

Linear Recirculating Roller Bearing and Guideway Assembly RUE-F

Mounting manual

Linear recirculating roller bearing and guideway assemblies RUE-F

About the mounting manual

This manual applies to linear recirculating roller bearing and guideway assemblies RUE...F. The guidance systems should only be fitted in accordance with this manual.

Symbols

The warning and hazard symbols are defined in accordance with ANSI Z535.6-2011.



In case of non-compliance, minor or moderate injury may occur. <

NOTICE

In case of non-compliance, damage or malfunctions in the product or the adjacent construction may occur. <

Tools and ancillary equipment required

The following tools and ancillary equipment are required for the mounting of linear recirculating roller bearing and guideway assemblies RUE...F:

- cleaning agent
- oil stone
- spring steel strip
- plastic hammer
- vernier
- dial gauge
- feeler gauge
- Allen key
- torque wrench
- open-end wrench
- lubricant

Mounting area, mounting tools

NOTICE

Malfunction caused by contamination. Unsuitable or contaminated tools can reduce the function and operating life of the guidance systems considerably. Contamination and moisture will impair the accuracy and function of the elements considerably and lead to an ongoing reduction in their operating life.

It must be ensured that contaminants and moisture cannot penetrate the units.

Guidance systems should only be fitted using the tools specified.

Machines, devices or equipment that generate cutting debris or dust must not be used in the vicinity of the fitting area.

The adjacent construction should be kept clean. <

Linear recirculating roller bearing and guideway assemblies RUE-F

Checking the adjacent construction

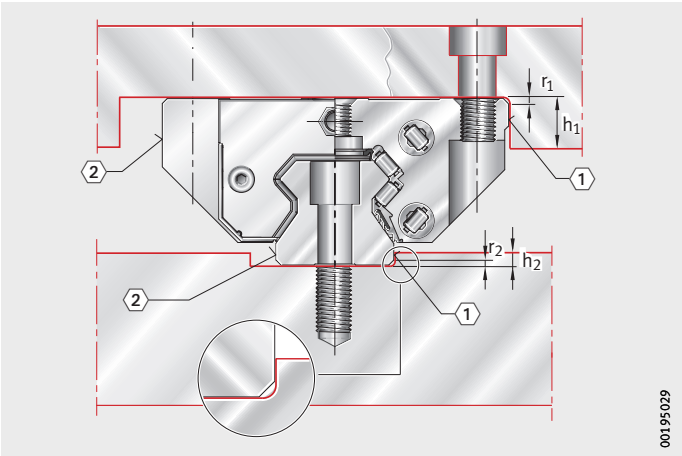
Checking the locating faces

- Check the holes and locating edges for burrs.
- Remove any burrs using an oil stone.
- Check the locating heights and corner radii, *Figure 1* and *table*.
- Correct any deviations.
- Ensure that the locating surfaces on the adjacent construction are in full contact with the locating surfaces on the carriage and guideway.

- ① Locating face
- ② Marked face

Figure 1
Locating heights and corner radii

Locating heights and corner radii



Designation	Locating heights		Corner radii	
	h_1 mm	h_2 mm max.	r_1 mm max.	r_2 mm max.
RUE35-F (-L, -H, -HL)	8	6	1	0,8
RUE45-F (-L, -H, -HL)	10	8	1	0,8
RUE55-F (-L, -H, -HL)	12	9,5	1	0,8
RUE65-F (-L, -H, -HL, SL)	15	10,5	1	0,8

Checking the dimensional and positional tolerances

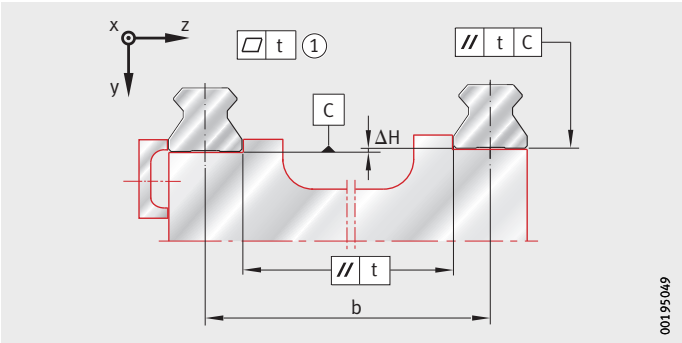
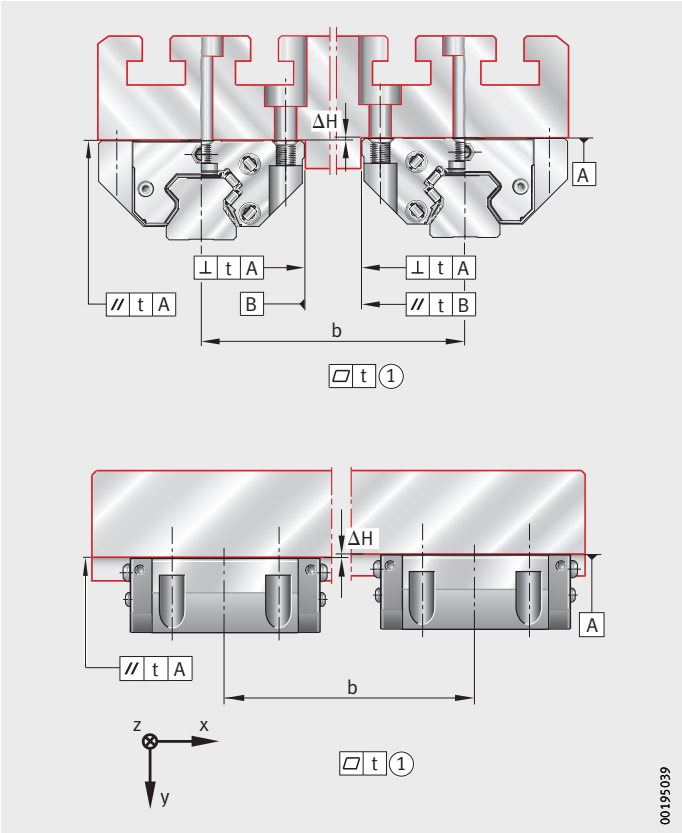
- ▶ Checking the dimensional and positional tolerances of the screw mounting and locating surfaces, see *table* and *Figure 2*, page 4.
- ▶ Machine the surfaces if necessary.
- ▶ If the machine bed has two defined locating surfaces, check the parallelism of the locating surfaces.
- ▶ Checking the parallelism, flatness and perpendicularity of the locating surfaces, see *table* and *Figure 3*, page 4.
At the specified maximum values, the displacement resistance may increase.
- ▶ The tolerance for parallelism, flatness and perpendicularity is determined by the preload class, see *table*. If deviations are identified, rework the support and locating surfaces for the guide-ways on the adjacent construction.

Values for geometry and position

Guideway ¹⁾	Preload class	
	V1, V2	V3 ²⁾ , V4, V5
	Parallelism, flatness, perpendicularity	
	t μm	
TSX35-E	15	10
TSX45-E	17	10
TSX55-E	20	10
TSX65-E	20	10

1) Valid for all guideway variants.
2) Standard preload class.

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Determining the height difference

- Determine the height difference ΔH (μm) of the support surfaces.
- Calculate the height difference, see *formula*, and compare this with the measured value.
- Machine the surfaces if necessary.

Height difference ΔH

For ΔH , permissible values are in accordance with the following equation.

$$\Delta H = a \cdot b$$

ΔH μm
Maximum permissible deviation from the theoretically precise position,
Figure 2, page 4
 a –
Factor, dependent on the preload class,
see *table*
 b mm
Centre distances between guidance elements

Factor a

Preload class	Factor a
V1	0,15
V2	0,09
V3 ¹⁾	0,075
V4	0,06
V5	0,06

¹⁾ Standard preload class.

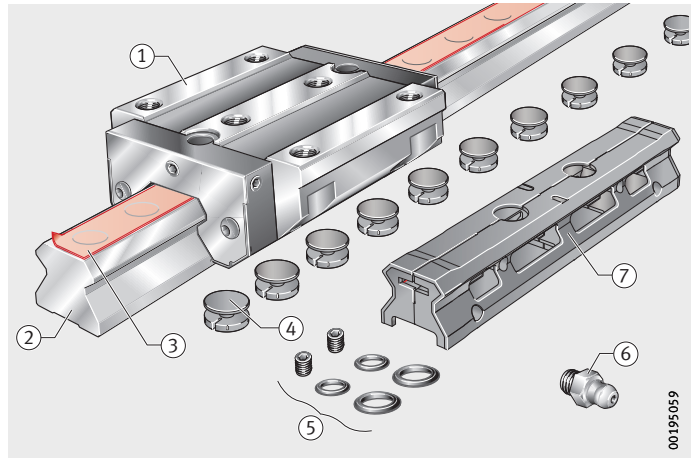
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Checking the scope of delivery

Do not remove the units from their packaging until immediately before fitting.

- ① Carriage
- ② Guideway
- ③ Adhesive strip (dependent on guideway variant)
- ④ Closing plugs (according to order)
- ⑤ Mounting set
- ⑥ Lubrication connector (according to order)
- ⑦ Dummy guideway

Figure 4
Scope of delivery (by way of example)



The carriage and guideway are protected by a preservative.



Sharp-edged counterbores. Risk of injury due to contact with sharp edges. The adhesive strip should only be removed when the units are fitted. ⚠

NOTICE

Open counterbores. Risk of damage to the seal lips as a result of moving the carriage over counterbores which have not been closed off. Do not move the carriage over counterbores that have not been closed off. If the carriage must be moved, protect the seal lips by sliding a spring steel strip (0,2 mm thick) between the guideway surface and the carriage. Bend the ends up slightly at both ends of the carriage. ⚠

The spring steel strip ⑧ must be produced by the customer.

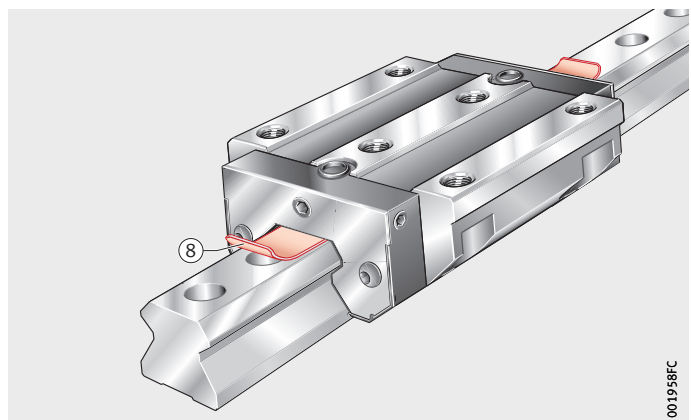
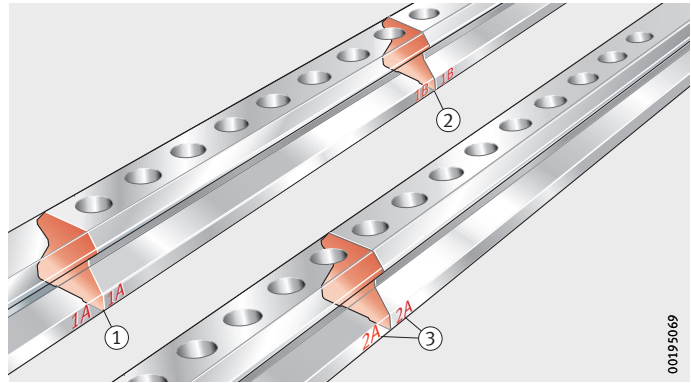


Figure 5
Spring steel strip with bent ends at both ends of the carriage

Multi-piece guideways are packed in sets. The joints ①, ②, ③ are marked consecutively, *Figure 6*.

①, ②, ③ Joints

Figure 6
Multi-piece guideways

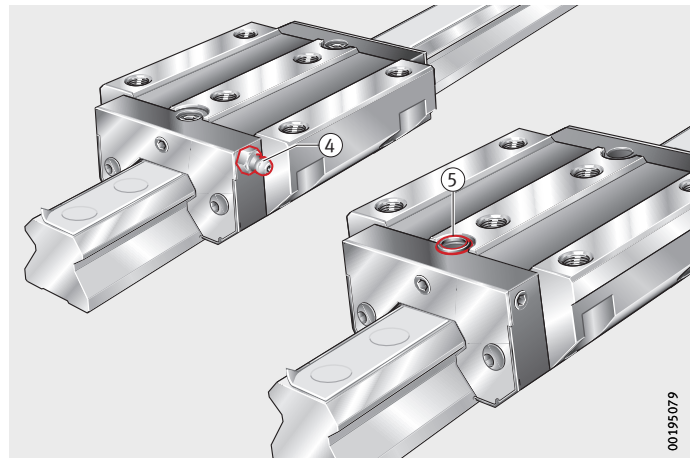


Mount the guideways such that the numbers and letters adjacent to each other are identical.

As standard, carriages have grease nipples similar to DIN 71412-A-M6 for lubrication via the end faces or sides (included in delivery) ④. If a different lubrication connector was selected when ordering, this is included instead of the standard lubrication connector. Alternatively, carriages can also be lubricated from above via the adjacent construction ⑤, *Figure 7*.

④ Lubrication from the side
⑤ Lubrication from above

Figure 7
Lubrication



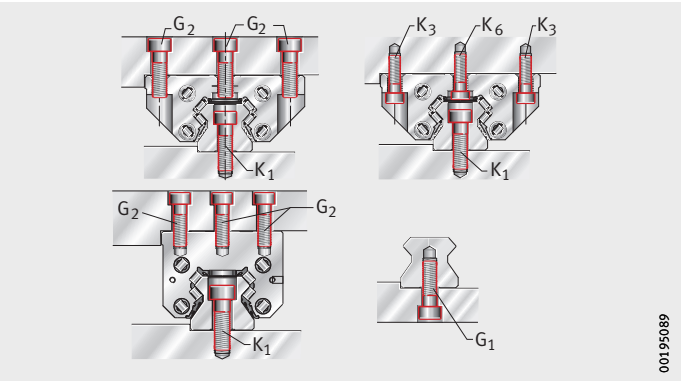
Other lubrication connectors for grease or oil lubrication are available as accessories.

Linear recirculating roller bearing and guideway assemblies RUE-F

Fixing screws and tightening torques

Units must only be located using the screws specified.
It is absolutely essential that the correct size, quantity, grade and
tightening torque are used, *Figure 8* and *table*.

Figure 8
Fixing screws



Tightening torques

Designation	Fixing screws			
	G ₁		G ₂	
	DIN EN ISO 4762-12.9			
		M _A Nm		M _A Nm
RUE35-F (-L)	M8	41	M10	41
RUE35-F-H (-HL)	M8	41	M8	41
RUE45-F (-L)	M12	140	M12	83
RUE45-F-H (-HL)	M12	140	M10	83
RUE55-F (-L)	M14	220	M14	140
RUE55-F-H (-HL)	M14	220	M12	140
RUE65-F (-L)	M16	340	M16	220
RUE65-F-H (-HL, -SL)	M16	340	M14	220
continued ▼				

Tightening torques

Designation	Fixing screws					
	K ₁		K ₃		K ₆	
	DIN EN ISO 4762-12.9				DIN 7984-8.8	
		M _A Nm		M _A Nm		M _A Nm
RUE35-F (-L)	M8	41	M8	41	M8	24
RUE35-F-H (-HL)	M8	41	–	–	–	–
RUE45-F (-L)	M12	140	M10	83	M10	48
RUE45-F-H (-HL)	M12	140	–	–	–	–
RUE55-F (-L)	M14	220	M12	140	M12	83
RUE55-F-H (-HL)	M14	220	–	–	–	–
RUE65-F (-L)	M16	340	M14	220	M14	130
RUE65-F-H (-HL, -SL)	M16	340	–	–	–	–
continued ➤						

Dismantling and fitting of carriages

The dummy guideway ① prevents damage to the rolling element set while the carriage is separated from the guideway.

NOTICE

Risk of rolling elements falling out and ingress of contamination. Possible damage to the rolling element set. Carriages should only be removed from or slid onto the guideway if it is necessary to do so, and only then using the dummy guideway. ◀

Dismantling for guideways with right-angled end

- ▶ With the carriage fitted, position the dummy guideway ① with the right-angled end ③ aligned against the end of the guideway ②.
- ▶ Slide the carriage onto the dummy guideway.
- ▶ After dismounting, leave the carriage on the dummy guideway.

Dismantling for guideways with chamfered end

- ▶ With the carriage fitted, position the dummy guideway ① with the chamfered end ④ aligned against the end of the guideway ②.
- ▶ Slide the carriage onto the dummy guideway.
- ▶ After dismounting, leave the carriage on the dummy guideway.

Fitting for guideways with right-angled end

- ▶ If the carriage is separate from the guideway, position the dummy guideway ① and carriage with right-angled end ③ aligned against the end of the guideway ②.
- ▶ Slide the carriage from the dummy guideway onto the guideway.
- ▶ Keep the dummy guideway for further mounting operations.

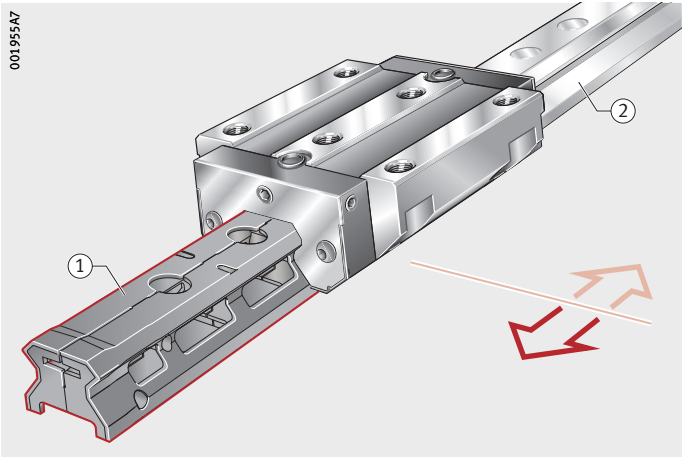
Fitting for guideways with chamfered end

- ▶ If the carriage is separate from the guideway, position the dummy guideway ① and carriage with chamfered end ④ aligned against the end of the guideway ②.
- ▶ Slide the carriage from the dummy guideway onto the guideway.
- ▶ Keep the dummy guideway for further mounting operations.

Linear recirculating roller bearing and guideway assemblies RUE-F

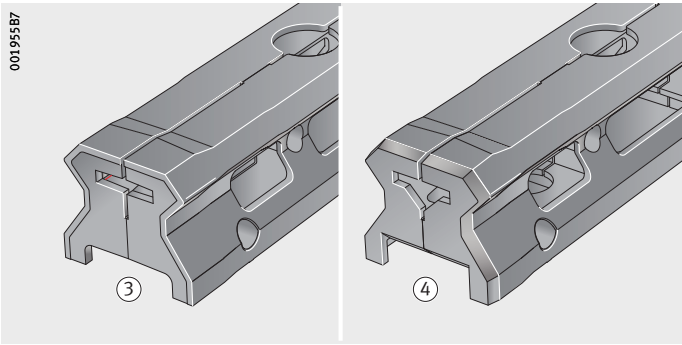
- ① Dummy guideway
- ② Guideway

Figure 9
Dismantling and fitting the carriage



- ③ Right-angled end
- ④ Chamfered end

Figure 10
Ends of the dummy guideway



Fitting of preassembled linear roller bearing and guideway assemblies

Fitting the datum side

The carriage ① is on the guideway ② and is mounted on the table. A unit that is not preassembled should be fitted in a similar way.

- Protect the seal lips using a spring steel strip ③.
- Position the recirculating unit with its datum side ④ on the machine bed.

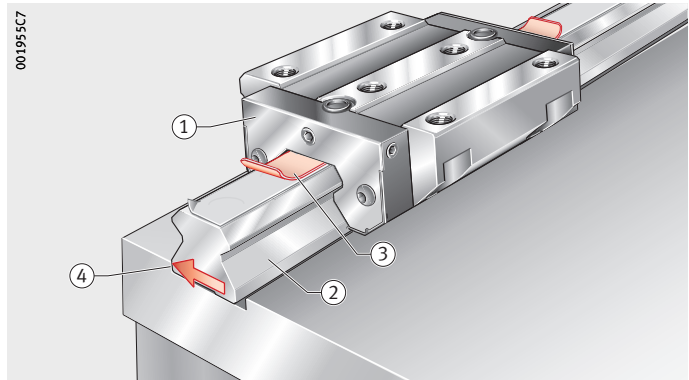


Figure 11
Fitting the recirculating unit on the datum side

- If multi-piece guideways are used, observe the correct sequence of the guideways ⑤, ⑥.

The gap at the end face ⑦ must be $< 0,05 \text{ mm}$.

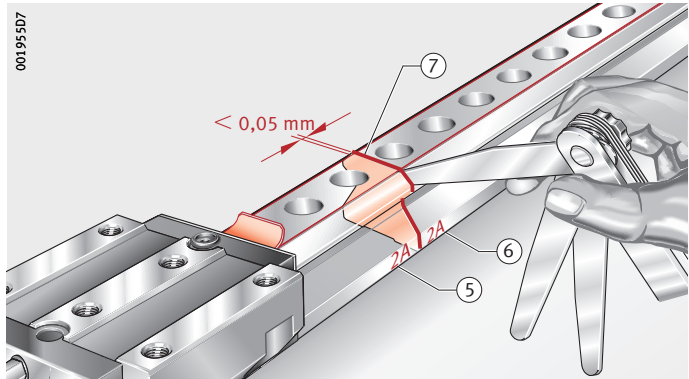
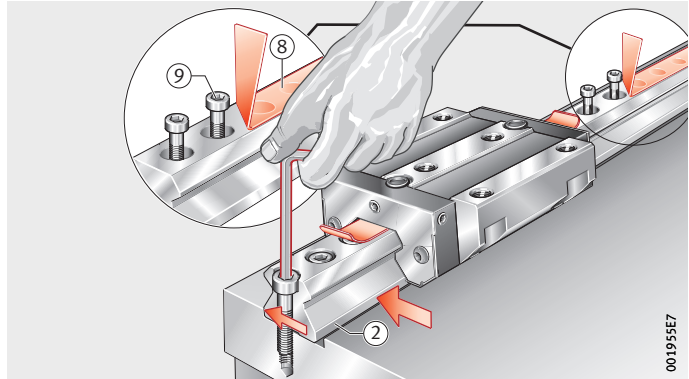


Figure 12
Observing the correct sequence of the guideways and checking the gap dimension

Linear recirculating roller bearing and guideway assemblies RUE-F

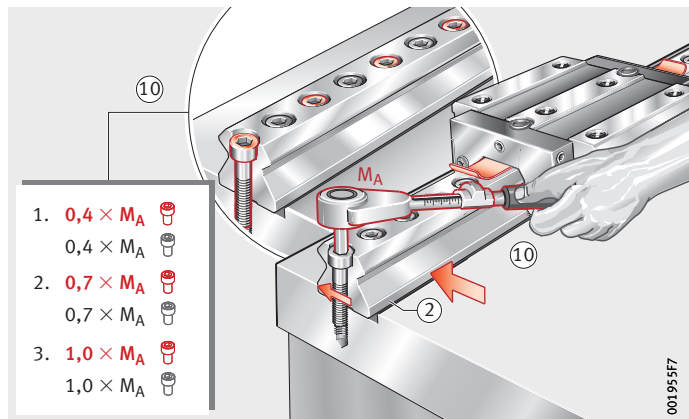
- Remove the adhesive strip ⑧ one hole at a time, insert the screws ⑨ in the holes and tighten finger tight.
- Press the guideway ② against the locating surface (arrows).

Figure 13
Locating the guideway
with screws and pressing against
the locating surface



- Tighten the screws in the sequence shown in the tightening scheme ⑩. In each step, tighten the screws marked in red first, followed by the screws marked in black. For tightening torque M_A , see table, page 8.

Figure 14
Tightening the screws in accordance
with the tightening scheme



**Fitting of plastic closing
plugs KA...-TN/B**

- Premount plastic closing plugs (KA...-TN/B) ① with the clinch ring in the counterbore by hand.
- Drive the closing plugs in flush using a hammer and press-in block ②.

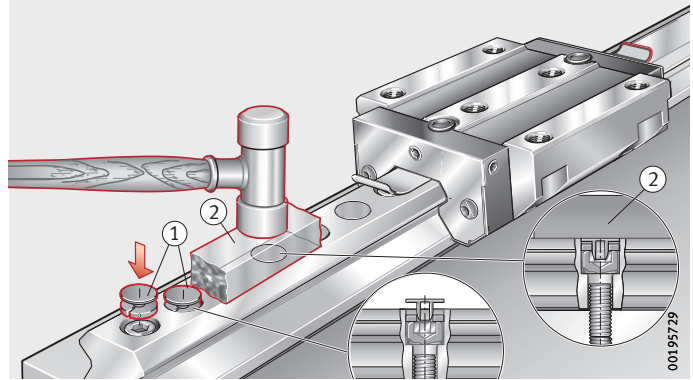


Figure 15
Driving in the plastic closing plugs

Do not work the plastic closing plugs using an oil stone ③ or similar implement.

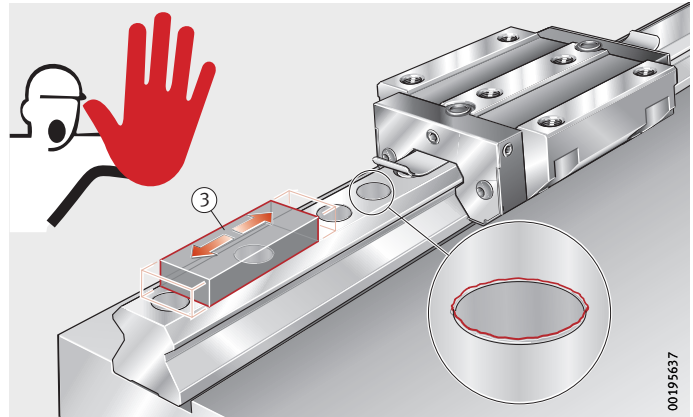


Figure 16
Do not work the plastic plugs
using an oil stone

Linear recirculating roller bearing and guideway assemblies RUE-F

Fitting of brass closing plugs KA...-M

- Drive brass closing plugs (KA...-M) ① in flush using a block ② (or fitting device MVH.TSX, see page 15).

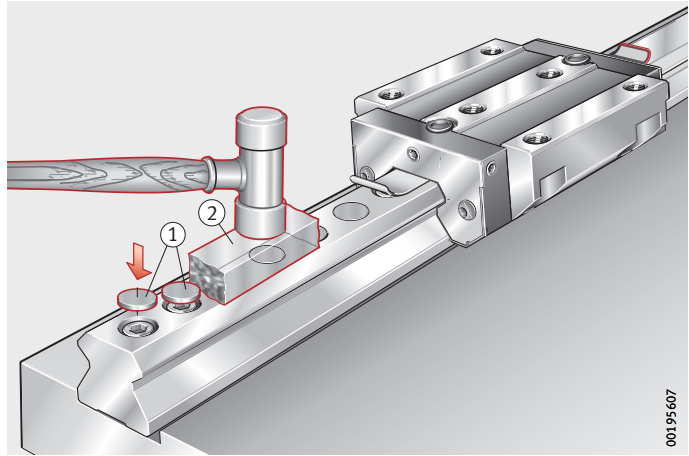


Figure 17
Driving in the brass closing plugs

- Smooth the surfaces using an oil stone ③.

NOTICE

Damaged surface coating, for example Corrotect. Loss of coating characteristics. Do not use an oil stone or similar implement on the surfaces of guideways treated with coatings. <

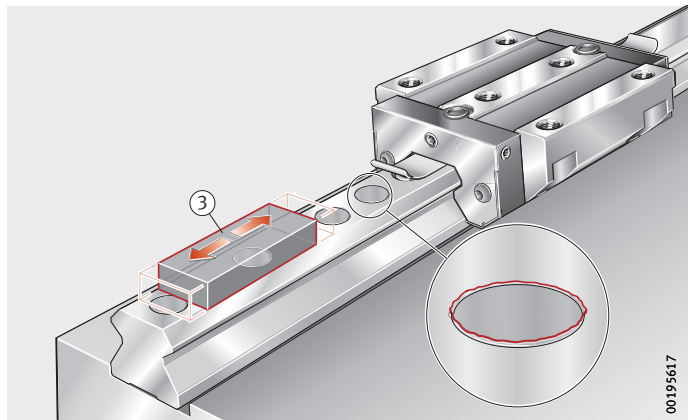


Figure 18
Smoothing the surfaces
using an oil stone

- Clean the surfaces using a lint-free cloth.

Fitting of two-piece steel closing plugs KA...ST/A

The two-piece steel closing plug (KA...ST/A) can only be fitted to guideway TSX...KA+ST.

- Insert the aluminium clinch ring ① in the hole.
- Locate the steel closing plug ② in the hole by hand.

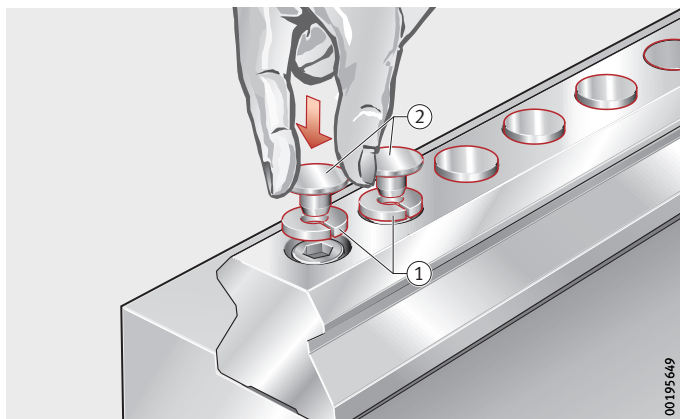


Figure 19
Fitting of two-piece steel closing plugs

- Press the closing plug in flush using the fitting device MVH.TSX ③.
- Connect fitting device MVH.TSX optionally available as an accessory.
- Connect fitting device MVH.TSX to the hydraulic source ④ and ensure that the bleed ⑤ is activated.

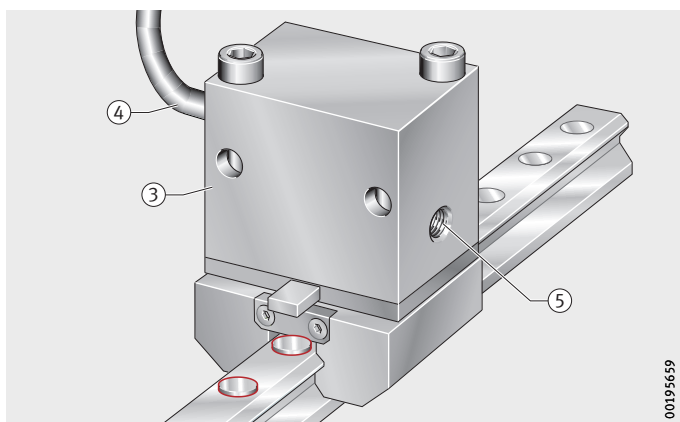


Figure 20
Preparing and positioning
the fitting device

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- Position the fitting device ③ over the closing plug ② until the pawl ⑥ contacts the next closing plug that has not yet been pressed in (for the last closing plug, carry out the alignment of fitting device MVH visually ⑦).
- Press in the closing plug (max. 300 bar).

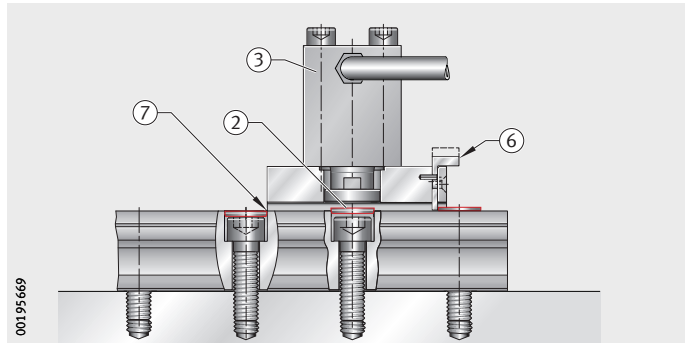


Figure 21
Pressing in the closing plug
using the fitting device

- Smooth the surfaces using an oil stone ⑧.

NOTICE

Damaged surface coating, for example Corrotect. Loss of coating characteristics. Do not use an oil stone or similar implement on the surfaces of guideways treated with coatings. ◀

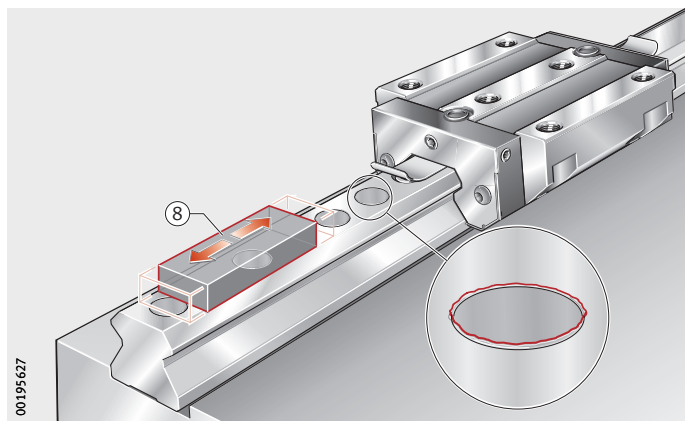


Figure 22
Smoothing the surfaces
using an oil stone

- Clean the surfaces using a lint-free cloth.

Fitting the adjustment side

- Place the recirculating unit for the adjustment side ① on the machine bed, ensuring that the locating surfaces are on the correct sides. If multi-piece guideways are used, observe the correct sequence of the guideways. The gap at the end face must be $< 0,05 \text{ mm}$, see page 11.
- Protect the seal lips using a spring steel strip.
- Remove the adhesive strip ② one hole at a time, insert the screws ③ in the holes and tighten finger tight.
- Check the seating of the O rings ④. Position the O rings correctly with grease if necessary.

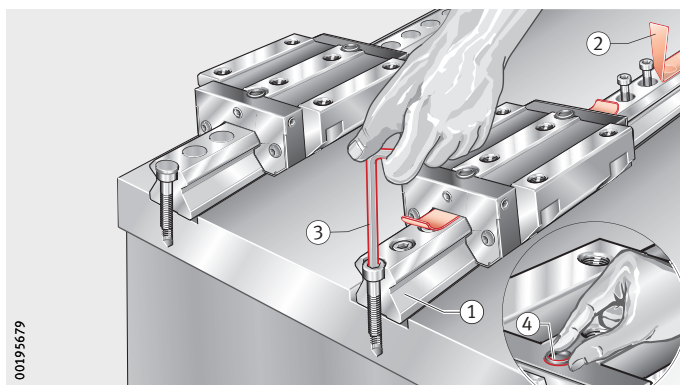


Figure 23
Fitting the recirculating unit on
the adjustment side

- Align the carriages ⑥ with the holes in the machine table ⑦ and place the table without shock contact on the carriages ⑥.

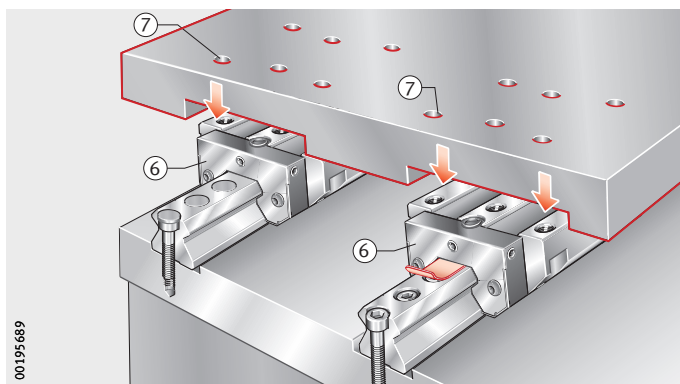


Figure 24
Aligning the carriages and
positioning the machine table
without shock contact

Linear recirculating roller bearing and guideway assemblies RUE-F

- Insert the screws ③ in the holes in the table and tighten finger tight.
- Press the carriage ⑥ against the locating surfaces ⑧ of the table ⑦ (arrow) and tighten the screws ③ to the tightening torque M_A . For tightening torque M_A , see *table*, page 8.
- Move the table ⑦ in order to align the guideway ⑤ on the adjustment side.

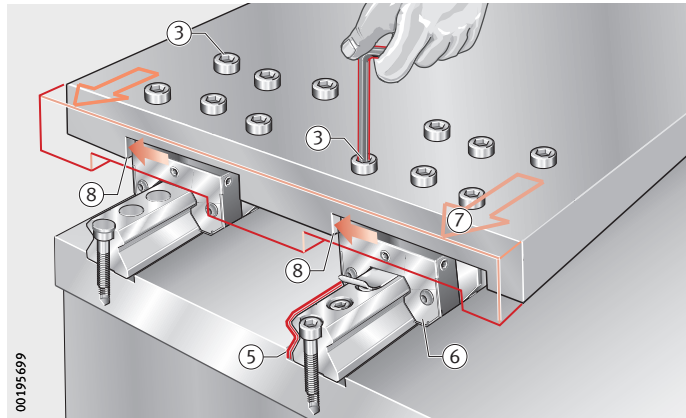


Figure 25
Screw mounting the table on the carriage and aligning the guideway on the adjustment side

- Tighten the screws ③ in the guideway in accordance with the tightening scheme. In each step, tighten the screws marked in red first, followed by the screws marked in black. For tightening torque M_A , see *table*, page 8.

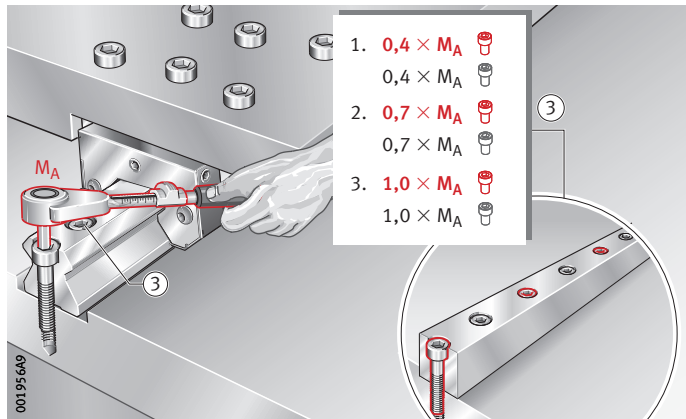


Figure 26
Tightening the screws in accordance with the tightening scheme

- Fit the closing plugs ⑨ following the same procedure described for the first guideway.
- Straighten out the end of the spring steel strip ⑩ and remove the strip.

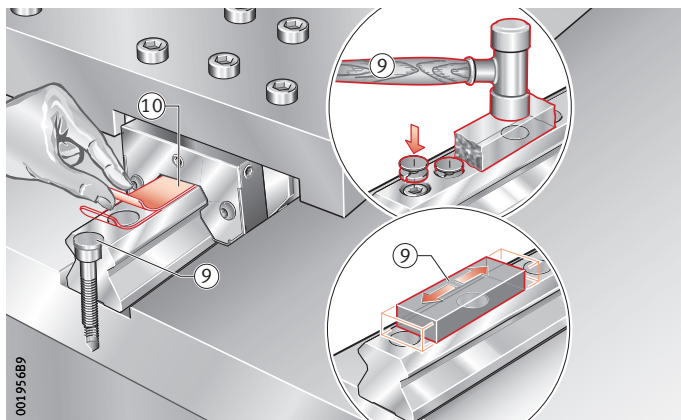


Figure 27
Fitting the closing plugs and
removing the strip

- Check that the recirculating unit runs uniformly by moving the table.
- If necessary, fully locate the guideway in relation to the bed and table ⑪, for example by means of synthetic resin.

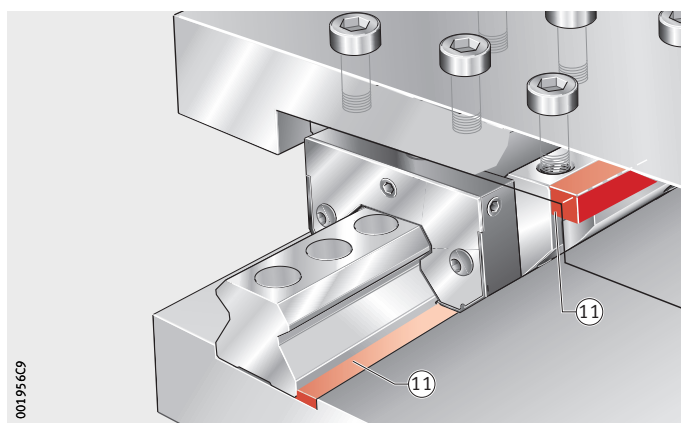


Figure 28
Checking that the recirculating unit
runs uniformly

Linear recirculating roller bearing and guideway assemblies RUE-F

Lubrication

A lubrication nipple for grease is included in the delivery, other lubrication connectors for grease or oil are available as accessories. Lubrication from above, see page 21.

Lubrication via the end face or sides

- Remove a screw plug ① from the end piece.
- Screw in the lubrication connector ②. Observe the tightening torques, RUE35-F max. 0,8 Nm, RUE45-F to RUE65-F max. 1,1 Nm. Observe the screw depth ③, max. 6 mm.

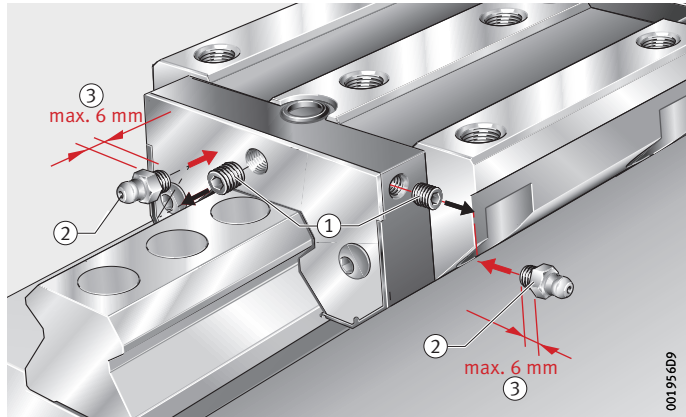
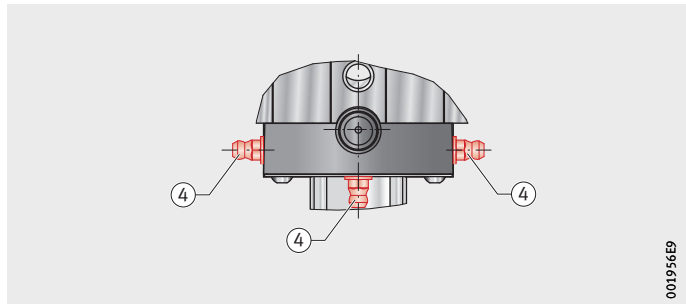


Figure 29
Fitting the lubrication connector in accordance with the specifications

- ④ Standard lubrication connector similar to DIN 71412-A-M6

Figure 30
Lubrication connector on the end face or sides



- Close off the upper hole using the grub screw supplied (included in the lubrication set MSatzRWU).

Lubrication carried out from above via the adjacent construction

- Seal using O ring. Lubrication set MSatzRWU is included.
- Completely cover the O ring ① with the adjacent construction ②.

Grub screw:
ISO 4026-M4×4
O ring:
RUE35-F to RUE55-F:
NBR70 similar to ISO 3601-10×1,5
RUE65-F:
NBR70 similar to ISO 3601-18×1,5

Figure 31
Inserting the O ring

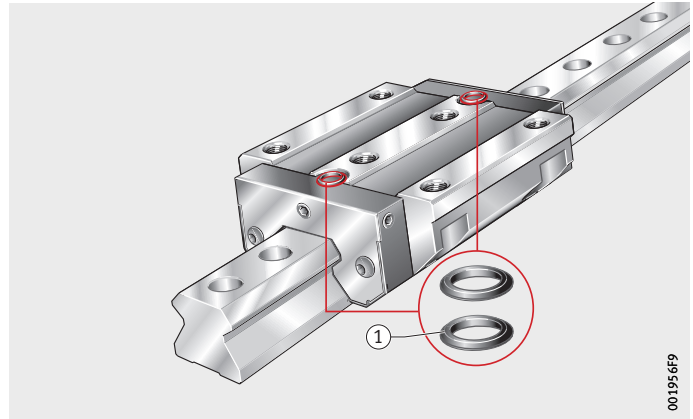
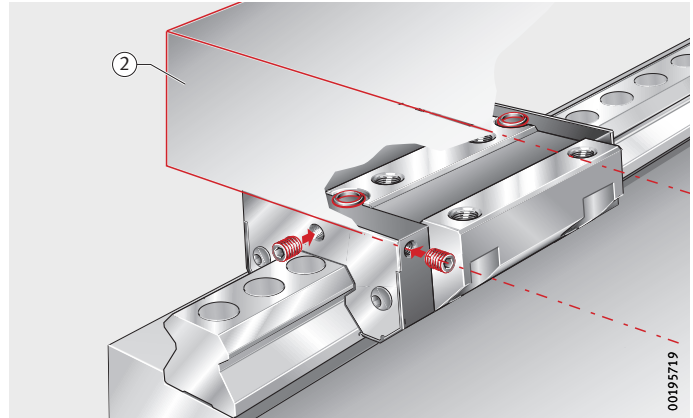


Figure 32
Screwing the grub screw into place and positioning the adjacent construction



Linear recirculating roller bearing and guideway assemblies RUE-F

Before initial operation

- Lightly oil or grease the guideways, depending on whether oil or grease lubrication is used.
- If oil lubrication is used, lubricate the carriages with the minimum oil quantity.

Always move the carriages during lubrication. The minimum stroke is four times the length of the saddle plate.

All the values given are guide values.

They are valid for the following conditions:

- operating duration 100%
- $C_0/P = 8$
- $v = 0,8 \text{ m/s}$
- stroke 500 mm to 1000 mm
- independent of mounting positions, 0° to 90°

Oil quantities for RUE..-F (commissioning)

Designation	Commissioning Minimum oil quantity Q_{\min} cm ³
RUE35-F (-H, -L, -HL)	1,3
RUE45-F (-H)	1,6
RUE45-F-L (-HL)	2,1
RUE55-F (-H)	2,8
RUE55-F-L (-HL)	3,2
RUE65-F (-H)	5,2
RUE65-F-L (-HL, -SL)	5,8

Initial grease quantities for RUE..-F

Designation	Initial grease quantity $\approx \text{g}$
RUE35-F (-H)	6,9
RUE35-F-L (-HL)	8,1
RUE45-F (-H)	11,5
RUE45-F-L (-HL)	16,1
RUE55-F (-H)	20,7
RUE55-F-L (-HL)	25,3
RUE65-F (-H)	23
RUE65-F-L (-HL, -SL)	28,8

Lubrication intervals

- ▶ Observe the lubrication interval.
Max. 12 months if grease lubrication is used.
- ▶ If lubrication is carried out by means of a central lubrication system, observe the oil impulse quantities Q_{imp} .

They are valid for the following conditions:

- operating duration 100%
- $C_0/P = 8$
- $v = 0,8 \text{ m/s}$
- stroke 500 mm to 1000 mm
- independent of mounting positions, 0° to 90°
- temperature $+20^\circ\text{C}$ to $+40^\circ\text{C}$
- lubrication connector on one side

Linear recirculating roller bearing and guideway assemblies RUE-F

Oil quantities for RUE..-F (relubrication quantities)

Designation	Relubrication quantities			
	Number of impulses ¹⁾	Oil impulse quantity Q_{imp} cm ³	Relubrication interval h	Consumption cm ³ /h
RUE35-F (-H, -L, -HL)	2	0,4	8	0,09
RUE45-F (-H)	2	0,6	7	0,17
RUE45-F-L (-HL)	2	0,6	7	0,17
RUE55-F (-H)	2	1	12	0,16
RUE55-F-L (-HL)	2	1	12	0,16
RUE65-F (-H)	3	1	3	1
RUE65-F-L (-HL, -SL)	3	1	3	1

¹⁾ The lubrication impulses must be carried out in direct succession.

Oil quantities for RUE..-F with minimal lubricant quantity metering unit

Designation	Number of impulses	Oil impulse quantity ¹⁾ Q_{imp} cm ³	Relubrication interval h	Consumption cm ³ /h
RUE35-F (-H)	1	0,12	2,4	0,05
RUE35-F-L (-HL)	1	0,12	2,4	0,05
RUE45-F (-H)	1	0,12	1,5	0,08
RUE45-F-L (-HL)	1	0,12	1,2	0,1
RUE55-F (-H)	1	0,12	0,9	0,13
RUE55-F-L (-HL)	1	0,12	0,8	0,15
RUE65-F (-H)	1	0,12	0,5	0,25
RUE65-F-L (-HL, -SL)	1	0,12	0,4	0,28

¹⁾ Integral piston distributors $4 \cdot 0,03 \text{ cm}^3 = 0,12 \text{ cm}^3$ per lubrication impulse, separate piston distributors are not permitted.

Oil quantities for RUE..-F with lubricant quantity metering valves SMDS

Designation	Number of impulses	Oil impulse quantity Q_{imp} cm ³	Relubrication interval h	Consumption cm ³ /h
RUE35-F-SMDS (-H)	1	0,1	1,3	0,075
RUE35-F-L-SMDS (-HL)	1	0,1	1,3	0,075
RUE45-F-SMDS (-H)	1	0,1	0,6	0,165
RUE45-F-L-SMDS (-HL)	1	0,1	0,6	0,175
RUE55-F-SMDS (-H)	1	0,2	1,2	0,165
RUE55-F-L-SMDS (-HL)	1	0,2	1,1	0,175
RUE65-F-SMDS (-H)	1	0,2	0,3	0,725
RUE65-F-L-SMDS (-HL, -SL)	1	0,2	0,3	0,74

**Schaeffler Technologies
AG & Co. KG**

Industrial Automation
Berliner Straße 134
66424 Homburg (Saar)
Germany
www.schaeffler.de/en
info.industrialautomation@schaeffler.com

In Germany:
Phone 0180 5003872
From other countries:
Phone +49 9721 91-0

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