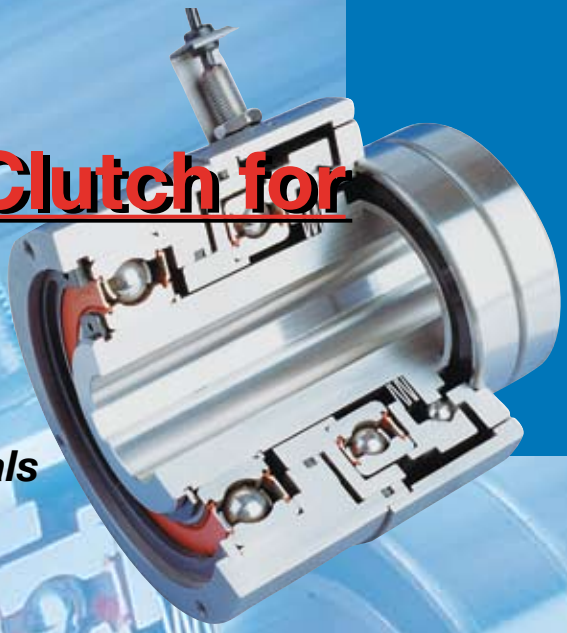
The controllable Torque Limiting Clutch for

Filling Machinery
Printing Machinery
Packaging Machinery
Conveyors and Materials



EAS®-Sp
EAS®-Sm/Zr

pneumatic or electromagnetic clutch

- ***Controllable during operation***
- ***Torque continuously adjustable***
- ***High switch-off accuracy***

www.mayr®.de

K.406.V05.GB

mayr®
power-
transmission

Your advantages when using *mayr*® Electromagnetically or Pneumatically Controlled Torque Limiting Clutches with ON/OFF Function:

- The clutches precisely limit the torque to the value determined by the supply current or air pressure and reduce damage, costly repairs and downtimes in the case of an overload.
- During operation the transmittable torque can be exactly adapted to the production cycle via the current level of pneumatic pressure. Your machine is protected in every production phase.
- The immediate readiness for service in the event of a failure reduces the downtimes of your equipment to a minimum.
- The clutches are remotely controllable by using current or air pressure as actuating or regulating mediums and can be included in complex control systems: a decisive advantage for usage in automated machinery.
- Specifically designed control units ensure easy operation and guarantee optimum usage of the full functional features of the clutches.
- The comprehensive range with the wide variety of performance principles and constructional variations offer a suitable design for your application.

Quality, Experience, Competence

mayr® power transmission have set the highest technical and innovative standards for decades. The foundation for this success are, among other things, the skills, productivity and quality consciousness of all *mayr*® employees.

Our DIN ISO 9001 certification confirms the high demands we set ourselves. With our sophisticated quality management, our accredited high product quality, our years of experience and the knowledge gained, we can offer you extensive competence in both mechanical and electrical power transmission which deserves your trust.

All products are subject to comprehensive inspection and load tests carried out on self developed testing equipment. They are included in our product programme having achieved our required technical standard and reliability after continuous testing.

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

Contents:

EAS®-Sp Pneumatically Controlled Torque Limiting Clutches

Short description:

- Disconnects input and output after overload has occured or via an external control.
- Synchronous (360°) re-engagement via air pressure.
- Backlash-free torque transmission.

EAS®-Sm/ EAS®-Zr Electromagnetically Controlled Torque Limiting Clutches

Short description:

- Disconnects input and output after overload has occured or via an external control.
- Synchronous re-engagement of the EAS®-Sm after each full turn (360°).
- Re-engagement in 15° increments possible with EAS®-Zr.

Electrical accessories

Further products in the EAS®-programme

EAS®-Compact®

EAS®-Compact® clutches meet the requirements of the modern electrical power transmission as to highest accuracy, dynamic and velocity to an optimum degree. These positive-locking clutches transmit the torque absolutely backlash-free and limit it exactly to the set value.

EAS®-element clutch/EAS®-element

EAS®-elements based EAS®-element clutches for high torque applications (0,25–190 kNm). Basic elements can be integrated into existing constructions and offer flexibility of design to suit specific applications.

EAS®-axial

Linear motion overload protection. Tensile and compressive forces are limited to their respective specified value. Eight sizes cover release forces of between 50 and 300 000 N in 12 variations in Type and design.

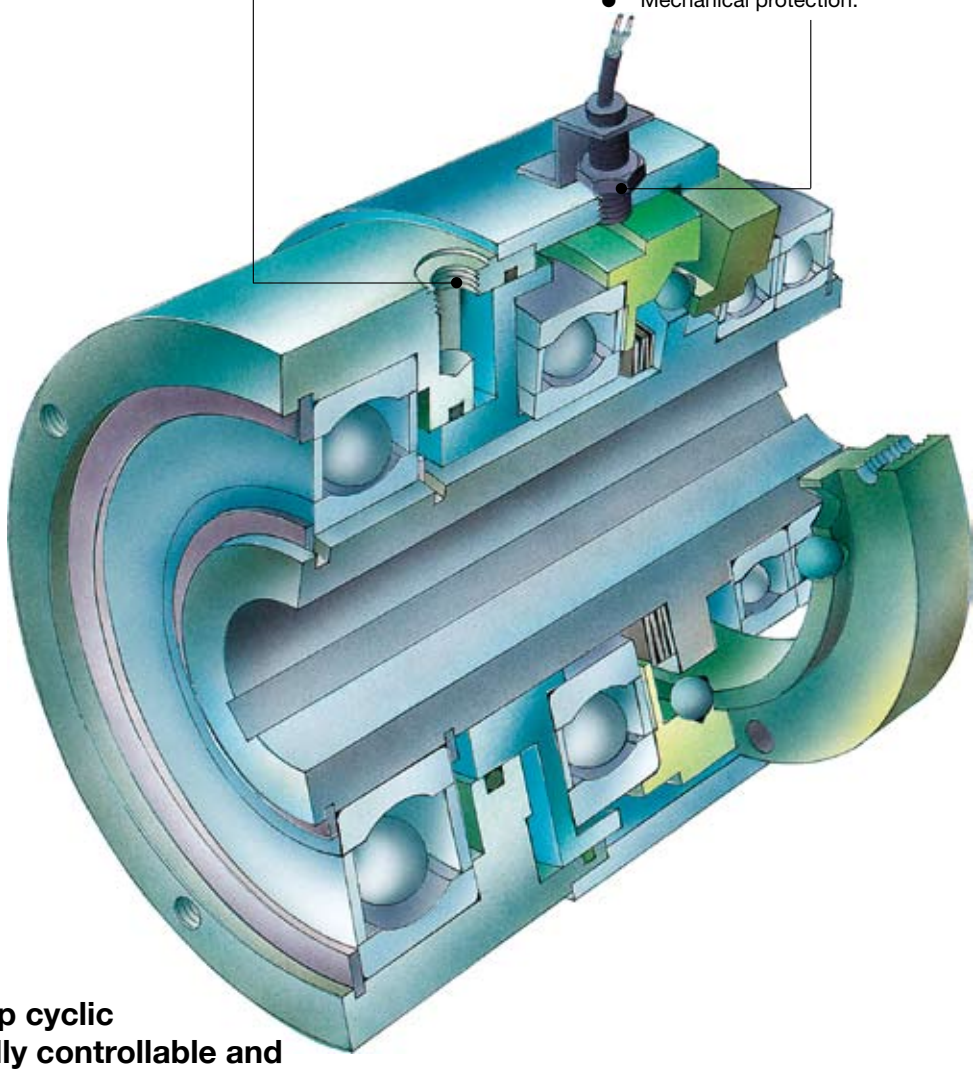
EAS®-Sp pneumatically controllable synchronous clutch

Connection for control unit

- Motionless air pressure supply.
- ON/OFF switching function, multi start function.
- Releases in case of an overload.
- Controllable operating pressure.
- Indication possibility of the functional condition.

Integrated limit switch

- Extreme short switch-off time.
- In case of an overload the limit switch detects the axial disengaging movement of the control element quickly and precisely.
- The limit switch gives a signal to release the clutch and to disconnect the drive or for further control functions.
- Mechanical protection.



The EAS®-Sp cyclic pneumatically controllable and adjustable overload clutch

EAS®-Sp means:

- Simple attachment of the drive elements
- Lower mass moment of inertia
- Long service life and maintenance free
- High disengaging torque accuracy
- Integrated mechanical protected limit switch

EAS®-Sp application:

- In packaging machinery
- In filling machinery
- In printing machinery
- In washing/cleaning machines and systems
- In materials handling equipment
- In general machine construction

Application:

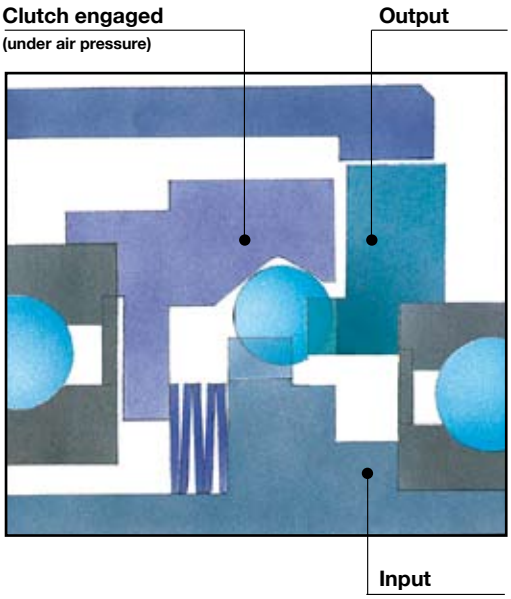
- In all kinds of automated machines
- With constantly changing operating conditions
- With constantly changing cycles and cycle speeds

Years of experience in the field of torque-limiting clutches, and consistent improvement and development of our products allow us to offer you the optimum clutch for your particular application.

Backlash-free principle

The backlash-free torque transmission:

- Balls in radially and axially arranged recesses on the hub and on the pressure flange.
- The balls are pressed simultaneously into recesses of the hub and pressure flange, and therefore transmit the torques backlash-free in both directions of rotation, similarly for reversing drives.



Operating principle

1. Overload function:

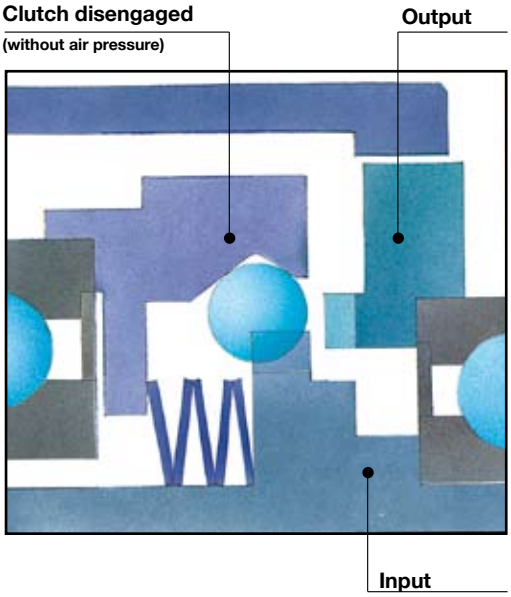
   During operation the clutch transmits the torque determined by the pneumatic pressure. When the torque is exceeded (due to overload) the clutch disengages, input and output are disconnected.

   Simultaneously the integrated limit switch (PNP-opener) is damped and gives an impulse to the EAS®-Sp control unit. The air is ventilated and the drive is disconnected.

2. Switching function:

   The clutch is pneumatically controllable.
   The torque is transmitted from input to output when the clutch is pressurized with air.
   The clutch and drive can be switched on or switched off via the pneumatic system.

3. Control function:
   The limiting torque for overload on the clutch can be adjusted continuously via the air pressure feed and pressure can be varied during operation.



Torque transmission and limitation

- The limit torque is determined by the existing pressure.
- Controllable torques are transmitted from the hub to the pressure flange and further to the input element via the patented backlash-free principle.
- When the limit torque is exceeded, the controlled pressure is exceeded. The limit switch is damped due to the axial movement of the control element. Input and output are disconnected.

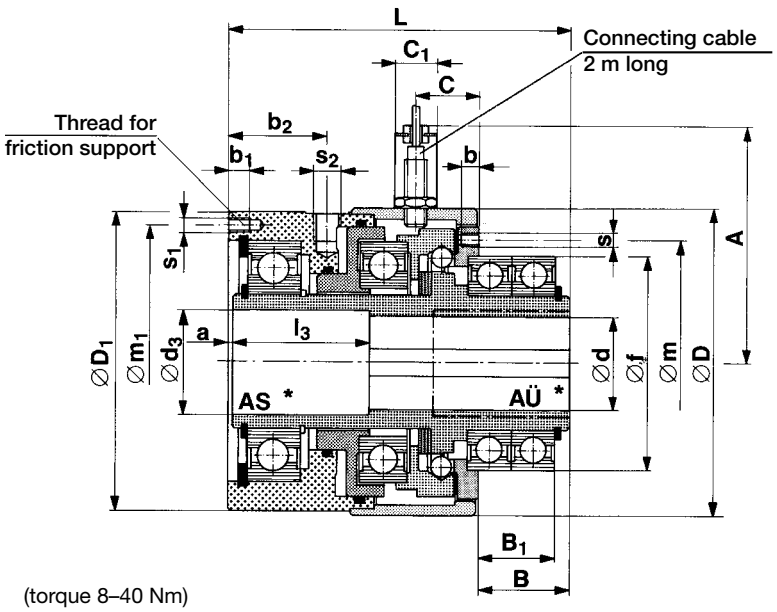
Output flange

- The corresponding output element (toothed wheel, pulley etc.) can be attached easily and precisely onto the pressure flange.
- The double bearing also allows the installation of wide input elements.
- Precise running accuracy.

Please Observe:

Please select the screw quality and the tightening torque for the fixing screws on the drive element so that the set limit torque is transmitted using frictional locking with sufficient certainty.

Standard **Type 450.125.0**



Size 01 Type 450.125. H (torque 8–40 Nm)
L (torque 4–20 Nm)

Sizes 0–5 Type 450.125.0

Limit switch is included in the delivery programme.

Technical data and dimensions

Size	Limit torque for overload M_G Nm	Max. speed n_{max} [1] rpm	Mass moment of inertia with d_{max} Hub side kgm²	Mass moment of inertia with d_{max} Flange side kgm²	Weight with d_{max} kg	A	a	B	B_1 [4]	b	b_1	b_2
01	4 – 40	5000	0,000280	0,000180	2,5	81	0	15	11	5,5	10	23,5
0	5 – 75	4000	0,000562	0,000345	3,7	88	1	28	24	5,5	8	30
1	25 – 150	2500	0,002127	0,000904	7	101	1,5	33,5	28	6,5	8	36,5
2	50 – 200	2000	0,004887	0,002109	9,7	108	2	36	30	8	10	39
3	100 – 500	2000	0,010375	0,005018	15	123	2,5	39,5	33	8	10	41
4	200 – 1000	1500	0,034797	0,016141	29,5	143	2	47	40	11	12	52
5	500 – 2500	500	0,199991	0,091811	82	186	5	64	54	15	15	68

Size	C	C_1	D	D_1	d_{min}	d_{max}	d_3	f_{h5} [5]	L	l_3	m	m_1	s	s_1	s_2
01	24	–[3]	76	72	10	20	23	47	87	30	56	65	6 x M5	4 x M5	G 1/8“
0	18,5	15	90	90	12	22	23	62	105	40	72	82	6 x M5	4 x M4	G 1/8“
1	23,5	15	115	112	15	35	36	80	126	50	92	102	6 x M5	4 x M5	G 1/8“
2	28,5	15	130	130	20	42	43	95	135	55	110	122	6 x M6	4 x M5	G 1/8“
3	30	15	160	154	20	50	51	110	153	60	139	140	6 x M8	4 x M6	G 1/4“
4	37,5	15	200	191	25	65	66	140	185	70	172	178	6 x M10	4 x M8	G 1/4“
5[2]	51,5	15	285	275	38	95	97	200	260	100	250	256	6 x M12	4 x M10	G 1/4“

1) The speed for re-engagement or for switching operation depends on the mass to be accelerated and the load torque (see page 8).
2) Size 5 not in stock
3) Without initiator guard bracket
4) Mounting tolerance +0,1
5) Fit arranged by the user H7
6) Position of the keyway to the mounting bore „s“ in the pressure flange not defined. Defined position possible on request.

The operating pressure of the clutch ranges between 1 and 6 bar; you can find the exact data on the diagram, page 8

We reserve the right to make dimensional and design alterations.

Order example:

To be included when ordering please state:	Size	Type	Bore Ø d^{H7}	DIN keyway	*Counterbore choice
Order number:		4 5 0 . 1 2 5 . 0		6)	AS or AÜ

01 – 5 → Size

AS: Counterbore coil carrier side
AÜ: Counterbore transmission flange side

6885/1

according to size

0 for sizes 0–5
H for size 01 torque 8–40 Nm
L for size 01 torque 4–20 Nm

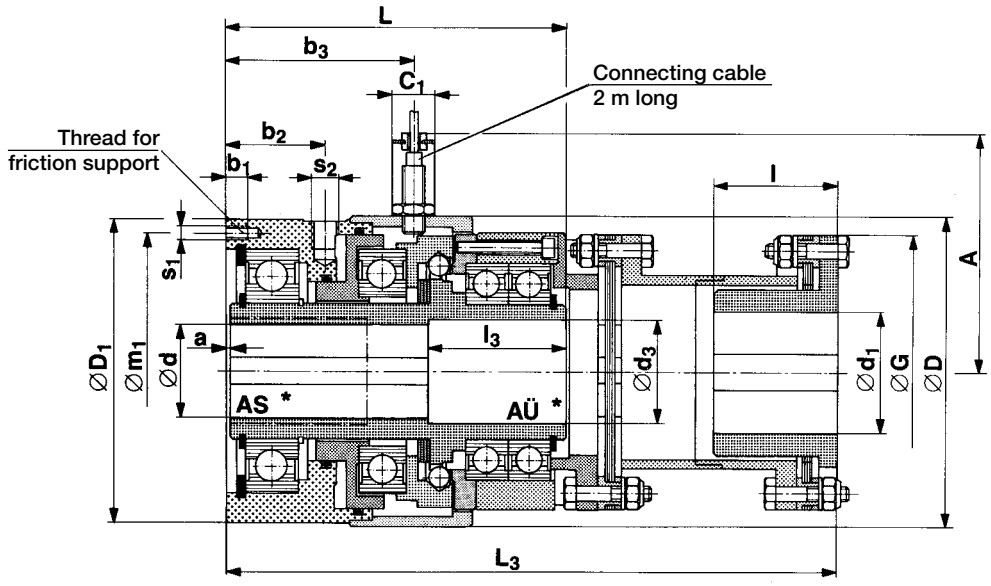
Example:
Order number 1 / 450.125.0 / 30 / AS / 6885 / 1
Order number 01 / 450.125.H / 18 / AS / 6885 / 1

EAS®-Sp synchronous clutch

mayr® power transmission

Torsionally rigid

Type 456.125.8



Sizes 0–5 Type 456.125.8

Limit switch is included in the delivery programme.

Technical data and dimensions

Size	Limit torque for overload M_G Nm	Rated torque of torsionally stiff coupling T_{KN} Nm	Max. speed n_{max} [1] rpm	Mass moment of inertia with d_{max} Hub side kgm²	Mass moment of inertia with d_{max} Flexible side kgm²	Weight with d_{max} kg	A	a	b_1	b_2	b_3
0	15 – 75	50	4000	0,000562	0,003795	6	88	1	8	30	58,5
1	25 – 150	100	2500	0,002127	0,005426	10	101	1,5	8	36,5	69
2	50 – 200	200	2000	0,004887	0,017592	15,8	108	2	10	39	70,5
3	100 – 500	400	2000	0,010375	0,035087	24	123	2,5	10	41	83,5
4	200 – 1000	1000	1500	0,034797	0,111144	48,5	143	2	12	52	100,5
5	500 – 2500	2500	500	0,199991	0,299397	114,5	186	5	15	68	144,5

Size	C_1	D	D_1	d_{min}	d_{max}	$d_{1\,min}$	$d_{1\,max}$	d_3	G	L	L_3	l	l_3	m_1	s_1	s_2
0	15	90	90	12	22	8	38	23	92	105	169	40	40	82	4 x M4	G 1/8“
1	15	115	112	15	35	12	45	36	102	126	194	45	50	102	4 x M5	G 1/8“
2	15	130	130	20	42	15	55	43	128	135	219	55	55	122	4 x M5	G 1/8“
3	15	160	154	20	50	20	65	51	145	153	247	65	60	140	4 x M6	G 1/4“
4	15	200	191	25	65	26	80	66	180	185	306	80	70	178	4 x M8	G 1/4“
5[2]	15	285	275	38	95	38	90	97	215	260	421	90	100	256	4 x M10	G 1/4“

1) The speed for re-engagement or for switching operation depends on the mass to be accelerated and the load torque (see page 8).
2) Size 5 not in stock

The operating pressure of the clutch ranges between 1 and 6 bar; you can find the exact data on the diagram, page 8.

We reserve the right to make dimensional and design alterations.

Order example:

To be included when ordering please state:	Size	Type	Bore Ø d^{H7}	DIN keyway	Bore Ø d_1^{H7}	DIN keyway	*Counterbore by choice
Order number:		4 5 6 . 1 2 5 . 8					AS or AÜ

01 – 5 →

- AS: Counterbore coil carrier side
- AÜ: Counterbore transmission flange side
- 6885/1
- according to size
- 6885/1
- according to size

Example:
Order number 1 / 456.125.8 / 30 / AÜ / 40 / 6885 / 1

Operating speeds

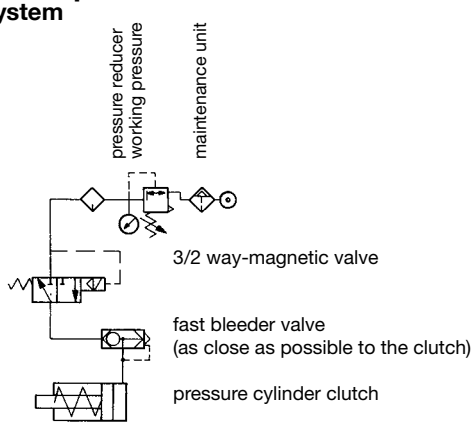
The speeds mentioned on pages 6 and 7 are operating speeds which refer to the engaged condition of the clutch.
The re-engagement speed of the EAS®-Sp clutches depends on the corresponding clutch size or mass moments of inertia of the flanged drive element.

Re-engagement or connection of the clutch under load should not take place.

Please contact our application engineers regarding your special application.

Switching examples

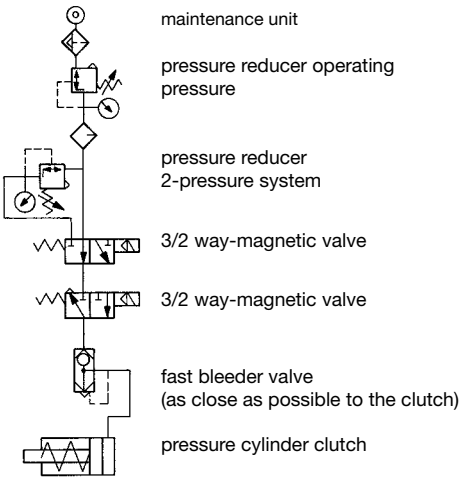
1-pressure system



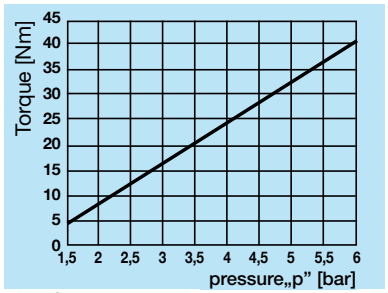
Compressed air characteristics:

The quality of the compressed air according to ISO 8573-1 should have a quality class 4 or higher.

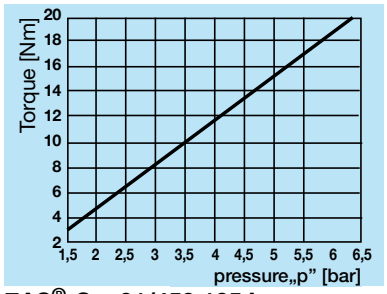
2-pressure system



Torque curves static [1)]



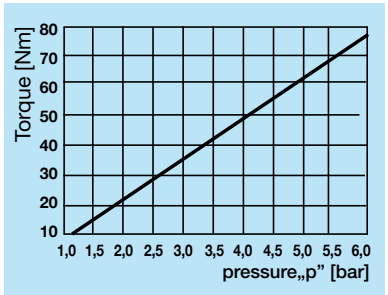
EAS®-Sp 01/450.125.H



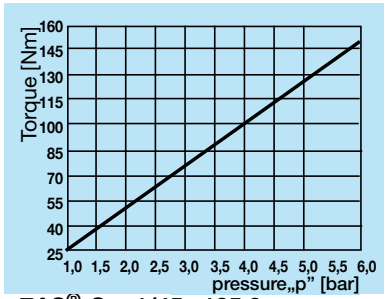
EAS®-Sp 01/450.125.L

Torque setting

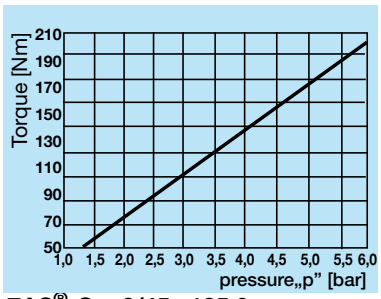
Adjusting and altering the torques can be accomplished by altering the air pressure. The torque capacity is proportional to the air pressure. It is recommended to maintain a constant compressed air pressure.
Using the EAS®-Sp control unit enables the torque to be simply and rapidly adjusted.



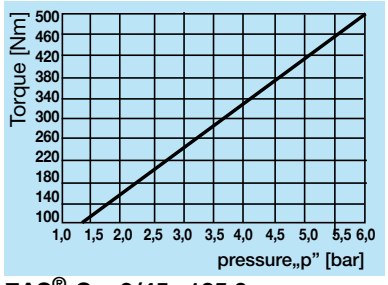
EAS®-Sp 0/45_.125.0



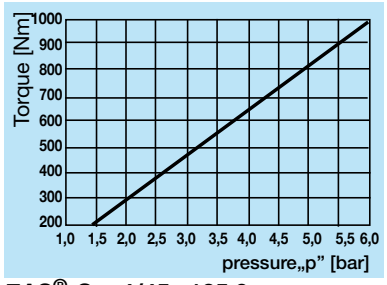
EAS®-Sp 1/45_.125.0



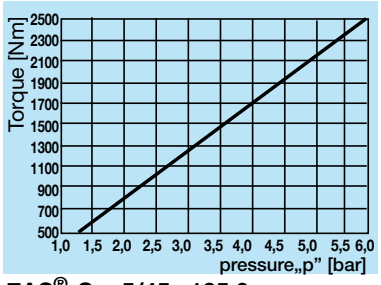
EAS®-Sp 2/45_.125.0



EAS®-Sp 3/45_.125.0



EAS®-Sp 4/45_.125.0



EAS®-Sp 5/45_.125.0

1) The values stated in the diagrams are reference values, which are subject to certain tolerances.

Securing the clutch onto the shaft

The EAS®-Sp clutches are supplied finish bored and keywayed to DIN 6885. The clutch must be drawn onto the shaft using a suitable device, and axially secured using a press cover (Fig. 1), set collars or locking rings.

EAS®-Sp clutches can be supplied with a cone bushing (Fig. 2) or shrink disk (Fig. 3) as special designs.

Please contact our works.

Attaching the friction support

The stator element of the clutch must not rotate. A friction support is required to absorb the low friction torque which is caused by the ball bearings of the stationary stator element. The friction support must not transmit any appreciable loads to the clutch.

Electrical connection

The clutch together with the integrated limit switch can be controlled via the EAS®-Sp control unit. Information and technical data on the control unit or limit switch can be found on pages 17 – 20 .

Installation examples

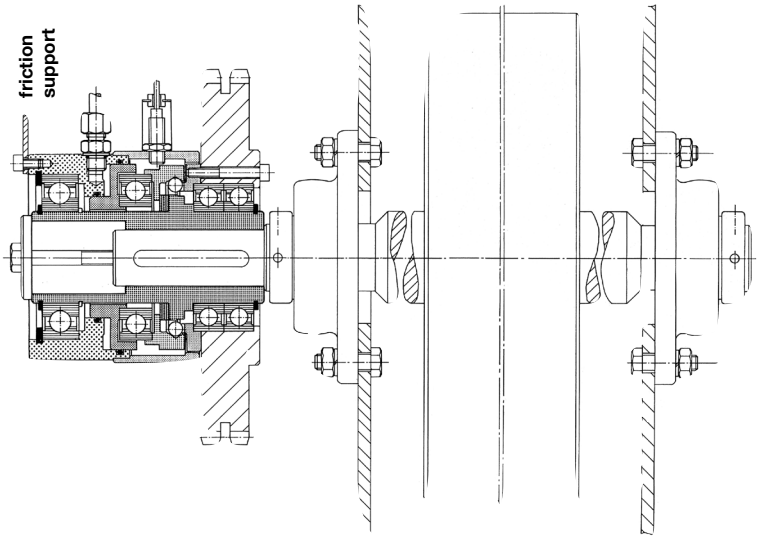


Fig. 1

EAS®-Sp clutch used in textile machines

The EAS®-Sp clutch is mounted onto the shaft end of a draw-off roll. The clutch is axially secured to the shaft via a press cover and a hexagon head screw, screwed into the threaded centre hole in the shaft. The friction support absorbs the frictional torque of the ball bearings between the stator element and hub and stops the stator element from rotating.

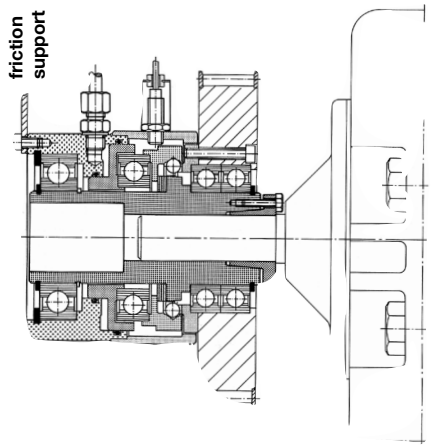


Fig. 2

EAS®-Sp clutch mounted onto motor shaft end

The clutch is axially secured via a cone bushing and allows a backlash-free torque connection from shaft to hub.

The friction support arm stops the stator element from rotating.

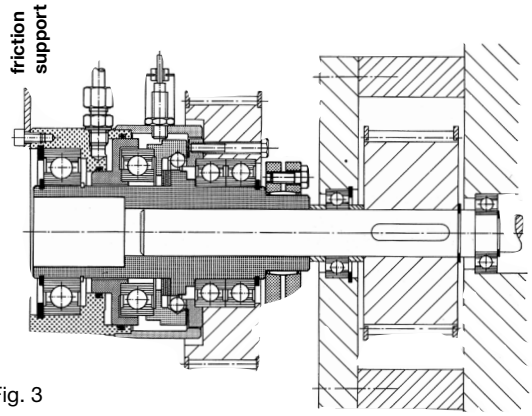


Fig. 3

EAS®-Sp clutch used in a conveyor system

The clutch is axially secured via a shrink disk and allows a backlash-free torque connection from shaft to hub.

The friction support arm stops the stator element from rotating.

EAS®-Sm/Zr electromagnetically operated overload clutch

EAS®-Sm/Zr control unit

- Continuous adjustment of the coil current and, therefore, of the limit torque, even during operation.
- Overexcitation for shortening the switching time or to achieve higher torques for a short time, e.g. to couple higher gyrating masses with higher speeds.
- Control of the synchronous switch-on and switch-off functions.
- Temperature monitoring.

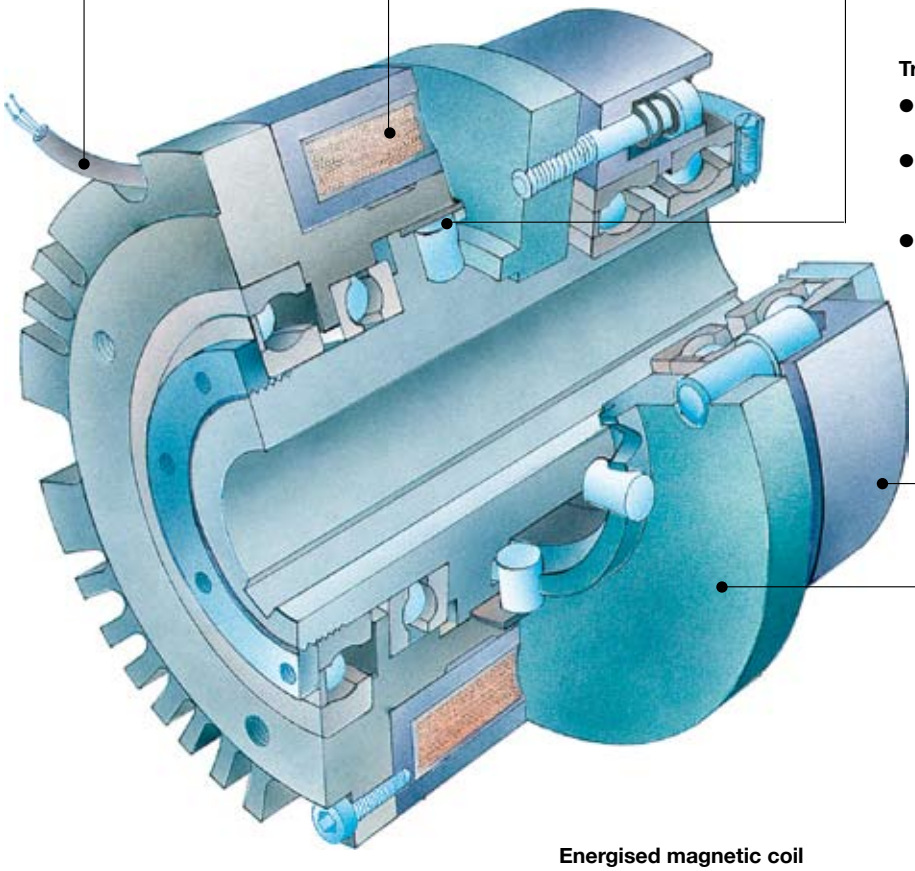
Torque adjustment

The limiting torque is adjusted continuously via the coil current. By doing so the armature disk is attracted magnetically. Armature disk and hub are connected positively.

An uniform and exact torque is maintained due to the *mayr*®-EAS®-Sm/Zr control unit with constant current control. Fluctuations in the supply voltage or changes in coil temperature do not influence the torque.

Torque transmission and limitation

- Adjustable torques are transmitted from the hub to the armature disk and further to the transmitting flange via the *mayr*®-precision rollers.
- When the limit torque is exceeded, the pre-set magnetic force is exceeded. The armature disk disengages. The *mayr*®-limit switch is then actuated. Input and output are disconnected.



Transmitting flange

- Supported radially by two deep groove ball bearings.
- The drive elements e.g. toothed wheels, pulleys can easily and precisely be attached.
- Precise axial run-out and shaft run-out

Please Observe:
Please select the screw quality and the tightening torque of the fixing screws on the drive element so that the set limit torque is transmitted using frictional locking with sufficient certainty.

The electromagnetically operated control clutch EAS®-Sm/Zr

- Combined electromagnetic torque limiting clutch and overload clutch.
- Controllable and adjustable.
- Continuous torque adjustment possible during operation
- Synchronous switch-on and switch-off functions of drives in a low speed range (0–100 rpm).
- If using several clutches, individual operation and control of different drives and shafts within one system are possible.
- Optimised drive control by means of the EAS®-Sm/Zr control modules.
- Also available as simple measuring clutches for checking the torques in drive lines.

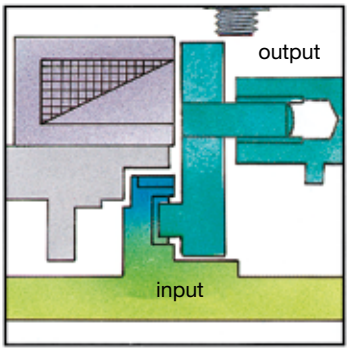
Energised magnetic coil

- As standard with 96V/24 VDC voltage
- Armature disk attracted by the magnetic force.
- The level of the magnetic force is determined by the air gap and coil current.
- The air gap is set at the factory.
- The coil current is continuously adjustable, even during operation.

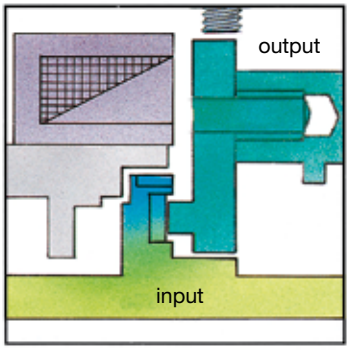
De-energised magnetic coil

- Input and output are disconnected.

energised



de-energised



EAS®-Sm/Zr electromagnetically operated overload clutch

The EAS®-Sm cyclic controllable and adjustable overload clutch

- Engagement is guaranteed only at one specific point due to the phased *mayr*®-synchronous geometry of the *mayr*®-precision rollers and roller detents.
- The EAS®-Sm/Zr control unit takes over the clutch control, regulation and monitoring functions at 96 VDC coil nominal voltage.

Versatile adaptation of cycles and processes for a complete system or single system are possible.

The instantly operational controllable and adjustable EAS®-Zr control clutch

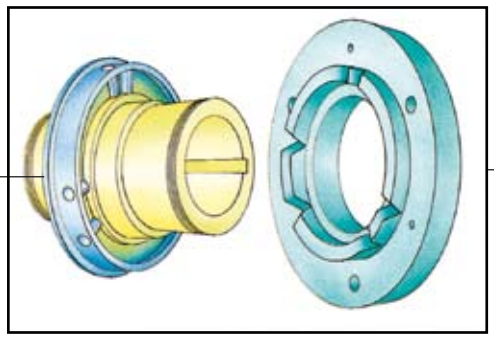
- Uniform and constant torque transmission due to precision manufacture of the roller detents.
- Prompt readiness for operation of the machine and equipment after removal of the overload is guaranteed by using the EAS®-Zr.
- Switch-on/off with the EAS®-Sm/Zr control unit.
- Applications in all types of automated machines.
- Adaptable to constantly changing overloads and cycle speeds.

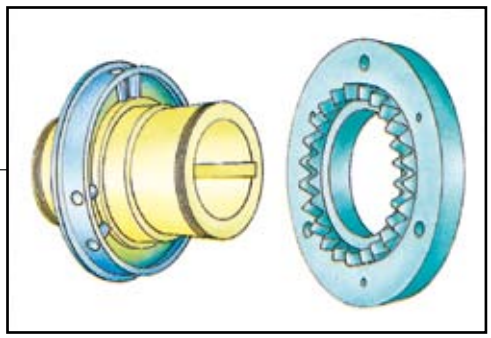
Operating principle of the EAS®-Sm electrically operated clutch

- The EAS®-Sm clutch disengages when the pre-set limit torque is exceeded.
- After a defined cycle is left out, and after removal of the overload the clutch re-engages at the same point as it disengaged (360°).
- The standard cycle corresponds to 360°. Other cycles, for example 180° are also available.

Operating principle of the EAS®-Zr electrically operated clutch

- The EAS®-Zr disengages when the pre-set limit torque is achieved. After removal of the overload, re-engagement is made at the next convenient roller detent.
- The *mayr*® limit switch is responsible for:
  - immediate drive switch-off
  - or further control functions.





Application of the EAS®-Sm/Zr electrically operated clutch

- in all kinds of automated machines
- with constantly changing overloads
- with changing cycles and speeds

- **in packaging machinery**
- **in filling machinery**
- **in printing machinery**
- **in cleaning machinery**
- **in materials handling equipment**

The EAS®-Sm/Zr control clutch in equipment and systems, which are used for

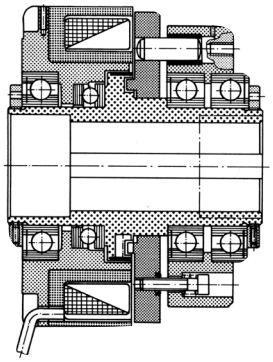
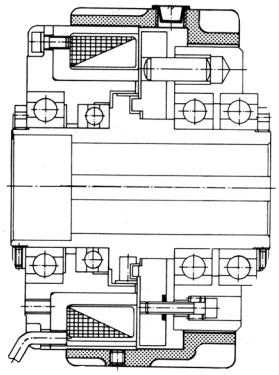
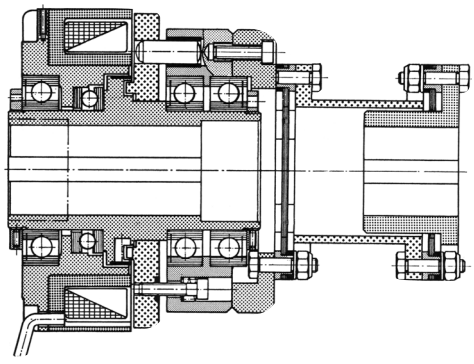
- **cycling**
- **positioning**
- **controlling**
- **checking.**

A control-technical standard for

. . . sequences
. . . processes
. . . adaptations

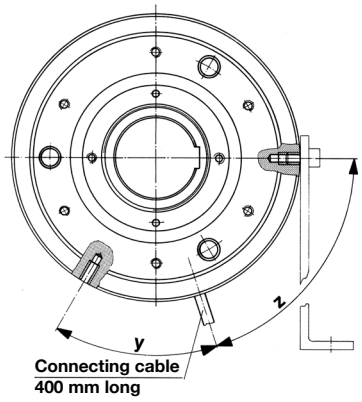
EAS®-Sm/Zr electromagnetically operated overload clutch

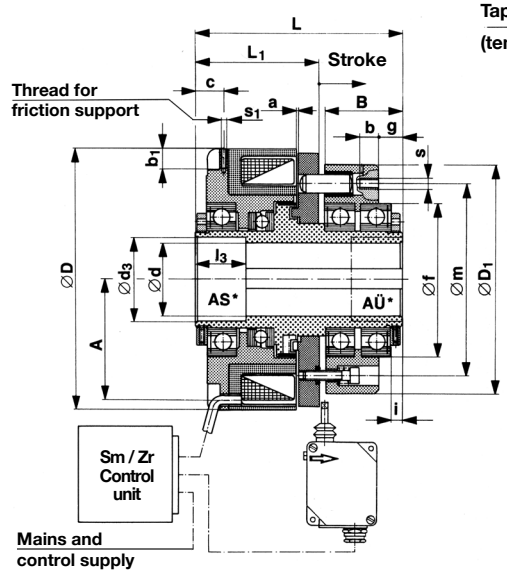
Summary of types

EAS®-clutch	Type	Torque (Nm)	Application
EAS®-Sm standard **EAS®-Zr standard** 	400.036.0 400.038.0	6–375	Electrical overload clutch with switching function. Torque adjustment via an adjustable D.C. voltage. Clutch disconnects the drive in case of an overload or when the current is switched off. Re-engaging EAS®-Sm after 360°. Re-engaging EAS®-Zr after 15°. Flange construction for assembly of pulley, toothed wheels etc., with any additional support bearing supplied by the costumer. page 13
EAS®-Sm with cover **EAS®-Zr with cover** 	400.036.2 400.038.2	6–375	The optional clutch cover prevents dirt getting into the air gap between the magnetic part and the armature disk, and between the armature disk and the transmission flange. Also the dust cover serves for mounting a contactless limit switch (proximity initiator see page 16 and 24). page 13
EAS®-Sm torsionally rigid **EAS®-Zr torsionally rigid** 	436.036.0 436.038.0	6–375	The clutch/ROBA®-D torsionally rigid all-steel flexible coupling combination for coaxial shaft connection to compensate misalignments. page 14
Electrical accessories			EAS®-Sm/Zr control unit page 21 Limit switch page 25

EAS®-Sm/Zr overload clutch

Standard

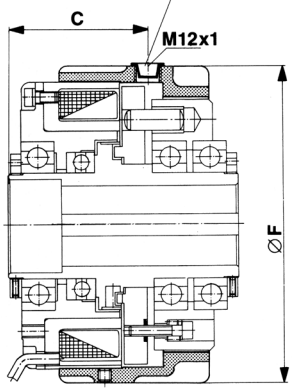




Sizes 0–4 Type 400.036.0
436.038.0

with cover Type 400.036._
Type 400.038._

Tapped hole for proximity sensor
(temperature resistant up to +100 °C)



Type 400.036.2
400.038.2

Technical data and dimensions

Size	Limit torque for overload M_G Nm	Max. speed n_{max} [1] rpm	Input power P_{20} W	Mass moment of inertia with d_{max}. Hub side kgm²	Mass moment of inertia with d_{max}. Flange side kgm²	Weight with d_{max} [2] kg	Stroke mm	A	a_{min} [3]	B	b**	b_1	C
0	6 – 25	4000	36	0,00035	0,00199	4,0	1,8	53	0,25	37,5	13,5	8	62
1	12 – 50	3000	46	0,00130	0,00431	6,0	2,3	63	0,25	41	13,5	10	68
2	25 – 100	2500	57	0,00305	0,00835	9,0	2,5	72,5	0,3	47,5	16	10	76,5
3	50 – 200	2000	73	0,00593	0,01603	13,7	3,0	84,5	0,3	52,5	21	10	86
4	100 – 375	2000	105	0,01177	0,03624	20,2	3,5	99	0,35	58	26	16	95

Size	c	D	D_1	d [4] over	d [4] to	d_3	l_3	F	f_{h6} [5]	g	i	L	L_1	m	s**	s_1	y	z
0	11,5	115	100	9 14	14 22	20 23	65 45	130	62	12	6	100	60,3	80	6xM5	2xM5	48°	72°
1	11,5	135	120	14 19 28	19 28 35	26 37 37	65 45 25	150	80	12	6	110	66,3	100	6xM5	2xM5	48°	72°
2	14	155	135	19 28 38	28 38 42	37 47 –	60 40 –	170	95	14	7	125	74,8	115	6xM6	2xM5	48°	72°
3	15	180	160	22 28 38	28 38 50	37 47 51	75 55 25	200	110	14	7	140	84,3	135	6xM8	2xM5	48°	72°
4	17	210	185	24 28 38 55	28 38 55 60	37 47 67 –	90 70 40 –	230	125	17	9	155	93,3	155	6xM10	2xM6	48°	72°

1) The speed for re-engagement or for switching operation depends on the mass to be accelerated and on the load torque (see “Technical data“, page 15).
2) Without cover
3) Nominal dimension adjusted at the factory
4) Smaller bores on request
5) Fit H7 by the user
** min. reach of screw 2,5 x s
6) Position of the keyway to the mounting bore „s“ in the pressure flange not defined. Defined position on request possible.

We reserve the right to make dimensional and design alterations.

Order example:

To be included when ordering, please state:	Size	Type	Voltage [VDC]	Bore Ø d^{H7}	DIN keyway	*Counterbore by choice	with limit switch
Order number:		4 0 0 . 03_ . _			6)	AS or AÜ	see page 25

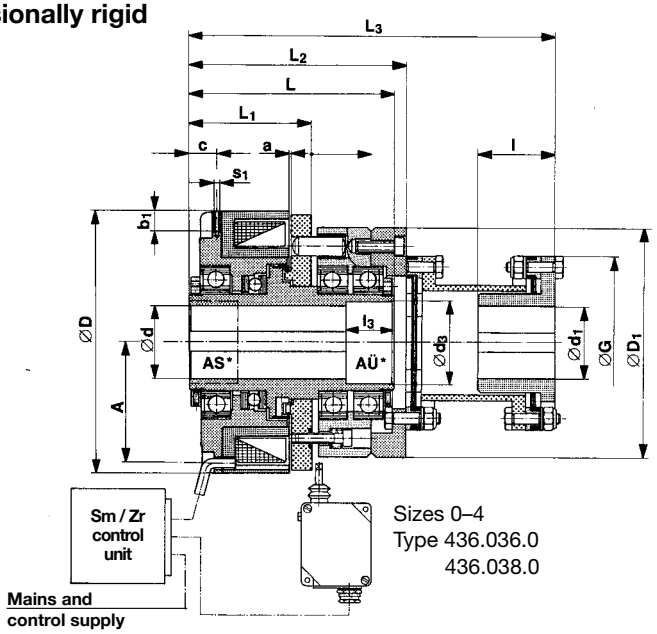
0 – 4
EAS®-Sm clutch 6
EAS®-Zr clutch 8
Standard 0
With cover 2

AS: Counterbore coil carrier side
AÜ: Counterbore transmission flange side
6885 / 1
according to size
24 VDC; 96 VDC

Example: Order number 1 / 400.036.0 / 96 / 30 / AS / 6885 / 1 / plus limit switch 055.000.5

EAS®-Sm/Zr overload clutch

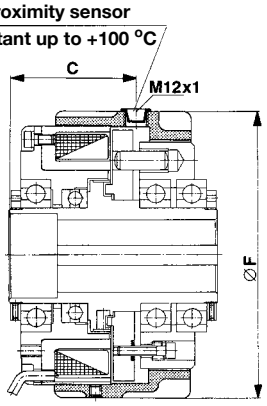
Torsionally rigid



Sizes 0–4
Type 436.036.0
436.038.0

with cover Type 436.036._ 436.038._

Tapped hole for proximity sensor temperature resistant up to +100 °C



Type 436.036.2
436.038.2

Technical data and dimensions

Size	Limit torque for overload M_G Nm	Nominal torque of torsionally rigid flexible coupling Nm	Max. speed n_{max} [1] rpm	Input power P20 W	Mass moment of inertia with d_{max} Hub side kgm²	Mass moment of inertia with d_{max} Flexible side kgm²	Weight with d_{max} [2] kg	Stroke mm	A	a_{min} [3]	b_1	c
0	6 - 25	30	4000	36	0,00035	0,00370	5,5	1,8	53	0,25	8	11,5
1	12 - 50	50	3000	46	0,00130	0,00780	8,0	2,3	63	0,25	10	11,5
2	25 - 100	100	2500	57	0,00305	0,01410	11,5	2,5	72,5	0,3	10	14
3	50 - 200	200	2000	73	0,00593	0,02896	18,2	3,0	84,5	0,3	10	15
4	100 - 375	400	2000	105	0,01177	0,06442	27,0	3,5	99	0,35	12	17

Size	D	D_1	d [4] over	d [4] to	d_3	l_3	$d_{1\,min}$	$d_{1\,max}$	G	L	L_1	L_2	L_3	l	s_1
0	115	100	9 14	14 22	20 23	65 45	8	28	80	100	60,3	106	173	35	2xM5
1	135	120	14 19 28	19 28 35	26 37 37	65 45 25	8	38	92	110	66,3	116	193	40	2xM5
2	155	135	19 28 38	28 38 42	37 47 –	60 40 –	11	45	102	125	74,8	130	217	45	2xM5
3	180	160	22 28 38	28 38 50	37 47 51	75 55 25	15	55	128	140	84,3	149	254	55	2xM5
4	210	185	24 28 38 55	28 38 55 60	37 47 67 –	90 70 40 –	19	65	145	155	93,3	162	287	65	2xM6

1) The speed for re-engagement of switching operation depends on the mass to be accelerated and on the load torque (see “Technical data“, page 15).

2) Without cover
3) Nominal dimension adjusted at the factory
4) Smaller bores on request

We reserve the right to make dimensional and design alterations.

Order example:

To be included when ordering, please state:	Size	Type	Voltage [VDC]	Bore Ø d^{H7}	DIN keyway	Bore Ø d_1^{H7}	DIN keyway	*Counterbore by choice	with limit switch
Order number:		4 3 6 . 03_ . _						AS or AÜ	see page 25

0 – 4
EAS®-Sm/Zr clutch 6
EAS®-Zr clutch 8
Standard 0
With cover 2

AS: Counterbore coil carrier side
AÜ: Counterbore transmission flange side
6885/1
according to size
6885/1
according to size
24 VDC; 96 VDC

Example: Order number 1 / 436.036.0 / 96 / 30 / AÜ / 35 / 6885 / 1 / with limit switch 055.000.5

Electrical connection

The supply voltage for the magnetic coil depends on the design, 96 VDC or 24 VDC being standard.

For monitoring the coil temperature there is a PTC-resistor in the coil (please see installation and operating instructions B.4.9.GB).

The clutch together with the limit switch can be controlled via the Sm/Zr control unit. Information and technical data can be found from page 21 onward.

Torque adjustment

Adjusting and altering the torque can be accomplished by altering the coil voltage.

The torque capacity is proportional to the coil current, independent of the coil temperature. A consistent coil current should therefore be maintained.

Using the EAS®-Sm/Zr control unit enables the torque to be simply and rapidly adjusted and controlled. The consistent current regulator on the control unit guarantees exact and consistent torque. Coil fluctuations do not affect the set torque (within the operational temperature).

Operational speeds

The speeds mentioned on pages 13 and 14 are operational speeds which refer to the clutch in engaged condition.
The re-engagement speed of the EAS®-Sm/Zr clutches depends on the corresponding clutch size or on the mass moments of inertia of the flanged drive elements. Re-engagement or connection of the clutch under load conditions should not take place.

Please contact our application engineers regarding your special application.

General mounting instructions

The EAS®-Sm/Zr is a continuously electrically operated clutch. In connection with this, it should be mentioned that magnetic fields can encroach on the clutch supports or drive elements, and affect their function.
After actuating the mechanical limit switch, the clutch output should stop immediately, as otherwise the lever mounted on the limit switch will be worn down due to grinding of the armature disk, meaning that the function of the clutch or limit switch can no longer be guaranteed.

To avoid clutch failures in max. torque ranges caused by thermal overload, the ambient temperature for the clutch should not exceed 40 °C. The permitted ambient temperature rises during operation with low torque.

Installation examples

EAS®-Sm clutch with dust cover

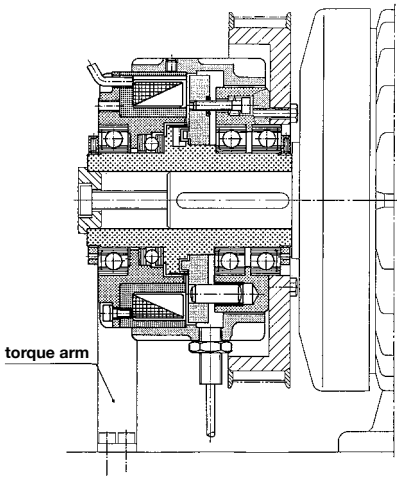


Fig. 4

The clutch is axially secured to the shaft via a press cover and a screw, screwed into the threaded centre hole in the shaft. The clutch cover stops dust and dirt from entering the clutch between the coil and armature disk and the armature disk and transmission flange.
Free axial movement of the armature disk must be ensured. The dust cover serves as a mounting point for the contactless proximity sensor (the proximity sensor is set in the factory).
The friction support absorbs the frictional torque of the roller bearings between the hub and the coil and stops the coil from rotating.

EAS®-Sm clutch combined with a torsionally rigid all-steel flexible coupling

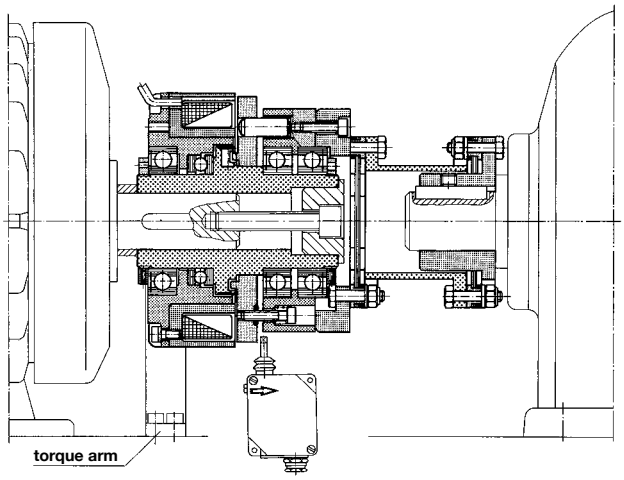


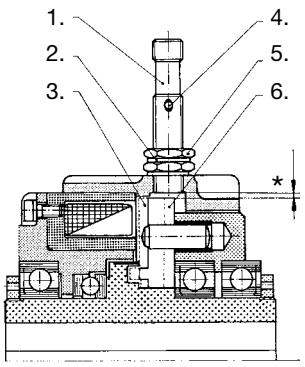
Fig. 5

The EAS®-Sm clutch is axially secured onto the motor shaft by a press cover and screw. A set screw secures the torsionally rigid coupling hub onto the gear box shaft. The torsionally rigid flexible coupling compensates for radial, axial and angular shaft misalignments. When the clutch disengages, the armature disk moves axially and operates the limit switch.
The friction support stops the magnetic part from rotating.

Limit switch Installation

PNP- normally closed proximity sensor
Type 055.009.6 –magnetic field resistant-

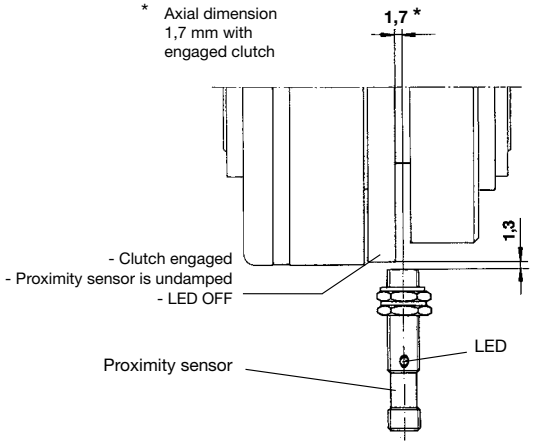
Installation into EAS®-Sm/Zr clutch with cover



1. Proximity sensor
2. Tooth lock washer (2x)
3. Clutch engaged
   (proximity sensor is undamped, LED OFF)
4. LED
5. Counter nut SW 17 (2x)
6. Clutch disengaged
   (proximity sensor is damped, LED ON)

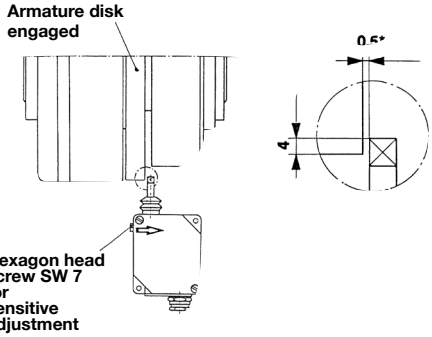
* Screw in proximity sensor (without connection cable) with disengaged clutch until contact, and then turn it back again by approx. 1 ¼ revolutions. Lock it with a counter nut against loosening.

Mounting onto the EAS®-Sm/Zr clutch without cover



Note: Incorrect limit switch installation causes faulty operation, i.e. no overexcitation, no monitoring of the overload.

Limit switch Type 055.000.5
-Light metal housing-



* The axial dimension 0,5 mm is adjusted with an engaged clutch and can be sensitively adjusted using a hexagon head screw SW7.

Note: Incorrect limit switch installation causes faulty operation, i.e. no overexcitation, no monitoring of the overload. If the clutch is disengaged and the drive is running, the switch lever is worn down due to grinding. In this case, a contactless sensor should be used (see “Installation into EAS®-SP clutch without cover”).

Securing the clutch onto the shaft

EAS®-Sm and EAS®-Zr clutches are supplied with finish bores and keyways according to DIN 6885.
The clutch is drawn onto the shaft with a suitable device and axially secured by the press cover, set collars or locking rings.

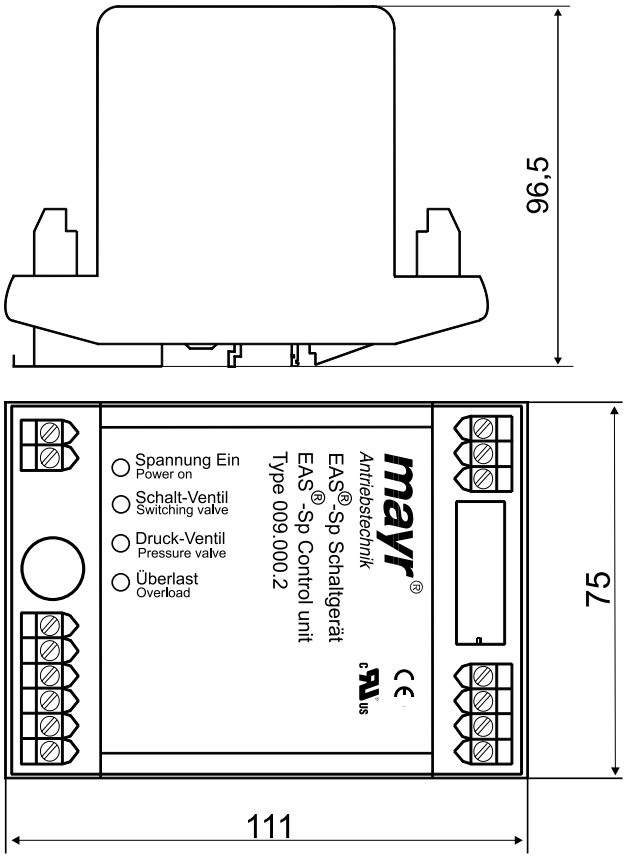
Attaching the friction support

The magnetic element of the clutch must not rotate freely. A support is required to absorb the low friction torque caused by the roller bearing on the static magnetic part (Figs. 4 and 5). The friction support must not transmit any appreciable forces (distortions) onto the clutch.

EAS®-Sp control unit Type 009.000.2

E189728

Dimensions (mm)



Application

This unit is used to monitor, control and to signal overload on pneumatically adjustable overload clutches with switching functions.

Function

The EAS®-Sp control unit monitors the switching condition of the clutch and emits a signal when the set torque is exceeded. It controls pneumatic valves which are used to lock or to open the compressed air supply or to switch from engagement pressure 2 to torque pressure 1.

Switching valve	opens or closes the compressed air supply to the clutch; connections V2a/V2b
Pressure valve	switches over between engagement pressure 2 and torque pressure 1 µm; connections V1a/V1b

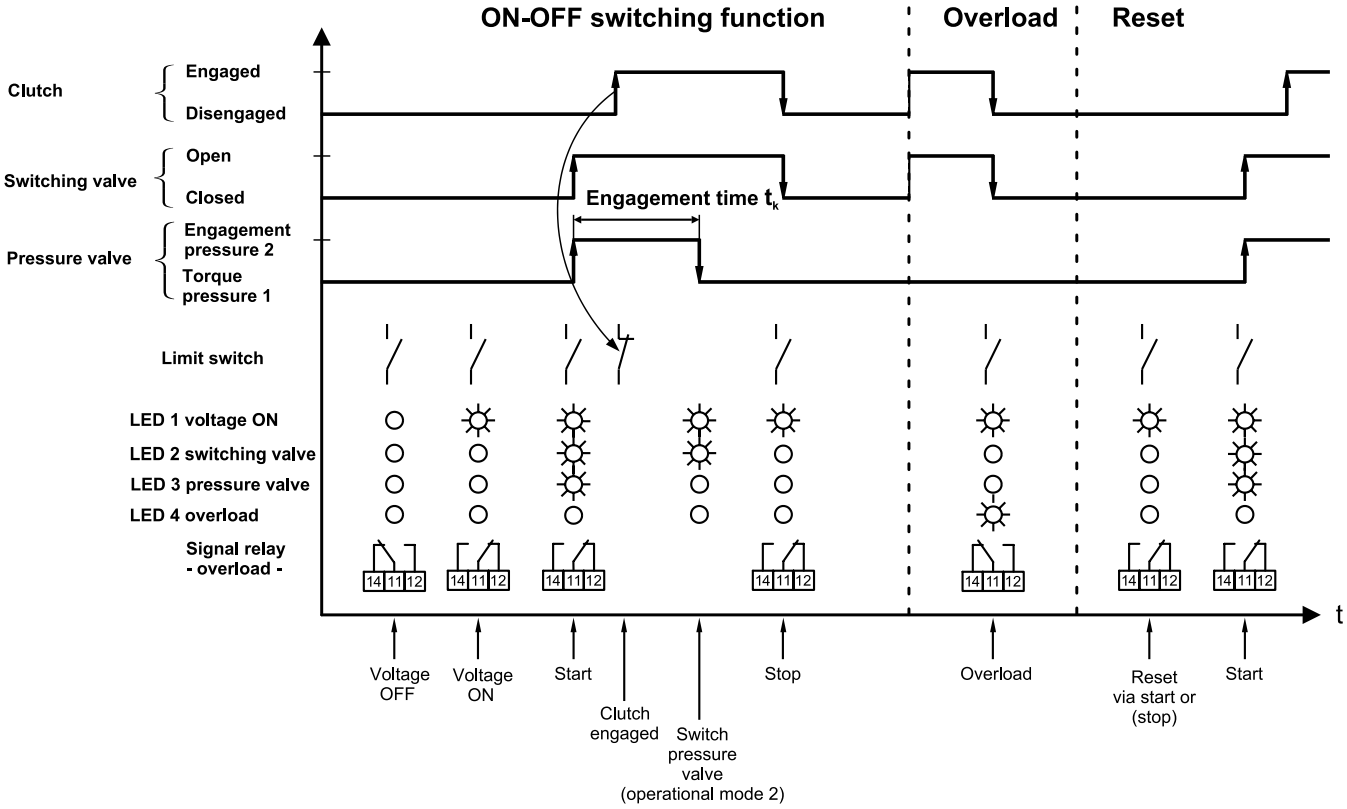
Both connections are resistant against short-circuiting.

Electrical Connection

24 V/Gnd	+24 VDC input voltage Please Observe: Installed protection against incorrect polarity! To set up the voltage supply in the EAS®-Sp control unit, the correct connection voltage polarity is necessary.
ON	Start button / (+) connection for SPS control.
OFF	Stop button / (+) connection for SPS control.
Gnd1	(-) Connection for SPS control
End	Limit switch signal
Gnd2	(-) Connection for limit switch
12 V	(+) Output voltage for ON/OFF contacts and limit switch
V1a/V1b	Pressure valve 24 VDC
V2a/V2b	Switching valve 24 VDC
14 – 11 – 12	**Overload signalling relay,** potential-free switch contacts, max. contact load 250 VAC/10 A

Please Observe! Do not apply any external voltage to the 12 V terminal.

Functional Sequence



Adjustments

Start - Operation

3 2 1

Single-start **(Manufacturer setting)**

Multi-start

Engagement time with single-start

0 - 30 sec. **(Manufacturer setting)**

0 - 5 min.

Engagement time with multi-start

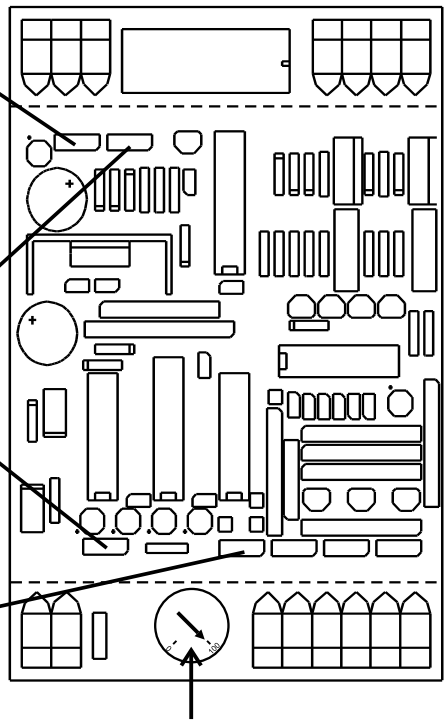
0 - 30 sec. **(Manufacturer setting)**

10 sec.

Operational mode

2 **(Manufacturer setting)**

1



Potentiometer 0 - 100 %
for engagement time t_k

Please Observe! To avoid malfunctions, the operational mode is to be observed before making adjustments.

Engagement Time t_k

Adjustments of the engagement time tk are to be carried out using the external potentiometer **0 - 100 %**.

Adjustment of the engagement times for the following operational conditions:

1) **Single-start** (Manufacturer setting)

Coding bridge:	"Engagement time for single-start"
(Manufacturer setting)	0 - 30 s (for speeds > 2 rpm)
By changing the coding:	0 - 5 min. (for speeds < 2 rpm)

2) **Multi-start** (by changing the settings)

a. Single-start-operation (for 1. impulse-start)

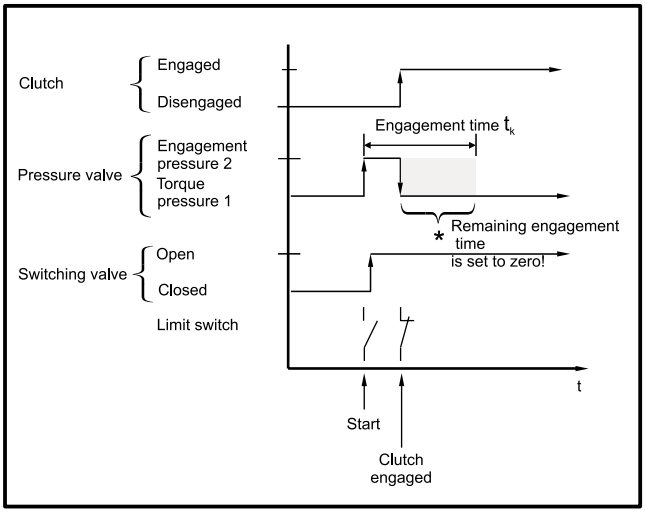
Coding bridge:	"Engagement time for single-start"
(Manufacturer setting)	0 - 30 s
By changing the coding:	0 - 5 min.

b. multi-start-operation (2. and additional impulses)

(Manufacturer setting)	0 - 30 s
By changing the coding:	10 s

Operational Mode 1 (Please Observe Settings)

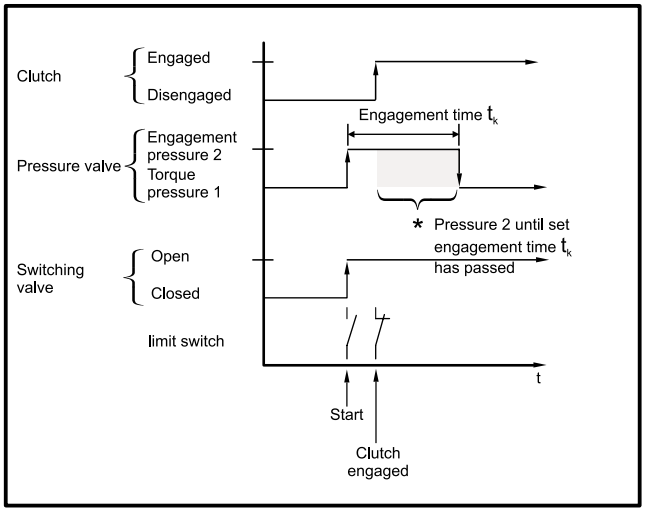
Switch over from engagement pressure 2 to torque pressure 1, if the clutch is engaged and the limit switch is actuated. The remaining engagement time is set to zero.



Operational Mode 2 (Manufacturer setting)

Switch over from engagement pressure 2 to torque pressure 1, when the engagement time tk has passed and the clutch remains engaged.

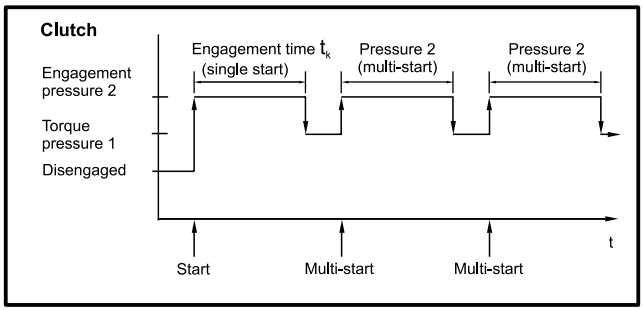
Please Observe! Clutch-ratchetting during the engagement time t_k causes disconnection of the clutch and emission of an overload signal.



Multi-start (Please Observe Adjustments)

The multi-start allows repetition of the engagement pressure 2 switch-on during functional operation.

Application possible in operational modes 1 or 2 and only with 2-contact function control.



Installation

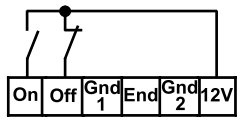
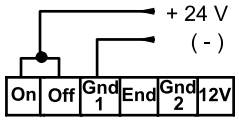
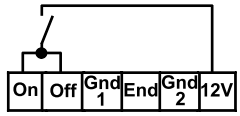
The unit is installed using a snap fastener attached to the housing which can be attached to all DIN EN mounting rails.

Power connections are to be run interference-free!

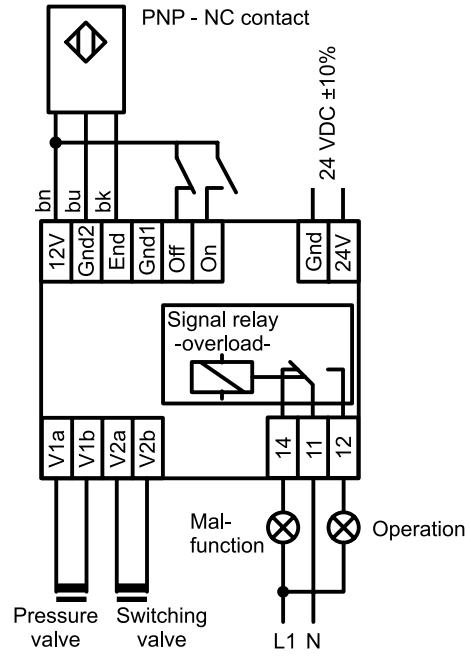
The control wires (ON – OFF – Gnd1 – End – Gnd2 – 12 V) are to be laid separately and at a sufficient distance from the high voltage current or pulsating wires (PE / L1 / N).

Connection Examples

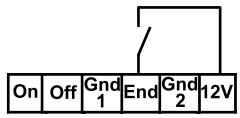
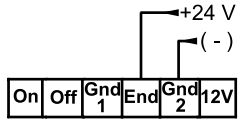
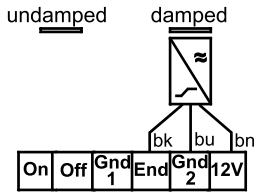
Control elements / Control functions

Application	Function
	**2 contacts** **Start:** close ON contact **Stop:** open OFF contact
	**SPS control** **Start:** +24 V **Stop:** 0 V SPS control 10–30 VDC
	**1 contact** **Start:** close contact **Stop:** open contact

Connection Example



Limit switch (monitoring)

Application	Function
	**1 contact** **Clutch engaged:** Contact closed **Clutch disengaged:** Contact open
	**SPS-control** **engaged:** +24 VDC **disengaged:** 0 VDC SPS control 10–30 VDC
	**PNP-NC contact** **Clutch engaged:** sensor undamped **Clutch disengaged:** sensor damped PNP-NC contact: 3 lead sensors, 10–30 VDC

Technical Data

Input voltage	+24 VDC, +/-10 %
Connection for pressure valve	+24 VDC, 0,5 Amp., resistant against short-circuits
Connection for switching valve	+24 VDC, 0,5 Amp., resistant against short-circuits
Current consumption	max. 1 A/100 % duty cycle
No-load supply power	<1 W
Protection	IP 20
Operating temperature	0 up to +50 °C
Storage temperature	-20 up to +70 °C
Max. clampable conductor cross section	0,14 – 2,5 mm^2 / AWG 26-14
Weight	210 g
Overload signal relay	potential-free contact, max. load 250 VAC/10 A
Conformity markings:	UL-standard UL 508 CSA-standard C22.2 No. 14-M91
Short circuit-resistant	If short-circuiting occurs, coil connections electronic monitoring registers and switches off the affected coil voltage between the coil connections V1a and V1b or V2a and V2b.

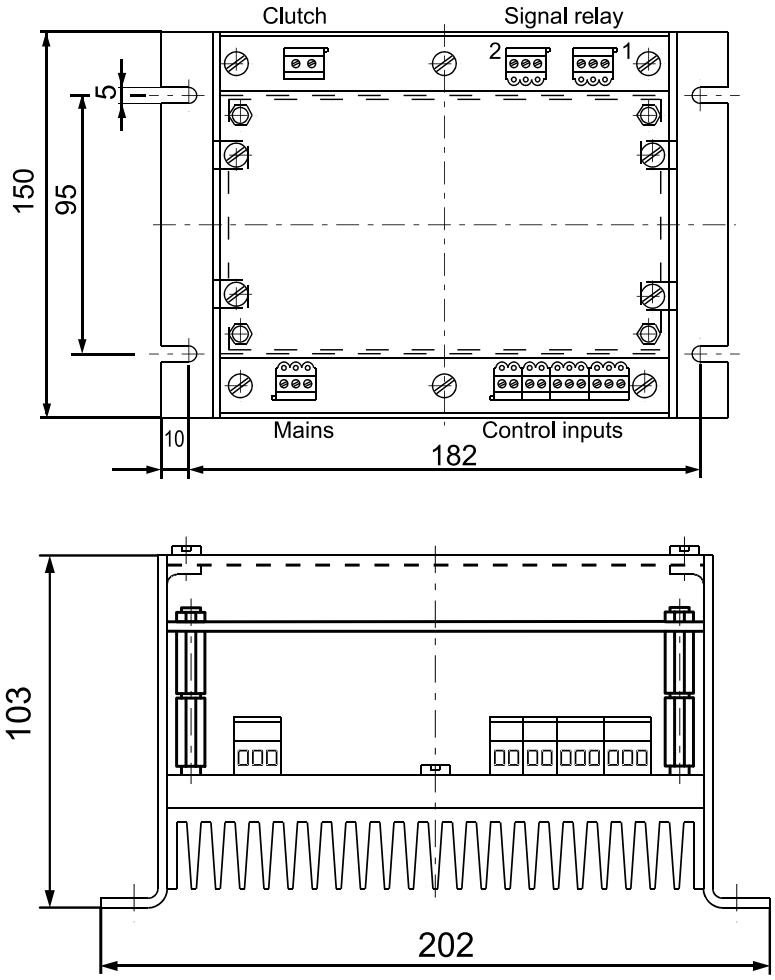
Please Observe! The customer is responsible for providing the input voltage-side protection fuse.

Warning: No overload status signal will be emitted if the limit switch is not installed according to the regulations.

Order example:

To be stated on order:	Type
Order number:	0 0 9 . 0 0 0 . 2

Dimension (mm)



Application

This unit is used to switch, control, monitor and to indicate overload for adjustable EAS®-Sm synchronous clutches and EAS®-Zr overload clutches.

Function

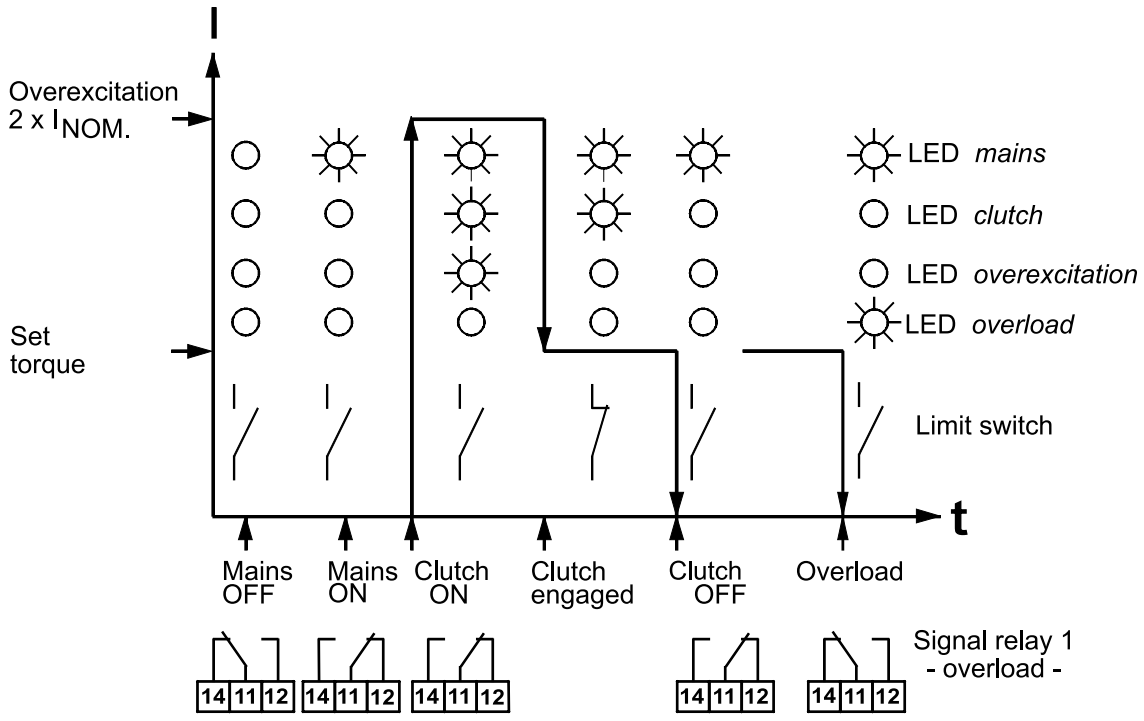
The EAS®-Sm/Zr control unit works according to the principle of cycled switching controllers with a frequency of 18 kHz. It switches, controls and monitors the clutch and emits a signal when the set torque is exceeded.

Switched with	• potential-free contacts • SPS control with 10 – 30 VDC
Controlled by	• coil current
Monitored with	• potential-free contacts • magnetic field-resistant proximity switches up to +100 °C
Temperature monitors	• coil-clutch > +130 °C • control unit > +80 °C

Electrical Connections

PE, L1, N	connection input voltage
Ku1 / Ku2	coil connection for clutch
14 – 11 – 12	contact signal relay 1 (overload)
24 – 21 – 22	contact signal relay 2 (excessive temperatures)
ON	connection „Start“ button
OFF	connection „Stop“ button
Gnd1	(-) connection with SPS control
End	limit switch signal
Gnd2	(-) connection for limit switch
12V	(+) connection for ON-button, OFF-button and limit switch
Gnd3	(-) connection with analogue torque adjustment
M	(+) connection with analogue torque adjustment
P1, P2	connection for coil thermistor (or bridge)

Functional Sequence



Order example:

To be stated on order:	Size	Type
Order number:		0 1 0 . 0 00 . 2

EAS®-Sm/Zr sizes 0-5

Installation / Connection Examples

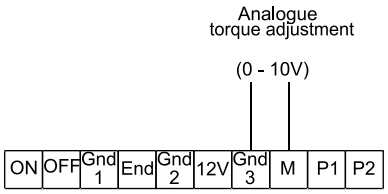
Please Observe! Do not apply external voltage to the 12 Volt terminal. Ensure **well-conducting connections** between the control unit housing and the metallic screw-on surface. Use toothed lock washers or spring washers under the fixing screws.

Power connections are to be run interference-free!

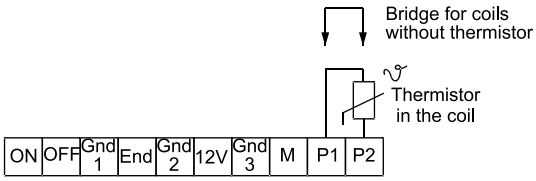
The control wires (ON OFF / Gnd1 / End / Gnd2 / 12V / Gnd3 / M / P1 / P2) are to be laid separately and at a sufficient distance from the high-voltage current or pulsating wires (PE / L1 / N / Ku1 / Ku2).

Installation should correspond to the **EMC directives!**

Analogue torque adjustment (observe coding!)

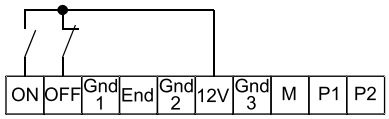


Connection example for thermistor or bridge



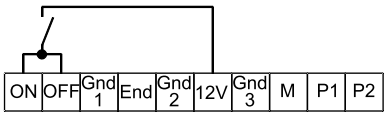
Start/Stop (2 contacts)

Start: close ON contact
Stop: open OFF contact



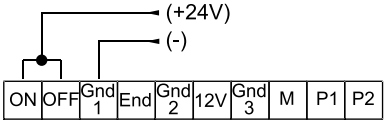
Start/Stop (1 contact)

Start: close ON-contact
Stop: open OFF-contact



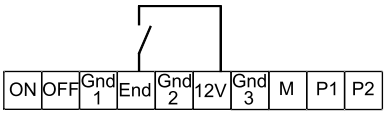
Start/Stop SPS control (SPS control 10 – 30 Volts)

Start: +24V
Stop: 0V



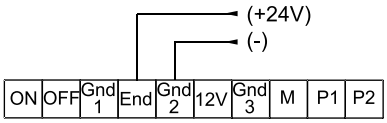
Limit switch (1 contact)

Clutch engaged: contact closed
Clutch disengaged: contact open



Limit switch SPS control
(SPS control 10 – 30 Volt)

Engaged: +24V
Disengaged: 0V

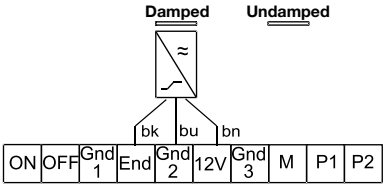


Limit switch PNP – NC contact

PNP – NC contact: 3-wire, magn. field resistant proximity switch, 10 – 30 VDC, operational temperature 100 °C.

Warning: No overload signal is emitted if the limit switch is fitted incorrectly.

Clutch engaged: sensor undamped
Clutch disengaged: sensor damped



Settings

Engagement time t_k (= overexcitation time)

The engagement time tk is set to the max. time of 5 s. (manufacturer setting). The engagement time is determined by:

Mode 1 The engagement time is stopped, i.e. switched from overexcitation to torque current when the clutch engages, as the limit switch is actuated.

Mode 2 When the set time has passed (independent of the clutch switch condition), overexcitation switches to torque current.

Technical Data

Input voltage	230 VAC, ±10 %, 50 - 60 Hz
Current consumption	max. 4 Amp./100 % DC
No-load power	< 4 Watt
CoilNOM-voltage	96 VDC
CoilNOM-power	max. 256 Watt
CoilNOM-current	***manufacturer setting*** according to the mayr®- EAS®-Sm/Zr-clutch size
Coil overexcitation	2x I_{NOM}, current limitation is adapted to the respective coil size.
Torque adjustment	25 % up to 100 % of the coil current (current stabilization)
Engagement time tk	5 seconds ±30 %
Protection	IP 20
Ambient temperature	0 °C up to +50 °C
Storage temperature	-20 °C up to +70 °C
Max. clampable conductor cross section	2,5 mm^2 / AWG 30-12
Weight	1,5 kg / 3,31 lb
Protection fuse	
Input-side G-microfuse	F1/F2, (4 A MT, 5x20 mm)
Coil-side G-microfuse	F3. The current is adapted to the mayr®-clutch size. Always use the same spare fuse.
Excess voltage category	two; one for connection to PELV/SELV (control wires), EN 50178 - 04/1998
Excess voltage protection	**For installation in excess voltage category III, a suitable excess voltage protection is required between the input voltage and the EAS® Sm/Zr control unit.**

Control unit temperature monitoring

A fitted temperature switch prevents the control unit from overheating.

Switch-off	The coil voltage is switched off at a working temperature of > 80 °C
New start	can only take place after the unit temperature has cooled to below 40 °C.
Reset	Switching the input voltage off and on again.

Clutch coil temperature monitoring

The coil temperature monitoring can only be used with a fitted thermistor. The thermistor should be connected to terminals P1/P2.

Advance warning	**at > +130 °C operational temperature** The coil voltage is not yet switched off.
Switch-off	at > +135 °C operational temperature The coil voltage is switched-off.
New start	can only take place after the coil temperature has cooled to below +120 °C.
Reset	is energised by clutch „start“.

Short-circuit-resistant coil connection

If short-circuiting occurs between the coil connections Ku1 and Ku2, the coil voltage is switched off. The short-circuit monitoring is reset by switching off the input voltage and removing the short circuit.

Warning! Not protected against earth short circuits!

Connecting the coil connections Ku1 or Ku2 against earthed metal components causes earth short circuits and therefore to unit failures. It may be necessary to equip the system with an earth leakage circuit breaker (ELCB), to protect against injury or damage. However, this does not protect against control unit failure.

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 registers axial disengaging 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.

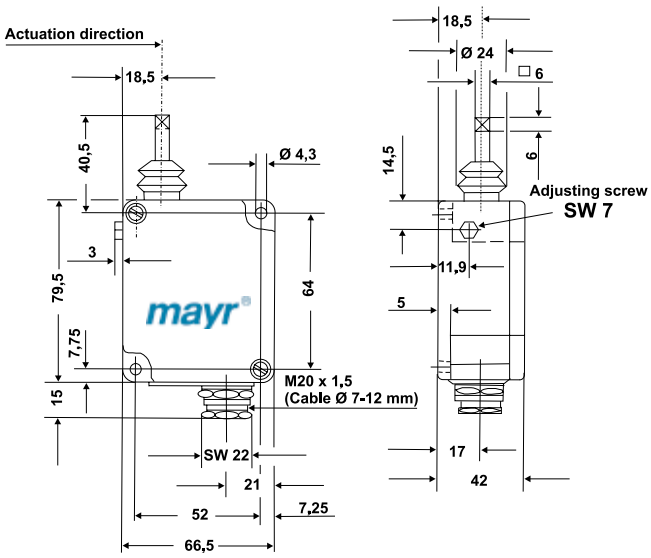
Design

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 M4 cap screws via two screw-on mounting links attached diagonally.

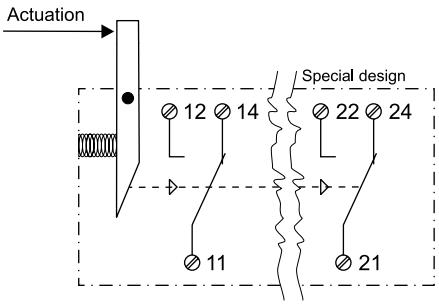
Technical Data

Contact	1 changeover contact (special design: 2 changeover contacts)
Switching capacity	250 VAC / 15 A (with 2 contacts: 10A) 24 VDC / 6 A 60 VDC / 1,5 A 250 VDC / 0,2 A min. 12 VDC/10 mA
Contact material	AgCdO 90/10
Switching frequency	Max. 200 switching operations/min
Ambient temperature	-10 °C up to +85 °C
Protection	IP 54
Weight	275 g
Switching path setting	Using the adjusting screw (SW 7), the zero point can be moved right or left by max. 5 mm
Switching path	Advance travel: min. 0,15 to 0,5 mm Overtravel: max. 10 mm, depending on the zero point setting
Special Types	Different control lever lengths as well as a design with 2 changeover contacts are possible on request

Dimensions (mm)



Electrical Connection



Order example:

To be stated on order:	Type
Order number:	055.000.5

Limit Switch Type 055.009.6 (Contactless, Magnetic Field-resistant)

Application

The magnetic field-resistant limit switch is used for monitoring and measuring axial or radial mechanical movements and adjustments e.g. on EAS®-clutches. Magnetic field-resistant or welding-resistant proximity switches are used where strong magnetic fields can influence the function of the proximity switch. For example, they can be used in the field of strong magnetic coils as well as welding guns or welding electrodes with high welding currents.

Function

When the sensor surface (damped) scans a metal control flag, the signal level changes from the applied U input voltage to 0 volt.

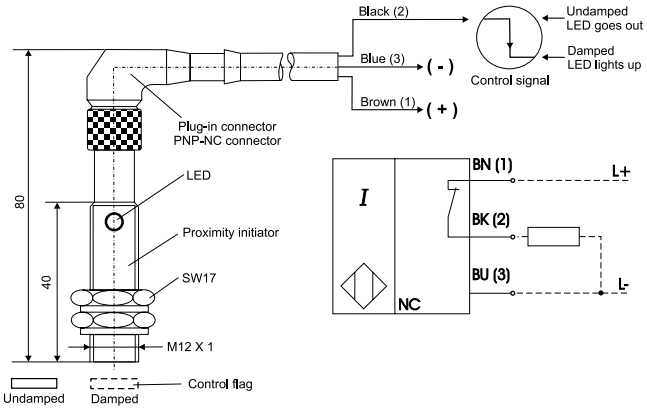
Electrical Connection

1	L+	BN (brown)
2	NC	BK (black)
3	L-	BLI (blue)
4	not connected	

Technical Data

Size	M12 x 1
Type	Rust-proof stainless steel, PTFE- coated
Input voltage	10 - 30 VDC PELV
No-load current	≤20 mA
Power capacity	200 mA
Switching frequency	max. 1000 Hz
Contact	PNP-NC, 3-wire sensor
Switching distance s_n	2 mm, flush installation
Secured switching distance s_a	1,6 mm
Repetitive accuracy	≤5 %
Characteristics	reverse polarity-protected, short-circuit-resistant, function indicator
Connection	plug-in connector, cable 5 m/PUR
Tightening torque	40 Nm
Ambient temperature	-25 °C up to +100 °C
Protection	IP 67

Dimensions (mm)



Order example:

To be stated on order:	Type	Connection voltage
Order number:	055.009.6	10 – 30 VDC

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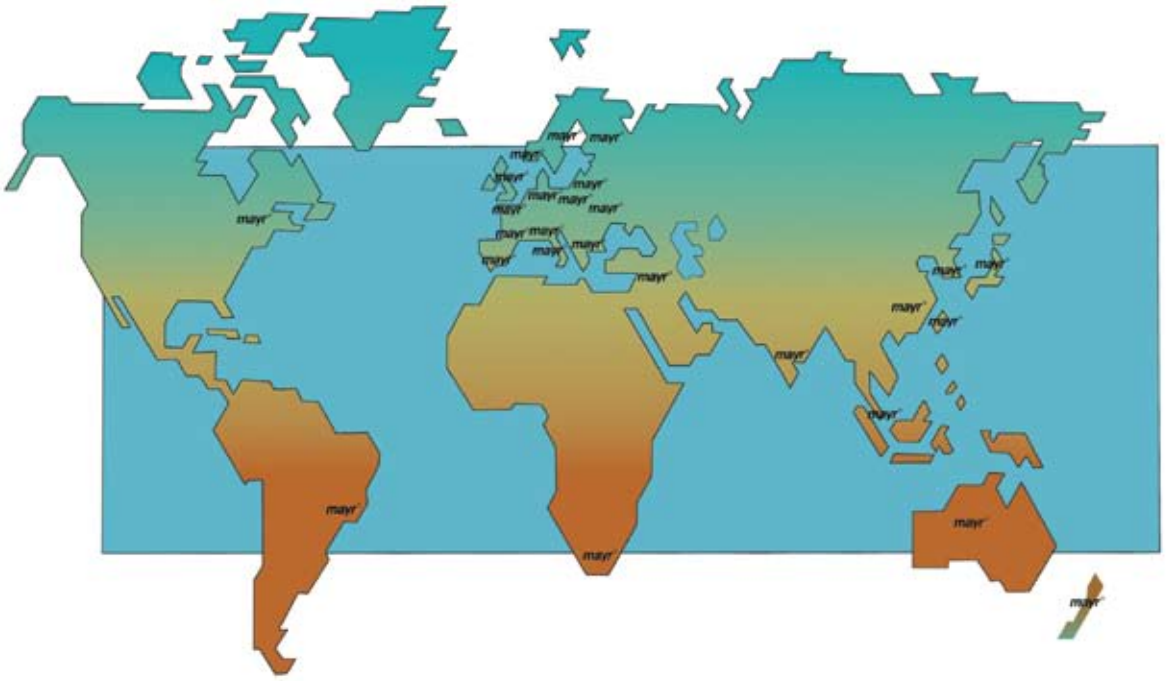

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Note:
If a country is not shown, please refer to headquarters or our web site to be advised of the nearest responsible agent.

your reliable partner

Product Summary

Safety Clutches/ Overload Clutches

- **EAS®-Compact®/EAS®-NC**
  Positive locking and completely backlash-free torque limiting clutches
- **EAS®-smartic®**
  Cost-effective torque limiting clutches, quick installation
- **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 hub**
  Load holding, frictionally locked torque limiting clutches
- **ROBA®-contitorque**
  Magnetic continuous slip clutches

Shaft Couplings

- **smartflex®**
  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
- **EAS®-control-DS**
  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-stop®-Z/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
- **ROBATIC®/ROBA®-quick/ROBA®-takt**
  Electromagnetic clutches and brakes, clutch brake units

DC Drives

- ***tendo*®-PM**
  Permanent magnet-excited DC motors
- ***tendo*®-SC**
  1 quadrant and 4 quadrant transistor controllers

14/05/2007 IM

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