Drive Nut
RS

Operating Instructions

Translation of the Original Operating Instructions | V02 03.04.2018

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Content

1. General information 1
   1.1. RS Drive Nut 1
      1.1.1. Identifying the RS drive nut 2
   1.2. Intended use 2
   1.3. Improper use 2
   1.4. Product guarantee 2
   1.5. Symbols and their meaning 3
      1.5.1. General symbols 3
      1.5.2. Safety symbols 3
   1.6. Organisational measures 4
      1.6.1. Requirements for staff performing tasks 4
   1.7. Disposal 4
2. Transport and storage 4
   2.1. Permissible ambient temperature 4
   2.2. Scope of delivery and verifying the delivery 4
3. Installation 5
   3.1. Prerequisites for installation 5
   3.2. Installation procedure 6
4. Operation 10
   4.1. Prerequisites for trouble-free operation 10
      4.1.1. Correct assembly 10
      4.1.2. Observing the predetermined shaft speed 10
      4.1.3. Observing the default thrust 11
   4.2. Handling 12
      4.2.1. Drive nut with free-movement lever 12
         4.2.1.1. Drive nuts with a mechanical free-movement lever 12
         4.2.1.2. Drive nuts with a pneumatic free-movement lever 12
5. Maintenance and repair 13
   5.1. Maintenance interval 13
   5.2. Grease 13
   5.3. Maintenance procedure 13
   5.4. Repair 13
   5.5. Spare parts 14

6. Technical appendix 15
6.1. RS drive nut design groups 15
6.1.1. RS drive nut standard design 15
6.1.2. F configuration 15
6.1.3. P configuration 15
6.1.4. R configuration 16
6.1.5. X configuration 16
6.2. Designation logic for the RS drive nut 18
6.3. Basic types of RS drive nut 19
6.3.1. RS3-08-4R4 drive nut 19
6.3.2. RS4-08-4R4 drive nut 20
6.3.3. RS3-10-4R5 drive nut 22
6.3.4. RS4-10-4R5 drive nut 23
6.3.5. RS4-15-4R7,5 drive nut 24
6.3.6. RS4-20-4R10 drive nut 25
6.3.7. RS4-25-4R12,5 drive nut 26
6.3.8. RS4-35-4R17,5 drive nut 27
6.3.9. RS4-50-3R25 drive nut 28
6.3.10. RS4-50-3L25 drive nut 29
6.3.11. RS4-60-3R30 drive nut 30
6.3.12. RS4-60-3L30 drive nut 31

1. General information

These Operating Instructions apply to all currently available types of the RS drive nut and their various configurations.

The Operating Instructions give the user important general information about the RS drive nut as well as information about storage, transportation, installation, commissioning, maintenance, and servicing.

Please read through the Operating Instructions carefully. All information and notes must be observed.

1.1. RS Drive Nut

The RS drive nut is a non-positive Uhing® linear drive that converts the rotation of a shaft into linear motion. It achieves this effect by pressing the specifically shaped bearing surfaces on the rolling rings, that have been mounted on an anti-friction bearing, against the shaft. The rolling rings roll on the surface of the shaft with their pitch angle with either a right- or left-hand pitch.

The RS drive nut is backlash-free and quiet in operation. Vibrations have a negative impact on the RS drive nut.

The RS drive nut is mainly used in the following areas:

- Measuring machines
- Drive engineering
- Materials handling systems
- Transportation systems
- The food industry
- Medical engineering

An extensive scheme with standard and customer-specific configurations is available for the RS drive nut. Basic types of the RS drive nut that are currently available and referenced in these Operating Instructions are:

- RS3-08-4
- RS4-08-4
- RS3-10-4
- RS4-10-4
- RS4-15-4
- RS4-20-4
- RS4-25-4
- RS4-35-4
- RS4-50-3
- RS4-60-3

Each of these basic types is available with various standard, and also customer-specific, configurations.

The basic types are described in Section *6.3 Basic Types of RS Drive Nut.* You will find a drawing, the article number, the description, and the configurations for each type here.

The manufacturer can inform you about the different versions of this basic type and about optional configurations on request.

1.1.1. Identifying the RS drive nut

Each drive nut has:

(1) An engraved serial number.

(2) An attached type plate with:
- The type description (type),
- The article number (art. no.) and
- The thrust F (N).

There are explanations about the type and article number in Section *6.3 Basic Types of RS drive nut.*

1.2. Intended use

All types of RS drive nut are solely for use on a hardened shaft.

1.3. Improper use

Any other application apart from use on a hardened shaft is improper.

1.4. Product guarantee

The guarantee on all types of the RS drive nut complies with the current VDMA conditions.

1.5. Symbols and their meaning

1.5.1. General symbols

Note: This symbol is used when reference is made to particularly important information.

Tip: This symbol is used to give tips and useful information.

1.5.2. Safety symbols

This symbol warns against danger.

This symbol warns against physical damage.

Danger level Signal word / colour	Significance in the event of non-compliance
DANGER	Leads to severe injuries.
ATTENTION	May lead to physical damage.

1.6. Organisational measures

1.6.1. Requirements for staff performing tasks

The prerequisite for using the RS drive nut is that the member of staff has carefully read the Operating Instructions. The member of staff should have basic knowledge of technical assembly in order to use the RS drive nut. Specific training is not necessary. Joachim Uhing GmbH & Co. KG recommends that staff who work with the RS drive nut receive training. Training dates can be agreed with Joachim Uhing GmbH & Co. KG's sales agencies and/or with their foreign representatives.

1.7. Disposal

Dismantle the RS drive nut:

1. The following applies to **RS3-08-4… to RS4-35-4…-**type drive nut:

   First of all, unscrew the pressure screw from the casing.

   Then remove the locking rings using circlip pliers.

   The following applies to **RS4-50/60-3…-**type drive nuts:

   Unscrew the four fastening screws from the casing using an Allen key.
2. Remove all other items from the casing.
3. Dispose of the aluminium parts in the container for aluminium waste, the steel parts in the container for steel scrap, and the springs and tapered rings in the container for reusable materials issued by the local waste disposal firm.

2. Transport and storage

2.1. Permissible ambient temperature

All types of RS drive nut can be used at temperatures of between -10°C and +70°C.

Please confer with the manufacturer if use below -10°C and above +70°C is required.

2.2. Scope of delivery and verifying the delivery

The delivery contains the fully assembled drive nut. Verify the delivery by comparing the type description, article number, and the stated thrust noted on the attached type plate with the information on your order and with your application's requirements.

3. Installation

The RS drive nut's pitch value and pitch direction are predetermined. The drive nut's pitch is half of the shaft's diameter as standard.

Alterations to the speed and direction of travel require the shaft's speed and rolling direction to be amended.

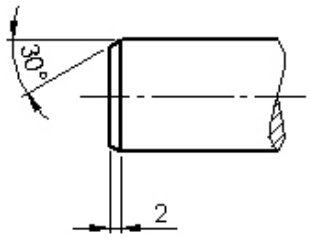
Please contact the manufacturer and/or your competent representative outside of Germany, if necessary.

3.1. Prerequisites for installation

As a basic principle, the RS drive nut requires a steel shaft with surfaces that have been induction hardened. The steel shaft must also be smoothed and polished. The minimum requirements are:

- Surface hardness: 50 HRC
- Tolerance on diameter: h6
- Roundness: maximum one half of the permissible diameter variation in accordance with ISO tolerance h6
- True running tolerance in accordance with DIN ISO 1101: ≤ 0.1 mm/m

The shaft must be chamfered on the leading end.



3.2. Installation procedure

DANGER	**Danger of injury at pinch points in the drive nut's movement**
	There are pinch points between the inner right and left sides of the bearing support brackets and the drive nut. There is a danger of severe injury at these pinch points when the drive nut moves. ➢ Secure these pinch points and the rotating shaft against contact. ➢ You must categorically never reach into the drive nut.

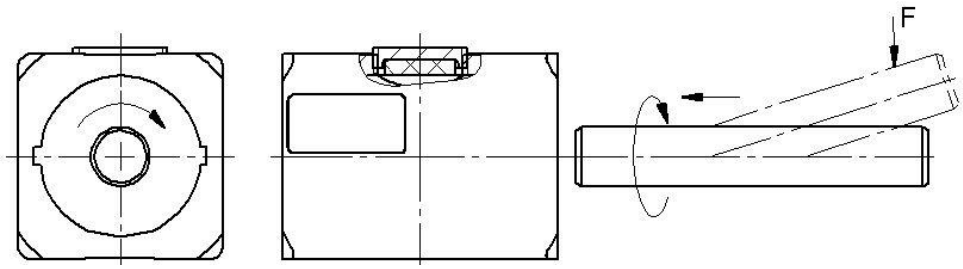
DANGER	**Danger of injury when operating free-movement levers on drive nuts in a vertical installation position**
	If a drive nut is used with a mechanical or pneumatic free-movement lever on a vertical drive, the drive nut may drop quickly and in an uncontrolled way after the free-movement lever is operated. There is a danger of severe injuries here. ➢ Secure the drive nut and any loads before operating the free-movement lever.

Drive nuts must be assembled in accordance with their rolling direction.

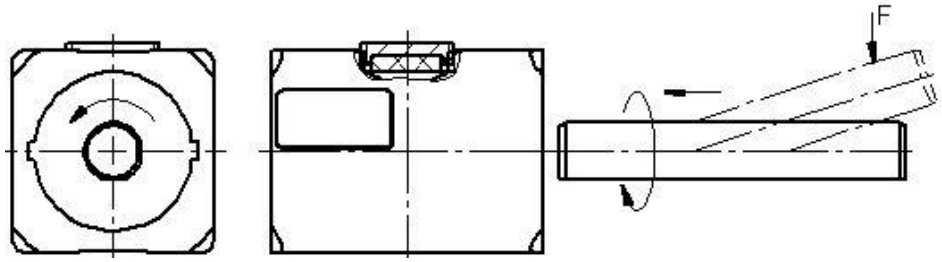
1. If your RS drive nut is equipped with a free-movement lever, operate this and push the shaft into the RS drive nut.

2. If there is no free-movement lever, screw the shaft into the linear drive with axial pressure and in the correct direction of rotation. In other words:

   - Turn **clockwise** for a drive nut with a right-hand rolling direction



   - Turn **anti-clockwise** for a drive nut with a left-hand rolling direction



ATTENTION

Damage to the device when assembling the actual load

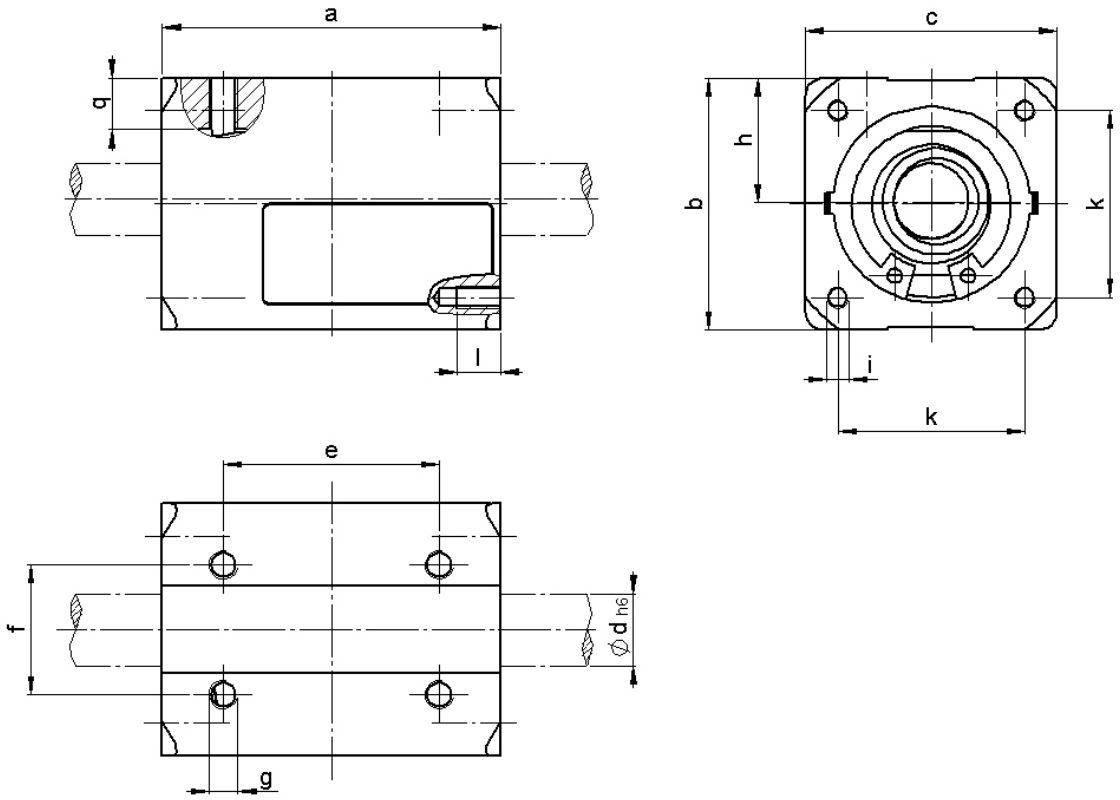
When assembling the actual load, you must categorically ensure that the fastening screws do not protrude into the inside of the casing.

Otherwise the drive nuts become damaged. This damage impairs the drive nut's function or renders it completely useless.

Table 1: Dimensions for RS types (mm)

	Weight														Technical data		
Type	m [kg]	a*	a_1*	b	c	d_{h6}	e	f	g	$h^{+0.3**}$	i	k	l	q	F_{RS} [N]	M_o [Ncm]	h [mm]
RS3-08-4	0.09	40	54	30	30	8	26	16	M4	15	M3	24	6	5	50	0.7	4
RS4-08-4	0.11	48	62	30	30	8	26	16	M4	15	M3	24	6	5	100	1.4	4
RS3-10-4	0.14	47	65	35	35	10	30	18	M4	16,8	M3	26	6	5	100	1.8	5
RS4-10-4	0.18	55	73	35	35	10	30	18	M4	16,8	M3	26	6	5	200	5.0	5
RS4-15-4	0.23	62	82	40	40	15	26	18	M4	19,6	M4	30	8	5	260	5.0	7.5
RS4-20-4	0.55	83	108	52	52	20	40	30	M5	26	M5	40	11	8	420	10.0	10
RS4-25-4	0.70	85	110	60	60	25	40	30	M5	29,4	M5	45	10	9	600	20.0	12.5
RS4-35-4	1.55	105	126	80	80	35	50	40	M6	40	M6	60	12	13	900	45.0	17.5
RS4-50-3	2.70	120	140	100	100	50	50	50	M8	48,8	-	-	-	16	1300	140.0	25
RS4-60-3	4.20	130	156	120	120	60	69	62	M10	58,4	-	-	-	15	2000	200.0	30

Bold type:	**Note:**	F_{RS} [N]	= maximum thrust
Standard configuration	* When using wipers dimension a changes to a_1	M_o [Ncm]	= idling torque
	** Applies to standard gradient 0.5 x d. With lower gradients the value is smaller.	h [mm]	= maximum gradient



3. Assemble the actual load as closely as possible to the drive nuts.

   Lever arms have an effect on the thrust!

4. Secure the drive nut against twisting.

5. If rotation is prevented using an actual load on the carriage, allowance should be made in the coupling to compensate for any misalignment between the shaft and the carriage. Keep the distance between the coupling and the drive nut as low as possible.

   Torque has an effect on the drive nut's thrust. This is why the ideal coupling is twist-free.

The drive nut must run without tension throughout the entire stroke distance.

The adjusting screws are labelled with red locking varnish. Do not make any changes to these screws! The drive nut's characteristics change if they are twisted.

The claim under guarantee expires if you interfere with the adjusting screws without permission during the guarantee period.

4. Operation

The RS drive nut's standard configurations are only designed for indoor use at standard room temperatures.

4.1. Prerequisites for trouble-free operation

4.1.1. Correct assembly

The drive nut will run almost wear-free if it has been correctly assembled. Slipping does not occur.

ATTENTION	**Physical damage due to the drive nut slipping**
	The shaft must be shut down immediately if the drive nut slips when the shaft is rotating due to a fault, such as an obstruction or overloading. Otherwise damage may occur to the drive nut and/or the shaft.

4.1.2. Observing the predetermined shaft speed

Each RS drive nut is designed for the speed that is predetermined by the operator. It may be operated at this speed as a maximum. Depending on the type, the maximum shaft speeds stated in the following Table 2 apply.

Table 2: Drive nut types and their maximum shaft speed

Type of drive nut	Max. shaft speed
RS 3-08-4	10000 min^{-1}
RS 4-08-4	10000 min^{-1}
RS 3-10-4	10000 min^{-1}
RS 4-10-4	10000 min^{-1}
RS 4-15-4	8000 min^{-1}
RS 4-20-4	7000 min^{-1}
RS 4-25-4	6000 min^{-1}
RS 4-35-4	4000 min^{-1}
RS 4-50-3	3400 min^{-1}
RS 4-60-3	2500 min^{-1}

The critical shaft speed is calculated using the following formula:

$$n_{crit} = 1{,}225 \cdot 10^8 \frac{d}{l^2}$$

Where:

d = shaft diameter in mm

l = shaft length between the contact points in mm

ncrit = critical shaft speed in min^{-1}

Depending on its geometric quality, the shaft can go out of balance at a speed of up to 25% lower than that specified above. This may lead to short term shaft vibration if it is necessary to go through a critical range in order to reach the operational speed. This has no effect on the operation of the drive nut.

If the operating speed is in the critical range, you can rectify this as follows:

1. With a double bearing support at one end: increase factor approx. 1.5
2. With double bearing supports at both ends: increase factor approx. 2.2.

The distance between the bearing support brackets should be at least 2.5 times the diameter of the shaft when using double bearing supports.

In cases of doubt, please contact the manufacturer.

4.1.3. Observing the default thrust

In the factory, the RS drive nut's thrust is set to a value that guarantees high functional reliability with a longer lifespan.

ATTENTION	**Physical damage due to the user altering the thrust**
	Do not alter the thrust! Otherwise it may cause considerable malfunctions and the drive nut's service life to be impaired.

It may cause a loss of thrust after a longer service life. Please contact the manufacturer if this occurs.

Request detailed documents for this purpose. Please also state the article number of the RS drive nut in question. You can find the article number on the type plate attached to the drive nut (see Section *1.1.1 Identifying the RS Drive Nut*).

4.2. Handling

As a basic principle, the drive nut is handled in the same way for all types. Only specific design configurations need to be handled differently to the standard type.

DANGER	**Danger of injury at pinch points in the drive nut's movement**
	There are pinch points between the inner right and left sides of the bearing support brackets and the drive nut. There is a danger of severe injury at these pinch points when the drive nut moves. ➢ Secure these pinch points and the rotating shaft against contact. ➢ You must categorically never reach into the drive nut.

4.2.1. Drive nut with free-movement lever

DANGER	**Danger of injury when operating the free-movement levers on drive nuts with vertical drives**
	If a drive nut is used with a mechanical or pneumatic free-movement lever on a vertical drive, the drive nut may drop quickly and in an uncontrolled way after the free-movement lever is operated. There is a danger of severe injuries here. ➢ Secure the drive nut and any loads before operating the free-movement lever.

The RS3-08-4… to RS4-35-4…-type drive nuts may be equipped with a mechanical or pneumatic free-movement lever. The free-movement lever is used to raise the traction between the RS drive nut and the shaft.

4.2.1.1. Drive nuts with a mechanical free-movement lever

Turn the free-movement lever by 90 degrees to the right or left

You can now freely move the drive nuts backwards and forwards on the shaft.

In order to recreate the traction, turn the free-movement lever back through 90 degrees into its original position.

4.2.1.2. Drive nuts with a pneumatic free-movement lever

Counteract the force closure with the aid of compressed air.

You can now freely move the drive nuts backwards and forwards on the shaft.

In order to recreate the traction, bleed the free-movement lever again.

5. Maintenance and repair

5.1. Maintenance interval

Perform maintenance on the RS drive nut at least once every three months.

If the drive nut is subject to heavy-duty operation, monthly or weekly maintenance is required.

Examples of heavy-duty conditions are:

- use in shift operation
- use in heavily polluted areas
- use in environmental temperatures above 70°C

5.2. Grease

Standard MoS_2-free anti-friction bearing grease is approved for lubricating the shaft, for example:

- SKF Alfalub LGMT 2
- Shell Alvania EP (LS) 2
- Esso Beacon 2
- BP Energrease LS2

5.3. Maintenance procedure

1. Clean the shaft.
2. Apply a very thin layer of grease onto the shaft using a clean cloth.

5.4. Repair

In the event of an error in the functionality of an RS drive nut, or if there is a defect, please contact the Sales Department of Joachim Uhing GmbH & Co. KG or your relevant agency abroad.

Repairs must only be performed by specialist personnel who have been authorised by the manufacturer.

If trouble-shooting and/or repair is not possible or useful on your premises, please send the RS drive nut to the manufacturer or to the responsible agency abroad.

5.5. Spare parts

All components that are equipped with the RS drive nut can basically be replaced.

Whichever components the drive nuts you use consist of, please see the Section *6.3 Basic Types of RS Drive nuts*

The article number, which you need for ordering the relevant components, is also stated there.

Experience has taught us that only the rolling rings used in the RS drive nuts need to replaced after a few years of use. Compression springs/disc spring gear clusters are also routinely replaced in this process.

The replacement is generally performed on the manufacturer's premises. You can send the RS drive nut to the manufacturer or to the relevant agency for this purpose.

6. Technical appendix

6.1. RS drive nut design groups

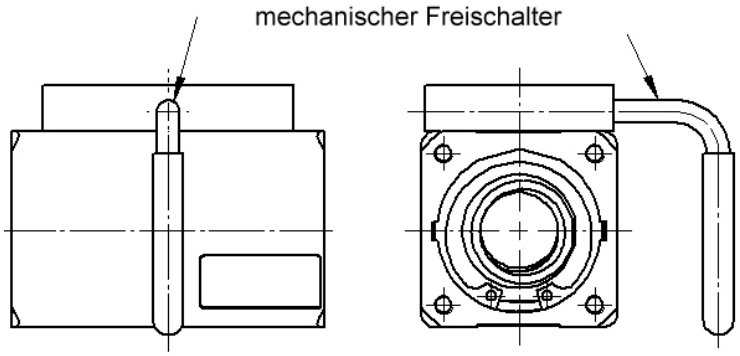
The RS drive nut is available in standard designs and in four customer-specific configurations.

6.1.1. RS drive nut standard design

The standard design of an RS drive nut is supplied without a free-movement lever, steady rollers or other special configuration.

6.1.2. F configuration

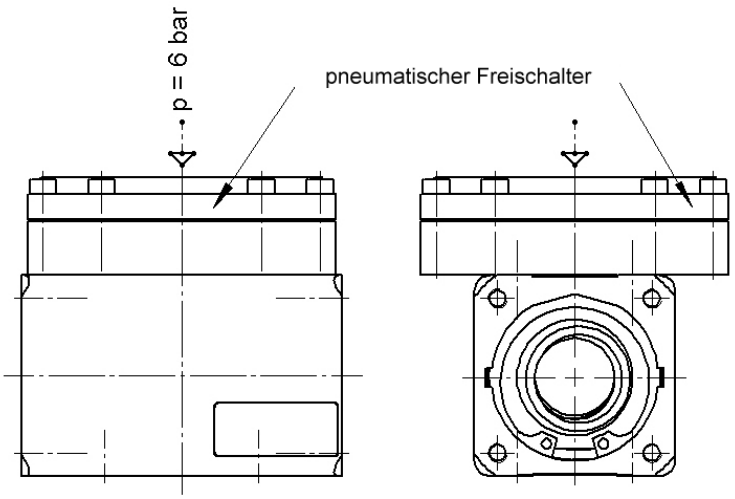
RS drive nuts with a mechanical free-movement lever are part of the F configuration. The free-movement lever enables the RS drive nut to be freely pushed on the shaft.



6.1.3. P configuration

RS drive nuts with a pneumatic free-movement lever are part of the P configuration (operating pressure: 6 bar). The free-movement lever enables the RS drive nut to be freely pushed on the shaft.

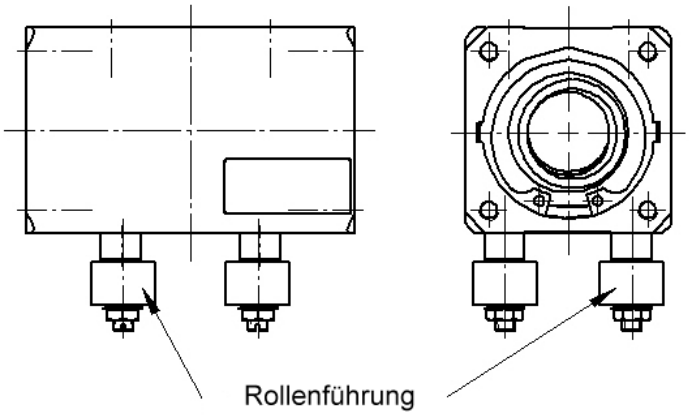
The thrust reduces when using a pneumatic free-movement lever! Please discuss this with the manufacturer.



6.1.4. R configuration

RS drive nuts with steady rollers are part of the R configuration.

The steady rollers are used as an anti-turn device, which prevents the drive nut turning on the shaft.



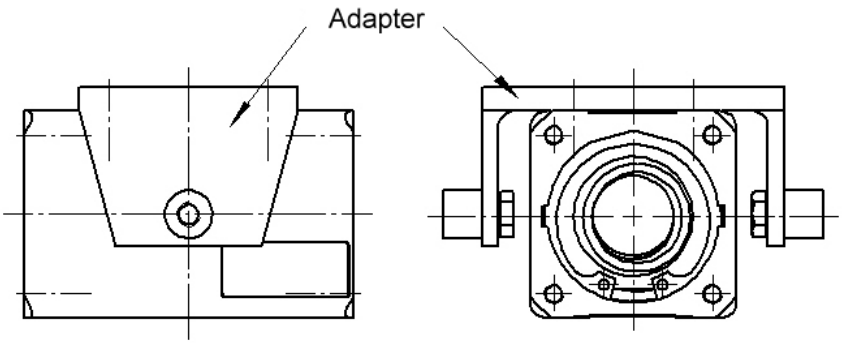
6.1.5. X configuration

RS drive nuts with a customer-specific configuration are part of the X configuration. The following components are available:

- **Reduced thrust**
  For function-dependent thrusts below the standard thrust.

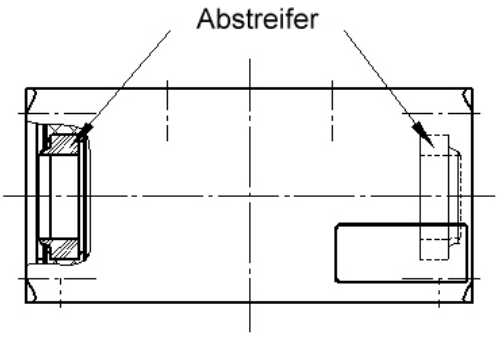
- **Special surface coating**
  Finishes, coloured anodising and other surface protections are possible.

- **Adapters**
  For torque-free coupling.



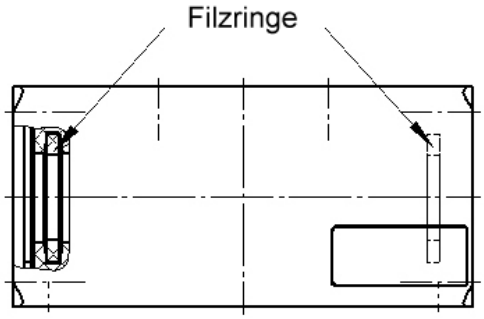
- **Wipers**
  For sealing against liquid, viscous and paste-like media.

When using wipers, the dimensions of table 1 *Dimensions for RS Types* in Section 3.2 named in column a[1] apply.

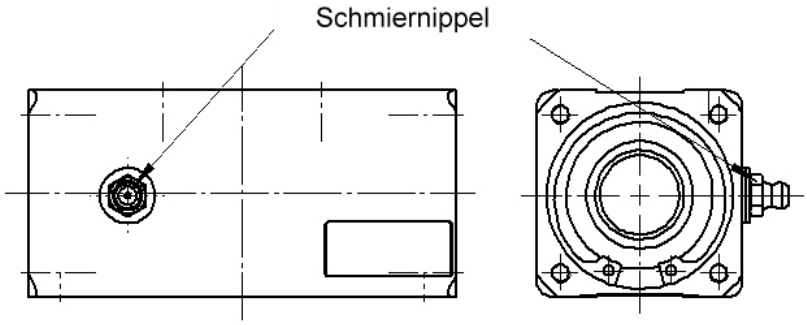


- **Felt rings**
  For sealing against dust and other coarse particles.

When using felt rings, dimension a changes (see table 1 *Dimensions for RS Types* in Section 3.2). Please discuss this this with the manufacturer.



- **Grease nipple**
  For lubricating the RS drive nuts using a grease gun.

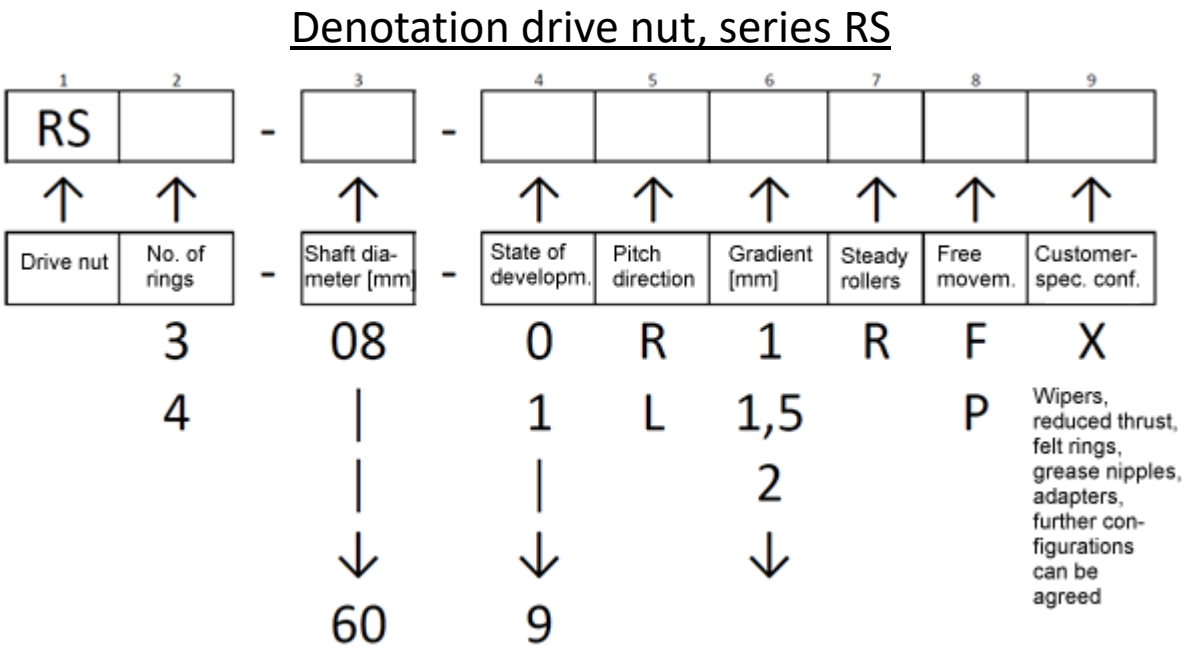


6.2. Designation logic for the RS drive nut

The designation of the RS drive nut contains information about the type and the configuration.

The designation of each RS drive nut is composed of a maximum of nine fields. Fields 1 - 6 always contain information. Fields 7, 8 and 9 are only filled in for particular drive nut configurations.

Field	Meaning
1	Product abbreviation of the Uhing drive nut: RS
2	Rolling ring number of the drive nut: 3 or 4
3	Shaft diameter of the drive nut in mm
4	State of development: a number from 0 to 9
5	Pitch direction: R = right, L = left
6	Gradient in mm
7	Steady rollers, if integrated
8	Type of free-movement switch, if integrated
9	Customer-specific configuration, if integrated

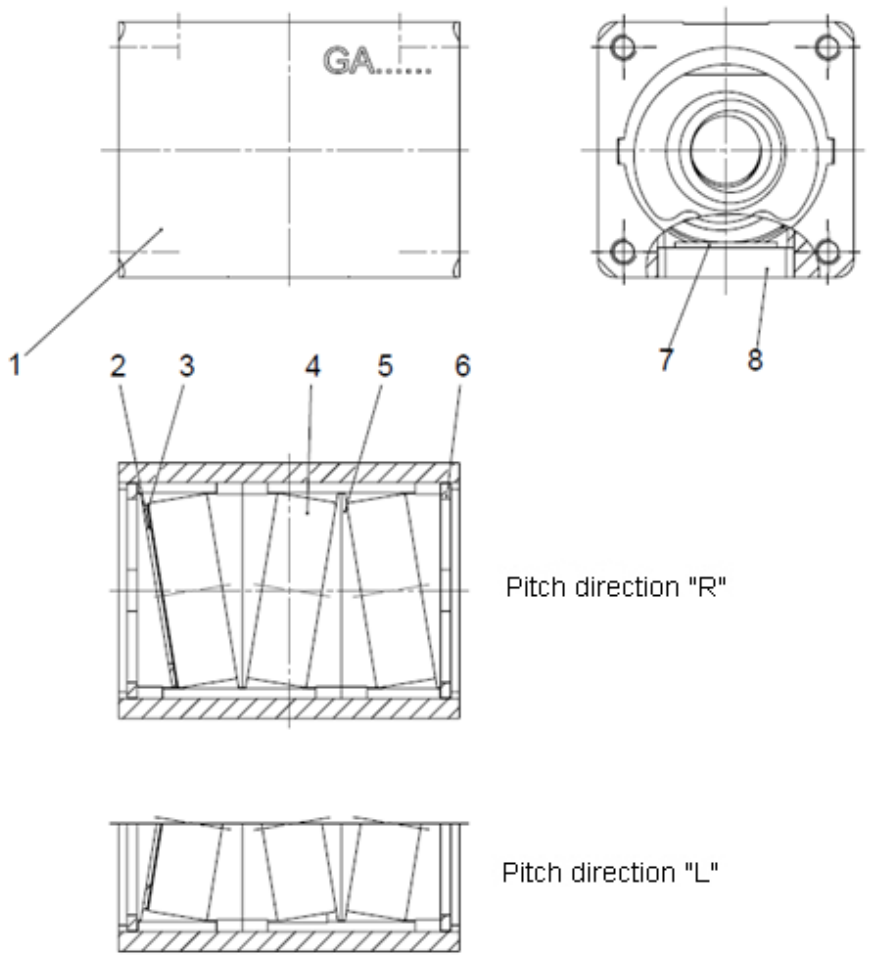


6.3. Basic types of RS drive nut

This section provides an overview of the basic types and parts lists with all the article numbers and drawings.

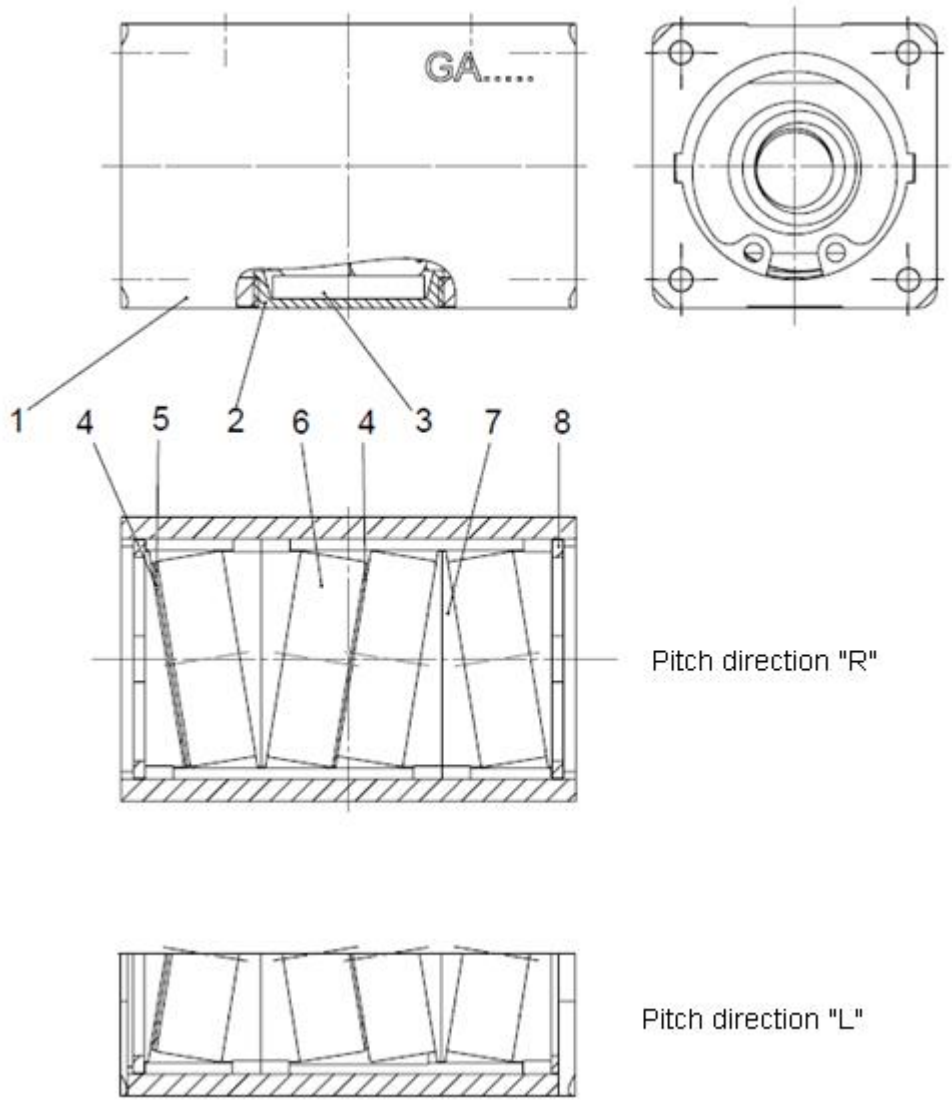
6.3.1. RS3-08-4R4 drive nut

Article no.	**527080001**	**Drawing no. 10D2708.0001**		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227080003	Casing		1
2	304090105	Shim	988 16x22x0.5	1
3	602150001	Ball bearing shim washer	KAS20	1
4	213080003	Roller ring		3
5	127080002	Tapered ring		6
6	305050606	Locking ring	472 24x1.2	2
7	227080001	Spring		1
8	227100024	Adjusting screw		1



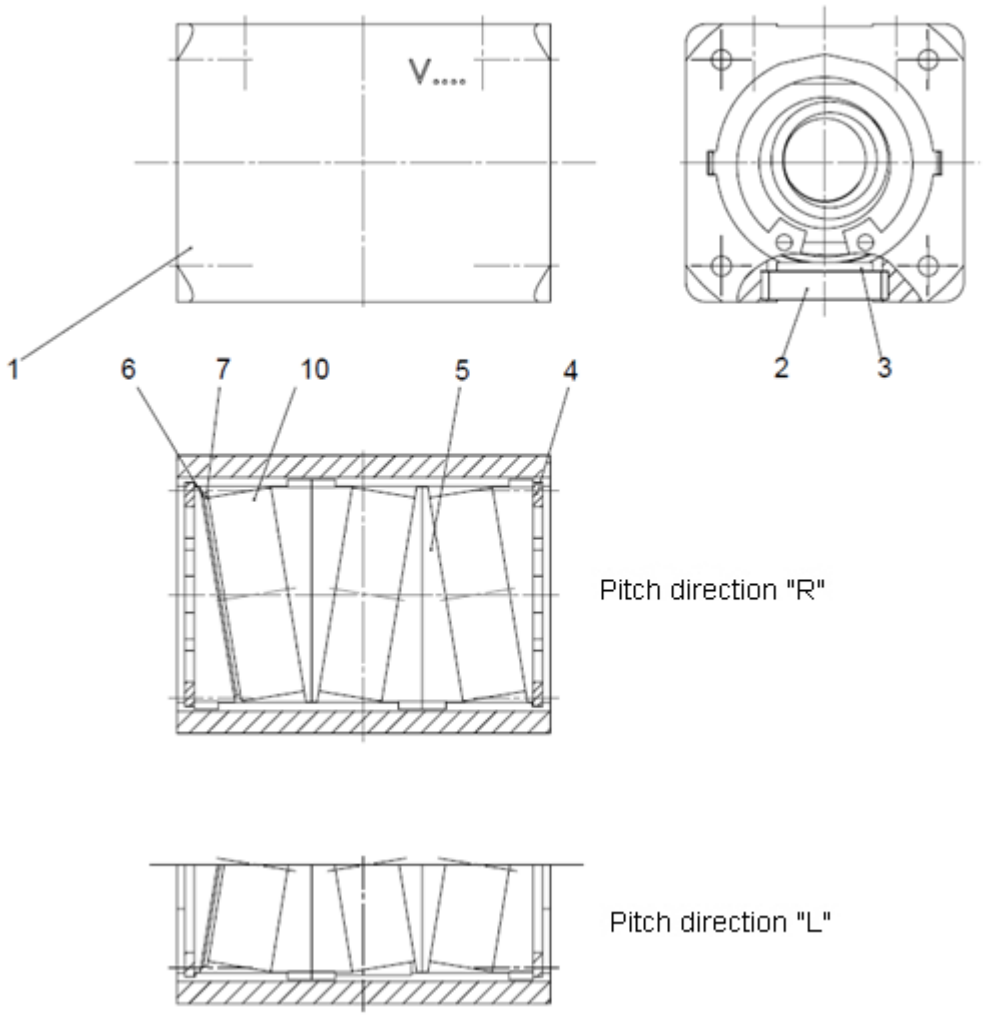
6.3.2. RS4-08-4R4 drive nut

Article no.	**527080002**	**Drawing no. 10D2708.0002**		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227080004	Casing		1
2	227150004	Adjusting screw		1
3	227080002	Spring		1
4	304090621	Shim	988 16x22x0.3	2
5	602150001	Ball bearing shim washer	KAS20	1
6	213080003	Roller ring		4
7	127080002	Tapered ring		6
8	305050606	Locking ring	472 24x1.2	2


GA.....
1
4
5
2
6
4
3
7
8
Pitch direction "R"
Pitch direction "L"

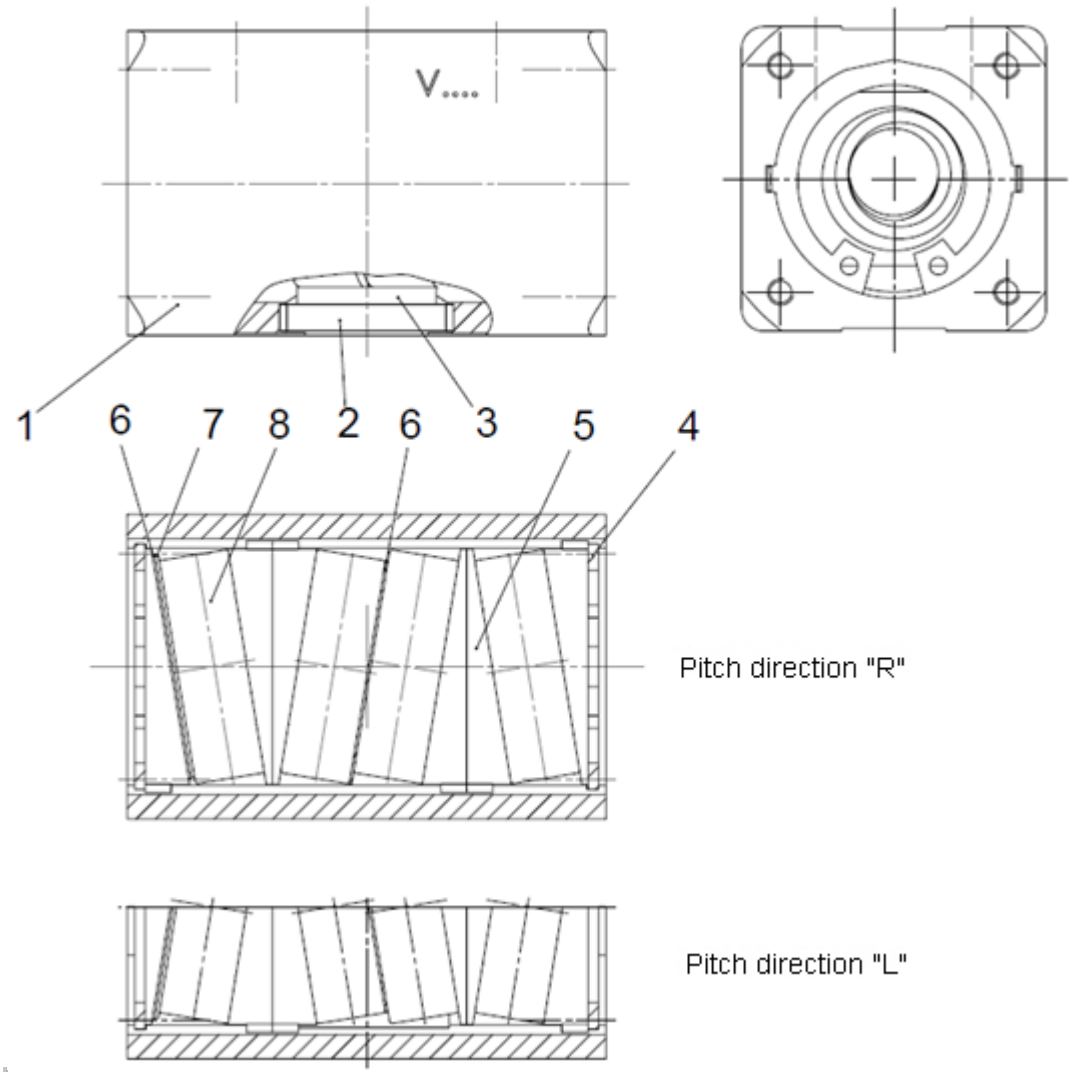
6.3.3. RS3-10-4R5 drive nut

Article no.	527100001	Drawing no. 10D2710.0018		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227100020	Casing		1
2	227100024	Adjusting screw		1
3	227100004	Spring		1
4	305050012	Locking ring	472 27x1.2	2
5	227100002	Tapered ring		6
6	304090322	Shim	988 19x26x0.3	1
7	602150002	Ball bearing shim washer	KAS26	1
10	213100001	Roller ring		3



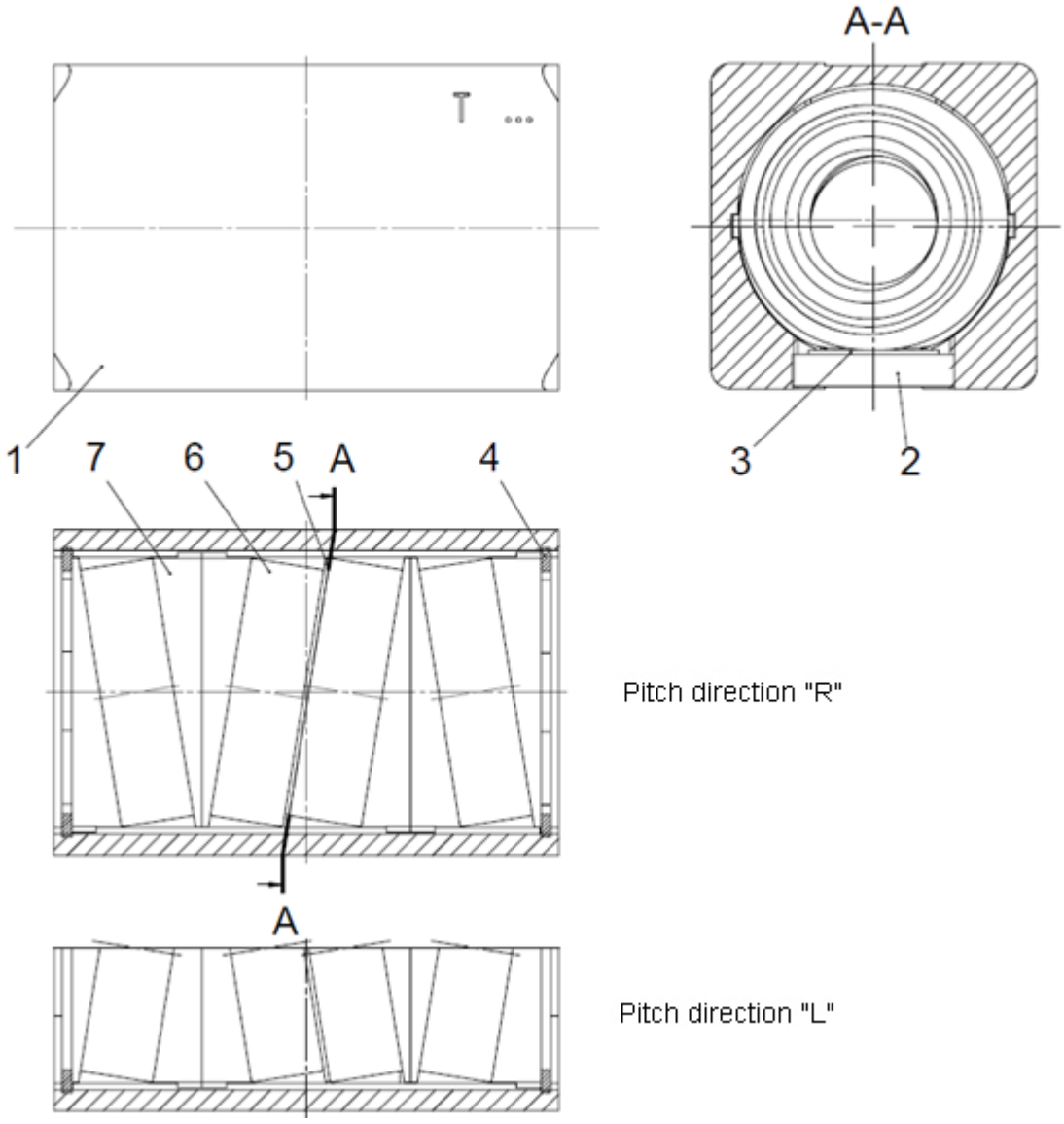
6.3.4. RS4-10-4R5 drive nut

Article no.	527100005	Drawing no. 10D2710.0056		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227100017	Casing		1
2	227100030	Adjusting screw		1
3	227100029	Spring		1
4	305050012	Locking ring	472 27x1.2	2
5	227100002	Tapered ring		6
6	304090322	Shim	988 19x26x0.3	2
7	602150002	Ball bearing shim washer	KAS26	1
8	213100001	Roller ring		4



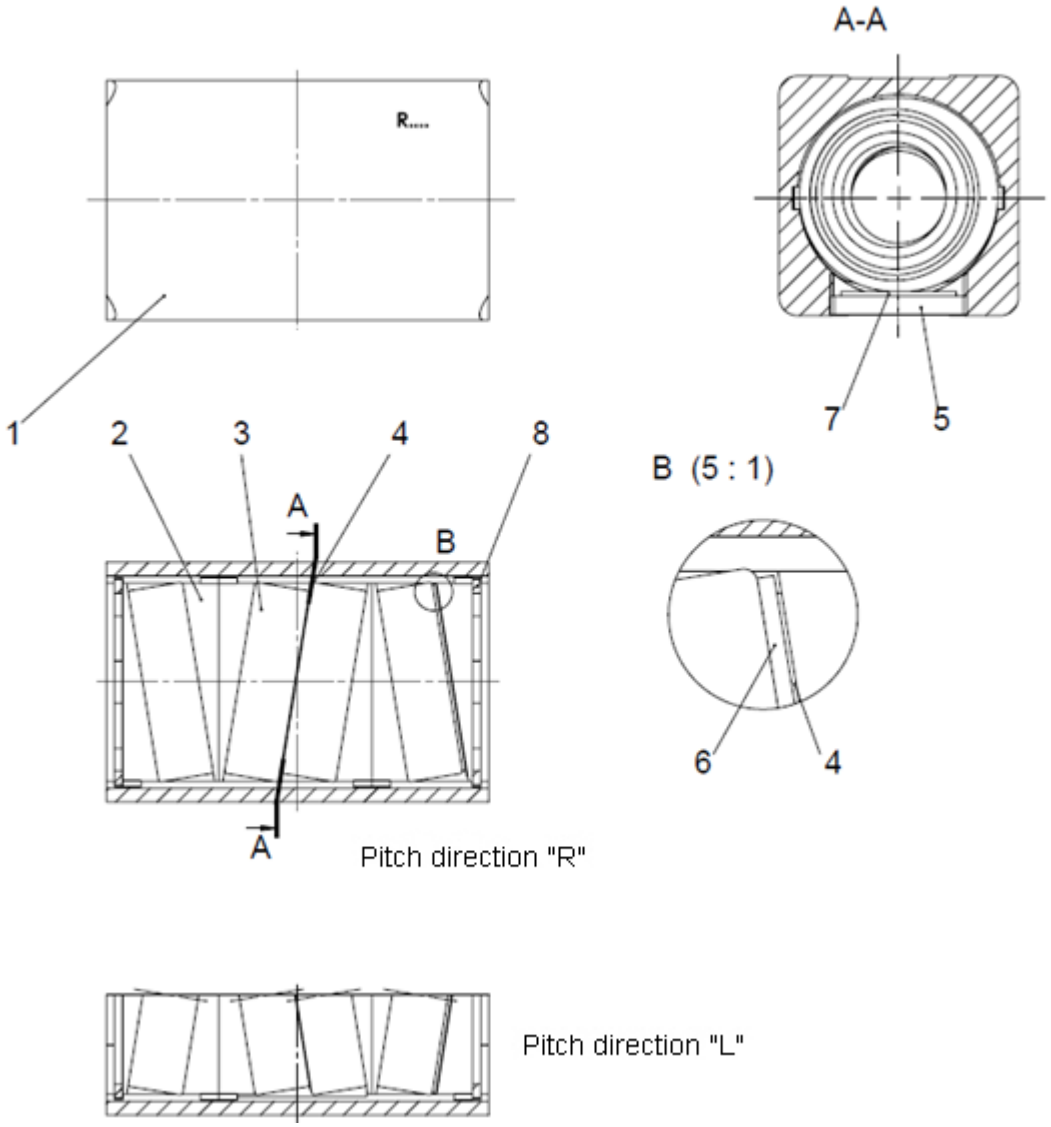
6.3.5. RS4-15-4R7,5 drive nut

Article no.	527150001	Drawing no. 10D2715.0013		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227150034	Casing		1
2	227150004	Adjusting screw		1
3	227150008	Spring		1
4	305050028	Locking ring	472 33x1.2	2
5	602150003	Ball bearing shim washer	KAS32	1
6	213150002	Roller ring		4
7	227150002	Tapered ring		6



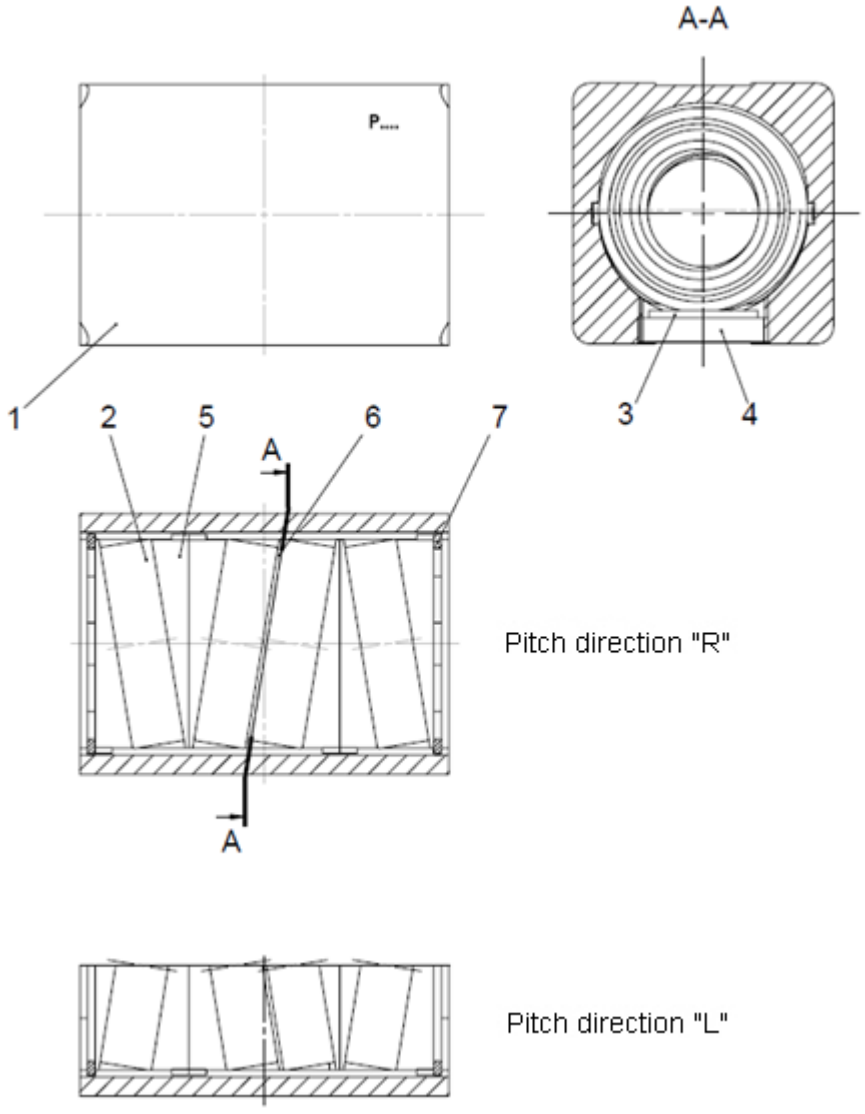
6.3.6. RS4-20-4R10 drive nut

Article no.	527200001	Drawing no. 10D2720.0010		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227200049	Casing		1
2	227200002	Tapered ring		6
3	213200002	Roller ring		4
4	304090368	Shim	988 30x42x0.2	2
5	227200003	Adjusting screw		1
6	602150006	Ball bearing shim washer	KAS42a	1
7	227200004	Spring		1
8	305050040	Locking ring	472 43x1.75	2



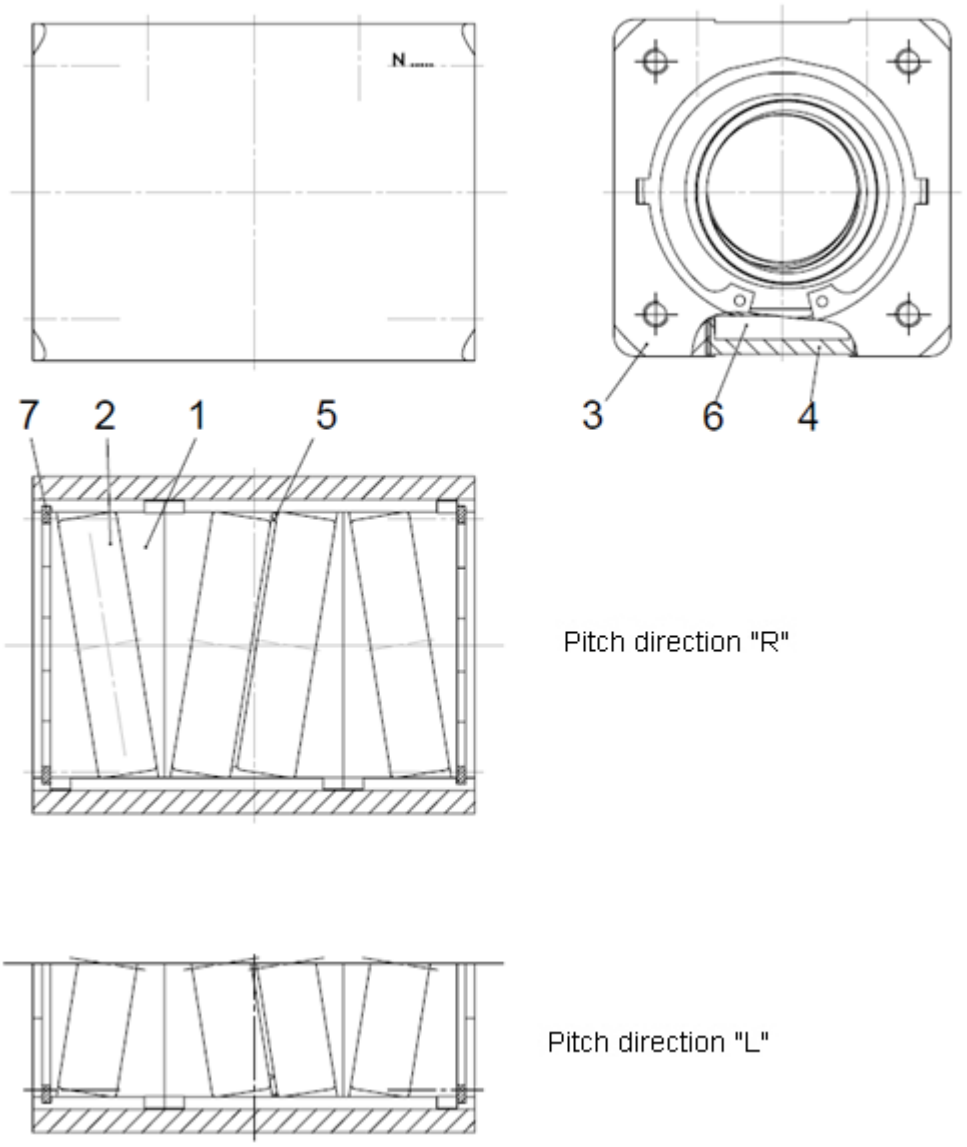
6.3.7. RS4-25-4R12,5 drive nut

Article no.	527250001	Drawing no. 10D2725.0018		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227250086	Casing		1
2	213250001	Roller ring		4
3	227250008	Spring		1
4	227250007	Adjusting screw		1
5	227250005	Tapered ring		6
6	602150004	Ball bearing shim washer	KAS47b	1
7	305050048	Locking ring	472 48x1.75	2



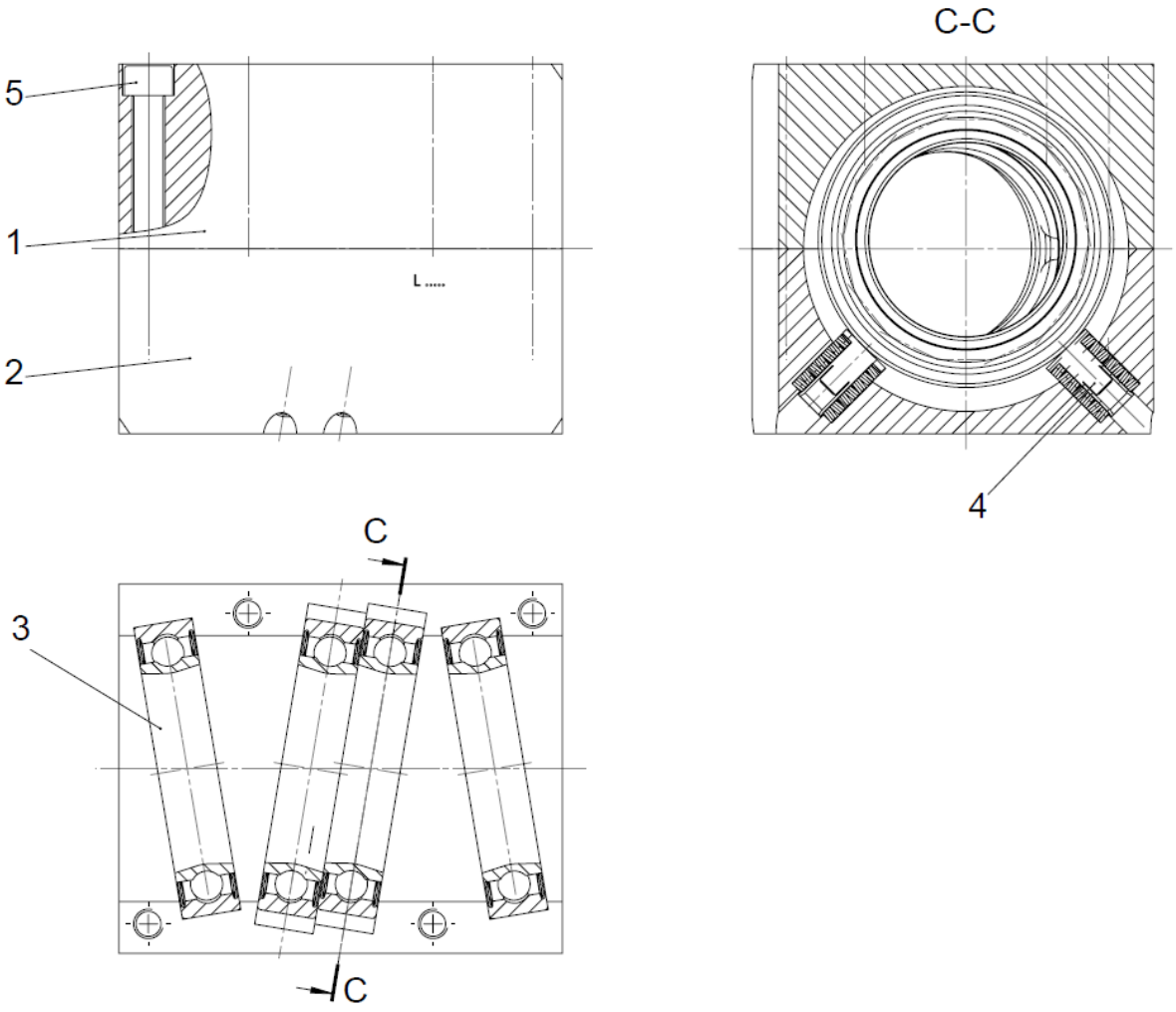
6.3.8. RS4-35-4R17,5 drive nut

Article no.	527350001	Drawing no. 10D2735.0024		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227350025	Tapered ring		6
2	213350001	Roller ring		4
3	227350023	Casing		1
4	227350027	Adjusting screw		1
5	602150005	Ball bearing shim washer	KAS62	1
6	227350028	Spring		1
7	305050072	Locking ring	472 63x2	2



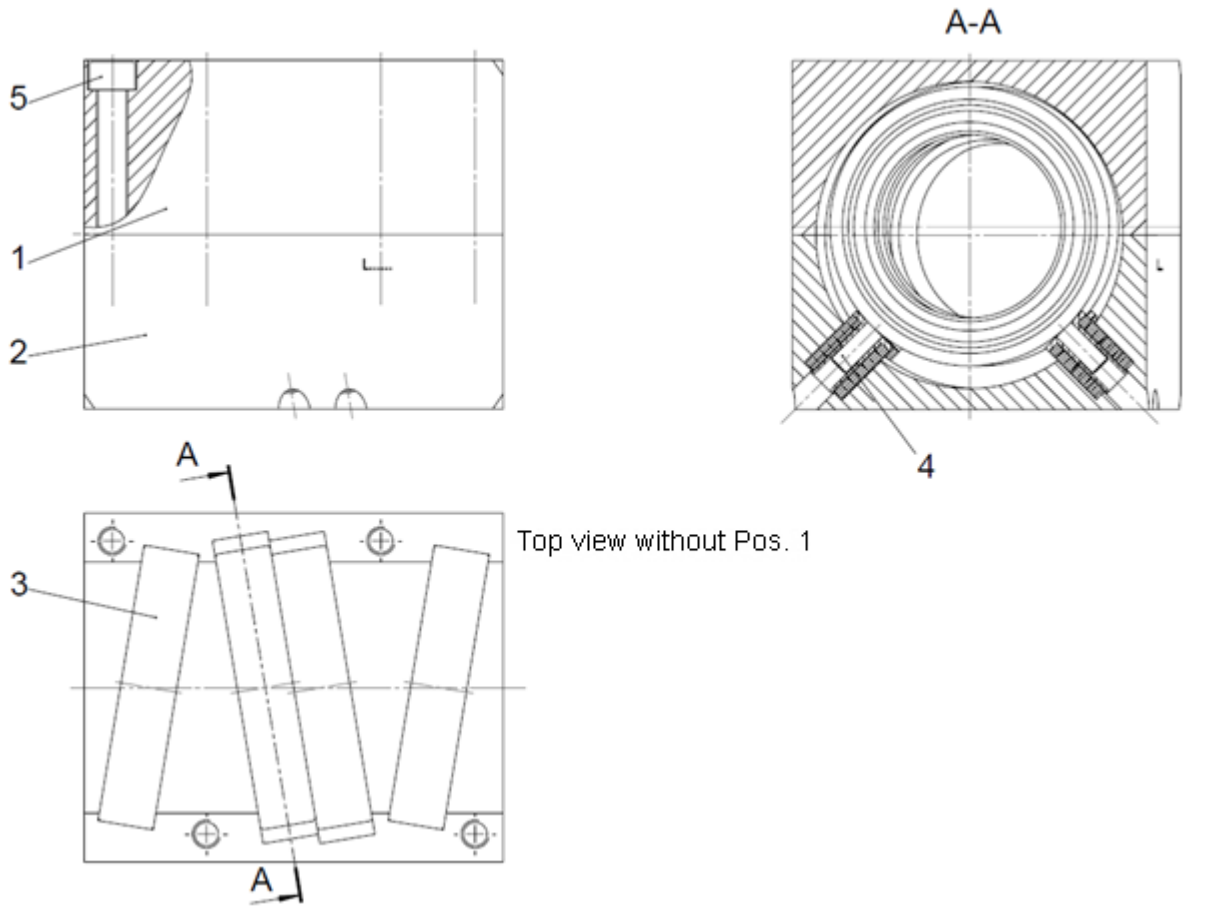
6.3.9. RS4-50-3R25 drive nut

Article no.	527500001	Drawing no. 10D2750.0010		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227500001	Upper part of casing		1
2	227500002	Lower part of casing		1
3	213500001	Roller ring		4
4	427500001	Disc spring gear clusters (complete)		4
5	301210284	Cylinder bolt	912 – M8 x 60 – 8.8	4



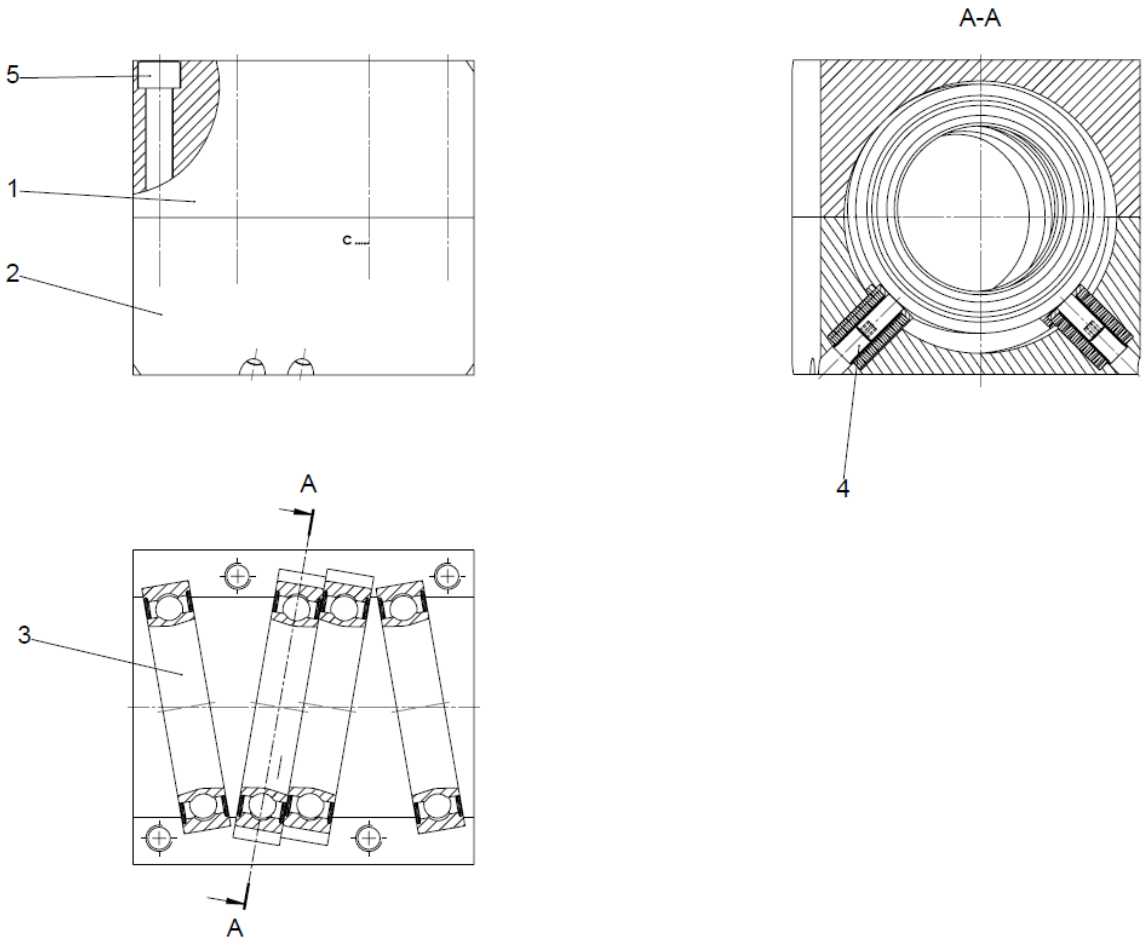
6.3.10. RS4-50-3L25 drive nut

Article no.	527500002	Drawing no. 10D2750.0011		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227500006	Upper part of casing		1
2	227500007	Lower part of casing		1
3	213500001	Roller ring		4
4	427500001	Disc spring gear clusters (complete)		4
5	301210284	Cylinder bolt	912 – M8 x 60 – 8.8	4



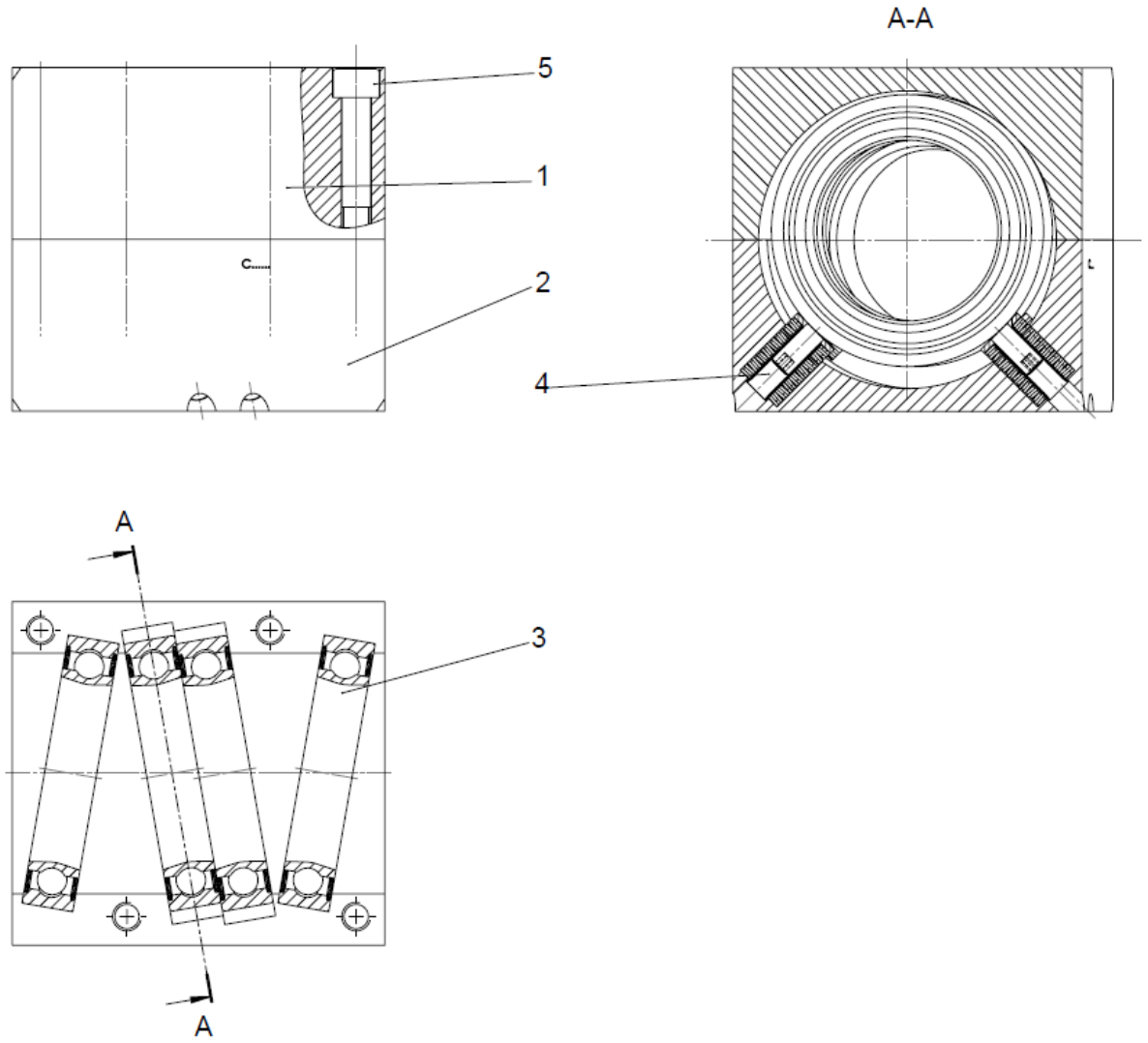
6.3.11. RS4-60-3R30 drive nut

Article no.	527600001	Drawing no. 10C2760.0000		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227600001	Upper part of casing		1
2	227600002	Lower part of casing		1
3	213600001	Roller ring		4
4	427600001	Disc spring gear clusters (complete)		4
5	301210340	Cylinder bolt	912 – M10 x 70 – 8.8	4



6.3.12. RS4-60-3L30 drive nut

Article no.	527600002	Drawing no. 10C2760.0001		
Item	**Article no.**	**Designation**	**Note**	**Number**
1	227600006	Upper part of casing		1
2	227600007	Lower part of casing		1
3	213600001	Roller ring		4
4	427600001	Disc spring gear clusters (complete)		4
5	301210340	Cylinder bolt	912 – M10 x 70 – 8.8	4



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