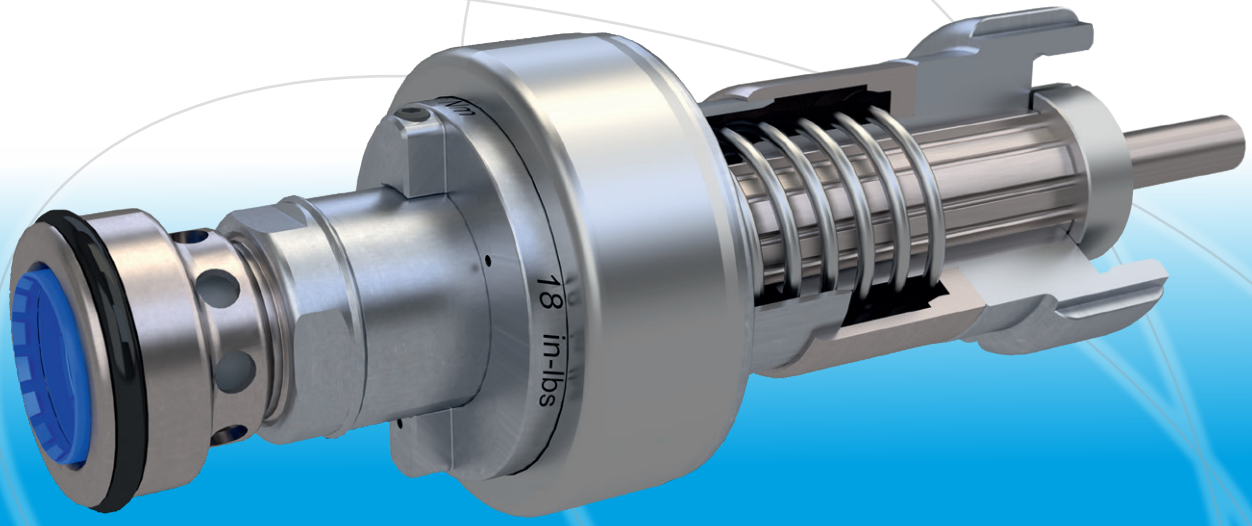
mayr®

your reliable partner



ROBA®-capping head

P.151000.V07.EN

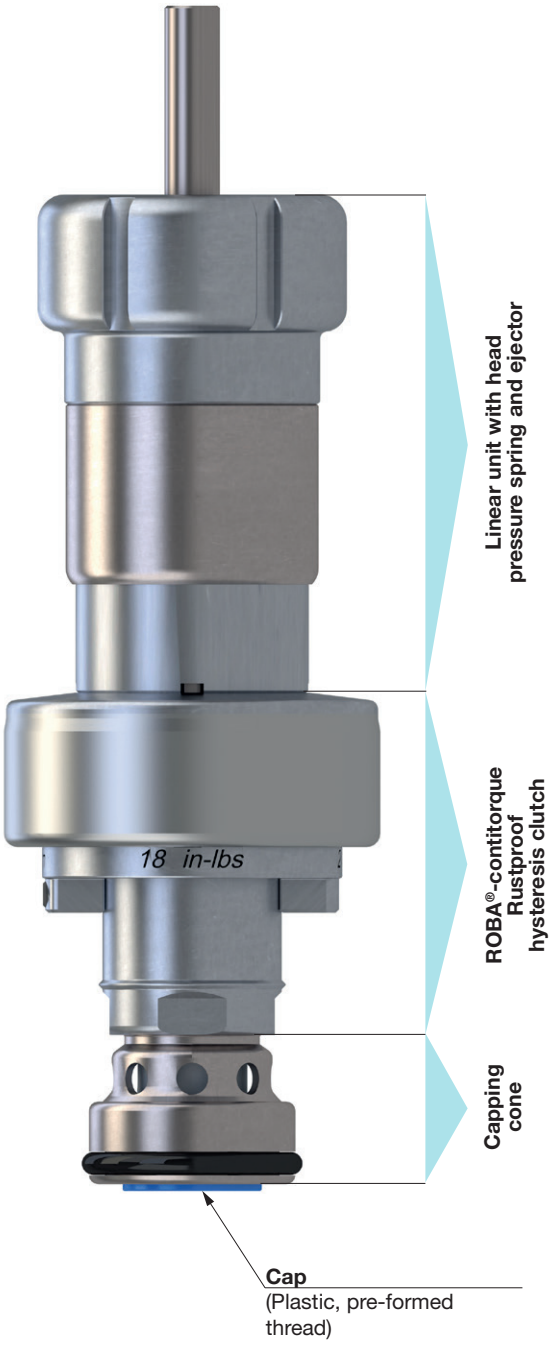
www.mayr®.com

ROBA®-capping head
Rustproof hysteresis-capping head

The perfect capping head for non-returnable and returnable PET bottles as well as for non-returnable glass bottles

Application of plastic caps (pre-formed thread) of all types with a defined torque for the:

- Food industry
- Pharmaceuticals industry
- Cosmetics industry
- Chemicals industry



Hysteresis clutches provide an extremely uniform and impact-free closing torque in comparison to permanent magnetic clutches. Therefore the hysteresis clutch provides a signficantly better application of the caps and moreover a longer system lifetime compared to the permanent magnetic clutches.

Advantages of the ROBA®-capping head hysteresis capping head:

- ***Maximum repetitive accuracy*** *of the closing torque through the hysteresis clutch*
- *Resistant to dirt and aggressive media due to rustproof,* ***enclosed construction***
- *Higher system lifetime through impact-free,* ***vibration-free hysteresis technology***
- ***Cones, the function of which has been tested,*** *available for all standard caps (for Pick&Place and Direct Pick-up)*
- *Simple* ***adjustment of the head pressure*** *possible*
- ***Maintenance-friendly construction:*** *Fast replacement of the capping head and capping head upper part*
- *Extremely* ***simple torque adjustment***
- ***Slim design*** *enables application in nearly all free-standing cappers or capper upper parts*
- ***Variable connection threads:*** *Suitable for all common drive spindles*
- ***Rustproof stainless steel design***
- ***Rustproof deep groove ball bearing*** *with food-grade lubricant*
- ***Hygienic design*** *(easy to clean)*
- ***Laser-engraved scale*** *for checking the set torque*

Function with synchronous operation

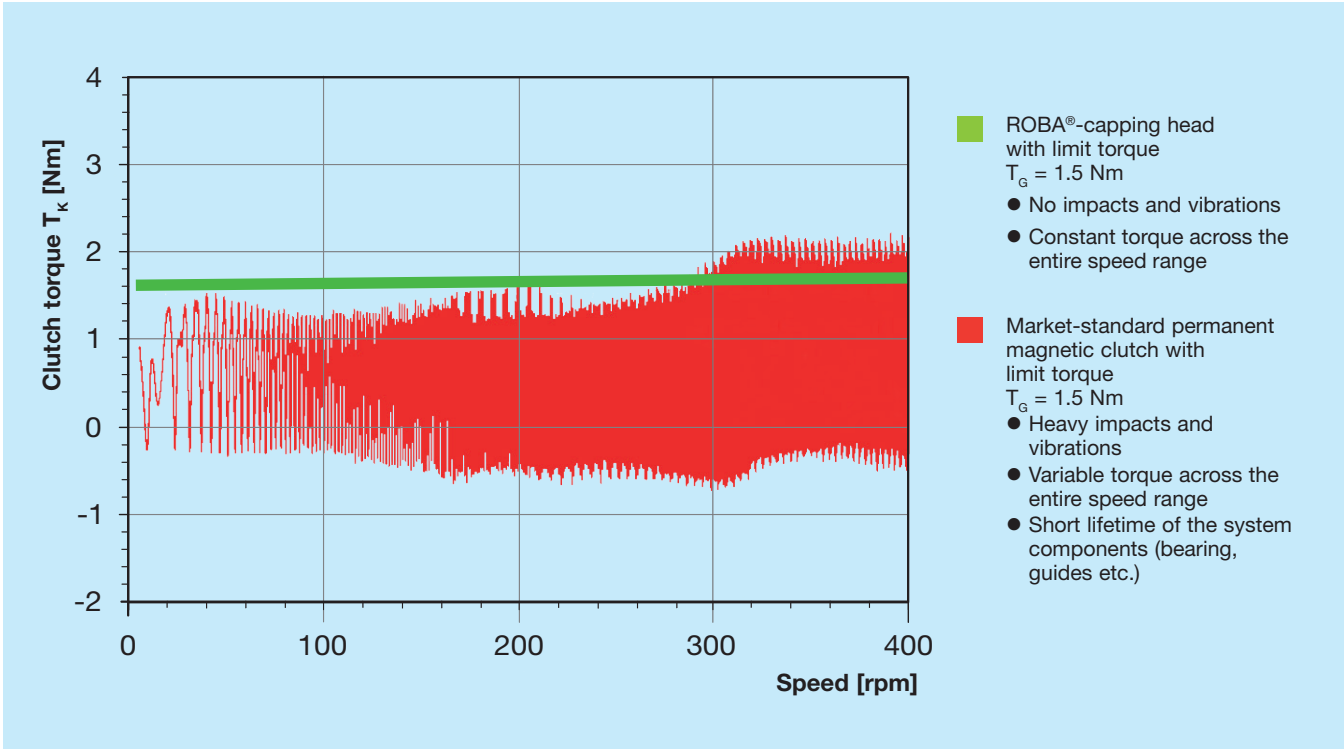
The ROBA®-capping head synchronously transmits the set torque from the machine spindle to the capping head.
In the process, the cap is screwed on to the container mouth – the end position of the container mouth is not yet reached. The torque is transmitted contactlessly via magnetic forces, which are generated by permanent magnets and which magnetise hysteresis material.
The machine spindle and the cap have the same torque.

Function with slipping operation

When the cap reaches its end position on the container mouth, then the hysteresis clutch slips. The cap is decelerated to a standstill and screwed onto the container mouth with a constant torque. In slipping operation, the machine spindle still rotates at a constant speed. The difference between the speed of the machine spindle and the speed of the cap is the so-called slip speed n_s.
In slipping operation, the hysteresis material is continuously remagnetised, the clutch heats up. The torque is transmitted asynchronously.
Even in case of slipping operation, the hysteresis clutch torque T_K remains consistently at the level of the set limit torque T_g.
When the container is tightly closed, the ROBA®-capping head lifts off the cap. The capping cone and the inner section of the hysteresis clutch are accelerated to the speed of the machine spindle again, the slip speed n_s returns to the value 0. The torque is transmitted synchronously again.

Contactless hysteresis technology

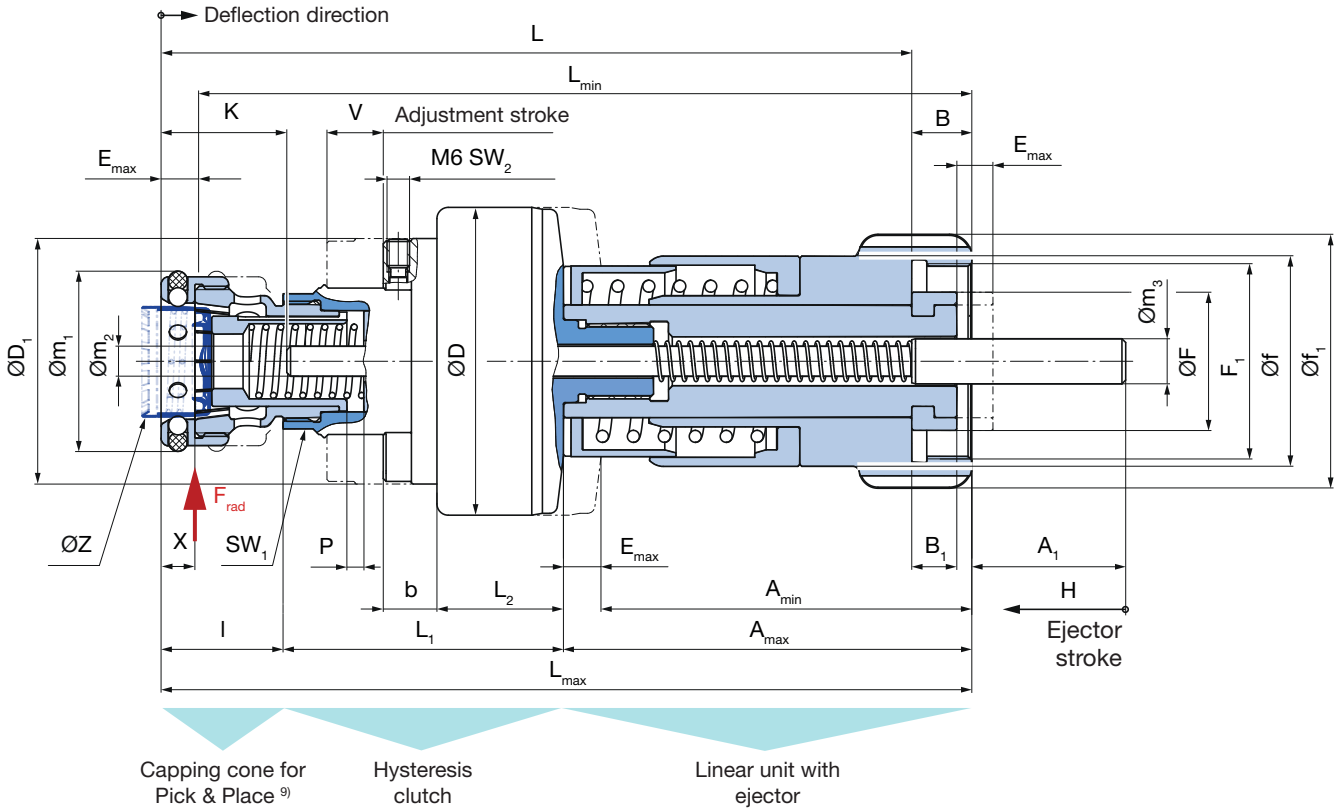
With the ROBA®-capping head, hysteresis technology ensures a contactless and therefore wear-free torque transmission. Furthermore, it is impact-free and vibration-free and therefore guarantees a higher system lifetime.
In addition, the capping heads are characterised through a high torque repetitive accuracy.
With its constant and impact-free closing torque, it is therefore the first choice for the application of screw caps made from plastic with pre-formed threads.
In this case, they are more suitable than permanent magnetic clutches with pulsating torques in slipping operation, which in part “hammer down” the scew caps so that they are often later difficult to open.
With the ROBA®-capping head hysteresis capping head, the limit torque can be easily and steplessly adjusted and can be directly read off via a laser-engraved scale. In addition, the closed construction makes the capping heads resistant to dirt and aggressive media. Furthermore, a simple, customer-specific adjustment of the head pressure is possible.



Torque-speed characteristic curve of a market-standard permanent magnetic clutch and a hysteresis clutch in slipping operation.

ROBA®-capping head

Type 111_.0_000
Sizes 3, 4



Order Number

__ / 1	1	1 __ . 0 __	0	0	0

Size	Torque range 6)		Head pressure 7)	
3	Entire torque range 5) (Size 3 or 4)	3	0	low
4			1	medium
	Medium torque range 5) (Only size 3)	4	2	high

Example: Order number 3 / 1114.01000 (torque range 1 - 2 Nm, head pressure 123 - 174 N)

1) Request the tolerance values for the maximum deviation of the set limit torque T_g from the scale value from mayr® power transmission. Repetitive accuracy of the torque ±2 %
2) Results in the maximum surface temperature of approx. 100 °C for machine spindle speed n = 200 rpm)
3) Application temperature in the range 0 – 45 °C
4) The maximum permitted speed in slipping operation must be calculated via the thermal design (see page 10).
5) Further torque ranges available on request
6) See table "Technical Data" for hysteresis clutch limit torques
7) See table "Technical Data" for head pressure
8) Capping cones for further cap types available on request
9) Capping cones for Direct Pick-up available on request
10) With regard to the nominal bearing lifetime L_{10h} = 12000 h; Point of application of F_{wheel} = Centre of capping cone (dimension X) and n = 350 rpm
11) Other connection threads available on request

Technical Data				Size		
				3		4
Type				1114.0_000	1113.0_000	1113.0_000
Limit torques [1] **of the hysteresis clutch**		$T_{g\,min}$	[Nm]	1	0.5	0.5
		$T_{g\,max}$	[Nm]	2	3	6
		$T_{g\,min}$	[in-lbs]	9	5	5
		$T_{g\,max}$	[in-lbs]	18	27	53
Permitted power loss [2] **at application temperature** [3] **[°C]**	0 - 25 °C	$P_{V,\,perm.}$	[W]	24	26	34
	26 - 35 °C			20	22	29
	36 - 45 °C			16.5	18	23.5
Maximum permitted mechanical speed [4]		n_{max}	[rpm]	450		
Permitted bearing load [10]	**Radial**	F_{rad}	[N]	159	214	238
	Axial	F_{ax}	[N]	300	300	300
Head pressure	**Type 111_._0_ _**		[N]	63 - 83		
	Type 111_._1_ _			123 - 174		
	Type 111_._2_ _			190 - 265		
Maximum permitted deflection of the linear unit	**Type 111_._0_ _**	E_{max}	[mm]	12.5		
	Type 111_._1_ _			12.5		
	Type 111_._2_ _			7.5		
Ejector stroke		H	[mm]	35 - 40		

Mass moments of inertia and weights			Sizes		
			3		4
Type			1114.0_000	1113.0_000	1113.0_000
Capping cone	J_V	[10^{-3} kgm²]	0.056		
Inner part (hysteresis clutch)	J_i	[10^{-3} kgm²]	0.447	0.541	1.724
Outer part (hysteresis clutch)	J_a	[10^{-3} kgm²]	0.653	0.779	2.375
Linear unit + ejector	J_L	[10^{-3} kgm²]	0.743		
Total	J_{ges}	[10^{-3} kgm²]	1.899	2.119	4.898
Weight		[kg]	3.24	3.51	5.15

Dimensions [mm]	Sizes		
	3		4
Type	1114.0_000	1113.0_000	1113.0_000
A_{min}	108.8 - E_{max}		
A_{max}	108.8		
A_1	Machine-specific		
b	14.3	14.6	12.8
B	16		
B_1	12		
E_{max}	see Technical Data		
D	82	82	104
D_1	65.4	65.4	83.4
f	56		
f_1	68		
F	36.8		
F_1 [11]	M52 x 1.5		
K	Machine-specific		
I	32.5		
L	200	218.8	233

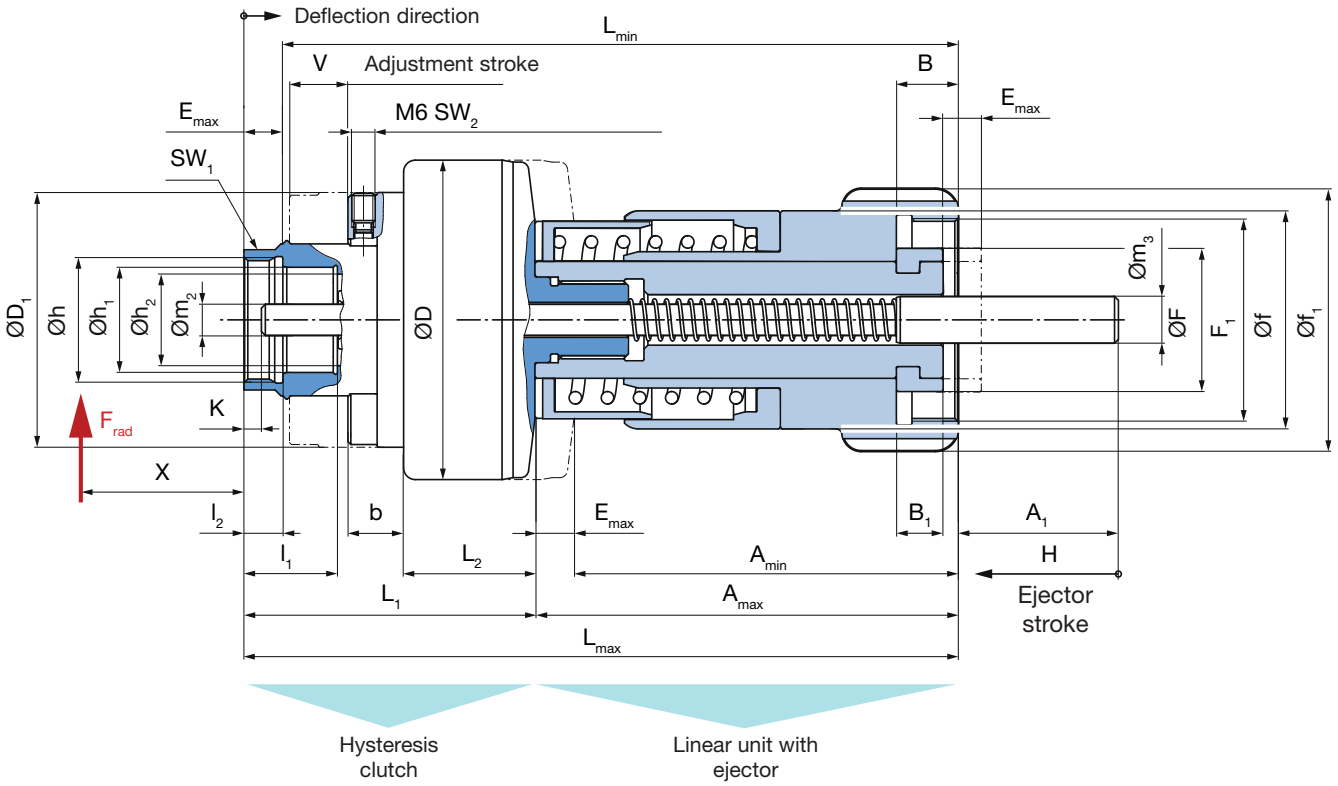
Dimensions [mm]	Sizes		
	3		4
Type	1114.0_000	1113.0_000	1113.0_000
L_{min}	216 - E_{max}	234.8 - E_{max}	249 - E_{max}
L_{max}	216	234.8	249
L_1	74.7	93.5	107.7
L_2	33.7	40.4	48.2
m_1	48		
m_2	8		
m_3	12		
SW_1	36	36	41
SW_2	3		
V	0 – 15	0 - 25.5	0 - 35
H	35 - 40		
P	4.5		
Z [8]	Cap type: Euro-Lok 28 mm		
X	8.75		

We reserve the right to make dimensional and constructional alterations.

Further sizes for smaller and larger torques on request.

ROBA®-capping head

Type 111_.0_240
Sizes 3, 4



Order number

__ / 1 1 1 __ . 0 __ 2 4 0		
Size	**Torque range** [6]	**Head pressure** [7]
3	Entire torque range [5] (Size 3 or 4) — 3	0 low
4	Medium torque range [5] (Only size 3) — 4	1 medium
		2 high

Example: Order number 3 / 1113.02240 (torque range 0.5 - 3 Nm, head pressure 190 - 265 N)

1) Request the tolerance values for the maximum deviation of the set limit torque T_g from the scale value from mayr® power transmision. Repetitive accuracy of the torque ±2 %.
2) Results in a maximum surface temperature of approx. 100 °C at machine spindle speed n = 200 rpm
3) Application temperature in the range 0 – 45 °C
4) The maximum permitted speed in slipping operation must be calculated via the thermal design (see page 10).
5) Further torque ranges available on request
6) See table "Technical Data" for the hysteresis clutch limit torques
7) See table "Technical Data" head pressure
8) With regard to the nominal bearing liftime L_{10h} = 12000 h; Point of application of F_{wheel} = see dimension X and n = 350 rpm
9) Other connection threads available on request

Technical Data				Size		
				3		4
Type				1114.0_240	1113.0_240	1113.0_240
Limit torques [1] of the hysteresis clutch		$T_{g\ min}$	[Nm]	1	0.5	0.5
		$T_{g\ max}$	[Nm]	2	3	6
		$T_{g\ min}$	[in-lbs]	9	5	5
		$T_{g\ max}$	[in-lbs]	18	27	53
Permitted power loss [2] at application temperature [3] [°C]	0 - 25 °C	$P_{V,\ perm.}$	[W]	24	26	34
	26 - 35 °C			20	22	29
	36 - 45 °C			16.5	18	23.5
Maximum permitted mechanical speed [4]		n_{max}	[rpm]	450		
Permitted bearing load [8]	radial	F_{rad}	[N]	159	214	238
	axial	F_{ax}	[N]	300	300	300
Head pressure	Type 111_._0_ _		[N]	63 - 83		
	Type 111_._1_ _			123 - 174		
	Type 111_._2_ _			190 - 265		
Maximum permissible deflection of the linear unit	Type 111_._0_ _	E_{max}	[mm]	12.5		
	Type 111_._1_ _			12.5		
	Type 111_._2_ _			7.5		
Ejector stroke		H	[mm]	35 - 40		

Mass moments of inertia and weights			Sizes		
			3		4
Type			1114.0_240	1113.0_240	1113.0_240
Inner part (hysteresis clutch)	J_i	[10^{-3} kgm²]	0.447	0.541	1.724
Outer part (hysteresis clutch)	J_a	[10^{-3} kgm²]	0.653	0.779	2.375
Linear unit + ejector	J_L	[10^{-3} kgm²]		0.743	
Total	J_{ges}	[10^{-3} kgm²]	1.843	2.063	4.842
Weight		[kg]	3.04	3.31	4.95

Dimensions [mm]	Sizes		
	3		4
Type	1114.0_240	1113.0_240	1113.0_240
A_{min}	108.8 - E_{max}		
A_{max}	108.8		
A_1	Machine-specific		
b	14.3	14.6	12.8
B	16		
B_1	12		
E_{max}	see Technical Data		
D	82	82	104
D_1	65.4	65.4	83.4
f	56		
f_1	68		
F	36.8		
F_1 [9]	M52 x 1.5		
h	M32 x 1.5		
h_1	27		
h_2	23.5		
K	Machine-specific		

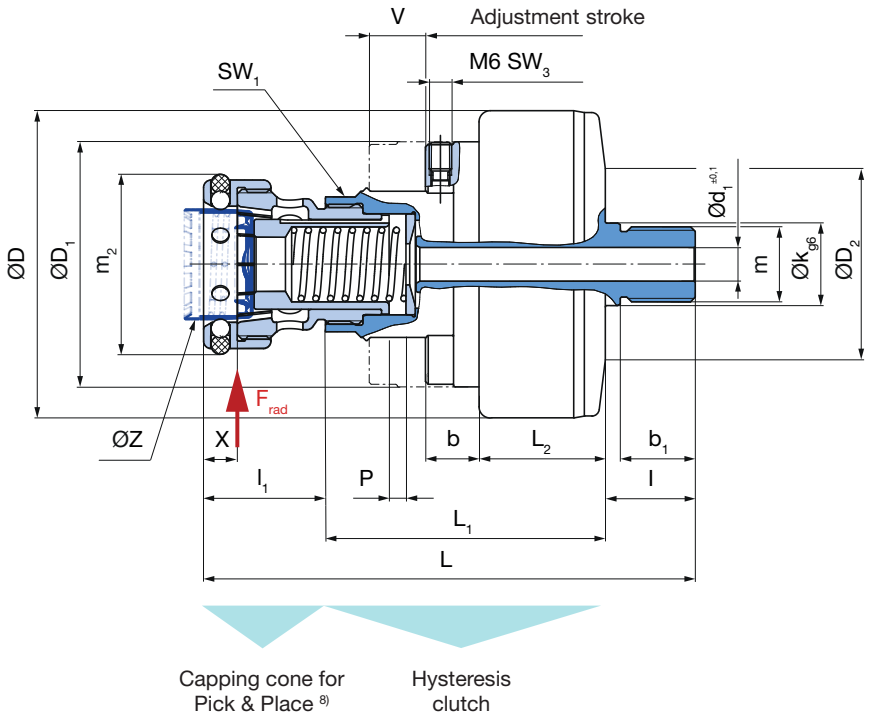
Dimensions [mm]	Sizes		
	3		4
Type	1114.0_240	1113.0_240	1113.0_240
I_1	24		
I_2	10		
L_{min}	183.5 - E_{max}	202.3 - E_{max}	216.5 - E_{max}
L_{max}	183.5	202.3	216.5
L_1	74.7	93.5	107.7
L_2	33.7	40.4	48.2
m_2	8		
m_3	12		
SW_1	36	36	41
SW_2	3		
V	0 – 15	0 - 25.5	0 - 35
H	35 - 40		
X	23.75		

We reserve the right to make dimensional and constructional alterations.

Further sizes for smaller and larger torques available on request.

ROBA®-capping head

Type 111_.44002
Sizes 3, 4



Order number

__ / 1 1 1 __ . 4 4 0 0 2			
▲		▲	
Size 3 4	**Torque range** [6] Entire torque range [5] (Size 3 or 4) Medium torque range [5] (Only size 3)	 3 4	

Example: Order number 3 / 1113.44002 (torque range 0.5 - 6 Nm)

1) Request the tolerance values for the maximum deviation of the set limit torque T_g from the scale value from mayr® power transmission. Repetitive accuracy of the torque ±2 %.
2) Results in a surface temperature of approx. 100 °C at machine spindle speed n = 200 rpm
3) Application temperature in the range 0 – 45 °C
4) The maximum permitted speed in slipping operation must be calculated via the thermal design (see page 10).
5) Further torque ranges available on request
6) See table "Technical Data" for the hysteresis clutch limit torque
7) Capping cones for further cap types available on request
8) Capping cones for Direct Pick-up available on request
9) With regard to the nominal bearing lifetime L_{10h} = 12000 h point of application of F_{wheel} = Centre capping cone (dimension X) and n = 350 rpm

Technical Data				Size		
				3		4
Type				1114.44002	1113.44002	1113.44002
Limit torques [1] of the hysteresis clutch		$T_{g\,min}$	[Nm]	1	0.5	0.5
		$T_{g\,max}$	[Nm]	2	3	6
		$T_{g\,min}$	[in-lbs]	9	5	5
		$T_{g\,max}$	[in-lbs]	18	27	53
Permitted power loss [2] at application temperature [3] [°C]	0 - 25 °C	$P_{V,\,perm.}$	[W]	24	26	34
	26 - 35 °C			20	22	29
	36 - 45 °C			16.5	18	23.5
Maximum permitted mechanical speed [4]		n_{max}	[rpm]	450		
Permitted bearing load [9]	radial	F_{rad}	[N]	159	214	238
	axial	F_{ax}	[N]	300	300	300

Mass moments of inertia and weights			Sizes		
			3		4
Type			1114.44002	1113.44002	1113.44002
Capping cone	J_V	[10^{-3} kgm²]	0.056		
Inner part (hysteresis clutch)	J_i	[10^{-3} kgm²]	0.447	0.541	1.724
Outer part (hysteresis clutch)	J_a	[10^{-3} kgm²]	0.653	0.779	2.375
Total	J_{ges}	[10^{-3} kgm²]	1.156	1.376	4.155
Weight		[kg]	1.63	1.9	3.54

Dimensions [mm]	Sizes		
	3		4
Type	1114.44002	1113.44002	1113.44002
b	14.3	14.6	12.8
b_1	20		
$d_1^{\pm 0.1}$	9		
D	82	82	104
D_1	65.4	65.4	83.4
k_{g6}	22		
l	24		
l_1	32.5		
L	131.2	150	164.2
L_1	74.7	93.5	107.7
L_2	33.7	40.4	48.2
m	M20 x 1.5		
m_2	48		
SW_1	36	36	41
SW_2	3		
V	0 – 15	0 - 25.5	0 - 35
P	4.5		
Z [7]	Cap type: Euro-Lok 28 mm		
X	8.75		

We reserve the right to make dimensional and constructional alterations.

Further sizes for smaller and larger torques available on request.

Thermal design of the ROBA®-capping head

The hysteresis clutch of the ROBA®-capping head slips after the cap has been screwed to its end position on the container mouth. The input and output sides move with relative speed in relation to one another, the so-called slip speed. The hysteresis material is constantly magnetised and demagnetised by the magnetic field of the permanent magnets. In the process, a power loss occurs which must be dissipated into the surroundings through convection and heat radiation. Depending on the application, the housing of the ROBA®-capping head can reach a temperature of 100 °C.
Otherwise the hysteresis clutch would overheat to an unpermitted extent and the magnetic material would be damaged. The power loss in continuous slipping operation depends on the set torque and the slip speed. If the hysteresis clutch is used e.g. with an assembly cycle and only slips a certain part of the complete cycle duration, then the calculated power loss can be reduced in contrast to the continuous slipping operation by means of the reduction factor V.

Calculation

$$P_V = \frac{T \times n_S}{9.55} \times V \leq P_{V,\,perm.}$$

$$V = \frac{t_s}{t_{cycle}} \quad \text{and } t_s \text{ [1)]}$$

t_s:
- ≤ 150 s for Size 3/1114._ _ _ _ _
- ≤ 120 s for Size 3/1113._ _ _ _ _
- ≤ 100 s for Size 4/1113._ _ _ _ _

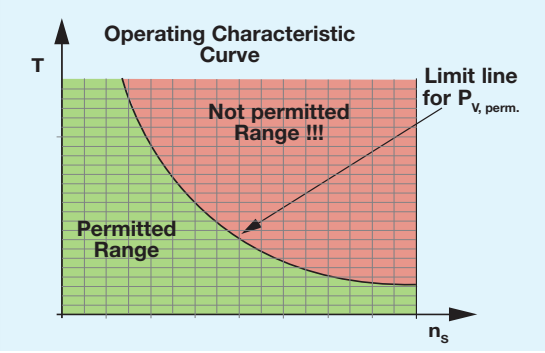
The following applied for continuous slipping operation:
V = 1

P_V	=	Loss of power of the hysteresis clutch [W]
$P_{V,\,perm.}$	=	Permitted power loss of the hysteresis clutch [W]
T	=	Torque of the hysteresis clutch [Nm]
n_S	=	Slip speed [rpm]
V	=	Reduction factor [-]
t_S	=	Slipping period [s]
t_{cycle}	=	Cycle period [s]

[1)] Valid for a maximum limit torque for Type 1114.____ / 1113._____ and slip speed n_s = 450 min^{-1} .

For other torques and slip speeds, please request the values of the slipping period t_s from *mayr*® power transmissions.

The following diagram shows the operating characteristic curve of the hysteresis clutch of the ROBA®-capping head.



The green range below the limit line of $P_{V,\,perm.}$ shows the permitted range in which the hysteresis clutch will not overheat.
If the operating point lies in the red range, above the limit line, the hysteresis clutch will overheat to an unpermitted extent and could be destroyed.

Design example

Screwing on plastic caps in cycle operation

Given:

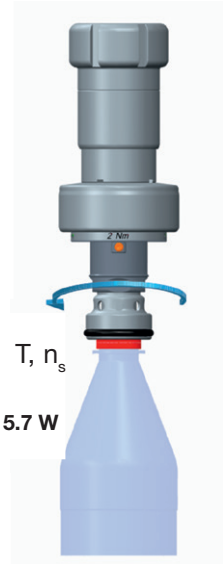
T	=	2.5 Nm	Screw-on torque plastic cap
n_S	=	300 rpm	Screw-on speed = slip speed
t_S	=	2 s	Slipping period
t_{cycle}	=	10 s	Cycle period
		40 °C	Operating temperature

Required:

P_V	=	???	Hysteresis clutch power loss

$$V = \frac{t_s}{t_{cycle}} = \frac{2\ s}{10\ s} = 0.2$$

$$P_V = \frac{T \times n_S}{9.55} \times V = \frac{2.5\ Nm \times 300\ rpm \times 0.2}{9.55} = 15.7\ W$$

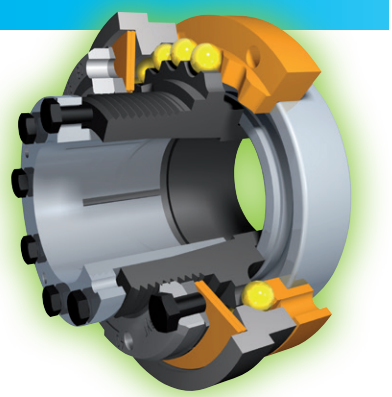


Selected:

=> ROBA®-capping head, Size 3, Type 1113._ _ _ _ _
with T_g = 0.5 - 3 Nm and
$P_{V,\,perm.}$ = 18 W > P_V = 15.7 W

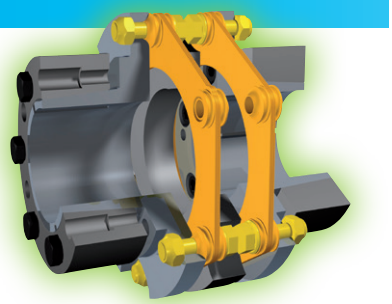
Product Summary

Safety Clutches/Overload Clutches



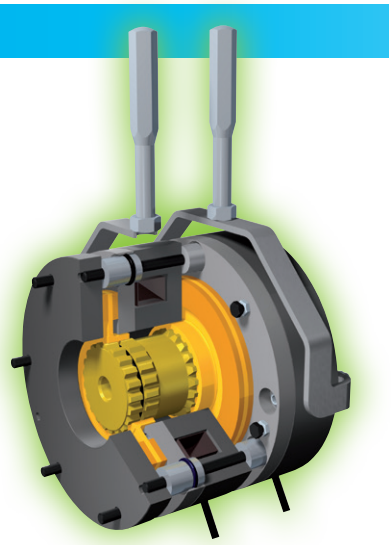
- **EAS®-Compact®/EAS®-NC**
  Positive locking and completely backlash-free torque limiting clutches
- **EAS®-smartic®**
  Cost-effective torque limiting clutches, quick installation
- **EAS®-element clutch/EAS®-elements**
  Load-disconnecting protection against high torques
- **EAS®-axial**
  Exact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

Shaft Couplings



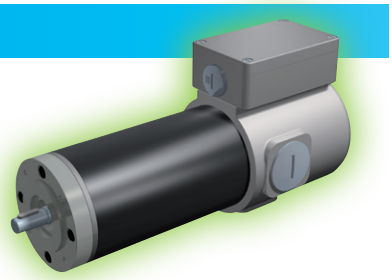
- **smartflex®/primeflex®**
  Perfect precision couplings for servo and stepping motors
- **ROBA®-ES**
  Backlash-free and damping for vibration-sensitive drives
- **ROBA®-DS/ROBA®-D**
  Backlash-free, torsionally rigid all-steel couplings
- **ROBA®-DSM**
  Cost-effective torque-measuring couplings

Electromagnetic Brakes/Clutches



- **ROBA-stop® standard**
  Multifunctional all-round safety brakes
- **ROBA-stop®-M motor brakes**
  Robust, cost-effective motor brakes
- **ROBA-stop®-S**
  Water-proof, robust monoblock brakes
- **ROBA-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
- **ROBA®-guidestop**
  Backlash-free holding brake for profiled rail guides
- **ROBATIC®/ROBA®-quick/ROBA®-takt**
  Electromagnetic clutches and brakes, clutch brake units

DC Drives



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

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