

Slip Ring Assembly (SRA)

Program 5100

Contents

1	General information	3
1.1	About this document.....	3
1.2	Limitation of liability	3
1.3	Copyright	4
1.4	Replacement parts	4
1.5	Material defects	4
1.6	Technical support	4
2	Safety rules	5
2.1	Personnel requirements	6
2.1.1	Qualifications	6
2.1.2	Unauthorized personnel	6
2.1.3	Training.....	7
2.2	Personal protective equipment	7
2.3	Intended use.....	8
2.4	Protective measures to be taken by the operator/user	9
3	Maintenance	10
3.1	Safety instructions	10
3.2	General information.....	11
3.3	Open encapsulated slip ring assembly (GS)	12
3.3.1	Open housing of a GS30	12
3.3.2	Open housing of a GS45/1, GS45/3, GS45/2, GS18, GS13 and GS15	13
3.3.3	Open housing (split hood) of a GS16, GS19, GS21, GS29, GS260, GS170, GS200 and GS285	14
3.3.4	Open housing (one-piece hood) on a GS16, GS19, GS21, GS29, GS260, GS170, GS200 and GS285	16
3.4	Clean the slip ring assembly.....	17
3.5	Wear limits for current collector	18
3.6	Replace current collector.....	23
3.6.1	Overview of current collector variants with slip rings	23
4	Cables and stranded wire	27
4.1	Wiring of the current collectors	27
4.2	Current collector variants.....	29
4.3	Wiring the slip rings	30



Slip Ring Assembly (SRA)

Program 5100

5	General overhaul	32
5.1	Change seals and bearings.....	32
5.1.1	Change seals and bearings of GS30.....	32
5.1.2	Change seals and bearings of GS45.....	33
5.1.3	Change seals and bearings of GS18, GS13 and GS15	34
5.1.4	Change seals and bearings of GS16, GS19, GS21 and GS29	35
5.1.5	Change seals and bearings of GS260, GS170, GS200 and GS285	36

Slip Ring Assembly (SRA)

Program 5100

1 General information

1.1 About this document

This document makes it possible for you to work safely and efficiently with a slip ring assembly.

This document is a part of the slip ring assembly and must be kept accessible to personnel at all times in its immediate vicinity.

Personnel must read this document carefully and understand it before starting any work. A basic condition for workplace safety is the observance of all safety and handling instructions appearing below.

Local accident protection regulations and general safety regulations apply for the area of use of the slip ring assembly.

Illustrations in this document are provided for basic understanding and may deviate from the actual implementation of the unit.

1.2 Limitation of liability

All data and information in this maintenance instruction has been compiled while taking the valid standards and regulations as well as the state-of-the art and our long years of experience and knowledge into consideration.

The manufacturer accepts no liability for damages resulting from:

- Non-observance of the operating instructions
- Improper use
- Use by untrained personnel
- Unauthorized modifications
- Technical changes
- Use of unauthorized replacement parts or accessories

The actual scope of delivery may differ from the explanations and descriptions provided here if the model in question is a special one, if additional equipment has been ordered or due to recent technical changes.

The obligations agreed upon in the delivery agreement and our General Terms and Conditions of business apply, as do the delivery conditions of the manufacturer and the legal regulations applicable at the time the contract was concluded.

All products are subject to technical modifications, within the context of improvement of function and further development.

Slip Ring Assembly (SRA)

Program 5100

1.3 Copyright

This document is subject to copyright, and is exclusively intended for internal use by customers.

Provision of the maintenance instruction to third parties, duplications in any form – even in part – as well as the reuse and/or disclosure of their content are not permitted without the written approval of the manufacturer, except for the customer's internal use.

Breach or infringement will result in liability for damages. Our right to further claims remains unaffected.

1.4 Replacement parts



WARNING!

Incorrect replacement parts are a safety hazard!

Incorrect or faulty replacement parts can impair safety and result in damage, malfunctions or complete failure.

- Always use original spare parts from the manufacturer!
- Order replacement parts from your contracted dealer or directly from the manufacturer.

Contact details:

Conductix-Wampfler GmbH

Rheinstraße 27 + 33

79576 Weil am Rhein - Märkt

Germany

Phone: +49 (0) 7621 662-0

Fax: +49 (0) 7621 662-144

info.de@conductix.com

www.conductix.com

Replacement parts list:

Separate document delivered with the order. If necessary, request from Conductix-Wampfler.

Please specify the order number in your request.

1.5 Material defects

The terms regarding defects can be found in the General Terms of Business of the manufacturer (see www.conductix.com).

1.6 Technical support

Our staff is available for technical support (see contact information).

Our employees are always interested in new information and experience from the field that can be valuable for the improvement of our products.

Slip Ring Assembly (SRA)

Program 5100

2 Safety rules

Safety instructions are identified by symbols in this maintenance instruction. Safety instructions are introduced by signal words that indicate the degree of the hazard. Always observe safety and hazard instructions, and work carefully to avoid accidents, bodily injury and damage to property!



DANGER!

... indicates an immediately hazardous situation, which if not avoided, may result in death or serious injury.



DANGER!

... indicates an immediately hazardous situation due to electricity, which if not avoided, may result in death or serious injury.



WARNING!

... indicates a possibly hazardous situation, which if not avoided, may result in death or serious injury.



WARNING!

... indicates a possibly hazardous situation due to electricity, which if not avoided, may result in death or serious injury.



CAUTION!

... indicates a possibly hazardous situation, which if not avoided, may result in moderate or minor injury.



Tips and recommendations:

... refers to useful tips and recommendations as well as information for efficient and trouble-free operation.



ATTENTION!

... indicates measures that help avoid property damage.

Slip Ring Assembly (SRA)

Program 5100

2.1 Personnel requirements

2.1.1 Qualifications



WARNING!

Inadequately trained persons are at risk of injury!

Improper use can result in serious injury to persons and property.

→ All activities must only be performed by qualified personnel.

The following qualifications are mentioned in this maintenance manual for different areas of operation:

■ **Trained personnel/operators**

have been instructed in an instruction session by the operator with respect to the tasks assigned to them and the potential dangers arising from improper actions.

■ **Specialist personnel**

consists of persons capable of performing assigned tasks and independently identifying and avoiding potential hazards based on their specialist training, knowledge and experience as well as their understanding of the applicable regulations. Personnel are considered qualified if they have successfully concluded training, for example, as electricians, master electricians, electrical engineers, or electrical technicians. Personnel are also considered qualified who have been employed correspondingly for several years, have been educated in theory and practice during that time, and have whose knowledge and skills in the trade required have been tested. The operator of the machine or system must document that the corresponding certification, or other documentation of qualification, is available or had been submitted previously.

- Only persons who can be expected to perform their work reliably are acceptable personnel. Persons whose responsiveness is influenced by drugs, alcohol, or medications, for example, are not permitted.
- When selecting personnel, follow all age- and occupation-specific guidelines applicable at the location of use.

2.1.2 Unauthorized personnel



WARNING!

Danger due to unauthorized personnel!

Unauthorized persons who do not meet the requirements described here are not acquainted with the dangers in the working area.

- Keep unauthorized personnel away from the working area
- In case of doubt, address such persons and direct them away from the working area
- Stop working as long as unauthorized persons are in the working area

Slip Ring Assembly (SRA)

Program 5100

2.1.3 Training

Before performing maintenance on the equipment, personnel must be trained by the owner. For better transparency, the performance of this instruction must be logged.

Example of instruction log:

Date	Name	Type of training	Training given by	Signature
11/5/2010	John Doe	First safety training for personnel	Horst Müller	

2.2 Personal protective equipment

Always wear:

During all tasks



Protective headgear

For protection against falling or flying parts and materials.



Protective gloves

For the protection of hands against friction, scrapes, puncture or deeper wounds, as well as against contact with hot surfaces.



Protective clothing

Primarily for protection against entrapment by moving machine parts. Work clothing must be close fitting with a low resistance to tearing; it must have close-fitting sleeves and no protruding parts.



Protective footwear

For protection against heavy falling parts and slipping on slippery floors.

Slip Ring Assembly (SRA)

Program 5100

Used for special tasks:

Specific protective equipment is required when executing particular tasks. Separate reference to this is made in the individual sections.



Safety eyewear

To protect the eyes against harmful influences, such as strong light, chemicals, dust, splinters or effects of the weather.



Respirator (FFP-3 – according to country-specific requirements)

For protection against materials, particles, and organisms.

In this case: protection from dust resulting from the wear of the carbon brushes.

2.3 Intended use

The slip ring assembly is exclusively designed and built for the intended use described herein.

- The slip ring assembly is used to supply electrical energy and electronic signals/data to portable (rotating) machine units.



WARNING!

Hazard due to improper use!

Any application that deviates from or goes beyond the intended use of the devices can result in hazardous situations.

Therefore:

The device may only be used as intended.

- Follow all information in this maintenance instruction strictly.
- The following applications of the slip ring assembly are prohibited. Non-intended use particularly includes the following:
 - Moving other machine units via the slip ring assembly in a rotating motion.
 - Exceeding the configured current and voltage specifications.
 - Exceeding the projected revolution speed.
 - Excessive acceleration
 - A change in ambient conditions (spatial changes to the planned installation site)
 - Bridging and/or disconnection of electrical sensors or switches
 - Using the slip ring assembly with unapproved accessories not authorized by the manufacturer.
 - Operating the slip ring assembly by untrained personnel
 - Operating the slip ring assembly in an environment that does not conform to the IP degree of protection.
 - Operating the slip ring assembly when installed on an improper foundation / base

Slip Ring Assembly (SRA)

Program 5100

2.4 Protective measures to be taken by the operator/user

The device is used in the commercial/industrial sector. The operator of the device is therefore subject to compliance with the relevant legal obligations concerning workplace safety. In addition to the safety instructions in this maintenance instruction, all safety, accident protection, and environmental regulations valid in the place of operation of the device must also be observed.

This particularly applies to the following:

- An SRA is a product which conforms to the low-voltage directive CE. The SRA is only suitable for installation in a system. The operator must therefore carry out a risk assessment of the complete system and consider a failure of the SRA.
- The operator must inform themselves about the applicable health and safety regulations and implement them in the form of operating instructions for the operation of the slip ring assembly.
- During the entire time the slip ring assembly is in use, the operator must check that these operating instructions still correspond to the current state of regulations and adapt them as necessary
- The operator must clearly manage and define responsibilities for installation, operation, troubleshooting and maintenance of the slip ring assembly.
- The operator must ensure that all employees involved with the slip ring assembly have read and understood this maintenance manual. The owner must also train the personnel at regular intervals and inform them of hazards.
- The owner must provide personnel with the necessary protective equipment.

The operator is furthermore responsible for ensuring that the slip ring assembly is always in perfect working order. The following therefore applies:

- The operator must ensure that the service intervals described in this maintenance instruction are observed.
- The operator must have all safety systems regularly inspected for functionality and completeness.

Slip Ring Assembly (SRA)

Program 5100

3 Maintenance

3.1 Safety instructions



DANGER!

Danger of electric shock!

- The enclosure must never be opened while the SRA is connected to the main network.
- All service work on the slip ring assembly may only be done in a non-electrified state!
- All phases are to be grounded and a restart of the system must be prevented by suitable measures.
- Check to ensure that the equipment is free of electricity.
- Cover or block off adjacent parts that are still electrified.



CAUTION!

Danger of sensitization, mucous membrane irritation and respiratory disease due to dust!

Abrasion residue from the carbon brushes collects in the slip ring assembly. This dust is very fine and is a health hazard.

- During cleaning, wear personal protective equipment:
 - Safety eyewear
 - Dust mask, class FFP3
- **Do not blow out dust with compressed air** but rather vacuum it away. The vacuum cleaner must be equipped with a Class H fine filter.
- Do not eat, drink or smoke during work!



WARNING!

Danger due to unauthorized personnel!

Unauthorized persons who do not meet the requirements described here are not acquainted with the dangers in the working area.

- Keep unauthorized personnel away from the working area
- In case of doubt, address such persons and direct them away from the working area
- Stop working as long as unauthorized persons are in the working area

Slip Ring Assembly (SRA)

Program 5100

Required protective equipment:



3.2 General information

The reliability of the slip ring assembly requires regular maintenance. It is recommended that trained personnel perform maintenance every 1,500 hours. Shorter maintenance periods are required in the tropics, when there is a high level of moisture, high temperature changes, as well as a lot of dust and dirt.

General information:

- Check all screws and nuts for firm seating and tighten if necessary.
- Check all seals for damage and replace if necessary.
- Check the housing for damage and sealing function and replace if necessary.

Insulators:

- Remove deposits and dust.
- Check for damage and replace if necessary.

Slip rings:

- Check surface and clean.
- Remove enamel beads and smudges with 240 grit sandpaper.
- After prolonged downtime, corrosion may need to be removed.

Current collector:

- Remove deposits and dust.
- Check for wear and replace if necessary.
- Check all electrical connections and correct if necessary.
- Check the position of the current collectors to the slip rings and, if necessary, correct them so that the current collector is aligned again symmetrically to the slip ring.

Cables:

- Check for damage and replace if necessary.
- Check cable attachment and strain relief (cable glands) and replace if necessary.

Bearings:

- The bearings are sealed and lubricated for life; only the functionality needs to be checked.
- It is recommended to replace the bearings in the course of a general overhaul.

General overhaul:

- After 20,000 operating hours a general overhaul should be carried out.
- Replace bearings.
- Replace all seals.

Slip Ring Assembly (SRA)

Program 5100

3.3 Open encapsulated slip ring assembly (GS)



DANGER!

See chapter 3.1 for detailed safety instructions during maintenance!

3.3.1 Open housing of a GS30

Required tools:

- Wrench 8 mm
- Wrench 10 mm
- Allen key SW 2.5 mm
- Phillips screwdriver PH2

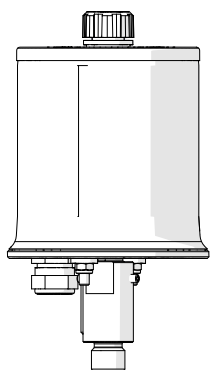


Figure 1: Side view

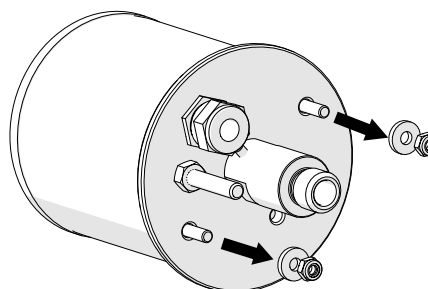


Figure 2: Release the hood fastening



ATTENTION!

The housing is grounded. Before the housing can be completely disassembled, the grounding cable must be loosened.

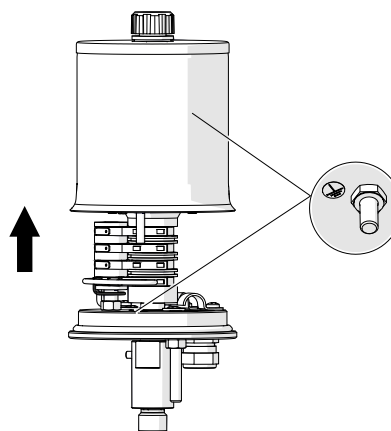


Figure 3: Remove the hood

Slip Ring Assembly (SRA)

Program 5100

3.3.2 Open housing of a GS45/1, GS45/3, GS45/2, GS18, GS13 and GS15

Required tools:

- Wrench 10 mm

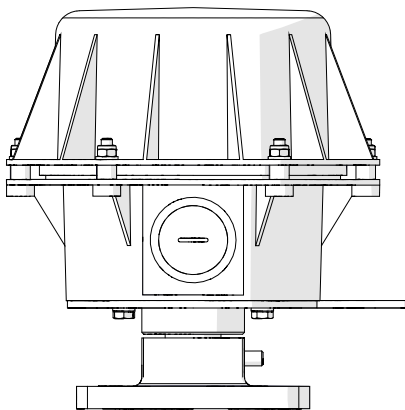


Fig. 4: Side view

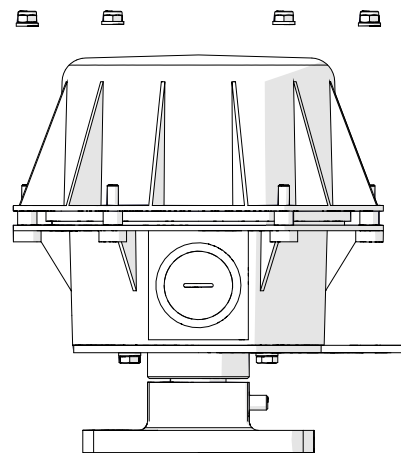


Fig. 5: Release the hood fastening

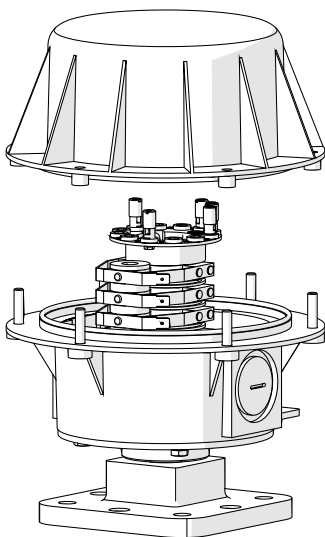


Figure 6: Remove the hood

Slip Ring Assembly (SRA)

Program 5100

3.3.3 Open housing (split hood) of a GS16, GS19, GS21, GS29, GS260, GS170, GS200 and GS285

Required tools:

- Wrench 10 mm
- Wrench 13 mm
- Wrench 17 mm

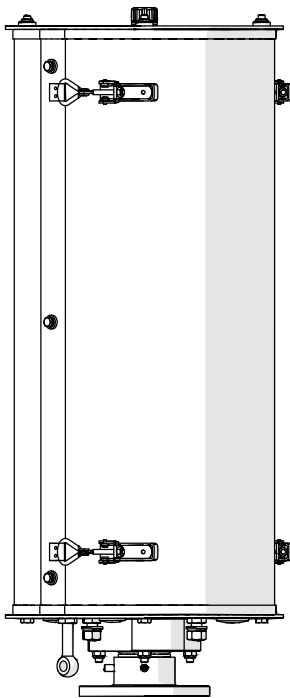


Fig. 7: Side view

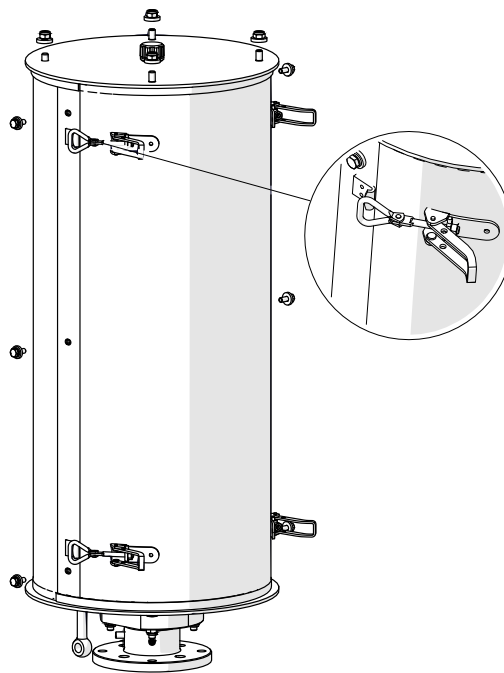


Fig. 8: Loosen cover, unscrew lateral jacket fastening and open clamping lock

Slip Ring Assembly (SRA)

Program 5100



ATTENTION!

The housing is grounded. Before the housing can be completely disassembled, the grounding cable must be loosened.

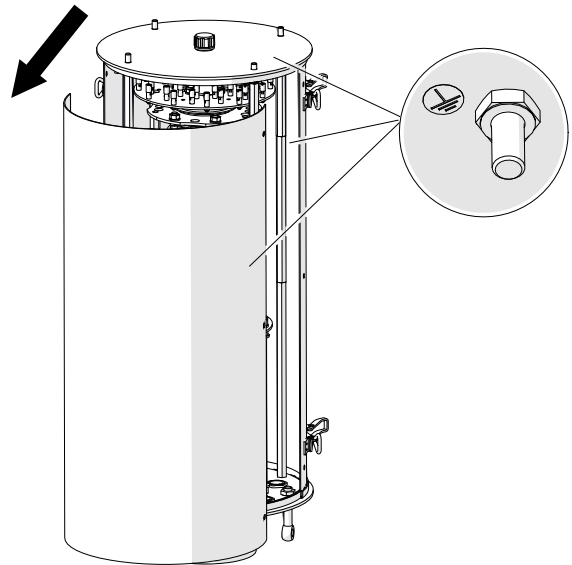


Figure 9: Remove housing halves and observe grounding

Slip Ring Assembly (SRA)

Program 5100

3.3.4 Open housing (one-piece hood) on a GS16, GS19, GS21, GS29, GS260, GS170, GS200 and GS285

Required tools:

- Wrench 10 mm
- Wrench 13 mm
- Wrench 17 mm

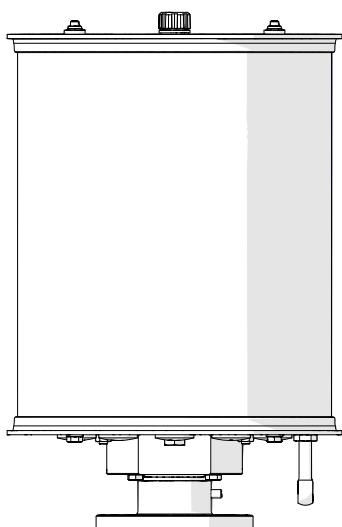


Figure 10: Side view

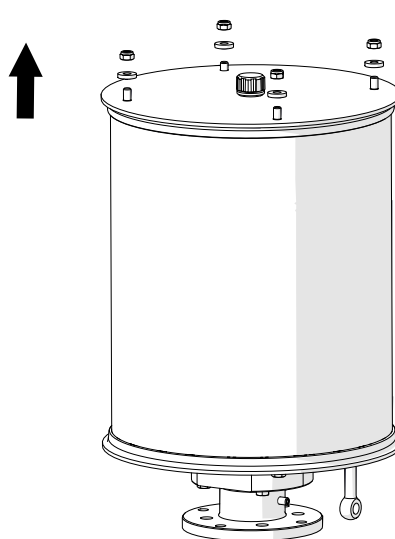


Figure 11: Release the hood fastening



ATTENTION!

The housing is grounded. Before the housing can be completely disassembled, the grounding cable must be loosened.

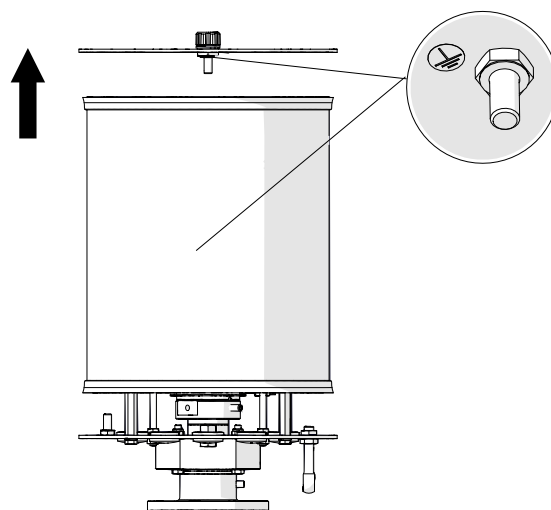


Fig. 12: Remove cover and hood, observe grounding

Slip Ring Assembly (SRA)

Program 5100

3.4 Clean the slip ring assembly



DANGER!

See chapter 3.1 for detailed safety instructions during maintenance!



ATTENTION!

Do not clean the ring surface with chemical agents. The ring surface can be destroyed by chemical agents.

1. Clean dust deposits and abrasion residue from the slip ring assembly.
2. Check slip ring surface and clean. Remove enamel beads and smudges with 240 grit sandpaper if necessary.

Slip Ring Assembly (SRA)

Program 5100

3.5 Wear limits for current collector



DANGER!

See chapter 3.1 for detailed safety instructions during maintenance!



The following table shows the material thicknesses (X_{min}), in which the current collectors are to be exchanged.

In the columns "Graphic," the dimension "X" is shown in each case.

For slip ring	Materials	Comment	Electricity ¹⁾ [A]	X_{min} . [mm]	Graphic
Type 30	1038123	PE with cable	16	8	
	1038125	Phase	16		
	1039654	Phase with Ag sliding contact	10		
	1156737	PE with cable and blade receptacle	16		

Slip Ring Assembly (SRA)

Program 5100

For slip ring	Materials	Comment	Electricity ¹⁾ [A]	X min. [mm]	Graphic
Type 45/1	1035208	PE	25	7	
	1035209	Phase	25		
	1037139	Phase with Ag sliding contact	10		
	1148795	PE with stranded wire	25		
	1151935	Phase, screwed version	25		
	1151936	PE, screwed version	25		
	1152831	Phase, screwed version	25		
	1152832	PE, screwed version	25		
	1152833	Phase with Ag sliding contact, screwed version	10		
Type 45/2	1146988	Phase	47	7	
	1148870	PE with stranded wire, screwed version	47		
	1151940	PE, screwed version	47		
Type 13 Type 260	1037235	PE	50	10	
	1037236	Phase	50		

Slip Ring Assembly (SRA)

Program 5100

For slip ring	Materials	Comment	Electricity ¹⁾ [A]	X min. [mm]	Graphic
Type 15	1029459	PE	90	11	
	1029461	Phase	90		
Type 16 Type 19	1036642	PE	150	13	
	1036643	Phase	150		
Type 17	3094163	Phase	10	2	

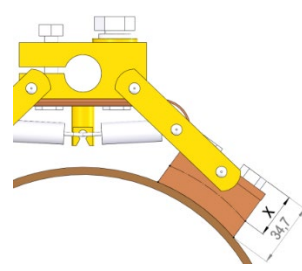
Slip Ring Assembly (SRA)

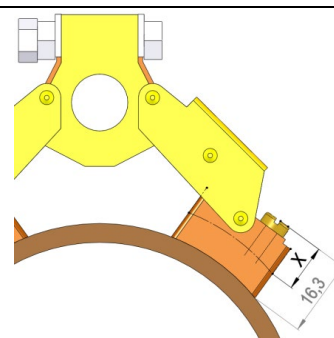
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For slip ring	Materials	Comment	Electricity ¹⁾ [A]	X min. [mm]	Graphic
Type 18 Type 170 Type 200 Type 285	3239275	Phase with Ag sliding contact	10	2	
	3017243	Phase with Ag sliding contact	10		
	3055320	Phase with Ag sliding contact	10		
	1034907	Phase	25		
	3055315	Phase	25		
Type 19	See type 16				
Type 21	1037249	PE	300	25	
	1037250	Phase	300		

Slip Ring Assembly (SRA)

Program 5100

<p>Type 29</p>	<p>1037253</p>	<p>Phase</p>	<p>500</p>	<p>18</p>	
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For slip ring	Materials	Comment	Electricity ¹⁾ [A]	X min. [mm]	Graphic
<p>Type 260</p>	<p>1038880</p>	<p>Phase with Ag sliding contact</p>	<p>10</p>	<p>10</p>	
<p>Type 170 Type 200 Type 285</p>	<p>Phase See type 13</p>		<p>See type 18</p>		

¹⁾ = At 100% duty cycle, max. 30°C ambient temperature. At standstill, lower values apply.

Slip Ring Assembly (SRA)

Program 5100

3.6 Replace current collector



DANGER!

See chapter 3.1 for detailed safety instructions during maintenance!



If one current collector is worn, it is recommended to replace all current collectors.

Conductix-Wampfler uses different types of current collectors!

1. Remove SRA hood.
2. Unscrew the cables and wires from the current collectors.
3. Insert new current collector, align symmetrically with the slip rings and screw on.
4. Reconnect all wires and check for firm seating.
5. Reinstall SRA hood.

3.6.1 Overview of current collector variants with slip rings

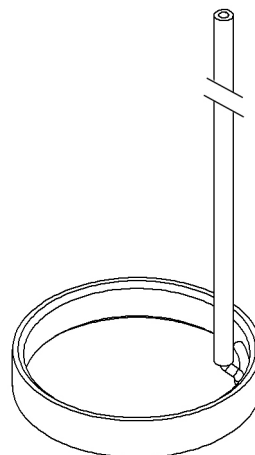
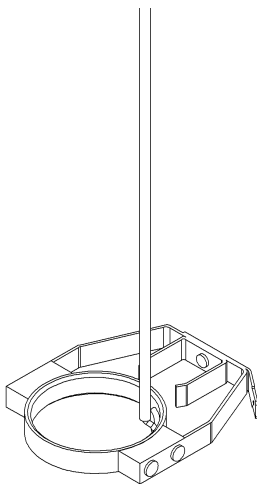


Figure 13: Type 30, Type 45/1 and 45/3 current collector with slip ring and stranded wire

Slip Ring Assembly (SRA)

Program 5100



Figure 14: Type 45/2 current collector with slip ring and stranded wire

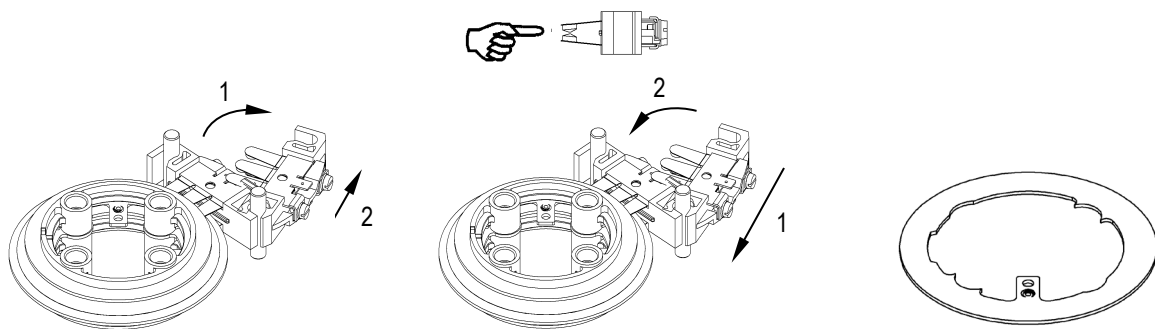


Figure 15: Type 18 current collector, assembly/disassembly and slip ring



Figure 16: Type 13, current collector with slip ring

Slip Ring Assembly (SRA)

Program 5100

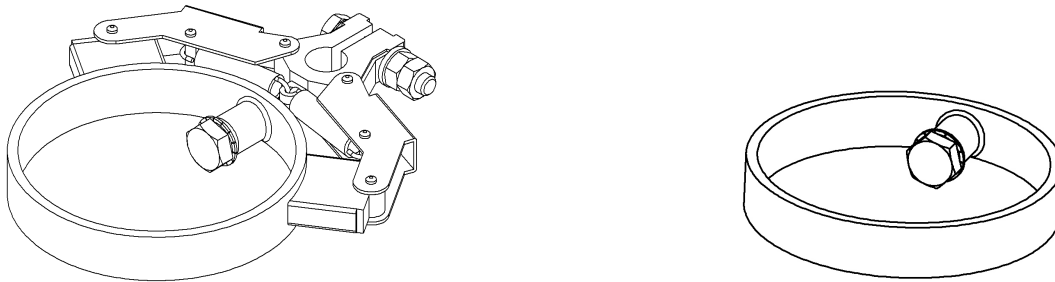


Figure 17: Type 15, current collector with slip ring

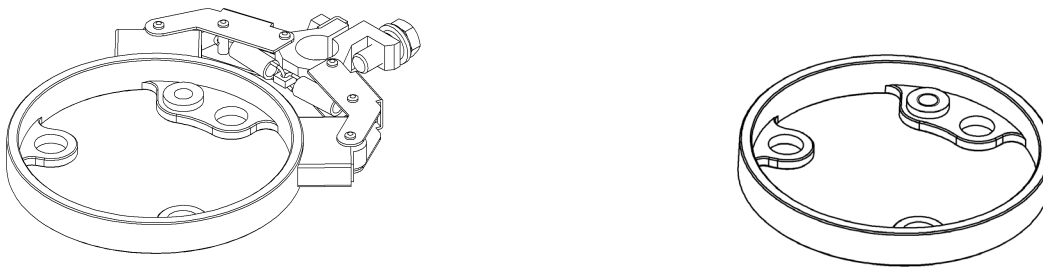


Figure 18: Type 16 and type 19, current collector with slip ring

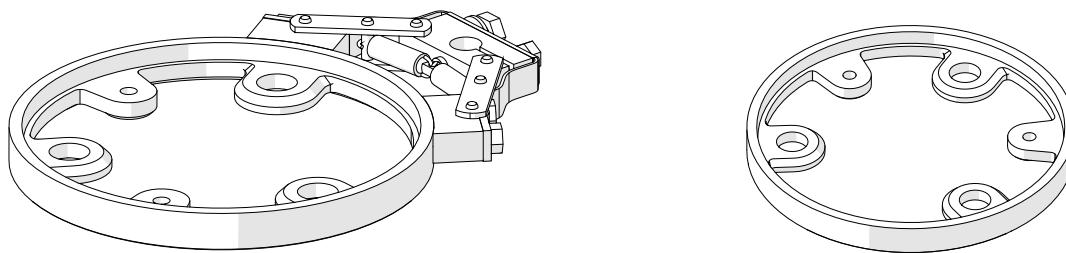


Figure 19: Type 21 and type 29, current collector with slip ring

Slip Ring Assembly (SRA)

Program 5100

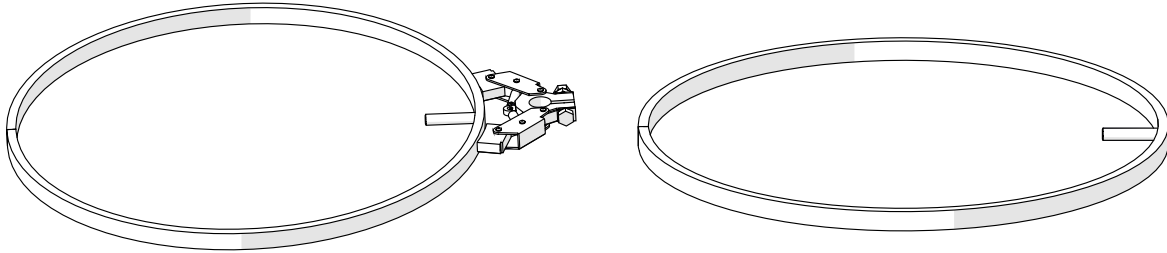


Figure 20: Type 260, current collector with slip ring

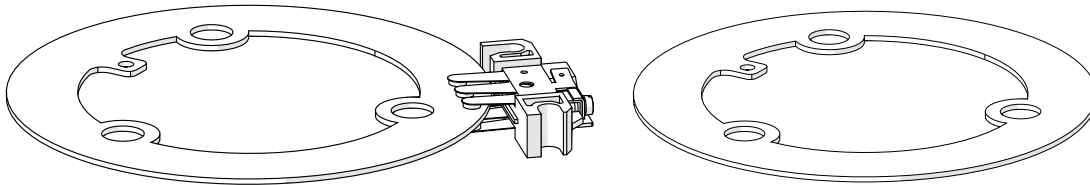


Figure 21: Type 170, current collector with slip ring

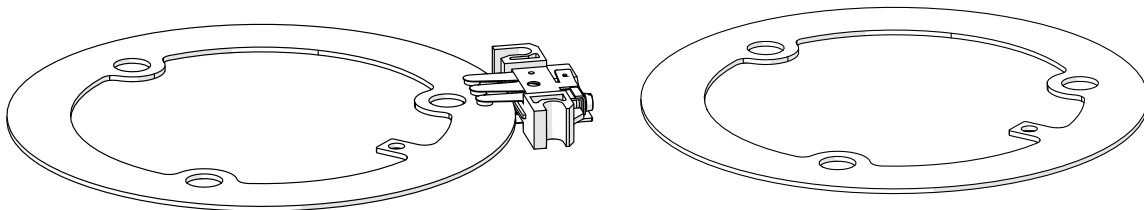


Figure 22: Type 200, current collector with slip ring

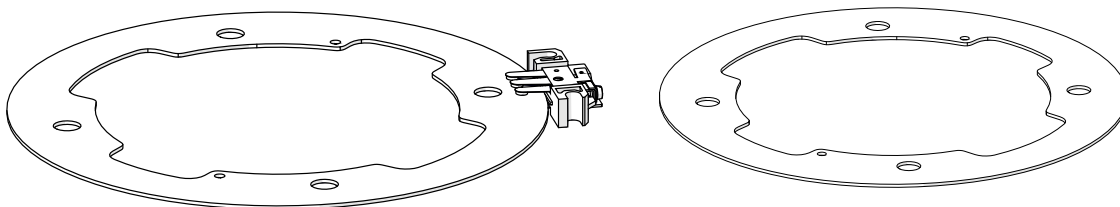


Figure 23: Type 285, current collector with slip ring

Slip Ring Assembly (SRA)

Program 5100

4 Cables and stranded wire

1. Check that cables are installed without twisting. If necessary, loosen the cable and install it so that it is not twisted.
2. Check the condition of the insulation and, if necessary, replace the damaged cable.
3. Check cable collars.
4. The cables in the SRA housing must be laid in such a way that the current collectors can move freely.

4.1 Wiring of the current collectors



DANGER!

See chapter 3.1 for detailed safety instructions during maintenance!

1. Remove SRA hood.
2. Connect the cable to the current collectors of the SRA and observe the following points:
 - The cable may not contact the SRA within the SRA housing!
 - The cables in the SRA housing must be laid in such a way that the current collectors can move freely.
 - Tighten the cable collars to relieve tension.
3. Reinstall SRA hood.

Slip Ring Assembly (SRA)

Program 5100

Overview of current collector variants:

Current collector	Connection material to be used
Type 30 and 45	Blade receptacle 6 3x0.5 (see Fig.24)
Type 13	M5 cable lug (see Fig.25)
Type 15	M6 cable lug (see Fig.25)
Type 16	M8 cable lug (see Figure 26)
Type 18	M4 cable lug (see Fig. 27) or insulated blade receptacle 6 3x0.5
Type 19	M8 cable lug (see Figure 26)
Type 21	M10 cable lug (see Figure 19)
Type 29	M12 cable lug (see Figure 19)
Type 260	M5 cable lug (see Figure 20)
Type 170, Type 200 and Type 285	M4 cable lug (see Fig. 27) or insulated blade receptacle 6 3x0.5

Slip Ring Assembly (SRA)

Program 5100

4.2 Current collector variants

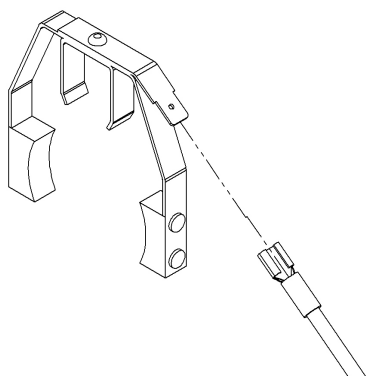


Fig.24: Connection current collector type 30 and type 45

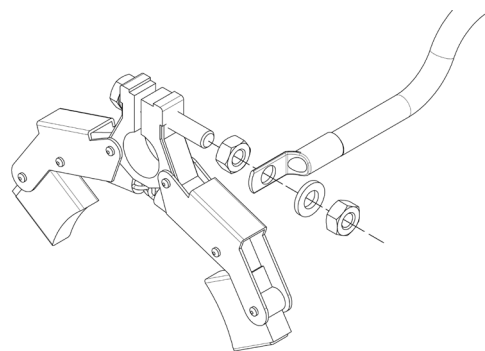


Fig.25: Connection current collector type 13, type 15 and type 260

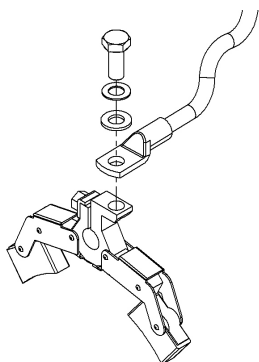


Figure 26: Connection current collector type 16 and type 19

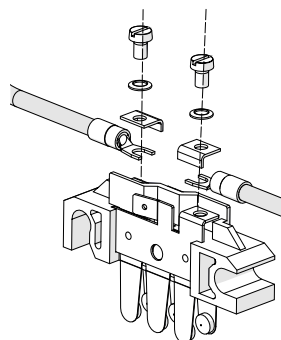


Fig. 27: Connection current collector type 18, type 170, type 200 and type 285 with fork shoe

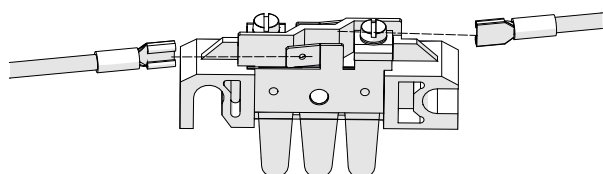


Figure 28: Connection of current collector type 18, type 170, type 200 and type 285 with flat plug

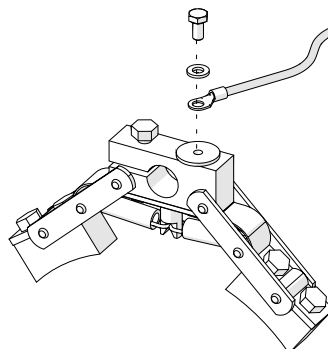


Figure 29: Connection current collector type 21 and type 29

Slip Ring Assembly (SRA)

Program 5100

4.3 Wiring the slip rings



DANGER!

See chapter 3.1 for detailed safety instructions during maintenance!



ATTENTION!

Supply line must be strain relieved!

The slip rings are connected to the supply line via the terminal board.

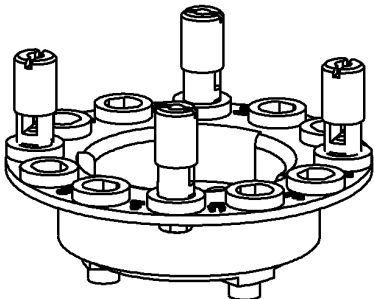


Fig.30: Clipboard with terminals type 30 and type 45

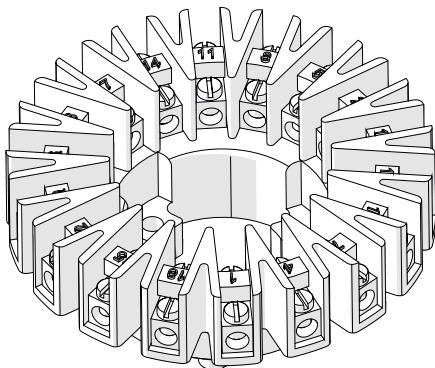


Fig. 31: Clipboard with terminals for type 45 from 13 poles

Slip Ring Assembly (SRA)

Program 5100

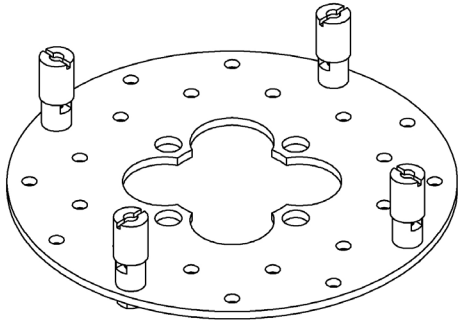


Figure 32: Terminal board type 18, type 13 and type 15

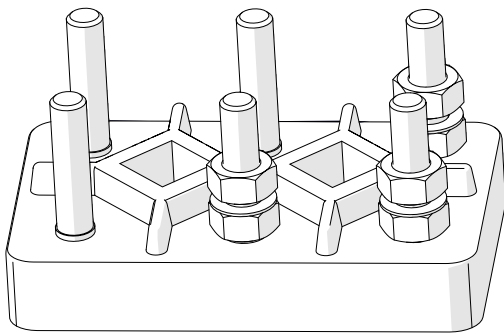


Fig.33: Terminal board type 260, type 170, type 200 and type 285

Slip Ring Assembly (SRA)

Program 5100

5 General overhaul



After 20,000 operating hours, a major overhaul should be done, replacing all bearings and seals.

5.1 Change seals and bearings



DANGER!

See chapter 3.1 for detailed safety instructions during maintenance!

The threaded pins DIN 914 must be free of dust and grease during assembly, and Loctite 243 must be used!

After every major overhaul, a mechanical and electrical functional test of the slip ring assembly must be carried out!

5.1.1 Change seals and bearings of GS30

Required tools:

- Wrench 8 mm
- Wrench 10 mm
- Allen key SW 2.5 mm
- Phillips screwdriver PH2

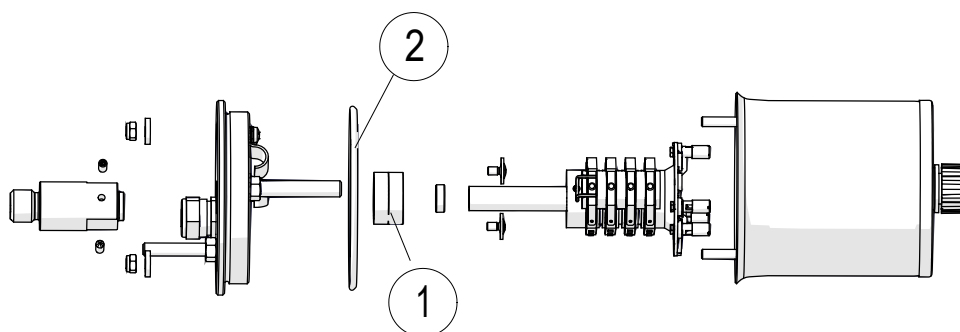


Figure 34: Change bearing (1) and seal (2) of GS30

Slip Ring Assembly (SRA)

Program 5100

5.1.2 Change seals and bearings of GS45

Required tools:

- Wrench 10 mm
- Allen key SW 4 mm

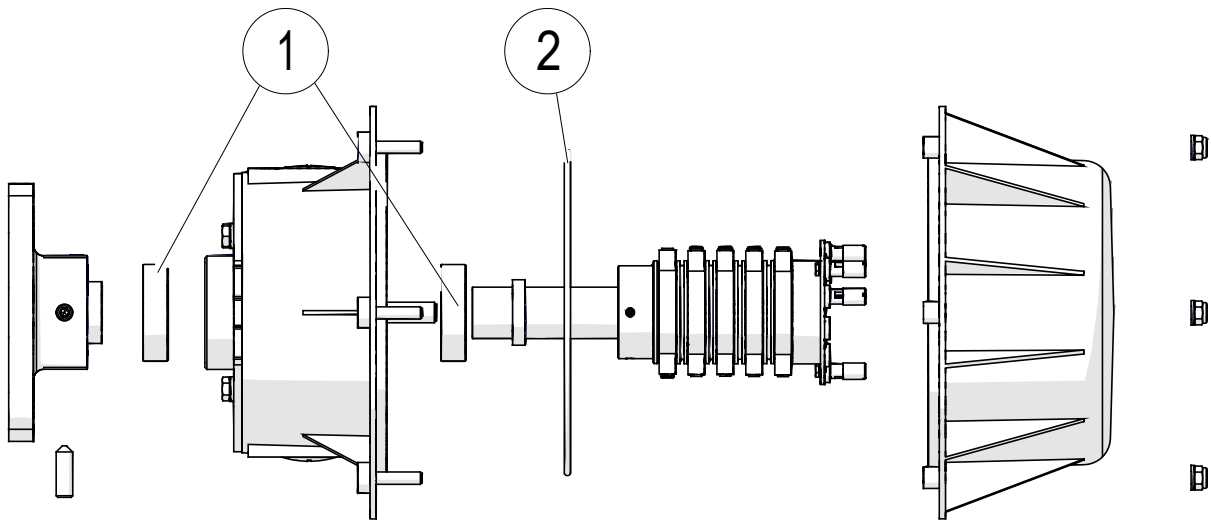


Figure 35: Change bearing (1) and seal (2) of GS45

Slip Ring Assembly (SRA)

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5.1.3 Change seals and bearings of GS18, GS13 and GS15

Required tools:

- Wrench 10 mm
- Wrench 13 mm
- Allen key SW 4 mm

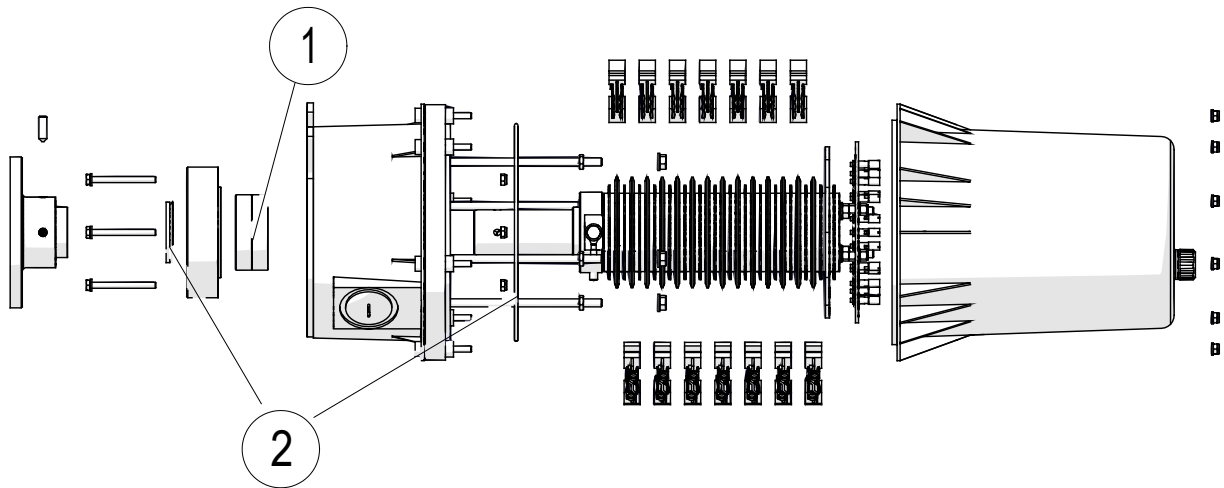


Fig.36: Change bearings (1) and seals (2) of GS18, GS13 and GS15

Slip Ring Assembly (SRA)

Program 5100

5.1.4 Change seals and bearings of GS16, GS19, GS21 and GS29

Required tools:

- Wrench 13 mm
- Wrench 17 mm
- Allen key SW 4 mm

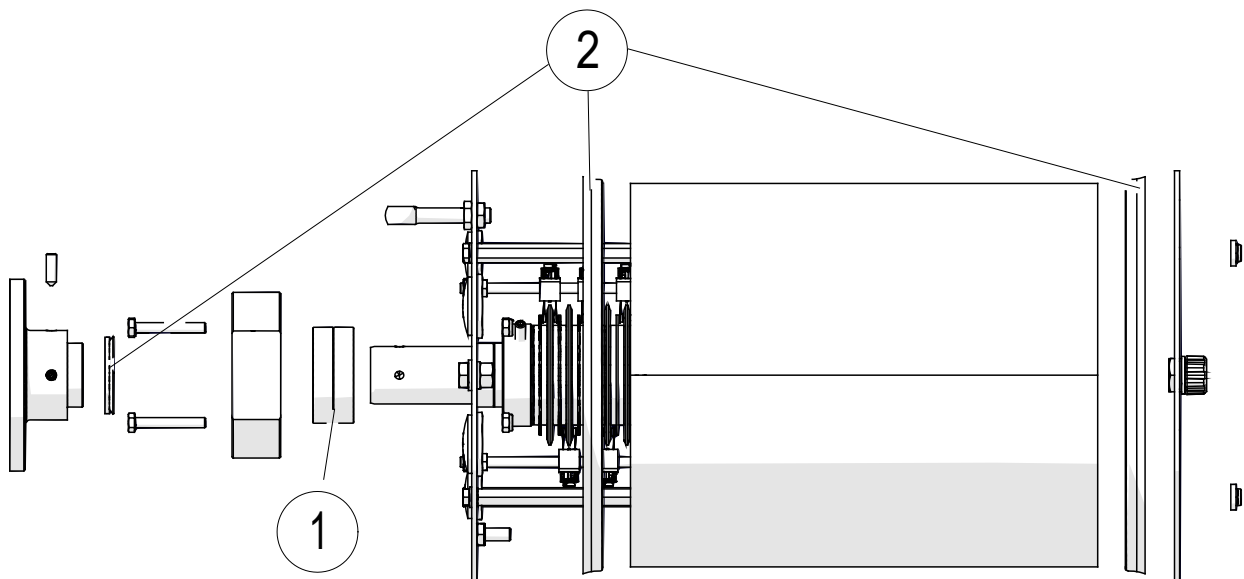


Fig.37: Change bearings (1) and seals (2) GS16, GS19, GS21 and GS29

Slip Ring Assembly (SRA)

Program 5100

5.1.5 Change seals and bearings of GS260, GS170, GS200 and GS285

Required tools:

- Wrench 10 mm
- Wrench 13 mm
- Wrench 16 mm
- Wrench 17 mm

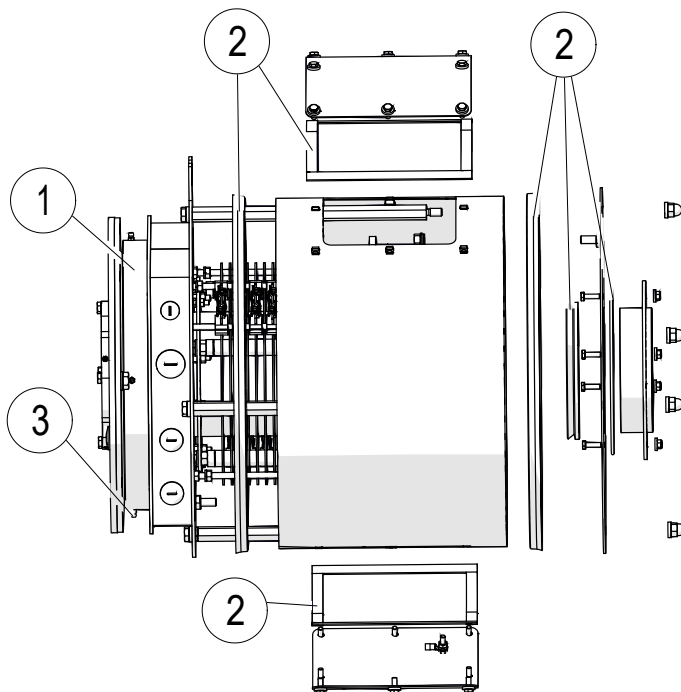


Figure 38: Change bearings (1) and seals (2) of GS260, GS170, GS200 and GS285; Conical grease nipple (3)

Maintenance Instruction



Slip Ring Assembly (SRA)

Program 5100

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