

TechnoStar 2000 / 4000

Flow-through - chlorine - electrolysis system



EN₀₁ Operation & Maintenance Instructions

Read these operation and maintenance instructions before start up!

To be held for future reference.

SALT | Use
WATER | Disinfect
LIGHT | Swim

Content

1 General	3
1.1 Introduction	3
1.2 References to intellectual property rights	3
1.3 Details for the operator	3
1.4 Instruction and training course assistance	3
1.5 Example of training course topics	3
Confirmation of the training instruction	4
2 Safety	5
2.1 General	5
2.2 Intended use	5
2.3 Details of signs and symbols	5
2.4 Residual risk	5
2.5 Information signs at the system	5
2.6 Safety tips for the operating personnel	6
2.7 Safety instructions for operating the system	6
2.8 Instructions for special kinds of danger	7
3. Product Description	8
3.1 General	8
3.2 Function	8
3.3 Technical Data	8
4. Transport and Assembly	9
4.1 General	9
4.2 Packaging	9
4.3 Transport	9
4.4 Assembly	9
4.5 Assembling the bypass	10
4.6 Electrical connection	11
5. Operation	12
5.1 Qualifications of the operating personnel	12
5.2 Operating and display elements	12
5.3 Conditions for operating	13
5.4 Start-up	13
5.5 Operating	14
5.6 Disturbances and their rectification	14
6 Maintenance and Servicing	15
6.1 General	15
6.2 Care and inspection	15
6.3 Maintenance	15
6.4 Replacing the Technostar 2000 AT electrolysis cell	15
6.5 Replacing the Technostar 2000 ST / PT electrolysis cell	17
6.6 Replacing the Technostar 4000 AT und 4000 AX electrodes	17
6.7 Acidification of the electrolysis cells	18
6.8 Care instructions for the electrolysis cell	19
7. Disposal	20
7.1 Environmental Protection	20
7.2 Acid and waste containing acid	20
7.3 Final decommissioning	20
8. Appendix	21
9. Spare parts list	21

1 General

1.1 Introduction

This operating manual provides significant assistance in the successful and smooth running of the Technostar 2000 AT, 2000 ST, 2000 PT, 4000 AT and 4000 AX flow-through – chlorine – electrolysis systems, also referred to as system for short in the following text.

The operating manual for the Technostar 2000 AT, 2000 ST and 2000 PT must always be available where the system is located and it has to be read and used by every person who is assigned to working on the system. This includes amongst other things:

- the assembly,
- the servicing and repair work,
- the maintenance (maintenance, care, repair) and/or,
- the transport.

1.2 References to intellectual property rights

This operating manual must be treated confidentially. Only authorised persons should have access to it. It may only be given to third parties with the written consent of Technopool Schwimmbadtechnologie GmbH.

All documents are protected in the sense of the copyright law. It is forbidden to forward on and copy the documents, even in part, as well as to use and communicate their contents, insofar as this is not expressly conceded in writing.

Violations are punishable and incur an obligatory payment of damages. Technopool Schwimmbadtechnologie GmbH reserves all the rights for the practice of industrial property rights.

1.3 Details for the operator

The operating manual is a significant component of the Technostar flow-through – chlorine – electrolysis system. The operator ensures that the service personnel learn these guidelines.

The operating manual is to be supplemented by the operator regarding the operating instructions due to national regulations for Health and Safety at Work and Environmental Protection, including the information on the responsibilities of supervision and obligations to report for the observance of operational specifics, e.g. concerning labour organisations, operational sequences and appointed personnel.

Besides the operating manual and the obligatory regulations for Health and Safety at Work applicable in the country of use as well as in the place of use, the recognised specialist technical regulations for safe and professional work must also be observed.

The operator of the flow-through – chlorine – electrolysis system may not make any changes, attach fittings or make alterations to the construction of the Technostar flow-through – chlorine – electrolysis system that may impair security, without the written consent of Technopool Schwimmbadtechnologie GmbH!

This also applies to the installation and setup of safety devices.

Any replacement parts to be used have to correspond to the technical requirements specified by Technopool Schwimmbadtechnologie GmbH. This is always guaranteed in the case of original spare parts.

Only appoint trained or instructed personnel. Clearly specify the responsibilities of the personnel for operating, servicing and repairing the system.

1.4 Instruction and training course assistance

As a contractor/operator you are obligated to inform and/or instruct the operating personnel about existing provisions of law and accident prevention regulations as well as about existing safety regulations at the plant. In doing so the different technical qualifications have to be taken into account.

The operating personnel must have understood the training and it must be ensured that the training is adhered to.

Only in this way can you ensure that your personnel work in a safety conscious and risk aware manner. This should be controlled on a regular basis. As the contractor/operator you should therefore obtain confirmation of each of the employee's attendance in writing.

On the following pages you will find examples of the training course topics, as well as a main form to copy for the confirmation of attendance.

If the operating personnel still require further training after the system has been delivered to the operator, please contact Technopool Schwimmbadtechnologie GmbH regarding the agreement conditions.

1.5 Example of training course topics

For safety

- Accident prevention regulations
- General legal provisions
- General safety precautions
- Action to be taken in an emergency
- Safety precautions for operating
- How to handle the safety devices with the Technostar flow-through – electrolysis systems
- Safety devices in the field of the Technostar flow-through – chlorine – electrolysis systems
- Definition of symbols and signs

To operate

- How to operate the controls
- Explanation of the operating system for the operating personnel
- Operator's special experiences in handling the Technostar Flow flow-through – chlorine – electrolysis systems
- Elimination of operational disturbances

For maintenance and service instructions

- Cleaning the system
- Exchange of replacement parts

Chapter 1: General

Confirmation of the training instruction

Topic of the training instruction:

Date:

Training instructor:

Training instructor's signature:

No.	Surname	First name	Signature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

2 Safety

2.1 General

The Technostar flow-through – chlorine – electrolysis systems from Technopool Schwimmbadtechnologie GmbH, also referred to hereinafter as systems, are built according to the state-of-the-art technology and recognised technical safety regulations.

Nonetheless dangers may arise for the operator or a third party when using them and/or the adverse effects of the system and other material assets, if they

- – are operated by personnel who are not trained or instructed,
- – are not employed as intended,
- – are not properly serviced or maintained.

2.2 Intended use

The Technostar flow-through – chlorine – electrolysis systems are exclusively intended to produce hypochlorous acid from the salt (NaCl) released in the swimming pool water. For this purpose the salt content of the pool water amounts normally to between 0.02 and 0.5 %.

Permitted additions of salt are added in the pool water in the form of natural brine, brine, seawater, salt granules or with the appropriate salt tablets.

The Technostar flow-through – chlorine – electrolysis systems may only be operated with the accessory equipment that has been provided and authorised by Technopool Schwimmbadtechnologie GmbH.

The data in section 3.3 Technical Data as well as in the original documentation of possible attached supplied products have to be observed and adhered to.

Another or a further use is considered as not being in compliance with the intended use.

The operator of a flow-through – chlorine – electrolysis system is alone responsible for the damages resulting there from. This equally applies to any modifications made to the system.

Observance of the directions described in this operating manual and in the supplied product's documentation concerning safety, how to operate, repair/service the system is also an integral part of its correct employment.

2.3 Details of signs and symbols

The following terms and/or signs are used in this operating manual for references to safety and particularly important information:

Danger!

Advises of direct imminent danger, which would lead to the serious injury of people or fatalities, if the specific instruction were not followed precisely.

Warning!

Advises of possible danger, which would lead to the serious injury of people or fatalities, if the specific instruction were not followed precisely.

Caution!

Advises of possible danger or of uncertain dangerous procedures, which may lead to the injury of people or assets, the system or its surroundings.

All WARNINGS have to be precisely adhered to!

Observe the safety directions specified in each case and conduct yourself in a particularly careful manner in these cases! Pass on all safety instructions to other users, too!

Beside the instructions stated in this operating manual all the general valid regulations for safety and the prevention of accidents have to be respected!

Info!

This refers to special facts; observance of these ensures a safe, proper and efficient handling of the Technostar flow-through – chlorine – electrolysis systems.

All instructions should be fulfilled in the interest of using a flow through rate chlorine electrolysis system as it was intended to be. Pass on all safety instructions to other users, too!

- Work and/or operating steps are characterised by a bullet point. The steps have to be followed in descending order!
- Lists are characterised by a hyphen.

The instructions and symbols directly mounted on the system have to be adhered to, for example warning signs, operating signs, direction of rotation arrows, component markings, etc.

The instructions and symbols directly mounted on the system must not be removed and have to be kept completely legible!

2.4 Residual risk

Even if all safety regulations have been adhered to residual risks still remain when operating the system.

All the people who work on the system have to be aware of these residual risks and obey the instructions, which are there to prevent these residual risks leading to accidents or damages.

Danger!

Electric shock when working on live components! Only certified electricians may carry out work on the electrical fittings. Always switch the system off at the mains when carrying out any work on the electrical equipment of the Technostar flow-through chlorine electrolysis system! Secure the system against being unintentionally switched on again! Set up the warning sign!

2.5 Information signs at the system

The following information signs are mounted:



Caution! Electrical hazard!

These signs are mounted on all control boxes and the terminal boxes, which may only be done by a certified electrician.

Chapter 2: Safety

The risk of an electric shock is indicated at the marked places. People who work on or with the system must proceed to do so with caution.



Earth wire connection!

This marking is affixed next to the earth screw.

The earth wire connection is a procedure that earths a dangerous contact voltage in case of an error.

The earthing equipment conductor carries out the protective earthing procedure. The earthing equipment conductor „PE“ (in Germany it has a green/yellow isolation case) is the conductor used for preventative measures during the indirect contact of metallic connecting parts with:

- other bodies
- foreign, conductive parts
- earth wires, earthing conductors and earthed, active parts.



DANGER Corrosive substances, acid!

This sign is mounted to the acid injection point near to the ball valve.

Work with corrosive substances may only be carried out with anti-acid protective clothing and/or corrosion resistant tools and/or containers (e.g. bottles, tanks). Unauthorised persons and people without acid-proof protective clothing are not allowed to enter the work area.

There is not only the danger of destroying the clothing, but also people's eyes and skin risk being chemically burnt (in a few cases also the mucous membranes).

If eyes are chemically burnt it can lead to an irreparable impairment of vision.

2.6 Safety tips for the operating personnel

The system may only be used if it is in a technically perfect condition as well as only if it is used for its intended purpose, safely whilst being aware of the dangers and observing this operating manual! All disturbances and in particular those that can jeopardise the safety have to be immediately eliminated!

Each person who is assigned to the installation, start-up, operation and maintenance of the system has to have fully read and understood this operating manual before commencing work – in particular the Safety chapter.

Once the work has begun it is too late.

This applies more so for personnel who are only occasionally employed on the system.

The operating manual must be accessible at all times at the system.

No liability is assumed for damages and accidents caused due to non-compliance of the operating manual.

Observe the relevant regulations for accident prevention as well as the other general recognised technical safety and occupational health regulations.

The responsibilities for the various activities in the areas of operation, maintenance and servicing must be clearly defined and adhered to. This is the only way to avoid incorrect handling, in particular in dangerous situations.

The operator is responsible for ensuring that the operating and maintenance personnel wear personal protection when using acid during the acidification of the Technostar 4000 AT's electrolysis cell. This includes in particular protective face cover, rubber or plastic boots, protective gloves and a protective apron.

If changes appear in the way the system operates that are relevant to safety or if disturbances arise, the system must be stopped immediately and the incidence has to be reported to the responsible place/authority!

Keep the first aid kit (first aid box, eye wash bottles, etc.) within easy reach!

The location and operation of fire extinguishers has to be made known and the ways to report a fire and for fire fighting have to be observed.

The instructions for service work in the Maintenance and Servicing chapter have to be observed without fail during inspections, maintenance and repairs on the system and the safety devices!

Work on the flow-through – chlorine – electrolysis system may only be carried out by authoritative personnel. The legal minimum age must be observed!

Only use trained or instructed personnel!

Personnel to be trained, taught, instructed or those placed in an apprenticeship may only work on the system whilst under the constant supervision of an experienced person!

2.7 Safety instructions for operating the system

2.7.1 General

During all work concerning

- the operation,
- the refitting,
- the inspection,
- the maintenance and
- the repairs

one has to adhere to the on and off procedures in accordance with this operating manual and the instructions for repair work!

The system may only be started if it is assembled and ready to operate.

The system may only be operated if all the guards and safety devices are present and fully functional, e.g. detachable guards!

The system has to be checked at least once every shift for externally recognisable damage, in particular screws, seals and loose

parts. If there are changes (including that of the operational behaviour) report this immediately to a responsible specialist.

When there is a malfunction immediately stop and secure the system. The disturbances are to be eliminated by specialists who are trained to do so.

2.7.2 Safety instructions for servicing

Inform the operating personnel before starting special and servicing work. There must be a designated supervisor.

The default periods, or those given in the operating manual, for repeat checks/inspections have to be observed.

The appropriate tools have to be used for carrying out service and repair work tasks.

The servicing area must be additionally illuminated, as far as necessary, with hand or stand lamps.

The system's main switch must be at position 0 for maintenance, repair and service work. A warning sign has to be attached that prohibits the circuit switching and refers to the work on the system.

In order to avoid electric shocks do not open any electrical components or casings and covers.

Do not touch any damaged, sharp or, in particular, live parts.

Regularly check cables, hose connections and in particular mobile parts for damages and if necessary replace.

Regularly inspect seals on the electrical casings and if necessary replace.

Tighten up loose bolt connections again during maintenance and repair work! If required, tighten the screws with a torque wrench provided for this.

If it is necessary to disassemble safety devices during maintenance or repairs, the assembly and inspection of the safety devices has to be carried out immediately after the maintenance and repair work is completed!

When carrying out assembly work above head height, use the intended or other safety assured climbing aids and work platforms provided! Do not use machine parts as climbing aids!

Have safety rails for maintenance work carried out at great heights! All handles, steps, railings, landings, platforms, ladders have to be kept free of contamination!

Do not use any aggressive or cleaning agents containing solvents. Use cleaning cloths without fibres.

Only use mild water-based cleaning agents. Observe the manufacturer's instructions. Do not use any organic solvents, as there is a risk of fire and explosion!

Ensure for a secure and environmentally friendly disposal of operating materials and auxiliary substances as well as of replacement parts!

2.8 Instructions for special kinds of danger

2.8.1 Electricity

Work may only be carried out on the electrical fittings by an electrician or instructed personnel under the direction and supervision of an electrician in accordance with the electro-technical regulations!

The system must be turned off at the main switch and secured against unauthorised access before opening the control cabinets.

The system must be turned off immediately at the main switch during disturbances in the supply of electricity!

Info!

Only use original fuses with the prescribed amperage! Never carry out work on live parts!

Isolate/disconnect components that are to be inspected serviced or repaired. Secure disconnected/isolated equipment from being unintentionally or automatically switched on again (secure fuses, block disconnectors, etc.) First check that the disconnected/isolated components are de-energised, then earth and short circuit and also disconnect/isolate neighbouring components that may possibly still be live.

If it is necessary to carry out work on live components (only in exceptional cases!) an additional person must be called in, who can activate the EMERGENCY-OFF button in case of an emergency or the main switch. Only use isolated-voltage tools.

The perfect earthing of the electrical system has to be guaranteed by a protective earthing system.

Regularly check the cable for damages and replace if necessary.

2.8.2 Noise

The A-weighted equivalent continuous sound pressure level amounts to 70 dB (A) at the control workstations during normal operation of the system.

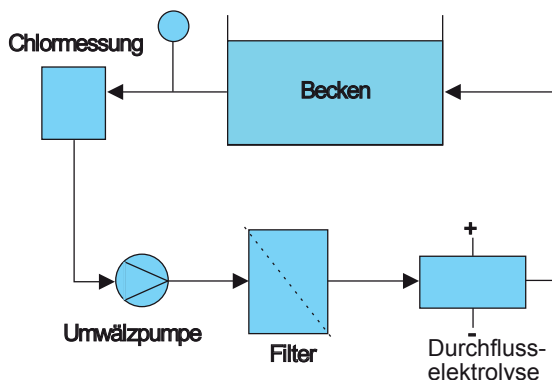
Therefore, it is not necessary to wear ear protection whilst operating the flow-through – chlorine – electrolysis system.

3. Product Description

3.1 General

The Technostar 2000 AT, 2000 ST, 2000 PT, 4000 AT und 4000AX flow-through – chlorine – electrolysis systems from Technopool Schwimmbadtechnologie GmbH produce the active ingredient „hypochlorous acid“(chem. HOCl) required for disinfection, from the salt (NaCl) released in the swimming pool water. This electro-chemical process takes place in a flow-through – chlorine – electrolysis cell. This is installed in a bypass of the clean water pipe.

The salted pool water with a salt content normally of 0.4 to 0.5 % is channelled through the open electrolysis cell on both sides. Through the workings of the electrolysis system first chlorine develops electrochemically at the anode and then onto disproportionation (redox reaction, in which an element is simultaneously oxidised and reduced) finally hypochlorous acid. This produces the disinfection effect in the water. Electro-chemical hydrogen develops at the cathode, which reaches the swimming pool through the recycled circuit and leaks out into the swimming pool hall via the water surface area. The formation of a dangerous explosive atmosphere from exceeding the lower explosion limit in areas can be excluded through a correct implementation of the procedure as per the present level of awareness.



The salt can be added to the pool water in the form of natural brine, brine, sea water, salt granules or salt tablets or it can already be present by natural means in the pool water, e.g. when using spa water or brine.

The salt content of the pool water under normal circumstances should be between 0.4% - 0.5%. Higher levels of salt content are likewise possible (to date, max. 18%).

The Technostar Systems 2000 AT, 2000 ST, 2000 PT und 4000AX are self-cleaning systems, the Technostar System 4000 AT is not self-cleaning. The Technostar System 2000 ST is fitted with two electrolysis cells as standard and can be extended up to four electrolysis cells. The Technostar System 2000 PT is also fitted with 2 electrolysis cells as standard, but cannot be extended. The Technostar System 2000 AT, 4000 AT and 4000 AX are fitted with one electrolysis cell.

3.2 Function

The installed measurement and control technology recognises a fall below the set nominal value (free chlorine) and sends out a control signal. With this control signal it acts as constant regulator outlet with PI – regulating properties and the current 4 - 20 mA.

This signal is converted into a control voltage in the Technostar flow-through – chlorine – electrolysis system. Afterwards this control voltage produces the required power output (current / voltage). With this power output the required hypochlorous acid is electrochemically created in the electrolysis cell.

If the disinfection value rises, measurement and control technology records it. The control signal is lowered. With the reduction of the signal the power output is likewise lowered. The production of the hypochlorous acid is stopped when the set nominal value of the measurement and control technology is reached.

A flow-through monitor constantly monitors the flow-through in the bypass. Thus ensuring that there is no production in the electrolysis cell when the water flow is interrupted.

In the Technostar Flow-through – Chlorine – Electrolysis Systems 4000 AX, 4000 AT and 2000 AT each electrolysis cell is fitted with a temperature sensor to monitor the temperature. It is installed directly inside the electrolysis cell body in direct proximity of the titanium plates. This sensor interrupts the production of the electrolysis cell at a temperature of 45 °C and above. After the sensor cools down to around approx. 40 °C it is automatically reset and reenables the system. The production can proceed.

3.3 Technical Data

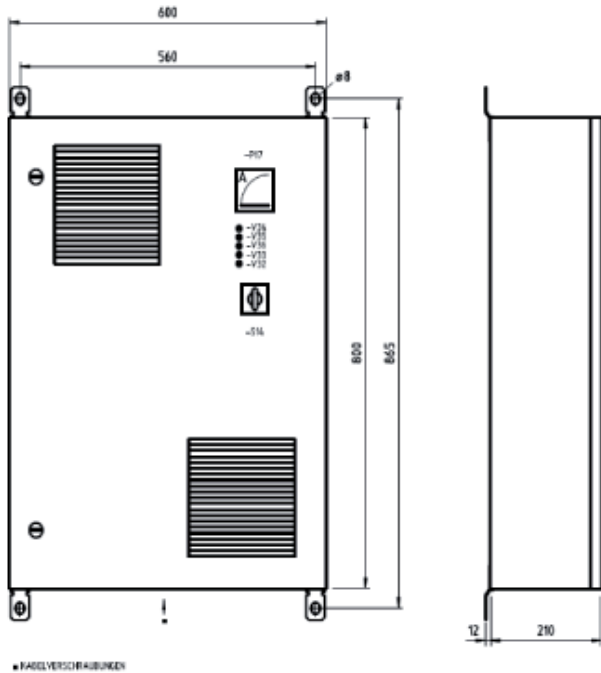
Technostar	2000 PT	2000 ST	2000 AT	4000 AT	4000AX
Mains supply	230 V / 50 / 60 Hz	230 V / 50 / 60 Hz	230 V / 50 / 60 Hz	400 V / 3/N/PE /50 / 60 Hz	400 V / 3/N/PE /50 / 60 Hz
Mains fuse	1 x 20 A	1 x 20 A	1 x 25 A	3 x 25 A (D-Characteristic)	3 x 25 A (D-Characteristic)
Control signal	4 - 20 mA/PI	4 - 20 mA/PI	4 - 20 mA/PI	4 - 20 mA/PI	4 - 20 mA/PI
Output current	12 A	12 A (max. 20 A)	40 A	250 A	250 A
Protection class	IP 23	IP 23	IP 23	IP 23	IP 23
Connected wattage	1.5 kVA	1.8 kVA	2.1 kVA	12.0 kVA	12.0 kVA
Surrounding temperature	approx. 35 °C	approx. 35 °C	approx. 35 °C	approx. 35 °C	approx. 35 °C
Dimensions (w/d/h) in mm	470x 400x 800	600x 210x 600	600x 210x 800	850x 400x 2200	850x 400x 2200
Weight in kg	approx. 35	approx. 36	approx. 40	approx. 280	approx. 280

4. Transport and Assembly

4.1 General

The Technostar flow-through – chlorine – electrolysis system is pre-assembled, tested and packed by the manufacturer.

After the Technostar flow-through – chlorine – electrolysis system has been delivered check it and the accessories for damages caused by damaged packaging.



CAUTION

Damages incurred during transport have to be reported immediately to the carrier, the insurance company and Technopool Schwimmbadtechnologie GmbH.

Check the entire delivery for completeness on the basis of the enclosed delivery note. Furthermore refer to the Sales and Delivery Terms from Technopool Schwimmbadtechnologie GmbH.

4.2 Packaging

The Technostar flow-through – chlorine – electrolysis system is delivered packed on pallets or in crates – unless otherwise agreed. The customer is responsible for the transport of the system. All warranty claims for transport damages are void against Technopool Schwimmbadtechnologie GmbH.

4.3 Transport

Caution! Inappropriate Transport!

Possible damage to property! The packed system may be damaged if it is incorrectly loaded, falls or slips! Avoid hard impacts when setting down! The selected means of transport has to be suitable for the respective tare weight! Observe the indications of weight in the section Technical Data! Make sure that the packed system does not slip during transport!

Warning! Transport the packed system with lifting tools! Floating loads!

Can cause serious injury or death! Do not stop or work under floating loads! Only use technically perfect lifting accessories with sufficient carrying capacity! The load is always well balanced and never transport it higher than is absolutely necessary!

4.4 Assembly

4.4.1 General instructions

- Always use suitable tools for the assembly and installation of plastic connecting parts!
- Only apply the appropriate amount of force!
- Plastic parts (in particular parts made of PVC) screw on and off better if the thread is coated with silicone lubricant beforehand.
- When attaching the flow-through – chlorine – electrolysis system to a wall casing use the mounted brackets on the casing.

Info!

We recommend using M8 – heavy-duty dowels.

A base has to be created before placing the Technostar System in the cabinet, on which the cabinet will be placed. The base should be high enough so that the cabinet cannot sustain water damages, for example if there is a burst pipe (see section 4.5.2 Assembly site). The base should have a clean and level surface, in order to facilitate an easy alignment.

4.4.2 Assembly site

The installation / assembly site is determined by size measurement with the operator or his representative, the plant engineer as well as the planner. Subsequently this site is examined to see if there are any negative influences that could endanger the functioning of the system. Should such influences exist then a possible solution is drawn up with the operator to eliminate these influences.

Info!

Select the assembly site in such a way that the power element of the control systems can be sufficiently cooled. The radiating heat from equipment and heat exchangers has to be shielded, so that the system can sufficiently expel its sensible heat. Observe the maximum permitted surrounding temperature of approx. 35 °C (see Technical data).

Info!

If the temperature at the scheduled installation site reaches approx. 35 °C or higher, then additional cooling has to be provided. This cooling can for example be created by a supply of the cooler external air. Select the system's setting up site so that it can be accessed by the operating and maintenance personnel.

Info!

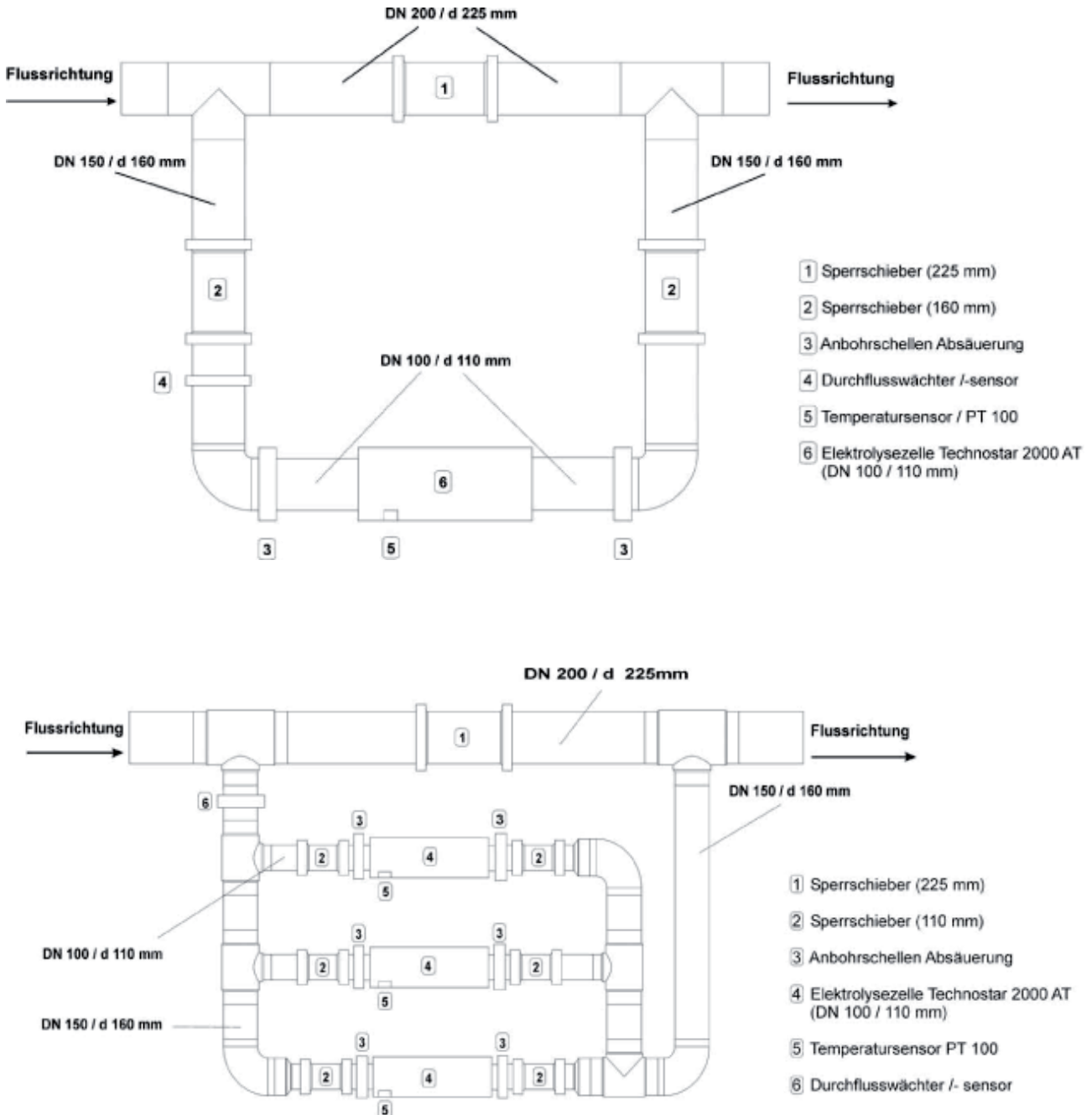
The setting up site of the storage may not be selected in a flood risk area. If there is no other setting up site available then other suitable preventative measures are to be discussed (raised base, wall mounting, etc.).

Chapter 4: Transport and Assembly

4.5 Assembling the bypass

Assemble the bypass to the arrangement of the flow-through chlorine – electrolysis cell in the following configuration pattern.

Fig. 4.1 shows the configuration with one electrolysis cell, Fig. 4.2 the configuration of several electrolysis cells. The exact configuration must be adapted to the spatial conditions.



Info!

If more than two electrolysis cells are arranged in the bypass, then they have to be scheduled for installation in a Tichelmann system. With this installation the flowing water divides itself almost equally on the individual cells. However, it must be ensured that the clean water pipe can also supply the required amount of water.

The flow-through sensor/monitor is installed in the bypass in the directional flow before the electrolysis cell(s).

The exact structure of a bypass can only be determined after a measurement of the site.

4.6 Electrical connection

The system's electrical connection to the mains has to correspond to the local regulations and may only be carried out by specialists. It has to be laid out in accordance with the preset connected wattage.

The mains supply is to be laid out in accordance with the preset connected wattage given by the manufacturer (see section 3.3 Technical Data).

Caution! Overriding the control!

Can distort the measurement and control values! Do not lay the signal cable parallel to the high voltage or mains lines! Lay the supply and signal lines in separated circuits! Make line junctions at a 90° angles! Use shielded cables for signal lines!

4.6.1 Connecting the Technostar 4000 AT electrolysis cell

Caution! Incorrect polarity of the connection cable!

Destroys the electrolysis cell! Respect the correct cable connection without fail (see connection diagram)!

The Technostar 4000 AT flow-through – chlorine – electrolysis system does not entail a self-cleaning system. Therefore the correct polarity must be heeded without fail with this system.

The Technostar 4000 AX flow-through – chlorine – electrolysis system does entail a self-cleaning system.

4.6.2 Connecting the Technostar 2000 AT electrolysis cell

Caution! Incorrect connection sequence of the cable!

Destroys the electrolysis cell!

Pay attention to the correct cable connection without fail!

The Technostar 2000 AT flow-through – chlorine – electrolysis system entails a self-cleaning system. The electrolysis cell is made up of two titanium packages. The connection poles are marked as follows:

1+, 1-, 2-, 2+.

The connection cables are linked to the electrolysis cell in precisely this sequence. If the sequence is changed the titanium in the electrolysis cell will be destroyed.

There must be no measurable (DC) voltage between the poles 1+ and 2+ as well as 1- and 2- !

4.6.3 Connecting the Technostar 2000 ST and PT electrolysis cell

These disinfection systems likewise entail a self-cleaning system. The Technostar 2000 ST is fitted with two cells as standard. When operated at full capacity it can be fitted with four cells. The Technostar 2000 PT is fitted with two cells as standard. However, a further upgrade is no longer possible here.

The electrolysis cells are attached parallel to the electrical connection. Thus an even distribution of power is ensured to the individual electrolysis cells.

4.6.4 Connection diagram for temperature sensors

The temperature sensors are connected in accordance with the following connection diagram:

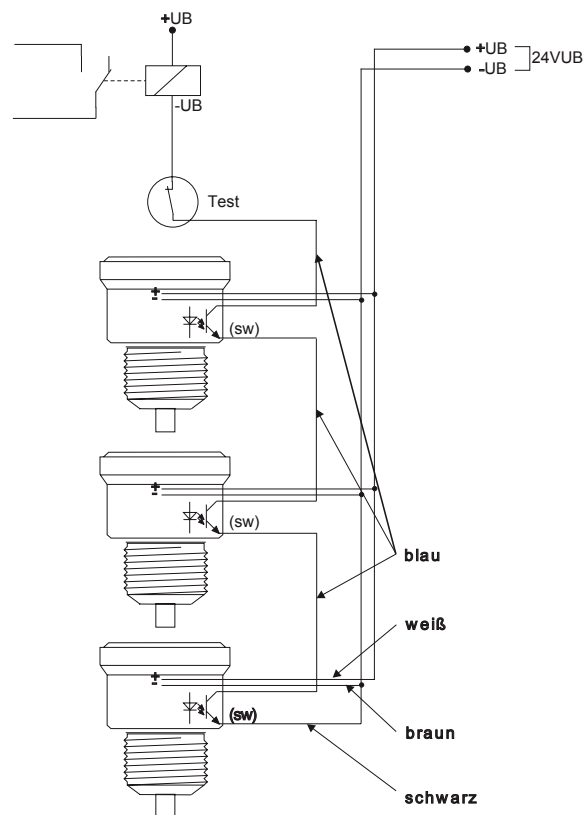


Fig. 4.3: Connection diagram for the temperature sensors

4.6.5 Selecting the cell's connection cable

The cell's connection cable has to be selected in such a way that the loss of voltage on the cables is as low as possible. The cross section of the cable has to be selected accordingly.

Example: With the Technostar 2000 AT a cable length of five to ten meters has to be selected with a cross section of 10mm². If the distance is greater then a cable cross-section of min. 16mm² must be used.

4.6.6 Connecting the 4000 AX electrolysis cell

This disinfection system likewise entail a self-cleaning system.

5. Operation

5.1 Qualifications of the operating personnel

Only employ trained or instructed personnel. Make the personnel's responsibilities very clear regarding operating, setting-up and installing the system as well as for servicing it!

Furthermore specify the operator's area of responsibility and make it possible for him to turn down instructions from third parties that are unsafe!

The operating personnel has to be informed about and/or instructed in existing legal provisions and accident prevention regulations as well as about the existing safety devices around the plant.

The operating personnel have to have understood the training/instruction course and it must be guaranteed that the training is observed.

Only in this way can all the employees attain a safety-aware and risk conscious approach in their work.

Info!

Please read the operating manual before starting the system up for the first time. Only the careful adherence to this operating manual guarantees a smooth and accident-free operation and a long service life of the system.

Only the following people may operate the system, those

- who have read and understood this operating manual,
- who have been instructed in how to operate the system,
- who are trusted with the safety devices,
- who are clear about the residual risks.

5.2 Operating and display elements

5.2.1 Operating and display elements Technostar 2000 AT, ST, PT and 4000 AX

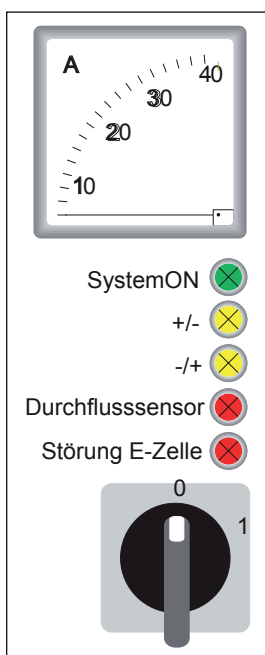


Fig. 5-1: Display and operating elements in the control system door of the 2000 AT, ST and PT systems.

- The gauge (Amperometer) displays the production capacity (electricity) of the electrolysis cell in ampere (A).
- The mains supply to the control system is switched on with the operating or main switch 0 / 1.
- The upper green light diode (LED) System ON displays a continuous light after the mains supply is switched on. The controls are ready for use.
- The yellow control-LED for the pole shift (+ / -, - / +) shows that the electrolysis process is running. They are only fitted in the control system door of the Technostar 2000 AT, ST and PT as well as 4000 AX flow-through – chlorine – electrolysis systems. Only one LED lights up respectively. The control LED's display changes when there has been a pole shift in the production. The pole shift triggers the self-cleaning. The self-cleaning removes deposits of calcium on the titanium plates.
- The red light diode flow-through sensor shows the release of an encoder of the safety cycle. The flow-through sensor, the temperature sensor and/or a locking mechanism are switched in sequence via the pumps (reverse filter) in the safety cycle. This means that if only one of these sensors is released (interrupted) then the production of the disinfection must have stopped. This is also identified as a threefold redundant protection. The temperature sensor is only integrated in the Technostar 2000 AT, 4000 AT and 4000 AX flow-through – chlorine – electrolysis systems!
- The red control-LED Fault E – Cell lights up, if:
 - the electrolysis cell is used up or
 - there is a fault and/or a disturbance in the secondary electric circuit and thus an interruption in production.

5.2.2 Operating and display elements Technostar 4000 AT

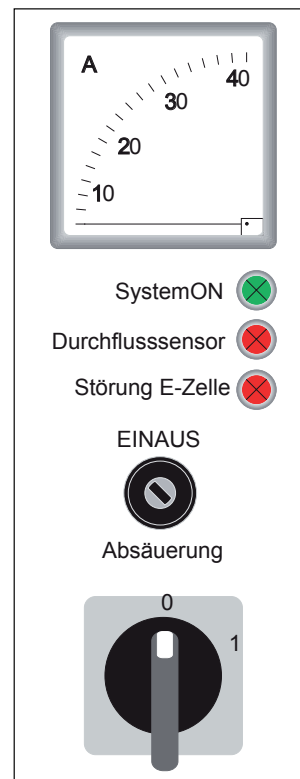


Fig. 5-2: Operating and display elements of the Technostar 4000 AT system

- The meter (Amperometer) displays the production capacity (electricity) of the electrolysis cell in ampere (A).
- The mains supply to the control system is switched on with the operating or main switch 0 / 1.
- The upper green light diode (LED) System ON displays a continuous light after the mains supply is switched on. The controls are ready for use.
- The red light diode flow-through sensor shows the release of an encoder of the safety cycle. The flow-through sensor, the temperature sensor and/or a locking mechanism are switched in sequence via the pumps (reverse filter) in the safety cycle. This means that if only one of these sensors is released (interrupted) then the production of the disinfection must have stopped. This is also identified as a threefold redundant protection
- The red control-LED Fault E – Cell lights up, if:
 - the electrolysis cell is used up or
 - there is a fault and/or a disturbance in the secondary electric circuit and thus an interruption in production.
- The cell cleaning of the Technostar 4000 AT flow-through – chlorine – electrolysis system is preselected with the Acidification ON-OFF key switch. The description of the acidification of the electrolysis cells is in Chapter 6 Maintenance and Servicing. For the acidification the Acidification ON-OFF key switch is turned to ON and next the system is switched on at the main switch.

5.3 Conditions for operating

- Make sure that the measurement and control system works and that it is correctly calibrated. Only then can the „Technostar“ system build up the required disinfection store.
- Check the displayed measured values of the measuring and control systems regularly with measurements taken manually.
- Make sure that the filter system is turned on. Water has to flow through the electrolysis cell.

Info!

The flow rate in the electrolysis cell is set during the start-up. The flap in the clean water line is provided with a marking in this position. After every change of an electrolysis cell the flap has to be set back to this marking. The flaps in front or behind the electrolysis cell(s) have to always be completely open for normal operations.

5.4 Start-up

Info!

The start-up is performed by the plant engineer in collaboration with the Technopool company and the operator. The personnel receive training on site on how to work the system:

- Set the swimming pool's pH value to a value between 7.0 and 7.4.

The amount of salt required depends on the amount of water in the swimming pool. To start off with put in 4kg of salt for every 1 m³ of water. This corresponds to a salt content of 0.4% (see also Calculating the Salt Content under 5.5 Operating).

- Fill your swimming pool with normal tap water if possible. Other types of water should be examined by a hygiene institute or your specialist for its applicability.

Info!

Water with iron content in particular is not suitable or it has to be treated first before being used with the electrolysis system. Water with phosphate content is, for example, a good fertile platform for algae.

- Stop the filter system, the counter current system and other devices before adding the salt granules. You thereby prevent the salt crystals from going through the floor drain, the gutter or skimmer and ending up in the piping and the filter basin.
- Distribute the required amount of salt as evenly as possible in the pool.

If all the salt is poured in one go it will have difficulty in dissolving as saturated brine forms around the mounds of salt. As water containing salt is heavier than fresh water the concentration of salt is significantly higher at the bottom than it is in the upper levels.

When using pre-prepared brine the filter system can be switched on directly.

- After the salt has dissolved or the required amount of brine has been put into the pool, switch the filter system to mixing the salt with the water.

Info!

The mixing is important!

- Set the measurement and control technology into operation and set the prescribed nominal values.
- Set the pH value to a value of between 7.0 and 7.4.

Note!

If the pH value is not set to within the given range it may lead to calcium deposits in the electrolysis cell(s)!

- After the measurement and control technology has been set into operation and everything is well mixed, turn the system's main switch to System ON.
- After a while measure the content of hypochlorous acid.

The hypochlorous acid formed from the salt is measured with DPD-1 test tablets or appropriate electronic measuring devices. It is measured in mg (milligram) per litre. The minimum content should not fall below 0.3 mg. The upper limit value should not exceed 1.0 mg under the normal operating conditions of open-air swimming pools. The values stated in DIN 19643 have to be adhered to.

Info! Private sector:

If you use a pool stabiliser (isocyanuric acid) or if you have put in organic chlorine (long term chlorine) for disinfecting before using a salt water system, then the measured value must be higher. In these cases check the content of stabiliser in the pool water, in order to determine the correct balance. If the value is too high let some of the pool water out and replenish it with fresh water or replace all of the water. The stabiliser accumulates in the pool water and can only be reduced by diluting it.

Chapter 5: Operation

- After switching the salt water system on for the first time measure the disinfection content of the hypochlorous acid at short intervals with the DPD-1 method.
- Measure at least 2 to 3 times a day. The disinfection content of the hypochlorous acid rises slowly.

The increase of the disinfection content is determined by:

- the respective capacity of the electrolysis system,
- the size of the pool,
- the actual salt content and,
- the water temperature.
- Check the pH value of the water.

The pH value is the key value for the swimming pool water. It determines the effectiveness of the disinfection procedure.

Info!

The pH value should be in the region of 7.0 – 7.4. As the pH value rises the disinfection capacity steadily decreases until it is ineffective.

5.5 Operating

- Make sure that the requirements for operating and the steps for the set-up have been carried out.
- Now switch on the Technostar flow-through – chlorine – electrolysis system with the main switch on the control system's door. The green control-LED System ON displays a continuous light.

If the control signal from the measurement and control technology lies between 4 and 20 mA, the flow-through – chlorine – electrolysis system starts to produce the hypochlorous acid in accordance with the requested output.

- You can now read the output of electricity in ampere on the amperometer on the control system's door.

Info!

Please take the electricity outputs at 100% drive from the Technical Data. The system's power output is now controlled directly by the measurement and control technology.

Check the salt content of the pool on a regular basis (min. 0.35 %). Thus preventing a deficiency in salt.

If the salt content of the pool water is controlled by a conductive measurement and control system, then the salt content has to be checked manually on a regular basis and if necessary re-balanced with this value. If the brine is not automatically re-filled then the amount of salt missing has to be refilled by hand. The salt should be evenly distributed in the pool so that it dissolves quickly (see also 5.4 Start-up)

Calculating the amount of salt:

A salt content of 0.4% corresponds to a quantity of 4kg of salt in every m³ of pool water.

If with a measurement you establish for example a salt content of 0.25 % = 2.5 kg of salt / m³, you are missing exactly 0.15 percentage points for the previous salt concentration of 0.4 %.

This corresponds to a missing amount of 1.5 kg of salt per m³ of water.

In order to attain the desired salt content of 0.4 % you must now add 1.5kg of salt per m³ of water in the pool water.

Visual inspection of the electrolysis cell

Carry out a visual inspection of the electrolysis cell(s) at regular intervals.

Info!

A white film on the titanium plates indicates calcium deposits.

If these deposits are only at the end of the titanium plates (light white film) and if the system has only just been started up, then the set production time should be shortened (minimum 60 min) for the Technostar 2000 AT / ST / PT and 4000 AX systems.

Caution! Changing the timing!

Can cause the system to malfunction! Only authorised and qualified technicians are allowed to override the system's timing. If necessary contact Technopool Schwimmbadtechnologie GmbH or an authorised service partner.

The Technostar 4000 AT flow-through – chlorine – electrolysis system is driven by a single magnetic pole. It is not self-cleaning. Therefore the calcium deposits visible as a white film on the titanium plates are normal. The electrolysis cell of the Technostar 4000 AT system must therefore be cleaned on a regular basis. (See Chapter 6 Maintenance and Servicing).

5.6 Disturbances and their rectification

Type of disturbance	Possible causes	Rectification of disturbances
Display flow-through sensor	mechanical fault	check sensor of the flow-through sensor
	no water flow	check flaps in the bypass
	interruption of the safety circuit	check safety circuit
	temperature sensor fault	replace sensor
	temperature sensor has released	display „red“ is automatically reset; remove triggering errors (water flow too low)
	other errors	inform customer service
Display E-cell	titanium in the electrolysis cell is used up	inform customer service; titanium/electrolysis-cell has to be exchanged
half output despite 100% requirement with MSR-technology	titanium in the electrolysis cell is used up; the breakdown of the titanium quits	inform customer service; an exchange of a titanium packet or electrolysis cell quits
	Technostar 2000 AT: Interruption of the energy supply	Check the output safety- machines to the E-cell; Interrupted cable prevent; correct contact error, otherwise inform customer service
no output signal despite 100 % drive of the MSR-technology	defective semiconductor fuse	check the fuse and if nec. replace, otherwise inform customer service
output signal of the MSR-technology (4-20 mA) is on but the system does not start up	reading converter in the Technostar is defective	inform customer services

6 Maintenance and Servicing

6.1 General

The Chapter Maintenance and Servicing covers the areas of care and visual inspections by the operating personnel as well as cleaning, maintenance and servicing of the Technostar 2000 AT / ST / PT, 4000 AT and 4000 AX flow-through – chlorine – electrolysis systems by specially trained maintenance personnel. The grouping of these areas in different maintenance intervals is meant to facilitate the planning for you of the respectively necessary maintenance measures.

The instructions described in this chapter are to be taken as minimum recommendations. Extensions could be necessary depending on the operating conditions, in order to obtain the functional quality of the system. Please refer to the appendix of this operating manual for the special further and/or supplementary information.

Danger! The system's live parts!

When touched can cause to fatal injuries or death! The system has to be switched off at the main switch before any maintenance work is carried out and secured against being unintentionally switched on again! Only qualified technical personnel are permitted to carry out work on the system's electrical fittings!

In order to prevent material and consequential damages to the system, maintain an orderly dismantling and assembly of the components.

The following therefore applies in principle for all extension and dismantling work:

- Marking the parts in their shared identity.
- Marking and noting the installation position and location.
- Dismantle, clean and store component groups separately.

After the repair work the following applies in principle:

- Check that all bolted connections are tight.
- Examine the tightness of all the pipe interconnections and connections.

6.2 Care and inspection

All system parts should be carefully and regularly maintained.

For instructions on looking after the electrolysis cells please refer to section 6.7.

It is the operating personnel's task to inspect the system's accessible work areas on a daily basis. All rubbish and/or contamination as far as it is accessible, should be removed and damages should be reported to the maintenance personnel.

- Always inspect the system therefore at the start of a shift.
- Clean badly soiled areas daily.
- Only wipe clean the soiled surfaces of casings or the control elements of the control cabinet's door with a damp cloth.
- When selecting a cleaning agent please ensure that none of the surfaces, keyboards, plastic parts or seals are aggressively affected.

All water based industrial cleaning agents can be freely used.

Carry out the following work in the intervals indicated. Please note that the intervals indicated only represent guideline values.

In the long term the times depend on the running time of the system and the surrounding conditions.

Component	Work to be done	Interval
Light diodes	check that they function	daily
Control cabinet ventilator	check that it functions smoothly	daily
Electrical conduit/ connecting cable	check its condition	3 months
SPS back-up battery	renew	2 year / service

6.3 Maintenance

The Technostar flow-through – chlorine – electrolysis systems are systems that are manufactured to the highest measures of quality with a long service life. Nonetheless some parts are subject to operational wear and tear (e.g. the titanium plates, automatic circuit breakers, fuses, hydraulic gate, etc.). Therefore regular visual inspections and inspections with technical measurements are necessary to ensure a long-term service.

Info!

Maintenance work and work to prevent the need for repairs have to be carried out in accordance with the specifications of the corresponding national regulations and standards.

Info!

Liability claims are invalid if they arise from non-compliance of the maintenance instructions and intervals!

6.4 Replacing the Technostar 2000 AT electrolysis cell

6.4.1 Dismantling the electrolysis cell

Only the replacement of one electrolysis cell is described. The procedure for further cells is respectively the same.

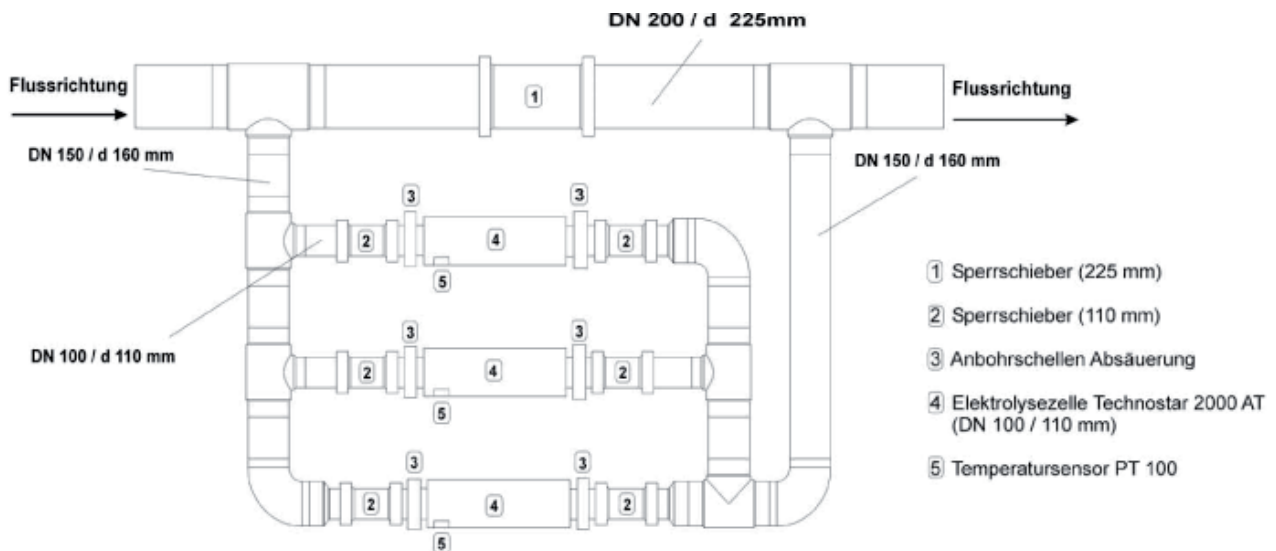


Fig. 6-1: System with three electrolysis cells of the Technostar 2000 AT system

Danger! Live system parts!

Can cause fatal injuries! The system has to be switched off at the main switch before any work is carried out and secured against being unintentionally switched on again!

Set up a warning sign: CAUTION! Do not switch on! Work is currently being carried out on the system!

- Turn off the system at the main switch and secure it against being unintentionally turned on again! Set up a warning sign!
- The numbers in brackets indicate the position numbers in Figure 6-1.
- Open up the stop valve of the clean water line (1).
- Close the stop valves in front (2) and behind (3) the electrolysis cells.
- Check the inscription on the connection cable and if necessary renew the inscription. Loosen the countering of the inscribed connection cable of the electrolysis cells with two combination wrenches SW 10. Next remove the connection cable.
- Now carefully dismantle the temperature sensor.
- Now loosen the threaded connections to the left and right of the electrolysis cell.

Caution! Residual water in the electrolysis cell!

Can lead to slippery floors with consequential injuries and damages to the parts located underneath the electrolysis cell! Collect the residual water from the electrolysis cell in a suitable container!

Remove the dripping water from the floor if necessary!

- Loosen the electrolysis cell's threaded connections completely.
- Next carefully take the electrolysis cell out without tilting it.

Info!

If the electrolysis cell is tilted as it is removed, the O-rings of the external threaded connections may be damaged! Check the O-rings after taking the electrolysis cell out. Immediately replace any damaged O-rings!

6.4.2 Installing the electrolysis cell

- Check that the O-rings on the external threaded connections are intact before installing the new electrolysis cell. Replace the O-rings if necessary.
- Lubricate the O-rings with silicone grease before installing. The silicone grease keeps the O-rings supple and facilitates the installation.
- Take heed of the directional flow of the electrolysis cell without fail (sticker on the cell casing). Slide the new electrolysis cell between the external threaded connections without tilting it and tighten them with both of the lock nuts.

Info!

The electrolysis cell has to be aligned in such a way that the temperature sensor is located above and the connecting bolts of the power supply are located below (see Fig. 6-2)!



Fig. 6-2: Arranging the electrolysis cell after it has been installed

- Now firmly tighten the lock nuts to the right and left.
- Next mount the temperature sensor. First lubricate the thread of the sensor with silicone grease.

- Then carefully screw in the temperature sensor upright in the cell casing up to the stopper (O-ring). Make sure that the thread is not damaged.

Info!

Once the thread is damaged and so the temperature sensor can no longer be screwed in up to the O-ring, the thread in the electrolysis cell can be re-cut. For this purpose use a 3/4" thread cutter (fine cutter). Afterwards, screw the in the temperature sensor as described above.

If you do not have a suitable fine cutter, but instead have a reserve cell, install the reserve cell and send the defective electrolysis cell to the factory to be repaired.

Caution! High application of force on the threaded bolts when countering the connection cable!

Can lead to the threaded bolts being torn from the titanium plates! When tightening the lock nuts no force must be applied to the threaded bolts!

- Install the connection cable of the electrolysis cell as per the inscription. Counter the connection cable with the help of two combination wrenches SW 10.
- Open the stop valves (2) and (3) again in the bypass.
- Check the electrolysis cell for leakages. If necessary retighten the screwed connections.
- Next close the stop valve in the clean water line and set it back to the markings again.
- Remove the warning sign on the control cabinet and turn the system back on at the main switch.
- Check the correct polarity of the connection cable with a multimeter.

The multimeter has to be set to a DC voltage and to a measuring range of greater than 30 V.

Measuring:

- The DC voltage must be no more than 30 V between poles 1+ and 1-.
- The DC voltage must be no more than 30 V between poles 2+ and 2-.
- There must be no measurable voltage between poles 1+ and 2+ as well as 1- and 2-.

Caution! Wrong polarity!

Damages the electrolysis cell! Turn the system off immediately at the main switch and attach the connection cable correctly!

6.5 Replacing the Technostar 2000 ST / PT electrolysis cell

Replace the electrolysis cell of Technostar 2000 ST and 2000 PT systems as described below.

6.5.1 Dismantling the electrolysis cell

Danger! Live system parts!

Can cause fatal injuries! The system has to be switched off at the main switch before any work is carried out and secured against being unintentionally switched on again!

Set up a warning sign: CAUTION! Do not switch on! Work is currently being carried out on the system!

- Turn off the system at the main switch and secure it against being unintentionally turned on again! Set up a warning sign!
- The numbers in brackets indicate the position numbers in Figure 6-1.
- Open up the stop valve of the clean water line (1).
- Close the stop valves in front (2) and behind (3) the electrolysis cells.
- Remove the connection cable of the electrolysis cell.
- Now loosen the threaded connections to the left and right of the electrolysis cell.

Caution! Residual water in the electrolysis cell!

Can lead to slippery floors with consequential injuries and damages to the parts located underneath the electrolysis cell! Collect the residual water from the electrolysis cell in a suitable container!

Remove the dripping water from the floor if necessary!

- Loosen the electrolysis cell's threaded connections completely.
- Next carefully take the electrolysis cell out without tilting it.

Info!

If the electrolysis cell is tilted as it is removed, the O-rings of the external threaded connections may be damaged! Check the O-rings after taking the electrolysis cell out. Immediately replace any damaged O-rings!

6.5.2 Installing the electrolysis cell

- Check that the O-rings on the external threaded connections are intact before installing the new electrolysis cell. Replace the O-rings if necessary.
- Lubricate the O-rings with silicone grease before installing. The silicone grease keeps the O-rings supple and facilitates the installation.
- Take heed of the directional flow of the electrolysis cell without fail (sticker on the cell casing). Slide the new electrolysis cell between the external threaded connections without tilting it and tighten them with both of the lock nuts.
- Now tighten the locknuts by hand to the right and left.
- Re-insert the connection cable of the electrolysis cell. Next check that the contact connection is firmly tightened.
- Open the stop valve in the bypass.
- Close the stop valve up to the markings in the clean water line.
- Remove the warning sign on the control cabinet and turn the system back on at the main switch.
- Check the system for leakages. If necessary eliminates the leakages.

6.6 Replacing the Technostar 4000 AT und 4000 AX electrodes

Info!

Only authorised and qualified technical personnel may replace the electrodes. If a replacement is necessary in the titanium

Chapter 6: Maintenance and Servicing

plates, please contact Technopool Schwimmbadtechnologie GmbH or an authorised service partner!

6.7 Acidification of the electrolysis cells

Info!

The acidification is available as standard with the Technostar 4000 AT system and as a special fitting with the 2000 AT system. The following describes an example of an acidification. The actual installation and operation depends on the conditions *en-situ* and may deviate from the description. The safety instructions for the acidification and for personal protective equipment have to be observed at all times!

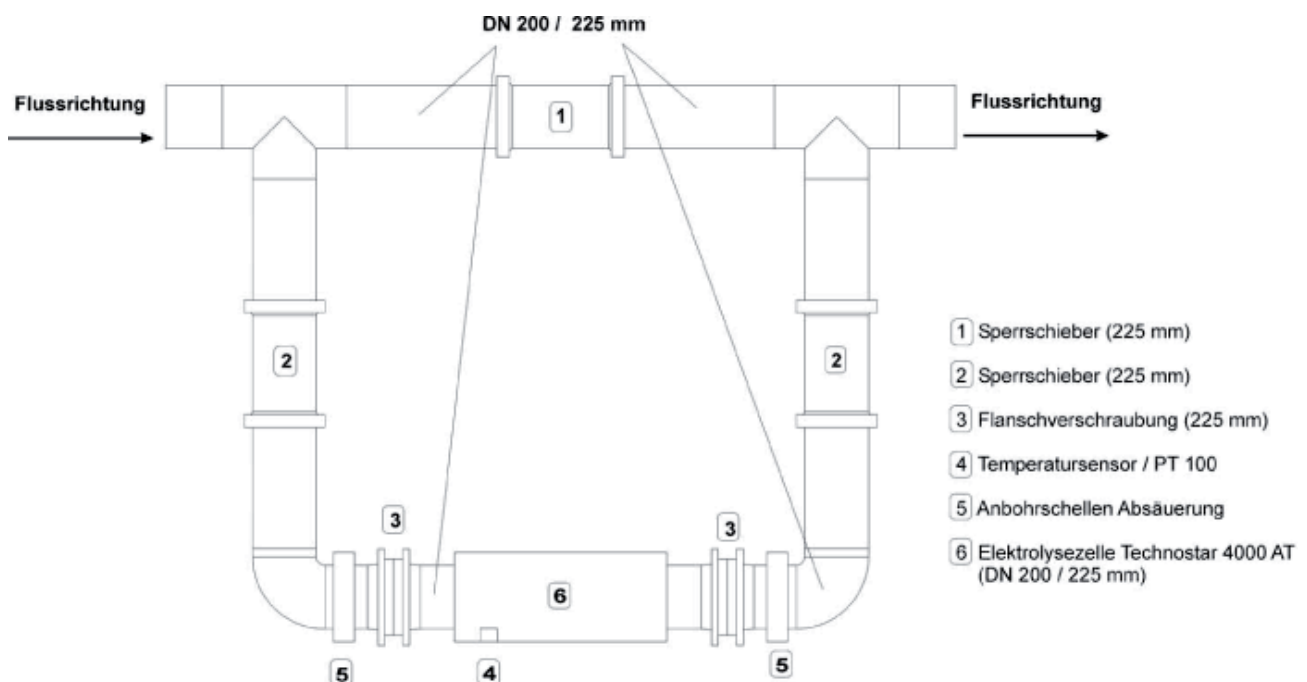


Fig. 6-3: System with the electrolysis cell of the Technostar 4000 AT system

Danger! Live system parts!

Can cause fatal injuries! The system has to be switched off at the main switch before any work is carried out and secured against being unintentionally switched on again!

Set up a warning sign: CAUTION! Do not switch on! Work is currently being carried out on the system!

- Turn off the system at the main switch and secure it against being unintentionally turned on again! Set up a warning sign!
- The numbers in brackets indicate the position numbers in Figure 6-3.
- Open up the stop valve of the clean water line (1).
- Close the stop valves in front (2) and behind (3) the electrolysis cells.
- Now drain the water drain from the electrolysis cell

Info!

The water can be drained with the ball valves (4) and (5) in Figure 6-2. Ball valve (4) serves to ventilate and ball valve (5) is for draining the water out of the electrolysis cell.

In individual installations additional connections/fittings are installed, which help with the drainage (compressed air supply). Additional instruction is required for this!

- Contact Technopool Schwimmbadtechnologie GmbH or an authorised service partner!
- Open both ball valves completely and empty the electrolysis cell.

Warning! Use of diluted hydrochloric acid!

Can cause chemical burns to the skin and eye injuries! Wear protective gloves, protective goggles and protective clothing before working with the diluted hydrochloric acid! When mixing the hydrochloric acid with the water, first pour water in a suitable container and then add the acid into the water. Never pour water into acid!

Caution! Residual water in the electrolysis cell! Slip hazard!

Can lead to slippery floors with consequential injuries and damages to the parts located underneath the electrolysis cell! Collect the residual water from the electrolysis cell in a suitable

container! Remove the dripping water from the floor if necessary!



Fig. 6-4: Acidification tank with pump

- Use the acidification tank with pump (see Fig. 6-4).

Info!

In Fig. 6-4 the ball valve (5) is identical to the ball valve (5) in Fig. 6-3. The ball valve (6) in Fig. 6-4 is used to drain the water. After the electrolysis cell has been emptied it has to be closed again without fail.

- Make sure that the acidification tank is firmly attached.
- Turn the key switch Acidification ON-OFF on the control cabinet to the ON position.
- Turn the system on at the main switch.

The acidification process to clean the titanium plates has begun.

The acidification is completed if there are no more calcium deposits on the titanium in the electrolysis cell. The visual inspection should be carried out with the help of a torch. The calcium has been completely dissolved and is no longer visible. If there are still visible white deposits after the acidification in the electrolysis then it is a case of magnesium and other harmless substances. They are cleaned off afterwards in the pool.

- After the acidification procedure has finished turn the system off at the main switch.
- Turn the key switch Acidification ON-OFF on the control cabinet back to the OFF position.

The diluted hydrochloric acid flows back into the container of the acidification station again. It can be used several times.

Info!

The installation height of the electrolysis cell has to be higher than the maximum overall height of the acid container. Only by adhering to these parameters is it possible for the acid to flow back into the acid storage container by means of (geodic) pressure difference.

- Make sure that all the acid that was used for the acidification returns back into the acidification container.
- Then close ball valves (4) and (5) again as per Fig. 6-3. Carefully check that the ball valves are closed.
- Now open the stop valves (2) and (3) again as per Fig. 6-3.

Now the electrolysis cell fills back up again with water.

- Check the lines and the slide gate as well as the ball valves for leakages.
- Close the stop valve in the clean water line up to the markings.
- Remove the warning sign on the control cabinet and turn the system back on at the main switch.

6.8 Care instructions for the electrolysis cell

The electrodes in the electrolysis cell are wearing parts; their service life depends greatly on the respective installation. The surface of the titanium electrode is coated with a mixed oxide. This coating is a prerequisite for the electrolysis cell's smooth operational running. The service life of the coating depends on various factors that can be significantly affected by the user.

6.8.1 Salt content of the swimming pool water

An insufficient salt content changes the chemical reactions on the titanium electrodes and causes the coating to decompose more quickly.

Therefore the salt content should not fall below the stipulated minimum level. The salt content is given in a specific framework for all devices. The device's output depends on the salt content. With a lower salt content the output is also lower. Therefore the running time and/or the power output are increased to compensate.

6.8.2 Higher metal content in the water (iron, manganese)

A higher metal content in the water can for example arise with untreated spring water. This type of water is not suitable for the electrolysis system. The fill-up water has to be treated accordingly beforehand (in accordance with the recommendations of the drinking water regulations)

6.8.3 pH-Value of the swimming pool water

The pH value must not fall below pH 7, but also not rise above pH 7.6. The ideal working range is between pH 7.0 and 7.4.

6.8.4 Acid content during cleaning

Warning! Use of diluted hydrochloric acid!

Can cause chemical burns to the skin and eye injuries! Wear protective gloves, protective goggles and protective clothing before working with the diluted hydrochloric acid! When mixing the hydrochloric acid with the water, first pour water in a suitable container and then add the acid into the water. Never pour water into acid!

- Only use diluted hydrochloric acid to clean the electrolysis cell. When using for example 31% technical hydrochloric acid it must be diluted to a ratio of 1:5 with water.
- Caution: never pour water into hydrochloric acid, always the other way round!

A hydrochloric acid content of over 10% slowly destroys the titanium plates and the coating. Commercial hydrochloric acid has a content of 31% - 35%. After the cleaning process the cell has to be thoroughly rinsed out with water.

Chapter 7: Disposal

6.8.5 Do not use any hard or metallic items

Do not use any hard or metallic items to clean the electrodes. If you do the surface of the titanium electrode can be destroyed.

6.8.6 Calcium deposits in the cell

Heavy calcium deposits on the electrodes as well as the bridging between the electrodes shortens the service life of the titanium plates.

6.8.7 Water temperatures over 70 °C

Water temperatures over 70 °C limit the life span of an electrode to a few days.

These temperatures may be reached if there is not enough water flowing through the electrolysis cell, but the system is switched on.

The lack of water can occur in the electrolysis cell especially if the water flow is divided into different channels: heating, pool cleaner, Jacuzzi, waterfall, etc. Therefore it must be ensured during the installation that there is always a sufficiently large enough flow rate available or that the device automatically switches off in such situations.

6.8.8 Operating the electrolysis cell in alternating voltage

The electrode cell may only be attached in the control system intended for it.

Operating the electrolysis cell in an alternating voltage destroys the titanium coating and leads to premature wear (loss).

7. Disposal

7.1 Environmental Protection

Caution! Hydrochloric acid!

Can contaminate the floor or end up in the drains!

The legal obligations for waste disposal and correct utilisation/removal have to be adhered to for all work with the acidification and the system! Store, transport, collect and dispose of acid in suitable containers!

Follow the safety data sheet!

7.2 Acid and waste containing acid

Info!

Acids and waste containing acid pose a high risk of danger for the environment. Therefore they are disposed of by specialist companies.

Supply these internal company waste disposals to be passed on to the specialist companies.

Read and observe the safety data sheets of the respective manufacturer as well as the operating instructions of the operator when handling acids and waste containing acid.

Info!

The hydrochloric acid has to be supplied in compliance with the hazardous waste instructions after prior treatment for a hazardous waste combustor certified for this purpose!

Waste code number:

The allocation of waste code numbers has to be conducted industry specific and process specific, in accordance with to the EAK regulation.

7.3 Final decommissioning

If the metering station is definitively decommissioned, the laws and regulations in force have to be followed at that point in time for the disposal.

Certainly it is wise to check which materials can be recycled and then do so.

8. Appendix

8.1 Manufacturer /Declaration of conformity

The declaration is enclosed with the control unit

8.2 Wiring diagram

The diagram is enclosed with the control system

9. Spare parts list

Spare part	Item no.	Quantity
TECHNOSTAR 2000 PT		
Semi-conductor replacement fuse 16 A	TS2000PHTS	1 x
Reconditioning of the electrolysis cell	TS2000PT/STET/2	1 x
Replacement of the electrolysis cell/ complete	TS2000PT/STEZ	1 x
O-ring / E-cell flange 63 mm	TS2000PT/ST/OR	2 x
TECHNOSTAR 2000 ST		
Semi-conductor replacement fuse 32 A	TS2000STHS	1 x
Reconditioning of the electrolysis cell	TS2000PT/STET/2	1 x
Replacement of the electrolysis cell	TS2000PT/STEZ	1 x
O-ring / E- cell flange 63 mm	TS2000PT/ST/OR	2 x
TECHNOSTAR 2000 AT		
Semi-conductor replacement fuse 50 A	TS2000ATHS	1 x
Temperature sensor	TS2000TS	1 x
Reconditioning of the electrolysis cell	TS2000ATET	1 x
Replacement of the electrolysis cell	TS2000ATEZ	1 x
O-ring / E- cell flange 110 mm	TS2000AT/OR	2 x
Connecting cable set electrolysis cell (4 x 6 mm ² with cable lugs + wire-end sleeves)	TS2000ATAK	1 x
Covering cap (connecting contact)	TS2000ATAKS	4 x
TECHNOSTAR 4000 AT / AX		
Semi-conductor replacement fuse 315 A	TS4000ATHS	1 x
Replacement of titanium plates for installation in the electrolysis cell	TS4000ATET	1 x
O-ring / E- cell flange 225 mm	TS4000ATOR	2 x







Technopool Schwimmbadtechnik GmbH

Wulftener Str. 18
49082 Osnabrück
Germany

Phone.: +49 541 18168-0
Fax: +49 541 1816818

E-Mail: info@technopool-gmbh.de
Internet: www.technopool.de

Lutz-Jesco GmbH

Am Bostelberge 19
30900 Wedemark
Germany

Phone.: +49 5130 5802-0
Fax: +49 5130 5802-68

E-Mail: info@lutz-jesco.de
Internet: www.lutz-jesco.de

24h-Hotline: +49 5130 580 280

Austria

Lutz-Jesco GmbH
Aredstraße 29/212
2544 Leobersdorf
Austria

Phone: +43 2256 62180
Fax: +43 2256 6218062
E-Mail: info@lutz-jesco.at
Internet: www.lutz-jesco.at

Great Britain

Lutz-Jesco (GB) Ltd.
Gateway Estate
West Midlands Freeport
Birmingham B26 3QD
Great Britain

Phone: +44 121 782 2662
Fax: +44 121 782 2680
E-Mail: info-gb@jesco.de
Internet: www.lutz-jesco.de

Netherlands

Lutz-Jesco Nederland B.V.
Nijverheidstraat 14 C
2984 AH Ridderkerk
Netherlands

Phone: +31 180 499460
Fax: +31 180 497516
E-Mail: info@lutz-jesco.nl
Internet: www.lutz-jesco.nl

Hungary

Lutz-Jesco Üzletég
Vasvári P. u. 9.
9024 Győr
Hungary

Phone: +36 96 523046
Fax: +36 96 523047
E-Mail: info@lutz-jesco.hu
Internet: www.lutz-jesco.hu

USA

Lutz-JESCO America Corp.
55 Bernar Park
Rochester, NY 14624
USA

Phone: +1 585 426-0990
Fax: +1 585 426-4025
E-Mail: mail@jescoamerica.com
Internet: www.jescoamerica.com

East Asia

Lutz-Jesco East Asia Sdn Bhd
Taman Perindustrian Jaya
47200 Petaling Jaya
Malaysia

Phone: +603 78454812
Fax: +603 78458413
E-Mail: info@lutz-jescoasia.com
Internet: www.lutz-jescoasia.com

Middle East

Lutz-Jesco Middle East FZE
P.O. Box 9614
SAIF-Free Zone Center
Sharjah
UAE

Phone: +971 6 5572205
Fax: +971 6 5572230
E-Mail: info-me@jesco.de
Internet: www.jescome.com

Best.-Nr. TPBA-91210-02-V02
Subject to technical changes
© Lutz-Jesco GmbH 12.2007
Printed in Germany