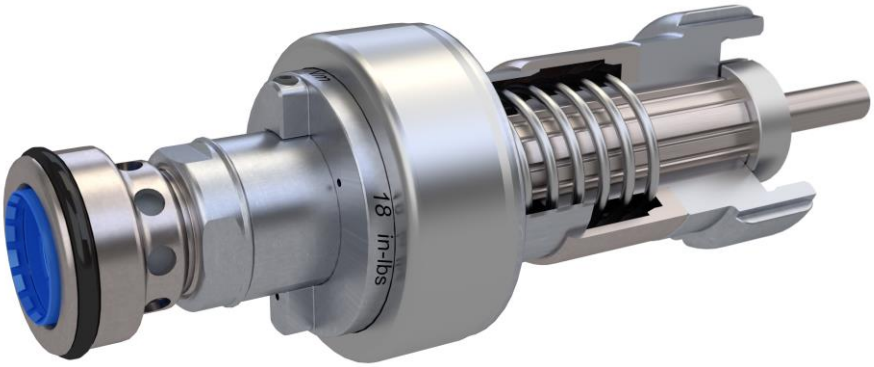
your reliable partner

Hysteresis capping head

ROBA®-capping head
Type 111_._ _ _ _ _
Sizes 3 and 4

Issue status 2017-02



Translation of the Original Operational Instructions
B.151000.EN

Contents

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Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these instructions may lead to malfunctions or to ROBA®-capping head failure, resulting in damage to other parts. These Operational Instructions are part of the capping head delivery.
Please keep them handy and near to the capping head at all times.

1 Safety Regulations

1.1 Safety and Guideline Signs

DANGER

Immediate and impending danger, which can lead to severe physical injuries or to death.

CAUTION

Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

DANGER

Danger of injury to people, in particular due to hot surfaces.

DANGER

Danger for people with heart pacemakers.

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1.2 Safety Regulations

Safety Regulations

These Operational Instructions are part of the capping head delivery.
Please keep them handy and near to the ROBA®-capping head head at all times.

It is forbidden to start initial operation of the product until you have ensured that all applicable EU directives and directives for the machine or system, into which the product has been installed, have been fulfilled.
At the time these Installation and Operational Instructions go to print, the ROBA®-capping head accord with the known technical specifications and are operationally safe at the time of delivery.
Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion. This statement is based on the ATEX directive.

DANGER

- ❒ The ROBA®-capping head is modified.
- ❒ The relevant standards for safety and / or installation conditions are ignored.

User-implemented Protective Measures

- ❒ Cover all moving parts to protect against seizure, dust or foreign body impact.
- ❒ The hysteresis clutch of the ROBA®-capping head heats up during slipping operation.
  Do not touch the hysteresis clutch housing, → otherwise there is a danger of burns!
- ❒ The hysteresis clutch of the ROBA®-capping head works using strong magnetic fields which can disturb or destroy electronic or mechanical devices. This is particularly the case for heart pacemakers. Data saved on credit cards, hard drives or disks can be deleted by the magnetic fields.
  In order to prevent such occurrences, please keep to the safety distance of more than 0.2 metres away from the hysteresis clutch of the ROBA®-capping head.
- ❒ The ROBA®-capping head must not be subjected to impact stresses, as the magnets break into slivers and can injure people.
- ❒ The ROBA®-capping head must not come into contact with metal chips.
- ❒ If work with metal parts is carried out close to the ROBA®-capping head, please be extremely careful, as the strong magnetic surface on the outer diameter of the magnetic part (Item 2 / Fig 22, section**20**) of the hysteresis clutch attracts metal parts. This can lead to personal injury and damage to the hysteresis clutch of the ROBA®-capping head through crushing.
- ❒ During installation or de-installation of the capping cone, the linear unit, the ejector and the thread plug proceed with utmost caution as pre-tensioned springs are installed in these units. Uncontrolled release of spring energy can lead to crush or concussion injuries to persons or material damage.
- ❒ The hysteresis clutch of the ROBA®-capping head may not be dismantled into its individual parts because due to the strong magnetic fields, ROBA®-capping head components or other elements may be pulled towards the magnet, causing crush injuries.
- ❒ Do not damage or make dirty the cylindrical fitting surface of the hysteresis clutch of the ROBA®-capping head on the hub
  (Item 1 / Fig. 21, section**20**), as this will reduce the running smoothness or cause the torque adjustment to fail.
- ❒ Before works on the ROBA®-capping head and the capping machine the capping machine must be switched off and secured against accidental switch-on

To prevent injury or damage, only professionals and specialists should work on the devices, following the relevant standards and directives. Please read the Installation and Operational Instructions carefully prior to installation and initial operation of the device.

These Safety Regulations are user hints only and may not be complete!

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2 Sectional views

2.1 Types 111_._ _0_ _ with capping cone for Pick&Place (P&P) (with ejector system)

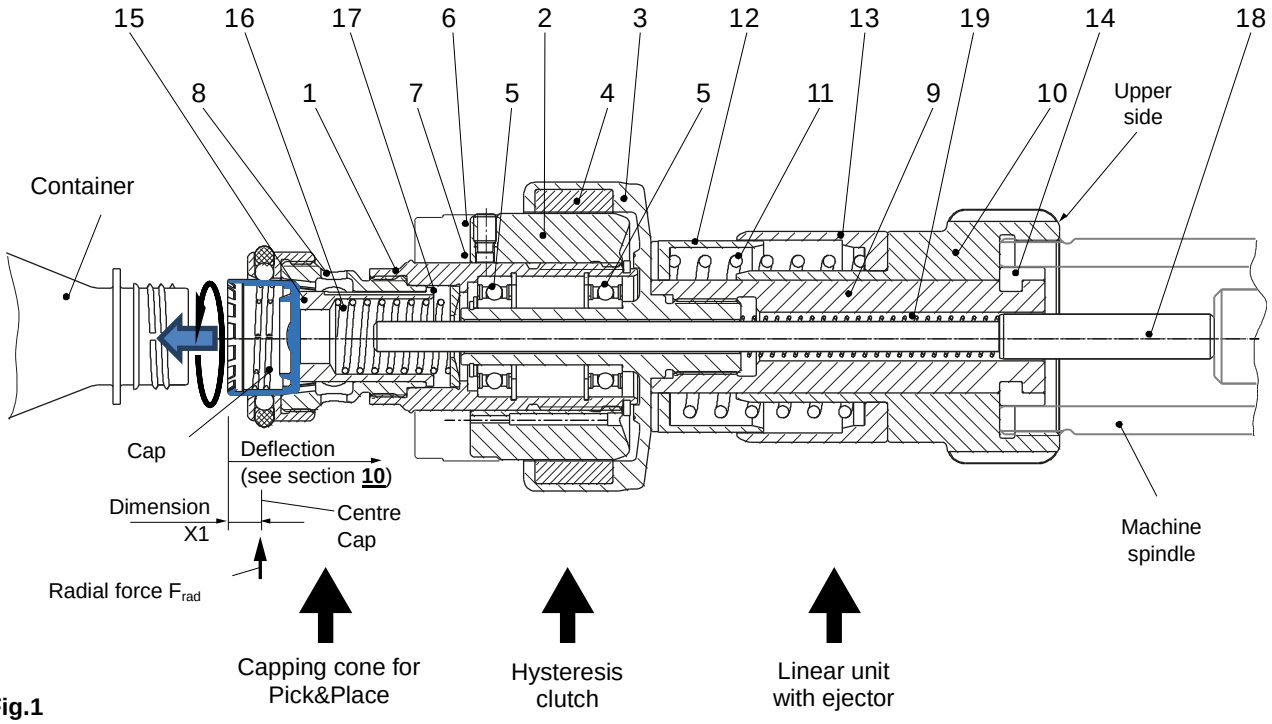

Fig.1

2.2 Types 111_._ _1_ _ with capping cone for Direct Pickup (without ejector system)

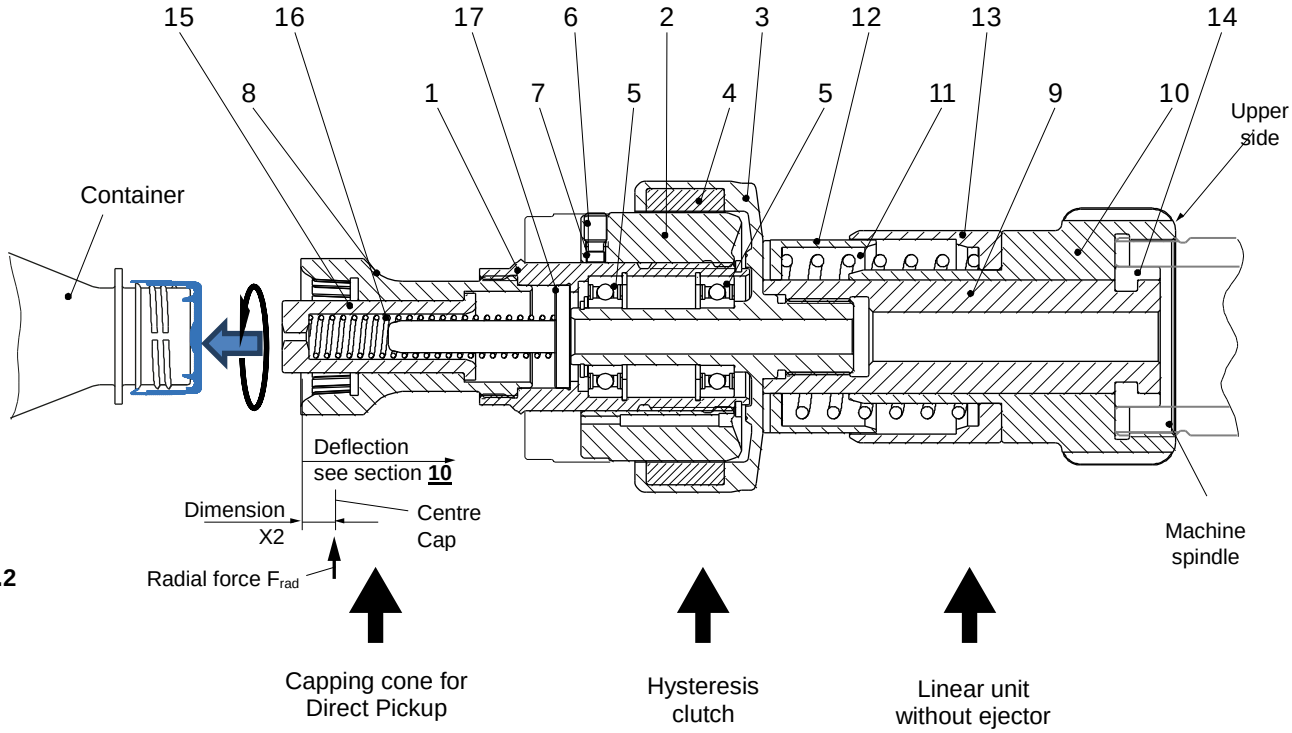

Fig.2

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3 Design

The ROBA®-capping head is composed of three assemblies.

3.1 Capping cone for Pick & Place (P&P) or Direct Pickup

The capping cone (8) is screwed into the hub (1) of the hysteresis clutch and presses the plunger (15) together with the plunger spring (16) and plunger disc (17) against the hub (1) of the hysteresis clutch.

3.2 Hysteresis clutch

The hysteresis clutch input side consists of a flange (3) with hysteresis material (4).
The hysteresis clutch output side consists of a magnetic part with permanent magnets (2) and a hub (1).
The magnetic part (2) is screwed onto the hub (1) and secured using the cup point socket set screw (6) and the plug (7) against rotation.
The input and output sides of the hysteresis clutch are connected rotatably using the roller bearings (5).

3.3 Linear unit with or without ejector

The linear unit is composed of a drive shaft (9), drive hub (10), head pressure spring (11), bushing 1 (12), bushing 2 (13). Split bushing (14), ejector rod (18) and ejector spring (19). When using a capping cone for Direct Pickup, ejector rod (18) and ejector spring (19) are omitted. The drive shaft (9) is screwed onto the threaded pin of the hysteresis clutch. Bushing 1 (12), head pressure spring (11), bushing 2 (13) and drive hub (10) are inserted into the drive shaft (9).
The head pressure (11) is pre-tensioned, the two halves of the split bushing (14) are inserted into the drive shaft (9), they serve as an axial stop for the drive hub (10) and ensure as a result the pre-tensioning of the head pressure spring (11).
The ejector rod (18) is inserted together with the ejector spring (19) into the bore of the drive shaft (9) (omitted for the capping cone for Direct Pickup).
The drive hub (10) is screwed with the machine spindle.
The bore in the machine spindle serves as a guide for the two-part split bushing (14) and prevents them from moving radially outwards.

4 Capping principle

4.1 Pick&Place (P&P)

The capping head receives the cap in its cone in the pick station of the capping machine.
The cap is already located in the cone and not on the container finish before unscrewing (section **2.1**).

4.2 Direct Pickup

The cap is already fed directly at the transfer point of the capping machine of the container finish.
The term direct towing is also used.
No cap is located in the cone before unscrewing (section **2.2**).

5 Types of capping cones

5.1 for Pick&Place (P&P)

The capping cone for Pick&Place has a multitude of radially spring-loaded balls which hold the cap after picking.
The sprung plunger is sunk into the cone and after picking aligns the cap horizontally to the axis of rotation of the capping head.

5.2 for Direct Pickup

The capping cone for Direct Pickup has no radially spring-loaded balls.
The sprung plunger protrudes from the cone during Direct Pickup, presses on the upper side of the cap before unscrewing and brings it into the correct position.

6 Parts List

(Only use *mayr*® original parts)

Item	Name
1	Hub
2	Magnetic part with permanent magnets
3	Flange
4	Hysteresis material
5	Roller bearing
6	Clamping screw
7	Plug
8	Capping cone for Pick&Place or Direct Pickup
9	Drive shaft
10	Drive hub
11	Head pressure spring
12	Bushing 1
13	Bushing 2
14	Split bushing (two-part)
15	Plunger for Pick&Place or Direct Pickup
16	Plunger spring for Pick&Place or Direct Pickup
17	Plunger disc for Pick&Place or Direct Pickup
18	Ejector rod (omitted for capping cone for Direct Pickup)
19	Ejector spring (omitted for capping cone for Direct Pickup)

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7 Summary of Constructional Designs

7.1 Types 111_._ _0_0 and 111_._ _1_ 0

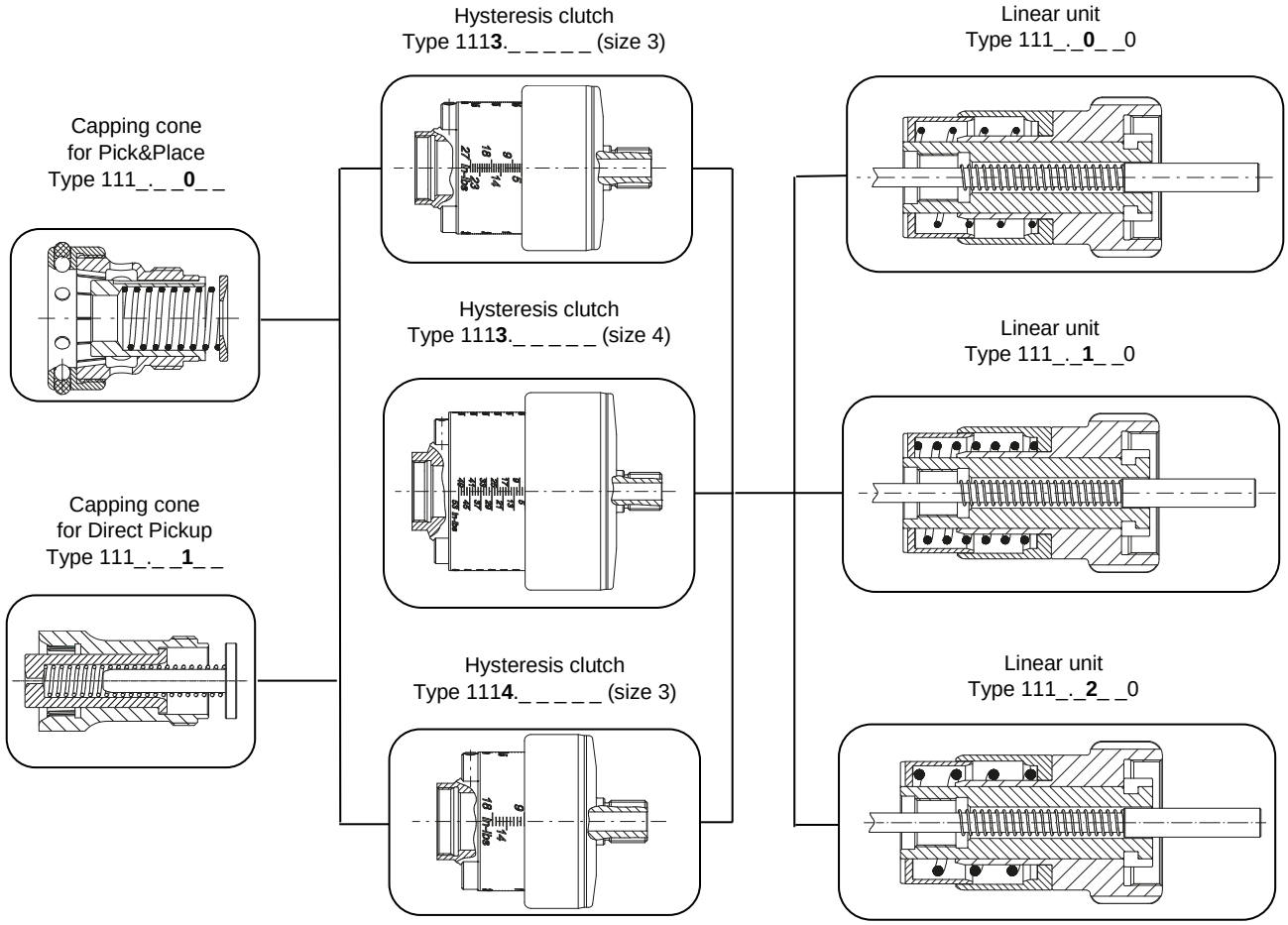

Fig.3

Please Observe:

For types 111_._ _ 1_ 0 the ejector rod (18) and the ejector spring (19) are omitted for the linear unit

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7.2 Types 111_._ _240

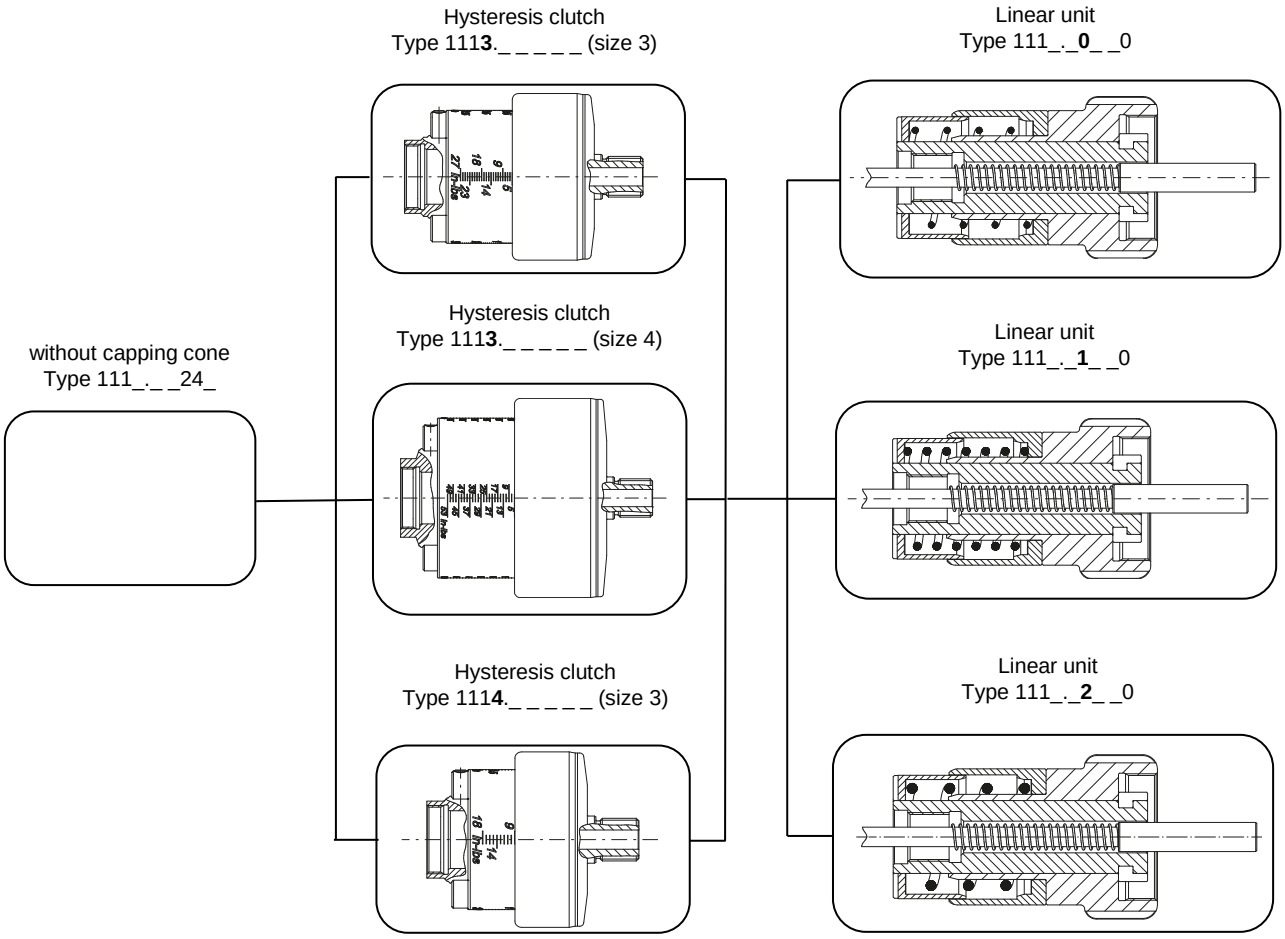

Fig. 4

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7.3 Types 111_._40_2 und 111_._41_2

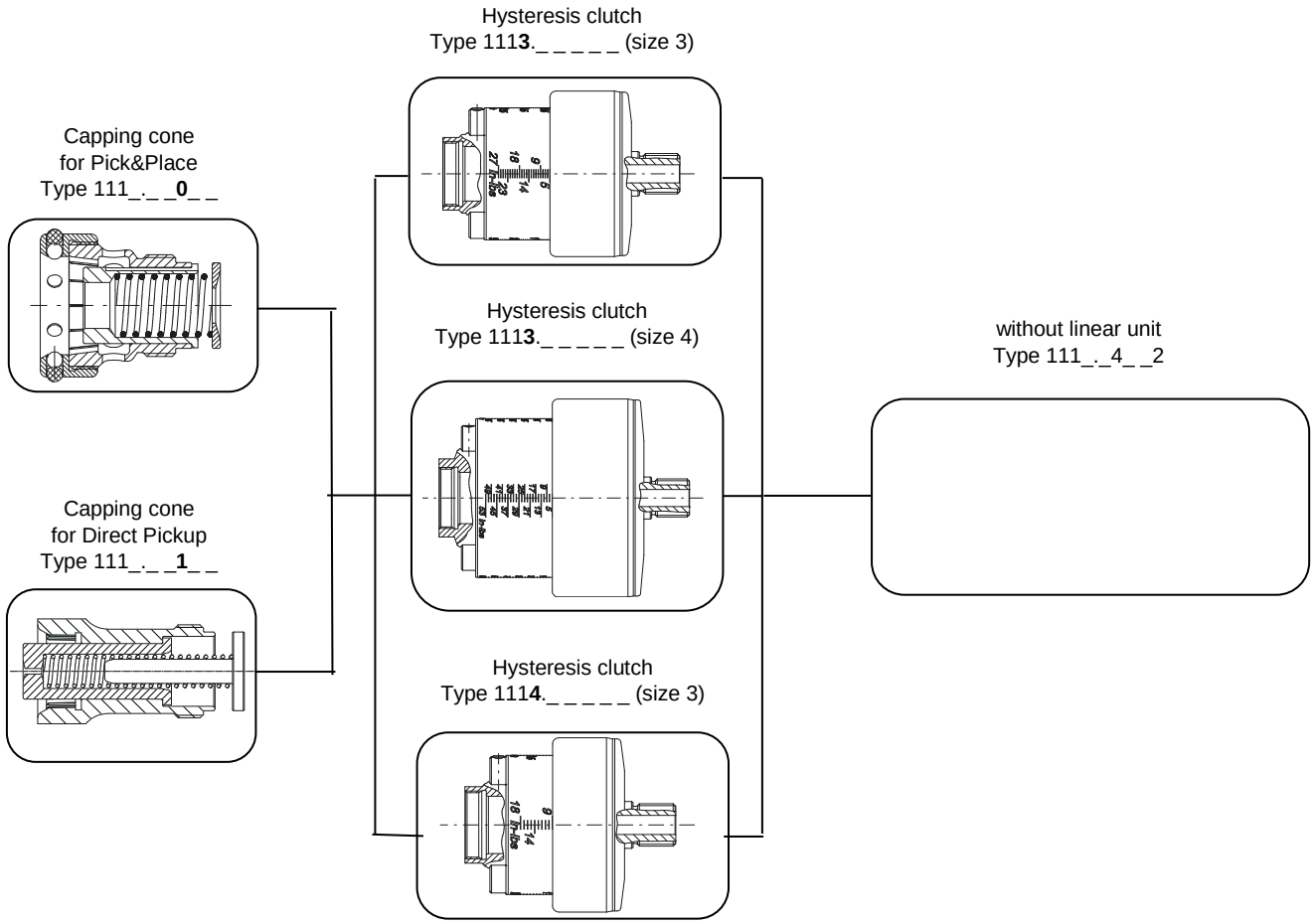

Fig. 5

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8 Function

The ROBA®-capping head (hysteresis capping head) is designed for use in capping machines and turns plastic screw caps (preformed thread) to a defined torque on container finishes (disposable and reusable plastic or disposable glass).
During the whole capping procedure the ROBA®-capping head is kept at a constant speed by the machine spindle.

8.1 Cap feed

8.1.1 Pick&Place (P&P)

The rotating ROBA®-capping head goes to the pick station at the start of the capping cycle and receives an already isolated screw cap in the cone. The radially spring-loaded balls ensure that the cap does not fall out of the cone.

8.1.2 Direct Pickup

At the start of the capping cycle the cap is fed directly to the container finish at the transfer point of the capping machine. The cap is located on the container and not in the cone.

8.2 Turn cap on container finish

The previously filled container must be secured both against turning and must be in vertical direction during the whole capping procedure.

During Pick&Place the rotating ROBA®-capping head places the screw cap on the container finish by means of the downward movement of the capping machine. The teeth of the capping cone (8) engage in the cap knurl and ensure torque-proof fixing of the cap in the cone.

During Direct Pickup the screw cap is already located on the container finish. By means of the downward movement of the capping machine the protruding plunger first touches the cap upper side and aligns the cap. Subsequently, the plunger springs up to the end position and the teeth of the capping cone (8) engage in the cap knurl and ensure torque-proof fixing of the cap in the cone.

The thread edges of the cap and the container finish touch each other. The screw cap is pressed onto the container finish to a defined vertical force (head pressure), which is produced by means of the downward movement of the capping machine, and screwed onto it.

The head pressure is the sum of the spring force from the head pressure spring (11), ejector spring (19) and the weight load of the ROBA®-capping head without the drive hub (10).
The head pressure spring (11) delivers the major portion.

During the downward movement of the capping machine the linear unit and the plunger (15) of the ROBA®-capping head deflect. The vertical force (head pressure) on the container increases continuously.
Capping cone (8) with plunger (15), ejector (18), hysteresis clutch and drive shaft (9) with their split bushing (14) move in the direction of the drive hub (10) and the head pressure spring (11) or rather ejector spring (19) shorten.

8.3 Tighten cap to defined torque

The ROBA®-capping head turns the cap on the container finish until the adjusted limit torque T_g of the hysteresis clutch is reached. Subsequently, the hysteresis clutch slips and interrupts the rotation of the ROBA®-capping head. The cap in the capping cone (8) and the output side of the hysteresis clutch are in doing so slowed down in a smooth and jolt-free way.
The cap is tightened to a defined torque and the container is tightly sealed.
The drive end of the hysteresis clutch, the linear unit and the ejector turn further however at a constant speed.
In this operating state the hysteresis material (4) is constantly re-magnetised and back again by the permanent magnets of the magnetic part (2).

This causes power loss, which must be released into the surrounding area via the flange (3) of the hysteresis clutch in the form of heat.
Please contact the manufacturers for precise details.

If the permitted power loss is exceeded, the hysteresis clutch of the ROBA®-capping head overloads
➔ Destruction of the permanent magnets
➔ The hysteresis clutch must be thermally designed (section **11**).

Owing to the upward movement of the capping machine the ROBA®-capping head is removed from the sealed container, the linear unit and the plunger (15) decompress again, the capping cone (8) with the plunger (15) loses contact to the screw cap and is accelerated once more to a constant speed together with the output side of the hysteresis clutch.

8.4 Ejection

For the Pick&Place version the ejector rod (18) is actuated by means of a mechanism of the capping machine and may push existing screw caps, which are not supposed to be there, out of the capping cone (8).

For the Direct Pickup the plunger (15) takes over the ejection of the screw caps.
Thus it is ensured that the capping cone (8) is empty at the beginning of a new capping cycle.

The capping cycle has ended and restarts once more.

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9 State of Delivery

The ROBA®-capping head is delivered manufacturer-assembled. The ejector rod (18) is supplied separately and the internal thread of the drive hub (10) is sealed with a thread plug.

If the ROBA®-capping head is delivered without the capping cone (8), then the internal thread of the hub (1) is protected with a sealing plug.

If the ROBA®-capping head is delivered without the linear unit, then the threaded pin of the flange (3) is to be provided with a protective sleeve.

The limit torque T_g of the hysteresis clutch is set to the maximum value at the place of manufacture.

The capping cone (8) in Pick&Place or Direct Pickup design is adapted for the intake of plastic screw caps with preformed threads.

All components of the ROBA®-capping head except the magnet material and the locking ring are manufactured from rustproof stainless steel (incl. stainless steel rolling bearings with food-grade lubricating grease and NSF-H1 approval).

The permanent magnets of the magnetic part (2), the hysteresis material (4) and the locking rings are provided with a corrosion protection coating.

9.1 State of delivery for types 111_._ _0_0 and 111_._ _1_0 (P&P cone is illustrated)

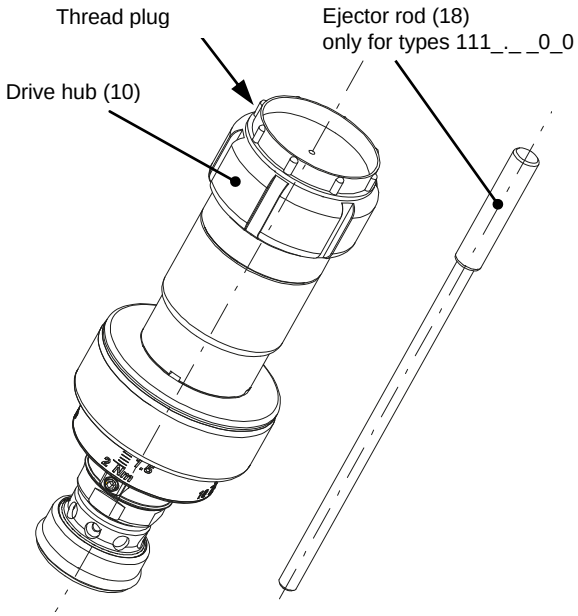

Fig. 6

9.2 State of delivery for types 111_._ _240

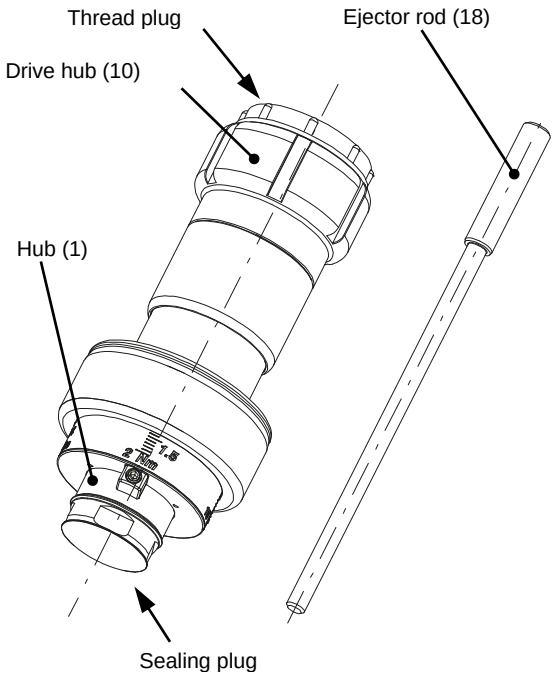

Fig. 7

9.3 State of delivery for types 111_._40_2 and 111_._41_2 (P&P cone is illustrated)

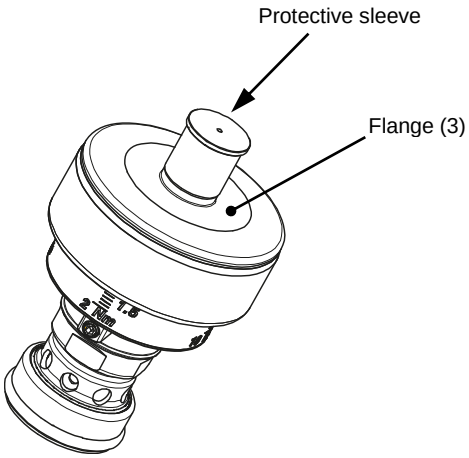

Fig. 8

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10 Technical data

Size / Type			3 / 1114._ _ _ _ _	3 / 1113._ _ _ _ _	4 / 1113. _ _ _ _ _
Limit torque T_g [1] of the hysteresis clutch		[Nm]	1 – 2	0.5 – 3	0.5 – 6
		[in-lbs]	9 – 18	5 – 27	5 – 53
permitted power loss $P_{v,zul}$ [W] [2] at application temperature [3]		0 - 25 °C	24	26	34
		26 - 35 °C	20	22	29
		36 - 45 °C	16.5	18	23.5
Maximum permitted mechanical speed n_{max} [4]		[rpm]	450		
Max. permitted bearing load [5] for roller bearing (5)		radial F_{rad} [N]	159	214	238
		axial F_{ax} [N]	300	300	300
Height B [mm]			200	218.8	233
Dimension X1 [mm]	not for types 111_._ _24_		8.65		
Dimension X2 [mm]			On request		
Head pressure [N]	for Types 111_._0_ _ 0		63 – 83		
	for Types 111_._1_ _ 0		123 – 174		
	for Types 111_._2_ _ 0		190 – 265		
Deflection E of the linear unit [mm] (Fig.1 and Fig.2, Page 5)	for Types 111_._0_ _ 0		0 – 12.5		
	for Types 111_._1_ _ 0		0 – 12.5		
	for Types 111_._2_ _ 0		0 – 7.5		
Maximum permissible deflection E_{max} of the linear unit [mm]	for Types 111_._0_ _ 0		12.5		
	for Types 111_._1_ _ 0		12.5		
	for Types 111_._2_ _ 0		7.5		
maximum plunger lift [mm]	for Types 111_. _ _00_		4.5		
	for Types 111_._ _10_		dependent on capping cone		
Ejector stroke H [mm]	for Types 111_._ _ 0 _0 and Types 111_._ _1_0		35 – 40		
Cap type		[-]	Plastic screw cap (preformed thread)		
Weight [kg]	for Types 111_.01000		*3.32*	*3.59*	*5.23*
Weight [kg]	for Types 111_.01240		*3.10*	*3.37*	*5.01*
Weight [kg]	for Types 111_.44002		*1.66*	*1.93*	*3.57*

Table 1

1) Request the tolerance values for the maximum deviation of the set limit torque T_g from the scale value at the manufacturer's.
At high relative speeds, the limit torque T_g increases due to eddy current effects.
Please contact the manufacturer for exact T_g values.
2) Refers to the maximum surface temperature of approx. 100 °C for rotating flanges (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 Dimensioning (section **11**) .
5) With regard to the nominal bearing service lifetime L_{10h} = 12000 h, point of application of the radial force F_{rad} see section **2.1**and **2.2** or rather **10** “Technical Data” and bearing speed n = 350 rpm.

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11 Thermal Dimensioning

$$P_V = \frac{T \cdot n_S}{9.55} \cdot V \leq P_{V,\ zul}$$

with $V = \frac{t_S}{t_{Cycle}}$ and t_S [6] $\begin{cases} \leq 100\ s \text{ for Size } 3 \\ \leq\ 70\ s \text{ for Size } 4 \end{cases}$

The following applied for continuous slipping operation: ***V = 1***

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

[6] Valid for maximum torque adjustment and a slipping speed of n_s = 450 rpm Please contact the manufacturer for other torques and slipping speed values for t_S.

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

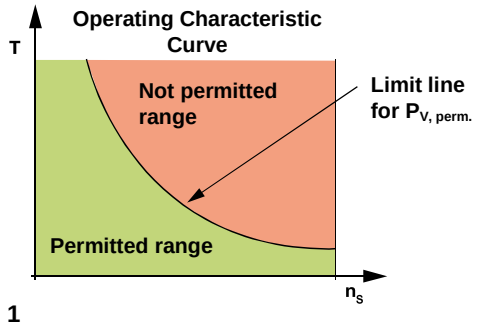

Diagram 1

The green area below the limit curve $P_{V,perm}$ shows the permitted range. If the operating point lies in the red area (above the limit curve), the hysteresis clutch will be destroyed by overload.

Calculation Example:

Screwing on screw caps
(Application as clutch in an assembly cycle)

- Given:

T	= 2 Nm	(Screw-on torque Cap
n_S	= 300 rpm	(Screw-on speed)
t_S	= 0.5 s	(Slipping period)
t_{Cycle}	= 2.0 s	(Cycle period)

Operating temperature 30 °C

- Required:

P_V = ??? (Power loss of the hysteresis clutch)

$$V = \frac{t_S}{t_{Zykl}} = \frac{0{,}5\,s}{2{,}0\,s} = 0{,}25$$

$$P_V = \frac{T \cdot n_S}{9{,}55} \cdot V = \frac{2\ Nm \cdot 300\ min^{-1} \cdot 0{,}25}{9{,}55} = \underline{15{,}71\ W}$$

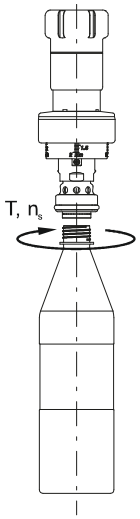

Fig. 9

- Selected:

ROBA®-capping head 3/1114._ _ _ _ _ with T_g= 1 – 2 Nm and $P_{V,perm}$ = 20 W > P_V = 15.71 W (section **10**)

12 Machine spindle design

1) The machine spindle must have an external thread and a centering bore (tolerance H7, R_a = 0.8 mm).
2) The shaft run-out tolerance from the centering bore to the external thread amounts to max. 0.05 mm.
3) The machine spindle must be surface hardened in the area of the external thread and the centering bore. Hardness: 1000 – 1200 HV 0.05; hardening depth: min. 0.02 mm
4) The machine spindle to be manufactured from rustproof stainless steel and the beginning and end of the thread of the external thread are to be cleanly deburred.

13 Design of the ejector system only for Types 111_._ _0_0 and 111_ . _ _ 240

The following points are to be taken into account for the ejector system design of the capping machine:

1) Dimension the stroke of the ejector system of the capping machine so that the plastic screw cap is ejected from the capping cone (8) in a functionally safe way. The permitted range for the ejector hub H must be adhered to in the process (section **10**).
2) The ejector rod (18) may only be actuated in a decompressed state of the ROBA®-capping head. (Section 2.1).
3) Only the dead weight of the ejector rod (18) may have an effect on the ejector spring (19). The weight load of the ejector system of the capping machine is to be directly introduced into the machine frame.
4) The actuator of the ejector system of the capping machine must touch the thick end of the ejector rod (18) in all operating states of the capping machine and may not lift off of it.
5) The actuator of the ejector system and the machine spindle must move synchronously, thus at an identical speed (n_s = n_B). A slippage ($n_s \neq n_B$) between both components is not permitted.

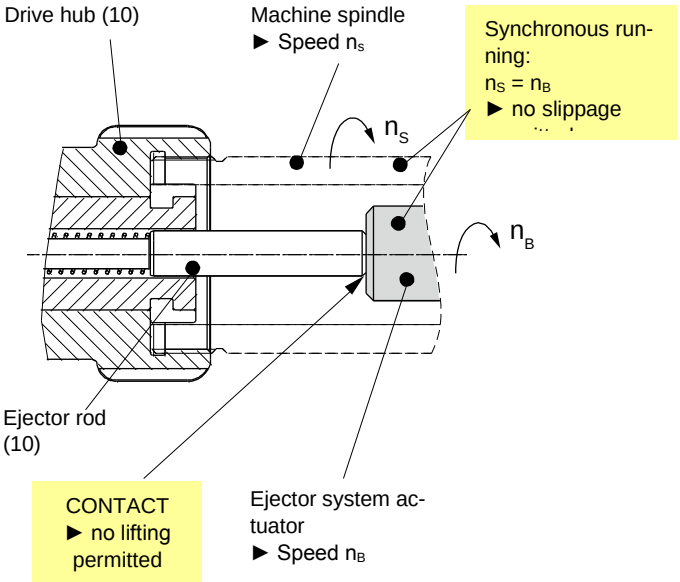

Fig. 10

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14 Installation position

The ROBA®-capping head is exclusively permitted for vertical installation, whereby the drive hub (10) faces upwards and the capping cone (8) faces downwards.

15 Cleaning

Spray the components of the ROBA®-capping head with a commercially available foam cleaner suitable for stainless steel. Allow the foam cleaner to take effect and subsequently rinse with hot water and dry with compressed air.

During cleaning no cleaning agent or water may penetrate the ring gap between the magnetic part (2) and the flange (3) of the hysteresis clutch.

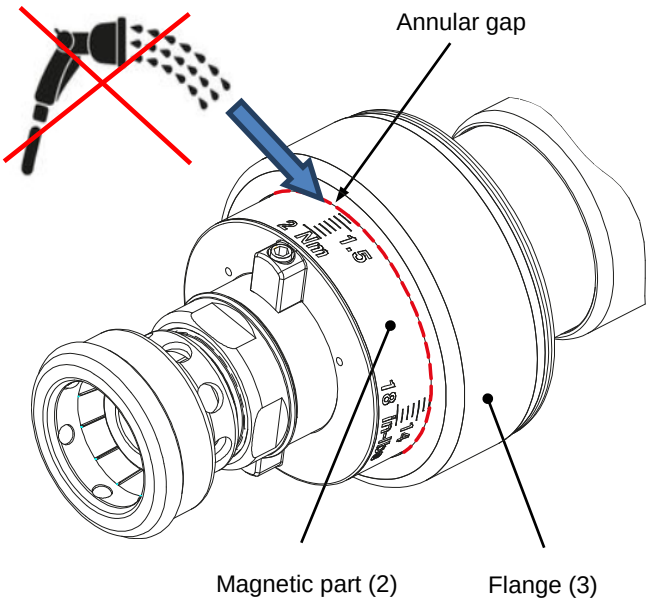

Fig. 11

The ROBA®-capping head should be cleaned 1x daily in the first or second shift operation.
For the first shift operation cleaning must be carried out at the end of the shift
.
For the second shift operation we recommend cleaning at the end of the late shift.
For the third shift operation cleaning should be carried out before or after each product change.

16 Control of the opening values

In this way during production faultless function of the ROBA®-capping head can be directly monitored, we recommend the regular control of the opening values of the plastic screw caps (opening values = maximum torque value when opening the plastic cap).
The opening values can be determined with a torque tester. The opening values are to be determined for all ROBA®-capping heads which are integrated into the capping machine, in each case at the start of production and then regularly during production.
The opening value depends on various factors. For detailed information, please contact the manufacturers.

17 Important Installation Guidelines

- ❒ Threads and inner diameters of the machine spindle, thread and centering surfaces of potentially present customer-side mounting parts must be clean and free of burrs and chips.
- ❒ Threads and inner diameters of the machine spindle, thread and centering surfaces of potentially present customer-side mounting parts must be lightly greased before the installation of the ROBA®-capping head.

CAUTION

The ROBA®-capping head has a highly magnetic surface on the outer diameter of the magnetic part (2) (section **20.1** /Fig 22). In order to prevent injury to personnel and damage to the hysteresis clutch, metal objects must not be brought near this surface.

When installing the ROBA®-capping head, please make sure that any heat produced can dissipate into the surrounding area.

The hysteresis clutch of the ROBA®-capping head must not be disassembled into its individual parts,

Do not damage
or make dirty the cylindrical fitting surface on the hub (1) of the hysteresis clutch (section **20.1** /Fig 22).

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18 Installation and assembly

CAUTION

Before works on the ROBA®-capping head and the capping machine the capping machine must be switched off and secured against accidental switch-on.

18.1 Remove transport protection

18.1.1 Remove thread plug completely and dispose of for types 111_._ _ _ _0

1) Unscrew the thread plug slowly from the drive hub (10). Shortly before the thread plug is completely unscrewed from the drive hub (10), press the thread plug by hand against the pre-tensioned ejector spring (19) so that the spring energy of the ejector spring (19) does not discharge suddenly.
2) Slowly and steadily reduce the manual force on the thread plug until the ejector spring (19) has fully slackened.

The thread plug is not required for further installation and can be disposed of.

CAUTION

When dismantling always press the thread plug by hand in the direction of the drive hub (10) and do not suddenly let go as this could lead to damage to the ROBA®-capping head or personal injury due to the pre-tensioned ejector spring (19).

The thread plug must be completely removed and disposed of.

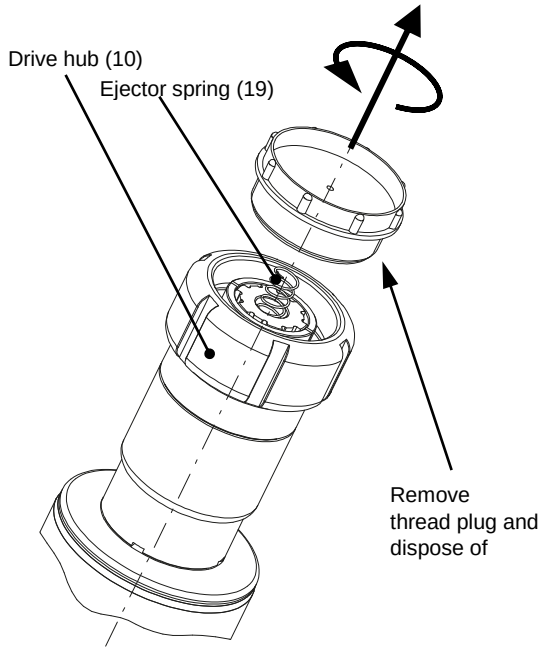

Fig. 12

18.1.2 Remove sealing plug completely and dispose of for types 111_._ _240

Extract the sealing plug by hand from the thread of the hub (1). The sealing plug is no longer required and can be disposed of.

CAUTION

For the disassembly of the sealing plug do not use any metallic tools as the highly magnetic surface on the outer diameter of the magnetic part attracts metal parts and as a result could cause crush injuries to persons and damage to the hysteresis clutch of the ROBA®-capping head.

The sealing plug must be completely removed and disposed of.

Highly magnetic surface on the outer diameter of the magnetic part (2)

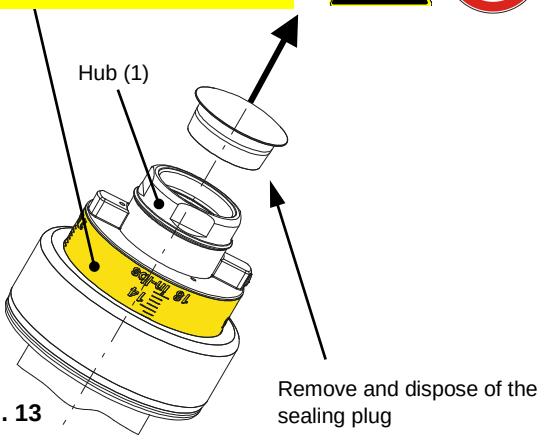

Fig. 13

18.1.3 Remove protective sleeve completely and dispose of for types 111_._4_ _2

Remove the protective sleeve from the thread of the flange (3) by hand. The sealing plug is no longer required and can be disposed of.

The protective sleeve must be completely removed and disposed of.

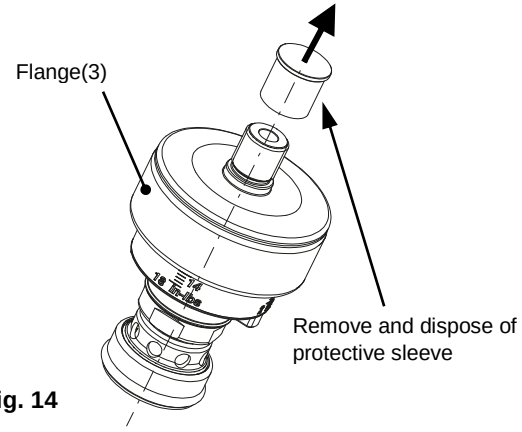

Fig. 14

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18.2 Adjust the ejector rod as required to the ejector system of the capping machine only for types 111_._ _0_0 and 111_ . _ _ 240

The linear measures Y and Z are defined as follows and must be calculated before adjustment of the ejector rod (18).

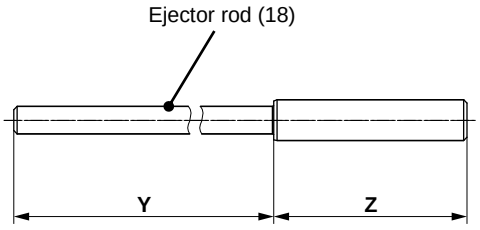

Fig. 15

18.2.1 Determination of linear measure Y

1) Determine and note plunger residue P with depth gauge

The position of the plunger may not be changed during measurement.

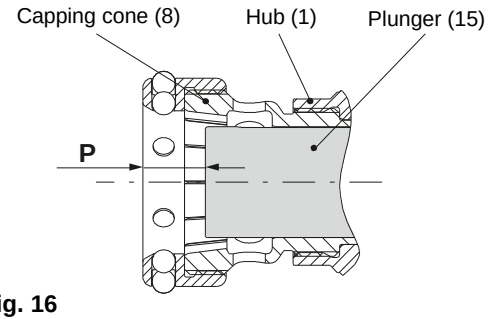

Fig. 16

2) Check measured plunger residue P for validity

$P \leq H - E_{max}$ -2.5 with **35 ≤ H ≤ 40**

If the plunger residue is not located in the valid range, please contact the manufacturers.

P = Plunger residue [mm]
H = Ejector stroke [mm]
E_{max} = Maximum deflection of the linear unit
(Table 1, Page 12)

3) Calculate and note linear measure Y

$Y = B - P - E_{max}$ -3

Y = Linear measure ejector [mm]
B = Height [mm] (section **10**)
P = Plunger residue [mm]
E_{max} = Maximum deflection of the linear unit
(Section **10**)

4) Check the validity of the calculated linear measure Y

Values for Y only valid for the defined range:
B - H - 0.5 ≤ Y ≤ 173 with **35 ≤ H ≤ 40**

If the linear measure Y is not located in the valid range, please consult the manufacturer.

18.2.2 Determination of linear measure Z

Determine and note actuator residue B [mm] with a depth gauge directly on the machine spindle of the capping machine. The actuator of the ejector system must be located in the upper position in the process. There must be no capping head present in the machine spindle.

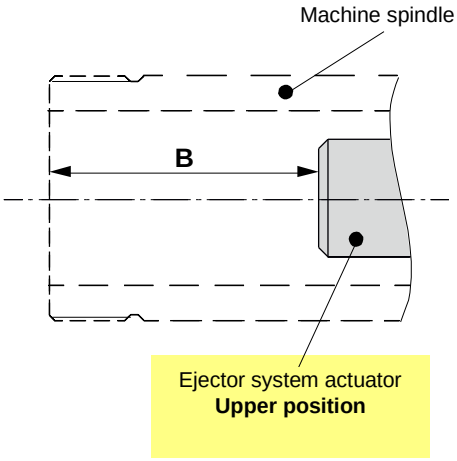

Fig. 17

1) Calculate and note linear measure Z

Z = B

The ejector hub must be located within the range
of 35 ≤ H ≤ 40.

Z = Linear measure ejector [mm]
B = Actuator residue {mm}
H = Ejector stroke [mm]

2) Check the validity of the calculated linear measure Z

Values for Z only valid for the defined range:
14 + H ≤ Z ≤ 57 with **35 ≤ H ≤ 40**

If the linear measure Z is not located in the valid range, please consult the manufacturer.

18.2.3 Shortening of the ejector rod

Shorten the ejector rod (18) on both ends so that it shows the linear measures Y and Z calculated above (linear tolerance in each case ±0.5 mm).
To shorten the ejector rod (18) we recommend a standard metal saw and a mill file. When shortening with the metal saw allow for some distance, as the saw surfaces must be smoothed with the mill file (max. roughness of the shortened surfaces: R_a 3.2).
Deburr and clean after shortening the ejector rod (18) at both ends. The ejector rod (18) must be free of grease, burrs, dust and chips before installation.

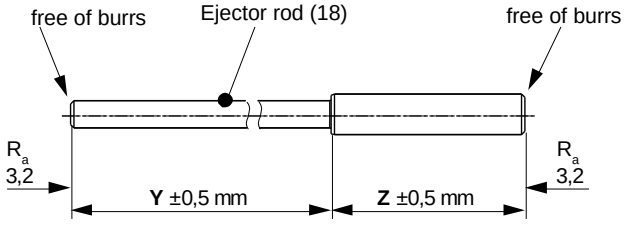

Fig. 18

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18.3 Mounting the ejector rod

Insert the ejector rod (18) with the thin end in front into the ejector spring (19) which is already located in the bore of the drive shaft (9) of the ROBA®-capping.

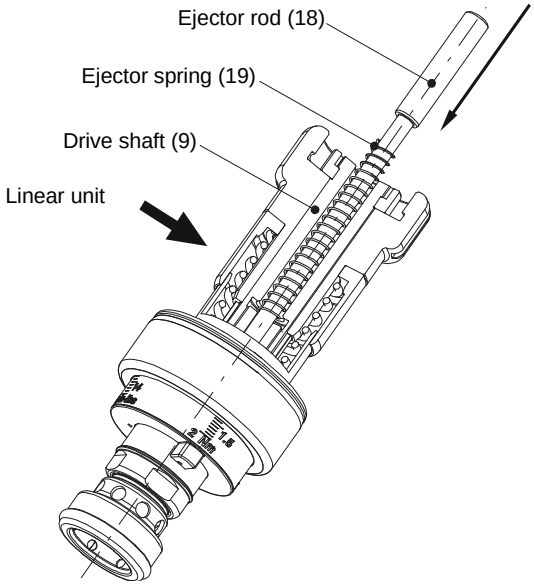
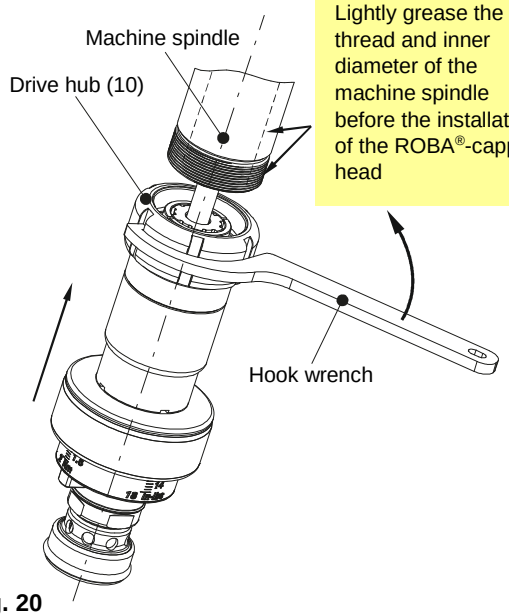


Fig. 19

18.4 Assembling the ROBA®-capping head in the capping machine

Lightly grease the thread and the inner diameter of the machine spindle before installation of the ROBA®-capping head. For this purpose observe the Lubrication plan (section **24.2**).

1) Secure the machine spindle against twisting.
2) Screw the ROBA®-capping head onto the thread of the machine spindle with a hook wrench up to the end position. In the process the hook wrench engages into one of the keyways of the drive hub (10).



Lightly grease the thread and inner diameter of the machine spindle before the installation of the ROBA®-capping head

Fig. 20

19 Functional Inspection

We recommend the following cycles for functional inspection:

Operating mode	Cycle for functional inspection
First shift	1x daily at the end of the shift
Second shift	1x daily at the end of the evening shift
Third shift	1x before or after each product change

Characteristics for functional inspection (in installed condition)

1) **Visual inspection**
of the capping cone (8) with plunger (15), the hysteresis clutch and the linear unit on foreign bodies, impurities, wear or damage.

2) **Checking that the roller bearing (5) moves easily**
For this purpose turn the capping cone (8) or the magnetic part (2) to the right by hand (2-3 rotations). In the process the machine spindle must be fixed.

In the event of a sluggish or rather rough running of the roller bearing (5) contact the manufacturers.

3) **Checking that the linear guidance moves easily (not for types 111_._ 4_ _ 2)**
For this purpose move the hysteresis clutch by hand vertically against the spring force of the head pressure spring (11) slowly upwards (in the direction of the drive hub (10)) and then move it slowly back down again into the initial position. In the process the machine spindle must be fixed.

CAUTION
Do not suddenly let go of the hysteresis clutch as damage to the ROBA®-capping head or personal injury could result from the pre-tensioned head pressure spring (11).

If the linear guidance is stiff then it must be relubricated. For this purpose observe the section “Maintenance and Maintenance Intervals” (section**22**) and the Lubrication plan (section**24.2**)

4) **Checking that the plunger (15) moves easily (not for types 111_._24_)**
For this purpose move the plunger (15) by hand against the spring force of the plunger spring (16) slowly upwards (in the direction of the hysteresis clutch) and then move it slowly back down again into the initial position. In the process the machine spindle must be fixed.

CAUTION
Do not suddenly let go of the plunger (15), as damage could occur to the pre-tensioned plunger springs (16) on the ROBA®-capping head or injuries to persons.

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20 Torque Adjustment Hysteresis clutch

If no specific torque is requested on order, the Hysteresis clutch of the ROBA®-capping head is set to the maximum torque.

The torque set on the Hysteresis clutch of the ROBA®-capping head can be read using the graduation scale located on the magnetic part (2).

The torque on the Hysteresis clutch of the ROBA®-capping head must only be adjusted step-wise (for the max. step width, see Table 2). After each step-wise adjustment, the hysteresis clutch must slip, so that no intermittent torque occurs.
Should intermittent torque occur, the hysteresis clutch must be set to maximum torque and the hub (1) must be turned by 2 turns relative to the flange (3).

Damage to or dirt on the cylindrical fitting surface will lead to reductions in running smoothness or torque adjustment failure.

The clamping screw (6) must not be dismantled, as otherwise the plug (7) could fall out of the threaded hole of the magnetic part (2) and may be lost.

Observe the max. tightening torque of 3 Nm for the clamping screw (6).
Use a torque wrench.

20.1 Torque adjustment procedure for hysteresis clutch

1) Turn the clamping screws (6) back until the magnetic part (2) can be turned. This equals approximately half a thread turn.
2) The torque must only be adjusted step-wise.
The maximum step width is defined in Table 2.
3) Secure the hub (1) against turning (using an open-end wrench SW 36) and magnetic part (2) with open-end wrench SW 10 or by hand slowly until either the maximum step width acc. to table 2 or the desired torque value is reached.
If the step width for torque adjustment is smaller than the maximum step width (see Table 2), then step 6) can be left out.
4) Tighten the clamping screw (6) by hand.
5) Turn the hub (1) relative to the flange (3) by approximately two turns (= 720° rotation angle) (“slipping“), so that the magnetisation of the hysteresis material (4) reverses.
In order to do this, secure the flange (3) by hand and turn either the hub (1) or the magnetic part (2) using an open-ended wrench (see step 3).
6) Repeat the previous steps 1) to 5) until the required torque of the hysteresis clutch is reached.
7) Tighten the clamping screw (6) (hexagon socket wrench opening 3) using a torque wrench to a tightening torque M_a = 3 Nm.

Size/Type	Torque adjustment range	Maximum step width
3/1114._ _ _ _ _	1 to 2 Nm	0.3 Nm
3/1113._ _ _ _ _	0.5 to 2 Nm	0.3 Nm
	2 to 3 Nm	0.5 Nm
4/1113._ _ _ _ _	0.5 to 2 Nm	0.4 Nm
	2 to 6 Nm	1 Nm

Table 2

Example for ROBA®-capping head 3/1114._ _ _ _ _
Torque adjustment from 1.7 Nm to 1.2 Nm:
(Short description)

a) Adjust the magnetic part (2) from the scale value 1.7 Nm to the scale value 1.4 Nm (max. step width 0.3 Nm) and let the clutch slip for approximately two turns.
b) Adjust the magnetic part (2) from the scale value 1.4 Nm to the scale value 1.2 Nm (step width 0.2 Nm) and let the clutch slip for approximately two turns.

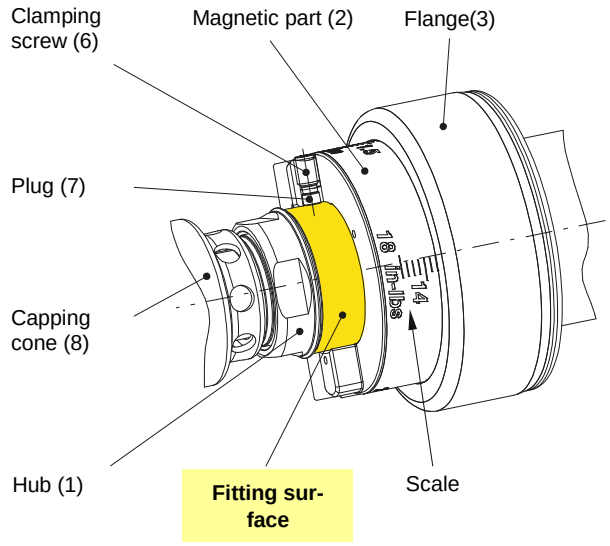

Fig. 21

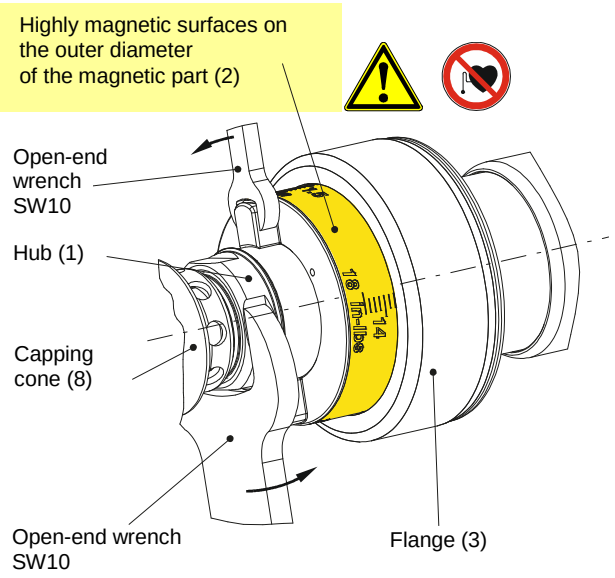

Fig 22

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21 Installation and disassembly

21.1 Capping cone and Plunger (not for types 111_._ _ 24_)

1) Unscrew the capping cone (8) with a hook wrench for the Pick&Place version or open-end wrench for the Direct Pickup version from the hub (1) of the hysteresis clutch. In the following pictures only the cone for the Pick&Place version is illustrated in each case.
2) To hold it in place an open-end wrench SW36 for size 3 and SW41 for size 4 is required, which engages into the flat of the hub (1).
3) When unscrewing the capping cone (8) ensure that the plunger (15), the plunger spring (16) and the plunger disc (17) do not get lost.

The installation of the capping cone takes place in reverse order and rotational direction.

CAUTION Always press the capping cone (8) by hand in the direction of the hub (1) and do not suddenly let go, as damage to the ROBA®-capping head or personal injury could result from the pre-tensioned plunger spring (16).

The inclined surface of the plunger disc (17) (only valid for Pick&Place cone) must show for the hub (1) of the hysteresis clutch **(Fig. 24)**.

The thread and the centering diameter of the capping cone (8) must be lightly greased before installation. This also applies for customer-side capping cones. For this purpose observe the Lubrication plan (section 24.2).

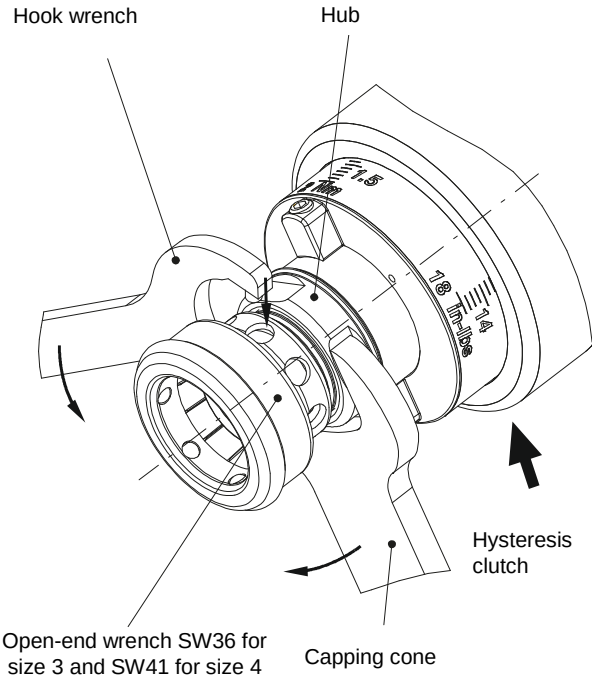
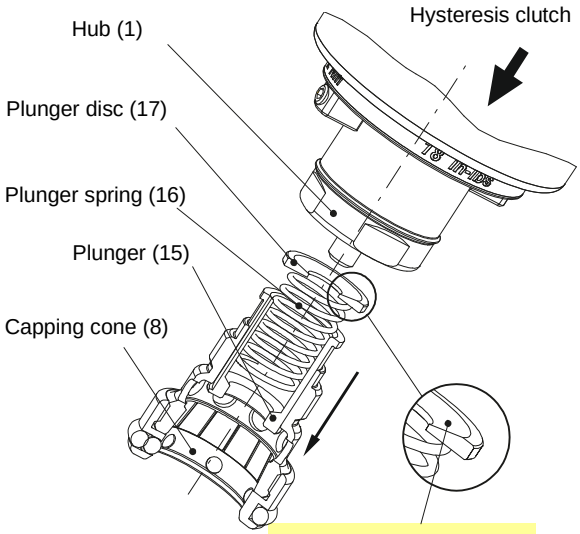


Fig. 23



Attention:
Inclined surfaces of the plunger disc (17) must show for the hub (1) (only valid for Pick&Place cone)

Fig. 24

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21.2 Linear unit und ejector (not for types 111_._4_ _2)

21.2.1 Remove ROBA®-capping head from the machine

1) Secure the machine spindle against twisting.
2) Lower the ROBA®-capping head with a hook wrench from the machine spindle.
   In the process the hook wrench engages into one of the keyways of the drive hub (10).
3) Ensure that the ROBA®-capping head does not fall to the ground and get damaged.

21.2.2 Removing ejector rod and ejector spring

1) Place the ROBA®-capping head with the capping cone (8) on a firm base.
2) Extract the ejector rod (18) and the ejector spring (19) by hand from the drive shaft (9).

21.2.3 Removing all individual parts from the drive shaft

1) Place the ROBA®-capping head with the capping cone (8) on a firm base.
2) Move the drive hub (10) with an axial force F by hand (against the spring force of the head pressure spring (11)) approx. 5 mm in the direction of the hysteresis clutch.
3) With the other hand push the two halves of the split bushing (14) radially from the keyway of the drive shaft (9) until the outer diameter of the split bushing (14) of the drive hub (10) fits.
4) Slowly and steadily reduce the axial force F on the drive hub (10) until the head pressure spring (11) has fully slackened.
5) Remove both halves of the split bushing (14).
6) The drive shaft (9) and drive hub (10) must always be mounted at the same angular position to each other. For this purpose during disassembly place a marking point on the facing-side of the drive shaft (9) and drive hub (10).
7) Remove bushings 1 and 2 (Items 12 and 13), together with the head pressure spring (11) and the drive hub (10) from the drive shaft (9).

CAUTION

Always impinge the drive hub (10) during installation or de-installation by hand with an axial force F in the direction of the hysteresis clutch and do not suddenly let go as damage to the ROBA®-capping head or personal injury could result from the pre-tensioned head pressure spring (11).

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21.2.4 Asrequired dismantle drive shaft

1) Clamp the drive shaft (9) approximately in the middle of the shaft in a commercially available vice with jaws.
2) Do not overtighten the vice so that the drive shaft (9) is not plastically deformed.
3) Join a commercially available oil filter strap wrench centrally on the outer diameter of the flange (3) of the hysteresis clutch and lower the hysteresis clutch together with the capping cone (8) of the drive shaft (9). Ensure that the leather strap of the oil filter strap wrench is laid completely around the outer diameter of the flange (3) in the form of a loop.

The installation of the ejector and the linear unit takes place in reverse order and rotational direction.

For re-installation of the linear unit ensure that both marking points on the drive shaft (9) and drive hub (10) correspond and that the threaded pin and the centering diameter of the flange (3), the drive shaft (9) and the split bushing (14) are greased. For this purpose observe the Lubrication plan (section 24.2).

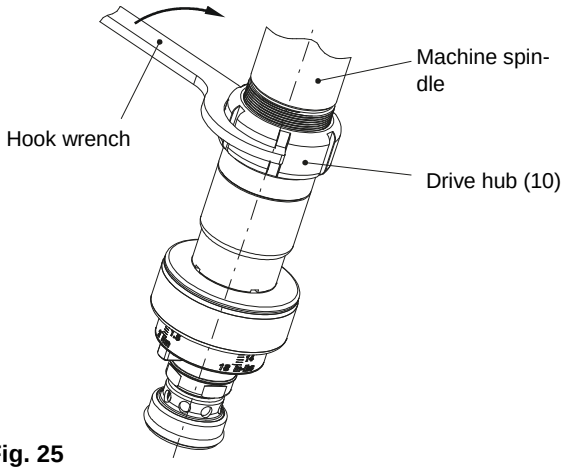

Fig. 25

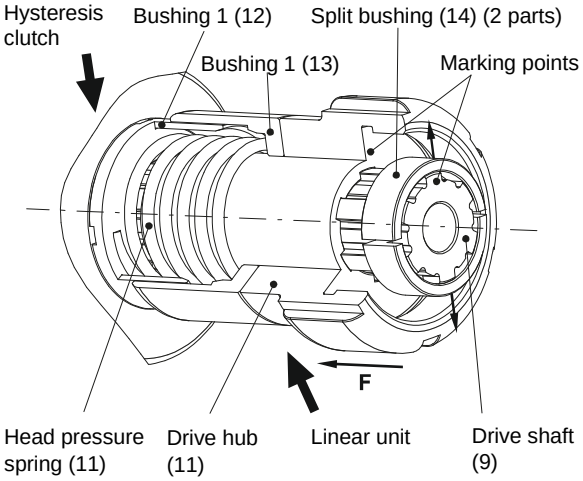

Fig. 26

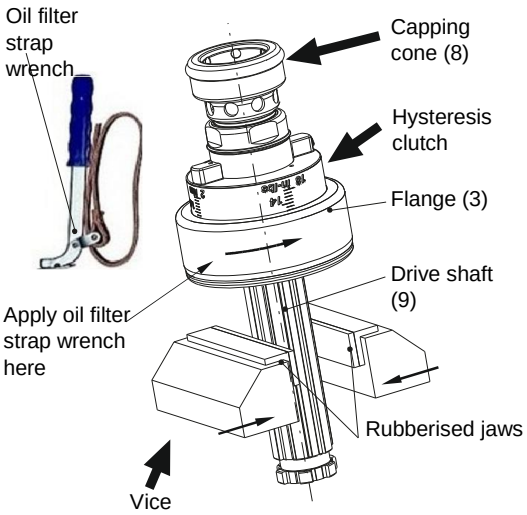

Fig. 27

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22 Maintenance and Maintenance Intervals

For this purpose observe the Lubrication plan (section **24.2**).

Defective or worn parts must be replaced and immediately replaced with new ones. To that end please contact the manufacturers.

22.1 Capping cone and Plunger (not for types 111_._ _ 24_)

Maintenance interval: 6 months or 3000 operating hours

1) Check gearing of the capping cone (8) for wear.
2) Check fit accuracy of the plastic cap in the capping cone (8).
3) Clean all individual parts of the capping cone and the plunger. As cleaning agents we recommend acetone or isopropyl alcohol and lint-free towels.
   The outer diameter of the capping cone (8) and the centering diameter must be lightly regreased with a brush before re-installation into the hub (1). As lubricating grease we recommend the food-grade grease Klübersynth UH1 64-1302 (company Klüber) or OBEEN UF2 (company Castrol).

For de-installation or rather installation of the capping cone (8) and the plunger (15) please observe the instructions in section **21.1**.

22.2 Hysteresis clutch

Maintenance interval: 6 months or 3000 operating hours

1) Measure and record torque (clockwise rotation) of the hysteresis clutch with a torque tester.

Should an adjustment of the torque of the hysteresis clutch be required, please observe the guidelines for torque adjustment (section**20**).

The torque transmission of the hysteresis clutch is contactless, meaning that no special maintenance is necessary. The roller bearings (5) are covered and greased with a grease filling to last for the duration of their lifetime.

22.3 Linear unit und ejector (not for types 111_._4_ _2)

Maintenance interval: 3 months or 1500 operating hours

1) All individual parts of the linear unit and ejector, thus remove lubricating grease and contamination from drive shaft (9), drive hub (10), bushing 1 and 2 (Items 12 and 13), head pressure (11), split bushing (14), ejector rod (18) and ejector spring (19). As cleaning agents we recommend acetone or isopropyl alcohol and lint-free towels.
2) The thread of the flange (3) of the hysteresis clutch and the drive shaft (9) or rather the split bushing (14) of the linear unit must be regreased. As lubricating grease we recommend the food grease Klübersynth UH1 64-1302 (company Klüber) or OBEEN UF2 (company Castrol). Distribute the grease uniformly with a brush on the outer surfaces of the drive shaft (9), threaded pin of the flange (3) and split bushing (14) or rather in the axial keyways of the drive shaft (9).
   After greasing the drive hub (10) should be moved back and forth several times on the drive shaft (9) so that the grease is uniformly distributed.

The angular position from the drive shaft (9) to the drive hub (10) may not be changed as a result of the de-installation and re-installation. For the de-installation or rather installation of the ejector and the linear unit observe the instructions on page20.

23 Disposal

All steel components and magnetic components:
Steel scrap (Code No. 160117)

Seals, O-rings, thread plugs:
Plastic (Code No. 160119)

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24 Greasing

24.1 Lubrication points

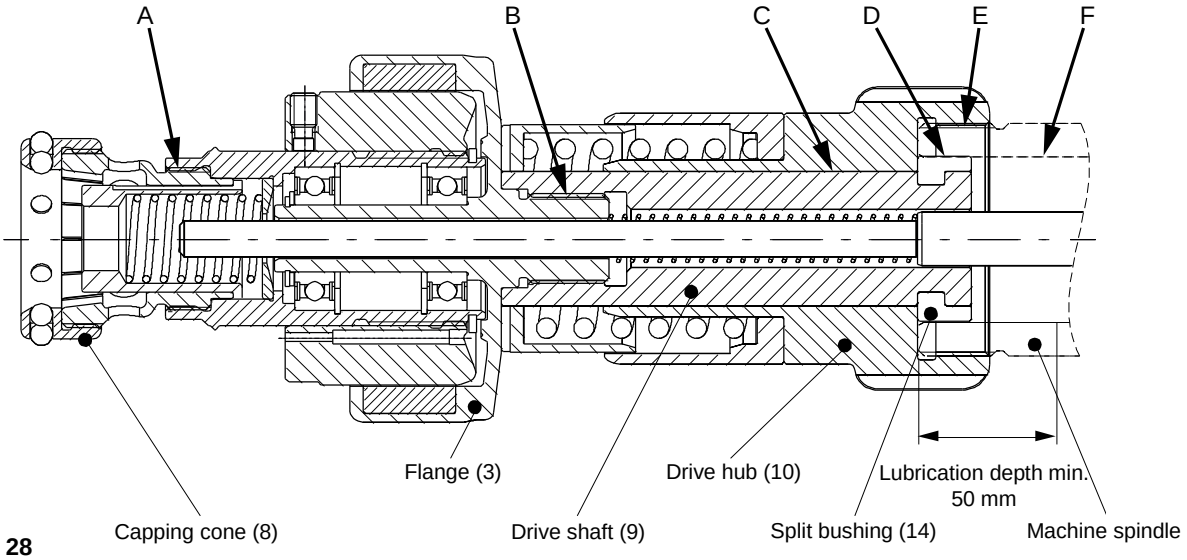


Fig. 28

24.2 Lubrication plan

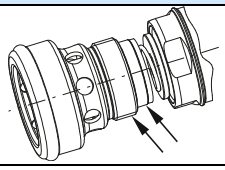
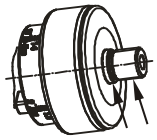
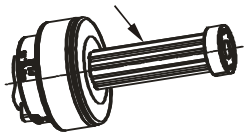
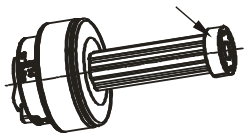
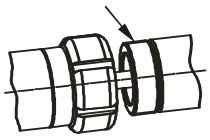
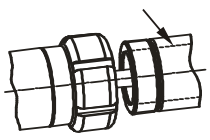
Lubrication points			Lubrication interval or time	Lubricant	
Abbreviation	Name	Fig.		Dosage	Name
A	Complete thread and centering diameterof capping cone (8)		During installation of the capping cone (8) or customer-side capping cones	lightly grease	Food grade greases Klübersynth UH1 64-1302 (Company Klüber) or OBEEN UF2 (Company Castrol).
B	Complete threaded pin and centering diameter of flange (3)		During installation of the linear unit or customer-side mounting parts	lightly grease	
C	Complete Spline shaft profile of drive shaft (9)		3 months or 1500 operating hours	heavily grease	
D	Complete outer diameter of split bushing (14)		3 months or 1500 operating hours	lightly grease	
E	Complete thread of machine spindle		During installation of the ROBA®-capping head	lightly grease	
F	Inside diameter of machine spindle up to approx. 50 mm depth		During installation of the ROBA®-capping head	lightly grease	

Table 3

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