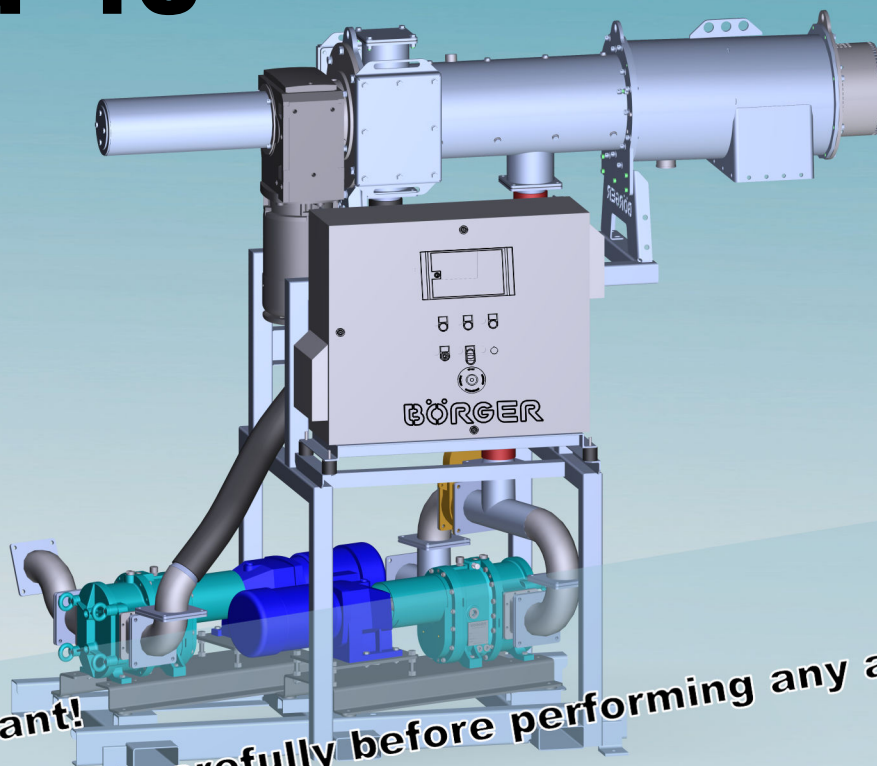


Operating Manual

Bioselect RC Separation Technology

RC-Control Unit 30 and 40



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

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Product Specifications

Unit:

Product group: Control unit

Type: RC-Control for Bioselect separation system

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

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1 General information

1.1 Introduction

This operating manual is an important aid for the correct and safe operation of the control unit.

It contains important information for operating the control unit and the components connected to it 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 control unit and the components controlled by it.

The operating manual must be made available at all times. All personnel who work on or with the control unit 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 control unit. 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 control unit without approval from Börger GmbH. This includes any changes to the programming beyond the settings described in the following chapters.

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 control unit. Clearly define the personnel responsible for operation, maintenance, repair and transportation.

1.4 Instruction

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

This obligation also applies to all other safety equipment on and around the control unit. 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.

Börger GmbH, their regional subsidiaries or your local sales partner will be happy to help you regarding staff instruction. On request, they can also carry out training on the functionality, commissioning, maintenance and repair of the control unit and the components controlled by it.

Contact us for a detailed quotation.

2 Safety

2.1 General information

The control unit 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.

Only high-quality electrical equipment, which has been specifically selected and programmed for the components controlled by it, has been used in the control unit.

Nevertheless, the operation of the control unit and the components controlled by it may endanger the operating person and cause damage to the connected components, the control unit 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



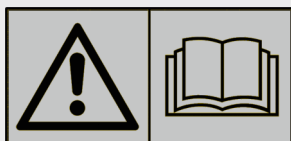
NOTE! Proper use

The control unit 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.

- Observe the technical specifications in the data sheet.
- Therefore, proper use is restricted to the specified pumped medium, temperatures, speeds and output only.

The RC-Control unit regulates the dynamic interaction of the components in the Börger Bioselect separation system in accordance with the parameters that have been optimized and saved for the application. The continuous regulation permits the automatic operation of the separation system. In the event of a malfunction, the RC-Control immediately switches off the connected components of the separation system.

In the event of overcurrent or excessively high temperatures, the control unit switches off the connected components. An EMERGENCY STOP switch additionally allows the operator to bring the connected components to an immediate standstill. It is possible to connect an external control unit. A timer enables fully automatic, time-dependent operation (timer operation).



Proper use includes compliance with the instructions on

- safety,
 - operation and control,
 - 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 control unit or the entire unit 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 control unit as detailed below.

All persons that work on and with the control unit 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 open or 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 fatal injury due to contact voltage!**

The frequency converters may carry a dangerous contact voltage for up to 10 minutes after disconnection from the power supply.

- Only open the control cabinet 10 minutes after shut down.

**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.

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 control unit 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 control unit. 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.

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 control unit 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 according to  *Chapter 2.7 “Securing the machine against restart” on page 21.*

- 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 control unit 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 Control cabinet

All electronic components with control functions are safely installed in the protective housing of the control cabinet and therefore protected from access, environmental factors and potentially explosive atmosphere. The control cabinet must always be kept locked during operation.

2.8.3 Fuses

The circuit breakers (automatic fuses) indicated on the electric circuit diagrams protect the electric circuits from being damaged by overcurrent.

2.8.4 Pressure transmitter for monitoring the operating pressure

A pressure transmitter measures the pressure at the pump outlet.

A control unit switches off the pump motor if the set pressure limit value is exceeded. An indicator light will indicate the fault.

2.8.5 PTC thermistor temperature sensor

PTC thermistor sensors protect the pump motor from damage due to overheating.

The control unit switches off the pump motor if the maximum admissible motor temperature is exceeded. An indicator light will indicate the fault.

2.8.6 Motor protection switch

A motor protection switch protects the motor from damage due to overload.

The control unit switches off the motor if the maximum admissible current consumption is exceeded.

2.8.7 Dry run protection, thermal

A temperature sensor PT100 on the quick-release cover monitors the temperature inside the pump chamber.

A temperature increase would occur in case of dry run, but also if the flow through the bypass system is reduced excessively for a longer period of time at certain pressure and operating temperatures (backflow too high).

The control unit switches off the pump motor if the temperature is exceeded. An indicator lamp will indicate the fault.

2.8.8 Filter ventilator

In the version with control cabinet climatization, a filter fan hood, a filter and a protective mesh protect the rotating axial ventilator fan from contamination and from anyone reaching into it. The air inlet and outlet openings may not be blocked. The filter fan hoods may not be removed.

2.8.9 UV cover (optional)

The operating terminal is protected from environmental factors and unauthorized access by a lockable UV cover. Except during the necessary operation on the operating terminal, the UV cover must always be kept locked.

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.



NOTE!

Instructions, symbols and warning signs

All instructions and symbols attached directly to the control unit and the components controlled by it (e.g. warning signs, operational signs, all component designations etc.) must be strictly adhered to.

- They may not be removed and must be kept completely legible.



Meaning:

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

Location:

In a clearly visible position on the inside of the control cabinet door

Different address possible, e.g. when delivered through a subsidiary.

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



Meaning:

Nameplate as per DIN EN 809 with marking in terms of Directive 2014/34/EU

Location:

In a clearly visible position on the inside of the control cabinet door

Different address possible, e.g. when delivered through a subsidiary.

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



Meaning:

The filter fan hood manufacturer's nameplate

Location:

In a clearly visible position on the filter fan hood



Meaning:

Marking of electrical equipment / circuits (the first number marks the page in the circuit diagram)

Location:

In a clearly visible position on the relevant electrical equipment in the control cabinet



Meaning:

EMERGENCY STOP switch (red on yellow)

Location:

At the front of the control cabinet



Meaning:

Warns of dangerous electrical voltage

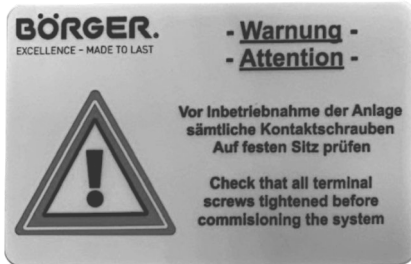
Location:

On the control cabinet and on individual components



Meaning:
Protective ground connection

Location:
On all connecting points to the protective ground wire



Meaning:
Warning: The electrical connections must be checked before commissioning the control unit and the components connected to it. In particular, it must be ensured that the terminal screws are tight.

Location:
In a clearly visible position on the inside and outside of the control cabinet



Meaning:
Warning: Components marked with this label carry voltage even after switching off the control unit via the main switch.

Location:
In a clearly visible position on the relevant components in the control cabinet

Additional markings on electrical equipment

Meaning:
See the manufacturer's operating manual

Location:
At each individual piece of electrical equipment

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 control unit and the components controlled by it may only be operated while they are in perfect working condition and only for their intended purpose, in a safe and risk-conscious manner having regard to this operating manual.

All malfunctions must be rectified immediately and professionally, especially those affecting safety. This applies particularly to defects such as loose electrical connections, frayed, burnt, kinked or otherwise damaged cables etc.

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 11*. Consulting the manual during work is already too late. This applies especially to personnel that only work occasionally on the control unit.

The operating manual must always be kept accessible next to the control unit.

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.

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:

- 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

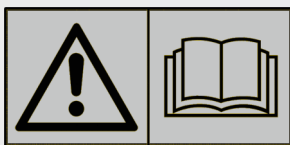


Further operating manuals / supplementary operating manuals

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 as described in ↗ *Chapter 5.3 “Downtimes” on page 112.*
2. ➤ Secure the Börger machine against unauthorized or uncontrolled reactivation as described in ↗ *Chapter 2.7 “Securing the machine against restart” on page 21.*
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.

- Aside from the special tools specified in  *Chapter 9.2 "Tools / installation aid" on page 155*, suitable customary workshop equipment is essential for carrying out maintenance work.
- 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 trouble-shooting 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.
- Aside from the special tools specified in ↗ *Chapter 9.2 “Tools / installation aid” on page 155*, suitable customary workshop equipment is essential for carrying out maintenance work.
- Also observe any
 - supplementary operating manuals
 - operating manuals of the components
 - Operating manuals of electronic partsin 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.

- 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 control unit 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 according to  *Chapter 2.7 “Securing the machine against restart” on page 21.*

**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.

**NOTICE!****Electrostatic discharge (ESD) can damage electrical equipment.**

You must therefore discharge electricity from your body by touching a grounded metal object before you touch the electrical equipment installed in the control unit.

Repeat this procedure during any work on electrical equipment installed in the control unit from time to time, to discharge any electrostatic charge that may have built up in your body.

- Please obtain the information on maintaining and repairing each individual electrical equipment as well as the connected components from the manufacturers' documentation supplied.
- Read and comply with the applicable regulations and any safety data sheets from the manufacturer as well as the operator's instructions in respect of storage, handling, use and disposal.

**NOTICE!**

Improper cleaning of the control unit 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 ↗ *Chapter 3.9 “Technical data” on page 70* 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.

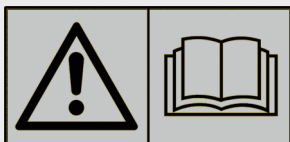


NOTE!

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.

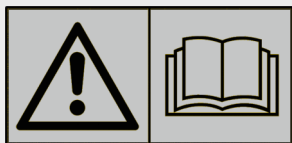


Further operating manuals / supplementary operating manuals

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.

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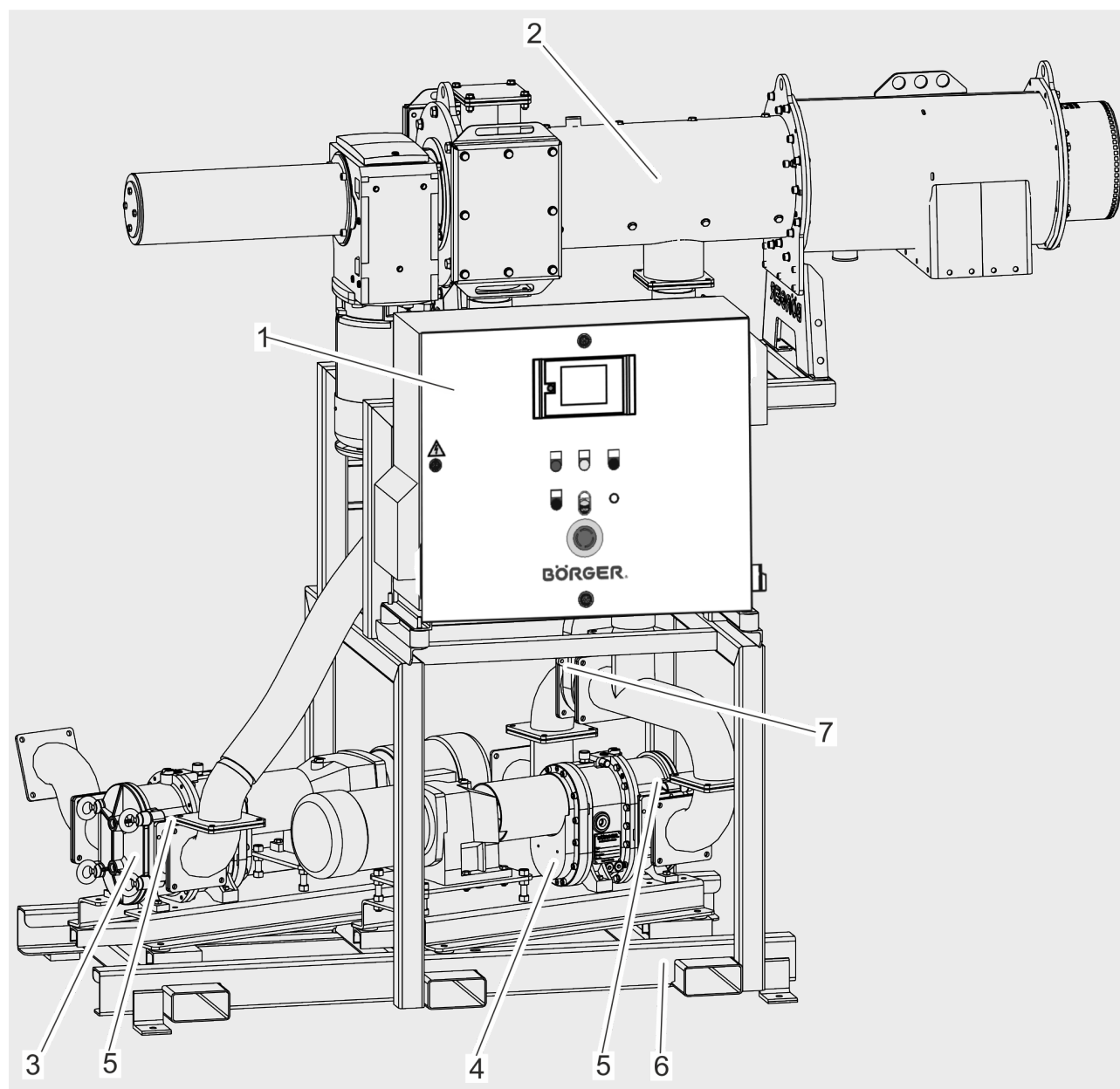
Operating manuals of electronic parts

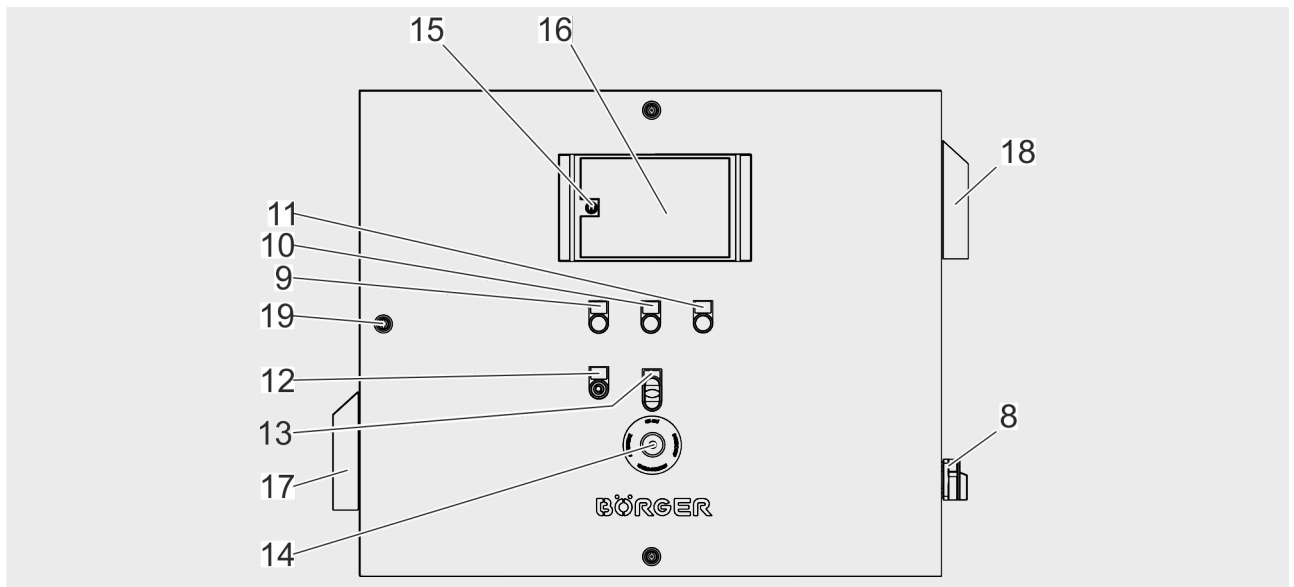
Pay particular attention to all instructions

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

3 Product Description

3.1 Construction of the RC-Control unit





1	RC-Control unit	11	Blue LED illuminated pushbutton for restoring readiness for operation after an EMERGENCY STOP
2	Bioselect RC with parallel shaft helical gear unit and electric motor	12	Potentiometer
3	Feed pump	13	Start button / stop button
4	Liquid phase pump	14	EMERGENCY STOP switch
5	Pressure transmitter	15	UV cover, lockable
6	Base frame	16	Operating terminal
7	Gate valve	17	Air outlet with outlet filter
8	Main switch	18	Air inlet with filter ventilator
9	Red LED indicator lamp, is lit in the event of malfunctions	19	Control cabinet lock
10	Yellow LED indicator lamp, is lit during automatic operation		

3.2 Control cabinet

The control cabinet is made of high-quality stainless steel, IP 55 casing protection type (DIN EN 60529).

A temperature controller installed in the control cabinet with a connected heater and filter ventilator controls the temperature inside the control cabinet, and thereby contributes towards the protection of the electronic components. Filters protect the ventilation openings from dirt.

Locks with a removable key make it possible to prevent unauthorized access.

The operating terminal with a touchscreen is under a lockable UV cover, IP 54, which protects it from exposure to the weather.

The stable mounting frame attached to the base frame of the small plant enables comfortable operation while standing.

3.2.1 Main switch

On the right of the control cabinet, there is the main switch (8) for the control unit and the connected components.

3.2.2 EMERGENCY STOP switch

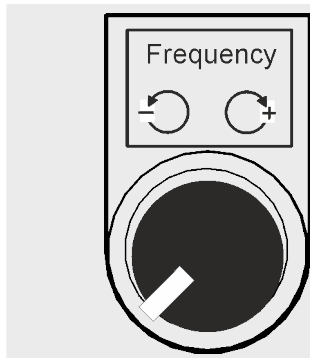
A central EMERGENCY STOP switch (14) switches off the connected components immediately when pressed.

3.2.3 Start button / stop button

By pressing the start/stop button with its indicator lamp (13), the connected components for **Manual operation** or **Automatic operation** are started and stopped if the main switch is activated. Start button, on top, for switching on, Stop button, at the bottom, to switch off the drives; in the center: indicator light for "ON"

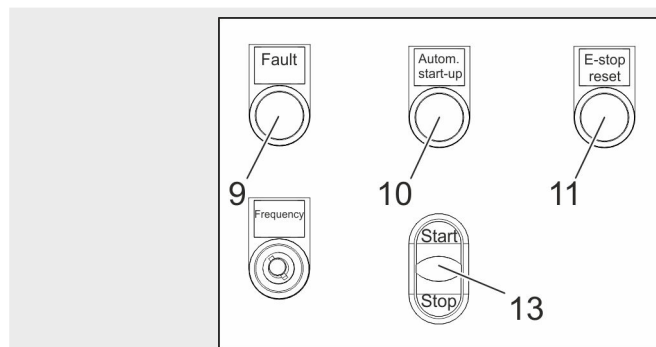
The indicator light indicates trouble-free operation.

3.2.4 Potentiometer



By turning the potentiometer (12), the frequency of the feed pump can be changed during the break-in period and while service programs are run in manual mode according to [Chapter 5.2 "Automatic operation and manual operation" on page 109](#) (operating mode "Manual operation").

3.2.5 LED elements



Red LED indicator lamp (9)

"Fault" is lit in the event of malfunctions

Yellow LED indicator lamp (10)

"Autom. start-up" warns of a possible automatic start-up of the motors

Blue LED illuminated pushbutton (11)

"EMERGENCY STOP reset" lights up after an EMERGENCY STOP and after reactivation of the control unit until readiness for operation has been restored by pushing that button

Indicator lamp Start button / Stop button (13)

is lit during trouble-free operation

3.2.6 Control unit

The PLC programmable logic controller is a modular, compact and powerful control unit for small control environments:

- Saving of setpoint values and limits
- Controlling of the frequency converter
- Evaluation of the output signals of the pressure transmitters

Extended control units are available as an option, according to ↗ *Chapter 3.7 “Options and accessories” on page 68.*

Further details on the PLC control module are contained in the manufacturer's operating manual.

The PLC control unit allows remote maintenance via GSM/UMTS or WLAN/LAN if the optional remote maintenance module is installed. This option makes it possible to obtain quick, targeted support should a fault arise, see ↗ *Chapter 3.7 “Options and accessories” on page 68.*

3.3 Frequency converter

The frequency adjustments based on the pressure and current evaluation by the PLC are made via the frequency converters.

Any alerts by the frequency converters are shown on the display of the operating terminal (16).

The safety functions of the frequency converters include protection of the motor against overloading and, by connecting the PTC thermistors of the component motors, against overheating. The frequency converters are equipped with a safety-oriented input for connecting the EMERGENCY STOP switch (integrated function for safe stop).



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.

3.4 Electrical connections

The standard version of the control unit is supplied with cable glands according to DIN EN 50262, and serial feed-through terminals.

The enclosed circuit diagram provides a detailed description of the cabling to be laid.

Extensions for measuring devices which have to be evaluated additionally are possible, according to ↗ *Chapter 3.7 "Options and accessories" on page 68*.

3.5 Operating terminal

The operating terminal (16) offers optimized visualization and enables comfortable operation.

Display 4" TFT display

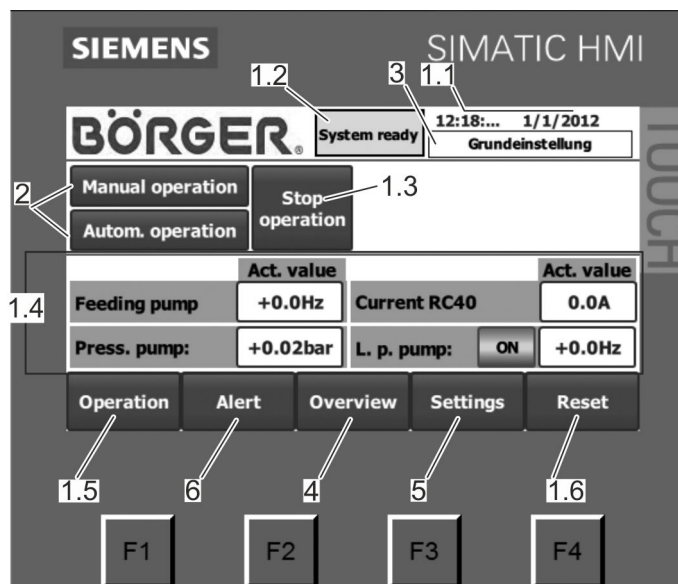
The software of the operating terminal is programmed entirely according to the order specifications for the components to be connected. The menu is delivered in German language as standard. Optionally, the display can be delivered in other or multiple languages.

The version of the control unit and the programming described in this operating manual is designed for operating a Bioselect separator and a rotary lobe pump. The description includes several variants which are possibly not included in your control unit. Please note the order documents. Optional extensions according to ↗ *Chapter 3.7 "Options and accessories" on page 68* are possible.

In addition, a 7" or 9" TFT display may be delivered with control units with optional extensions.

3.6 Menu navigation

3.6.1 Main menu



1 Main menu

1.1 Current **date and time** display

1.2 **Operating status** display: System ready / System not ready

1.3 **Stop operation**: Touching this option ends the operating mode and stops the connected drives

1.4 **Actual values** display:

— Frequency, pressure of the feed pump, current consumption of the separator and frequency of the liquid phase pump

1.5 **Operation**:

— Touching the field leads back to the main menu from a sub-menu

1.6 **Reset**:

— Touching the field resets the control unit back to the operation status after a fault has been reported ("Acknowledging" the fault message)

2 Operating mode activation fields

— Manual operation (without control)

— Automatic operation (controlled operation), highlighted when selected

3 Default setting:

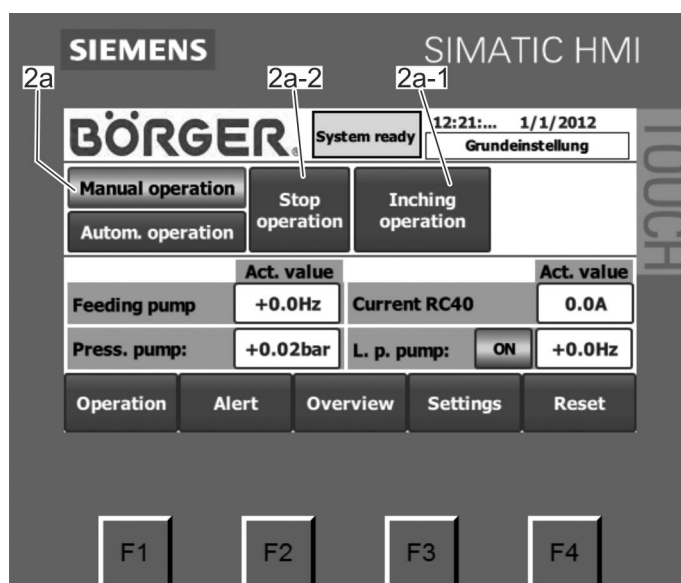
Main program of main menu

4 **Overview:** Touching the field leads to the chart where the actual values of the components are displayed

5 **Settings:** Touching the field leads to various settings submenus according to  Chapter 3.6.6 “Settings menu” on page 51, see description below.

6 **Alert:** Touching the field leads to the menu for current fault messages

3.6.2 Manual operation



Operating mode activation fields

2a **Manual operation:** Operating mode, to be activated for uncontrolled operation (frequency settings for manual speed regulation via potentiometer, start-up of the motors via start/stop button) as well as for inching operation (highlighted when active)

2a-1 **Inching operation:** Touching the field leads to the submenu for inching operation

2a-2 **Stop operation:** Touching this option ends the operating mode and stops the connected drives



2a-1 Manual operation /Inching operation submenu (the frequency settings for speed regulation are made manually via the potentiometer (12), according to [Chapter 3 "Product Description"](#) on page 40.

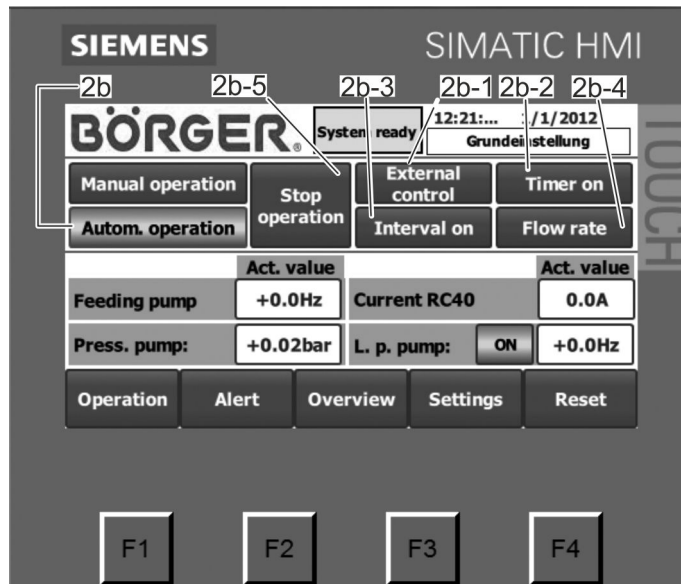
A Activation fields, the corresponding motors start forward operation (**Forward**) without an additional start-up process for the duration of the touch when the corresponding field is touched. The motors stop as soon as the corresponding field is released.

B Activation fields, activate backward operation (**Backward**) of the connected components until the field is released, e.g. for fast pressure reduction after a malfunction caused by exceeding the permissible maximum pressure (cause to be investigated and eliminated at a later stage), or for emptying the pipe for maintenance purposes.

C Touching the field starts emptying the system, in addition a conveyor can be switched on, e.g. in the event of a malfunction or maintenance work

D Actual values: Working pressure, current consumption, frequency of the liquid phase pump

3.6.3 Automatic operation



2b Automatic operation: Operating mode, to be activated for controlled operation in accordance with the saved parameters, highlighted when activated

2b-1 Activation field External control: Activation prepares the separator control unit for the signals of a connected external control unit, highlighted and flashing when activated

2b-2 Activation field Timer on: Activates timer operation in accordance with the operating and break times saved in the timer, highlighted and flashing when activated

2b-3 Activation field Interval on: Activates interval operation in accordance with the operating and break times saved in the Times/values submenu, highlighted and flashing when activated

2b-4 Activation field Flow rate: Activation shows the actual/target values of the individual flow rate and total flow rate

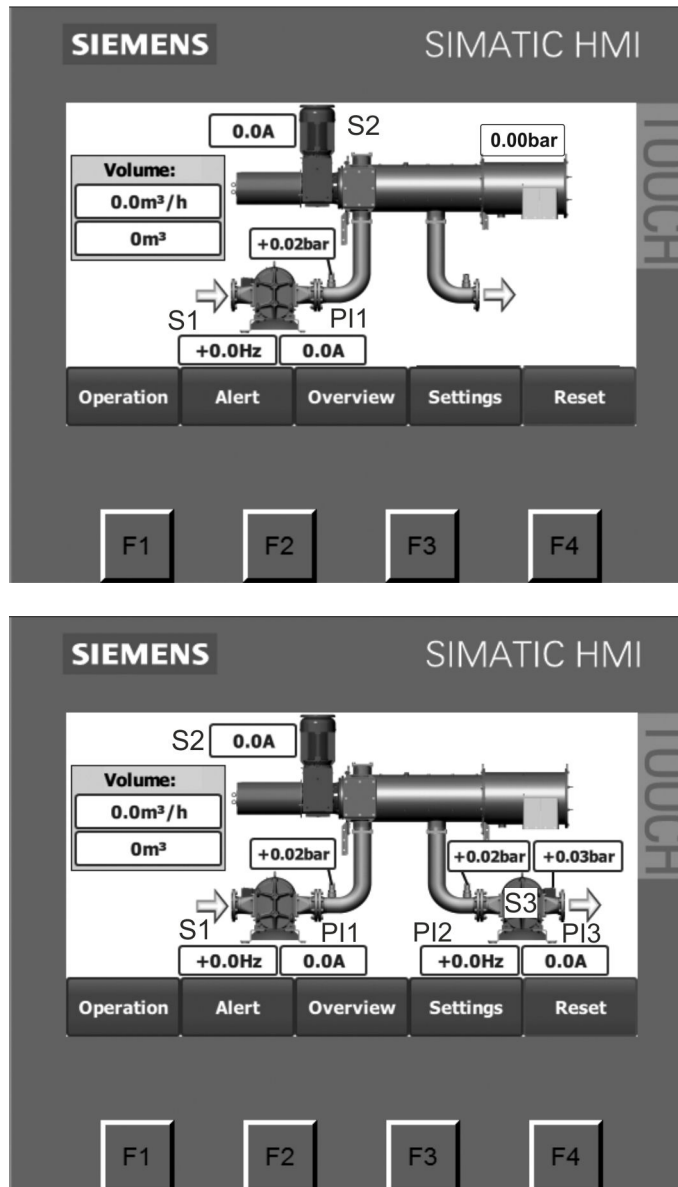
Systems stops when the pre-set flow rate is reached, see
 ↗ *Chapter 3.6.6 “Settings menu” on page 51*

2b-5 Stop operation: Touching this option ends the operating mode and stops the connected drives

3.6.4 Default setting

3 Default setting menu: Is displayed automatically when switching on the control unit (main program)

3.6.5 Overview menu



4 **Overview** menu: Display of current values

S1: Frequency and current consumption of the feed pump

S2: Current consumption of the Bioselect motor (auger)

S3: Frequency and current consumption of the liquid phase pump

PI1 Pressure in front of separator

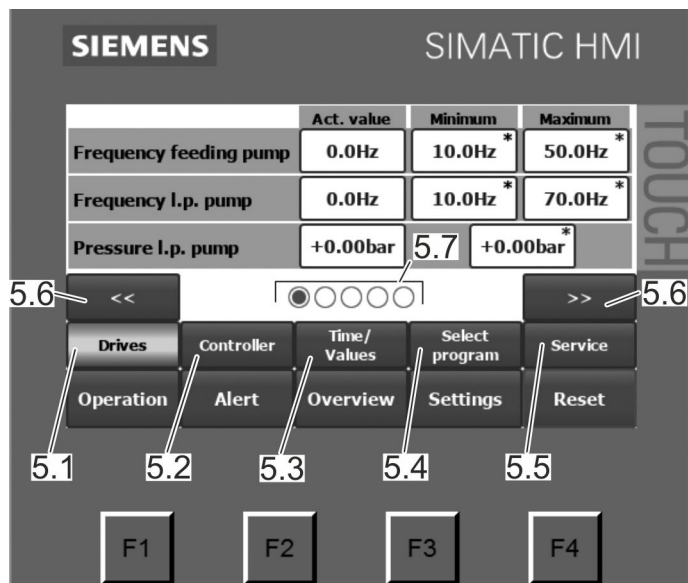
PI2 Pressure behind the separator

PI3 Pressure behind the liquid phase pump

**NOTE!**

Input fields with an asterisk (*) in the right upper section are shown on the following pages. The values in these fields are included in the program and can be changed.

3.6.6 Settings menu



5 Settings menu:

5.1 **Drives:** Touching the field leads to the submenu for setting different values

5.2 **Controller:** Touching the field leads to the submenu in which the general control parameters are stored (risk of severe damage when changing these parameters!)

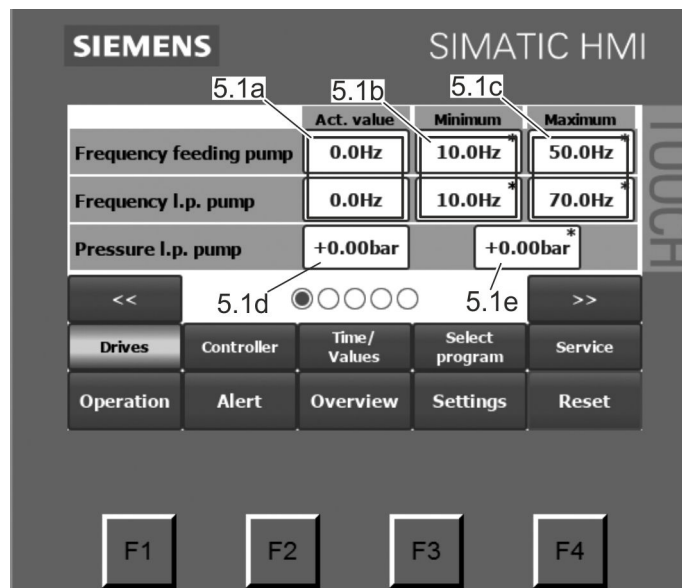
5.3 **Times/values:** Touching the field leads to the submenu for setting times and further values

5.4 **Select program:** Touching the field leads to the menu for program selection

5.5 **Service:** Touching the field leads to the submenu for running service programs and performing further settings

5.6 **Arrow facing to the right, arrow facing to the left:** Scrolling through the submenus

5.7 **Display:** Displays current submenu page



5.1 **Drives** submenu, first page:

5.1a Display of actual values

— Frequencies of the feed and liquid phase pump

5.1b Input of limit values in automatic operation

— Minimum frequency of the feed and liquid phase pump

5.1c Input of limit values in automatic operation

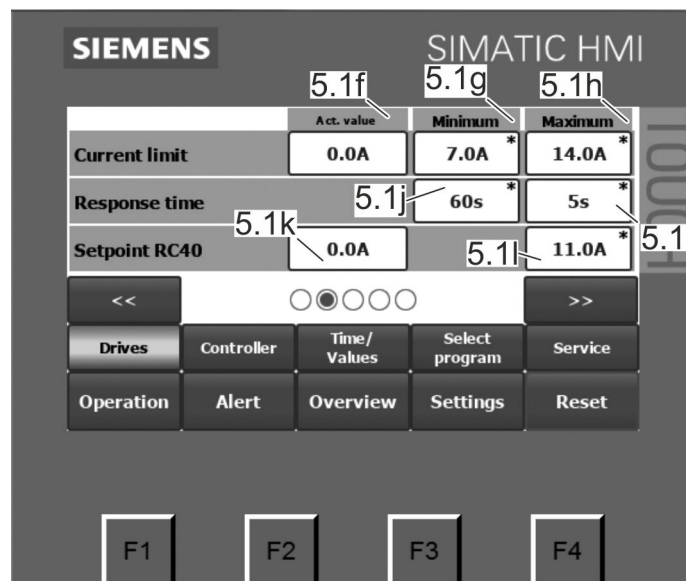
— Maximum frequency of the feed and liquid phase pump

5.1d Display of actual value

— Pressure of liquid phase pump during automatic operation

5.1e Input of target value

— Input of target value, pressure of the liquid phase pump in automatic operation



5.1 **Drives** submenu, second page:

5.1f Display of actual value

— Current consumption of the Bioselect motor

5.1g Input of limit value

— Minimum current consumption of Bioselect motor

5.1h Input of limit value

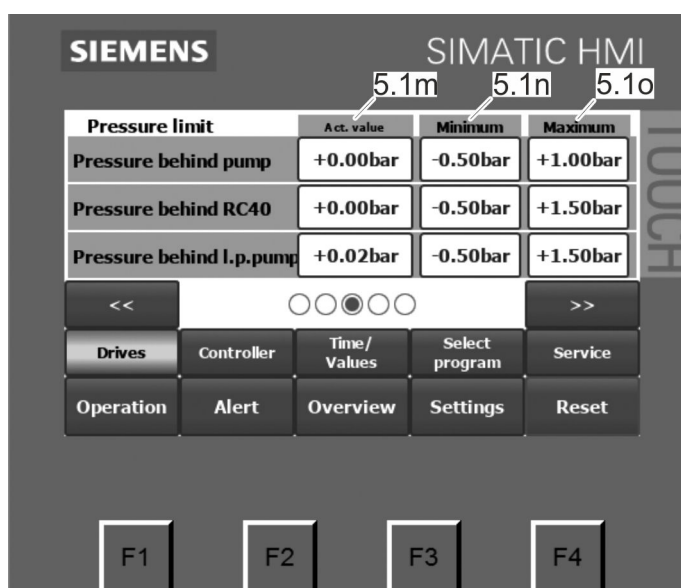
— Maximum current consumption of Bioselect motor

5.1i Input of response time until the system is shut down when the value exceeds the maximum current consumption of the Bioselect motor

5.1j Input of response time until the system is shut down when the value falls below the minimum current consumption of the Bioselect motor

5.1k Display of actual value: Current consumption of Bioselect motor in automatic operation

5.1l Target value: Target current consumption at which the Bioselect motor is run in automatic operation



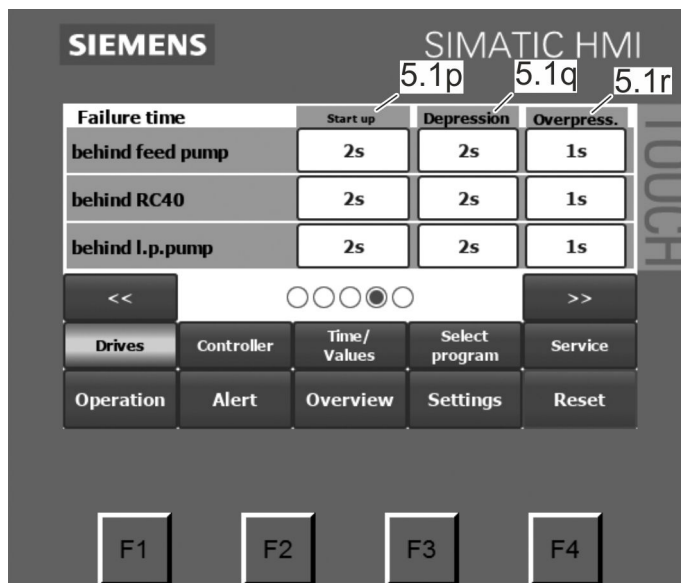
5.1 **Drives** submenu, third page "**Pressures limits**":

5.1m Display of actual pressure values

- Pressure (PI1) in front of RC40
- Pressure (PI2) behind RC40
- Pressure (PI3) behind liquid phase pump

5.1n Input of limit value of minimum working pressure

5.1o Input of limit value of maximum working pressure



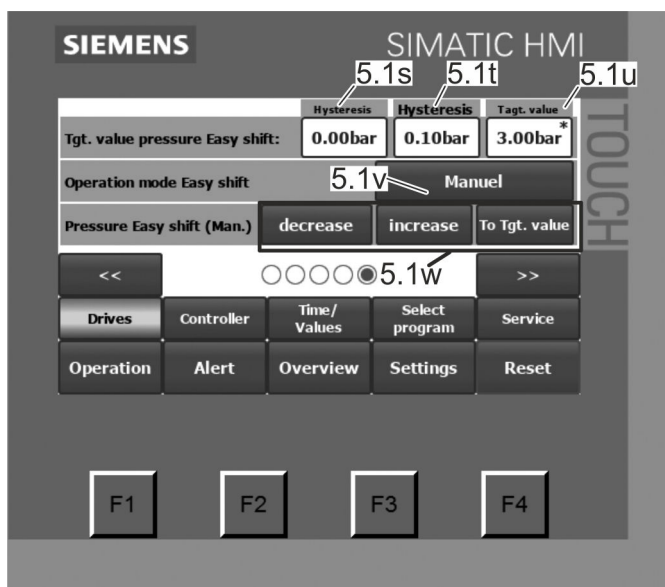
5.1 Drives submenu, fourth page "Failure time":

The individual components can be operated beyond their pressure limits for a short time without a fault being triggered.

5.1p Input of delay (in case of strong pressure variations during start-up)

5.1q Input of the time in which the value may fall below the target pressure without a fault being triggered

5.1r Input of the time in which the target pressure may be exceeded without a fault being triggered



5.1 **Drives** submenu, fifth page:

This is the control of the RC pneumatic cylinder (Easy Shift).

- Example: The target pressure is set to 3.0 bar, the actual pressure is 1.0 bar, the pressure inlet valve opens and regulates the pressure up to 3.0 bar.
- If the pressure falls below 2.9 bar (target pressure - hysteresis) the pressure inlet valve opens and regulates the pressure up to 3.0 bar.
- If the pressure is higher than 3.1 bar the pressure outlet valve opens until 3.0 bar are reached.

In addition, the pneumatic cylinder (Easy Shift) can be controlled in manual mode.

5.1s Display of actual value

- Pressure of pneumatic cylinder (Easy Shift)

5.1t Input of hysteresis

- Input of pressure tolerance by which the target value of 3.00 bar may be exceeded or undershot

5.1u Input of target value

- Input of target value, pressure of pneumatic cylinder (Easy Shift)

5.1v Manual operation/Automatic operation (changeover switch)

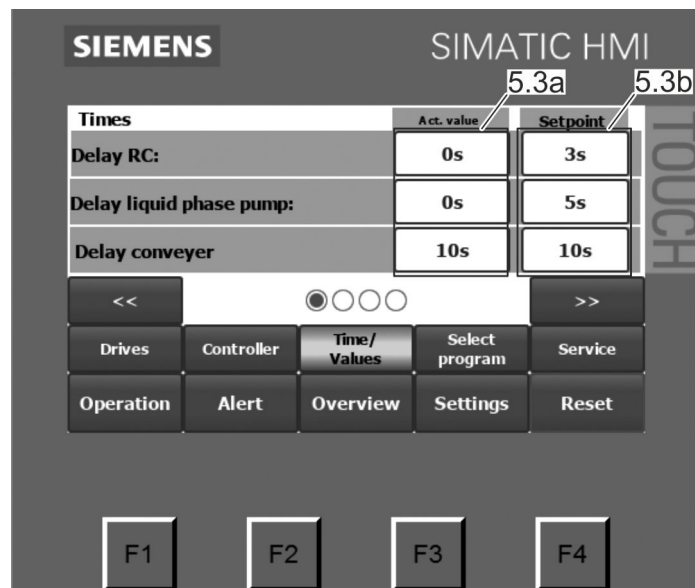
- Touching the field activates the manual adjustment of the pneumatic cylinder (Easy Shift)

5.1w Input of inching operation

- The pressure of the pneumatic cylinder (Easy Shift) can be decreased, increased or set to the target value by touching the corresponding field.

5.2 **Controllers** submenu:

The control parameters in this menu may not be changed!



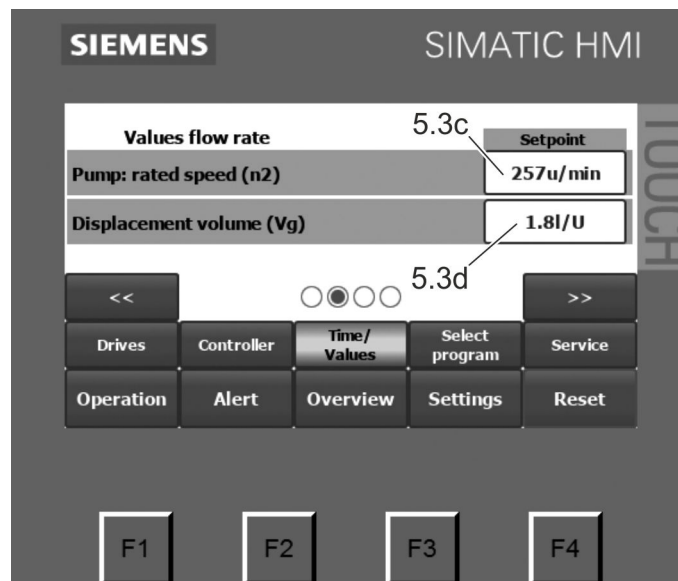
5.3 **Times/values** submenu, first page “Times”

5.3a Display of actual value

- Delay of RC40
- Delay of liquid phase pump
- Delay of conveyor

5.3b Input of delay target value

- Delay of RC40
- Delay of liquid phase pump
- Delay of conveyor



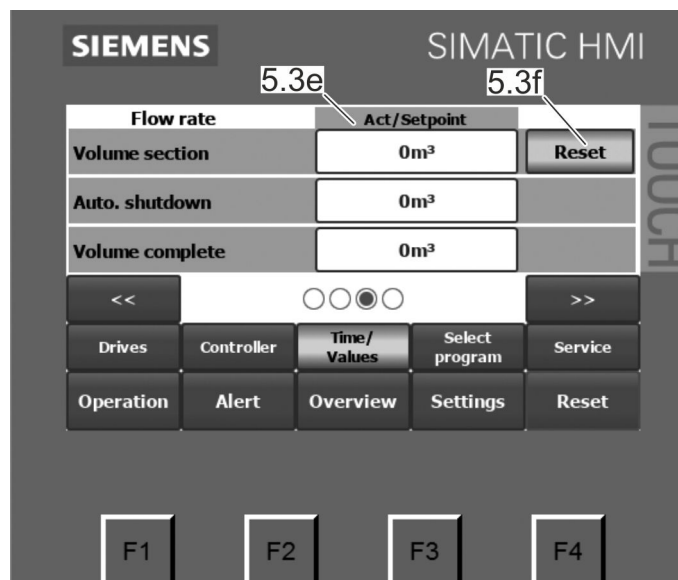
5.3 **Times/values** submenu, second page "**Values flow rate**":

5.3c Display of revolutions per minute

— Nominal speed of feed pump

5.3d Display of liters per rotation (This is a calculated value that does not take wear or similar into account!)

— Geometric displacement volume of the feed pump

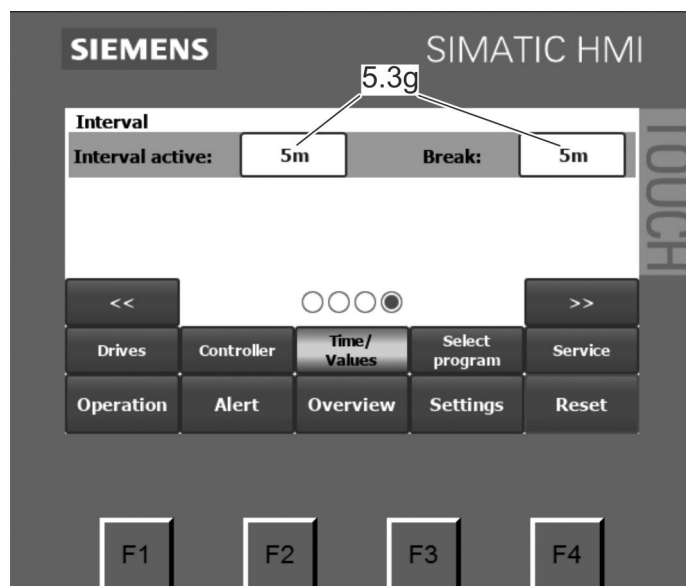


5.3 **Times/values** submenu, third page "**Flow rate**":

5.3e Display of actual/target values

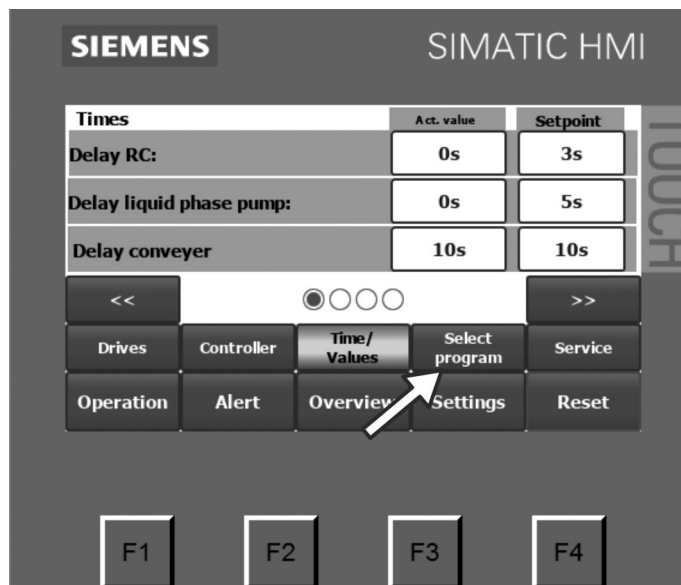
- Volume section = display of the current volume
- Automatic shutdown = the separator switches off at this limit value
- Volume complete = display of total volume since commissioning

5.3f Activate **Reset** to set individual capacity to 0 (only possible when the machine is at a standstill)

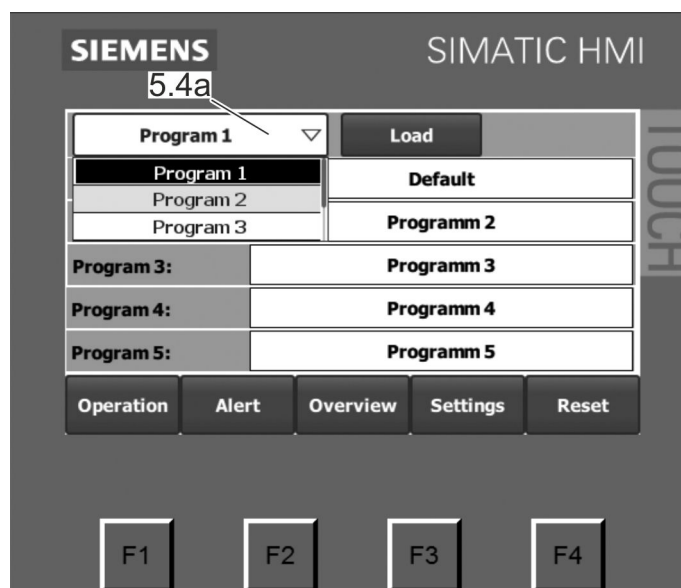


5.3 **Times/values** submenu, fourth page "Interval":

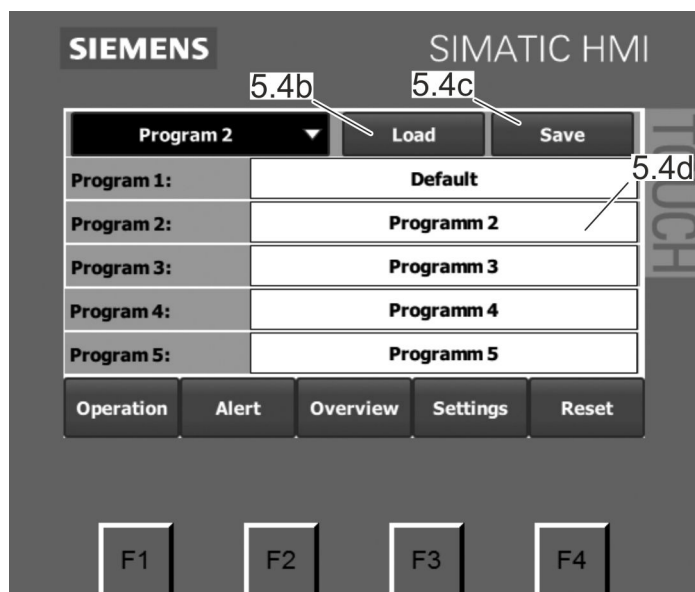
5.3g Input of interval duration of the system for "operation" and "break" in minutes



5.4 Select programs submenu:



5.4a Touching the field activates the program selection



5.4b Touching the field loads the program selected

5.4c Touching the field saves the program (after changes to the program have been made)

5.4d Touching the field opens a window with a digital keyboard

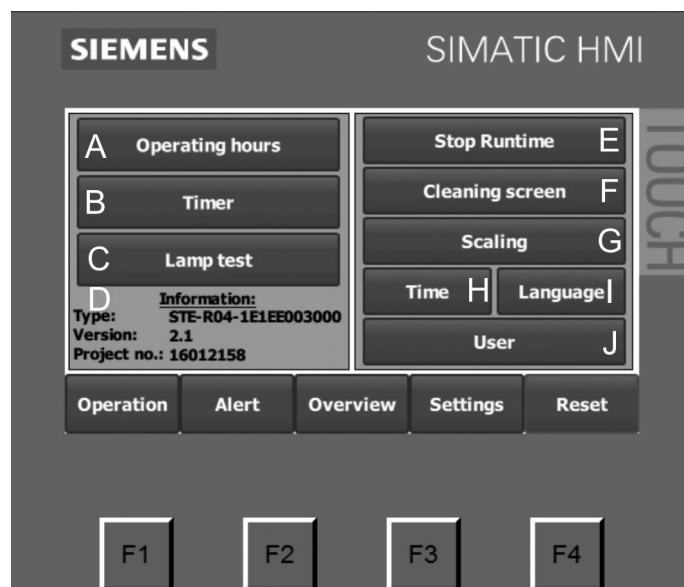


5.4e Input line for changing the name of the program

5.4f Return button for confirming the input

**NOTE!**

Values with an asterisk (*) from the settings are saved according to  *Chapter 3.6.5 “Overview menu” on page 50.*



5.4 "Service" submenu

A Operating hours: Touching the field leads to the operating hours counter and intermediate meter.

B Timer: Touching the field leads to the menu for setting the switch-on and switch-off times for time-dependent operation (timer operation)

C Lamp test: Touching the field makes the LED elements light up for testing purposes, provided an appropriate electrical connection is in place and the LED element in question is not defective.

D Info: Version and project information

E Stop runtime: Ends the program, can only be accessed by Börger GmbH.

F Cleaning screen: When touching this field, the touch screen is locked for 20 seconds to permit cleaning the screen during operation without changing any settings.

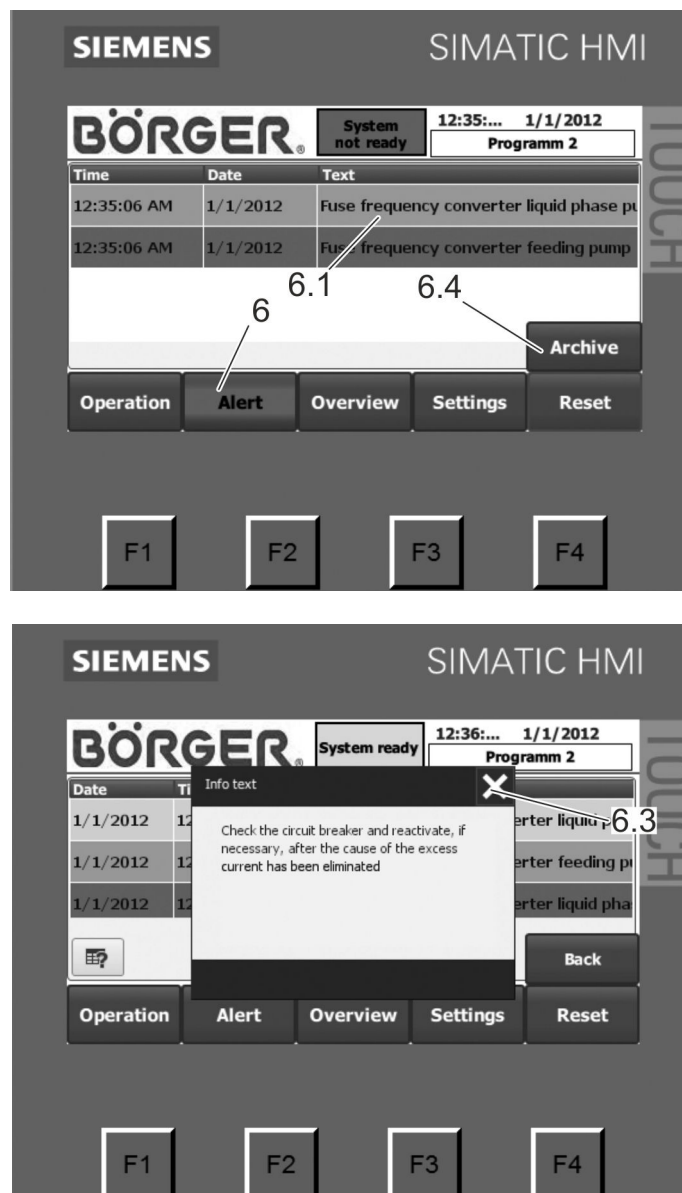
G Scaling: This submenu for general functions of the control unit can only be accessed by Börger GmbH.

H Time: Touching the field leads to a submenu for setting the date and local time.

I Language: Selection fields for optional display languages

J User: Touching the field leads to the menu for selecting the user and administering user accounts

3.6.7 Alert menu



6 **Alert** menu: Touching the field leads to the submenu for current fault messages

6.1 Current fault message (example)

6.2 Short descriptions of the fault messages can be retrieved by touching the help field marked by a "?".

6.3 To close the help window, touch the X on the right top of the window edge.



6.4 **Archive:** Touching the field leads to the alert log where the last 250 alerts are displayed; the following letters in the "Status" column mean:

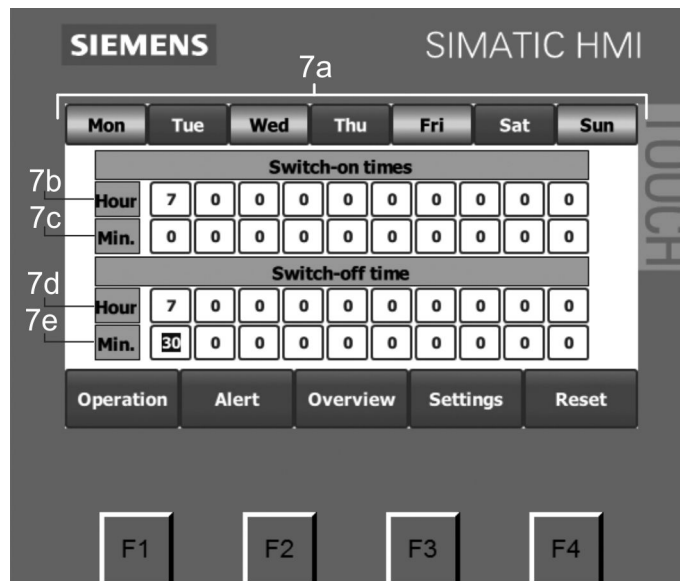
K: Fault message not acknowledged

KG: Fault message acknowledged

The fault messages can be dragged up and down by slightly pressing the finger on the touch screen.

6.5 **Back:** Touching the field leads back to the submenu for current fault messages

3.6.8 Timer menu



7 Timer menu

Up to ten switch-on and switch-off times (in hours and minutes) can be entered for the connected motors.

7a Touching selects the days of the week to which the saved switch-on and switch-off times apply (the system remains stationary on days which have not been selected)

Switch-on times: Times at which the motors are to be switched on:

7b Input of hours

7c Input of minutes

Switch-off times: Times at which the motors are to be switched off:

7d Input of hours

7e Input of minutes

3.6.9 Function keys



The function keys F1-F4 have no separate additional function in the standard version of the control unit.

- **F1**: same function as the **Operation** field
- **F2**: same function as the **Alert** field
- **F3**: same function as the **Settings** field
- **F4**: same function as the **Reset** field

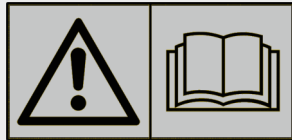


NOTE! **Software adaptation**

The largely self-explanatory software can be adapted to the individual requirements of your application as a matter of course.

This may lead to deviations from the menu navigation displayed here. However, the general functionality is the same.

3.7 Options and accessories



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.

Option remote maintenance module

Optionally, the control unit can be supplied with a remote maintenance module. The remote maintenance module enables remote maintenance via GSM/UMTS by Börger GmbH. This option makes it possible to obtain quick, targeted support should a fault arise.

If this option was agreed to in advance, the remote maintenance module is assembled ready for operation and generally already appropriately configured for the SIM card that you provided. Alternatively, remote maintenance via WLAN/LAN is possible. For further information, please contact Börger customer service.

Upon consultation with Börger customer service, the control unit can also be retrofitted for remote maintenance.



NOTE!

Remote maintenance module

For individual cases, a unit for performing remote maintenance can also be leased from Börger customer service.

Further options

The following units or components may be integrated in the control unit:

- Temperature gauges
- Fill level sensors or other additional measuring devices
- Valves
- Conveyor

etc. Further optional special equipment for the control unit is available for special applications.

Details can be found in the enclosed circuit diagram. The menus of the control unit will be extended as required in this case. The operating manuals of the relevant manufacturer of the component are included.

3.8 Operating principle

The RC-Control unit regulates the frequency of the electric motors by means of a PLC control unit and frequency converters.

The components of the Bioselect separation system are controlled according to the parameters that have been entered and saved on the operating terminal.

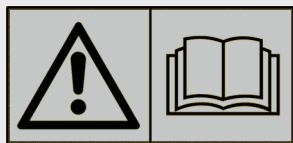
The frequency of the Bioselect motor is set as a constant value. The reference variable in the control loop is the current consumption of the Bioselect motor which is decisive for the performance of the system. The pressures that are constantly being measured at the outlet connection of the feed pump, at the cone of the press channel of the Bioselect separator and in front of the liquid phase pump are evaluated in relation to the pre-set limits.

If there are any changes in the system, the frequency of the liquid phase pump is automatically adjusted.

The application-adjusted programming also permits fault monitoring and cleaning and emptying of the Bioselect RC separator. Via relevant protective functions of the frequency converters, the RC-Control unit also protects the motors of the connected components from damage due to overloading or overheating. In the event of overcurrent or excessively high temperatures, the control unit switches off the Bioselect separator.

An EMERGENCY STOP switch additionally allows the operator to bring the separator to an immediate standstill. It is possible to connect an external control unit. A timer enables fully automatic, time-dependent operation (timer operation).

3.9 Technical data

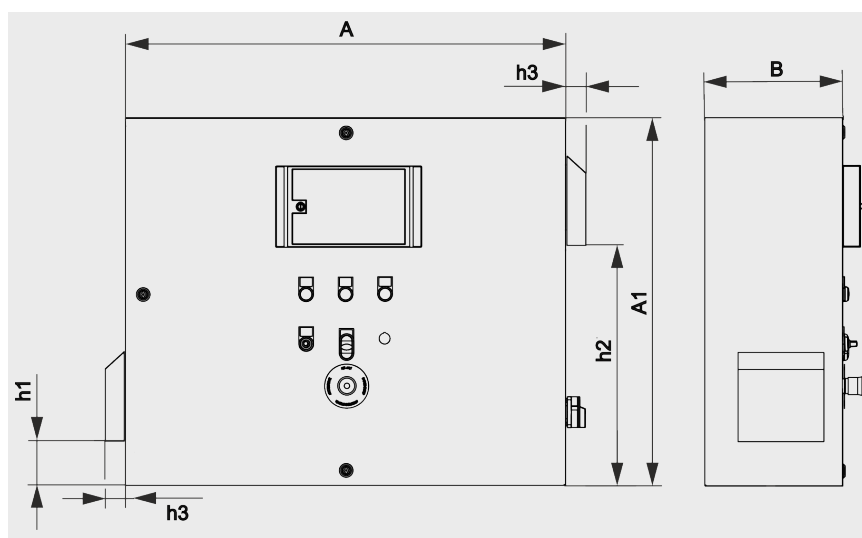


Operating manuals of electronic parts

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.

3.9.1 Dimensions



Dimensions

Dimensions	approx. [mm]		approx. [inch]	
	RC 40	RC 30	RC 40	RC 30
A	900	650	35.43	25.59
A1	750	750	29.53	29.53
B	300	300	11.81	11.81
h1	90	90	3.54	3.54
h2	460	460	18.11	18.11
h3	55	55	2.17	2.17

Weights

Weight	approx. [kg]		approx. [lb]	
	RC 40	RC 30	RC 40	RC 30
	115	90	254	198

3.9.2 Electrotechnical data

Electrical connection:	400 V AC, 3P/N/PE, 50 Hz
Control voltage:	24 V DC
Nominal current:	(nominal current of drives) x 0.8, see nameplate



NOTE! Mains fuse

Mains fuse required:

- min. 1.6 x nominal current, see circuit diagram
- all phases (3P/N/PE), including the neutral conductor, must be properly connected and fully functional.
- the residual current devices for electric shock protection must be AC/DC sensitive (RCD, type B).

3.9.3 Ambient conditions of control unit

	[°C]	[°F]
Ambient temperature	0 to 30	32 to 86
Storage temperature	15 to 25	59 to 77
Operating temperature	20	68
Relative humidity up to	90%	90%

3.9.4 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.

Data Separator RC 40

Swine liquid manure

Substrate:		Swine liquid manure	
DS content at input		5 – 6 %	
Type		RC 40	RC 40 HP
Flow rate:	m³/h	25-40	15-40
	gpm	110-176	66-176
DS content of thin phase ¹⁾ %		2-5	2-5
Output quantity Thick matter t/h		2-4	1-4
DS content Thick matter %		18-25	20-35 ³⁾
Energy demand ²⁾ kWh/m³ (approx.)		0.1-0.3	0.1-0.4

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	88-528	88-528
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

Data Separator RC 30

Swine liquid manure

Substrate:		Swine liquid manure	
DS content at input		5 – 6 %	
Type		RC 30	RC 30 HP
Flow rate:	m³/h	10-20	4-20
	gpm	44-88	18-88
DS content of thin phase ¹⁾ %		2-5	2-5
Output quantity Thick matter t/h		1-2	0.5-2
DS content Thick matter %		18-25	20-35 ³⁾
Energy demand ²⁾ kWh/m³ (approx.)		0.1-0.2	0.2-1.6

Cattle liquid manure

Substrate:		Cattle liquid manure	
DS content at input		7 – 10 %	
Type		RC 30	RC 30 HP
Flow rate:	m³/h	8-18	4-12
	gpm	35-79	18-53
DS content of thin phase ¹⁾ %		2-5	2-5
Output quantity Thick matter t/h		1-2	0.5-2
DS content Thick matter %		18-23	20-35 ³⁾
Energy demand ²⁾ kWh/m³ (approx.)		0.2-0.5	0.2-1.6

Digestate

Substrate:		Digestate	
DS content at input		6 – 12 %	
Type		RC 30	RC 30 HP
Flow rate:	m³/h	6-15	4-15
	gpm	26-66	17-66
DS content of thin phase ¹⁾ %		3-6	3-6
Output quantity Thick matter t/h		1-2	0.5-2
DS content Thick matter %		18-23	20-35 ³⁾
Energy demand ²⁾ kWh/m³ (approx.)		0.3-0.7	0.3-1.6

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!****Characteristics of the 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.

**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

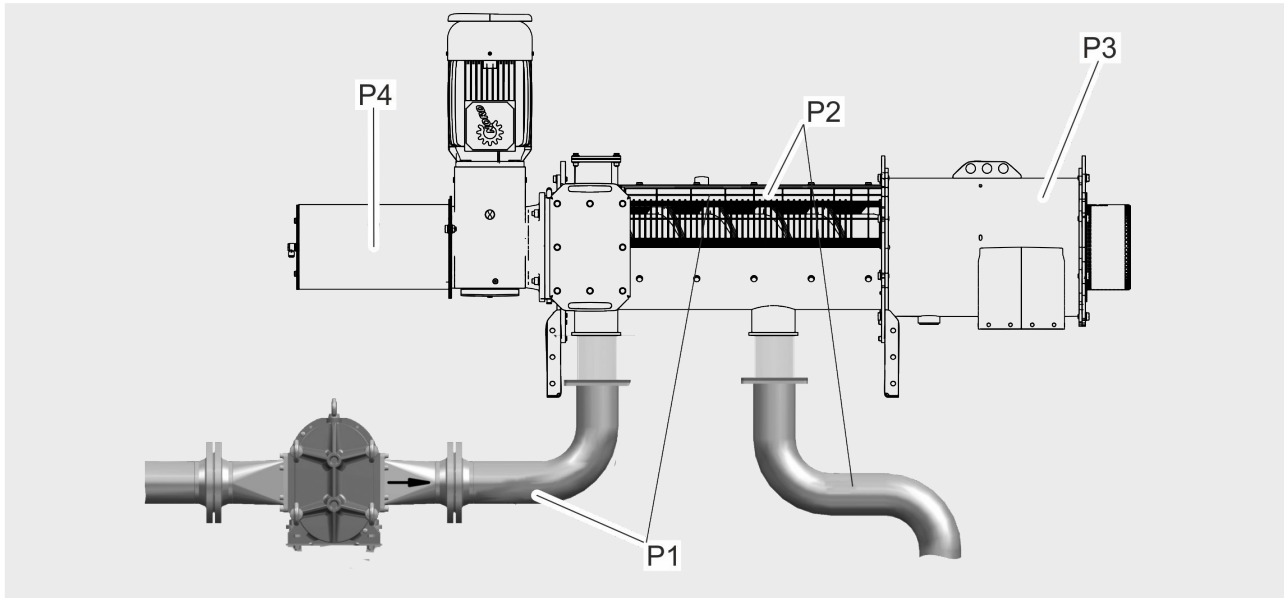
	Pressure resistance of the screen
Max. differential pressure	2 bar
	29 psi

	Separation effect
Min. differential pressure	80 - 300 mbar
	1.16 - 4.35 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.



RC 40 operation with RC-Control unit

Pressure	Operating limits	Short-term
P1 inlet pressure	0.2 to 2 bar	up to 2.5 bar
	2.90 psi to 29.00 psi	up to 36.26 psi
P2 liquid phase	-200 mbar to 100 mbar	-200 mbar to 100 mbar
	-2.90 psi to 1.45 psi	-2.90 psi to 1.45 psi
Differential pressure (DP) P1 – P2	0.1 bar to 2.2 bar	0.1 bar to 2.7 bar
	1.45 psi to 31.91 psi	1.45 psi to 39.16 psi

RC 30 operation with RC-Control unit

Pressure	Operating limits	Short-term
P1 inlet pressure	0.2 to 2 bar	up to 2.5 bar
	2.90 psi to 29.00 psi	up to 36.26 psi
P2 liquid phase	-500 mbar to 0 bar	-500 mbar to 0 bar
	-7.25 psi to 0 psi	-7.25 psi to 0 psi
Differential pressure (DP) P1 – P2	0.2 bar to 2.5 bar	0.0 bar to 3 bar
	2.90 psi to 36.26 psi	0 psi to 43.51 psi

- P3 = accumulated solid phase, variable
- P4 = Pre-tension of spring or pneumatic cylinder (Easy Shift), 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 auger, which results in an increased current consumption of the drive that eventually can cause damage to the device.

Operation with RC-Control unit:

- If the differential pressure of 2.2 bar (31.90 psi) at the RC 40 or 1.0 bar (14.50 psi) at the RC 30 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 auger, which results in an increased current consumption of the drive that eventually can cause damage to the device.

Current consumption limits RC 40

	with control unit	without control unit
Minimum	7 A	7 A
Optimum	11-11.4 A	< 9.5 A
Short-term	14 A	14 A
Maximum	17 A	17 A



NOTICE!

RC 40 - Current consumption limit

A power consumption in excess of 18 A can lead to motor damage.

- Auger jammed with thick matter.
- Auger can no longer be released / moved backwards.

In this case, the Bioselect RC separator would require manual cleaning as described in  *Chapter 6.1 "Machine care" on page 145.*

Current consumption limits RC 30

	with control unit	without control unit
Minimum	5 A	5 A
Optimum	8-8.3 A	< 6.9 A
Short-term	10 A	10 A
Maximum	12 A	12 A



NOTICE!

RC 30 - Current consumption limit

A current consumption in excess of 12 A can lead to motor damage.

- Auger jammed with thick matter.
- Auger can no longer be released / moved backwards.

In this case, the Bioselect RC separator would require manual cleaning as described in  *Chapter 6.1 "Machine care" on page 145.*

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!**

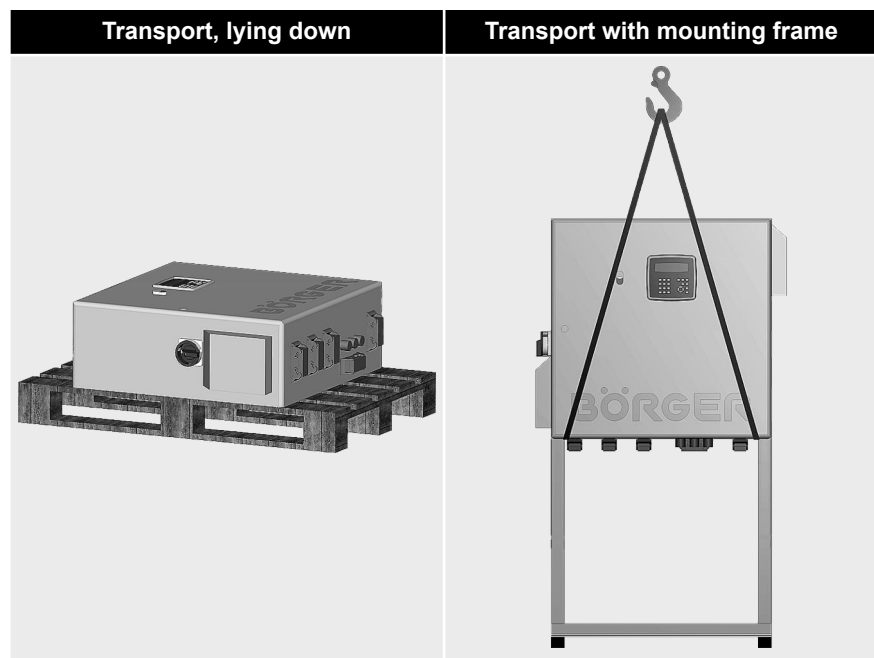
Packages can have their center of gravity elsewhere than in the middle. If not properly aligned, the package can tilt and fall. Falling or tilting packages can cause severe injuries.

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

**NOTE!****Weight distribution**

The weight of the control cabinet can be distributed asymmetrically, depending on the version.

Tool: ■ Hoists

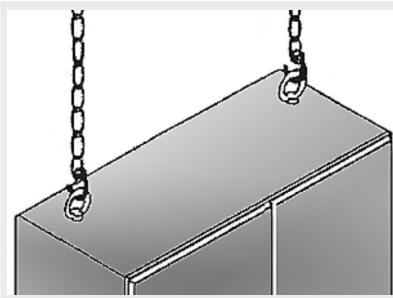


— Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 35.*

1. ➤ Observe the specifications in the hoist instructions, especially for the inclination angle allowed.
2. ➤ Transport the control cabinet using a suitable hoist.
3. ➤ If a special base frame with additional lifting lugs or forklift pockets was delivered, use them accordingly.
4. ➤ Transport the control cabinet lying down, e.g. on a pallet using a forklift truck.
5. ➤ Lift the control cabinet attached to the mounting frame with the assistance of a crane or forklift truck and holding belts in the manner shown here.

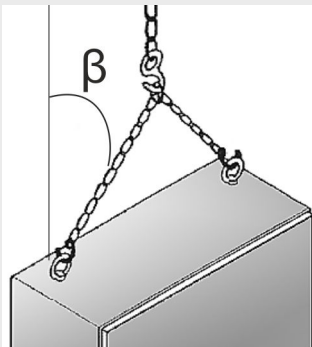
Installation on a wall:

1. ➤ Screw two M8 lifting eye bolts into the threaded sockets at the top of the control cabinet.
2. ➤ If necessary, use a suitable load lifting beam or two cranes.
3. ➤ Carefully lift the control cabinet using the crane(s).



The permitted load per lifting eye bolt when

- applying a symmetrical load and
- using two perpendicular hoists is **1000 N (225 lbf)**.



The maximum overall load when

- applying a symmetrical load and
- using hoists at an inclination angle β of 60° is **1600 N (360 lbf)**.

The maximum overall load when

- applying a symmetrical load and
- using hoists at an inclination angle β of 45° is **1200 N (270 lbf)**.

4.2 As-delivered condition

The control unit is usually set up for each respective application and delivered in a programmed condition.

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 damaging the electronic components in case of extreme weather and/or storage conditions!

Protect the control unit from heat, moisture and frost.

- The control unit may not be exposed to extreme weather conditions which cause the values to fall below or exceed the limits of the components.



NOTE!

Storage conditions

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

Always adhere to the following storage conditions for the control unit:

- 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 control unit from cold, particularly from frost, as well as from moisture, contamination and mechanical influences.
- 3.** ➤ Before commissioning / recommissioning at a later date, remove all protective covers and anti-corrosion coatings.

4.3.2 Interim storage

For the interim storage of a control unit, the following applies:

- 1.** ➤ Adopt appropriate measures to prevent the **formation of condensation** inside the control cabinet, e.g. by using a moisture-resistant cover, even in cases of interim storage for short periods.
- 2.** ➤ Follow the storage instructions in accordance with ↗ *Chapter 4.3.1 "Storage" on page 82.*

4.4 Installation

4.4.1 Setup

**NOTICE!**

Risk of damaging the electronic components in case of extreme weather and/or storage conditions!

Protect the control unit from heat, moisture and frost.

- The control unit may not be exposed to extreme weather conditions which cause the values to fall below or exceed the limits of the components.

1. ▶ Position the control unit so that the lateral ventilation openings of the unit are not blocked. The unimpeded inlet and outlet of air must be guaranteed.
2. ▶ Ensure that the protection from heat, cold, moisture and frost is sufficient.
3. ▶ Position the control unit so that it remains accessible at all times. The service space required for work on the control unit is 1.0 x 1.0 m (3.28 x 3.28 ft).

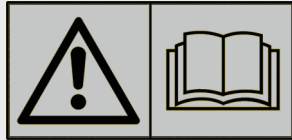
4.4.2 Installing the control cabinet

A second person is required for installing a control unit, which is supplied separately.

The control unit is wrapped in packaging material to protect it from dirt and scratching.

- 1.** ➤ Completely remove all the packaging material before commissioning.
 - ⇒ Mounting holes are located on the rear panel of the control cabinet.
- 2.** ➤ Take any necessary precautions to ensure that the sensitive electrical equipment is not damaged during installation.
- 3.** ➤ Secure large and heavy control cabinets during installation as described in  *Chapter 4.1 "Transportation" on page 79.*
- 4.** ➤ Install the control unit with suitable screws and washers on a straight, dry wall using suitable dowels or a suitable holding frame. For installation on a holding frame, use force-locked screw-locking devices.
- 5.** ➤ Align the control cabinet carefully using a spirit level. Compensate for uneven walls with washers, if necessary, so that the control cabinet is not tilted forward or backward.
- 6.** ➤ Check that all the terminal and fastening screws, which may have become loose during transportation and installation, are tight and retighten them if necessary.

4.4.3 Preparation for commissioning

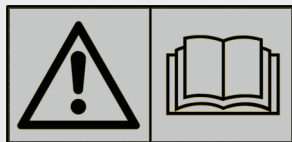


Further operating manuals / supplementary operating manuals

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.



NOTE! **Connecting pipes**

Ensure that all the pipes have been properly connected and do not leak.



NOTE! **Checking the direction of rotation**

Check the direction of rotation according to chapter 4.3.6 “Checking the Bioselect separator functions” of the operating manual for the RC separator and the rotary lobe pumps.

4.4.4 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)

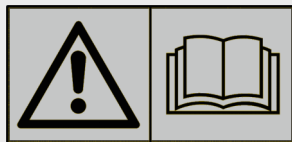


NOTE!

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.



NOTICE!

Risk of material damage due to impermissible changes to the frequency converter!

The overcurrent switchpoint at the frequency converters is preset according to the nominal current of the motors of the connected components.

The frequency converters switch off the motors with a type and temperature-dependent delay if the nominal current of the motors is exceeded 1.2-fold or more.

The parameter settings of the frequency converters must not be changed without prior consultation with Börger customer service. Otherwise, the warranty will be void.

The system must be completely installed before establishing the electrical connections.

1. ➤ Connect all electrical monitoring devices according to the operating manuals from the manufacturers.
2. ➤ Ground the control unit properly, see operating manual of the drive manufacturer. Also use the bore hole for the ground terminal.

3. ➤ Connect the pressure transmitters according to the enclosed circuit diagram.
4. ➤ Connect any additional components according to the enclosed circuit diagram, if the control unit has been designed for this purpose.
5. ➤ Connect any external control devices according to the enclosed circuit diagram, if the control unit is to be networked for remote operation.
6. ➤ Connect the power supply via an AC/DC sensitive residual current device (RCD Type B) according to the enclosed circuit diagram.
7. ➤ Ensure that the necessary power supply is reliably available.

Fully automatic or remote operation

If the system is to be operated fully automatically or linked to a network for remote operation: Connect the external control unit for remote operation according to the enclosed circuit diagrams.

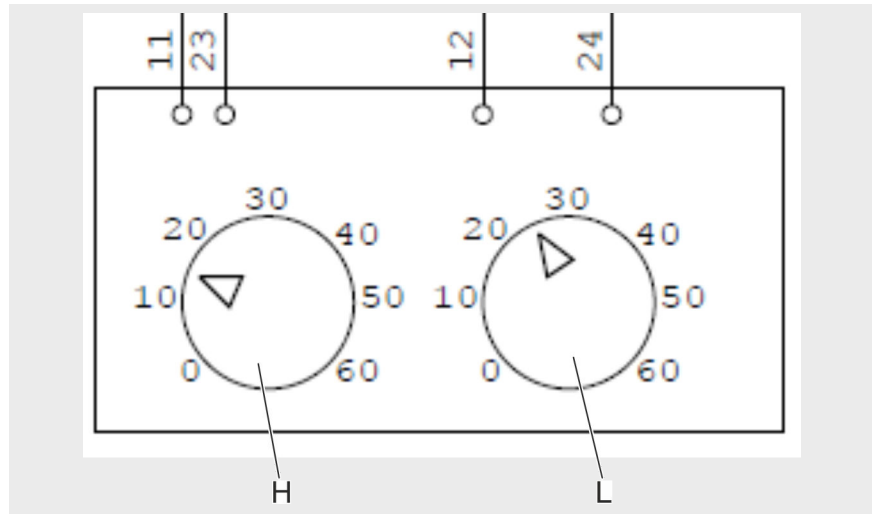
1. ➤ Connect the CEE plug, if available, to the power supply. Only insert the plug into an appropriate coupling.
2. ➤ Ensure that all phases in the power supply line (including the neutral conductor) are properly connected and fully functional.
3. ➤ Ensure that the necessary power supply is reliably available.
4. ➤ **Optional: connection to an external control unit**
 - **Option 1:** Connect the external control unit using the free connection in the control cabinet according to the enclosed circuit diagrams.
 - **Option 2: Profinet:** Use a PN-PN coupler on the 5-port switch, and plug the network cable into the PN-PN coupler. Please note the circuit diagrams in the appendix.



NOTE! **Profinet**

Your control unit can be upgraded with the Profinet option at any time.

4.4.5 Control cabinet climatization



The twin thermostat ensures the trouble-free operation of the built-in electric and electronic devices installed in the cabinet even in difficult operating conditions. It prevents, among other things, condensate formation or frost damage and protects against resulting malfunctions.

➔ Turn the temperature controllers for control cabinet climatization to:

- **Heater [H]** (red) - **15 °C** (59 °F)
- **Ventilator [L]** (blue) - **25 °C** (77 °F)

4.4.6 Secure installation / checking fastening screws

➔ Check that all the terminal and fastening screws, which may have become loose during transportation and installation, are tight and retighten them if necessary.

4.5 Checks before commissioning



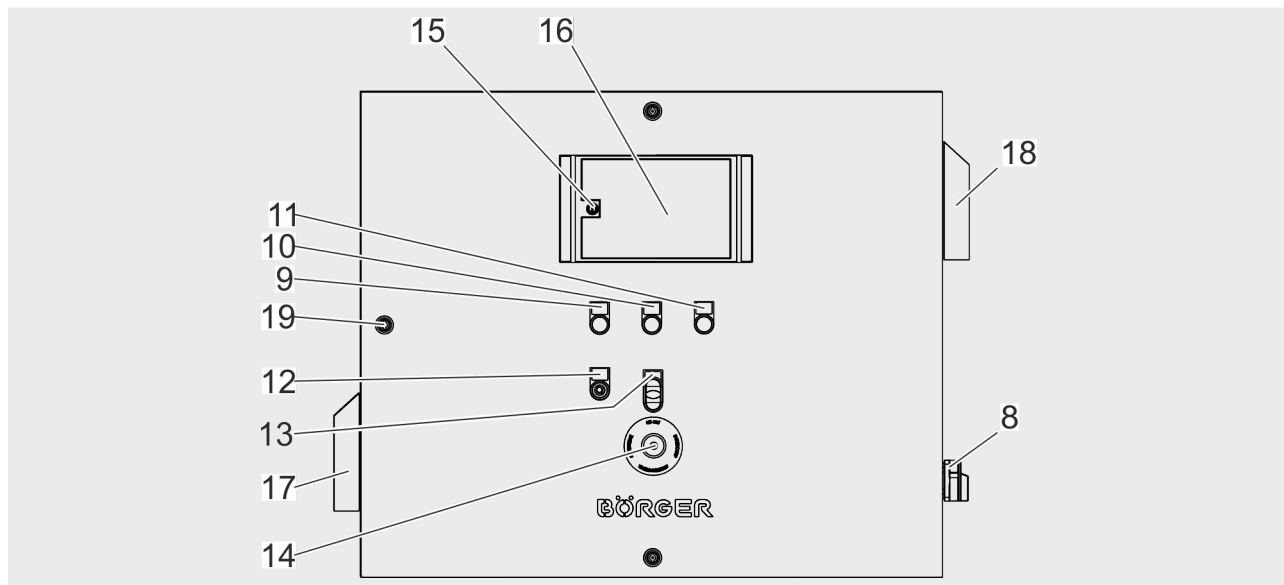
NOTE!

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.

5 Operation



1	RC-Control unit	11	Blue LED illuminated pushbutton for restoring readiness for operation after an EMERGENCY STOP
2	Bioselect RC with parallel shaft helical gear unit and electric motor	12	Potentiometer
3	Feed pump	13	Start button / stop button
4	Liquid phase pump	14	EMERGENCY STOP switch
5	Pressure transmitter	15	UV cover, lockable
6	Base frame	16	Operating terminal
7	Gate valve	17	Air outlet with outlet filter
8	Main switch	18	Air inlet with filter ventilator
9	Red LED indicator lamp, is lit in the event of malfunctions	19	Control cabinet lock
10	Yellow LED indicator lamp, is lit during automatic operation		

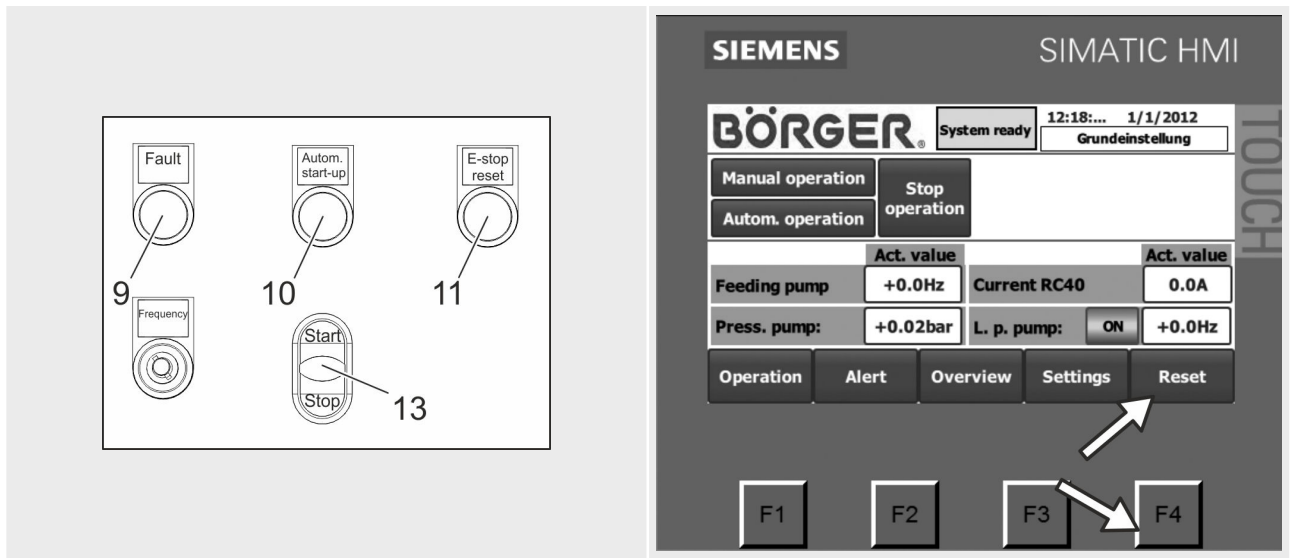
5.1 Commissioning



NOTE! Checklist for commissioning

A checklist for commissioning the Börger machine including control unit can be found in ↗ *Chapter 9.3 "Checklist for commissioning" on page 156.*

5.1.1 Switching on the control unit and checking the functions



1. ➤ Turn the main switch (8) to ON.
2. ➤ The control unit starts up (approx. 20 seconds).
3. ➤ When the main menu is displayed on the operating terminal, press the LED illuminated pushbutton "Emergency stop reset" (11).
4. ➤ Activate the **Reset** field in the main menu or touch field **F4**.
5. ➤ Verify the function of the connected pressure transmitters and any optional monitoring devices.

5.1.2 Password input, customization of password, user name and logoff time



NOTE! Password input

The functions and menus that permit an adjustment of the preset parameters are protected against unauthorized access with a password.

By factory default, two users, an operating person and a set-up user, are configured on the control unit.

- The default **password** for the **set-up user** (Einrichter) is **123456**.
- The default **password** for the **operating person** (Bediener) is **1234**.

**NOTE!****Access rights operating person**

The standard settings do not allow the **operating person** (Bediener) to change any values.

They are entitled to:

- select the operating mode,
- perform inching operation,
- start up the plant,
- view fault notifications and reactivate the system by pressing the **Reset** button,
- call up the menus for review purposes and
- change the password of the operating person as well as the user name and logoff time.

**NOTE!****Access rights set-up user**

The **set-up user** (Einrichter) is also not granted unlimited access to the parameters of the control unit.

They are additionally entitled to:

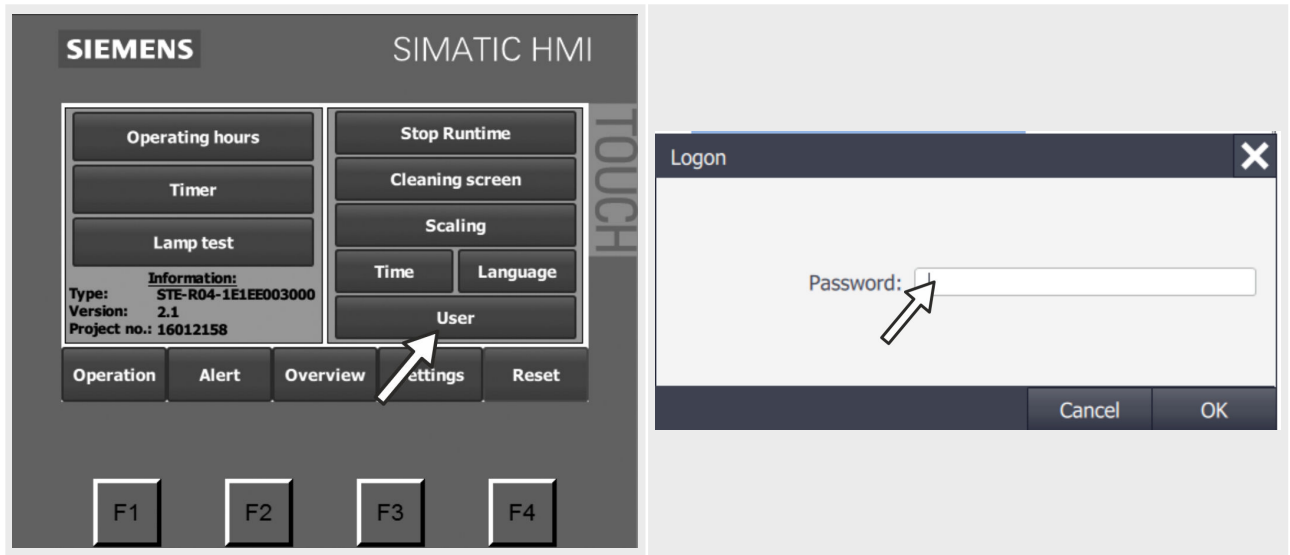
- set the date and time, lock the screen for cleaning, perform the lamp test in the **Settings** menu,
- reset the intermediate meters according to  *Chapter 5.7 “Resetting the intermediate meter” on page 141*,
- perform process-specific parameter settings in consultation with Börger customer service,
- change the password of the set-up user as well as the user name and logoff time.

**NOTE!****Renewed password request**

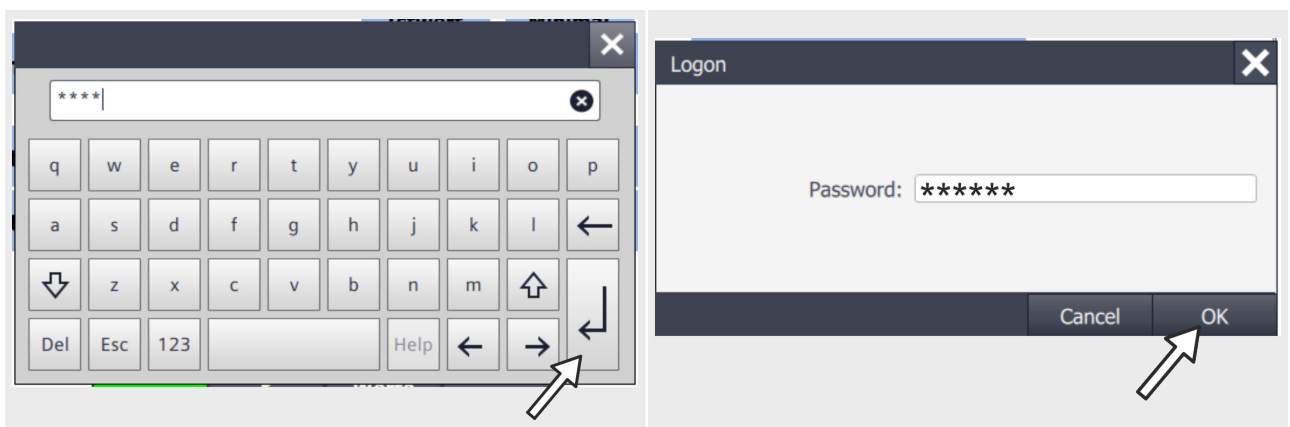
Once you have successfully logged in with a password, all the variable parameters remain accessible until no further input that requires a password has occurred for fifteen minutes. The relevant menu areas are then once more protected by a renewed password request.

Logging out via the **Logout** field in the **User** submenu immediately restores password protection.

1. In the **User** menu, you can change the password, the logoff time and the user name, see explanation below.
 - ⇒ On commissioning, the password should be replaced by a secure, individual password.
2. Keep the above-mentioned general password handy.

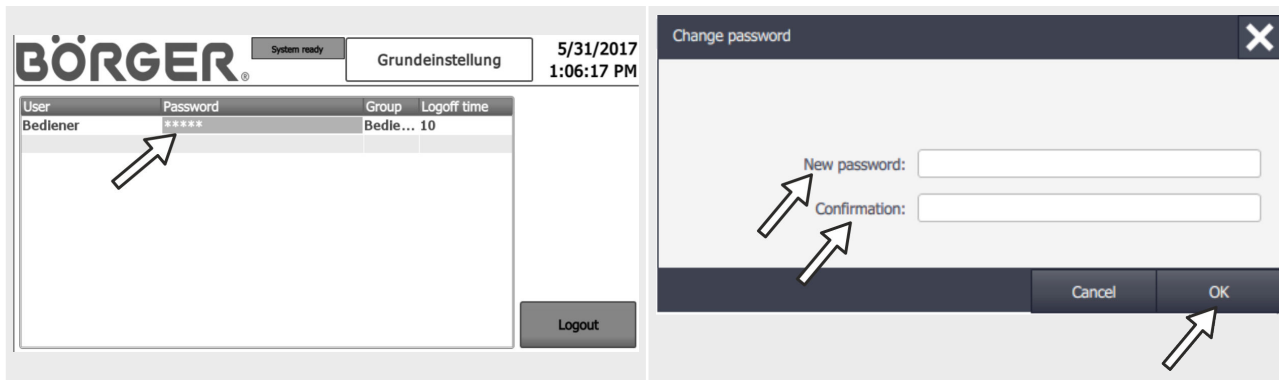


3. Select the **User** menu by touching the relevant field.
4. Unless you had already logged in, a login window for logging in with the corresponding password opens.
5. Touch the entry field **Password**.



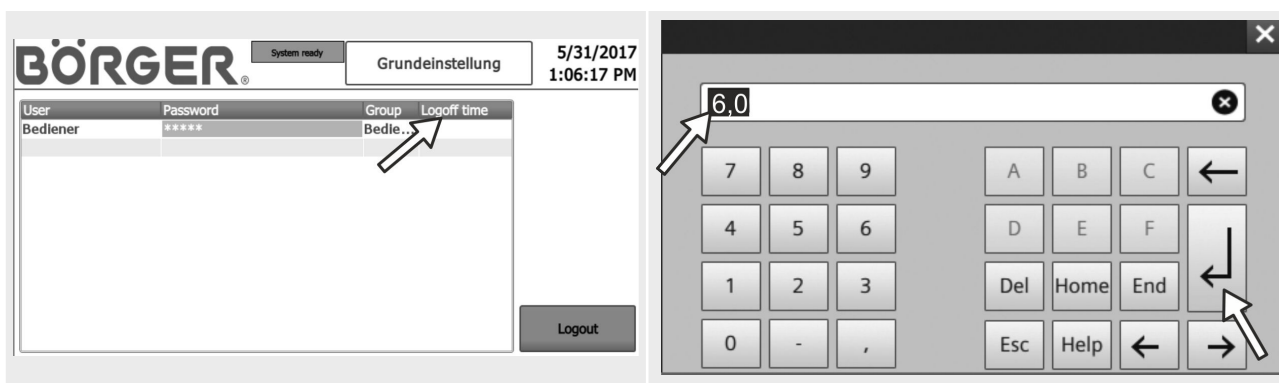
6. A window with a digital keyboard opens.
7. Enter the password and confirm with **Return** for it to be entered in the entry field.
8. Confirm your input in the entry field by touching the **OK** field.
9. Touch the **User** menu again.

10. Touch the field in the Password column.



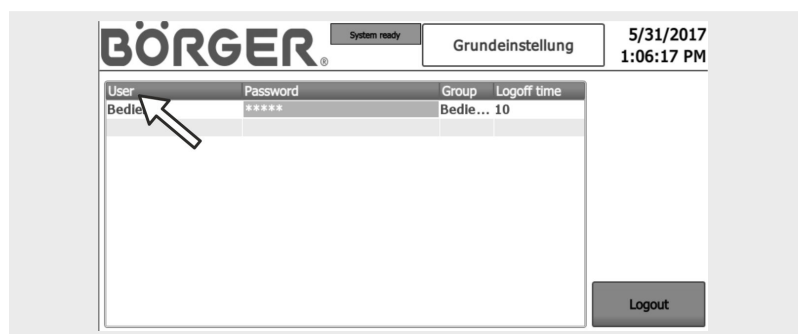
11. Use the digital keyboard, which opens when the Password field is touched, to enter the new password and the confirmation and accept your entries with **OK**.

12. If you wish to change the logoff time, touch the field in the **Logoff time** column.



13. Enter the required period (in the range of 1 to 60 minutes) from login to automatic logout.

14. Confirm the input with **Return**.

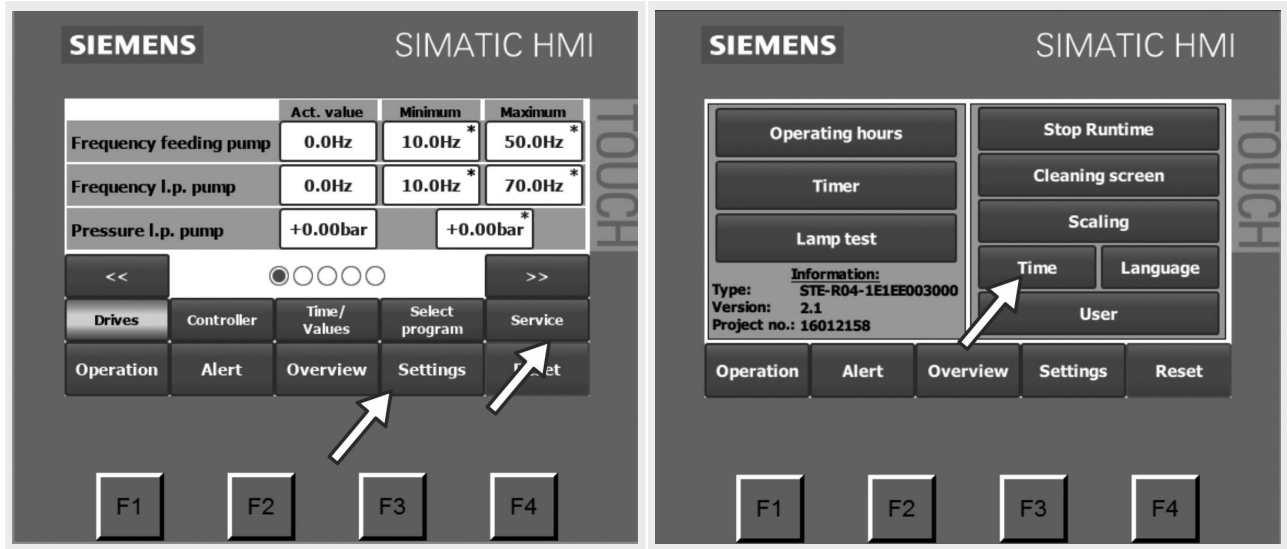


15. If you wish to change the user name, enter the new user name in the entry field **User**.

16. Confirm the input with **Return** for it to be entered in the entry field.

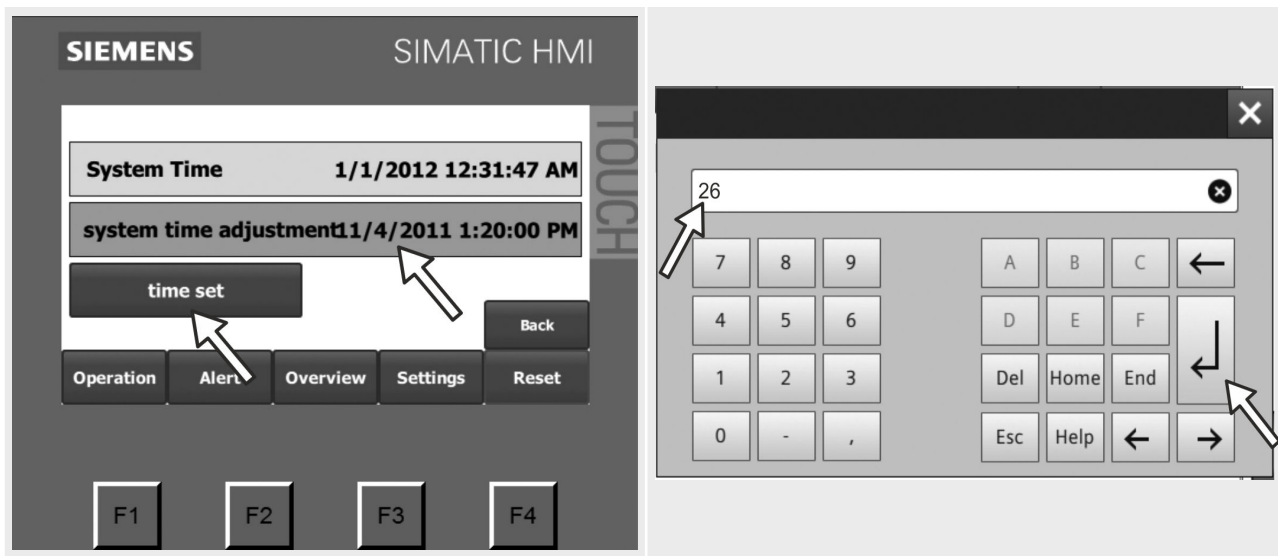
17. Confirm your input in the entry field by touching the **OK** field.

5.1.3 Setting the date and system time



The system time shown on the display can be corrected in order to adapt it to the local time, daylight saving time, or after longer power cuts.

2. Select the **Settings** menu by touching the relevant field.
3. Select the **Service** submenu.
4. For this work step, the set-up user password is required or you have to be logged in as set-up user already.
5. Touch the **Time** field.
6. Touch the **System time adjustment** field.
7. Enter the new value in the format MM/DD/YYYY HH:MM:SS using the keyboard that opens and confirm the input with **Return**.
8. Accept the set time by touching the **Time set** field.



5.1.4 Setting the limits, break-in period

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 3.9 “Technical data” on page 70 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.

**NOTE!**
Experiences

The frequency values are based on values which have proven their worth in practice. If necessary, the settings can be adapted by means of the control unit.

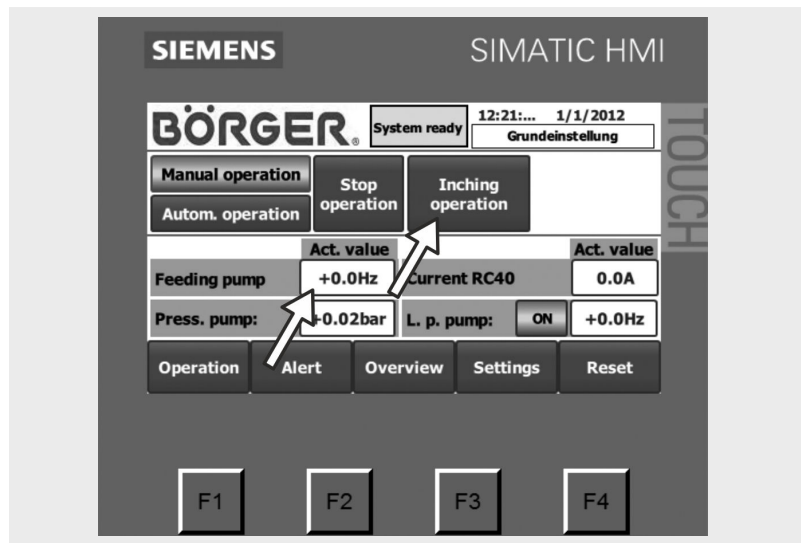
The device-specific values, the limits as well as the variable parameters for the Bioselect separation system are already pre-set according to the application specified in the order by factory default, see ↗ *Chapter 3.9.4 “Performance data and maximum loads” on page 71.*

Setting the frequencies

1. ➤ Adhere to the recommended system limits for continuous operation according to ↗ *Chapter 3.9.4 “Performance data and maximum loads” on page 71*, to the extent that nothing to the contrary has been agreed to in the particular case.
2. ➤ When the system is put into operation for the first time or put back into operation after complete emptying, a short break-in period (approx. 10 minutes) is necessary, so that the thick matter plug can form in the compactor unit. The frequency limits can then also be optimized for the substrate used, so that the required consistency can be achieved when the system operates at full capacity.

This break-in period is largely automated through the pre-set reaction times. Only the frequency of the feed pump needs to be reduced for the break-in period.

3. ➤ Select the **Inching operation** menu by touching the relevant field.



4. ➤ Regulate the frequency of the feed pump via the potentiometer (12) at the front, see chapter 5 "Operation" on page 92.
5. ➤ Reduce the maximum frequency of this drive for the break-in period as per the following table depending on the substrate fed. In doing so, proceed as previously described.

Feed pump values	Liquid manure		Digestate
	Swine	Cattle	
Hz:	20	15	12

5.1.5 Filling



NOTE! Increased liquid content

The first material discharged may have an increased liquid content until a thick matter plug has been formed.

**NOTE!**
Pre-filling

The feed line at the inlet of the feed pump should be filled, see the operating manual of the relevant rotary lobe pump. If the feed pump must be primed with substrate, it should be equipped at the inlet connection with a sleeve socket or a suitable device for pre-filling.

Pre-filling of feed pump during priming

- 1.** ➤ Adopt suitable measures to catch or drain the liquid if it may not enter the process.
- 2.** ➤ Open any valves.
- 3.** ➤ Loosen the screw plug, if present, of the sleeve socket in the feed pipe connection of the feed pump.
- 4.** ➤ Fill with substrate or at least 4 to 5 liters (1.057-1.321 gal) of water (e.g. with a water hose).
- 5.** ➤ Close the sleeve socket with the screw plug.

5.1.6 Breaking in
Pre-filling of feed pump during priming

- 1.** ➤ Adopt suitable measures to catch or drain the liquid if it may not enter the process.
- 2.** ➤ Open any valves.
- 3.** ➤ Loosen the screw plug, if present, of the sleeve socket in the feed pipe connection of the feed pump.
- 4.** ➤ Fill with substrate or at least 4 to 5 liters (1.057-1.321 gal) of water (e.g. with a water hose).
- 5.** ➤ Close the sleeve socket with the screw plug.

**NOTE!****Current consumption of the motor**

Target value for the **current consumption** of the motor on the separator drive:

- For the **Bioselect RC 30** this value is **8 A**.
- For the **Bioselect RC 40** this value is **11 A**.

This value should be reached during the break-in period for the separation system to operate at optimum efficiency.

**NOTE!****Changing the frequency**

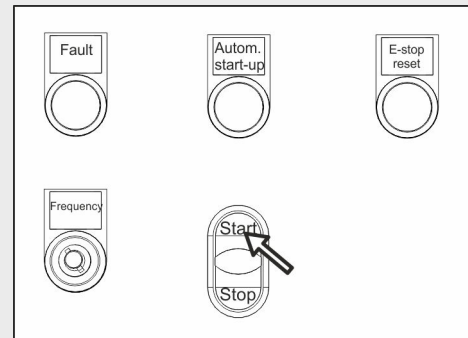
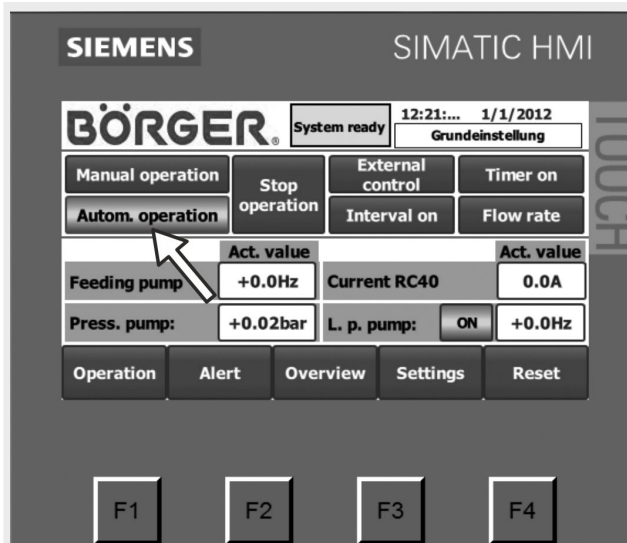
Only change the frequency during breaking in in small increments (2 to 3 Hz), until the optimum result is achieved.

- Bear in mind that it takes about a minute before an adjustment of the parameter settings affects the liquid content / the DS content of the solid phase.

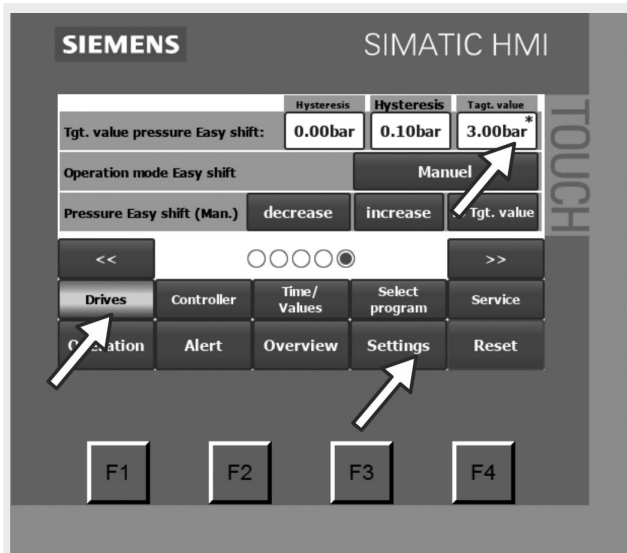
**NOTE!****Liquid content of the thick matter**

- To regulate the liquid content of the thick matter, the pre-tension of the Multi Disc (rotating cap) can be adjusted according to chapter 5.2 of the operating manual of the Bioselect RC separator, and/or the pressure in the pneumatic cylinder of the Multi Disc (rotating cap) can be changed.

1. Select the "Automatic operation" operating mode.



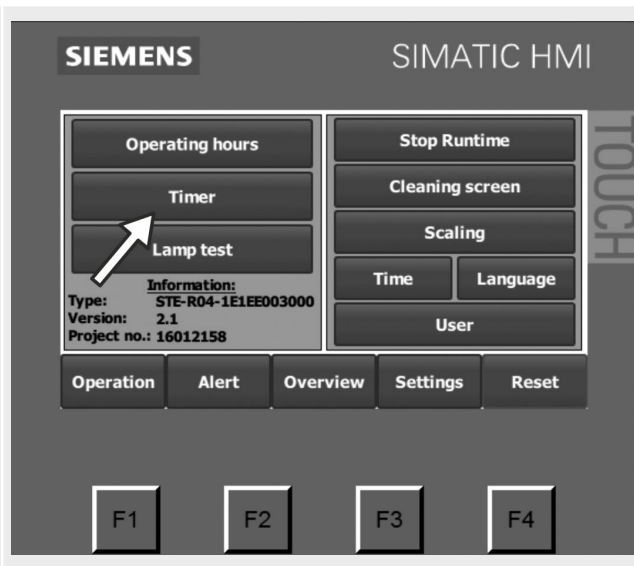
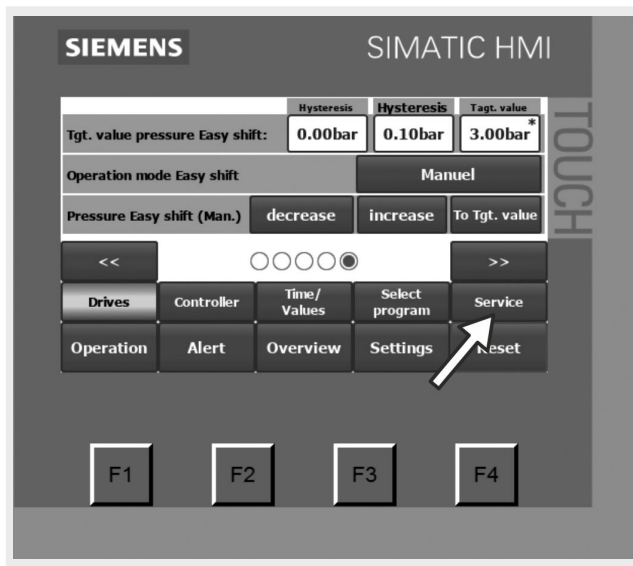
2. Start the drives by pressing the start button on the RC-Control unit.
3. Select the **Settings** menu.
4. Select the **Drives** submenu.
5. Select the field to be set by touching it.



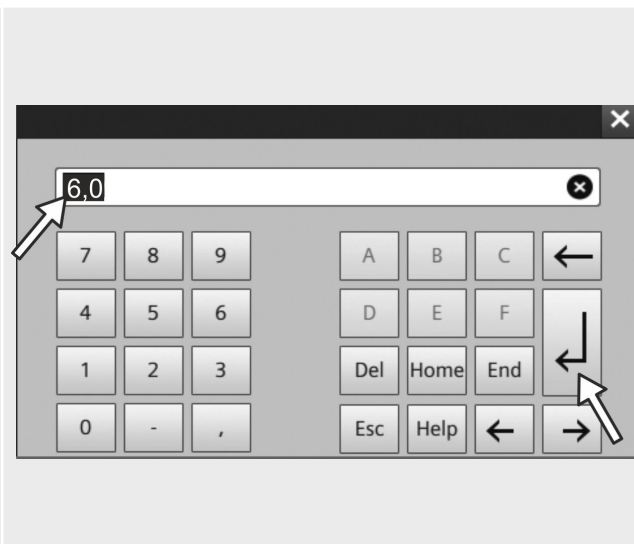
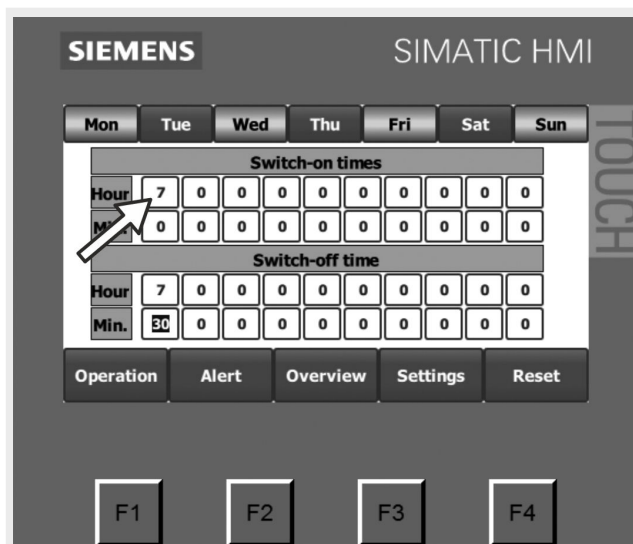
6. Enter the required value using the keyboard window that opens, and accept the input with **Return**.

5.1.7 Setting the operating cycle for timer operation

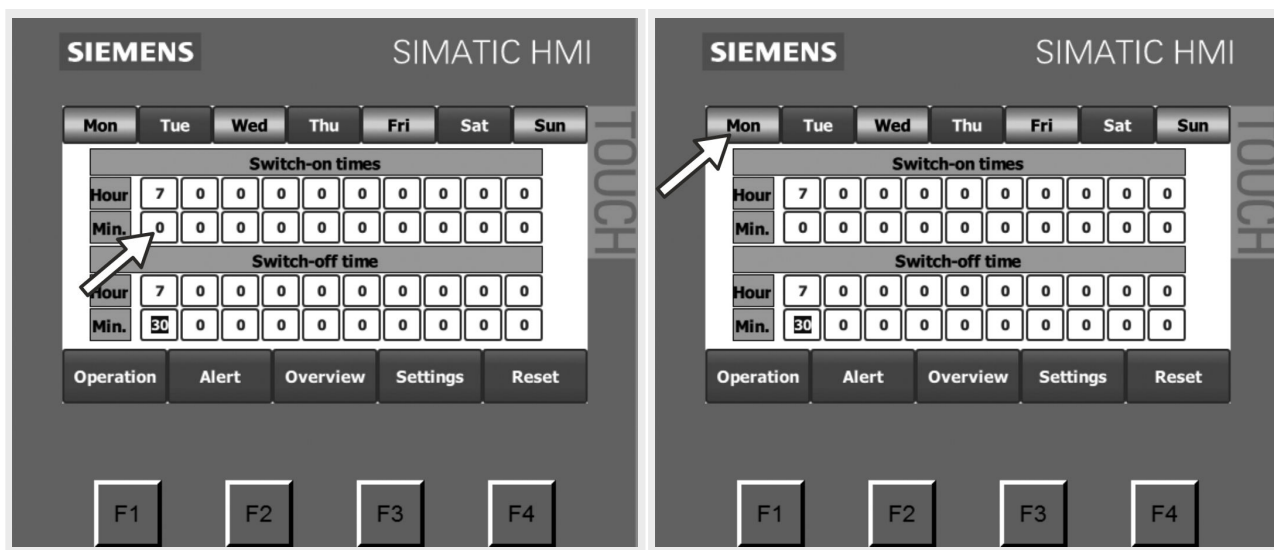
If the system is to be run in time-dependent operation (timer operation), the switch-on and switch-off times must be set in the **Timer** menu. This setting can also be performed during automatic operation. Timer operation can be activated and deactivated during automatic operation at any time.



1. Please ensure that the date and time settings are correct.
 - Otherwise, correct the setting as described in [Chapter 5.1.3 “Setting the date and system time”](#) on page 97.
 - In respect of longer interval breaks, observe the notes in [Chapter 5.3.1 “Downtimes of connected components”](#) on page 112.
2. Select the **Timer** menu.



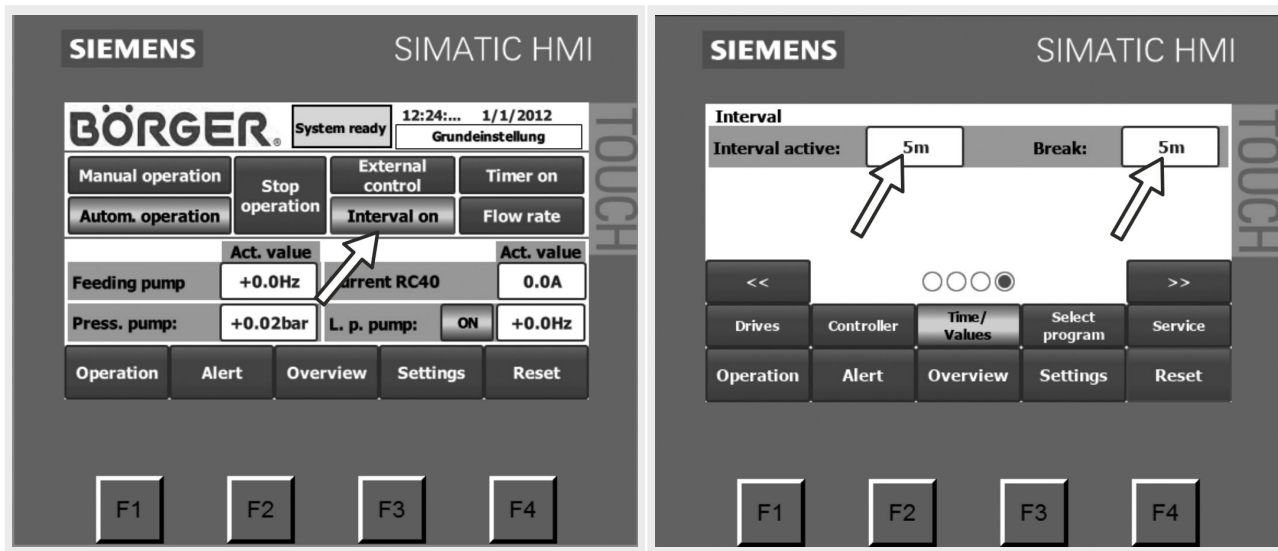
3. You can program up to 10 switch-on and switch-off times. You can subsequently select the days on which these apply. The components will remain switched off on days that have not been selected. The switch-on and switch-off times are entered in two steps: first the hour, then the minute below.
4. Select the first hour field under **Switch-on times**.
5. Enter the required hour for the system to switch on using the keyboard window that opens and accept the input with **Return**.
6. Select the minute field below.



7. Enter the required minute for the system to switch on using the keyboard window that opens and accept the input with **Return**.
8. Proceed accordingly to save switch-off times and further switch-on times.
9. Touch the field until it is highlighted in order to select the days of the week to which the saved switch-on and switch-off times are to apply (the system remains stationary on days which have not been selected).

5.1.8 Setting the operating cycle for interval operation

If the system is to work in the "Interval" operating mode, the operation and break intervals must be set in the main menu. These settings can be made before, during or after the break-in period. The intervals can range from 1 minute to 999 minutes.



1. In respect of longer interval breaks, observe the notes in [Chapter 5.3.1 "Downtimes of connected components"](#) on page 112.
2. Touch the **Interval on** field.
3. To set the intervals, touch the field displaying the minutes.



4. Enter the required working time using the keyboard window that opens, and accept the input with **Return**.
5. Proceed accordingly to save the break time.

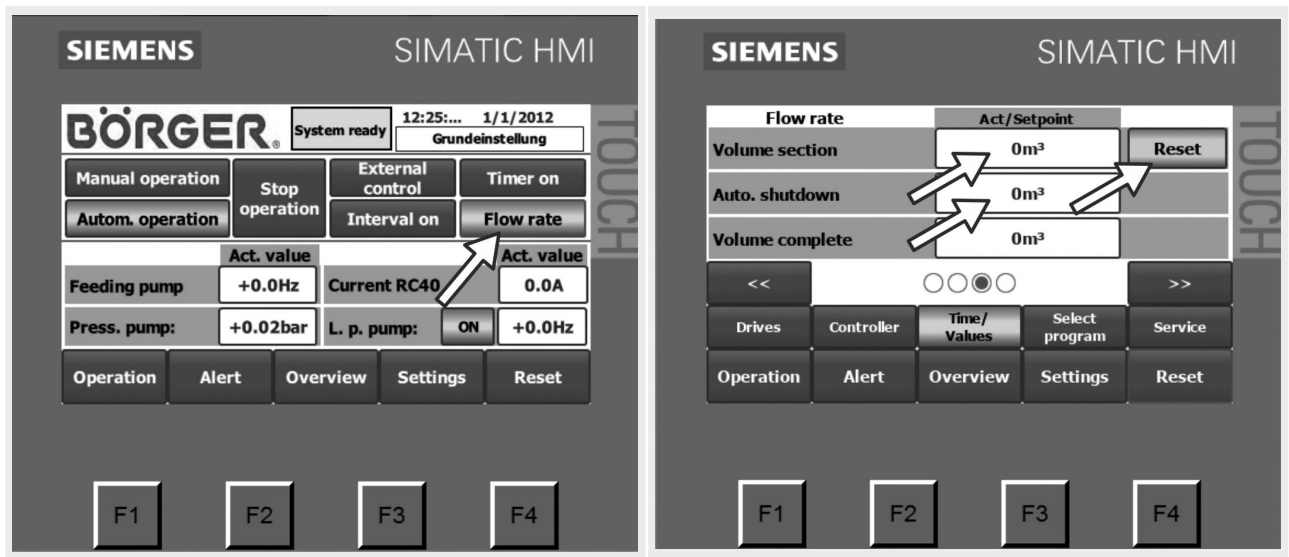
5.1.9 Flow rate

**NOTE!**
Flow rates

The flow rates are calculated based on the geometric displacement volumes of the rotary lobe pumps (in new condition).

The volume actually delivered usually deviates from the geometric displacement volume calculated because of the consistency of the substrate and the condition of the pump.

If more precise volume specifications are needed, a suitable measuring device must be provided.

Activation field Flow rate:

1. Select the **Flow rate** field by touching it.
2. Select the field displaying the flow rate value (volume section or automatic stop).

3. Enter the required flow rate using the keyboard window that opens, and accept the input with **Return**.



4. Start the process by pressing the START button (13).
5. Activate Reset to set volume section to 0 (only possible when the machine is at standstill).

5.1.10 Adjusting control parameters



NOTICE!

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

The nominal current settings of the motor at the motor protection switch or at the frequency converter must not be changed. Non-compliance may lead to motor 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!

Adjustments of parameters

Should adjustments of the control parameters be required, please contact Börger customer service.

5.2 Automatic operation and manual operation

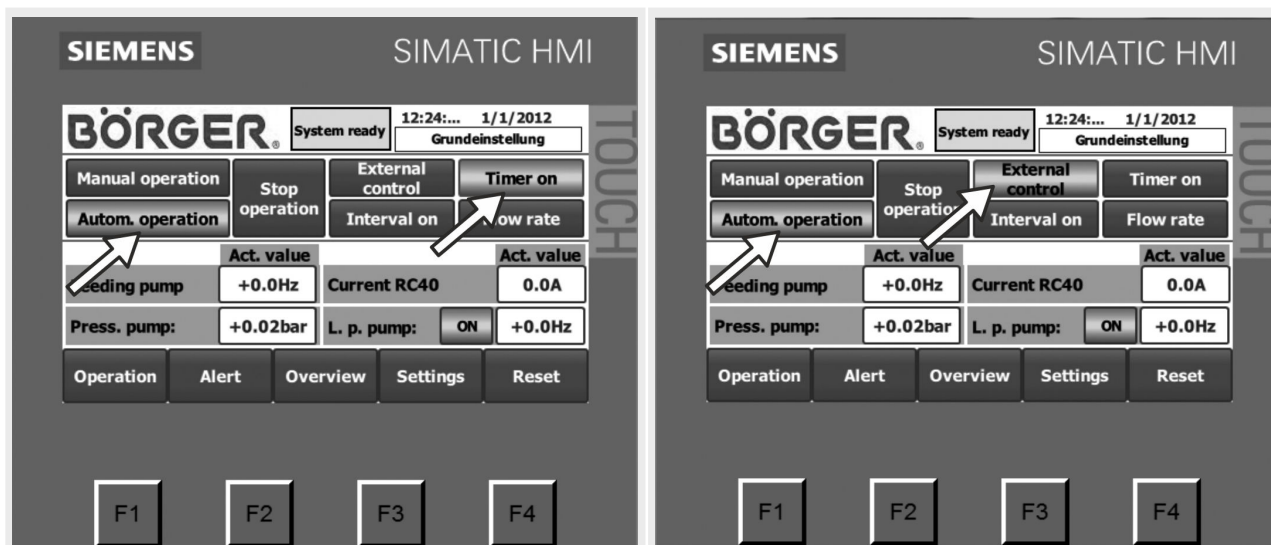


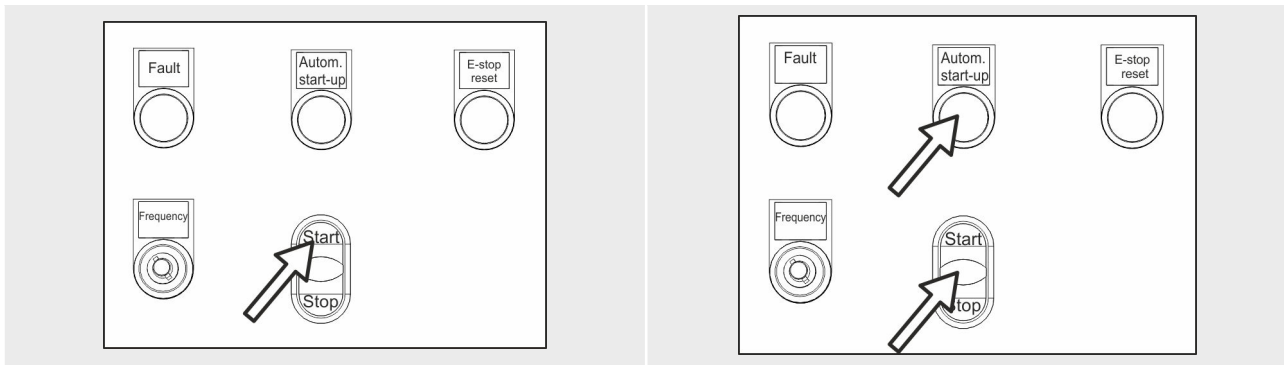
NOTE! Automatic operation

In general, Börger Bioselect separation systems are suitable for automatic continuous operation within the scope of the pre-set pressure and output limits, provided the substrate remains unchanged and homogeneous, and, according to the selected operating mode, can work continuously in interval operation or be externally controlled.

- The Bioselect separation system is operated in **Automatic operation**.

Automatic operation





1. ➤ For **Automatic operation**, activate the timer by touching the **Timer on** field if timer operation in accordance with pre-defined times is required according to [Chapter 5.1.7 “Setting the operating cycle for timer operation”](#) on page 104.
2. ➤ For **Automatic operation**, activate externally controlled operation by touching the **External control** field if an external control unit has been connected whose signals are to start up and stop the components.
3. ➤ Press the start button if controlled automatic operation is to be started without a timer and without an external control unit.
4. ➤ During trouble-free operation of the components, the indicator light of the start-stop button will be lit in all operating modes.

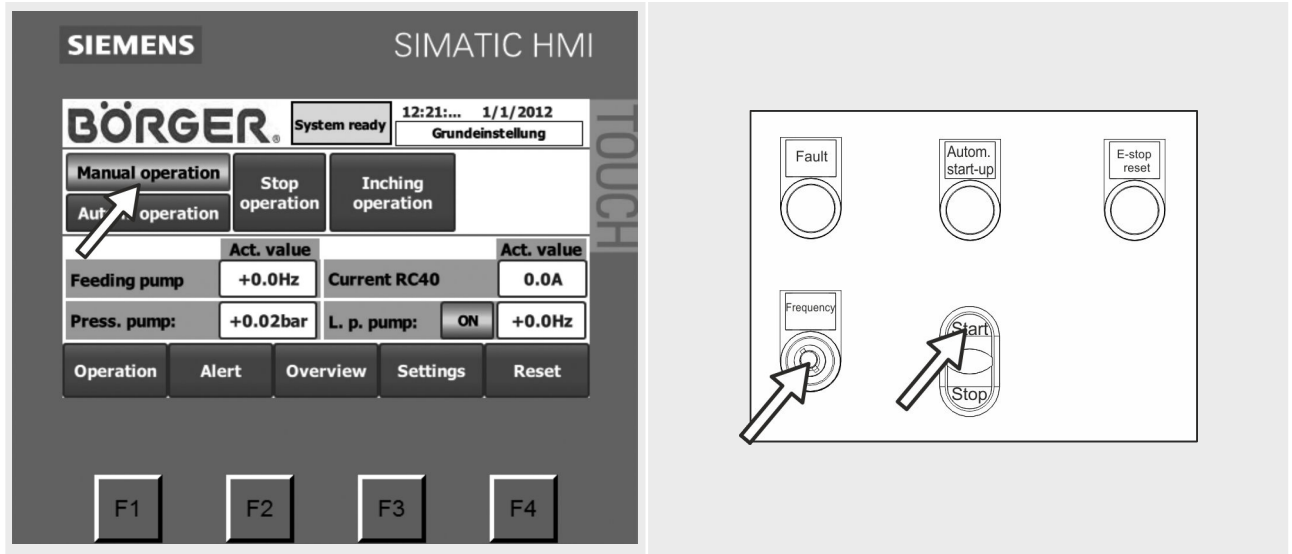
During timer operation and externally controlled operation, the yellow LED indicator lamp **Autom. start-up** will be lit before any automatic start-up of the components.



NOTE! Manual operation

The **Manual operation** operating mode is used for function testing during inching operation, for example. Manual operation is also used for short-term, uncontrolled operation, e.g. for pre-filling the system. The speed settings of the feed pump are made manually via the potentiometer located at the front.

Manual operation



1. ➤ Upon completion of all preparatory tasks, select the operating mode by pressing the corresponding field until it is highlighted.
— **Manual operation** for short-term uncontrolled operation.
2. ➤ For **Manual operation**: Press the start button. The motors of the connected components start with the speeds specified for manual operation.
3. ➤ Regulate the speed of the feed pump via the potentiometer at the front.

5.3 Downtimes

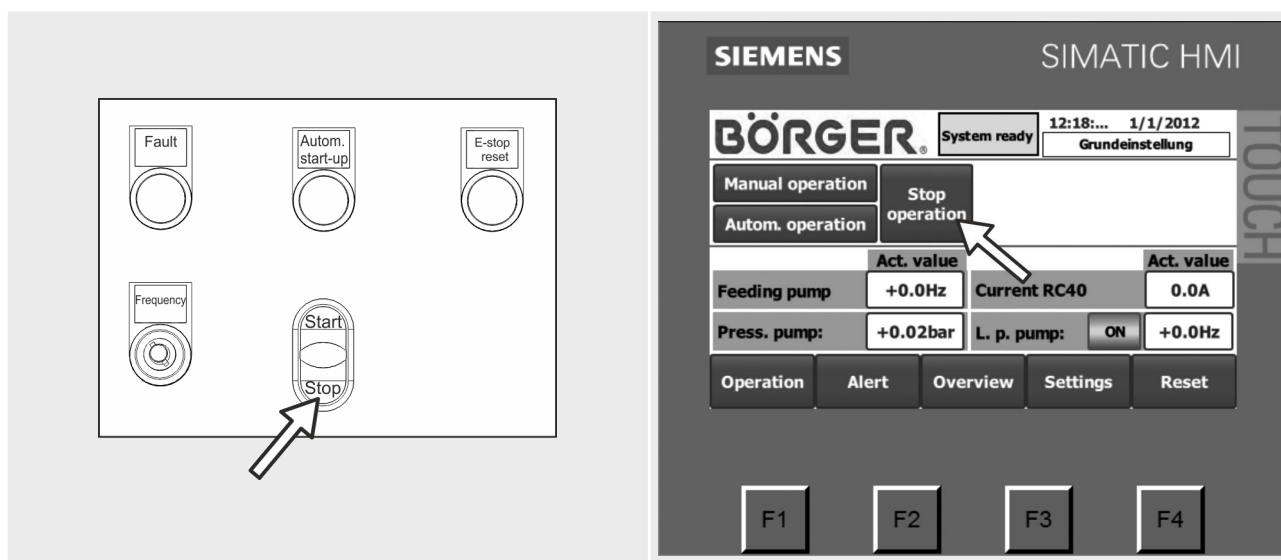
5.3.1 Downtimes of connected components



NOTE! Manual switch-off

If **Automatic operation** has been activated, the control unit remains switched on during regular operation. The motors of the connected components are switched on and off in accordance with the signals provided by the timer if the Timer is activated, or in accordance with the signals provided by the connected external control unit if **External control** is activated (LED indicator lamp **Autom. start-up** is lit).

Manual switch-off



➔ Switch off the motors of the connected components manually by pressing the **stop button** at the control unit or end the operating mode by touching the **Stop operation** field.

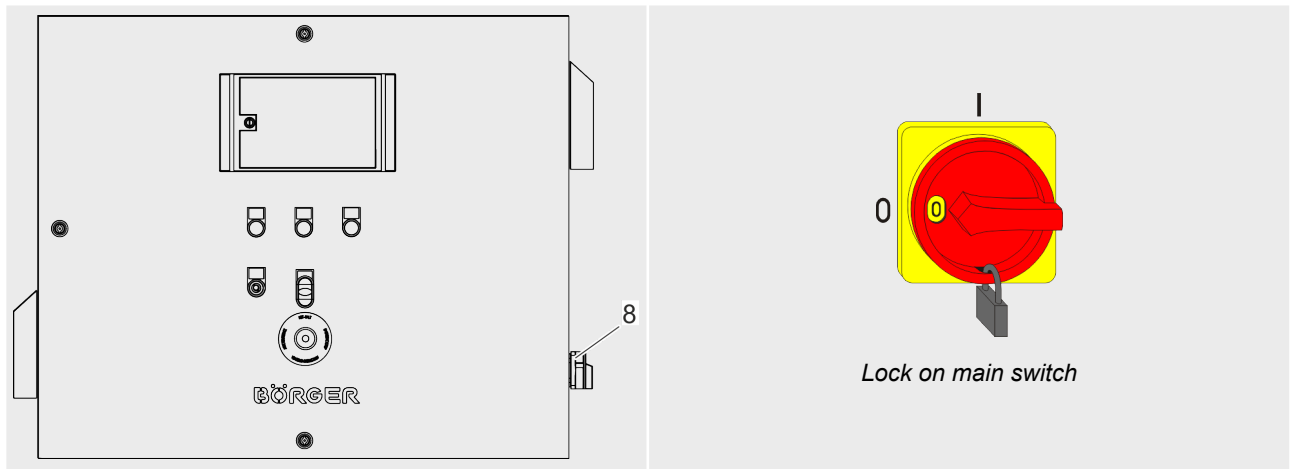
5.3.2 Switching off the control unit



NOTICE!

Risk of material damage when switching off the control unit during ongoing operation!

Only switch off the control unit if the pump and other components are already switched off.



1. ➤ In order to switch off the control unit, turn the main switch (8) to the OFF position.
2. ➤ For any maintenance work, please ensure that the control unit cannot be switched on again accidentally, for example by locking the main switch with a U-lock.

5.4 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.

5.5 Service programs



NOTICE!

Risk of material damage caused by long lasting emptying and backward operation!

When using the emptying and backwards programs, ensure that the system is stopped on time.

The rotary lobe pumps should – depending on the version – not, or only for a short time, run dry, i.e. without pumped medium.

At low frequencies, less frictional heat is generated so that the risk of damage is reduced. At higher frequencies, the risk of damaging rubber coated rotors increases substantially.

The auger of the Bioselect RC separator must not rotate for a lengthy period of time without being supplied with fibrous substrate. This would lead to too much material being removed from the natural fiber brush and from the thick matter plug. In addition, lengthy dry run periods may damage the wedge wire screen.



WARNING!

Health hazard, e.g. due to the release of explosive gases.

The RC-Control unit permits backward operation of the connected feed pump for the purpose of emptying the system and for troubleshooting purposes.

Depending on the application, this backward operation or prolonged backward operation could be associated with dangers. In the event of prolonged backward operation of the pump at a high frequency, air might be pumped into the substrate tank.

The operator must take this into account in their hazard assessment and take all necessary measures, if required.

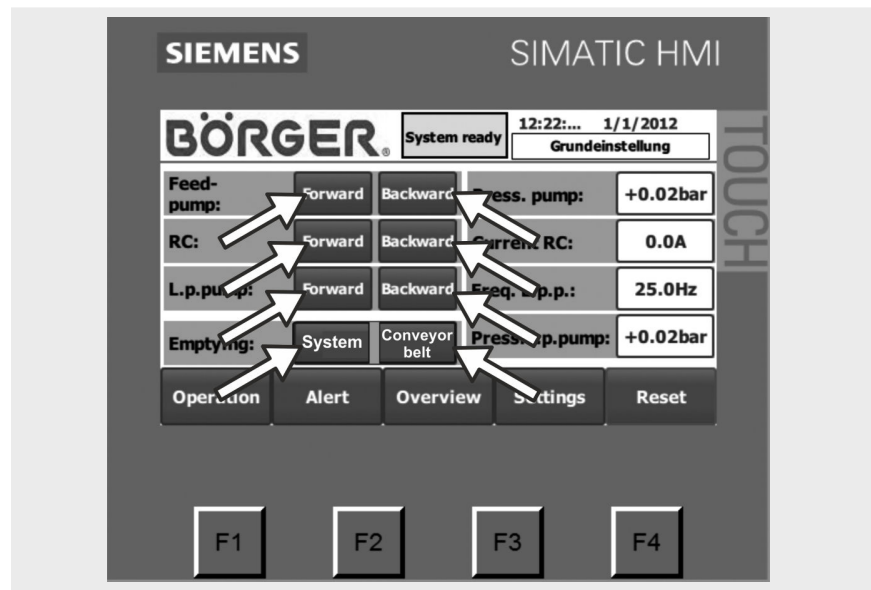


NOTE!

“Emptying” program

If the emptying program has been performed, the solid phase can temporarily have a higher liquid content after the restart.

In **Manual operation**, the program **Emptying and Conveyor** can be started and the components can be run forwards and backwards. The corresponding motors start without an additional start-up process for the duration of the touch when the corresponding field is touched. The motors stop as soon as the corresponding field is released.



1. "External control" operating mode:

The service program "Emptying" described in chapter 5.5.1 cannot be used in externally controlled operation because the presence of the operating personnel is necessary to check on the process on site.

2. Deactivate the "External control" operating mode for the work steps on site described in the following chapters and activate the "Automatic operation" operating mode, by touching the "Automatic operation" field until activation is signaled by the field being highlighted in green and the green highlighting of the "External control" field is switched off.

5.5.1 Emptying

**NOTICE!**

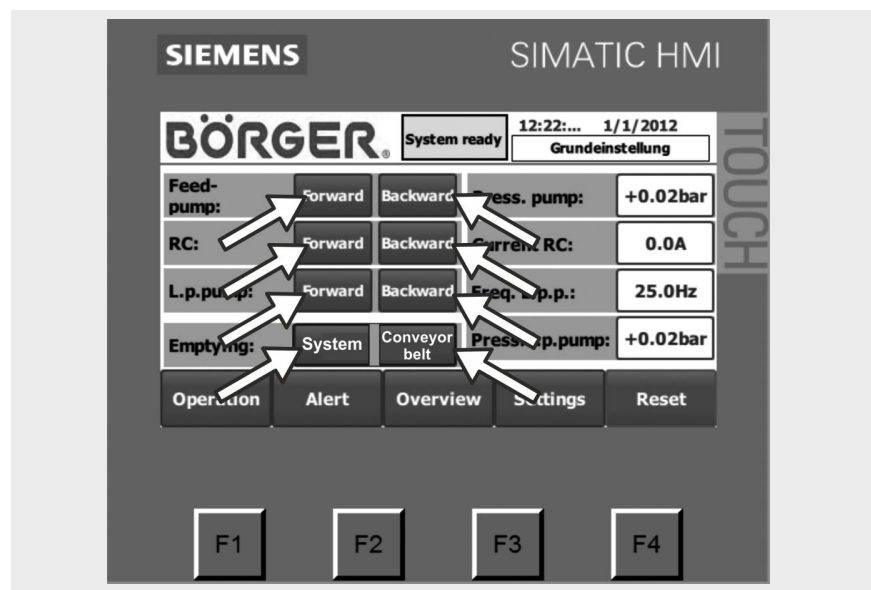
Flushing for an extended period of time may cause damage to the natural fiber brush and the thick matter plug.

Do not flush longer than necessary.

- Otherwise, too much material may be removed from the natural fiber brush and from the thick matter plug.
- The wedge wire screen can get damaged, if the Bioselect auger rotates for a lengthy period without being supplied with fibrous substrate.
- **Börger recommends flushing for only 30 to 60 seconds, depending on the kind of the substrate (consistency of the natural fiber brush).**

In the "Emptying" program mode, the system can be flushed by feeding a cleaning substrate (e.g. water) before it is, for example, transported to a new location or temporarily placed in interim storage.

- In the process, the direction of rotation of the feed pump is changed from forwards to backwards.



1. Stop the supply of the substrate by closing the valves of the feed line or removing the suction hose and connect the line or the hose to feed the cleaning substrate (e.g. a water hose) to the feed pump, e.g. to an optional ball valve.
2. Start feeding the cleaning substrate / water.
3. Activate the "Emptying" program by touching the **System** field until activation is signaled by the field being highlighted in yellow.
4. If necessary, start the **Conveyor** by touching the corresponding field.
5. Terminate the "Emptying" or "Conveyor" program by releasing the corresponding field.
6. When recommissioning, observe the relevant instructions in [Chapter 5.1 "Commissioning" on page 92](#).



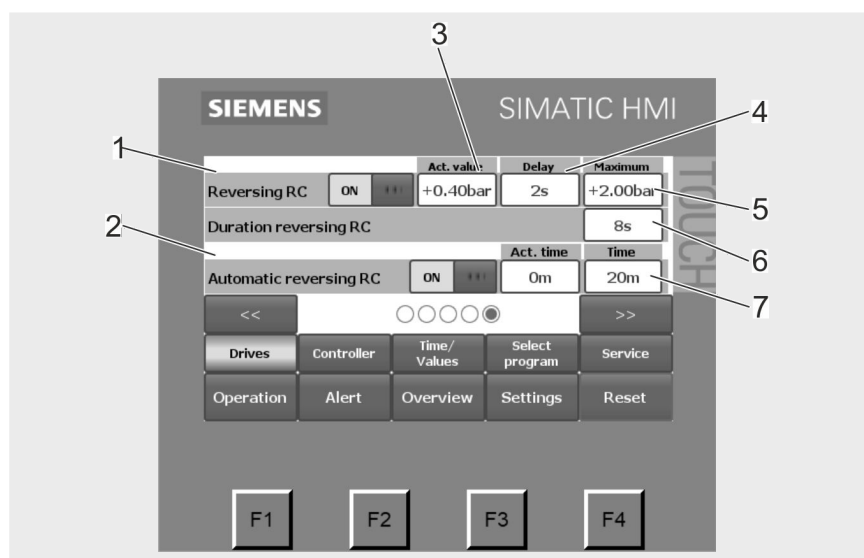
NOTE!

Nevertheless, if the location of the system or the substrate fed has changed, the gradual adjustment of the frequencies, according to [Chapter 5.1.5 "Filling" on page 100](#) is necessary once more.

**NOTE!****Adjustments of the frequencies**

Nevertheless, if the location of the system or the substrate fed has changed, the gradual adjustment of the frequencies, according to Chapter 5.1.5 "Filling" on page 100 is necessary once more.

5.5.2 Reversing, automatic



1	Pressure-dependent reversing	5	Max. pressure
2	Time-dependent reversing	6	Duration of reversing process
3	Actual pressure	7	Time interval
4	Delay time		

**NOTE!****Pressure-dependent reversing (1)**

The function **pressure-dependent reversing (1)** is used for cleaning the wedge wire screen.

- If the actual pressure (3) increases to the max. pressure (5) in the separator and the delay time (4) has expired, the separator reverses once for approx. 8 sec. (adjustable (6)).
- The feed pump also reverses briefly for approx. 3 sec.
- Any liquid phase pump installed is stopped during the reversing process.
- After completion of the reversing process, the separator returns to normal operation.

**NOTE!****Time-dependent reversing (2)**

The function **time-dependent reversing (2)** is used for cleaning the wedge wire screen.

- **Pressure-dependent reversing (1)** must be **activated** for this purpose.
- After an adjustable time interval (7) has expired, the separator reverses once for approx. 8 sec. (adjustable (6)).
- The feed pump also reverses briefly for approx. 3 sec.
- Any liquid phase pump installed is stopped during the reversing process.
- After completion of the reversing process, the separator returns to normal operation.

**NOTE!****Parameters for reversing**

The **values set for reversing** are suitable for the majority of applications. Depending on the substrate being fed, adjustments within the scope of the limits may, however, be useful for successful reversing in individual cases.

Changes to the **delay time** can lead to undesirable results:

- A delay time that is too short or the omission of a delay time can lead to frequent system downtimes due to slight, harmless fluctuations in the feed substrate.
- A response time that is too long may result in damage to the separator.

Always make necessary adjustments to the reversal settings in small increments.

5.5.3 Backward operation

**NOTE!****Establishing the transporting function**

If this has not restored the transporting function, you should consider trying a releasing process with the lowest possible pre-tension on the Multi Disc (rotating cap). Before doing so, measure the installation length of the spring under tension and pre-load the tension spring to the required length before recommissioning.

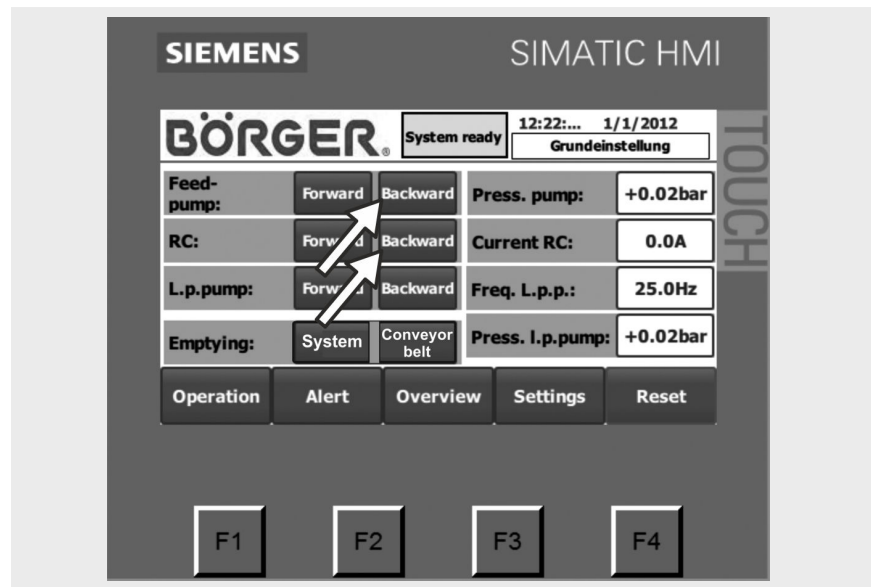
For the design "Pressure adjustment by compressed air" reduce the pressure to a minimum.

If this has not restored the transporting function, the Bioselect must be cleaned by hand and checked for damage, see the operating manual of the Bioselect RC separator.

If the **press channel** has been blocked by too much dry material and/or the auger has become stuck in solids, the thick matter plug can be loosened in manual mode and the material can be discharged **backwards**.

In order to liberate the substrate from the feed unit, the feed pump should initially be run backwards at a **low frequency** for 5 seconds, if the hazard assessment of the operator permits to do so.

The separator should then run backwards for a maximum of 10 seconds.



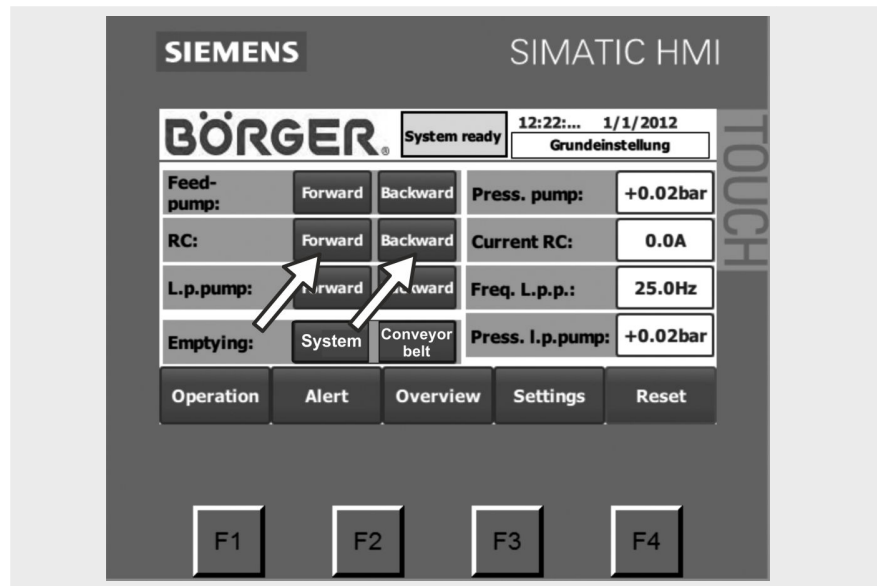
1. ▶ Regulate the frequency of the feed pump via the potentiometer to level 0 (lowest frequency).
2. ▶ Activate the **Backward** field of the feed pump for approx. 5 seconds.
3. ▶ Activate the **Backward** field of the RC by touching the relevant field and maintain the contact for approx. 10 seconds.
4. ▶ Terminate running backwards by releasing the **Backward** field.
5. ▶ If it is discovered that the fault has not been remedied when operation is resumed, repeat the process.
6. ▶ Reactivate the required operating mode according to *Chapter 5.2 "Automatic operation and manual operation" on page 109.*

5.5.4 Cleaning the filter / loosening the thick matter plug

To clean the wedge wire screen and/or to loosen the thick matter plug in the press channel slightly, the auger of the Bioselect RC separator can repeatedly be run alternately backwards and forwards, for no longer than 5 seconds in each case. The natural fiber bristles, which have formed on the auger, are thereby raised alternately forwards and backwards so that they brush the wedge wire screen.

The feed pump is switched off.

The thick matter plug and the natural fiber brush regenerate themselves with the assistance of the fibers of the substrate being fed, without a renewed break-in period being required.



1. ➤ Activate the **Backward** field by touching the relevant field for approx. 5 seconds.
2. ➤ Activate the **Forward** field by touching the relevant field for approx. 5 seconds.
3. ➤ Repeat the process for a maximum of 6 intervals.



NOTE!
Restoring the transporting function

If this has not restored the transporting function, the auger must be cleaned by hand and checked for damage, see the operating manual of the Bioselect RC separator.

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.

- 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.

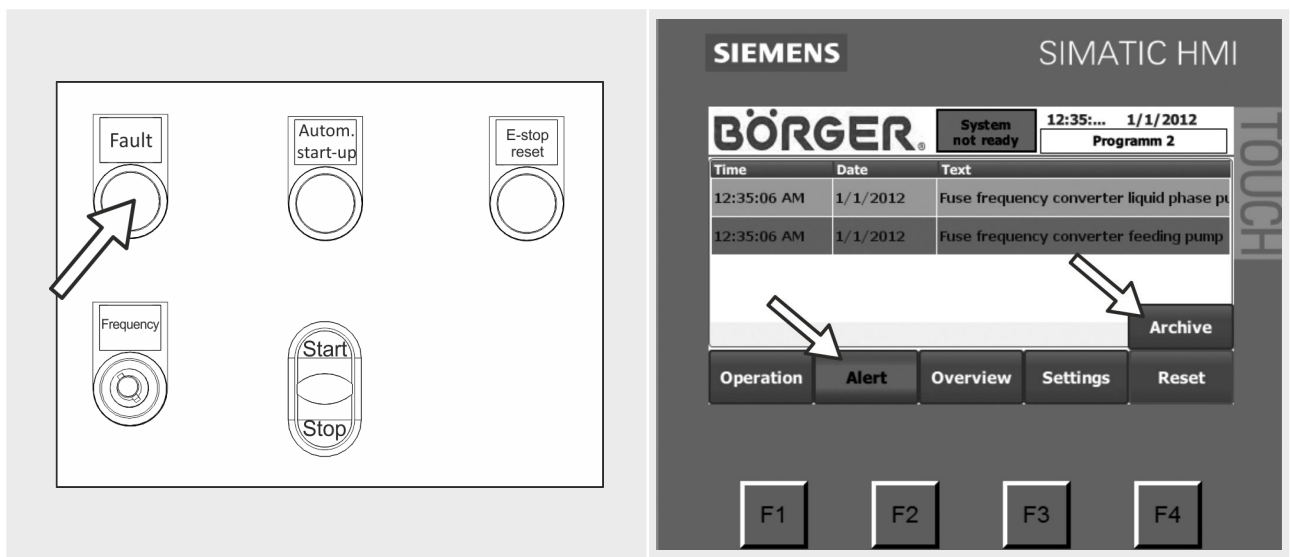
- In the event of a malfunction, shut down the Börger machine and all upstream and downstream system components immediately until the cause has been rectified.



NOTE! Malfunction

In the event of malfunctions, the red LED indicator lamp **Fault** is lit.

5.6.1 Troubleshooting

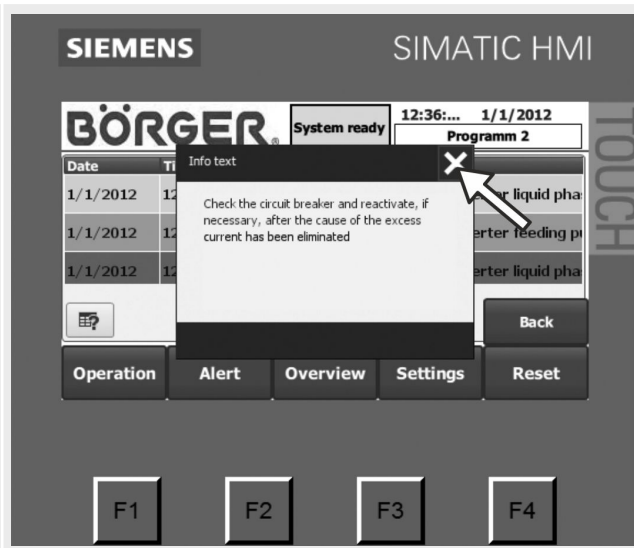
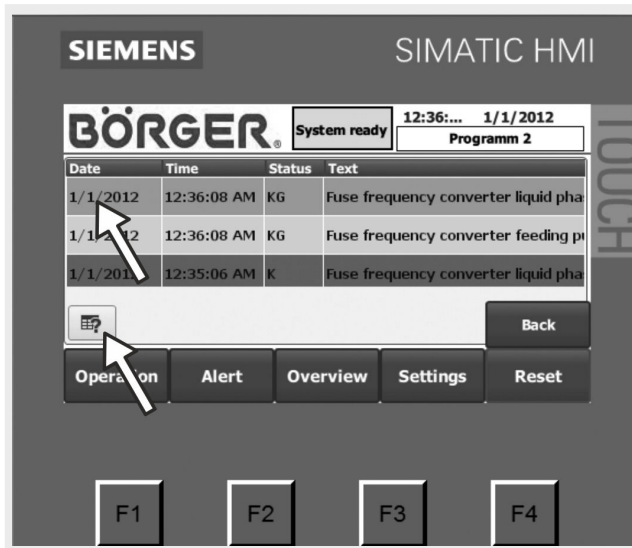


1. The Alert field is highlighted in red if there is a fault.
2. Touch the **Alert** field. The current fault message is displayed.
3. Touch the **Archive** field to open the alert archive.

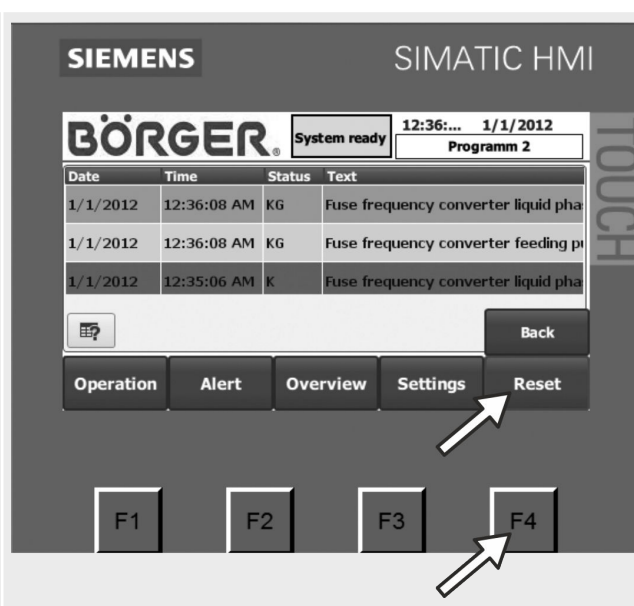
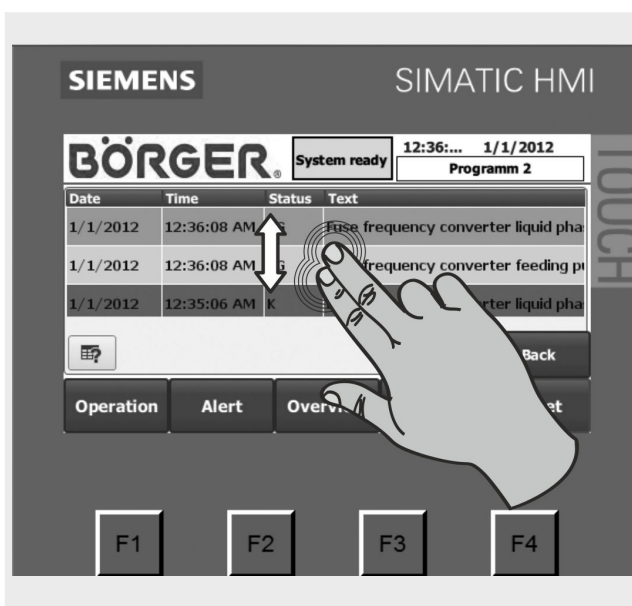
The alert archive lists the faults that have occurred in chronological order. Up to 250 entries are saved. The older entries are automatically deleted when this number is exceeded.

The individual fault messages can be selected by touching the line.

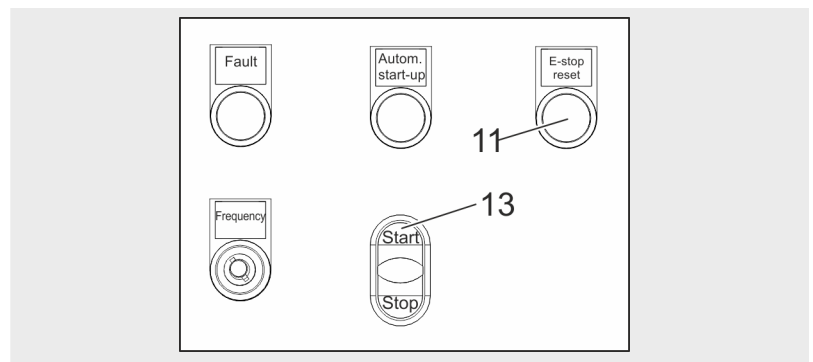
4. Select the current fault message (the figure only shows sample text; see fault messages and troubleshooting in this chapter).



5. A window with the help text appears.
6. If an explanation is required in respect of the fault message, touch the question mark.
7. To close the help window, touch the X on the right top of the window edge.
8. Eliminate the cause of the fault.
9. The fault messages can be dragged up and down by slightly pressing the finger on the touch screen.



10. ➔ Also observe the chapters on possible faults in the operating manuals of connected components and electrical equipment in the appendix.
11. ➔ Acknowledge each fault upon rectification of the cause of the fault by pressing the **Reset** field or function key **F4**, according to  *Chapter 5.1.1 "Switching on the control unit and checking the functions" on page 93.*
12. ➔ If the blue LED indicator pushbutton "Emergency stop reset" (11) is lit, also restore readiness for operation by pressing this button.



13. ➔ Restart the motors of the connected components by pressing the START button (13) in the selected operating mode.

5.6.2 Faults - General

Fault	Possible causes	Fault elimination
The display of the control unit remains blank	Main switch is switched off (in the "OFF" position)	— Turn main switch to the "ON" position — Press the blue LED indicator pushbutton "Emergency stop reset"
	Power supply interrupted	— Plug in the CEE-plug — Restore power supply
	Circuit breaker is set to zero	— Rectify any causes for overcurrent — Reactivate the circuit breaker — Confirm the fault

Fault	Possible causes	Fault elimination
The display only shows hash symbols (####) in the input and output fields.	Corrosion on contacts — (plug / socket)	Contact spray on network cable — e.g. WD40
	Network cable defective	— Replace the network cable
	Switch defective	— Replace the switch
	Display defective	— Replace the display
	PLC defective	— Replace the PLC
	PLC in stop mode	If the above points could not remedy the problem: — Contact Börger support!

Fault	Possible causes	Fault elimination
Fault, EMERGENCY STOP switch pressed — Red LED indicator lamp is lit — Blue LED illuminated push-button is lit	Manual activation of the EMERGENCY STOP switch due to a dangerous situation	— Eliminate the dangerous situation — Unlock the EMERGENCY STOP switch — Press the blue LED indicator pushbutton "Emergency stop reset"

Fault	Possible causes	Fault elimination
Fuse, PLC outputs	Short circuit / overcurrent at the PLC, circuit breaker set to 0	— Rectify any causes for short circuit / overcurrent — Reactivate the circuit breaker

Fault	Possible causes	Fault elimination
Fault - ventilator/heating fuse	Cables defective	— Check the circuit breaker and reactivate after the cause has been eliminated — Confirm the fault

5.6.3 Faults - separation system

Fault	Possible causes	Fault elimination
Fuse, frequency converter of separation system drive motor	Short circuit / overcurrent at the mentioned frequency converter, circuit breaker set to 0	— Rectify any causes for short circuit / overcurrent — Reactivate the corresponding circuit breaker

Fault	Possible causes	Fault elimination
Fault - frequency converter of separation system drive motor	Electrical connection to the motor interrupted	— Determine and eliminate the cause according to the error code on the frequency converter and in the operating manual of the manufacturer and confirm the fault
	Other causes	— Eliminate the cause of the fault according to the operating manual of the frequency converter — If the frequency converter is defective, contact Börger customer service

Fault	Possible causes	Fault elimination
Motor protection switch on drive motor of the separation unit	Short circuit / overcurrent at the mentioned drive, motor protection switch set to 0	— Rectify any causes for short circuit / overcurrent — Reactivate the corresponding motor protection switch
	Short circuit / overcurrent at the mentioned frequency converter, circuit breaker set to 0	— Rectify any causes for short circuit / overcurrent — Reactivate the corresponding circuit breaker

Fault	Possible causes	Fault elimination
Fault - penetration at separator	Penetration at rotating cap	— Reduce maximum frequency of the feed pump — Check material being fed for insufficient DS content

Fault	Possible causes	Fault elimination
Fault - separator current measurement	Fault at current measurement module	— Check the motor and the lines — Determine and eliminate the cause according to the operating manual — Confirm the fault

Fault	Possible causes	Fault elimination
Fault - minimum current Bioselect RC	Feed pump does not transport any substrate to the Bioselect RC	— Eliminate the cause according to the operating manual — Confirm the fault
	No thick matter plug in the Bioselect RC	— Form a new thick matter plug as per chapter 5.1 of Bioselect RC operating manual
	Material not suitable	— Use or mix material in accordance with chapter 2.3 of Bioselect RC operating manual
	Maximum frequency of the feed pump is set too low	— Increase the frequency of the motor of the feed pump and thus the pump pressure according to <i>Chapter 5.6.9 "Changing the pressure limits" on page 137</i> and <i>Chapter 3.9.4 "Performance data and maximum loads" on page 71</i>.

Fault	Possible causes	Fault elimination
Fault - maximum current Bioselect RC	Dry solids content of the input raw material too high,	— Remove dry, encrusted material and thick matter plug, then re-commission as described in the Bioselect RC operating manual
	Consistency of the thick matter plug is too high	— Adjust the compactor and dosing unit in accordance with the Bioselect RC operating manual
	Auger blocked or deformed, e.g. due to foreign bodies	— Remove blockage / foreign bodies — Check auger and replace if damaged
	Press channel blocked	— Clean the press channel / loosen the thick matter plug according to <i>Chapter 5.5.4 "Cleaning the filter / loosening the thick matter plug" on page 122</i>
	DS content of the substrate too high	— Only feed suitable substrate

5.6.4 Faults - pressure

Fault	Possible causes	Fault elimination
Fault - pressure transmitter downstream of separator	Electrical connection to the mentioned pressure transmitter interrupted or pressure transmitter defective	— Check pressure transmitter and cable and replace, if necessary — Confirm the fault

Fault	Possible causes	Fault elimination
Fault - pressure downstream of separator	Liquid phase pump does not pump	— Eliminate the cause of the fault according to the operating manual — Confirm the fault

Fault	Possible causes	Fault elimination
Fault - pressure downstream of feed pump	Max. pressure limit exceeded	— Reduce pressure by running the pump backwards in manual operating mode — Determine the cause, eliminate the fault — Confirm the fault
	Screen permeability too low	— If necessary, replace the wedge wire screen with one that has a larger slot opening width

Fault	Possible causes	Fault elimination
Fault - pressure sensor downstream of liquid phase pump	Pressure sensor defective or broken cable	— Check pressure sensor and cable and replace, if necessary

5.6.5 Faults - Liquid phase pump

Fault	Possible causes	Fault elimination
Fuse, liquid phase pump frequency converter	Determine the cause according to the error code on the frequency converter and in the operating manual of the manufacturer	— Check circuit breaker and reactivate, if necessary, after the cause has been eliminated and confirm the fault

Fault	Possible causes	Fault elimination
Fault - liquid phase pump frequency converter	Electrical connection to the motor interrupted	— Determine and eliminate the cause according to the error code on the frequency converter and in the operating manual of the manufacturer and confirm the fault
	Other causes	— Eliminate the cause of the fault according to the operating manual of the frequency converter

Fault	Possible causes	Fault elimination
Fault - liquid phase pump frequency converter communication	Cables defective	— Check the cable connections

5.6.6 Faults - feed pump

Fault	Possible causes	Fault elimination
Fuse, feed pump frequency converter	Determine the cause according to the error code on the frequency converter and in the operating manual of the manufacturer	— Check circuit breaker and reactivate, if necessary, after the cause has been eliminated and confirm the fault

Fault	Possible causes	Fault elimination
Fault - feed pump frequency converter	Electrical connection to the motor interrupted	— Determine and eliminate the cause according to the error code on the frequency converter and in the operating manual of the manufacturer and confirm the fault
	Other causes	— Eliminate the cause of the fault according to the operating manual of the frequency converter — If the frequency converter is defective, contact Börger customer service

Fault	Possible causes	Fault elimination
Fault - feed pump frequency converter communication	Cables defective	Check the cable connections

5.6.7 Adjusting the parameters

**NOTICE!****Changing the settings may cause severe material damage!**

Adjusting the values inappropriately or ignoring the system limits specified in ↗ *Chapter 3.9.4 “Performance data and maximum loads” on page 71* as well as the limits of the components of the Bioselect separation system can cause substantial damage to the components.

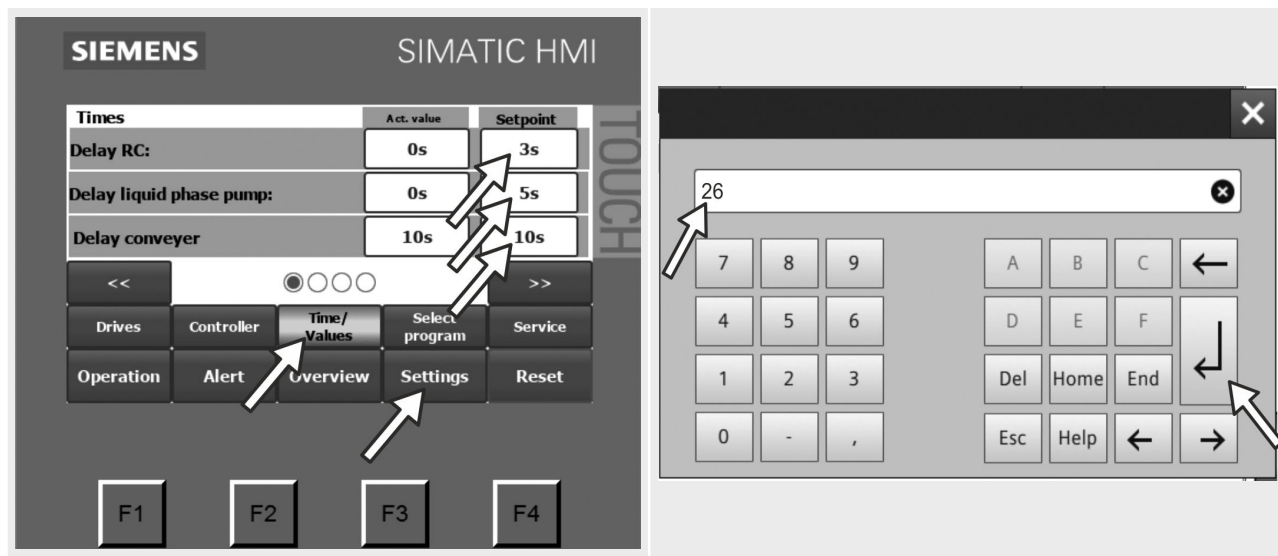
- Changes to the setting may only be carried out by experienced, qualified specialists taking all the factors of the application into account.
- In case of doubt, contact your Börger customer service or make use of the remote maintenance option according to ↗ *Chapter 3.7 “Options and accessories” on page 68*.

**NOTE!****Preset limits**

The limits according to ↗ *Chapter 3.9.4 “Performance data and maximum loads” on page 71* or individually pre-set by Börger for your application according to the order are usually optimal if the commissioning was properly carried out and should not be changed without consulting Börger customer service.

- The software of the RC-Control unit does not allow severely incorrect inputs. But even within the freely accessible area, changes to the parameters should only be made in exceptional cases under specific operating conditions.
- In such special cases for particular applications, the pressure limits, response times and the setpoint of the current consumption of the Bioselect RC separator can be changed. The password of the set-up user must be entered for this.

5.6.8 Changing the delay times



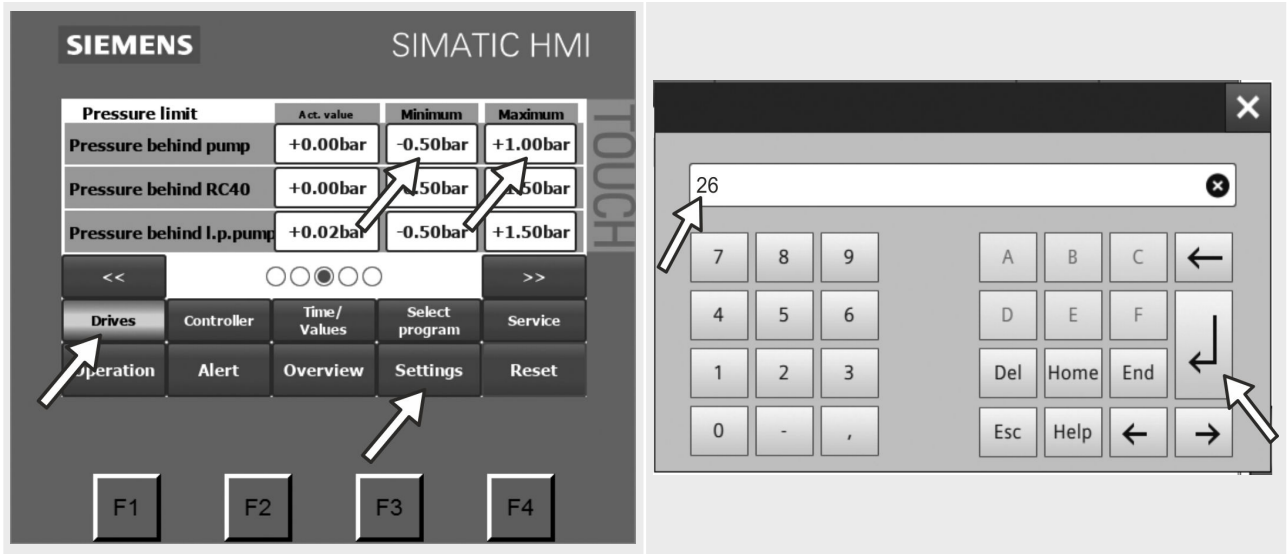
In special cases for particular applications, in which a downstream process (e.g. a dryer) requires an immediate output of material, or in the interval operation it may make sense to adapt the delay times of the liquid phase pump or the Bioselect RC separator.

If the delay time is too short, there is a risk that the auger of the Bioselect RC separator will become clogged with material or blocked by encrusted substrate.

In special cases for particular applications in which a substrate that has a tendency towards becoming slightly encrusted regularly remains in the separator during break times and this is to be loosened first, the delay time of the Bioselect separator can be increased to up to 8 seconds and the delay time of the liquid phase pump to up to a maximum of 10 seconds.

1. Select the **Settings** menu.
2. Select the **Times/values** submenu.
3. Select the field to be set by touching it.
4. Enter the required time using the keyboard window that opens, and accept the input with **Return**.

5.6.9 Changing the pressure limits



You should only change the pre-set values for the minimum and the maximum pressure of the feed pump if this measure has been expressly recommended by Börger customer service due to the specific circumstances of the process.

It may be worth considering to **reduce the maximum pump pressure** (pressure upstream of RC...), if the substrate does not contain the solids required for thick matter plug formation within the separator and the thick matter plug with sealing effect does not become sufficiently solid.

In order to keep the liquid phase from permeating the thick matter plug, the maximum pump pressure can be reduced so that the system switches off earlier if the pump pressure rises, e.g. due to a blockage in the liquid phase discharge or an insufficient running speed of the liquid phase pump.

The maximum pump pressure (pressure upstream of RC...) may also be reduced with regard to a subsequent process (e.g. drying), so that a timely switch-off of the system can be guaranteed via the pressure transmitter.

The maximum pump pressure and the maximum frequency of the feed pump are usually reduced in parallel according to ↗ *Chapter 5.6.9 "Changing the pressure limits" on page 137.*

It is not recommended to **increase the maximum pump pressure** (pressure upstream of RC...). In exceptional cases (in order to make full use of the performance capacity of the separation system and operating conditions permitting), the pressure limit can also be increased to the maximum of 1.0 bar (14.50 psi) when the maximum frequency of the feed pump is increased, but only with optimal, absolutely homogeneous substrate and if the progress is trouble-free.

It may be desirable in such applications in which the substrate being fed could be fully discharged, to **increase the minimum pump pressure** of the feed pump (default value: 0 bar/psi) for dry run protection. When entering the minimum pump pressure for dry run protection, the position of the pump must be taken into account. If the pump is e. g. located 10 m (32.81 ft) lower than the separator, the minimum pump pressure must be set to >1 bar (14.50 psi) in order for the system to switch off in due time when the feed pump is running dry.

**NOTE!****Minimum pump pressure**

— The minimum pump pressure must always be lower than the maximum pump pressure.

1. Select the **Settings** menu.
2. Select the **Drives** submenu.
3. Select the field to be set by touching it.
4. Enter the required current consumption using the keyboard window that opens, and accept the input with **Return**.

5.6.10 Target current consumption of the Bioselect RC

The optimum load of the Bioselect separation system is reached when the current consumption of the motor of the Bioselect RC 40 separator is 11 A. The optimum load of the Bioselect RC 30 separation system is 8 A. A reduction in the target current consumption results in a loss of performance.

The current consumption may not be increased for continuous operation to more than 14 A (10 A) and such an increase can result in the components of the system being damaged.

The standard target current consumption setting of the motor of the Bioselect RC separator is set to 11 A (8 A). This setting enables an optimum load, without generating fault messages in respect of increased current consumption due to minor variations in the substrate.

In special cases for particular applications, it may however make sense to reduce the target current consumption, for example in respect of substrates that have a low DS content and a low required consistency of the solid phase. Furthermore, the reduction of the target current consumption may possibly be worth recommending if the requirement of a homogeneous agitation of the substrate being fed cannot be optimally achieved. Failing this, variations in the substrate may cause unnecessary fault messages and downtimes of the separation system.

It may be worth considering to **increase the minimum current consumption** in cases in which the substrate might not have been agitated homogeneously with certainty and the DS content between sinking and floating layers is insufficient.

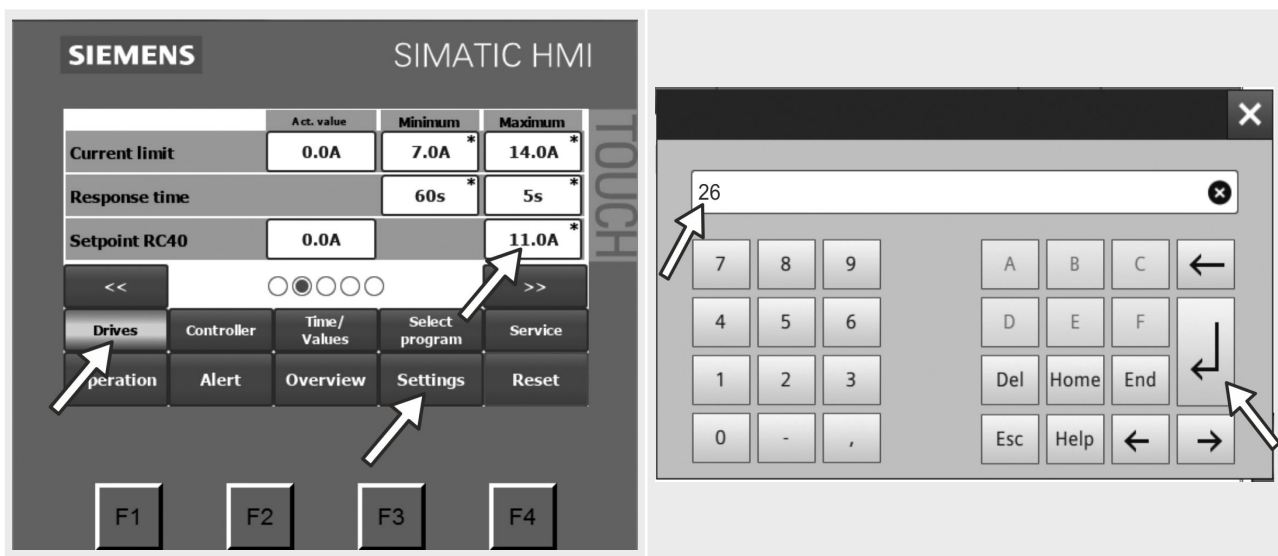
To ensure that the system switches off in time in such cases in which the DS content of the substrate being fed is too low (which might cause the thick matter plug with sealing effect in the separator to break), the minimum current consumption value can be increased. For troubleshooting, it is then necessary to homogeneously agitate the substrate after the shutdown because the minimum current consumption has been undercut.

The **minimum current consumption may not be reduced** to under 7 A (RC 40) or 5 A (RC 30), respectively. This value must not be undercut because otherwise the thick matter plug and the natural fiber brush would not be formed / remain intact. The system would not be functional and could get damaged.

It may be worth considering to temporarily **increase the maximum current consumption** to up to 17 A (RC 40) or 12 A (RC 30), respectively, in exceptional cases, when an insufficiently homogeneous substrate with a high DS content is to be processed for a short period of time, so that the current consumption of the drive frequently (but only briefly) exceeds the standard limit.

However, the substrate should generally be homogeneously agitated. Operating the system at its limits should always remain a temporary solution for exceptional cases. Otherwise, there is always a risk of higher wear / damage to the device occurring.

Reducing the maximum current consumption is a possible measure in such applications, in which the substrate tends to cause encrustations which are so heavy that the thick matter plug is difficult to remove from the separator, for example. To prevent such solidification, the maximum current consumption of the separator can be limited in order for the system to switch off sooner and the thick matter plug to be loosened using the corresponding service programs.



1. Select the **Settings** menu.
2. Select the **Drives** submenu.
3. Select the field to be set by touching it.
4. Enter the required current consumption using the keyboard window that opens, and accept the input with **Return**.

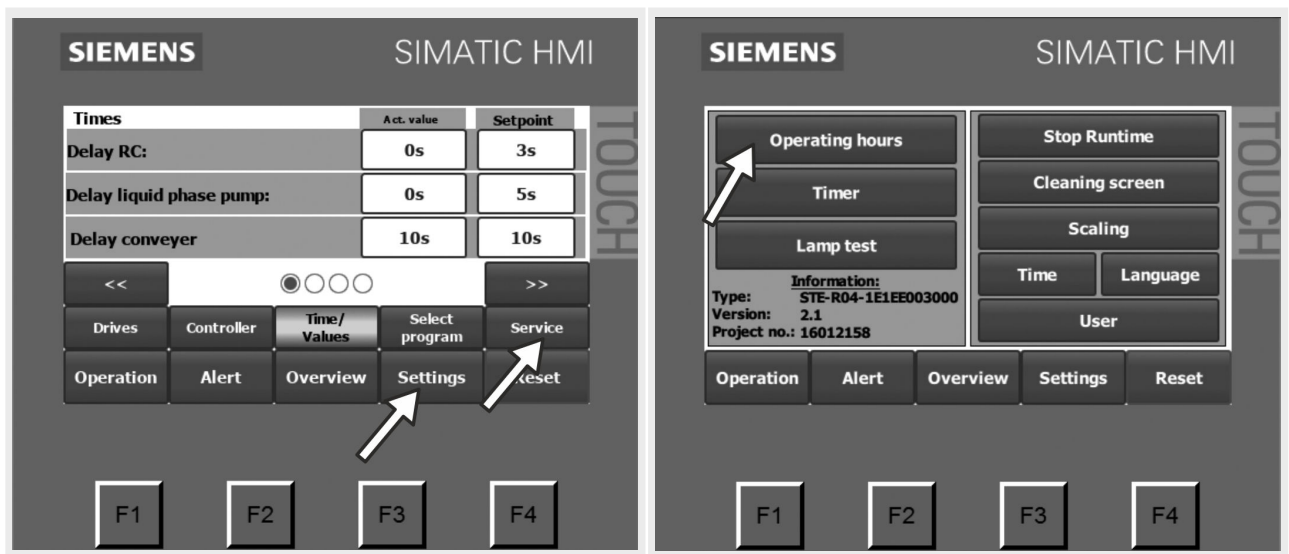
5.7 Resetting the intermediate meter



NOTE!

Resetting the intermediate meter

- The connected components must be stationary in order to reset the intermediate meter.
- The intermediate meter can also be reset during downtimes of the connected components during timer operation or during externally-controlled operation.

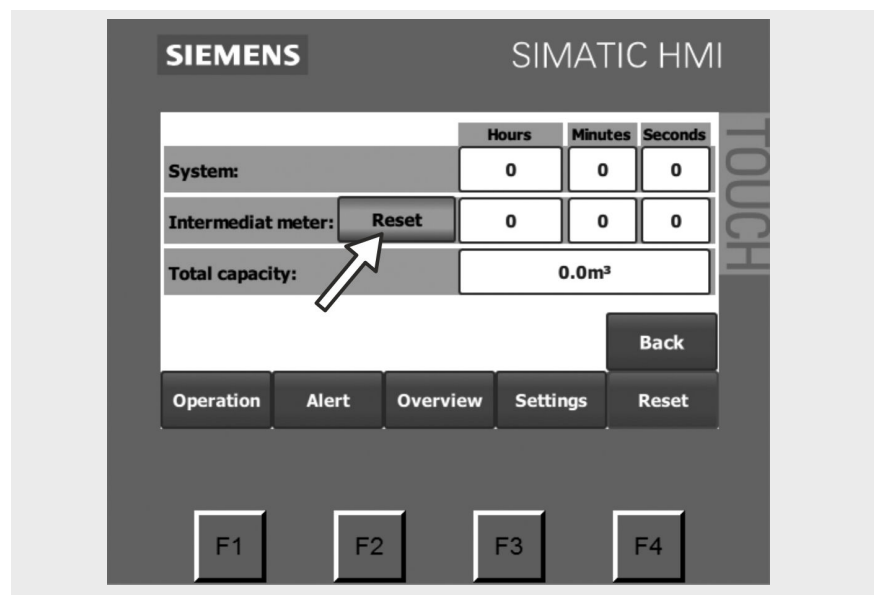


The connected components must be stationary in order to reset the intermediate meter.

The intermediate meter can also be reset during downtimes of the connected components during timer operation or during externally-controlled operation.

- Ensure that the connected components are stationary according to [Chapter 5.3.1 “Downtimes of connected components” on page 112](#).

1. For this work step, you will need the set-up user password.
2. Select the **Settings** menu by touching the relevant field.
3. Select the **Service** submenu.
4. Select the **Operating hours** submenu.
5. Select **Reset** in order to reset the intermediate meter to 0.



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.

- 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.

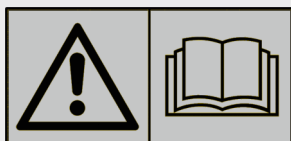


WARNING!

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.



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.

- Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 35.*
- 1.** ➤ Information on maintenance and repairs for special assemblies can be found in the supplier documentation in the appendix (↗ *Chapter 9.7 “Supplier documentation” on page 160*).
- 2.** ➤ Dispose of operating materials and replaced parts in a safe and environmentally-friendly manner, see also ↗ *Chapter 7 “Disposal” on page 152.*

6.1 Machine care

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



NOTICE!

Improper cleaning of the control unit 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 high pressure, a vacuum cleaner or a hand brush with plastic bristles etc. to clean the inside because the production of static electricity can damage electrical equipment.
- In particular, keep moisture away from all the electrical equipment.
- Observe the operating manuals of the manufacturers of the electrical equipment in respect of care and maintenance.

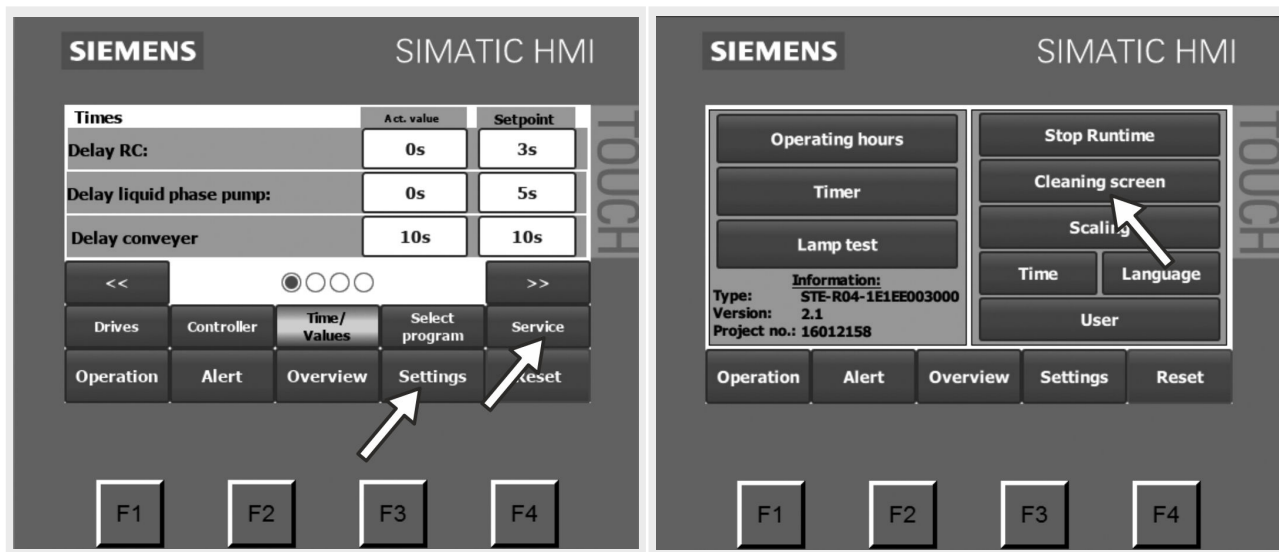
6.1.1 Cleaning the outside

Protective equipment: ■ Light respiratory protection

- Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 35.*
- Shut down the control unit and downstream and upstream system components as described in ↗ *Chapter 5.3 “Downtimes” on page 112.*

1. ➤ Keep all markings of the control unit in a legible state at all times.
2. ➤ Only clean the outside of the control unit by wiping or brushing it down. Use lint-free cleaning cloths.
3. ➤ When required, use a standard aqueous industrial cleaner.

6.1.2 Cleaning the outside of the operating terminal during operation



1. ➤ Touch the **Settings** field to open the relevant settings menu.
2. ➤ Touch the **Service** field to open the relevant submenu.

If the operating terminal is to be cleaned while the control unit is switched on, the program **Cleaning screen** must be activated to prevent touching the screen causing changes to the settings.

3. ➤ Touch the **Cleaning screen** field.

4. ➤ The input function of the screen is switched off for a period of 20 seconds. A cleaning image appears that indicates the remaining duration of the cleaning phase.



5. ➤ During this time, clean the display using suitable agents (screen cleaner, anti-static cloth).
6. ➤ If necessary, repeat the input lock by touching the Cleaning screen field again.

6.1.3 Internal cleaning

Protective equipment: ■ Light respiratory protection

- Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 35.*
 - Shut down the control unit and downstream and upstream system components as described in ↗ *Chapter 5.3 “Downtimes” on page 112.*
 - Secure the control unit against unauthorized or uncontrolled reactivation as described in ↗ *Chapter 2.7 “Securing the machine against restart” on page 21*
1. ➤ Observe the warnings in ↗ *Chapter 6 “Maintenance and repairs” on page 143.*
 2. ➤ Keep the interior free of dust and dry.
 3. ➤ If necessary, use a compressed air spray to clean the inside, e.g. the DEKRA-approved Dust Off 67 compressed air spray from CRC Kontakt-Chemie.
 4. ➤ Only use lint-free, anti-static cleaning cloths.

6.2 Maintenance and inspection

6.2.1 Maintenance and inspection plan



NOTE!

Maintenance intervals

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

→ Read and follow the safety instructions detailed in [Chapter 2.12 "Safety instructions for maintenance and rectifying malfunctions"](#) on page 35.

when necessary

Checking the exterior surfaces for dust deposits and dirt

- If necessary, clean the outer surfaces as described in [Chapter 6.1 "Machine care"](#) on page 145

Checking the interior surfaces for dust deposits and dirt

- If necessary, clean the inner surfaces as described in [Chapter 6.1 "Machine care"](#) on page 145

Checking the relays

- Replace relays, if necessary, according to the manufacturer's specifications and the attached circuit diagrams
[Chapter 6.1 "Machine care"](#) on page 145

weekly

Checking the display

- Contact Börger if there are display errors

Checking the LED elements (Lamp test)

- Replace defective LED elements

biannually

Checking the filter ventilator

- Replace filter, if necessary, according to the manufacturer's specifications

Checking the outlet filter

- Replace filter, if necessary, according to the manufacturer's specifications

yearly

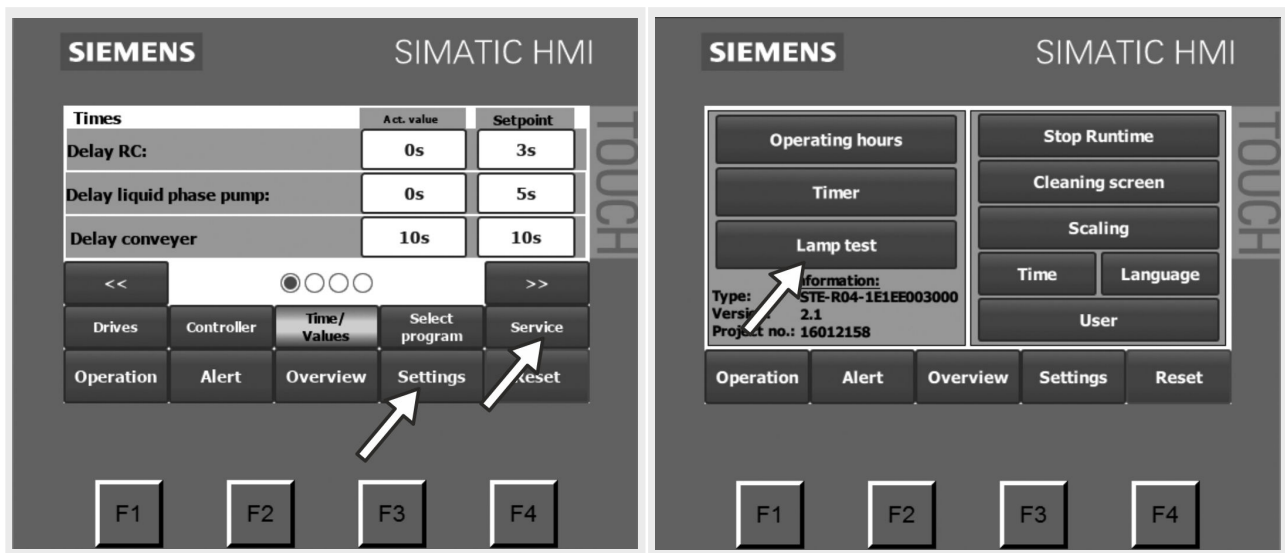
Checking the electrical lines and connections, e.g.

- Are the protective sheaths intact?
- Are the lines still positioned safely?
- Have the lines not been sharply bent?
- Remedy shortcomings immediately, replace defective cables, taking the enclosed circuit diagrams into account

Checking the fuses

- Replace fuses, if necessary, according to the manufacturer's specifications and the attached circuit diagrams

6.2.2 Lamp test



The correct functioning of the LED elements (indicator lamps, indicator pushbutton, indicator lamp of the start/stop button) can be checked when the system is idle or during operation.

1. Touch the **Settings** field to open the relevant settings menu.
2. Touch the **Service** field to open the relevant submenu.
3. Touch the **Lamp test** field.
4. The LED elements (see [Chapter 3.2.5 "LED elements" on page 43](#)) are lit when functioning properly.
5. Failing this, no proper connection to the corresponding power supply may have been established or the respective LED element may be defective.

6. ➔ Ensure that there is a proper connection to the power supply or replace the LED element, if necessary.

6.2.3 Insulation measurements



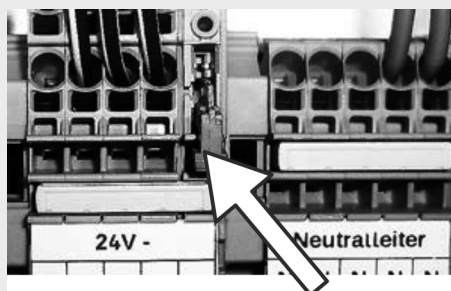
NOTICE!

Risk of severe material damage due to improper insulation measurements!

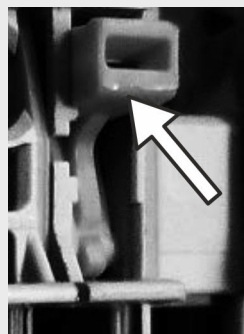
Insulation measurements (measuring voltage 500 V) may only be performed by a suitably trained qualified electrician.

The disconnect terminal block for test and measurement must be unlocked (locking bar facing downwards, see figure) before insulation measurements are performed. Otherwise, the measuring voltage may cause damage to components of the control unit.

Locking bar facing downwards



Locking bar pressed to the top



- Read and follow the safety instructions detailed in ↗ *Chapter 2.12 “Safety instructions for maintenance and rectifying malfunctions” on page 35.*
- Information on maintenance and repairs for special assemblies can be found in the supplier documentation in the appendix.
- Dispose of operating materials and replaced parts in a safe and environmentally-friendly manner, see ↗ *Chapter 7 “Disposal” on page 152.*
- ➔ After performing the measurement, the locking bar must be pressed all the way to the top until it stops (see figure).
 - ⇒ Otherwise, protection by the circuit breaker (24 V) is ineffective.

6.3 Repairs



NOTE!

Börger customer service

If you have any questions on troubleshooting, installation, maintenance and repair work, contact Börger customer 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 the control unit. Only the most frequently requested equipment can be mentioned below.

If your control unit 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.

9 Appendix

9.1 Circuit diagrams and parts lists

The circuit diagrams and parts lists are enclosed separately with the operating manual. They contain all relevant data for your control unit.

— Observe these documents.

9.2 Tools / installation aid

The tools below are needed to carry out the required checks and correct installation:

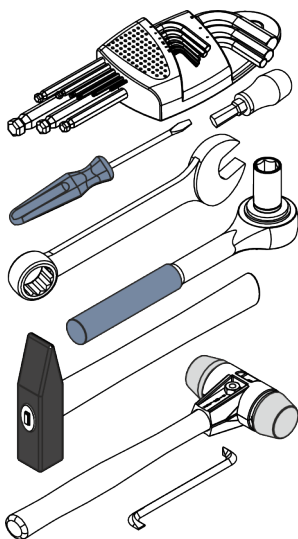
Standard tools

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



9.3 Checklist for commissioning

This checklist can be used as an additional aid when commissioning a Börger machine with control unit. 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	The factory default operating parameters are adequate for the application		
3	Control unit professionally installed on a straight, dry wall / suitable holding frame		
4	Secure position of terminal and fastening screws checked and tightened again, where necessary		
5	Connected components installed correctly as described in the operating manual		
6	Power supply and any external control units properly connected		
7	Control unit closed, keyholder duty assigned		
8	Data entry permissions discussed and passwords changed and safely stored according to <i>☞ Chapter 5.1.2 "Password input, customization of password, user name and logoff time" on page 93.</i>		
9	Time checked and (if required) corrected		
10	For timer operation: Switch-on and switch-off times saved in the timer, days of the week for operation selected acc. to <i>☞ Chapter 5.1.7 "Setting the operating cycle for timer operation" on page 104</i>		
11	Function check according to <i>☞ Chapter 5.1.1 "Switching on the control unit and checking the functions" on page 93</i> carried out without faults		
12	Current consumption, frequency and pressure of the connected components checked and okay		
13	UV cover, if applicable, closed during operation		
14	Maintenance and inspection intervals organized		

9.4 EU Declaration of Conformity

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



We hereby declare that the following products:

Product description:	Control unit		
Product line:	STE		
Type descriptions:	RC-xx RS-xx B-MX-xx Ocean-xx	BS-xx MS-xx TP-xx	PF-xx MSFU-xx
Serial number:	from 17XX XXXX – 1.X		
Year of manufacture:	from 2017		

are 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:

- EN 60592
- EN 60204-1
- EN ISO 12100
- EN 61439

Name and address of the authorized representative:

André Bushuven
Börger GmbH

Borken-Weseke,
Town / city

16.05.2022
Date


Alois Börger - Managing Director

9.5 UK - Declaration of Conformity

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



We hereby declare that the following products:

Product description:	Control unit
----------------------	--------------

Product line:	STE
---------------	-----

Type descriptions:	RC-xx RS-xx B-MX-xx Ocean-xx	BS-xx MS-xx TP-xx	PF-xx MSFU-xx
--------------------	---------------------------------------	-------------------------	------------------

Serial number:	from 17XX XXXX – 1.X
----------------	----------------------

Year of manufacture:	from 2017
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are in compliance with all provisions of the **Electrical Equipment (Safety) Regulations 2016 (2016 No. 1101)** and the **Electromagnetic Compatibility Regulations 2016 (2016 No. 1091)**.

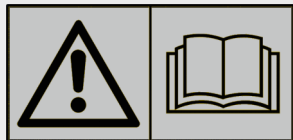
The following harmonized standards were applied:

- EN 60592
- EN 60204-1
- EN ISO 12100
- EN 61439

Name and address of the authorized representative:	André Bushuven Börger GmbH
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Borken-Weseke, Town / city	16.05.2022 Date	 Alois Börger - Managing Director
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9.6 Additional documentation



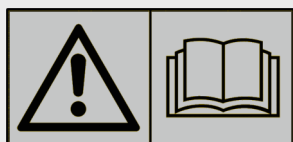
Further operating manuals / supplementary operating manuals

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.

9.7 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.

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