

BIOCAT KS 8000
BIOCAT KS 11000
BIOCAT KS 14000
BIOCAT KS 3.5D
BIOCAT KS 5D



Operating instructions

EN

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1 Foreword

1.1 Notes to the Operating instructions

These operating instructions contain all the important information you will need for the proper operation of the device described. Observing these instructions helps avoid dangers, reduce repair costs and downtime, and increase the reliability and service life of the device.

The operating manual must always be available at the place of use.

The manufacturer accepts no liability for damage caused by failure to comply with these operating instructions, the applicable regulations or improper use. The risk is borne solely by the user / operator.

For more information or for problems that are not dealt with in detail in these operating instructions, please place a request directly with WATERCryst customer service.

WATERCryst customer service: kundendienst@watercryst.com
AT +43 5232 20602 - 204
DE +49 2129 3475755 - 204

1.2 Safety instructions

The symbols in the operating instructions have the following meaning:



Warning

This symbol indicates information that must be observed to avoid the possibility of extensive property damage. The safety instructions must be followed.



Note

This symbol indicates information regarding the use of the device. Failure to follow this instruction can lead to malfunctions.



Instruction

This symbol indicates a measure that must be observed to ensure correct installation and commissioning.

WATERCryst disclaims all liability if users disregard the notices marked on the equipment and/or in the operating instructions!

1.3 Intended use



BIOCAT KS 8000

The BIOCAT KS 8000, KS 11000, KS 14000, KS 3.5D, and KS 5D limescale conditioners **sustainably reduce the build-up of limescale in potable water systems and sanitation facilities**. The underlying principle of the biomineralisation process protects against limescale build-up without using chemical additives or the electrolytic decomposition of water.

The units are designed to be installed in the main connection of the potable water system of single- and multi-family homes, hospitals, hotels, schools, other public buildings, and commercial and industrial objects.

Unit selection and sizing are carried out according to WATERCryst planning documents and design specifications.



The device is not suitable for:

- technical installations for which complete or partial desalination is necessary or prescribed by the manufacturer.
- process water that does not correspond to TVW in its composition.
- water which is highly undersaturated with respect to lime (aggressive to lime) in the area of the treatment unit.
- an operating pressure of the plant greater than 8 bar or less than 2 bar.

The manufacturer accepts no liability for damage caused by failure to comply with these operating instructions, the applicable regulations or improper use. The risk is borne solely by the user / operator.

1.4 Warranty

The warranty is honoured in the sense of our General Terms of Sale and Delivery only if:

- the device is installed by a qualified professional,
- the device is used in accordance with the instructions of this operating manual,
- the device is properly deployed,
- repairs are carried out exclusively by authorised and qualified personnel,
- no unauthorised changes are made to the device.

1.5 Duty of care of the operator

The BIOCAT limescale conditioning system was designed and built under careful observance of harmonised standards and other technical specifications.

The system is thus state of the art and allows maximum safety during all operational states.

The system's safety can only be implemented in practice if all necessary measures are taken. Due diligence of the operating company comprises planning and controlling the execution of these measures.

In particular, the operating company must ensure that

- the system is used only for its intended purpose.
- the system is operated only in a perfectly functioning state, and the safety devices, in particular, are checked regularly for proper functioning.
- the required personal protective equipment is available to and worn by the operational, maintenance and repair personnel.
- the operating manual is always available at the installation site of the device/system, in legible condition and in full.
- only qualified and authorised personnel operate, maintain and repair the system.
- these personnel are regularly instructed in all relevant occupational safety and environmental protection issues and are familiar with the operating instructions, particularly the safety instructions contained therein.
- all safety and warning notices attached to the system remain attached and legible.
- changes to the system are made by authorised and expert personnel only.

2 Structure and function

2.1 Scope of supply and device setup

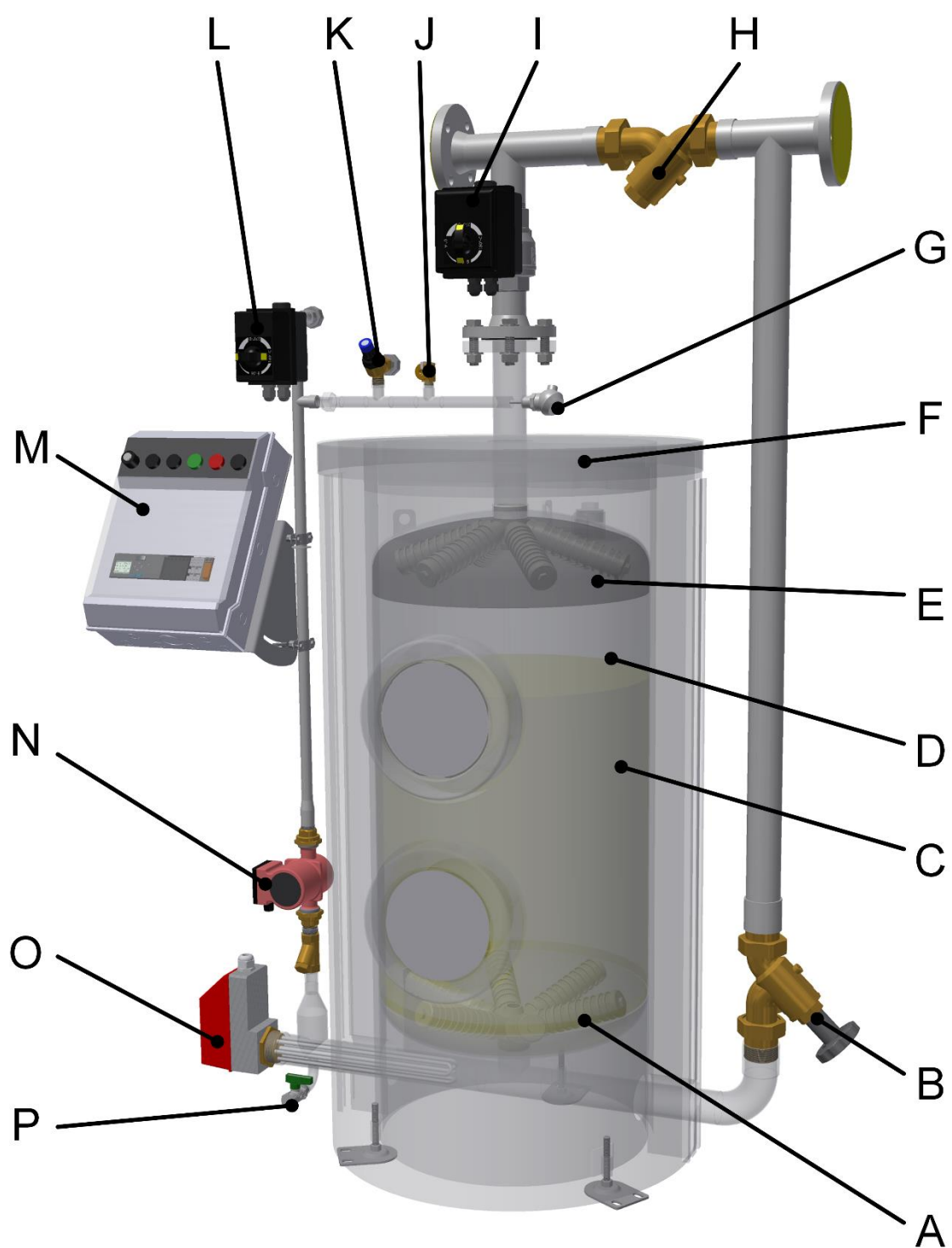
2.1.1 Scope of delivery



- 1: BMS connector
- 2: Control unit
- 3: Container including catalyst granulate, piping, valves, heater and pump
- 4: Thermal insulation

The units are delivered ready for installation. The BIOCAT KS 8000, KS 11000 and KS 14000 are delivered already filled with catalyst granulate. For the BIOCAT KS 3.5D and KS 5D, filling takes place on-site after the unit's installation.

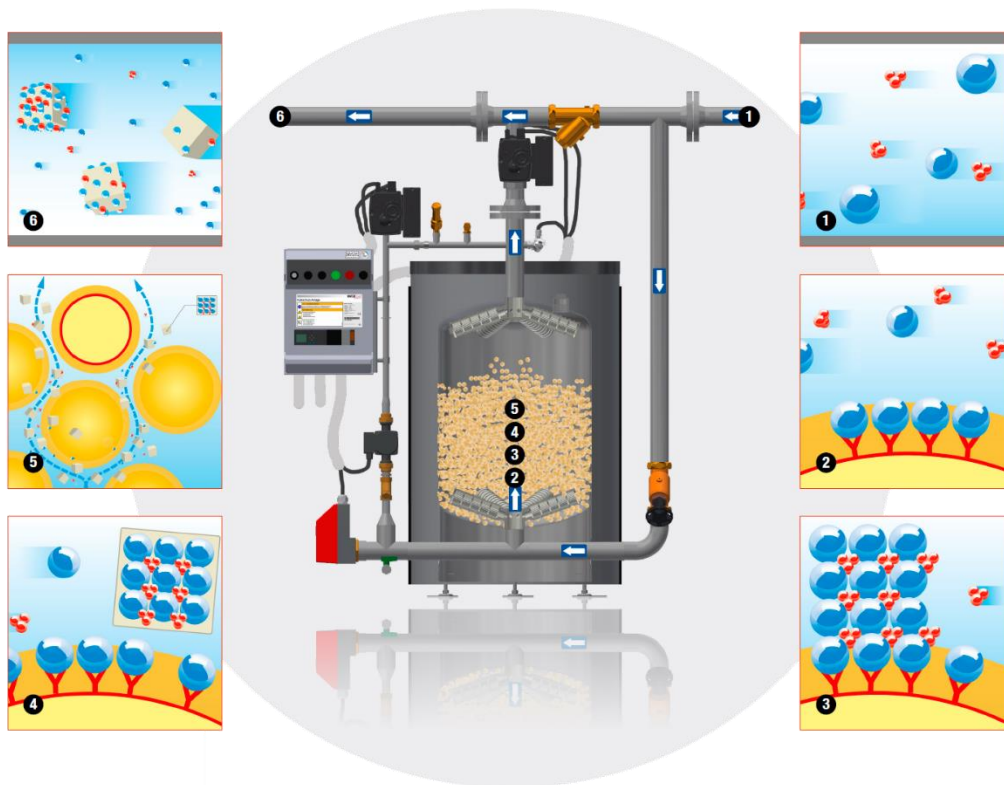
2.1.2 Device setup



Pos.	Component	Description
A	Filter stars	Filter stars made of food-safe plastic
B	Check valve RV can be shut off	stopcock with integrated backflow preventer according to EN 1717
C	Catalyst granulate	fine-grained, polymer catalyst granulate
D	Stainless steel tank with piping	stainless steel container PN10 with maintenance flange
E	Filter granulate	floating filter granulate made of polypropylene
F	Thermal insulation	for retention of the catalyst granulate
G	PT 100	EPS thermal insulation, thickness 90 mm
H	RV check valve	Temperature regulator 50°C - 200°C
I	Main ball valve with actuator	Backflow preventer according to EN 1717
J	Venting valve	2-way ball valve for switching between water treatment, bypass during thermal disinfection and backwashing
K	Safety valve	Air vent
L	Ball valve DN 15 with actuator	Safety valve 10bar
M	Control unit	2-way ball valve for backwashing
N	Charging pump	Control and monitoring unit via Siemens LOGO
O	Screw-in heating element	Grundfos charge pump for heating up the tank during thermal disinfection
P	Drain cock	Screw-in heating element with overtemperature protection for heating up the tank during thermal disinfection

2.2 Description of function

The functioning of the BIOCAT limescale conditioners is based on the patented WATERCryst catalyst technology. This leaves the valuable minerals in the potable water and does not alter its natural composition.



1. Lime (chemically: calcium carbonate CaCO_3) is present in drinking water dissolved in calcium (Ca^{2+}) and carbonate ions (CO_3^{2-}).
2. The BIOCAT lime protection devices include the WATERCryst catalyst granulate, with docking points for calcium and carbonate ions on a specially developed surface.
3. The calcium and carbonate ions are captured by docking points of the granulate and joined together to form the smallest lime crystals. This process takes place independently, without energy or the addition of chemicals. The docking points significantly reduce the activation energy for the formation of lime crystals.
4. When the lime crystals reach a certain size (size reference 10.000ths of a millimetre), they are released from the surface of the granulate by the water flow.
5. The docking points are now free again to build up a new lime crystal from the passing water (the docking points and the granulate do not consume each other and therefore act continuously as a catalyst for the formation of lime crystals). Lime crystals are rinsed inside the BIOCAT limescale protection system with every water withdrawal from the tank and then distributed throughout the drinking water pipe system and the water heaters.
6. The lime crystals now serve as docking points for the excess calcium and carbonate ions in cold and warm water. During tapping, these are finally rinsed out via the fittings. This significantly reduces the formation of lime deposits in pipes and hot water tanks. The water hardness remains unchanged.



BIOCAT limescale conditioners leave the valuable minerals in the potable water. Once the water evaporates from tiles, fittings or shower walls, the minerals are left behind and build up corresponding residues.

Your bathroom and sanitary facilities must therefore be regularly maintained and cleaned. Important information plus tips and tricks can be found on the WATERCryst website

www.watercryst.com

Control and monitoring electronics ensure automatic and proper operation. Microbiological impairment of the equipment is excluded by regular, automatic thermal disinfection (TD). During TD, the container with the catalyst granulate is disconnected from the drinking water supply line via the ball valves - the bypass position continues to ensure the supply of drinking water. The water in the tank is heated up to 75°C, and after a certain time of action, it is rinsed out with an automatic rinse (RS). The system automatically returns to the water treatment mode (WT).



Danger of scalding!

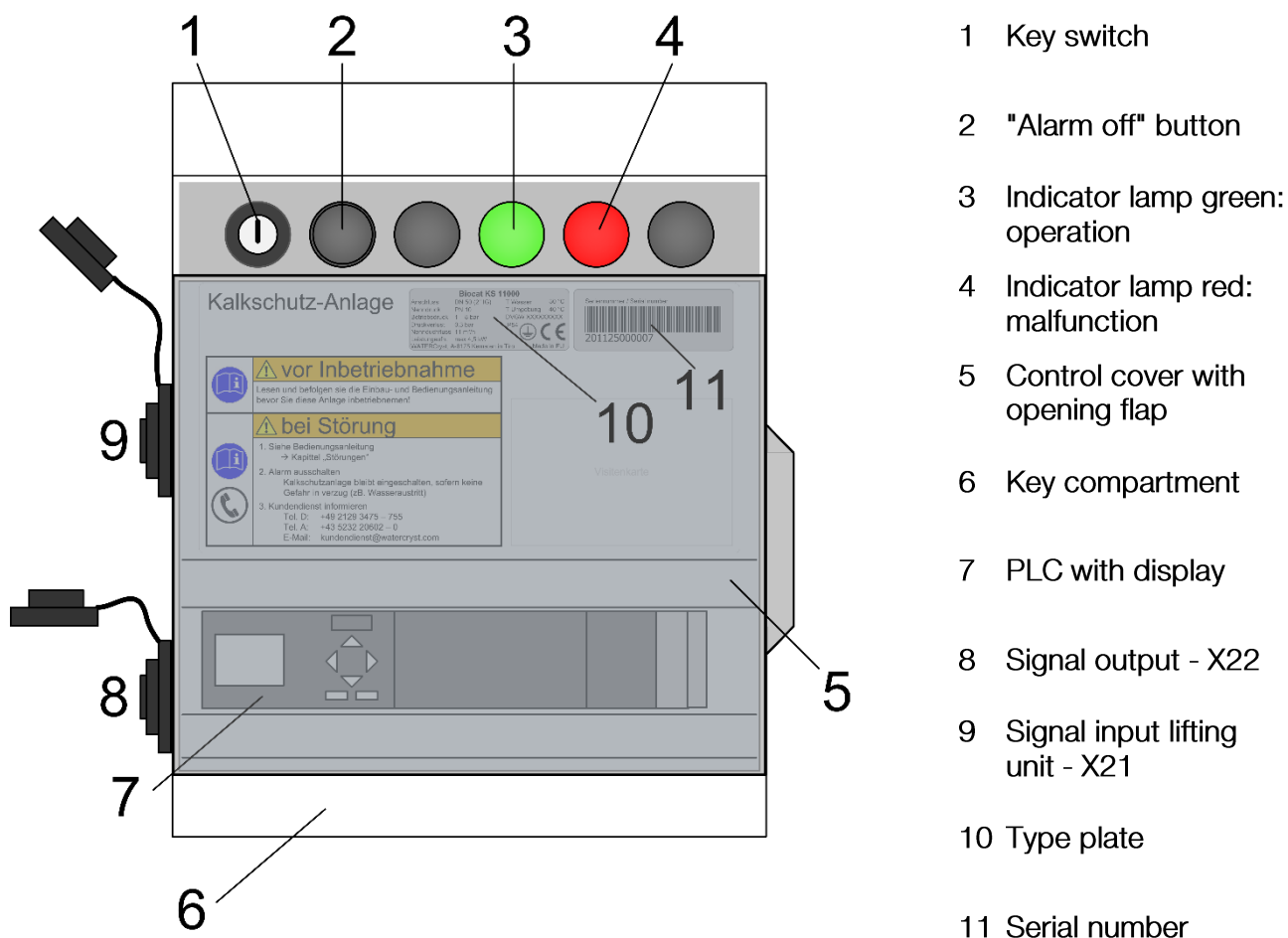
During backwashing after thermal regeneration, hot water (approx. 80°C) escapes from the backwash line!

With the integrated FailSafe function, the ball valves KH1 and KH3 are moved into a safe position in the event of a power supply failure. This prevents permanent flushing of the BIOCAT limescale protection system. The battery pack provides the energy for the FailSafe function.

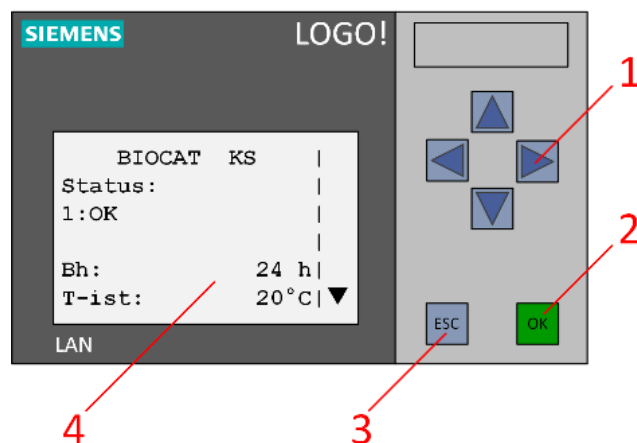
2.3 Control and monitoring module

The control and monitoring module with a PLC - industrial control provides the following functions:

- Monitoring functions
 - Maintenance interval for granulate change via operating hours counter
 - Time interval for automatic thermal disinfection
 - Position of the control valves for thermal disinfection and backwash
 - Heating function for thermal disinfection
 - Temperature in all operating phases
- Display elements
 - Green and red light
 - Display of the control unit
 - Acoustic alarm
 - 2 potential-free signal contacts for ZLT
 - Limescale protection
 - Lifting unit
- Operating hours counter
 - Display of the current operating hours
 - Display and alarm in case of service request (granulate change after 5 years)
- Operating elements
 - Key switch
 - Alarm off button
 - Cursor keys LOGO
 - ESC, OK button LOGO
- Control elements
 - charge pump
 - Temperature sensor Pt100 for temperature monitoring



The control is operated via the 4 cursor keys (1), the OK key (2) and the ESC key (3), which are located to the right of the display (4).



After plugging in the mains plug, the menu shown in the figure above appears in the control unit's display. (Display during operation of the control)

3 Technical data

Hydraulic		KS 8000	KS 11000	KS 14000	KS 3.5D	KS 5D
Residential units max. according to VDI 3807-T3 *)	WE	30	68	114	160	230
Nominal flow Q_N	[l/h]	7.900	10.100	11.800	12.500	13.500
Continuous flow Q_D	[l/h]	650	1.500	2.500	3.500	5.000
Nominal pressure		PN10				
Operating pressure (min - max)	[bar]	2-8				
Differential pressure Δp at nominal flow Q_N	[bar]	0,3				
Ambient temperature	[°C]	25				
Max. water temperature	[°C]	25				
Backflushing flow rate (at 4 bar)	[l/min]	40				
Flushing volume flow rate (at 4 bar)	[l]	80	150	180	320	360

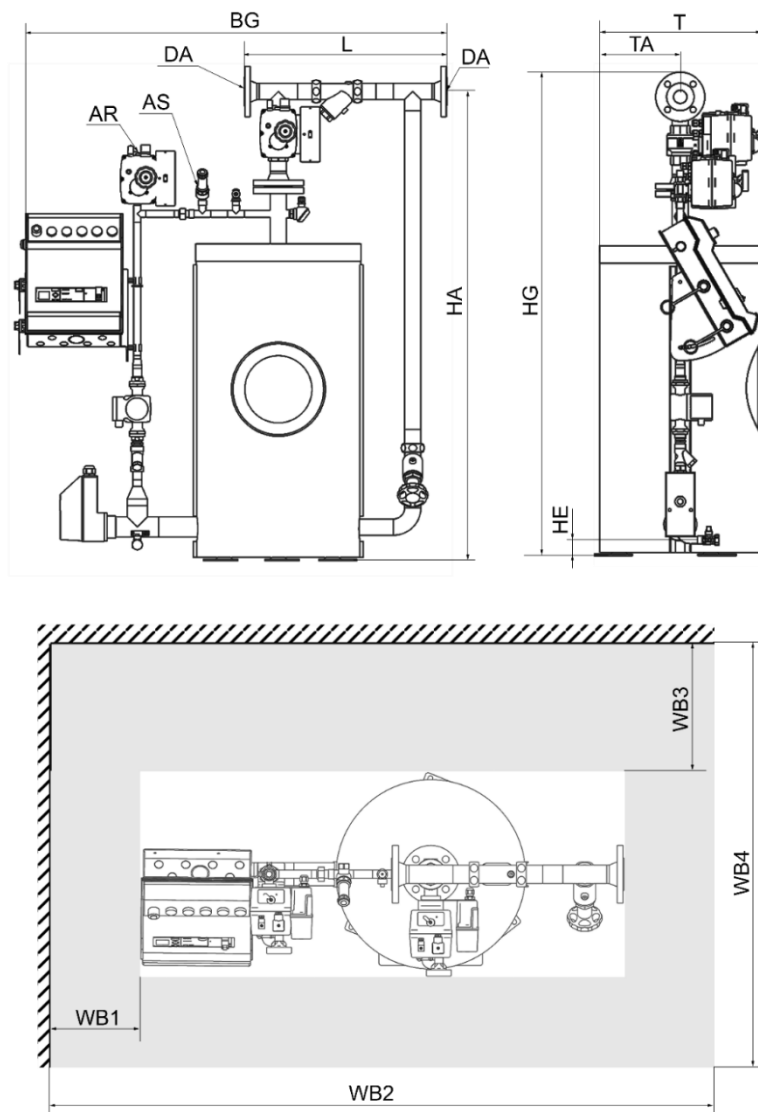
Electrical		KS 8000	KS 11000	KS 14000	KS 3.5D	KS 5D
Input power in the treatment mode	[W]	14				
TD input power	[W]	2.070	4.570		6.070	
Mains connection		400V, 50Hz, 3P+N+PE				
Plug type		CEE 16A 400V 3P+N+PE				
Protection class		1				
Protection type		IP42				

*) According to VDI 3807-T3, the maximum number of residential units (WE) specified in the table refers to an average occupancy rate of 2.2 persons per WE and an average water consumption of 100 litres/person/day. In practice, depending on the usage behaviour of the residents and the actual occupancy of the apartments, significant deviations from the statistical average values may occur, which must be taken into account when planning and designing the limescale protection systems.



The layout of the BIOCAT limescale conditioners must, in principle, adhere to the planning recommendations of WATERCryst. The relevant documents and planning information can be found in our planner documentation.

4 Installation dimensions



Dimensions		Unit	KS 8000	KS 11000	KS 14000	KS 3.5D	KS 5D
HG	Total height	[mm]	1.500	1.630	1.900	2.200	2.400
BG	Total width	[mm]	1.250	1.330		1.500	
HA	Height supply/drain	[mm]	1.435	1.550	1.820	2.120	2.320
HE	Height tapping valve	[mm]	70	40	43	90	
L	Length of piping	[mm]	610	680		825	
T	Depth	[mm]	520	700		790	
TA	Depth piping	[mm]	245	350		390	
WB1	Maintenance area 1	[mm]	min. 400				
WB2	Maintenance area 2	[mm]	min. 2.200			min. 2.400	
WB3	Maintenance area 3	[mm]	min. 250				
WB4	Maintenance area 4	[mm]	min. 1.700			min. 1.950	
DA	Diameter connection	DN	40 (1 1/2“)	50 (2“)			
AS	Connection pressure relief valve	DN	15 (1/2“)	15 (1/2“)			
AR	Connection backflush line	DN	15 (1/2“)	15 (1/2“)			

5 Installation and commissioning

5.1 Safety instructions and installation conditions

Attention!

- When used in potable water installations, note and adhere to all (local) installation regulations, general guidelines and standards for the supply of potable water and heated potable water (TrinkwV, DIN2000, DIN2001, DIN50930, DIN1988, DVGW; ÖVGW or SVGW standards).
- Use the device in proper working condition and for its intended use and in full awareness of safety concerns and possible dangers.
- Observe the installation and operating instructions.
- Faults that can affect safety must be rectified immediately by a specialist.
- Installations and repairs that authorised professionals do not undertake, technical modifications to the device that are not approved in writing by the manufacturer, and the use of non-original spare parts will void the warranty and product liability of the manufacturer.
- The system is designed for a nominal pressure of 10 bar.
For the system to function correctly, the operating pressure must be set between a min. of 2 bar and a max. of 8 bar with a commercially available pressure regulating valve.
- The device must be connected to properly installed, grounded and secure single-phase mains electricity (230 V / 50 Hz).
- Insert the plug only after assembly is complete.
- The system must not be exposed to direct moisture. In particular, water dripping from above must be prevented.
- Check the tightness and proper functioning of the system regularly and comply scrupulously with the prescribed inspection and maintenance intervals and the measures provided for this purpose.
- Before performing maintenance or repair work, bar access by unauthorised persons to the working area of the limescale conditioner.
 - Affix or put up an information board that draws attention to the maintenance or repair work.
 - Unplug the device, depressurise the system, and secure against restarting.
 - Before maintenance or repair work, ensure that all device and system parts have cooled down to room temperature.

The unit has a rinse line that must be led into a drain. The flushing water temperature is 80°C. An unobstructed flow of the drain water must therefore be ensured on-site at all times.

Attention: Load-lifting equipment must be secured against power failure.



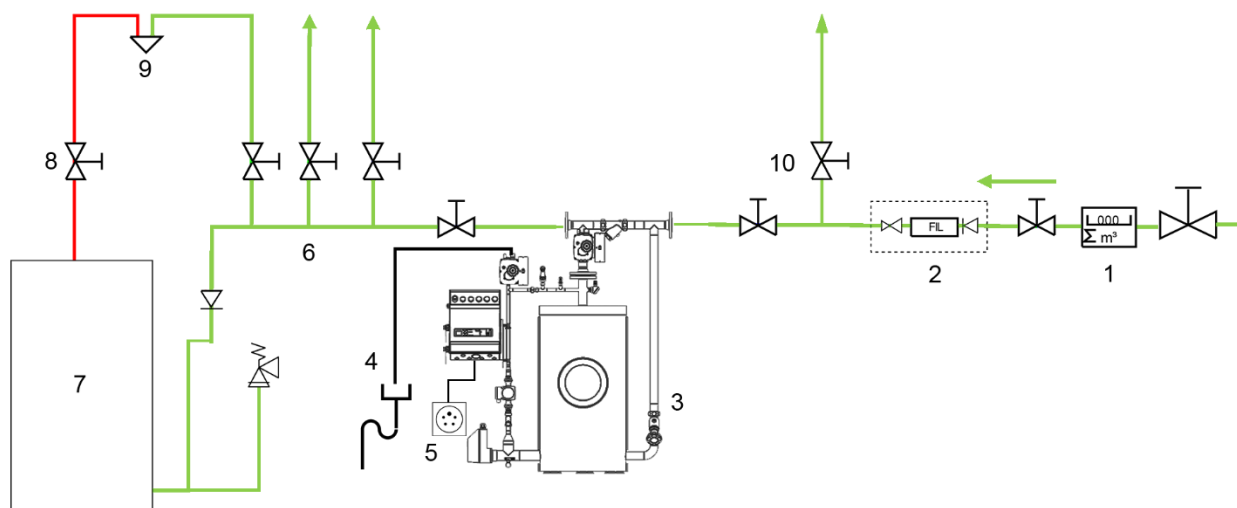
The operating pressure must be at least 2 bar and must not exceed 8 bar. If necessary, a pressure reducer must be installed upstream of the unit.

5.2 Installation diagram

For mounting, see enclosed mounting instructions BIOCAT KS 8000-5D.

5.2.1 Variant A: Protection of the complete drinking water installation

Install the BIOCAT KS device in the house water connection directly after the water meter, RV, filter and pressure regulator!



1. Water meter
2. Domestic water station
3. BIOCAT KS limescale protection device
4. Free outlet in drain
5. Three-phase socket
6. Cold water distributor with cold water risers
7. Drinking water heater
8. Hot water manifold with hot water risers
9. Mixer tap



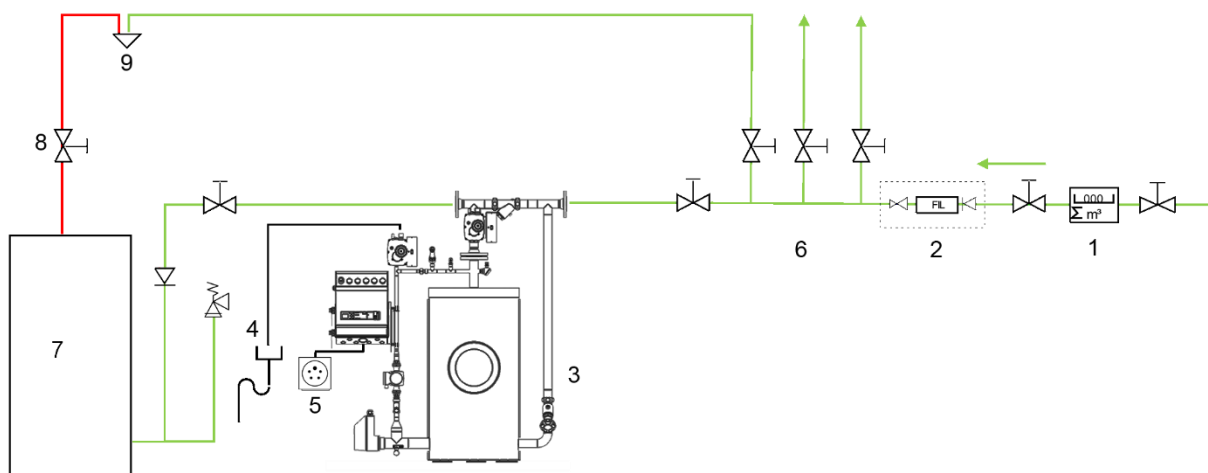
The installation diagram does not contain all the shut-off and safety devices required for proper installation but only the essential components for the proper installation of the device. In particular, relevant standards must be observed in DIN 1988 and local installation guidelines.



Components 4 and 5 are not included in the scope of delivery and **MUST** be provided by the customer during installation!

5.2.2 Variant B: Protection of the entire hot water installation

Install the BIOCAT KS device directly in the cold water inlet to the drinking water heater or the hot water tank!



1. Water meter
2. Domestic water station
3. BIOCAT KS limescale protection device
4. Free outlet in drain
5. Three-phase socket
6. Cold water distributor with cold water risers
7. Drinking water heater
8. Hot water manifold with hot water risers
9. Mixer tap



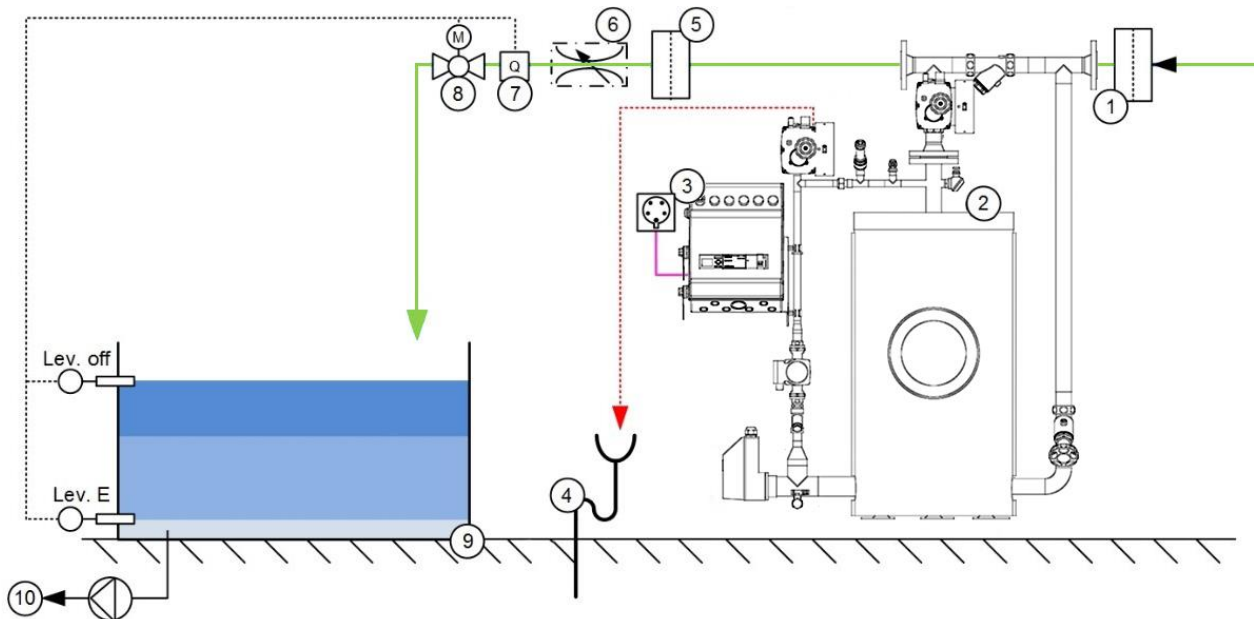
The installation diagram does not contain all the shut-off and safety devices required for proper installation but only the essential components for the proper installation of the device. In particular, relevant standards must be observed in DIN 1988 and local installation guidelines.



Components 4 and 5 are not included in the scope of delivery and **MUST** be provided by the customer during installation!

5.2.3 Variant C: Protection of a drinking water reservoir and subsequent drinking water installation

Install the BIOCAT KS unit directly into the cold water inlet of a drinking water reservoir!



1. Pre-filter
2. BIOCAT KS limescale protection device
3. High-voltage socket
4. Free outlet into drain;- adequately dimensioned and temperature-resistant.
5. Fine filter
6. Flow limiter
7. Flow measurement
8. Shut-off unit
9. Drinking water holding tank
10. Consumer



The installation diagram does not contain all the shut-off and safety devices required for proper installation but only the essential components for the proper installation of the unit. In particular, relevant standards must be observed in DIN 1988 and local installation guidelines.



The components and fittings 1, 3, 4, 5, 6, 7 and 8 are not included in the scope of delivery and **MUST** be provided by the customer during installation!



The unit size selection is chosen according to the refill volume flow of the drinking water storage basin.
BIOCAT Continuous flow rate $Q_D \geq$ Refill volume flow Q_{Refill}
 The set value of the flow limiter must not exceed the continuous flow rate of the BIOCAT.

Setting the flow limiter (6)

BIOCAT KS 8.000	Max. 650l/h
BIOCAT KS 11.000	Max. 1.500 l/h
BIOCAT KS 14.000	Max. 2.500 l/h
BIOCAT KS 3.5D	Max. 3.500 l/h
BIOCAT KS 5D	Max. 5.000 l/h

5.3 Commissioning



Commissioning is carried out exclusively by WATERCryst customer service. Otherwise, WATERCryst excludes any warranty and guarantee!

5.3.1 Preparations



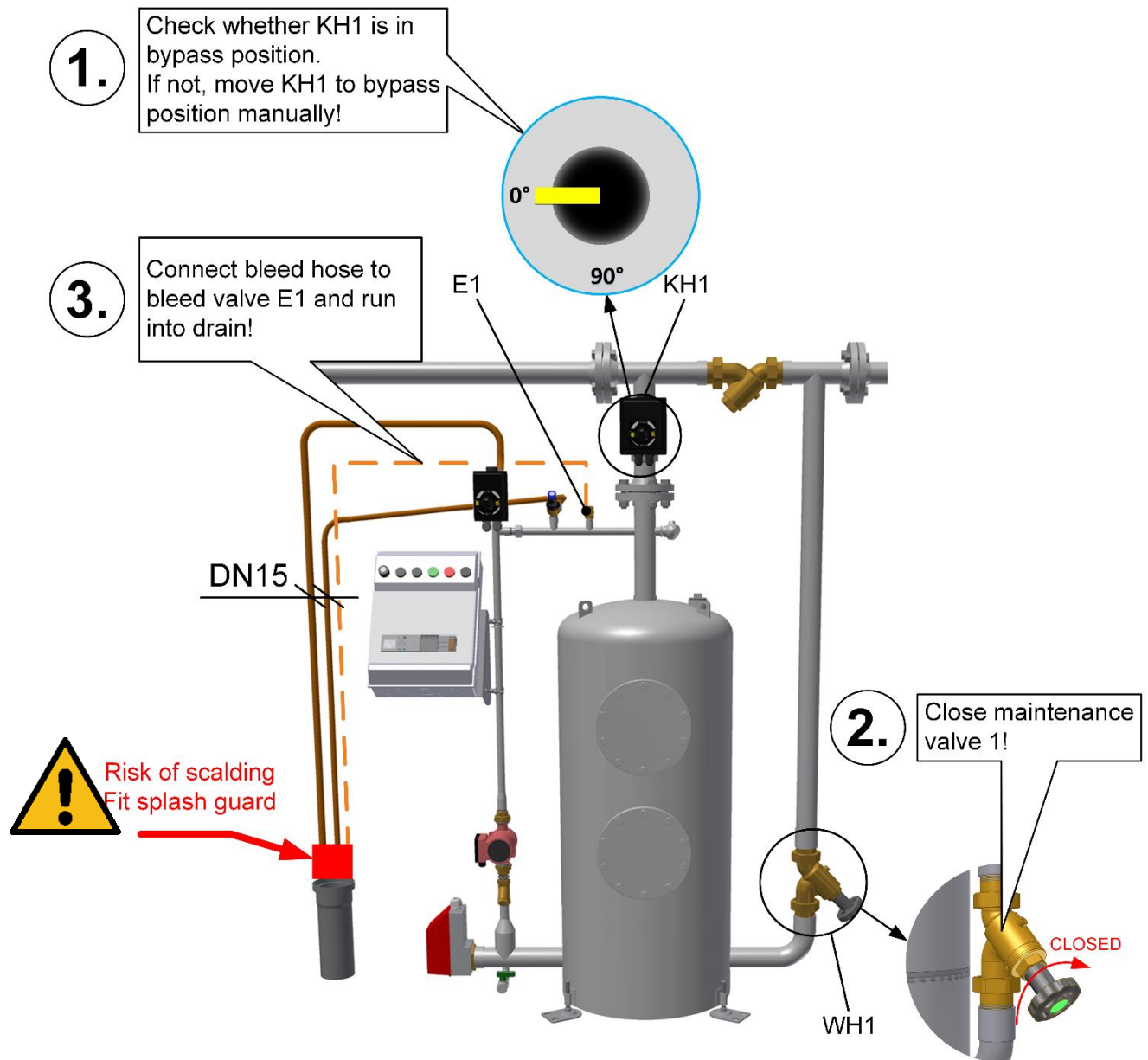
The unit must be properly filled with WATERCryst catalyst or granules before start-up.

5.3.1.1 Removing the thermal insulation

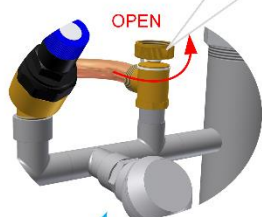


For KS 8000, KS 11000, KS 14000 continue with chapter 5.3.2 Filling and venting page 22.

5.3.2 Filling and venting



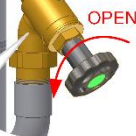
4. E1 Fully open!



E1

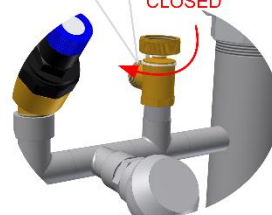
WH1

5. Open maintenance valve 1 until water escapes at E1!



6. 1. Close E1!
2. Remove hose from E1!

CLOSED



E1



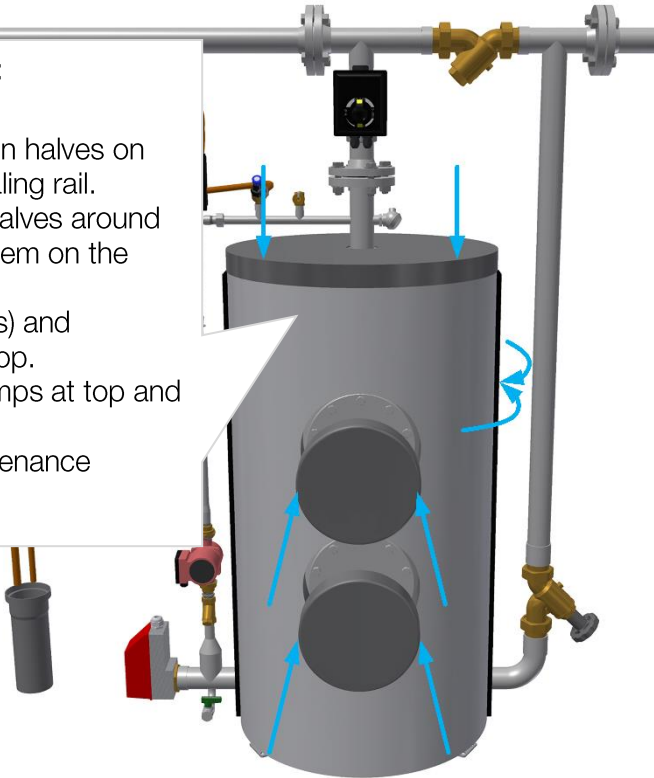
Visual inspection for leaks!

Before mounting the thermal insulation, check installation and device for leaks; also, check the tank bottom!

5.3.3 Installing thermal insulation

Mount the thermal insulation:

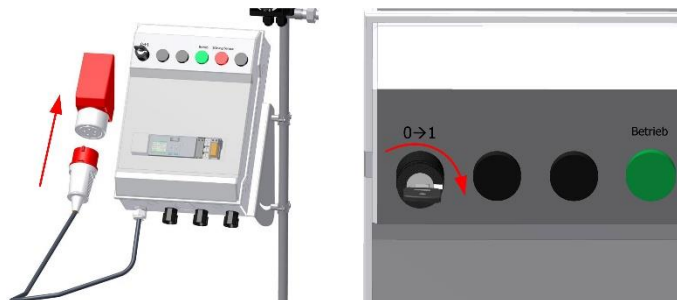
1. Connect the insulation halves on one side with the sealing rail.
2. Bend the insulation halves around the tank and close them on the opposite side.
3. Place insulation mat(s) and protective cover on top.
4. attach side snap clamps at top and bottom.
5. place cover on maintenance flanges.



Ensure that the maintenance cocks are completely open and the unit is filled with water and vented!

The control unit requires a three-phase, fused mains connection of 400 V, 50Hz, min. 10A, max. 16A (CEE 16A 400V 3P+N+PE)!

5.3.4 Switching the device on



When the key switch is turned on, the control system automatically starts a complete hygiene program for the intrinsic safety of the unit before the BIOCAT limescale protection system is connected to the drinking water installation.



The day of the week and the time **MUST** be set for proper operation!
See chapter: Set system time and date.

Furthermore, the interval of the thermal disinfection can be shortened if required, and the status signal of a possibly connected lifting system can be integrated.

6 Operation and settings



Check the connection of the drain!

Flushing volume = varies depending on system type -> see technical data.
Volume flow = 40 l/h.

The drain must be temperature resistant up to min. 80°C!

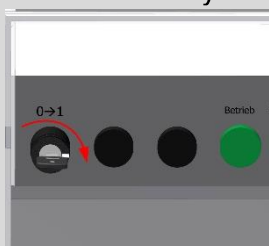


Ensure that the maintenance cocks are completely open and that the unit is filled with water and vented!

The control unit requires a three-phase, fused mains connection of 400 V, 50Hz, fuse protection: varies depending on the system type -> see Technical data.

6.1 Initialisation with hygiene program

Switch on the system



First display after switching on:

```

BIOCAT KS
Hygiene-program
in 00:01h
1.BF -> 2.TD
Push the button
to skip.
    
```

After switching on the plant, the initial hygiene program is started automatically if it is not skipped!

```

BIOCAT KS
Hygiene-program
in 00:01h
1.BF -> 2.TD
Push the button
to skip.
    
```



Check whether the existing drain complies with the standard! (DN 100)

```

BIOCAT KS
Hygiene-prog.: |
                |
BF active!     |
TD in 02:00m   |
T-act: 25°C    |▼
    
```

Observe temperature rise!

```

BIOCAT KS
Hygiene-prog.: |
                |
TD active!     |
T-act: 20°C    |
t-hold: 0s     |▼
    
```



Attention: Hot water!

```

BIOCAT KS
Hygiene-prog.: |
                |
BF active!     |
T-act: 47°C    |▼
    
```

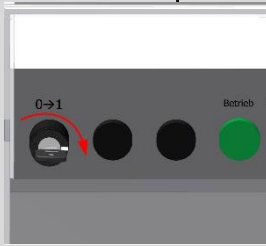
Thermal disinfection successfully completed!

```

BIOCAT KS
Status:        |
Ok             |
Oh: 12345 h    |
T-act: 12°C    |▼
    
```

6.2 Initialization -> Make settings

Switch on plant



First display after switching on:

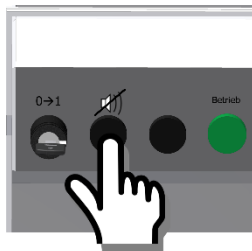
```
BIOCAT KS
Hygiene-program
in 00:01h
1.BF -> 2.TD
Push the button
to skip.
```

Service function:



For service purposes, it is possible to skip the hygiene program-> press the button.

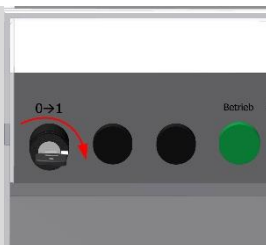
Function may only be used by trained service technicians, as the device does not perform thermal disinfection and backwashing beforehand!



First display after skipping:

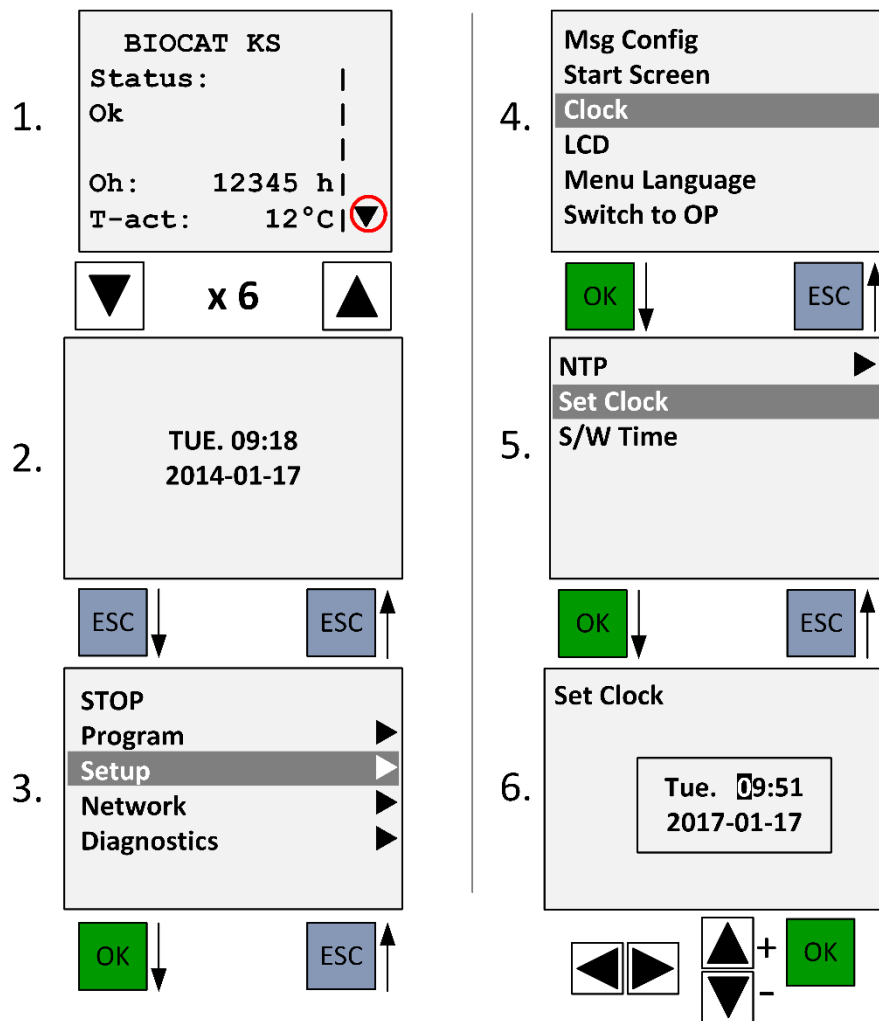
```
BIOCAT KS
Status:      |
Ok           |
Oh:         12345 h |
T-act:       12°C |▼
```

Make settings on the system.



Restart the system to apply the settings.

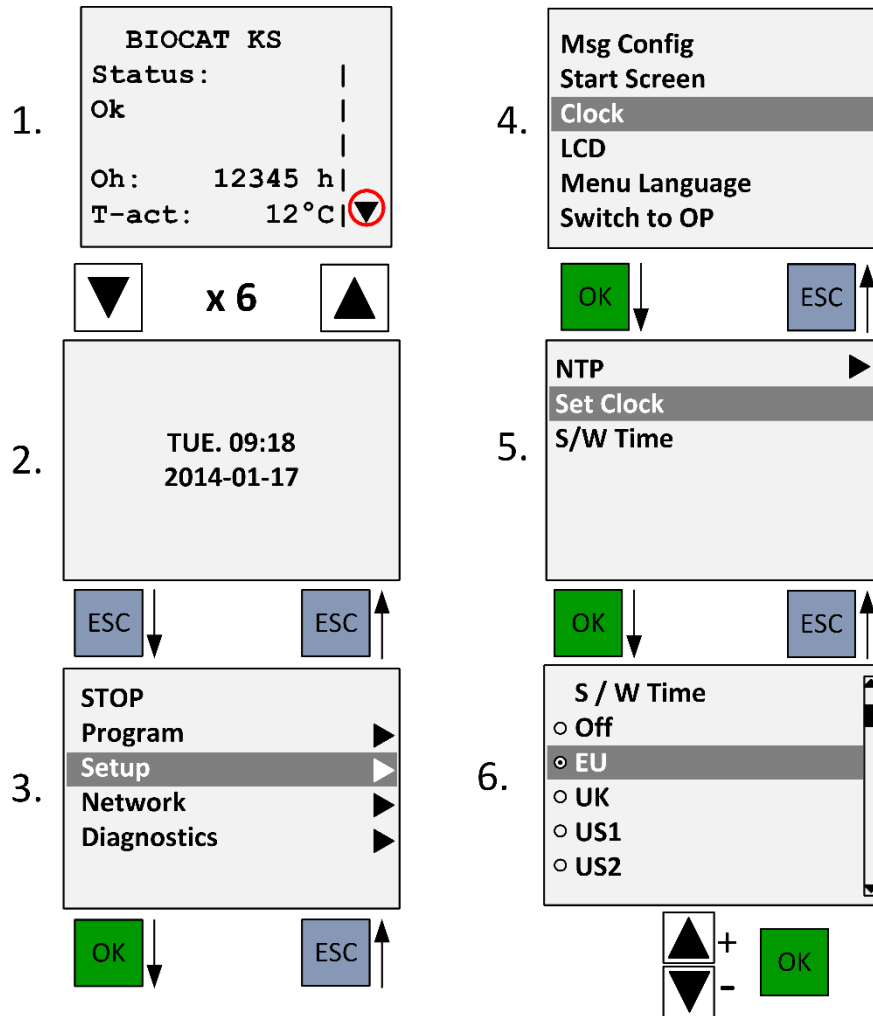
6.3 Set system time and date



The system's time and date must be set (see following page!). Setting the time and date activates the time clock of the controller. The date and time must also be set again when restarting the system after longer power failures (longer than 20 days)!

If the clock is not activated, emergency operation is automatically activated, and thermal disinfection is performed every 96 h (= 4 days)!

6.3.1 Setting summer/winter time

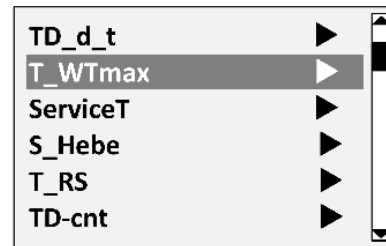
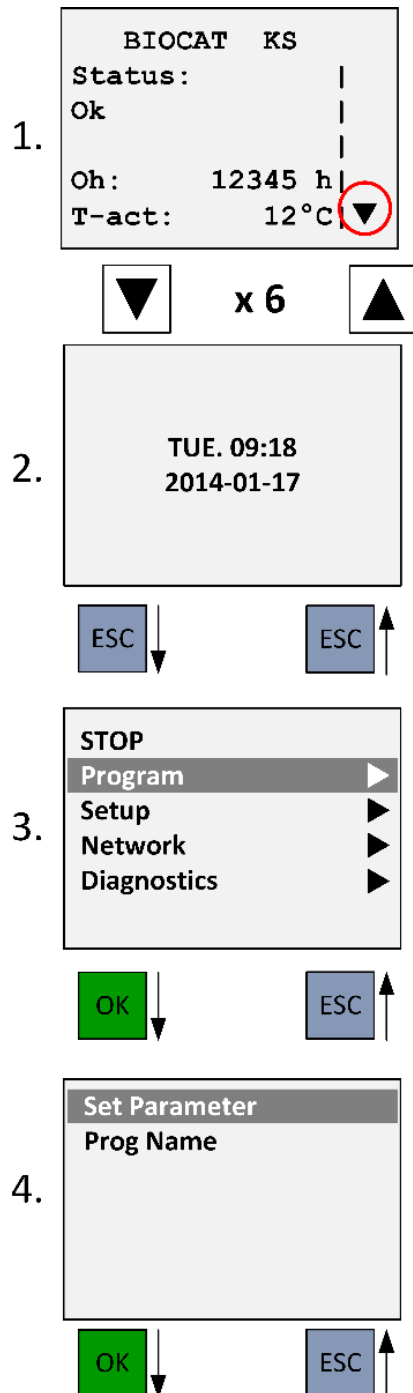


Summer/winter time:

OFF: current time is adopted

EU/UK: automatic summer/winter time

6.4 Setting the device parameters (OPTIONAL)



TD_d_t:

Time of thermal disinfection

Langua_EN:

If activated, the language changes to English.

T_WTmax:

Maximum cold water temperature

ServiceT:

Reset service timer

S_Hebe:

Incorporation of lifting equipment

T_RS:

Maximum backflush temperature

Initialzeit:

Adjust the time between the start-up and the initial-Backflush

TD-cnt:

Counter thermal disinfection

Log_Int:

Adjust logging rate (sample rate).
Ineffective if Log_Trg is not active.

Log_Trg:

If activated, a higher sample rate of the datalog is possible.

StandAlone:

On: Plant executes TD according to "TD_d_t".
Off: Plant executes TD after release (NI1) via network.

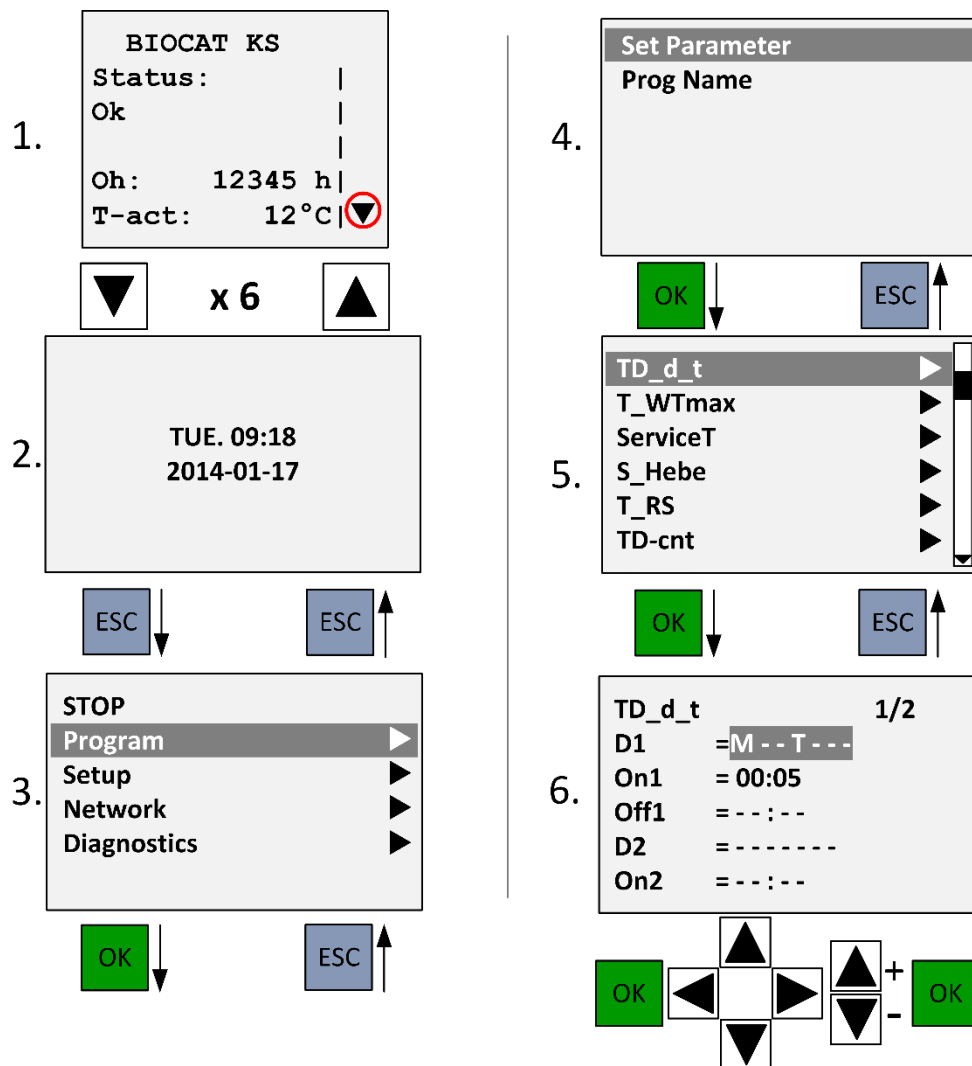
Exit module level:

Restart the system (switch off → wait 10 seconds → switch on).

6.5 Setting the time of thermal disinfection (TD) (OPTIONAL)



The default setting for the TD start time is Monday and Thursday at 00:05. If a change in the time of thermal disinfection is necessary for plant-specific reasons, the parameterisation must be carried out as follows



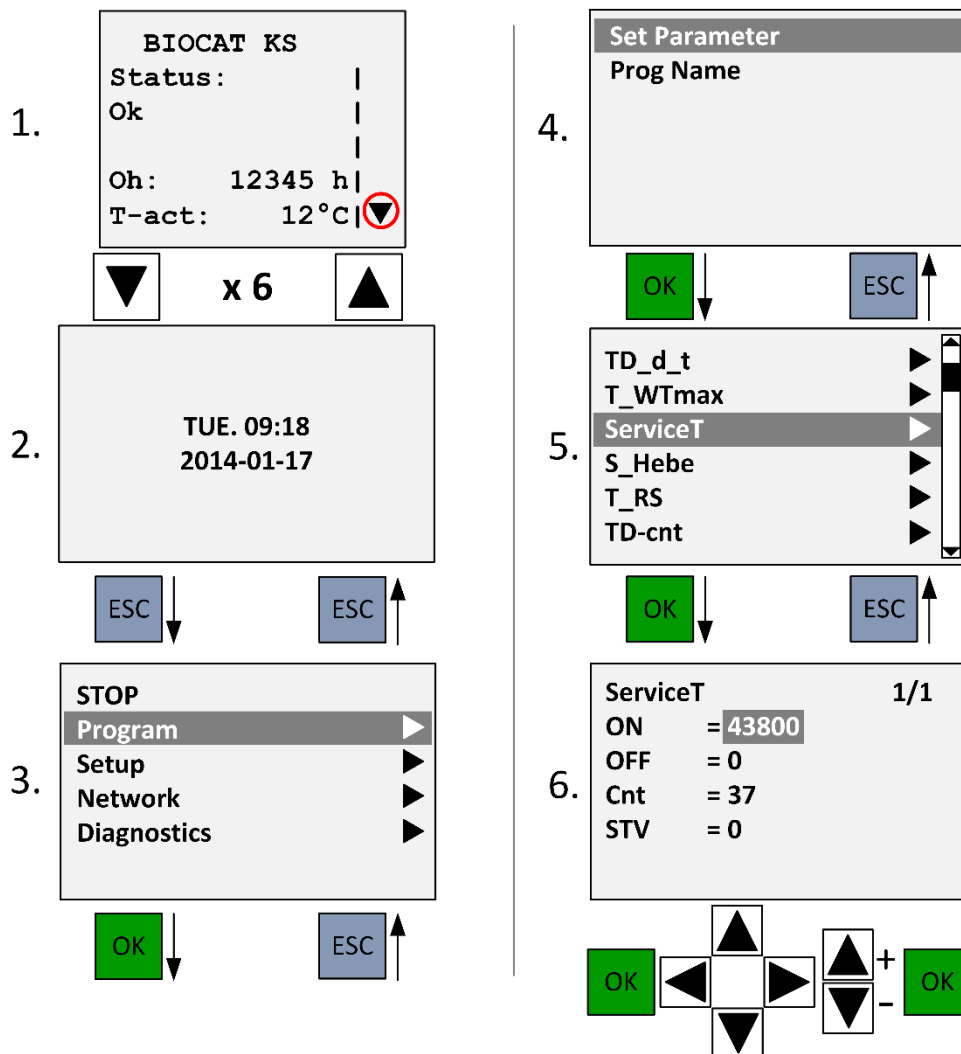
Exit module level:

Restart the system (switch off → wait 10 seconds → switch on).

6.6 Changing the service timer (OPTIONAL)



A service interval of 43.800 h (= 5 years) is preset at the factory.
If a change of the service interval is necessary for plant-specific reasons or if the operating hours counter value must be changed, the parameterisation must be carried out as follows.



Exit module level:

Restart the system (switch off → wait 10 seconds → switch on).

6.7 Triggering manual thermal disinfection (TD)



For hygienic reasons and to check the proper function, a thermal disinfection must be triggered at each initial start-up!

1.

```
BIOCAT KS
Status:      |
Ok           |
Oh:         12345 h|
T-act:       12°C|▼
```

 +  5 Sek.

2.

```
BIOCAT KS
Hygiene-prog.: |
              |
TD active!     |
T-act:         20°C|
t-hold:         0s|▼
```

Only possible in WT mode.

7 BMS signalling contact (optional)



The device has a 2-pole signal input with an enclosed chassis connector and cable plug, as well as a potential-free fault signal contact, which can be connected by means of a 4-pole chassis connector attached to the control housing, 4-pole chassis connector and cable socket attached to the control housing, thus enabling integration into the central control system.

max. load:

Voltage: 0...24V AC/DC

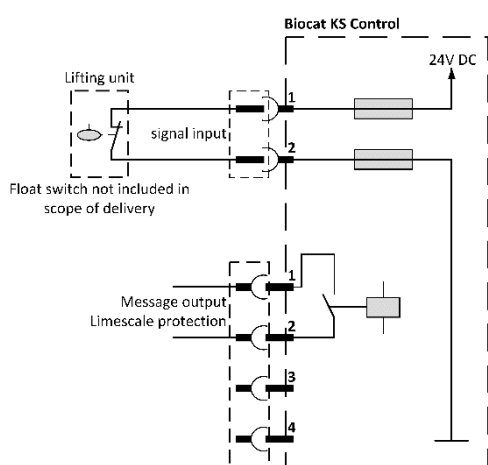
Current: max. 1 A

Switching states:

The device runs error-free	Contact	closed
Error	Contact	open
Service needed	Contact	open
Device de-energized/switched off	Contact	open

Lifting system:

Lifting device runs error free	Contact	closed
Error/Full	Contact	open



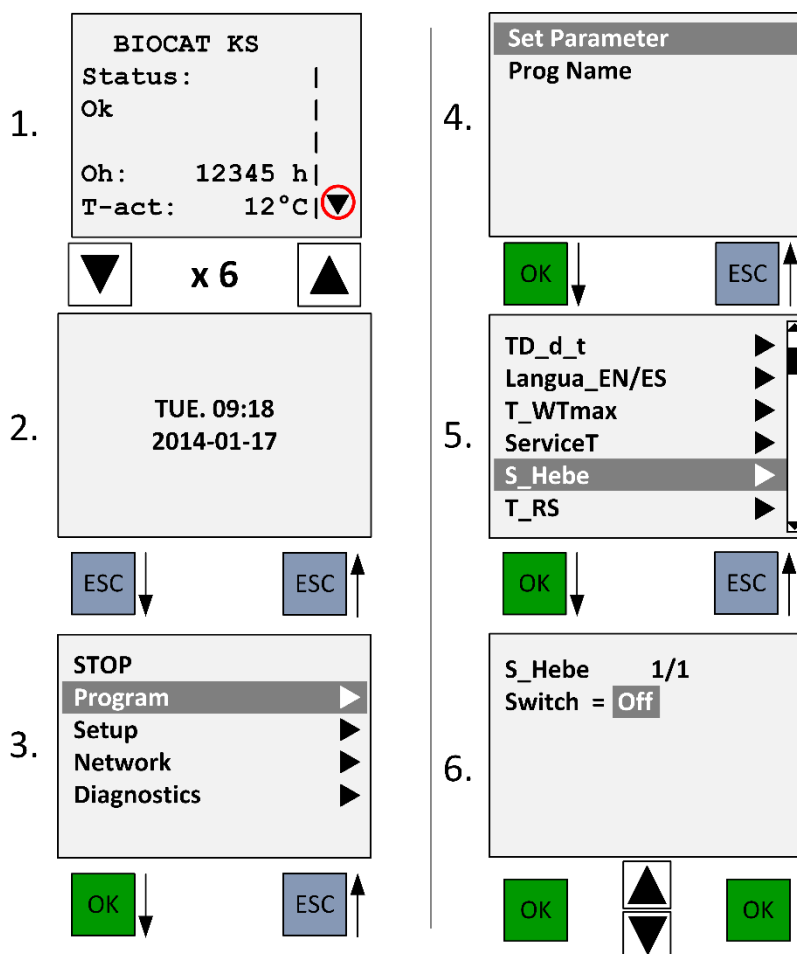
Emergency stop float switch must be designed as NC contact (normal position: closed).



The connection of the signal contact is not mandatory for the function of the limescale protection system!



If the signal contact of a lifting unit is connected, the software must be enabled by changing the switch S_Hebe as described below.
(With connected signal contact "ON". If the signal input of the lifting station is not connected "OFF") The lifting station input is ignored if the switch is set to "OFF".



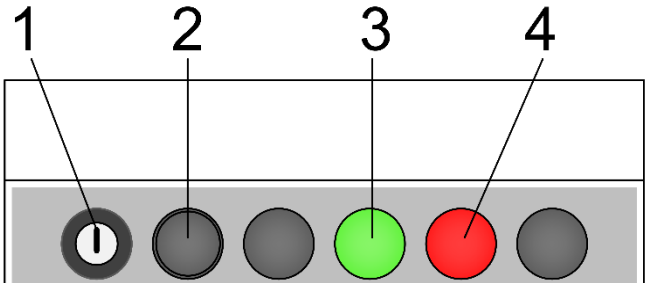
Exit module level:

Restart the limescale protection system by switching it off and then on again 10 sec. later.

8 Operating states and displays

The displays and signaling of the operating states, maintenance requirements as well as fault messages are carried out via the following elements:

8.1 Display BIOCAT



- 1 Key switch
- 2 "Alarm off" button
- 3 Indicator lamp green: Operation
- 4 Indicator lamp red: Fault

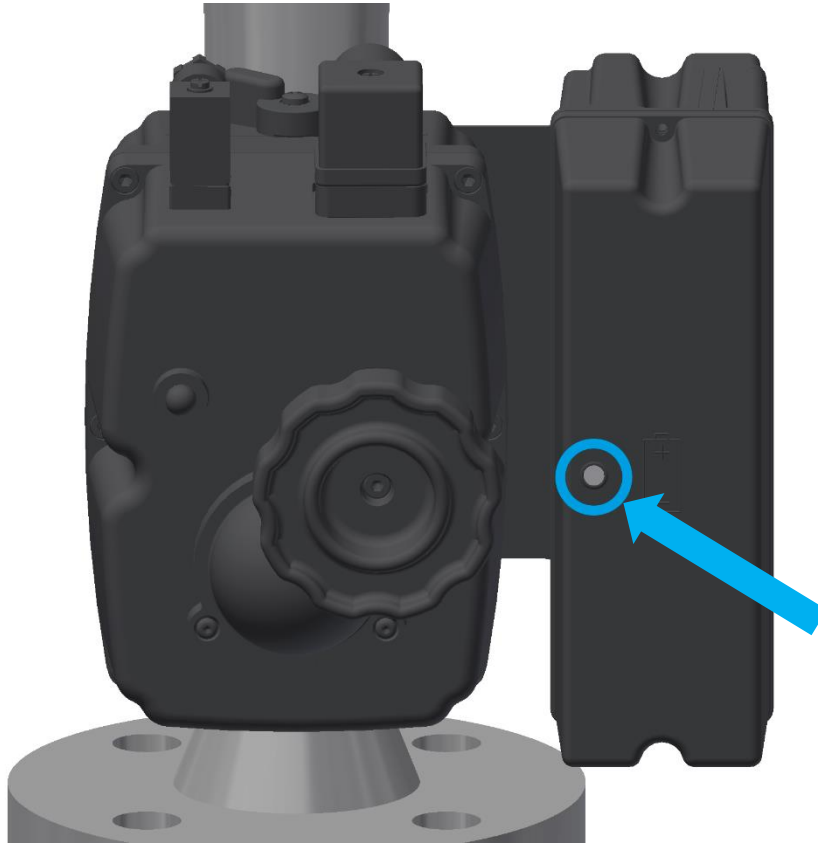
	Operating status light (green)
	Service/error light (red)

Legend:	
	Light switched off
	Light flashes slowly (approx. every 3 sec.)
	Light flashes quickly (approx. 1 time per sec.)
BIOCAT KS Status: Ok Oh: 12345 h T-act: 12°C ▼	Display
	Audible alarm signal: No alarm signal sounds during proper water treatment
	Signal contact: Is integrated into central control technology (CCT)

8.2 Display FailSafe Pack

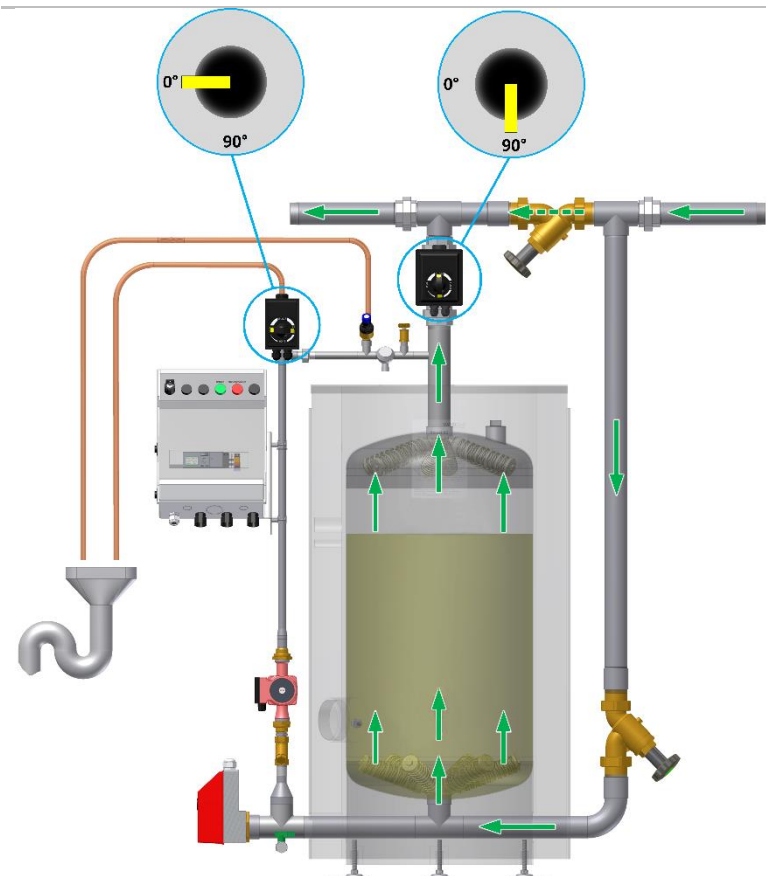
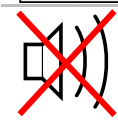
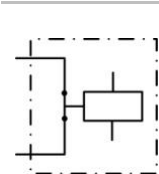
The actuators of BIOCAT KS 8000, KS 11000, KS 14000, and BIOCAT KS 3,5D or KS 5D are equipped with FailSafe-Packs to ensure the safe closing of the actuators in case of a power failure.

Depending on the status, the LED on the FailSafe pack lights up in a different colour.

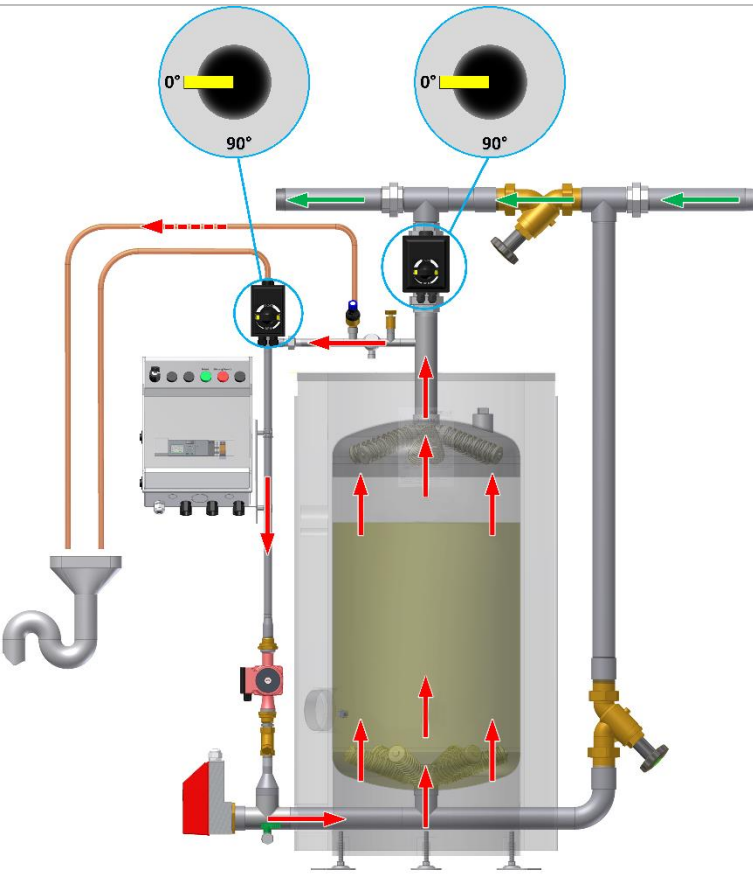
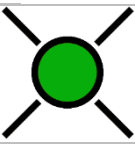


Legend:		
	Operation (green)	Mains voltage is present, proper function
	Batteries low (yellow)	Battery should be changed
	Battery error (red)	Batteries empty, weak or not present
	FailSafe active (blue)	Actuator is controlled by battery power
	LED off	No mains voltage, actuator closed

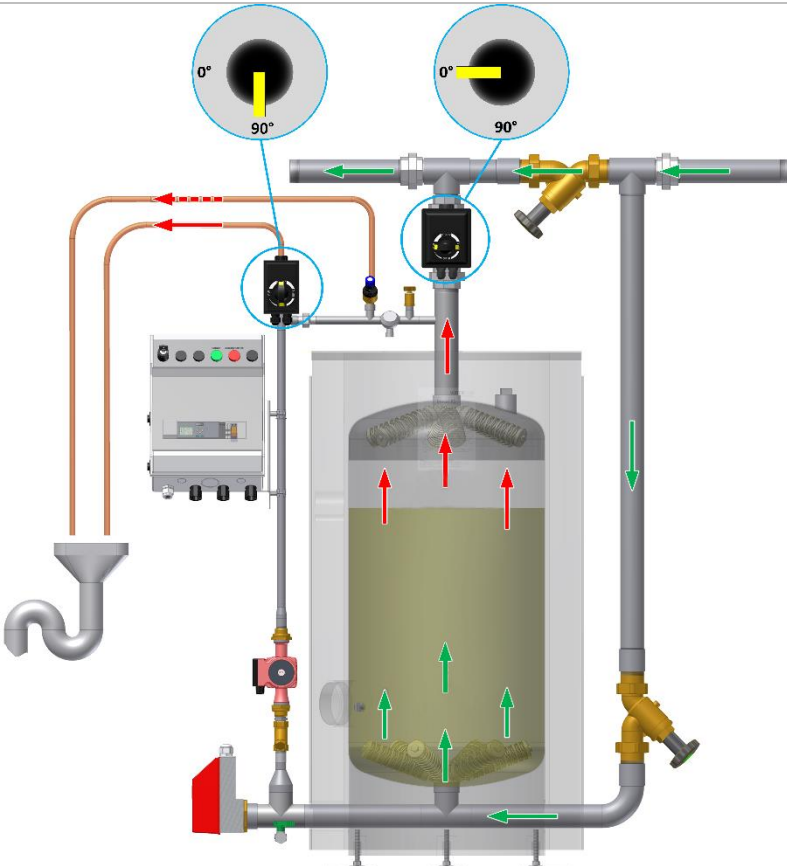
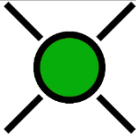
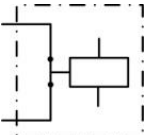
8.3 Water treatment WT

		The water is led downwards via the piping through the backflow preventer during water treatment. The container with the catalyst granulate is flowed through evenly from bottom to top. The treated water enters the downstream installation through the 2-way ball valve.	
		on	
		off	
BIOCAT KS Status: Ok Oh: 12345 h T-act: 12°C ▼		Display	
		off	
		closed	

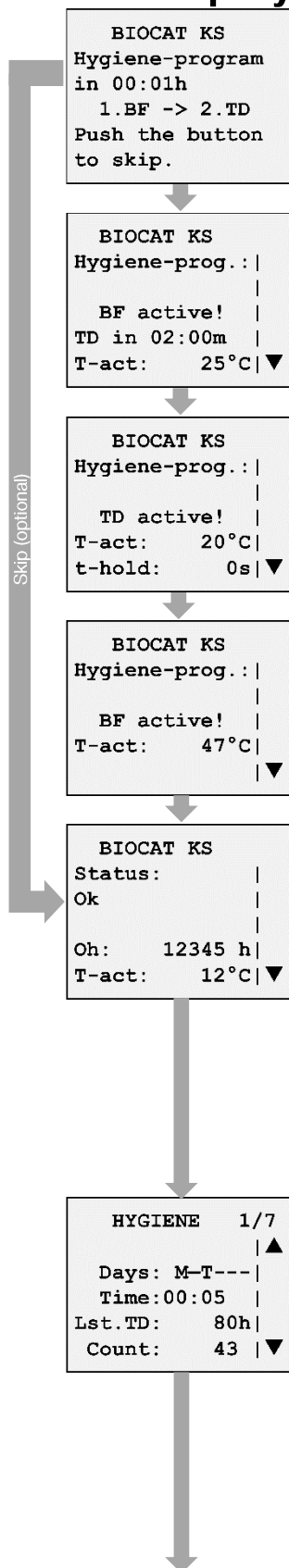
8.4 Thermal disinfection TD

	During thermal disinfection, the water supply is ensured via a bypass of the overflow valve. The main ball valve is in the shut-off position. The water is heated by an electric heating rod and pumped into the tank by the charging pump. (Heating takes place under pressure!) Heating temperature: 75 °C Total duration of disinfection: approx. 3-5 h (depending on tank size).
	Flashes slowly (approx. every 5 seconds)
	off
BIOCAT KS Hygiene-prog.: TD active! T-act: 20°C t-hold: 0s ▼	Display
	off

8.5 Backflushing BF

		After thermal disinfection has been completed, the backwash line is opened via the small 2-way ball valve. A partial flow rinses the hot water from the bottom to the top of the tank. Flushing volume flow: approx. 40 l/min (depending on line pressure) Flushing time: approx. 5 min. (depending on line pressure).  In the event of a power failure during backflush operation, the flushing flow is automatically interrupted by the integrated fail-safe module of the ball valve actuator.	
		Flashes slowly (approx. every 2.5 seconds)	
		off	
BIOCAT KS Hygiene-prog.: BF active! TD in 02:00m T-act: 25°C ▼ BIOCAT KS Hygiene-prog.: BF active! T-act: 47°C ▼		Display: 1. BF on restart before TD. 2. BF after TD.	
		off	
		closed	

8.6 Display



Switch on Commissioning- Home page	Hygiene program starts in 1 min -> 1st RS, 2nd TD Press button to skip. => RS active!
BF active	Backwashing active -> Thermal disinfection starts in 2 min
T-act	Current water temperature
TD active	Thermal disinfection active
T-act	Current water temperature
t-hold	Holding time at T-is $\geq$ T-min (70°)
	Backwashing until the set target cold water temperature is reached (factory setting: $\leq 25^\circ$)
Standard Operating- Display in WT mode	
Bh	Operating hours since initial start-up or since last granulate change (Since all equipment is tested before delivery, the counter may not start at 0).
T-act	Current temperature at the 1st temperature sensor
Days	Days on which thermal disinfection is performed. z.B.: M - - T - - - Monday, Thursday (Factory setting: Mon and Thu)
Time	Start time of thermal disinfection. (Factory setting: 00:05 h)
Lst. TD	Time since last successfully completed thermal disinfection in hours.
Count	Counts the number of successfully completed thermal disinfections.

```

HYGIENE 2/7
TD-TEMPERATURE |▲
T-min: 70°C |
CONTROLLER |
T-off: 75°C |
Hyst.: -5°C |▼

```

```

HYGIENE 3/7
|▲
Number of TDs |
43x |
Last TD was |
80h ago |▼

```

```

TIMEOUTS 4/7
|▲
BV-pos. 60s |
TD-heat 11700s |
TD-hold 3600s |
Backfl. 360s |▼

```

```

TEMPERATURES 5/7
|▲
T-MAX-WT:
35°C |
T-ACTUAL:
25°C |▼

```

```

HYGIENE 6/7
|▲
TD-DURATION
is 1200s |
BF-DURATION
is 0s |▼

```

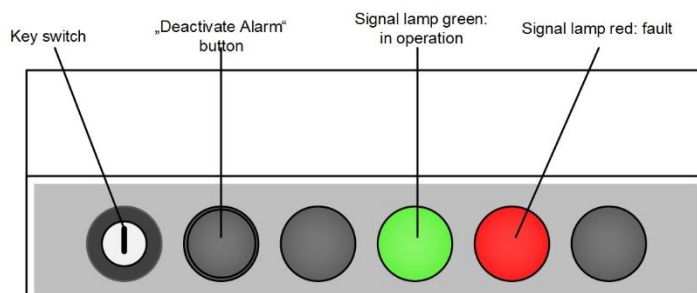
```

POWER GRID 7/7
0->I 4x |▲
last 84h |
-----
SOFTWARE: DE,EN
KSL8_1.5_8000

```

T-min	Limit value above which the heating switches on again during TD.
T-off	Limit value at which the heating switches off during TD.
Hyst.	Difference between switch-on and switch-off temperature.
Number of TDs	Counts the number of successfully completed thermal disinfections.
Last TD was ... ago	Time since last successfully completed thermal disinfection in hours.
BV-Pos.	Maximum time to reach the target position of the respective ball valve.
TD-heat	Maximum time to reach the holding temperature.
TD-hold	Time period during which the temperature is kept at 70-80°C.
Backfl.	Maximum time to cool down from the holding temperature to the cold water temperature.
T-MAX-WT	Maximum cold water temperature that may be reached in the water treatment.
T-ACTUAL	Current temperature in the tank.
TD-DURATION	Duration of the last thermal disinfection or duration of the currently running disinfection.
BF-DURATION	Duration of the last backwash or duration of the currently running backwash.
0->I	Number of times the system was restarted.
last	Time since the last restart.
Software	Available languages.

9 Warning and error messages



BIOCAT	Display warning				Display error	
Mode	WT	TD	BF	Status	Error mode	Status
Operation (green)				On / Flushing		Off
Error (red)				On		On
Display						
Speaker						On
Reporting contact						Open
	Operation and limescale protection active to a limited extent.					Limescale protection inactive!

In the event of functional and operational malfunctions, the controller records both the operating mode affected (WT, TD, RS) and the components of the lime protection system affected by the malfunction (e.g. ball valve KH1, etc.) and stores them in an error log.

The output of the errors takes place via the message lamps and an acoustic alarm, and via the display. The query of the error messages or the error log occurs as stated below.

9.1 Reading out error messages

The error log can be displayed using the up arrow key and the down arrow key.

```
      BIOCAT KS
Status:      |
Error!       |
             |
Oh:    12345 h|
T-act:    12°C|▼
```



```
E01/Mi 01:15 |▲
on 2016-06-01 |
             |
WT-Error:    |
Ball valve   |
position?    |▼
```



```
E03/Mi 01:15 |▲
on 2016-06-01 |
             |
BF-Error:    |
Ball valve   |
position?    |▼
```



```
E08/Mi 01:15 |▲
On 2016-06-01 |
             |
BF-Error:    |
Lifting unit |
error!       |▼
```



Switch off / reset alarm:

- The "Alarm off" button can switch off the alarm signal. The alarm signal will come back after 48h (= 2 days) if the error is not corrected.
- The alarm can be deactivated permanently (until the next initialisation) by holding down the "Alarm off" button for 10 seconds. Three short "peep-peep-peep" sounds confirm successful deactivation.

9.2 Warning messages

9.2.1 Warning E20 - Date and time setting missing

The warning occurs if the system time and date of the LOGO! controller are not set.
The weekly timer for the user-differentiated TD settings only works if the clock is set.
The limescale protection system automatically starts thermal disinfection every 96 h.

Display	E20/-- --:-- ▲ EMERGENCY OPERATION: Adjust time and date! I-TD 96h ▼
---------	---

9.2.2 Warning E50 - CAT change due

The warning occurs as soon as the service timer reaches the value 43,800 h (= 5 years).
The catalyst granulate must be replaced by WATERCryst customer service!

Display	E50/Mi 01:15 ▲ On 2016-06-01 CAT-Service necessary! Contact servicehotline ▼
---------	--

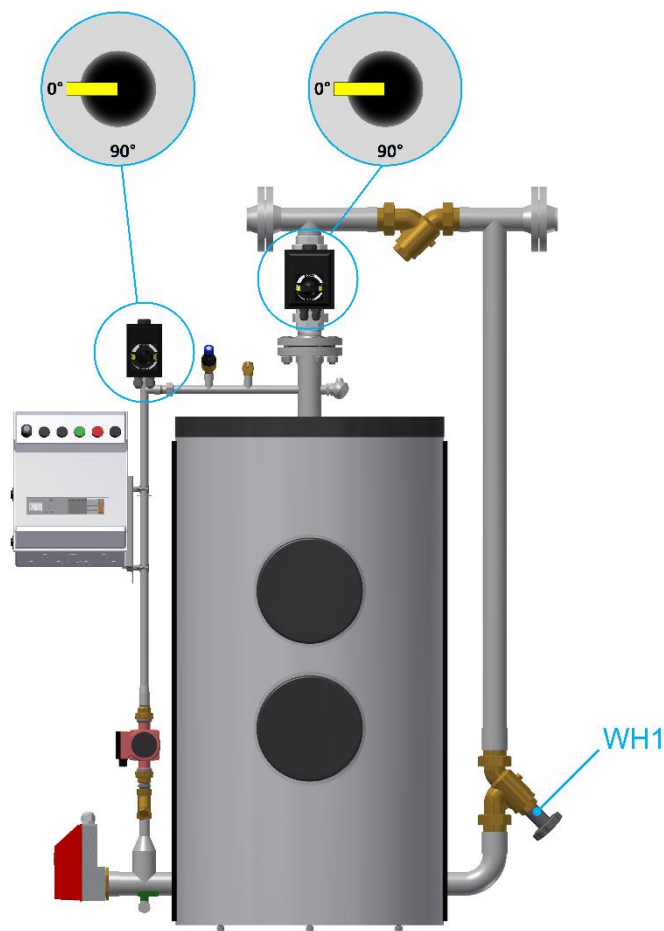
9.3 Error messages

9.3.1 General notes



In the event of faults and malfunctions that cannot be rectified immediately, the system must be taken out of service.

- Disconnect the device from the supply voltage.
- In the event of a power failure, both ball valves automatically move to their respective shut-off position with the aid of the battery packs.
- Close the angle seat valve (WH1).



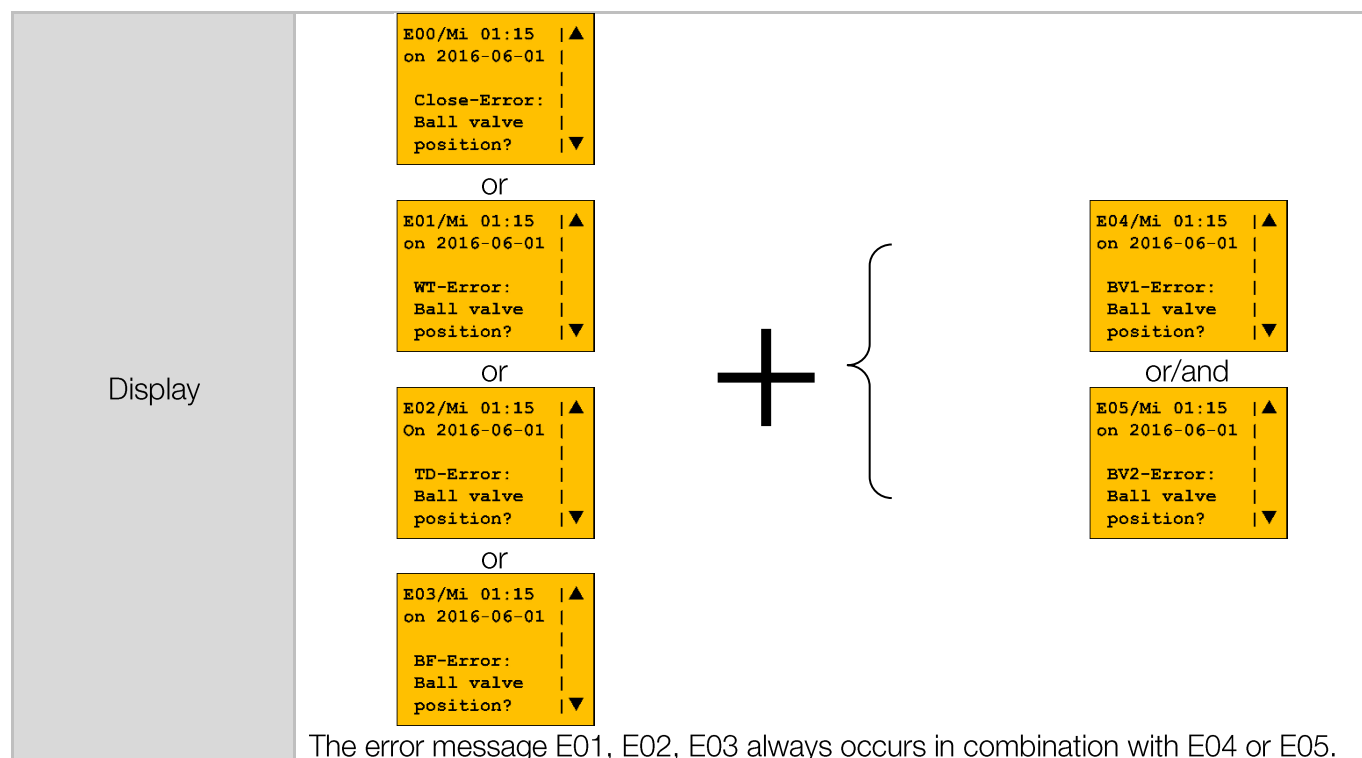
The device must be protected against being put into operation and marked as "out of service".

The water supply to the consumers is ensured via the bypass.

The limescale protection effect is not guaranteed for the period when the device is out of operation.

9.3.2 Error E00 - E05 – Positioning ball valves

The controller does not receive any feedback from the position detection of the ball valve drive KH1 or KH2. The error message is output in combination with E04 "KH1 error" or E05 "KH2 error" and serves as additional information in which operating state the error occurred.



Possible causes

- Ball valve does not move
- Batteries FailSafe defective
- Wiring between control and drive defective
- Cam switch for position detection adjusted or defective
- Ball valve drive defective
- LOGO! control input/output defective

Measures / Review

- Check if there is another error
- Checking the function of the indicated drive (e.g. by manual backwashing)
- If position change does not occur, check the ball valve (jamming, LED of the battery pack).
- Checking the wiring between the drive and the controls
- Is the actuating lever correctly engaged in AUTO mode?
- Replace drive if necessary
- LOGO! input defective (continuously off or continuously on)
- LOGO! output defective
- If necessary, exchange LOGO!



Display of the LED in case of error E00 - E05		
Battery weak (yellow)		Warning => Batteries low
Battery error (red)		Valve locked => Replace batteries
Operation (green)		Technical problem => Contact customer service
Battery change => page 55		

9.3.3 Error E06 - Heating time exceeded at TD

The PT100 temperature sensor detects that the disinfection of at least 70°C could not be reached!

Display	E06/Mi 01:15 ▲ on 2016-06-01 TD-Error: Heating-time exceeded! ▼
---------	--

Possible causes

- Dry run
- Heating circuit defective
 - Phase failed
 - Contactor defective
 - Heating defective
 - Pump defective
 - Wiring error pump or heater
- Temperature circuit
 - Temperature sensor defective
 - Faulty PT100
- BV2 faulty
 - BV2 in TD pos. leaking (water leakage via BF line)
 - BV2 Assembly error (drive pos does not match BV pos)
 - incorrect position of a ball valve
- BV1 faulty
 - BV2 Mounting error (drive pos does not match BV pos)
 - incorrect position of a ball valve

Measures / Review

- Check if there is another error
- Check power supply
- Control of inputs in the input menu
- Check overtemperature protection heating
- Check heater resistance
- Check temperature switch
- Check pump
- Check wiring
- Check ball valve positions
- Replace temperature switch if necessary
- If necessary, replace LOGO! controller

9.3.4 Error E07 - Backwash failed

The temperature element PT100 detects during backwashing (15/45 min) that the temperature could not be lowered below 25°C!

Display	E07/Mi 01:15 ▲ On 2016-06-01 BF-Error: Temperature is not reached! ▼
---------	---

Possible causes

- No water pressure
- Temperature sensor defective
- LOGO! AM2 Module defective
- LOGO! output defective
- Cold water temperature too high
- Angle seat valve closed
- KH2 defective

Measures / Review

- Check if there is another error
- Checking the water supply
- Check correct drainage via the backwash line
- Check ball valve positions
- Control of inputs in the input menu
- Check wiring
- Check temperature switch
- Check control
- Replace temperature switch if necessary
- If necessary, replace LOGO! Controller

BIOCAT	Timeout to reach temperature ($\leq 25^{\circ}\text{C}$)
KS 8000	6 Minutes
KS 1100	8 Minutes
KS 1400	9 Minutes
KS 3.5D	18 Minutes
KS 5D	21 Minutes

9.3.5 Error E08 - Backwashing not possible, lifting unit!

Backwashing cannot be performed because the signal contact does not output a signal!

Display	E08/Mi 01:15 ▲ On 2016-06-01 BF-Error: Lifting unit error! ▼
---------	--

Possible causes

- Lifting unit malfunction
- Signal input of the lifting unit not connected
- Fuses of the signal input tripped

Measures / Review

- Check message input
- Checking the lifting unit

10 Decommissioning

10.1 Planned decommissioning

10.1.1 Important notes on decommissioning

Although drinking water is provided in excellent quality by water suppliers in compliance with the Drinking Water Ordinance, the use-dependent and technical framework conditions in the building installation can have an undesirable negative influence on the drinking water quality, so that in the worst case it no longer complies with the EU Drinking Water Directive EU 2020/2184 or the national regulations derived from it.

An essential aspect of hygienically safe operation is that the water in the domestic installation is regularly replaced and thus renewed through consumption and use. According to VDI 6023, the water in the installation and the appliances must be replaced after stagnation of more than 72 hours (3 days).

If this regular water exchange is not ensured, the drinking water installation and the installed technical apparatus (filter, water treatment, drinking water heating, circulation circuits) must be properly decommissioned.

The following points must be observed for the BIOCAT limescale protection system in the event of reduced water consumption, interruptions to operation or longer shutdowns of the domestic installation.

Case A: Reduced consumption and/or low utilisation rate

BIOCAT limescale protection systems can still be operated intrinsically safe.

BIOCAT limescale protection systems are automatically thermally disinfected at least twice a week and then completely rinsed again with cold water, thus guaranteeing the hygienic intrinsic safety of the BIOCAT limescale protection system, even in the phase of reduced water consumption or an interruption in operation - provided that the power and water supply (line pressure) are available without restriction. If the rinsing water is disposed of by a lifting unit, the operator must ensure the proper operation of the lifting unit.

Measures that the operator must take for the hygienically safe operation of your domestic installation in phases of reduced water consumption in accordance with the aaRdT remain unaffected by this and must be carried out properly.

Case B: Energy and water supply can be ensured during the interruption of operations

As long as energy and water supply with sufficient operating pressure are ensured during an interruption of operation or longer shutdown of the system, the BIOCAT limescale protection system can and should remain in operation. The procedure is then identical to case A.

Case C:

No energy and/or water supply are available during operation and/or an interruption of operation and/or a longer standstill period.

C1 Short-term power failure less than 3 days

BIOCAT limescale protection systems are automatically disconnected from the mains supply of the drinking water installation in the event of a power failure thanks to the integrated fail-safe function and the water supply is ensured via a bypass function.

As soon as power is available again, the BIOCAT limescale protection system goes back into operation after an automatic hygiene rinse followed by thermal disinfection with subsequent rinsing.

C2 Water supply interrupted for less than 72 hours (3 days)

BIOCAT limescale protection systems are automatically thermally disinfected at least twice a week. If the water pressure for rinsing the disinfected devices with cold water is missing, the integrated fail-safe function automatically disconnects the BIOCAT system from the mains supply of the drinking water installation and ensures the water supply via a bypass function. In this case, the system issues an error message.

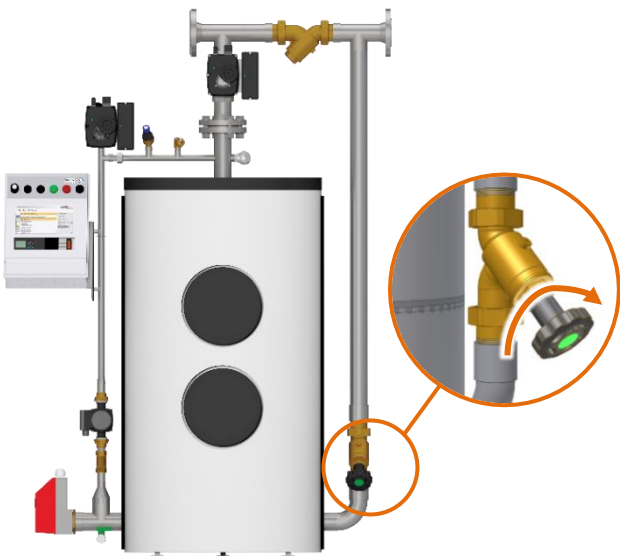
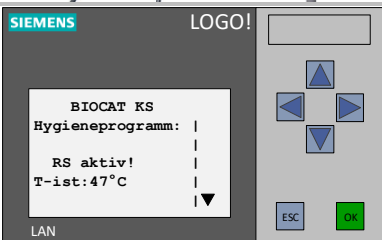
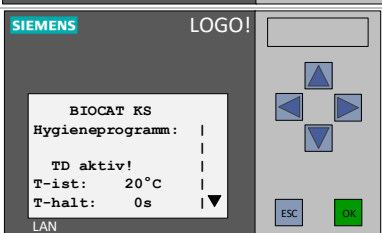
The BIOCAT limescale protection system must be reactivated by the operator as soon as water pressure is available again and the limescale protection function is to be activated. The BIOCAT limescale protection system automatically carries out an (additional) thermal disinfection at a defined (programmed) time after an interruption of operation due to a power failure.

C3 Power failure and/or lack of water supply for 3 days

In case of a planned decommissioning of the house installation without power or water supply, the BIOCAT limescale protection system must be properly decommissioned according to the following instructions in order to minimise the risk of microbial germination. The BIOCAT limescale protection system must be kept closed and under water pressure and stored as cool as possible.

Please contact Watercryst customer service before restarting the unit.

10.1.2 Decommissioning

1.		Close the valve. Water supply is not interrupted.
2.		Disconnect the BIOCAT limescale protection system from the mains.
3.		Wait until all actuators are de-energised. (LED no longer lights up)
4.		Reconnect the BIOCAT limescale protection system.
5.		Backwash mode RS Hygiene programme RS active! ➔ Wait for backwash
6.		Thermal disinfection TD is active.

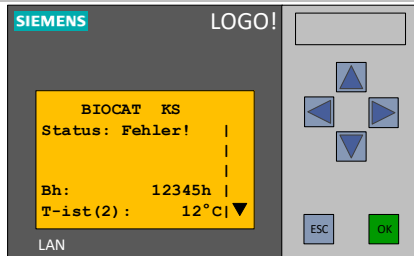
7.

	Heating time
KS 8000	4h 21min
KS 11000	4h 23min
KS 14000	5h 39min
KS 3.5D	7h 03min
KS 5D	7h 51min

The heating time varies depending on the size of the appliance.

The unit can be left for the duration of the heating.

8.



After the heating process has been completed, the system reports an error because backwashing is no longer possible (shut-off valve see 8.).

Error details can be displayed by pressing the lower cursor key.



The thermal disinfection of the decommissioning is successfully completed with an error E07.

9.



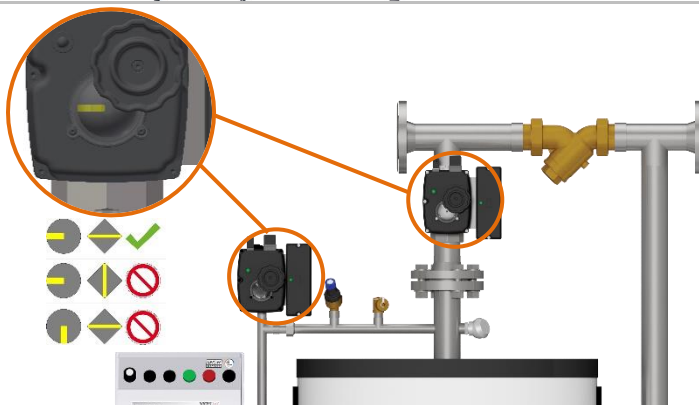
If the display of the system shows anything other than error E07, the Watercryst customer service must be informed. In this case, decommissioning has not been carried out properly.

10.



Disconnect the BIOCART limescale protection system from the mains.

11.



The yellow markings of the two ball valves must be in a horizontal position.



When the valve and the two ball valves are closed, the BIOCART system is in bypass mode and is properly shut down.

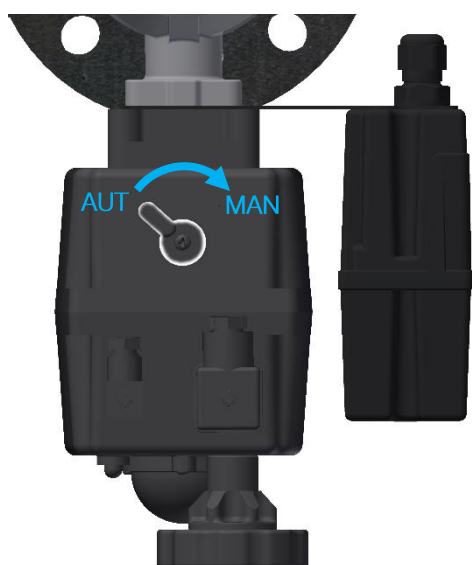
10.2 Manual shutdown in case of defective ball valve actuator

If a malfunction occurs at the ball valve drive after a power failure in backwash operation, the flushing flow is not interrupted automatically but must be interrupted by manually adjusting KH2. In addition, a bypass must be created by adjusting KH1. The system must be disconnected from the power supply by setting the main switch to the "0" position to adjust the ball valves. In addition, the ball valves must be switched to manual operation.

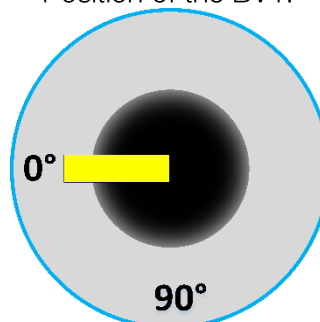


Manual adjustment of the ball valve drives may only be carried out if the fail-safe function is faulty and the main switch is switched off!

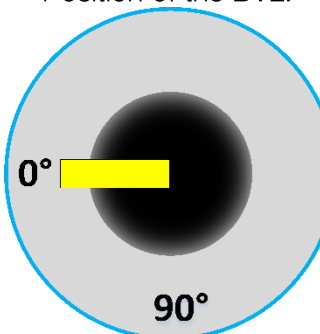
1.



Position of the BV1:



Position of the BV2:

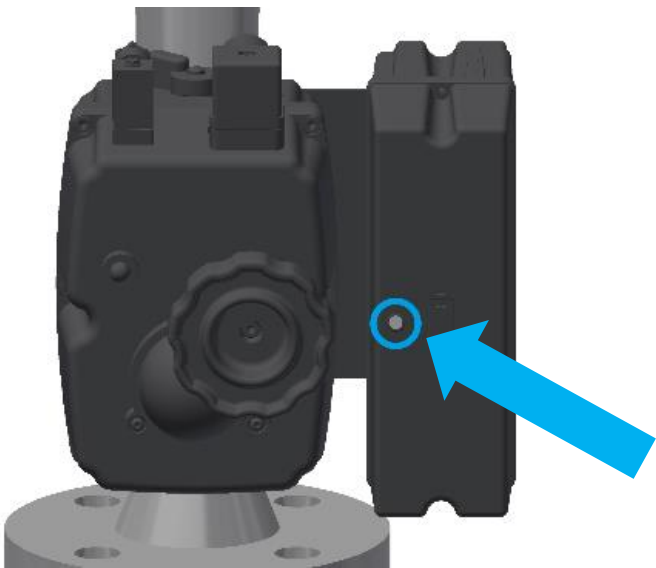


2.



11 Battery change FailSafe Pack

A battery-operated FailSafe-Pack ensures the FailSafe function of the actuators on the BIOCAT limescale protection systems. These batteries must be replaced when the LED on the FailSafe-Pack indicates the following.



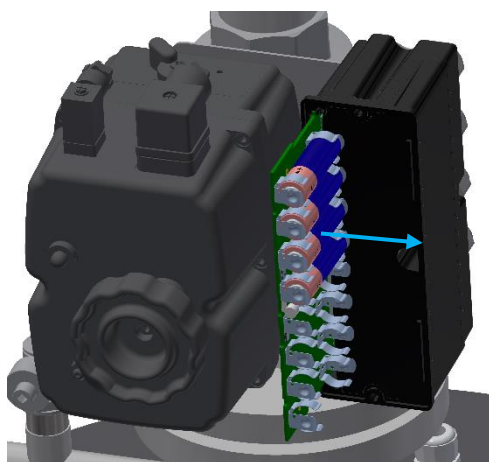
Indication of the LED when the battery is about to be changed		
Battery weak (yellow)		Warning => Batteries low
Battery error (red)		Valve locked => Replace batteries



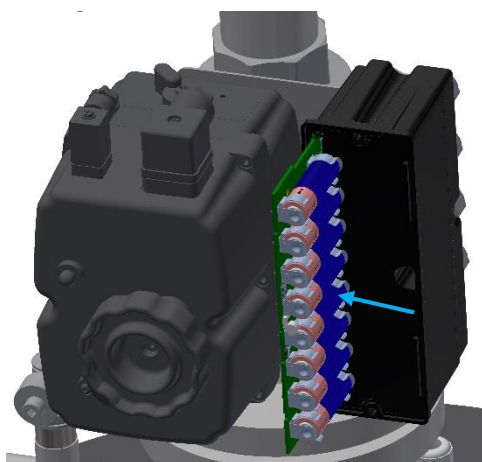
1. Switch off the BIOCAT limescale protection system or disconnect it from the mains voltage



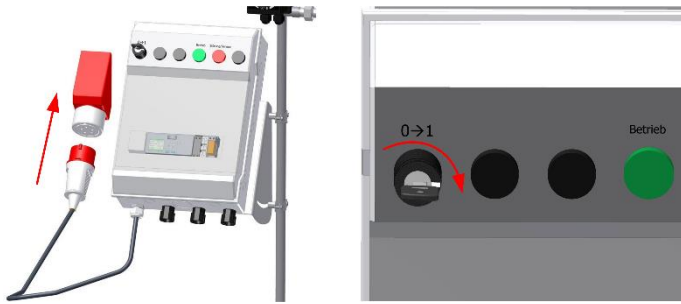
2. Remove the front cover of the FailSafe pack



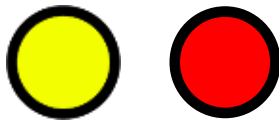
3. Take out 8 x Varta lithium batteries



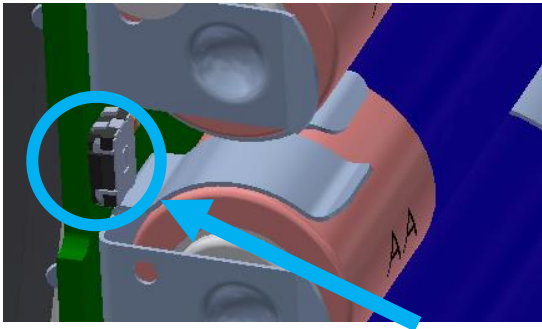
4. insert new batteries



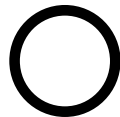
5. Switch on BLOCAT



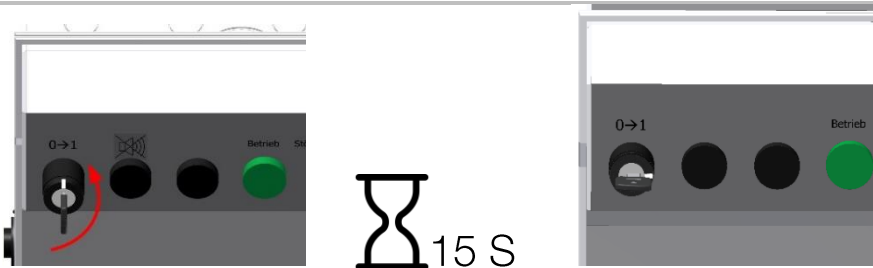
6. The LED of the FailSafe-Pack lights up in the same colour as before the system was switched off (yellow or red)



7. Press and hold the button for 3 seconds to start the commissioning of the FailSafe pack



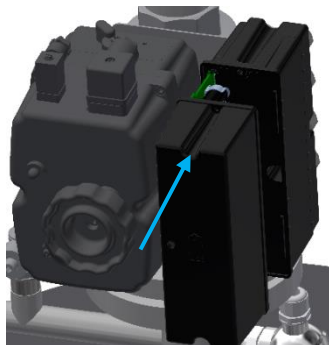
8. LED on the FailSafe pack lights up white



9. Switch off the BIOCAT with the key switch.
10. Restart after 15 seconds waiting time



11. LED on the FailSafe pack
now lights up green



12. Mount the cover again



13. The FailSafe pack is ready for operation

12 Maintenance

In addition to the usual regular inspections of technical equipment in accordance with the regulations and standards applicable to the field of application, the catalyst granulate of BIOCAT limescale protection systems must be replaced every 5 years. If the water is permanently chemically disinfected, the service life of the WATERCryst catalyst granulate is reduced to 3 years.

WATERCryst offers a corresponding service kit for this purpose.

Wear parts such as RV valves (angle seat valve, excess flow valve) and seals must be replaced after 10 years.



Danger of slipping!
Due to escaping granulate - Put up information sign.



Danger of scalding!
Due to escaping hot water - wait until system parts have cooled down to room temperature and relieve the system from line pressure.



Switch off the device and secure it with a padlock before switching it on again.



Before maintenance work, the **maintenance area must be secured** to ensure that no unauthorised persons can access the unit!

12.1 Maintenance documentation



Note!

Commissioning and maintenance work must be noted in the maintenance record!

WATERCryst [®] Kundendienst	
Betriebshandbuch / Wartungsnachweis	
Projektnummer: 7864	Biocat KS 10D II Anschlüsse: DN 10 (2" Flansche) Sensortyp: Pt 10 Sensortiefe: 1-8 m Flussleistung: 0-10 m³/h Sensortemperatur: 0-100 °C TÜV-Zertifikat: m30, 30 °C TÜV-Zertifikat: m30, 30 °C NOMINALENOM: 400 V (50 Hz) (IP 65) Lebensdauer: max. 10 Jahre SCHÜTZKATEGORIE: I WaterCryst A-C 175 Kunden in Trier N302 in EU CE Sicherheitsmerkmale / Sonderanforderungen: 2012190000001 Originalkenn CA-Service alle 5 Jahre
Einbaudatum: 14.04.2015	
Installationsfirma: <i>Installateur Master</i>	
Monteur: <i>Klaus Monteur</i>	
Straße: <i>Masterstraße 14</i>	
PLZ / Ort: <i>1234 / Masterstadt</i>	
Tel.: _____	
Bei Fragen oder technischen Problemen wenden Sie sich bitte an unseren Kundendienst (Kontakt siehe Rückseite)	
Rev.: 11013800-0	

Service-ID: 7864	
KS 8000 - 14000, 1.5D - 1.5D	
Zeitpunkt TD: Tag: ☐ Mo ☐ Di ☐ Mi ☐ Do ☐ Fr ☐ Sa ☐ So	
0 Liter	Uhrzeit TD-Start: _____ Uhr
0 Tage	Letzte TD vor: _____ h
Granulatwechsel durchgeführt? ☐ JA ☐ NEIN	
16 m³	Betriebsstunden: _____ h
374 m³	Wärmemasser Zähler Nr.: _____
	Zählerstand: _____ m³
Name: Hans Kundendienst	
Unterschrift: <i>Hans Kundendienst</i>	

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Rev.: 11013800-0



Service

When requesting service, please be sure to quote the BIOCAT serial number from the type plate and the **error code** from the device display!



WATERCryst Wassertechnik GmbH
Elsa-Brandström-Str. 31
DE-42781 Haan
+49 2129 3475 - 204

Branch Austria
Messerschmittweg 26
AT-6175 Kematen in Tirol
+43 5232 20602 - 204
office@watercryst.com, www.watercryst.com



WATERCryst in Denmark
WATERCryst Vandteknik ApS
Birk Centerpark 40 - C/O Innovatorium A/S
DK-7400 Herning
+45 89 88 07 63
denmark@watercryst.com, www.watercryst.dk



WATERCryst partner in Czechia and Slovakia
Duco Tech CZ s.r.o.
Polívkova 583/30
CZ-158 00 Praha 5 - Jinonice
+420 777 733 095
servis@ducotech.cz, www.ducotech.cz



WATERCryst partner in Switzerland
Georg Fischer JRG AG
Hauptstraße 130
CH-4450 Sissach
+41 61 975 23 77
tkd.jrg.ps@georgfischer.com, www.gfps.com

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