25	0.2
angular	± (degrees)		1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8
axial	± (mm)		1		1		2		2		2		2		2		2	

Static torsional stiffness calculated at 50% T_{KN} Dynamic torsional stiffness calculated at T_{KN}

optional stainless steel

single-position
multi-position
load holding
full disengagement

Production monitored
Type Testet

MODEL **ES2**

BACKLASH FREE TORQUE LIMITER

MODEL ES 2		Series															
		5		10		20		60		150		300		450		800	
Type (Elastomer insert)		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Rated torque (Nm)	T_{KN}	9	12	12.5	16	17	21	60	75	160	200	325	405	530	660	950	1100
Max. torque* (Nm)	T_{Kmax}	18	24	25	32	34	42	120	150	320	400	650	810	1060	1350	1900	2150
Adjustment range possible from -to (Nm)	T_{KN}	1-3 or 3-6		2 - 6 or 4 - 12		10 - 25 or 20 - 40		10 - 30 or 25 - 80		20 - 70 45 - 150 80 - 180		100 - 200 150 - 240 200 - 320		80 - 200 200 - 350 300 - 500		400 - 650 500 - 800 600 - 900	
Adjustment range ("F" Version) possible from -to (Nm)	T_{KN}^F	2.5 - 4.5		2 - 5 or 5 - 10		8 - 20 or 16 - 30		20 - 40 or 30 - 60		20 - 60 40 - 80 80 - 150		120 - 180 or 180 - 300		60 - 150 100 - 300 250 - 500		200 - 400 or 450 - 800	
Overall length (mm)	A	50		60		86		96		106		140		164		179	
Overall length ("F" Version) (mm)	A_F	50		60		86		96		108		143		168		190	
Outer diameter of actuation ring (mm)	B	35		45		65		73		92		120		135		152	
Outer diameter of actuation ring ("F" Version) (mm)	B_F	42		51.5		70		83		98		132		155		177	
Clamping fit length (mm)	C_1	8		10.3		17		20		21		31		34		46	
Fit length (mm)	C_2	14		16		27		31		35		42		51		45	
Length of hub (mm)	C_3	16.7		20.7		31		36		39		52		57		74	
Inner diameter from Ø to Ø H7 (mm)	D_1	4 - 12.7		5 - 16		8 - 25		12 - 32		19 - 36		20 - 45		28 - 60		35 - 80	
Inner diameter from Ø to Ø H7 (mm)	D_2	6 - 14		6 - 20		12 - 30		15 - 32		19 - 42		30 - 60		35 - 60		40 - 75	
Inner diameter (Elastomer insert) (mm)	D_E	10.2		14.2		19.2		26.2		29.2		36.2		46.2		60.5	
Diameter of the hub (mm)	E_1	25		32		42		56		66.5		82		102		136.5	
Diameter of the hub (mm)	E_2	19		40		55		66		81		110		123		132	
Distance (mm)	F	15		17		24		28		31		35		45		50	
Distance ("F" Version) (mm)	F_F	14		16		22		29		30		35		43		54	
Distance (mm)	G_1	4		5		8.5		10		11		15		17.5		23	
Distance (mm)	G_2	5		5		7.5		9.5		11		13		17		18	
Distance between centers (mm)	H_1	8		10.5		15		21		24		29		38		50.5	
Screws (ISO 4762/12.9)	I_1	M3		M4		M5		M6		M8		M10		M12		M16	
Tightening torque (Nm)		2		4.5		8		15		35		70		120		290	
Distance between centers SK-side (mm)	H_2	10		15		19		23		27		39		41		48	
Screws (ISO 4762/12.9)	I_2	M4		M4		M6		M8		M10		M12		M16		2x M16	
Tightening torque (Nm)		4		4.5		15		40		70		130		200		250	
Diameter with screwhead (mm)	K_S	25		32		44.5		57		68		85		105		139	
Approx. weight (kg)		0.2		0.3		0.6		1.0		2.4		5.8		9.3		14.3	
Moment of inertia (10^{-3} kgm^2)	J_{ges}	0.02		0.06		0.25		0.7		2.3		11		22		33.5	
Actuation path (mm)		0.8		1.2		1.5		1.7		1.9		2.2		2.2		2.2	

Information about static and dynamic torsional stiffness as well as max. possible misalignment see page 16

A^F, B^F, F^F = Full disengagement version

Maximum transmittable torque (Nm) of clamping hub based on bore diameter (mm)

Series	Ø 4	Ø 5	Ø 8	Ø 16	Ø 19	Ø 25	Ø 30	Ø 32	Ø 35	Ø 45	Ø 50	Ø 55	Ø 60	Ø 65	Ø 70	Ø 75	Ø 80
5	1,5	2	8														
10		4	12	32													
20			20	35	45	60											
60				50	80	100	110	120									
150					120	160	180	200	220								
300					200	230	300	350	380	420							
450							420	480	510	600	660	750	850				
800									700	750	800	835	865	900	925	950	1.000

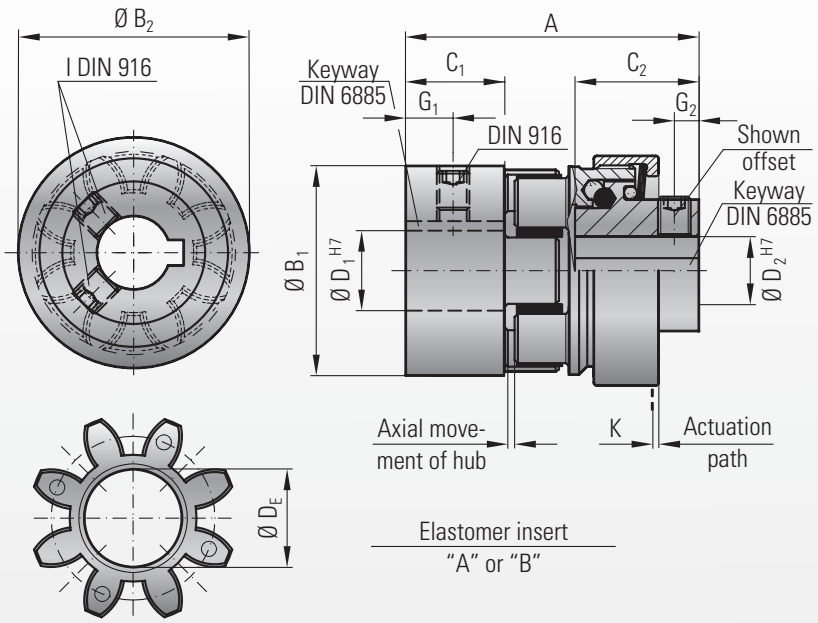
Higher torque values possible through additional keyway

optional stainless steel

MODEL **ESL**

LOW BACKLASH TORQUE LIMITERS

with keyway connection



Material:
Torque limiting portion: high-strength steel
Clutching balls: hardened steel
Clamping hubs: high-strength aluminum
Elastomer insert: precision molded, wear-resistant, thermally stable polymer

Design:
Zero backlash elastomer coupling with integral torque limiter. All sizes available in standard multi-position design.

Speed:
Negligible abrasion with disengagement speeds up to 200 rpm
Higher speeds available upon request

Fit tolerance:
Tolerance between hub and shaft 0.01 – 0.05 mm

MODEL ESL			Series									
			5		10		20		60		150	
Type (Elastomer insert)			A	B	A	B	A	B	A	B	A	B
Rated torque	(Nm)	T_{Kn}	9	12	12.5	16	17	21	60	75	160	200
Adjustment range* from - to	(Nm)	T_{Kn}	1-6		1-12		3-19		5-60		20-150	
Overall length	(mm)	A	34		45		64		80		90	
Diameter of the hub	(mm)	B_1	25		32		42		56		66.5	
Diameter of the hub	(mm)	B_2	29		32		46		59		75	
Clamping fit length	(mm)	C_1	12.5		12		25		30		35	
Clamping fit length	(mm)	C_2	11.5		20		22		31		35	
Inner diameter from Ø to Ø H7	(mm)	D_1	6-15		6-18		8-25		12-32		19-38	
Inner diameter from Ø to Ø H7	(mm)	D_2	6-10		6-12		8-19		12-24		19-32	
Inner diameter max. (elastomer)	(mm)	D_E	10.5		14.2		19.2		26.2		29.2	
Distance	(mm)	G_1	5		6		9		11		12	
Distance	(mm)	G_2	2.5		3.5		4		4		4	
Screws DIN 916**		I	depending on bore diameter see below table									
Approx. weight	(kg)		0.05		0.15		0.2		0.5		1	
Moment of inertia	(10^{-3} kgm^2)	J_1/J_2	0.01		0.02		0.08		0.15		0.5	
Actuation path	(mm)	K	0.6		1		0.6		1.2		1.2	

* Adjustment range preset by R+W. **Information about static and dynamic torsional stiffness as well as max. possible misalignment** see page 16

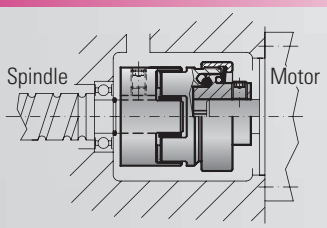
Ordering specifications

ESL / 10 / A / 14 / 12 / 10 / XX

- Model
- Series
- Type of elastomer
- Bore D1 H7 with keyway
- Bore D2 H7 with keyway
- Disengagement torque Nm (factory set – non-adjustable)
- Non-standard e.g. Stainless steel

All data is subject to change without notice.

Installation instruction



Disengagement torque setting

The ESL torque limiter is factory preset at the required disengagement torque and is not adjustable.

** Set screw	
D_1/D_2	E
- Ø 10	M3
Ø 11-12	M4
Ø 13-30	M5
Ø 31-58	M8
Ø 59-80	M10

Bore sizes < Ø 6 are manufactured without a keyway

optional stainless steel

MODEL **ATEX**

FOR USE IN HAZARDOUS AREAS AND EXPLOSIVE ATMOSPHERE

Atmosphere Explosive

ATEX 95 is regulated by the new European directive. Generally the explosive atmosphere is classified in 3 different zones.

Zone 0:
A place in which an explosive atmosphere consists out of a mixture of air and flammable substances in the form of gas, vapor or mist, and **is present frequently, continuously** or for **extended periods**.
Zone 20:
Is relevant for an explosive atmosphere in the form of clouds of combustible dust in air under the same conditions as above.

Zone 1:
Described as a place in which an explosive atmosphere consists of a mixture of air and flammable substances in the form of gas, vapor or mist, and is **likely to occur** in normal operation occasionally.
Zone 21:
Is relevant for an explosive atmosphere in the form of clouds of combustible dust in air under the same conditions as above.

Zone 2:
A place in which an explosive atmosphere consists of a mixture of air with flammable substances in the form of gas, vapor or mist, and is **not likely to occur** in normal operation but, if it does occur, it will persist **for a short period only.**
Zone 22:
Relevant for an explosive atmosphere in the form of a cloud of combustible dust in air under the same conditions as above.

For the classified zones 1/21 and 2/22 the Servomax couplings EK-EEX do have an accreditation according to ATEX 95/a

Design of ATEX torque limiter:
Full disengagement version offered for ATEX environments to avoid excess friction subsequent to disengagement.

All dimensions and material are the same as the standard products.

An IP65 rated sealed intermediate flange must be used with all bellows-style torque limiters.

The ES2 style torque limiter comes with an electrically conductive insert (Sh65D). The insert prevent electrostatic charging and sparking.

Rating:
For safety purposes, all misalignment, speed and torque ratings are reduced by 30%. Technical data available upon request.

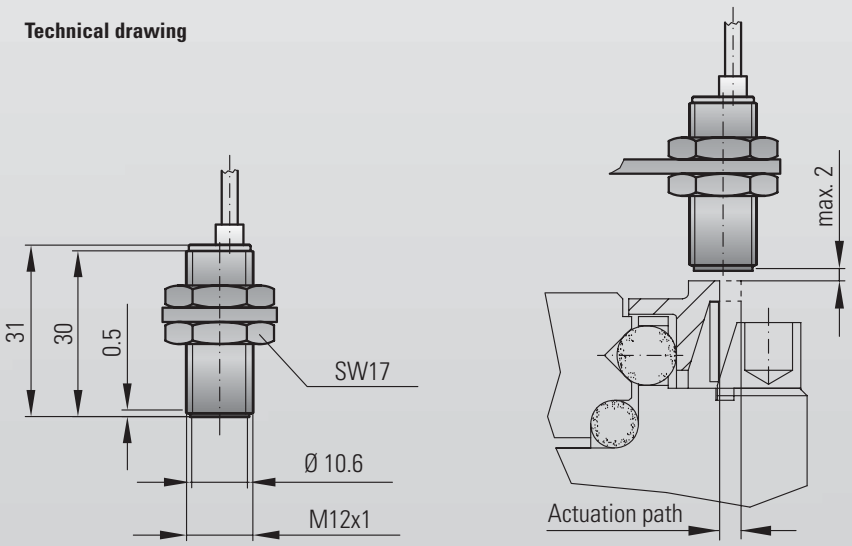
Maintenance:
Visually inspect the torque limiter at regular maintenance intervals.

Assembly instructions:
Assembly and maintenance instructions will be provided with each torque limiter.

Mechanical ATEX Limit switch

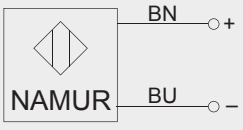
Order-No.: 658.1624.004

Technical drawing



Technical Data	
Voltage	DC 5 ... 25V
Output current	> 3mA
Switch frequency	≤ 800 Hz
Temperature range	-25 °C to +70°C
Protective system	IP 67
Switch type	open
Detection gap	max. 2 mm
Certification	TÜV 98 ATEX 1293
Identification	(Ex) II 2 G EEx ib IIC T6

Switch diagram



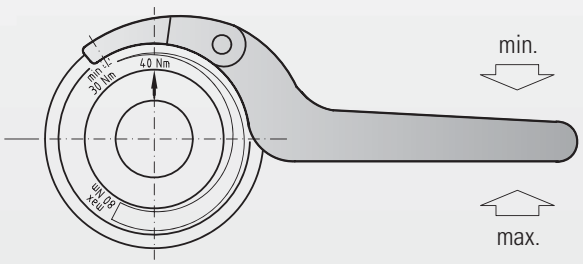
Note:
After installation, it is necessary to fully test the functionality of the limit switch.

ACCESSORIES

BACKLASH FREE TORQUE LIMITER

Spanner wrench for torque adjustment (for DIN 1816 nuts)

Order-No.: see table



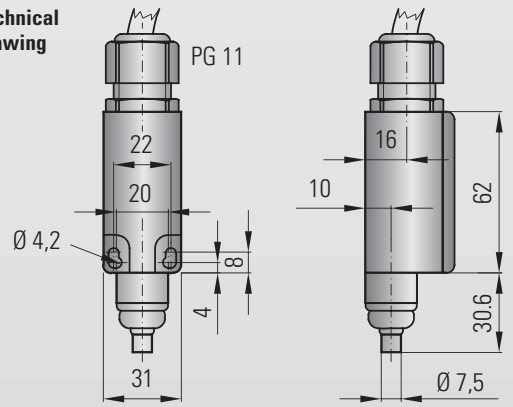
Miniature torque limiters (series 1.5 – 10) do not require a spanner wrench. These adjustment nuts can be turned with a bolt or a drift pin.

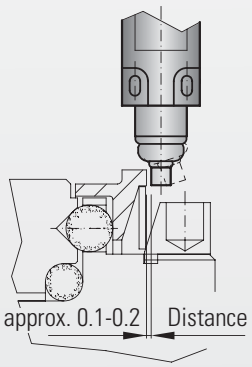
Series ES2	Series SK	• Single-position • Multi-position • Load holding	Full disengagement
x	15	No. 49/4	No. 49/4
20	30	No. 55/4	No. 55/4
60	60	No. 66/5	No. 66/5
150	80/150	No. 82/5	No. 82/5
x	200	No. 90/6	No. 98/5
300	300	No. 114/6	No. 114/6
450	500	No. 126/8	No. 126/8
800	800	No. 134/8	No. 144/8
x	1500	No. 163/8	No. 163/8
x	2500	No. 210/10	No. 226/10

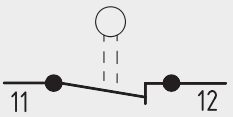
Mechanical Limit Switch (appropriate from series 30 up)

Order-No.: 618.6740.644

Technical drawing





Technical data	
Max. voltage	500 V AC
Max. constant current	10 A
Protective System	IP 65
Contact system	Opener (forced separating)
Temperature range	- 30 - +80 °C
Actuation	Plunger (metal)
Switch diagram	

Note:
After installation, it is necessary to fully test the functionality of the limit switch.

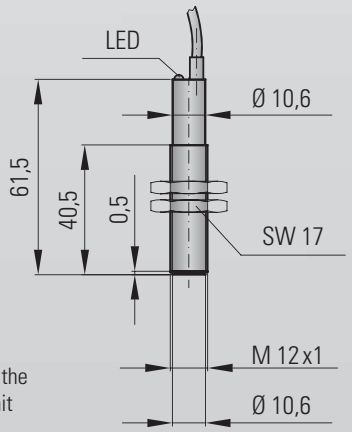
The plunger should be placed as close as possible to the actuation ring of the torque limiter (approx. 0.1 – 0.2 mm)

The mechanical limit switch is suitable for series 30 and up. For smaller torque limiters, the proximity sensor is recommended.

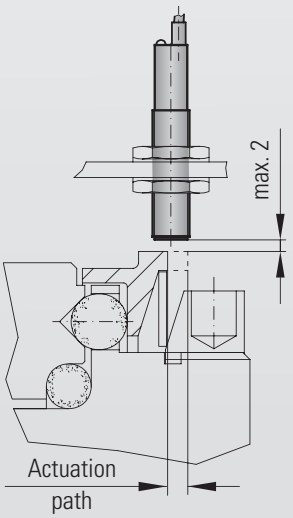
Proximity sensor

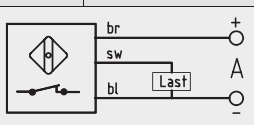
Order-No.: 650.2703.001

Technical drawing



Note:
After installation, it is necessary to fully test the functionality of the limit switch.



Technical data	
Voltage	10 to 30 V DC
Max output current	200 mA
Max switch frequency	800 Hz
Temperature range	-25°C to +70°C
Protective system	IP 67
Switch type	normally open
Max detection gap	2 mm
Switch diagram	

GENERAL FUNCTION

R+W torque limiters are ball detent style overload couplings. They protect drive and driven mechanical components from damage associated with torque overloads.

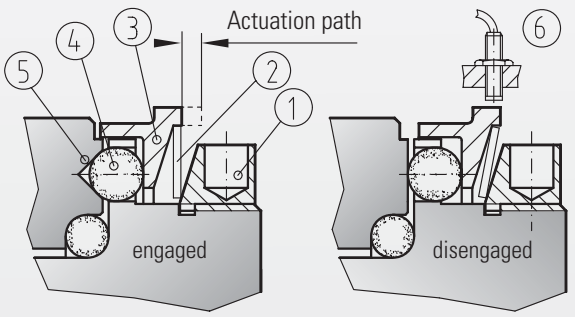
- Backlash free transmission torque is accomplished by a series of steel balls (4) nested in hardened detents (5).
- Disc springs push against an actuation ring (3) keeping the balls nested.
- The disengagement torque is adjustable by means of an adjustment nut (1).
- In the event of an overload, the actuation ring (3) moves axially allowing the balls to roll out of the detents separating the drive and driven elements.
- The movement of the actuation ring (3) can be sensed by means of a mechanical switch or proximity sensor (6) triggering the drive to shut down.

Single-position / Multi-position / Load holding

In a torque overload, for the single-position design (standard) and multi-position design, the spring disengages to allow the balls to come out of their detents, separating the drive and driven elements. A very light residual spring pressure remains so that the coupling will re-engage once the torque is reduced below the overload setting.

In the load holding version the drive and driven elements are only allowed limited rotation in order to allow for movement of the actuation ring.

Re-engagement is only possible at low speed.

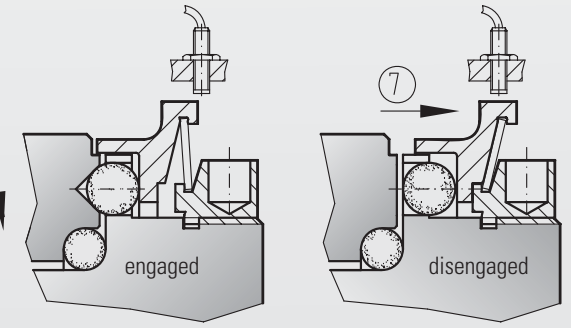


Full disengagement version

With this design, when a torque overload is detected, the disc spring completely flips over and places no residual spring pressure on the actuation ring. The drive and driven elements are completely separated.

Coupling will not re-engage automatically. A manual reset is required (Picture 3a, 3b).

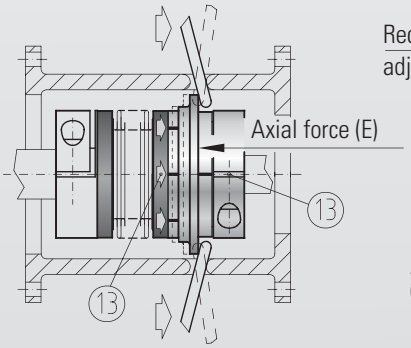
CAUTION:
Re-engagment should only be performed when the coupling is still and not rotating!



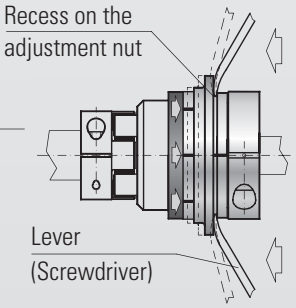
Torque limiting portions of SK and ES2 are identical.

The R+W full disengagement torque limiter can be re-engaged in 6 different positions (every 60 degrees) with low axial force (E). Marks on the actuation ring and body (13) will line up to indicate the re-engagement points.

Re-engagement of series 60 and up can be achieved through the use of 2 levers, which are to be supported at a recess on the adjustment nut (picture 3b). Screwdrivers can be used as a lever.



Picture 3a (up to series 60)



Picture 3b (series 60 and up)

optional stainless steel

single-position
multi-position
load holding
full disengagement

MOUNTING-INSTRUCTIONS

BACKLASH FREE TORQUE LIMITER

MODEL SK1 / SKN / SKP

SK1 / SKN / SKP have an integral bearing for support of attached component (pulley, sprocket, etc.)

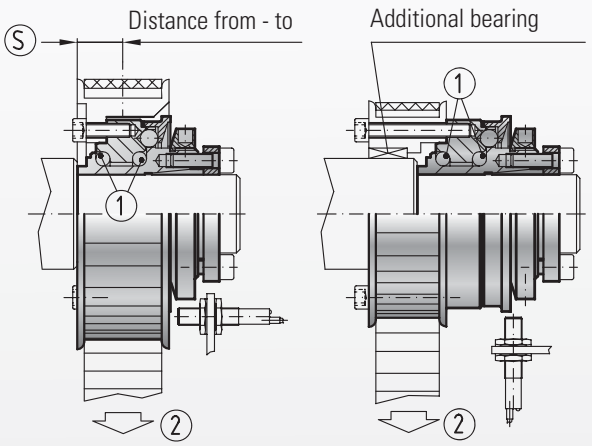
Please do not exceed the maximum radial force (2) as described in the table below.

When centering the load over the "S" dimension, additional bearing support is not required.

For offset mounting, additional bearing support is required.

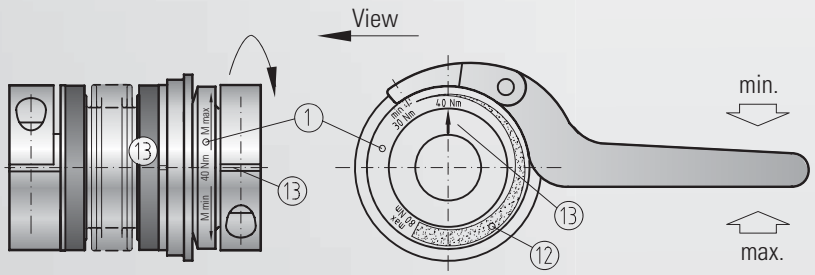
This is recommended, for example, if the attached component has a very small diameter or the driven element is very wide.

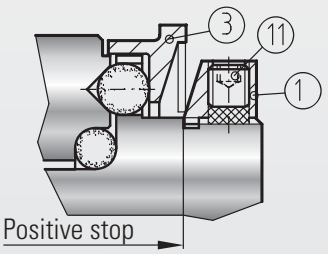
Depending on the installation situation, ball bearings, needle bearings or bushings may be used.



Series	1,5	2	4,5	10	15	30	60	150	200	300	500	800	1500	2500
Radial load capacity,max (N)	50	100	200	500	1400	1800	2300	3000	3500	4500	5600	8000	12000	20000
(S) from-to (mm)	3-6	5-8	5-11	6-14	7-17	10-24	10-24	12-24	12-26	12-28	16-38	16-42	20-50	28-60

Disengagement torque setting



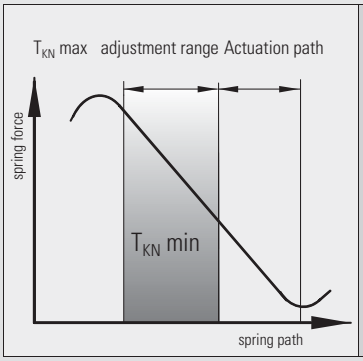


① adjustment nut
⑪ fastening screw
③ steel actuation ring
⑫ adjustment range
⑬ marking

R+W torque limiters are factory set to the customer specified disengagement torque, which is marked onto the coupling. The adjustment range (min/max) is also marked on the adjustment nut (1). The customer can adjust the disengagement torque as long as it falls into the range (12) indicated on the adjustment nut.

Do not exit the adjustment range during setting.

To adjust the disengagement torque, loosen the locking screws (11) and rotate the adjustment nut, using a spanner wrench, to the desired new setting. Tighten the 3 locking screws (11) and test the coupling.



CAUTION:

R+W torque limiters incorporate disc springs that exhibit a special spring characteristic. It is important to stay within the range of the coupling.

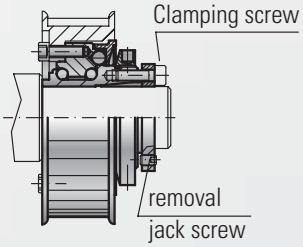
MOUNTING AND DISMOUNTING OF TORQUE LIMITERS

Mounting preparation

All mounting surfaces including shafts, bores, keys and keyways, must be clean and free of burrs, nicks and dents. Inspect shaft diameters, coupling bore diameters, key and keyway dimensions and tolerances. All R+W coupling bores are machined to ISO tolerance H7.Clearances between the shaft and hub are maintained to be within 0.01 and 0.05 mm. A light coating of oil is recommended to ease the mounting process and will not affect the clamping force of the hub.

CAUTION:
Do not use sliding grease, or oils or grease with molybdenum disulfide or other high pressure additives.

SK 1
with tapered bushing
Series 15 - 2500



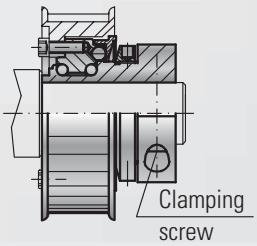
Mounting:
Slide the coupling onto the shaft to the proper axial position. Using a torque wrench, uniformly tighten the clamping screws using a cross-wise tightening pattern until all the clamping screws are evenly tightened to the correct tightening torque provided in Table 1. During tightening the coupling may move slightly towards the tapered bushing.

Caution! Further tightening of the clamping screws may destroy the tapered bushing connection.

NOTE: Prior to reassembly make sure that the jack-screws are removed or raised to their original position.

Dismounting:
Loosen the clamping screw (N). Insert the three jack screws into the tapped holes on the tapered segment. Apply even pressure to remove the tapered segment. Remove the coupling.

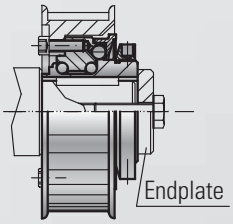
SK 1 / SKN
with clamping hub
SK 1 Series 1.5 - 10
SKN Series 15-1500



Mounting:
Slide the coupling onto the shaft to the proper axial position. Using a torque wrench tighten the clamp screw to the proper tightening torque. (Page 7/9)

Dismounting:
Simply loosen the clamp screw (P) and remove the coupling.

SKP
with keyway
Series 1.5 - 2500

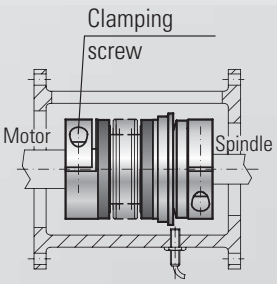


Mounting:
Slide the coupling onto the shaft. Lock it in position, with an end plate (8) for example. Figure 6.

Dismounting:
Remove the end plate and slide the coupling off the shaft using an appropriate tool.

Metal bellows torque limiters

SK 2
with clamping hub



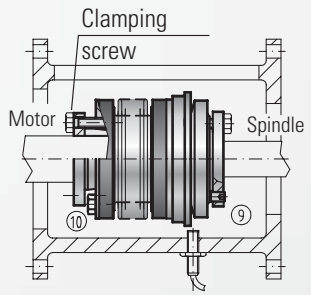
Mounting:
Prior to mounting make sure that the shafts to be connected do not exceed the angular or lateral misalignment limits for the coupling size to be used. This data can be found in the catalog. Slide the coupling on the first shaft end to the proper axial position. Using a torque wrench, tighten the clamp screw to the correct tightening torque. Insert the second shaft into the other end of the coupling to the proper axial position. Make sure that the coupling is free of any axial forces before tightening. Tighten the clamp screw as above using a torque wrench.

Dismounting:
Simply loosen the clamp screw and remove the coupling.

MOUNTING INSTRUCTIONS

MOUNTING AND DISMOUNTING OF TORQUE LIMITERS

SK 3
With tapered conical clamp

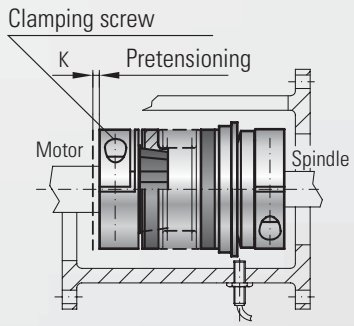


Mounting:
Prior to mounting make sure that the shafts to be connected do not exceed the angular or lateral misalignment limits for the coupling size to be used. This data can be found in the catalog. Slide the coupling onto the first shaft to the proper axial position. Using a torque wrench, uniformly tighten the clamping screws using a cross-wise tightening pattern. Apply 1/3, 2/3 and full torque until all the clamping screws are evenly tightened to the correct tightening torque (see page 13).

CAUTION: Mounting is completed. Further tightening of the clamp screws may damage the tapered bushing connection.

Dismounting:
Loosen the clamping screws. Use the three jack screws 9 conveniently mounted in the hub to evenly back out the tapered segment. Remove the coupling.

SK 5
Blind-mate with clamping hubs

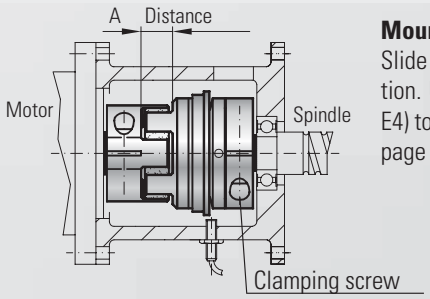


Mounting:
Prior to mounting it is necessary to consider the overal length of the assembled coupling. The press-fit coupling requires a specific pre-tensioning (K) between the two coupling halves to ensure backlash free
operation. Mount the „female" coupling segment containing the bellow onto the first shaft end to the proper axial position. Using a torque wrench tighten the clamp screw to the proper tightening torque. Mount the „male" coupling segment onto the second shaft end. The proper axial position is when the two couplings come together and the coupling is compressed by the proper pre-tension distance (K). See page 14. When the coupling segment is properly positioned tighten the clamp screw to the proper torque.

Dismounting:
Pull the coupling apart. Simply loosen the clamp screws and remove the coupling from the shaft.

Elastomer torque limiters

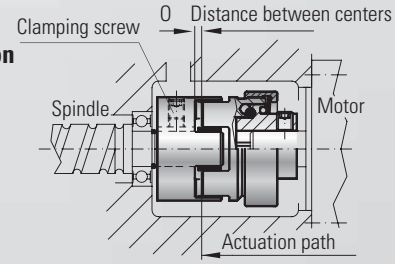
ES 2
With clamping hubs



Mounting:
Slide the coupling on the shaft ends to the proper axial position. Using a torque wrench, tighten the clamp screws (E1/ E4) to the correct tightening torque as indicated (in the table page 3)

Dismounting:
Simply loosen the clamp screw E1, E4 and remove the safety coupling.

ESL
With pure keyway connection



Mounting:
Slide the torque limiting portion onto the motor shaft. At the correct axial position, tighten the clamping screw (DIN 916). Repeat this step for the coupling hub on the spindle shaft.

The minimum distance O (see table on page 25) is critical during installation since the torque limiting portion will move axially upon disengagement.

The torque limiter functions according to a ratcheting principle. High-strength, hardened steel ball bearings are alternately engaged next to each other. One indexed position follows another (ratcheting).

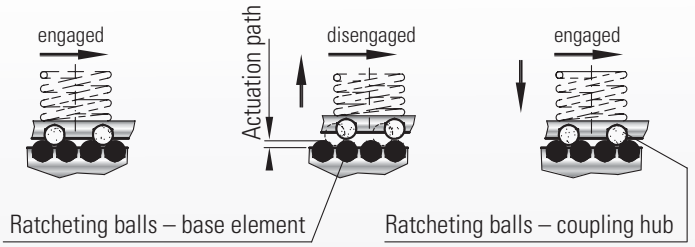
Dismounting:
Loosen the clamping screw and remove the safety coupling.

optional stainless steel

single-position
multi-position
load holding
full disengagement

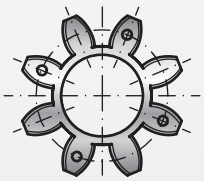
MOUNTING AND DISMOUNTING OF TORQUE LIMITERS

The ESL torque limiter is factory preset at the required disengagement torque and is not adjustable.



Elastomer inserts

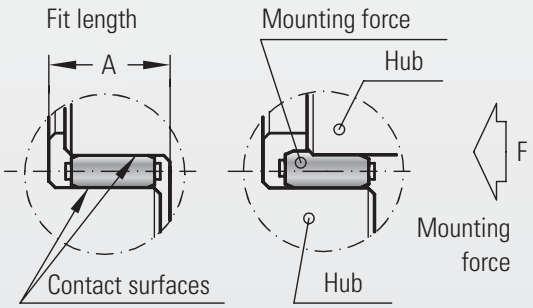
The equalizing element of an EK coupling is the elastomer insert. It transmits the torque without backlash or vibration. The elastomer insert defines the features of the entire coupling and/or of the entire drive system. The insert is available in 2 different shore values.



Type	Color	Shore hardness	Material	Temperature range	Features
A	red	98 Sh A	TPU	-30°C - +100°C	high damping
B	green	64 Sh D	TPU	-30°C - +120°C	high torsional stiffness

To achieve zero backlash the coupling hubs must be pressed together with an axial force compressing the elastomer ring. Cleaning the elastomer ring and hubs and applying a light film of oil will aid in the assembly process.

Caution!
Use PU – compatible greases such as petroleum jelly.

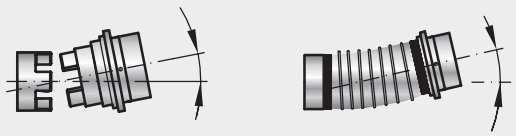


Series			5	10	20	60	150	300	450	800
Fit length	mm	A	9	11.5	16	18	20	24	26	31
minimum distance*	mm	0	0.7	1.1	0.7	1.3	1.3	-	-	-

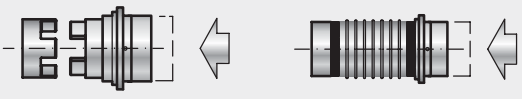
* Only necessary for ESL

Max. misalignment

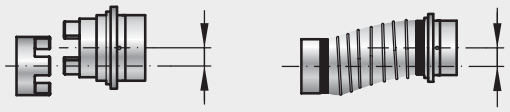
Angular misalignment Δ Kw



Axial misalignment Δ Ka



Lateral misalignment Δ Kr



CAUTION:
Exact alignment of the R+W Torque Limiter considerably increases the service life of the metal bellows.

Reducing or eliminating lateral misalignment eliminates the radial loading of the adjacent bearings, increasing service life and reducing heat.

For drives running at high speed it is recommended to align the coupling with a dial indicator.

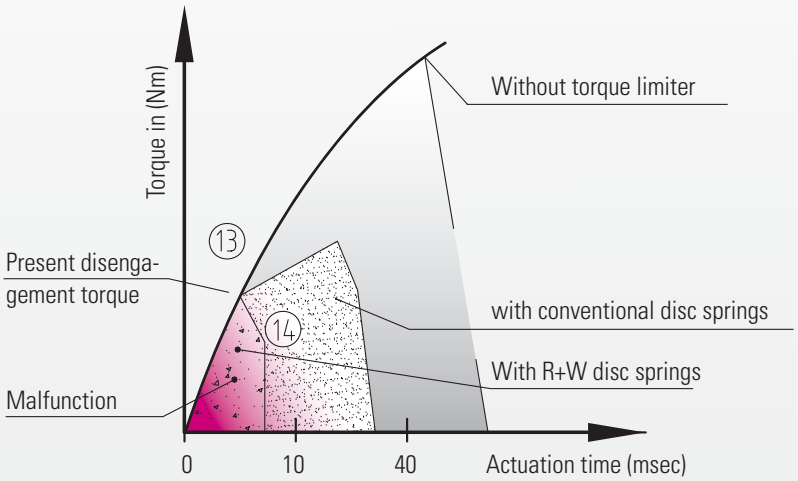
Max. misalignment values see table. Axial misalignment between 1-2 mm.

ADDITIONAL INFORMATION

BACKLASH-FREE TORQUE LIMITERS FROM R+W

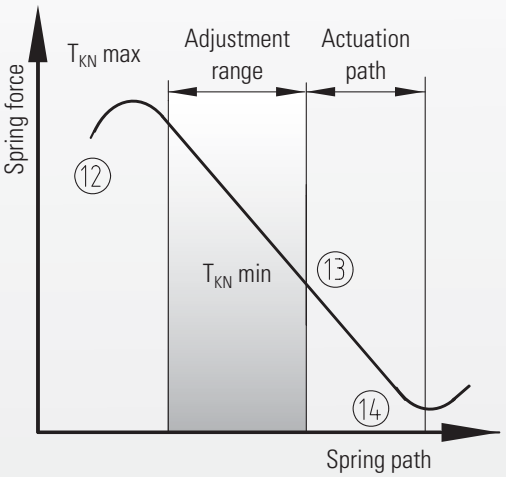
Behaviour and characteristic

Disengagement behavior



Spring characteristic

Degressive spring characteristic



Spring package:
R + W torque limiters function by means of a disc spring with a digressive characteristic developed exclusively for this application. Upon the couplings actuation, this characteristic (13) brings about an immediate drop in the torque (14) and an interruption of the force flux.

The spring force of the disc spring drops to a lower value after the disengagement process.

This advantage guarantees extremely short actuation times (1-3 ms), low wear and very low residual friction (between 2-5 %).

Speed:
The service life of the coupling is essentially determined by the number of rotations after disengagement.

Wear:
No wear occurs during engaged operating condition. In the event of an overload the drive should be stopped through a mechanical limit switch or proximity switch immediately.

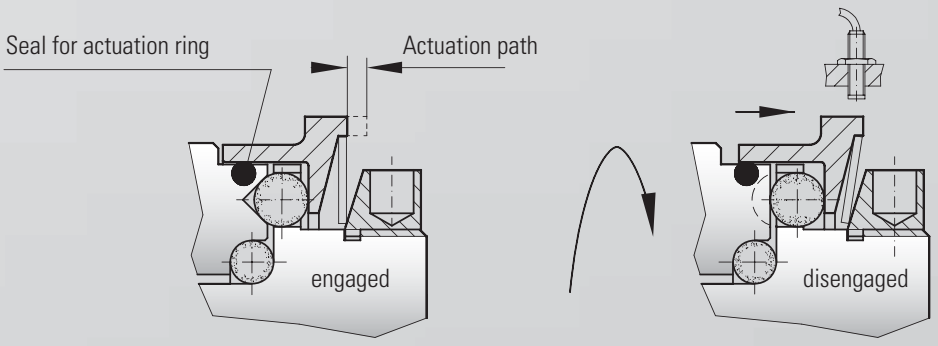
Maintenance:
When properly engaged, the torque limiters are wear free, and therefore require no maintenance. The ball detent mechanism within each coupling is permanently lubricated.

Seal:
Sealing of the torque limiters is available.

Torque Limiter in sealed version (Option)

Advantages of the sealing:

- Protection from dirt and liquid contamination
- Appropriate for food service and light washdown environments
- No escape of grease possible



Prior technical approval is suggested for applications using our products other than specified.

optional stainless steel

SELECTION

BACKLASH FREE TORQUE LIMITERS FROM R+W

According to disengagement torque

As a rule torque limiters are rated according to the required disengagement torque, which must be greater than the torque that is necessary for regular machine operation.

The disengagement torque of the torque limiters is determined as a rule in accordance with the drive specifications.

The following calcucation has proven itself as a good rule of thumb:

$$T_{KN} \geqq 1.5 \cdot T_{AS} \quad (Nm)$$

or

$$T_{KN} \geqq 9550 \cdot \frac{P_{AN}}{n} \cdot 1.5 \quad (Nm)$$

T_{KN}	=	rated torque of coupling	(Nm)
T_{AS}	=	peak torque of motor	(Nm)
T_{KN}	=	rated torque of coupling	(Nm)
P_{AN}	=	drive power	(kw)
n	=	speed of drive	(rpm))

According to acceleration torque (start-up at no load)

S_A = shock or load factor
S_A = 1 (uniform load)
S_A = 2 (non-uniform load)
S_A = 3 (high dynamic load)

Values for S_A = 2-3 are usual for servo drives on machine-tools

$$T_{KN} \geqq \alpha \cdot J_L \geqq \frac{J_L}{J_A + J_L} \cdot T_{AS} \cdot S_A \quad (Nm)$$

T_{KN}	=	rated torque of coupling	(Nm)
α	=	angular acceleration $\alpha = \frac{\omega}{t} = \frac{\pi \cdot n}{t \cdot 30}$	$\frac{1}{s^2}$
t	=	acceleration time	(s)
ω	=	angular speed in	(s^{-1})
n	=	speed of drive	(rpm)
J_L	=	moment of inertia on load side	(kgm^2)
J_A	=	moment of inertia on driving side	(kgm^2)
T_{AS}	=	peak torque of motor	(Nm)

According to acceleration and load torque (start with load)

$$T_{KN} \geqq \alpha \cdot J_L + T_{AN} \geqq \left[\frac{J_L}{J_A + J_L} \cdot (T_{AS} - T_{AN}) + T_{AN} \right] \cdot S_A \quad (Nm)$$

S_A = shock or load factor
S_A = 1 (uniform load)
S_A = 2 (non-uniform load)
S_A = 3 (high dynamic load)

Values for S_A = 2-3 are usual for servo drives on machine-tools

T_{KN}	=	rated torque of coupling	(Nm)
α	=	angular acceleration $\alpha = \frac{\omega}{t} = \frac{\pi \cdot n}{t \cdot 30}$	$\frac{1}{s^2}$
t	=	acceleration time	(s)
ω	=	angular speed in	(s^{-1})
n	=	speed of drive	(rpm)
J_L	=	moment of inertia on load side	(kgm^2)
T_{AN}	=	load torque	(Nm)
J_A	=	moment of inertia on driving side	(kgm^2)
T_{AS}	=	peak torque of motor	(Nm)

optional stainless steel

SELECTION

BACKLASH FREE TORQUE LIMITER

According to feed force

Spindle drive

$$T_{AN} = \frac{s \cdot F_V}{2000 \cdot \pi \cdot \eta} \quad (Nm)$$

T_{AN}	=	load torque	(Nm)
S	=	spindle pitch	(mm)
F_V	=	feed force	(N)
η	=	spindle efficiency	

Timing belt drive

$$T_{AN} = \frac{d_0 \cdot F_V}{2000} \quad (Nm)$$

T_{AN}	=	load torque	(Nm)
d_0	=	pinion dia. (pulley)	(mm)
F_V	=	feed force	(N)

According to resonant frequency (SK 2 / 3 / 5 with bellows attachment)

Usually high resonant frequencies of the couplings are required in order to make high acceleration values possible and to avoid excessive vibration.

For the purpose of caclulation the drive is reduced to a 2 mass sytem.

$$f_e = \frac{1}{2 \cdot \pi} \sqrt{C_T \times \frac{J_{Masch} + J_{Mot}}{J_{Masch} \cdot J_{Mot}}} \quad (Hz)$$

C_T	=	torsional stiffness of the coupling	(Nm/rad)
$J_{Masch.}$	=	moment of inertia of machine (spindle + slide + workpiece + half of coupling)	(kgm^2)
$J_{Mot.}$	=	moment of inertia of motor (motor's rotor + half of coupling)	(kgm^2)
f_e	=	Resonant frequency of a two mass system	(Hz)

According to torsional sitiffness (SK 2 / 3 / 5 with bellows attachment)

Transmission errors due to a torsional stress on the metal bellows:

$$\varphi = \frac{180}{\pi} \cdot \frac{T_{AS}}{C_T} \quad (Degrees)$$

φ	=	angle of turn	(degrees)
C_T	=	torsional stiffness of coupling	(Nm/rad)
T_{AS}	=	peak torque of motor	(Nm)

According to the function system

Load holding version: On SK1 / SKP / SKN models the load holding version has a double load safety margin. Ensure that models with bellows (SK2, 3 and 5) are of adequate size. The overload torque in this case should not exceed the nominal torque rating of the coupling.

optional stainless steel

FACTORS AND SIZING CALCULATIONS

BACKLASH FREE ELASTOMER COUPLINGS ES2 / ESL

Temperature factor S_υ

Temperature (υ)	A Sh 98 A	B Sh 64 D
> -30°C to -10°C	1,5	1,7
> -10°C to +30°C	1,0	1,0
> +30°C to +40°C	1,2	1,1
> +40°C to +60°C	1,4	1,3
> +60°C to +80°C	1,7	1,5
> +80°C to +100°C	2,0	1,8
> +100°C to +120°C	–	2,4

Start factor S_Z

Z_h	up to 120	120 - 240	above 240
S_Z	1,0	1,3	on request

Shock and load factor S_A

Uniform load	$S_A = 1,0$
Non-uniform load	$S_A = 1,8$
High dynamics, frequent reversing loads	$S_A = 2,5$

T_{KN}	=	Rated torque of the coupling	(Nm)
T_{Kmax}	=	Max. torque of the coupling	(Nm)
T_S	=	Existing peak torque of the coupling	(Nm)
T_{AS}	=	Peak torque of the drive element	(Nm)
T_{AN}	=	Rated torque of the drive element	(Nm)
T_{LN}	=	Rated torque of the driven element	(Nm)
P_{LN}	=	Power of the driven element	(KW)
n	=	Speed	(rpm)
J_A	=	Motor´s moment of inertia	(kgm^2)
J_L	=	Machine´s moment of inertia (Spindle + slide + workpiece)	(kgm^2)
J_1	=	Moment of inertia of a coupling half at the driving end	(kgm^2)
J_2	=	Moment of inertia of a coupling half at the driven end	(kgm^2)
m	=	Ratio of the moments of inerta driving to driven element	
υ	=	Temperature of the area around the coupling (observe radiant heat)	
S_υ	=	Temperature factor	
S_A	=	Shock or load factor	
S_Z	=	Start factor (factor for the number of starts/hour)	
Z_h	=	Cycle of starts	(1/h)

Selection of the Elastomer Coupling

1. Calculation example without shock or reversing loads

The rated torque of the coupling (T_{KN}) needs to be higher than the rated torque of the driven element (T_{LN}) times the temperature factor S_υ at the coupling for the application. If T_{LN} is not known, T_{AN} can be used for the calculation instead.

Condition: $T_{KN} > T_{LN} \times S_\upsilon$

Auxiliary calculation: $T_{LN} = \frac{9550 \times P_{LN}}{n}$

Calculation example: (No loads and shocks)

Drive face: DC - motor
$T_{AN} = 119$ Nm

Coupling conditons:
$\upsilon = 70°$ C
$S_\upsilon = 1,7$ (for 70°/Type A)

Driven face: Pump
$T_{LN} = 85$ Nm

Condition: $T_{KN} > T_{LN} \times S_\upsilon$
$T_{KN} > 85$ Nm $\times 1,7$
$T_{KN} > 144,5$ Nm → **Result:** A coupling type **EK 2/150/A** ($T_{KN} = 160$ Nm) is selected.

2. Calculation example with shock loads

In all cases the maximum rated torque (T_{Kmax}). of the coupling can not be exceeded. First calculate the rated torque (T_{KN}) of the coupling same as above. Compare this result to the peak torque (T_S) times the start factor (S_Z) times the temperature factor (S_υ) for the application. The greater of the two values must be less than (TKmax) of the coupling.

Condition: $T_{KN} > T_{LN} \times S_\upsilon$

Auxiliary calculation: $T_{LN} = \frac{9550 \times P_{LN}}{n}$

Condition: $T_{Kmax} > T_S \times S_Z \times S_\upsilon$

Auxiliary calculation: $T_S = \frac{T_{AS} \times S_A}{m + 1}$ $\quad m = \frac{J_A + J_1}{J_L + J_2}$

R+W: EXPERTISE AND KNOW-HOW

BACKLASH FREE TORQUE LIMITER

Quality and know-how for couplings in servo, NC and stepper motor systems.

The demands on drive technology have dramatically and steadily increased in the past few years. Our company **R+W** is proud to have reached a leading market position within the same few short years and we continue to work hard in the areas of design and technical development to stay there. **R+W** has representatives in more than 40 countries all over the world and is opening more branches every year.

Our range of high-quality precision couplings meet the needs of the most demanding applications. But for our technical staff this is not enough. We are constantly developing, new solutions, new designs, new possibilities.

We want you to contact us, to give us the opportunity to create a solution and to earn your business. Each person on the **R+W** staff knows that quality comes from his or her personal engagment with, and listening to, the customer.

Benefit from our quality and efficiency.

We are ISO 9001 certified. Our production and customer service department have been organized to maximize efficiency and minimize delivery time.

Extensive quantities of component inventory are kept on hand to ensure the quickest possible delivery, often within one day. Special designs are a major part of our business and are immediately processed, designed and built. **R+W** also has developed proprietary software to calculate resonant frequencies and other performance limits.

R+W continues to reinvest to ensure that our couplings remain innovative to improve their efficiency and operating dependability with your applicatons.

R+W: First Manufacturer of Safety Coupling with TÜV-Certificate

The complete line of R+W torque limiters were put through a complex test by TÜV Süd and met all the requirements for certification. The tests included normal wear, number of disengagements, precision of disengagement torque setting, and overall function and safety. During testing, overload events were simulated through active changes in the operating torque and running speed during operation.

Test result: The torque limiters meet all the requirements of the German GPSG law, an objective of the EG-directive.

Special low cost rust protection process

Corrosion protection which is equivalent to that of galvanized or chrome-plated surfaces is available.

The positive features of this include good resistance to wear and corrosion.

The parts are resistant to a salt spray test pursuant to DIN 50021 for a period of 140 hours.

This process represents a genuine, low cost alternative to expensive stainless steel materials.

Couplings with this surface treatment have been used for many years by well-known companies in the food industry.

Download

All 2D and 3D drawings can be downloaded directly from our website: **www.rwcouplings.com.**

DIN ISO 9001

Quality awareness is a high priority at R+W.

The introduction of DIN ISO 9001 has meant the refinement of quality procedures and the appropriate documentation.

In a one-year preparation peroid, the ISO 9001 quality system was produced and certified on 4 March 1997.

Constant monitoring and improvement of the system ensures a technically superior product with a quality standard second to none.

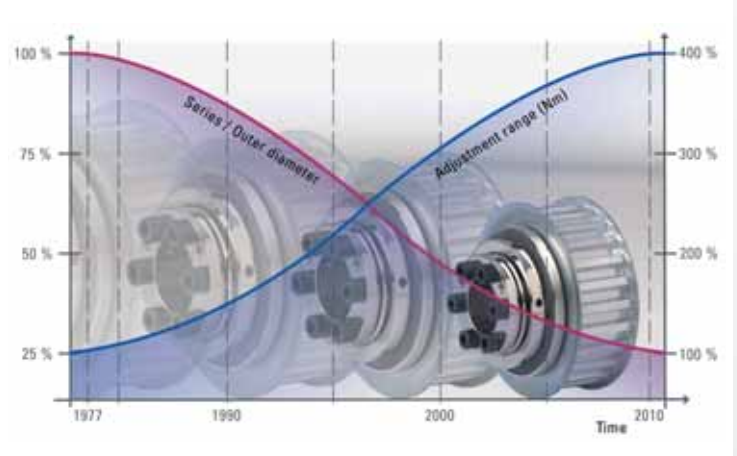
optional stainless steel

single-position
multi-position
load holding
full disengagement

PRODUCT DEVELOPMENT

More compact and higher torque capacity

The trend for safety couplings in the coming years will call for a more compact, higher torque capacity model. This becomes possible through the use of special materials, as well as the implementation of new procedures and techniques in manufacturing and the production of individual components.



Fiberglass reinforced high-strength plastic

After the successful introduction of alternative materials such as fiberglass reinforced thermoplastic to precision couplings, it becomes realistic to offer torque limiters, either partially or entirely out of fiberglass reinforced plastic in the near future. High-strength plastic materials provide the mechanical designer with additional freedom in the layout of the machine compared to standard materials such as aluminum or steel.

New product line ST from 1,000 – 160,000 Nm

The implementation of an ST torque limiter minimizes machine downtime, resulting in an increase in production capacity. The ST torque limiters are designed for high torque applications. This is possible through equally positioned torque modules around the circumference of the base element.

ST 1

Torque Limiter for indirect drives

- Compact, simple design
- Precise overload protection
- Torsionally rigid
- Integral bearings for timing belt, pulley or sprocket

ST 2

Torque Limiter for direct drives

- Compensation for misalignment
- Precise overload protection
- Vibration damping

ST 3

Torque Limiter for direct drives

- Torsionally rigid
- Compensation for misalignment
- Precise overload protection

ST 4

Torque Limiter with gear coupling

- High power density
- Compensations for misalignment
- Low restoring force
- Resilient

Request a copy of the complete ST catalog today!

R+W®
COUPLING TECHNOLOGY

Expertise and Know-how for your particular application.

R+W Antriebselemente GmbH
Alexander-Wiegand-Straße 8
D-63911 Klingenberg/Germany

Tel. +49-(0)9372 – 9864-0
Fax +49-(0)9372 – 9864-20

info@rw-kupplungen.de
www.rwcouplings.com

QUALITY MANAGEMENT
We are certified
according to ISO 9001-2008

TGA-ZM-05-91-00
Registration No. 40503432/2

THE R+W-PRODUCT RANGE

TORQUE LIMITERS
Series SK + ST

From 0.1 – 160,000 Nm, Bore diameters 3 – 290 mm
Available as a single position, multi-position,
load holding, or full disengagement version
Single piece or press-fit design

BELLOWS COUPLINGS
Series BK

From 2 – 10,000 Nm
Bore diameters 10 – 180 mm
Single piece or press-fit design

LINE SHAFTS
Series ZA / ZAE / EZ / EZV

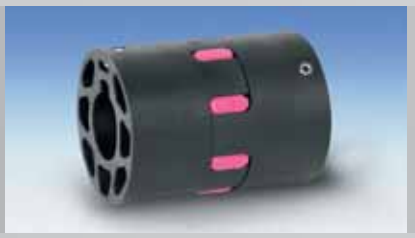
From 10 – 4,000 Nm
Bore diameters 10 – 100 mm
Available up to 6 mtr. length

MINIATURE BELLOWS COUPLINGS
Series MK

From 0.05 – 10 Nm
Bore diameters 1 – 28 mm
Single piece or press-fit design

SERVOMAX®
ELASTOMER COUPLINGS
Series EK

From 2 – 2,000 Nm, Shaft diameters 3 – 80 mm
backlash-free, press-fit design



ECOLIGHT®
ELASTOMER COUPLINGS
Series TX 1

From 2 – 810 Nm
Shaft diameters 3 – 45 mm

LINEAR COUPLINGS
Series LK

From 70 – 2,000 N
Thread M5 – M16

POLYAMID COUPLINGS
MICROFLEX
Series FK 1

Rated torque 1 Ncm
Bore diameters 1 – 1.5 mm

526/01/10/2.000

ROBUST AND COMPACT

Full disengagement

ST

TORQUE LIMITERS

SERIES ST | 1,000 – 160,000 Nm

R+W®
COUPLING TECHNOLOGY

THE ULTIMATE COUPLING FROM 1,000 – 160,000 NM

www.rwcouplings.com

optional stainless steel

Series **ST**

TORQUE LIMITERS

Areas of application for the ST

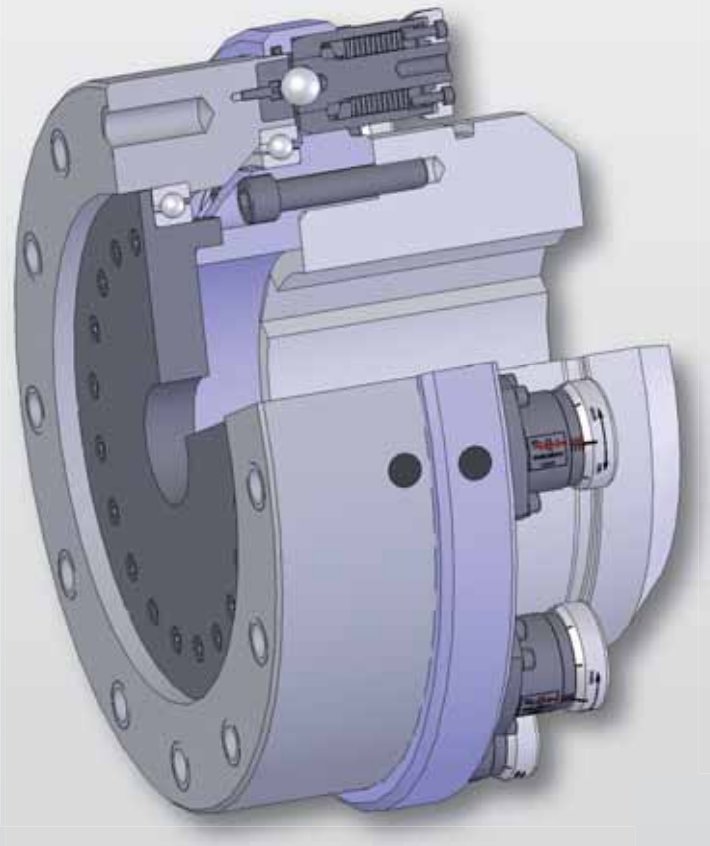
Heavy duty applications

- Rolling mills
- Dredgers
- Steel mills
- Industrial shredders
- Industrial conveyors
- Wind turbines
- Extruders
- Wastewater management
- Tunnel boring machines
- and much more

Features of the ST

- Compact, simple design
- Full disengagement
- Robust
- Precise overload protection
- Torsionally rigid
- Adjustable torque setting
- Infinite life and maintenance free

RELIABLE TORQUE OVERLOAD PROTECTION



Use of ST torque limiters will minimize machine downtime due to crashes and increase the availability and productivity of your machine.

ST torque limiters are designed for high torque applications. This is achieved through the use of individual torque modules evenly spaced around the circumference of the coupling.

The ST torque limiter is based on a spring loaded, ball-detent design.

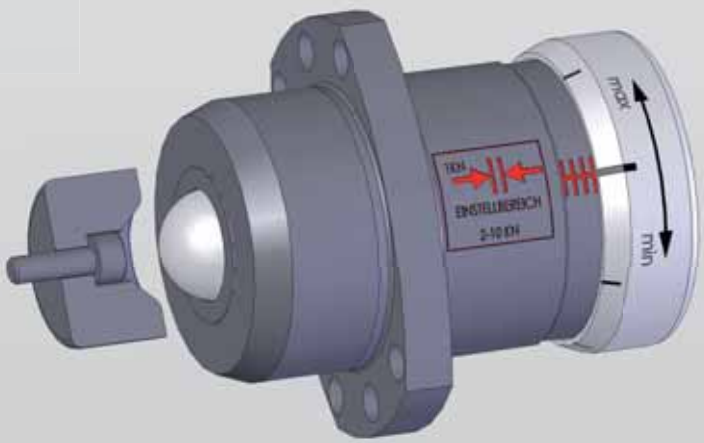
The transmittable torque is determined by the number of torque modules and their distance from the center of the coupling.

In the event of an overload, the balls exit the detents in the axial direction, resulting in a permanent separation of the drive and driven elements.

An axial force on the plunger re-engages the torque module.

The sealed torque module design prevents contamination by dirt and debris.

The torque module consists of two components.
These include the adjustable housing and plunger core.
The set torque is easily visible on a scale.



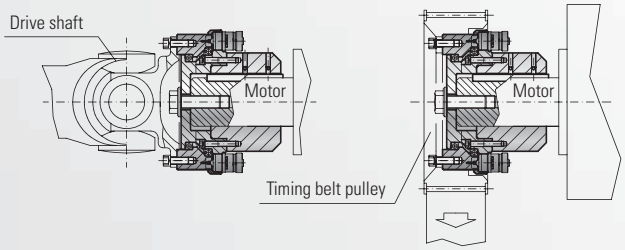
optional stainless steel

MODELS	FEATURES	POSSIBLE APPLICATIONS

ST 1

with keyway connection for indirect drives

- Compact, simple design
- Precise overload protection
- Torsionally rigid
- Integral bearings for timing belt pulley or sprocket

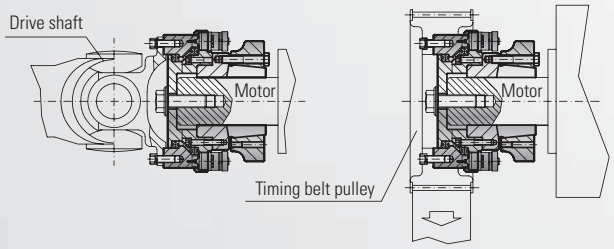


see page 4

STN

with conical clamp connection for indirect drives

- High clamping force
- Compact, simple design
- Precise overload protection
- Torsionally rigid
- Integral bearings for timing belt pulley or sprocket

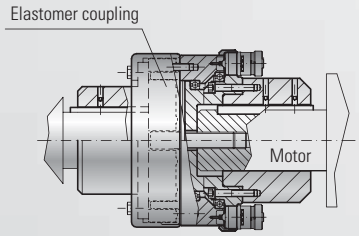


see page 5

ST 2

with keyway connection and elastomer coupling

- Vibration damping
- Compensation for misalignment
- Precise overload protection

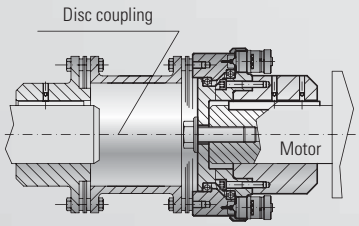


see page 8

ST 3

with keyway connection and disc coupling

- Torsionally rigid
- Compensation for misalignment
- Precise overload protection

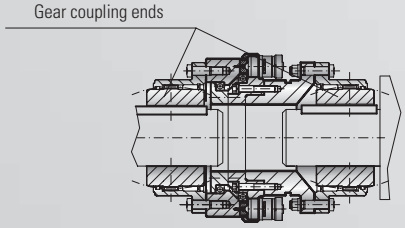


see page 7

ST 4

with keyway connection and gear coupling

- High torque density
- Compensation for misalignment
- Precise overload protection



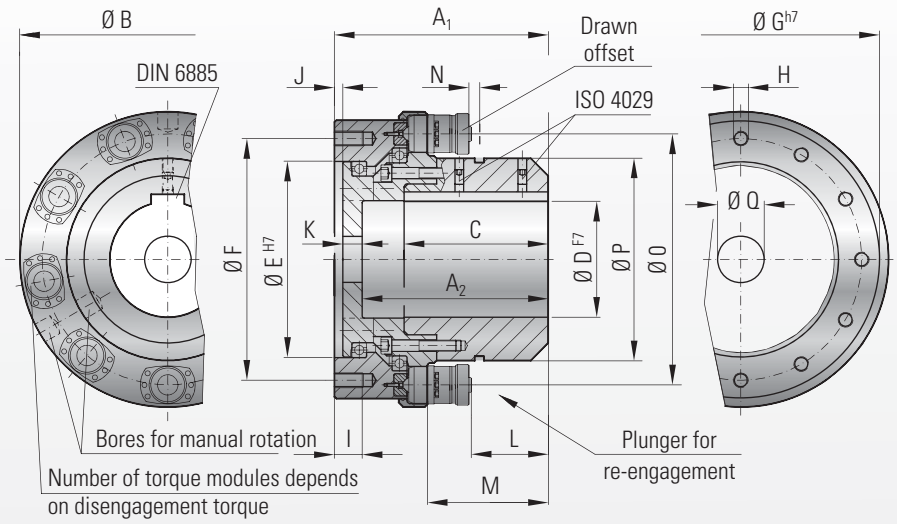
see page 10

optional stainless steel

MODEL **ST 1**

TORQUE LIMITER

with keyway connection



Material:
High-strength, nitro-carburized steel

Design:
Drive side: Coupling hub with keyway connection or spline profile.
Driven side: Output flange with 12x fastening threads and integral bearings.
Torque modules: Evenly spaced around the circumference. Field adjustable within the selected range.

Temperature range:
-30 to +120° C

Service life:
Infinite life and maintenance free when operated within the technical specifications.

Fit tolerance:
Tolerance between hub and shaft 0.02 – 0.07 mm

MODEL ST 1			Series											
			10			25			60			160		
Adjustment range available from - to	(KNm)		1-6	2-10	6-18	2-8	4-15	10-25	8-18	15-35	30-60	20-50	40-100	80-160
			3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length	(mm)	A_1	183			230			320			410		
Bore depth	(mm)	A_2	158			200			275			360		
Flange outside diameter	(mm)	B	270			318			459			648		
Fit length	(mm)	C	120			155			220			290		
Bore diameter possible Ø to Ø F7	(mm)	D	40-110			60-140			80-200			100-290		
Flange centering diameter H7	(mm)	E	170			210			300			450		
Bolt circle diameter ±0.3	(mm)	F	220			260			360			570		
Outside diameter h7	(mm)	G	259			298			418			618		
Fastening threads		H	12 x M16			12 x M16			12 x M20			12 x M24		
Thread depth	(mm)	I	25			30			35			40		
Fit length	(mm)	J	6			8			8			10		
Wall thickness	(mm)	K	17			20			30			38		
Distance	(mm)	L	45			83			96			136		
Distance	(mm)	M	95			130			165			225		
Actuation path	(mm)	N	4			4			7,5			10		
Bolt circle diameter - modules	(mm)	O	220			270			376			532		
Hub outside diameter	(mm)	P	170			218			295			418		
Bore for fastening screw	(mm)	Q	max. 110			max. Ø 140			max. Ø 200			max. Ø 290		
Moment of inertia (approx.) D max.	(10^{-3} kgm²)		370			780			4600			24600		
Speed max.	(1/min.)		4200			3800			2500			2000		
Allowable max. radial force standard*	(KN)		40			60			100			200		
Approx. weight at D max.	(kg)		40			63			179			463		

* higher radial force through additional bearing support.

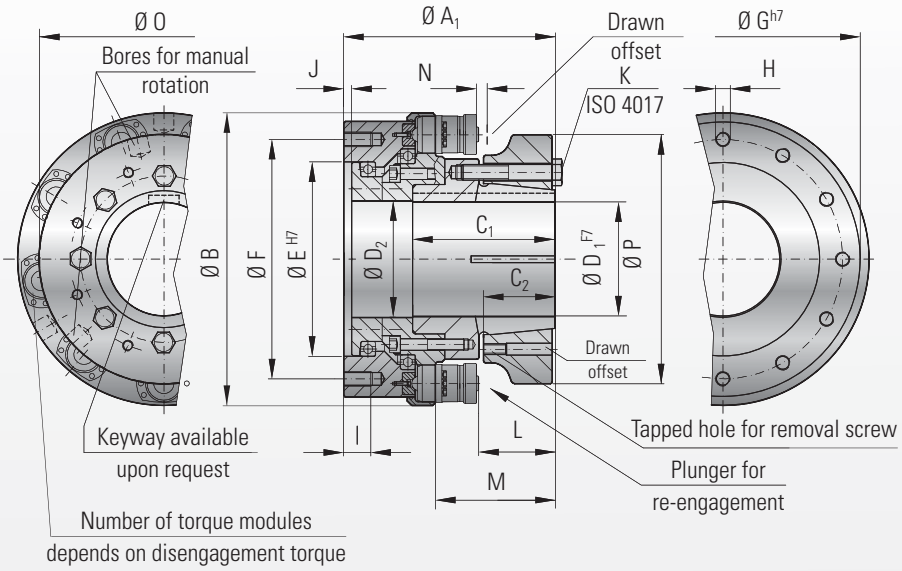
Full disengagement

optional stainless steel

MODEL **STN**

TORQUE LIMITER

with backlash free conical clamping connection



Material:
High-strength, nitro-carburized steel

Design:
Drive side: Coupling hub with tapered conical clamping connection
Driven side: Output flange with 12x fastening threads and integral bearings.
Torque modules: Evenly spaced around the circumference. Field adjustable within the selected range.

Temperature range:
-30 to +120° C

Service life:
Infinite life and maintenance free when operated within the technical specifications.

Fit tolerance:
Tolerance between hub and shaft 0.02 – 0.07 mm

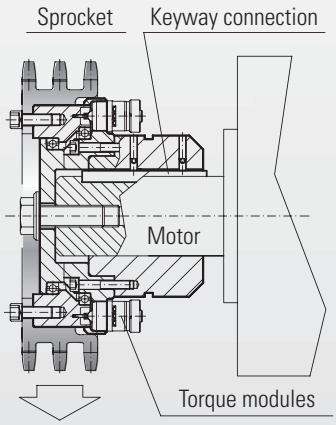
MODEL STN			Series											
			10			25			60			160		
Adjustment range available from - to	(KNm)		1-6	2-10	6-18	2-8	4-15	10-25	8-18	15-35	30-60	20-50	40-100	80-160
			3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length	(mm)	A_1	210			227			318			425		
Flange outside diameter	(mm)	B	270			318			459			648		
Fit length / keyway length	(mm)	C_1	147			152			218			305		
Effective clamping length	(mm)	C_2	62			67			93			125		
Bore diameter possible Ø to Ø F7	(mm)	D_1	65 - 110			70 - 150			80 - 200			140 - 290		
Bore diameter max. Ø F7 with keyway	(mm)	D_1	100			140			180			270		
Inside diameter	(mm)	D_2	110,2			140,2			200,2			290,2		
Flange centering diameter H7	(mm)	E	170			210			300			450		
Bolt circle diameter ±0.3	(mm)	F	220			260			360			570		
Outside diameter h7	(mm)	G	259			298			418			618		
Fastening threads		H	12 x M16			12 x M16			12 x M20			12 x M24		
Thread depth	(mm)	I	25			30			35			40		
Fit length	(mm)	J	6			8			8			10		
Tightening screw ISO 4017		K	8 x M16			9 x M16			8 x M20			8 x M24		
Tightening torque	(Nm)		180			180			300			710		
Distance	(mm)	L	72			80			94			151		
Distance	(mm)	M	122			127			163			240		
Actuation path	(mm)	N	4			4			7,5			10		
Bolt circle diameter - modules	(mm)	O	220			270			376			532		
Hub outside diameter	(mm)	P	218			278			378			535		
Moment of inertia (approx.) D max.	(10^{-3} kgm²)		446			789			5700			30700		
Speed max.	(1/min.)		4200			3800			2500			2000		
Allowable max. radial force standard*	(KN)		40			60			100			200		
Approx. weight at D max.	(kg)		50			65			200			550		

* higher radial force through additional bearing support.

optional stainless steel

MODEL **ST 1 / STN**

Mounting example with sprocket and keyway connection

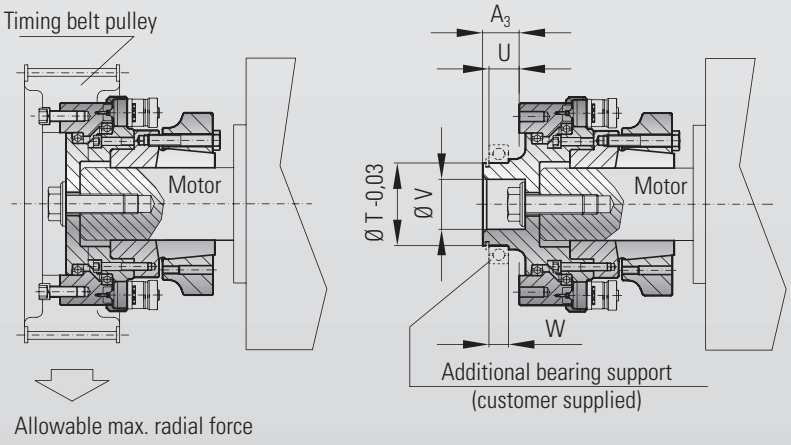


Ordering example

ST1 /025 /4-15/12 /120 /25 / xx

- Model
- Series
- Adjustment range (KNm)
- Disengagement torque (KNm)
- Bore Ø D H7
- Bore for fastening screw (Ø Q)
- Non-standard (e.g. stainless steel)

Mounting example with timing belt pulley and conical clamping hub

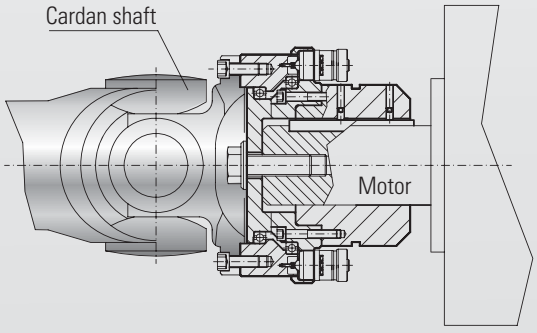


Ordering example

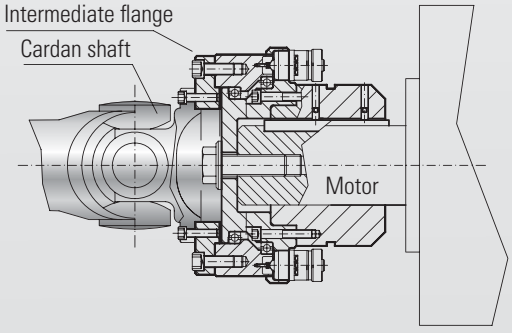
STN /025 /4-15/12 /120 /25 / xx

- Model
- Series
- Bore Ø D H7
- Bore for fastening screw (Ø Q)
- Adjustment range (KNm)
- Disengagement torque (KNm)
- Non-standard (e.g. stainless steel)

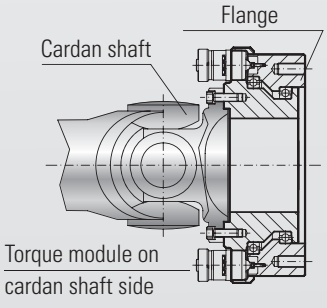
Mounting example for cardan shafts



Bolt circle and centering diameter are matched to the cardan shaft.



Mounting with intermediate flange.



Flange mounting on both sides possible.

Designs for Direct Drives

optional stainless steel

with integral elastomer jaw coupling

MODEL **ST 2**

Torque 1,000 – 160,000 Nm

Features

- Vibration damping
- Compensation for axial, lateral, and angular misalignment
- Robust
- Mounts axially

see pages 8/9

with integral disc pack coupling

MODEL **ST 3**

Torque 1,000 – 160,000 Nm

Features

- Torsionally rigid for precise torque transmission
- Compensation for axial, lateral, and angular misalignment
- Low restoring forces
- Wear and maintenance free

upon request

with integral gear coupling

MODEL **ST 4**

Torque 1,000 – 160,000 Nm

Features

- High torque density
- Compensation for axial, lateral, and angular misalignment
- Low restoring forces
- Robust

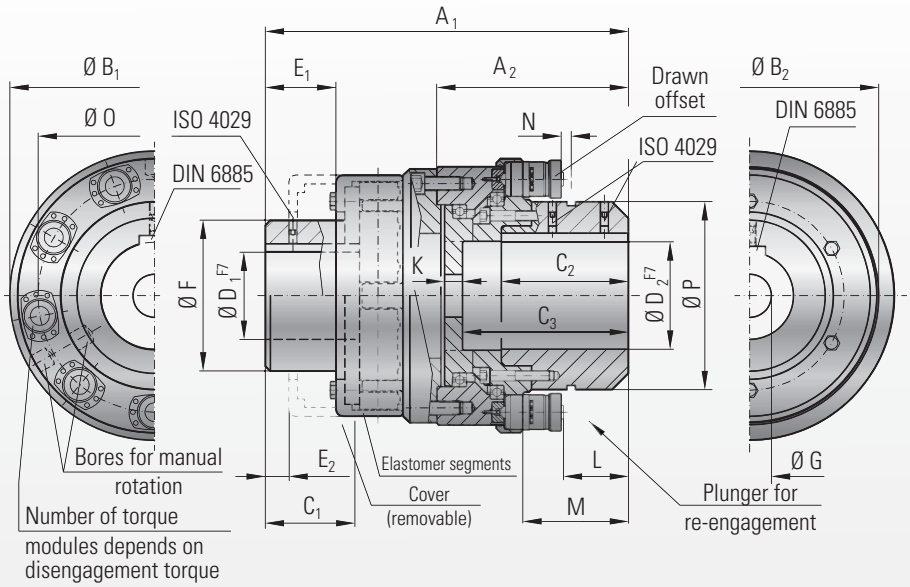
see page 10

optional stainless steel

MODEL **ST 2**

TORQUE LIMITER

with integral elastomer coupling



Material:
Torque limiter: High-strength, nitro-carburized steel
Elastomer segments: precision molded, wear resistant rubber compound (75-80 Shore A)
Elastomer coupling: coupling hubs made from high-strength, cast steel (coated)

Design: with keyway or spline connection. Elastomer segments for misalignment compensation. Torque modules evenly spaced around the circumference. Field adjustable within the selected range.

Temperature range: see page 9

Service life: Infinite life and maintenance free when operated within the technical specifications.

Fit tolerance:
Tolerance between hub and shaft 0.02 – 0.07 mm

Balancing: Standard balancing G16
(higher speeds upon request)

MODEL ST 2			Series											
			10			25			60			160		
Adjustment range available from - to	(KNm)		1-6	2-10	6-18	2-8	4-15	10-25	8-18	15-35	30-60	20-50	40-100	80-160
			3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length ±2	(mm)	A_1	360			437			580			730		
Length of torque limiting portion	(mm)	A_2	183			230			320			410		
Flange OD (ST portion)	(mm)	B_1	270			318			459			648		
Flange OD (elastomer portion)	(mm)	B_2	290			330			432			553		
Fit length/keyway length D1	(mm)	C_1	97			116			160			230		
Fit length/keyway length D2	(mm)	C_2	120			155			220			290		
Bore depth (torque limiting portion)	(mm)	C_3	158			200			275			360		
Bore diameter (elastomer portion) Ø – Ø F7	(mm)	D_1	40-105*			60-130*			80-160*			100-200*		
Bore diameter (torque limiting portion) Ø – Ø F7	(mm)	D_2	40-110			60-140			80-200			100-290		
Length to cover	(mm)	E_1	70			87			112			152		
Length to (cover removed)	(mm)	E_2	22			26			40			65		
Hub diameter	(mm)	F	160			200			255			300		
Bore for fastening screw	(mm)	G	max. 110			max. 140			max. 200			max. 290		
Distance	(mm)	L	45			83			96			136		
Distance	(mm)	M	95			130			165			225		
Actuation path	(mm)	N	4			4			7.5			10		
Bolt circle diameter ST	(mm)	O	220			270			376			532		
Hub outside diameter	(mm)	P	170			218			295			418		
Moment of inertia (approx.) D max.	(10^{-3} kgm²)		854			1850			8960			36858		
Speed max.	(1/min.)		2700			2300			1800			1500		
Approx. weight at D max.	(kg)		80			115			287			729		
Axial	(mm)		1.5			1.5			2			2.5		
Lateral	(mm)		0.4			0.5			0.6			0.7		
Angular	(Degrees)		1			1			1			1		
Dynamic torsional stiffness at T_{KN} (Standard A Insert)	(10^3 Nm/rad)		145			230			580			1000		

* larger bore diameters upon request.

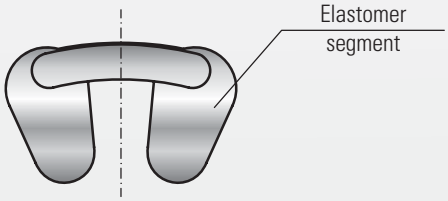
MODEL **ST 2**

The elastomer segments

The compensating element of the ST2 torque limiters are the elastomer segments. These transmit the torque, while damping vibrations. The elastomer segments determine the properties of the entire coupling. The elastomer segments will also compensate for lateral, axial, and angular misalignment.

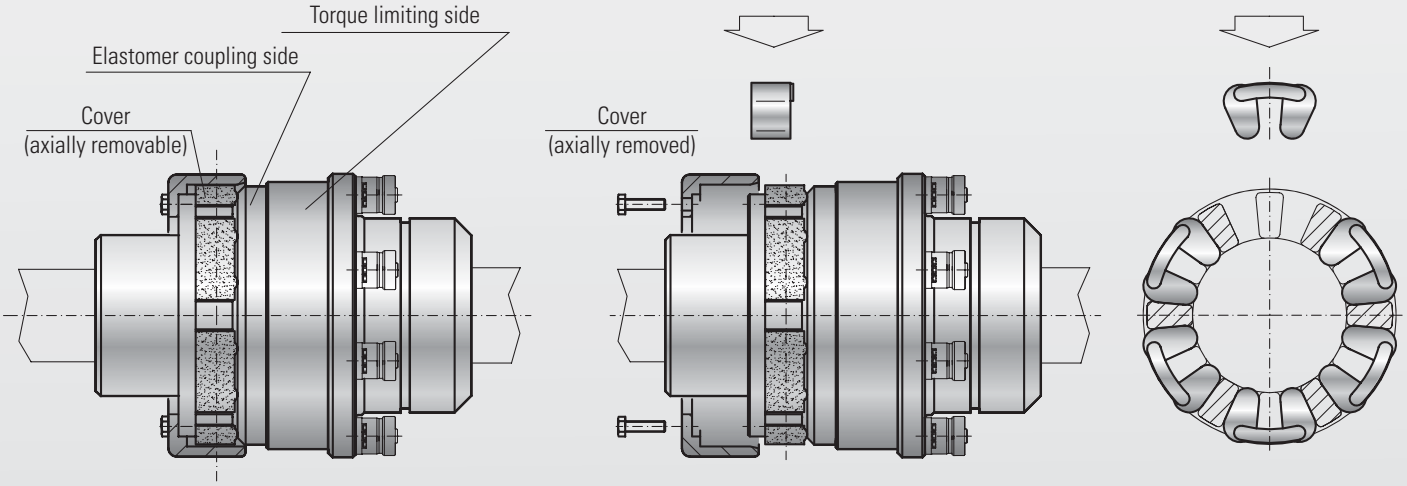
The standard elastomer segment is the type "A". Three different types are available.

Type	Relative damping (ψ)	Temperature range constant	peak	Material	Shore hardness	Features
A (Standard)	1,0	-40°C to +80°C	+90°C	Natural and synthetic rubber	75-80 Shore A	Very high wear resistance
B	1,0	-40°C to +100°C	+120°C	Synthetic rubber	73-78 Shore A	Resistant to mineral oils and power fuel
C	1,0	-70°C to +120°C	+140°C	Silicone rubber	70-75 Shore A	High temperature range



Note: Elastomer segments can easily be changed after installation.
Every coupling utilizes 6x elastomer segments.
The elastomer segments do not need to be installed prior to installation.

Changing the elastomer segments



Ordering example

ST2 / 025 / 10-25 / 15 / 100 / 120 / xx

- Model
- Series
- Adjustment range (KNm)
- Disengagement torque (KNm)
- Bore Ø D_1 F7
- Bore Ø D_2 F7
- Non-standard (e.g. stainless steel)

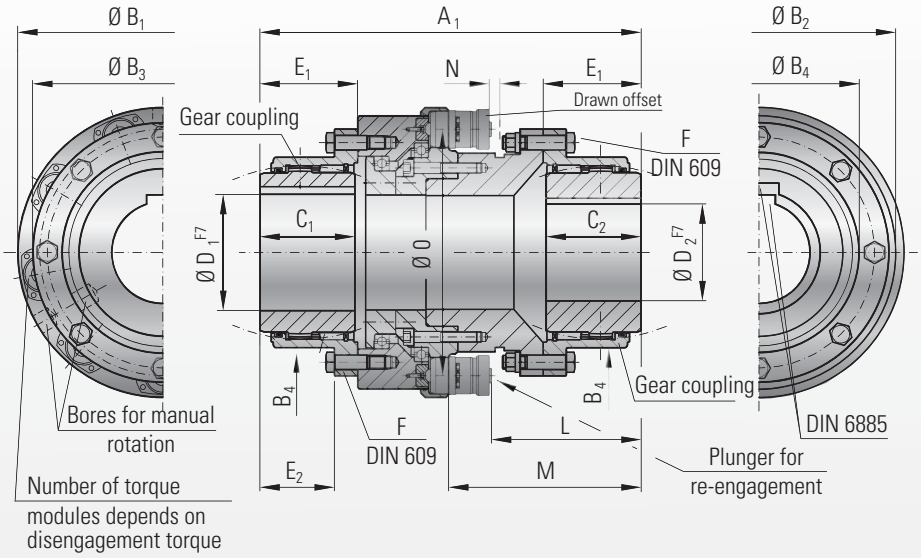
For easier handling, the coupling will be shipped unassembled.

optional stainless steel

MODEL **ST 4**

TORQUE LIMITER

with integral gear coupling



Material:
Torque limiter: High-strength, nitro-carburized steel
Gear coupling ends: Extremely wear resistant tooth geometry made from high-strength alloyed steel (surface nitro-carburized)

Design: with keyway or spline connection. Gear coupling for misalignment compensation. Torque modules evenly spaced around the circumference. Field adjustable within the selected range.

Temperature range: -30 to +120° C

Service life:
Infinite life and maintenance free when operated within the technical specifications.

Fit tolerance:
Tolerance between hub and shaft 0.02 – 0.07 mm

Balancing: Standard balancing G16
(higher speeds upon request)

MODEL ST 4			Series											
			10			25			60			160		
Adjustment range available from - to	(KNm)		1-6	2-10	6-18	2-8	4-15	10-25	8-18	15-35	30-60	20-50	40-100	80-160
			3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length	(mm)	A_1	377			430			615			850		
Flange OD (ST portion)	(mm)	B_1	270			318			459			648		
Mounting flange (ST portion)	(mm)	B_2	259			298			418			618		
Flange diameter (gear coupling)	(mm)	B_3	234			274			380			506		
Hub diameter (gear coupling)	(mm)	B_4	181			209			307			426		
Fit length/keyway length	(mm)	$C_{1/2}$	90			105			150			220		
Bore diameter Ø – Ø F7	(mm)	$D_{1/2}$	40-112*			55-132*			90-198*			150-275*		
Length	(mm)	E_1	92.5			108			154			225		
Length	(mm)	E_2	70			79			116			196		
Screw DIN 609 12.9	(mm)	F	8 x M16			8 x M20			10 x M20			16 x M24		
Tightening torque	(Nm)		280			650			650			1100		
Distance	(mm)	L	146			172			237			320		
Distance	(mm)	M	196			222			306			412		
Actuation path	(mm)	N	4			4			7.5			10		
Bolt circle diameter ST	(mm)	O	220			270			376			532		
Moment of inertia (approx.) D max.	(10^{-3} kgm²)		545			1298			7547			39742		
Speed max.	(1/min.)		2700			2300			1800			1500		
Approx. weight at D max.	(kg)		69			115			325			870		
Axial	(mm)		4			5			6			8		
Lateral	(mm)		6			7			8			10		
Angular	(Degrees)		1.2			1.2			1.2			1.2		

* larger bore diameters upon request.

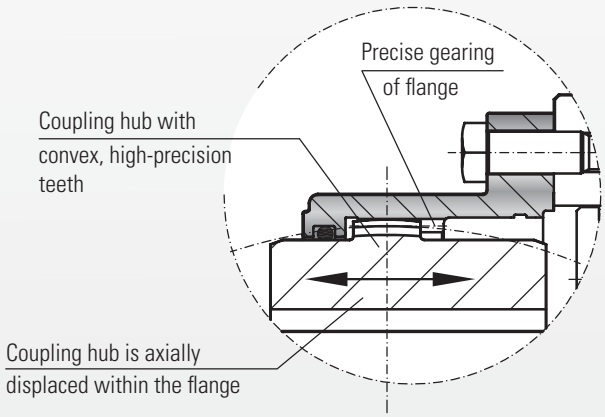
optional stainless steel

MODEL **ST 4**

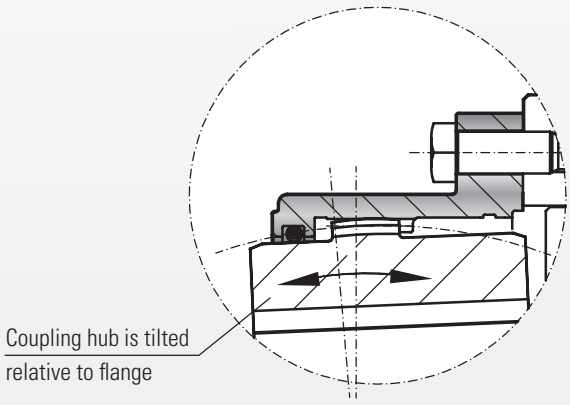
Function of the gear coupling

Shaft misalignment is compensated for through the high precision gearing of the coupling hub and flange. The gearing transmits the torque with minimal backlash and a high degree of torsional rigidity. The precise geometry of the gearing ensures the performance of the coupling.

The gearing compensates for lateral, angular, and axial misalignment.

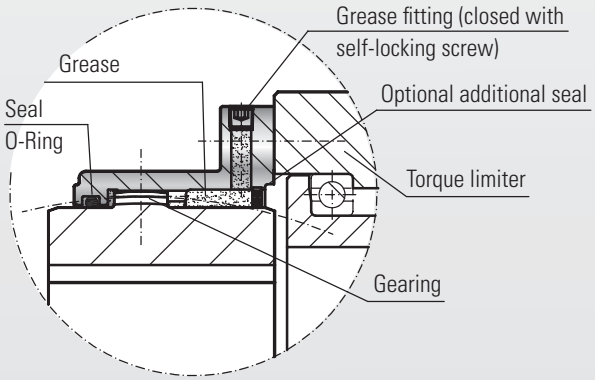


Axial misalignment



Angular and lateral misalignment

Maintenance and lubrication



Ordering example

ST4 / 025 / 10-25 / 15 / 100 / 120 / xx

- Model
- Series
- Adjustment range (KNm)
- Disengagement torque (KNm)
- Bore Ø D_1 F7
- Bore Ø D_2 F7
- Non-standard (e.g. stainless steel)

Recommended lubricants

Note: The lubrication of the gearing is very important to the service life of the gear coupling.

An additional seal (optional) ensures the lubrication of the gearing over a long period of time.

Lubricant: High performance grease

Normal speed and operating load		High speed and operating load	
Castrol	Impervia MDX	Caltex	Coupling Grease
Esso	Fibrax 370	Klüber	Klüberplex GE 11-680
Klüber	Klüberplex GE 11-680	Mobil	Mobilgrease XTC
Mobil	Mobilux EPO	Shell	Albida GC1
Shell	Alvania grease EP R-O or ER 1	Texaco	Coupling Grease
Total	Specis EPG		

For easier handling, the coupling will be shipped unassembled.

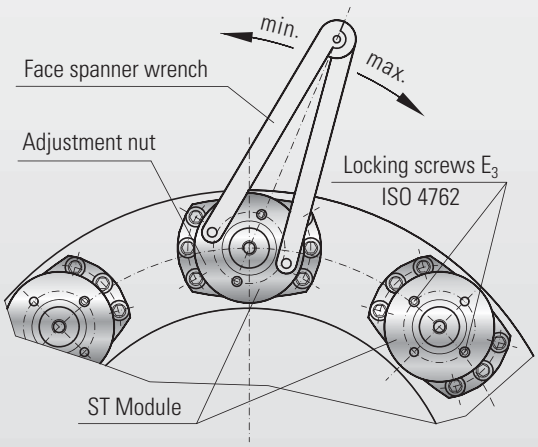
optional stainless steel

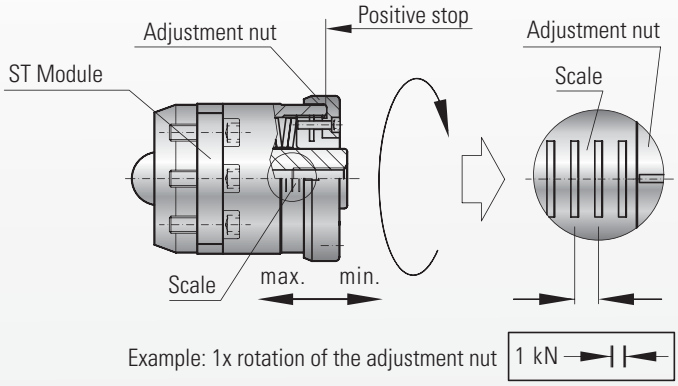
MODEL **ST 1 / STN / ST 2 / ST 3 / ST 4**

TORQUE LIMITEREN

Mounting Instructions

Torque adjustment





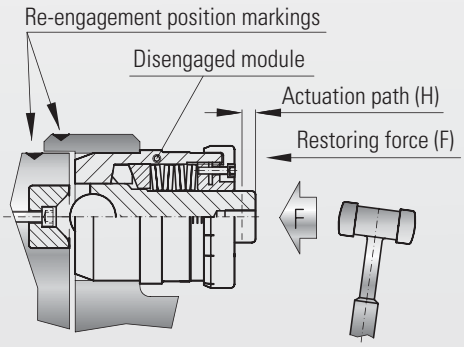
Example: 1x rotation of the adjustment nut 1 kN

After loosening (approx. 1 rotation) the locking screws (E_3), the adjustment nut be turned to adjust the disengagement setting. The adjustment is limited by a positive stop at the max setting. The upper value at min. is marked on the adjustment scale. After adjustment, the torque setting is secured by tightening the locking screws (E_3).

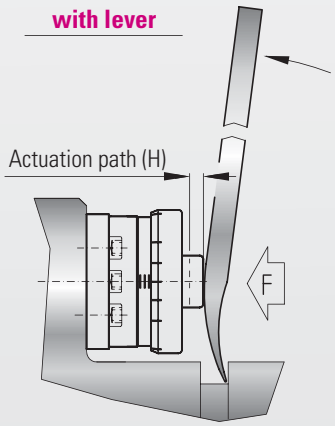
Note: All torque modules must be set to the same value.

Re-engagement of the torque modules

with rubber mallet



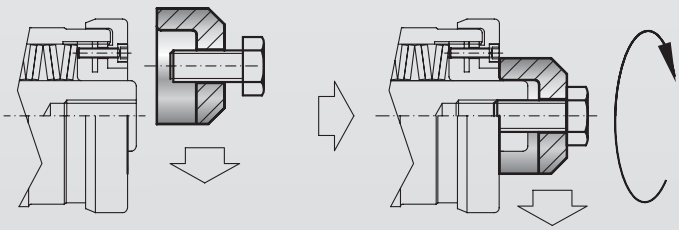
with lever



After the overload has been cleared, the drive and driven side must be rotated until the re-engagement position markings are lined up. The modules can only be re-engaged in this position.

The module is re-engaged through applying an axial force to the plunger. You will hear the module re-engage. Once this is complete, the torque limiter is ready for operation.

Manual disengagement of modules



Engaged module

Disengaged module

Prior to machine start-up, the individual modules can be manually disengaged in an assembled state. A manual disengagement tool is available from R+W for this task (see page 13).

optional stainless steel

MODEL **ATEX**

FOR USE IN EXPLOSIVE ATMOSPHERES

Regulated under the new European directive, ATEX 95a. Explosive atmospheres are classified into 3 different zones.

Zone 0: An explosive atmosphere consisting of a mixture of air and flammable substances, in the form of a gas, vapor, or mist, that is present frequently, continuously, or for extended periods of time.

Zone 20: An explosive atmosphere consisting of clouds of combustible dust in the air under the same conditions above.

Zone 1: An explosive atmosphere consisting of a mixture air and flammable substances, in the form of gas, vapor, or mist, that is likely to occur in normal operation occasionally.

Zone 21: An explosive atmosphere consisting of clouds of combustible dust in the air under the same conditions above.

Zone 2: An explosive atmosphere consisting of a mixture air and flammable substances, in the form of gas, vapor, or mist, that is unlikely to occur in normal operation, but would only persist for a short period of time if it were to occur.

Zone 22: An explosive atmosphere consisting of clouds of combustible dust in the air under the same conditions above.

For zones 1/21 and 2/22, ST-EEx torque limiters can be supplied with ATEX 95a accreditation.

Mounting and operating instructions:
Detailed mounting and instruction manuals are supplied with the ST-EEx torque limiters.
The following information is included:

- Assembly of the ST-EEx torque limiter
- Precise tightening torques and misalignment ratings
- Details covering proper implementation
- Maintenance
- Inspection intervals
- Troubleshooting
- Coupling identification markings
- Certificate of conformance

Identification:
All ST-EEx torque limiters are inscribed with manufacturer and accreditation information.

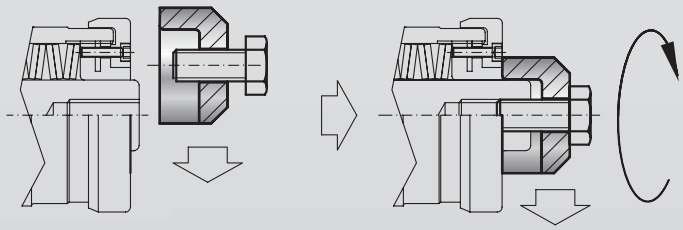
Accreditation information example:

Typ: ST4 25 EEx-2009
II 2 G D
EEx fr c T3 / 135°C
Ser.No.: A 200101.1
Tech.Ref.No.:2009/008RW

ACCESSORIES

Engagement / disengagement tool

Order-No.: see table



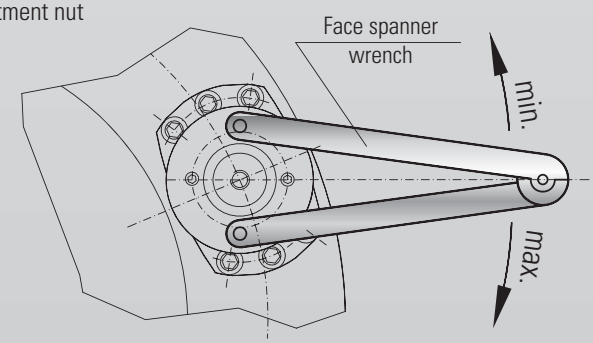
Engaged module | Disengaged module

Series	Engagement / disengagement tool
15	Order-No. AV/0015
30	Order-No. AV/0030
70	Order-No. AV/0070

Face spanner wrench

Order-No.: see table

For rotation of adjustment nut

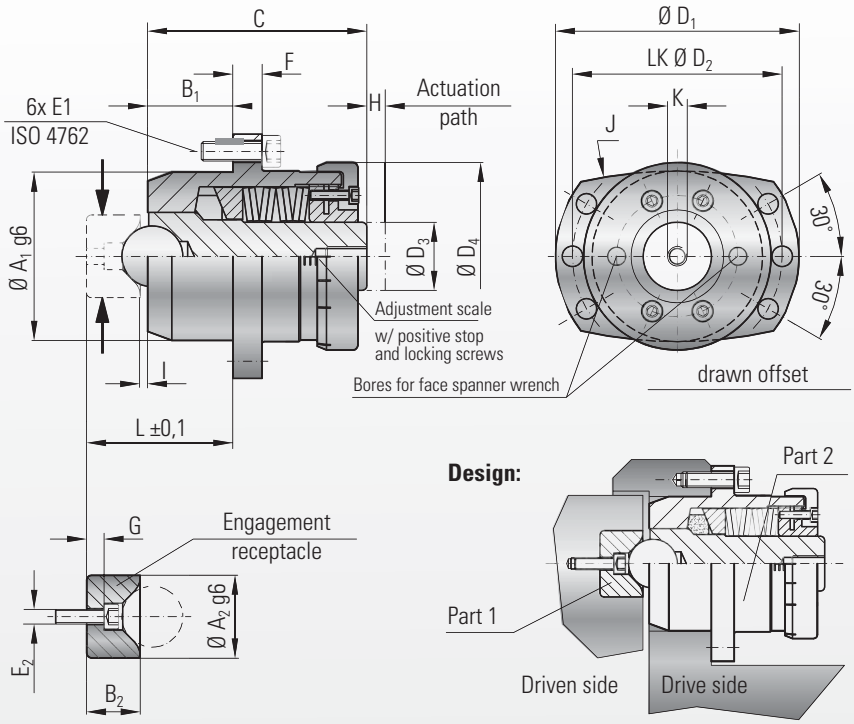


Series	Face spanner wrench
15	Order-No. SLS/0015
30	Order-No. SLS/0030
70	Order-No. SLS/0070

optional stainless steel

MODEL **ST**

TORQUE MODULE



Material: High-strength, nitro-carburized steel

Design: Two part assembly for installation into prefabricated coupling components.
Part 1: Engagement receptacle
Part 2: Module with self-contained, spring loaded plunger.

The spring tension is adjustable in the field.

The set force is visible on the adjustment scale.

Temperature range: -30 to +120° C

Service life: Infinite life and maintenance free when operated within the technical specifications.

Fit tolerance: For mounting of the ST torque modules, an H7 bore tolerance is required.

Re-engagement: The modules are re-engaged by applying an axial force to the plunger when a synchronized angularity of the drive and driven side is present.

MODEL ST			Series		
			15	30	70
Tangential force (KN) Adjustment range available from - to	(ranges)	1	1-4	5-10	8-20
		2	2-8	10-20	15-40
		3	6-20	20-35	30-70
Centering diameter torque module g6	(mm)	A_1	40	70	90
Centering diameter engagement receptacle g6	(mm)	A_2	24	34	44
Centering length torque module	(mm)	B_1	20	35	45
Centering length engagement receptacle	(mm)	B_2	14	22	30
Overall length	(mm)	C	70	103	135
Outside diameter	(mm)	D_1	59	100	129
Bolt circle diameter	(mm)	D_2	50	86	110
Diameter plunger	(mm)	D_3	16	28	35
Diameter adjustment nut	(mm)	D_4	44	75	92
Screw / tightening torque ISO 4762	(mm)	E_1	6 x M5 x 16 / 10 Nm	6 x M8 x 25 / 40 Nm	6 x M12 x 35 / 120 Nm
Screw / tightening torque ISO 4762	(mm)	E_2	M4 x 14 4.5 Nm	M6 x 20 15.5 Nm	M8 x 25 38 Nm
Flange thickness	(mm)	F	7	12	16
Distance	(mm)	G	5	8	10
Actuation path	(mm)	H	4	7.5	10
Distance	(mm)	I	2	3	4
Radius	(mm)	J	110	200	250
Inner thread	(mm)	K	M8 x 15	M10 x 25	M16 x 30
Distance ± 0,1	(mm)	L	36	60	79
Weight	(kg)		0.65	2.7	6

axial spring force ≈ tangential force/1.4

MODEL **ST**

Ordering example

ST / 30 / 2 / 12 / xx

- Model
- Series
- Adjustment range 1/2/3
- Tangential force (KN)
- Non-standard (e.g. stainless steel)

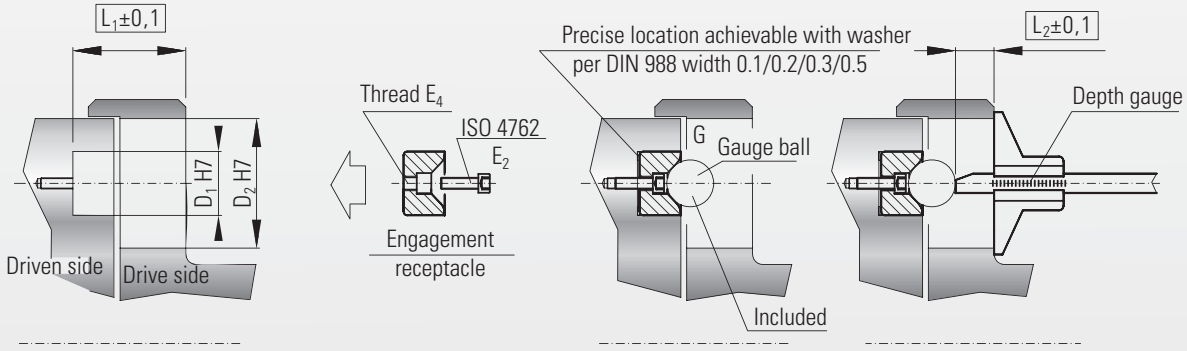
Maintenance

The ST modules are lubricated and sealed for life. Routine maintenance is not required. The modules have an extreme service life, however, after several disengagements, the function of the modules should be checked.

Mounting instructions ST

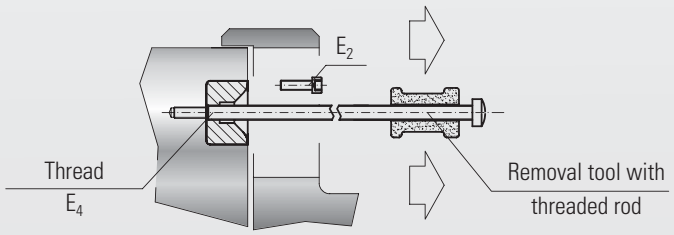
Mounting engagement receptacle

Note: Measurements L1 and L2 must be checked prior to installing the torque modules.

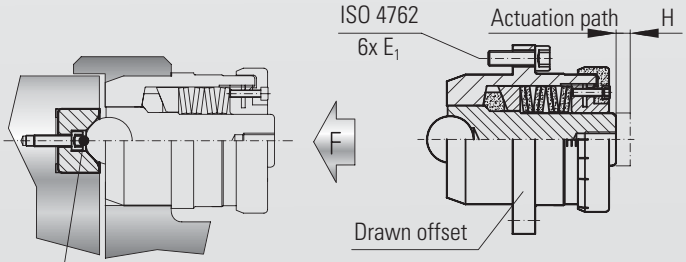


Dismounting of engagement receptacle

After loosening the mounting screw E2, the engagement receptacle can re dismounted with a removal tool.



Mounting of torque module



Note: Prior to mounting the torque module, the ball seat must be lubricated (e.g. Klüber Isoflex Topas NB 52).

MODEL ST		Series 15	Series 30	Series 70
Screws	E_1	6 x M5 x 16 (12.9)	6 x M8 x 25 (12.9)	6 x M12 x 35 (12.9)
Tightening torque		10 Nm	40 Nm	120 Nm
Screws	E_2	1 x M4 x 12	1 x M6 x 20	1 x M8 x 25
Tightening torque		4,5 Nm	15,5 Nm	38 Nm
Screws	E_3	4 x M4 x 14	4 x M4 x 16	4 x M5 x 20
Tightening torque		4,5 Nm	4,5 Nm	10 Nm
Thread	E_4	M5	M8	M10
Actuation path	H	4 mm	7,5 mm	10 mm
Restoring force	F	max. 2 KN	max. 4 KN	max. 6 KN
Fit length	L_1 ±0,1	36	60	79
Depth measurement	L_2 ±0,1	10	20,5	29
Gauge ball	Ø G	16	25	30

optional stainless steel

SELECTION

According to disengagement torque

As a rule, torque limiters are rated according to the required disengagement torque, which must be greater than the necessary operating torque.

The disengagement torque is determined according to the drive specifications.

The following formula provides a basis for calculation:

$$T_{AR} \geqq K \cdot T_{max} \text{ (Nm)}$$

K = 1,3 uniform load
K = 1,5 light, non-uniform load
K = 1,8 sheavy, non-uniform load

or

$$T_{Drive} \geqq 9550 \cdot \frac{P_{Drive}}{n} \text{ (Nm)}$$

T_{AR}	=	Disengagement torque of coupling	(Nm)
K	=	service factor	
T_{max}	=	peak operating torque	(Nm)
T_{Drive}	=	Nominal torque of drive	(Nm)
P_{Drive}	=	Drive power	(kW)
n	=	Drive speed	(min^{-1})

According to acceleration torque (start-up at no load)

S_A = Shock or load factor
S_A = 1 (uniform load)
S_A = 2 (non-uniform load)
S_A = 3 (highly dynamic load)

$$T_{AR} \geqq \alpha \cdot J_L \geqq \frac{J_L}{J_A + J_L} \cdot T_{AS} \cdot S_A \text{ (Nm)}$$

T_{AR}	=	Disengagement torque of coupling	(Nm)
α	=	Angular acceleration $\alpha = \frac{\omega}{t} = \frac{\pi \cdot n}{t \cdot 30}$	$\frac{1}{s^2}$
t	=	Acceleration time	(sec.)
ω	=	Angular velocity	(1/s)
n	=	Drive speed	(min^{-1})
J_L	=	Moment of inertia on load side	(kgm^2)
J_A	=	Moment of inertia on drive side	(kgm^2)
T_{AS}	=	Peak torque of motor	(Nm)

According to acceleration and load torque (start-up with load)

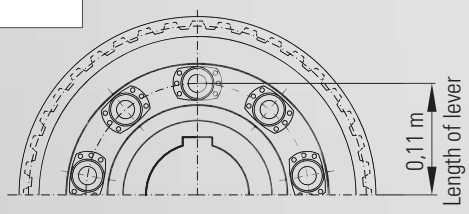
$$T_{AR} \geqq \alpha \cdot J_L + T_{AN} \geqq \left[\frac{J_L}{J_A + J_L} \cdot (T_{AS} - T_{AN}) + T_{AN} \right] \cdot S_A \text{ (Nm)}$$

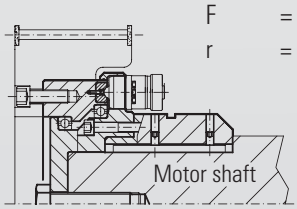
S_A = Shock or load factor
S_A = 1 (uniform load)
S_A = 2 (non-uniform load)
S_A = 3 (highly dynamic load)

T_{AR}	=	Disengagement torque of coupling	(Nm)
α	=	Angular acceleration $\alpha = \frac{\omega}{t} = \frac{\pi \cdot n}{t \cdot 30}$	$\frac{1}{s^2}$
t	=	Acceleration time	(s)
ω	=	Angular velocity	(1/s)
n	=	Drive speed	(min^{-1})
J_L	=	Moment of inertia on load side	(kgm^2)
T_{AN}	=	Load torque	(Nm)
J_A	=	Moment of inertia on drive side	(kgm^2)
T_{AS}	=	Peak torque of motor	(Nm)

According to number of torque modules

$$T_{AR} = S \cdot F \cdot r$$





T_{AR}	=	Disengagement torque of coupling	(Nm)
S	=	Number of torque modules	
F	=	Tangential force	(kN)
r	=	Length of lever	(m)

SELECTION

According to linear feed force

Spindle drive

$$T_{AN} = \frac{s \cdot F_V}{2000 \cdot \pi \cdot \eta} \quad (Nm)$$

T_{AN}	=	Load torque	(Nm)
S	=	Pitch	(mm)
F_V	=	Linear feed force	(N)
η	=	Efficiency factor	

Timing belt drive

$$T_{AN} = \frac{d_0 \cdot F_V}{2000} \quad (Nm)$$

T_{AN}	=	Load torque	(Nm)
d_0	=	Gear diameter (timing belt pulley)	(mm)
F_V	=	Linear feed force	(N)

According to resonant frequency

The resonant frequency of the coupling must be higher or lower than the frequency of the machine.

The following calculation is used for a 2 mass system:

$$f_e = \frac{1}{2 \cdot \pi} \sqrt{C_T \times \frac{J_{Machine} + J_{Mot}}{J_{Machine} \cdot J_{Mot}}} \quad (Hz)$$

C_T	=	Torsional stiffness of coupling	(Nm/rad)
$J_{Masch.}$	=	Moment of inertia total machine (Spindle + carriage + components + coupling half)	(kgm^2)
$J_{Mot.}$	=	Moment of inertia motor (Rotor + coupling half)	(kgm^2)
f_e	=	Resonant frequency of 2 mass system	(Hz)

Specifications of elastomer jaw coupling ST2

Series	ST2 / 10	ST2 / 25	ST2 / 60	ST2 / 160
T_{KN} Rated torque (Nm)	10,000	15,000	40,000	80,000
T_{Kmax} Peak torque (Nm)	22,000	33,000	88,000	176,000
Dynamic torsional stiffness (10^3 Nm/rad)	145	230	580	1000
Relative damping	1	1	1	1

Rating factors

Shock or load factor S_A

Drive	Load variables of machine		
	G	M	S
Electric motors, turbines, hydraulic motors	1.25	1.6	2.0
Internal combustion engines ≥ 4 cylinders Degree of uniformity ≥ 1:100	1.5	2.2	2.5

G = Uniform load, M = Average load, S = Heavy load

Temperature factor S_υ

Ambient temperature	-40 C° +30 C°	+40 C°	+60 C°	+80 C°	> +80 C°
S_t	1.0	1.1	1.4	1.8	upon request

Start factor S_z

Start frequency per hour	30	60	120	240	>240
S_Z	1.0	1.1	1.2	1.3	upon request

optional stainless steel

SELECTION

According to torque

1. Calculation of drive torque T_{DR}.

$$T_{DR}\,[Nm] = 9550 \frac{P\,[kW]}{n\,[rpm]}$$

2. Calculation of the rated torque of the coupling based on drive torque T_{DR} considering all rating factors.

$$T_{KN} \geq T_{DR} \times S_A \times S_\upsilon \times S_z$$

Selection example:
Calculation of coupling for use between an electric motor (P= 450 kW at 980 rpm) and belt conveyor.

Uniform load present	= G	:	S_A	= 1.25
Ambient temperature	40°C	:	S_υ	= 1.1
Start frequency	30/h	:	S_z	= 1.0

$$T_{DR} = 9550 \frac{450\ kW}{980\ rpm} = 4385.2\ Nm$$

$$T_{KN} \geq T_{DR} \times S_A \times S_\upsilon \times S_z$$
$$T_{KN} \geq 4385.2\ Nm \times 1.25 \times 1.1 \times 1.0 = 6029.7\ Nm$$

Selected coupling: ST2/10 with T_{KN} = 6030 Nm

Classification of load by type of machine

Excavators
S bucket-chain excavators
S traveling gear (caterpillar)
M traveling gear (rails)
M suction pumps
S bucket wheels
M slewing mechanisms

Construction machines
M concrete mixers
M road construction machines

Chemical industry
M mixers
G agitators (light fluids)
M dryer drums
G centrifuges

Conveyor systems
S conveyor machines
G belt conveyors (bulk materials)
M band pocket conveyors
M chain conveyors
M circular conveyors
M hoists
G flour bucket conveyors
M screw conveyors
M gravel bucket conveyors
M steel belt conveyors

Blowers, ventilators[1]
G blowers (axial/radial) P:n ≤ 0.007
M blowers (axial/radial) P:n ≤ 0.007
S blowers (axial/radial) P:n ≤ 0.007
G cooling tower fans P:n ≤ 0.007
M cooling tower fans P:n ≤ 0.007
S cooling tower fans P:n ≤ 0.007

Generators, converters
S generators

Rubber machinery
S extruders
S kneading mills
M mixers
S rolling mills

Woodworking machines
G woodworking machines

Cranes
S traveling gear
S lifting gear
M slewing mechanisms

Plastics machines
M mixers
M shredders

Metalworking machines
M sheet metal bending machines
S plate straightening machines
S presses
M shears
S stamp punches
M machine tools, main drives

Foodstuffs machines
G filling machines
M kneading machines
M sugarcane crushers
M sugarcane cutters
S sugarcane mills
M sugar beet cutters
M sugar beet washers

Paper machines
S wood cutters
S calenders
S wet presses
S suction presses
S suction rollers
S drying cylinders

Pumps
S piston pumps
G rotary pumps
S plunger pumps

Stone, clay
S crushers
S rotary kilns
S hammer mills
S brick presses

Textile machines
M tanning vats
M willows
M looms

Compressors
S piston compressors
M turbo-compressors

Rolling mills
M plate turner
S pig transport equipment
M wire drawing mills
S descaling breakers
S cold-roll mills
M chain drags
M traverse drags
M roller tables
S pipe welding machines
S continuous casting machines
M roller adjust mechanisms

Laundry machines
M drum dryers
M washing machines

Water treatment
M aerators
G water screw conveyors

[1]) P = Power of drive in kW
n = speed in rpm

SELECTION

Specifications of gear coupling ST4

Series		ST4 / 10	ST4 / 25	ST4 / 60	ST4 / 160
T_{KN} Rated torque	(Nm)	16,000	22,000	62,000	174,000
T_{Kmax} Peak torque	(Nm)	32,000	44,000	124,000	348,000
Grease	(dm^3)	0.5	0.8	1.5	3.3
n Ref (Speed max.)	(1/min.)	6,050	5,150	3,600	3,050

* only allowable at reduced torque and misalignment

Selection based on torque

1. Calculation of drive torque T_{DR}.

$$T_{AN}\,[Nm] = 9550 \frac{P\,[kW]}{n\,[rpm]}$$

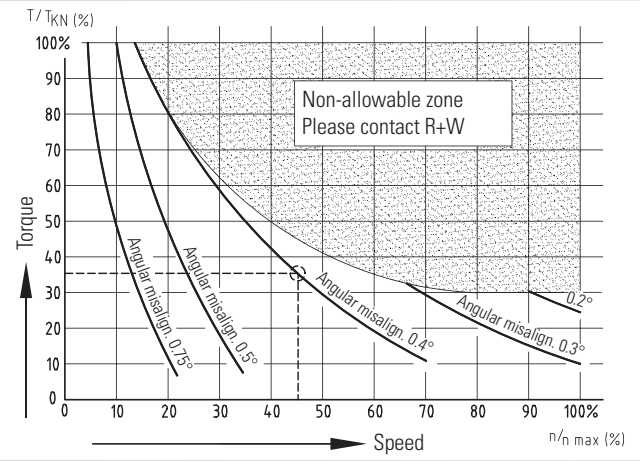
2. Calculation of the rated torque of the coupling based on drive torque T_{DR} considering all rating factors (Shock or load factor S_A, see page 17)

$$T_{KN} \geq T_{DR} \times S_A$$

Application graph

Max torque, max speed, and max misalignment should never occur at the same time.

Calculation of T / T_{KN} and n / n_{max} ▶ Calculate values and enter and check in the diagram below.



Example: Coupling ST4/10

T = 5600 Nm $\quad T/_{TKN} = \frac{5600}{16000} \cdot 100 = 35\%$

n = 2700 rpm $\quad n/_{n_{max}} = \frac{2700}{6050} \cdot 100 = 45\%$

Angular misalignment: 0.4°

➤ In allowable zone; selected coupling ST4 can be used.

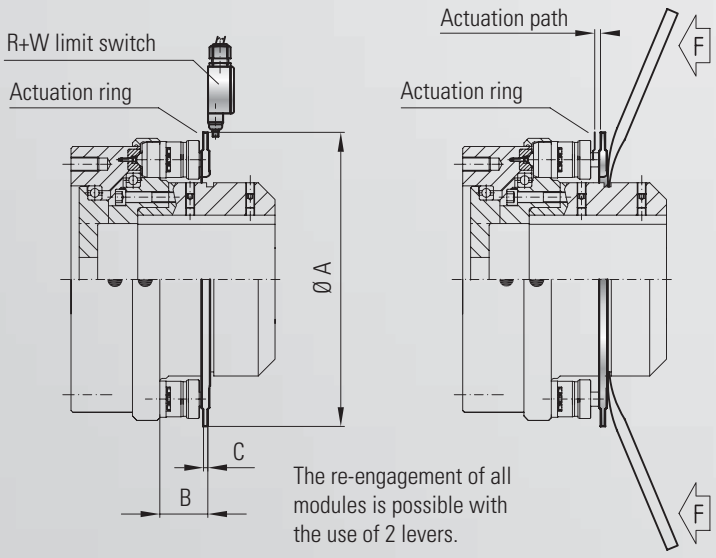
Selection example:
Calculation of a coupling for use between an electric motor (P= 1000 kW at 980 rpm) and screw conveyor (S_A= 1.6).

$$T_{DR} = 9550 \frac{1000\ kW}{980\ rpm} = 9744\ Nm$$

$$T_{KN} \geq T_{AN} \times S_A$$
$$T_{KN} \geq 9744\ Nm \times 1.6 = 15{,}591\ Nm$$

Selected coupling: ST4/10 with T_{KN} = 16,000 Nm

Optional actuation ring



The re-engagement of all modules is possible with the use of 2 levers.

MODEL ST 1		Series 10	25	60	160
Outside diameter	A	278	328	upon request	upon request
Distance	B	57	57	upon request	upon request
Actuation ring thickness	C	4.5	4.5	upon request	upon request

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From 0.1 – 160,000 Nm, Bore diameters 3 – 290 mm
Available as a single position, multi-position, load holding, or full disengagement version
Single piece or press-fit design

BELLOWS COUPLINGS
Series BK

From 2 – 10,000 Nm
Bore diameters 10 – 180 mm
Single piece or press-fit design

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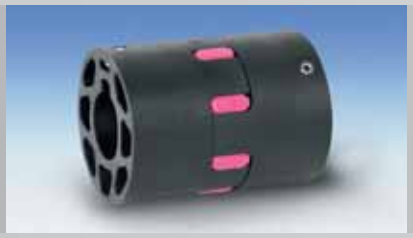
From 10 – 4,000 Nm
Bore diameters 10 – 100 mm
Available up to 6 mtr. length

MINIATURE BELLOWS COUPLINGS
Series MK

From 0.05 – 10 Nm
Bore diameters 1 – 28 mm
Single piece or press-fit design

SERVOMAX®
ELASTOMER COUPLINGS
Series EK

From 2 – 2,000 Nm, Shaft diameters 3 – 80 mm
backlash-free, press-fit design



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Series TX 1

From 2 – 810 Nm
Shaft diameters 3 – 45 mm

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Series LK

From 70 – 2,000 N
Thread M5 – M16

POLYAMID COUPLINGS
MICROFLEX
Series FK 1

Rated torque 1 Ncm
Bore diameters 1 – 1.5 mm

528/02/10/2.000