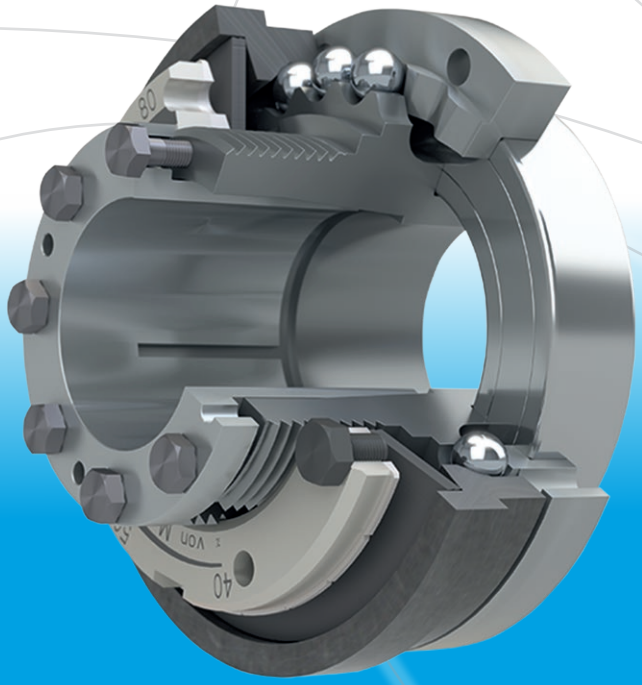
mayr®

your reliable partner



EAS®-compact®

K.490.V17.EN

www.mayr®.com

We safeguard the movements of this world

Specialists in power transmission for more than a century

mayr® power transmission is one of the most traditional and yet most innovative German companies in the field of power transmission. From modest beginnings in the year 1897, the family enterprise from the Allgäu region has developed into the world market leader. Today, approximately 700 employees work at the headquarters in Mauerstetten; about 1200 employees work for the company worldwide.

An unsurpassed standard product range

mayr® power transmission offers a wide variety of torque limiters, safety brakes, backlash-free shaft misalignment compensation couplings and high-quality DC drives. Regarding customer-specific requirements, too, the company possesses the expertise to develop customized and economical solutions. This is why numerous renowned machine manufacturers trust in holistic solutions by *mayr*® power transmission.

Represented worldwide

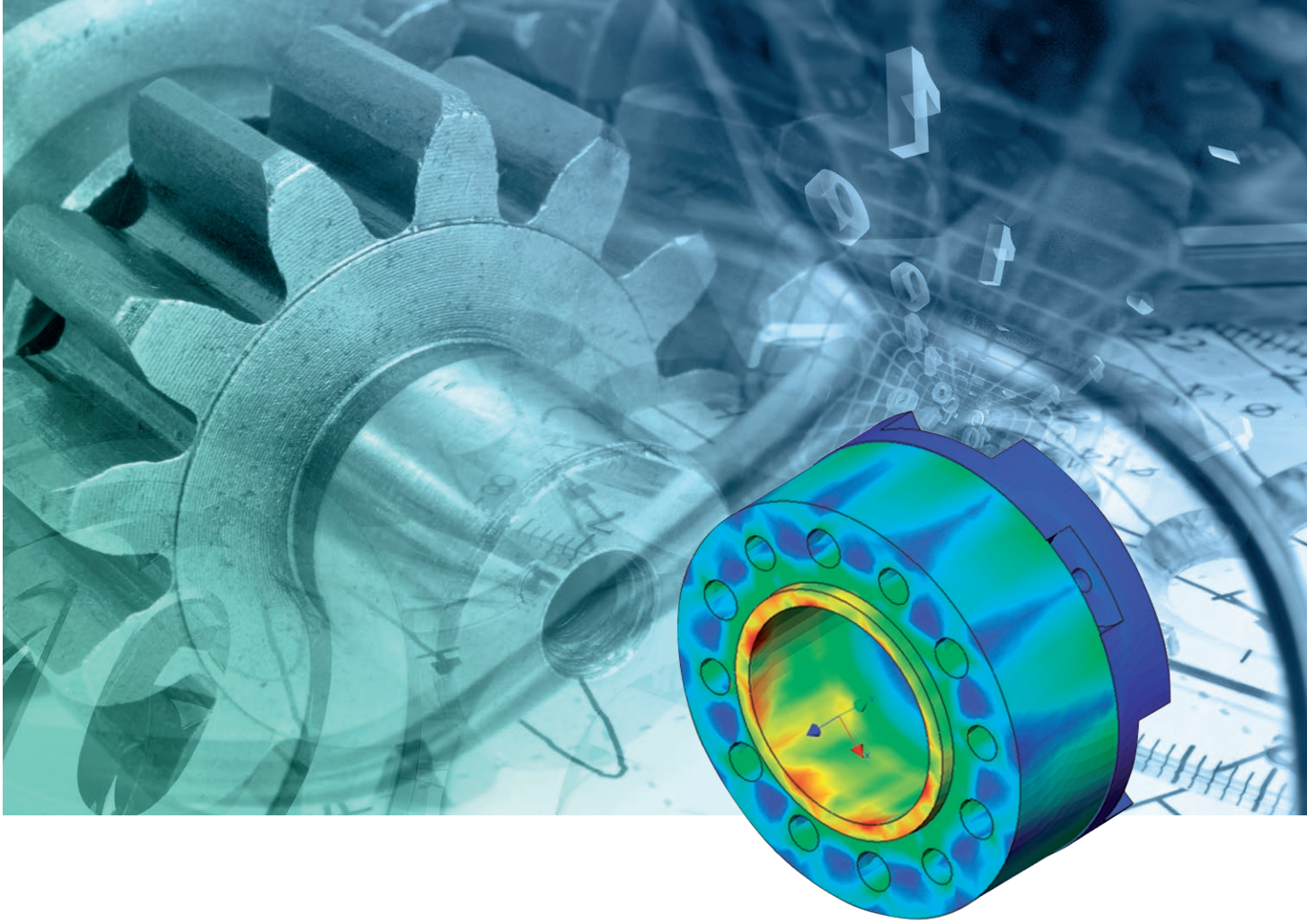
With eight subsidiaries in Germany, sales offices in the USA, France, Great Britain, Italy, Singapore and Switzerland as well as 36 additional country representatives, *mayr*® is available in all important industrial areas, guaranteeing optimum customer service around the globe.

Never compromise on safety

We make no compromises where safety is concerned. Only top products of a perfect quality guarantee that no people are injured or machines damaged in case of malfunctions, collisions and other hazardous situations. The safety of your employees and machines is our motivation to always provide the best and most reliable clutches, couplings or brakes.

mayr® power transmission holds numerous ground-breaking patents, and is the global market or technological leader for

- application-optimised **safety brakes,** for example for passenger elevators, stage technology and gravity-loaded axes
- **torque limiters** to protect against expensive overload damage and production losses and
- backlash-free **servo couplings**.



Tradition and innovation – the best of both worlds

Tradition and innovation do not contradict each other - on the contrary. They are the two supporting pillars which have guaranteed stability and reliability for generations. Long-term stability, independence as well as a good reputation and satisfied customers are important values for a family enterprise rich in tradition.

Therefore, we place emphasis on:

- Tested product quality,
- Optimum customer service,
- Comprehensive know-how,
- Global presence,
- Successful innovations and
- Effective cost management.

By pursuing our own objective of always offering our customers the technologically most advanced and most economical solution, we have been able to gain the trust of many leading industrial companies from all branches and from all over the world as a reliable partner.

Place your trust in our know-how and our more than 50 years of experience in the areas of torque limiters, safety brakes and shaft couplings.

Tested quality and reliability

mayr® products are subject to meticulous quality inspections. These include quality assurance measures during the design process as well as a comprehensive final inspection. Only the best, tested quality leaves our place of manufacture. All products are rigorously tested on calibrated test stands, and adjusted precisely to the requested values. An electronic database in which the measurement values are archived together with the associated serial numbers guarantees 100 % traceability. On request, we confirm the product characteristics with a test protocol.

The certification of our quality management according to DIN EN ISO 9001:2000 confirms the quality-consciousness of our colleagues at every level of the company.

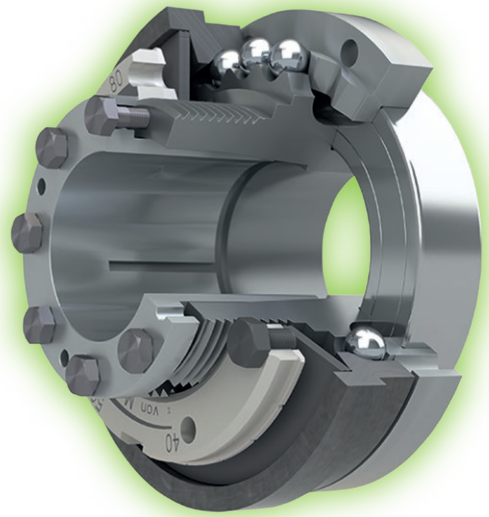
EAS®-compact® - the economically viable protection for machines

Function

If the set limit torque is exceeded, the clutch disengages. The torque drops immediately. A mounted limit switch registers the disengagement movement and switches off the drive. The limit switch signal can also be used for further control functions.

After the malfunction has been rectified, the **EAS®-compact® ratchetting clutches** and the **EAS®-compact® synchronous clutches** automatically re-engage (for a detailed description of the re-engagement behaviour, see page 5).

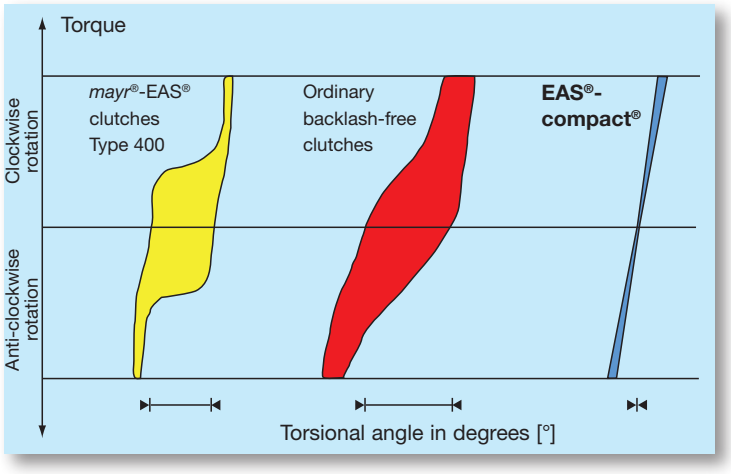
Overload clutches of the series **EAS®-compact® -F** separate the drive end and the output side completely and remain in this state until they are intentionally re-engaged by hand or via a suitable device. Detailed description see catalogue **K.4190.V_ _.EN**.



The EAS®-compact® matrix for success

Product characteristics	Your advantages	Your benefits
Backlash-free torque transmission	Long lifetime, Low wear	Lowest maintenance effort
Safe, readable torque adjustment	Simple installation and operation	Time-saving during initial operation
High performance density	Low mass moment of inertia, compact construction	High machine dynamic
Convenient torque course in the drive line on overload	Optimised dimensioning	Effective and efficient machine construction

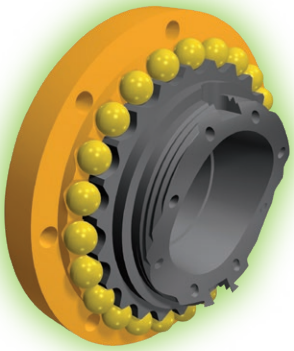
EAS®-compact® – the backlash-free principle



Backlash means:

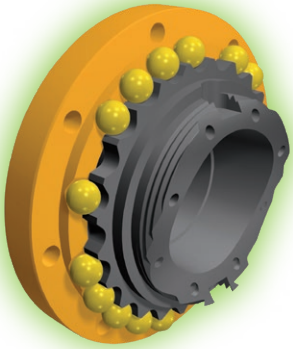
- The torsional angle between the input and output of the clutch
- Also known an “torsional backlash”
- Not to be confused with the transmission backlash from the shaft onto the hub
- **At *mayr*®, backlash-free means:**
  Backlash > 0
  (see diagram)

EAS®-compact®/EAS®-NC Ratchetting clutch



- When the set limit torque is reached, the clutch disengages; the torque drops immediately.
- The clutch ratchets.
- After the cause of overload has been removed, the clutch automatically re-engages into the next of the series of ball detents.
- The clutch is ready for operation again.

EAS®-compact®/EAS®-NC Synchronous clutch

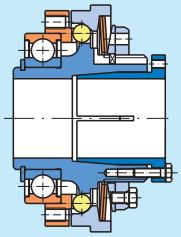


- When the set limit torque is reached, the clutch disengages; the torque drops immediately.
- After the cause of overload has been removed, the clutch re-engages automatically after 360 angular degrees. Other cycle sequences, for example 180 degrees, are also available.
- The clutch is ready for operation again.

Contents

Summary of constructional designs EAS®-compact® ratchetting clutch/ synchronous clutch

EAS®-compact® short hub



Torque:
5 to 1500 Nm

Sizes 01 to 4
Type 490._ _ _.0

Also available in rustproof design!

- Flange clutch for direct installation of the drive element with the resulting radial force approximately in the bearing centre

See installation example, Fig. 1, page 54

With cone bushing	Type 490._1_.0
With keyway	Type 490._2_.0

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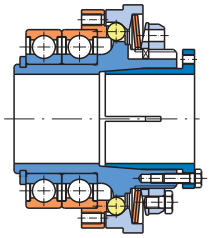
EAS®-compact® double bearing design



Torque:
5 to 1500 Nm

Sizes 01 to 4
Type 490._ _ _.2

- Flange clutch with a stable, double bearing for the drive element

With cone bushing	Type 490._1_.2
With keyway	Type 490._2_.2

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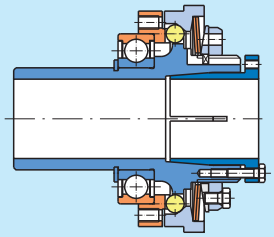
EAS®-compact® long protruding hub



Torque:
5 to 1500 Nm

Sizes 01 to 4
Type 490._ _ _.1

- Flange clutch for very wide drive elements or elements with a very small diameter
- Suitable bearings for the drive element are ball bearings, needle bearings or plain bearings.

See installation example, Fig. 2, page 54

With cone bushing	Type 490._1_.1
With keyway	Type 490._2_.1

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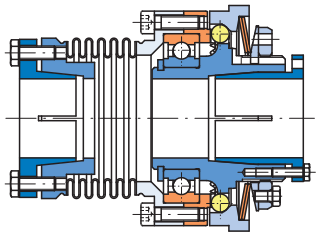
EAS®-compact® with steel bellows coupling



Torque:
5 to 350 Nm

Sizes 01 to 3
Type 493._ _ _.0

- Double shaft design with a torsionally rigid steel bellows coupling
- Compensation for axial, radial and angular shaft misalignments. See installation example, Fig. 4, page 54

Hub designs:
EAS®-side/steel bellows-side

Cone bushing/cone bushing	Type 493._1_.0
Key hub/key hub	Type 493._2_.0
Cone bushing/clamping hub	Type 493._3_.0

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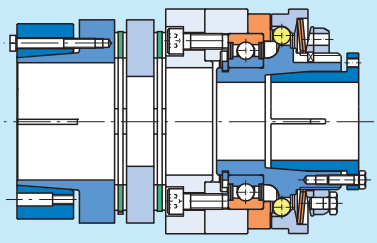
EAS®-compact® torsionally rigid



Torque:
5 to 1500 Nm

Sizes 01 to 4
Type 496._ _ _.0

- Double shaft design with a robust disk pack coupling
- Compensation for axial, radial and angular shaft misalignments
- High torsional rigidity

Hub designs:
EAS®-side/torsionally rigid side

Cone bushing/shrink disk hub	Type 496._1_.0
Key hub/clamping hub	Type 496._2_.0
Key hub/key hub	Type 496._2_.0

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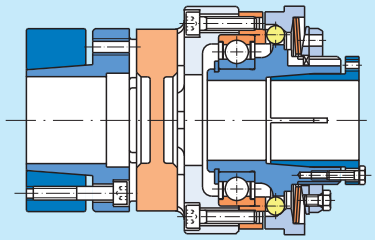
Summary of constructional designs EAS®-compact® ratchetting clutch/synchronous clutch

EAS®-compact®
lastic backlash-free



Torque:
5 to 1200 Nm

Sizes 01 to 4
Type 494._ _ _._

- Double shaft design with a flexible, backlash-free coupling
- Compensation for axial, radial and angular shaft misalignments
- High damping characteristics

See installation example, Fig. 3, page 54

Hub designs:
EAS®-side/flexible side

Cone bushing/clamping hub	Type 494._0_._
Cone bushing/shrink disk hub	Type 494._1_._
Key hub/key hub	Type 494._2_._

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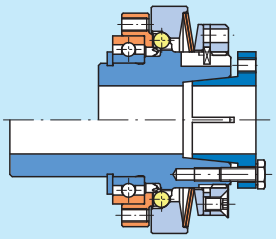
Summary of constructional designs EAS®-NC miniature clutch

EAS®-NC short hub
EAS®-NC long protruding hub



Torque:
0.65 to 15 Nm

Sizes 03 and 02
Type 450._ _ _._

EAS®-NC short hub

- Flange clutch for direct installation of drive elements with the resulting radial force approximately in the bearing centre

With cone bushing	Type 450._1_.0
With keyway	Type 450._2_.0

EAS®-NC long protruding hub

- Flange clutch for very wide drive elements or elements with a very small diameter

With cone bushing	Type 450._1_.1
With keyway	Type 450._2_.1

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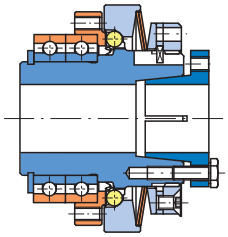
EAS®-NC
double bearing design



Torque:
0.65 to 15 Nm

Sizes 03 and 02
Type 450._ _ _.2

- Flange clutch with a stable, double bearing for the drive element

With cone bushing	Type 450._1_.2
With keyway	Type 450._2_.2

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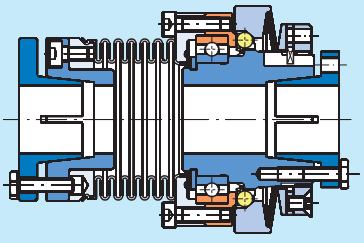
EAS®-NC
with steel bellows coupling



Torque:
0.65 to 15 Nm

Sizes 03 and 02
Type 453._ _ _.0

- Double shaft design with a torsionally rigid steel bellows coupling
- Compensation for axial, radial and angular shaft misalignments

Hub designs:
EAS®-side/steel bellows-side

Cone bushing/cone bushing	Type 453._1_.0
Key hub/key hub	Type 453._2_.0

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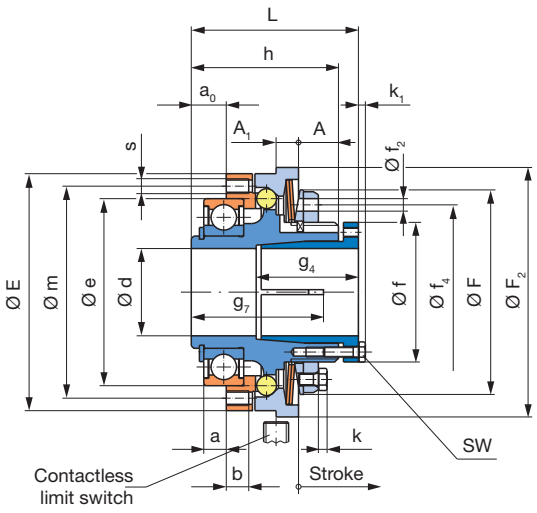
EAS®-compact® ratchetting clutch/synchronous clutch

EAS®-compact® short hub with cone bushing

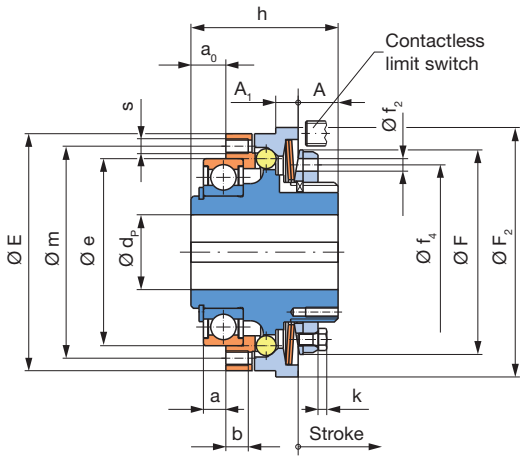
Type 490._1_.0
Sizes 01 to 4



For information on rustproof designs, please order catalogue!

EAS®-compact® short hub with keyway

Type 490._2_.0
Sizes 01 to 4



For information on rustproof designs, please order catalogue!

Order Number

with cone bushing	1	0	Ratchetting clutch [3]	Torque adjustment value (Optional)	
with keyway	2	5	Synchronous clutch		

__ / 4 9 0 . __ __ __ . 0 / __ / __ / __ / __

Sizes	Torque range [1]		Hub bore	With limit switch see pages 51 – 53 (option)	Radial torque adjustment see page 42 (Option)
01 to 4	medium	5	Ø d^{H7}		
	high	6	Ø d_P^{H7}		
	very high	7			
	maximum [2]	8			

Example: Order number 1 / 490.620.0 / 25 / 60 / limit switch 055.002.5 / radial adjustment

1) See Technical Data, limit torque for overload M_G
2) Max. torque range only available as synchronous clutch, speed < 250 rpm
3) Standard ratchetting division is 15°; other ratchetting divisions optionally available (45°/60°/90°/120°/180°/...)

EAS®-compact® ratchetting clutch/synchronous clutch

Technical data				Size [1]					
				01	0	1	2	3	4
Limit torques for overload [1] [2]	Type 490.5_ _.0	M_G	[Nm]	5 – 12.5	10 – 25	20 – 50	40 – 100	70 – 175	120 – 300
	Type 490.6_ _.0	M_G	[Nm]	10 – 25	20 – 50	40 – 100	80 – 200	140 – 350	240 – 600
	Type 490.7_ _.0	M_G	[Nm]	20 – 50	40 – 100	80 – 200	160 – 400	280 – 700	480 – 1200
	Type 490.8_ 5.0 [11]	M_G	[Nm]	25 – 62.5	50 – 125	100 – 250	200 – 500	350 – 875	600 – 1500
Max. speed		n_{max}	[rpm]	4000	3000	2500	2000	1200	800
Thrust washer stroke on overload			[mm]	1.2	1.5	1.8	2.0	2.2	2.5

Mass moments of inertia and weights				Size					
				01	0	1	2	3	4
Hub-side	Type 490._1_.0	I	[10^{-3} kgm²]	0.211	0.531	1.388	2.846	6.858	29.432
	Type 490._2_.0	I	[10^{-3} kgm²]	0.205	0.505	1.302	2.630	6.329	28.443
Pressure flange-side	Type 490._1_.0	I	[10^{-3} kgm²]	0.093	0.234	0.643	1.306	2.649	6.690
	Type 490._2_.0	I	[10^{-3} kgm²]	0.093	0.234	0.643	1.306	2.649	6.690
Weights	Type 490._1_.0	m	[kg]	0.68	1.14	1.98	2.88	4.59	10.63
	Type 490._2_.0	m	[kg]	0.63	1.02	1.75	2.55	4.07	10.06

Tensioning screws and screw-on bores				Size					
				01	0	1	2	3	4
Tensioning screws in cone bushing	Number, dimensions	M	[mm]	6 x M4	6 x M4	8 x M4	8 x M5	8 x M6	8 x M8
	Wrench opening	SW	[mm]	7	7	7	8	10	13
	Tightening torque	T_A	[Nm]	4	4	4	8	12	25
Screw-on bores in pressure flange [12]	Number, dimensions	s	[mm]	8 x M4	8 x M5	8 x M6	8 x M6	8 x M8	8 x M10
				Screws quality class 12.9 must be used to secure the drive element.					

Dimensions [mm]		Size					
		01	0	1	2	3	4
A		12	13.5	16	17	20.5	46
A_1		7	8	9	10	12	16
a [5]		5	7	9	10	10	12
a_0		8	11	14	16	18	21
b		6	7	9	10	12	15
E		65	80	95	110	130	166
e_{h5} [6]		47	62	75	90	100	130
F		61.5	67	82	97	117	150
F_2		70	85	100	115	135	166
f		38	44	56	70	84	100
f_2		5	5	5	6	7	-
f_4		50	55	70	84	100	-
Minimum shaft length	g_4	34	39	42	48	53	93
	g_7	31	36	48	49	62	78
h		40	48	59	64	75	115
k		2.8	2.8	3.5	4.0	4.0	-
k_1		2.8	2.8	2.8	3.5	4.0	5.3
L [7]		47	56	67	73	86	130
m		56	71	85	100	116	150

Bores [mm]		Size					
		01	0	1	2	3	4
d [2] [3] [4]	d_{min}	10	15	22	32	35	40
	d_{max}	20	25	35	45	55	65
d_P [2] [10]	$d_{P\,min}$ [8]	12	15	22	28	32	40
	$d_{P\,max}$ [9]	20	25	30	40	50	65

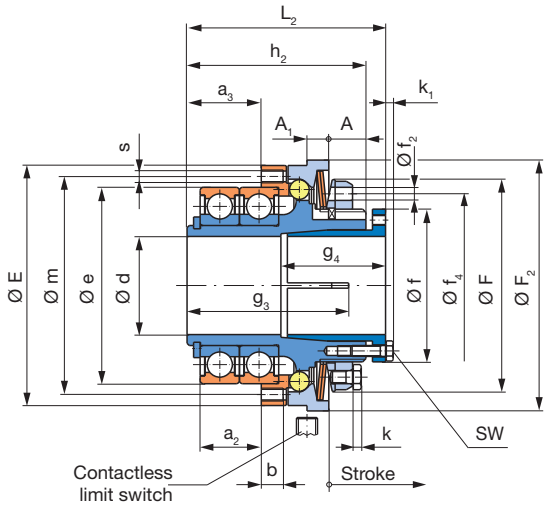
We reserve the right to make dimensional and constructional alterations.

1) Further sizes for smaller and larger torques available on request
2) Please observe the shaft load in max. torque range.
3) Shaft tolerance up to Ø 38 $_{h6}$, over Ø 38 $_{h8}$
4) Transmittable torques available with smaller bores on request
5) Mounting tolerance + 0.1
6) Tolerance user-side H7
7) Dimensions in untensioned condition (shorter in tensioned condition)
8) Smaller bores for low torques available on request
9) Larger bores available on request
10) The position of the keyway to the mounting bore “s” in the pressure flange is not defined. Defined position available on request
11) Maximum speed: 250 rpm
12) The screw-on bores in the pressure flange are not angle-synchronous to the hub keyway in the standard version.

EAS®-compact® ratchetting clutch/synchronous clutch

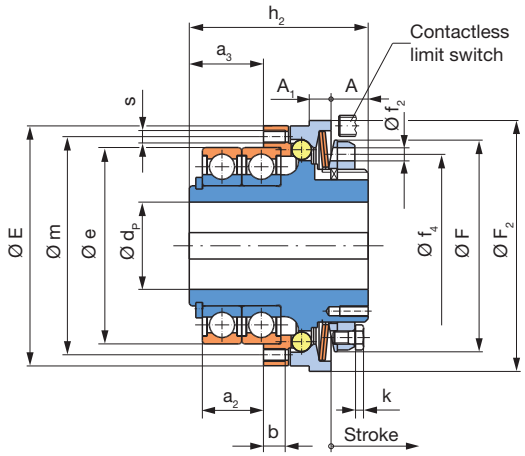
EAS®-compact® double bearing design with cone bushing

Type 490._1_.2
Sizes 01 to 4



EAS®-compact® double bearing design with keyway

Type 490._2_.2
Sizes 01 to 4



Order Number

	with cone bushing	**1**	**0**	Ratchetting clutch [3]	Torque adjustment value (Optional)	With limit switch see pages 51 – 53 (option)	
	with keyway	**2**	**5**	Synchronous clutch			

__ / 4 9 0 . __ __ __ . 2 / __ / __ / __ / __

Sizes	Torque range [1]		2-bearing design	Hub bore	Torque adjustment
01	medium	**5**	**2**	Ø d^{H7}	radial
to	high	**6**		Ø d_P^{H7}	see page 42
4	very high	**7**			(option)
	maximum [2]	**8**			

Example: Order number 1 / 490.610.2 / 25 / 60 / limit switch 055.002.5 / radial adjustment

1) See Technical Data, limit torque for overload M_G
2) Max. torque range only available as synchronous clutch, speed < 250 rpm
3) Standard ratchetting division is 15°; other ratchetting divisions optionally available (45°/60°/90°/120°/180°/...)

EAS®-compact® ratchetting clutch/synchronous clutch

Technical data				Size 1)					
				01	0	1	2	3	4
Limit torques for overload 1) 2)	Type 490.5_ _.2	M_G	[Nm]	5 – 12.5	10 – 25	20 – 50	40 – 100	70 – 175	120 – 300
	Type 490.6_ _.2	M_G	[Nm]	10 – 25	20 – 50	40 – 100	80 – 200	140 – 350	240 – 600
	Type 490.7_ _.2	M_G	[Nm]	20 – 50	40 – 100	80 – 200	160 – 400	280 – 700	480 – 1200
	Type 490.8_ 5.2 11)	M_G	[Nm]	25 – 62.5	50 – 125	100 – 250	200 – 500	350 – 875	600 – 1500
Max. speed		n_{max}	[rpm]	4000	3000	2500	2000	1200	800
Thrust washer stroke on overload			[mm]	1.2	1.5	1.8	2.0	2.2	2.5

Mass moments of inertia and weights				Size					
				01	0	1	2	3	4
Hub-side	Type 490._1_.2	I	[10^{-3} kgm²]	0.215	0.552	1.450	2.998	7.081	30.990
	Type 490._2_.2	I	[10^{-3} kgm²]	0.209	0.526	1.364	2.782	6.552	30.000
Pressure flange-side	Type 490._1_.2	I	[10^{-3} kgm²]	0.100	0.273	0.799	1.675	3.162	8.570
	Type 490._2_.2	I	[10^{-3} kgm²]	0.100	0.273	0.799	1.675	3.162	8.570
Weights	Type 490._1_.2	m	[kg]	0.79	1.35	2.35	3.45	5.27	11.96
	Type 490._2_.2	m	[kg]	0.74	1.23	2.12	3.12	4.75	11.35

Tensioning screws and screw-on bores				Size					
				01	0	1	2	3	4
Tensioning screws in cone bushing	Number, dimensions	M	[mm]	6 x M4	6 x M4	8 x M4	8 x M5	8 x M6	8 x M8
	Wrench opening	SW	[mm]	7	7	7	8	10	13
	Tightening torque	T_A	[Nm]	4	4	4	8	12	25
Screw-on bores in pressure flange (12)	Number, dimensions	s	[mm]	8 x M4	8 x M5	8 x M6	8 x M6	8 x M8	8 x M10
				Screws quality class 12.9 must be used to secure the drive element.					

Dimensions [mm]		Size					
		01	0	1	2	3	4
A		12	13.5	16	17	20.5	46
A_1		7	8	9	10	12	16
a_2 5)		14	19	25	28	28	34
a_3		17	23	30	34	36	43
b		6	7	9	10	12	15
E		65	80	95	110	130	166
e_{h5} 6)		47	62	75	90	100	130
F		61.5	67	82	97	117	150
F_2		70	85	100	115	135	166
f		38	44	56	70	84	100
f_2		5	5	5	6	7	-
f_4		50	55	70	84	100	-
Minimum shaft length	g_3	40	48	63	67	80	100
	g_4	34	39	42	48	53	93
h_2		49	60	75	82	93	137
k		2.8	2.8	3.5	4.0	4.0	-
k_1		2.8	2.8	2.8	3.5	4.0	5.3
L_2 7)		56	68	83	91	104	152
m		56	71	85	100	116	150

Bores [mm]		Size					
		01	0	1	2	3	4
d 2) 3) 4)	d_{min}	10	15	22	32	35	40
	d_{max}	20	25	35	45	55	65
d_P 2) 10)	$d_{P\,min}$ 8)	12	15	22	28	32	40
	$d_{P\,max}$ 9)	20	25	30	40	50	65

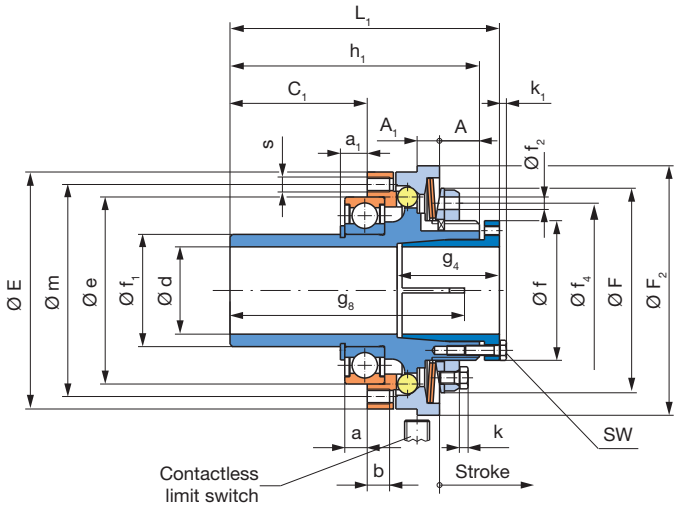
We reserve the right to make dimensional and constructional alterations.

1) Further sizes for smaller and larger torques available on request
2) Please observe the shaft load in max. torque range.
3) Shaft tolerance up to Ø 38 $_{h6}$, over Ø 38 $_{h8}$
4) Transmittable torques available with smaller bores on request
5) Mounting tolerance + 0.1
6) Tolerance user-side H7
7) Dimensions in untensioned condition (shorter in tensioned condition)
8) Smaller bores for low torques available on request
9) Larger bores available on request
10) The position of the keyway to the mounting bore “s” in the pressure flange is not defined. Defined position available on request
11) Maximum speed: 250 rpm
12) The screw-on bores in the pressure flange are not angle-synchronous to the hub keyway in the standard version.

EAS®-compact® ratchetting clutch/synchronous clutch

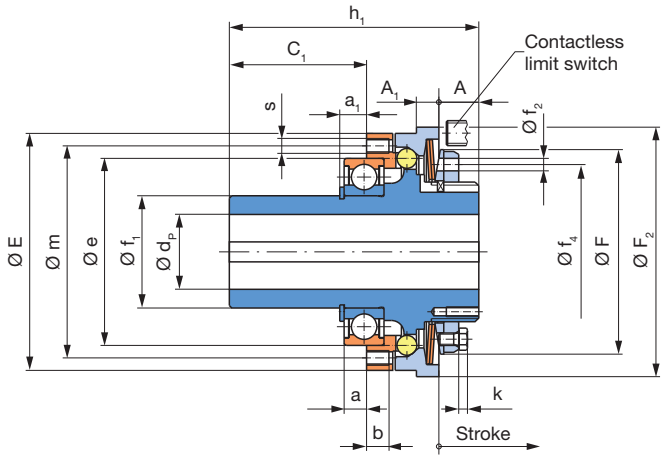
EAS®-compact®long protruding hub with cone bushing

Type 490._1_.1
Sizes 01 to 4



EAS®-compact® long protruding hub with keyway

Type 490._2_.1
Sizes 01 to 4



Order Number

	with cone bushing	**1**	**0**	Ratchetting clutch [3]	Torque adjustment value (Optional)	With limit switch see pages 51 – 53 (option)
	with keyway	**2**	**5**	Synchronous clutch		

__ / 4 9 0 . __ __ __ . 1 / __ / __ / __ / __

Sizes	Torque range [1]				Hub bore	Torque adjustment
01 to 4	medium	**5**	long protruding hub	**1**	Ø d^{H7}	radial see page 42 (option)
	high	**6**			Ø d_P^{H7}	
	very high	**7**				
	maximum [2]	**8**				

Example: Order number 1 / 490.610.1 / 25 / 60 / limit switch 055.002.5 / radial adjustment

1) See Technical Data, limit torque for overload M_G
2) Max. torque range only available as synchronous clutch, speed < 250 rpm
3) Standard ratchetting division is 15°; other ratchetting divisions optionally available (45°/60°/90°/120°/180°/...)

EAS®-compact® ratchetting clutch/synchronous clutch

Technical data				Size [1]					
				01	0	1	2	3	4
Grenzdrehmomente für Überlast [1] [2]	Type 490.5_ _.1	M_G	[Nm]	5 – 12.5	10 – 25	20 – 50	40 – 100	70 – 175	120 – 300
	Type 490.6_ _.1	M_G	[Nm]	10 – 25	20 – 50	40 – 100	80 – 200	140 – 350	240 – 600
	Type 490.7_ _.1	M_G	[Nm]	20 – 50	40 – 100	80 – 200	160 – 400	280 – 700	480 – 1200
	Type 490.8_ 5.1 [11]	M_G	[Nm]	25 – 62.5	50 – 125	100 – 250	200 – 500	350 – 875	600 – 1500
Max. speed		n_{max}	[rpm]	4000	3000	2500	2000	1200	800
Thrust washer stroke on overload			[mm]	1.2	1.5	1.8	2.0	2.2	2.5

Mass moments of inertia and weights				Size					
				01	0	1	2	3	4
Hub-side	Type 490._1_.1	I	[10^{-3} kgm²]	0.225	0.588	1.491	3.105	7.350	30.890
	Type 490._2_.1	I	[10^{-3} kgm²]	0.219	0.562	1.405	2.889	6.851	29.900
Pressure flange-side	Type 490._1_.1	I	[10^{-3} kgm²]	0.093	0.234	0.643	1.306	2.649	6.690
	Type 490._2_.1	I	[10^{-3} kgm²]	0.093	0.234	0.643	1.306	2.649	6.690
Weights	Type 490._1_.1	m	[kg]	0.78	1.36	2.26	3.34	5.18	11.65
	Type 490._2_.1	m	[kg]	0.73	1.24	2.04	3.00	4.66	11.04

Tensioning screws and screw-on bores				Size					
				01	0	1	2	3	4
Tensioning screws in cone bushing	Number, dimensions	M	[mm]	6 x M4	6 x M4	8 x M4	8 x M5	8 x M6	8 x M8
	Wrench opening	SW	[mm]	7	7	7	8	10	13
	Tightening torque	T_A	[Nm]	4	4	4	8	12	25
Screw-on bores in pressure flange [12]	Number, dimensions	s	[mm]	8 x M4	8 x M5	8 x M6	8 x M6	8 x M8	8 x M10
	Screws quality class 12.9 must be used to secure the drive element.								

Dimensions [mm]		Size					
		01	0	1	2	3	4
A		12	13.5	16	17	20.5	46
A_1		7	8	9	10	12	16
a [5]		5	7	9	10	10	12
a_1		6.5	8.75	11.5	13	14	16
b		6	7	9	10	12	15
C_1		33	43	55	67	73	76
E		65	80	95	110	130	166
e_{h5} [6]		47	62	75	90	100	130
F		61.5	67	82	97	117	150
F_2		70	85	100	115	135	166
f		38	44	56	70	84	100
$f_{1\ h6}$		30	40	45	55	65	85
f_2		5	5	5	6	7	-
f_4		50	55	70	84	100	-
Minimum shaft length	g_4	34	39	42	48	53	93
	g_8	56	68	89	100	117	133
h_1		65	80	100	115	130	170
k		2.8	2.8	3.5	4.0	4.0	-
k_1		2.8	2.8	2.8	3.5	4.0	5.3
L_1 [7]		72	88	108	124	141	185
m		56	71	85	100	116	150

Bores [mm]		Size					
		01	0	1	2	3	4
d [2] [3] [4]	d_{min}	10	15	22	32	35	40
	d_{max}	20	25	35	45	55	65
d_P [2] [10]	$d_{P\ min}$ [8]	12	15	22	28	32	40
	$d_{P\ max}$ [9]	20	25	30	40	50	65

We reserve the right to make dimensional and constructional alterations.

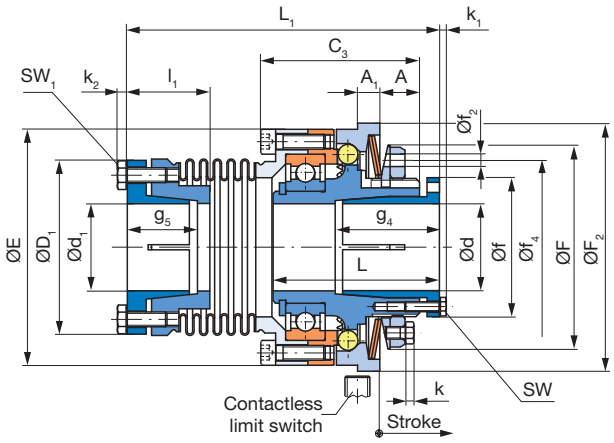
1) Further sizes for smaller and larger torques available on request
2) Please observe the shaft load in max. torque range.
3) Shaft tolerance up to Ø 38 $_{h6}$, over Ø 38 $_{h8}$
4) Transmittable torques available with smaller bores on request
5) Mounting tolerance + 0.1
6) Tolerance user-side H7
7) Dimensions in untensioned condition (shorter in tensioned condition)
8) Smaller bores for low torques available on request
9) Larger bores available on request
10) The position of the keyway to the mounting bore “s” in the pressure flange is not defined. Defined position available on request
11) Maximum speed: 250 rpm
12) The screw-on bores in the pressure flange are not angle-synchronous to the hub keyway in the standard version.

EAS®-compact® ratchetting clutch/synchronous clutch

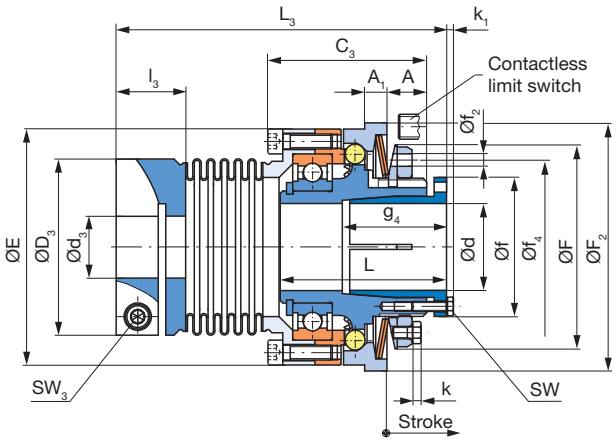
EAS®-compact® with steel bellows coupling

Type 493._ _ _ .0
Sizes 01 to 3

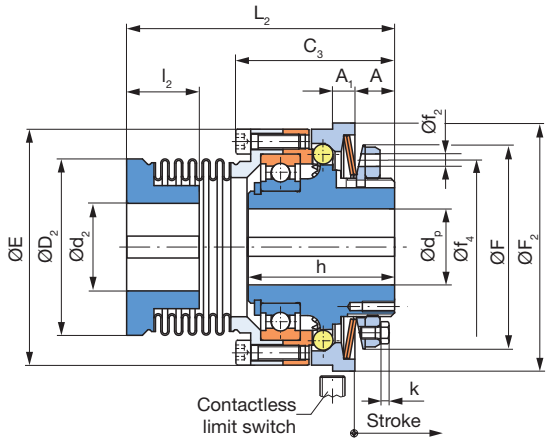
EAS®-side cone bushing, Steel bellows-side cone bushing Type 493._1_.0



EAS®-side cone bushing, Steel bellows-side clamping hub Type 493._3_.0



EAS®-side key hub, Steel bellows-side key hub Type 493._2_.0



Order Number

EAS®-side	Steel bellows-side					
Cone bushing	Cone bushing	**1**				
Key hub	Key hub	**2**	**0**	Ratchetting clutch [2]	Torque adjustment value (Optional)	With limit switch see pages 51 – 53 (option)
Cone bushing	Clamping hub	**3**	**5**	Synchronous clutch		

__ / 4 9 3 . __ __ __ . 0 / __ / __ / __ / __ / __

Sizes	Torque range [1]		Hub 1 bore	Hub 2 bore	Radial torque adjustment
01 to 3	medium	**5**	Ø d^{H7}	Ø d_1^{H7}	see page 42 (option)
	high	**6**	Ø d_P^{H7}	Ø d_2^{H7}	
				Ø d_3^{H7}	

Example: Order number 1 / 493.615.0 / 22 / 25 / 60 / limit switch 055.002.5 / radial adjustment

1) See Technical Data, limit torque for overload M_G
2) Standard ratchetting division is 15°; other ratchetting divisions optionally available (45°/60°/90°/120°/180°/...)

EAS®-compact® ratchetting clutch/synchronous clutch

Technical data				Size [1]				
				01	0	1	2	3
Limit torques for overload [1]	Type 493.5_ _.0	M_G	[Nm]	5 – 12.5	10 – 25	20 – 50	40 – 100	70 – 175
	Type 493.6_ _.0	M_G	[Nm]	10 – 25	20 – 50	40 – 100	80 – 200	140 – 350
Max. speed		n_{max}	[rpm]	4000	3000	2500	2000	1200
Thrust washer stroke on overload			[mm]	1.2	1.5	1.8	2.0	2.2
Nominal torques, steel bellows coupling		T_{KN}	[Nm]	50	100	200	350	600
Permitted misalignments	axial	ΔK_a	[mm]	0.4	0.6	0.8	1.0	1.0
	radial	ΔK_r	[mm]	0.15	0.15	0.20	0.25	0.30
	angular	ΔK_w	[°]	2	2	2	2	2

Mass moments of inertia and weights				Size				
				01	0	1	2	3
EAS®-hub-side	Type 493._1_.0	I	[10^{-3} kgm²]	0.211	0.531	1.388	2.846	6.858
	Type 493._2_.0	I	[10^{-3} kgm²]	0.205	0.505	1.302	2.630	6.359
	Type 493._3_.0	I	[10^{-3} kgm²]	0.211	0.531	1.388	2.846	6.858
Steel bellows-side	Type 493._1_.0	I	[10^{-3} kgm²]	0.269	0.753	1.764	3.602	7.789
	Type 493._2_.0	I	[10^{-3} kgm²]	0.249	0.690	1.546	3.018	6.818
	Type 493._3_.0	I	[10^{-3} kgm²]	0.286	0.789	1.772	3.773	8.087
Weights	Type 493._1_.0	m	[kg]	1.09	1.88	3.08	4.60	7.19
	Type 493._2_.0	m	[kg]	1.04	1.76	2.85	4.27	6.90
	Type 493._3_.0	m	[kg]	1.22	1.91	3.10	4.65	7.12

Tensioning screws				Size				
				01	0	1	2	3
In cone bushing EAS®-side	Number, dimensions	M	[mm]	6 x M4	6 x M4	8 x M4	8 x M5	8 x M6
	Wrench opening	SW	[mm]	7	7	7	8	10
	Tightening torque	T_A	[Nm]	4	4	4	8	12
In cone bushing steel bellows-side	Number, dimensions	M_1	[mm]	4 x M4	6 xM5	6 x M6	6 x M8	6 x M8
	Wrench opening	SW_1	[mm]	7	8	10	13	13
	Tightening torque	T_A	[Nm]	3	5	9.5	17	17
In clamping hub steel bellows-side	Number, dimensions	M_3	[mm]	1 x M5	1 x M6	1 x M6	1 x M8	1 x M10
	Wrench opening	SW_3	[mm]	4	5	5	6	8
	Tightening torque	T_A	[Nm]	10	18	18	43	87

Dimensions [mm]		Size				
		01	0	1	2	3
A		12	13.5	16	17	20.5
A_1		7	8	9	10	12
C_3		45	53	64	70	81
D_1		47	60	70	81	98
D_2		47	60	71	81	98
D_3		50	60	71	82	98
E		65	80	95	110	130
F		61.5	67	82	97	117
F_2		70	85	100	115	135
f		38	44	56	70	84
f_2		5	5	5	6	7
f_4		50	55	70	84	100
Minimum shaft length	g_4	34	39	42	48	53
	g_5	24	27	29	32	35
	l_3	24	28	28	36	40
h		40	48	59	64	75
k		2.8	2.8	3.5	4.0	4.0
k_1		2.8	2.8	2.8	3.5	4.0
L [4]		47	56	67	73	86
L_1 [4]		93	109	125.5	138	164
L_2		77.5	92	107.5	119	140.5
L_3 [4]		102	119	133	150	177
l_1 [4]		27.5	29	33	37	45
l_2		25	27	29	36	44

Bores [mm]			Size				
			01	0	1	2	3
EAS®-side	d [2) 3)]	d_{min}	10	15	22	32	35
		d_{max}	20	25	35	45	55
	d_P	$d_{P\,min}$	12	15	22	28	32
		$d_{P\,max}$	20	25	30	40	50
Steel bellows-side	d_1 [2) 3)]	$d_{1\,min}$	9	12	15	22	32
		$d_{1\,max}$	20	25	35	42	50
	d_2	$d_{2\,min}$	9	12	15	22	32
		$d_{2\,max}$	20 [5)]	25 [6)]	35 [7)]	42 [8)]	50
	d_3	$d_{3\,min}$	12	15	25	30	35
		$d_{3\,max}$	25	32	42	45	55

We reserve the right to make dimensional and constructional alterations.

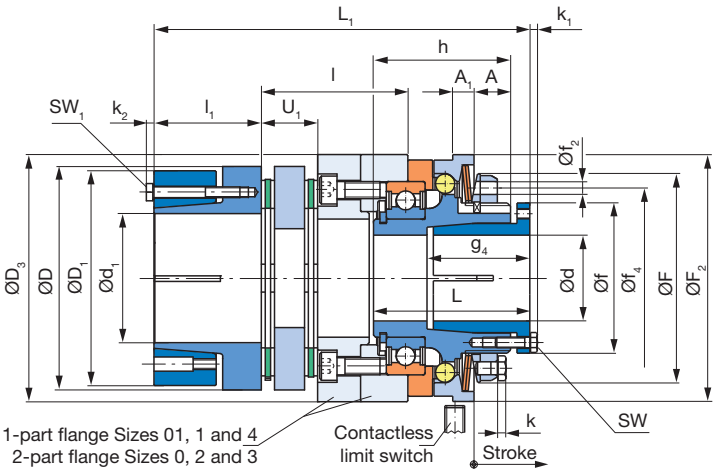
1) Further sizes for smaller and larger torques available on request
2) Shaft tolerance up to Ø 38 $_{h6}$, over Ø 38 $_{h8}$
3) Transmittable torques available with smaller bores on request
4) Dimensions in untensioned condition (shorter in tensioned condition)
5) Up to Ø 18 keyway acc. DIN 6885/1, over Ø 18 keyway acc. DIN 6885/3
6) Up to Ø 22 keyway acc. DIN 6885/1, over Ø 22 keyway acc. DIN 6885/3
7) Up to Ø 33 keyway acc. DIN 6885/1, over Ø 33 keyway acc. DIN 6885/3
8) Up to Ø 38 keyway acc. DIN 6885/1, over Ø 38 keyway acc. DIN 6885/3

EAS®-compact® ratchetting clutch/synchronous clutch

EAS®-compact® torsionally rigid

Type 496._ _ _.0
Sizes 01 to 4

EAS®-side cone bushing, ROBA®-DS-side shrink disk hub Type 496._1_.0, Sizes 01 to 4

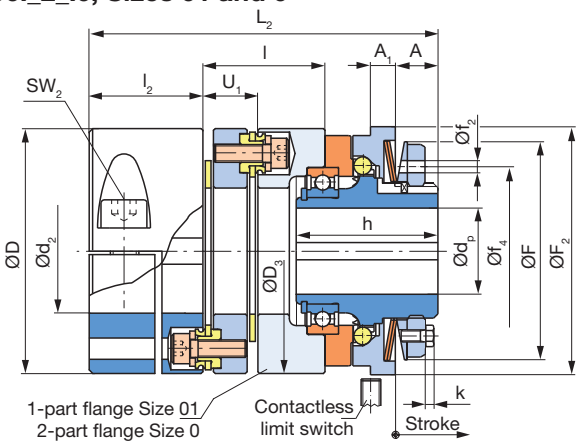


All EAS®-compact® clutches can be combined with almost all components of the ROBA®-DS backlash-free shaft coupling. The Types shown here represent only a selection of the most established designs.

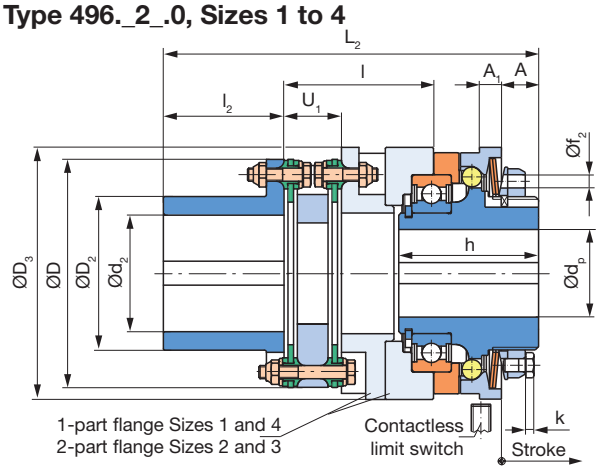
For further combination possibilities, see page 43.

We are happy to advise you on the dimensioning and configuration of your optimum clutch.

EAS®-side key hub, ROBA®-DS-side clamping hub with keyway Type 496._2_.0, Sizes 01 and 0



EAS®-side key hub, ROBA®-DS-side key hub Type 496._2_.0, Sizes 1 to 4



The missing dimensions (Øf4, ØF and ØF2) are identical to Type 496._2_.0

Order Number

EAS®-side	ROBA®-DS-side					
Cone bushing	Shrink disk hub	1	0	Ratchetting clutch [3]	Torque adjustment value (Optional)	With limit switch see pages 51 – 53 (option)
Key hub	Clamping hub [4] with keyway (Sizes 01 – 0) / key hub (Sizes 1 – 4)	2	5	Synchronous clutch		

__ / 4 9 6 . __ __ __ . 0 / __ / __ / __ / __ / __

Sizes	Torque range [1]		Hub 1 bore	Hub 2 bore	Radial torque adjustment
01 to 4	medium	5	Ø d^{H7}	Ø d_1^{H7}	see page 42 (option)
	high	6	Ø d_P^{H7}	Ø d_2^{H7}	
	very high	7			
	maximum [2]	8			

Example: Order number 1 / 496.625.0 / 22 / 25 / 60 / limit switch 055.002.5 / radial adjustment

1) See Technical Data, limit torque for overload M_G
2) Max. torque range only available as synchronous clutch, speed < 250 rpm
3) Standard ratchetting division is 15°; other ratchetting divisions optionally available (45°/60°/90°/120°/180°/...)
4) Clamping hub also available without keyway (Sizes 01-0)

EAS®-compact® ratchetting clutch/synchronous clutch

Technical data				Size 1)					
				01	0	1	2	3	4
Limit torques for overload 1)	Type 496.5_ _.0	M_G	[Nm]	5 – 12.5	10 – 25	20 – 50	40 – 100	70 – 175	120 – 300
	Type 496.6_ _.0	M_G	[Nm]	10 – 25	20 – 50	40 – 100	80 – 200	140 – 350	240 – 600
	Type 496.7_ _.0	M_G	[Nm]	20 – 50	40 – 100	80 – 200	160 – 400	280 – 700	480 – 1200
	Type 496.8_ 5.0 5)	M_G	[Nm]	25 – 62.5	50 – 125	100 – 250	200 – 500	350 – 875	600 – 1500
Max. speed		n_{max}	[rpm]	4000	3000	2500	2000	1200	800
Thrust washer stroke on overload			[mm]	1.2	1.5	1.8	2.0	2.2	2.5
Nominal torques, torsionally rigid coupling		T_{KN}	[Nm]	100	150	300	650	1100	1600
Permitted misalignments	axial 6)	ΔK_a	[mm]	0.9	1.1	0.8	1.1	1.3	1.5
	radial	ΔK_r	[mm]	0.20	0.20	0.20	0.25	0.30	0.30
	angular	ΔK_w	[°]	2.0	2.0	1.4	1.4	1.4	1.4

Mass moments of inertia and weights				Size					
				01	0	1	2	3	4
EAS®-hub-side	Type 496._1_.0	I	[10^{-3} kgm²]	0.211	0.531	1.388	2.846	6.858	29.432
	Type 496._2_.0	I	[10^{-3} kgm²]	0.205	0.505	1.302	2.630	6.359	28.443
ROBA®-DS-side	Type 496._1_.0	I	[10^{-3} kgm²]	0.849	2.395	2.915	9.543	21.443	38.996
	Type 496._2_.0	I	[10^{-3} kgm²]	0.709	2.086	2.417	7.815	18.215	31.480
Weights	Type 496._1_.0	m	[kg]	1.63	2.95	3.80	7.04	11.45	19.16
	Type 496._2_.0	m	[kg]	1.43	2.61	3.50	6.35	10.81	17.31

Tensioning screws				Size					
				01	0	1	2	3	4
In cone bushing EAS®-side	Number, dimensions	M	[mm]	6 x M4	6 x M4	8 x M4	8 x M5	8 x M6	8 x M8
	Wrench opening	SW	[mm]	7	7	7	8	10	13
	Tightening torque	T_A	[Nm]	4	4	4	8	12	25
In shrink disk ROBA®-DS-side	Number, dimensions	M_1	[mm]	4 x M5	6 x M5	6 x M5	6 x M5	6 x M6	6 x M8
	Wrench opening	SW_1	[mm]	8	8	8	8	10	13
	Tightening torque	T_A	[Nm]	6	6	6	8.5	10	25
In clamping hub ROBA®-DS-side	Number, dimensions	M_2	[mm]	1 x M8	1 x M8	-	-	-	-
	Wrench opening	SW_2	[mm]	6	6	-	-	-	-
	Tightening torque	T_A	[Nm]	33	33	-	-	-	-

Dimensions [mm]	Size					
	01	0	1	2	3	4
A	12	13.5	16	17	20.5	46
A_1	7	8	9	10	12	16
D	69	79	77	104	123	143
D_1	68	78	77	100	115	143
D_2	-	-	50	70	80	100
D_3	69	85	100	115	135	172
F	61.5	67	82	97	117	150
F_2	70	85	100	115	135	166
f	38	44	56	70	84	100
f_2	5	5	5	6	7	-
f_4	50	55	70	84	100	-
min. Wellenlänge g_4	34	39	42	48	53	93
h	40	48	59	64	75	115
k	2.8	2.8	3.5	4.0	4.0	-
k_1	2.8	2.8	2.8	3.5	4.0	5.3
k_2	3.5	3.5	3.5	3.5	4.0	5.3
L 4)	47	56	67	73	86	130
L_1 4)	105.3	132.8	141.2	175.2	208	237
L_2	98.3	120.3	133.2	171.2	207	237
l	34.3	49.8	48.2	68.2	85	68
l_1	32	37.5	40	50	55	60
l_2	32	33.5	40	55	65	75
U_1	15.3	15.8	21.2	26.2	34	35.2

Bores [mm]			Size					
			01	0	1	2	3	4
EAS®-side	d 2)	d_{min}	10	15	22	32	35	40
		d_{max}	20	25	35	45	55	65
	d_P	$d_{P\,min}$	12	15	22	28	32	40
		$d_{P\,max}$	20	25	30	40	50	65
ROBA®-DS-side	d_1 3)	$d_{1\,min}$	19	25	25	40	45	55
		$d_{1\,max}$	38	45	45	60	70	90
	d_2	$d_{2\,min}$	19	25	16	25	30	35
		$d_{2\,max}$	35	42	32	50	55	70

We reserve the right to make dimensional and constructional alterations.

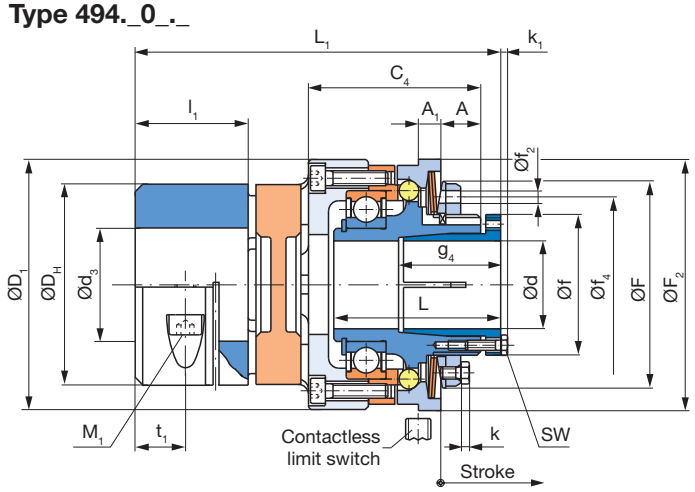
1) Further sizes for smaller and larger torques available on request
2) Shaft tolerance up to Ø 38 $_{h6}$, over Ø 38 $_{h8}$
3) Recommended shaft tolerance $_{g6}$
4) Dimensions in untensioned condition (shorter in tensioned condition)
5) Maximum speed: 250 rpm
6) Only permitted as a static or virtually static value.

EAS®-compact® ratchetting clutch/synchronous clutch

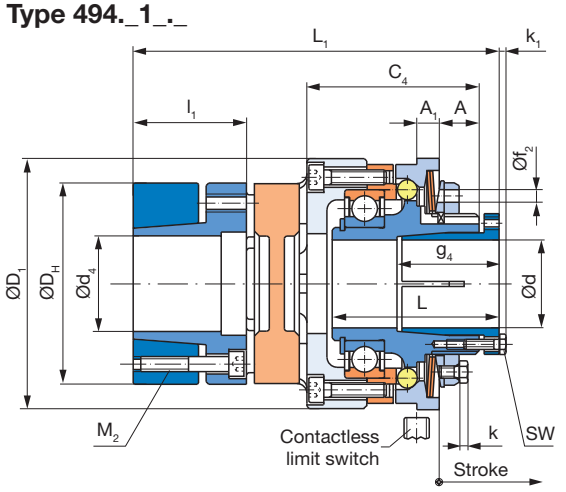
EAS®-compact® lastic backlash-free

Type 494._ _ _._
Sizes 01 to 4

EAS®-side cone bushing, ROBA®-ES-side clamping hub Type 494._0_._

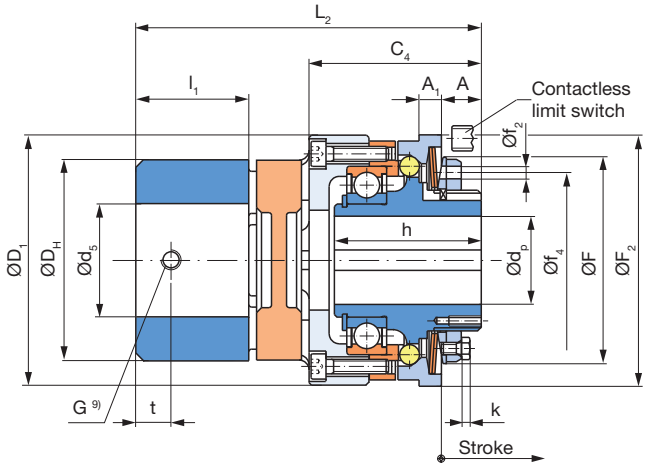


EAS®-side cone bushing, ROBA®-ES-side shrink disk hub Type 494._1_._



The missing dimensions (Øf, Øf4, ØF and ØF2) are identical to Type 494._0_._

EAS®-side key hub, ROBA®-ES-side key hub Type 494._2_._



Order Number

EAS®-side	ROBA®-ES-side				
Cone bushing	Clamping hub	0			
Cone bushing	Shrink disk hub	1	0	Ratchetting clutch 2)	Torque adjustment value (Optional)
Key hub	Key hub	2	5	Synchronous clutch	With limit switch see pages 51 – 53 (Option)

__ / 4 9 4 . __ __ __ . __ / __ / __ / __ / __ / __

Sizes	Torque range 1)		Flexible coupling		Hub 1 bore	Hub 2 bore	Radial torque adjustment
01 to 4	medium	5	92 Shore A	3	Ø d^{H7}	Ø d_3^{F7}	see page 42 (option)
	high	6	98 Shore A	4	Ø d_P^{H7}	Ø d_4^{H7}	
	very high	7	64 Shore D	6		Ø d_5^{H7}	

Example: Order number 1 / 494.615.3 / 22 / 25 / 60 / limit switch 055.002.5 / radial adjustment

1) See Technical Data, limit torque for overload M_G
2) Standard ratchetting division is 15°; other ratchetting divisions optionally available (45°/60°/90°/120°/180°/...)
3) The transmittable torques on the flexible coupling "T_{KN}" are dependent on factors such as Temperature factor, torsional rigidity, etc., see also coupling dimensioning ROBA®-ES catalogue K.940.V_ _ or contact the manu-facturer. Furthermore, the transmittable torques of the flexible coupling are dependent on the bore diameter d_3 or d_4, see also Table 1 on page 50.
4) Shaft tolerance up to Ø 38 $_{h6}$, over Ø 38 $_{h8}$
5) Transmittable torques available with smaller bores on request
6) Smaller bores for smaller torques available on request
7) Larger bores available on request
8) Shaft tolerance up to Ø 40 $_{j6}$
9) Keyway 180° offset to "G"
10) Dimensions in untensioned condition (shorter in tensioned condition)

EAS®-compact® ratchetting clutch/synchronous clutch

Technical data					Size					
					01	0	1	2	3	4
Limit torques for overload [3]	Type 494.5_ _._		M_G	[Nm]	5 – 12.5	10 – 25	20 – 50	40 – 100	70 – 175	120 – 300
	Type 494.6_ _._		M_G	[Nm]	10 – 25	20 – 50	40 – 100	80 – 200	140 – 350	240 – 600
	Type 494.7_ _._		M_G	[Nm]	20 – 50	40 – 100	80 – 200	160 – 400	280 – 700	480 – 1200
Max. speed			n_{max}	[rpm]	4000	3000	2500	2000	1200	800
Thrust washer stroke on overload				[mm]	1.2	1.5	1.8	2.0	2.2	2.5
Nominal and maximum torques [3], flexible coupling		92 Shore A	T_{KN}/T_{max}	[Nm]	35 / 70	95 / 190	190 / 380	265 / 530	310 / 620	900 / 1800
		98 Shore A	T_{KN}/T_{max}	[Nm]	60 / 120	160 / 320	325 / 650	450 / 900	525 / 1050	1040 / 2080
		64 Shore D	T_{KN}/T_{max}	[Nm]	75 / 150	200 / 400	405 / 810	560 / 1120	655 / 1310	1250 / 2500
Permitted misalignments	axial		ΔK_a	[mm]	1.4	1.5	1.8	2.0	2.1	2.6
	radial	92 Shore A	ΔK_r	[mm]	0.14	0.15	0.17	0.19	0.21	0.25
		98 Shore A	ΔK_r	[mm]	0.10	0.11	0.12	0.14	0.16	0.18
		64 Shore D	ΔK_r	[mm]	0.07	0.08	0.09	0.10	0.11	0.13
	angular	92 Shore A	ΔK_w	[°]	1.0	1.0	1.0	1.0	1.0	1.0
		98 Shore A	ΔK_w	[°]	0.9	0.9	0.9	0.9	0.9	0.9
		64 Shore D	ΔK_w	[°]	0.8	0.8	0.8	0.8	0.8	0.8

Mass moments of inertia and weights				Size					
				01	0	1	2	3	4
EAS®-hub-side	Type 494._0_._	I	[10^{-3} kgm²]	0.211	0.531	1.388	2.846	6.858	29.432
	Type 494._1_._	I	[10^{-3} kgm²]	0.211	0.531	1.388	2.846	6.858	29.432
	Type 494._2_._	I	[10^{-3} kgm²]	0.205	0.505	1.302	2.630	6.359	28.443
ROBA®-ES-side	Type 494._0_._	I	[10^{-3} kgm²]	0.322	0.700	1.846	7.627	14.530	48.570
	Type 494._1_._	I	[10^{-3} kgm²]	0.381	0.833	2.280	7.475	14.167	43.038
	Type 494._2_._	I	[10^{-3} kgm²]	0.324	0.696	1.847	7.613	14.520	49.106
Weights	Type 494._0_._	m	[kg]	1.06	1.58	2.69	6.31	9.23	21.53
	Type 494._1_._	m	[kg]	1.18	1.74	3.05	6.20	8.91	21.44
	Type 494._2_._	m	[kg]	1.02	2.09	2.70	6.23	9.56	21.09

Tensioning screws				Size					
				01	0	1	2	3	4
In cone bushing EAS®-side	Number, dimensions	M	[mm]	6 x M4	6 x M4	8 x M4	8 x M5	8 x M6	8 x M8
	Wrench opening	SW	[mm]	7	7	7	8	10	13
	Tightening torque	T_A	[Nm]	4	4	4	8	12	25
In clamping hub ROBA®-ES-side	Number, dimensions	M_1	[mm]	1 x M6	1 x M8	1 x M8	1 x M10	1 x M12	1 x M14
	Wrench opening	SW_1	[mm]	5	6	6	8	10	12
	Tightening torque	T_A	[Nm]	10.5	25	25	70	120	200
In shrink disk ROBA®-ES-side	Number, dimensions	M_2	[mm]	4 x M5	8 x M5	8 x M6	4 x M8	4 x M8	4 x M12
	Wrench opening	SW_2	[mm]	4	4	5	6	6	10
	Tightening torque	T_A	[Nm]	6	6	10.5	25	30	90

Dimensions [mm]	Size					
	01	0	1	2	3	4
A	12	13.5	16	17	20.5	46
A_1	7	8	9	10	12	16
C_4	47	56.5	69	74	87	130
D_1	70	85	100	115	135	175
D_H	55	65	80	95	105	135
F	61.5	67	82	97	117	150
F_2	70	85	100	115	135	166
f	38	44	56	70	84	100
f_2	5	5	5	6	7	-
f_4	50	55	70	84	100	-
G [9]	M5	M6	M8	M8	M8	M10
min. Wellenlänge g_4	34	39	42	48	53	93
h	40	48	59	64	75	115
k	2.8	2.8	3.5	4.0	4.0	-
k_1	2.8	2.8	2.8	3.5	4.0	5.3
L [10]	47	56	67	73	86	130
L_1 [10]	102	119.5	146	159	182	255
L_2	95	111.5	138	150	171	240
l_1	30	35	45	50	56	75
t	10	15	15	20	25	20
t_1	12	13.5	20	20	21	27.5

Bores [mm]			Size					
			01	0	1	2	3	4
EAS®-side	d [4] [5]	d_{min}	10	15	22	32	35	40
		d_{max}	20	25	35	45	55	65
	d_P [6] [7]	$d_{P\,min}$	12	15	22	28	32	40
		$d_{P\,max}$	20	25	30	40	50	65
ROBA®-ES - side	d_3 [3]	$d_{3\,min}$	15	19	20	28	35	45
		$d_{3\,max}$	28	35	45	50	55	80
	d_4 [3]	$d_{4\,min}$	15	19	20	28	35 [8]	45
		$d_{4\,max}$	28	38	45	50	60 [8]	75
	d_5 [3]	$d_{5\,min}$	8	10	12	14	20	38
		$d_{5\,max}$	28	38	45	55	60	80

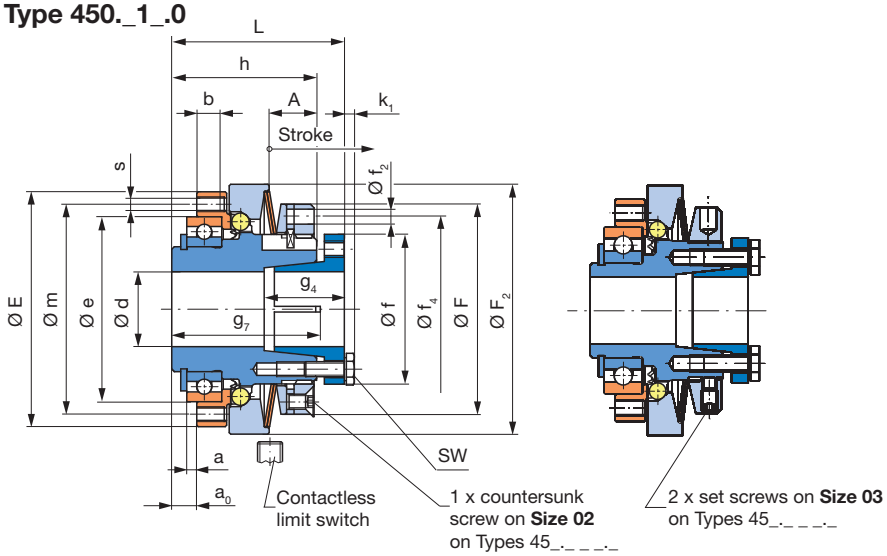
We reserve the right to make dimensional and constructional alterations.

EAS®-NC ratchetting clutch/synchronous clutch

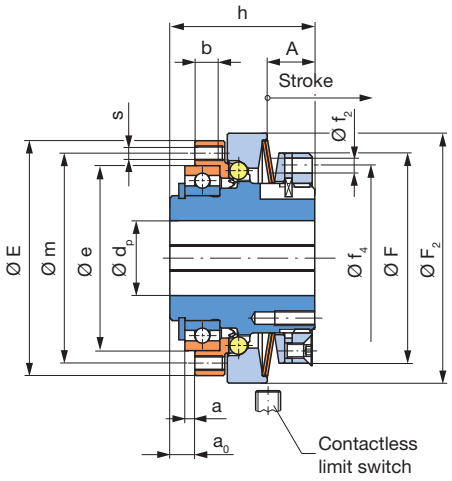
EAS®-NC short hub

Type 450._ _ _.0
Sizes 03 and 02

with cone bushing
Type 450._1_.0



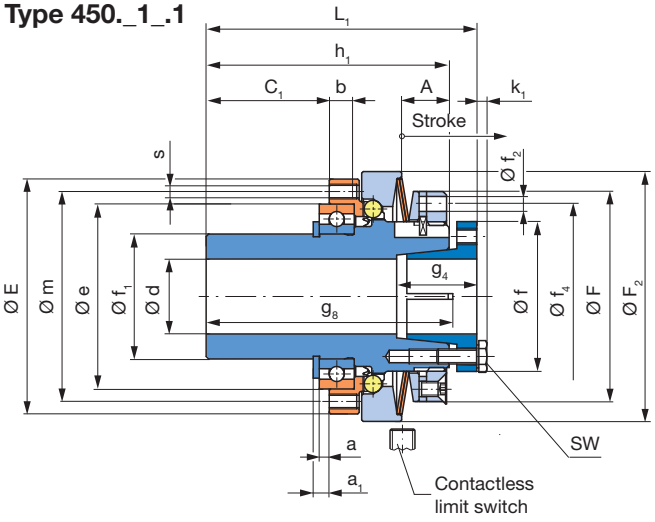
with keyway
Type 450._2_.0



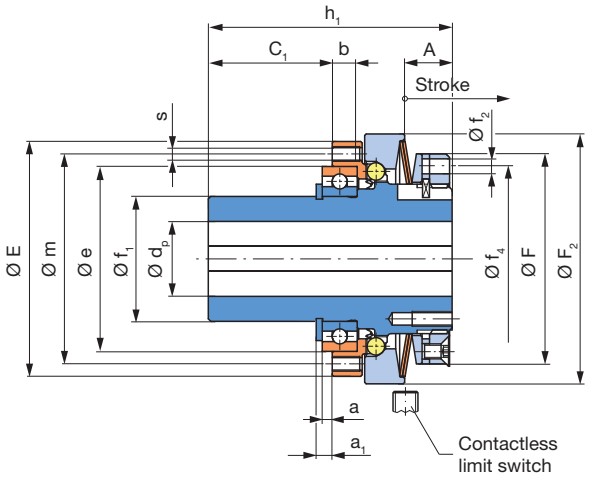
EAS®-NC long protruding hub

Type 450._ _ _.1
Sizes 03 and 02

with cone bushing
Type 450._1_.1



with keyway
Type 450._2_.1



Order Number

	with cone bushing	**1**	**0**	Ratchetting clutch	Torque adjustment value (Optional)
	with keyway	**2**	**5**	Synchronous clutch	

__ / 4 5 0 . __ __ __ . __ / __ / __ / __

Sizes **03 and 02**	**Torque range** [1]		short hub	**0**	Hub bore Ø d^{H7} Ø d_p^{H7}	With limit switch see pages 51 – 53 (option)
	medium	**5**	long protruding hub	**1**		
	high	**6**	Hub			
	very high	**7**				

Example: Order number 02 / 450.610.0 / 15 / 8 / limit switch 055.002.5

1) See Technical Data, limit torque for overload M_G

EAS®-NC ratchetting clutch/synchronous clutch

Technical data				Size 1)	
				03	02
Limit torques for overload 1)	Type 450.5_ _._	M_G	[Nm]	0.65 – 1.30	2 – 5
	Type 450.6_ _._	M_G	[Nm]	1.30 – 2.60	5 – 10
	Type 450.7_ _._	M_G	[Nm]	2.00 – 3.80	6 – 15
Max. speed		n_{max}	[rpm]	4000	4000
Thrust washer stroke on overload			[mm]	0.8	1.0

Mass moments of inertia and weights				Size	
				03	02
Hub-side	Type 450._1_.0	I	[10^{-3} kgm²]	0.027	0.054
	Type 450._2_.0	I	[10^{-3} kgm²]	0.025	0.051
	Type 450._1_.1	I	[10^{-3} kgm²]	0.028	0.058
	Type 450._2_.1	I	[10^{-3} kgm²]	0.026	0.055
Pressure flange-side	Type 450._____._	I	[10^{-3} kgm²]	0.008	0.018
Weights	Type 450._1_.0	m	[kg]	0.18	0.28
	Type 450._2_.0	m	[kg]	0.17	0.26
	Type 450._1_.1	m	[kg]	0.20	0.32
	Type 450._2_.1	m	[kg]	0.19	0.30

Tensioning screws and screw-on bores				Size	
				03	02
Tensioning screws in cone bushing	Number, dimensions	M	[mm]	4 x M3	4 x M3
	Wrench opening	SW	[mm]	5.5	5.5
	Tightening torque	T_A	[Nm]	1	1
Screw-on bores in pressure flange	Number, dimensions	s	[mm]	6 x M3	6 x M3

Dimensions [mm]		Size	
		03	02
A		7.2	9.5
a 2)		2	2
a_0		4.5	5.0
a_1		3.0	3.2
b		5	5
C_1		20.5	25
E		40	47
e_{h5} 4)		30	37
F		37	42
F_2		45	50
f		26	30
$f_{1\ h6}$		17	25
f_2		-	3
f_4		-	37
Minimum shaft length	g_4	11.5	15.5
	g_7	25.5	30.5
	g_8	41.5	50.5
h		24	29
h_1		40	49
k_1		2	2
L 6)		28.5	34.5
L_1 6)		44.5	54.5
m		35	42

Bores [mm]		Size	
		03	02
d	d_{min}	6	8
	d_{max}	12	15
d_P 3)	$d_{P\ min}$	6	8
	$d_{P\ max}$	11	16 5)

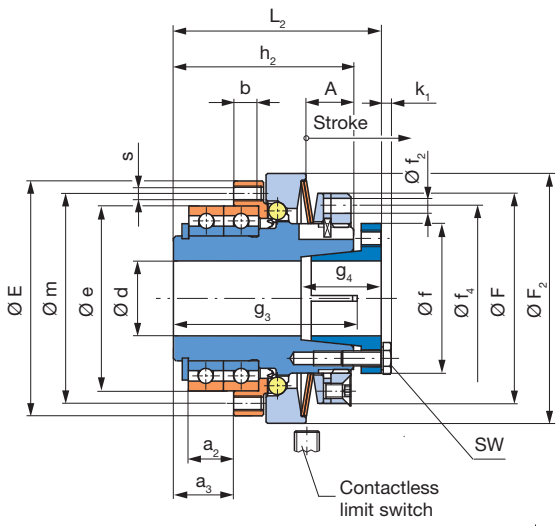
We reserve the right to make dimensional and constructional alterations.

1) Further sizes for smaller and larger torques available on request
2) Mounting tolerance + 0.1
3) The position of the keyway to the mounting bore “s“ in the pressure flange is not defined. Defined position available on request
4) Tolerance user-side H7
5) Up to Ø 14 keyway acc. DIN 6885/1, over Ø 14 keyway acc. DIN 6885/3
6) Dimensions in untensioned condition (shorter in tensioned condition)

EAS®-NC ratchetting clutch/synchronous clutch

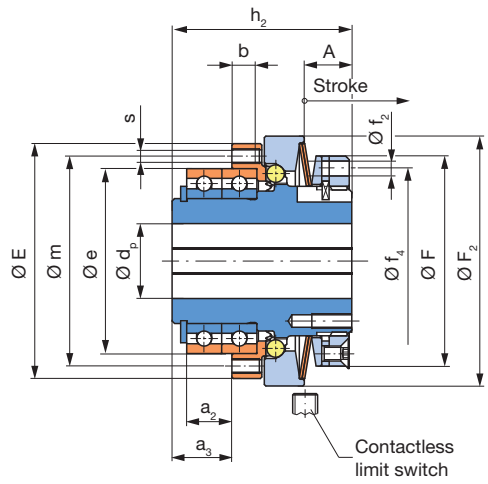
EAS®-NC double bearing design with cone bushing

Type 450._1_.2
Sizes 03 and 02



EAS®-NC double bearing design with keyway

Type 450._2_.2
Sizes 03 and 02



Order Number

		with cone bushing with keyway	**1** **2**	**0** **5**	Ratchetting clutch Synchronous clutch	Torque adjustment value (Optional)

__ / 4 5 0 . __ __ __ . 2 / __ / __ / __

Sizes **03** **and** **02**	**Torque range** [1] medium high very high	**5** **6** **7**	2-bearing design	**2**	Hub bore Ø d^{H7} Ø d_p^{H7}	With limit switch see pages 51 – 53 (option)

Example: Order number 02 / 450.610.2 / 15 / 8 / limit switch 055.002.5

1) See Technical Data, limit torque for overload M_G

EAS®-NC ratchetting clutch/synchronous clutch

Technical data				Size [1]	
				03	02
Limit torques for overload [1]	Type 450.5_ _.2	M_G	[Nm]	0.65 – 1.30	2 – 5
	Type 450.6_ _.2	M_G	[Nm]	1.30 – 2.60	5 – 10
	Type 450.7_ _.2	M_G	[Nm]	2.00 – 3.80	6 – 15
Max. speed		n_{max}	[rpm]	4000	4000
Thrust washer stroke on overload			[mm]	0.8	1.0

Mass moments of inertia and weights				Size	
				03	02
Hub-side	Type 450._1_.2	I	[10^{-3} kgm²]	0.028	0.058
	Type 450._2_.2	I	[10^{-3} kgm²]	0.026	0.055
Pressure flange-side	Type 450._ _ _.2	I	[10^{-3} kgm²]	0.008	0.018
Weights	Type 450._1_.2	m	[kg]	0.13	0.31
	Type 450._2_.2	m	[kg]	0.18	0.29

Tensioning screws and screw-on bores				Size	
				03	02
Tensioning screws in cone bushing	Number, dimensions	M	[mm]	4 x M3	4 x M3
	Wrench opening	SW	[mm]	5.5	5.5
	Tightening torque	T_A	[Nm]	1	1
Screw-on bores in pressure flange	Number, dimensions	s	[mm]	6 x M3	6 x M3

Dimensions [mm]		Size	
		03	02
A		7.2	9.5
a_2 [2]		9	9
a_3		11.5	12
b		5	5
E		40	47
e_{h5} [4]		30	37
F		37	42
F_2		45	50
f		26	30
f_2		-	3
f_4		-	37
Minimum shaft length	g_3	32.5	37.5
	g_4	11.5	15.5
h_2		31	36
k_1		2	2
L_2 [6]		35.5	41.5
m		35	42

Bores [mm]		Size	
		03	02
d	d_{min}	6	8
	d_{max}	12	15
d_P [3]	$d_{P\,min}$	6	8
	$d_{P\,max}$	11	16 [5]

We reserve the right to make dimensional and constructional alterations.

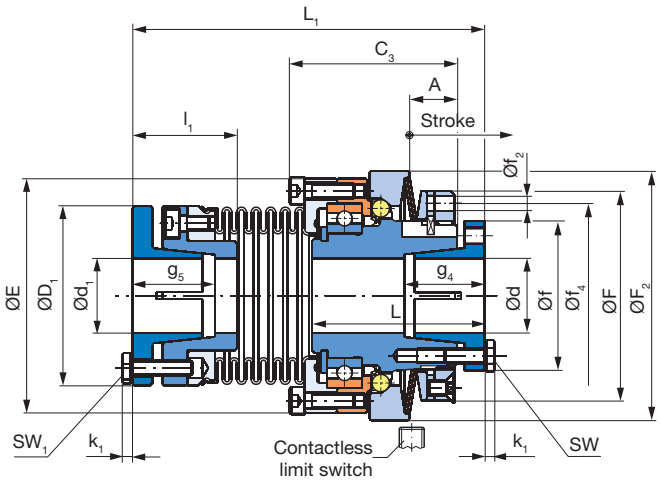
1) Further sizes for smaller and larger torques available on request
2) Mounting tolerance + 0.1
3) The position of the keyway to the mounting bore "s" in the pressure flange is not defined. Defined position available on request
4) Tolerance user-side H7
5) Up to Ø 14 keyway acc. DIN 6885/1, over Ø 14 keyway acc. DIN 6885/3
6) Dimensions in untensioned condition (shorter in tensioned condition)

EAS®-NC ratchetting clutch/synchronous clutch

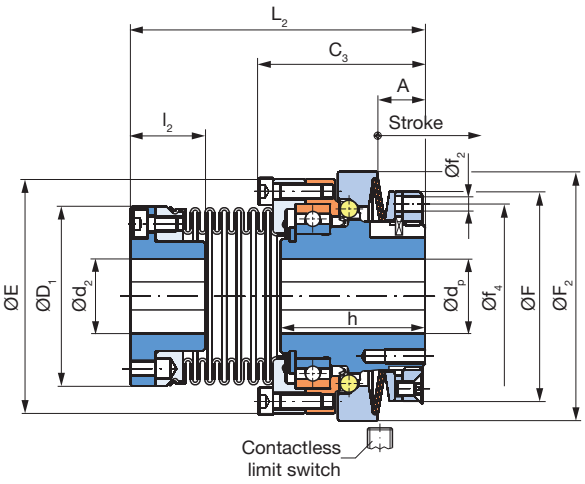
EAS®-NC with steel bellows coupling

Type 453._ _ _ .0
Sizes 03 and 02

EAS®-side cone bushing, Steel bellows-side cone bushing Type 453._1_.0



EAS®-side key hub, Steel bellows-side key hub Type 453._2_.0



Order Number

EAS®-side	Steel bellows-side			
Cone bushing	Cone bushing	1	0	Ratchetting clutch
Key hub	Key hub	2	5	Synchronous clutch

Torque adjustment value (Optional)

__ / 4 5 3 . __ __ __ . 0 / __ / __ / __ / __

Sizes 03 and 02	Torque range [1]		Hub 1 bore Ø d^{H7} Ø d_p^{H7}	Hub 2 bore Ø d_1^{H7} Ø d_2^{H7}	with Limit switch see pages 51 – 53 (option)
	medium	5			
	high	6			
	very high	7			

Example: Order number 02 / 453.615.0 / 15 / 15 / 8 / limit switch 055.002.5

1) See Technical Data, limit torque for overload M_G

EAS®-NC ratchetting clutch/synchronous clutch

Technical data				Size [1]	
				03	02
Limit torques for overload [1]	Type 453.5_ _.0	M_G	[Nm]	0.65 – 1.30	2 – 5
	Type 453.6_ _.0	M_G	[Nm]	1.30 – 2.60	5 – 10
	Type 453.7_ _.0	M_G	[Nm]	2.00 – 3.80	6 – 15
Max. speed		n_{max}	[rpm]	4000	4000
Thrust washer stroke on overload			[mm]	0.8	1.0
Nominal torques, steel bellows coupling		T_{KN}	[Nm]	12	25
Permitted misalignments	axial	ΔK_a	[mm]	0.2	0.3
	radial	ΔK_r	[mm]	0.1	0.1
	angular	ΔK_w	[°]	2	2

Mass moments of inertia and weights				Size	
				03	02
Hub-side	Type 453._1_.0	I	[10^{-3} kgm²]	0.027	0.054
	Type 453._2_.0	I	[10^{-3} kgm²]	0.025	0.051
Steel bellows-side	Type 453._1_.0	I	[10^{-3} kgm²]	0.027	0.063
	Type 453._2_.0	I	[10^{-3} kgm²]	0.025	0.057
Weights	Type 453._1_.0	m	[kg]	0.27	0.45
	Type 453._2_.0	m	[kg]	0.24	0.39

Tensioning screws				Size	
				03	02
In cone bushing EAS®-side	Number, dimensions	M	[mm]	4 x M3	4 x M3
	Wrench opening	SW	[mm]	5.5	5.5
	Tightening torque	T_A	[Nm]	1.3	1.3
In cone bushing steel bellows-side	Number, dimensions	M_1	[mm]	4 x M3	4 x M3
	Wrench opening	SW_1	[mm]	5.5	5.5
	Tightening torque	T_A	[Nm]	1.3	1.3

Dimensions [mm]		Size	
		03	02
A		7.2	9.5
C_3		28	33.5
D_1		30	36
E		40	47
F		37	42
F_2		45	50
f		26	30
f_2		-	3
f_4		-	37
Minimum shaft length	g_4	11.5	15.5
	g_5	12.5	16
h		24	29
k_1		2	2
L [3]		28.5	34.5
L_1 [3]		58.5	70.5
L_2		49.3	59
l_1 [3]		14	21
l_2		9.5	15

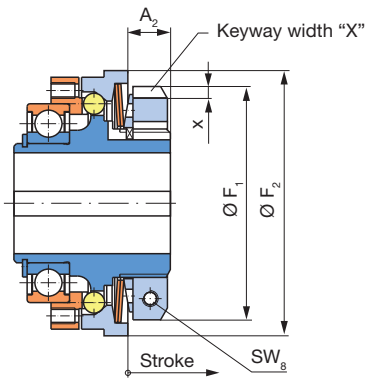
Bores [mm]			Size	
			03	02
EAS®-side	d	d_{min}	6	8
		d_{max}	12	15
	d_P	$d_{P\,min}$	6	8
		$d_{P\,max}$	11	16 [2]
Steel bellows-side	d_1	$d_{1\,min}$	6	8
		$d_{1\,max}$	12	15
	d_2	$d_{2\,min}$	6	8
		$d_{2\,max}$	11	16 [2]

We reserve the right to make dimensional and constructional alterations.

1) Further sizes for smaller and larger torques available on request
2) Up to Ø 14 keyway acc. DIN 6885/1, over Ø 14 keyway acc. DIN 6885/3
3) Dimensions in untensioned condition (shorter in tensioned condition)

EAS®-compact® Options

EAS®-compact® with adjusting nut for radial torque adjustment

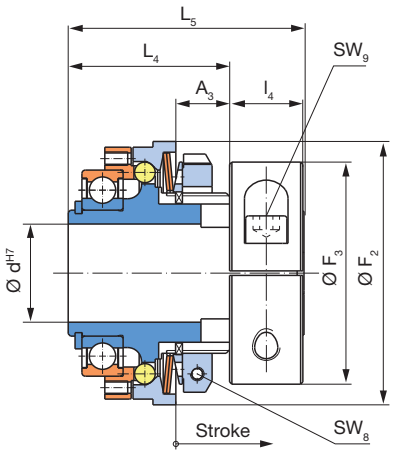


The EAS®-compact® can be equipped with an adjusting nut for radial torque adjustment if the clutch cannot be accessed axially due to narrow installation conditions.
On this variant, the graduation for reading and adjusting the torque is mounted radially visible on the outer diameter.

Dimensions [mm]	Size				
	01	0	1	2	3
A_2	12	13.5	16	17	20.5
F_1	61	73	88	104	125
F_2	70	85	100	115	135
X	8	8	10	10	10
x	3.5	3.5	4	4	4

EAS®-compact® with clamping ring

EAS®-compact® clutches with clamping ring hub can be mounted extremely quickly and easily onto the shaft. The slotted clamping ring is tensioned using one single screw. Due to the equipment with an adjusting nut for radial torque adjustment, the limit torque for overload can be altered even in installed condition.



Dimensions [mm]	Size				
	01	0	1	2	3
A_3	15.5	19	20.5	23.5	26
F_2	70	85	100	115	135
F_3	60	72	84	97	115
L_4	43.5	53.5	63.5	70.5	80.5
L_5	65	77	90	103	117
l_4	18	22	26	32	36

Bores [mm]		Size				
		01	0	1	2	3
d H7 1)	d_{min}	10	15	22	32	35
	d_{max}	25	32	40	45	55

1) For transmittable torques dependent on bore, see Table 1.

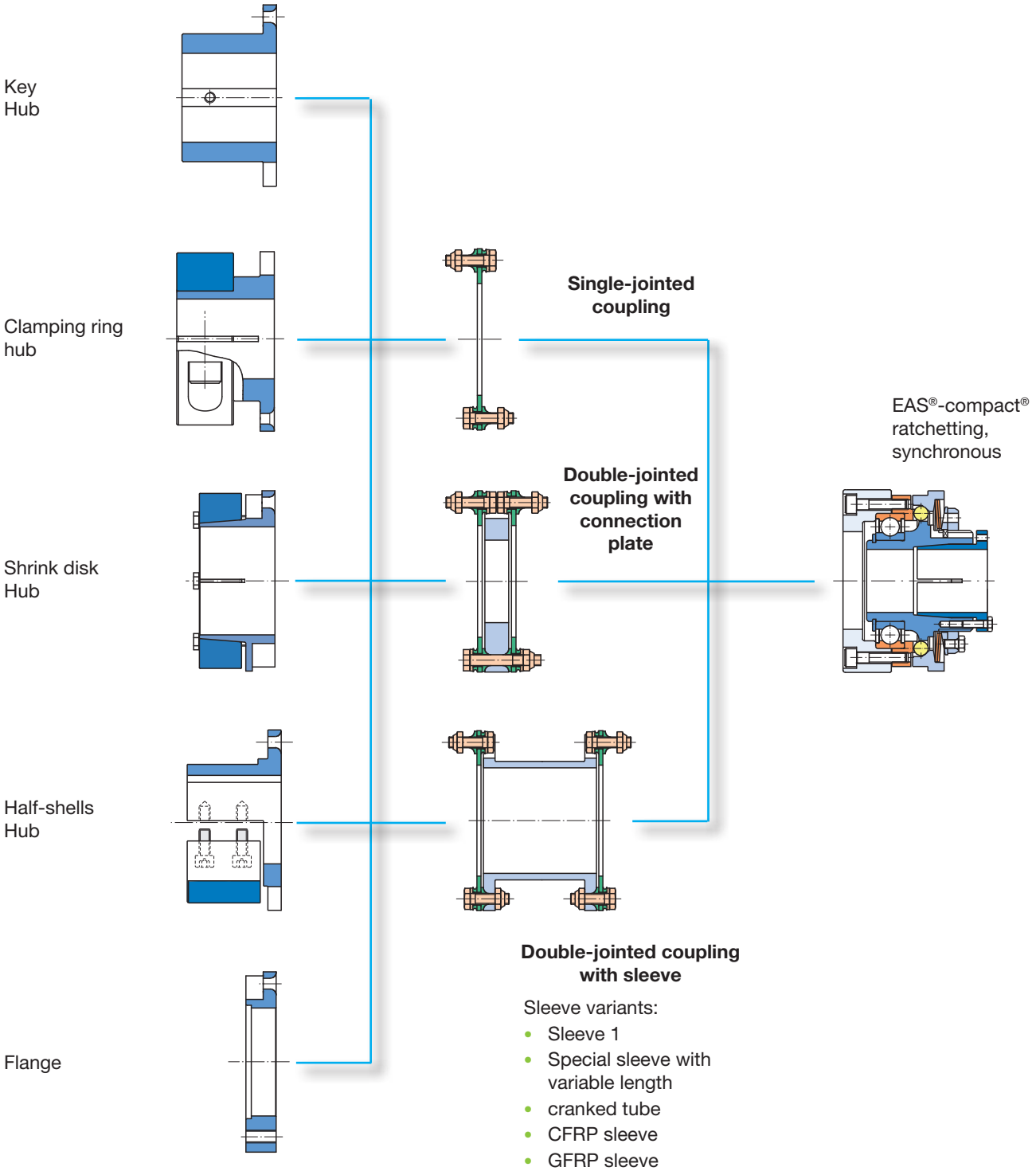
Frictionally-locking transmittable torques T_R [Nm] EAS®-Compact® with clamping ring					
Bore	Size				
	01	0	1	2	3
Ø 10	44	-	-	-	-
Ø 12	52	-	-	-	-
Ø 14	61	-	-	-	-
Ø 16	69	101	-	-	-
Ø 18	78	113	-	-	-
Ø 20	87	126	-	-	-
Ø 22	96	138	199	-	-
Ø 25	109	168	226	327	-
Ø 28	-	201	253	366	523
Ø 30	-	216	290	420	561
Ø 32	-	230	325	470	598
Ø 35	-	-	355	515	700
Ø 38	-	-	386	559	798
Ø 40	-	-	406	588	840
Ø 45	-	-	-	661	945
Ø 50	-	-	-	-	1050
Ø 55	-	-	-	-	1155

Table 1

Screws				Size				
				01	0	1	2	3
Locking screw in adjusting nut	Number, dimensions	M_8	[mm]	1 x M4	1 x M5	1 x M6	1 x M6	1 x M8
	Wrench opening	SW_8	[mm]	3	4	5	5	6
	Tightening torque	T_A	[Nm]	3	5.5	9.5	9.5	23
In the clamping ring	Number, dimensions	M_9	[mm]	1 x M6	1 x M8	1 x M10	1 x M12	1 x M14
	Wrench opening	SW_9	[mm]	5	6	8	10	12
	Tightening torque	T_A	[Nm]	16	40	79	135	220

EAS®-compact® Options

EAS®-Compact® torsionally rigid Modular Structure



Sleeve variants:

- Sleeve 1
- Special sleeve with variable length
- cranked tube
- CFRP sleeve
- GFRP sleeve
- Axially separable sleeve

All EAS®-compact® ratchetting and synchronous clutches can be combined with almost all components of the ROBA®-DS backlash-free shaft coupling. For a current selection of different Types, please see pages 16 and 17.

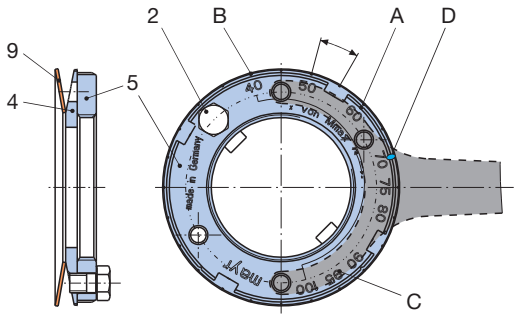
We are happy to advise you on the dimensioning and configuration of your optimum design.

Technical Explanations

Readable Torque Adjustment

The EAS®-compact®overload clutch offers easily readable torque adjustment on the adjusting nut (for Sizes 01 to 3). This readability makes adjusting the torque far more simple, and also allows easy checks on the set release value on the installed clutch.

- The limit torque can be finely adjusted and accurately read due to the adjusting nut with the fine thread and the easily-readable graduation scale.
- The positive-locking (or frictionally-locking) safeguard on the adjusting nut protects against self-turning, inadvertent adjustment of the set limit torque. The integral blocking protection prevents the cup springs from becoming spring-bound.



Illustrations 1: EAS®-compact® ratchetting and synchronous clutch

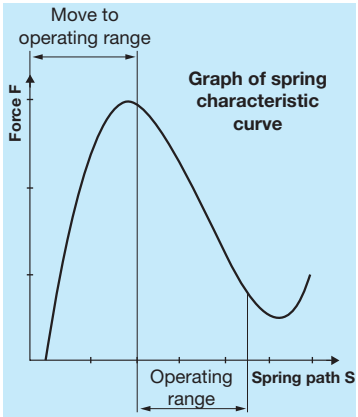


Fig. 3
(The diagram only serves as an example)

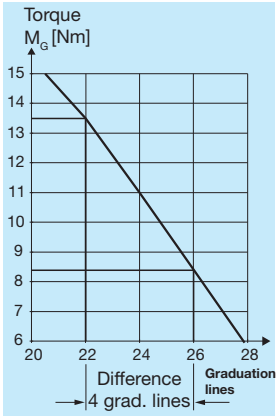


Fig. 4
(The diagram only serves as an example)

Depending on the drive and the drive constellation, torque peaks (e.g. via start-up torque impacts on asynchronous motors) can occur which lie substantially above the system (motor) operating torque.
This behaviour is to be taken into account customer-side when dimensioning or adjusting the clutch.

Torque Adjustment

Adjustment takes place by turning the adjusting nut (5) (Sizes 03 to 3) or the set screws (6) (Sizes 4 and 5).
The installed cup springs (9) are operated in the negative range of the characteristic curve (Fig. 3). A stronger pre-tension produces a dropping in spring force. Turning the adjusting nut (5) (Sizes 03 to 3) or the set screws (6) (Sizes 4 and 5) clockwise therefore produces a decrease in spring force. Turning it anti-clockwise produces an increase in torque (facing direction towards the adjusting nut (5) – Figs. 1 and 2).

If no other torque adjustment is requested customer-side, the EAS®-compact® ratchetting and synchronous clutches are **generally** set and marked (calibrated) manufacturer-side to approx. 70 % of the respective maximum torque. The respective torque adjustment or the adjustable torque range are visible on the type tag.

A control “spring operation in the operating range” can be carried out via the dimension “a”.

EAS®-compact® ratchetting and synchronous clutch (Sizes 01 - 3): Dimension “a” is the distance between the adjusting nut facing-side (5) to the thrust washer facing-side (3) (Fig. 5).

For the corresponding data, please see the Installation and Operational Instructions.

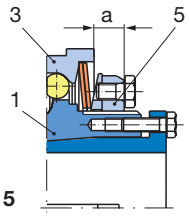


Fig. 5

EAS®-NC Sizes 03 and 02 must be adjusted according to the Adjustment Diagram (please order if necessary) if no adjustment or calibration was made manufacturer-side.

EAS®-NC Size 03 (Fig. 7):

- Unscrew both set screws (8) from the adjusting nut (5).
- Grease the thread surfaces on the adjusting nut (5) and the hub (1).
- Set the adjusting nut (5) to the required dimension “a” (acc. Adjustment Diagram) using a hook wrench.
- Paint both set screws (8) with Loctite 243, screw them into the adjusting nut (5) and tighten them.

EAS®-NC Size 02 (Fig. 8 and Fig. 4):

- Loosen the locking screw (2).
- Grease the thread and contact surfaces on the adjusting nut (5), the locking ring (4) and the hub (1).
- The adjusting nut (5) is adjusted by hand up to contact on the cup springs (9).
- Continue to turn until the four notches on the circumference of the adjusting nut (5) and the notches in the locking ring (4) align.
- Turn the adjusting nut (5) further using a face wrench to the number of graduation lines which equal the required torque (Fig. 4, number of graduation lines in the Adjustment Diagram). The 4 notches on the circumference of the adjusting nut (5) and on the locking ring (4) must be in the same position.
- Paint the locking screw (2) with Loctite 243 and screw it into the adjusting nut (5).

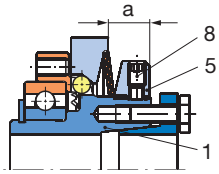


Fig. 7

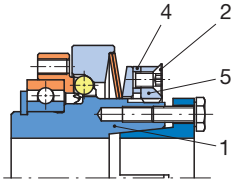


Fig. 8

Technical Explanations

Adjusting the Torque

Sizes 01 to 3 (Figs. 1, 2 and 6):

- Convert the required torque (acc. formula below) in percent of the maximum adjustment value.

$$\frac{\text{Required torque adjustment}}{\text{Max. torque adjustment (see Table Technical Data)}} \times 100 = \text{Adjustment in \%}$$

- Loosen the locking screw (2) in the adjusting nut (5).
- Turn the adjusting nut (5) clockwise or anti-clockwise according to the engraved adjustment scale (Figs. 1 and 2) using a hook wrench or a face wrench, until the required torque is set.
- The required torque results from the marking overlap (D) on the locking ring (4) and the percent value (C) on the adjusting nut (5), see Fig. 1.
- Paint the locking screw (2) with Loctite 243 and screw it into the adjusting nut (5); the 4 notches (A) in the adjusting nut (5) and the notches (B) in the locking ring (4) must be in the same position (Fig. 1). Correct slightly if necessary.

Example:

EAS®-compact® Size 3, Type 490.610.0 (M_G max. = 350 Nm):
Torque pre-adjustment = 70 % of M_G max. = 245 Nm.
The adjustment should be increased from 245 Nm to 280 Nm.

- Define the torque adjustment in percent of M_G max. using the formula below:

$$\frac{280}{350} \times 100 = 80\ \%$$

- Turn the adjusting nut (5) according to the facing-side graduation scale Fig. 1) **anti-clockwise** from 70 % to 80 % on the adjustment scale using a face wrench.

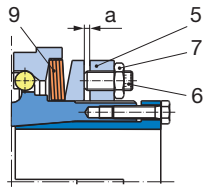


Fig. 9

Size 4 (Figure 9):

The torque is changed exclusively via the set screws (6) and not via the adjusting nut (5).

- Loosen all hexagon nuts (7).
- Adjust all set screws (6) evenly to the required dimension "a" using a hexagon socket wrench (dimension "a" see adjustment table glued onto the clutch).
- Counter the set screws (6) again using hexagon nuts (7).

After de-installing the clutch (e.g. due to cup spring replacement or changes to the cup spring layering), the clutch must be re-adjusted.

Permitted Bearing Load

The output element is centred on the deep groove ball bearing (tolerance H7/h5) and bolted together with the pressure flange (3).

If the resulting radial force from the output element is anywhere near the centre of the ball bearing and under the maximum permitted radial load according to Table 1, an additional bearing for the output element is unnecessary.

No appreciable axial forces (see Table 1) should be transferred from the output element onto the clutch pressure flange (3).

Permitted bearing load			Size								
			03	02	01	0	1	2	3	4	5
Axial forces	F_A	**[kN]**	0.12	0.28	0.65	1	1.5	2.4	4.2	5	7.7
Radial forces	F_R	**[kN]**									
1-bearing design			0.1	0.25	0.65	1	1.5	2.4	4.2	5	-
2-bearing design			0.15	0.375	1	1.5	2.25	3.6	6.3	7.5	11.5
Transverse force torques*	M_Q	**[Nm]**	0.5	1.5	5	10	20	30	40	50	70

Table 1

* Torques, which put strain on the deep groove ball bearing due to the non-centric axial forces having an effect on the pressure flange.

Technical Explanations

Size Selection, Energy Calculation, Torque Adjustment for Horizontal Servo Axes

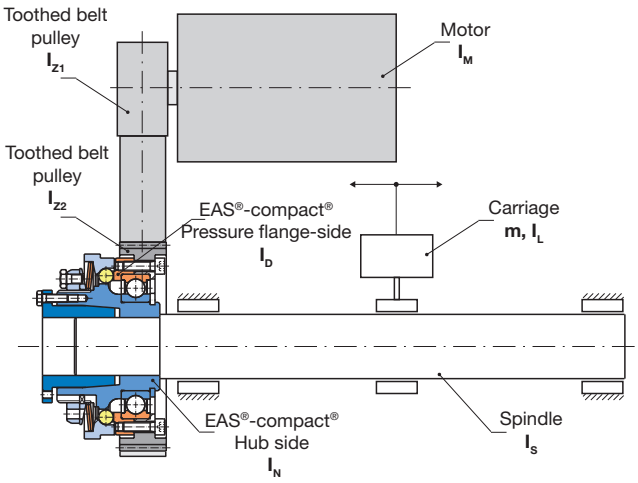


Fig. 1

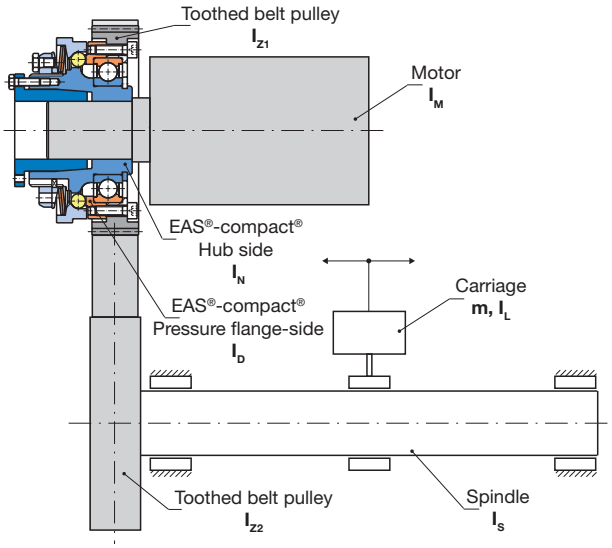


Fig. 2

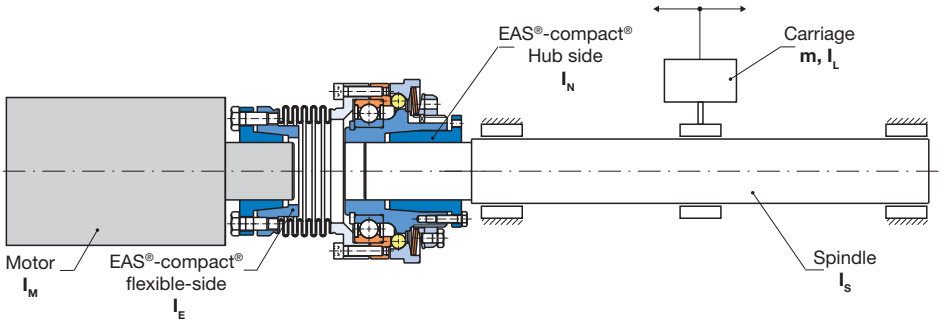
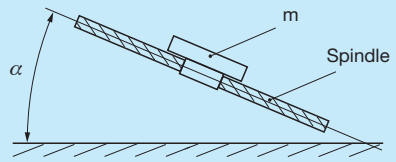


Fig. 3

Configuration Fig. 1	Configuration Fig. 2	Configuration Fig. 3	
Total mass moment of inertia without EAS®-compact® clutch			
$I_g = I_M + I_{Z1} + (I_{Z2} + I_S + I_L) \cdot (\frac{n_2}{n_1})^2$ I_L from equation (7)	$I_g = I_M + I_{Z1} + (I_{Z2} + I_S + I_L) \cdot (\frac{n_2}{n_1})^2$ I_L from equation (7)	$I_g = I_M + I_{Ku} + I_S + I_L$ I_L from equation (7)	[kgm²] (1)
Mass moment of inertia drive-side referring to the shaft with the EAS®-compact® clutch			
$I_1 = I_D + I_{Z2} + (I_{Z1} + I_M) \cdot (\frac{n_1}{n_2})^2$	$I_1 = I_M + I_N$	$I_1 = I_M + I_E$	[kgm²] (2)
Mass moment of inertia output-side (spindle-side) referring to the shaft with the EAS®-compact® clutch			
$I_2 = I_N + I_S + I_L$ I_L from equation (7)	$I_2 = I_D + I_{Z1} + (I_{Z2} + I_S + I_L) \cdot (\frac{n_2}{n_1})^2$ I_L from equation (7)	$I_2 = I_N + I_S + I_L$ I_L from equation (7)	[kgm²] (3)
Clutch pre-selection			
$M_{erf.} = 1.5 \cdot M_2$ M_2 from equation (4)	$M_{erf.} = 1.5 \cdot M_1$	$M_{erf.} = 1.5 \cdot M_1$	[Nm]

Configuration Fig. 1	Configuration Fig. 2	Configuration Fig. 3		
Torque on the spindle				
$M_2 = M_1 \cdot \frac{n_1}{n_2}$	As configuration Fig. 1	As configuration Fig. 1	[Nm]	(4)
Carriage feed rate				
$v = \frac{p \cdot n_2}{6 \cdot 10^4}$	As configuration Fig. 1	As configuration Fig. 1	$[\frac{m}{s}]$	(5)
Angular speed of the motor shaft ω_1 and the spindle ω_2				
$\omega_1 = \frac{n_1 \cdot \pi}{30}$ $\omega_2 = \frac{n_2 \cdot \pi}{30}$	As configuration Fig. 1	As configuration Fig. 1	[s^{-1}]	(6)
Mass of the carriage reduced on the spindle				
$I_L = m \cdot \frac{v^2}{\omega_2^2}$ v from equation (5), ω_2 from equation (6)	As configuration Fig. 1	As configuration Fig. 1	[kgm^2]	(7)
Energy on collision without EAS®-compact® clutch				
$W_g = \frac{1}{2} \cdot I_g \cdot \omega_1^2$ I_g from equation (1), ω_1 from equation (6)	As configuration Fig. 1	As configuration Fig. 1	[J]	(8)
Energy on collision with EAS®-compact® clutch				
$W_2 = \frac{1}{2} \cdot I_2 \cdot \omega_2^2$ I_2 from equation (3), ω_2 from equation (6)	$W_2 = \frac{1}{2} \cdot I_2 \cdot \omega_1^2$ I_2 from equation (3), ω_1 from equation (6)	$W_2 = \frac{1}{2} \cdot I_2 \cdot \omega_1^2$ I_2 from equation (3), ω_1 from eq.(6)	[J]	(9)
Remaining residual energy				
$W_R = \frac{W_2}{W_g} \cdot 100$ W_g from equation (8), W_2 from equation (9)	As configuration Fig. 1	As configuration Fig. 1	[%]	(10)
Uncoupled energy				
$\Delta W = W_g - W_2$ $\Delta W = 100 - W_R$ W_g from equation (8), W_2 from equation (9),	As configuration Fig. 1 W_R from equation (10)	As configuration Fig. 1	[J] [%]	(11) (12)
Required disengagement torque in the acceleration phase (horizontal axis)				
$M_A = M_B \cdot \frac{I_2}{I_2 + I_1} \cdot \frac{n_1}{n_2}$ I_1 from equation (2), I_2 from equation (3)	Speed ratio $\frac{n_1}{n_2}$ not applicable.	Speed ratio $\frac{n_1}{n_2}$ not applicable	[Nm]	(13)
Required disengagement torque in the acceleration phase (axis in any direction)				
$M_A = [(M_B \cdot \frac{n_1}{n_2} - M_L) \cdot \frac{I_2}{I_2 + I_1} + M_L] \times 1.2$ M_L from equation (15)	$M_A = [(M_B - M_L \cdot \frac{n_2}{n_1}) \cdot \frac{I_2}{I_2 + I_1} + M_L \cdot \frac{n_2}{n_1}] \times 1.2$ M_L from equation (15)	$M_A = [(M_B - M_L) \cdot \frac{I_2}{I_2 + I_1} + M_L] \times 1.2$ M_L from equation (15)	[Nm]	(14)
Load torque from carriage mass in any direction				
$M_L = \frac{m \cdot g \cdot \sin\alpha \cdot p}{2 \cdot \pi \cdot 1000}$ 	As configuration Fig. 1	As configuration Fig. 1	[Nm]	(15)
Limit torque adjustment				
$M_G = 1.5 \cdot M_2$ M_2 from equation (4)	$M_G = 1.5 \cdot M_1$	$M_G = 1.5 \cdot M_2$ M_2 from equation (4)	[Nm]	(16)

Condition: The disengagement torque M_A from equation (13) or (14) (multiplied by a factor of 1.2) must be smaller than the torque M_G set on the clutch.

Technical explanations

Calculation Example

Configuration as shown in Fig. 1

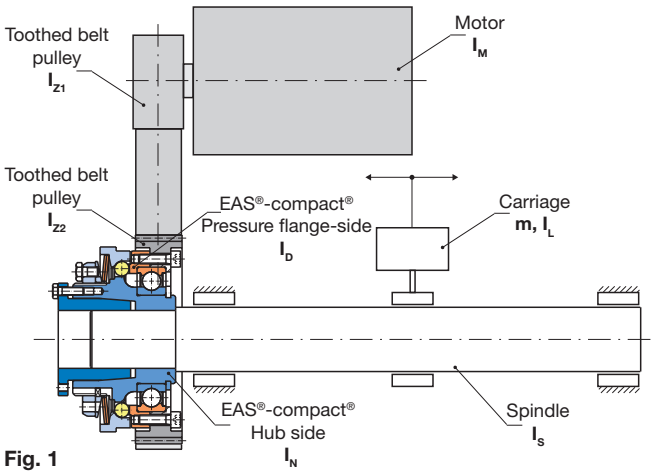


Fig. 1

Data:

Mass of the carriage	m	=	560 kg
Mass moment of inertia of the motor	I_M	=	0.0037 kgm²
Mass moments of inertia of the	I_{Z1}	=	0.0006 kgm²
Toothed belt pulleys	I_{Z2}	=	0.01132 kgm²
Mass moment of inertia of the spindle	I_S	=	0.00067 kgm²
Drive speed of the motor	n_1	=	2000 rpm
Speed of the spindle	n_2	=	1000 rpm
Pitch of the spindle	p	=	10 mm
Nominal torque of the motor	M_1	=	14 Nm
Max. torque of the motor	M_B	=	40 Nm

Clutch pre-selection

$M_{erf.} = 1.5 \cdot M_2$
M_2 from equation (4)

$M_{erf.} = 1.5 \cdot 28 = \mathbf{42}$ [Nm]

Selected: EAS®-compact® Size 0, Type 490.610.0
Torque range $\mathbf{M_G = 20 \div 50}$ **Nm**
(see Technical Data, page 9)

Total mass moment of inertia of the EAS®-compact®

Hub side $I_N = 0.000531$ kgm² (see Techn. Data, page 9)

Pressure flange side $I_D = 0.000234$ kgm² (see Techn. Data, page 9)

Total mass moment of inertia without EAS®-compact® clutch

$I_g = I_M + I_{Z1} + (I_{Z2} + I_S + I_L) \cdot (\frac{n_2}{n_1})^2$ I_L from equation (7)

$I_g = 0.0037 + 0.0006 + (0.01132 + 0.00067 + 0.00142) \cdot (\frac{1000}{2000})^2$

$I_g = \mathbf{0.00765}$ [kgm²] (1)

Mass moment of inertia drive-side referring to the shaft with the EAS®-compact® clutch

$I_1 = I_D + I_{Z2} + (I_{Z1} + I_M) \cdot (\frac{n_1}{n_2})^2$

$I_1 = 0.000234 + 0.01132 + (0.0006 + 0.0037) \cdot (\frac{2000}{1000})^2$

$I_1 = \mathbf{0.0287}$ [kgm²] (2)

Mass moment of inertia output-side (spindle-side) referring to the shaft with the EAS®-compact® clutch

$I_2 = I_N + I_S + I_L$ I_L from equation (7)

$I_2 = 0.000531 + 0.00067 + 0.00142 = \mathbf{0.00262}$ [kgm²] (3)

Torque on the spindle

$M_2 = M_1 \cdot \frac{n_1}{n_2} = 14 \cdot \frac{2000}{1000} = \mathbf{28}$ [Nm] (4)

Carriage feed rate

$v = \frac{p \cdot n_2}{6 \cdot 10^4} = \frac{10 \cdot 1000}{6 \cdot 10^4} = \mathbf{0.1667}$ $[\frac{m}{s}]$ (5)

Angular speed of the motor shaft ω_1 and the spindle ω_2

$\omega_1 = \frac{n_1 \cdot \pi}{30} = \frac{2000 \cdot \pi}{30} = \mathbf{209}$ [s⁻¹] (6)

$\omega_2 = \frac{n_2 \cdot \pi}{30} = \frac{1000 \cdot \pi}{30} = \mathbf{104.7}$ [s⁻¹] (6)

Mass of the carriage reduced on the spindle

$I_L = m \cdot \frac{v^2}{\omega_2^2} = 560 \cdot \frac{0.1667^2}{104.7^2} = \mathbf{0.00142}$ [kgm²] (7)

v from equation (5), ω_2 from equation (6)

Energy on collision without EAS®-compact® clutch

$W_g = \frac{1}{2} \cdot I_g \cdot \omega_1^2 = \frac{1}{2} \cdot 0.00765 \cdot 209^2 = \mathbf{167}$ [J] (8)

I_g from equation (1), ω_1 from equation (6)

Energy on collision with EAS®-compact® clutch

$W_2 = \frac{1}{2} \cdot I_2 \cdot \omega_2^2 = \frac{1}{2} \cdot 0.00262 \cdot 104.7^2 = \mathbf{14}$ [J] (9)

I_2 from equation (3), ω_2 from equation (6)

Remaining residual energy

$W_R = \frac{W_2}{W_g} \cdot 100 = \frac{14}{167} \cdot 100 = \mathbf{8.4}$ [%] (10)

W_g from equation (8), W_2 from equation (9)

Uncoupled energy

$\Delta W = W_g - W_2 = 167 - 14 = \mathbf{153}$ [J] (11)

$\Delta W = 100 - W_R = 100 - 8.4 = \mathbf{91.6}$ [%] (12)

Required disengagement torque in the acceleration phase (horizontal axis)

$M_A = M_B \cdot \frac{I_2}{I_2 + I_1} \cdot \frac{n_1}{n_2}$ I_1 from equation (2), I_2 from equation (3)

$M_A = 40 \cdot \frac{0.00262}{0.00262 + 0.0287} \cdot \frac{2000}{1000} = \mathbf{6.7}$ [Nm] (13)

Limit torque adjustment

$M_G = 1.5 \cdot M_2 = 1.5 \cdot 28 = \mathbf{42}$ [Nm] (16)

Condition: The disengagement torque $1.2 \cdot M_A = 1.2 \cdot 6.7 = 8.04$ Nm is smaller than the torque $M_G = 42$ Nm set on the clutch.

Technical Explanations

Keys

I_g	[kgm²]	Total mass moment of inertia without EAS®-compact® clutch
I_1	[kgm²]	Mass moment of inertia drive-side referring to the shaft with the EAS®-compact® clutch
I_2	[kgm²]	Mass moment of inertia output-side (spindle-side) referring to the shaft with the EAS®-compact® clutch
I_M	[kgm²]	Mass moment of inertia of the motor
I_{Z1}	[kgm²]	Mass moment of inertia of the motor-side toothed belt pulley
I_{Z2}	[kgm²]	Mass moment of inertia of the second toothed belt pulley
I_S	[kgm²]	Mass moment of inertia of the spindle
I_L	[kgm²]	Mass of the carriage reduced on the spindle
I_N	[kgm²]	Mass moment of inertia of the EAS®-compact®, hub-side
I_D	[kgm²]	Mass moment of inertia of the EAS®-compact®, pressure flange-side
I_E	[kgm²]	Mass moment of inertia of the EAS®-compact®, flexible coupling
I_{Ku}	[kgm²]	Mass moment of inertia of the double shaft connection before installation of the EAS®-compact® clutch
M_1	[Nm]	Motor nominal torque
M_2	[Nm]	Torque on the spindle
M_A	[Nm]	Required disengagement torque in the acceleration phase
M_B	[Nm]	Maximum motor torque
M_G	[Nm]	Limit torques for overload
M_L	[Nm]	Load torque from the carriage mass in any direction
$M_{erf.}$	[Nm]	Required torque (pre-selection of the clutch)
g	[m·s^{-2}]	Gravitational acceleration
m	[kg]	Carriage mass
n_1	[rpm]	Drive speed on the motor (rapid movement)
n_2	[rpm]	Spindle speed (rapid movement)
p	[mm]	Spindle pitch
v	[m·s^{-1}]	Carriage feed rate
W_g	[J]	Total energy on collision without EAS®-compact® clutch
W_2	[J]	Energy on collision with EAS®-compact® clutch
W_R	[%]	Remaining residual energy
ΔW	[J]	Uncoupled energy
ΔW	[%]	Uncoupled energy
ω_1	[s^{-1}]	Angular speed of the motor shaft
ω_2	[s^{-1}]	Angular speed of the spindle

Frictionally-locking Transmittable Torques

Table 1: Assignment of the bore diameters d_3/d_4 on the flexible coupling to the transmittable torque "T_R" EAS®-compact® synchronous and ratchetting clutches Types 494._0_._/494._1_._

			Bore		Size					
					01	0	1	2	3	4
Frictionally-locking transmittable torques **Clamping hub Ø d_3** Valid for F7/k6 **Shrink disk hub Ø d_4** Valid for H7/k6 The transmittable torques of the clamping connection take the max. tolerance backlash of the shaft tolerance k6/ bores F7 or H7 into account. If the tolerance backlash is larger, the torque decreases.	T_R	[Nm]	Ø 15	d_3	34	-	-	-	-	-
				d_4	56	-	-	-	-	-
			Ø 16	d_3	36	-	-	-	-	-
				d_4	62	-	-	-	-	-
			Ø 19	d_3	43	79	-	-	-	-
				d_4	81	141	-	-	-	-
			Ø 20	d_3	45	83	83	-	-	-
				d_4	87	153	197	-	-	-
			Ø 22	d_3	50	91	91	-	-	-
				d_4	100	177	228	-	-	-
			Ø 24	d_3	54	100	100	-	-	-
				d_4	120	203	261	-	-	-
			Ø 25	d_3	57	104	104	-	-	-
				d_4	125	216	279	-	-	-
			Ø 28	d_3	63	116	116	208	-	-
				d_4	135	256	332	300	-	-
			Ø 30	d_3	-	124	124	228	-	-
				d_4	-	282	368	350	-	-
			Ø 32	d_3	-	133	133	248	-	-
				d_4	-	308	405	400	-	-
			Ø 35	d_3	-	145	145	280	350	-
				d_4	-	343	460	500	450	-
			Ø 38	d_3	-	-	158	315	390	-
				d_4	-	373	513	600	500	-
			Ø 40	d_3	-	-	166	340	420	-
				d_4	-	-	547	680	600	-
			Ø 42	d_3	-	-	174	365	455	-
				d_4	-	-	577	730	720	-
			Ø 45	d_3	-	-	187	404	505	545
				d_4	-	-	617	790	850	1402
			Ø 48	d_3	-	-	-	442	560	590
				d_4	-	-	-	850	1000	1596
			Ø 50	d_3	-	-	-	470	600	630
				d_4	-	-	-	880	1180	1731
			Ø 52	d_3	-	-	-	-	640	662
				d_4	-	-	-	-	1270	1873
			Ø 55	d_3	-	-	-	-	705	710
				d_4	-	-	-	-	1353	2095
			Ø 58	d_3	-	-	-	-	-	764
				d_4	-	-	-	-	1428	2308
			Ø 60	d_3	-	-	-	-	-	800
				d_4	-	-	-	-	1471	2420
			Ø 62	d_3	-	-	-	-	-	840
				d_4	-	-	-	-	-	2570
			Ø 65	d_3	-	-	-	-	-	900
				d_4	-	-	-	-	-	2750
			Ø 68	d_3	-	-	-	-	-	954
				d_4	-	-	-	-	-	2989
			Ø 70	d_3	-	-	-	-	-	990
				d_4	-	-	-	-	-	3157
			Ø 72	d_3	-	-	-	-	-	1032
				d_4	-	-	-	-	-	3306
			Ø 75	d_3	-	-	-	-	-	1095
				d_4	-	-	-	-	-	3550
			Ø 78	d_3	-	-	-	-	-	1158
				d_4	-	-	-	-	-	-
			Ø 80	d_3	-	-	-	-	-	1200
				d_4	-	-	-	-	-	-

Limit Switch Type 055.00_.5 (Contactless)

Application

This device is used for measuring and monitoring axial and radial disengagement movements, e.g. on EAS®-clutches. It acts as a control sensor for electronic and mechanical sequences.

Function

When the sensor surface of the NAMUR sensor scans a metal control flag (damped), the signalling relay is triggered, is deenergised and drops. Contacts 1 - 2 are opened. Damping is possible from all sides.

Electrical Connection (Terminals)

1 – 2 – 3	Floating change-over contacts
5 – 6	Connection input voltage

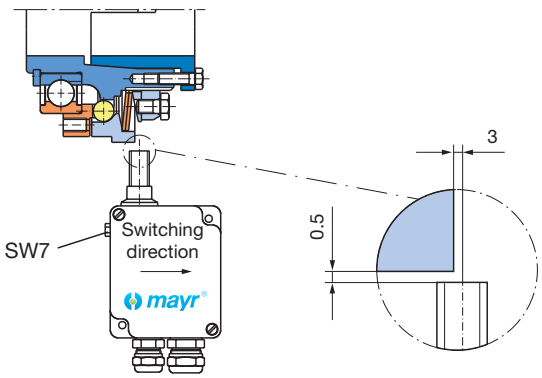
Design

The electronic amplifier is installed in a light metal housing. The limit switch is fixed using two screw-on mounting links attached diagonally with M4 cap screws.

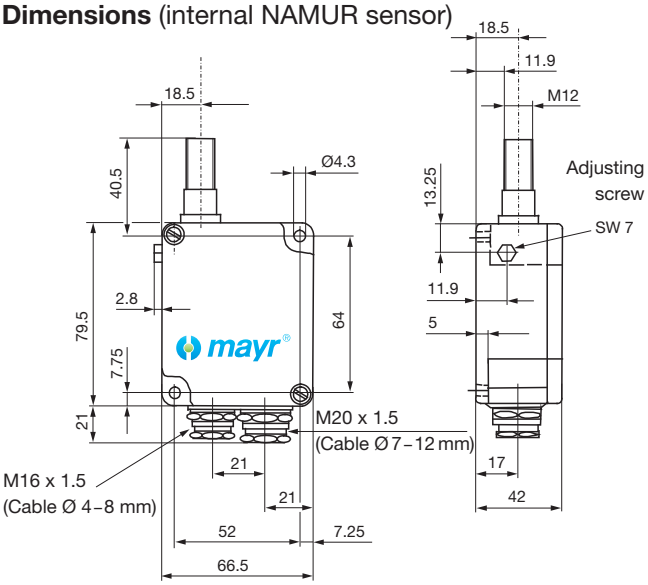
Technical data

Input voltage (dependent on design)	230 VAC, ±10 %, 50 – 60 Hz 115 VAC, ±10 %, 50 – 60 Hz 24 VDC, PELV, ±5 %, protected against reverse polarity, for overvoltage category II connection
Power consumption	Max. 1.5 VA
Ambient temperature	-10 °C up to +60 °C limit switch -25 °C up to +60 °C NAMUR sensor
Protection	IP54
Conductor cross-section	Max. 2.5 mm² / AWG 14
Weight	400 g / 14 oz
Device fuses	0.1 A/fast acting at 24 VDC (in system)
Signalling relay	Floating change-over contacts Contact load max. 250 VAC / 12 A Contact material AgNi 90/10 max. switching frequency 20 Hz at min. load, 0.1 Hz at max. load
NAMUR sensor internal	Installed in a light metal housing, switching distance S_n 2 mm, flush fitting, max. switching frequency 2 kHz, the zero point can be set per 1 mm by means of the lateral adjusting screw SW 7
NAMUR sensor external	Metal housing M12 x 1, switching distance S_n 2 mm, flush fitting, max. switching frequency 2 kHz, standard cable length 2 m, max. 100 m on special design, protection IP67

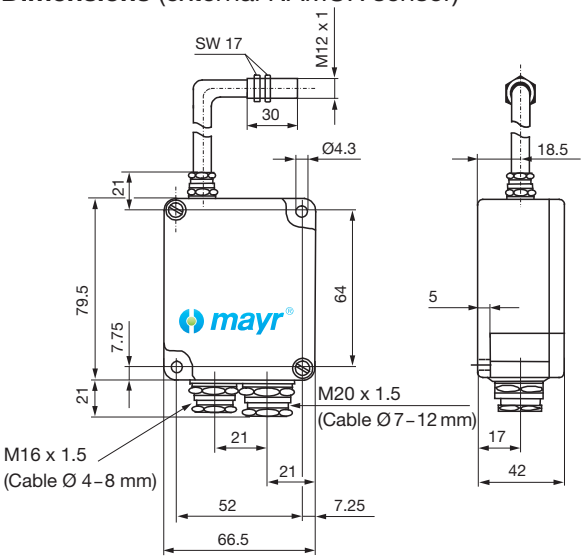
Installation



Dimensions (internal NAMUR sensor)



Dimensions (external NAMUR sensor)



Order Number

0 5 5 . 0 0 __ . 5 / __

Contactless sensing		Connection voltage
Sensor external	1	230 VAC
Sensor internal	2	115 VAC
		24 VDC

Limit Switch Type 055.000.5 (Mechanical Operation)

Application

This device is used to monitor mechanical movements and end positions. It is a controlling sensor for electronic and mechanical sequences. It also detects axial disengagement movements, e.g. on EAS®-clutches.

Function

The pre-tensioned contact is discharged by actuating the switching lever:
Contacts 11 – 14 (21 – 24) open, contacts 11 – 12 (21 – 22) close.

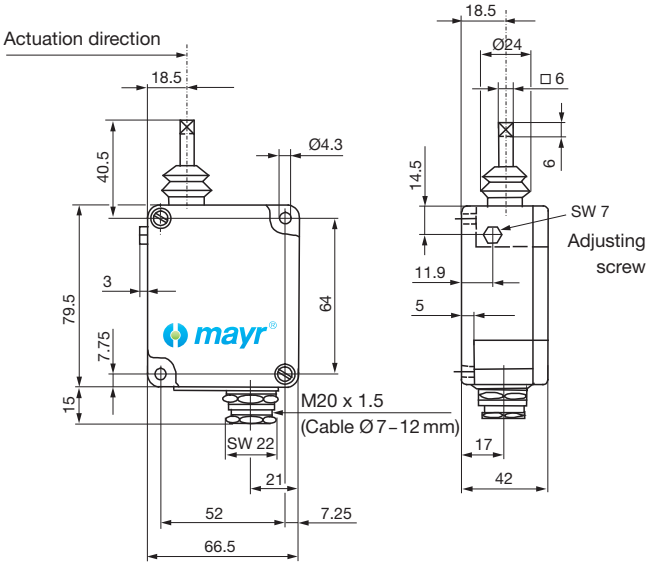
Design

The microswitch is fitted into a light metal housing and is actuated by a switching lever. Operation is only possible in one direction.
The limit switch is fixed using two screw-on mounting links attached diagonally with M4 cap screws.

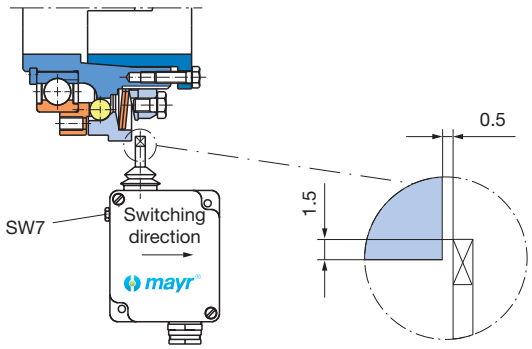
Technical data

Contact	1 change-over contact (special design: 2 change-over contacts)
Switching power contacts: 10 A)	250 VAC / 15 A (with 2 change-over 24 VDC / 6 A 60 VDC / 1.5 A 250 VDC / 0.2 A min. 12 VDC / 10 mA
Contact material	AgSnO
Switching frequency operations/min	Max. 200 switching
Ambient temperature:	-10 °C up to +85 °C
Protection	IP54
Weight	275 g
Switching travel setting	Using the adjusting screw (SW 7), the zero point can be moved right or left by max. 5 mm
Switching travel	Pretravel: min. 0.15 to 0.5 mm Overtravel: max. 10 mm, depending on the zero point setting
Special types	Different switching lever lengths as well as a design with 2 change-over contacts are possible on request

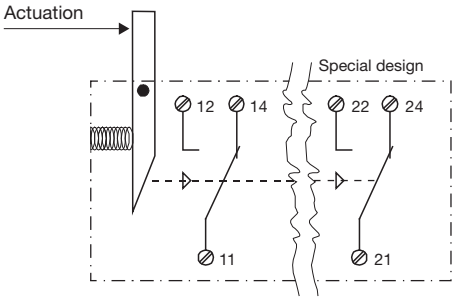
Detail drawing



Installation



Electrical connection



Order Number

0 5 5 . 0 0 0 . 5

Limit Switch Type 055.010.6 (Mechanical Operation, Multi-directional)

Application

The limit switch is used to monitor and measure axial or radial mechanical movements and adjustments e.g. on EAS®-clutches. The device is suitable for clutches with a minimum stroke of 1.1 mm with radial actuation and 0.9 mm with axial actuation.

Function

By actuating the metal tappet, contacts 11 – 12 are opened.

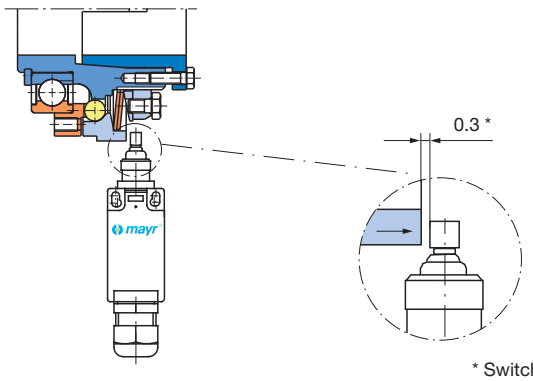
Electrical Connection (Terminals)

11 – 12	NC contact

Technical data

Contact	1 x NC contact, positive opening contacts
Contact (Special Design)	additional 1 x NO contact, terminals 23 – 24, galvanically separated (Zb)
Contact-opening	see Switching Travel Diagram
Contact-closing	see Switching Travel Diagram
Contact-load	NC contact 250 VAC / 2.5 A 24 VDC / 1 A min. 12 VDC / 10 mA
Contact distance 250 VAC	>1,25 mm axial, forced opening
Contact distance 24 VDC	<1.25 mm, min. 0.5 mm
Contact material	Ag90Ni10
Max. input current	acc. DIN EN 60947-5-1 AC15 / DC13
Metal tappet travel	max. 4 mm axial or radial
Switching frequency	max. 100/min.
Mechanical lifetime	1 x 10^6 switching cycles, unloaded
Conductor cross-section	1.5 mm² / AWG 16
Ambient temperature:	-30 °C up to +80 °C
Protection	IP65
Protection insulation	acc. Protection Class II
Housing	thermoplastic, self extinguishing acc. UL94-V0
Weight	120 g / 4.2 oz

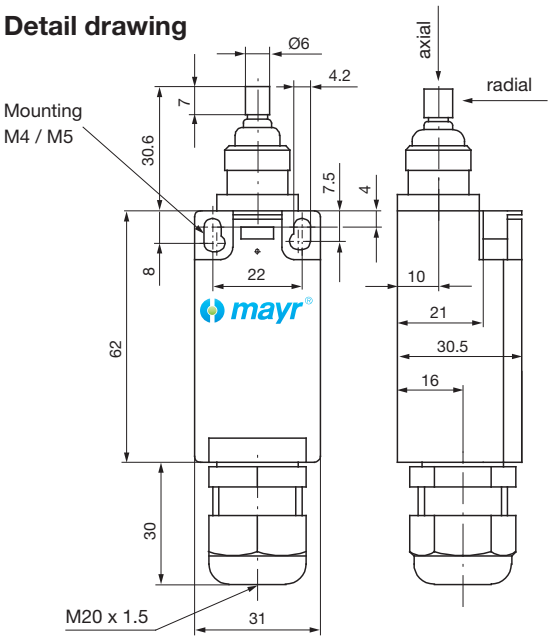
Installation



* Switch distance on engaged clutch

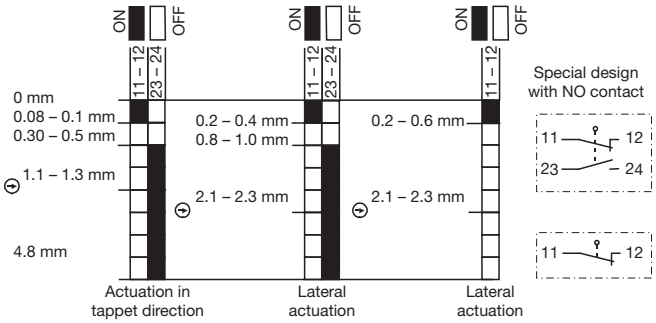
Ind.Cont.Eq.
LISTED 1B68

Detail drawing



Fixed positioning for safety application with fixing screws 2 x M5 (DIN 912).

Switching travel diagram



Do not install switch so that it drags and observe max. actuation travel (travel of metal tappet).

Order Number

0 5 5 . 0 1 0 . 6

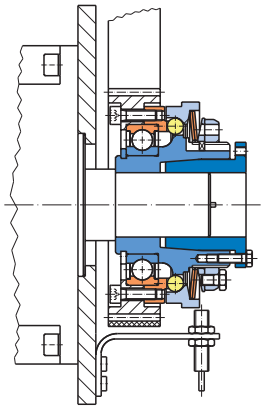
Installation Examples

EAS®-compact® short hub

The drive elements of the EAS®-compact® short hub are centred on the deep groove ball bearing and are screwed together with the pressure flange. If the resulting radial force from the drive element is anywhere near the centre of the ball bearing, an additional bearing for the drive element is unnecessary.

The screw quality and the tightening torque for the fixing screws of the drive element are to be selected so that the set limit torque can be safely transmitted using frictional locking.

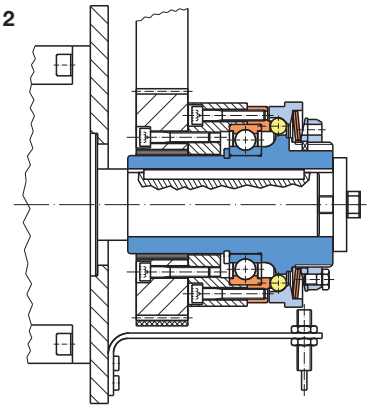
Fig. 1



EAS®-compact® long protruding hub

The EAS®-compact® long protruding hub is recommended for very wide drive elements or for elements with very small diameters. On a small diameter, the drive element is screwed together via a customer-side intermediate flange with the clutch pressure flange. Ball bearings, needle bearings or plain bearings are suitable as bearings for the drive element, depending on the installation situation and the installation space.

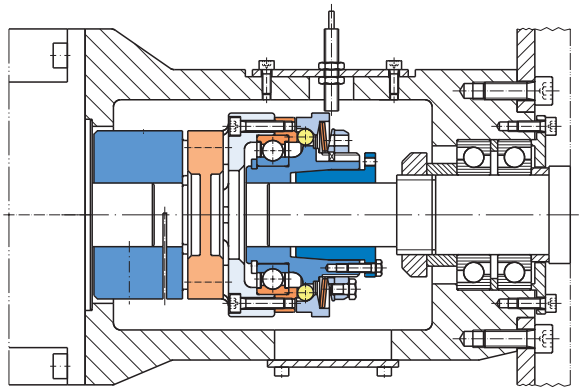
Fig. 2



EAS®-compact® with flexible shaft coupling

The EAS®-compact® with a backlash-free, torsionally flexible and vibration-damping shaft coupling for the connection of two shafts. The coupling compensates for axial, radial and angular shaft misalignments. In comparison to the EAS®-compact® with steel bellows coupling, this product is torsionally flexible to a small extent in the circumferential direction.
In the installation example on the right, the EAS®-compact® lastic is mounted backlash-free between the rotor and a ball screw spindle. The torque is transmitted backlash-free up to the point of disengagement and drops immediately on overload. The contactless limit switch (sensor) emits a signal to switch off the drive.

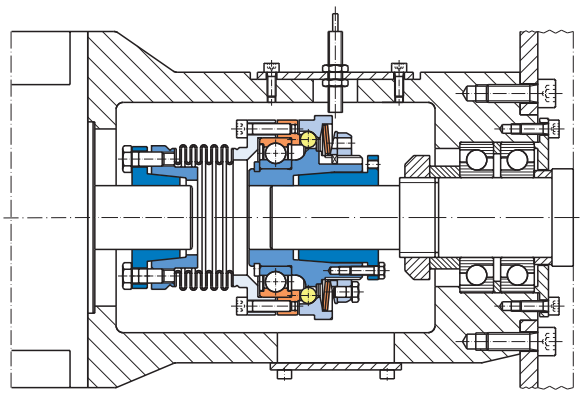
Fig. 3



EAS®-compact® with steel bellows coupling

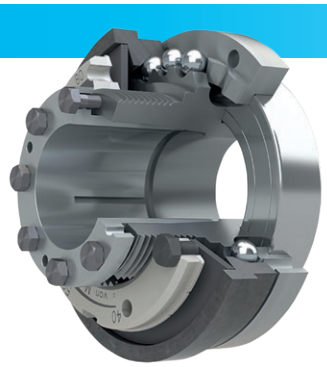
The EAS®-compact® with a torsionally rigid flexible steel bellows coupling for the connection of two shafts. The coupling compensates for axial, radial and angular shaft misalignments. It is torsionally rigid in the circumferential direction.
In comparison with the EAS®-compact® with ROBA®-D coupling, the EAS®-compact® with steel bellows coupling has a lower mass moment of inertia.
In the installation example on the right, the EAS®-compact® with steel bellows coupling is mounted between the rotor and a ball screw spindle. The torque is transmitted backlash-free up to the point of disengagement and drops immediately on overload. The contactless limit switch (sensor) emits a signal to switch off the drive.

Fig. 4



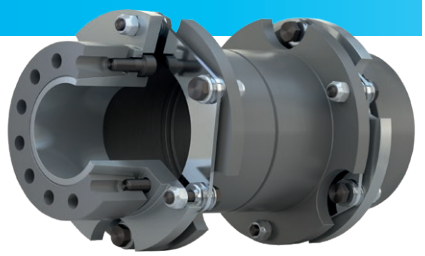
Product Summary

Torque Limiters/Overload Clutches



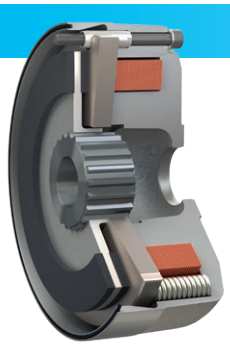
- **EAS®-compact®/EAS®-NC/EAS®-smartic®**
  Positive locking and completely backlash-free torque limiting clutches
- **EAS®-reverse**
  Reversing re-engaging torque limiting clutch
- **EAS®-element clutch/EAS®-elements**
  Load-disconnecting protection against high torques
- **EAS®-axial**
  Exact limitation of tensile and compressive forces
- **EAS®-Sp/EAS®-Sm/EAS®-Zr**
  Load-disconnecting torque limiting clutches with switching function
- **ROBA®-slip hubs**
  Load-holding, frictionally locked torque limiting clutches
- **ROBA®-contitorque**
  Magnetic continuous slip clutches
- **EAS®-HSC/EAS®-HSE**
  High-speed torque limiters for high-speed applications

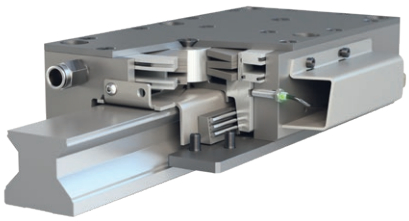
shaft couplings



- **smartflex®/primeflex®**
  Perfect precision couplings for servo and stepping motors
- **ROBA®-ES**
  Backlash-free and damping for vibration-sensitive drives
- **ROBA®-DS/ROBA®-D**
  Backlash-free, torsionally rigid all-steel couplings
- **ROBA®-DSM**
  Cost-effective torque-measuring couplings

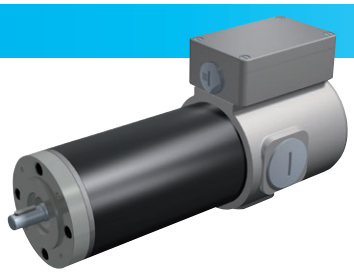
Electromagnetic Brakes/Clutches





- **ROBA-stop® standard**
  Multifunctional all-round safety brakes
- **ROBA-stop®-M motor brakes**
  Robust, cost-effective motor brakes
- **ROBA-stop®-S**
  Water-proof, robust monoblock brakes
- **ROBA®-duplostop®/ROBA®-twinstop®/ROBA-stop®-silenzio®**
  Doubly safe elevator brakes
- **ROBA®-diskstop®**
  Compact, very quiet disk brakes
- **ROBA®-topstop®**
  Brake systems for gravity loaded axes
- **ROBA®-linearstop**
  Backlash-free brake systems for linear motor axes
- **ROBA®-guidestop**
  Backlash-free holding brake for profiled rail guides
- **ROBATIC®/ROBA®-quick/ROBA®-takt**
  Electromagnetic clutches and brakes, clutch brake units

DC Drives



- **tendo®-PM**
  Permanent magnet-excited DC motors

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