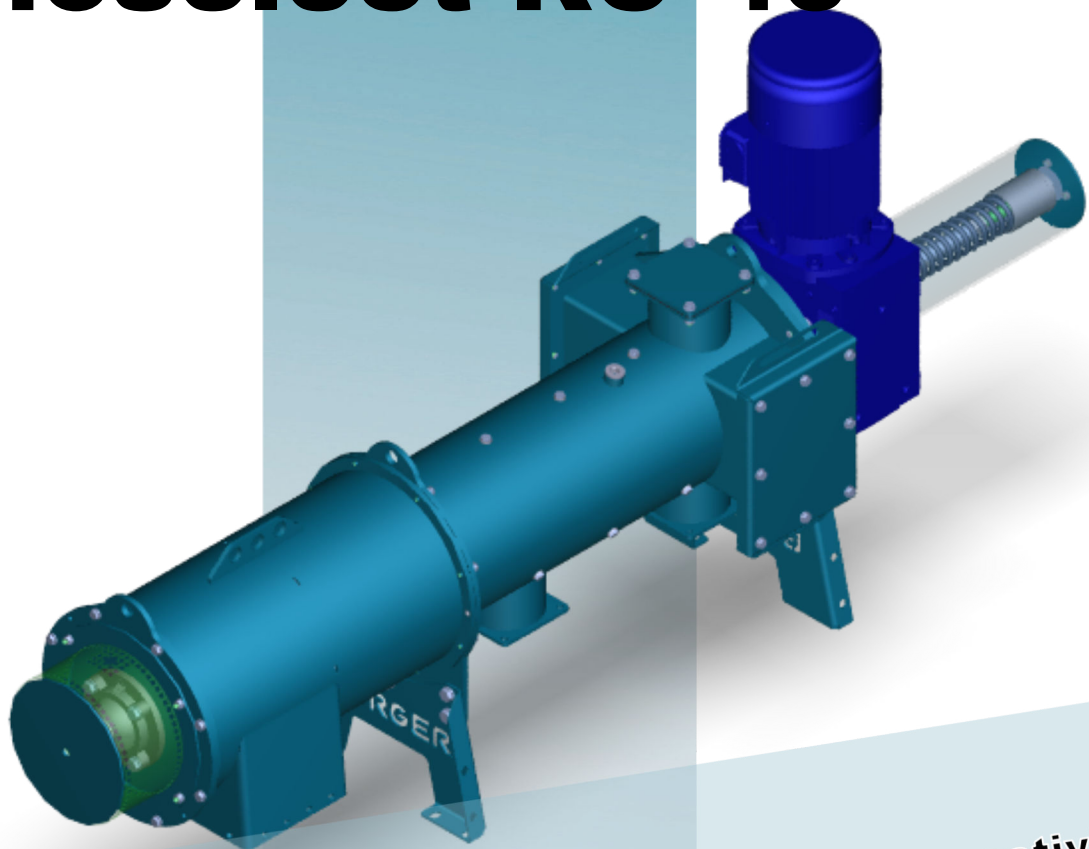


Operating Manual

Börger Separator

Bioselect RC 40



Important!

Please read carefully before performing any activity involving the device! Keep for future reference!

Börger Worldwide

Europe	Germany - Head Office -	Börger GmbH Benningsweg 24 46325 Borken-Weseke Deutschland	Phone Fax E-mail Internet	+49 (0) 2862 / 91030 +49 (0) 2862 / 910346 info@boerger.de www.boerger.de
	France	Börger France S.A.R.L. 9 rue des Prés 67670 Wittersheim France	Phone Fax E-mail Internet	+33 (0) 3 / 88515468 +33 (0) 3 / 88515413 info@borger.fr www.borger.fr
	Great Britain/ Ireland	Börger UK Ltd. East Wing - Old School Watling St. Gailey Staffordshire ST19 5PR, United Kingdom	Phone Fax E-mail Internet	+44 (0) 1902 / 798977 +44 (0) 1902 / 798979 uk@boerger.com www.boerger.com
	Netherlands Belgium Luxembourg	Börger Benelux Postbus 78 7630 AB Ootmarsum Nederland	Phone Fax E-mail Internet	+31 (0) 541 / 293687 +31 (0) 541 / 293578 info@boerger-pumps.nl www.boerger-pumps.nl
	Poland	Boerger Polska Sp.z o.o. ul. Toszecka 101 44-100 Gliwice Polska	Phone Fax E-mail Internet	+48 32 / 3356094 +48 32 / 3356095 info@boerger.pl www.boerger.pl
America	USA	Boerger, LLC 2860 Water Tower Place Chanhassen, MN 55317 USA	Phone Fax E-mail Internet	+1 877 / 7263743 +1 612 / 4357300 +1 612 / 4357301 america@boerger.com www.boerger.com
Asia Australia / Oceania	Singapore	Boerger Pumps Asia Pte. Ltd. 16 Boon Lay Way #01-48 TradeHub21 Singapore 609965	Phone Fax E-mail Internet	+65 / 65629540 +65 / 65629542 asia@boerger.com www.boerger.com
	China	Boerger Pumps (Shanghai) Co., Ltd. Room 709, Building A, No. 555, Lansong Road, Pudong District, Shanghai 200137 P.R. China	Phone Fax E-mail Internet	+86 (0) 21 / 61604075 +86 (0) 21 / 61604076 shanghai@boerger.com www.boerger.com.cn
	India	Boerger Pumps India Business Suite MR - 6, Vatika Business Centre, First India Place, 2nd Floor, Sushant Lok, Phase I, Block B, Gurugram HR 122002 India	Phone E-mail Internet	+91 (0) 124 / 4028835 india@boerger.com www.boerger.com
Africa*	Head Office	Börger GmbH Benningsweg 24 46325 Borken-Weseke Deutschland	Phone Fax E-mail Internet	+49 (0) 2862 / 91030 +49 (0) 2862 / 910346 info@boerger.de www.boerger.com
Your sales partner:				
(Stamp)				

* Algeria, Morocco: See France, Börger France S.A.R.L.

Product Specifications

Unit:

Product group: Separator

Type: RC 40

Precise product specifications for your unit, with the exception of control units, can be found in the data sheet enclosed with this operating manual.

Manufacturer's address:

Company: Börger GmbH

Address: Benningsweg 24

Town / city: 46325 Borken-Weseke

Phone: +49 (0) 2862 / 9103 – 0

Fax: +49 (0) 2862 / 9103 – 46

E-mail: info@boerger.de

Internet: www.boerger.de

Spare parts orders and customer service in Germany:

Phone: +49 (0) 2862 / 9103 – 31

Fax: +49 (0) 2862 / 9103 – 49

E-mail: service@boerger.de

Spare parts orders and customer service in other countries:

See separate contact data for your regional sales partner

Document data:

Document: BA-RC40_EN

Issue date: 17.01.2024

Language: English translation of the German original, available at service@boerger.de

Table of Contents

1	General information.....	8
1.1	Introduction.....	8
1.2	Notes on copyrights and property rights.....	8
1.3	Information for the operator.....	9
1.4	Training and instruction.....	10
1.5	Sample training topics.....	10
2	Safety.....	13
2.1	General information.....	13
2.2	Notes on signs and symbols.....	13
2.3	Proper use.....	15
2.4	Residual risk.....	17
2.5	Qualifications for operating personnel.....	22
2.6	Personal protective equipment.....	25
2.7	Securing the machine against restart.....	26
2.8	Description of the safety equipment.....	27
2.8.1	EMERGENCY STOP.....	27
2.8.2	Clamping unit cover.....	27
2.8.3	Counter bearing cover.....	28
2.8.4	Intermediate chamber.....	28
2.8.5	Optional monitoring devices.....	29
2.9	Markings and signs.....	29
2.10	Markings and signs to be attached by the operator.....	30
2.11	Safety instructions for operating personnel.....	31
2.11.1	General work on the Börger machine.....	32
2.11.2	Work on the electrical system.....	34
2.12	Safety instructions for maintenance and rectifying malfunctions.....	37
2.13	Information on special dangers.....	43
2.13.1	Oil, grease and other chemical substances.....	43
2.13.2	Noise.....	43
3	Product Description.....	44
3.1	Construction of the Börger machine.....	44
3.1.1	Feed unit.....	46
3.1.2	Separating and conveying unit.....	46
3.1.3	Compactor and clamping unit.....	46
3.1.4	Drive connection.....	47

3.1.5	Shaft seal.....	48
3.1.6	Intermediate chamber (quench).....	48
3.1.7	Maintenance openings.....	49
3.1.8	Design and mounting position.....	50
3.1.9	Pipe connections on inlet and outlet.....	51
3.1.10	Units / drive options.....	52
3.1.11	Options and accessories.....	53
3.2	Operating principle.....	54
3.3	Technical data.....	55
3.3.1	Dimensions.....	56
3.3.2	Performance data and maximum loads.....	61
4	Transportation, Storage and Installation.....	66
4.1	Transportation.....	66
4.2	As-delivered condition.....	68
4.3	Storage and interim storage.....	69
4.3.1	Storage.....	69
4.3.2	Interim storage.....	71
4.4	Installation.....	72
4.4.1	Preparation for installation.....	73
4.4.2	Setup.....	73
4.4.3	Installing the inlet and outlet.....	78
4.4.4	Liquid phase outlet.....	83
4.4.5	Electrical connection.....	84
4.4.6	Connection of pneumatic unit.....	86
4.5	Checks before commissioning.....	87
4.5.1	Checking smooth running following storage and long downtimes.....	88
4.5.2	Checking readiness for operation.....	89
4.5.3	Checking the direction of rotation.....	91
5	Operation.....	93
5.1	Commissioning.....	95
5.1.1	Operation with control unit.....	98
5.1.2	Operation without control unit.....	98
5.2	Complete commissioning.....	99
5.3	Continuous operation.....	99
5.4	Downtimes.....	100
5.4.1	Downtimes - operation with control unit.....	100
5.4.2	Downtimes - operation without control unit.....	101

5.5	Emergency shut-down.....	102
5.6	Malfunctions.....	103
5.7	Measures following on demand work!.....	108
6	Maintenance and repairs.....	109
6.1	Machine care.....	111
6.1.1	Cleaning the outside.....	113
6.1.2	Pressure relief.....	114
6.1.3	Internal cleaning.....	116
6.2	Maintenance and inspection.....	120
6.2.1	Maintenance and inspection plan.....	120
6.2.2	Lubricant fill level and changing the lubricants.....	123
6.2.3	Lubricating the adjustment mechanism and the bearing.....	127
6.3	Repairs.....	128
6.3.1	Notes on repair work.....	129
6.3.2	Removing/repairing the clamping unit.....	131
6.3.3	Replacing the mechanical seal.....	137
6.3.4	Changing the <i>Multi Disc</i> plate.....	146
6.3.5	Changing the filter press channel.....	150
6.3.6	Replacing the wedge wire screen.....	153
6.3.7	Replacing the brush auger.....	157
6.3.8	Modifying the position of the auger adapters	164
6.3.9	Other repairs.....	167
6.3.10	Maintenance instructions for special equipment.....	167
6.3.11	Measures following repair and maintenance work!.....	168
6.3.12	Queries.....	169
7	Disposal.....	170
7.1	Environmental protection.....	170
7.2	Oil, oily waste and grease.....	170
7.3	Plastics.....	170
7.4	Metals.....	171
7.5	Electrical and electronic waste.....	171
7.6	Final decommissioning.....	171
8	Accessories.....	172
8.1	Frequency converter.....	172
8.2	Control unit.....	173
8.3	Fill level sensor for conical piles.....	173

9	Appendix	174
9.1	Data sheet.....	174
9.2	Wear parts.....	174
9.3	Assembly drawing.....	177
9.4	Spare parts list.....	180
9.4.1	Tools / installation aid.....	184
9.5	Checklist for commissioning.....	186
9.6	EU Declaration of Conformity / EU Declaration of Incorporation.....	188
9.6.1	EU Declaration of Conformity.....	188
9.6.2	EU Declaration of Incorporation.....	189
9.7	UK - Declaration of Conformity / UK - Declaration of Incorporation.....	190
9.7.1	UK - Declaration of Conformity.....	190
9.7.2	UK - Declaration of Incorporation.....	191
9.8	Additional documentation.....	192
9.9	Supplier documentation.....	192
9.10	Technical data (maintenance).....	193
9.10.1	Lubricants - fill levels.....	193
9.10.2	Tightening torques (guidelines).....	194
10	Index	195

1 General information

1.1 Introduction

This operating manual is an important aid for the correct and safe operation of the Börger machine.

It contains important information for operating the Börger machine in a safe, proper and economical manner.

Adhering to these instructions will help avoid associated dangers, reduce repair costs and downtimes and increase the reliability and service life of the Börger machine.

The operating manual must be made available at all times. All personnel who work on or with the Börger machine must read and adhere to the manual. This work includes:

- operation and troubleshooting
- maintenance (machine care, maintenance and repairs)
- transportation.

1.2 Notes on copyrights and property rights

This operating manual must be treated as confidential. It may only be made accessible to authorized persons. The manual may only be passed on to third parties following written approval from Börger GmbH.

All documents are protected according to the copyright laws. The distribution and reproduction of documents, in whole or in part, plus the exploitation and distribution of all associated content is forbidden unless expressly authorized in writing.

Violations will be prosecuted and may lead to claims for compensation. All rights for exercising industrial property rights are reserved by Börger GmbH.

1.3 Information for the operator

The operating manual is an integral part of the Börger machine. The operator is responsible for making the operating personnel aware of this manual.

Additionally, the operator is obligated to ensure the notice and observance of national regulations for accident prevention and environmental protection, plus the notice and observance of supervision and reporting duties taking special operational aspects into account, e.g. regarding work organization, work processes and personnel.

Aside from the operating manual and the currently valid accident prevention regulations in the country of operation and at the installation site, all recognized special regulations for safe and proper operation must be observed.

The operator is not permitted to make or arrange for any changes, modifications or alterations to the Börger machine without approval from Börger GmbH.

Any spare parts used must comply with the technical requirements specified by Börger GmbH. This is always guaranteed when original spare parts are used. Only original spare parts may be used during the warranty period, failing which the warranty is void.

Only trained or instructed personnel may be assigned to operate, maintain, repair or transport the Börger machine. Clearly define the personnel responsible for operation, maintenance, repair and transportation.

1.4 Training and instruction

As the operator, you are obligated to inform and, if necessary, instruct your operating personnel in regard to the applicable legal and accident prevention regulations, as well as the available safety equipment on the Börger machine.

This obligation also applies to all other safety equipment on and around the Börger machine. The different technical qualifications of the operating personnel must be taken into account. The operating personnel must have fully understood the instructions, and adherence to the instructions must be guaranteed. Only then can your personnel work safely and be fully aware of associated risks.

Adherence to instructions must be checked on a regular basis. As the operator, you should therefore have each instructed staff member confirm their training participation in writing.

Sample training topics and a sample form for confirming participation in the training/instruction can be found on the following pages.

Börger GmbH, their regional subsidiaries or your local sales partner will be happy to help you regarding staff instruction. They can also carry out training on the functionality, commissioning, maintenance and repair of the Börger machine, on request.

Contact us for a detailed quotation.

1.5 Sample training topics

1. Operational safety

- Accident prevention regulations
- General legal regulations
- General safety instructions
- Measures in the event of emergencies
- Safety instructions for operating the Börger machine
- Using the safety equipment on the Börger machine
- Safety equipment on and around the Börger machine
- Explanation of symbols and signs

2. Operating the Börger machine

- Using the operating elements on the Börger machine
- Explanation of the operating manual for operating personnel
- Specific experiences in using the Börger machine
- Troubleshooting / dealing with malfunctions

3. Repair and maintenance regulations

- Correct handling of cleaning agents and lubricants
- Specific experiences regarding repair, maintenance, cleaning and care of the Börger machine

Training topic

Trainer signature:

No.	Surname, first name	Signature
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

2 Safety

2.1 General information

The Börger machine has been developed and constructed according to current state-of-the-art technology and recognized safety guidelines in observance of the valid safety regulations in the country of manufacture.

However, operation of the Börger machine may endanger the operating person and cause damage to the Börger machine or other material assets in the following circumstances:

- When operated by untrained or uninstructed personnel
- When not used properly
- When not maintained or repaired properly

2.2 Notes on signs and symbols

The following terms, signs and symbols are used in this operating manual, and indicate particularly important information.



DANGER!

Warns of an immediate hazardous situation with unavoidable serious injuries or death as a result if the instructions shown are not strictly adhered to.



WARNING!

Warns of a hazardous situation with the possible risk of subsequent serious injuries or death if the instructions shown are not strictly adhered to.



CAUTION!

Warns of a possible hazardous situation with the risk of subsequent moderate or light injuries and material damage if the instructions shown are not strictly adhered to.

**NOTICE!**

Indicates a possible hazardous situation or unsafe, dangerous work processes that may lead to damage to the machine or surrounding area.

**NOTE!**

Offers useful information on safe and proper operation.

▶ Arrow symbols describe work and/or operational steps. These steps must be carried out in the sequence of the numbering.

— Indents indicate lists.

↪ *Arrow symbols indicate references to further chapters.*

**NOTE!****Illustration of work steps:**

Some of the diagrams and photographic images used in this operating manual, which are only used to illustrate a function or a particular work step, show a different type of device, however the functional principle or work step is the same.

2.3 Proper use

The Bioselect separator is a separation system for the separation of solids and liquids in various types of digestate containing solids as well as in agricultural liquid manure.

The substrate must be mixed homogeneously.

The original medium is separated into a thickened, almost solid phase and a liquid phase by means of a purely mechanical process, and without additives such as thickening or flocculating agents.

The substrate that is to be processed may not contain harder solids such as stones, iron parts, etc. Such solids could damage the screen, for example.

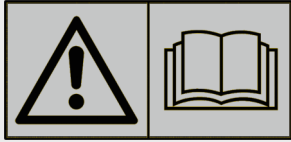


NOTE!

The separator or entire unit is configured exclusively for the operating conditions entered in your request/order and specified in the order confirmation and enclosed data sheet.

In essence, the separator is suitable for different substrates of the type described.

- When changing the substrate that is to be separated, it may be necessary to adjust the pre-tension acting on the *Multi Disc* (cf. ↗ *Chapter 3 “Product Description” on page 44*) in order to achieve the required separation result.
- The uninterrupted, unobstructed, steady feed of the substrate during operation must be ensured.
- The slot opening width of the screen is determined by the specifications contained in the order. The wedge wire screen may need to be changed for a substrate that deviates from that which was specified in the order.



Proper use includes compliance with the instructions

- on safety,
 - on operation and control,
 - on repairs and maintenance,
- specified in this operating manual.

Any other use or use over and above these specifications is deemed as improper use. The operator of the Börger machine is solely liable for any resulting damage.

2.4 Residual risk

Even when all safety instructions are adhered to, there are residual risks involved in operating the Börger machine as detailed below.

All persons that work on and with the Börger machine must be aware of these residual risks and observe the associated instructions to avoid accidents or damage caused by these residual risks.

It may be necessary to remove on-site safety equipment during installation and when making modifications. This causes a residual risk and potential danger that each operating person must be aware of:

**DANGER!****Risk of fatal injury due to electric power!**

There is an immediate risk of fatal electric shock if live components are touched. Damage to the insulation of the individual components can be fatal.

- Have all work on the electrical equipment performed by skilled electricians.
- In the event of damage to the insulation, cut off the power supply immediately and initiate repairs.
- Before working on live components of electrical systems and equipment, de-energize these components and secure them in this state for the duration of the work.

Adhere to the following safety rules in this regard:

- Disconnect.
- Secure against restart.
- Verify that components have been de-energized.
- Ground and short-circuit.*
- Cover or shield any adjacent live components.*
- Never bypass or disable any fuses. Comply with the correct amperage specification when replacing fuses.
- Keep moisture away from all live components. This may lead to short circuits.
- Ensure that all electric connections have been properly reconnected before switching the unit on again and that the cables used are undamaged and have not been sharply bent.
- Ensure that the control cabinet is properly closed before switching on and during operation.

* Under certain circumstances, exceptions may apply for systems with a nominal voltage of up to 1000V (see DIN VDE 0105-100)

**DANGER!****Risk of injury due to rotating parts!**

Moving parts can cause severe injury.

- Do not reach into rotating parts or handle rotating parts when the machine is in operation.
- Never open protective covers when in operation.
- Perform work on the Börger machine only when stationary.
- Observe the delay time: Prior to opening protective covers, make sure that all components have stopped moving.
- Shut down the machine and upstream and downstream system components before carrying out any work on the Börger machine or accessories. ↪ *Chapter 5.4 "Downtimes" on page 100*
- The operating person is obligated to check that all safety equipment is installed and fully functional before putting the machine into operation.
- The Börger machine must only be switched on when the inlet and outlet connections have been established and the maintenance openings have been securely installed.

**WARNING!****Risk of fatal injury due to suspended loads!**

Loads can swing and fall during lifting operations. This can cause severe injury, including death.

- Never stand under or within the swinging range of suspended loads.
- Do not move loads unsupervised.
- Only use approved hoists and slings with sufficient load-bearing capacity.
- Do not use torn or worn hoists such as ropes and belts.
- Do not place hoists such as ropes and belts near sharp corners and edges and do not tie them together or twist them.
- Put the load down when leaving the operating site.

**WARNING!****Risk of serious injuries caused by liquid spouting out or escaping gases!**

Gases or liquids may escape uncontrollably from seals and screw connections. Especially when flange connections are released and maintenance openings are opened, pressurized liquid can spout out at the cover.

Never loosen connections when the unit is pressurized.

- Ensure that all valves and shut-off devices on the inlet and outlet are closed.
- Release the pressure and empty the Börger machine via a drainage device (if available).
- Collect any leakage of medium by suitable means and dispose of it in accordance with the applicable local guidelines.
- Therefore, wear your personal protective equipment (PPE)
↳ *Chapter 2.6 “Personal protective equipment” on page 25* when opening the cover and take all necessary precautions.

**CAUTION!****Risk of burns!**

Particularly when used outside at correspondingly high ambient temperatures and high medium temperatures, individual parts of the Börger machine can become hot and should not be touched during operation.

Stop the feed and shut down the Börger machine prior to any troubleshooting, maintenance and repair work on the Börger machine and the accessories.

Allow the system to cool down completely, if necessary, before carrying out troubleshooting, maintenance and repair work.

Avoid dust formation as this contributes to heat build-up.

**CAUTION!**

Health hazard due to residues of dangerous medium inside and on the Börger machine!

There is an increased health hazard from contact with the medium and contaminated components.

Generally, the following applies:

- When using dangerous or health-endangering media, take all necessary safety measures when performing work on the Börger machine.
- Avoid direct contact with the medium (skin/eye contact, swallowing, inhaling).
- Remove spillage from your skin without delay.
- Do not store or consume beverages, food or tobacco in the working area.

2.5 Qualifications for operating personnel



WARNING!

Personnel with insufficient qualifications represent a hazard!

Insufficiently qualified personnel are not able to assess the risks when using the machine and expose themselves and others to the risk of serious or fatal injuries.

- All work must only be performed by personnel with the appropriate qualifications.
- Keep insufficiently qualified personnel away from the working area.

The various tasks described in this manual impose different requirements on the qualifications of personnel who are entrusted with these tasks.

Only personnel of whom it can be expected that they perform these tasks reliably, are approved for all tasks. Persons whose capability to react is impaired, for instance through drugs, alcohol, or medication, are not approved.

The operating personnel must have been informed or instructed on the applicable legal and accident prevention regulations as well as the safety equipment on and around the Börger machine. The operating personnel must have fully understood the instructions, and adherence to the instructions must be guaranteed. Only then can all personnel work safely and in full awareness of the associated risks.

- Appoint only trained or instructed personnel.
- Clearly define the personnel responsible for operation, installation, maintenance and repair.
- In addition, also specify the area of responsibility for the operating persons and allow them to reject unsafe instructions from others.

Manufacturer

Certain work may be carried out by manufacturer's qualified personnel only. Other personnel is not authorized to carry out this work. To have this work carried out, please contact our customer service.

Mechanics

Mechanics have completed professional training or are able to provide evidence of having completed further training which enables them to perform the special tasks mentioned in these instructions on the system and its components.

The skills acquired during training or further training enable mechanics to identify and evaluate hazards associated with the system and its components.

These include:

- Knowledge about health and safety at work
- Knowledge about the basics of first aid
- Technical knowledge
- Knowledge about assembly, maintenance and repair
- Knowledge about machine operation, system management and system operation

Operating person

Operating persons are able to provide evidence of having completed further training which enables them to perform the simple tasks mentioned in these instructions on the system and its components.

The knowledge acquired during further training enables operating persons to identify and evaluate hazards associated with the system and its components.

These include:

- Knowledge about health and safety at work
- Knowledge about the basics of first aid
- Technical knowledge
- Knowledge about assembly, maintenance and repair
- Knowledge about machine operation, system management and system operation

Qualified electricians

Qualified electricians have completed professional training in electrical engineering or are able to provide evidence of having completed further training which enables them to perform the special tasks mentioned in these instructions on the electrical system and its components.

The skills acquired during training or further training enable qualified electricians to identify and evaluate hazards associated with the system and its components.

These include:

- Knowledge about health and safety at work
- Knowledge about the basics of first aid
- Basics of electrical engineering
- Construction, wiring and checking of circuits
- Effects and dangers associated with electricity
- Troubleshooting and documentation of the electrical system
- Installation of electrical systems
- Special regulations

Warehouse worker

Warehouse workers are able to provide evidence of having completed further training which enables them to perform the special transport and storage tasks mentioned in these instructions with the system and its components.

The knowledge acquired during further training enables warehouse workers to identify and evaluate hazards associated with the system and its components during transport and storage.

These include:

- Knowledge about health and safety at work
- Knowledge about the basics of first aid
- Receiving goods and checking them for completeness and integrity
- Selecting storage locations with regard to technical and safety-related aspects
- Storing goods using handling equipment, taking into consideration the type, character, volume and weight of the products
- Selecting handling systems or hoists depending on the product type, quantity and distance

2.6 Personal protective equipment

Personal protective equipment serves to protect personnel from adverse effects to safety and health whilst working. Staff must wear personal protective equipment whilst carrying out various work on the plant. The individual sections of these instructions make specific reference to the requirements.



Light respiratory protection

Light respiratory protection protects against harmful dusts.



Occupational safety clothing, chemical-resistant

The chemical-resistant occupational safety clothing is used to protect the skin from contact with chemicals which are a health hazard.



Safety gloves, chemical-resistant

Chemical-resistant safety gloves are used to protect the hands from corrosive chemicals.



Safety goggles

Safety goggles (closed on all sides) are used to protect the eyes from flying particles and liquid spray.



Safety shoes

Safety shoes protect the feet from crushing, falling parts and prevent slipping on a slippery floor.

2.7 Securing the machine against restart



WARNING!

Risk of fatal injury if the plant is switched back on uncontrolledly or without authorization!

Switching the Börger machine on without authorization or uncontrolledly can cause serious injuries.

- Before switching back on, make sure that all safety devices are fitted and fully functional and that staff are not at any risk.
- Always adhere to the sequence to secure the plant to prevent it from being switched back on. ↪ *Chapter 2.7 “Securing the machine against restart” on page 26*

- 1.** ➤ Shut off the media supply by closing the respective shut-off valves.
- 2.** ➤ Shut off the energy supply.
- 3.** ➤ Inform the person responsible that work is being carried out in the danger area.
- 4.** ➤ Attach a sign to the control cabinet to indicate that work is being carried out in the danger area and that switching on is prohibited. The sign must include the following information:
 - Switched off on:
 - Switched off at:
 - Switched off by:
 - Note: Do not switch on!
 - Note: Do not switch on before ensuring that personnel are at no risk.

2.8 Description of the safety equipment



WARNING!

Risk of fatal injury if safety devices are not fully functional!

Non-functional or overridden safety devices may cause severe injuries, including death.

- Check whether all safety devices are functional and correctly installed before starting work with the machine.
- Never override or bypass safety devices.
- Ensure that all safety devices are accessible at all times.

The Börger machine is equipped with the required safety equipment according to the applicable legal guidelines in the country of manufacture, current state-of-the-art technology and recognized safety regulations.

2.8.1 EMERGENCY STOP



When pressing the EMERGENCY STOP button, the machine is shut down by the energy supply being switched off or the machine being mechanically disconnected from the drives. Once the EMERGENCY STOP switch has been activated, it must be turned in order to reset it and restart the machine.

WARNING!

Risk of fatal injury if the plant is switched back on uncontrolledly or without authorization!



Switching the machine on without authorization or uncontrolledly can cause serious injuries.

- Ensure that the cause of the EMERGENCY STOP has been eliminated and all safety features are installed and functional prior to a restart.
- Do not reset the EMERGENCY STOP switch before the danger has been eliminated.

2.8.2 Clamping unit cover

The clamping unit must be secured by a fixed cover against reaching in.

The cover of the clamping unit may not be removed, and must always be carefully reinstalled and closed after being opened or removed for maintenance purposes.

2.8.3 Counter bearing cover

The counter bearing must be secured by a fixed cover against reaching in.

The cover may not be removed, and must always be carefully reinstalled and closed after being opened or removed for maintenance purposes.

2.8.4 Intermediate chamber

The separator interior is separated from the gear unit by a fluid-filled intermediate chamber (see  *Chapter 6.2.2 “Lubricant fill level and changing the lubricants” on page 123*) as standard. The heat-absorbing quench fluid prevents the mechanical seal from running dry and captures any substrate that enters the intermediate chamber due to leaks in the shaft seal. This quench function also prevents the gear unit from being damaged by intrusion of the substrate.

Additional intermediate space is provided between the intermediate chamber and gear unit. This way, particularly high protection of the gear unit against damage by penetrating substrate is guaranteed.

2.8.5 Optional monitoring devices

If the Börger machine is equipped with additional monitoring devices, then the corresponding safety instructions can be found in the manufacturer's operating manual in the appendix.

If your Börger machine was supplied with such monitoring devices, you must ensure that these devices function correctly.

2.9 Markings and signs

The symbols and information signs below are located in the work area. They refer to the immediate environment in which they are attached.



WARNING!

Danger due to illegible signage!

Over time, stickers and signs can get soiled or become illegible due to other reasons, so that dangers are not recognized and necessary operating instructions cannot be observed. This poses a risk of injury.

- Do not remove any safety notes, warnings and operating instructions.
- Keep them completely legible.
- Replace damaged signs or stickers immediately.



Meaning:

Nameplate according to directive 2006/42/EC (machinery directive)

Location:

In a clearly visible position on the motor plate of the separator

CE marking not applicable for incomplete machines where only a declaration of incorporation may be delivered, and in certain other cases.



Meaning:

Grounding (bore hole for ground screw or terminal)

Location:

On one of the mounting rails or on the base frame

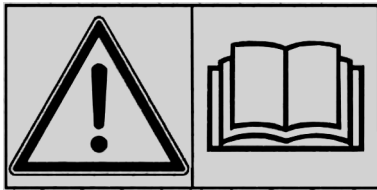


Meaning:

Do not touch rotating parts

Location:

In a clearly visible position on the counter bearing casing



Meaning:

Please read the operating manual carefully before performing any activity involving the device! Keep for future reference!

Location:

In a clearly visible position on the packaging of the operating manual

2.10 Markings and signs to be attached by the operator

The operator may also be required to attach additional markings and signs on or around the Börger machine.

These additional markings and signs may relate to regulations for wearing personal protective equipment, for example.

2.11 Safety instructions for operating personnel

The Börger machine may only be operated while it is in perfect working condition and only for its intended purpose, in a safe and risk-conscious manner having regard to this operating manual. All malfunctions must be rectified immediately, especially those affecting safety.

Every person assigned with commissioning, operation or maintenance work must have fully read and understood this operating manual beforehand – specifically  *Chapter 2 “Safety” on page 13*. Consulting the manual during work is already too late. This applies especially to personnel that only work occasionally on the Börger machine.

The operating manual must always be kept accessible next to the Börger machine.

No liability will be assumed for any damage and accidents caused by non-compliance with the operating manual.

Adhere to the applicable accident prevention regulations and all other generally recognized safety regulations and guidelines for occupational health at work.

Clearly specify the responsible parties for the various maintenance and repair tasks and adhere thereto. Only then can handling errors be avoided, especially in dangerous situations.

The operator must make personal protective equipment mandatory for operating and maintenance personnel. This applies to safety shoes, protective goggles and protective gloves. Always wear this protective equipment when working on the Börger machine.

Keep long hair tied and do not wear loose clothing or jewelry. There is always a danger of getting caught, pulled in or dragged along by moving components.

2.11.1 General work on the Börger machine



NOTE!

Work on the Börger machine!

- Work on the Börger machine may only be carried out by trained, reliable personnel.
- Personnel in training or requiring instruction, as well as persons currently in vocational training, may only operate the Börger machine under the constant supervision of an experienced staff member.

Personnel:

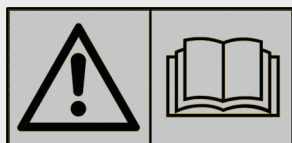
- Mechanics
- Operating person
- Warehouse worker
- Manufacturer

Protective equipment:

- Occupational safety clothing, chemical-resistant
- Safety shoes
- Safety gloves, chemical-resistant
- Safety goggles
- Light respiratory protection

Tool:

- Tools, general



Further operating manuals / supplementary operating manuals

You must completely read the separate operating manuals and/or supplementary operating manuals for components and/or special versions.

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance.



Supplier documentation

You must completely read the separate supplier documentation.

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance.

If malfunctions occur on the Börger machine:

- 1.** ➤ Shut down the Börger machine and downstream and upstream system components. ➤ *Chapter 5.4 “Downtimes” on page 100*
- 2.** ➤ Secure the Börger machine against unauthorized or uncontrolled reactivation. ➤ *Chapter 2.7 “Securing the machine against restart” on page 26*
- 3.** ➤ Report the malfunction to the responsible department/person.
 - This especially applies to safety-related alterations to the Börger machine.

**NOTE!**

Adhere to the prescribed intervals for regular maintenance and inspections or those specified herein and in the operating manuals of the components.

- Suitable workshop equipment as well as specified special tools are essential for carrying out maintenance work.
↳ *Chapter 9.4.1 “Tools / installation aid” on page 184*
- Modifications, repairs, maintenance and troubleshooting may only be carried out when the Börger machine is switched off. Accidental restarting of the unit must be prevented completely.
- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Also observe any
 - supplementary operating manuals
 - operating manuals of the componentsin the appendix.
- Large assemblies and components must be carefully attached and secured to hoists when they are removed or replaced so that associated dangers are minimized. Only appropriate hoists and lifting media in technically perfect working condition with sufficient load capacities may be used.
 - Never stand under suspended loads.
- At the start of maintenance, repairs or machine care, clean any dirt or cleaning agents off the connections and screw connections. Do not use any aggressive cleaning agents. Use lint-free cleaning cloths.
- During installation, always tighten any screw connections that have been loosened for maintenance and repair work. Tighten to the prescribed torque, where this is specified.
- Dispose of operating materials and replacement parts in a safe and environmentally-friendly manner.

2.11.2 Work on the electrical system

**DANGER!****Risk of fatal injury due to electric power!**

There is an immediate risk of fatal electric shock if live components are touched. Damage to the insulation of the individual components can be fatal.

- Have all work on the electrical equipment performed by skilled electricians.
- In the event of damage to the insulation, cut off the power supply immediately and initiate repairs.
- Before working on live components of electrical systems and equipment, de-energize these components and secure them in this state for the duration of the work.

Adhere to the following safety rules in this regard:

- Disconnect.
- Secure against restart.
- Verify that components have been de-energized.
- Ground and short-circuit.*
- Cover or shield any adjacent live components.*
- Never bypass or disable any fuses. Comply with the correct amperage specification when replacing fuses.
- Keep moisture away from all live components. This may lead to short circuits.
- Ensure that all electric connections have been properly reconnected before switching the unit on again and that the cables used are undamaged and have not been sharply bent.
- Ensure that the control cabinet is properly closed before switching on and during operation.

* Under certain circumstances, exceptions may apply for systems with a nominal voltage of up to 1000V (see DIN VDE 0105-100)

Personnel:

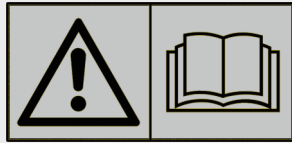
- Qualified electricians

Protective equipment:

- Occupational safety clothing, chemical-resistant
- Safety shoes
- Safety gloves, chemical-resistant
- Safety goggles

Tool:

- Tools for electrical work



Operating manuals of electronic parts

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance,
- in the operating manuals of electronic parts in the appendix.



NOTE!

Adhere to the prescribed intervals for regular maintenance and inspections of the electrical system and/or components or to those intervals specified herein and in the operating manuals of the components.

- The electrical system may only be opened, maintained and repaired by qualified electricians, while having proper regard to the attached electric circuit diagrams.
- Carry out modifications, repairs, maintenance and troubleshooting on the control unit only when the electrical system is switched off. Accidental restarting of the unit must be prevented completely.
- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Suitable workshop equipment as well as specified special tools are essential for carrying out maintenance work.
↳ *Chapter 9.4.1 "Tools / installation aid" on page 184*
- Also observe any
 - supplementary operating manuals
 - operating manuals of the components
 - Operating manuals of electronic parts
 in the appendix.
- Protect the electronic components from moisture and impurities. Clean the electronic components with suitable agents according to the manufacturers' operating manuals only. Do not use aggressive cleaning agents to clean the surface. Use lint-free cleaning cloths.
- Dispose of any replacement parts in a safe and environmentally-friendly manner.

2.12 Safety instructions for maintenance and rectifying malfunctions



WARNING!

Risk of injury due to inadequate troubleshooting, maintenance and repair work!

Inadequate troubleshooting, maintenance and repair work can lead to severe injury and significant material damage.

- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Ensure sufficient installation space before commencing work.
- Keep the installation site clean and tidy! Loosely stacked or scattered components and tools cause accidents.
- Ensure correct installation where components have been removed, reinstall all fastening elements and observe the tightening torques of screws.
- Ensure the following before putting the machine back into operation:
 - Ensure that all troubleshooting, maintenance and repair work is performed and completed as per the information and notes provided in this manual.
 - Ensure that nobody enters the hazardous area.
 - Ensure that all covers and safety features are installed and function correctly.



WARNING!

Risk of fatal injury if the plant is switched back on uncontrolledly or without authorization!

Switching the Börger machine on without authorization or uncontrolledly can cause serious injuries.

- Before switching back on, make sure that all safety devices are fitted and fully functional and that staff are not at any risk.
- Always adhere to the sequence to secure the plant to prevent it from being switched back on. ↪ *Chapter 2.7 “Securing the machine against restart” on page 26*

**WARNING!****Risk of fatal injury if safety devices are not fully functional!**

Non-functional or overridden safety devices may cause severe injuries, including death.

- Check whether all safety devices are functional and correctly installed before starting work with the machine.
- Never override or bypass safety devices.
- Ensure that all safety devices are accessible at all times.

**WARNING!****Risk of injury when using unsuitable spare parts!**

The use of unsuitable spare parts can cause malfunctions which can lead to severe injury, including death, and to significant material damage.

- Only use suitable spare parts.
- Always contact the manufacturer if in doubt.

**WARNING!****Severe injury due to residual pressure!**

Despite having depressurized the Börger machine, it may be under residual pressure in the event of congestion or lump formation in the medium.

- Take extra care when removing the flange connections and maintenance openings to prevent accidents caused by the release of residual pressure.

**WARNING!****Ignition hazard due to frictional heat!**

The separator may only be run dry, i.e. without being fed any substrate, for short periods of time.

The frictional heat that develops at the *Multi Disc* could ignite dry residues of substrate.

Provide appropriate monitoring devices.

**NOTICE!****Risk of severe material damage due to a delayed shut-down in the event of a malfunction!**

A delayed shut-down in the event of malfunction can cause permanent damage to the Börger machine.

- In the event of a malfunction, shut down the Börger machine and all upstream and downstream system components immediately until the cause has been rectified.

**NOTICE!****Risk of damage caused by frost!**

Frost can cause damage to the Börger machine.

- Protect the Börger machine and its connections against frost.



NOTICE!

Improper cleaning of the Börger machine can lead to malfunctions and damage!

- Do not use water jets.
- Do not use aggressive cleaning agents, solvents or sandpaper, as these can damage the metallic and plastic surfaces, casing coating and seals.
- Do not use metal objects such as scrapers and screwdrivers for cleaning coated machine parts.
- Never clean sensitive components with hard scrubbing and strong mechanical pressure.
- Do not use a vacuum cleaner or a hand brush with plastic bristles etc. to clean electronic components because the production of static electricity can damage the electronic components.



NOTICE!

There is a danger of considerable material damage if the limits are not complied with!

Failure to comply with the limits can cause permanent damage to the Börger machine and its components.

- The values may neither exceed nor fall below the limits specified in  *Chapter 3.3 “Technical data” on page 55* of the standard operating manual and the specifications on the data sheet.
- On Börger machines that operate with a frequency converter, make sure that the operating speed is sufficiently below the maximum permissible speed (for speed limit based on machine configuration, see enclosed data sheet).
- Take all necessary precautions to ensure that the permissible differential pressure between the inlet and outlet of the Börger machine is not exceeded.
- Make sure that the pressure on the outlet does not exceed the permissible pressure of the pipe system and the Börger machine, and not overload the drive and its elastic connections.
- The temperature values according to the data sheet may not exceed or fall below the limits. Double-check this.

**NOTICE!**

Risk of material damage due to impermissible changes to limit values.

The settings at the evaluation units or at the frequency converter must not be changed. Non-compliance may lead to material damage.

**NOTE!**

Presettings of parameters

Unit-specific values, limits as well as variable parameters are preset by factory default according to the order specifications for the particular case.

**NOTE!**

When using frequency converters

Due to their working principle, frequency converters generate leakage current.

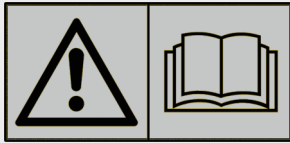
- For proper operation of a frequency converter at a residual current device, the use of an AC/DC sensitive **residual current device (type B)** according to **EN50178/VDE0160** is required due to the DC component of the leakage current.

**Further operating manuals / supplementary operating manuals**

You must completely read the separate operating manuals and/or supplementary operating manuals for components and/or special versions.

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance.



Supplier documentation

You must completely read the separate supplier documentation.

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance.



Operating manuals of electronic parts

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance,
- in the operating manuals of electronic parts in the appendix.

2.13 Information on special dangers

2.13.1 Oil, grease and other chemical substances



ENVIRONMENT!

Danger due to incorrect handling of environmentally hazardous substances!

Inappropriate handling of environmentally hazardous substances, especially incorrect disposal, can cause significant damage to the environment.

- Especially water-polluting materials such as grease and lubricating oil must not pollute the soil or enter the sewage system during installation, repair and maintenance work.
 - These materials must be collected, stored, transported and disposed of in suitable containers.
- When handling oil, grease and other chemical substances, pay attention and adhere to the applicable regulations and safety data sheets issued by the respective manufacturer relating to storage, handling, correct use and disposal.
- Comply with the legal obligations regarding waste avoidance and the proper recycling/disposal of waste during all work

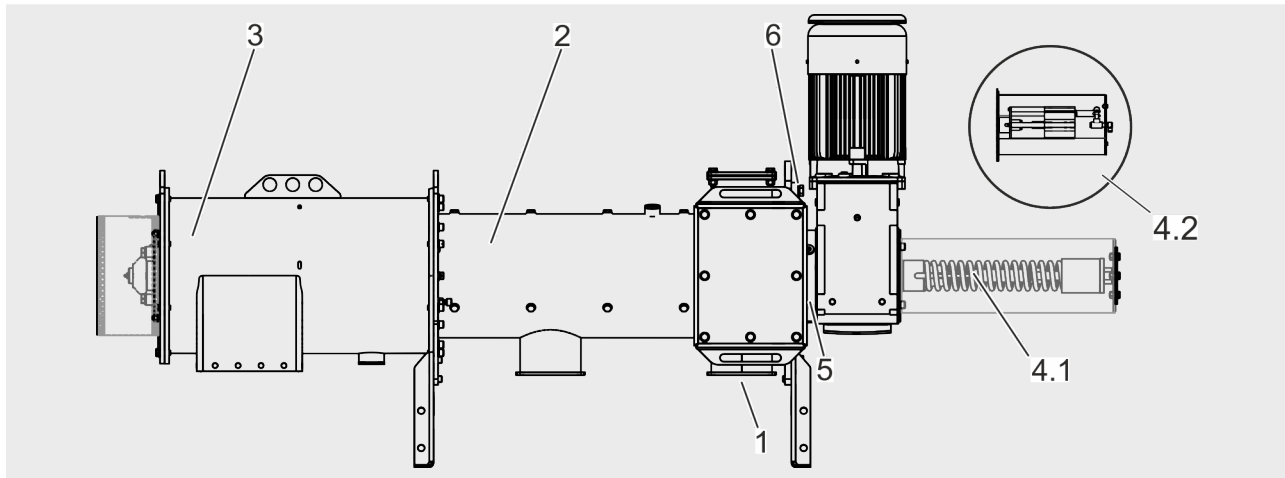
When handling oil, grease and other chemical substances, pay attention and adhere to the applicable regulations and safety data sheets issued by the respective manufacturer relating to storage, handling, correct use and disposal.

2.13.2 Noise

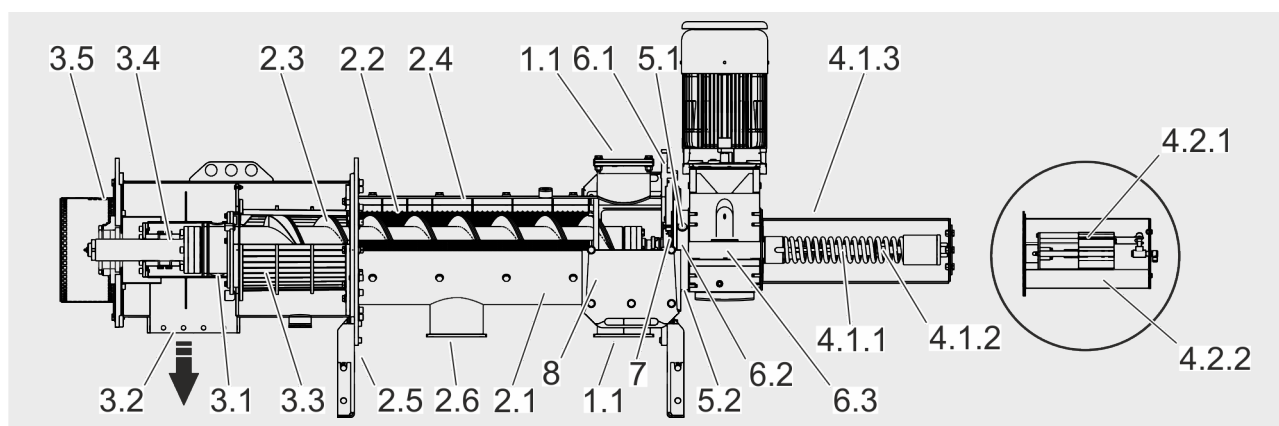
The A-weighted equivalent continuous noise level on the workstations is below 80 dB(A) during normal operation of the Börger machine. Higher noise levels may occur at the Börger machine installation site due to local conditions. In this case, the operator is obligated to provide operating personnel with appropriate protective equipment.

3 Product Description

3.1 Construction of the Börger machine



1	Feed unit
2	Separating and conveying unit
3	Compactor unit
4.1	Easy Shift clamping unit - mechanical
4.2	Easy Shift clamping unit - pneumatic
5	Intermediate chamber (quench)
6	Drive connection



1	Feed unit		
1.1	Inlet (substrate)		
2	Separating and conveying unit		
2.1	Pipe casing	2.4	Rotation lock on screen
2.2	Wedge wire screen	2.5	Mounting rail
2.3	Brush auger	2.6	Outlet (liquid phase)
3	Compactor unit		
3.1	<i>Multi Disc</i> (sealer/peeler)	3.4	Adjustment mechanism
3.2	Counter bearing casing	3.5	Counter bearing cover
3.3	Press channel or filter press channel for HP version		
4.1	Easy Shift clamping unit - mechanical		
4.1.1	Tension springs	4.1.3	Cover of mechanical clamping unit
4.1.2	Clamping screw		
4.2	Easy Shift clamping unit - pneumatic		
4.2.1	Pneumatic cylinder	4.2.2	Cover of pneumatic clamping unit
5	Intermediate chamber (quench)		
5.1	Filler for quench fluid, safety opening with safety plug	5.2	Drain for quench fluid
6	Drive connection		
6.1	Motor plate	6.3	Drive shaft
6.2	B5 flange		
7	Shaft seal, mechanical seal		
8	Maintenance opening		

3.1.1 Feed unit

The feed unit (1) is flanged on to the pipe casing (2.1) and the motor plate (6.1). The feed unit is the part of the separator to which the feed pump or the feed line has to be connected. Two inlet openings (1.1) are available for the connection of the feed, whereby the unused short, straight pipe connector is sealed with a blind flange as standard.

The substrate is pumped into the feed unit by the feed pump, or, in the case of gravity feed operation, fed from the reservoir, from where it proceeds into the separating and conveying unit (2).

3.1.2 Separating and conveying unit

The separating and conveying unit (2) is located inside the robust Bioselect pipe casing (2.1), which is connected to the compactor unit (3).

The substrate that is to be separated is fed into the separating and conveying unit (2) via the feed unit (1), for example by means of a rotary lobe pump or via gravity feed from an elevated reservoir.

The rotating brush auger (2.3) inside the wedge wire screen (2.2) transports the thick matter to the compactor unit (3), while the liquid phase drains through the wedge wire screen (2.2) and the outlet openings (2.6) at the bottom of the pipe casing.

The wedge wire screen (2.2) is secured against rotating by rotation lock rails mounted inside the pipe casing.

3.1.3 Compactor and clamping unit

The rotating brush auger (2.3) transports the thick matter phase into the press channel (3.3) of the compactor unit (3).

The thick matter outlet is sealed by the *Multi Disc* (3.1), which is connected to the brush auger.

The pressure of the *Multi Disc* (3.1) is maintained by the pre-tension of the tension spring (4.1.1) or with pneumatic clamping units by the pressure of the pneumatic cylinder (4.2.1).

The pre-tension of the tension spring (4.1.1) can be adjusted via the clamping screw (4.1.2).

The thick matter, which is continuously transported into the compactor unit via the brush auger during the separation process, is initially collected and compressed in the press channel (3.3) of the sealed compactor unit when its amount increases.

If the increasing accumulation of thick matter reaches a point at which the resulting force exceeds the pre-tension setting of the tension spring (4.1.1), the thick matter pushes the *Multi Disc* (3.1) out of its closed position.

The thick matter outlet opens and the thick matter is discharged downwards from the open side (↓ symbol) of the counter bearing casing (3.2).

In addition, the *Multi Disc* (3.1) is equipped with peeling tabs which peel the material pushing outwards off the thick matter plug in the event of congestion.

As soon as the pressure exerted by the thick matter on the *Multi Disc* (3.1) reduces, the pre-tension of the tension spring (4.1.1) brings the *Multi Disc* (3.1) back into its closed position.

The adjustment mechanism (3.4) holds the *Multi Disc* (3.1) and transmits the torque to the *Multi Disc* (3.1). The spring tension is transmitted to the *Multi Disc* via the adjustment mechanism (3.4).



NOTE!
Pneumatic adjustment

As a rule, the pressure on the *Multi Disc* in the version with pneumatic adjustment is adapted by means of a control unit.



NOTE!
HP version

The press channel (3.3) is designed as a fluid-permeable filter press channel in the HP version in order to achieve very high dry solids contents (DS contents) in the solid phase.

3.1.4 Drive connection

The Bioselect is equipped with a motor plate (6.1), onto which the corresponding gear motor (hollow shaft with keyway) is flanged.

The gear motor is supplied factory-installed as standard.

3.1.5 Shaft seal

The Börger Bioselect is equipped with a specially developed and optimized mechanical seal (7) as standard, which seals off the interior of the separator completely from the gear unit or the intermediate chamber (see ↗ *Chapter 3.1.6 “Intermediate chamber (quench)” on page 48*).

Mechanical seals are available in a variety of material combinations. The mechanical seal of your separator is described in the enclosed data sheet.

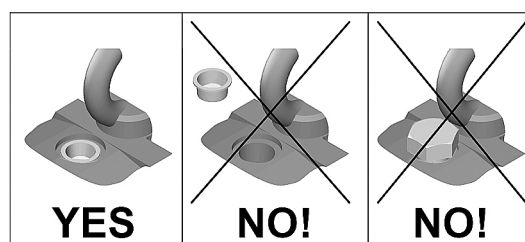
3.1.6 Intermediate chamber (quench)

The intermediate chamber with safety plug separates the hydraulic part of the separator from the gear unit. It is used for monitoring the integrity of the mechanical seal.

Overflowing caused by penetrating substrate indicates that the mechanical seal must be replaced immediately in order to prevent the substrate from entering the gear unit.

The safety opening in the intermediate chamber may only be closed with the safety plug.

When the safety opening is closed tightly, emerging substrate cannot escape and will penetrate the gear unit if the mechanical seal is defective. This could damage the gear unit.



**NOTICE!**

Risk of damage to the gear unit when the intermediate chamber is closed tightly!

When the vent hole is closed tightly or has become blocked, emerging medium from the working chamber cannot escape through the intermediate chamber and will penetrate the gear unit if the mechanical seal is defective. This could damage the gear unit.

- The safety opening in the intermediate chamber is used for monitoring the integrity of the mechanical seal, and must not be closed.
- Overflowing of the intermediate chamber indicates a seal malfunction.

3.1.7 Maintenance openings

**WARNING!**

Risk of fatal injury if maintenance openings are opened during operation!

If maintenance openings are opened during operation, objects and materials can be ejected and sources of danger become accessible. This may lead to severe injury or death.

- Only open the maintenance openings with the machine at standstill and the power supply switched off and secured against uncontrolled reactivation.
- After completion of the work close the maintenance openings and reinstall all fastening elements.

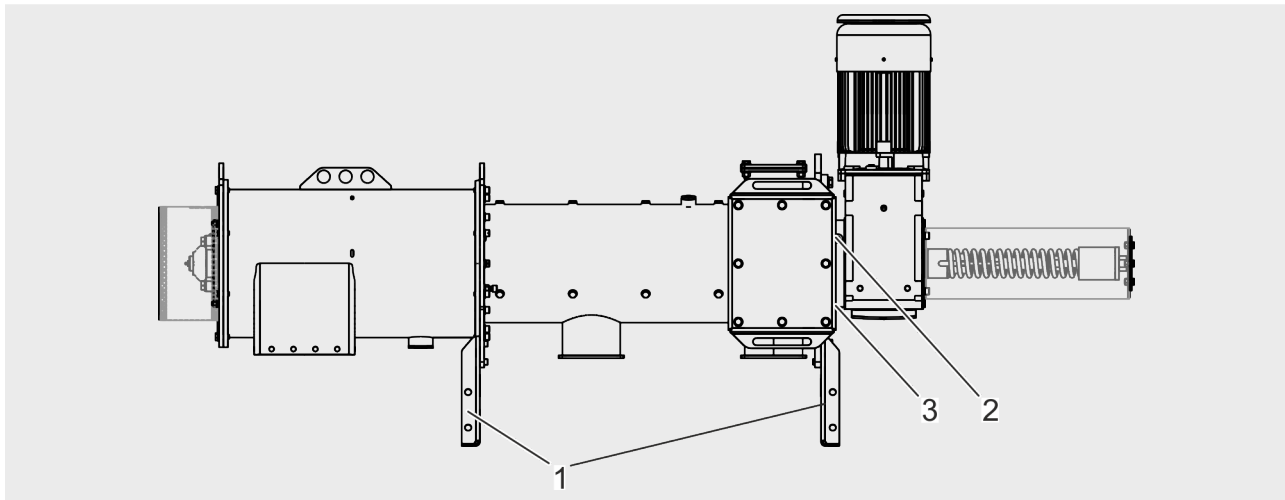
Fiber accumulation and dirt can be removed through the maintenance opening (8).

3.1.8 Design and mounting position



NOTE! **Standing mounting position!**

The Börger Bioselect is only designed for a standing mounting position, feet (mounting rails) at the bottom, shaft horizontal.



- | | |
|---|--|
| 1 | Mounting rails |
| 2 | Fill hole / safety opening on intermediate chamber |
| 3 | Drain for quench fluid |

3.1.9 Pipe connections on inlet and outlet

Inlet/feed

- The feed unit of the separator has two short, straight pipe connectors with a 6" square flange each, whereby the unused connector is closed with a blind flange.

Outlet/drain

- The standard version of the separator is equipped with a 6" square flange, e.g. to connect the appropriate valve (slurry valve, brass double four-bolt flange valve).

Options

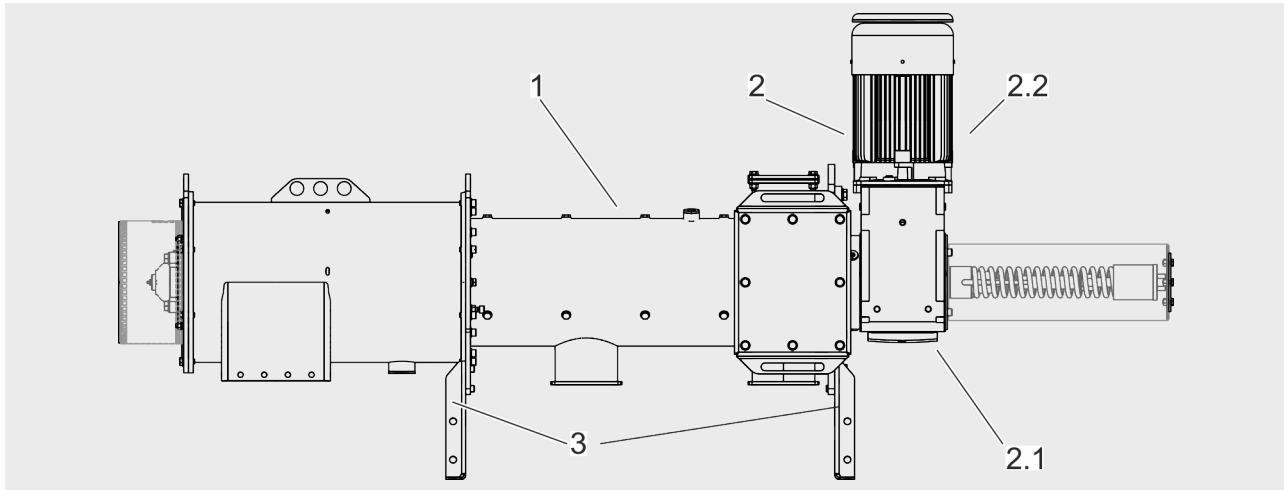
The inlet and outlet can be equipped with the same or different pipe connectors. Pipe connectors are available with a variety of connections, for example:

- DIN EN flange
- ANSI/ASME flange
- Quarter turn coupling
- Quick-release coupling, e.g. Perrot, female adapter (optional male)
- Dairy screw connections, and others

The pipe connectors can be equipped with optional additional fittings, **e.g.** screw sockets G $\frac{1}{2}$ " or G 1" or screw sockets with NPT threads, for the connection of pressure gauges, shut-off devices or breather systems.

3.1.10 Units / drive options

The majority of Börger separators are delivered as a unit, i.e. with the gear motor mounted.



1 Börger Bioselect

2 Drive with gear motor

2.1 Gear unit

2.2 Electric motor

3 Mounting rail

3.1.11 Options and accessories



NOTE! **Special equipment**

A variety of special equipment and additional accessories are available for the safe operation of the Börger machine according to its application. ↗ *Chapter 8 “Accessories” on page 172*

You will find explanations referring to the special equipment and any delivered accessories in the appendix.

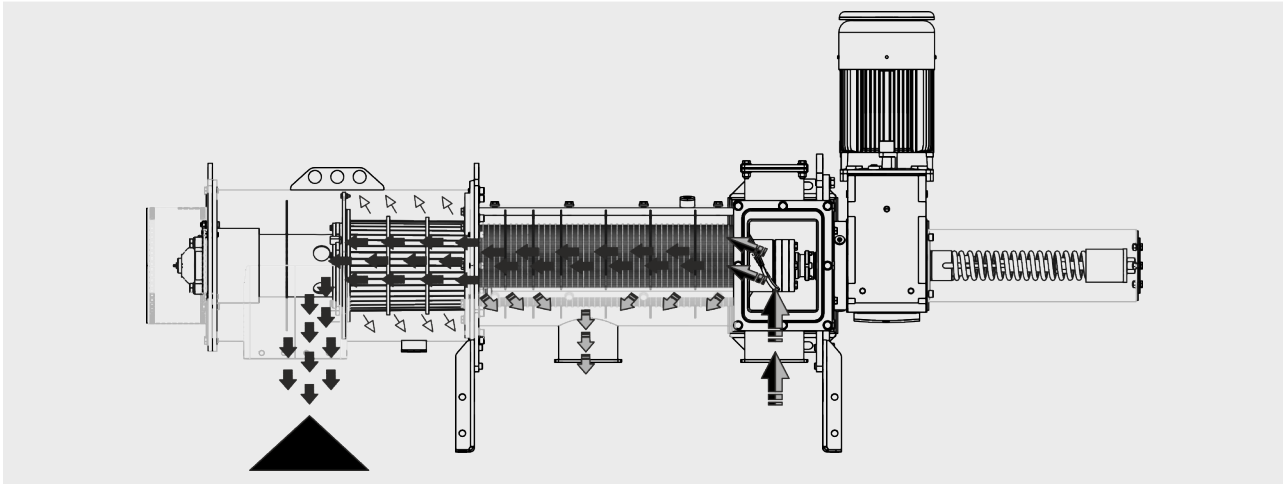


NOTICE! **Risk of material damage due to non-compliance with the operating manuals for accessories!**

Non-compliance with supplementary operating manuals for special equipment or accessories can lead to damage to the Börger machine.

- If your Börger machine is equipped with special equipment, then you must first read the corresponding supplementary operating manual for the equipment or accessories before carrying out any installation, commissioning, maintenance or repair work on the machine.

3.2 Operating principle



The Börger Bioselect is a purely mechanically operating separator with a thick matter compressor.

The substrate that is to be separated is transported into the vessel-like Bioselect by a feed pump or via a gravity feed with inlet pressure. Inside the pipe casing, there is the pipe-shaped wedge wire screen.

The liquid phase introduced here drains, almost without pressure, by means of gravity through the slot openings in the screen to the peripheral zones of the pipe casing and, finally, to the outlet, while the solid phase is transported by the rotating brush auger inside the wedge wire screen into the filter press channel of the compactor unit where it is pressed and further liquid is drained off.

The DS content of the solid phase is regulated via the adjustable pre-tension of the spring which acts upon the *Multi Disc* that functions as a sealer and peeler. If the force of the accumulated thick matter exceeds the force of the tension springs, then the thick matter pushes the *Multi Disc* out of its closed position. The *Multi Disc*, which is equipped with peeling tabs, peels the material pushing outwards off the thick matter plug. The thick matter loosened in this way is discharged downwards.

As soon as the pressure exerted by the thick matter on the *Multi Disc* reduces, the tension springs, which are under pre-tension, bring the *Multi Disc* back into its closed position.

**NOTE!****Pneumatic adjustment**

As a rule, the pressure on the *Multi Disc* in the version with pneumatic adjustment is adapted by means of a control unit.

3.3 Technical data

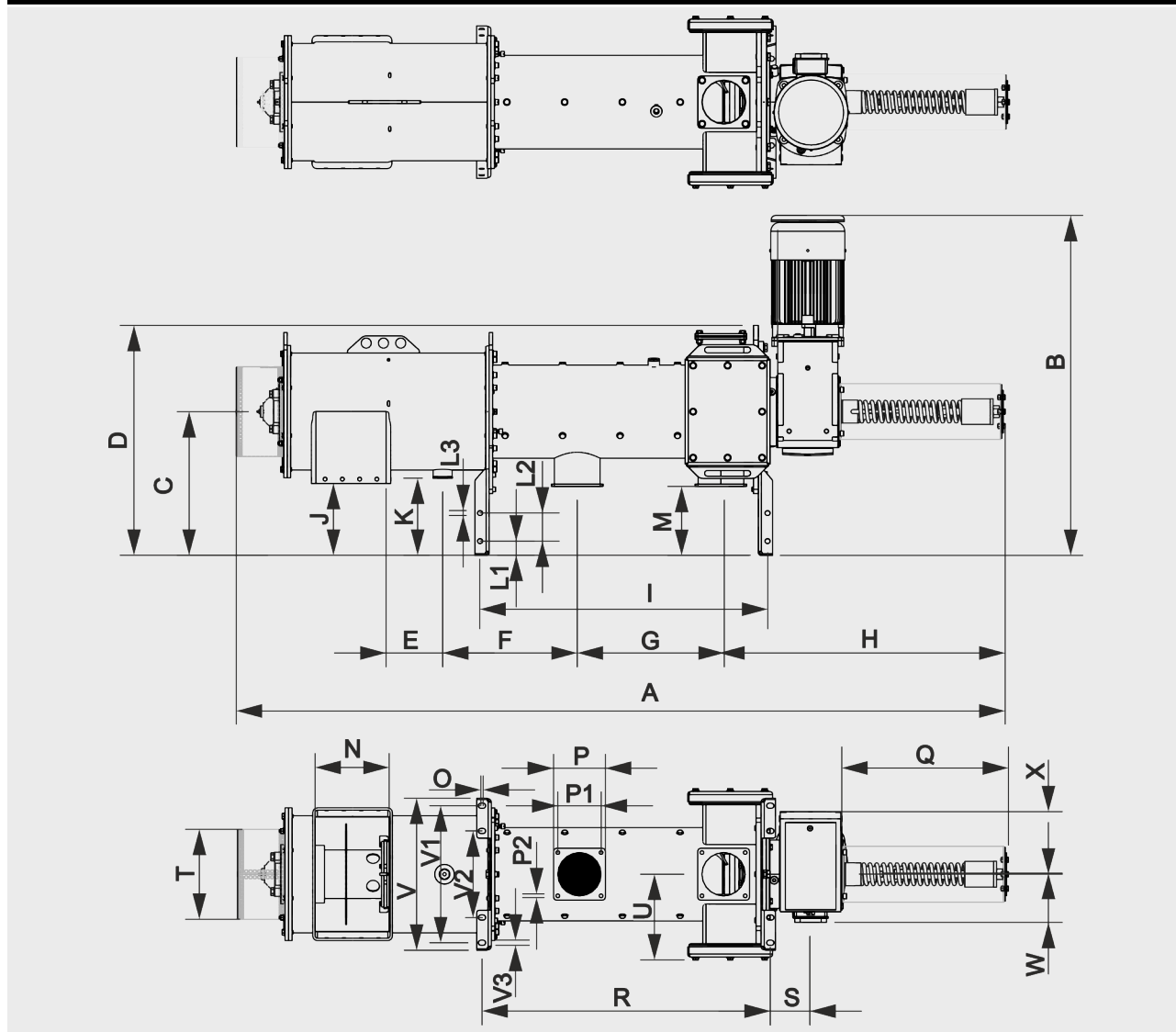
Börger machines are configured individually for the application requirements. This leads to a wide range of variations that have been optimized for specific applications. Therefore, only the data of some of the standard versions can be listed here as examples.

Detailed specifications for your Börger machine or unit can be found in the data sheet and the **individual dimensional drawing** sent when the machine was ordered.

Please contact Börger customer service if you require a copy of this drawing.

3.3.1 Dimensions

Bioselect without attachment parts



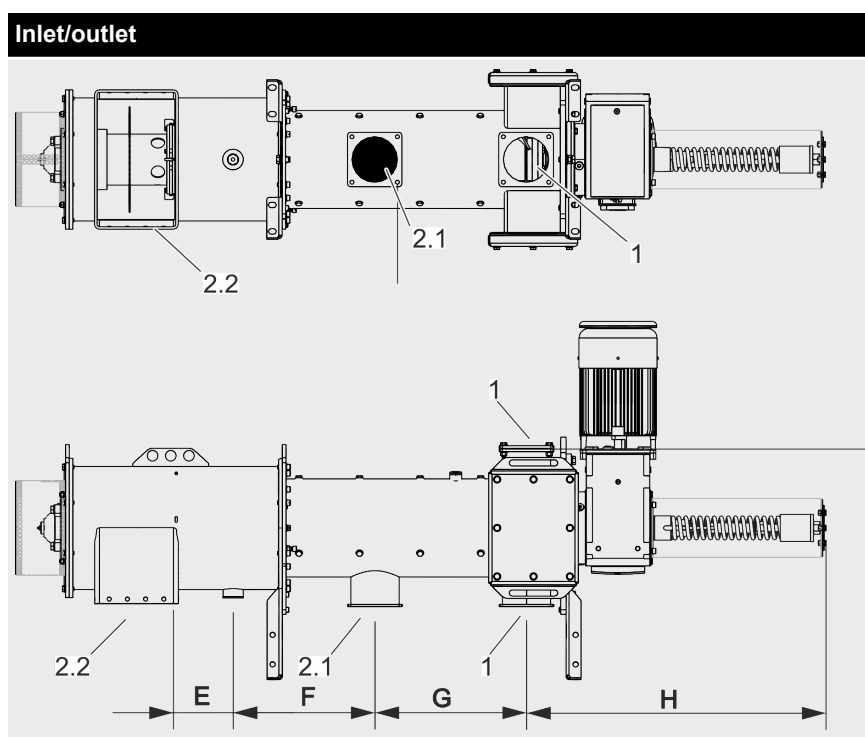
Dimensions without attachment parts

Dimensions	approx. [mm]		approx. [inch]	
	RC 40	RC 40 HP	RC 40	RC 40 HP
A		2696		106.1
B	1182	1182	46.5	46.5
C	500	500	19.7	19.7
D	800	800	31.5	31.5
E	192	192	7.6	7.6
F	468	468	18.4	18.4
G	500	500	19.7	19.7
H	1010	1010	39.8	39.8
I	1000	1000	39.4	39.4
J	250	250	9.8	9.8
K	274	274	10.8	10.8
L1	50	50	2.0	2.0
L2	100	100	3.9	3.9
L3	Ø 18	Ø 18	0.7	0.7
M	240	240	9.4	9.4
N	260	260	10.2	10.2
O	7	7	0.3	0.3
P	□ 180	□ 180	□ 7.1	□ 7.1
P1	□ 150	□ 150	□ 5.9	□ 5.9
P2	Ø 14	Ø 14	Ø 0.6	Ø 0.6
Q	600	600	23.62	23.62
R	1000	1000	39.4	39.4
S	140	140	5.5	5.5
T	312	312	12.3	12.3
U	297	297	11.7	11.7
V	527	527	20.7	20.7
V1	475	475	18.7	18.7
V2	300	300	11.8	11.8
V3	Ø 18	Ø 18	Ø 0.7	Ø 0.7
W	183	183	7.2	7.2
X	217	217	8.5	8.5

Weights	RC 40	
	approx. [kg]	approx. [lb]
Weight without drive:	413	911

Unit mass:

see data sheet



1 Inlet

2.1 Outlet 1

2.2 Outlet 2

Dimensions inlet / outlet

Dimensions	approx. [mm]		approx. [inch]	
	RC 40	RC 40 HP	RC 40	RC 40 HP
Nominal diameter: 150				
A	972	972	38.27	38.27
B	240	240	9.45	9.45
C	500	500	19.69	19.69
C1	-	-	-	-
C2	649	649	25.55	25.55
D	-	-	-	-
E	520	520	20.47	20.47

Dimensions	approx. [mm]		approx. [inch]	
Nominal diameter: 150	RC 40	RC 40 HP	RC 40	RC 40 HP
O	150	150	5.91	5.91
Ø P	150	150	5.91	5.91
Ø Q	14	14	0.55	0.55
R	180	180	7.09	7.09
S	444	444	17.48	17.48
T	260	260	10.24	10.24

Deviations in individual dimensions within acceptable tolerances due to production cannot be ruled out. The pipe connectors delivered as an option are designed according to the dimensional drawing created for the order.

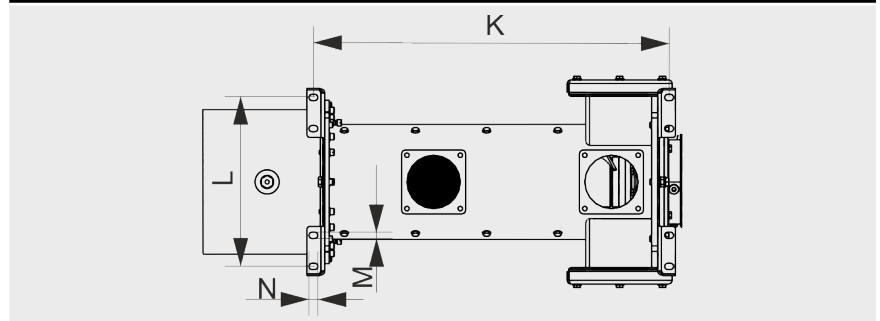
Inlet (substrate)

The feed unit of the separator has two short, straight pipe connectors with a 6" square flange each, whereby the unused connector is closed with a blind flange.

Outlet (liquid phase and thick matter)

The pipe casing is equipped with a 6" square flange as standard. Optionally, adapters for DIN flanges or other connections as well as the corresponding connection variations can be supplied. The counter bearing casing is equipped with an outlet for the thick matter.

Mounting rails



The Bioselect has two mounting rails.

4 slotted holes for M16 screws (mounting at the frame) or corresponding heavy-duty anchors (mounting at the bottom) are available for mounting.

Dimensions of the mounting rails

Dimensions	approx. [mm]		approx. [inch]	
	RC 40	RC 40 HP	RC 40	RC 40 HP
K	1000	1000	39.65	39.65
L	475	475	17.52	17.52
M	18	18	0.71	0.71
N	25	25	0.95	0.95

Complete unit

The dimensions can be found in the specific dimensional drawing created for the order. The dimensions and weights of the drive and gear unit etc. can be found in the corresponding manufacturer's documentation. The weight of the complete unit is specified in the data sheet.

3.3.2 Performance data and maximum loads

The actual output of the separator depends on several factors, such as pressure, viscosity, DS content / DS structure of the substrate which is to be separated, rotational speed, ambient temperature, humidity, etc. The following values are therefore intended as guidelines only.



NOTE!

Swine liquid manure

Swine liquid manure must contain barley husks and/or straw. Its DS content must be 5 to 6%. Otherwise, swine liquid manure cannot be processed with the Bioselect RC. If liquid manure from corn- or bread-fed animals is to be processed, it must be mixed so as to obtain the required DS content and the required DS quality.

Swine liquid manure

Substrate:		Swine liquid manure	
DS content at input		5 – 6 %	
Type		RC 40	RC 40 HP
Flow rate:	m ³ /h	25 - 40	15 - 40
	gpm	110 - 176	66 - 176
DS content of thin phase ¹⁾ %		2 - 5	2 - 5
Output quantity		2 - 4	1 - 4
Thick matter t/h			
DS content		18 - 25	20 - 35 ³⁾
Thick matter %			
Energy demand ²⁾		0.1 - 0.3	0.1 - 0.4
kWh/m ³ (approx.)			

Cattle liquid manure

Substrate:		Cattle liquid manure	
DS content at input		7 – 10 %	
Type		RC 40	RC 40 HP
Flow rate:	m³/h	20 - 35	10 - 35
	gpm	88 - 154	44 - 154
DS content of thin phase 1) %		3 - 6	3 - 6
Output quantity Thick matter t/h		2 - 4	1 - 4
DS content Thick matter %		18 - 23	20 – 35 ³⁾
Energy demand ²⁾ kWh/m³ (approx.)		0.2 - 0.4	0.2 - 0.6

Digestate

Substrate:		Digestate	
DS content at input		6 – 12 %	
Type		RC 40	RC 40 HP
Flow rate:	m³/h	20 - 40	10 - 40
	gpm	88 - 176	44 - 176
DS content of thin phase 1) %		3 - 6	3 - 6
Output quantity Thick matter t/h		2 - 4	1 - 4
DS content Thick matter %		18 - 23	20 – 35 ³⁾
Energy demand ²⁾ kWh/m³ (approx.)		0.1 - 0.3	0.1 - 0.6

DS content

¹⁾ The DS content of the thin phase is dependent, amongst other things, on the structure of the fibrous matter, which in liquid manure, for example, depends on the kind of feed used.

²⁾ The energy demand is oriented, amongst other things, at the required level of solid content (DS content) and the pre-tension set in the compactor unit to this end.

³⁾ DS content of more than 30% and up to 35% under ideal operating conditions



NOTE! Separation of fibers

In order to ensure that the fibers are separated from the system, the fibers should be larger than the slot opening width of the wedge wire screen. The ideal slot opening width of the screen for the DS contents and DS qualities required can be different depending on the separation medium.

Pressure limits

Pressure resistance of the screen

Max. differential pressure	2 bar
	29 psi

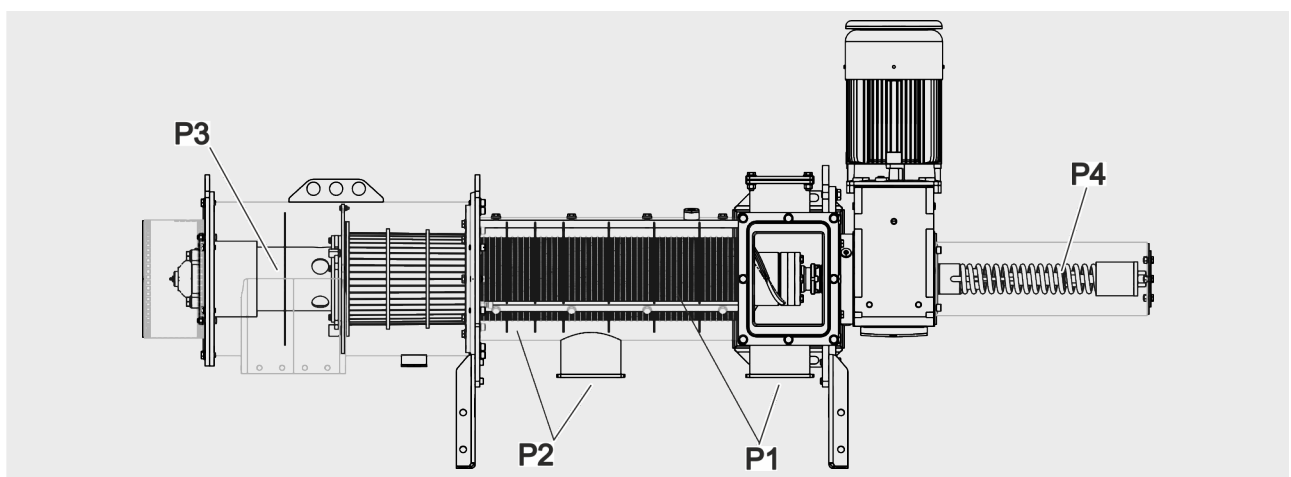
Separation effect

Min. differential pressure	80 - 200 mbar
	1.16 - 2.90 psi

The pressure limits during operation of the Bioselect RC separator are oriented at the operating conditions.

For example, in the case of gravity feed operation without using a control unit, lower pressure operating limits must be adhered to.

A control unit should always be used whenever the substrate is fed via a pump. Otherwise, low pressure operating limits must also be adhered to in this case.



Operation without control unit

Pressure	Operating limits	Short-term
P1 inlet pressure	80 - 200 mbar	up to 300 mbar (0 to 3 mH ₂ O)
	1.16 - 2.90 psi	up to 4.35 psi (0 to 3 mH ₂ O)
P2 liquid phase	-200 - 100 mbar	-200 - 100 mbar
	-2.90 - 1.45 psi	-2.90 - 1.45 psi
Differential pressure (DP) P1 – P2	80 - 400 mbar	100 - 500 mbar
	0.16 - 5.80 psi	1.45 - 7.25 psi

Operation with RC-Control unit

Pressure	Operating limits	Short-term
P1 inlet pressure	0.2 - 2 bar	up to 2.5 bar
	2.90 - 29.00 psi	up to 36.30 psi
P2 liquid phase	-200 - 100 mbar	-200 - 100 mbar
	-2.90 - 1.45 psi	-2.90 - 1.45 psi
Differential pressure (DP) P1 – P2	0.1 - 2.2 bar	0.1 - 2.7 bar
	1.45 - 31.91 psi	1.45 - 39.16 psi

- P3 = accumulated solid phase, variable
- P4 = spring pre-tension, variable

Operation with gravity feed:

The differential pressure in continuous operation should be approx. 200 mbar (2.90 psi).

- If this value is permanently exceeded, the thick matter contains an undesirably large amount of liquid.
- If the differential pressure is lower than 80 mbar (1.16 psi), no separation takes place.

If the inlet pressure P1 is permanently exceeded, too much solid matter enters the brush auger, which results in an increased power consumption of the drive that eventually can cause damage to the device.

Operation with RC-Control unit:

If the limit of the differential pressure of 2.2 bar (31.91 psi) is exceeded, the liquid content of the solid phase is undesirably high.

If the inlet pressure P1 (feed pressure) is permanently exceeded, too much solid matter enters the brush auger, which results in an increased power consumption of the drive that eventually can cause damage to the device.

Power consumption limits

	with control unit	without control unit
Minimum	8A	8A
Optimum	15A	< 11A
Short-term	16A	16A
Maximum	18A	18A

* values at 400V 50Hz

**NOTICE!**

Risk of material damage if the limit of the current consumption is exceeded!

The current consumption must not exceed the limit of 18 A. Otherwise, malfunctions or even lasting damage to the wedge wire screen and the motor may occur.

- If the brush auger is stuck in the solid matter such that the brush auger can no longer be released / moved backwards, the Bioselect RC separator would require manual cleaning as described in  *Chapter 6.1 "Machine care" on page 111*.

Check the current consumption of the gear motor at the Bioselect at all times during the break-in period.

4 Transportation, Storage and Installation

4.1 Transportation



WARNING!

Risk of fatal injury due to suspended loads!

Loads can swing and fall during lifting operations. This can cause severe injury, including death.

- Never stand under or within the swinging range of suspended loads.
- Do not move loads unsupervised.
- Only use approved hoists and slings with sufficient load-bearing capacity.
- Do not use torn or worn hoists such as ropes and belts.
- Do not place hoists such as ropes and belts near sharp corners and edges and do not tie them together or twist them.
- Put the load down when leaving the operating site.



WARNING!

Risk of injury by falling or tilting packages!

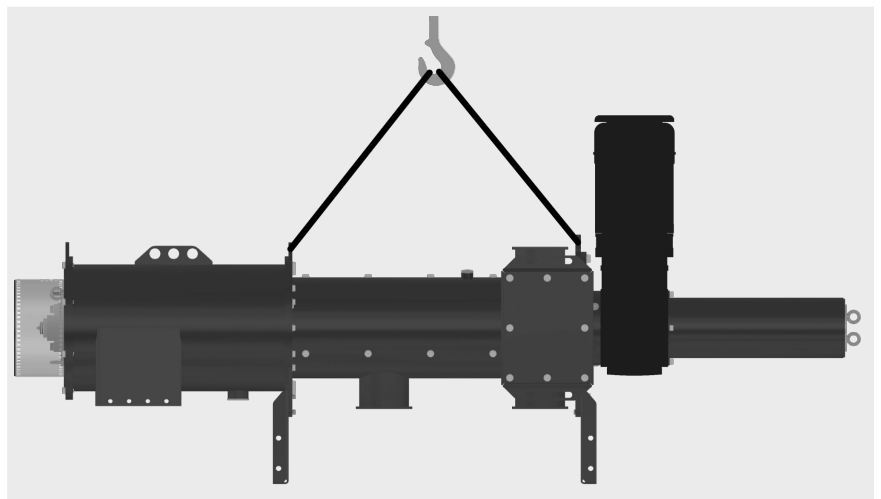
Packages can have their center of gravity elsewhere than in the middle. If not properly aligned, the package can tilt and fall. Falling or tilting packages can cause severe injuries.

- Lift the package carefully and monitor whether it tilts. Realign if necessary.

Tool: ■ Hoists

Be sure to read and follow all instructions:

- on safety,
 - on operation and control,
 - on installation, repairs and maintenance. ↗ *Chapter 2.12*
“Safety instructions for maintenance and rectifying malfunctions” on page 37
1. ➤ Observe the specifications in the hoist instructions, especially for the inclination angle allowed.
 2. ➤ Transport the Börger machine using a suitable hoist.
 3. ➤ If a special base frame with additional lifting lugs or forklift pockets was delivered, use them accordingly.



Transport the standard version of Bioselect units with gear motor in the manner shown here, for example.

- If a special base frame with lifting lugs or forklift pockets was delivered, use them accordingly.

4.2 As-delivered condition

Be sure to read and follow all instructions:

- on safety,
- on operation and control,
- on installation, repairs and maintenance. ↗ *Chapter 2.12*
“Safety instructions for maintenance and rectifying malfunctions” on page 37

The Börger machine is delivered in a pre-assembled, packed state. Optional accessories may be included in separate packaging.

- 1.** ▶ Observe the applicable delivery conditions for the order.
- 2.** ▶ Check that the delivery is complete when you receive it.
- 3.** ▶ Inspect the delivery immediately for any signs of transport damage.
- 4.** ▶ Ensure that the unit is not put into operation in the event of incorrect or incomplete delivery, or transport damage.
- 5.** ▶ Inform the shipping agent immediately of any transport damage and contact Börger GmbH.

4.3 Storage and interim storage

4.3.1 Storage



NOTICE!

Risk of damage caused by frost!

Frost can cause damage to the Börger machine.

- Protect the Börger machine and its connections against frost.



NOTICE!

Risk of material damage due to medium remaining in the Börger machine

If the medium remains in the Börger machine during storage periods and long downtimes, it can cause material damage to the wedge wire screen and make it more difficult to start the Börger machine.

- It is **essential** to empty the Börger machine before storage or long downtimes, especially with swelling media such as paper. ↪ *Chapter 5.4 “Downtimes” on page 100*
- In the case of other media, such as slurry, allow a corresponding soaking time for the medium so that the machine can be restarted after a long downtime.



NOTE!

Storage conditions

If the Börger machine is not used immediately, then appropriate storage conditions are as important as the correct installation and maintenance for subsequent trouble-free operation.

Be sure to read and follow all instructions:

- on safety,
- on operation and control,
- on installation, repairs and maintenance. ↪ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*

Always adhere to the following storage conditions for the Börger machine:

- The storage room must be evenly ventilated and free of dust and vibrations
 - The relative humidity must be below 65% and the temperature between 15 °C and 25 °C (59 °F and 77 °F)
 - Avoid exposure to direct heat sources (sunlight, heating)
-
1. ➤ Repair any damage to the external coating, galvanized components and corrosion protection on bare metal parts caused by external influences.
 2. ➤ Protect the Börger machine from cold, particularly from frost, as well as from moisture, contamination and mechanical influences. Close the inlet and outlet connections in particular (flange, coupling etc.), plus any other openings to the interior with covers impermeable to moisture.
 3. ➤ Before commissioning / recommissioning at a later date, remove all protective covers and anti-corrosion coatings.

If the device was stored for two years or more, or if the storage conditions detailed above could not be met:

- Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.*
 - To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
-
1. ➤ Replace the lubricants before commissioning.
 2. ➤ Check all O-rings that come into contact with the medium and the mechanical seal and replace them if necessary as described in ↗ *Chapter 6.3.3 “Replacing the mechanical seal” on page 137.*
 3. ➤ Lubricate the adjustment mechanism as described in ↗ *Chapter 6.2.3 “Lubricating the adjustment mechanism and the bearing” on page 127.*
 4. ➤ Observe the **drive** manufacturer’s instructions for storing the drive.
 5. ➤ Observe the manufacturer’s instructions for storing any **accessories**.



NOTE!

Börger customer service

If you have any questions on troubleshooting, installation, maintenance and repair work, contact Börger customer service.

4.3.2 Interim storage

For the interim storage of a used Börger machine, the following applies:

Be sure to read and follow all instructions:

- on safety,
 - on operation and control,
 - on installation, repairs and maintenance. ↪ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*
1. ➤ Clean the Börger machine thoroughly. ↪ *Chapter 6.1 “Machine care” on page 111*
 2. ➤ Apply suitable corrosion protection to the machine.
 3. ➤ Follow the storage instructions. ↪ *Chapter 4.3.1 “Storage” on page 69*

4.4 Installation



WARNING!

Risk of fatal injury as a result of incorrect installation!

Errors during installation may lead to extremely dangerous situations and cause severe material damage.

- Install the component parts professionally. Observe specified screw tightening torques.
- Please observe the following prior to initial commissioning.
 - Ensure that all installation work is performed and completed as per the information and notes provided in this manual.
 - Ensure that all covers and safety features are installed and function correctly.
 - Ensure that nobody enters the hazardous area.



Further operating manuals / supplementary operating manuals

You must completely read the separate operating manuals and/or supplementary operating manuals for components and/or special versions.

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance.



Supplier documentation

You must completely read the separate supplier documentation.

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance.



Operating manuals of electronic parts

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance,
- in the operating manuals of electronic parts in the appendix.

4.4.1 Preparation for installation



NOTICE!

Risk of material damage due to non-compliance with the operating manuals for accessories!

Non-compliance with supplementary operating manuals for special equipment or accessories can lead to damage to the Börger machine.

- If your Börger machine is equipped with special equipment, then you must first read the corresponding supplementary operating manual for the equipment or accessories before carrying out any installation, commissioning, maintenance or repair work on the machine.

- Read and follow the safety instructions detailed in  *Chapter 2.12 "Safety instructions for maintenance and rectifying malfunctions" on page 37.*

- 1.**  Check all specifications in the technical data sheet and only install the Bioselect if it is suitable for the intended application.

- 2.**  Apart from the performance data on the separator, also check that the materials are compatible with the substrate that is to be separated.

- 3.**  If available, replace the transport lock on the gear unit with the breather system.

- 4.**  Check that any accessories for the operation of the Börger machine are available and make sure that the accessories are ready for operation according to the operating manual of the manufacturer.

4.4.2 Setup



NOTICE!

Risk of frost!

Pieces of ice in the separating and conveying unit or the freezing of the brush auger onto the wedge wire screen can result in substantial damage to the screen upon resumption of operation.

- Protect the Bioselect and the connections against frost.



NOTICE!

Sufficient air circulation at the drive!

- Ensure that there is sufficient circulation of air around the drive; see the drive manufacturer's operating manual.



NOTE!

Installation of the drive

If your Bioselect was delivered **without a drive**, then the drive must be installed first.



NOTICE!

Wrong drive

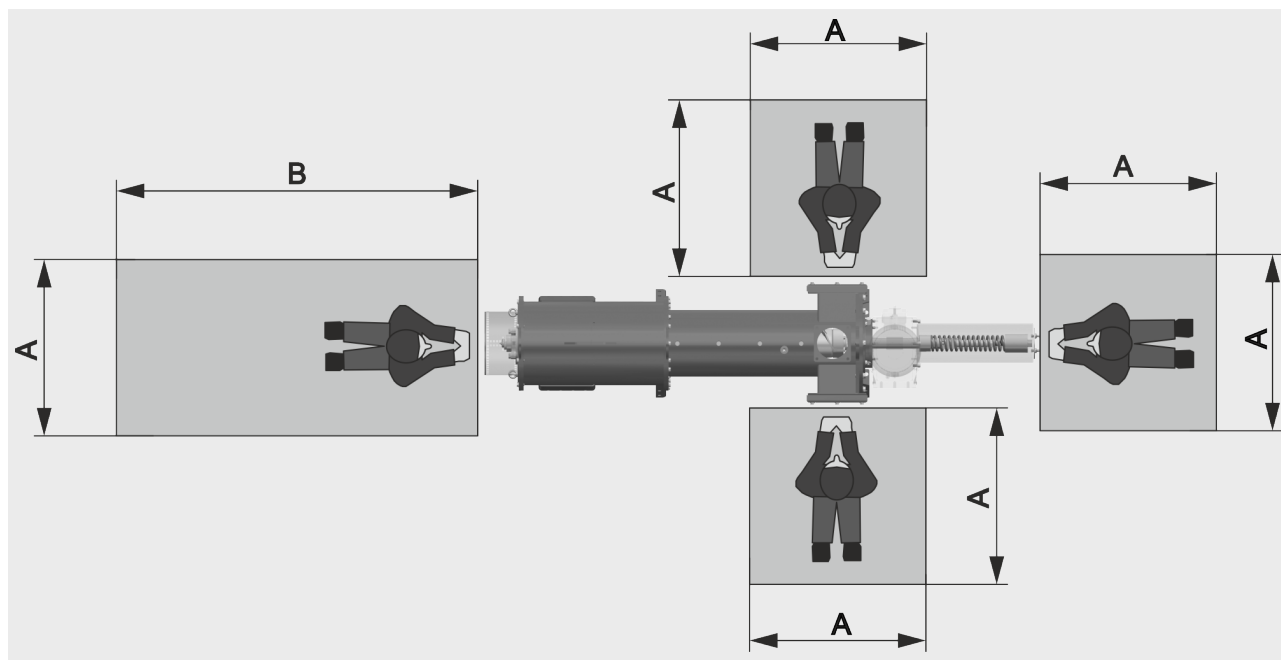
If an inadequate drive is installed, the risk of damage to the device and the environment cannot be excluded.

- Only if an appropriate special version of the Bioselect separator was delivered as agreed, for example, in respect of the configuration and length of the shaft, can the installation of another, previously agreed upon drive be effected.
 - Such a special version is then specified in the supplied data sheet.
-
- Read and follow the safety instructions detailed in  *Chapter 2.12 "Safety instructions for maintenance and rectifying malfunctions" on page 37.*
 - To the extent necessary, amply secure the surrounding area when performing installation. Cordon off the working area with a red and white safety chain and a warning sign.
1.  Read the drive manufacturer's operating manual.
 2.  Ensure that the parallel keys are correctly positioned in the keyway of the separator's drive shaft.
 3.  Install the drive according to the operating manual of the drive manufacturer, paying particular attention to the instructions on the installation of the solid shaft with parallel key into the hollow shaft of the gear unit (also refer to  *Chapter 6.3.3 "Replacing the mechanical seal" on page 137.*)

4. ➤ Use four suitable hexagon head screws (position 48 in the standard spare parts list) to attach the modified B5 flange to the motor plate of the separator.
5. ➤ Fill the intermediate chamber in accordance with ↗ *Chapter 6.2.2 "Lubricant fill level and changing the lubricants" on page 123.*

**Version with mounting
rails**

The recommended size of the service spaces for maintenance and repair work is:



Service space dimensions

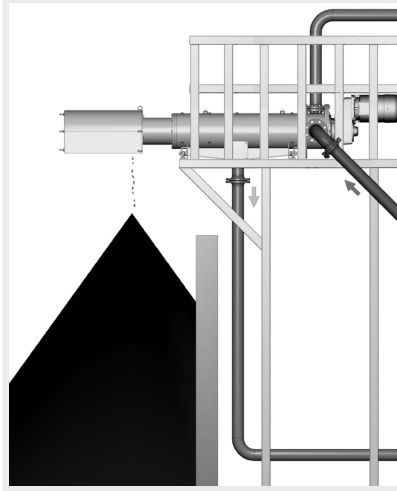
Dimensions	approx. [m]		approx. [ft]	
	RC 40	RC 40 HP	RC 40	RC 40 HP
A	1.0	1.0	3.3	3.3
B	2.0	2.0	6.6	6.6



NOTE! Service space

Ensure that the service spaces at the compactor and the adjustment units are accessible with a telescopic loader or similar.

Ensure that there is sufficient circulation of air around the drive; see the drive manufacturer's operating manual.

Conical pile

Install the separator in such a way that the thick matter is discharged freely downwards, e.g. onto a conveyor belt. In order to create a conical pile, there must be a sufficiently large difference in height between the thick matter outlet and the ground. The volume of the conical pile is dependent on the installation height.

- The surface must be solid, level, clean and dry.
- Position the mounting rails without subjecting them to stress.
- Compensate for any unevenness
 - e.g. by using washers or shims.
- Install the Bioselect without stress on the mounting rails on the solid, stable frame using four suitable screws, or on a solid surface using secure fixing systems (such as heavy-duty anchors) which are suitable for the surface and the application.

Other versions

- Mobile Bioselect units must be operated on a solid surface and be secured in place.
- Separators that are operated on a vehicle must be fixed to the vehicle frame.
- Ensure the necessary difference in height between the thick matter outlet (protection cover) and the ground, e.g. by positioning the outlet above a sufficiently deep pit.
- When installing special versions, check whether a supplementary operating manual is enclosed in the appendix and, if so, follow the instructions.

4.4.3 Installing the inlet and outlet

**NOTICE!****Risk of damage due to incorrectly installed pipe system!**

Börger machines are robust, and are constructed for use with high loads. However, they must not be used as an anchor point for the pipe under any circumstances. Even at low vibrations, the stress generated on the pipe during operation can lead to cracks on weaker components / weld seams.

- Pipes and any additional components such as valves, check valves etc. must not subject the machine and flange connections to stress.
- Avoid misalignment between the machine pipe connectors and the pipe.
- All attachment parts must be supported as close to the machine as possible according to the valid general technical rules.

Feed pump

If your Bioselect was delivered **without an installed feed pump** and if a feed with sufficient inlet pressure cannot be guaranteed, a feed pump must initially be installed at a connection of the feed unit:

Feed pump recommendation

We recommend using a Börger PL series rotary lobe pump, which has been designed for the required flow rate of the separation system and the necessary separation outcome.

The feed pump for the Bioselect RC needs to meet the following specifications to fill the Bioselect optimally:



NOTE!

Use for anaerobic digestate or cattle liquid manure

- Flow rate at 50 Hz: approx. 25 m³/h (±5 m³/h) (110 gpm (±22 gpm))
- The flow rate needs to be variable from approx. 5 to 30 m³/h (22 to 132 gpm) (e.g. controlled through a frequency converter)
- It ought to be low-pulsation pumping
- Required working pressure: 80 to 200 mbar (1.2 to 2.9 psi), when operated with a control unit up to 2 bar (29.0 psi) (where required, the pump pressure must be higher in case of longer pipes)
- Recommendation: Börger rotary lobe pump PL



NOTE!

Use for swine liquid manure, DS content 5-6% (barley husks / straw)

- Flow rate at 50 Hz: approx. 40 m³/h (± 5 m³/h) (176 gpm (±22 gpm))
- The flow rate needs to be variable from approx. 5 to 30 m³/h (22 to 132 gpm) (e.g. controlled through a frequency converter)
- It ought to be low-pulsation pumping
- Required working pressure: 80 to 200 mbar (1.2 to 2.9 psi), when operated with a control unit up to 2 bar (29.0 psi) (where required, the pump pressure must be higher in case of longer pipes)
- Recommendation: Börger rotary lobe pump PL

**NOTE!****Displacement volume of the feed pump**

If the flow rate of the feed pump is too high or too low, this reduces the service life of the pump drive that, in these circumstances, must be operated with correspondingly high or low frequencies to achieve the required separation and consistency results.

If the flow rate of the feed pump is too low, this does not damage the separator, however, it decreases the flow rate and the functionality of the system.

- Read and follow the safety instructions detailed in  *Chapter 2.12 "Safety instructions for maintenance and rectifying malfunctions" on page 37.*
- To the extent necessary, amply secure the surrounding area when performing installation. Cordon off the working area with a red and white safety chain and a warning sign.
- 1.  Read and observe the operating manual of the pump manufacturer.
- 2.  Only use an appropriate pump with a suitable connection.
- 3.  Install the outlet of the feed pump according to the instructions in the manufacturer's operating manual on one of the two inlet flanges of the feed unit of the separator and using suitable seals.
- 4.  Ensure that the unused inlet opening is tightly sealed with a blind flange.

Gravity feed with inlet pressure**NOTE!**
Bioselect gravity feed

The gravity feed to the Bioselect takes place from a tank which is constantly filled to the same level, such as a bioreactor (fermenter), a secondary fermenter or a storage container.

Required fill level inside the feed line to the Bioselect:

for **anaerobic digestate and cattle liquid manure** approx. 1.0 m (3.3 ft), inlet pressure = 100 mbar (1.45 psi) (directly at the device, consider losses in the piping!)

for **swine liquid manure** approx. 2.0 m (6.6 ft), inlet pressure = 200 mbar (2.90 psi) (directly at the device, consider losses in the piping!)

The feed line should be installed at the storage container at least 1 m (3.3 ft) below the liquid level. Otherwise, biogas might enter the Bioselect in the event of fill level fluctuations, or recently inserted, insufficiently fermented biomass might enter the separation process from the floating layer too soon.

If not readily assembled upon delivery or installed at the feed line, install a suitable shut-off device at the separator inlet to prevent a continued feed of substrate when the unit is stationary.

Be sure to read and follow all instructions:

- on safety,
- on operation and control,
- on installation, repairs and maintenance. ↗ *Chapter 2.12*
“Safety instructions for maintenance and rectifying malfunctions” on page 37

- 1.** ➤ Clean all connection flanges and all other connections before installation and ensure that they are not damaged.
- 2.** ➤ On flange connections, ensure that the flanges are positioned exactly face to face, even without being fixed by screws. They must not be inclined, nor pressed together, nor spring backwards due to tensile forces.
- 3.** ➤ Prevent any stress on the pipes connected to the Börger machine by taking suitable measures.
- 4.** ➤ Use seals that are suitable for the connections.
- 5.** ➤ Install the connections to the matching pieces on the pipes or hoses without stress. When necessary, apply the appropriate torque for the connection. Consult the manufacturer's instructions for coupling connections.

4.4.4 Liquid phase outlet

**NOTE!**

The liquid phase must be able to drain off or be pumped off at the outlet without pressure.

**NOTE!****Shut-off device at the outlet**

Depending on the operating conditions, it is advisable to install an appropriate shut-off device at the outlet of the separator to prevent the continued draining of the liquid phase when the unit is stationary and to close the interior of the separator airtight, so that the remaining substrate does not dry up.

- Read and follow the safety instructions detailed in  *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.*
- To the extent necessary, amply secure the surrounding area when performing installation. Cordon off the working area with a red and white safety chain and a warning sign.
-  Connect the discharge pipe with the suitable connection to the outlet opening using an appropriate seal.

4.4.5 Electrical connection

**DANGER!****Risk of fatal injury due to electric power!**

There is an immediate risk of fatal electric shock if live components are touched. Damage to the insulation of the individual components can be fatal.

- Have all work on the electrical equipment performed by skilled electricians.
- In the event of damage to the insulation, cut off the power supply immediately and initiate repairs.
- Before working on live components of electrical systems and equipment, de-energize these components and secure them in this state for the duration of the work.

Adhere to the following safety rules in this regard:

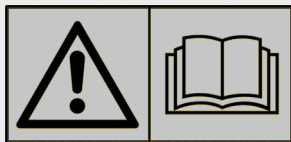
- Disconnect.
- Secure against restart.
- Verify that components have been de-energized.
- Ground and short-circuit.*
- Cover or shield any adjacent live components.*
- Never bypass or disable any fuses. Comply with the correct amperage specification when replacing fuses.
- Keep moisture away from all live components. This may lead to short circuits.
- Ensure that all electric connections have been properly reconnected before switching the unit on again and that the cables used are undamaged and have not been sharply bent.
- Ensure that the control cabinet is properly closed before switching on and during operation.

* Under certain circumstances, exceptions may apply for systems with a nominal voltage of up to 1000V (see DIN VDE 0105-100)

**NOTE!****When using frequency converters**

Due to their working principle, frequency converters generate leakage current.

- For proper operation of a frequency converter at a residual current device, the use of an AC/DC sensitive **residual current device (type B)** according to **EN50178/VDE0160** is required due to the DC component of the leakage current.

**Operating manuals of electronic parts**

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance,
- in the operating manuals of electronic parts in the appendix.

The Börger machine must be completely installed before establishing the electrical connections.

Be sure to read and follow all instructions:

- on safety,
- on operation and control,
- on installation, repairs and maintenance. ↪ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*

- 1.** ➤ Connect all electrical monitoring devices according to the operating manuals from the manufacturers.
- 2.** ➤ Connect the drive **on versions with an electric drive** according to the operating manual from the manufacturer.
- 3.** ➤ Ground the Börger machine properly, see operating manual of the drive manufacturer. Also use the bore hole for the ground terminal.

4.4.6 Connection of pneumatic unit

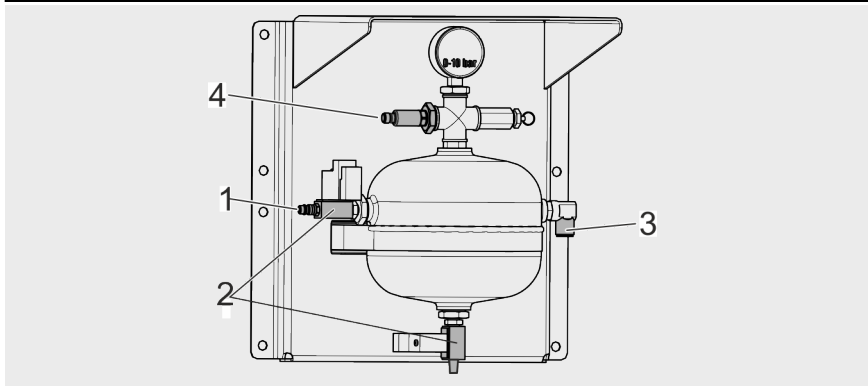


CAUTION! Risk of injury due to residual pressure!

Residual pressures may still be present despite pressure relief.

- Take extra care when removing the compressed air connections to prevent accidents caused by the release of residual pressure.

Pressure cylinder of pneumatic unit



1 COMPRESSED AIR SUPPLY

- Coupling connector DN 7.2

2 VALVE

- Valve (MS 18310 24V)

3 PLUG CONNECTION TO THE SEPARATOR

- Plug connection 12mm

4 SENSOR

- PT5404

Be sure to read and follow all instructions:

- on safety,
- on operation and control,
- on installation, repairs and maintenance. ↪ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*

1. ➤ Connect the plug connection (3) to the separator.
2. ➤ Connect the compressed air supply (1) to your compressor.

**NOTE!**
Pre-tension adjustment

The pressure exerted on the *Multi Disc* is adjusted via the control unit. Please observe the information in the BA-RC-Control operating manual.

4.5 Checks before commissioning

**DANGER!**
Risk of injury due to rotating parts!

Moving parts can cause severe injury.

- Do not reach into rotating parts or handle rotating parts when the machine is in operation.
- Never open protective covers when in operation.
- Perform work on the Börger machine only when stationary.
- Observe the delay time: Prior to opening protective covers, make sure that all components have stopped moving.
- Shut down the machine and upstream and downstream system components before carrying out any work on the Börger machine or accessories. ↪ *Chapter 5.4 “Downtimes” on page 100*
- The operating person is obligated to check that all safety equipment is installed and fully functional before putting the machine into operation.
- The Börger machine must only be switched on when the inlet and outlet connections have been established and the maintenance openings have been securely installed.



NOTICE!

Risk of material damage due to imbalances!

- Persistent encrustations of substrate residue between the brush auger and the wedge wire screen can result in the wedge wire screen being deformed and permanently damaged by the rotation of the brush auger when put back into operation.
- Foreign bodies (e.g. stones) can damage the filter and the rotation lock.

Check for smooth running!

- Ensure that no imbalances are caused by improper cleaning, substrate residue or foreign bodies.

4.5.1 Checking smooth running following storage and long downtimes

- Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.*
 - To the extent necessary, amply secure the surrounding area when performing installation. Cordon off the working area with a red and white safety chain and a warning sign.
1. ➤ Before recommissioning a used separator, check that the interior is free of foreign particles, encrustations of hardened substrate residue and other impurities, and that the brush auger can rotate freely, see ↗ *Chapter 6 “Maintenance and repairs” on page 109* in this respect.
 2. ➤ Ensure that the *Multi Disc* can rotate freely and move axially to open and close, i.e. that it is not blocked by encrustations of hardened substrate residue. If required, clean the *Multi Disc* and lubricate the adjustment mechanism, see ↗ *Chapter 6.1.3 “Internal cleaning” on page 116* and ↗ *Chapter 6.2.3 “Lubricating the adjustment mechanism and the bearing” on page 127.*

4.5.2 Checking readiness for operation

**NOTE!****Integration into the EMERGENCY STOP system**

A Börger machine must be integrated in an **EMERGENCY STOP system**.

- It is only permissible to do without an emergency stop device if the emergency stop device would not reduce the stopping time and if it would not enable the special measures required to deal with the risk to be taken.
- The normal shutdown equipment must then be labeled accordingly.

**NOTE!**

The quench fluid is used for monitoring the integrity of the mechanical seals, and also for protection, lubrication and cooling of the mechanical seals. ↪ *Chapter 3.1.5 “Shaft seal” on page 48*
↪ *Chapter 3.1.6 “Intermediate chamber (quench)” on page 48*

- Read and follow the safety instructions detailed in ↪ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*.
 - Ensure that the Börger machine is integrated into an **emergency stop** system, or, if such a system is not mandatory, that the shutdown device is adequately labeled.
1. ➤ If your Börger machine was delivered with special **accessories**, then ensure that these accessories are installed correctly and ready for operation. This especially applies to devices used for safety and monitoring system functionality. Adhere to the relevant operating manuals for the accessories.
 2. ➤ Ensure that you have removed the **transport lock from the breather system on the drive** if one was present according to the operating manual of the drive manufacturer.
 3. ➤ Check the **oil level in the gear unit of the Börger machine**. On standing versions, the oil level must reach at least halfway up the oil sight glass. If this is not the case, the gear oil (cf. data sheet) must be refilled, see ↪ *Chapter 6.2.2 “Lubricant fill level and changing the lubricants” on page 123*.

4. ➤ Ensure that the **breather system at the gear unit** is properly installed.
5. ➤ Ensure that the **breather at the intermediate chamber** is properly installed and the quench fluid can drain off freely in the event of a seal leakage, or, when medium must not be released into the atmosphere, that a suitable drain system is installed.
6. ➤ Check whether the **delivered quench fluid** (see enclosed data sheet) is suitable or whether an alternative fluid must be used in order to observe environmental protection regulations, or for biological or other reasons. This must be compatible with the medium, and must not adversely affect the O-rings of the mechanical seals. Consult Börger GmbH regarding this, if necessary.
7. ➤ Check the **fill level in the intermediate chamber**. On standing versions, the quench fluid must reach halfway up the shaft. Otherwise, the quench fluid (cf. data sheet) must be refilled. If there is much more fluid in the intermediate chamber than the optimum fill level when the mechanical seal is intact, some of the fluid should be drained off in order to prevent premature overflowing. Otherwise, the functionality of the leak monitor may be compromised. In this regard, also see ↪ *Chapter 6.2.2 "Lubricant fill level and changing the lubricants" on page 123*.
8. ➤ Ensure that the **supply lines** to the drive are connected and secured according to the relevant regulations.
9. ➤ Provide a dry run protection such as a **level monitoring system** in the substrate being fed, if required.
10. ➤ Ensure that the unit is properly **grounded**.
11. ➤ Check that the **pipe connectors** are attached correctly and do not leak (torque for the connection between Börger machine and pipe connector according to ↪ *Chapter 4.4.1 "Preparation for installation" on page 73*).
12. ➤ Check that all **screws and nuts**, which may have become loose during transportation and installation, are tight.
13. ➤ Ensure that the **thick matter can fall out freely**.
14. ➤ Make sure that the **liquid phase can drain without being hindered**, and that the permissible pipe length has not been exceeded.
15. ➤ Rectify all errors determined by this check.

4.5.3 Checking the direction of rotation

**DANGER!****Risk of injury due to rotating parts!**

Moving parts can cause severe injury.

- Do not reach into rotating parts or handle rotating parts when the machine is in operation.
- Never open protective covers when in operation.
- Perform work on the Börger machine only when stationary.
- Observe the delay time: Prior to opening protective covers, make sure that all components have stopped moving.
- Shut down the machine and upstream and downstream system components before carrying out any work on the Börger machine or accessories. ↪ *Chapter 5.4 "Downtimes" on page 100*
- The operating person is obligated to check that all safety equipment is installed and fully functional before putting the machine into operation.
- The Börger machine must only be switched on when the inlet and outlet connections have been established and the maintenance openings have been securely installed.

**NOTICE!****Incorrect direction of rotation**

If the direction of rotation is wrong, the thick matter will not be pumped into the compactor unit and to the thick matter outlet.

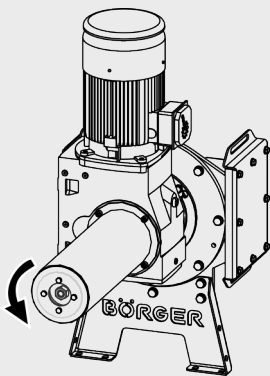
- If the unit is operated in the wrong direction of rotation for a lengthy period, the feed unit may become congested with thick matter and damage to the screen and the drive may occur.



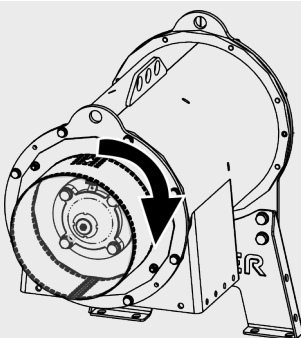
NOTICE!
Risk of frost!

Pieces of ice in the separating and conveying unit or the freezing of the brush auger onto the wedge wire screen can result in substantial damage to the screen upon resumption of operation.

- Protect the Bioselect and the connections against frost.



- The gear motor on the Bioselect must rotate **counter-clockwise** when looking at the rear of the drive.



- The brush auger must rotate **clockwise** when looking at the side with the adjustment mechanism and the *Multi Disc*.

- Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.*

- ➔ After establishing the electric connections, check the direction of rotation of the separator and the connected rotary lobe pump (if applicable) by briefly switching on the drives (switch off immediately after switching on!) and correct this if necessary.

5 Operation



WARNING!

Risk of injury as a result of improper operation!

Improper operation may cause severe injury and considerable material damage.

- Prior to commissioning, ensure that all installation work is performed and completed as per the information and notes provided in this manual.
- Ensure that all operating steps are performed as per the information and notes provided in this manual.
- Ensure the following before starting work:
 - Ensure that all covers and safety features are installed and function correctly.
 - Ensure that nobody is in the hazardous area.
- Never bridge or disable safety features during operation.



NOTICE!

There is a danger of considerable material damage if the limits are not complied with!

Failure to comply with the limits can cause permanent damage to the Börger machine and its components.

- The values may neither exceed nor fall below the limits specified in  *Chapter 3.3 "Technical data" on page 55* of the standard operating manual and the specifications on the data sheet.
- On Börger machines that operate with a frequency converter, make sure that the operating speed is sufficiently below the maximum permissible speed (for speed limit based on machine configuration, see enclosed data sheet).
- Take all necessary precautions to ensure that the permissible differential pressure between the inlet and outlet of the Börger machine is not exceeded.
- Make sure that the pressure on the outlet does not exceed the permissible pressure of the pipe system and the Börger machine, and not overload the drive and its elastic connections.
- The temperature values according to the data sheet may not exceed or fall below the limits. Double-check this.

**NOTICE!****Risk of material damage due to imbalances!**

- Persistent encrustations of substrate residue between the brush auger and the wedge wire screen can result in the wedge wire screen being deformed and permanently damaged by the rotation of the brush auger when put back into operation.
- Foreign bodies (e.g. stones) can damage the filter and the rotation lock.

Check for smooth running!

- Ensure that no imbalances are caused by improper cleaning, substrate residue or foreign bodies.

**NOTICE!****Risk of damage caused by frost!**

Frost can cause damage to the Börger machine.

- Protect the Börger machine and its connections against frost.

**NOTE!****Contamination caused by production residues!**

Börger machines may contain residues from the manufacturing process, e.g. grease or oil. Contamination caused by packaging and transport cannot be ruled out.

- If necessary, thoroughly rinse the Börger machine with a suitable agent as part of the test run (↗ *Chapter 5.1 “Commissioning” on page 95*) while adhering to the limits before commissioning the machine for the first time.

**ENVIRONMENT!****Danger due to incorrect handling of environmentally hazardous substances!**

Inappropriate handling of environmentally hazardous substances, especially incorrect disposal, can cause significant damage to the environment.

- Especially water-polluting materials such as grease and lubricating oil must not pollute the soil or enter the sewage system during installation, repair and maintenance work.
 - These materials must be collected, stored, transported and disposed of in suitable containers.
- When handling oil, grease and other chemical substances, pay attention and adhere to the applicable regulations and safety data sheets issued by the respective manufacturer relating to storage, handling, correct use and disposal.
- Comply with the legal obligations regarding waste avoidance and the proper recycling/disposal of waste during all work

5.1 Commissioning

**NOTICE!****Risk of damage to the mechanical seal due to a lack of quench fluid!**

Risk of damage to the mechanical seal due to a lack of quench fluid!

- The heat-absorbing quench fluid prevents the mechanical seal from running dry and captures any medium that enters the intermediate chamber due to leaks in the mechanical seal.
- This quench function also prevents the gear unit from being damaged by the ingress of medium.
- Make sure that the fill level in the intermediate chamber is sufficient.

**NOTICE!**
Risk of frost!

Pieces of ice in the separating and conveying unit or the freezing of the brush auger onto the wedge wire screen can result in substantial damage to the screen upon resumption of operation.

- Protect the Bioselect and the connections against frost.

**NOTE!**

Upon first commissioning of the separator, a thick matter plug must develop in the compactor channel before the device can be switched to continuous operation. During this break-in period, it is necessary to proceed step by step.

- The pre-tension at the *Multi Disc*, which acts as a sealer and peeler, must be tangible but not too strong upon first commissioning.
- To achieve an optimum result, it is necessary to adjust the pre-tension in small steps (and therefore to increase the consistency and lower the liquid content of the solid phase).

**NOTE!**
Mechanical pre-tension adjustment

The procedure described below relates to the version with mechanical adjustment. As a rule, the pressure on the *Multi Disc* in the version with pneumatic adjustment is adapted by means of a control unit.

Please observe the information in the BA-RC-Control operating manual.

- Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.*
- To the extent necessary, amply secure the surrounding area when performing installation. Cordon off the working area with a red and white safety chain and a warning sign.

1. ➤ The tension springs are set to an initial pre-tension by factory default.

Disassemble the covering plate as described in ↗ *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131.*

2. ➤ Check the pre-tension that pushes the *Multi Disc* against the press channel or the filter press channel in the case of the HP version.

3. ➤ Correct the pre-tension, if necessary, by turning the clamping screw using a suitable wrench.

4. ➤ Install the covering plate as described in ↗ *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131.*

5. ➤ Switch on the gear motor of the separator.

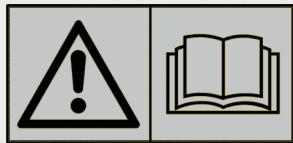
6. ➤ To start with, feed the Bioselect with substrate slowly and in doses by opening any shut-off devices and/or switching on the connected pump in low-frequency mode.

⇒ After a few seconds, the thick matter which is still viscous will enter the compactor unit. Depending on the substrate, it may take up to a few minutes until the thick matter is sufficiently pressed and dehydrated, the rotating and sealing *Multi Disc* opens, and the first thick matter material falls out.

7. ➤ Should the output product still contain an undesirably high amount of liquid after a few minutes:

- Switch off the pump or close off the gravity feed.
- Switch off the gear motor of the separator.
- Increase the pre-tension on the *Multi Disc* as described in this chapter.

5.1.1 Operation with control unit



Operating manual of the control unit

- Pay attention to all the **instructions and safety regulations** contained in the operating manual of the control unit in the appendix.

5.1.2 Operation without control unit



NOTICE!

Power consumption during operation

The power consumption must not permanently exceed 11 A* for operation without a control unit.

- Otherwise, malfunctions or even lasting damage to the wedge wire screen and the motor may occur.

Check the current consumption of the gear motor at the Bioselect at all times during the break-in period.

* values at 400V 50Hz



NOTE!

When the power consumption of the drive exceeds the limit of 11 A*:

Reduce the inlet pressure, e.g. by

- reducing the frequency of the pump drive if the feed pump is connected,
- putting the Bioselect in a higher position in case of gravity feed operation, if necessary.

* values at 400V 50Hz



NOTE!

When the power consumption of the drive falls below the limit of 11 A*:

- The inlet pressure, and therefore the output, can be increased correspondingly.

* values at 400V 50Hz

5.2 Complete commissioning

The Börger machine can be operated properly when all functions run correctly and no leaks are detected.



NOTE!

Checklist for commissioning

A checklist for commissioning the Börger machine can be found in the appendix.

↪ Chapter 9.5 “Checklist for commissioning” on page 186

5.3 Continuous operation



NOTICE!

Risk of material damage due to imbalances!

- Persistent encrustations of substrate residue between the brush auger and the wedge wire screen can result in the wedge wire screen being deformed and permanently damaged by the rotation of the brush auger when put back into operation.
- Foreign bodies (e.g. stones) can damage the filter and the rotation lock.

Check for smooth running!

- Ensure that no imbalances are caused by improper cleaning, substrate residue or foreign bodies.

- Read and follow the safety instructions detailed in ↪ Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.

Börger separators are suitable for continuous operation.

1. ➤ The specified operating cycle for which the Bioselect was designed can be found in the enclosed data sheet.
2. ➤ Observe the maintenance and inspection intervals according to ↪ Chapter 6.2 “Maintenance and inspection” on page 120.

5.4 Downtimes



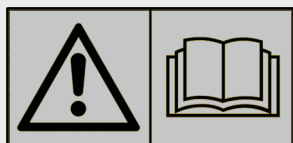
NOTICE!

Risk of material damage due to medium remaining in the Börger machine

If the medium remains in the Börger machine during storage periods and long downtimes, it can cause material damage to the wedge wire screen and make it more difficult to start the Börger machine.

- It is **essential** to empty the Börger machine before storage or long downtimes, especially with swelling media such as paper. ↪ *Chapter 5.4 "Downtimes" on page 100*
- In the case of other media, such as slurry, allow a corresponding soaking time for the medium so that the machine can be restarted after a long downtime.

5.4.1 Downtimes - operation with control unit



Operating manual of the control unit

- Pay attention to all the **instructions and safety regulations** contained in the operating manual of the control unit in the appendix.

Emptying:

- Read and follow the safety instructions detailed in ↪ *Chapter 2.12 "Safety instructions for maintenance and rectifying mal-functions" on page 37.*
- 1. Release the pre-tension of the *Multi Disc* by releasing the spring or, for the pneumatic version, releasing the pressure.
- 2. Run the "**Emptying**" program until:
 - the idling current has been reached **and**
 - the pressure upstream of the liquid phase pump is at 0.0 bar (0.0 psi).
- 3. Close the liquid phase outlet.
- 4. Leave the residual substrate in the Bioselect during normal downtimes, provided the type of substrate does not prevent this and there is no risk of it drying out (airtight closed system).

5. ➤ Clean the Bioselect in these cases, and before long down-time periods as described in ↗ *Chapter 4.3.1 "Storage" on page 69.*

6. ➤ Protect the Bioselect particularly against frost.

5.4.2 Downtimes - operation without control unit

Emptying:

— Read and follow the safety instructions detailed in ↗ *Chapter 2.12 "Safety instructions for maintenance and rectifying malfunctions" on page 37.*

1. ➤ Switch off / close the valve of the feed.

— For operation with an installed feed pump, please observe the operating manual of the pump.

2. ➤ Release the pre-tension of the *Multi Disc* by releasing the spring or, for the pneumatic version, releasing the pressure.

3. ➤ **Emptying:**

Empty the Bioselect as far as possible, by switching it off with an appropriate delay after stopping the feed.

— Switch off the separator drive after approx. 60 seconds.

— Emptying is complete when:

- the current consumption has reached the idling current and
- the pressure upstream of the liquid phase pump is at 0.0 bar (0.0 psi).

— Otherwise, malfunctions may occur during a restart as a result of the unregulated feed (auger clogged with material, thick matter plug too tight).

4. ➤ Close the liquid phase outlet.

5. ➤ Leave the residual substrate in the Bioselect during normal downtimes, provided the type of substrate does not prevent this and there is no risk of it drying out (airtight closed system).

6. ➤ Clean the Bioselect in these cases, and before long down-time periods as described in ↗ *Chapter 4.3.1 "Storage" on page 69.*

7. ➤ Protect the Bioselect particularly against frost.

5.5 Emergency shut-down



NOTE! EMERGENCY STOP

The **EMERGENCY STOP** button as an **EMERGENCY STOP** enables the **immediate shut-down** of the Börger machine.

In cases of emergency, the Börger machine must be shut down as fast as possible, the energy supply must be switched off and pressure must be released.

Please proceed as follows in emergencies:

1. ➤ Activate the EMERGENCY STOP by pressing the EMERGENCY STOP button immediately.
2. ➤ If a risk to your own life can be excluded, evacuate other persons from the danger zone.
3. ➤ If necessary, initiate first aid measures.
4. ➤ Alert emergency personnel.
5. ➤ Inform person responsible on site.
6. ➤ Switch off the Börger machine and secure against restart.
7. ➤ Clear access routes for emergency personnel.
8. ➤ Brief emergency personnel.
9. ➤ Commission qualified personnel with troubleshooting.



WARNING!

Risk of fatal injury if the plant is switched back on uncontrolledly or without authorization!

Switching the machine on without authorization or uncontrolledly can cause serious injuries.

- Ensure that the cause of the EMERGENCY STOP has been eliminated and all safety features are installed and functional prior to a restart.
- Do not reset the EMERGENCY STOP switch before the danger has been eliminated.

5.6 Malfunctions



WARNING!

Risk of injury due to inadequate troubleshooting, maintenance and repair work!

Inadequate troubleshooting, maintenance and repair work can lead to severe injury and significant material damage.

- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Ensure sufficient installation space before commencing work.
- Keep the installation site clean and tidy! Loosely stacked or scattered components and tools cause accidents.
- Ensure correct installation where components have been removed, reinstall all fastening elements and observe the tightening torques of screws.
- Ensure the following before putting the machine back into operation:
 - Ensure that all troubleshooting, maintenance and repair work is performed and completed as per the information and notes provided in this manual.
 - Ensure that nobody enters the hazardous area.
 - Ensure that all covers and safety features are installed and function correctly.



WARNING!

Risk of injury when using unsuitable spare parts!

The use of unsuitable spare parts can cause malfunctions which can lead to severe injury, including death, and to significant material damage.

- Only use suitable spare parts.
- Always contact the manufacturer if in doubt.



NOTICE!

Risk of severe material damage due to a delayed shut-down in the event of a malfunction!

A delayed shut-down in the event of malfunction can cause permanent damage to the Börger machine.

- In the event of a malfunction, shut down the Börger machine and all upstream and downstream system components immediately until the cause has been rectified.

Fault	Possible causes	Fault elimination
The Bioselect does not start, or runs with difficulty after a down-time	Solids from the substrate have become encrusted and are blocking the rotating parts	— Run the Bioselect backwards without feed for a short period of time (changing the direction of rotation) — Release the tension spring(s), briefly switch on the Bioselect, tighten the tension spring(s) again, or, in case of pneumatic adjustment, release the pressure, briefly switch on the Bioselect, pressurize again — Clean the compactor unit, lubricate the adjustment mechanism — Clean the interior / auger shaft
	Wedge wire screen or rotation lock is deformed (e.g. by foreign bodies) and blocks the brush auger	— Replace the wedge wire screen
	Gear motor incorrectly mounted or connected	— Install the solid shaft of the separator into the hollow shaft of the gear unit according to the operating manual from the drive manufacturer — Ensure that the electrical connection is free of faults and that the power supply is reliable
	Drive output too low	— Install the correct drive
	Brush auger is frozen to the wedge wire screen	— Defrost the machine and protect it against frost

Fault	Possible causes	Fault elimination
Insufficient or no material is discharged from the thick matter outlet	Incorrect flow direction / direction of drive rotation	— Change the direction of drive rotation
	Feed line closed or blocked	— Open the shut-off devices — Clean the feed line
	The feed connection leaks	— Tighten the screws on the flange connection cross-wise with uniform strength — Check/replace the seal — Check the pipes for damage and rectify, if necessary — Rule out leaks in other components
	DS content of the substrate too low	— Only use the Bioselect as intended, i.e. for digestate and liquid manure in accordance with  Chapter 2.3 “Proper use” on page 15.
	The brush auger is clogged with material and is consequently unable to transport material	— Clean the brush auger — Eliminate the cause (e.g. working pressure too high)
	Press channel, or filter press channel for HP version, blocked	— Repeatedly run the Bioselect without feed alternately backwards and forwards (changing the direction of rotation) — Clean press channel or filter press channel for HP version
	<i>Multi Disc</i> jammed	— Rectify jam — Reduce pre-tension, if necessary — Lubricate adjustment mechanism
	Pre-tension of tension spring(s) too high	— Reduce pre-tension

Fault	Possible causes	Fault elimination
The material discharged from the thick matter outlet is too thin	Liquid phase drain is closed or blocked	— Open the shut-off devices — Clean the drainpipe
	Inlet pressure too high	— Reduce the inlet pressure
	Pre-tension on the <i>Multi Disc</i> too low	— Increase pre-tension
	Screen permeability too low	— Clean blocked wedge wire screen and/or optional filter press channel — If necessary, replace the wedge wire screen with one that has a larger slot opening width
	The brush auger is clogged with material and is consequently unable to transport material	— Clean the brush auger

Fault	Possible causes	Fault elimination
The liquid discharged from the outlet of the separating and conveying unit is too thick	Screen permeability too high / DS content of the substrate too low	— Check the wedge wire screen for damage and replace, if necessary — After changing the substrate, replace the wedge wire screen with one that has a smaller slot opening width, if necessary — Only use the Bioselect as intended, i.e. for digestate and liquid manure in accordance with Chapter 2.3 "Proper use" on page 15.
	Output of thick matter pump too low	— Increase the speed
	Filter torn / defective	— After changing the substrate, replace the wedge wire screen with one that has a smaller slot opening width, if necessary — Only use the Bioselect as intended, i.e. for digestate and liquid manure in accordance with Chapter 2.3 "Proper use" on page 15.

Fault	Possible causes	Fault elimination
Insufficient or no liquid is discharged from the outlet of the separating and conveying unit	Liquid phase outlet is closed or blocked	— Open the shut-off devices — Clean the drainpipe
	Inlet pressure is too low, the substrate does not reach the outlet	— Increase the inlet pressure
	DS content of the substrate too high	— Only use the Bioselect as intended, i.e. for digestate and liquid manure in accordance with  Chapter 2.3 "Proper use" on page 15.
	The outlet connection leaks	— Tighten the screws on the flange connection cross-wise with uniform strength — Check/replace the seal — Check the pipes for damage and rectify, if necessary — Rule out leaks in other components

Fault	Possible causes	Fault elimination
Liquid escapes from the safety opening	Temperature-related expansion with too much fluid in intermediate chamber	— Drain some of the quench fluid out of the intermediate chamber
	Shaft seal on product side damaged	— Replace the mechanical seal

**NOTE!**

Contact Börger GmbH if there are other kinds of malfunctions or any other causes for malfunctions.

5.7 Measures following on demand work!

Following completion of the work and before starting the unit, carry out the following steps:

Be sure to read and follow all instructions:

- on safety,
 - on operation and control,
 - on installation, repairs and maintenance. ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*
1. ► Check all screws that have been loosened previously for firm seat.
 2. ► Check whether all safety devices and covers that have been removed previously are reinstalled properly.
 3. ► Ensure that all tools, materials and other equipment used have been removed from the work area.
 4. ► Clean the work area and remove any spilled substances, e.g. liquids, processing material or similar.
 5. ► Reset the emergency stop devices, if required.
 6. ► Confirm malfunctions at the control unit.
 7. ► Ensure that nobody enters the hazardous area.
 8. ► Ensure that all safety features of the unit function perfectly.
 9. ► Take the unit into operation again. ↗ *Chapter 5.3 “Continuous operation” on page 99*

6 Maintenance and repairs



WARNING!

Risk of injury due to inadequate troubleshooting, maintenance and repair work!

Inadequate troubleshooting, maintenance and repair work can lead to severe injury and significant material damage.

- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Ensure sufficient installation space before commencing work.
- Keep the installation site clean and tidy! Loosely stacked or scattered components and tools cause accidents.
- Ensure correct installation where components have been removed, reinstall all fastening elements and observe the tightening torques of screws.
- Ensure the following before putting the machine back into operation:
 - Ensure that all troubleshooting, maintenance and repair work is performed and completed as per the information and notes provided in this manual.
 - Ensure that nobody enters the hazardous area.
 - Ensure that all covers and safety features are installed and function correctly.



WARNING!

Risk of injury when using unsuitable spare parts!

The use of unsuitable spare parts can cause malfunctions which can lead to severe injury, including death, and to significant material damage.

- Only use suitable spare parts.
- Always contact the manufacturer if in doubt.



CAUTION! **Risk of burns!**

Particularly when used outside at correspondingly high ambient temperatures and high substrate temperatures, the Bioselect casing and the individual parts of the separator can become hot and should not be touched during operation.

Stop the feed and shut down the Bioselect prior to any maintenance and repair work on the Bioselect and the accessories.

Allow the system to cool down completely, if necessary, before carrying out repair and maintenance work.

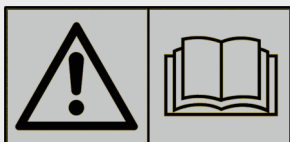
Avoid dust formation as this contributes to heat build-up.



NOTE! **Minimum requirements**

The instructions described in this chapter are to be understood as the minimum requirements.

- Depending on the operating conditions, further work may be necessary to maintain the Börger machine in an optimum condition.
- The maintenance tasks detailed in this chapter may only be carried out by trained personnel employed by the operator.
- Repair work on the Börger machine may only be carried out by qualified, authorized specialists employed by the operator.



Further operating manuals / supplementary operating manuals

You must completely read the separate operating manuals and/or supplementary operating manuals for components and/or special versions.

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance.

Be sure to read and follow all instructions:

- on safety,
 - on operation and control,
 - on installation, repairs and maintenance. ↪ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*
- 1.** ➤ Observe the assembly drawing, the spare parts list and the wear parts list when carrying out repairs or ordering spare parts. ↪ *Chapter 9.2 “Wear parts” on page 174*
↪ *Chapter 9.4 “Spare parts list” on page 180*
 - 2.** ➤ Read and strictly comply with the applicable regulations, manufacturer's safety data sheets and operator's instructions in respect of the storage, handling, use and disposal of oils, grease and other chemical substances.
 - 3.** ➤ Dispose of operating materials and replaced parts in a safe and environmentally-friendly manner.
↪ *Chapter 7 “Disposal” on page 170*

6.1 Machine care

Appropriate machine care helps to maintain the functionality of the Börger machine in the long term. In general, regular cleaning of dust and deposits from all surfaces is sufficient.

**CAUTION!**

Health hazard due to residues of dangerous medium inside and on the Börger machine!

There is an increased health hazard from contact with the medium and contaminated components.

Generally, the following applies:

- When using dangerous or health-endangering media, take all necessary safety measures when performing work on the Börger machine.
- Avoid direct contact with the medium (skin/eye contact, swallowing, inhaling).
- Remove spillage from your skin without delay.
- Do not store or consume beverages, food or tobacco in the working area.

**NOTICE!**

Improper cleaning of the Börger machine can lead to malfunctions and damage!

- Do not use water jets.
- Do not use aggressive cleaning agents, solvents or sandpaper, as these can damage the metallic and plastic surfaces, casing coating and seals.
- Do not use metal objects such as scrapers and screwdrivers for cleaning coated machine parts.
- Never clean sensitive components with hard scrubbing and strong mechanical pressure.
- Do not use a vacuum cleaner or a hand brush with plastic bristles etc. to clean electronic components because the production of static electricity can damage the electronic components.

**ENVIRONMENT!**

Danger due to incorrect handling of environmentally hazardous substances!

Inappropriate handling of environmentally hazardous substances, especially incorrect disposal, can cause significant damage to the environment.

- Especially water-polluting materials such as grease and lubricating oil must not pollute the soil or enter the sewage system during installation, repair and maintenance work.
 - These materials must be collected, stored, transported and disposed of in suitable containers.
- When handling oil, grease and other chemical substances, pay attention and adhere to the applicable regulations and safety data sheets issued by the respective manufacturer relating to storage, handling, correct use and disposal.
- Comply with the legal obligations regarding waste avoidance and the proper recycling/disposal of waste during all work

6.1.1 Cleaning the outside



CAUTION! **Risk of burns!**

Particularly when used outside at correspondingly high ambient temperatures and high substrate temperatures, the Bioselect casing and the individual parts of the separator can become hot and should not be touched during operation.

Stop the feed and shut down the Bioselect prior to any maintenance and repair work on the Bioselect and the accessories.

Allow the system to cool down completely, if necessary, before carrying out repair and maintenance work.

Avoid dust formation as this contributes to heat build-up.

Protective equipment: ■ Light respiratory protection

Be sure to read and follow all instructions:

- on safety,
 - on operation and control,
 - on installation, repairs and maintenance. ↪ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*
 - Shut down the Börger machine and downstream and upstream system components. ↪ *Chapter 5.4 “Downtimes” on page 100*
- 1.** ➤ Keep all markings on the Börger machine in a legible state at all times.
 - 2.** ➤ Only clean the outside of the Börger machine by wiping or brushing it down. Use lint-free cleaning cloths.
 - 3.** ➤ When required, use a standard aqueous industrial cleaner.

6.1.2 Pressure relief

**WARNING!**

Risk of serious injuries caused by liquid spouting out or escaping gases!

Gases or liquids may escape uncontrollably from seals and screw connections. Especially when flange connections are released and maintenance openings are opened, pressurized liquid can spout out at the cover.

Never loosen connections when the unit is pressurized.

- Ensure that all valves and shut-off devices on the inlet and outlet are closed.
- Release the pressure and empty the Börger machine via a drainage device (if available).
- Collect any leakage of medium by suitable means and dispose of it in accordance with the applicable local guidelines.
- Therefore, wear your personal protective equipment (PPE)
↳ *Chapter 2.6 “Personal protective equipment” on page 25* when opening the cover and take all necessary precautions.

**WARNING!**

Severe injury due to residual pressure!

Despite having depressurized the Börger machine, it may be under residual pressure in the event of congestion or lump formation in the medium.

- Take extra care when removing the flange connections and maintenance openings to prevent accidents caused by the release of residual pressure.

**CAUTION!**

Health hazard due to residues of dangerous medium inside and on the Börger machine!

There is an increased health hazard from contact with the medium and contaminated components.

Generally, the following applies:

- When using dangerous or health-endangering media, take all necessary safety measures when performing work on the Börger machine.
- Avoid direct contact with the medium (skin/eye contact, swallowing, inhaling).
- Remove spillage from your skin without delay.
- Do not store or consume beverages, food or tobacco in the working area.

**NOTE!**

Emptying!

Empty the Börger machine as described in ↗ *Chapter 5.4 “Downtimes” on page 100.*

Be sure to read and follow all instructions:

- on safety,
 - on operation and control,
 - on installation, repairs and maintenance. ↪ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*
 - Shut down the Börger machine and downstream and upstream system components. ↪ *Chapter 5.4 “Downtimes” on page 100*
 - Secure the Börger machine against unauthorized or uncontrolled reactivation. ↪ *Chapter 2.7 “Securing the machine against restart” on page 26*
1. ➤ Close all valves and shut-off devices so that no medium can enter the working chamber of the Börger machine.
 2. ➤ Release the pressure and empty the Börger machine via a drainage device (if available).
 - Collect any leakage of medium by suitable means and dispose of it in accordance with the applicable local guidelines.
 3. ➤ Close the drainage device, if available.

6.1.3 Internal cleaning



WARNING!
Severe injury due to residual pressure!

Despite having depressurized the Börger machine, it may be under residual pressure in the event of congestion or lump formation in the medium.

- Take extra care when removing the flange connections and maintenance openings to prevent accidents caused by the release of residual pressure.

**CAUTION!****Health hazard due to residues of dangerous medium inside and on the Börger machine!**

There is an increased health hazard from contact with the medium and contaminated components.

Generally, the following applies:

- When using dangerous or health-endangering media, take all necessary safety measures when performing work on the Börger machine.
- Avoid direct contact with the medium (skin/eye contact, swallowing, inhaling).
- Remove spillage from your skin without delay.
- Do not store or consume beverages, food or tobacco in the working area.

**ENVIRONMENT!****Danger due to incorrect handling of environmentally hazardous substances!**

Inappropriate handling of environmentally hazardous substances, especially incorrect disposal, can cause significant damage to the environment.

- Especially water-polluting materials such as grease and lubricating oil must not pollute the soil or enter the sewage system during installation, repair and maintenance work.
 - These materials must be collected, stored, transported and disposed of in suitable containers.
- When handling oil, grease and other chemical substances, pay attention and adhere to the applicable regulations and safety data sheets issued by the respective manufacturer relating to storage, handling, correct use and disposal.
- Comply with the legal obligations regarding waste avoidance and the proper recycling/disposal of waste during all work

**NOTE!****Emptying!**

Empty the Börger machine as described in ↗ *Chapter 5.4 "Downtimes" on page 100.*

Be sure to read and follow all instructions:

- on safety,
 - on operation and control,
 - on installation, repairs and maintenance. ↪ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*
 - Shut down the Börger machine and downstream and upstream system components. ↪ *Chapter 5.4 “Downtimes” on page 100*
 - Secure the Börger machine against unauthorized or uncontrolled reactivation. ↪ *Chapter 2.7 “Securing the machine against restart” on page 26*
 - Relieve the pressure in the Börger machine. ↪ *Chapter 6.1.2 “Pressure relief” on page 114*
1. ➤ Remove the required flange connections and maintenance openings to get to the working chamber of the Börger machine.
 2. ➤ Thoroughly clean the rotating parts and the working chamber of the machine from deposits and contamination.
 3. ➤ Thoroughly clean all parts before reinstalling removed parts.
 4. ➤ Check all removed parts for wear and only reuse them if they are undamaged.
 5. ➤ Only replace worn components, seals, screws, nuts etc., but especially the wetted parts, with original spare parts.
 6. ➤ Reassemble the flange connections and maintenance openings that have been loosened previously.



NOTE!

Cleaning the adjustment mechanism

Clean and lubricate the adjustment mechanism at regular intervals to prevent the *Multi Disc* from blocking. ↪ *Chapter 6.2.1 “Maintenance and inspection plan” on page 120*

- Observe ↪ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37* and switch off the feed or close the valve of the feed. Switch off the Bioselect.
- Lubricate the adjustment mechanism as described in ↪ *Chapter 6.2.3 “Lubricating the adjustment mechanism and the bearing” on page 127.*



NOTE!

Cleaning the wedge wire screen

Clean the **wedge wire screen** when necessary:

- Run the brush auger backwards by changing the direction of rotation of the drive. The natural fiber brush, which forms and regenerates itself on the brush auger during the process, then cleans the wedge wire screen.

6.2 Maintenance and inspection

6.2.1 Maintenance and inspection plan



NOTICE!

Risk of material damage due to improper maintenance!

- Also observe the maintenance intervals detailed in the operating manuals for the drive gear unit, motor etc., which are included in the appendix.
- Prepare a maintenance schedule adapted to the operating conditions.



NOTE!

Replacement of the *Multi Disc* plate

Check the wear limit for the *Multi Disc* plate!

- The peeling tabs of the *Multi Disc* plate should have a residual height of **at least 2.5 mm!**
- Otherwise, replace the *Multi Disc* plate!



NOTE!

Maintenance intervals

The following intervals are guidelines. These intervals can be significantly reduced depending on the operating conditions.

when necessary

Checking the outer surfaces for dust deposits and dirt

- If necessary, clean the outer surfaces ↗ Chapter 6.1 “Machine care” on page 111

Checking the wedge wire screen for clogging/contamination

- If necessary, clean the wedge wire screen ↗ Chapter 6.1.3 “Internal cleaning” on page 116

daily**Audible check for smooth running**

- In the event of a malfunction: take appropriate measures ↪ *Chapter 5.6 "Malfunctions" on page 103*

Visual check for leaks

- Replace the seals, if necessary ↪ *Chapter 5.6 "Malfunctions" on page 103*

Checking the function and quantity/quality of the thick matter

- Adjust operating parameters ↪ *Chapter 5.6 "Malfunctions" on page 103*
- Replace damaged parts, if necessary ↪ *Chapter 5.6 "Malfunctions" on page 103*

Checking the horizontal alignment of the Börger machine

- Correct alignment, if necessary

weekly**Clean and lubricate the adjustment mechanism and the bearing as described in ↪ *Chapter 6.2.3 "Lubricating the adjustment mechanism and the bearing" on page 127***

- Lubricate the adjustment mechanism and the bearing every 50 operating hours, at the latest after one week, using a suitable multi-purpose grease as detailed in the lubricant list.

monthly**Checking the level of the quench fluid in the intermediate chamber**

- Refill, if necessary

Checking the oil level of the gear unit according to the operating manual of the gear unit manufacturer

- Refill, if necessary, according to operating manual of gear unit manufacturer

quarterly**Checking the Börger machine and attachment parts for tight fit and possible damage**

- Tighten any loosened parts
- Replace damaged parts

Checking all safety notes, warnings and operating instructions

- If necessary, replace damaged signs or stickers immediately

biannually

Checking the quality of the quench fluid

- Replace the quench fluid, if necessary ↗ Chapter 6.2.2 “*Lubricant fill level and changing the lubricants*” on page 123
- Replace seals, if necessary ↗ Chapter 6.3.3 “*Replacing the mechanical seal*” on page 137

Belt drive: Checking the belt tension

- Correct belt tension, if necessary

Belt drive: Visual check for cracks and porous areas

- Replace belt, if necessary (always replace the belts completely and with belts which consist of a single piece, have discharging properties and are of the same set)

yearly

- Checking the electrical system and control unit for integrity and proper function

- Changing the lubricants



NOTE!

Observe the operating conditions!

The oil change intervals apply to normal operating conditions.

- Change the lubricants after approximately 8000 operating hours or after one year, whichever occurs first.
- Extreme operating conditions (higher operating temperatures, high air humidity, aggressive environment and frequent changes in operating temperature) shorten the oil change intervals.



NOTE!

Changing the lubricant

Observe the detailed information and instructions on changing the lubricant as described in the lubricant list and in the data sheet regarding the lubricants used.

every 10 years / every 40,000 operating hours

General overhaul (includes checking the carrier shafts)

- Contact Börger customer service or send the Börger machine for a general overhaul ↗ *Chapter 6.3.9 “Other repairs” on page 167*

6.2.2 Lubricant fill level and changing the lubricants



CAUTION!

Health hazard due to residues of dangerous medium inside and on the Börger machine!

There is an increased health hazard from contact with the medium and contaminated components.

Generally, the following applies:

- When using dangerous or health-endangering media, take all necessary safety measures when performing work on the Börger machine.
- Avoid direct contact with the medium (skin/eye contact, swallowing, inhaling).
- Remove spillage from your skin without delay.
- Do not store or consume beverages, food or tobacco in the working area.



NOTICE!

Risk of severe material damage if the quench fluid is not compatible with the medium!

Loss of seal function if the quench fluid is not compatible with the medium may lead to severe material damage.

- Observe the detailed specifications and instructions on changing the lubricants in the lubricant list, which is part of this operating manual, as well as the specifications in the data sheet regarding the lubricants used.
- **Regarding the quench fluid, especially consider:**
Due to the possibility, though unlikely, of quench fluid entering the working chamber and thus intruding on the process itself, the quench fluid must be compatible with the medium in addition to the other materials (especially with the material of the O-rings).

**NOTE!****Behavior of the quench fluid**

The level of quench fluid may not drop below the minimum indicated on the level indicator.

- The quench fluid can rise to the rim of the fill hole due to its function and depending on the operating temperature. A leak of the mechanical seal can only be assumed if the fluid overflows.
- A slow and slight loss of quench fluid may occur due to evaporation as well as due to lubrication of the mechanical seal.
- A sudden and persistently strong or complete loss of quench fluid in vacuum operation is indicative of a leak in the mechanical seal.

**ENVIRONMENT!****Danger due to incorrect handling of environmentally hazardous substances!**

Inappropriate handling of environmentally hazardous substances, especially incorrect disposal, can cause significant damage to the environment.

- Especially water-polluting materials such as grease and lubricating oil must not pollute the soil or enter the sewage system during installation, repair and maintenance work.
 - These materials must be collected, stored, transported and disposed of in suitable containers.
- When handling oil, grease and other chemical substances, pay attention and adhere to the applicable regulations and safety data sheets issued by the respective manufacturer relating to storage, handling, correct use and disposal.
- Comply with the legal obligations regarding waste avoidance and the proper recycling/disposal of waste during all work

- Read and follow the safety instructions detailed in  *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.*
- Shut down the Börger machine and downstream and upstream system components as described in  *Chapter 5.4 “Down-times” on page 100.*
- Secure the Börger machine against unauthorized or uncontrolled reactivation as described in  *Chapter 2.7 “Securing the machine against restart” on page 26.*

1. Lubricant fill level:

Check the level and quality of the quench fluid in the intermediate chamber as described in  *Chapter 6.2.1 “Maintenance and inspection plan” on page 120* or more often, depending on the operating conditions.

2. Use an oil dipstick, when necessary.

Optimum fill level

Design (mounting position)	Intermediate chamber
M1 (upright)	Up to the center of or covering the shaft



NOTE!

Changing the lubricants

Change the lubricant according to the following description after approximately 8000 operating hours (or earlier, depending on the operating conditions) or after one year, whichever occurs first.

1.  Change the lubricant earlier if it is heavily contaminated.
2.  Use a safe drip pan when draining used lubricant.
3.  Position of drain and fill holes: see drawing in  *Chapter 3.1.8 “Design and mounting position” on page 50.*
4.  Observe the following fill quantity:

RC 40

Fill quantity

Design (mounting position)	Intermediate chamber	
	approx. [l]	approx. [gal]
M1 (upright)	0.8	0.21



NOTE! Changing the lubricant

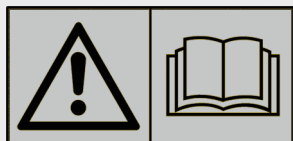
Observe the detailed information and instructions on changing the lubricant as described in the lubricant list and in the data sheet regarding the lubricants used.



NOTE! Intervals for changing the lubricants

- The intervals for changing the lubricants can vary significantly and be reduced considerably depending on the operating conditions, such as high levels of humidity, high temperatures, temperature variations, aggressive atmospheres etc.

Fill level check and change of lubricants at the drive



Operating manual of drive manufacturer

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance,
- in the operating manual of the drive manufacturer.

6.2.3 Lubricating the adjustment mechanism and the bearing

**NOTE!****Lubricating the bearing and the adjustment mechanism**

The adjustment mechanism and the bearing must be lubricated with a suitable multi-purpose grease at regular intervals!

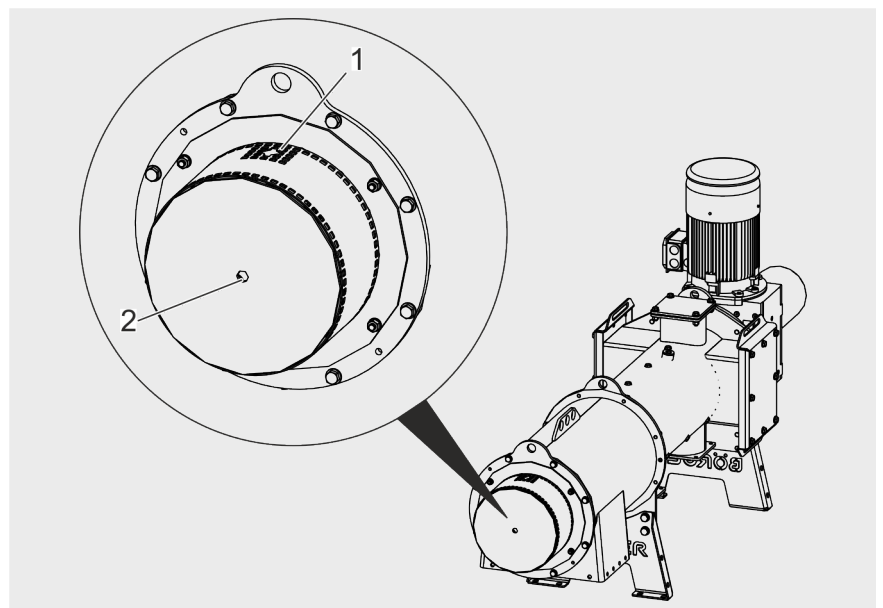
- Lubricate the adjustment mechanism and the bearing **every 50 operating hours**, at the latest after one week!
- The adjustment mechanism and the bearing can be lubricated through the openings (1, 2) in the cover.

**NOTE!****Only lubricate the bearing during operation!**

- Only lubricate the bearing (1) during separator operation.
 - Only apply the lubricant with low pressure.

**NOTE!****Only apply the lubricant to the adjustment mechanism with the unit at standstill!**

- Only apply the lubricant to the adjustment mechanism (2) when the unit is at a standstill.



Tool: ■ Grease gun

— Read and follow the safety instructions detailed in  *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.*

1.  Apply suitable lubricant to the opening 2 using an adequate grease gun in order to lubricate the adjustment mechanism.
2.  Apply suitable lubricant to the opening 1 using an adequate grease gun in order to lubricate the bearing.

6.3 Repairs



WARNING!

Risk of injury due to inadequate troubleshooting, maintenance and repair work!

Inadequate troubleshooting, maintenance and repair work can lead to severe injury and significant material damage.

- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Ensure sufficient installation space before commencing work.
- Keep the installation site clean and tidy! Loosely stacked or scattered components and tools cause accidents.
- Ensure correct installation where components have been removed, reinstall all fastening elements and observe the tightening torques of screws.
- Ensure the following before putting the machine back into operation:
 - Ensure that all troubleshooting, maintenance and repair work is performed and completed as per the information and notes provided in this manual.
 - Ensure that nobody enters the hazardous area.
 - Ensure that all covers and safety features are installed and function correctly.

**CAUTION!**

Health hazard due to residues of dangerous medium inside and on the Börger machine!

There is an increased health hazard from contact with the medium and contaminated components.

Generally, the following applies:

- When using dangerous or health-endangering media, take all necessary safety measures when performing work on the Börger machine.
- Avoid direct contact with the medium (skin/eye contact, swallowing, inhaling).
- Remove spillage from your skin without delay.
- Do not store or consume beverages, food or tobacco in the working area.

6.3.1 Notes on repair work

**NOTE!****Installation length of tension springs**

Always measure the installation length of the springs under tension before removing the tension springs. This allows you to shorten the renewed break-in period. Pre-load the reinstalled tension springs approximately to the measured length.

When replacing the tension springs with other tension springs which have a lower or higher spring force, the pre-tension at the new springs must be set lower in accordance with the higher spring force of the new tension springs or higher in accordance with the lower tension force of the new tension springs.

**NOTE!****Assembly drawing / spare parts list**

- Observe the assembly drawing of the Börger machine.
↳ Chapter 9.3 “Assembly drawing” on page 177
- Observe the spare parts list of the Börger machine.
↳ Chapter 9.4 “Spare parts list” on page 180

- Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.*
 - **Empty** the Börger machine as described in ↗ *Chapter 5.4 “Downtimes” on page 100.*
 - Shut down the Börger machine and downstream and upstream system components as described in ↗ *Chapter 5.4 “Downtimes” on page 100.*
 - Secure the Börger machine against unauthorized or uncontrolled reactivation as described in ↗ *Chapter 2.7 “Securing the machine against restart” on page 26.*
 - To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
 - Relieve the pressure in the Börger machine according to ↗ *Chapter 6.1.2 “Pressure relief” on page 114.*
 - Clean the interior of the Börger machine as described in ↗ *Chapter 6.1.3 “Internal cleaning” on page 116.*
- 1.** ➤ Thoroughly clean all parts and the working chamber of the machine before reinstalling removed parts.
 - 2.** ➤ Check all removed parts for wear and only reuse them if they are undamaged.
 - 3.** ➤ Only replace worn components, seals, screws, nuts etc., but especially the wetted parts, with original spare parts according to the following instructions.

6.3.2 Removing/repairing the clamping unit



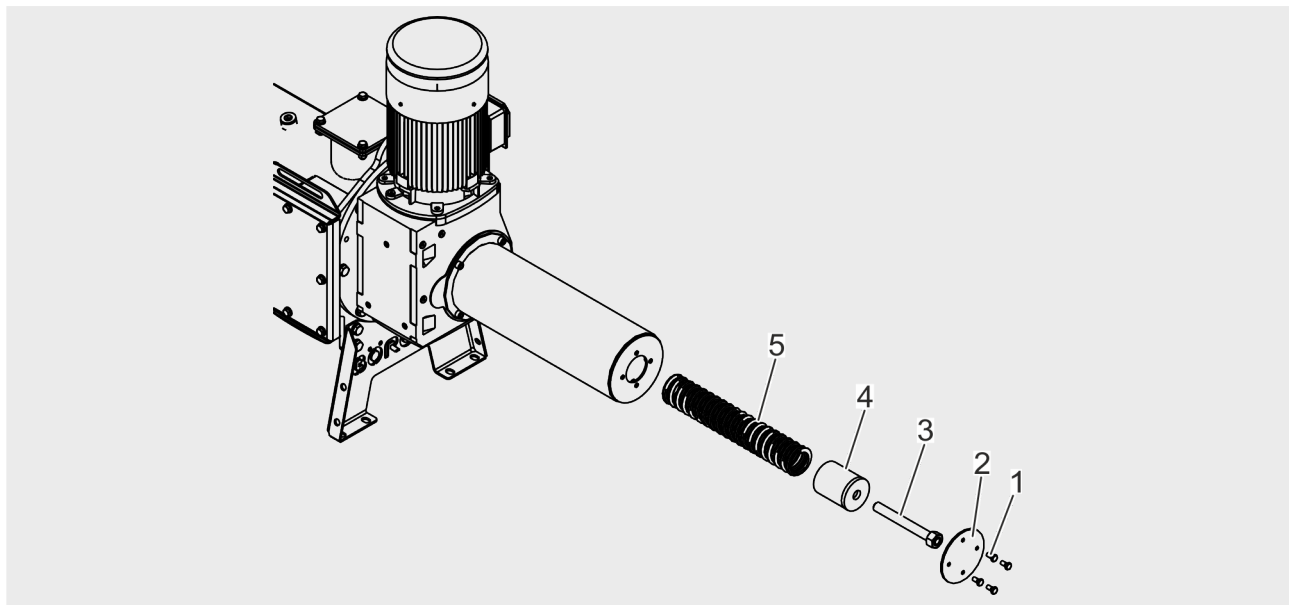
CAUTION!

Risk of injury due to tensioned spring!

During dismantling of the clamping unit, compression spring tension can be released uncontrollably.

- Release the spring tension before starting work on the clamping unit!
- Only perform work at the clamping unit as described in this operating manual!

Clamping unit with mechanical adjustment



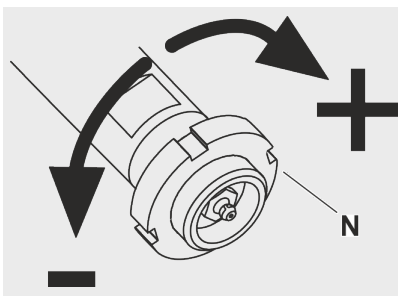
1	Hexagon head screw	4	Roll pin
2	Cover plate	5	Tension spring
3	Clamping screw		

- Read and follow the safety instructions detailed in [Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions”](#) on page 37.
- **Empty** the Börger machine as described in [Chapter 6.3.1 “Notes on repair work”](#) on page 129.
- Shut down the Börger machine and downstream and upstream system components as described in [Chapter 5.4 “Down-times”](#) on page 100.

- Secure the Börger machine against unauthorized or uncontrolled reactivation as described in [Chapter 2.7 “Securing the machine against restart” on page 26](#)
- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Relieve the pressure in the Börger machine according to [Chapter 6.1.2 “Pressure relief” on page 114](#).
- Clean the interior of the Börger machine as described in [Chapter 6.1.3 “Internal cleaning” on page 116](#).

1. Remove the four hexagon head screws (4) at the covering plate (5) that are connected to the collar of the tension spring cover and lift off the covering plate (5).
2. Remove the clamping screw (6).
3. Remove the roll pin (7) and the tension spring (8).
4. Fit the new tension spring (8) with roll pin (7).
5. Install the clamping screw (6).
6. Tighten the clamping screw (6) until a sufficiently high pre-tension on the *Multi Disc* has been achieved.

- If necessary, correct the pre-tension as described in [Chapter 5.1 “Commissioning” on page 95](#).

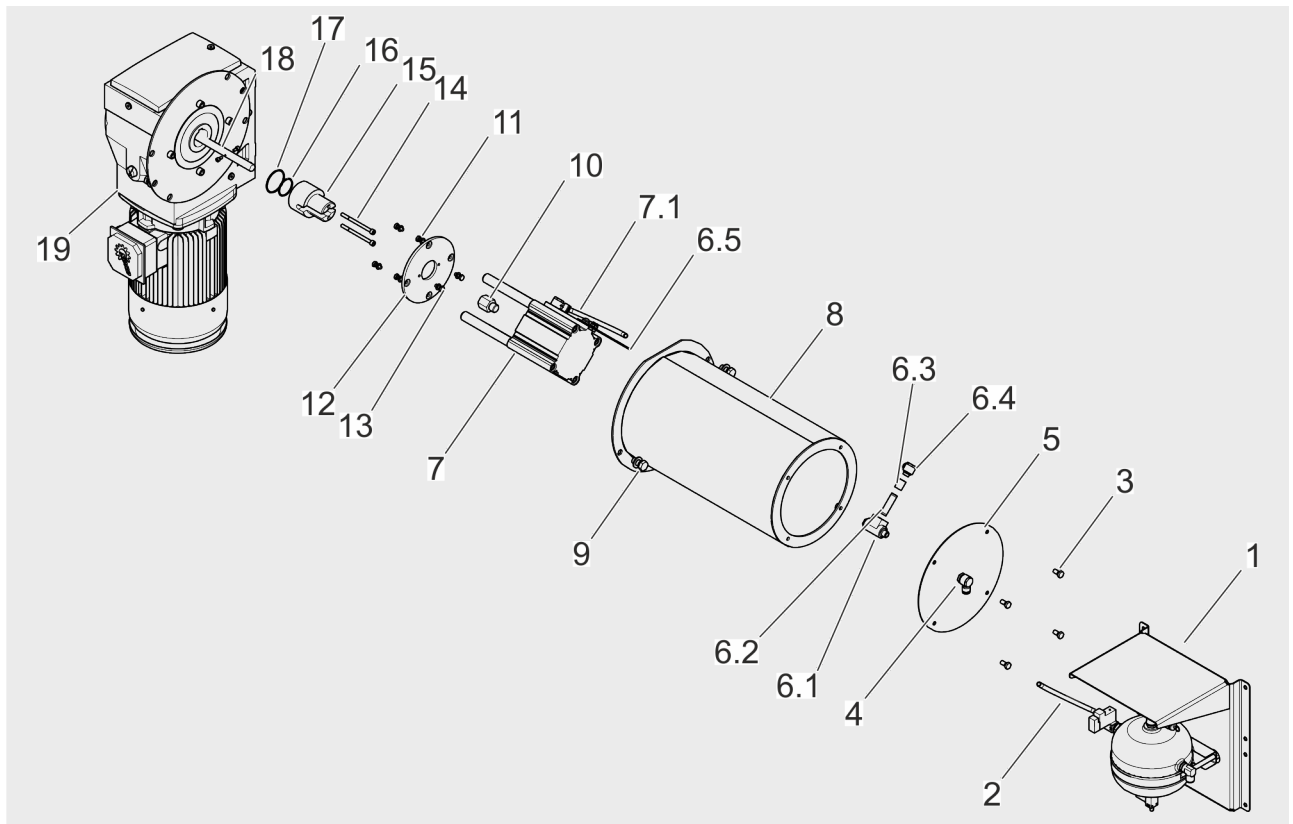


Adjust the clearance!

- Adjust the slotted nut [N] in such a way that the distance between the *Multi Disc* and the press channel (or filter press channel in the case of the HP version) is very small but the plates do not rub against each other.

7. Install the cover plate (5) with the hexagon head screws (4).

Clamping unit with pneumatic adjustment



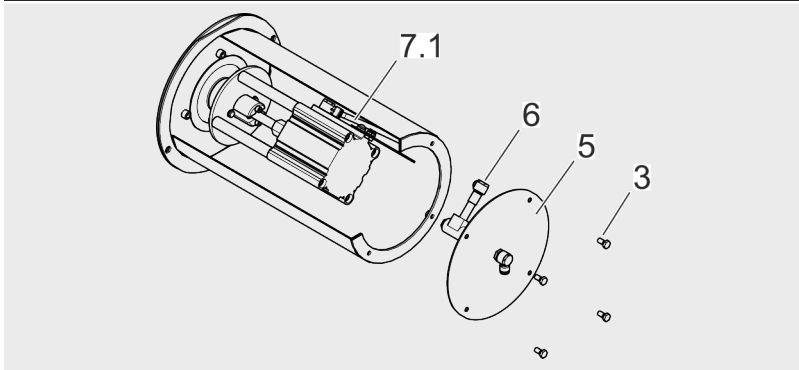
1	Compressed-air container	8	Cover
2	Compressed-air tube	9	Hexagon socket head cap screws
3	Hexagon head screw	10	Threaded adapter, pneumatic cylinder
4	Elbow union	11	Hexagon head screw with washer
5	Plate for rotating union	12	Pressure plate, pneumatic cylinder
6.1	Rotating union	13	Hexagon head screw with washer
6.2	Double pipe nipple	14	Hexagon socket head cap screw
6.3	Socket	15	Spring guide bolt
6.4	Angle plug connection	16	O-ring
6.5	Carrier plate	17	O-ring
7	Pneumatic cylinder unit	18	Threaded rod
7.1	Compressed-air tube	19	Drive

- Read and follow the safety instructions detailed in Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.
- **Empty** the Börger machine as described in Chapter 6.3.1 “Notes on repair work” on page 129.

- Shut down the Börger machine and downstream and upstream system components as described in ↗ *Chapter 5.4 “Down-times” on page 100.*
- Secure the Börger machine against unauthorized or uncontrolled reactivation as described in ↗ *Chapter 2.7 “Securing the machine against restart” on page 26*
- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Relieve the pressure in the Börger machine according to ↗ *Chapter 6.1.2 “Pressure relief” on page 114.*
- Clean the interior of the Börger machine as described in ↗ *Chapter 6.1.3 “Internal cleaning” on page 116.*

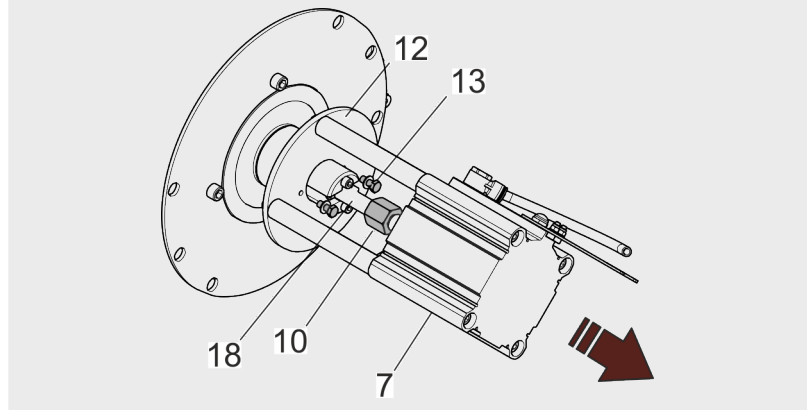
1. Release the pressure from the clamping unit.
2. Remove the compressed-air tube (2) of the compressed-air container (1) from the elbow union (4).
3. Loosen the hexagon head screws (3) from the plate (5) for the rotating union (6).

Remove the plate for the rotating union



4. Pull the plate (5) with the rotating union (6) out of the cover (8) so that you can remove the unit from the compressed-air tube (7.1).
5. Loosen the two hexagon socket head cap screws (9) at the cover of the clamping unit (8) and lift off the cover (8).

6. ➔ Loosen the two hexagon head screws (13) at the plate of the pneumatic cylinder unit (12).

Remove the pneumatic cylinder unit

7. ➔ Loosen the threaded adapter (10) at the threaded rod (18) using a 30 mm hexagon socket wrench.

8. ➔

**NOTE!**

Ensure that a second person holds the pneumatic cylinder unit (7) when the hexagon head screws (13) are loosened.

⇒ Remove the pneumatic cylinder unit (7).

9. ➔ Check the pneumatic cylinder. Replace the pneumatic cylinder if it shows signs of damage.
10. ➔ Slide the pneumatic cylinder unit (7) onto the threaded rod (18) and tighten the threaded adapter (10) at the same time using a 30 mm hexagon socket wrench.
11. ➔ Tighten the two hexagon head screws (13) at the plate of the pneumatic cylinder unit (12).
12. ➔ Install the cover (8) of the clamping unit and tighten the hexagon socket head cap screws (9).
13. ➔ Attach the compressed-air tube (7.1) to the plate (5) with the rotating union (6).
14. ➔ Push the plate with the rotating union (6) and the compressed-air tube (7.1) into the cover (8) so that the plate (5) sits firmly on the cover (8).
15. ➔ Tighten the hexagon head screws with washers (3).
16. ➔ Attach the compressed-air tube (2) of the compressed-air container (1) to the elbow union (3) of the clamping unit.

- 17.**  Pressurize the clamping unit.

6.3.3 Replacing the mechanical seal

**NOTICE!**

Risk of material damage due to incorrect handling of mechanical seals!

Make sure not to damage the sealing surfaces of the new seal faces.

- The sealing surfaces must be clean and should not be scratched.

**NOTICE!**

Risk of loss of seal function due to oil/grease on the O-rings of mechanical seals!

Material damage resulting from loss of seal function

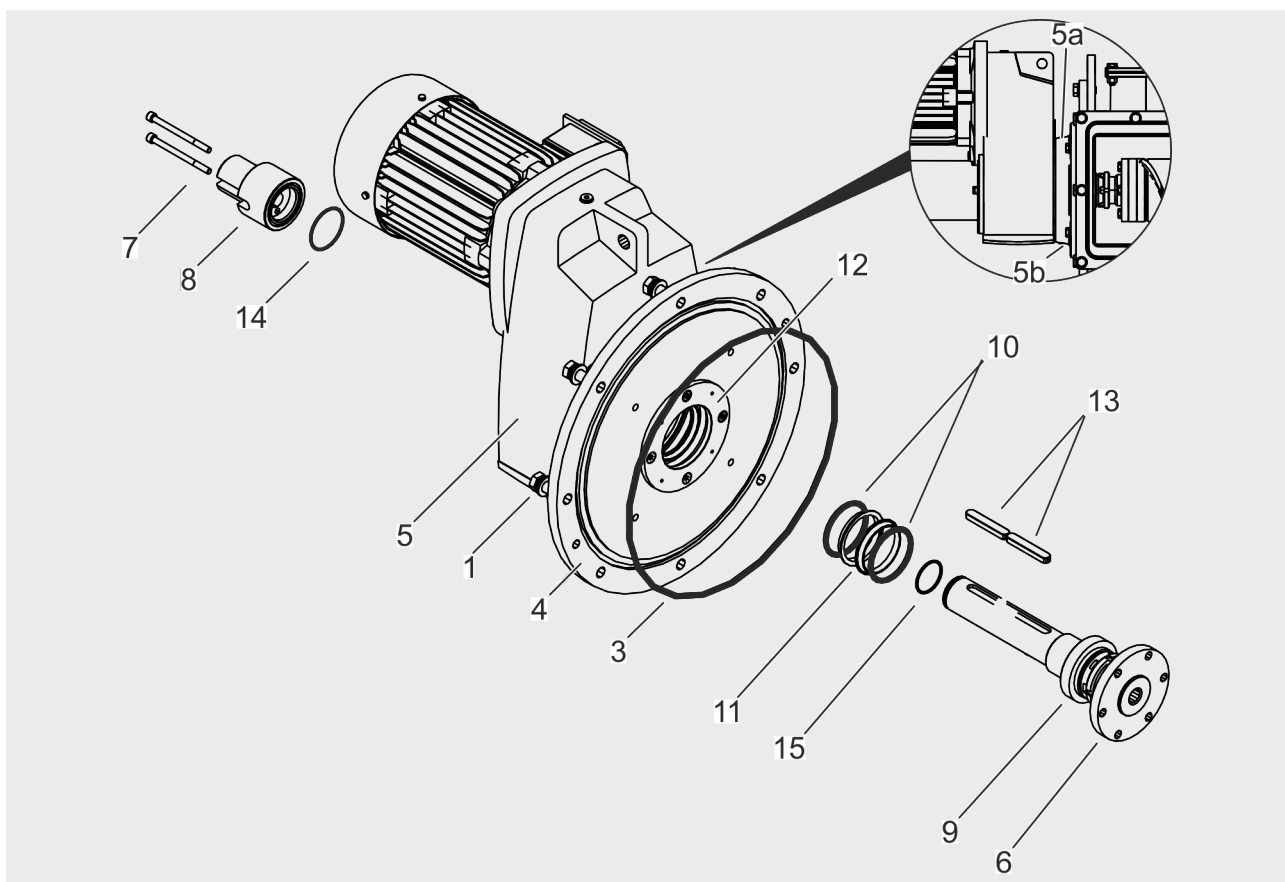
- The O-rings of a mechanical seal must be installed without oil or grease.

**NOTE!**

Spray cleaner (degreaser)

Generally, the seal faces equipped with O-rings can be inserted dry.

- In order to ensure that they are free of grease and to aid insertion, the O-rings can be sprayed lightly, depending on their resistance, with a quickly-volatilizing spray cleaner (degreaser) that leaves no residue.



1	Hexagon head screws with washers (8x)	11	Mechanical seal
3	O-ring	12	Stationary seal holding bush
4	Motor plate	13	Parallel key A 14x9x80
5	Parallel shaft helical gear motor	14	O-ring 60
5a	safety plug	15	O-ring 60
5b	Screw plug	16	Hexagon head screws
6	Drive shaft with flange	17	Drive flange
7	Hexagon socket head cap screw, M8	18	Hexagon head screws with washers
8	Spring guide bolt	19	Cover for maintenance opening
9	Rotating seal holding bush, FL with thread	20	O-ring
10	O-ring		

A long service life of the mechanical seal can be expected, if the unit is used as intended and the limits are not exceeded. The mechanical seal only needs to be replaced if substrate has entered the intermediate chamber and the quench fluid runs out, e.g. after feeding aggressive substrates or substrate admixtures that have attacked the O-rings of the mechanical seal or the mechanical seal.

Tool: ■ Multitool [M]

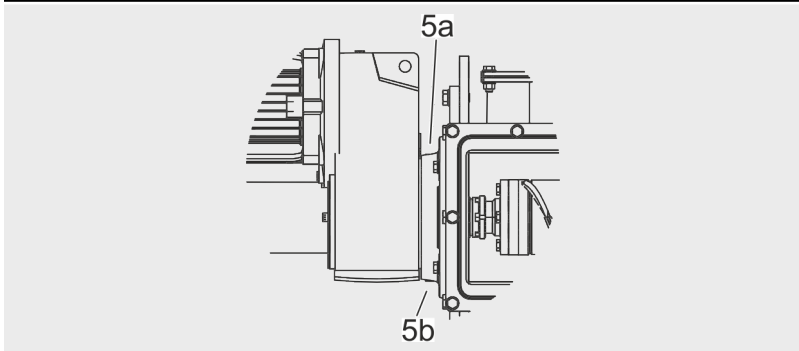
Drive flange, auger adapter

Tightening torques	approx. [Nm]	approx. [ft-lbs]
M12 hexagon head screws, stainless steel	65	48

- Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.*
- **Empty** the Börger machine as described in ↗ *Chapter 6.3.1 “Notes on repair work” on page 129.*
- Shut down the Börger machine and downstream and upstream system components as described in ↗ *Chapter 5.4 “Downtimes” on page 100.*
- Secure the Börger machine against unauthorized or uncontrolled reactivation as described in ↗ *Chapter 2.7 “Securing the machine against restart” on page 26*
- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Relieve the pressure in the Börger machine according to ↗ *Chapter 6.1.2 “Pressure relief” on page 114.*
- Clean the interior of the Börger machine as described in ↗ *Chapter 6.1.3 “Internal cleaning” on page 116.*

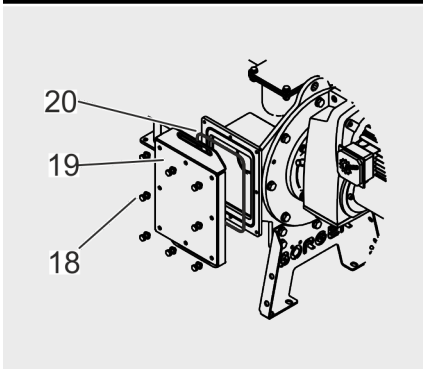
- Disassemble the clamping unit as described in ↗ *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131.*
 - Disassemble the *Multi Disc* as described in ↗ *Chapter 6.3.4 “Changing the Multi Disc plate” on page 146.*
 - Dismantle the drive pin and the drive sleeve and remove the threaded rod as detailed in ↗ *Chapter 6.3.7 “Replacing the brush auger” on page 157.*
1. ➤ Drain the quench fluid from the intermediate chamber after loosening the screw plug (5b) of the intermediate chamber drain while adhering to the relevant safety precautions relating to the substrate and the quench fluid. See ↗ *Chapter 6.2.2 “Lubricant fill level and changing the lubricants” on page 123* and the lubricant list in respect of the quench fluid.

Drain the quench fluid

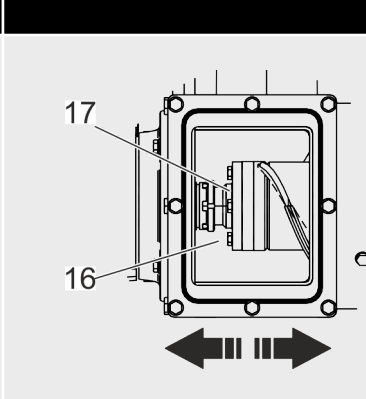


2. ➤ Thoroughly clean the intermediate chamber after a leak in the mechanical seal to remove all substrate deposits from the intermediate chamber. To do so, flush a suitable liquid (water, if appropriate) through the fill hole with the drain open after the safety plug has been removed.
3. ➤ Separate the drive flange as detailed in ↗ *Chapter 6.3.7 “Replacing the brush auger” on page 157.*

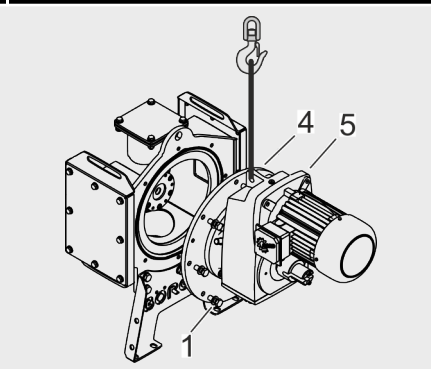
Dismantle the cover of the maintenance opening



Separate the drive flange



Lift off the drive and the motor plate



4. ➔ Loosen the eight hexagon head screws (1) with washers on the motor plate (4) and remove the unit consisting of the drive (5), the O-ring (3) and the motor plate (4) from the pipe casing (2) using a suitable hoist.

**NOTE!**

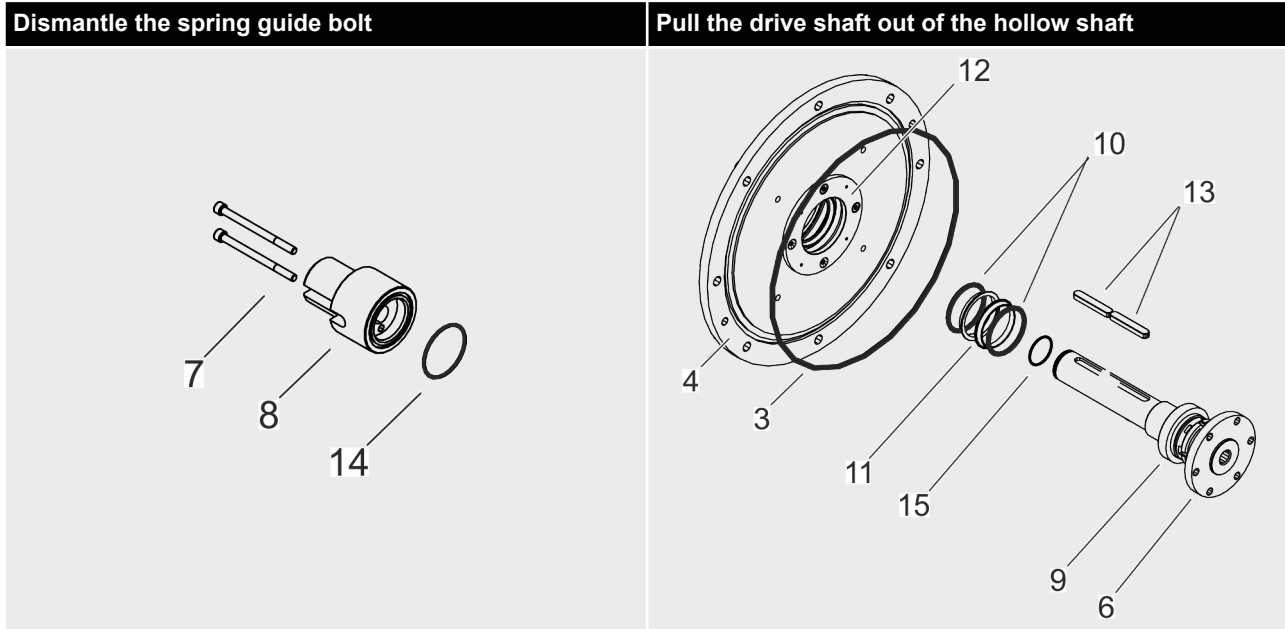
Hold the unit in such a way that lubricant does not run out of the gear unit breather.

**WARNING!****Risk of fatal injury due to suspended loads!**

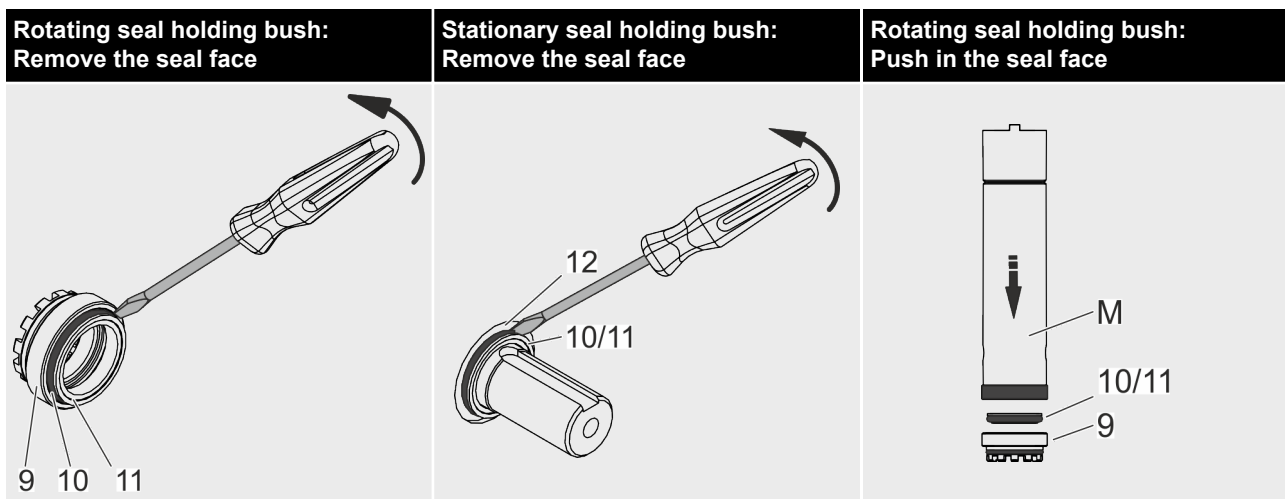
Loads can swing and fall during lifting operations. This can cause severe injury, including death.

- Never stand under or within the swinging range of suspended loads.
- Do not move loads unsupervised.
- Only use approved hoists and slings with sufficient load-bearing capacity.
- Do not use torn or worn hoists such as ropes and belts.
- Do not place hoists such as ropes and belts near sharp corners and edges and do not tie them together or twist them.
- Put the load down when leaving the operating site.

1. ➤ Loosen the two hexagon socket head cap screws (7) at the spring guide bolt (8).
2. ➤ Remove the spring guide bolt (8) with the O-ring (14).

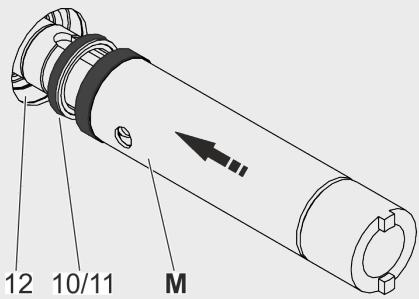
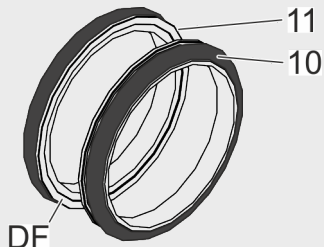
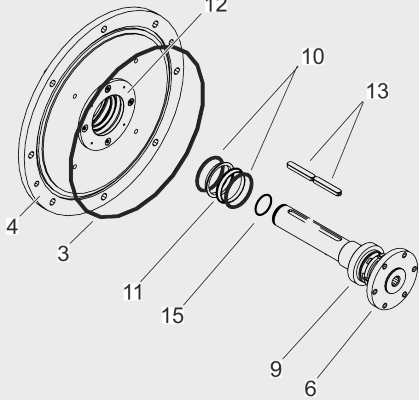


3. ➤ Pull the drive shaft (6) out of the hollow shaft.
4. ➤ Remove the seal face (11) with the O-ring (10) out of the rotating seal holding bush (9) fastened to the shaft.



5. ➤ Remove the seal face (11) with O-ring (10) out of the stationary seal holding bush (12) remaining in the motor plate using a suitable tool (e.g. small lever).
6. ➤ Clean the O-ring seats with a suitable agent that is compatible with the seal material, quench fluid and substrate, e.g. alcohol-based industrial cleaner.

7. ➔ If delivered separately, fit the O-rings (10) onto the new seal faces (11). The mechanical seals are normally equipped with O-rings on delivery.
8. ➔ Press a seal face (11) with O-ring (10) into the rotating seal holding bush (9) using the push-in tool for mechanical seals (Multitool).
9. ➔ Press the other seal face (11) with O-ring (10) into the stationary seal holding bush (12) using the push-in tool for mechanical seals (Multitool).

Stationary seal holding bush: Push in the seal face	Seal face: lightly coat with suitable oil	Push the drive shaft into the hollow shaft
		

10. ➔ Lightly coat the clean **sealing surfaces of the seal faces** with suitable oil.
11. ➔ Check that the parallel keys (13) in the drive shaft (6) are positioned correctly and securely, and ensure that they are not damaged. Failing this, the parallel keys must be replaced.
12. ➔ Check the O-rings (3, 14, 15). Replace the O-rings if they show signs of damage.
13. ➔ Push the drive shaft (6) into the hollow shaft.
14. ➔ Install the O-ring (15).

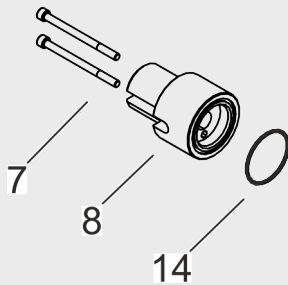
i

NOTE!

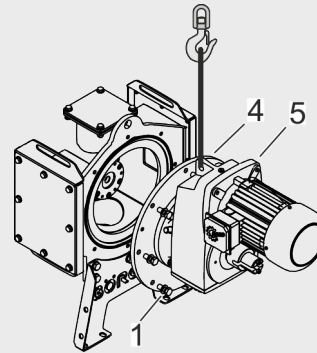
Install the O-ring (15) of the drive shaft (6) only after you have pushed the drive shaft (6) into the hollow shaft.

- 15.** Install the spring guide bolt (8) with the O-ring (14) and tighten the two hexagon socket head cap screws (7) at the spring guide bolt (8).

Install the spring guide bolt

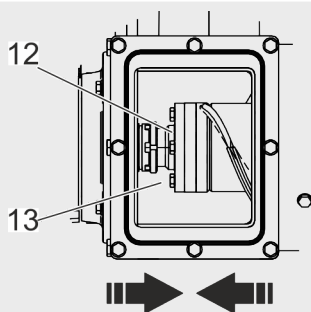


Install the drive and the motor plate at the pipe casing

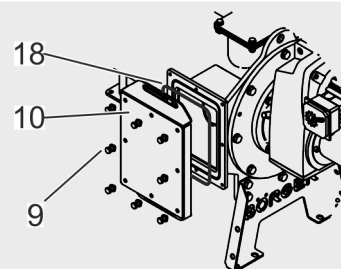


- 16.** Attach the unit consisting of the drive (5), the O-ring (3) and the motor plate (4) to the pipe casing (2) using an appropriate hoist and tighten the eight hexagon head screws (1) with washers at the motor plate (4).
- 17.** Close the screw plug (5b) and fill the intermediate chamber with quench fluid through the fill hole (5a). Adhere to [Chapter 6.2 "Maintenance and inspection" on page 120](#).
- 18.** Connect the drive flange as detailed in [Chapter 6.3.7 "Replacing the brush auger" on page 157](#).
- 19.** Install the drive pin, the drive sleeve and the threaded rod as detailed in [Chapter 6.3.7 "Replacing the brush auger" on page 157](#).

Install the drive flange



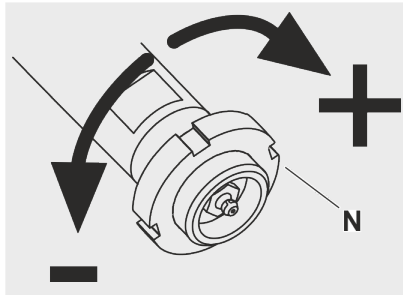
Install the cover of the maintenance opening



- 20.** Install the *Multi Disc* as described in [Chapter 6.3.4 "Changing the Multi Disc plate" on page 146](#).
- 21.** Attach the clamping unit as described in [Chapter 6.3.2 "Removing/repairing the clamping unit" on page 131](#).

- 22.** → Tighten the clamping screw (10) until a sufficiently high pre-tension on the *Multi Disc* (3a, 3b) has been achieved or pressurize the clamping unit in the version with pneumatic adjustment.

— If necessary, correct the pre-tension as described in
↪ Chapter 5.1 “Commissioning” on page 95.

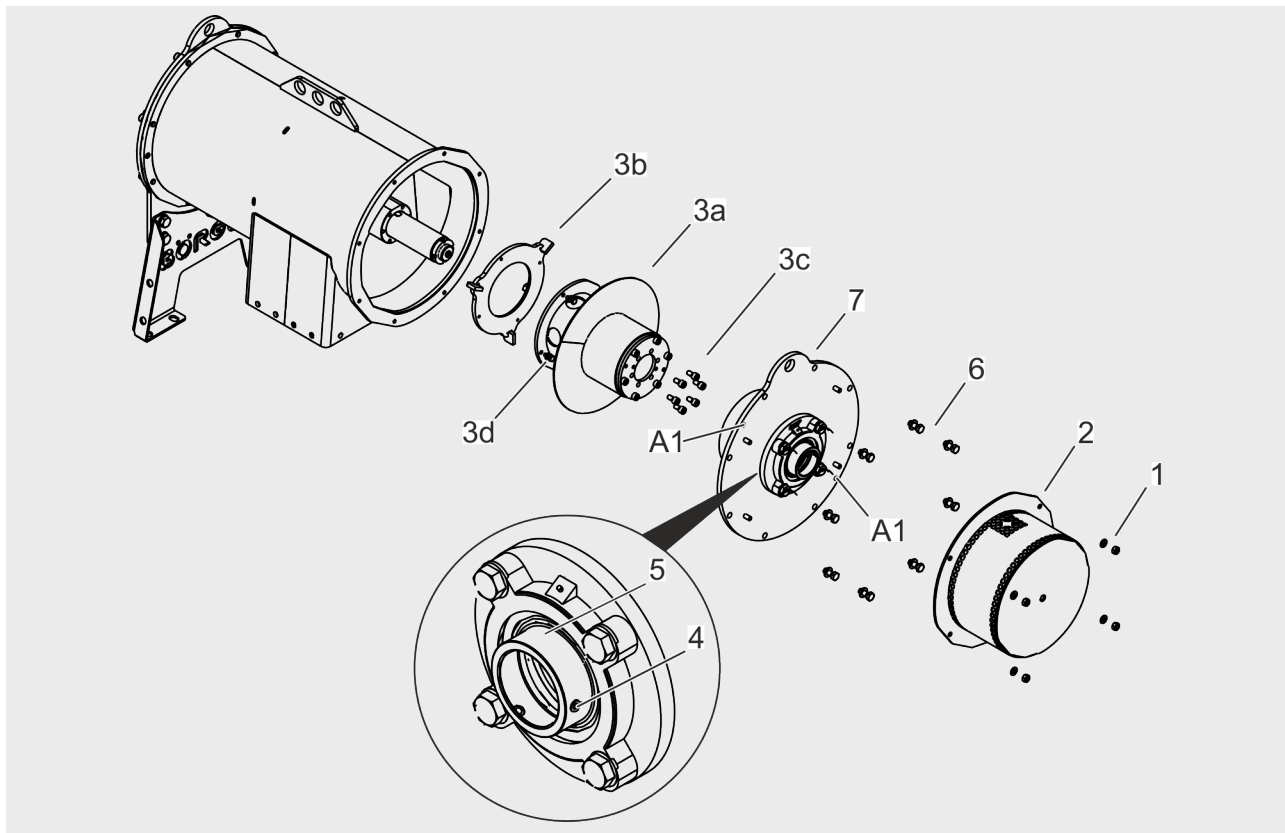


Adjust the clearance!

- Adjust the slotted nut [N] in such a way that the distance between the *Multi Disc* and the press channel (or filter press channel in the case of the HP version) is very small but the plates do not rub against each other.

- 23.** → Install the protection cover or the counter bearing cover according to ↪ Chapter 6.3.4 “Changing the *Multi Disc* plate” on page 146.

6.3.4 Changing the *Multi Disc* plate



1	Hexagon nuts with washers	6	Hexagon head screws with washers
2	Counter bearing cover	7	Counter bearing plate
3a	<i>Multi Disc</i> cap	8	Hexagon head screw
3b	<i>Multi Disc</i> plate with peeling tabs	9	Cover plate
3c	Hexagon socket head cap screws with washers	10	Clamping screw
3d	Hexagon head screws with washers	A1	Jacking thread - <i>Multi Disc</i> cap
4	Grub screw	A1	Jacking thread - Counter bearing plate
5	Counter bearing inner ring	AH	Drive sleeve



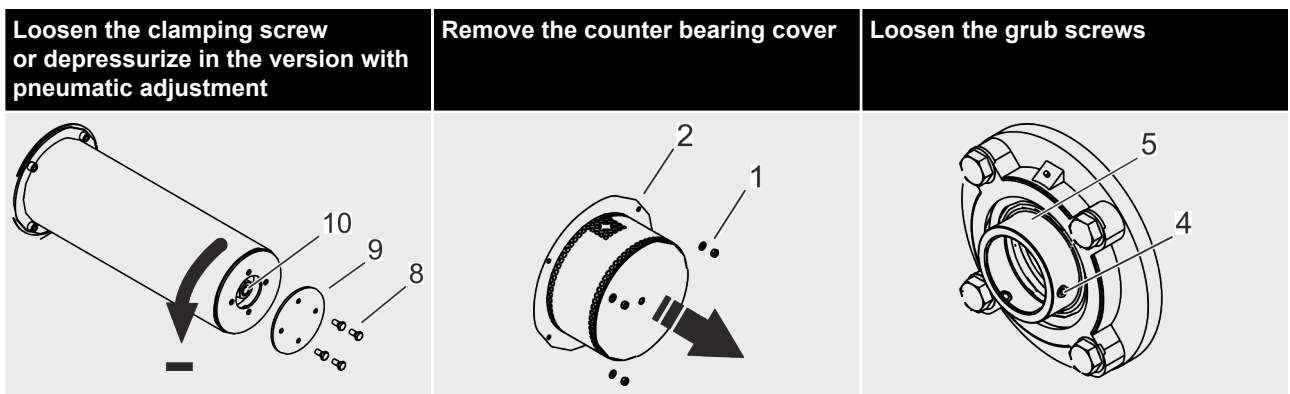
NOTE!

Replacement of the *Multi Disc* plate

Check the wear limit for the *Multi Disc* plate!

- The peeling tabs of the *Multi Disc* plate should have a residual height of **at least 2.5 mm!**
- Otherwise, replace the *Multi Disc* plate!

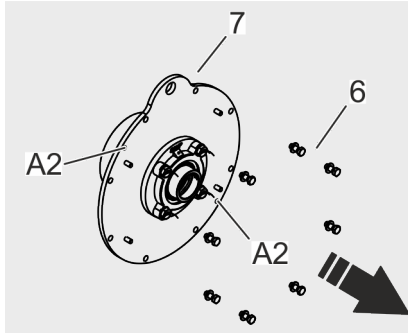
- Read and follow the safety instructions detailed in Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.
- **Empty** the Börger machine as described in Chapter 6.3.1 “Notes on repair work” on page 129.
- Shut down the Börger machine and downstream and upstream system components as described in Chapter 5.4 “Downtimes” on page 100.
- Secure the Börger machine against unauthorized or uncontrolled reactivation as described in Chapter 2.7 “Securing the machine against restart” on page 26
- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Relieve the pressure in the Börger machine according to Chapter 6.1.2 “Pressure relief” on page 114.
- Clean the interior of the Börger machine as described in Chapter 6.1.3 “Internal cleaning” on page 116.
- Loosen the clamping screw of the clamping unit as described in Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131, or depressurize the clamping unit in the version with pneumatic adjustment.



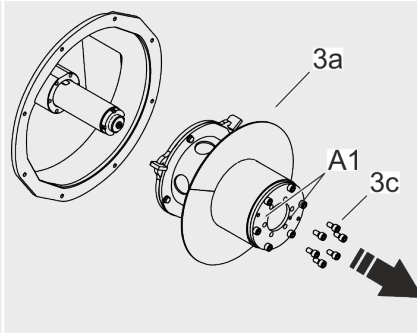
- 1.** Loosen the hexagon nut (1) at the cover (2) of the counter bearing and lift off the cover (2).
- 2.** Loosen the two grub screws (4) at the inner ring (5) of the counter bearing.
- 3.** Loosen and remove the hexagon head screws (6) with washers.

4. ➡

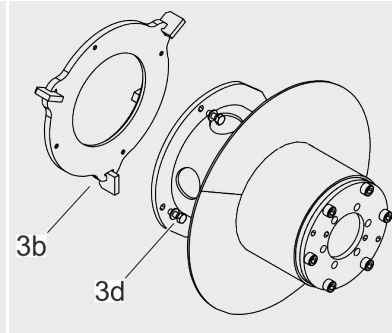
Remove the counter bearing plate



Pull off the Multi Disc cap



Replace the Multi Disc plate



Remove the counter bearing plate (7).

— If required, use the jacking threads [A2].

5. ➡ Loosen and remove the six inner hexagon socket head cap screws with washers (3c).

6. ➡ Remove the *Multi Disc* cap (3a) with the *Multi Disc* plate (3b).
— If required, use the jacking threads [A1].

7. ➡ Loosen and remove the hexagon head screws (3d).

8. ➡ Remove the *Multi Disc* plate (3b) from the *Multi Disc* cap (3a).

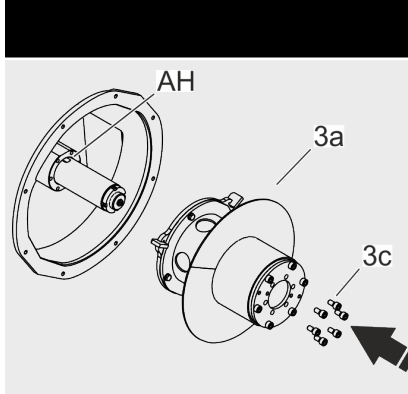
9. ➡ Attach the new *Multi Disc* plate (3b) to the *Multi Disc* cap (3a) using the hexagon head screws (3d).

— Only tighten the hexagon head screws (3d) slightly at first.

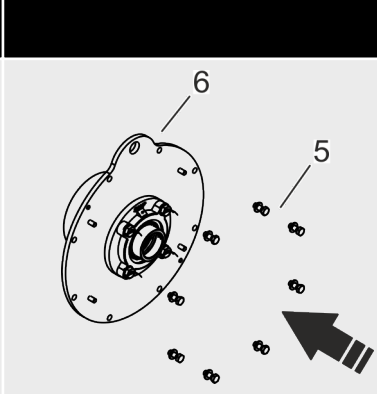
10. ➡ Push the repaired *Multi Disc* (3a, 3b) over the drive sleeve [AH] up to the stop.

— Now, tighten the hexagon head screws (3d) properly.

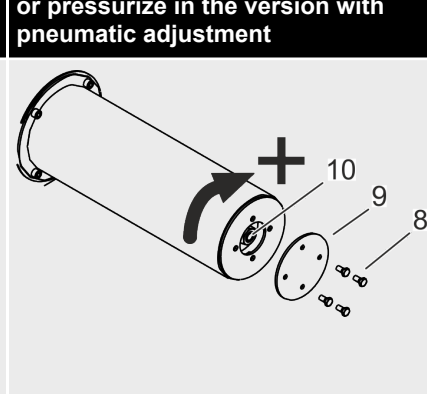
Push on and install the Multi Disc cap



Install the counter bearing plate



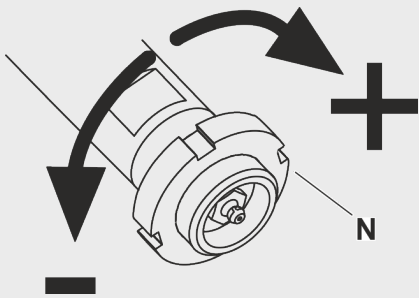
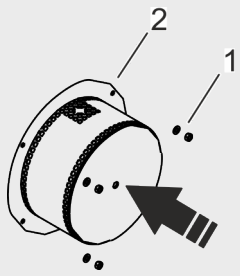
Applying pre-tension:
Tighten the clamping screw or pressurize in the version with pneumatic adjustment



11. ➡ Retighten the six inner hexagon socket head cap screws with washers (3c).

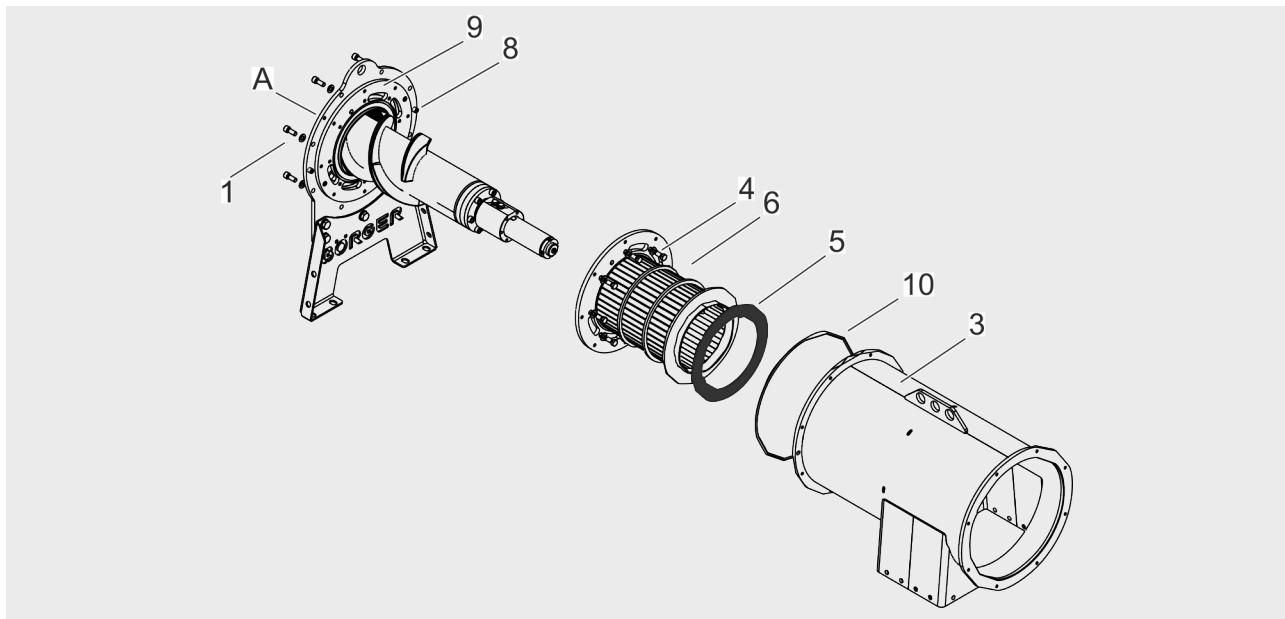
12. ➤ Lubricate the adjustment mechanism as detailed in
 ↪ *Chapter 6.2.3 "Lubricating the adjustment mechanism and the bearing" on page 127.*
13. ➤ Place the counter bearing plate (7) properly.
14. ➤ Insert the hexagon head screws (6) with the washers and tighten them.
15. ➤ Tighten the two grub screws (4) at the inner ring (5) of the counter bearing.
16. ➤ Tighten the clamping screw (10) until a sufficiently high pre-tension on the *Multi Disc* (3a, 3b) has been achieved or pressurize the clamping unit in the version with pneumatic adjustment.

— If necessary, correct the pre-tension as described in
 ↪ *Chapter 5.1 "Commissioning" on page 95.*

Adjust the clearance!	Install the counter bearing cover
 — Adjust the slotted nut [N] in such a way that the distance between the <i>Multi Disc</i> and the press channel (or filter press channel in the case of the HP version) is very small but the plates do not rub against each other.	

17. ➤ Install the cover (2) of the counter bearing and tighten the hexagon nuts (1).
18. ➤ Install the covering plate (9) and tighten the four hexagon head screws (8) in the version with mechanical adjustment.

6.3.5 Changing the filter press channel



1	Hexagon socket head cap screws with washers	6	Filter press channel or press channel
2	Dowel pins	8	Dowel pins
3	Counter bearing casing	9	Adapter plate
4	Hexagon head screws with washers	10	O-ring
5	Foam rubber sealing washer	A	Jacking threads

- Read and follow the safety instructions detailed in [Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.](#)
- **Empty** the Börger machine as described in [Chapter 6.3.1 “Notes on repair work” on page 129.](#)
- Shut down the Börger machine and downstream and upstream system components as described in [Chapter 5.4 “Downtimes” on page 100.](#)
- Secure the Börger machine against unauthorized or uncontrolled reactivation as described in [Chapter 2.7 “Securing the machine against restart” on page 26](#)
- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Relieve the pressure in the Börger machine according to [Chapter 6.1.2 “Pressure relief” on page 114.](#)
- Clean the interior of the Börger machine as described in [Chapter 6.1.3 “Internal cleaning” on page 116.](#)

- Loosen the clamping screw of the clamping unit as described in  *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131*, or depressurize the clamping unit in the version with pneumatic adjustment.
 - Disassemble the *Multi Disc* as described in  *Chapter 6.3.4 “Changing the Multi Disc plate” on page 146*.
- 1.**  Loosen the outer eight hexagon socket head cap screws with washers (1) at the collar of the pipe casing and lift off the counter bearing casing (3) with the O-ring (10). If required, use the jacking threads [A].
 - 2.**  Loosen the eight hexagon head screws with washers (4) at the collar of the filter press channel or press channel (6) and lift off the filter press channel or press channel (6) with the foam rubber sealing washer (5) and the O-ring (10).
 - 3.**  Check the O-rings (7, 10) and the foam rubber sealing washer (5). Replace the O-rings and the foam rubber sealing washer if they show signs of damage.
 - 4.**  Install the new press channel or filter press channel (6) with the foam rubber sealing washer (5) and the O-ring (10) and tighten the eight hexagon head screws with washers (4) only slightly at first.
 - 5.**  Now, tighten the hexagon head screws with washers (4).
 - 6.**  Install the counter bearing casing (3) and tighten the outer eight hexagon socket head cap screws with washers (1) at the collar of the pipe casing only slightly at first.

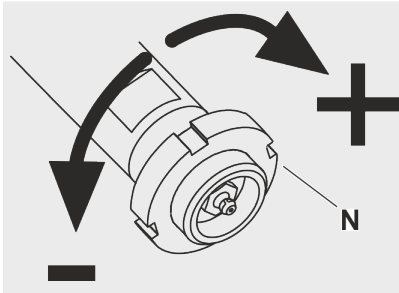
i**NOTE!****Dowel pins (8)**

- Check that the dowel pins (8) are correctly positioned.

- 7.**  Now, tighten the hexagon socket head cap screws with washers (4).
- 8.**  Install the *Multi Disc* as described in  *Chapter 6.3.4 “Changing the Multi Disc plate” on page 146*.
- 9.**  Attach the clamping unit as described in  *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131*.

- 10.** Tighten the clamping screw until a sufficiently high pre-tension on the *Multi Disc* has been achieved or pressurize the clamping unit in the version with pneumatic adjustment.

— If necessary, correct the pre-tension as described in [Chapter 5.1 “Commissioning” on page 95](#).

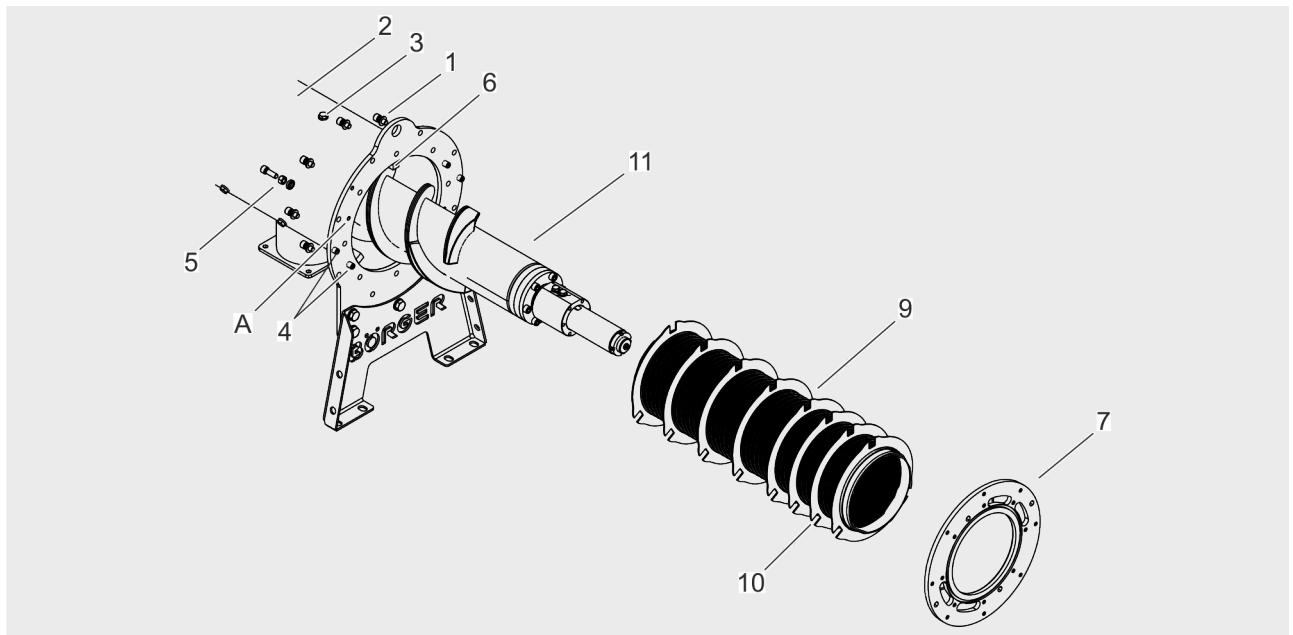


Adjust the clearance!

- Adjust the slotted nut [N] in such a way that the distance between the *Multi Disc* and the press channel (or filter press channel in the case of the HP version) is very small but the plates do not rub against each other.

- 11.** Install the counter bearing cover according to [Chapter 6.3.4 “Changing the Multi Disc plate” on page 146](#).

6.3.6 Replacing the wedge wire screen



1	Hexagon socket head cap screws with washers	7	Adapter plate
2	Pipe casing	9	Wedge wire screen
3	Hexagon head screws with DSL double lock washer	10	Rotation locks on the wedge wire screen
4	Dowel pins	11	Brush auger
5	Hexagon head screws with hexagon nuts and DSL double lock washer	12	Hexagon head screws with DSL double lock washer
6	Rotation lock rails	A	Jacking threads

Tool: Torque wrench

Rotation lock rails

Tightening torques	approx. [Nm]	approx. [ft-lbs]
M12 hexagon head screws, stainless steel	30	22

- Read and follow the safety instructions detailed in Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.
- **Empty** the Börger machine as described in Chapter 6.3.1 “Notes on repair work” on page 129.

- Shut down the Börger machine and downstream and upstream system components as described in ↗ *Chapter 5.4 “Down-times” on page 100.*
 - Secure the Börger machine against unauthorized or uncontrolled reactivation as described in ↗ *Chapter 2.7 “Securing the machine against restart” on page 26*
 - To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
 - Relieve the pressure in the Börger machine according to ↗ *Chapter 6.1.2 “Pressure relief” on page 114.*
 - Clean the interior of the Börger machine as described in ↗ *Chapter 6.1.3 “Internal cleaning” on page 116.*
-
- Loosen the clamping screw of the clamping unit as described in ↗ *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131*, or depressurize the clamping unit in the version with pneumatic adjustment.
 - Disassemble the *Multi Disc* as described in ↗ *Chapter 6.3.4 “Changing the Multi Disc plate” on page 146.*
 - Disassemble the filter press channel as described in ↗ *Chapter 6.3.5 “Changing the filter press channel” on page 150.*
1. ➤ Loosen the inner eight hexagon socket head cap screws (1) with washers at the collar of the pipe casing which are used to fix the adapter plate (7) and lift off the adapter plate (21). If required, use the jacking threads [A].
 2. ➤ Pull the wedge wire screen (9) out of the pipe casing (2).
⇒ **The wedge wire screen (9) can now be replaced.**
 3. ➤ Clean the interior of the pipe casing (2).



NOTE!

Pay attention to the correct installation direction of the new wedge wire screen.

- The distances between the rotation locks are smaller towards the filter press channel or press channel and larger towards the drive.
- Thus, the side with the larger distances between the rotation locks is pushed into the pipe casing first.

4. ➤ Insert the new wedge wire screen (9) all the way to the stop in the pipe casing (2). Make sure that the three rotation lock rails (6) in the pipe casing (2) slot into the recesses of the rotation locks (10) on the wedge wire screen.

**NOTE!****Rotation lock rails!**

- If necessary, the rotation lock rails for the rotation locks of the wedge wire screen can easily be adjusted by carefully loosening the hexagon head screws. Retighten the hexagon head screws applying the appropriate torque.

5. ➤ Install the adapter plate (7) and tighten the inner eight hexagon socket head cap screws with washers (1) from the other side of the collar at the pipe casing (2) only slightly at first in order to fix the adapter plate (7).

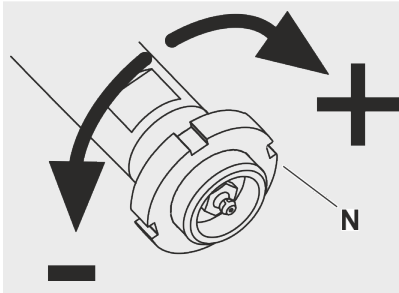
**NOTE!****Inner dowel pins (4)**

- Check that the dowel pins (4) are correctly positioned.

6. ➤ Now tighten the hexagon socket head cap screws (1) with washers.
7. ➤ Install the filter press channel as described in ↗ *Chapter 6.3.5 “Changing the filter press channel” on page 150.*
8. ➤ Install the *Multi Disc* as described in ↗ *Chapter 6.3.4 “Changing the Multi Disc plate” on page 146.*
9. ➤ Attach the clamping unit as described in ↗ *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131.*

- 10.** Tighten the clamping screw until a sufficiently high pre-tension on the *Multi Disc* has been achieved or pressurize the clamping unit in the version with pneumatic adjustment.

— If necessary, correct the pre-tension as described in
 ↪ *Chapter 5.1 "Commissioning" on page 95.*



Adjust the clearance!

- Adjust the slotted nut [N] in such a way that the distance between the *Multi Disc* and the press channel (or filter press channel in the case of the HP version) is very small but the plates do not rub against each other.

- 11.** Install the counter bearing cover according to ↪ *Chapter 6.3.4 "Changing the Multi Disc plate" on page 146.*

6.3.7 Replacing the brush auger

**WARNING!****Risk of fatal injury due to suspended loads!**

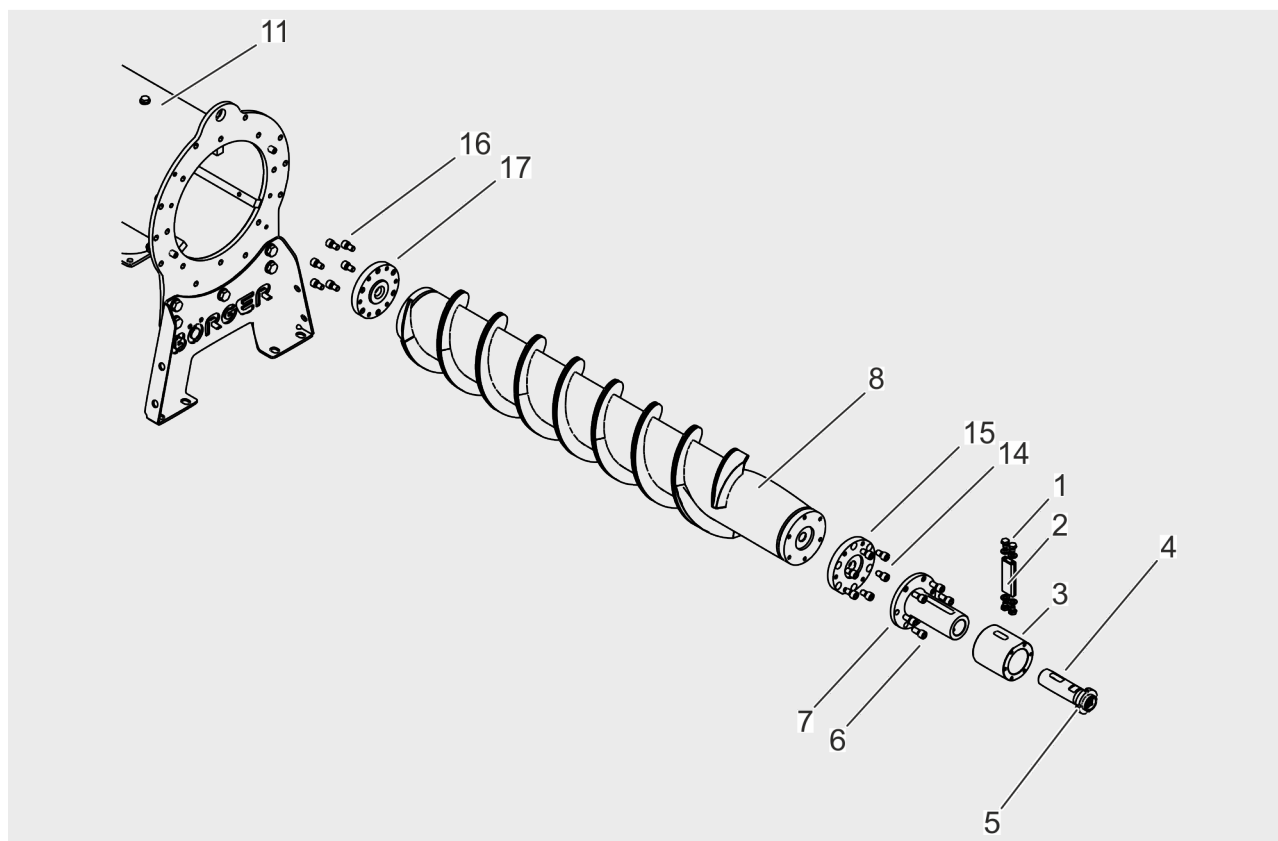
Loads can swing and fall during lifting operations. This can cause severe injury, including death.

- Never stand under or within the swinging range of suspended loads.
- Do not move loads unsupervised.
- Only use approved hoists and slings with sufficient load-bearing capacity.
- Do not use torn or worn hoists such as ropes and belts.
- Do not place hoists such as ropes and belts near sharp corners and edges and do not tie them together or twist them.
- Put the load down when leaving the operating site.

**NOTICE!****Risk of severe material damage due to incorrect installation and/or dismantling of the brush auger**

If no hoist is used, the risk of damage to the wedge wire screen due to tilting of the brush auger cannot be excluded.

- Only use approved hoists and slings with sufficient load-bearing capacity.



1	Hexagon head screws with washers	10	Cover for maintenance opening
2	Drive block	11	Pipe casing
3	Drive sleeve	12	Hexagon head screws
4	Drive pin with slotted nuts	13	Drive flange
N	Slotted nut	14	Hexagon socket head cap screws
6	Hexagon socket head cap screws with washers (2x)	15	Auger adapter
7	Mounting flange	16	Hexagon socket head cap screws
8	Brush auger	17	Auger adapter
9	Hexagon head screws with washers	18	O-ring
		S	Wrench flats

Tool:

- Torque wrench
- Hoists

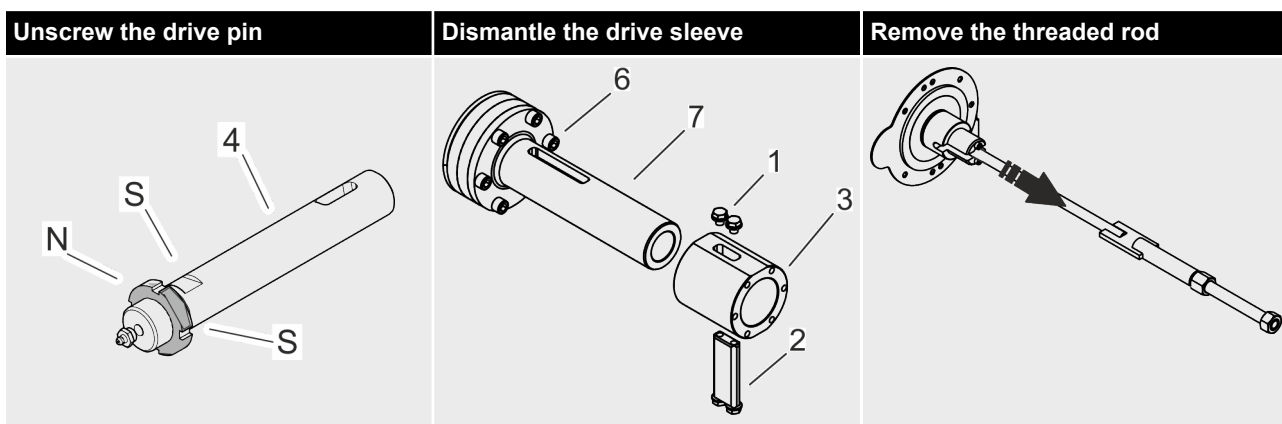
Drive flange, auger adapter

Tightening torques	approx. [Nm]	approx. [ft-lbs]
M12 hexagon head screws, stainless steel	65	48

- Read and follow the safety instructions detailed in  *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.*
- **Empty** the Börger machine as described in  *Chapter 6.3.1 “Notes on repair work” on page 129.*
- Shut down the Börger machine and downstream and upstream system components as described in  *Chapter 5.4 “Downtimes” on page 100.*
- Secure the Börger machine against unauthorized or uncontrolled reactivation as described in  *Chapter 2.7 “Securing the machine against restart” on page 26*
- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Relieve the pressure in the Börger machine according to  *Chapter 6.1.2 “Pressure relief” on page 114.*
- Clean the interior of the Börger machine as described in  *Chapter 6.1.3 “Internal cleaning” on page 116.*
- Loosen the clamping screw of the clamping unit as described in  *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131*, or depressurize the clamping unit in the version with pneumatic adjustment.
- Disassemble the clamping unit as described in  *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131.*

- Disassemble the *Multi Disc* as described in ↗ Chapter 6.3.4 “Changing the Multi Disc plate” on page 146.
- Disassemble the filter press channel as described in ↗ Chapter 6.3.5 “Changing the filter press channel” on page 150.

1. Loosen two hexagon head screws (1) with washers at the top or bottom of the drive sleeve (3) which are used to fix the drive block. After that, the drive block (2) with the two other hexagon socket head cap screws with washers can be removed.
2. Remove the drive sleeve (3).



3. Use the drive pin (4) to pull out the threaded rod as far as two wrench flats [S] become visible.
4. Use the wrench flats [S] to unscrew the drive pin with the slotted nut [N] from the threaded rod.
5. Loosen the four hexagon socket head cap screws (19) and remove the cover (20).
6. Pull out the threaded rod (21) from the side of the drive.
7. Loosen the six hexagon socket head cap screws (6) on the connection between the mounting flange (7) and the auger adapter (15) and detach the mounting flange (7) from the auger adapter (15).

- 8.** ➔ Loosen the eight hexagon head screws with washers (9) at the covers of the maintenance openings (10) and lift off the covers (10).

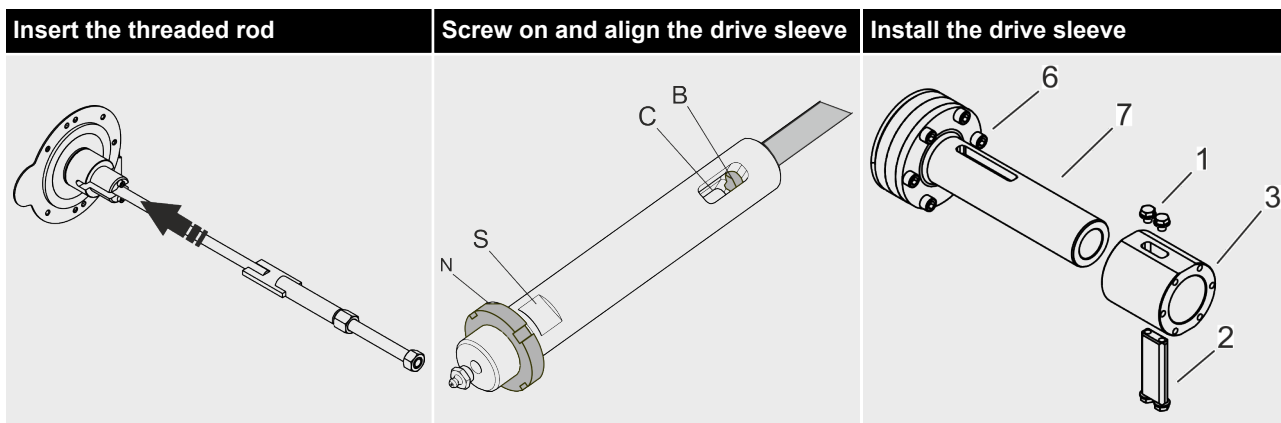
Dismantle the cover of the maintenance opening	Separate the drive flange	Replace the brush auger old/new

- 9.** ➔ You can get to the screws which are used to connect the drive flange (13) to the auger adapter (17) through the maintenance openings. Loosen the six hexagon head screws (12).
- 10.** ➔ Pull out the brush auger (8) with the auger adapters (15, 17) from the side of the counter bearing casing using a suitable hoist.
- 11.** ➔ Loosen the hexagon socket head cap screws (14, 16) of the auger adapters (15, 17) and disconnect the adapters from the brush auger (8).

If required, replace auger adapter	Install the drive flange	Install the cover of the maintenance opening

- 12.** ➔ Attach the new brush auger (8) to the auger adapters (15, 17) and tighten the hexagon socket head cap screws (14, 16).
- 13.** ➔ Attach the mounting flange (7) to the auger adapter (15) and tighten the six hexagon socket head cap screws (6).
- 14.** ➔ Push the new brush auger (8) with the auger adapters (15, 17) and the mounting flange (7) into the pipe casing (11) up to the stop.

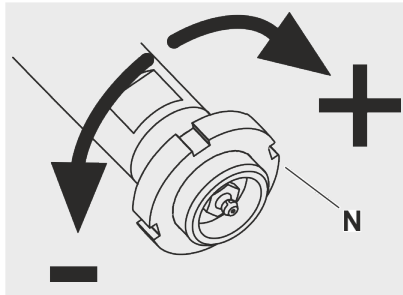
15. Make sure that the bore holes of the auger adapter (17) are aligned with the bore holes of the drive flange (13). For example, use a rod to push it into the mounting flange (7) in order to turn the brush auger (8).
16. Use the maintenance openings to tighten the hexagon head screws (12) at the connection between the drive flange (13) and the auger adapter (17) applying the appropriate torque.
17. Check the O-rings (18). Replace the O-rings if they show signs of damage.
18. Install the covers of the maintenance openings (10) and tighten the hexagon head screws (9) with washers.
19. Insert the threaded rod (5) at the side of the drive.



20. Screw the drive pin with the slotted nut [N] onto the threaded rod using the two wrench flats [A] until the end of the threaded rod [B] is flush with the elongated hole [C] of the drive pin.
21. Install the drive sleeve (3) in such a way that the elongated hole of the drive sleeve is congruent with the elongated hole [C] of the drive pin (4) and mounting flange (7).
22. Insert the drive block (2) with the two hexagon head screws with washers into the drive sleeve (3) and tighten the two hexagon head screws (1) with washers previously loosened.
23. Install the filter press channel as described in [Chapter 6.3.5 "Changing the filter press channel" on page 150](#).
24. Install the *Multi Disc* as described in [Chapter 6.3.4 "Changing the Multi Disc plate" on page 146](#).
25. Attach the clamping unit as described in [Chapter 6.3.2 "Removing/repairing the clamping unit" on page 131](#).

- 26.** → Tighten the clamping screw (10) until a sufficiently high pre-tension on the *Multi Disc* (3a, 3b) has been achieved or pressurize the clamping unit in the version with pneumatic adjustment.

— If necessary, correct the pre-tension as described in
↗ Chapter 5.1 “Commissioning” on page 95.

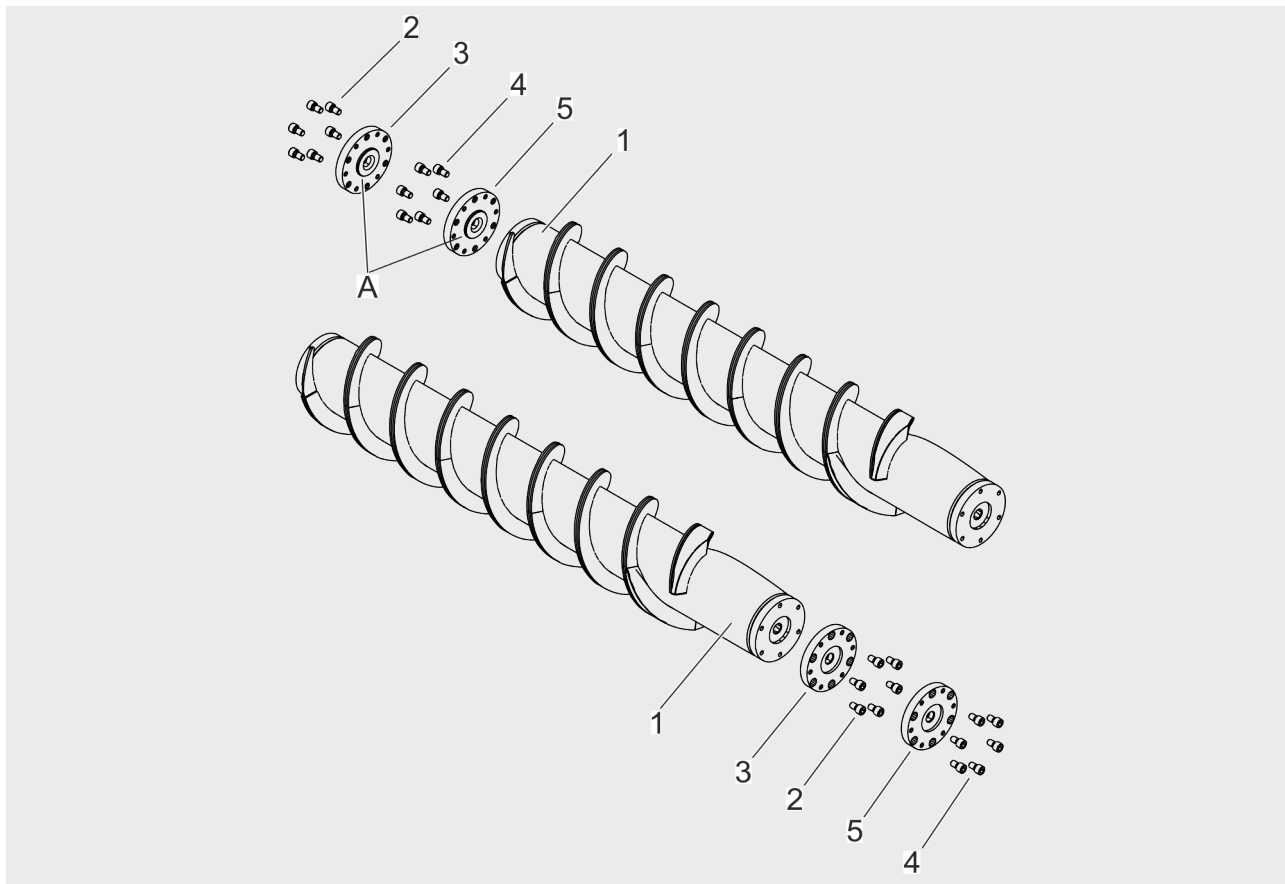


Adjust the clearance!

- Adjust the slotted nut [N] in such a way that the distance between the *Multi Disc* and the press channel (or filter press channel in the case of the HP version) is very small but the plates do not rub against each other.

- 27.** → Install the counter bearing cover according to ↗ Chapter 6.3.4 “Changing the *Multi Disc* plate” on page 146.

6.3.8 Modifying the position of the auger adapters



1	Brush auger	4	Hexagon socket head cap screws
2	Hexagon socket head cap screws	5	Auger adapter
3	Auger adapter	A	Centering elevation

Drive flange, auger adapter

Tightening torques	approx. [Nm]	approx. [ft-lbs]
M12 hexagon head screws, stainless steel	65	48

- Read and follow the safety instructions detailed in [Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37.](#)
- **Empty** the Börger machine as described in [Chapter 6.3.1 “Notes on repair work” on page 129.](#)
- Shut down the Börger machine and downstream and upstream system components as described in [Chapter 5.4 “Downtimes” on page 100.](#)

- Secure the Börger machine against unauthorized or uncontrolled reactivation as described in  *Chapter 2.7 “Securing the machine against restart” on page 26*
- To the extent necessary, amply secure the surrounding area when performing maintenance. Cordon off the working area with a red and white safety chain and a warning sign.
- Relieve the pressure in the Börger machine according to  *Chapter 6.1.2 “Pressure relief” on page 114.*
- Clean the interior of the Börger machine as described in  *Chapter 6.1.3 “Internal cleaning” on page 116.*

- Loosen the clamping screw of the clamping unit as described in  *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131*, or depressurize the clamping unit in the version with pneumatic adjustment.
- Disassemble the clamping unit as described in  *Chapter 6.3.2 “Removing/repairing the clamping unit” on page 131.*
- Disassemble the *Multi Disc* as described in  *Chapter 6.3.4 “Changing the Multi Disc plate” on page 146.*
- Disassemble the filter press channel as described in  *Chapter 6.3.5 “Changing the filter press channel” on page 150.*
- Remove the brush auger as described in  *Chapter 6.3.7 “Replacing the brush auger” on page 157.*

1. Longer thick matter plug:

Screw together the two auger adapters (3, 5) in the direction of the *Multi Disc*.

2. Shorter thick matter plug:

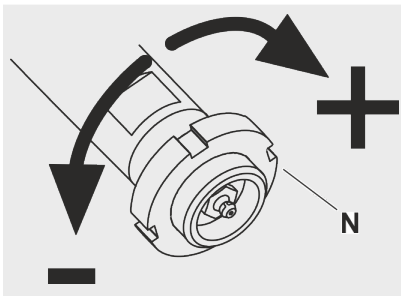
Screw together the two auger adapters (3, 5) in the direction of the drive.

3. Install the brush auger as described in *Chapter 6.3.7 “Replacing the brush auger” on page 157.*

4. Install the filter press channel as described in *Chapter 6.3.5 “Changing the filter press channel” on page 150.*

5. Install the *Multi Disc* as described in *Chapter 6.3.4 “Changing the Multi Disc plate” on page 146.*

6. ➔ Attach the clamping unit as described in ↗ *Chapter 6.3.2 "Removing/repairing the clamping unit" on page 131.*
7. ➔ Tighten the clamping screw (10) until a sufficiently high pre-tension on the *Multi Disc* (3a, 3b) has been achieved or pressurize the clamping unit in the version with pneumatic adjustment.
 - If necessary, correct the pre-tension as described in ↗ *Chapter 5.1 "Commissioning" on page 95.*



Adjust the clearance!

- Adjust the slotted nut [N] in such a way that the distance between the *Multi Disc* and the press channel (or filter press channel in the case of the HP version) is very small but the plates do not rub against each other.

8. ➔ Install the protection cover or the counter bearing cover according to ↗ *Chapter 6.3.4 "Changing the Multi Disc plate" on page 146.*



NOTE!

Alignment of the centering elevation (A)

The centering elevation (A) of the auger adapter must always point towards the brush auger.



NOTE!

Completeness

Make sure that you always install both auger adapters.



NOTE!

Length of the thick matter plug

Please contact Börger customer service if you require more information on the suitable length of the thick matter plug.

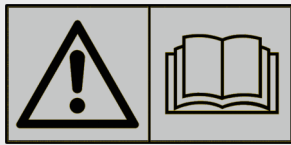
6.3.9 Other repairs

If repairs to your Börger machine are required that are not covered by the described repair and maintenance measures, we recommend contacting Börger customer service.

The factory can only accept repair orders if a completed safety certificate / declaration of decontamination accompany the device submitted for repair, as well as any necessary safety data sheets for the medium and / or cleaning agent.

The relevant form is also available as a download from our website under the service menu.

6.3.10 Maintenance instructions for special equipment



Operating manual special version

Pay particular attention to all instructions

- on safety,
- on operation,
- on repairs and maintenance,

as detailed in the enclosed supplementary operating manuals for **special versions**.

6.3.11 Measures following repair and maintenance work!

Following completion of the work and before starting the unit, carry out the following steps:

Be sure to read and follow all instructions:

- on safety,
 - on operation and control,
 - on installation, repairs and maintenance. ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 37*
- 1.** ➤ Check all screws that have been loosened previously for firm seat.
 - 2.** ➤ Check whether all safety devices and covers that have been removed previously are reinstalled properly.
 - 3.** ➤ Ensure that all tools, materials and other equipment used have been removed from the work area.
 - 4.** ➤ Clean the work area and remove any spilled substances, e.g. liquids, processing material or similar.
 - 5.** ➤ Reset the emergency stop devices, if required.
 - 6.** ➤ Confirm malfunctions at the control unit.
 - 7.** ➤ Ensure that nobody enters the hazardous area.
 - 8.** ➤ Ensure that all safety features of the unit function perfectly.
 - 9.** ➤ Take the unit into operation again. ↗ *Chapter 5.3 “Continuous operation” on page 99*

6.3.12 Queries

Börger machines are easy to maintain. We hope that we have clearly described all the relevant operating steps in this operating manual. Nevertheless, Börger machines are customized and developed for the specific requirements of the operator so that not all questions can be fully answered in a general operating manual.

— If you have any questions, please contact Börger customer service. We will be happy to help.

We would also be grateful to receive feedback on any errors or unclear passages in this operating manual. This will help us to improve and develop this document and to offer you and all of our customers the best possible service.

7 Disposal

7.1 Environmental protection



ENVIRONMENT!

Danger due to incorrect handling of environmentally hazardous substances!

Inappropriate handling of environmentally hazardous substances, especially incorrect disposal, can cause significant damage to the environment.

- Especially water-polluting materials such as grease and lubricating oil must not pollute the soil or enter the sewage system during installation, repair and maintenance work.
- These materials must be collected, stored, transported and disposed of in suitable containers.
- When handling oil, grease and other chemical substances, pay attention and adhere to the applicable regulations and safety data sheets issued by the respective manufacturer relating to storage, handling, correct use and disposal.
- Comply with the legal obligations regarding waste avoidance and the proper recycling/disposal of waste during all work

7.2 Oil, oily waste and grease

Oil, oily waste and grease pose a significant risk to the environment. Therefore, disposal of such materials must be handled by a specialist company.

- Collect any oil and oily waste and only dispose of them according to the legal requirements through authorized waste disposal companies/authorities.

7.3 Plastics

1. ➤ Sort any plastic waste as thoroughly as possible.
2. ➤ Dispose of plastics according to the legal requirements through authorized waste disposal companies/authorities.

7.4 Metals

- 1.** ➤ Sort and separate different metal types.
- 2.** ➤ Dispose of these metals according to the legal requirements through authorized waste disposal companies/authorities.

7.5 Electrical and electronic waste

Electrical and electronic waste must be disposed of separately.
Electrical and electronic waste must not be disposed of with domestic waste.

- Only dispose of electrical or electronic waste according to the legal requirements through authorized waste disposal companies/authorities, e.g. recycling plants.

7.6 Final decommissioning

- Check which materials can be recycled and make the appropriate arrangements.

8 Accessories

The range of accessories supplied by Börger GmbH is as multi-faceted as the areas of application for Börger machines.

If your Börger machine was delivered with accessories, the corresponding operating manuals can generally be found in the appendix or in the packaging of the units, if delivered as originally packed.

8.1 Frequency converter

The machine can be operated with a frequency converter. Only frequency converters that deliver a constant torque are suitable for the Börger machine.



NOTE!

When using frequency converters

Due to their working principle, frequency converters generate leakage current.

- For proper operation of a frequency converter at a residual current device, the use of an AC/DC sensitive **residual current device (type B)** according to **EN50178/VDE0160** is required due to the DC component of the leakage current.



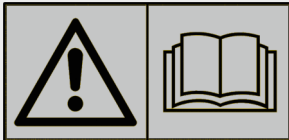
NOTE!

External drive cooler

An external drive cooler may be necessary if the motor frequency is set very low.

8.2 Control unit

To consistently achieve an optimal separation result and to prevent limits from being exceeded and damage from occurring as a result, a control unit can control the interaction between the feed pump, the drive at the Bioselect and any overpressure protection devices, if applicable.



Operating manual of the control unit

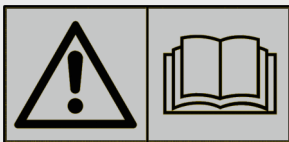
- Pay attention to all the **instructions and safety regulations** contained in the operating manual of the control unit in the appendix.

8.3 Fill level sensor for conical piles



NOTE! Level indicator

- A fill level sensor can be used to control the fill level for the ejected thick matter.

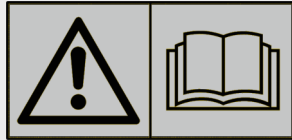


Operating manual - Fill level sensor

- Pay attention to all the **instructions and safety regulations** contained in the operating manual of the fill level sensor in the appendix.

9 Appendix

9.1 Data sheet



Data sheet

The data sheet is enclosed separately with the operating manual.
The data sheet contains all relevant data for your Börger machine or unit.

- Especially consider the operating conditions and limits mentioned in the data sheet. They may deviate from the information mentioned in this operating manual if the machine has special equipment.

9.2 Wear parts



WARNING!

Risk of injury when using unsuitable spare parts!

The use of unsuitable spare parts can cause malfunctions which can lead to severe injury, including death, and to significant material damage.

- Only use suitable spare parts.
- Always contact the manufacturer if in doubt.

The following wear parts list includes the quantity, designation and position number of the elements that are replaced during the corresponding repair work. Also observe the assembly drawing according to ↗ *Chapter 9.3 “Assembly drawing” on page 177* and the spare parts list according to ↗ *Chapter 9.2 “Wear parts” on page 174*.

The required number of individual parts will to some extent depend on your Börger machine. Take note of the number of parts removed during repair work, cf. also figures in the repair chapters.

Replacing the wedge wire screen:

Pos. no.	Designation	Quantity
5	Wedge wire screen	1
31	O-ring	1
35	O-ring	1
38	Foam rubber sealing washer	1

Replacing the mechanical seal:

Pos. no.	Designation	Quantity
19	Mechanical seal — 2 x seal face — 2 x O-ring	1
29	O-ring	1
34	O-ring	1

Replacing the brush auger:

Pos. no.	Designation	Quantity
10	Brush auger	1
32	O-ring	1

Changing parts of the *Multi Disc* plate:

Pos. no.	Designation	Quantity
13b	<i>Multi Disc</i> plate	1
13c	Hexagon head screw	0/4

Replacing parts of the clamping unit:

Pos. no.	Designation	Quantity
54	Clamping screw	0/1
82	Tension spring	0/1

Replacing the filter press channel:

Pos. no.	Designation	Quantity
3	Press channel or filter press channel	1
35	O-ring	1
38	Foam rubber sealing washer	1

**NOTE!****Spare parts orders!****The data below are required:**

- **Serial number**
 - see nameplate
- **Type code**
 - according to data sheet
 - (Important! - comparison with serial number!)

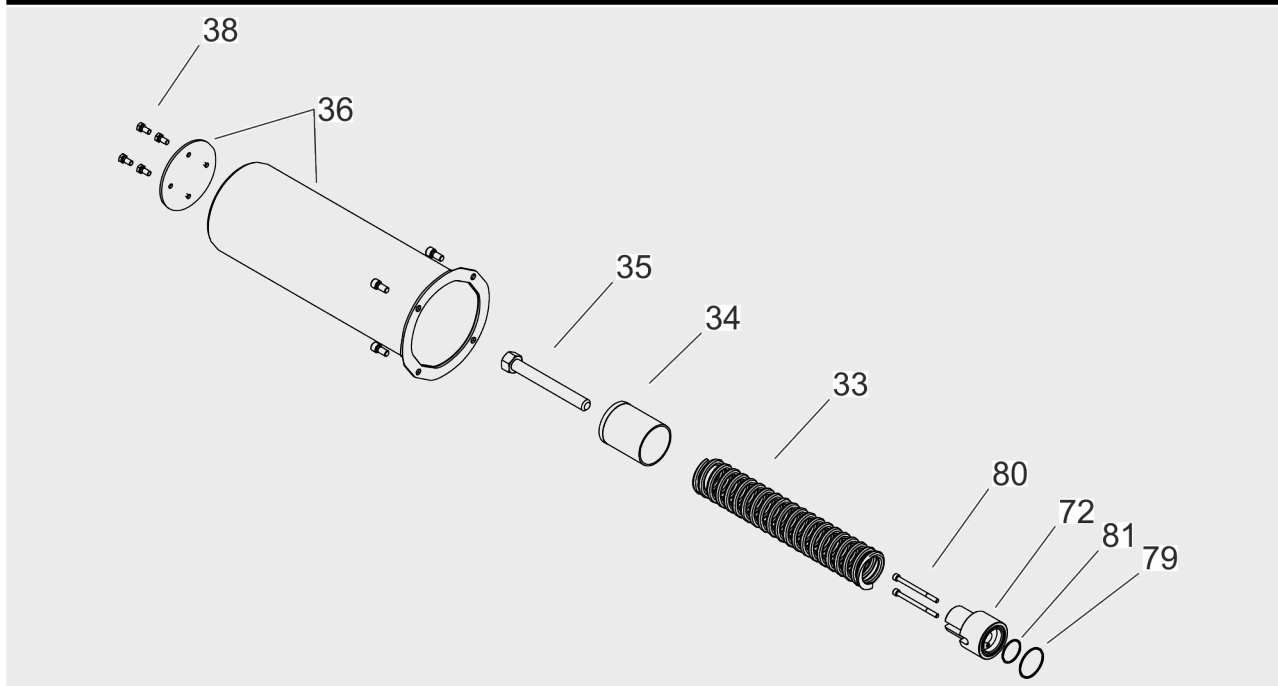
Börger GmbH will then obtain the information for **the appropriate spare parts for you from the production documents of your machine.**

- Record all modifications made to the equipment after the initial delivery, such as changes to rotating components (type, material) or seals.
- In order to avoid incorrect deliveries, always quote all modifications made when ordering spare parts.

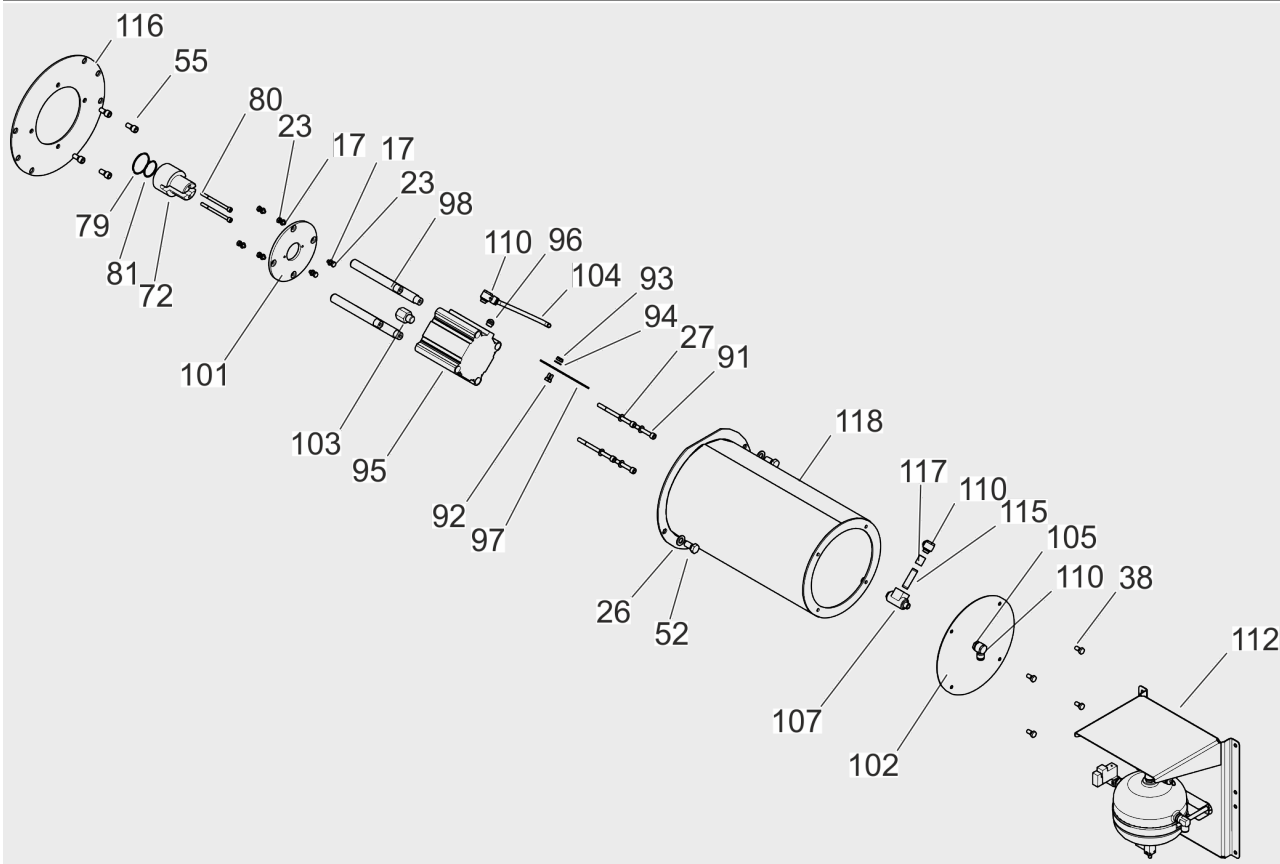
9.3 Assembly drawing

The assembly drawing shows the positions of the spare parts as described in ↗ *Chapter 9.4 "Spare parts list" on page 180.*

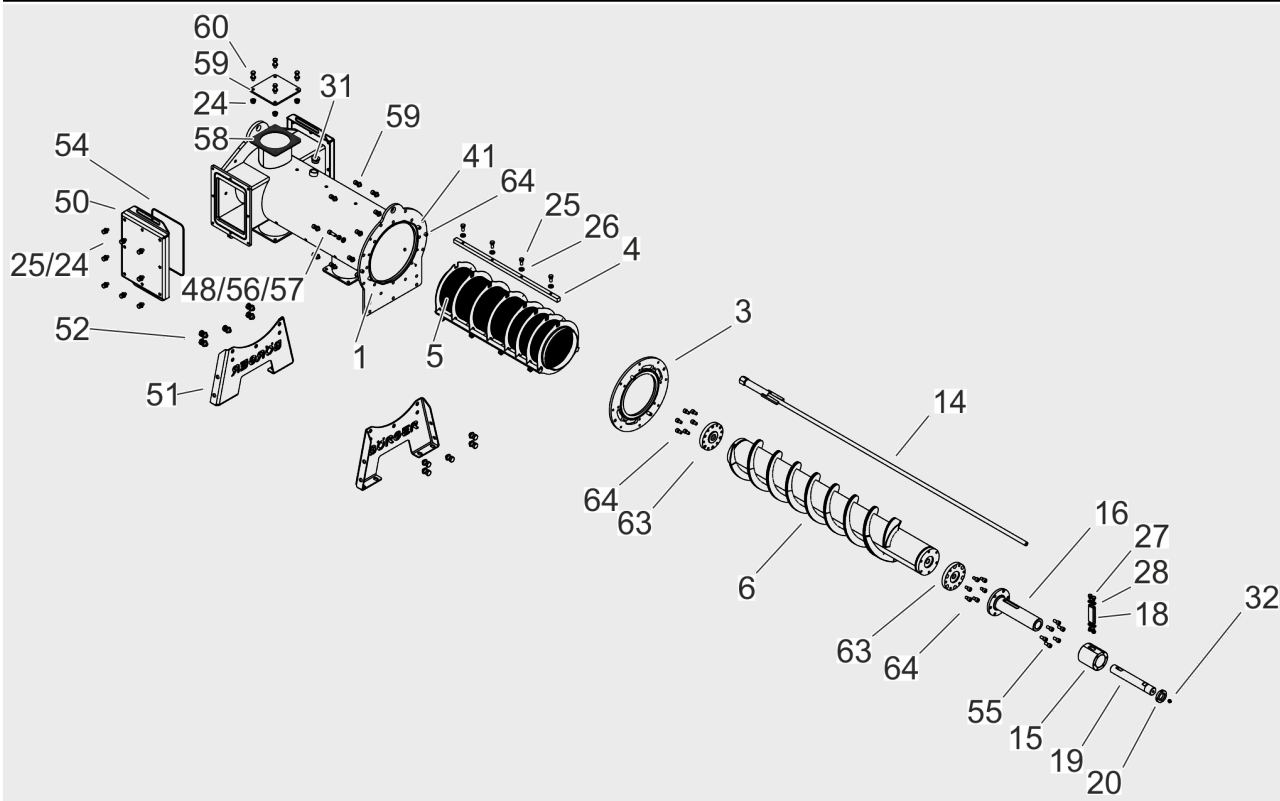
Easy Shift clamping unit - mechanical



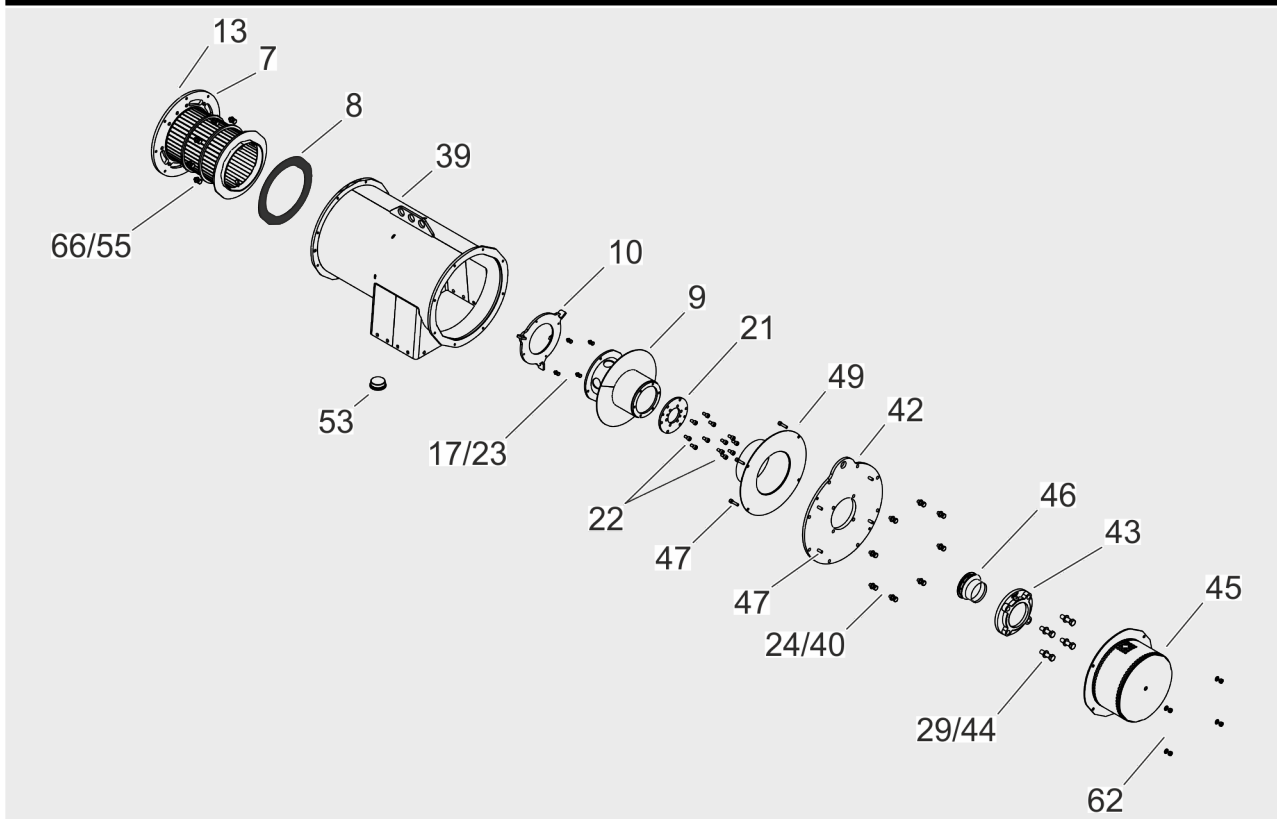
Easy Shift clamping unit - pneumatic



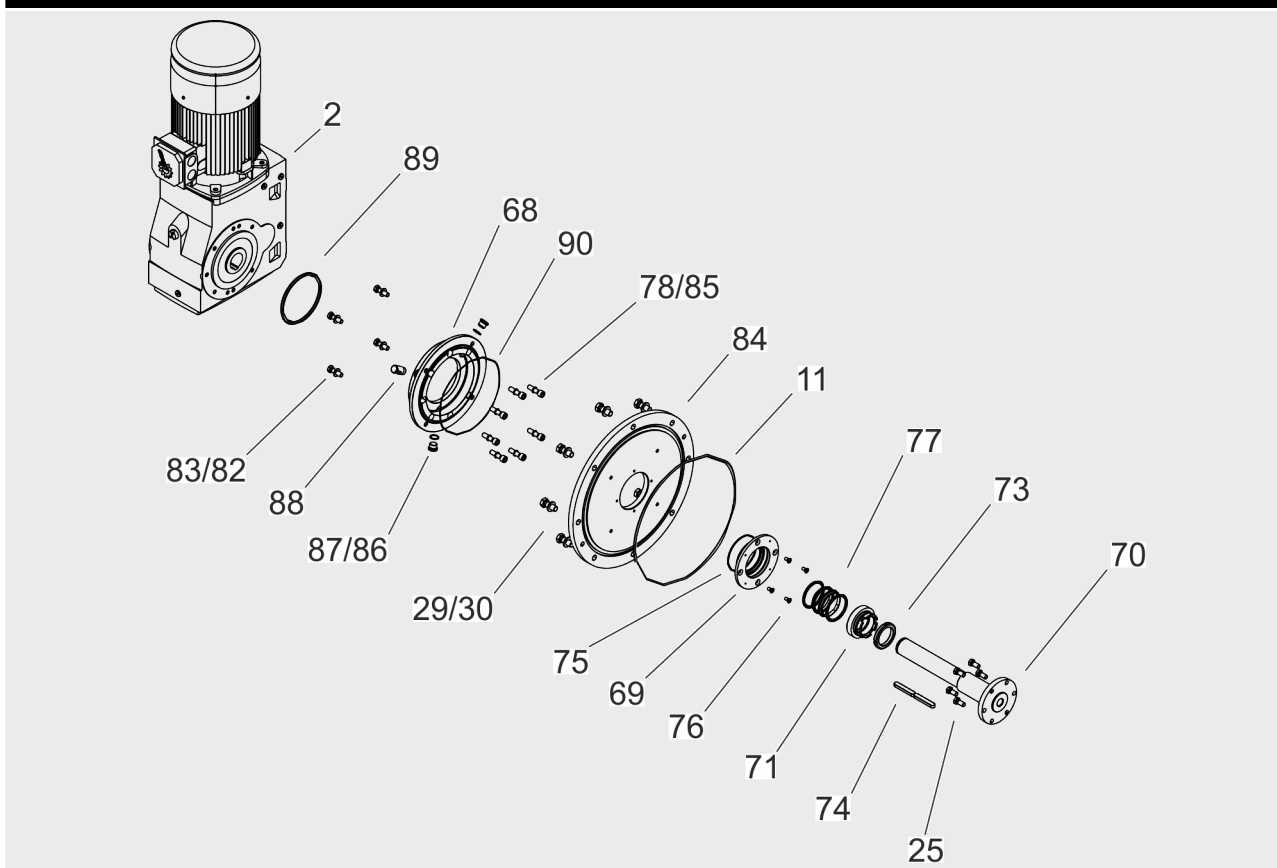
Pipe casing, wedge wire screen, auger



Press filter, counter bearing casing



Drive unit



9.4 Spare parts list



WARNING!

Risk of injury when using unsuitable spare parts!

The use of unsuitable spare parts can cause malfunctions which can lead to severe injury, including death, and to significant material damage.

- Only use suitable spare parts.
- Always contact the manufacturer if in doubt.

The spare parts list is universal. The positioning of the parts can be seen in the assembly drawing. The parts used in your Börger machine are defined according to the type designation and all the additional specifications in the data sheet.

Pos.	Art. no.	Item description	Quantity
1	40201	Pipe casing RC 40	1
2	30311	Drive unit	1
3	30400	Adapter plate	1
4	30220	Guide rail RC 30/RC 40	3
5	30108-2	Wedge wire screen, 0.25 mm slot opening width, with rotation lock supports	1
	30102-1	Wedge wire screen, 0.50 mm slot opening width, with torque profile	
	30107-2	Wedge wire screen, 0.75 mm slot opening width, with rotation lock supports	
6	10057915	Brush auger	1
7	50672	Press filter RC50 HP slot opening width 0.5-1	1
8	50902	Foam rubber sealing washer	1
9	30688	<i>Multi Disc</i> cap	1
10	50690	<i>Multi Disc</i> plate with peeling tabs	1
11	50670	O-ring 400x7	1
14	30445-1	Threaded rod	1
15	30436	Drive sleeve	1
16	30429	Drive flange	1
17	Z50285	Washer DIN EN ISO 7089 A8.4x16x1.6-A2	4
18	30121	Drive block	1
19	30118-275	Drive pin	1
20	Z10203	Self-locking slotted nut with polyamide clap ring, M40x1.5	1
21	30693	Carrier plate	1

Pos.	Art. no.	Item description	Quantity
22	Z91519	Hexagon socket head cap screw DIN EN ISO 4762 M10x20-A4	12
23	Z50053	Hexagon head screw DIN EN ISO 4017 M8x20-A2	4
24	Z50275	Washer DIN EN ISO 7089 A13x24x2.5-A2	56
25	Z50018	Hexagon head screw DIN EN ISO 4017 M12x25-A2	42
26	Z50657	DSL double lock washer M12	14
27	Z50273	Washer DIN EN ISO 7089 A10.5x20x2-A2	8
28	Z50063	Hexagon head screw DIN EN ISO 4017 M10x12-A2	4
29	Z10122	Washer DIN EN ISO 7089 A17x30x3-A2	22
30	Z50081	Hexagon head screw DIN EN ISO 4017 M16x40-A2	8
31	Z22820	Screw plug DIN 908-G1-A4	1
32	V10634	Lubricating nipple DIN 71412 A (H1) M12 x 1.75	1
33	50674	Compression spring, D_546, L=460mm	1
34	50663	Washer RC50	1
35	70442	Threaded rod with M24 with nut	1
36	30442	Spring cover incl. cover plate	1
38	Z50064	Hexagon head screw DIN EN ISO 4017 M10x20-A4	4
39	40951	Counter bearing casing	1
40	Z50019	Hexagon head screw DIN EN ISO 4017 M12x30-A2	8
41	Z33509	Dowel pin, DIN EN ISO 8735 14x32-VA	6
42	30116	Counter bearing plate	1
43	KR-10120	Flanged housing	1
44	Z50086	Hexagon head screw DIN EN ISO 4017 M16x60-A2	4
45	70450	Counter bearing cover	1
46	KR-10130	Bearing with grub screws	1
47	Z39410	Hexagon socket head cap screw DIN EN ISO 4762 M10x40-A4	4
48	Z49432	Hexagon socket head cap screw DIN EN ISO 4762 M12x30-A4	8
49	30460	Cover inside, counter bearing	1
50	75952	Cover plate	2
51	40950	Foot RC	2
52	Z50079	Hexagon head screw DIN EN ISO 4017 M16x30-A2	10
53	Z22831	Screw plug DIN 908-G2-A4	1
54	O75326	O-ring, 310 x 5, NBR for rectangular groove	2
55	Z49531	Hexagon socket head cap screw DIN EN ISO 4762 M12x25-A2	18
56	Z49442	Hexagon socket head cap screw DIN EN ISO 4762 M12x35-A4	2
57	Z48216	Hexagon nut DIN EN ISO 4032 M12-A4	6
58	21002	Gasket 6" square flange	1
59	21024	Square flange 6" blank	1
60	Z50022	Hexagon head screw DIN EN ISO 4017 M12x40-A2	4

Pos.	Art. no.	Item description	Quantity
62	Z50343	Hexagon nut DIN EN ISO 4032 M10-A4	4
63	40955	Auger adapter RC 40	2
64	Z61230	Hexagon socket head cap screw DIN EN ISO 4762 M12x20-A4	12
68	MF1004	B5 flange SK9042.1 ø300 Bioselect RC50	1
69	D35108	Stationary holding bush, FL 167.7 mm	1
70	30430-1	Drive journal RC40 SK9042.1	1
71	D35160	Rotating holding bush with thread FL	1
72	30438	Spring guide bolt RC30	1
73	Z50656	Slotted nut DIN 981 KM 12 M60x2	1
74	Z38118	Parallel key, DIN 6885-1 A 14x9x80	1
75	O35708	O-ring 110x3	1
76	Z38250	Countersunk screws ISO 10642 Torx similar to DIN965-M8x16-A4	4
77	D35008	Mechanical seal FL	1
78	Z50244	Hexagon socket head cap screw DIN EN ISO 4762 M12x45-A2	7
79	D55401	O-ring 60x3	1
80	Z39352	Hexagon socket head cap screw DIN EN ISO 4762 M8x110-8.8 galvanized	2
81	MC3106	O-ring 45x3 NB	1
82	Z50275	Washer DIN EN ISO 7089 A13x24x2.5-A2	4
83	Z50022	Hexagon head screw DIN EN ISO 4017 M12x40-A2	4
84	50400	Motor plate RC50/RC30	1
85	K32505	Sealing washer DIN 7603-A 12x18x1.5-Cu	7
86	K22407	Sealing washer DIN 7603-A 21x26x2-Cu	2
87	Z19308	Screw plug DIN 908-G1-2 galvanized	2
88	MECH-3024	Breather 1/2"	1
89	D65508	O-ring 145.7 x 8.3, NBR	1
90	O65211	O-ring 239 x 3, NBR	1

Detail for the version with pneumatic adjustment:

Pos.	Art. no.	Item description	Quantity
17	Z50285	Washer DIN EN ISO 7089 A8.4x16x1.6-A2	6
23	Z50053	Hexagon head screw DIN EN ISO 4017 M8x20-A2	6
26	Z10122	Washer DIN EN ISO 7089 A17x30x3-A2	2
27	Z50273	Washer DIN EN ISO 7089 A10.5x20x2-A2	2
38	Z50064	Hexagon head screw DIN EN ISO 4017 M10x20-A4	4
52	Z50079	Hexagon head screw DIN EN ISO 4017 M16x30-A2	2
55	Z49530	Hexagon socket head cap screw DIN EN ISO 4762 M12x25-A2	4

Pos.	Art. no.	Item description	Quantity
72	30438	Spring guide bolt RC30	1
79	D55401	O-ring 60x3	1
80	Z39352	Hexagon socket head cap screw DIN EN ISO 4762 M8x110-8.8 galvanized	2
81	MC3106	O-ring 45x3 NB	1
91	Z92290	Hexagon socket head cap screw DIN EN ISO 4762 M10x135-8.8	2
92	Z50453	Hexagon socket head cap screw DIN EN ISO 4762 M6x16-A2	2
93	Z50645	Hexagon nut DIN EN ISO 7040 M6	2
94	Z50282	Washer DIN EN ISO 7089 A6.4x12x1.6-A2	2
95	FZB-3090-5	Pneumatic cylinder	1
96	SDD38MSV	Silencer G 3/8"	1
97	40956	Carrier plate	1
98	50009	Distance bolt, pneumatic cylinder	4
101	30005	Pressure plate, pneumatic cylinder	1
102	70466	Cover plate for cover of pneumatic cylinder	1
103	30007	Threaded adapter, pneumatic cylinder	1
104	FZB-3013	Polyamide hose, black, 12x9mm 380mm	1
105	MECH-1759	Bulkhead fitting G 3/8" – G 1/2"	1
107	50710	Rotating union G3/8 ball bearing and sealing	1
110	50011	Angle screw-in fitting	3
112	71003	Compressed-air container installed, Bioselect with pneumatic cylinder	1
115	MECH-1365	Double pipe nipple 3/8 - 40mm	1
116	30004	Plate, pneumatic unit	1
117	MECH-1975	Screw socket 3/8"	1
118	70465	Pneumatic cylinder cover	1

9.4.1 Tools / installation aid

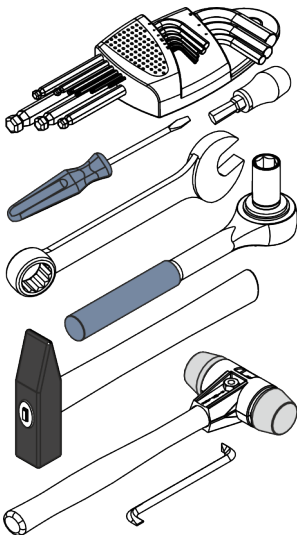
Standard tools

Tools for electrical work

- These tools shall comply with the international standard **IEC 60900** (identical to **EN 60900** for Europe and **DIN EN 60900** for Germany).
- The standard applies to “Insulated and insulating hand tools” used for live working and work near live parts, with voltage ratings up to 1000V AC or 1500V DC.
- Products designed and manufactured according to this standard contribute to the user’s safety, provided they are used by qualified electricians in compliance with the safe working practices and the operating manual (if applicable).

Tools, general

- Various hexagon socket wrenches and/or sockets for hexagon socket head cap screws.
- Various open-end / ring spanners and/or sockets for hexagon head screws.
- Hammer
- Soft face hammer
- Screw drivers in various sizes
- Lever

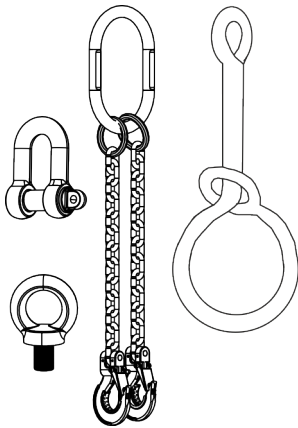


Special tools**Grease gun**

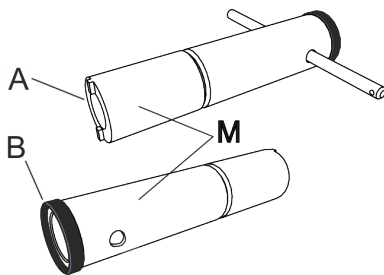
A grease gun is a tool which is used to apply lubricant via a lubricating nipple to a lubricating point e.g. a bearing point.

Hoists

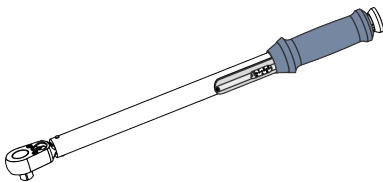
Lifting and slinging gear must be designed and dimensioned adequately according to the particular hazard and the loads occurring during transport.

**Multitool [M]**

- Special tool [A] for rotating seal holding bushes
- Push-in tool [B] for mechanical seals
- (Remove handle!)

**Torque wrench**

- A torque wrench is a hand-held fastening tool, with which a defined torque can be applied to a connecting element (screw or nut), so as to ensure the required clamping force between the connecting components even at maximum operating forces.



9.5 Checklist for commissioning

This checklist can be used as an additional aid when commissioning a Börger machine. It is not a substitute for careful reading of the operating manual before commissioning the unit.

Customer:	Börger order confirmation no.:
Machine number:	Type code:
Your project:	Order number:
Commissioning date:	Delivery date:

Test point		Carried out by: (date/signature)	Checked by: (date/signature)
1	Operating manual and appendices read and understood		
2	Application data and operating parameters according to data sheet correspond to application		
3	Mounting rails fixed correctly to solid, even surface		
4	Pre-tension of <i>Multi Disc</i> OK, protection cover installed		
5	Pipes laid correctly on feed and discharge side, pipes fixed and not leaking		
6	Optional safety equipment installed correctly, connected and functions checked		
7	Electrical connections and grounding OK, direction of rotation correct		
8	Oil level in drive OK, transport lock removed from breather (if present)		
9	Fluid level in intermediate chamber OK, fill hole not closed		
10	All valves in pipes opened; check valves installed correctly		
11	Noise and vibration levels normal when drive is switched on		
12	Pipes checked for leaks again with Bioselect switched on		
13	Check of the flow rate and quality achieved and of the working pressure		
14	Current consumption of drive checked to guarantee correct installation		
15	Pre-tension and inlet pressure adjusted, break-in period successfully completed		
16	Maintenance and inspection intervals organized for the machine		

9.6 EU Declaration of Conformity / EU Declaration of Incorporation

9.6.1 EU Declaration of Conformity

Börger GmbH | Benningsweg 24 | 46325 Borken-Weseke | Germany



We hereby declare that the following products:

Product description:	Bioselect separator
Type descriptions:	RC 25, RC 30, RC 40, RC 50, RC 75, RC 150
Serial number:	from 1000 0000
Year of manufacture:	from 2018

are in compliance with all relevant provisions of the **Machinery Directive (2006/42/EC)**.

The machines are further in compliance with all provisions of the **Electrical Equipment (2014/35/EU)** and **Electromagnetic Compatibility (2014/30/EU)** Directives.

The following harmonized standards were applied:

- DIN EN ISO 13857
- DIN EN 809
- DIN EN 12162

Name and address of the authorized representative:

Bernd Valtwies
Börger GmbH

Borken-Weseke,
Town / city

15.01.2024
Date


Alois Börger - Managing Director

9.6.2 EU Declaration of Incorporation

Börger GmbH | Benningweg 24 | 46325 Borken-Weseke | Germany



We hereby declare that the following products:

Product description:	Bioselect separator
----------------------	---------------------

Type descriptions:	RC 25, RC 30, RC 40, RC 50, RC 75, RC 150
--------------------	---

Serial number:	from 1000 0000
----------------	----------------

Year of manufacture:	from 2018
----------------------	-----------

are in compliance with the requirements of the **Machinery Directive (2006/42/EC)**: Annex I, para. 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4 and 1.5.1.

The incomplete machine is further in compliance with all provisions of the **Electrical Equipment (2014/35/EU)** and **Electromagnetic Compatibility (2014/30/EU)** Directives.

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine is to be installed is in compliance with the provisions of the Machinery Directive (2006/42/EC).

The manufacturer is obligated to electronically submit the specific documentation for the incomplete machine to the authorities of individual member states upon request.

The specific technical documentation associated with the machine has been created in accordance with Annex VII Part B.

Name and address of the authorized representative:	Bernd Valtwies Börger GmbH
--	-------------------------------

Borken-Weseke, Town / city	15.01.2024 Date	 Alois Börger - Managing Director
-------------------------------	--------------------	---

9.7 UK - Declaration of Conformity / UK - Declaration of Incorporation

9.7.1 UK - Declaration of Conformity

Börger GmbH | Benningsweg 24 | 46325 Borken-Weseke | Germany



We hereby declare that the following products:

Product description: Bioselect separator

Type descriptions: RC 25, RC 30, RC 40, RC 50, RC 75, RC 150

Serial number: from 1000 0000

Year of manufacture: from 2018

are in compliance with all relevant provisions of the **Supply of Machinery (Safety) Regulations 2008 - (2008 No. 1597)**.

The machines are further in compliance with all provisions of the **Electrical Equipment (Safety) Regulations 2016 (2016 No. 1101)** and the **Electromagnetic Compatibility Regulations 2016 (2016 No. 1091)**.

The following harmonized standards were applied:

- DIN EN ISO 13857
- DIN EN 809
- DIN EN 12162

Name and address of the authorized representative:

Bernd Valtwies
Börger GmbH

Borken-Weseke,
Town / city

15.01.2024
Date


Alois Börger - Managing Director

9.7.2 UK - Declaration of Incorporation

Börger GmbH | Benningsweg 24 | 46325 Borken-Weseke | Germany



We hereby declare that the following products:

Product description:	Bioselect separator
----------------------	---------------------

Type descriptions:	RC 25, RC 30, RC 40, RC 50, RC 75, RC 150
--------------------	---

Serial number:	from 1000 0000
----------------	----------------

Year of manufacture:	from 2018
----------------------	-----------

are in compliance with the following essential requirements of the
Supply of Machinery (Safety) Regulations 2008 - (2008 No. 1597).

The incomplete machine is further in compliance with all provisions of the
Electrical Equipment (Safety) Regulations 2016 (2016 No. 1101) and the
Electromagnetic Compatibility Regulations 2016 (2016 No. 1091).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine is to be installed is in compliance with the provisions of the
Supply of Machinery (Safety) Regulations 2008 - (2008 No. 1597).

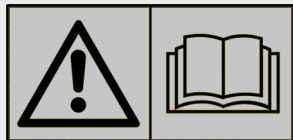
The manufacturer is obligated to electronically submit the specific documentation for the incomplete machine to the authorities of individual member states upon request.

The specific technical documentation associated with the machine has been created in accordance with Annex VII Part B.

Name and address of the authorized representative:	Bernd Valtwies Börger GmbH
--	-------------------------------

Borken-Weseke, Town / city	15.01.2024 Date	 Alois Börger - Managing Director
-------------------------------	--------------------	---

9.8 Additional documentation



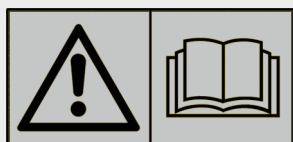
Further operating manuals / supplementary operating manuals

You must completely read the separate operating manuals and/or supplementary operating manuals for components and/or special versions.

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance.

9.9 Supplier documentation



Supplier documentation

You must completely read the separate supplier documentation.

Pay particular attention to all instructions

- on safety,
- on operation and control,
- on repairs and maintenance.

9.10 Technical data (maintenance)

9.10.1 Lubricants - fill levels



NOTE!

Lubricant list and data sheet!

Observe the detailed information and instructions on changing the lubricant as described in the lubricant list and in the data sheet regarding the lubricants used.



NOTE!

Fill level in the intermediate chamber!

Check the **fill level in the intermediate chamber** having regard to the information detailed under lubricant fill level and changing the lubricants. ↪ *Chapter 6.2.2 “Lubricant fill level and changing the lubricants” on page 123*

- Check whether the **delivered quench fluid** (see enclosed data sheet) is suitable or whether an alternative fluid must be used in order to observe environmental protection regulations, or for biological or other reasons. This must be compatible with the medium, and must not adversely affect the O-rings of the mechanical seals. Consult Börger GmbH regarding this, if necessary.

Optimum fill level

Design (mounting position)	Intermediate chamber
M1 (upright)	Up to the center of or covering the shaft

RC 40

Fill quantity

Design (mounting position)	Intermediate chamber	
	approx. [l]	approx. [gal]
M1 (upright)	0.8	0.21

9.10.2 Tightening torques (guidelines)

Rotation lock rails

Tightening torques	approx. [Nm]	approx. [ft-lbs]
M12 hexagon head screws, stainless steel	30	22

Drive flange, auger adapter

Tightening torques	approx. [Nm]	approx. [ft-lbs]
M12 hexagon head screws, stainless steel	65	48

10 Index

A

Accessories	172
Control unit	173
Level indicator	173
Additional documentation	192
Adjustment mechanism	127
Appendix	174
Data sheet	174
As-delivered condition	68
Assembly drawing	177
Auger adapter	164

B

Börger Worldwide	2
Brush auger	157

C

Check	
Direction of rotation	91
Readiness for operation	89
Smooth running	88
Checking readiness for operation	89
Checklist for commissioning	186
Clamping unit	46, 131
Covering	27
Commissioning	95
Checks	87
Complete	99
with control unit	98
without control unit	98
Compactor unit	46
Complete commissioning	99
Components	44
Connection	
electrical	84
Connection of pneumatic unit	86

Construction

Accessories	53
Components	44
Design	50
Drive connection	47
Drive options	52
Intermediate chamber	48
Mounting position	50
Options	53
Pipe connections	51
Quench	48
Shaft seal	48
Units	52
Contact data	3
Contact data worldwide	2
Continuous operation	99
Control unit	173
Copyrights	8
Counter bearing	
Covering	28
Covering	
Clamping unit	27
Counter bearing	28
Customer service	3

D

Data sheet	174
Declaration of Conformity	188
Declaration of Incorporation	188
Decommissioning	171
Design	50
Dimensions	56
Inlet	58
Mounting rails	59
Outlet	58

Disposal	170	Installation	66, 72
Decommissioning	171	Inlet	78
Electrical and electronic waste	171	Outlet	78
Environmental protection	170	Preparatory steps	73
Grease and lubricating oil	170	Installation aid	184
Metals	171	Instruction	10
Oil	170	Interim storage	71
Oily waste	170	Intermediate chamber	28, 48, 123
Plastics	170	Quench	28
Downtimes	100	Internal cleaning	116
Operation with control unit	100	Introduction of the operating manual	8
Operation without control unit	101	K	
Drive connection	47	Key to the signs	13
Drive options	52	Key to the symbols	13
E		L	
Electrical connection	84	Labeling	29
Emergency	102	Level indicator	173
Emergency shut-down	102	Limits	
EMERGENCY STOP	27	Current consumption	65
EU Declaration of Conformity	188	Pressure	63
EU Declaration of Incorporation	188, 189	Pressure with RC-Control unit	63
F		Pressure without control unit	63
Feed pump	78	Lubricant fill level	
Feed unit	46	Gear unit	193
Filter press channel	150	Intermediate chamber	193
Frequency converter	172	Lubricants, lubricating oil	
G		Level	123
Gear oil	120	Replacement	123
Gear unit of the Börger machine	123	M	
General information	8	Machine care	111
I		Cleaning the outside	113
Inlet		Maintenance	120
with inlet pressure	81	Lubricants	123
Inspection	120	Machine care	111
Inspection plan	120	Maintenance and inspection plan	120

Measures following maintenance work .	168	Emergency shut-down	102
Other repairs	167	Malfunctions	103
Special equipment	167	with control unit	98
Maintenance and inspection		without control unit	98
Lubricating the adjustment mechanism .	127	Operator	
Maintenance and inspection plan	120	Information for the operator	9
Maintenance and repairs	109	Marking	30
Cleaning the outside	113	Noise, protective equipment	43
Electrical system	34	Signs	30
General work	32	Training and instruction	10
Internal cleaning	116	Outlet	
Machine care	111	Liquid phase	83
Pressure relief	114	P	
Maintenance openings	49	Performance data	61
Malfunctions	103	Cattle liquid manure	62
Measures following on demand work . .	108	Digestate	62
Other repairs	167	DS content	62
Special equipment	167	Swine liquid manure	61
Markings		Personal protective equipment	25
Symbols on the machine	29	Personnel	22
Maximum loads	61	Pipe connections	51
Monitoring equipment	29	Points of contact	3
Mounting position	50	PPE	25
Mounting rails	59	Press channel	150
Version	75	Pressure relief	114
<i>Multi Disc</i> plate	146	Product Description	44
O		Product Specifications	3
Offer for Börger training courses	10	Proper use	15
Oil change	123	Property rights	8
Oil level	123	Protective equipment	25
Operating personnel	22	Q	
Operating principle	54	Qualifications	
Operation	93	Operating personnel	22
Commissioning	95	Skills	22
Continuous operation	99	Quench	48
Downtimes	100		

Quench fluid 120

R

Repairs 128, 129

Auger adapter 164

Brush auger 157

Clamping unit 131

Clamping unit with pneumatic adjustment
..... 133

Filter press channel 150

Measures following repairs 168

Mechanical seal 137

Multi Disc plate 146

Notes 129

Other repairs 167

Press channel 150

Queries 169

Special equipment 167

Wedge wire screen 153

Residual risk 17

S

Safety

Chemical substances 43

General information 13

Instructions for operating personnel 31

Maintenance 37

Maintenance and repairs 26, 37

Markings and signs 29

Noise, protective equipment 43

Oil, grease 43

Proper use 15

Residual risk 17

Safety equipment 27

Signs and symbols 13

Troubleshooting 26, 37

Safety equipment 27

Intermediate chamber 28

Safety instructions

Electrical system 34

General work 32

Securing the machine against restart ... 26, 37

Separating and conveying unit 46

Service 3

Setup

Service spaces 73, 75

Shaft seal 48

Signs 29

Skills 22

Spare parts list 180

Installation aid 184

Tools 184

Spare parts orders 3

Special dangers 43

Storage 66, 69

Storage conditions 69

Subsidiaries 2

Supplier documentation 192

Symbols

In the manual 13

Markings on the machine 29

T

Technical data 55

Technical data (maintenance)

Lubricants - fill levels 193

Tightening torques (guidelines) 193

Tightening torques 194

Tools 184

Training 10

Training topics 10

Transportation 66

Troubleshooting

Electrical system 34

General work 32

U**UK - Declaration of Conformity 190****UK - Declaration of Incorporation 191****UKCA marking**

UK - Declaration of Conformity 190

UK - Declaration of Incorporation 190

Units 52

Use 15

V

Versions 77

W

Wear parts 174

Brush auger 175

Filter press channel 176

Mechanical seal 175

Multi Disc plate 175

Wedge wire screen 175

Wedge wire screen 153