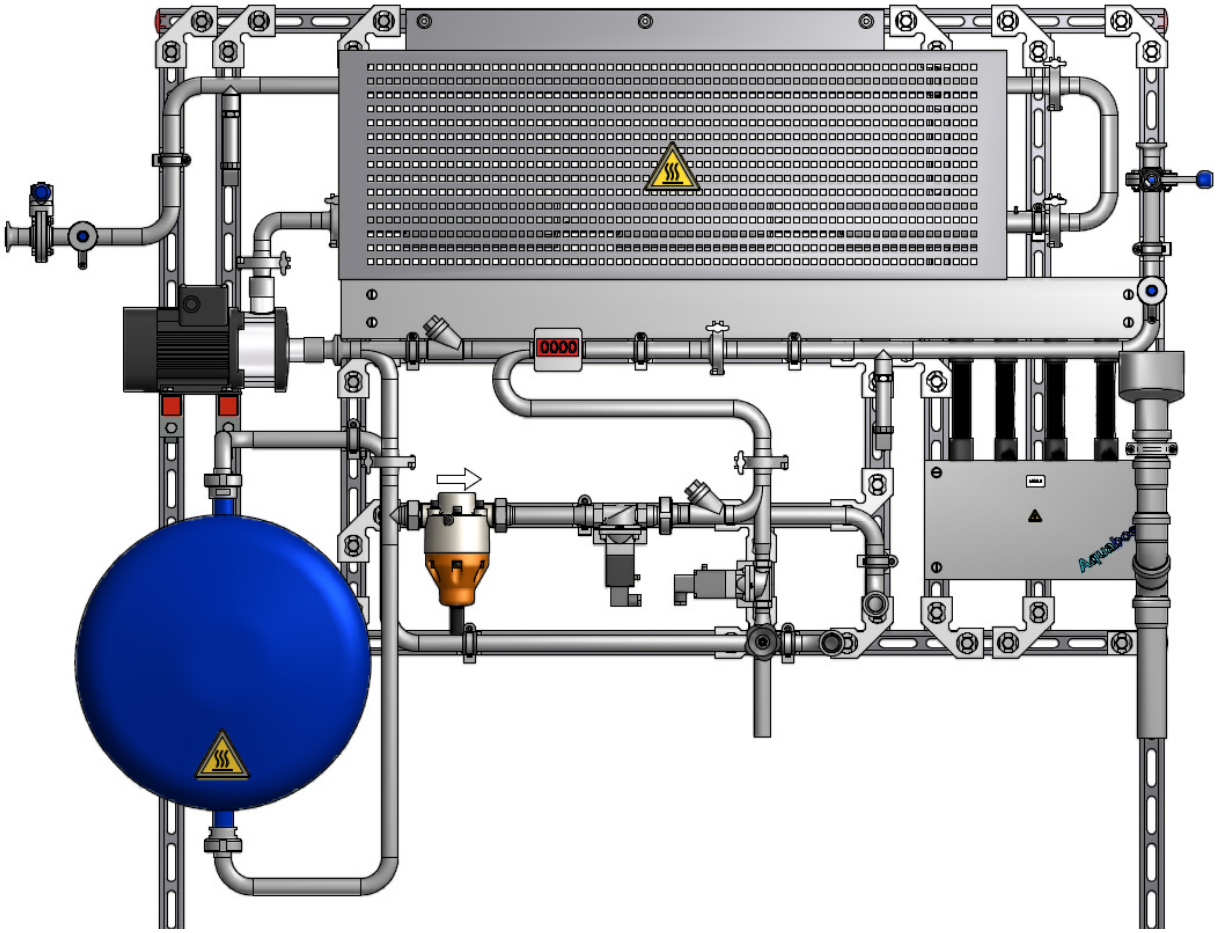
Aquaboss®



Aquaboss® Hot Rinse SMART 10/20/30/40/50

Inline hot disinfection

Art. no.: LA53578_EN_BAV

Rev. 0.9 Date 2017-07-25
Software version V02.01

B BRAUN
SHARING EXPERTISE

TÜV SÜD EN ISO 13485 tuv-sud.com/ps-cert

CE 0123

Dear Customers,

If you have problems with this system which you are unable to solve by consulting these operating instructions, please contact either B. Braun directly, your service technician or your authorized B. Braun partner with as precise a description as possible of the problems you are having and your unit details.

These operating instructions must always be kept on the site where the water treatment system is installed

The operating instructions include basic directives which are to be observed before operation and maintenance work. For this reason, they must be read by the fitter and specialist staff/operator responsible before the system is put into operation. In addition, they must always be available for reference on site.

The system operator is obliged to adhere to the working, maintenance and technical safety check processes described in these operating instructions as well as to the respective intervals.

Where aspects of the operating instructions are not observed, B. Braun cannot guarantee safe operation of the system.

These operating instructions are an integral part of the supplied system and must be handed over to the new owner if the system is resold.

B. Braun reserves the right to alter sections of these operating instructions or technical data without prior notice.

If you have any questions regarding these operating instructions or would like to make any comments or suggestions for improvement, please do not hesitate to contact us directly.

B. Braun Avitum AG

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Germany

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www.bbraun.com

Your personal service department

Name _____
can be reached at all hours by phone under:

_____

Suggestions for improvement

When working with these operating instructions, you may have an idea that could contribute to improving the contents. Please do not keep this idea to yourself – let us have your suggestions. This will make it possible for us to incorporate your suggestions in subsequent versions.

- Yes, I would like to make a suggestion!

  My address is:

  Name: ……

  Address: ……

  ……

  Phone: ……

  Fax: ……

- The article and revision numbers of the operating instructions to hand are as follows

  Art. no.:…… Rev.: ……

- My suggestion for improvement concerns the page(s):

  ……

- My suggestion:

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  Use further pages if necessary. You can also enclose pages copied from the operating instructions with your suggestions entered on them.

Please send your suggestion to:

B. Braun Avitum AG

Schwarzenberger Weg 73-79
34212 Melsungen
Germany

Fax: +49 (56 61) 75-0

Notes on the operating instructions

The operating instructions contain information on the safe use of the system.

Before a medical product can be used, users must be convinced of the functionality and proper state of the medical product according to applicable European and national requirements; furthermore they must observe the operating instructions as well as any other safety-related information and maintenance and repair information provided.

The operator must be instructed on the following points and committed to observe them:

- The user must be committed to only operate the system when it is in perfect working order. The system must not be used or applied if there are any faults that could cause harm to patients, employees or third parties. The user must ensure that the devices function and are in intended condition prior to any use.
- The user must be instructed as to the risks, rules of behaviour and necessary protective measures to be taken when dealing with the substances used, and be trained to react correctly in the event of danger and provide first aid.
- The user must be instructed on the permissible operating data (e.g. setting data for safety and control mechanisms).
- The user must be instructed on system maintenance and the elimination of operational faults.
- The user must be instructed on safe handling of the products. This includes theoretical principles, proper handling and conditions for application.
- Through instructions and checks, the operator must provide for cleanness and clarity where the system is used.
- The operator must fulfil his obligation to clearly regulate who is responsible for commissioning, operating and maintaining the system to ensure that such work is carried out by all the persons involved without any misunderstandings as to who is competent where safety aspects are concerned.
- The medical product may only be operated according to its intended purpose in accordance with the current European and national regulations in their current version.
- The medical product may only be set up, operated and used by persons who have participated in the required training or have knowledge of and experience with the product.
- The user is obliged to inform his supervisor/operator immediately as to any changes on the system that affect safety and to observe all the safety instructions.

Signs and symbols used in the operating instructions

DANGER	The signal word indicates a high-risk hazard which, if not avoided, will cause death or severe injury.
WARNING	The signal word indicates a medium-risk hazard which, if not avoided, may cause death or severe injury.
CAUTION	The signal word indicates a low-risk hazard which, if not avoided, may cause minor or moderately severe injury.
ATTENTION	The signal word warns of material and environmental damage.
NOTE	The signal word points to suggestions / details on the economical use or just to a simpler work step.
➔	This symbol indicates a cross reference to a chapter within these operating instructions.

Signs and symbols used at the control cabinet

Caution, hot surface

Protective earth connection

Ground connection

Three-phase alternating current with neutral conductor

Observe the operating instructions

OFF (power supply, disconnect from mains supply)

ON (power supply, connect with mains supply)

Dangerous voltage

Attention residual risks. Refers to the necessity of examining the operating instructions for important safety-related aspects.

Shows the manufacturer of the medical product in compliance with the EU guidelines 90/385/EEC, 93/42/EEC and 98/79/EC an.

Shows the date on which the medical product was manufactured.

Shows the manufacturer's article number so that a certain medical product can be identified.

Shows the manufacturer's serial number so that a certain medical product can be identified.

A symbol for the temperature limits. The temperature limits the medical product can safely be exposed to are shown.

These operating instructions comprise two sections:

Part 1 – Operating Instructions

Here you will find subjects which are important for the normal operation of the system.

1. Security
2. Area of application and intended use
3. Accessories list for Hot Rinse SMART 10/20/30/40/50
4. Use in combination with other equipment
5. Fonctions
6. Description of components
7. Display and keypad
8. Commissioning / Decommissioning
9. Switching the unit on/off
10. Programming the system
11. Carrying out hot rinse, menu item 3, Auto on/off
12. Carrying out hot rinse in manual mode
13. Overview of operating phases
14. Faults / Causes / Elimination

Part 2 – Supplementary Operating Instructions

Here you will find subjects which are important for commissioning and maintenance/technical safety checks.

1. Handover declaration for the operating instructions
2. Transport and setup
3. Work prior to initial commissioning
4. Commissioning

   Commissioning log
5. System parameters
6. Technical data
7. Maintenance and technical safety check (TSC)
8. Spare and Wear Parts List

Part 1 – Operating Instructions

1. Safety

1.1 General safety

The ***Aquaboss***® inline hot cleaning system, abbreviated to HRS 10…50 below, has been designed according to the latest technical standards and is fail-safe.

The system may only be operated with the control cabinet closed.
The control cabinet can be opened during maintenance work.

DANGER

Electric shock!

Dangerous voltage when the control cabinet is open.

→ Switch off the system at the main switch and unplug from the mains.

The safety guidelines applicable at the workplace must be kept at all times.

Improper or irregular use can put operating personnel at risk.
For this reason:

- Read and carefully observe the operating instructions as well as the safety instructions before setup, putting the unit into operation and starting maintenance work.
- Keep the operating instructions near the system.
- Commissioning, operation and maintenance may only be carried out by authorized, trained and B. Braun-instructed specialists. Electrical work may only be carried out by authorized, trained and instructed electricians.
- All local safety and accident prevention regulations are always applicable for operating the system. These must be observed and maintained at all times.
- Observe instruction and warning signs.
- Consult a doctor immediately in the case of injuries, accidents or inflammation of the skin.

WARNING

Hot surface!

The system (pipelines) become hot during operation. There is a risk of burns through contact with hot surfaces.

→ Let the system (pipelines) cool down first after a hot rinse.

1.2 Operational safety

- If the system comes to a sudden standstill, the operator should **not** immediately change to another operating mode. The system may have been stopped for manual adjustments to be made. Unexpected switch-on can lead to serious injuries.
- Every hot rinse carried out using this system should be documented in the medical product log (➔ part 2, page 7-4) and for the units connected.
- It is prohibited to change the water quality by adding chemicals or disinfectants during hot cleaning.

⚠ **ATTENTION**	**Do not modify, remove, bypass or bridge safety devices.**

NOTE	**Impermissible modes of operation:** **The operational safety of the system delivered is only guaranteed when it used for the intended purpose. The values specified in the technical data must be kept, limit values must never be exceeded.**

⚠ **ATTENTION**	**It is prohibited to change the water quality by adding any chemicals or disinfectants during hot cleaning.**

- Never allow the pump to run dry.
- An annual technical safety check (TSC) by B. Braun-authorized specialists is compulsory.
- The system is to be operated only with closed control cabinet.

1.3 Microbiological safety

When used properly, micro-organisms within the system (HRS 10...50 inc. connected ring piping) will be killed. The system is self-sanitizing.

However, the micro-organism load depends on:

- Germ load in the feed (permeate quality of the reverse osmosis)
- Operating frequency of the reverse osmosis connected
- Hot cleaning frequency, duration and temperature
- Design of the pipe routing (target: few dead zones)

⚠ WARNING

Risk of poisoning and pyrogenic reactions.

The operator is responsible for selecting the water treatment equipment and for the annual permeate test, based on the values of Ph. Eur. and ISO 13959.

⚠ WARNING

Risk from chemical and/or microbial contamination.

The permeate quality is connected to the feed water quality. If the feed water quality deteriorates significantly, changes to the permeate can lead to exceedance of permissible limits.

The operator is responsible for the regular monitoring of the limit values for the feed water.

- It is recommended that the water quality is tested for its microbiological quality at least every six months.
- If the total germ count exceeds 30 CFU/ml, disinfection is recommended within 7 days (action limit).
- A continuously high germ load can lead to the development of biofilm. Biofilm can usually only be eliminated by a combination of mechanical and chemical cleaning.
- Exceeding the limit set out by the European Pharmacopoeia (Ph.Eu.) or ISO 13959 requires immediate cleaning and disinfection (alarm limit for the total germ count 50 CFU/ml and for endotoxines 0.125 E.U./ml).

NOTE

EN ISO 15883-1 stipulates a reaction time of 10 minutes for an A0 value of 600 at a temperature of 80 °C. Lower temperatures require longer heating phases to kill off most vegetative bacteria, yeasts, fungi and viruses.
(Reference: EN ISO 15883-1 “Washer-disinfectors – part 1: General requirements, terms and definitions and tests”)

1.4 Safety during servicing

- Maintenance and repair work may only be carried out by authorized specialists.
- Maintenance and repair work should be recorded in writing in the medical product log and on the system (“Maintenance” label).

DANGER

Electric shock!

Dangerous voltage when the control cabinet is open.

→ Switch off the system at the main switch and unplug from the mains.

- Make sure that the system has cooled down completely before starting servicing work.
- The system must be switched off at the main switch and disconnected from the power supply before servicing work is started.
- Only have the system set up by experienced specialists, electrical work must always be carried out by authorized electrical specialists.
- When work is being done on pumps and pressurized pipelines, these are depressurized first to prevent injuries.
- Any damaged or removed instruction and warning signs or safety labels must be renewed without delay.
- All dismantled safety devices must be properly refitted after servicing work has been completed.
- Unauthorized conversion work or modifications to the system can impair personal and system safety and are therefore prohibited.
- In order to exclude any risk to patients, maintenance, TSC or servicing must only be carried out during times without dialysis.

NOTE

Only original spare parts as well as accessories and consumables from B. Braun must be used ➔ part 2, chapter 9 and ➔ part 1, chapter 3.

B. Braun does not accept any liability for damage caused by the use of other spare parts, accessories or consumables.

1.5 Risks due to non-observance of safety instructions

Non-observance of the safety instructions can lead to danger for the user and/or the patient. Non-observance can lead to the following dangers, for example:

- Failure of key system functions
- Failure of prescribed methods of routine check and disinfection
- Danger to persons through electrical and mechanical means

1.6 Residual risks

NOTE	**Residual risks remain despite the measures taken to avoid such risks.**

Residual risks are potential hazards which are not apparent, e.g.:

- Risks which can result from the product or flushing medium, such as allergies, inflammation of the skin or burns.
- Risks arising as a result of control system faults

1. **Electrocution**
   The hot water system Hot Rinse SMART 10...50 is operated with an electrical voltage of 380–400 V(AC). Improper opening of the control cabinet or damage to the electrical cables can cause electrocution (risk of fatal injury!)
   Any work on the system that requires the control cabinet to be opened or contact with the connection cables may only be carried out when the system has been switched off (main switch to “0”) and disconnected from the mains supply. If the system has a permanent connection, the system must be disconnected completely from the mains using the upstream separator.
2. **Noise**
   A noise level of less than 80 dB(A) is measured up to a distance of 0.5 m from the system. The law does not require any measures regarding hearing protection for background noises of up to 80 dB(A).
   However, the noise level can increase in a location in which several sources of noise are positioned, thus requiring hearing protection. Therefore it is recommended that additional noise level measurement be carried out if there are several devices in one room, and all the groups of personnel (cleaning personnel, operators etc.) should be informed about individual measures for hearing protection.
3. **Hot surface**
   When the system is in operation, there is a risk of the joints, branches and sampling cocks on the piping becoming hot, despite 100% insulation (risk of burns!).
   Operators who trigger or program hot cleaning should therefore familiarise themselves clearly with the system and inform colleagues or groups of people affected.

1.7 Contraindications and potential undesirable side effects

1.7.1 Contraindications

Do not use hot cleaning if the operating state of the medical products used with the Hot Rinse SMART 10...50 is not clear. The reverse osmosis must be in the “Standby” operating mode and the standby release must be switched to hot cleaning by hardware handshake.

Do not use hot cleaning if protective equipment (e.g. guards, warning displays) are faulty or missing, or if the heating capacity of the system is reduced (reduction in disinfection success).

Following conversion / extension of the connected ring piping, validation must be carried out to ensure that the heating capacity at every point in the ring piping is sufficient to achieve thermal disinfection in accordance with the specifications EN ISO 15883-1 (80°C, 20 min).

1.7.2 Side effects

Not known.

1.8 Impermissible modes of operation

The operational safety of the system delivered is only guaranteed when the system is used for the intended purpose. The values specified in the technical data must be kept, limit values must never be exceeded.

2. Area of application and intended use

The operator is responsible for the intended use of the system.

NOTE	**The HRS 10…50 hot rinse is a system used for the regular disinfection of the ring piping by the system heating itself up to 90°C.** **The control system of the connected reverse osmosis system works separately and independently of the control system for the ring piping heating. The contents of the ring piping are heated by inline heating elements.**

NOTE	**The *Aquaboss*® HRS 10…50 hot rinse may only be used for the intended purpose and has been designed for a service life of 10 years.**

Any use over and above this is deemed to be improper. The manufacturer shall not be liable for any damage resulting from this.

The devices of the HRS 10...50 series are electrical medical devices that are subject to special precautionary measures in terms of EMC; they must be installed and put into operation according to the instructions in part 2, chapter 6.6.

NOTE	**Portable and mobile high-frequency communication equipment can influence electrical medical devices.**

NOTE	**The devices of the HRS 10...50 series must not be used if they are located immediately next to or stacked on top of other devices. However, if this is required, the devices must be observed to check for proper operation in this arrangement.**

2.1 Operational features

- Sanitization
  The system produces hot water of up to 90°C for the sanitation:
  - of a connected ring piping
  - further connected medical products which are resistant to hot water.
- Hot storage
  Hot water can circulate in the ring piping for a selected period in order to optimise the microbiological quality.
- Leakage protection
  The hot cleaning system is leak-protected, thus increasing operational safety.
- Programmed operation
  Regular sanitation is user-friendly thanks to programmed heating times.
- Unintentional discharge of hot water to the consumer (ring piping and connected devices) is not possible thanks to the hardware handshake of the connected systems. The conditions for hot cleaning always have to be released by the consumers and the operator.

2.2 Important performance features

The HRS 10...50 system is an autonomous unit for the production of hot water for sanitation purposes.

2.3 Application regulations

- No products or media are to be processed which, under the influence of pressure and temperature, tend to cause uncontrolled reactions such as an increase in viscosity, increase in temperature, hardening, frothing or the generation of gas which could cause the system to exceed limit values even for only a short time.
- The local regulations for connection of the ring piping drain must be heeded.
- Feed and waste water must be installed properly according to DIN 1988-100 and EN 1717.

Die ***Aquaboss***® HRS 10…50 hot rinse has a short application period (< 30 days) in accordance with guideline 93/42/EEC Annex IX.

NOTE	**Following installation and commissioning, the operator is responsible for the continual monitoring of the limit values of the chemical contents in the water and their correlation with the applicable standards.**

During initial commissioning, the HRS 10…50 is handed over to the operator in perfect technical and microbiological condition.

NOTE	**For hygienic reasons, B. Braun Avitum AG advises the following:** • **at least once a month or** • **after the ring piping flow has been at a standstill for more than 72 hours** **carry out thermal sanitation at a temperature of more than 80°C and for at least 30 minutes.**

NOTE	**According to the specifications of the European Pharmacopoeia and the study group for applied hygiene in dialysis, microbiological sampling of water systems is recommended every six months.**

3. Accessory list for Hot Rinse SMART 10/20/30/40/50

Table 3-1: Accessories (optional) for HRS 10/20/30/40/50

Position	Designation	Article no.:
1.	Connection set for ***Aquaboss***® EcoRO Dia I/II C up to 1400	6514400
2.	Connection set for ***Aquaboss***® EcoRO Dia I/II C from 1400	6514500
3.	Connection set for ***Aquaboss***® EcoRO Dia I/II up to 1400	6514600
4.	Connection set for ***Aquaboss***® EcoRO Dia I/II from 1400	6514700
5.	Flash lamps (red)	6510000
6.	***Aquaboss***® Vision (maintenance software)	2001000
7.	Software licence for Hot Rinse SMART 10...50	2001051
8.	Connection set for ***Aquaboss***® Vision	2050305
9.	Remote control	2000305
10.	Water monitor (Aqua control)	3049037
11.	Insulation for piping 100% per metre Ø 35 mm Ø 28 mm	 48902 48836
12.	Fitting accessories	6509900

NOTE **If cables, transformers and accessories other than those listed above are used, this may have a negative influence on jamming and noise immunity.**

⚠ WARNING **Risk of poisoning by dissolved construction material and thermal destruction of components!**

→ In combination with a hot cleaning system, only temperature-resistant original materials up to a minimum of 90°C must be used.

4. Use in combination with other equipment

The operator combines the HRS 10...50 with further medical products such as reverse osmosis systems, ring piping, media supply units or dialysis machines.

The manufacturer, B. Braun Avitum AG, stipulates the following hot cleaning system requirements for combination with other medical products:

- When used in combination with permeate ring piping, these must be implemented in accordance with EN ISO 11197 (medical electrical equipment, specific requirements for the safety of medical supply units). The pressure loss at the end of the ring piping must not exceed 3 bar with maximum throughput. The minimum flow speed at nominal throughput must not exceed 0.5 m/sec. The inlet and outlet of the ring piping must be able to be locked mechanically.
- The ring pipes used must be insulated 100% against heat loss (DIN 1988) and be designed for a permanent operating temperature of 98°C.
- When used in combination with permeate ring pipes, these must be implemented in accordance with DIN EN ISO 11197, VDE 0750-211 Medical Supply Units EN ISO 11197 (medical electrical equipment, specific requirements for the safety of medical supply units).
- Tapping points must be suitable for operating temperatures of up to 98°C.
- When used in combination with media supply units (Class I Medical Product), the tapping points for permeate must be implemented in accordance with DIN EN ISO 11197, VDE 0750-211 Medical Supply Units EN ISO 11197 (medical electrical equipment, specific requirements for the safety of medical supply units).
- Dialysis units (Class IIb medical products) used in combination with the system must comply with standard DIN / VDE 0753-4 [regulations for the use of haemodialysis machines]. Dialysis machines must have been designed for inline use with a permeate temperature of up to 90°C / 7.5 bar.

The use in combination with reverse osmosis and loops from the from B. Braun Avitum AG (Class IIb Medical Products) is possible. B. Braun Avitum AG must be consulted if the system is to be used in combination with reverse osmosis systems (IIb MP) from other manufacturers. In addition, dialysis machines must comply with standard IEC 60601-2-16 (corresponds to IEC 60601-2-16 DIN EN 60601-2-16 concerning the special requirements on the safety of haemodialysis, haemodiafiltrations and haemofiltration units) or the first issue of this standard.

⚠ ATTENTION	**The user must ensure that the devices function and are in a proper condition before using the combination of devices.**

- The loss of pressure in the connected ring piping must not be greater than 3 bar for a flow of 1000 l/h.

NOTE	**Die *Aquaboss*® HRS 10…50 hot rinse has been designed for safe operation in combination with the *Aquaboss*® products (ring piping, reverse osmosis).**

⚠ WARNING	**Risk of poisoning and pyrogene reactions.** **Even if the reverse osmosis system generates water of a quality that fulfills the requirements of the international standard DIN EN ISO 26722, the distribution of this water can deteriorate the quality of the same to such an extent that it no longer fulfills the requirements accordng to standard DIN EN ISO 26722 if the distribution system is not serviced appropriately.** **The service/STK of the Hot Rinse SMART and the connected distribution system must be carried out according to manufacturer specifications.**

⚠ ATTENTION	**It must be ensured that additional equipment that is connected to the analogue and digital interfaces of the device satisfies the appropriate EN specifications (e.g. EN 60950 for data processing devices, EN 61010-1 for measuring/control/ laboratory devices and EN 60601-1 for electro-medical devices). Furthermore, all configurations must satisfy the valid version of the system standard EN 60601-1-1. The person who connects additional equipment to the signal input or output sections is a system configurator and is therefore responsible for ensuring that the valid version of system standard EN 60601-1-1 is observed. If you have any questions please contact your local dealer or the Technical Services department.**

5. Functions

5.1 How it works Hot Rinse SMART 10/20/30/40/50

⚠ ATTENTION	**No permeate withdrawal is permitted during the dwell time.**

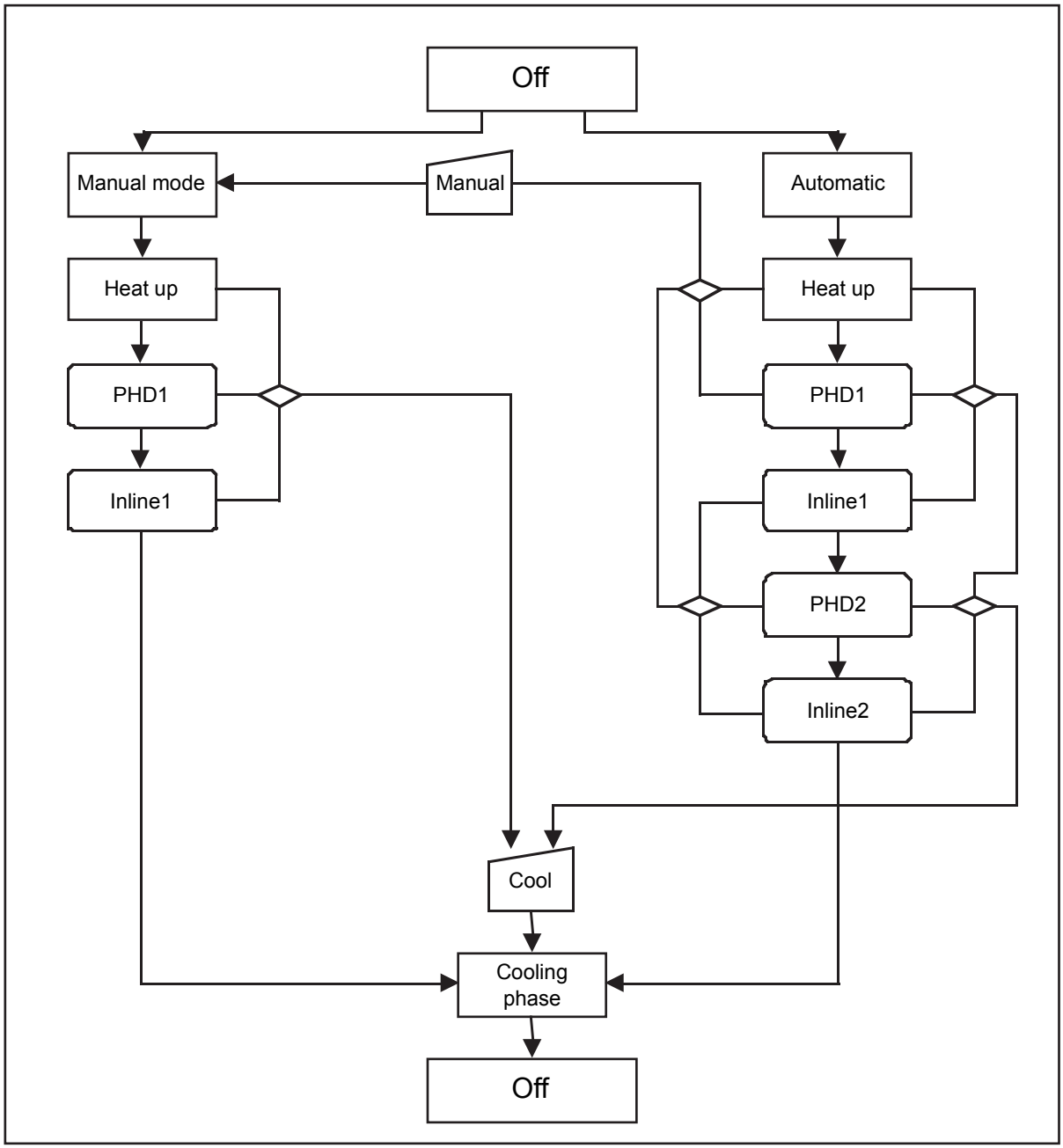
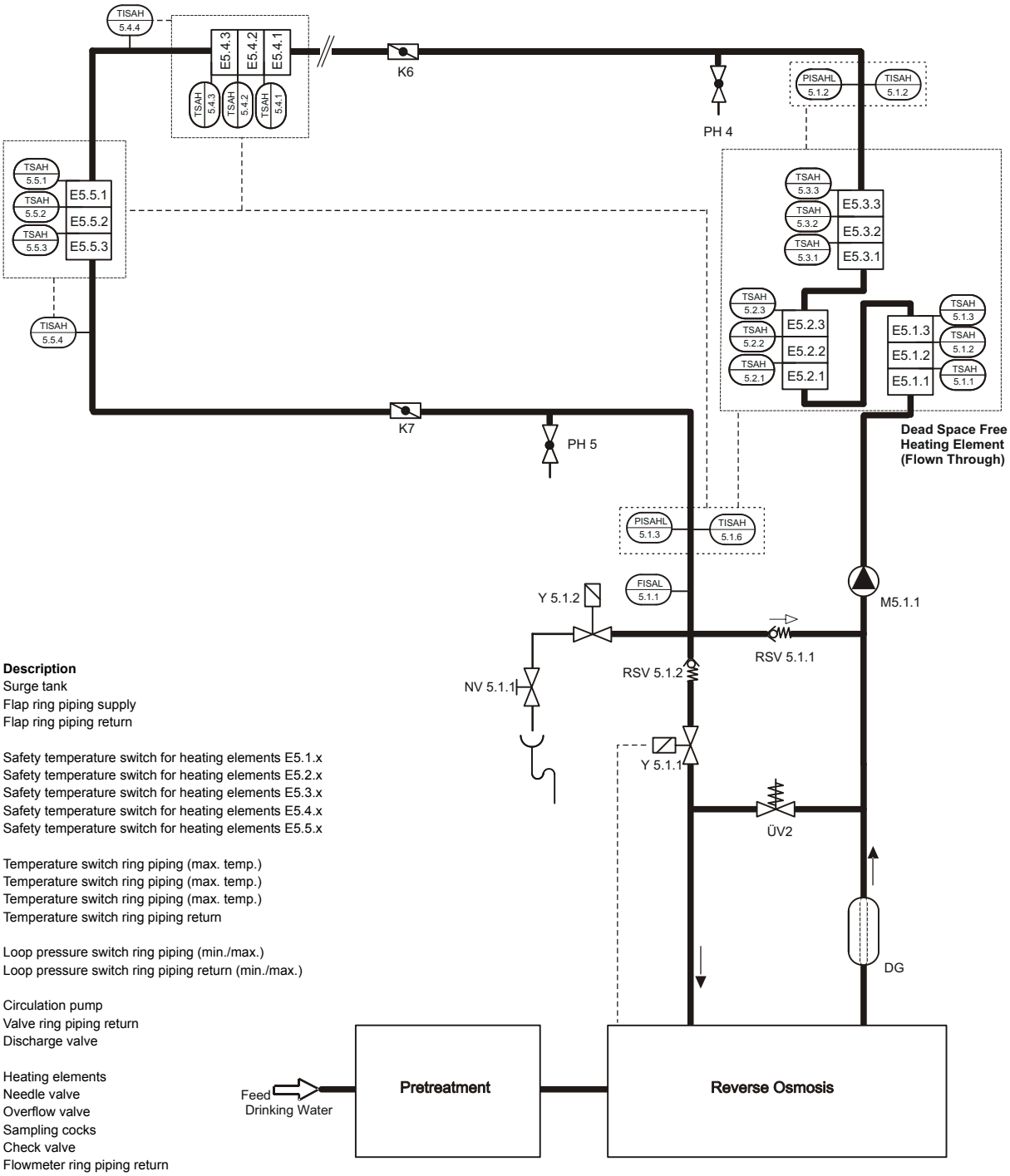


Figure 5-2: Operating modes

Out	Media flow through the pipes of the HRS 10…50 is without any dead zones.
AUTOMATIC	In automatic mode a complete hot cleaning is effected, according to the parameters (weekdays/times) programmed in the menu item “Auto On/Off). Additional precondition: communicating reverse osmosis has not malfunctions and is not in dialysis mode but rather in nighttime mode/ standby mode.
MANUAL MODE	In manual mode a complete hot cleaning is effected according to the parameters programmed in the menu item “manual mode” (duration). Additional preconditions: analogous to automatic mode. Manual mode can only be started from the operating modes “OFF”, “Standby mode” or “Heating”. PHD and inline phase times can be programmed.
HEATING	The water is circulated via pump M1 and heated up to the setpoint temperature by the actuated heating elements.
PHD 1	In the PHD1 phase (permanent hot disinfection), the hot water circulates at constant nominal temperature. Temperature and duration of the hot cleaning determine the efficiency of germ destruction.
INLINE 1	In the inline phase, connected tapping points/sampling cocks or devices that can be cleaned hot may/should be sanitized. Since water is withdrawn during this phase, the hot water capacity is limited. Phases PHD and Inline can therefore be repeated (PHD2/Inline2).
Cool	**From each operating mode of a hot cleaning cycle, the process can be terminated by pressing the button “cool”.**
COOLING PHASE	(In the submenu “Active cooling” is is specified, if the system should cool down after the hot cleaning (manual mode or automatic mode) against the ambient temperature (passive) or the feed of fresh water (permeate of the communicating reverse osmosis) (active).
Out	After the setpoint temperature for the cooling phase has been reached, the system returns to Standby/OFF mode.

5.2 Hot Rinse SMART 10/20/30/40/50



Key:

Name	Description
DG	Surge tank
K6	Flap ring piping supply
K7	Flap ring piping return
TSAH 5.1.x	Safety temperature switch for heating elements E5.1.x
TSAH 5.2.x	Safety temperature switch for heating elements E5.2.x
TSAH 5.3.x	Safety temperature switch for heating elements E5.3.x
TSAH 5.4.x	Safety temperature switch for heating elements E5.4.x
TSAH 5.5.x	Safety temperature switch for heating elements E5.5.x
TISAH 5.1.2	Temperature switch ring piping (max. temp.)
TISAH 5.4.4	Temperature switch ring piping (max. temp.)
TISAH 5.5.4	Temperature switch ring piping (max. temp.)
TISAH 5.1.6	Temperature switch ring piping return
PISAHL 5.1.2	Loop pressure switch ring piping (min./max.)
PISAHL 5.1.3	Loop pressure switch ring piping return (min./max.)
M 5.1.1	Circulation pump
Y 5.1.1	Valve ring piping return
Y 5.1.2	Discharge valve
E 5.1.1 – 5.5.3	Heating elements
NV 5.1.1	Needle valve
ÜV2	Overflow valve
PH4/5	Sampling cocks
RSV 5.1.x	Check valve
FISAL 5.1.1	Flowmeter ring piping return
Feed	Water supply
Pre-treatment	Sand filter, softener, activated charcoal etc. (not included in the scope of supply)
RO	Reverse osmosis (not included in the scope of supply)

6. Description of components

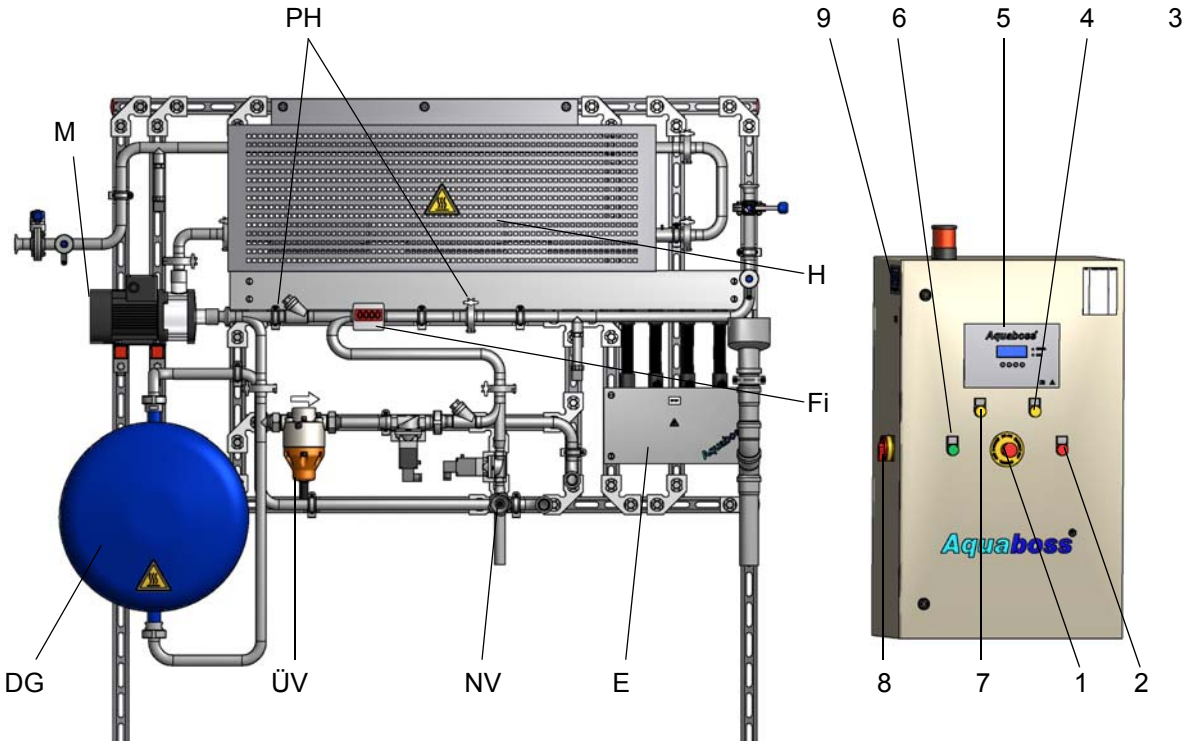


Figure 6-3: *Aquaboss*® Hot Rinse SMART 10/20/30/40/50 front view

Switch cabinet

1 EMERGENCY-OFF pushbutton
2 Signal lamp – Alarm
3 Signal lamp – Hot rinse
4 Signal lamp – Hot rinse start
5 Display, 4 lines at 20 characters each with display-guided key control
6 Signal lamp – Inline operation
7 Signal lamp – Temperature reached
8 Main switch ON / OFF
9 Type plate

Hydraulic components

E Electrical connection box
Fi Flowmeter FIS 5.1.1
DG Surge tank
H Heating elements
M Booster pump, pump M 5.1.1
NV Manual valve NV 5.1.1
PH Sampling cocks PH4 / PH5
ÜV2 Overflow valve ÜV2

6.1 Signal lamps

- “**Collective alarm**” lamp lights up.
  As soon as the “Collective alarm” lamp lights up, the type of fault appears on the display. Each fault is displayed with a comment.
- Lamp “**Hot rinse**”.
  The system is in disinfection mode.
- “**Heating**”
  As soon as this signal lamp lights up the heating is switched on.
- “**Inline**” lamp lights up.
  As soon as the “Inline” lamp lights up, hot water can be withdrawn for rinsing the system.
- “**Temperature reached**”
  As soon as this signal lamp lights up the tank temperature has been reached.

7. Display and keypad

The parameters and operating states are displayed on a 4-line LCD display.

There are 2 LEDs to the right of the display which indicate either correct operation (green) or an error / alarm (red.

Operator guidance via the display and the four keys is a fast and simple possibility of viewing and changing the operating parameters (only personnel authorised by the manufacturer is permitted to make operation-relevant changes).

B. Braun advises proceeding with the help of the operating instructions when using the system for the first time and when operators are not familiar with the system.

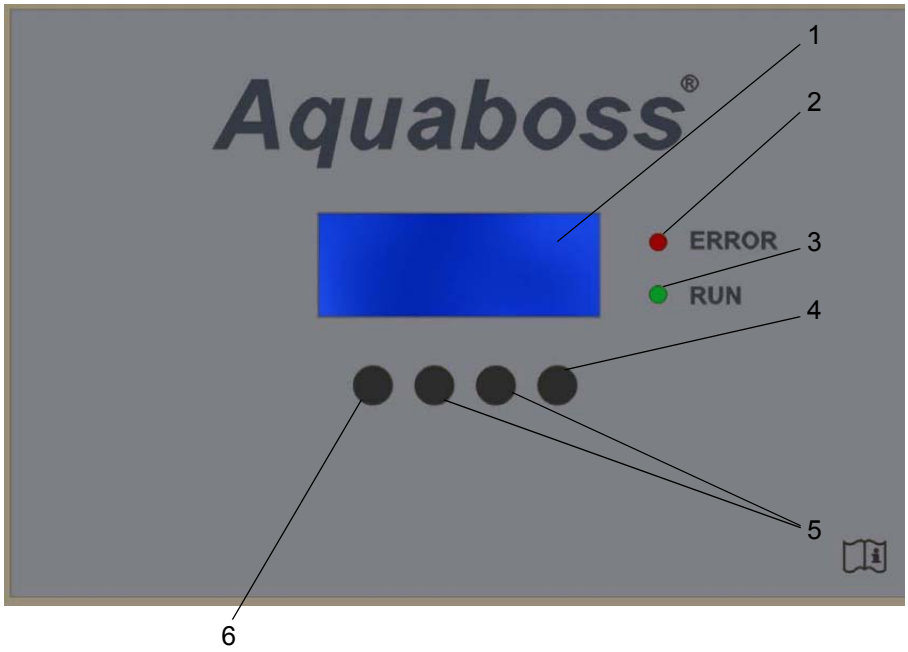


Figure 7-4: Display with function keys

1 LCD display, 4 lines
2 LED red, error/alarm
3 LED green, RUN
4 Enter key
5 Adjustment keys
6 Menu key

8. Commissioning / Decommissioning

The system may only be operated by specially qualified persons who are familiar with the operating instructions and have been instructed by a B. Braun service technician. They must have been informed about general accident prevention regulations.

During commissioning, it must be checked whether:

- All electrical connections are correct
- All connections are leak-free

DANGER	**Electric shock!** **Dangerous voltage when the control cabinet is open.** **→ Switch off the system at the main switch and unplug from the mains.**

8.1 System start-up

- Switch the system on at the main switch.
  See part 1, page 9-1 ff.

8.2 System start-up after shutdown due to a fault

If the system is at a standstill due to a fault, the cause will be shown on the display (error code).

ATTENTION	**The system must not be switched on again until the cause has been eliminated.**

NOTE	**Fault correction with fault codes is dealt with in Chapter 14 “Faults / Causes / Correction”.**

8.3 Putting the system out of operation

If valve Y 5.1.1 (ring piping return) is not actuated via the connected water treatment plant (reverse osmosis), valve Y 5.1.1 must be opened manually via the main switch if the HRS 10...50 is switched off.

For this, the small grey lever at the side of the black valve block has to be turned through 90°.

NOTE	**A permeat return in the ring line is only guaranteed with valve Y 5.1.1 open.**

If the valve is actuated via the connected reverse osmosis (e.g. ***Aquaboss*** ® (Eco)Ro Dia I / II, (Eco)Ro Dia IC / II C) this measure must not be taken into consideration.

8.4 Return and disposal

Electrical medical devices are subject to the guideline for used electric and electronic appliances 2002/96 dated January 27, 2003, and have to be disposed of in an environmentally friendly manner.

The medical product contains a battery. Used batteries should be taken for recycling. The battery is located on the CPU in the control cabinet and can be lifted off the PCB using a screwdriver:

The following steps are to be followed:

1. Switch the main switch to “0”
2. Screw off the EMC cover
3. Replace the battery

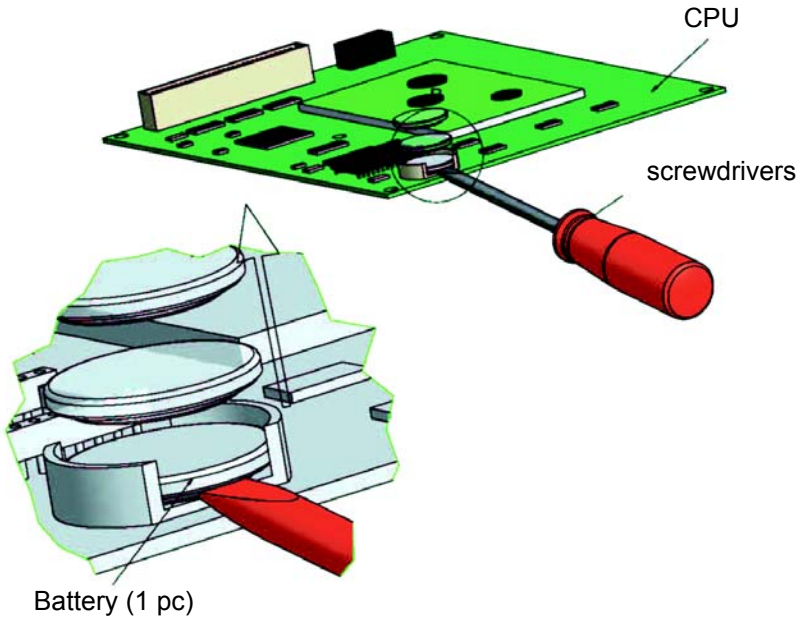


Figure 8-5: Battery removal

In accordance with legislative regulations, B. Braun Avitum AG offers to take back systems it supplies and dispose of these as stipulated by legislation.

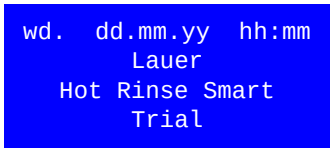
NOTE	**The materials used meet the requirements of directive 2011/65/EU OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS).**

9. Switching on/off of the device

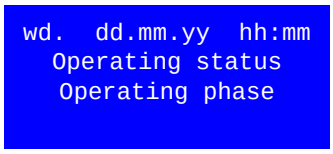
A CPU test is carried out after the HRS 10...50 has been switched on at the main switch. The display LEDs next to the display light up for 3 sec.

(If switch-on takes place after voltage has been interrupted, the operating time last selected remains stored and is initiated again.)

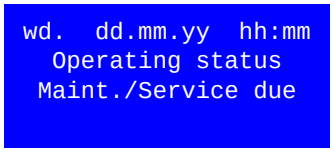
NOTE	**If a fault is determined during start-up, a new fault message appears and the system fault display lights up.**



Display during the CPU test (approx.3 seconds)

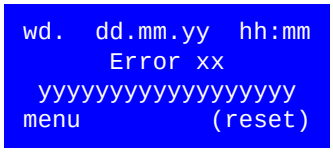


Following the system test, the operating status and operating phase are shown on the display.



If maintenance is due, this is indicated by flashing on the 3rd line:

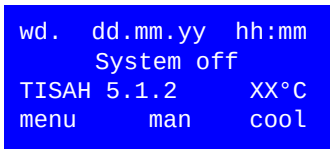
Maintenance/service due or battery empty



Every alarm or error is indicated by specification of the fault code and fault type. At the same time, the collective alarm relay and the internal buzzer are activated

(see Chapter 14.2 – Causes of faults and their correction).

10. Programming the system



All the HRS 10…50 functions are software-controlled. For this reason, parameters have to be set for the functional sequences and limit values before hot water sanitation is carried out. There are no sanitation data saved in the factory settings.

Pressing the “menu” key takes you to the parameter setting level of the HRS 10...50.

10.1 Input of system data and parameters

The program branches into the parameter setting level by requesting the program item “menu” from the basic state.

Core data for the system can be queried in the subprogram items on this level. In addition, control parameters can be modified.

Parameters that are related to the system's functional safety and parameters used by technical service personnel for checking system functions are protected by passwords and may only be changed by authorized personnel.

Selecting a menu item

<< Changes to the previous menu

↑ Previous menu item / selection

↓ Subsequent menu item / selection

Enter Activate selection

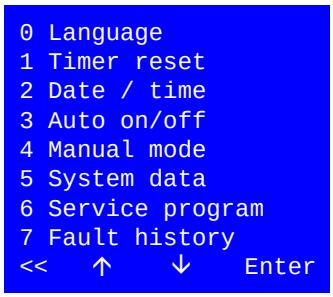
Querying / changes values

+/- Value input / change

Enter Next value / conclude entry / selection of submenu

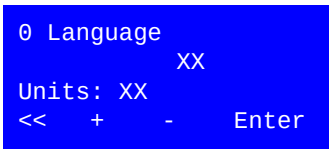
<< Leave input field / previous menu

10.2 Menu



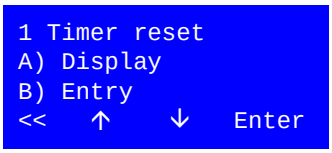
The menu branches into 7 submenus with the aid of which the complete system can be configured.
Pressing the << key returns the operator to the basic state. Pressing the up (↑) and down (↓) keys allows the operator to select between the submenus.
A submenu item is selected by pressing Enter.

10.3 Language



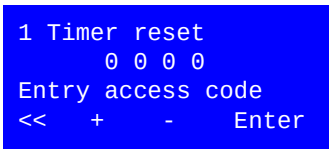
In submenu 0 “Language” the display language can be defined.
There is a choice between metric units (EU) and US imperial units (US).
The operator changes between the units by pressing the +/- key.
Press << to return to the main menu.

10.4 Timer reset



The date for the next maintenance due is processed in menu 1 “Timer Reset”.
The date is shown under A) Display.
The date can be updated following maintenance under B) Entry.

After the selection of A) Display
the date of the due maintenance is displayed.

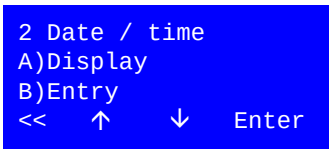


After the selection of B) Entry
the service code must be entered and confirmed by pressing Enter.

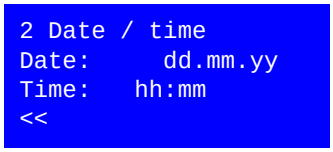
Then the current maintenance date is displayed and can be updated by pressing the reset key (as per menu item 5.27).

10.5 Entry date / time

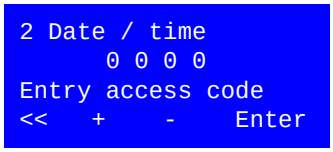
Entering the day of the week as well as the date and time is a necessary precondition for the perfect function of HRS 10...50. The necessary settings can be made under the menu item “Entry date / time”.



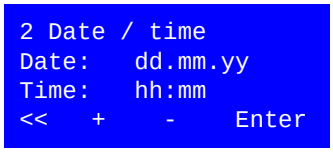
Under menu 2 “Date / time” there is a choice between A) Display and B) Entry.



A) Display is for viewing only, no adjustment is possible



In order to update the date and time under B) Entry, the service code must be entered. For this, the individual digits are selected using the + and – keys and confirmed by pressing Enter.



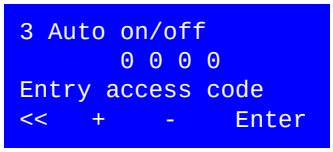
The values are entered by pressing the +/- keys.
“Enter” takes you to the next entry item.
Pressing << takes you back to the menu.

NOTE	**There is no automatic change between summer and winter time.**

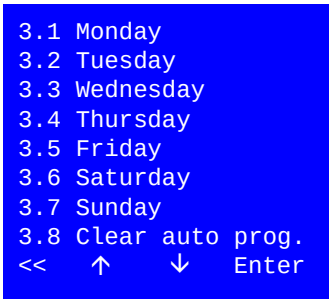
10.6 Automatic On / Off

The program item Auto on/off determines the operating modes of the HRS 10…50.
To protect the disinfection times against unintentional adjustment, the access code is required to carry out submenu B) Entry.

A) Display for viewing only, no adjustment is possible.



The access code (customer password) can be defined in menu item 5.28. The default setting for the customer password is 2232. We recommend changing the password to a customer-specific one when the system is handed over to the operator. The individual digits of the access code can be changed using +/-. Changing to the next digit is possible using “Enter”.

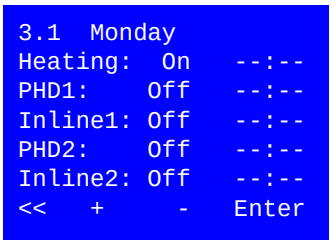


↑ **= upper submenu**

↓ **= lower submenu**

Enter = Selection of weekday

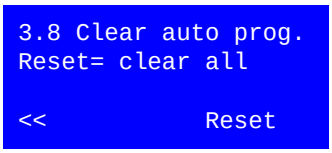
Pressing the menu item “Weekday” takes you to the programming mask for the hot rinsing times of the respective weekday.



An individual time program can be entered for each weekday for the times at which the individual hot rinse operating steps are carried out.
The structure of the submenu corresponds to the hot rinse sequence.
Move to the next menu subitem by pressing the >> key.

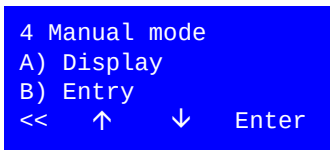
⚠ **ATTENTION**	**Entering incorrect values can endanger the proper functioning of the control system.**

NOTE	**When sanitation is carried out in automatic mode, two PHD and inline times can be programmed.**

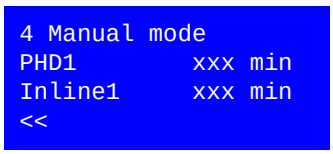


Pressing “Reset” sets all entries in menu 3 (Auto on/off) to 0.

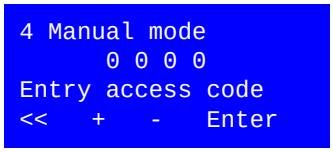
10.7 Manual mode



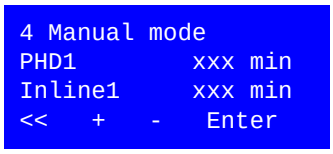
The user has the possibility of carrying out sanitation of the ring piping in manual mode.
After the manual mode option has been activated in the start menu, the automatic times for this day are ignored and a hot rinse is carried out according to the programmed duration for manual mode.
The setpoint temperature for manual mode can be taken from menu items 5.15 – 5.17.



Via A) Display → viewing only, no adjustment possible.



Via B) Entry → Parameters can only be changed following entry of the access code.

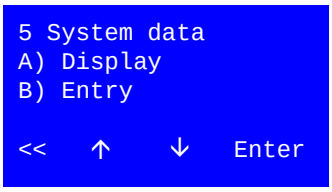


Input range PHD1 = 0 … 999 min
Input range Inline1 = 0 … 240 min

The parameters can be changed using the + and - key and confirmed by pressing the Enter key.

NOTE	**In manual mode the operating phases PHD2 and Inline2 are not carried out.**

10.8 System data

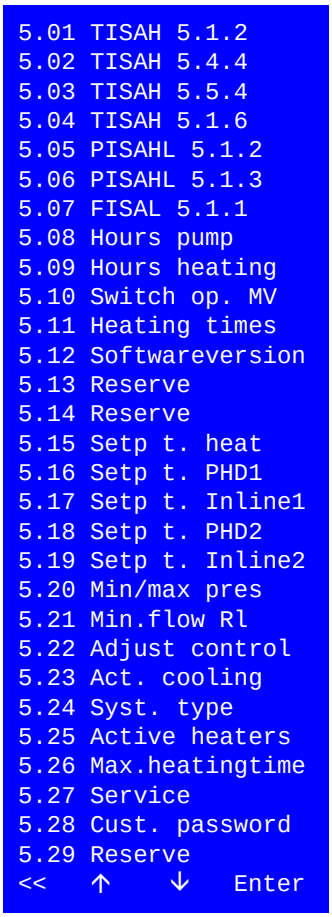


Actuating menu item 5 System data branches the display into the parameter setting level.

The selection option A) Display allows all system settings and measured values to be viewed without the settings being able to be changed.

The selection option B) Entry allows the system setting to be changed following entry of the access code.

10.8.1 Display system data menu 5 A



The arrow keys ↑ and ↓ can be used to change between the individual menu items, which are opened by pressing Enter.

Temperature data

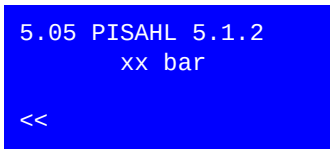
The temperature measured at the start of the ring piping is recorded by TISAH 5.1.2 and displayed under menu item 5.01.

The temperature measured at the heating element E5.4 is recorded by TISAH 5.4.4 and displayed under menu item 5.02.

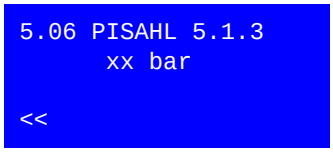
The temperature measured at the heating element E5.5 is recorded by TISAH 5.5.4 and displayed under menu item 5.03.

In menu item 5.04 the temperature at the ring piping return TISAH 5.1.6 is displayed.

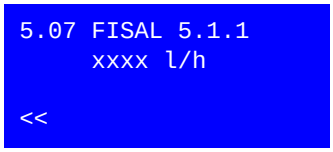
Reaching the target temperature at the return flow of the ring piping (RL) serves to release initiation of the next operating phase.



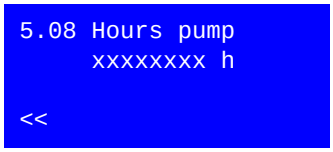
Menu item 5.05 provides information about the pressure measured at PISAHL 5.1.2 downstream from the pump M 5.1.1.



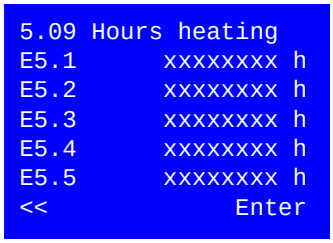
Menu item 5.06 provides information about the pressure measured at PISAHL 5.1.3 at the end of the ring piping.



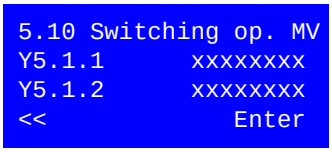
Menu item 5.07 shows the current flow at the end of the ring piping.



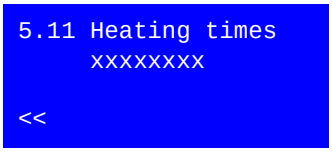
Menu item 5.08 provides information about the pump's operating hours.



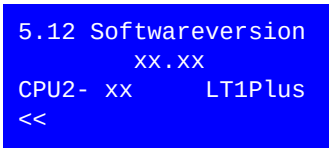
Menu item 5.09 provides information about the operating hours of the individual heating elements.



Menu item 5.10 provides information about the number of switching operations performed by each solenoid valve (MV).



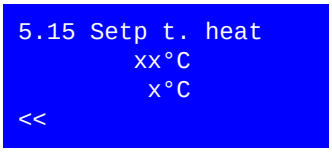
Menu item 5.11 provides information about the number of heating cycles of the HRS 10…50 carried out without fault.



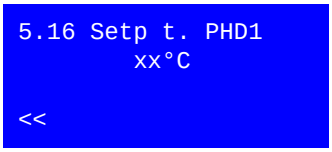
Menu item verifies the current software version.
In addition, the print versions CPU II + LT1Plus are verified.

Not occupied

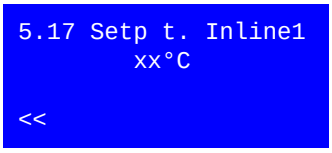
Not occupied



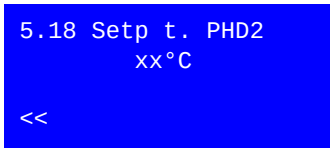
Under menu item 5.15 the upper display value shows the setpoint temperature programmed for the heating elements programmed for the operating phase “Heating” and the lower display value shows the specific temperature loss over the ring piping.
After these values have been reached, the system switches from the operating phase “Heating” to the next operating phase (“PHD” or “Inline”).



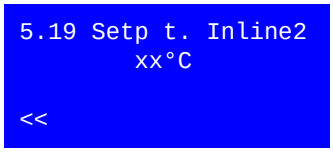
Menu item 5.16 shows the setpoint temperature programmed for the operating phase PHD1.



Menu item 5.17 shows the setpoint temperature programmed for the operating phase Inline1.

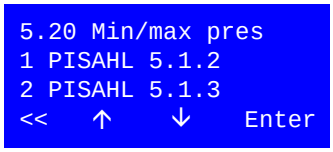


Menu item 5.18 shows the setpoint temperature programmed for the operating phase PHD2.

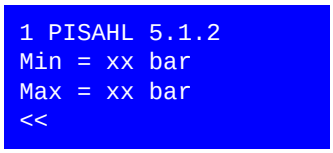


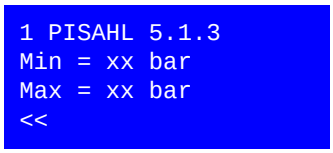
Menu item 5.19 shows the setpoint temperature programmed for the operating phase Inline2.

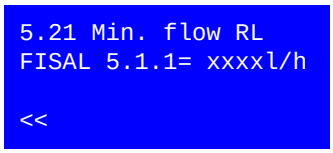
NOTE	**Setpoint temperatures PHD2 and Inline2 are only effective in automatic mode.**



Menu item 5.20 shows the pressure limit values (min./max.) programmed for the pressure sensors downstream from the pump PISAHL 5.1.2 and PISAHL 5.1.3 on the ring piping return.

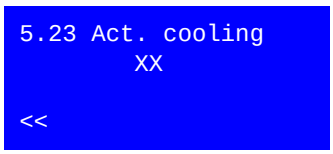






Menu item 5.21 shows the minimum flow required at the end of the ring piping.

The adjust control values 1, 2, 3 are used to define 3 temperature differences to the setpoint temperature in order to switch the heating elements E5.x.1, E5.x.2, E5.x.3 off and thus achieve an optimum heating curve.



The menu item provides information about whether Hot Rinse SMART and ring piping are to be cooled down with RO water after a heating cycle (active cooling) or whether the hot water should simply cool down in the ring piping (passive cooling).

```
5.24 Syst. type
Hot Rinse Smart
        xx
<<
```

The system version supplied can be seen in this menu item:

Hot Rinse SMART 10
Hot Rinse SMART 20
Hot Rinse SMART 30
Hot Rinse SMART 40
Hot Rinse SMART 50

```
5.25 Active heaters
E5.1    xxx
E5.2    xxx
E5.3    xxx
E5.4    xxx
E5.5    xxx
<<            Enter
```

The possible heaters which are connected are listed in menu item 5.25. and their status is shown as “on” (connected) or “off” (not connected).

```
5.26 Max.heatingtime
      xxx min

<<
```

If the target temperature for hot cleaning is not reached within the maximum heating time given, the system issues an alarm.

```
5.27 Service
     xx months

<<
```

Menu item 5.27 shows the prescribed service interval in months. The next service date can be read off under menu item 1.1 “Service”.

```
5.28 Cust. password
      0 0 0 0
Entry access code
<<            Enter
```

- without function – in the Display menu

```
5.29 Reserve


<<            Enter
```

- without function

10.8.2 Input system data menu 5 B

ATTENTION **Entering incorrect values can endanger the proper functioning of the control system.**

```
5 System data
A) Display
B) Entry
<<   +    -    Enter
```

The selection option B) Entry allows the system setting to be changed following entry of the access code.

Menu 5B can only be opened through an access code.

```
5 System data
      0 0 0 0
Entry access code
<<   +    -    Enter
```

The code figures are set using +/-.

Enter Activate selection

NOTE **The access code is deactivated automatically after 30 minutes, if no parameters are set in 5B or menu 7. The access code can also be deactivated by switching the device off at the main switch and waiting for 10 sec.**

```
5.15 Setp t. heat
5.16 Setp t. PHD1
5.17 Setp t. Inline1
5.18 Setp t. PHD2
5.19 Setp t. Inline2
5.20 Min/max pres
5.21 Min.flow Rl
5.22 Adjust control
5.23 Act. cooling
5.24 Syst. type
5.25 Active heaters
5.26 Max.heatingtime
5.27 Service
5.28 Cust. password
5.29 Reserve
<<   ↑    ↓    Enter
```

Collective screen submenu 5 B

The arrow keys ↑ and ↓ can be used to change between the individual menu items, which are opened by pressing Enter.

```
5.15 Setp t. heat
        xx°C
         x°C
<<    +    -
```

Under menu item 5.15 the upper display value shows the setpoint temperature programmed for the heating elements programmed for the operating phase “Heating” and the lower display value shows the specific temperature loss over the ring piping.
After these values have been reached, the system switches from the operating phase “Heating” to the next operating phase (“PHD” or “Inline”).

Value range:	Upper display	50…90°C (122–194°F)
	Lower display	0…-10°C (0–50°F)

E.g.:
Upper display: 80°C (setpoint temperature heating)
-> Adjust heater to a target temperature of 80°C
Lower display:-9°C (Temperature loss via the ring piping)
-> When the temperature difference 71°C (80°C – 9°C = 71°C) is reached at the end of the ring piping (TISAH 5.1.6) the system switches to the next operating phase.

```
5.16 Setp t. PHD1
       xx°C

<<    +    -
```

PHD1 (Permanent Hot Rinse): Target temperature which must be maintained during the PHD1 phase.

Hot water may not be be drawn from the ring piping during the PHD1 phase. The target specification must be within the range around 50°C (125°F) – 90°C (190°F).

```
5.17 Setp t. Inline1
       xx°C

<<    +    -
```

Inline1: Target temperature which must be maintained during the Inline1 phase.

The target specification must be within the range around 50°C (125°F) – 90°C (190°F).

```
5.18 Setp t. PHD2
       xx°C

<<    +    -
```

PHD2 (Permanent Hot Rinse): Target temperature which must be maintained during the PHD2 phase.

Hot water may not be be drawn from the ring piping during the PHD2 phase. The target specification must be within the range around 50°C (125°F) – 90°C (190°F).

```
5.19 Setp t. Inline2
       xx°C

<<    +    -
```

Inline2: Target temperature which must be maintained during the Inline2 phase.

The target specification must be within the range around 50°C (125°F) – 90°C (190°F).

```
5.20 Min/max pres
PISAHL 5.1.2
PISAHL 5.1.3
<<   ↑    ↓   Enter
```

In this menu item the permissible system pressure, measured at the PISAHL 5.1.2 (pressure after pump M 5.1.1) and PISAHL 5.1.3 (pressure at the end of the ring piping), is set.

```
PISAHL 5.1.2
Min = xx bar
Max = xx bar
<<   +    -    Enter
```

```
PISAHL 5.1.3
Min = xx bar
Max = xx bar
<<   +    -    Enter
```

The minimum pressure can be set in the range 0.3 – 2 bar (4.3 – 29 psi), the maximum pressure in the range 3 – 8 bar (43.5 – 116 psi).

```
5.21 Min. flow RL
FISAL 5.1.1= xxxxl/h

<<   +    -    Enter
```

Corresponding to the ring piping diameter and the capacity of the reverse osmosis connected, it is necessary to set the minimum flow parameter at the end of the ring piping to a minimum value:
DN 20: 1000 l/h
DN 15: 500 l/h

A minimum flow in the ring piping prevents partial overheating of the system.

```
5.22 Adjust control
1 = xx°C
2 = xx°C
3 = xx°C
<<   +    -    Enter
```

The adjust control values permit a low-vibration, sturdy control of the heating process. All heaters E.5.1-E.5.5 are made up of three heating elements each. These can be actuated separately.
When the actual temperature (TISAH5.1.6) reaches the first adjust control value (setpoint value minus “1”), all the third heating elements of the heaters E.5.x are switched off.
When the second adjust control value is reached (setpoint temperature minus “2”), all the second heating elements are switched off.
When the third adjust control value has been exceeded (setpoint temperature minus “3”), none of the heaters is actuated any longer.
This regulation prevents overshoot of the heating curve.
Value range 1: -5…+10°C (23…50°F)
Value range 2: -5…+10°C (23…50°F)
Value range 3: -5…+10°C (23…50°F)

```
5.23 Act. cooling
        XX

<<    +    -
```

HRS 10…50 offers the option of cooling using RO water after hot rinse in order to return quickly to the dialysis operating temperature.
The options for the cooling process are selected in the menu item “Active cooling”. Active cooling is set to yes (activate) or no (passive cooling) by pressing the +/- keys.

```
5.24 Syst. type
Hot Rinse Smart
        XX
<<    +    -   Enter
```

In the menu item System type the version of the Hot Rinse SMART delivered is set.
Hot Rinse SMART 10: 1x3 heating elements (9 kW)
Hot Rinse SMART 20: 2x3 heating elements (18 kW)
Hot Rinse SMART 30: 3x3 heating elements (27 kW)
Hot Rinse SMART 40: 4x3 heating elements (36 kW)
Hot Rinse SMART 50: 5x3 heating elements (45 kW)

```
5.25 Active heaters
E5.1    xxx
E5.2    xxx
E5.3    xxx
E5.4    xxx
E5.5    xxx
<<   +    -    Enter
```

In submenu 5.25 al connected heaters are shown (“on”). Not connected heaters are shown with “off”.
If one of the heaters has a technical defect, the heating affected can be switched “off” manually for a problem-free hot rinse.
Note: lack of heating capacity slows the heating process and can lead to insufficient sanitation, depending on the dimensioning of the ring piping.
If a heater is defective, we recommend reporting this to Service and initiating a repair.

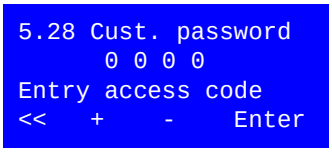
```
5.26 Max.heatingtime
       xxx min

<<    +    -
```

A maximum heating time is entered for safety reasons.
If the time is exceeded without the target temperature being reached, an alarm is triggered.
Value range: 60 – 180 minutes

This menu item determines the service intervals for HRS 10…50.
There is a choice between 6 and 12 months.

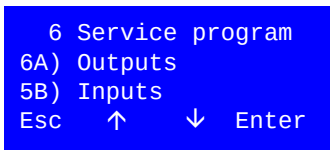
NOTE	**The changed value for the service interval is only take over following the next service.**



In this menu the customer has the possibility of defining his own password. After the last digit has been confirmed the code is saved.

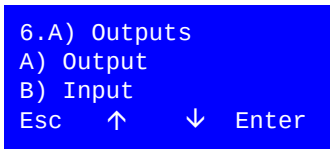
Not occupied

10.9 Service programme, menu item 6

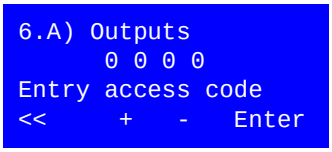


In the service program the digital inputs can be viewed and all outputs can be individually set (“1”) and deleted (“0”) for test purposes.

<< Switches to the previous menu.
↑ Move selection up.
↓ Move selection down.
Enter Activate selection.



10.9.1 Set/deleting outputs, menu 6A outputs



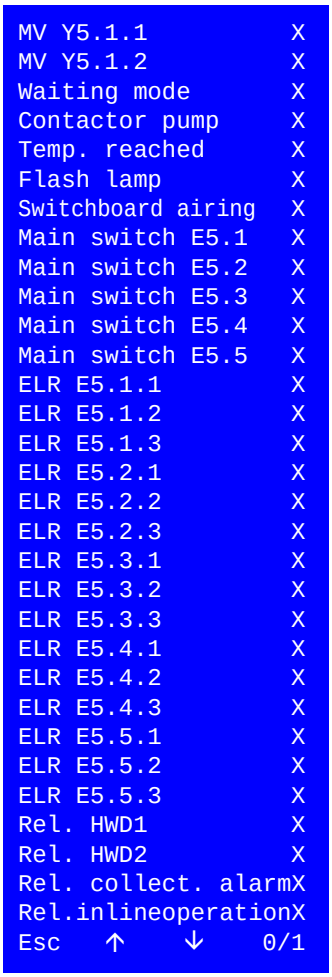
Menu 6B can only be opened through an access code.

The customer-specific code or the manufacturer's technicians' code can be used as the access code.

<< Changes to the previous menu.
+/- Entry of values
Enter Activate selection.

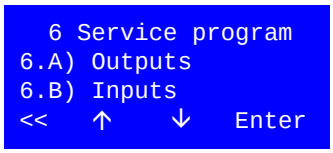
Note: When service program 6A is opened, the normal operating mode is interrupted and all outputs can be switched.

When service program 6B is closed, the system is returned to its basic state.



Solenoid valve return flow RO Y5.1.1
Solenoid valve discharge Y5.1.2
System is programmed for the current day
Contactor pump M5.1.1 on
Signal lamp temperature reached
Flash lamp
Switchboard airing on
Main contactor heater E5.1 on
Main contactor heater E5.2 on
Main contactor heater E5.3 on
Main contactor heater E5.4 on
Main contactor heater E5.5 on
ELR heater E5.1.1 switched on
ELR heater E5.1.2 switched on
ELR heater E5.1.3 switched on
ELR heater E5.2.1 switched on
ELR heater E5.2.2 switched on
ELR heater E5.2.3 switched on
ELR heater E5.3.1 switched on
ELR heater E5.3.2 switched on
ELR heater E5.3.3 switched on
ELR heater E5.4.1 switched on
ELR heater E5.4.2 switched on
ELR heater E5.4.3 switched on
ELR heater E5.5.1 switched on
ELR heater E5.5.2 switched on
ELR heater E5.5.3 switched on
Relay K1103 HWD1 hot rinse on
Relay K1104 HWD2 on
Relay K1105 Collective alarm on
Relay K1106 HWD Inline mode on
Command line
<< = Back to the submenu
↑ = Upper position, ↓ = Lower position
0/1 = Set/delete output

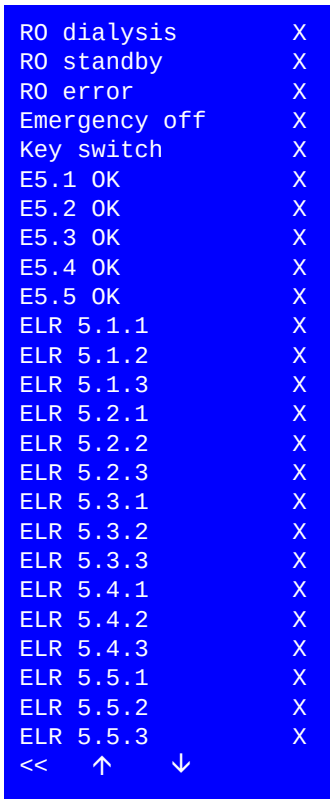
10.9.2 Considering inputs, menu 6B inputs



Considering digital inputs

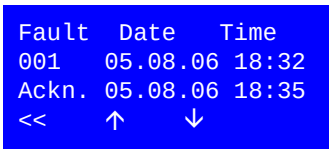
Menu 6B makes it possible for the operator to consider the switch states of the digital inputs even during normal system operation.

0/1 = Input not set / set
<< Switches to the previous menu
↑ Move selection up
↓ Move selection down



Digital input RO in dialysis mode
Digital input RO in night-time mode
Digital input RO fault
Digital input Emergency off
Digital input Key switch
Digital input Hardware chain heater E5.1 is OK
Digital input Hardware chain heater E5.2 is OK
Digital input Hardware chain heater E5.3 is OK
Digital input Hardware chain heater E5.4 is OK
Digital input Hardware chain heater E5.5 is OK
Digital input ELR 5.1.1 on
Digital input ELR 5.1.2 on
Digital input ELR 5.1.3 on
Digital input ELR 5.2.1 on
Digital input ELR 5.2.2 on
Digital input ELR 5.2.3 on
Digital input ELR 5.3.1 on
Digital input ELR 5.3.2 on
Digital input ELR 5.3.3 on
Digital input ELR 5.4.1 on
Digital input ELR 5.4.2 on
Digital input ELR 5.4.3 on
Digital input ELR 5.5.1 on
Digital input ELR 5.5.2 on
Digital input ELR 5.5.3 on
<< = Back to the submenu
↑ = Upper position, ↓ = Lower position

10.10 Fault history menu 7



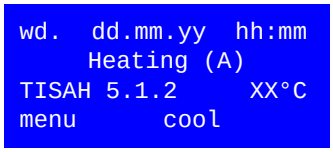
The last 20 error codes that have led to a system switch-off are shown under menu item 7 with alarm/error number, date and time of occurrence as well as date and time of acknowledgement.

↑ ↓ = Change to the next fault

<< = Back to the submenu

11. Execution of hot desinfection, menu item 3, auto On/Off

11.1 Heating



When the “Heating on” start time has been reached, the first hot rinse step starts. The heating of the ring piping is shown on the display as an operating message.

Precondition for heating is:

Reverse osmosis in night-time mode (DI2 = 1)

The heating process is shown on the display as an operating message. During heating the full heating capacity (9 kW or 45 kW depending on system version) is connected until the target temperature is achieved with a deviation of 3K.

During the heating phase it is possible to change to the cooling phase (cool) or to manual mode at any time.

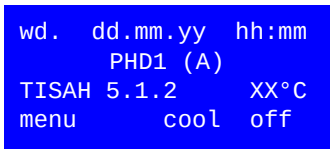
After the setpoint temperature defined in menu item 5.15 has been reached, the heaters switch off and then only compensate the temperature losses of the ring piping.

(A) stands for automatic mode

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals.

NOTE	**During the heating phase no water may be drawn.**

11.2 Hot cleaning PHD 1



Purpose: Hot water sanitation of the ring piping

Preconditions are:

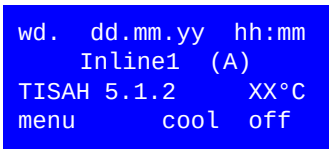
1. RO in night-time mode / standby mode
2. Heating setpoint temperature reached
3. End-time PHD1 specified but not reached yet.

(A) stands for automatic mode

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

NOTE	**No water may be drawn off during PHD 1.**

11.3 Hot cleaning Inline 1



Purpose: Hot water sanitation of the sampling and tapping points.

Preconditions for starting inline phase 1 are:

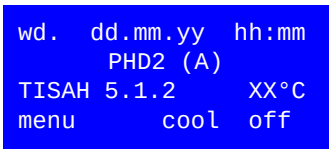
1. RO in night-time mode
2. Inline setpoint temperature reached
3. End-time Inline1 specified but not reached yet.

Hot water can be drawn from the system during the inline phase.

(A) stands for automatic mode

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

11.4 Hot cleaning PHD 2



In automatic mode it is possible to have a further PHD2 phase follow the completed Inline 1 phase.

Preconditions are:

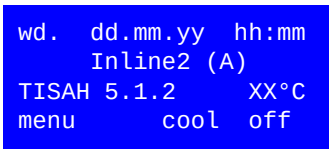
1. RO in night-time mode
2. Heating setpoint temperature reached
3. End-time PHD2 specified but not reached yet.

(A) stands for automatic mode

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

NOTE	**No water may be drawn off during PHD 2.**

11.5 Hot cleaning Inline 2



In automatic mode it is possible to have a further Inline phase follow the completed PH 2 phase.

Preconditions for starting inline phase 2 are:

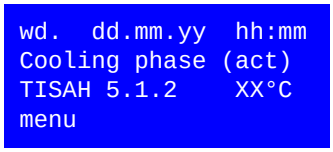
1. RO in night-time mode
2. Inline setpoint temperature reached
3. End-time Inline2 specified but not reached yet.

Hot water can be drawn from the system during the inline phase.

(A) stands for automatic mode

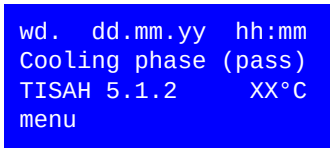
Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

11.6 Cooling phase



If the “Active cooling” option is set to “yes” in menu item 5.23, the ring piping is cooled down to 36°C with fresh water from the reverse osmosis in a last process step.

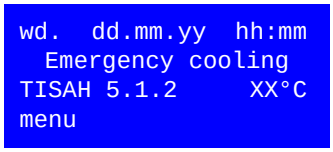
Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals.



If the “Active cooling” option is set to “no” in menu item 5.23, the system comes to a standstill until the ring piping has cooled down to 36°C.

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

11.7 Cooling (emergency cooling)



During the operating phases Off / Heating / PHD and Inline it is possible to initiate emergency cooling manually by pressing the “cool” key.

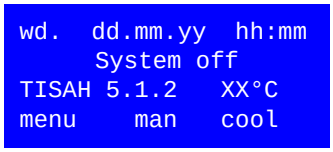
During emergency cooling only the ring piping is cooled to 36°C.

If a specific ERROR (see part 1, page 14-2) is established, the system automatically initiates emergency cooling.

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

12. Execution of hot disinfection in manual mode

12.1 Heating



If times are set in menu 4 manual modes and the RO is in standby mode, the message “manuel” appears above the key 2 to start hot cleaning in manual mode.

Independently of the programmed automatic mode, the Hot Rinse 10...50 can be switched to manual mode from the operating mode “Off” or during ongoing hot cleaning.

Condition for manual mode is

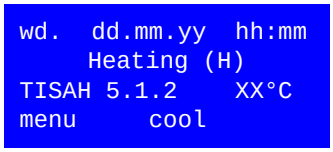
Reverse osmosis (RO) in night-time mode

The function “Manual” appears on the display with release of the standby mode/night-time mode by the RO.

The duration for PHD1 and Inline1 programmed under menu 4 overwrite the automatic values of the respective day after the “Manual” option has been actuated.

The program sequence manual mode corresponds to the automatic mode sequence in the operating phases “Heating” ➔ PHD 1 ➔ Inline 1

The operating phases PHD 2 and Inline 2 are not available.

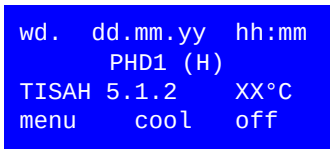


(H) stands for manual mode

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

NOTE	**During the heating phase no water may be drawn.**

12.2 Hot cleaning PHD1



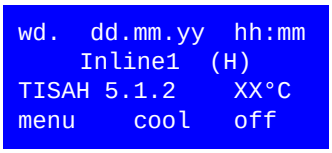
The PHD1 phase is operated for the PHD1 duration in menu 4.

(H) stands for manual mode

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

NOTE	**During the PHD1 no water must be drawn.**

12.3 Hot cleaning Inline1



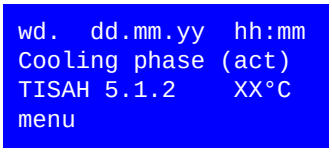
The Inline1 phase is operated for the Inline1 duration in menu 4.

(H) stands for manual mode

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

12.4 Hot cleaning Inline1

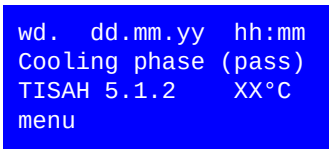
12.4.1 Cooling phase active



If in menu item 5.23 the opion “active cooling” is set to “yes”, the ring piping is cooled down to 36°C in a last process step with fresh water from the reverse osmosis.

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals.

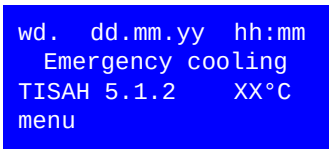
12.4.2 Cooling phase passive



If in menu item 5.23 the option “active cooling” is set to “no”, the system stops until the ring line has cooled down to 36°C.

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

12.5 Emergency cooling



During the operating phases Off / Heating / PHD and Inline it is possible to initiate emergency cooling manually by pressing the “cool” key.

During emergency cooling only the ring piping is cooled to 36°C.

If a specific ERROR (see part 1, page 14-2) is established, the system automatically initiates emergency cooling.

Line 3 alternately displays the temperatures of the active temperature sensors at 3 second intervals

13. Overview of operating phases

13.1 Digital inputs

DI	Input designation	Comment
1	RO dialysis	Signal dialysis mode from RO
2	RO night-time mode/standby	Signal release hot rinse from RO
3	RO alarm	Signal fault/alarm from RO
4	FISAL 5.1.1	Flowmeter, impulse generator
5		
6		
7		
8		
9	Emergency off	Emergency off chain OK
10	Key-operated switch	Remote starting of manual mode
11		
12		
13	Main switch E5.1	Hardware chain heater E5.1
14	Main switch E5.2	Hardware chain heater E5.2
15	Main switch E5.3	Hardware chain heater E5.3
16	Main switch E5.4	Hardware chain heater E5.4
17	Main switch E5.5	Hardware chain heater E5.5
18	ELR 5.1.1 defective	If DO18 = 0 but DI18 = 1 (timeout 500ms)
19	ELR 5.1.2 defective	If DO19 = 0 but DI19 = 1 (timeout 500ms)
20	ELR 5.1.3 defective	If DO20 = 0 but DI20 = 1 (timeout 500ms)
21	ELR 5.2.1 defective	If DO21 = 0 but DI21 = 1 (timeout 500ms)
22	ELR 5.2.2 defective	If DO22 = 0 but DI22 = 1 (timeout 500ms)
23	ELR 5.2.3 defective	If DO23 = 0 but DI23 = 1 (timeout 500ms)
24	ELR 5.3.1 defective	If DO24 = 0 but DI24 = 1 (timeout 500ms)
25	ELR 5.3.2 defective	If DO25 = 0 but DI25 = 1 (timeout 500ms)
26	ELR 5.3.3 defective	If DO26 = 0 but DI26 = 1 (timeout 500ms)
27	ELR 5.4.1 defective	If DO27 = 0 but DI27 = 1 (timeout 500ms)
28	ELR 5.4.2 defective	If DO28 = 0 but DI28 = 1 (timeout 500ms)
29	ELR 5.4.3 defective	If DO29 = 0 but DI29 = 1 (timeout 500ms)
30	ELR 5.5.1 defective	If DO30 = 0 but DI30 = 1 (timeout 500ms)
31	ELR 5.5.2 defective	If DO31 = 0 but DI31 = 1 (timeout 500ms)
32	ELR 5.5.3 defective	If DO32 = 0 but DI32 = 1 (timeout 500ms)

13.2 Analogue inputs 4…20 mA

AI	Input designation	Remark	Scope
1	PISAHL 5.1.2	Pressure RL feed	0–10bar
2	TISAH 5.1.2	Temperature RL feed	PT100 -20…+120°C
3	TISAH 5.4.4	Temperature heater 4	PT100 -20…+120°C
4	PISAHL 5.1.3	Pressure RL return flow	0–10bar
5	TISAH 5.1.6	Temperature RL return flow	PT100 -20…+120°C

13.3 Analogue inputs LF+temperature

AI	Input designation	Remark	Scope
LF1			
LF2			
LF3			
LF4			
TIS5	TISAH 5.5.4	Temperature heater 5	NTC

13.4 Digitale outputs

TUN	Output designation	Remark
1	Y5.1.1	Shutoff valve to the RO during hot cleaning
2	Y5.1.2	Drain valve for discharging hot water after hot cleaning
3	HRS 10...50 in waiting mode	Display that hot cleaning is programmed today
4		
5		
6		
7		
8		
9	Pump on	Switches pumps on and off
10	Temperature reached	Signal lamp “Temperature reached”
11	Flash lamp	Flash lamp during hot cleaning
12	Switchboard airing	Switchboard airing on
13	Main switch E5.1	Main switch in 400VAC circuit
14	Main switch E5.2	Main switch in 400VAC circuit
15	Main switch E5.3	Main switch in 400VAC circuit
16	Main switch E5.4	Main switch in 400VAC circuit
17	Main switch E5.5	Main switch in 400VAC circuit
18	ELR E5.1.1	ELR load relay for controlling heating
19	ELR E5.1.2	ELR load relay for controlling heating
20	ELR E5.1.3	ELR load relay for controlling heating
21	ELR E5.2.1	ELR load relay for controlling heating
22	ELR E5.2.2	ELR load relay for controlling heating
23	ELR E5.2.3	ELR load relay for controlling heating
24	ELR E5.3.1	ELR load relay for controlling heating
25	ELR E5.3.2	ELR load relay for controlling heating
26	ELR E5.3.3	ELR load relay for controlling heating
27	ELR E5.4.1	ELR load relay for controlling heating
28	ELR E5.4.2	ELR load relay for controlling heating
29	ELR E5.4.3	ELR load relay for controlling heating
30	ELR E5.5.1	ELR load relay for controlling heating
31	ELR E5.5.2	ELR load relay for controlling heating
32	ELR E5.5.3	ELR load relay for controlling heating

Line	Operating status	Operating phase	RO dialysis								Emergency off				Main switch E5.2 OK	Main switch E5.3 OK	Main switch E5.3 OK
			DI1	DI2	DI3	DI4	DI5	DI6	DI7	DI8	DI9	DI10	DI11	DI12	DI13	DI14	DI15
1	**Power up test**	**Power up test**	x	x	x	x					x						
2	**System off**	**System off**	x	x	x	x					1				0	0	0
			Continue to hot rinse heating if: menu 3 auto: DI2 = 1, start time *Heating On* reached and *Inline Off* or *PHD Off prog.* or menu 4 manual: DI2 = 1 and *Manual* key activated														
3	**Hot rinse**	**Heat up**	0	1	1	P					1				1	1	1
			Continue to hot rinse PHD1 mode if: Nominal temperature M5.15 N RIAH 5.16 reached and PHD1-Off programmed (also for two consecutive days). If no PHD1-off but Inline1-off is programmed, continue to Inline1 (for two successive days as well														
4	**Hot rinse**	**PHD1 Automatic or Manual mode**	0	1	1	P					1				1	1	1
			Continue to hot rinse Inline1-operation if: Menu 3 auto: operation to *PHD-off* is reached, continue to *Inline1* if programmed (alse for two consecutive days), otherwise continue to cooling phase. Menu 4 Manual: If manual-PHD has expired, continue to Inline1 if programmed, otherwise continue to cooling phase														
5	**Hot rinse**	**Inline1 Automatic or Manual mode**	0	1	1	P					1				1	1	1
			Continue to hot rinse PHD2-operation if: Menu3 auto: operation to *Inline1-Off* is reached, continue to *PHD2* if programmed (also for two consecutive days), otherwise continue to cooling phase. Menu 4 Manual: If *Manual-Inline1* has expired, continue to cooling phase, with manual mode no PHD2 and Inline2.														
6	**Hot rinse**	**PHD2 Automatic**	0	1	1	P					1				1	1	1
			Continue to hot rinse Inline2-operation if: Menu 3 auto: operation to *PHD2-off* is reached, continue to *Inline2* if programmed (also for two following days), otherwise continue to cooling phase														
7	**Hot rinse**	**Inline2 Automatic**	0	1	1	P					1				1	1	1
			Continue to cooling phase if: Menu 3 Auto: mode up to Inline2-off has been reached, then continue to cooling phase. Menu 4 Manual: With manual mode no PHD2 and Inline2.														
8	**Hot rinse**	**Cooling phase not enabled**	0	1	1	0					1				0	0	0
9	**Hot rinse**	**Cooling phase enabled**	0	1	1	P					1				0	0	0
10	**Emergency cooling**	**Emergency cooling enabled**	0	1	1	P					1				0	0	0

Line	Operating status	Operating phase	Main switch E5.4 OK	Main switch E5.5 OK	ELR 5.1.1 – 5.1.3	ELR 5.2.1 – 5.2.3	ELR 5.3.1 – 5.3.3	ELR 5.4.1 – 5.4.3	ELR 5.5.1 – 5.5.3	Solenoid Y5.1.1	Solenoid Y5.1.2	HRS in waiting mode				
			DI16	DI17	DI18 - DI20	DI21 - DI23	DI24 - DI26	DI27 - DI29	DI30 - DI32	DO 1	DO 2	DO 3	DO4	DO5	DO6	DO7
1	**Power up test**	**Power up test**			0	0	0	0	0	0	0	0				
2	**System off**	**System off**	0	0	0	0	0	0	0	1	0	#1				
			Continue to hot rinse heating if: menu 3 auto: DI2 = 1, start time *Heating On* reached and *Inline Off* or *PHD Off prog.* or menu 4 manual: DI2 = 1 and *Manual* key activated													
3	**Hot rinse**	**Heat up**	1	1	#3	#3	#3	#3	#3	0	0	0				
			Continue to hot rinse PHD1 mode if: Nominal temperature M5.15 N RIAH 5.16 reached and PHD1-Off programmed (also for two consecutive days). If no PHD1-off but Inline1-off is programmed, continue to Inline1 (for two successive days as well													
4	**Hot rinse**	**PHD1 Automatic or Manual mode**	1	1	#3	#3	#3	#3	#3	0	0	0				
			Continue to hot rinse Inline1-operation if: Menu 3 auto: operation to *PHD-off* is reached, continue to *Inline1* if programmed (alse for two consecutive days), otherwise continue to cooling phase. Menu 4 Manual: If manual-PHD has expired, continue to Inline1 if programmed, otherwise continue to cooling phase													
5	**Hot rinse**	**Inline1 Automatic or Manual mode**	1	1	#3	#3	#3	#3	#3	0	0	0				
			Continue to hot rinse PHD2-operation if: Menu3 auto: operation to *Inline1-Off* is reached, continue to *PHD2* if programmed (also for two consecutive days), otherwise continue to cooling phase. Menu 4 Manual: If *Manual-Inline1* has expired, continue to cooling phase, with manual mode no PHD2 and Inline2.													
6	**Hot rinse**	**PHD2 Automatic**	1	1	#3	#3	#3	#3	#3	0	0	0				
			Continue to hot rinse Inline2-operation if: Menu 3 auto: operation to *PHD2-off* is reached, continue to *Inline2* if programmed (also for two following days), otherwise continue to cooling phase													
7	**Hot rinse**	**Inline2 Automatic**	1	1	#3	#3	#3	#3	#3	0	0	0				
			Continue to cooling phase if: Menu 3 Auto: mode up to Inline2-off has been reached, then continue to cooling phase. Menu 4 Manual: With manual mode no PHD2 and Inline2.													
8	**Hot rinse**	**Cooling phase not enabled**	0	0	0	0	0	0	0	0	0	0				
9	**Hot rinse**	**Cooling phase enabled**	0	0	0	0	0	0	0	0	0	0				
10	**Emergency cooling**	**Emergency cooling enabled**	0	0	0	0	0	0	0	0	0	0				

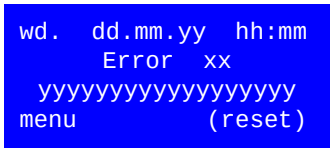
Line	Operating status	Operating phase		Contactor pump	Lamp temp. reached	Flash lamp	Switchboard airing on	Main switch heater 5.1 – 5.5	ELR E5.1.1 – 5.1.3 (delay 0.5s)	ELR E5.2.1 – 5.2.3 (delay 0.5s)	ELR E5.3.1 – 5.3.3 (delay 0.5s)	ELR E5.4.1 – 5.4.3 (delay 0.5s)	ELR E5.5.1 – 5.5.3 (delay 0.5s)		
			DO8	DO9	DO10	DO11	DO12	DO13 - DO17	DO18 - DO20	DO21 - DO23	DO24 - DO26	DO27 - DO29	DO30 - DO32	C1101	C1102
1	**Power up test**	**Power up test**		0	0	0	0	0	0	0	0	0	0		
2	**System off**	**System off**		0	0	0	0	0	0	0	0	0	0		
			Continue to hot rinse heating if: menu 3 auto: DI2 = 1, start time *Heating On* reached and *Inline Off* or *PHD Off prog.* or menu 4 manual: DI2 = 1 and *Manual* key activated												
3	**Hot rinse**	**Heat up**		0	#2	1	1	1	#4	#4	#4	#5	#6		
			Continue to hot rinse PHD1 mode if: Nominal temperature M5.15 N RIAH 5.16 reached and PHD1-Off programmed (also for two consecutive days). If no PHD1-off but Inline1-off is programmed, continue to Inline1 (for two successive days as well												
4	**Hot rinse**	**PHD1 Automatic or Manual mode**		0	#7	1	1	1	#8	#8	#8	#9	#10		
			Continue to hot rinse Inline1-operation if: Menu 3 auto: operation to *PHD-off* is reached, continue to *Inline1* if programmed (alse for two consecutive days), otherwise continue to cooling phase. Menu 4 Manual: If manual-PHD has expired, continue to Inline1 if programmed, otherwise continue to cooling phase												
5	**Hot rinse**	**Inline1 Automatic or Manual mode**		0	#11	1	1	1	#12	#12	#12	#13	#14		
			Continue to hot rinse PHD2-operation if: Menu3 auto: operation to *Inline1-Off* is reached, continue to *PHD2* if programmed (also for two consecutive days), otherwise continue to cooling phase. Menu 4 Manual: If *Manual-Inline1* has expired, continue to cooling phase, with manual mode no PHD2 and Inline2.												
6	**Hot rinse**	**PHD2 Automatic**		0	#15	1	1	1	#16	#16	#16	#18	#18		
			Continue to hot rinse Inline2-operation if: Menu 3 auto: operation to *PHD2-off* is reached, continue to *Inline2* if programmed (also for two following days), otherwise continue to cooling phase												
7	**Hot rinse**	**Inline2 Automatic**		0	#19	1	1	1	#20	#20	#20	#21	#22		
			Continue to cooling phase if: Menu 3 Auto: mode up to Inline2-off has been reached, then continue to cooling phase. Menu 4 Manual: With manual mode no PHD2 and Inline2.												
8	**Hot rinse**	**Cooling phase not enabled**		0	0	1	#23	0	0	0	0	0	0		
9	**Hot rinse**	**Cooling phase enabled**		1	0	1	1	0	0	0	0	0	0		
10	**Emergency cooling**	**Emergency cooling enabled**		1	0	1	1	0	0	0	0	0	0		

Line	Operating status	Operating phase	HWD1	HWD2	Collective alarm	HWD inline operation							
			C1103	C1104	C1105	C1106							
1	**Power up test**	**Power up test**	0	0	1	0							
2	**System off**	**System off**	0	0	1	0							
			Continue to hot rinse heating if: menu 3 auto: DI2 = 1, start time *Heating On* reached and *Inline Off* or *PHD Off prog.* or menu 4 manual: DI2 = 1 and *Manual* key activated										
3	**Hot rinse**	**Heat up**	1	0	1	0							
			Continue to hot rinse PHD1 mode if: Nominal temperature M5.15 N RIAH 5.16 reached and PHD1-Off programmed (also for two consecutive days). If no PHD1-off but Inline1-off is programmed, continue to Inline1 (for two successive days as well										
4	**Hot rinse**	**PHD1 Automatic or Manual mode**	1	0	1	0							
			Continue to hot rinse Inline1-operation if: Menu 3 auto: operation to *PHD-off* is reached, continue to *Inline1* if programmed (alse for two consecutive days), otherwise continue to cooling phase. Menu 4 Manual: If manual-PHD has expired, continue to Inline1 if programmed, otherwise continue to cooling phase										
5	**Hot rinse**	**Inline1 Automatic or Manual mode**	1	1	1	1							
			Continue to hot rinse PHD2-operation if: Menu3 auto: operation to *Inline1-Off* is reached, continue to *PHD2* if programmed (also for two consecutive days), otherwise continue to cooling phase. Menu 4 Manual: If *Manual-Inline1* has expired, continue to cooling phase, with manual mode no PHD2 and Inline2.										
6	**Hot rinse**	**PHD2 Automatic**	1	0	1	0							
			Continue to hot rinse Inline2-operation if: Menu 3 auto: operation to *PHD2-off* is reached, continue to *Inline2* if programmed (also for two following days), otherwise continue to cooling phase										
7	**Hot rinse**	**Inline2 Automatic**	1	1	1	1							
			Continue to cooling phase if: Menu 3 Auto: mode up to Inline2-off has been reached, then continue to cooling phase. Menu 4 Manual: With manual mode no PHD2 and Inline2.										
8	**Hot rinse**	**Cooling phase not enabled**	1	0	1	0							
9	**Hot rinse**	**Cooling phase enabled**	1	1	1	0							
10	**Emergency cooling**	**Emergency cooling enabled**	1	1	X	0							

Line	Operating status	Operating phase	Comments:
1	**Power up test**	**Power up test**	
2	**System off**	**System off**	#1:DO3 = 1 if in menu 3 *Heater on* is programmed for the current day. If temperature at *TISAH5.1.2, 5.4.4, 5.5.4, 5.1.6* >40°C then *Alarm 17*
			Continue to hot rinse heating if: menu 3 auto: DI2 = 1, start time *Heating On* reached and *Inline Off* or *PHD Off prog.* or menu 4 manual: DI2 = 1 and *Manual* key activated
3	**Hot rinse**	**Heat up**	Leakage monitoring enabled #2: DO10=1 if setpoint temperature *M5.15* has been reached #3: If output ELR=1 then input must also be 1 #4: Control according to *M5.15* and *M5.22*, if temp. at TISAH 5.1.2 >93°C DO18 to DO26 off for 20sec #5: Control according to *M5.15* and *M5.22*, if temp. at TISAH 5.4.4 >93°C DO27 to DO29 off for 20sec #6: Control according to *M5.15* and *M5.22*, if temp. at TISAH 5.5.4 >93°C DO30 to DO32 off for 20sec
			Continue to hot rinse PHD1 mode if: Nominal temperature M5.15 N RIAH 5.16 reached and PHD1-Off programmed (also for two consecutive days). If no PHD1-off but Inline1-off is programmed, continue to Inline1 (for two successive days as well
4	**Hot rinse**	**PHD1 Automatic or Manual mode**	Leakage monitoring enabled #7: DO10=1 if setpoint temperature *M5.16* has been reached #3: If output ELR=1 then input must also be 1 #8: Control according to *M5.16* and *M5.22*, if temp. at TISAH 5.1.2 >93°C DO18 to DO26 off for 20sec #9: Control according to *M5.16* and *M5.22*, if temp. at TISAH 5.4.4 >93°C DO27 to DO29 off for 20sec #10: Control according to *M5.16* and *M5.22*, if temp. at TISAH 5.5.4 >93°C DO30 to DO32 off for 20sec
			Continue to hot rinse Inline1-operation if: Menu 3 auto: operation to *PHD-off* is reached, continue to *Inline1* if programmed (alse for two consecutive days), otherwise continue to cooling phase. Menu 4 Manual: If manual-PHD has expired, continue to Inline1 if programmed, otherwise continue to cooling phase
5	**Hot rinse**	**Inline1 Automatic or Manual mode**	No leakage monitoring active #11: DO10=1 if nominal temperature M5.17 reached #12: control according to M5.17 and M5.22, if temp. to TISAH 5.1.2 >93°C DO18 to DO26 off for 20sec #13: control according to M5.17 and M5.22, if temp. to TISAH 5.4.4 >93°C DO27 to DO29 off for 20sec #14: control according to M5.17 and M5.22, if temp. to TISAH 5.5.4 >93°C DO30 to DO32 off for 20sec
			Continue to hot rinse PHD2-operation if: Menu3 auto: operation to *Inline1-Off* is reached, continue to *PHD2* if programmed (also for two consecutive days), otherwise continue to cooling phase. Menu 4 Manual: If *Manual-Inline1* has expired, continue to cooling phase, with manual mode no PHD2 and Inline2.
6	**Hot rinse**	**PHD2 Automatic**	Leakage monitoring enabled #15: DO10=1 if setpoint temperature *M5.18* has been reached #16: Control according to *M5.18* and *M5.22*, if temp. at TISAH 5.1.2 >93°C DO18 to DO26 off for 20sec #17: Control according to *M5.18* and *M5.22*, if temp. at TISAH 5.4.4 >93°C DO27 to DO29 off for 20sec #18: Control according to *M5.18* and *M5.22*, if temp. at TISAH 5.5.4 >93°C DO30 to DO32 off for 20sec
			Continue to hot rinse Inline2-operation if: Menu 3 auto: operation to *PHD2-off* is reached, continue to *Inline2* if programmed (also for two following days), otherwise continue to cooling phase
7	**Hot rinse**	**Inline2 Automatic**	No leakage monitoring enabled #19: DO10=1 if setpoint temperature M5.17 has been reached #20: Control according to M5.19 and M5.22, if temp. at TISAH 5.1.2 >93°C DO18 to DO26 off for 20sec #21: Control according to M5.19 and M5.22, if temp. at TISAH 5.4.4 >93°C DO27 to DO29 off for 20sec #22: Control according to M5.19 and M5.22, if temp. at TISAH 5.5.4 >93°C DO30 to DO32 off for 20sec
			Continue to cooling phase if: Menu 3 Auto: mode up to Inline2-off has been reached, then continue to cooling phase. Menu 4 Manual: With manual mode no PHD2 and Inline2.
8	**Hot rinse**	**Cooling phase not enabled**	Active cooling yes/no see M5.23 #23: DO12 120sec after reached *cooling phase not active* switch off with delay #24: if TISAH 5.1.2, TISAH 5.4.4, TISAH 5.5.4 and TISAH 5.1.6 ≤36°C +30 sec delay HWD1 K1103 switch off and change to *system off.* If DI1=1 (delay. 10sec.) change to emergency cooling If DO13=0 increase the heating time counter M5.11
9	**Hot rinse**	**Cooling phase enabled**	Active cooling yes/no see M5.23 #24: if TISAH 5.1.2, TISAH 5.4.4, TISAH 5.5.4 and TISAH 5.1.6 ≤36°C +30 sec delay HWD1 K1103 switch off and change to *system off.* If necessary, reset *Alarm 20 power failure*
10	**Emergency cooling**	**Emergency cooling enabled**	If specified error or manual hot cooling triggered and one of the operating modes Heating PHD1, Inline1, PHD2, Inline2 active, cool ring piping until TISAH 5.1.2, TISAH 5.4.4, TISAH 5.54 and TISAH 5.1.6 ≤36°C +30 sec delay are reached. If necessary reset *Alarm 14 TISAHL too high*

14. Faults / Causes / Elimination

14.1 Fault messags



If a fault is detected on the system, a fault message appears (see chapter “Fault messages”).
yyyy = Fault text

14.1.1 Fault types

There are 2 types of fault messages:

1. ERROR

- System is switched off or emergency cooling initiated
- The emergency cooling finishes when all temperature measuring points have reached the discharge temperature of 36°C.
- Fault message display
- Collective alarm (relay)
- Reset by switching the system off and on or via keypad

2. ALARM

- Operation is continued (see table 14.2.1 “effects” column)
- Fault message display
- Collective alarm (relay)
- Reset via keypad or self-acknowledgement (depending on fault)

NOTE	**The first error message is retained even if further faults occur.**

NOTE	**B. Braun recommends that the alarm output (fault message) and warning information output (disinfection mode) be connected to a central alarm. This can be the B. Braun remote control system, for example.**

14.2 Causes of faults and their correction

14.2.1 Fault codes via control

Alarm/Error	Initiate operating phase	Cause	Delay	System off	Hot cleaning	Cooling phase
wd. dd.mm.yy hh:mm Error 01 CPU menu	System off	CPU defect RAM, Watchdog, EPROM fault	No	Only power-up		
wd. dd.mm.yy hh:mm Error 02 Watchdog PP menu	System off	Watchdog power pack/ ext. voltage Watchdog has tripped or ext. safety circuit	No	X	X	X
wd. dd.mm.yy hh:mm Error 03 EEPROM menu	System off	EEPROM defective or data transmission to EEPROM interrupted	No	Only power-up		
wd. dd.mm.yy hh:mm Alarm 04 RTC menu	Malfunction message (no automatic mode possible)	Real time clock defective or data transmission to real time clock interrupted	No	X	X	
wd. dd.mm.yy hh:mm Error 05 Emergency off menu	System off	Emergency-off has tripped	No	X	X	X
wd. dd.mm.yy hh:mm Error 06 Hardware chain E5.1 menu	HRS10: Emergency cooling HRS 20/30/40/50: Heater E5.1 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If the digital output DO13 is actuated, there must be a signal at the digital input DI13. Otherwise the faults listed are possible. - Fuse failed - Residual current-operated circuit breaker FI has tripped - Bimetal switch has tripped	No		X	

Alarm/Error	Initiate operating phase	Cause	Delay	System off	Hot cleaning	Cooling phase
wd. dd.mm.yy hh:mm Error 07 Hardware chain E5.2 menu	HRS 20/30/40/50: Heater E5.2 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated Failure of all heaters causes emergency cooling Failure of all heaters causes emergency cooling.	If the digital output DO14 is actuated, there must be a signal at the digital input DI14. Otherwise the faults listed are possible. - Fuse failed - Residual current-operated circuit breaker FI has tripped - Bimetal switch has tripped	No		X	
wd. dd.mm.yy hh:mm Error 08 Hardware chain E5.3 menu	HRS 20/30/40/50: Heater E5.3 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated. Failure of all heaters causes emergency cooling.	If the digital output DO15 is actuated, there must be a signal at the digital input DI15. Otherwise the faults listed are possible. - Fuse failed - Residual current-operated circuit breaker FI has tripped - Bimetal switch has tripped	No		X	
wd. dd.mm.yy hh:mm Error 09 Hardware chain E5.4 menu	HRS 20/30/40/50: Heater E5.4 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated Failure of all heaters causes emergency cooling.	If the digital output DO16 is actuated, there must be a signal at the digital input DI16. Otherwise the faults listed are possible. - Fuse failed - Residual current-operated circuit breaker FI has tripped - Bimetal switch has tripped	No		X	
wd. dd.mm.yy hh:mm Error 10 Hardware chain E5.5 menu	HRS 20/30/40/50: Heater E5.5 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated. Failure of all heaters causes emergency cooling.	If the digital output DO17 is actuated, there must be a signal at the digital input DI17. Otherwise the faults listed are possible. - Fuse failed - Residual current-operated circuit breaker FI has tripped - Bimetal switch has tripped	No		X	
wd. dd.mm.yy hh:mm Error 11 TISAH 5.1.2 menu	Emergency cooling up to TISAH 5.4.4, TISAH 5.5.4, TISAH 5.1.6 ≤ 36°C	Temp. sensor TISAH 5.1.2 defect Wire break sensor	5 sec	X	X	X

Alarm/Error	Initiate operating phase	Cause	Delay	System off	Hot cleaning	Cooling phase
wd. dd.mm.yy hh:mm Error 12 TISAH 5.4.4 menu	Heater E5.4 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	Temp. sensor TISAH 5.4.4 defect Wire break sensor	5 sec	X	X	X
wd. dd.mm.yy hh:mm Error 13 TISAH 5.5.4 menu	Heater E5.5 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	Temp. sensor TISAH 5.5.4 defect Wire break sensor	5 sec	X	X	X
wd. dd.mm.yy hh:mm Error 14 TISAH 5.1.6 menu	Emergency cooling up to TISAH 5.1.2, TISAH 5.4.4, TISAH 5.5.4 ≤ 36°C	Temp. sensor TISAH 5.1.6 defect Wire break sensor	5 sec	X	X	X
wd. dd.mm.yy hh:mm Alarm 15 PISAHL 5.1.2 menu	Malfunction message Self-acknowledging	Pressure sensor PISAHL 5.1.2 defect or pressure dropped below min. pressure	5 sec	X		
wd. dd.mm.yy hh:mm Error 15 PISAHL 5.1.2 menu	Emergency cooling	Pressure sensor PISAHL 5.1.2 defect or pressure dropped below min. pressure	5 sec		X	
wd. dd.mm.yy hh:mm Alarm 16 PISAHL 5.1.3 menu	Malfunction message Self-acknowledging.	Pressure sensor PISAHL 5.1.3 pressure dropped below min. pressure	5 sec	X	X	
wd. dd.mm.yy hh:mm Alarm 17 TISAH too high menu	Emergency cooling Self-acknowledging	TISAHL 5.1.2 and/or TISAHL 5.4.4, TISAHL 5.5.5, TISAHL 5.1.6 > 40°C while system off and RO in dialysis mode	15 sec	X		
wd. dd.mm.yy hh:mm Error 18 Flow RL too low menu	Emergency cooling.	Only when pump on. Flow to FISAL 5.1.1 < limit value M5.21	10 sec		X	

Alarm/Error	Initiate operating phase	Cause	Delay	System off	Hot cleaning	Cooling phase
wd. dd.mm.yy hh:mm Error 19 RO shut down menu	Malfunction message Self-acknowledging System off	RO shut down Standby = 0 Dialysis = 0 No input signal from RO	180 sec		X	
wd. dd.mm.yy hh:mm Error 20 Pump press min menu	System off	Pressure dropped below min. pressure Pressure dropped below min. pressure during DO9 pump on,	10 sec		X	
wd. dd.mm.yy hh:mm Error 21 Pump press max. menu	System off	Pump pressure too high Max. pressure exceeded during DO9 pump on	5 sec	X	X	
wd. dd.mm.yy hh:mm Error 22 Leakage alarm menu	System off	During the operating phases heating and PHD mode, the pressure at PISAHL 5.1.2 or PISAHL 5.1.3 must not drop to below 1 bar	No		Only heating and PHD 1+2	
wd. dd.mm.yy hh:mm Alarm 23 Power failure menu	Malfunction message Self-acknowledging	Following power failure the system must start emergency cooling when the ring piping temp. is ≥ 36°C	No	X	X	
wd. dd.mm.yy hh:mm Alarm 24 No RO cold water menu	Malfunction message Display text: “Y 5.1.2 defect or no water from RO cooling for cooling RL by opening Y5.1.2. Risk of scalding“ (alternating)	If the temperature at TISAH 5.1.6 has not dropped by at least 10°C after 30 min. active cooling phase or emergency cooling. Cause: no water production by the RO or Y5.1.2 is defect.	No			X
wd. dd.mm.yy hh:mm Error 25 Dialysis on menu	Emergency cooling	Switching the RO to dialysis mode during heating or a hot cleaning phase must initiate emergency cooling (DI1 = 1)	4 sec		X	

Alarm/Error	Initiate operating phase	Cause	Delay	System off	Hot cleaning	Cooling phase
wd. dd.mm.yy hh:mm Error 26 TISAH 5.1.6 too high menu	Emergency cooling	Temp.RL too high = TISAH 5.1.6 > 98°C	30 sec	X	X	
wd. dd.mm.yy hh:mm Error 27 TISAH 5.1.2 too high menu	Emergency cooling	Temp.supply flow too high = TISAH 5.1.2 > 98°C	30 sec	X	X	
wd. dd.mm.yy hh:mm Error 28 TISAH 5.4.4 too high menu	Emergency cooling	Temp.E5.4 too high = TISAH 5.4.4 > 98°C	30 sec	X	X	
wd. dd.mm.yy hh:mm Error 29 TISAH 5.5.4 too high menu	Emergency cooling	Temp.E5.5 too high = TISAH 5.5.4 > 98°C	30 sec	X	X	
wd. dd.mm.yy hh:mm Error 30 Failure RO menu	System off Self-acknowledging within 180s	Failure RO	5 sec		X	X
wd. dd.mm.yy hh:mm Alarm 31 Max heating time menu	Emergency cooling	Maximum heating-up time menu 5.25 exceeded. Heaters defective. Setpoint temperature of the respective operating phases not reached at TISAH 5.1.6.	5 sec		X	
wd. dd.mm.yy hh:mm Error 32 ELR 5.1.1 defective menu	HRS 20/30/40/50: Heater E5.1 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated HRS10: Emergency cooling	If DO18 = 0 but DI18 = 1	Nein	X	X	

Alarm/Error	Initiate operating phase	Cause	Delay	System off	Hot cleaning	Cooling phase
wd. dd.mm.yy hh:mm Error 33 ELR 5.1.2 defective menu	HRS 20/30/40/50: Heater E5.1 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated HRS10: Emergency cooling	If DO19 = 0 but DI19 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 34 ELR 5.1.3 defective menu	HRS 20/30/40/50: Heater E5.1 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated HRS10: Emergency cooling	If DO20 = 0 but DI20 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 35 ELR 5.2.1 defective menu	Heater E5.2 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO21 = 0 but DI21 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 36 ELR 5.2.2 defective menu	Heater E5.2 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO22 = 0 but DI22 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 37 ELR 5.2.3 defective menu	Heater E5.2 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO23 = 0 but DI23 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 38 ELR 5.3.1 defective menu	Heater E5.3 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO24 = 0 but DI24 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 39 ELR 5.3.2 defective menu	Heater E5.3 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO25 = 0 but DI25 = 1	Nein	X	X	

Alarm/Error	Initiate operating phase	Cause	Delay	System off	Hot cleaning	Cooling phase
wd. dd.mm.yy hh:mm Error 40 ELR 5.3.3 defective menu	Heater E5.3 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO26 = 0 but DI26 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 41 ELR 5.4.1 defective menu	Heater E5.4 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO27 = 0 but DI27 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 42 ELR 5.4.2 defective menu	Heater E5.4 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO28 = 0 but DI28 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 43 ELR 5.4.3 defective menu	Heater E5.3 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO29 = 0 but DI29 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 44 ELR 5.5.1 defective menu	Heater E5.5 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO30 = 0 but DI30 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 45 ELR 5.5.2 defective menu	Heater E5.5 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO31 = 0 but DI30 = 1	Nein	X	X	
wd. dd.mm.yy hh:mm Error 46 ELR 5.5.3 defective menu	Heater E5.5 is switched off, current hot cleaning is ended normally, new hot cleaning is only possible after the fault has been eliminated	If DO32 = 0 but DI30 = 1	Nein	X	X	

Part 2 – Supplementary Operating Instructions

1. Handover declaration for the operating instructions

1.1 *Aquaboss*® Hot Rinse SMART 10/20/30/40/50 Hot Disinfection

System HRS 10/20/30/40/50 .....

Serial number .....

Year/month of manufacture .....

1.2 Customer's address

Company .....

Street .....

Postcode, city .....

1.3 Confirmation of handover of operating instructions

We have purchased the system specified under part 1.1.
When the system was handed over to us, we were given the operating instructions for:

System number .....

in the languages

..... Quantity .....

..... Quantity .....

Company stamp

Customer name, block letters

.....

....

Date Customer's signature

1.4 System handover date

.....

1.5 Maintenance and servicing personnel

The following persons have been named by the customer and have been instructed and trained on the system by B. Braun and made aware of:

Protective equipment, hazardous areas, impermissible types of operation, set-up, operation, maintenance and servicing.

....

Name (customer staff) Signature

....

Name (customer staff) Signature

....

Name (customer staff) Signature

☐ B. Braun commissioning log

☐ Customer-specific commissioning log

Company stamp/Customer's signature

1.6 The system was handed over to the customer by

Name, block letters

.....

....

Date Signature

2. Transport and setup

NOTE	**Only have transport carried out by experienced transport experts.**

There are handling instructions printed on the packaging; these must be heeded:

Fragile goods – handle with care.

Transport and storage must be carried out in such a manner that the arrows on the packaging point upwards.
Rolling, swinging, severe tilting or tumbling and other such ways of handling must be avoided.

The goods must be protected from the wet and high humidity.

The system is delivered in a wooden crate.

- Check the shipment for transport damage and completeness.
- In case of any transport damage, keep the packaging and inform the shipping agent and manufacturer immediately!
- Place the device on solid, even ground.

2.1 Scope of delivery

The system is packed and delivered with the following components:

- Appendix 3
- These operating instructions
- Circuit diagram

NOTE	**Dead weight > 260 kg** Suitable aids (such as a forklift truck) must be used for all types of transport. The system must be protected from tipping over and from improper use.

2.2 Dimensions of the system

Designation	Dimensions [mm] W x H x D
Hydraulics Hot Rinse SMART 10/20/30 Extension for 40/50	1943 x 1624 x 377 Length: 2245 mm per heating pipe
Control cabinet Hot Rinse SMART 10/20 Hot Rinse SMART 30/40/50	600 x 1000 x 350 800 x 1800 x 400

2.3 Requirements for the place of installation

Wall-mounting:

- Level, water-repellent wall with a permissible load-bearing capacity of at least 500 kg/m^2. The device is fixed to the wall using dowel plugs which are included in the accessory pack art. no. 6509900.

Installation room:

- Impact- and vibration-free.

Space required for operation and maintenance:

- 1.5 m space in front of and at the side of the system.

IP protection:

- Hydraulics: IP 54
- Electrics: IP 42

The system must be protected from splashwater and high levels of dust: The system is suitable for operation in roofed and weather-protected locations (e.g. closed rooms).

2.4 On-site connections to media supply

2.4.1 Electrical connection

Hot Rinse SMART 10/20: 400 V, 50 Hz, 32 A CEE-plug

Hot Rinse SMART 30/40/50: 400 V, 50 Hz permanent electrical connection in accordance with local safety regulations (e.g. DIN VDE 0298-4).

2.4.2 Hydraulic connection

The system water supply is via a DN 20 hose connection (TriClamp NW25) to the reverse osmosis or ring piping:

- Ring piping supply: TriClamp hose with projection/ Connecting pipe TriClamp with recess
- Ring piping return: Hose with recess/ Connecting pipe TriClamp with projection

2.4.3 Waste water connection

The waste water is routed via a free-drop path of 2 • d_{inner} (inner diameter), but at least 20 mm into the drain/sewage system (min. NW 50 HT-pipe) and secured (DIN 1988/EN 1717).

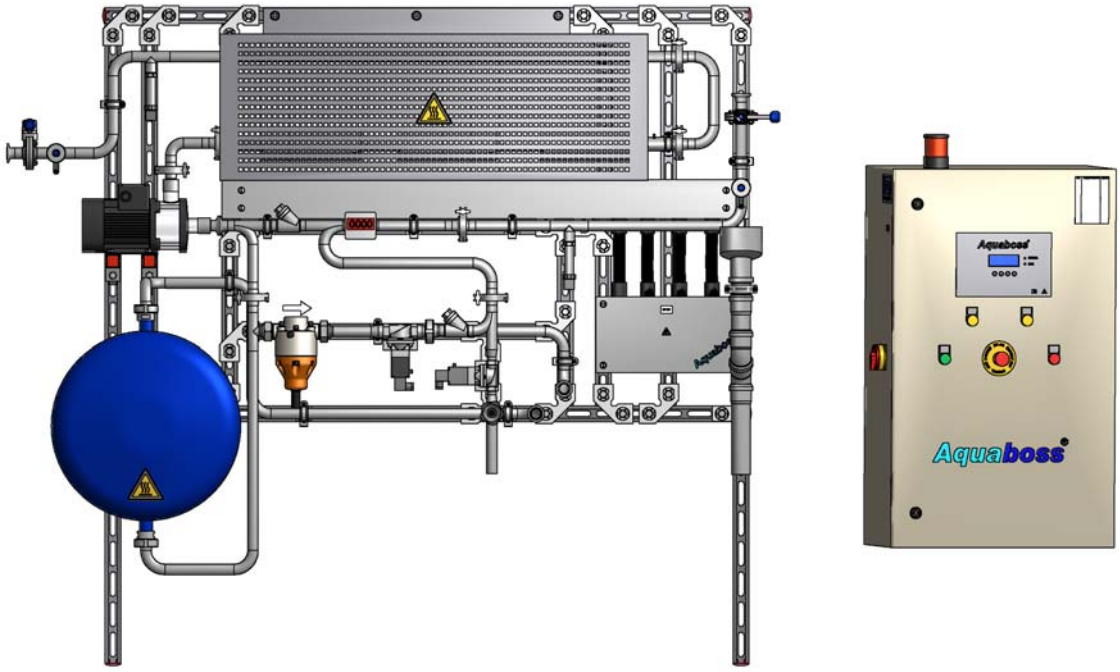


Figure 2-6: Installation plan 10/20

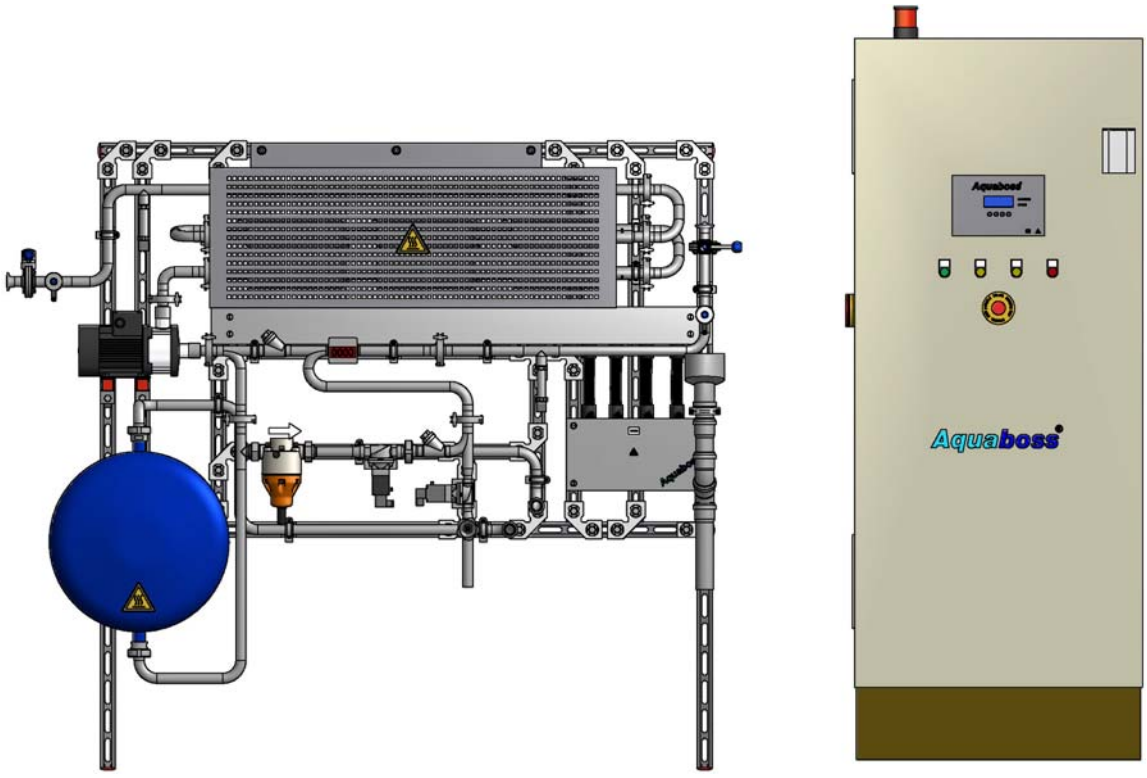


Figure 2-7: Installation plan 30/40/50

NOTE	**The local draining regulations must be heeded!**

2.5 Loop requirements

Anforderungen an die Ringleitung	
Pressure los	max <3 bar
Temperature loss	max ≤ 30W/m @90°C (≙100 % isolation)
Temperature resistance	98°C continuous operation
Material	Premium steel 1.4404/1.4571 316L PEX (vern. polyethylene) PVDF (polyvinylidine fluoride)
Minimum flow speed	> 0.5 m/sec.
Loop input	Tri-clamp NW25 advance
Loop output	Tri-clamp NW25 setback

The Hot Rinse SMART is conceived and designed for operating in combination with the ***Aquaboss***® central reverse osmosis and loop aqua system.

3. Work prior to initial commissioning

Before commissioning, the following work must be carried out by the customer / a service technician:

- Feed and waste water must be installed properly according to DIN 1988-100 and DIN EN 1717 or other local regulations.
- The local regulations for discharge must be observed.
- Initial commissioning incl. language selection in the menu navigation.
- Complete commissioning log.

3.1 Set-up and alignment of the system

The system is set up on a flat surface near the power and water connections provided. Make sure that the connections and control elements are easily accessible.

3.2 Design

⚠ ATTENTION	**In order to connect an HRS 10…50 to an existing reverse osmosis (RO) e.g. *Aquaboss*® EcoRO Dia I / II, a few modifications must be carried out on the RO unless already prepared in the factory:** • **The T-piece to the branch ÜV2 is offset at the EcoRO Dia I / II so that the entire quantity of permeat, which leaves the RO system, can be detected.**

3.3 Electrical connection

NOTE	**The machine is to be switched on for the first time only by trained, skilled workers.**

Check whether the local operating voltage, frequency and fuse protection corresponds to the data on the data plate and the technical data. The system **must not** be connected if deviations are found.

The command devices to control the system are mounted in a control box on the front of the system.

The command devices and relays have already been wired to terminal strips inside the control box in accordance with the circuit diagram.

Depending on the customer's equipment, B. Braun or authorized personnel can connect an **alarm device** to the terminals provided in accordance with the circuit diagram. It must be ensured that all signals which are connected to the system from external facilities are provided as potential-free contacts in the appropriate supplementary equipment.

⚠ DANGER	**Electric shock!** **Danger to life from dangerous electrical voltage.** **→ Electrical work may only be carried out by authorised, trained and instructed electricians!**

4. Initial commissioning

NOTE	**Initial commissioning may only be performed by trained specialists or a trained specialist authorised by B. Braun.**

Incorrect commissioning of the system can lead to damage to the system and personal injury.

The customer personnel are instructed fully on the use of the system when it is commissioned.

The following **commissioning log** as well as the **handover declaration for the operating instructions** (➔ part 2, page 1-1) are completely filled in in the process and signed.

Commissioning log

Other Applicable Documents

- Printout Secutest SIII
- Operating instructions vers. ……
- Handover declaration for the operating instructions ➔ part 2, page 1-1

ORDER NUMBER .....

SYSTEM DESIGNATION..... **SERIAL NUMBER (S/N)**.....

SOFTWARE ..... **S/N CPU** .....

S/N LT ..... **S/N PUMP**.....

CUSTOMER ..... **ADDRESS**.....

VISUAL INSPECTION: SURFACE / ID /
OVERALL IMPRESSION / DAMAGE

.....

All accessories present:

.....

.....

Check for correct power supply as indicated on the type plate (V / Hz / kVA) ☐

Combination with other medical devices (reverse osmosis, ring piping)

Reverse osmosis type/ serial number: .....

Ring piping manufacturer/dimension/length/material:

.....

.....

1. Connection of the HRS 10…50 to the ring piping (water supply, DN 20) ☐

Check for leaks ☐

2. Connection/ installation of accessory parts (Aqua Control, flash lamps, insulation, …)

..... ☐

3. Electrical connection of switch cabinet ☐

4. Check for electrical safety

Protective conductor resistance acc. to DIN EN 61010-1		Measured value	Limit value
Measurement between connection cable and housing		R_{SL}	< 0.1 Ω
Measurement between connection cable and mounting plate		R_{SL}	< 0.1 Ω
Measurement between connection cable and doors/ front plate		R_{SL}	< 0.1 Ω
Insulation test		R_{ISO}	> 0.5 MΩ
Leakage current			
Housing leakage current normal condition (NORMAL CONDITION)	$I_{GA.NC}$		< 0.5 mA
Housing leakage current first fault (SINGLE FAULT)	$I_{GA.SF}$		< 3.5 mA

All checks passed ☐

5. System start-up

Start heating cycle with target temperature 80°C (TIS 6.1.1)					
Start temperature (T_{Start})		°C	Target temperature (T_{Target})		°C
Effective heating time (t_{eff}= t_{Target} – t_{Start})		hh:min	Calculated heating power ($\Delta T_{Target-Start.}$):t_{eff}		K/h

Heating phase min. 30 min in operation				
Checking of inline function (water removal via PH1 without leakage alarm)	☐	Pressure (PISAHL 5.1.2) min.: 2 bar max. 5 bar		bar
Checking of PHD function (no water removal)	☐	Pressure (PISAHL 5.1.2) min.: 3.5 bar max. 5 bar		bar

Initiate cooling phase (active)					
Start time Cool down:		h:min	Time when ring piping < 36°C (TISAH 5.1.2 – TISAH 5.1.6)		h:min
eff. cooling time:		hh:min			

Successful heating cycle completed ☐

Configured switch points

Menu	Description	Unit	Area	Factory setting	Customer setting
0	Language	---	DE/EN/FR/NL/NO/ SE/IT…	acc. order	
	Units:	EU : °C, bar US : °F, psi	---	acc. order	
1	**Timer Reset**				
1.1	Service	DD.MM.YY	Date + Service interval time	Up to date	
2	Date / Time	DD.MM.YY hh:mm		Up to date	
3	**Auto On / Off**			--:--	
3.1	Monday	Heating: On --:-- PHD1: Off --:-- Inline1: Off --.-- PHD2: Off --.-- Inline2: Off --.--	hh:mm (00 :01 – 23 :59) 00 :00 = --.-- = Off	Off	
3.2	Tuesday	Heating: On --:-- PHD1: Off --:-- Inline1: Off --.-- PHD2: Off --.-- Inline2: Off --.--	hh:mm (00 :01 – 23 :59) 00 :00 = --.-- = Off	Off	
3.3	Wednesday	Heating: On --:-- PHD1: Off --:-- Inline1: Off --.-- PHD2: Off --.-- Inline2: Off --.--	hh:mm (00 :01 – 23 :59) 00 :00 = --.-- = Off	Off	
3.4	Thursday	Heating: On --:-- PHD1: Off --:-- Inline1: Off --.-- PHD2: Off --.-- Inline2: Off --.--	hh:mm (00 :01 – 23 :59) 00 :00 = --.-- = Off	Off	
3.5	Friday	Heating: On --:-- PHD1: Off --:-- Inline1: Off --.-- PHD2: Off --.-- Inline2: Off --.--	hh:mm (00 :01 – 23 :59) 00 :00 = --.-- = Off	Off	
3.6	Saturday	Heating: On --:-- PHD1: Off --:-- Inline1: Off --.-- PHD2: Off --.-- Inline2: Off --.--	hh:mm (00 :01 – 23 :59) 00 :00 = --.-- = Off	Off	
3.7	Sunday	Heating: On --:-- PHD1: Off --:-- Inline1: Off --.-- PHD2: Off --.-- Inline2: Off --.--	hh:mm (00 :01 – 23 :59) 00 :00 = --.-- = Off	Off	
3.8	Clearing all	---	---	---	---

Menu	Description	Unit	Area	Factory setting	Customer setting
4	**Manual mode**				
	PHD1	min	0... 999 min	= 0	
	Inline1	min	0…240 min	= 0	
5	**System data**				
5.15	Setp t. heat	°C/°F	upper display 50...90°C (122–194°F) lower display 0–10°C (0–50°F)	85°C	
5.16	Setp t. PHD1	°C/°F	50 ... 90 °C	85°C	
5.17	Setp t. Inline1	°C/°F	50 ... 90 °C	85°C	
5.18	Setp t. PHD2	°C/°F	50 ... 90 °C	85°C	
5.19	Setp t. Inline2	°C/°F	50 ... 90 °C	85°C	
5.20	Min/Max pres				
	PISAHL 5.1.2	Min = bar/psi Max = bar/psi	min: 0.3 bar – 2 bar max: 3 bar – 8.0 bar	min: 0.5 bar max: 8.0 bar	
	PISAHL 5.1.3	Min = bar/psi Max = bar/psi	min: 0.3 bar – 2 bar max: 3 bar – 8.0 bar	min: 0.5 bar max: 8.0 bar	
5.21	Min. flow RL				
	FISAL 5.1.1	l/h	500 l/h or 1000 l/h	1000 l/h	
5.22	Adjust control				
	1 =	C/°F	-5 …+10°C	3	
	2 =	C/°F	-5 …+10°C	2	
	3 =	C/°F	-5 …+10°C	1	
5.23	Active cooling	---	On / Off	On	
5.24	Type of install				
	Hot Rinse Smart		10/20/30/40/50	acc. order	
5.25	Active heaters				
	E5.1		On / Off	On / Off	
	E5.2		On / Off	On / Off	
	E5.3		On / Off	On / Off	
	E5.4		On / Off	On / Off	
	E5.5		On / Off	On / Off	
5.26	Max. heating time		180 minutes	180 min	
5.27	Service		6, 12 months	6 months	
5.28	Cust. password				
	Enter code			2232	
5.29	Reserve	---	---	---	---

Menu	Description	Unit	Area	Factory setting	Customer setting
6	**Service program**				
7	**Fault history**				
	ÜV1 (RO)	bar		2.0 (±0.5) with HRS	
	ÜV2	bar		5.0 (±0.5)	
	NV 5.1.1	l/h	≤ 400	350 – 400	

7. Training of responsible personnel/customer (see handover declaration)

Programming phases ☐

Using the operating instructions ☐

Programming carried out according to customer's wishes:

.....

Repairs carried out:

.....

Travel time ..... Working time .....

Date ..... Date .....

Signature B. Braun technician ..... Signature customer .....

5. System key data

Manufacturer's address

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Schwarzenberger Weg 73-79
34212 Melsungen
Germany

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www.bbraun.com

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ISO 9001 and EN 13485 certified
CE mark CE 0123
Made in Germany (EU)

Nameplate

The type plate is on the left-hand side of the switch cabinet.

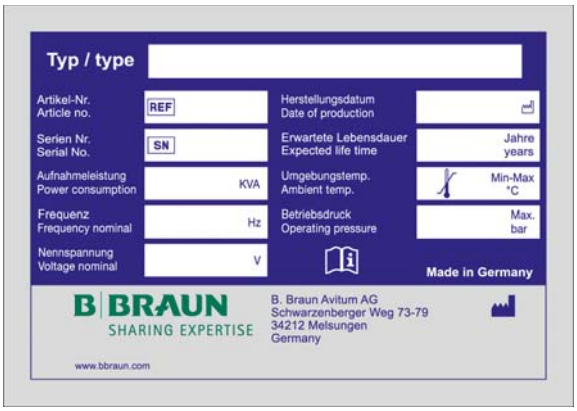

Figure 5-8: Example of a type plate

When ordering spare parts, please quote the following:

- Equipment type
- Serial number (SN)
- Description and article number
- Required quantity

NOTE	**Only original spare parts, accessories and consumables from B. Braun are to be used ➔ part 2 from page 8-1.** **B. Braun does not accept any liability for damage caused by the use of other spare parts or accessories and consumables.**

6. Technical Data

6.1 Design data

Electrical connection Hot Rinse SMART 10/20 Hot Rinse SMART 30/40/50	400 V / 50 Hz / via CEE plug 32 A on-site (see chap. 2.4)
Increase ambient temperature	5 – 40 °C
Power input	See type plate
Power consumption ring line in holding phase	0.040 kW/m
Internal temperature of housing (control cabinets)	5 – 60 °C
Relative air humidity (control)	max 75 % rel. hum., non-condensing
Materials in contact with the product	Stainless steel 1.4404; 1.4408; 1.4571; 1.4435; 1.4581; ethylene-propylene-dien (EPDM); poly-vinylidene fluoride (PVDF); poly-tetrafluoroethylene (PTFE); IIR

6.2 Circuit diagram

Electrical circuit diagram HRS 10/20	87805xx
Electrical circuit diagram HRS 30/40/50	87804xx

6.3 Control

6.3.1 Feed voltage

Input voltage range:	24 VDC (± 5 %), low safety voltage
Input current:	max. 10A
Connection:	3-pole screw-type terminal, grid 5.08 mm, vertical (Phönix)

6.3.2 Internal voltage supply

5 VDC (± 5 %) controlled	Low safety voltage
15 VDC (± 5 %) controlled	Low safety voltage

6.4 Command equipment

The control system is made up of a CPU with integrated digital inputs/ outputs and an operating display.

6.4.1 Print size

Control pane/CPU:	CPU 2
Power element	LT1 Plus

6.4.2 LCD display

The LCD display is an integrated part of the operating unit.

Character size:	4.75 mm
Number of characters per line:	20
Number of lines:	4
Background illumination:	blau

6.4.3 LED display

System under voltage:	LED “RUN” (green) lights up
Alarm:	LED “ERROR” (red) and LED “RUN” (green) flash alternately
Error:	LED “ERROR” (red) flashes

6.5 Input and output signals

6.5.1 Analogue inputs

Quantity:	5
Voltage:	15 VDC
Resolution:	10 Bit
Sensors:	4–20 mA/ 13 – 30 VDC

Input designation		Comment	Measuring range	
AI1	PISAHL 5.1.2	Pressure RL feed	0–10 bar	≤ 0.5 %
AI2	TISAH 5.1.2	Temperature RL feed	PT100 -20…+120°C	± 2 °C
AI3	TISAH 5.4.4	Temperature heater 4	PT100 -20…+120°C	≤ 0.5 %
AI4	PISAHL 5.1.3	Pressure RL return flow	0–10 bar	≤ 0.5 %
AI5	TISAH 5.1.6	Temperature RL return flow	PT100 -20…+120°C	± 2 °C

Input designation		Comment	Scope	
LF1				
LF2				
LF3				
LF4				
TIS	TISAH 5.5.4	Temperature heater 5	NTC	

6.5.2 Relay output general

Number of relays:	6
Relay coil	24VDC / 30 mA
Load	max. 48 VDC / 20 mA
Internal fuse:	None

Input designation		Output designation	Scope
C1101	Change-over contact		
C1102	Change-over contact		
C1103	Make contact	HWD1 disinfection mode	From start hot rinse to end of cooling phase
C1104	Make contact	HWD 2	Signal to RO for permeate production
C1105	Change-over contact	Collective alarm	
C1106	Make contact	HWD inline operation	Release permeate removal

6.5.3 Interface RS232

Serial interface for data traffic with host computer (PC, mainframe etc.). Connection via standard interface 5V-V24 or 5V current ring piping.

The connector offers the option of connecting a further galvanic RS-232-Subprint. This is used to connect an external modem or an external ComServer (Ethernet).

The modem must be of the type Zyxel Omni Net (or a similar type) and is connected with a normal RS-232 cable. The ComServer is of the type 58211 (W&T) and must be connected with the cable W&T, no: 1199x to the RS-232-Subprint. Power is supplied via an additional power pack.

6.5.4 Digital inputs

Quantity	32
Excitement	24 V DC, low safety voltage
Line current	1.0 to 2.0 mADC

DI	Input designation	Comment
1	RO dialysis	Signal dialysis mode from RO
2	RO night-time mode	Signal release hot rinse from RO
3	RO error	Error signal from RO
4	FISAL 5.1.1	Flowmeter, impulse generator
5		
6		
7		
8		
9	Emergency off	Emergency off chain OK
10	Key-operated switch	Remote starting of manual mode
11		
12		
13	Main switch E5.1	Hardware chain heater E5.1
14	Main switch E5.2	Hardware chain heater E5.2
15	Main switch E5.3	Hardware chain heater E5.3
16	Main switch E5.4	Hardware chain heater E5.4
17	Main switch E5.5	Hardware chain heater E5.5
18	ELR 5.1.1 defective	If DO18 = 0 but DI18 = 1
19	ELR 5.1.2 defective	If DO19 = 0 but DI19 = 1
20	ELR 5.1.3 defective	If DO20 = 0 but DI20 = 1
21	ELR 5.2.1 defective	If DO21 = 0 but DI21 = 1
22	ELR 5.2.2 defective	If DO22 = 0 but DI22 = 1
23	ELR 5.2.3 defective	If DO23 = 0 but DI23 = 1
24	ELR 5.3.1 defective	If DO24 = 0 but DI24 = 1
25	ELR 5.3.2 defective	If DO25 = 0 but DI25 = 1
26	ELR 5.3.3 defective	If DO26 = 0 but DI26 = 1
27	ELR 5.4.1 defective	If DO27 = 0 but DI27 = 1
28	ELR 5.4.2 defective	If DO28 = 0 but DI28 = 1
29	ELR 5.4.3 defective	If DO29 = 0 but DI29 = 1
30	ELR 5.5.1 defective	If DO30 = 0 but DI30 = 1
31	ELR 5.5.2 defective	If DO31 = 0 but DI31 = 1
32	ELR 5.5.3 defective	If DO32 = 0 but DI32 = 1

6.5.5 Digital outputs

Quantity	32
Excitement	24 VDC
Load	Switch-on current max. 4A Operating current 400 mA
Internal fuse:	Short-circuit fuse

DO	Output designation	Comment
1	Y5.1.1	Shutoff valve to the RO during hot cleaning
2	Y5.1.2	Drain valve for discharging hot water after hot cleaning
3	HRS 10/20 in waiting mode	Display: hot cleaning is programmed today.
4		
5		
6		
7		
8		
9	Pump on	Switches the pump on and off
10	Temperature reached	Signal lamp “Temperature reached”
11	Flash lamp	Flash lamp during hot cleaning
12	Switchboard airing	Switchboard airing on
13	Main switch E5.1	Main switch in 400VAC circuit
14	Main switch E5.2	Main switch in 400VAC circuit
15	Main switch E5.3	Main switch in 400VAC circuit
16	Main switch E5.4	Main switch in 400VAC circuit
17	Main switch E5.5	Main switch in 400VAC circuit
18	ELR 5.1.1	ELR load relay for controlling heating
19	ELR 5.1.2	ELR load relay for controlling heating
20	ELR 5.1.3	ELR load relay for controlling heating
21	ELR 5.2.1	ELR load relay for controlling heating
22	ELR 5.2.2	ELR load relay for controlling heating
23	ELR 5.2.3	ELR load relay for controlling heating
24	ELR 5.2.1	ELR load relay for controlling heating
25	ELR 5.3.2	ELR load relay for controlling heating
26	ELR 5.3.3	ELR load relay for controlling heating
27	ELR 5.4.1	ELR load relay for controlling heating
28	ELR 5.4.2	ELR load relay for controlling heating
29	ELR 5.4.3	ELR load relay for controlling heating
30	ELR 5.5.1	ELR load relay for controlling heating
31	ELR 5.5.2	ELR load relay for controlling heating
32	ELR 5.5.3	ELR load relay for controlling heating

6.6 EMC guidelines

Guidelines and manufacturer's declaration – electromagnetic transmission		
The devices of the HRS 10...50 series are designed for operation in an environment as described below. The customer or user of an HRS 10...50 should ensure that it is operated in such an environment		
Transmission measurements	**Conformity**	**Electromagnetic environment – guidelines**
HF transmission according to CISPR 11	Group 1	The HRS 10...50 uses high-frequency energy solely for its internal functions. Therefore its HF transmission is very low and it is unlikely that there will be any interference with neighbouring devices.
HF transmission according to CISPR 11	Class B	HRS 10...50 are suitable for use in facilities other than those in the home, as well as in facilities that are directly connected to a public power supply network that also supplies buildings that are used for residential occupancy.
Transmission of harmonics according to IEC 61000-3-2	Hot Rinse SMART 10: Class A Hot Rinse SMART 20/30/40/50: not applicable (I >16 A per phase)	
Transmission of voltage fluctuations/flickering according to IEC 61000-3-3	Hot Rinse SMART 10: conforms Hot Rinse SMART 20/30/40/50: not applicable (I >16 A per phase)	

Guidelines and manufacturer's declaration – electromagnetic interference			
The devices of the HRS 10...50 series are designed for operation in the electromagnetic environment described below. The customer or user of an HRS 10...50 should ensure that it is operated in such an environment.			
Test of interference immunity	**IEC 60601 test level**	**Conformity level**	**Electromagnetic environment – guidelines**
Electrostatic discharge (ESD) according to IEC 61000-4-2	± 6 kV contact discharge ± 8 kV air discharge	± 6 kV contact discharge ± 8 kV air discharge	Floors should be made of wood or concrete or have ceramic tiles. If the floor covering is made of synthetic material, the relative humidity must be at least 30%.
Fast transient electrical emissions/bursts according to IEC 610004-4	± 2 kV for mains cables ± 1 kV for input and output cables	± 2 kV for mains cables ± 1 kV for input and output cables	The quality of the supply voltage should correspond to that of a typical commercial or hospital environment.
Surges according to IEC 61000-4-5	± 1 kV differential mode voltage ± 2 kV common mode voltage	± 1 kV differential mode voltage ± 2 kV common mode voltage	The quality of the supply voltage should correspond to that of a typical commercial or hospital environment.
Hot Rinse SMART 10: Voltage dips, short-term interruptions and fluctuations in the voltage supply according to IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for ½ period 40 % U_T (60 % dip in U_T) for 5 periods 70 % U_T (30 % dip in U_T) for 25 periods <5 % U_T (>95 % dip in U_T) for 5 s	<5 % U_T (>95 % dip in U_T) for ½ period 40 % U_T (60 % dip in U_T) for 5 periods 70 % U_T (30 % dip in U_T) for 25 periods <5 % U_T (>95 % dip in U_T) for 5 s	
Hot Rinse SMART 20/30/40/50: Voltage dips, short-term interruptions and fluctuations in the voltage supply according to IEC 61000-4-11	not applicable (I >16 A per phase)		
Magnetic field for the power supply frequency (50/60 Hz) according to IEC 61000-4-8	3 A/m	3 A/m	Magnetic fields in the mains frequency should correspond to the values typical of those found in commercial and hospital environments.
NOTE: U_T is the AC supply voltage before applying the test level			

Guidelines and manufacturer's declaration – electromagnetic interference

The devices of the HRS 10...50 series are designed for operation in the electromagnetic environment described below. The customer or user of an HRS 10...50 should ensure that it is operated in such an environment.

Test of interference immunity	**IEC 60601 test level**	**Conformity level**	**Electromagnetic environment – guidelines**
			Portable and mobile radio devices should not be used more closely to the HRS 10...50, including the cables, than the recommended electrical clearance that is calculated for the appropriate equation for the transmitting frequency. **Recommended electrical clearance:**
Guided HF emission according to IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz	3 V	d = 1.17 √ P
Radiated HF emission according to IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	d = 1.17 √ P for 80 MHz to 800 MHz d = 2.33 √ P for 800 MHz to 2.5 GHz P is the maximum rated power of the transmitter in Watts (W) according to the information provided by the transmitter manufacturer, and d is the recommended electrical clearance in metres (m) For all frequencies, the field strength of stationary radio transmitters according to local inspection[1)] should be less than the conformity level.[2)]  Interference is possible in the neighbourhood of all devices that are marked with the following symbol.

NOTE 1: The higher frequency range applies for 80 MHz and 800 MHz.

NOTE 2: These guidelines may not be applicable in all cases. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

1) The field strength of stationary transmitters such as base stations of mobile phones and mobile land radio communications service devices, amateur radio stations and AM and FM radio and television transmitters can theoretically not be predetermined precisely; to determine the electromagnetic environment in terms of stationary transmitters, the location should be studied in detail. If the measured field strength at the spot where an HRS 10...50 is used exceeds the above conformity level, the HRS 10...50 should be observed to ensure that it functions properly. If unusual performance characteristics are observed, additional measures may be necessary, such as changing the orientation or moving the HRS 10...50 to another location.

2) Over the frequency range of 150 Hz to 80 MHz the field strength should be less than 3 V/m.

Recommended electrical clearances between portable and mobile HF telecommunication devices and a Hot Rinse SMART 10...50

The HRS 10...50 is designed for operation in an electromagnetic environment in which HF emissions are monitored. The customer or user of an HRS 10...50 can help avoid electromagnetic interference by maintaining the minimum clearance between portable and mobile HF telecommunication devices (transmitters) and an HRS 10...50 – depending on the output and on the communication device, as described below.

Nominal power of the transmitter	**Electrical clearance depending on the transmitting frequency**		
	150 kHz to 80 MHz	**80 MHz to 800 MHz**	**800 MHz to 2.5 GHz**
W	d = 1.17 √ P	d = 1.17 √ P	d = 2.33√ P
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.7	3.7	7.4
100	11.7	11.7	23.3

In the case of transmitters whose maximum nominal power is not listed in the table above, the recommended electrical clearance of d in metres (m) can be determined using the equation that belongs in the respective column, whereby P is the maximum electrical clearance in Watts (W) according to the information provided by the transmitter manufacturer.

NOTE 1: The higher frequency range applies for 80 MHz and 800 MHz.

NOTE 2: These guidelines may not be applicable in all cases. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

7. Maintenance and technical safety checks (TSC)

The functional safety of the HRS 10...50 can only be maintained if the medical product log is maintained properly and made accessible to technicians during the TSC / service.

The Hot Rinse is a low-maintenance system.

NOTE	**Follow the instructions on specific checks for your system!** **➔ part 2 page 7-2** **Keep the medical product log!** **➔ part 2 from page 7-3** **Observe instructions for maintenance and the TSC!** **➔ part 2 from page 7-6**

⚠ WARNING	**Component failure due to non-compliance with service and safety technical checks!** **Standstill of the Hot Rinse SMART system and thus no hot rinse possible.** **→ An annual technical safety check (TSC) by B. Braun-authorized specialists is compulsory.**

⚠ WARNING	**Risk to the patient due to system failure or non-compliance with permeate requirements.** **→ After service, repairs, exchange of components or other changes, the operator must provide documented proof that the system complies with the original specifications (e.g. material compatibility).** **After conversion / extension of the connected ring piping ensure by means of validation that the heating output is sufficient at every point of the ring piping to guarantee a thermal disinfection according to the provisions of EN ISO 15883-1 (80°C; 20 min).**

⚠ WARNING	**Risk of poisoning and pyrogene reactions.** **Even if the reverse osmosis system generates water of a quality that fulfills the requirements of the international standard DIN EN ISO 26722, the distribution of this water can deteriorate the quality of the same to such an extent that it no longer fulfills the requirements accordng to standard DIN EN ISO 26722 if the distribution system is not serviced appropriately.** **The service/STK of the reverse osmosis system, the hot rinse system and the connected distribution system must be carried out according to manufacturer specifications.**

⚠ WARNING	**Risk of poisoning and pyrogene reactions.** **Non-compliance of the service provisions and disinfection provisions of the manufacturer can lead to the deterioration of the permeate quality or to the impairment of the function of the system.**

7.1 Specific checks for your system

On this form, you will find the stipulations entered by B. Braun for specific checks which have been laid down especially for your system. The specific checks must be carried out at the intervals given here.

Independently of this, the medial product log ➔ part 2 page 7-4 must be kept and the maintenance and technical safety check measures ➔ part 2 page 7-7 must be carried out and logged.

Specific checks to be carried out	Description	Interval	Notes

7.2 Medical product log and maintenance / technical safety check log

The functional safety of the HRS 10...50 can only be maintained if the medical product log is maintained properly and made accessible to technicians during the TSC / service.

Completely and correctly kept logbooks are absolutely essential to determine the type of service and checks to be carried out periodically.

The type of activity, the date carried out and the person doing the work must be entered in the respective log book every time a check is made.

Sample pages for the medical product log and the maintenance and TSC log are provided in these operating instructions. You can copy these pages as often as required.

Please always keep the completed pages near the system.

Medical product log Hot Rinse ➔ part 2 page 7-4

Maintenance and TSC log ➔ part 2 page 7-6

Maintenance and TSC log ➔ part 2 page 7-7

Medical product log Hot Rinse SMART 10/20/30/40/50

Every hot rinse cycle carried out by the system must be recorded daily in the medical log in accordance with the medical products operator's directive dated June 29, 1998, including details of all operation conditions.

Serial no.: .....

Month / year / day	Operating mode	Heat up		PHD 1		Inline 1	
	Manual / Auto	Time	Temp.	Time	Temp.	Time	Temp.
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

PHD 2		Inline 2		Comment	Visa
Time	Temp.	Time	Temp.		

Maintenance and TSC log Hot Rinse SMART 10/20/30/40/50

All the maintenance, technical safety checks, disinfection and cleaning carried out on the system must be recorded in the maintenance and technical safety check log.

The technical safety checks (TSC) must be carried out annually.

Serial no.: .....

Maintenance work carried out	Date:	Running time in hours:	Description of maintenance work, remarks:	Visa:

Service plan and technical safety check (TSC)
Hot Rinse SMART 10/20/30/40/50

Dialysis centre .....
Contact partner .....
Street .....
Postcode/town .....
Inventory number .....
Order Number .....
Date of manufacture .....
Pump type M 5.1.1 .....

Serial number (SN) .....
Software .....
.....
System type Hot Rinse SMART 10 ❑
Hot Rinse SMART 20 ❑
Hot Rinse SMART 30 ❑
Hot Rinse SMART 40 ❑
Hot Rinse SMART 50 ❑

Maintenance ❑ TSC ❑ Date: .....

1.	**Overall optical evaluation inc. leak tightness of the assembly components**	Replaced	Carried out / OK	Last replacement month year	Values / data / remarks
1.1	Check flap setting K6 / K7 (open)		❑		
1.2	Dairy couplings checked and re-tightened		❑		
1.3	Check membrane pressure vessel / Hydrowatch				
1.3.1	Check air pressure test/setting, correct if necessary with ring piping not under pressure		❑		bar
1.3.2	Leak test (visual inspection)		❑		
1.3.3	Check Hydrowatch (green indicator visible)		❑		
1.3.4	Replacement (every five years)	❑	❑		
1.4	Check installation of heater safety grilles		❑		
1.5	Check suspension / attachment of hydraulic unit		❑		
1.6	Replace O-rings (49207) in the disc-type non-return valve (35983) when annual operating hours >250	❑	❑	❑	

2.	**Solenoid valves**	Replaced	Carried out / OK	Last replacement month year	Values / data / remarks
2.1	Switching cycle Y 5.1.1		❑		
2.1.1	Check coil Y5.1.1		❑		
2.1.2	Replace Y5.1.1 + seal set inc. membrane (if required)	❑			
2.1	Switching cycle Y 5.1.2		❑		
2.2.1	Check coil Y5.1.2		❑		
2.2.2	Replace Y5.1.2 + seal set inc. membrane (if required)	❑			

3.	**Recording control parameters**	Setpoint	Actual value	Values / data / remarks
3.1	Temperatures			
3.1.1	Setpoint temperature heating	°C	°C	
3.1.1	Setpoint temperature PHD1	°C	°C	
3.1.3	Setpoint temperature Inline1	°C	°C	
3.1.4	Setpoint temperature PHD2	°C	°C	
3.1.5	Setpoint temperature Inline2	°C	°C	
3.2	Auto / on-off			
3.3	Alarm values pressure / flow			
3.3.1	Min. pressure PISAHL 5.1.2	0.3 – 2 bar	bar	
3.3.2	Max. pressure PISAHL 5.1.2	3 – 8 bar	bar	
3.3.3	Min. pressure PISAHL 5.1.3	0.3 – 2 bar	bar	
3.3.4	Max. pressure PISAHL 5.1.3	3 – 8 bar	bar	
3.3.5	Min. Flow RL FISAL	DN 20=1000 l/h DN 15= 500 l/h	l/h	
3.4	General control parameters			
3.4.1	Adjust control value 1	3		
	Adjust control value 2	4		
	Adjust control value 3	5		
3.4.2	Active cooling			
3.4.5	Maximum heat-up time			
3.5	Check date/time			

4.	**Recording operating times**	Setpoint	Actual value	Values / data / remarks
4.1	Operating hours			
4.1.1	Operating time pump			H
4.1.2	Operating time heater E5.1			H
4.1.3	Operating time heater E5.2			H
4.1.4	Operating time heater E5.3			H
4.1.5	Operating time heater E5.4			H
4.1.6	Operating time heater E5.5			H
4.2	Heating times			H

5.	**Control cabinet**	Replaced	Carried out / OK	Last replacement month year	Values / data / remarks
5.1	Check insulation of all cabe lugs, replace if necessary	❑	❑		
5.2	Replace CPU battery (every 5 years)	❑	❑		
5.3	Check terminal screws of the connection cable and main circuits		❑		
5.3.1	Check terminal screws in the junction box UV5.1		❑		
5.4	Trip residual current-operated circuit breaker				
5.5	Check terminal screws fuse switch				
5.6	Check terminal screws of the contactors				
5.6	Check terminal screws of the solid-state contactors				
5.8	Check terminal screws of the solid-state contactors				
5.8.1	Relay -20K3 heater E5.1.1 Change if necessary	❑	❑		
5.8.2	Relay -20K5 heater E5.1.2 Change if necessary	❑	❑		
5.8.3	Relay -20K7 heater E5.1.3 Change if necessary	❑	❑		
5.8.4	Relay -21K3 heater E5.2.1 Change if necessary	❑	❑		
5.8.5	Relay -21K5 heater E5.2.2 Change if necessary	❑	❑		
5.8.6	Relay -21K7 heater E5.2.3 Change if necessary	❑	❑		
5.8.7	Relay -22K3 heater E5.3.1 Change if necessary	❑	❑		
5.8.8	Relay -22K5 heater E5.3.2 Change if necessary	❑	❑		
5.8.9	Relay -22K7 heater E5.3.3 Change if necessary	❑	❑		
5.8.10	Relay -23K3 heater E5.4.1 Change if necessary	❑	❑		
5.8.11	Relay -23K5 heater E5.4.2 Change if necessary	❑	❑		
5.8.12	Relay -23K7 heater E5.4.3 Change if necessary	❑	❑		
5.8.13	Relay -24K3 heater E5.5.1 Change if necessary	❑	❑		
5.8.14	Relay -24K5 heater E5.5.2 Change if necessary	❑	❑		
5.8.15	Relay -24K7 heater E5.5.3 Change if necessary	❑	❑		

5.	**Control cabinet**	Replaced	Carried out / OK	Last replacement month year	Values / data / remarks
5.9	Tighten terminal screws of the auxiliary relays (general)				
5.8.1	Relay -50K5 waiting mode Replace if necessary	❑	❑		
5.9.2	Relay -52K5 flash lamp Change if necessary	❑	❑		
5.9.3	Relay -52K7 heater switchboard airing Change if necessary	❑	❑		
5.9.4	Relay -58K4 HWD1 Change if necessary	❑	❑		
5.9.5	Replace relay -58K4.1 HWD1 if necessary	❑	❑		
5.9.6	Relay -58K5 HWD2 Change if necessary	❑	❑		
5.9.7	Relay -58K6 inline operation Change if necessary	❑	❑		
5.9.8	Relay -58K7 alarm Change if necessary	❑	❑		
5.9.9	Relay -58K8 alarm Change if necessary	❑	❑		
5.10	Inspection of the earthing conductor connections				
5.10.1	Firm attachment of the earthing conductor terminals on the rail		❑		
5.10.2	Terminal screws of the earthing conductor terminals tightened		❑		
5.10.3	Earthing bolts for control cabinet door tightened		❑		
5.10.4	Earthing bolts for mounting plate tightened		❑		
5.10.5	Earthing bolts for housing tightened		❑		
5.11	Correct fitting of the protective covers				
5.11.1	Protective cover main switch		❑		
5.11.2	Protective cover connection terminals Terminal strip – X1		❑		
5.11.3	Protective cover CPU		❑		
5.11.4	Protective cover LT1Plus		❑		
5.12	Lamp test				
5.12.1	Signal lamp -34H1 hot rinse replace if necessary	❑	❑		
5.12.2	Signal lamp -34H2 inline operation Change if necessary	❑	❑		
5.12.3	Signal lamp -34H3 alarm Change if necessary	❑	❑		
5.12.4	Signal lamp -34H4 temperature reached Change if necessary	❑	❑		
5.12.5	Flash lamp -34H6 Change if necessary	❑	❑		

6.	**Repeat test for medical electrical devices as per DIN EN 62353**	Measured value	Limit value	Values / data / remarks

ATTENTION: Implementation of the test in compliance with IEC 62353

☐ Repeat test

☐ Test after repair

Protective class: 1

Mains connection: PIE ☐ PIE = permanently connected ME-device (permanently installed equipment)

NPS ☐ NPS = non-detachable power supply cable

6.1	**Visual inspection** Mains supply cable, overall system:			☐ OK	☐ n.OK
6.2	**Protective conductor resistance** Measurement between mains connection cable and housing	R_{SL}	<0.300Ω	☐ OK	☐ n.OK
6.2.1	Measurement between mains supply cable and mounting plate	R_{SL}	<0.300Ω	☐ OK	☐ n.OK
6.2.2	Measurement between mains supply cable and door/front plate	R_{SL}	<0.300Ω		
6.3	**Leakage resistance** Touch all accessible conductive parts with a test probe	R_{ISO}	>2.0MΩ	☐ OK	☐ n.OK
6.4	**Leakage current** Mains connection PIE: With permanently installed equipment (PIE) the measurement of DEVICE LEAKAGE CURRENT is not necessary. Mains connection NPS: The measurement of DEVICE LEAKAGE CURRENT is necessary.				
	Device leakage current (substitute measurement):	I_{EGA}	<1.0mA	☐ OK	☐ n.OK
6.5	Functional test	☐ OK ☐ n.OK			
6.6	Measurement log available	☐ OK ☐ n.OK			
6.7	Safety or functional faults were not established.				
6.8	No direct risk, the faults discovered can be eliminated quickly.				
6.9	Device must be removed from circulation until the faults have been eliminated!				
6.10	Device does not comply with the requirements – Modifications/replacement of components/ putting out of operation is recommended				
6.11	The next repeat test is necessary in:	☐ 12 months			

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Test carried out by Date, signature

7.	**Labelling / marking**	Replaced	Carried out / OK	Last replacement month year	Values / data / remarks
7.1	Labelling in the control cabinet (replace if necessary)				
7.1.1	Marking of operating equipment		❑		
7.2	Labelling of the hydraulic unit (replace if necessary)				
7.2.1	Marking of sensor system		❑		
7.2.2	Safety instructions		❑		

8.	**Function test**	Limit value	Actual value	Values / data / remarks
8.1	Start Hot Rinse Smart and allow it to run			
	Check the current consumption of the system		Test equipment number	
8.2	Overall current consumption of the system			
8.2.1	L1		A	
8.2.2	L2		A	
8.2.3	L3		A	
8.3	Current consumption of the heaters			
8.3.1	Heater E5.1.1	1<13.5A	A	
8.3.2	Heater E5.1.2	1<13.5A	A	
8.3.3	Heater E5.1.3	1<13.5A	A	
8.3.4	Heater E5.2.1	1<13.5A	A	
8.3.5	Heater E5.2.2	1<13.5A	A	
8.3.6	Heater E5.2.3	1<13.5A	A	
8.3.7	Heater E5.3.1	1<13.5A	A	
8.3.8	Heater E5.3.2	1<13.5A	A	
8.3.9	Heater E5.3.3	1<13.5A	A	
8.3.10	Heater E5.4.1	1<13.5A	A	
8.3.11	Heater E5.4.2	1<13.5A	A	
8.3.12	Heater E5.4.3	1<13.5A	A	
8.3.13	Heater E5.5.1	1<13.5A	A	
8.3.14	Heater E5.5.2	1<13.5A	A	
8.3.15	Heater E5.5.3	1<13.5A	A	
8.4	Current consumption of the pump			
8.4.1	Pump M5.1.1	see type plate	A	
8.4.2	L1		A	
8.4.3	L2		A	
8.4.4	L3		A	

9.	Function test	Setpoint	Actual value	Values / data / remarks
9.1	Recording of the operating temperatures during inline		Test equipment number	
9.1.1	TISAH 5.1.2 RL feed	°C	°C	
9.1.2	TISAH 5.4.4 heater E5.4	°C	°C	
9.1.3	TISAH 5.5.4 heater E5.5	°C	°C	
9.1.4	TISAH 5.1.6 RL return flow	°C	°C	
9.2	Recording of the operating pressures		Test equipment number	
9.2.1	PISAHL 5.1.2 RL feed	4 – 6 bar	bar	
9.2.2	PISAHL 5.1.3 RL return flow	3 – 5 bar	bar	
9.2.3	ÜV 2	3 – 4 bar	bar	
9.2.4	ÜV 1	max. 2 bar	bar	

10.	Handover	Carried out / OK	Values / data / remarks
10.1	Operating status	❑	
10.2	Have fault-free handover confirmed	❑	

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Service technician, block letters

.....
Place / date, signature

The system was taken over in perfect condition

.....
System operator, block letters

.....
Place / date, signature

8. Spare and wear parts list Hot Rinse SMART 10/20/30/40/50

8.1 Hot Rinse SMART 10/20/30/40/50

A detailed spare parts list is included in the scope of delivery for the system.

See TM047