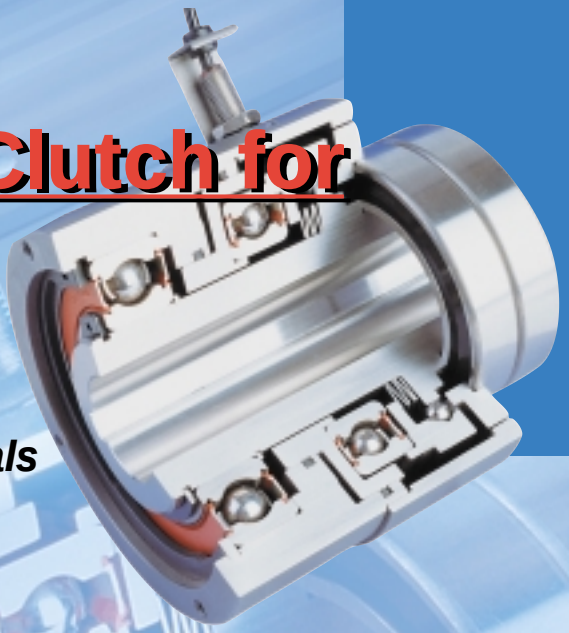
The controllable Torque Limiting Clutch for

Filling Machinery
Printing Machinery
Packaging Machinery
Conveyors and Materials Handling Equipment



pneumatic or electromagnetic clutch

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

K.406.V04.GB

power-transmission

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 (360°) re-engagement of the EAS®-Sm.
- Re-engagement in 15° increments possible with EAS®-Zr.

Electrical accessories

Further products in the EAS®-programme

EAS®-NC / EAS®-Compact

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

EAS®-overload / EAS®-element

EAS®-elements based overload 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 monitored via unique compact mechanical element. Eight sizes cover forces between 50 an 300 000 N in 12 variations in type and design.

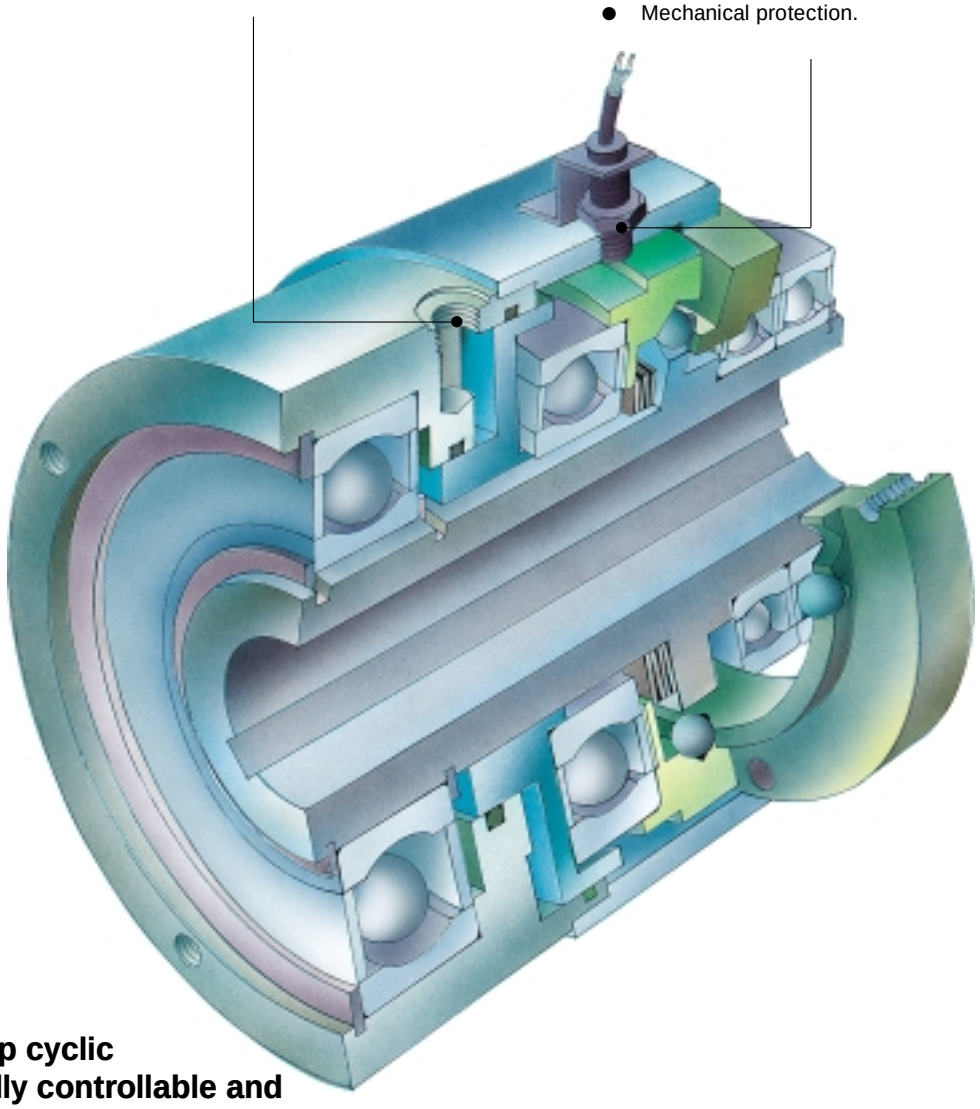
EAS®-Sp pneumatically controllable synchronous clutch

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
- Less moment of inertia
- Long service life and maintenance free
- High disengaging torque accuracy
- Integrated mechanical protected limit switch

Application:

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

EAS®-Sp application:

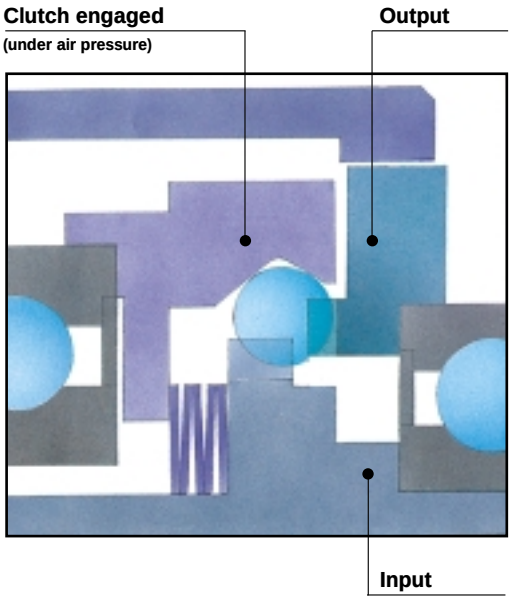
- In packaging machinery
- In filling machinery
- In printing machinery
- In washing/cleaning machines and systems
- In materials handling equipment
- In general machine construction

This newly developed clutch presents a solution for applications where pneumatic control is required, and shows the consistant product development from *mayr*® to maintain their leadership in torque control and power transmission products.

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 torque transmission is backlash-free in both directions of rotation, similarly for reversing drives.



Operating principle

1. Overload function:

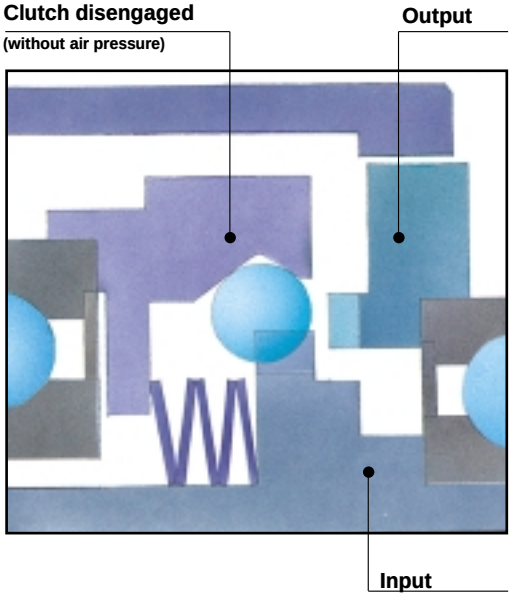
   During operation the clutch transmits the torque determined by the pneumatically pressure. When the limiting torque is exceeded (due to overload) the clutch disengages, input and output are disconnected.
   Simultaneously the integrated limit switch (PNP-opener) is damped and gives an impulse to the EAS®-Sp control unit. The air is exhausted 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 adjusted continuously via the air pressure feed and pressure can be switched on or switched off due to the pneumatically system.

3. Control function:

   The limiting torque for overload at the clutch can be adjusted continuously via the air pressure feed and pressure can be varied during operation.



Torque transmission and limitation

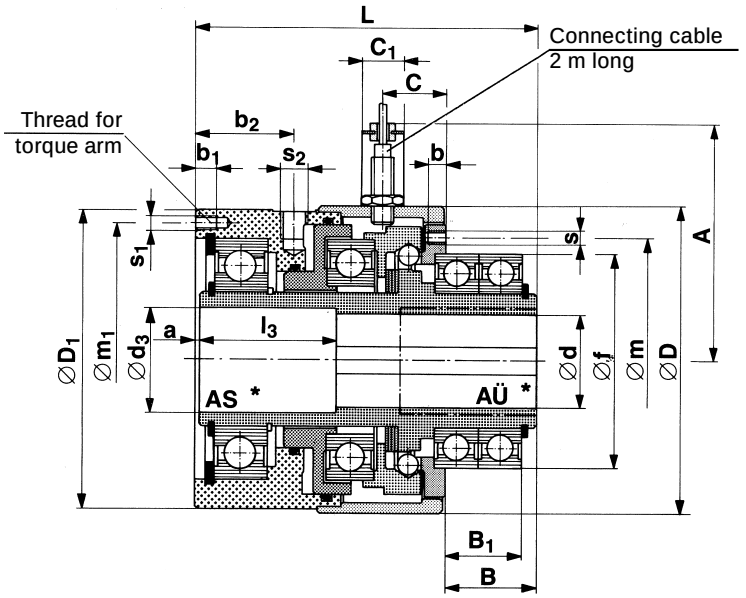
- The disengaging is determined by the existing pressure.
- Controllable torques are transmitted from the hub to the pressure flange and further to the output element via the patented backlash-free principle.
- When the setting torque is exceeded the controlled pressure is exceeded. The limit switch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

Output flange

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

Standard

Type 450.125.0



Size 01 Type 450.125.H (torque 8–40 Nm)
Type 450.125.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	Limiting 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 synchronous switching operation depends on the inertia to be accelerated and the drive torque (see page 8).
2) Size 5 not in stock
3) Without initiator guard bow
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 coupling 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:		450.125.0		6)	AS or AÜ

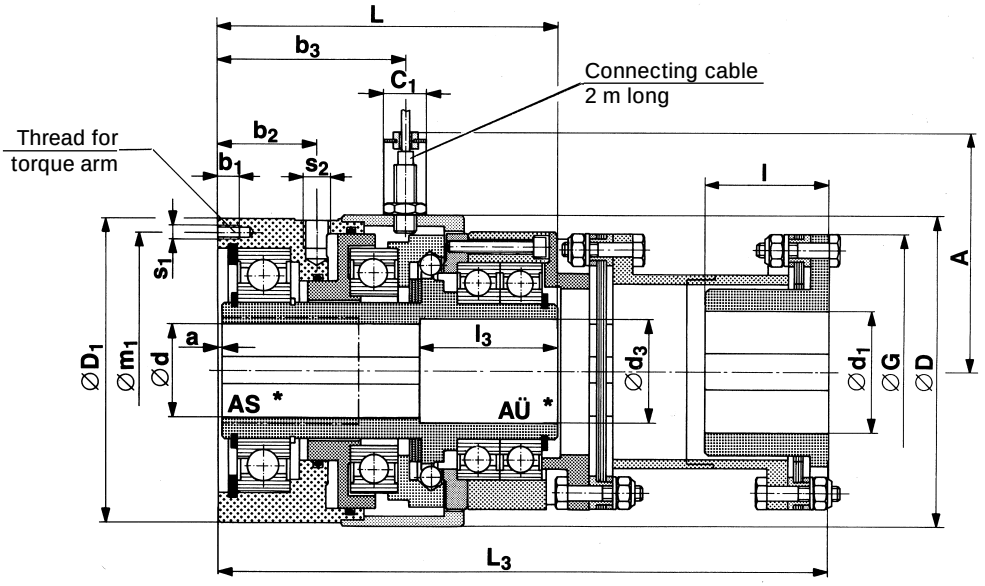
01 – 5 → Size

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

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	Limiting torque for overload M_G Nm	Rated torque of torsionally rigid 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 synchronous switching operation depends on the inertia to be accelerated and the drive torque (see page 8).
2) Size 5 not in stock

The operating pressure of the coupling 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

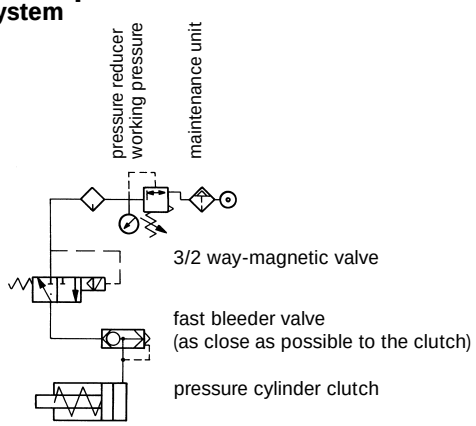
The speeds mentioned on pages 6 and 7 are operating speeds which refer to the engaged condition of the clutch.
The re-engaging speed of the EAS®-Sp clutches depends on the corresponding clutch size or mass moments of inertia of the flanged drive element.

A re-engagement or interconnection of the clutch under load should not take place.

Please contact our application engineers regarding your special application.

Switching examples

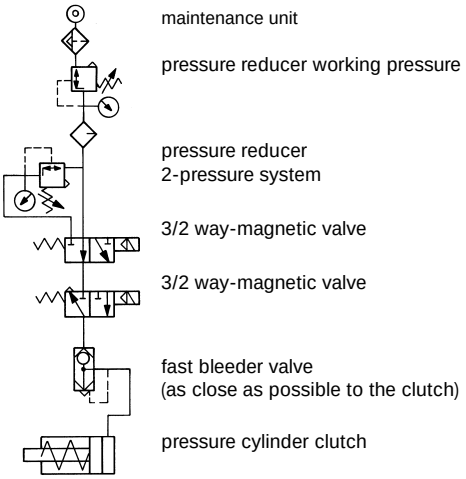
1-pressure system



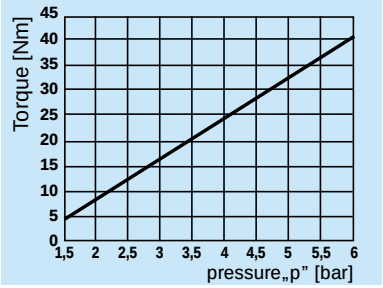
Compressed air characteristics:

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

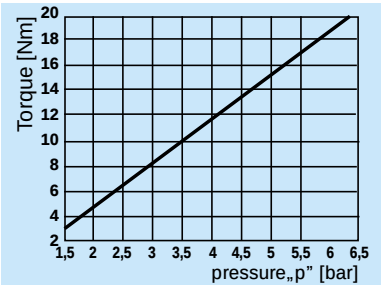
2-pressure system



Torque curves static [1)]



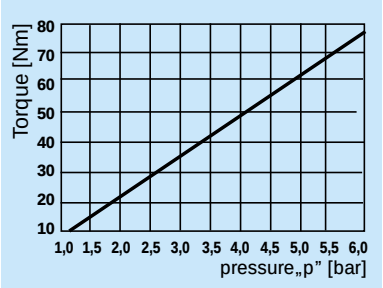
EAS®-Sp 01/450.125.H



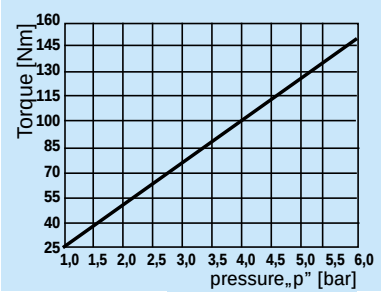
EAS®-Sp 01/450.125.L

Torque setting

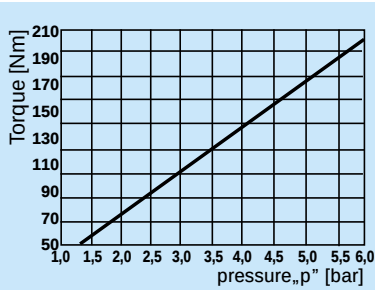
Adjusting and altering the torques can be accomplished by altering the air pressure. The torque capacity is proportional to the air pressure. It is recommended to maintain a constant compressed air. Using the EAS®-Sp control unit enables the torque to be simply and rapidly adjusted.



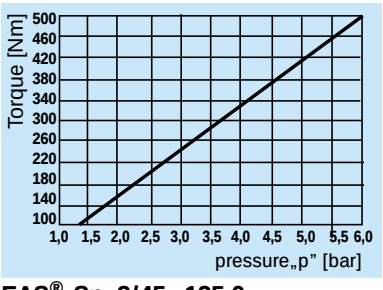
EAS®-Sp 0/45_.125.0



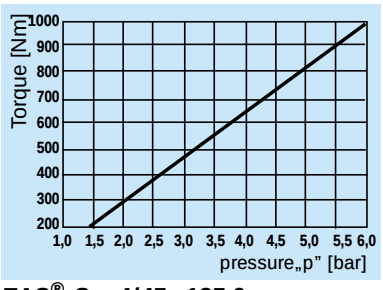
EAS®-Sp 1/45_.125.0



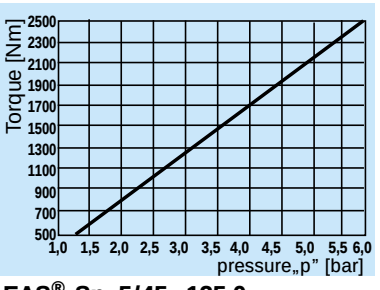
EAS®-Sp 2/45_.125.0



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.

Fitting the shafts

The EAS®-Sp clutches are supplied finish bored and keywayed to DIN 6885. The clutch must be drawn onto the shaft and axially secured by locating plate (Fig. 1) and axial securing screw, collars or retaining rings.

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

Please contact our works.

Attaching the torque arm

The stator element of the clutch must not rotate. A torque arm is required to absorb the low friction torque which is caused by the ball bearings of the stationary stator element. The torque arm 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 8 and 9.

Installation examples

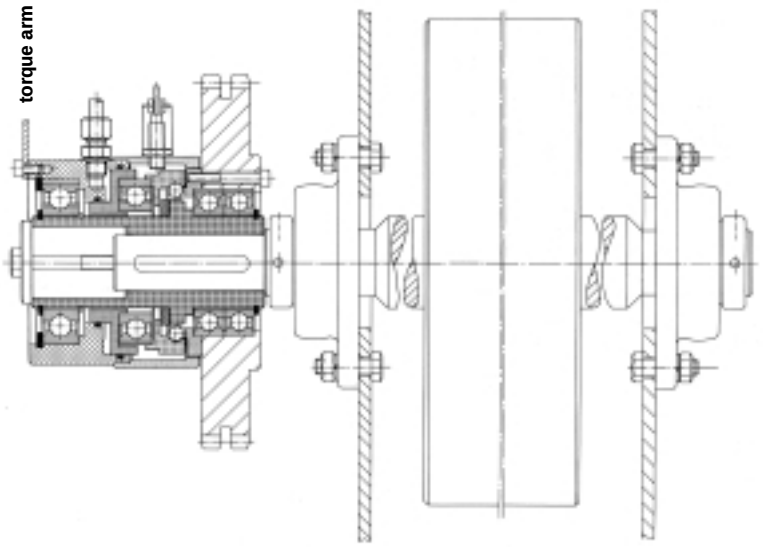


Fig. 1

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 locating plate and screw, fastened into the axially tapped hole in the shaft. The torque arm absorbs the frictional torque of the ball bearings between stator element and hub and stops the stator element from rotating.

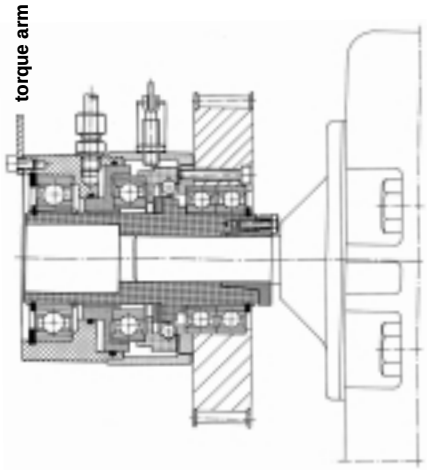


Fig. 2

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 torque arm stops the stator element from rotating.

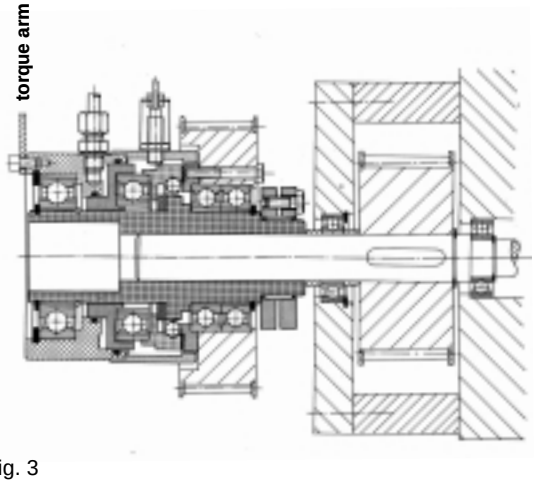


Fig. 3

EAS®-Sp clutch used in a conveyor system

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

The torque 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 limiting torque, even during the 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.**

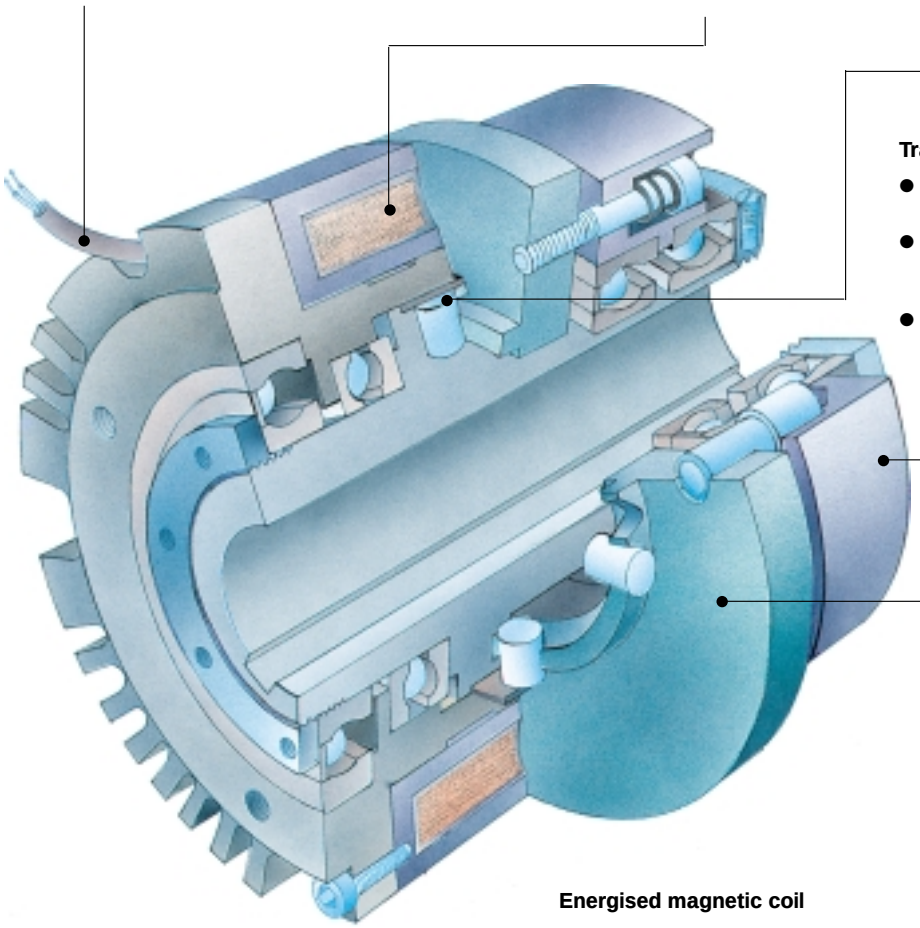
Torque adjustment

The limiting torque is adjusted continuously via the coil current. By doing so the armature disc is attracted magnetically. Armature disc 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 temperature changings of the coil do not influence the torque.

Torque transmission and limitation

- Adjustable torques are transmitted from the hub to the armature disc and further to the transmitting flange via the *mayr*®-precision rollers.
- When the limiting torque is exceeded the pre-set magnetic force is exceeded. 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. gears, pulleys can easily and precisely be attached.
- Precise concentric and axial location.

The electromagnetically operated control clutch EAS®-Sm/Zr

- Combined electromagnetically operated clutch and overload clutch.
- Controllable and adjustable.
- Continuous torque control during operation.
- Synchronous switching-on and switching-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.

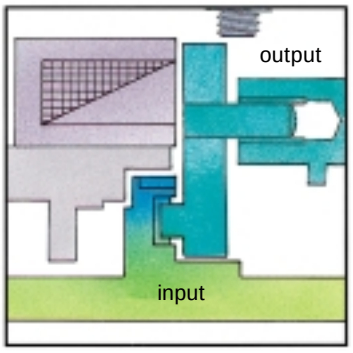
Energised magnetic coil

- As standard with 96V/24 VDC voltage
- Armature disc 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.

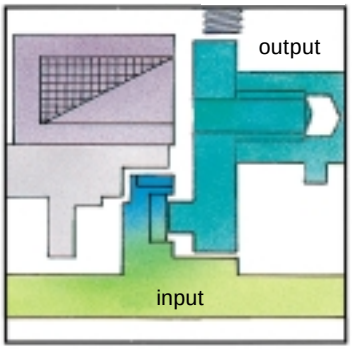
De-energised magnetic coil

- Input and output are disconnected.

energised



de-energised



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 seats.
- A synchronous switching-on and switching-off function is secured by the EAS®-Sm/Zr control unit.

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

EAS®-Zr electrically operated clutch

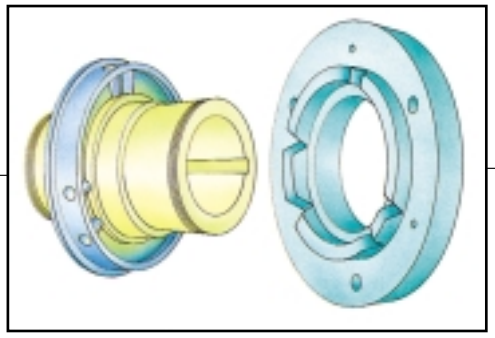
- Uniform and constant torque transmission due to precision manufacture of the roller detents.
- The prompt readiness for operation of the machine and equipment after removal of the overload is guaranteed by using the EAS®-Zr.
- Switching-on/off with the EAS®-Sm/Zr control unit.
- Applications in all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

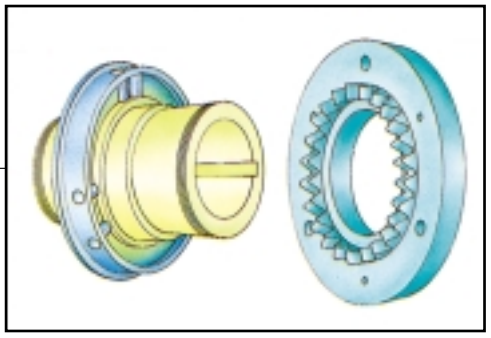
Operating principle of the EAS®-Sm electrically operated clutch

- The EAS®-Sm clutch disengages when the pre-set limiting torque is exceeded.
- After removal of the overload the clutch re-engages at the same point as disengagement (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 limiting torque is achieved. After removal of the overload, re-engagement is made at the next convenient roller detent.
- The drive is switched off immediately via the limit switch.
- Other control functions are also made via the limit switch.





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

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

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

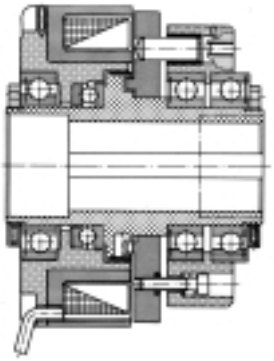
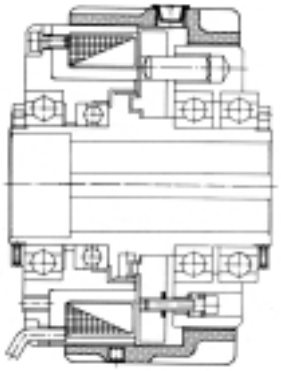
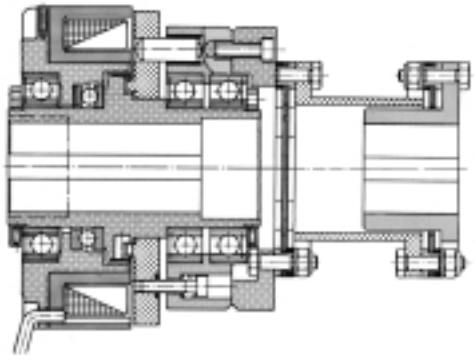
The EAS®-Sm/Zr control clutch in equipment and systems, which are

- cycling
- positioning
- controlling
- checking.

A technical standard for

. . . sequences
. . . processes
. . . tuning

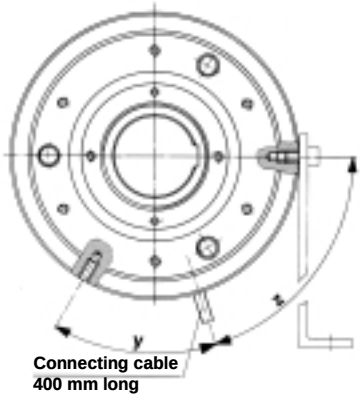
Summary of types

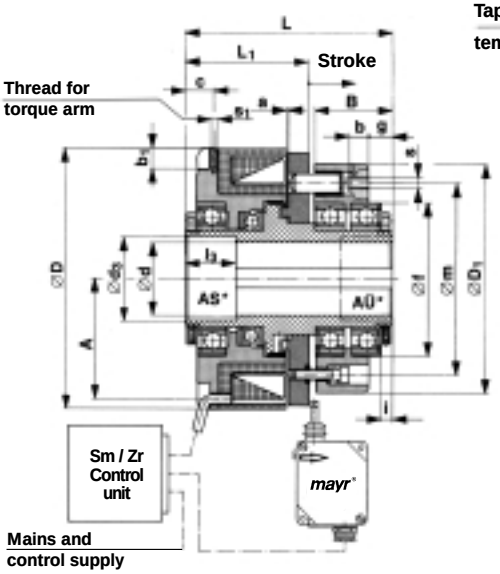
EAS®-clutch	Type	Torque (Nm)	Application
EAS®-Sm standard **EAS®-Zr standard** 	400.036.0 400.038.0	6–375	Electrical overload clutch with switching function. Torque adjustment through an adjustable D.C. voltage. Clutch disconnects the drive in case of an overload or when the current is switched off. Re-engaging EAS®-Sm after 360°. Re-engaging EAS®-Zr after 15°. Flange construction for assembly of pulley, gearwheel 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 coil, armature disc and transmitting flange. Also the dust cover serves for mounting a contactless limit switch (proximity initiator see page 19). 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 17 Limit switch page 22

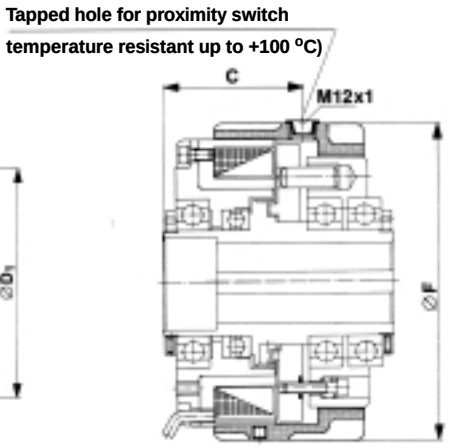
Standard

Sizes 0–4 Type 400.036.0
400.038.0

with cover Sizes 0–4
Type 400.036.2
Type 400.038.2







Technical data and dimensions

Size	Limiting torque for overload M_G Nm	Max. speed n_{max} 1) rpm	Electr. 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 over	d 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 of synchronous switching operation depends on the masses to be accelerated and on the load moment (Load torque see “Technical data“, page 15).
2) Without cover
3) Rated dimension adjusted at the factory
4) Smaller bores on request
5) Fit H7 by the user
6) Position of the keyway to the mounting bore „s“ in the pressure flange not defined. Defined position on request possible.

** min. reach of screw 2,5 x s

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 22

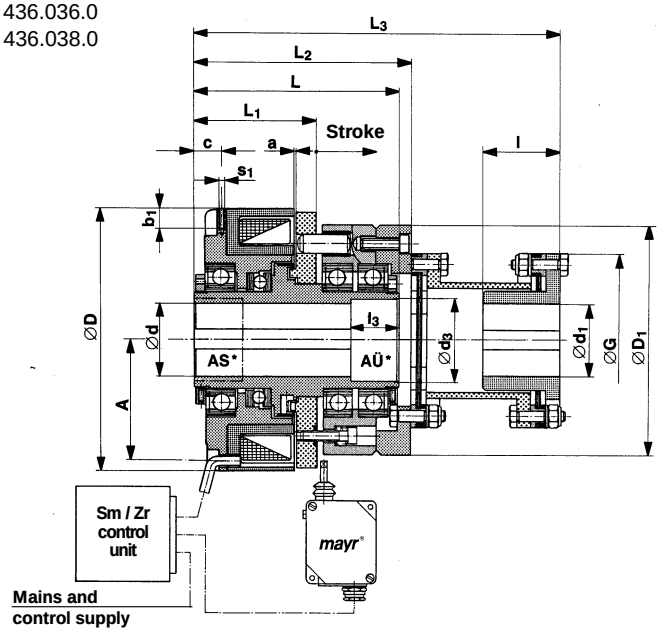
0 – 4
EAS®-Sm clutch 6
EAS®-Zr clutch 8
Standard 0
With cover 2

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

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

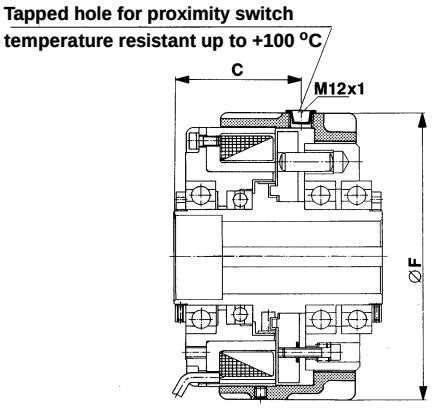
Torsionally rigid

Sizes 0–4
Type 436.036.0
436.038.0



with cover

Sizes 0–4
Type 436.036.2
436.038.2



Technical data and dimensions

Size	Limiting torque for overload M_G Nm	Rated torque of torsionally rigid flexible coupling Nm	Max. speed n_{max} [1] rpm	Electr. 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 over	d 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	20	65	8	28	80	100	60,3	106	173	35	2xM5
			14	22	23	45									
1	135	120	14	19	26	65	8	38	92	110	66,3	116	193	40	2xM5
			19	28	37	45									
			28	35	37	25									
2	155	135	19	28	37	60	11	45	102	125	74,8	130	217	45	2xM5
			28	38	47	40									
			38	42	–	–									
3	180	160	22	28	37	75	15	55	128	140	84,3	149	254	55	2xM5
			28	38	47	55									
			38	50	51	25									
4	210	185	24	28	37	90	19	65	145	155	93,3	162	287	65	2xM6
			28	38	47	70									
			38	55	67	40									
			55	60	–	–									

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

2) Without cover
3) Rated 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 22

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 coil depends on the type, 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 instruction 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 on the pages 17-19.

Torque adjustment

Adjusting and altering the torque can be accomplished by the following.

Altering the coil voltage:

The torque capacity is proportional to the coil current, independent of the coil temperature, although it is recommended to maintain a constant coil current.

Using the EAS®-Sm/Zr control unit enables the torque to be simply and rapidly adjusted and controlled. The constant current regulator of the control unit guarantees exact and constant torque. Variations in the supply voltage or differing coil temperatures 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 engaged condition of the clutch.

The re-engaging speeds of the EAS®-Sm/Zr clutches depend on the corresponding clutch size or on the mass moments of inertia of the flanged output elements. A re-engagement or connection of the clutch under load conditions should not be made.

Please contact our application engineers referring your special application.

General mounting instructions

The EAS®-Sm/Zr is a continuously electrically operated clutch. In this connection it should be mentioned that magnetic fields can overlap to the adjacent components and impair the function.

After actuating the mechanical limit switch the output of the clutch should stop immediately as otherwise the lever mounted at the limit switch is worn down due to grinding of the armature disc and, therefore, the function of the clutch or limit switch is not guaranteed any more.

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

Installation examples

EAS®-Sm clutch with dust cover

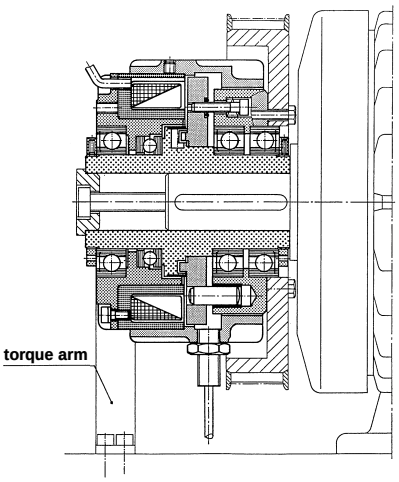


Fig. 4

The clutch is axially secured to the shaft via locating plate and screw, fastened into the axially tapped hole in the shaft. The clutch cover stops dust and dirt entering the clutch between the coil and armature, and armature and transmission flanges. The free axial movement of the armature must be ensured. The dust cover serves as a mounting point for contactless proximity switch (setting of the proximity initiator in the factory).

The torque arm absorbs the frictional torque of the ball bearings between the hub and the coil and stops the coil from rotating.

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

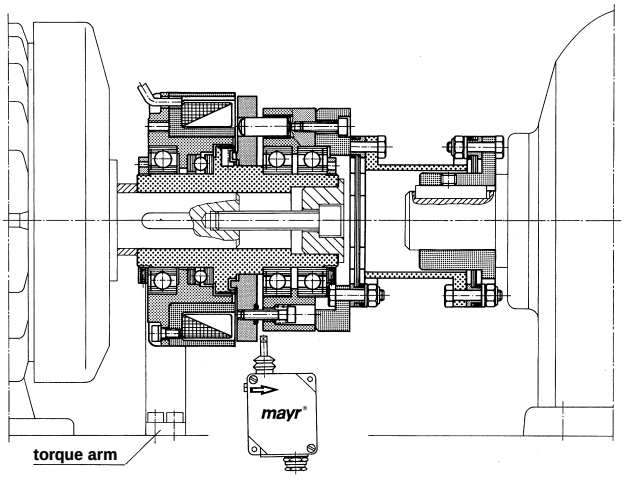


Fig. 5

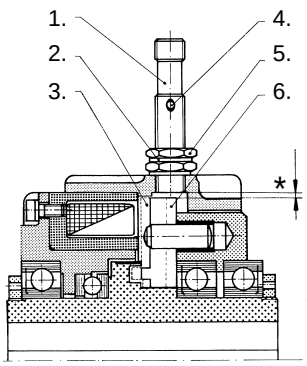
The EAS®-Sm clutch is axially secured onto the motor shaft by a locating plate and screw. A grub screw secures the torsionally rigid coupling hub onto the gear box shaft. The torsionally rigid flexible coupling accepts radial, axial and angular shaft misalignments. When the clutch disengages, the armature moves axially and operates the limit switch.

The torque arm stops the coil carrier from rotating.

Fitting the limit switch

PNP-normally closed
Type 055.009.6 -magnetic field resistant-

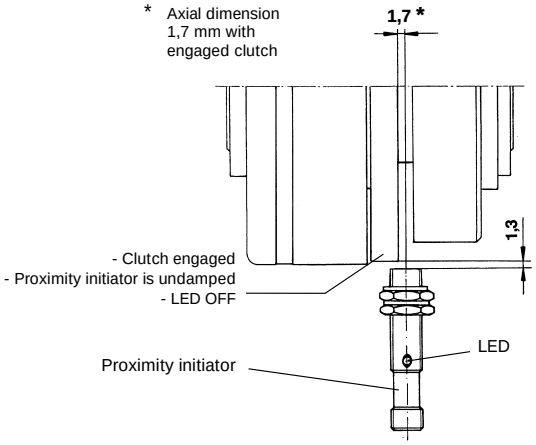
Fitting in EAS®-Sm/Zr clutch with cover



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

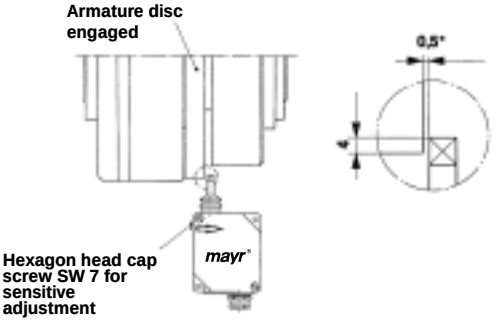
* Turn in proximity initiator (without connection cable) with disengaged clutch until contact and return it afterwards by approx. 1 1/4 revolutions. Lock it with a counter nut against moving.

Fitting to EAS®-Sm/Zr clutch without cover



Note: An incorrect fitting of the limit switch causes a faulty operation, i.e. no overexcitation, no monitoring of the overload.

Limit switch Type 055.000.5
-mechanical actuating-



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

Note: An incorrect fitting of the limit switch causes a faulty operation, i.e. no overexcitation, no monitoring of the overload.
In case of a disengaged clutch and running drive the switch lever is worn down due to the grinding. In this cases the contactless reading should be used (see “fitting“ at EAS®-SP-clutch without cover).

Fitting to the shaft

EAS®-Sm and EAS®-Zr clutches are supplied with finish bores and keyways to DIN 6885.
The clutch is drawn onto the shaft with a suitable device and axially secured by the washer and bolt in the center of the shaft, shaft collars or retaining rings.

Attaching the torque arm

The magnetic element of the clutch must not rotate freely. A torque arm is required to absorb the low friction torque between the hub and stationary coil carrier, and to ensure that the coil carrier does not rotate (Figs. 4 + 5). The torque arm must not transmit any appreciable forces to the clutch.

Application

Monitoring, controlling, overload signalling for pneumatically adjustable overload clutches with switching functions.

Function

The EAS®-Sp control unit monitors the ON/OFF conditions of the clutch and signals when the set torque is exceeded. Control of pneumatic valves which are used for locking and opening of the air pressure supply or for switching over from engaging pressure 2 to torque-pressure 1.

Engaging valve opens or closes the air pressure feed to the clutch; terminals V2a/V2b

Pressure valve switches over between engaging pressure 2 and torque pressure 1; terminals V1a/V1b

Both terminals are short circuit proof.

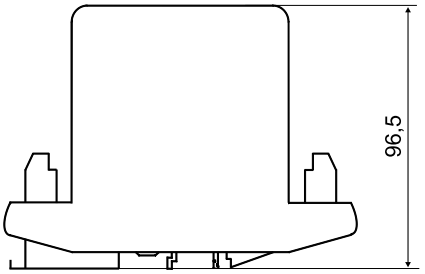
Electric connection

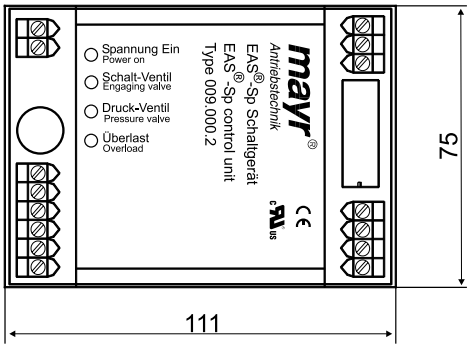
24 V/Gnd	+24 VDC-input voltage Attention: Installed protection against incorrect polarity! To set-up the power supply in the EAS®-Sp control unit, the correct polarity of the supply voltage is necessary.
ON	Start button / (+) connection with PLC-drive
OFF	Stop button / (+) connection with PLC-drive
Gnd1	(-) Connection with PLC-drive
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	ON/OFF valve 24 VDC
14 – 11 – 12	**Overload relay**, floating switch contacts, max. contact load 250 VAC/10 A

Attention! Do not apply any external voltage to the terminals +12 V.

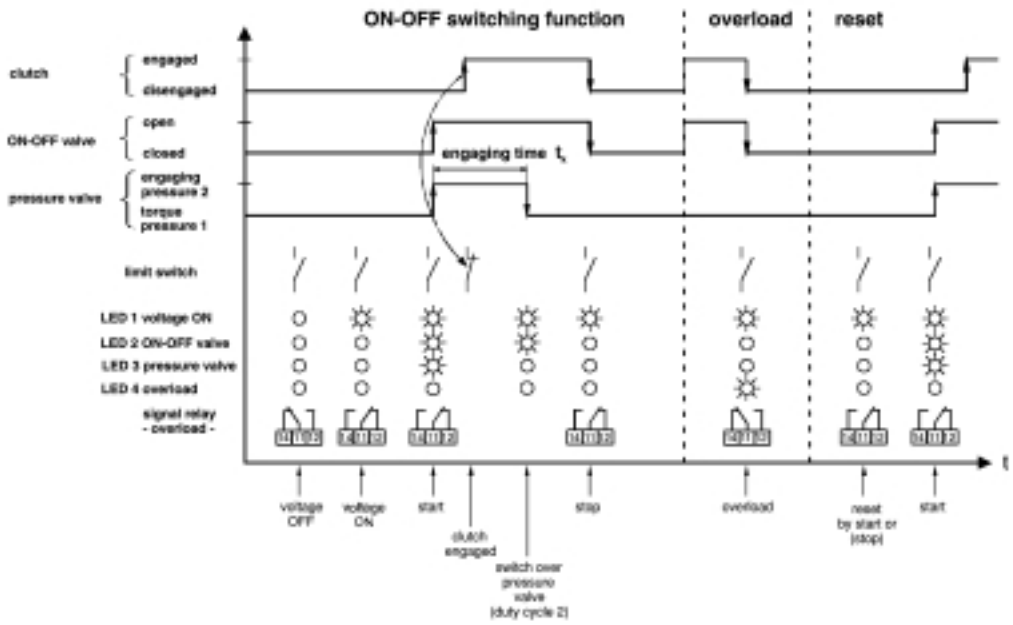
E 189728 (N)

Dimension (mm)

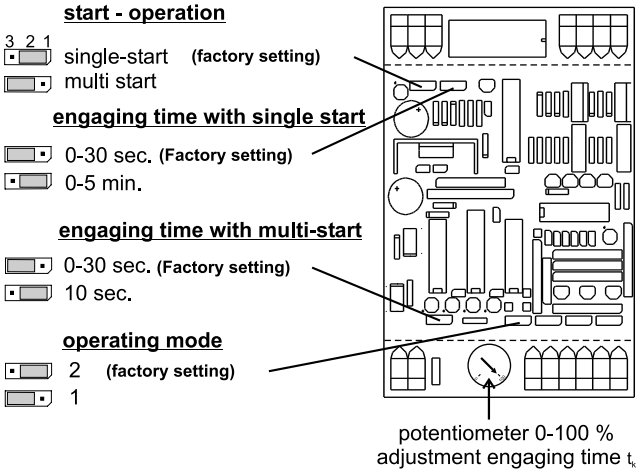




Functional sequence



Adjustments



Please observe! To avoid malfunctions, operation is to be observed before changing the adjustments.

Engaging time t_k

The adjustments of the engaging time tk is made with the external potentiometer **0–100 %.**

Coding and adjustments of the engaging times for following operational conditions:

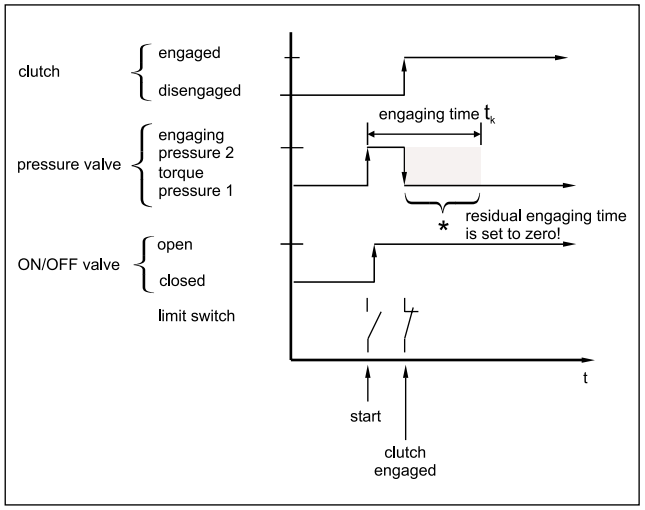
1) **Single-start** (factory setting)
Coding bridge: "Engaging time with single-start"
(factory setting) 0–30 sec.
(for speeds > 2 rpm)
By changing the coding: 0–5 min.
(for speeds < 2 rpm)

2) **Multi-start** (by changing the coding)
a. single-start-operation (for 1. impulse-start)
Coding bridge: "Engaging time with single-start"
(factory setting) 0–30 sec.
By changing the coding: 0–5 min.

b. multi-start-operation (2. and additional impulses)
(factory setting) 0–30 sec.
By changing the coding: 10 sec.

Operating mode 1 (observe adjustments)

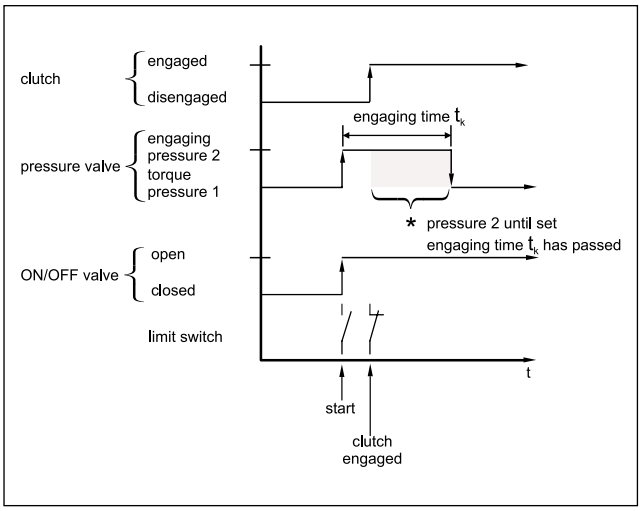
Switch over from engaging pressure 2 to torque pressure 1, when the clutch engages and actuates the limit switch. The remaining engaging time is set to zero.



Operating mode 2 (factory setting)

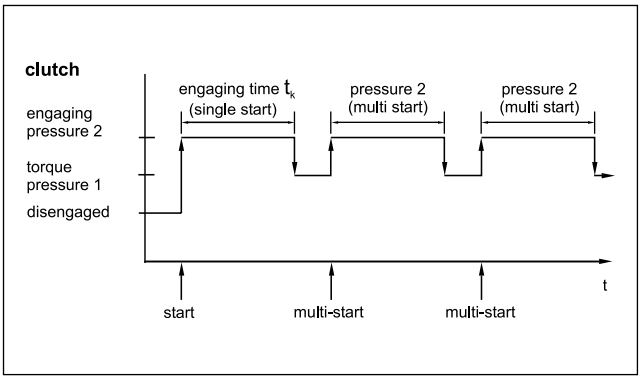
Switch over from engaging pressure 2 to torque pressure 1, when the engaging time t_k has passed and the clutch remains engaged.

Please observe! A ratchetting of the clutch during the engaging time t_k causes a disconnection of the clutch and an overload signal is provided.



Multi-start (observe adjustments)

The multi-start allows a repetitive switching-on of the engaging pressure 2 during the functional operation.
Application possible only with 2 contact functions.



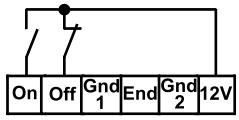
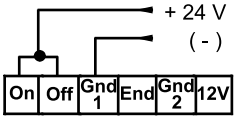
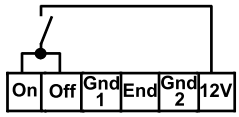
Installation

The unit is installed by a snap-in fastener attached at the housing which can be attached on all DIN EN-mounting rails.

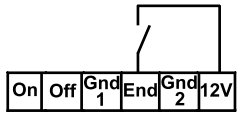
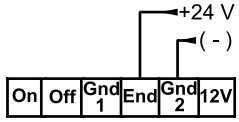
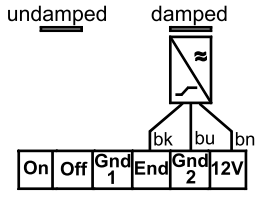
Power connections are to be interference free! The control lines (ON – OFF – Gnd1 – End – Gnd2 – 12V) are to be placed separately and in a sufficient distance from the power or pulsing wires (PE / L1 / N).

Connection examples

Control elements / -functions

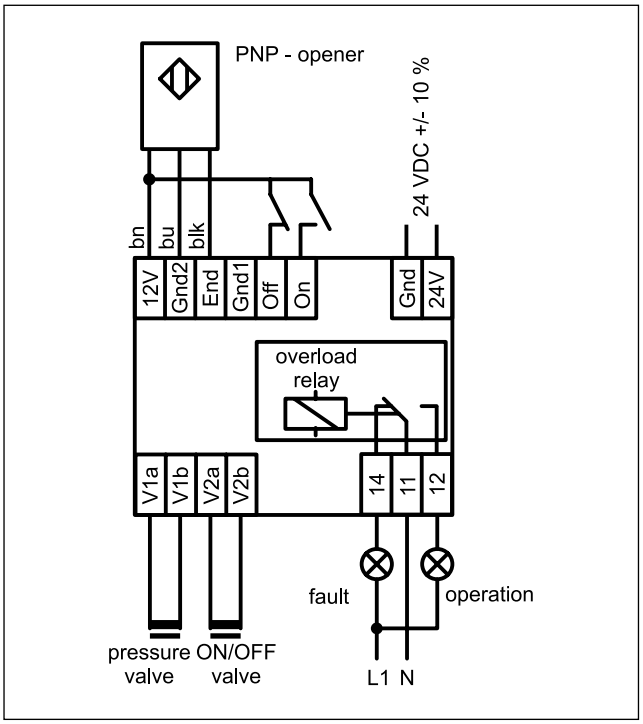
Application	Function
	**2 contacts** **start:** close ON contact **stop:** open OFF contact
	**PLC-drive** **start:** +24 V **stop:** 0 V PLC-drive 10–30 VDC
	**1 contact** **start:** close contact **stop:** open contact

Limit switch (monitoring)

Application	Function
	**1 contact** **clutch engaged:** contact closed **clutch disengaged:** contact open
	**PLC-drive** **engaged:** +24 VDC **disengaged:** 0 VDC PLC-drive 10–30 VDC
	**PNP-opener** **clutch engaged:** sensor undamped **clutch disengaged:** sensor damped PNP-opener: 3 conductor sensor, 10–30 VDC

Attention: There is no overload status signal, if the limit switch is adjusted incorrectly.

Connection example



Technical data

Input voltage	+24 VDC, +/-10 %
Terminals for pressure valve	+24 VDC, 0,5 Amp., short-circuit-proof
Terminals ON/OFF valve	+24 VDC, 0,5 Amp., short-circuit-proof
Current consumption	max. 1 A/100 % duty cycle
No load consumption	<1 W
Protection	IP 20
Operation temperature	0 up to +50 °C
Storage temperature	-20 up to +70 °C
Conductor cross section	0,14–2,5 mm² / AWG 26-14
Weight	0,21 kg / 0,46 lb
Overload relay contact	floating contact, max. load 250 VAC/10 A
Approvals:	UL-standard UL 508 CSA-standard C22.2 No. 14-M91
Short-circuit proof coil connections	In the event of a short circuit between the coil connections V1a and V1b or V2a and V2b the coil voltage concerned is switched off by an electronic monitoring.

Attention! A safety fuse between the input voltage and the EAS®-Sp control unit is to be provided by the customer.

Order example:

To be included when ordering, please state:	Type
Order number:	0 0 9 . 0 0 0 . 2

Application

Switching, controlling, monitoring and overload indication for adjustable EAS®-Sm synchronous-clutches, EAS®-Zr overload clutches.

Function

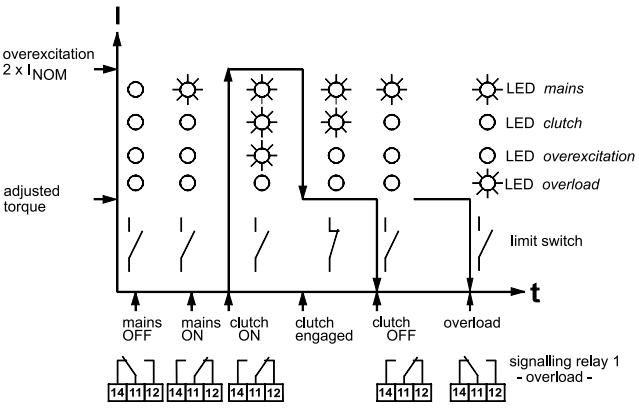
The EAS®-Sm/Zr-control unit works according to the principle of cycled switching controllers with a frequency of 18 kHz. It switches, controls and monitors the switch condition of the clutch and signals when the set torque is exceeded.

Switching with	• potential free contacts • PLC-drive with 10–30 VDC
Controlling by	• coil current
Monitoring with	• magnetic field resistant proximity switches up to +100 °C (potential free contacts)
Temperature monitoring	• coil-clutch >+130 °C • control unit >+80 °C

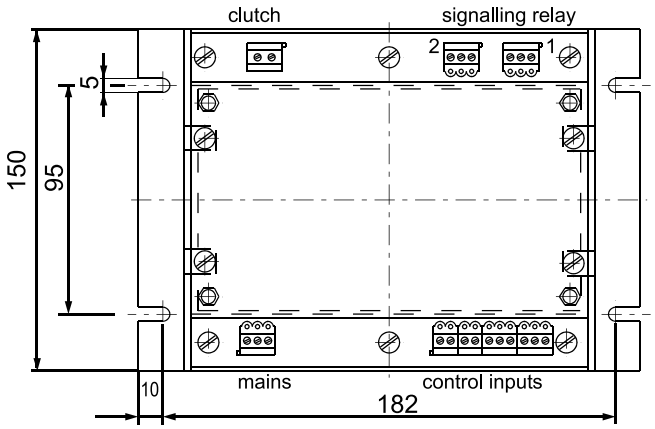
Electrical connections

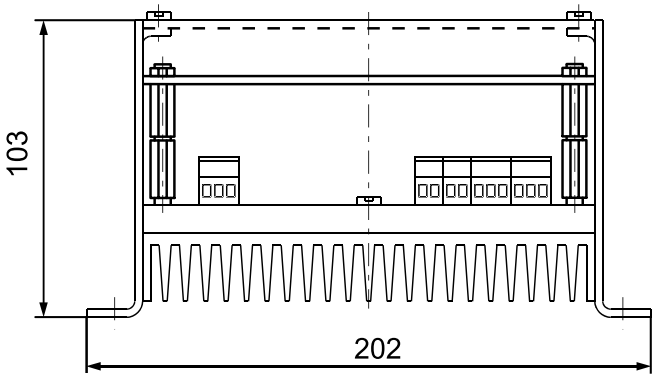
PE, L1, N	Connection input voltage
Ku1 / Ku2	Coil connection for clutch
14 – 11 – 12	Contact signalling relay 1 (overload)
24 – 21 – 22	Contact signalling relay 2 (over temperature)
ON	Connection „Start“ button
OFF	Connection „Stop“ button
Gnd1	(-) Connection with PLC-drive
End	Limit switch signal
Gnd2	(-) 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 of the coil thermistor (or bridge)

Functional sequence



Dimensions (mm)





Order example:

To be included when ordering, please state:	Size	Type
Order number:	X	0 1 0 . 0 00 . 2

EAS®-Sm/Zr sizes 0-5

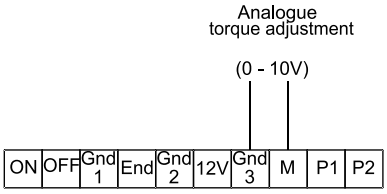
Installation / Connection examples

Please observe! Do not apply an external voltage to the 12 Volt terminal. Assure well conducting connections between the control unit housing and the metallic fastening areas. Use tooth lock or spring washers under the fixing screws.

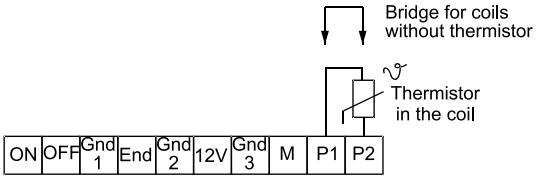
Trouble-free wiring!
Routing of control wiring (ON OFF / Gnd1 / End / Gnd2 / 12V / Gnd3 / M / P1 / P2) has to be separately and in sufficient distance from high-voltage current carrying or pulsating wires (PE / L1 / N / Ku1 / Ku2).

An ***EMC-corresponding installation*** is to be observed!

Analogue torque adjustment (observe coding!)

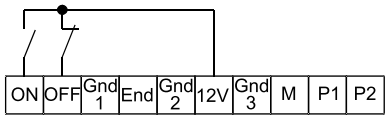


Connection example for thermistor or bridge



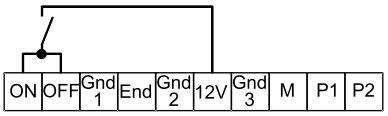
Start/Stop (2 – contacts)

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



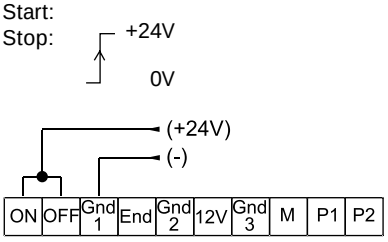
Start/Stop (1 – contact)

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



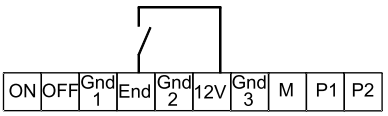
Start/Stop PLC – drive (PLC drive 10 – 30 Volt)

Start:
Stop:



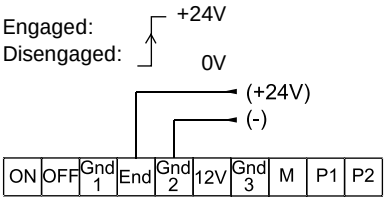
Limit switch (1 – contact)

Clutch engaged: contact closed
Clutch disengaged: contact open



Limit switch PLC – drive
(PLC drive 10–30 Volt)

Engaged:
Disengaged:

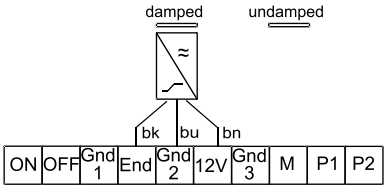


Limit switch PNP – normally closed contact

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

Attention: No overload signal, if the limit switch is fitted incorrectly.

Clutch engaged: transmitter undamped
Clutch disengaged: transmitter damped



Settings

Engaging time t_k (= overexcitation time)

The engaging time t_k is set to the max. time of 5 secs. (factory setting). The engaging time is determined by:

Mode 1 The engaging time is stopped, i.e. switching over from overexcitation to torque current when the clutch engages and the limit switch is actuated.

Mode 2 Switch over from overexcitation to torque current when the set time has passed (independent of the switch condition from the clutch).

Technical data

Input voltage	230 VAC, ±10 %, 50-60 Hz
Current consumption	max. 4 Amp./100 % DF
Open circuit power	< 4 Watt
$Coil_{NOM}$-voltage	96 VDC
$Coil_{NOM}$-power	max. 256 Watt
$Coil_{NOM}$-current	***factory setting accordingly*** 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)
Engaging time t_k	5 seconds ±30 %
Protection	IP 20
Ambient temperature	0 °C up to +50 °C
Storage temperature	-20 °C up to +70 °C
Conductor cross section	2,5 mm^2 / AWG 30-12
Weight	1,5 kg / 3,31 lb
Fuse protection	
Input side G-microfuse	F1/F2, (4 AMT, 5x20 mm)
Coil side G-microfuse	F3. The current is adapted to the mayr®-clutch size. Use always the same spare fuse.
Overvoltage category	II (two), EN 50178 - 04/1998
Overvoltage protection	**For the installation in overvoltage category III a suitable overvoltage protection is required between the input voltage and the EAS® Sm/Zr switch gear.**

Temperature monitoring of the control unit
A fitted temperature switching prevents the overheating of the control unit.

Switch-OFF	The coil voltage is switched-off with >80 °C working temperature.
New start	can only be made, when the unit temperature is below 40 °C.
Reset	Switching-ON and OFF of the input voltage.

Temperature monitoring of the clutch coil
The temperature monitoring of the coil can only be made with a fitted thermistor. The thermistor is connected to the terminals P1/P2.

Pre-warning	**with >+130 °C operational temperature** The coil voltage is not switched-off yet.
Switch-off	**with >+135 °C operational temperature** The coil voltage is switched-off.
New start	can only be made, when the coil temperature is below +120 °C.
Reset	by „start“ clutch is energised.

Short-circuit resistant coil connection
The coil voltage is switched off in case of a short circuit between Ku1 and Ku2. Reset of the short-circuit monitoring is made by switching-off the input voltage and removing the short circuit.

Attention! Earth shorts are not protected!
Connections Ku1 or Ku2 against earthed metal components cause shorts and therefore failures of the units. A residual current circuit breaker protection is required by the customer.

Limit switch Type 055.009.6 (contactless, magnetic field resistant)

Application

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

Function

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

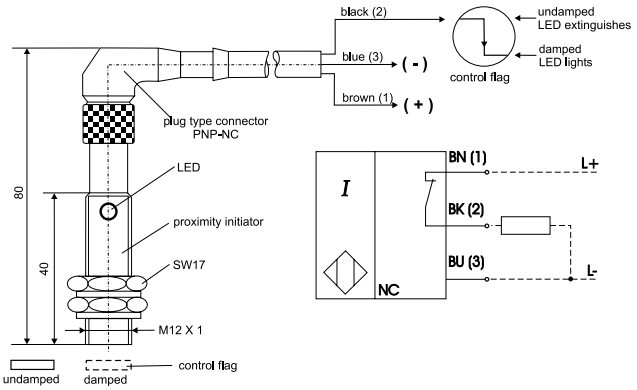
Electric connection

1	+	BN (brown
2	NC	BK (black)
3	–	BU (blue)
4		not connected

Technical data

Size	M12 X 1
Type	stainless steel, PTFE coated
Input voltage	10–30 VDC PELV
No-load current	≤20 mA
Operating current	200 mA
Switching frequency	max. 1000 Hz
Contact	PNP-NC, 3-wire sensor
Switching distance Sn	2 mm, flush mounted
Secured switching distance	1,6 mm
Repeatability	≤5 %
Characteristics	reverse polarity protected, short circuit proof, functional indicator
Connection	plug type 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 included when ordering, please state:	Type	Supply voltage
Order number:	055.009.6	10-30 VDC

Limit switch Type 055.000.5 (mechanical operation)

power transmission

Application

Monitoring of mechanical movements and final positions. Control switch for electronic and mechanical sequences. Measuring of axial disengaging movements, for example in connection with EAS®-clutches.

Function

The pre positioned contact is unloaded by actuating the control lever: Open contacts 11-14 (21-24), close 11-12 (21-22).

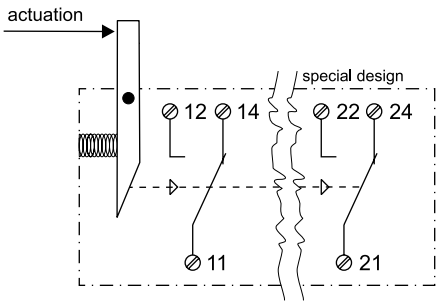
Design

The micro switch fitted into an aluminium die cast housing is actuated by a control lever. Operation is only possible in one direction. The limit switch is fastened with M4 cap screws via two screw-on brackets attached diagonally.

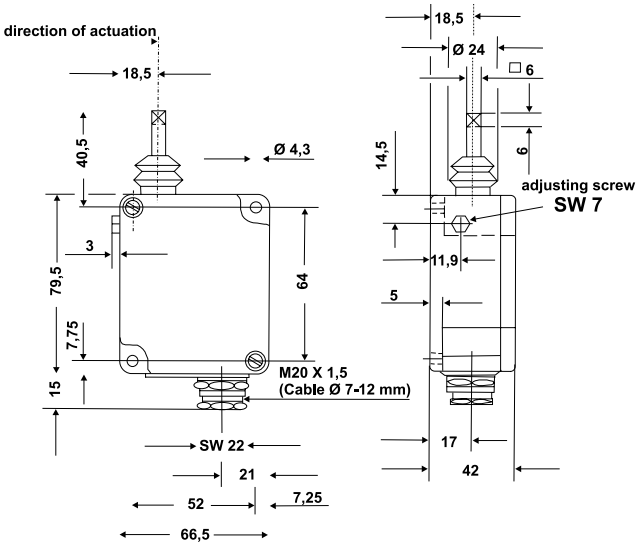
Technical data

Contact type	1 change-over contact (special design: 2 change-over 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
Switch travel setting	By the adjusting screw (SW 7) arranged laterally the zero shift is possible to right or left by max. 5 mm
Switch travel	Pre-travel min. 0,15 to 0,5 mm Over-travel: max. 10 mm, depending on the zero shift
Special types	On request different control lever lengths as well as a design with 2 change-over contacts are possible

Electrical connection



Dimensions (mm)



Order example:

To be included when ordering, please state:	Type
Order number:	055.000.5