

Type T-CUT PP

Tubular/pipe modules for microfiltration
Tubular-/Rohrmodule für die Mikrofiltration
Modules tubulaires pour microfiltration



Operating Instructions

Bedienungsanleitung
Manuel d'utilisation

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Technische Änderungen vorbehalten.
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T-CUT PP – Tubular/pipe modules for microfiltration

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1 OPERATING INSTRUCTIONS

The operating instructions describe the entire life cycle of the product. Keep these instructions in a location which is easily accessible to every user and make these instructions available to every new owner of the product.

WARNING!

The operating instructions contain important safety information!

Failure to observe these instructions may result in hazardous situations.

- ▶ The operating instructions must be read and understood.

1.1 Product-specific Data Sheet

With each product, a product-specific data sheet is included containing information on the product. This information must be noted in addition to the operating instructions.

Should you no longer have the data sheet at your disposal, you can find it on the internet at: www.cut-membrane.com.

1.2 Symbols

DANGER!

Warns of an immediate danger.

- ▶ Failure to observe the warning will result in a fatal or serious injury.

WARNING!

Warns of a potentially dangerous situation.

- ▶ Failure to observe the warning may result in serious injuries or death.

CAUTION!

Warns of a possible danger.

- ▶ Failure to observe this warning may result in a moderate or minor injury.

NOTE!

Warns of damage to property.

- ▶ Failure to observe this warning may result in damage to the product or the system.

 Indicates important additional information, tips and recommendations.

 Refers to information in these operating instructions or in other documentation.

- ▶ Designates instructions for risk prevention.
- Designates a procedure which you must carry out.

1.3 Definitions of Terms

In these instructions, the term „product“ always refers to the T-CUT PP tubular/pipe module.

2 AUTHORIZED USE

Incorrect use of the T-CUT PP tubular/pipe module may be a hazard to people, nearby equipment and the environment.

- ▶ This product is designed to filter substances out of liquid media.
- ▶ The specification data, the operating conditions and conditions of use specified in the contract documents, operating instructions and product-specific data sheet must be observed during use. The designated field of application is specified in Section [“5 Product Information”](#).
- ▶ This product may only be used following detailed consultation with a representative of Bürkert Fluid Control Systems.
- ▶ Correct transportation, correct storage and installation and careful use and maintenance are essential for reliable and problem-free operation.
- ▶ Use the product only as intended.

2.1 Restrictions

If exporting the product, observe any restrictions in force.

3 BASIC SAFETY INSTRUCTIONS

These safety instructions do not make allowance for any

- contingencies and events which may arise during assembly, operation, and maintenance of the product.
- local safety regulations - the operator is responsible for observing these regulations, also in relation to the installation personnel.



DANGER!

Risk of poisoning, chemical burns, contamination from escaping medium.

- ▶ Check the product for leak-tightness prior to commencing use.
- ▶ When handling hazardous substances, always take appropriate precautionary measures and wear personal protective equipment in accordance with the requirements of the medium.
- ▶ Before disconnecting lines, the medium must be flushed from the entire system.

Risk of injury from high pressure in the system/product.

- ▶ Before working on the system or product, switch off the pressure and vent/drain the lines and product.

General hazardous situations:

To prevent injuries:

- ▶ Ensure that the system cannot be activated unintentionally.
- ▶ Installation and maintenance work may be carried out only by authorized technicians with the appropriate tools.
- ▶ After an interruption in the filtration process, ensure that the process is restarted in a controlled manner.
- ▶ The product may be operated only when in perfect condition and in consideration of the operating instructions and product-specific data sheet.
- ▶ The general rules of technology apply to application planning and operation of the product.

To prevent damage to the product:

- ▶ Protect the product from excessive exposure to UV radiation and from frost.
- ▶ Do not allow the product to come into contact with organic solvents. Remove contaminants with water or approved cleaning agents.
- ▶ Protect the product from impacts.
- ▶ Do not exceed the maximum pressure drop.
- ▶ At the maximum permitted temperature, the module must not be operated at pressures higher than those specified in the product-specific data sheet.
- ▶ Do not make any external modifications to the product.
- ▶ Pressure surges, sudden increases in the solid content of the feed, heavy cross-flow drops and temperature shocks must absolutely be avoided.
- ▶ Only feed in the media types specified in Section [“7.2.1 Compatible Media”](#) to the media connections. The use of unnamed media is the responsibility of the user.
- ▶ Do not place a physical load on the module (e.g. by placing objects on it or standing on it).

4 GENERAL INFORMATION

4.1 Contact Address

Germany

Bürkert Fluid Control Systems
CUT Membrane Technology GmbH
Feldheider Strasse 42
D-40699 Erkrath/Düsseldorf
Tel: +49 (0) 2104 - 176 32 0
Fax: +49 (0) 2104 - 176 32 22
Email: info@cut-membrane.com

International

Contact addresses can be found in the internet at: www.burkert.com

4.2 Warranty

The warranty is only valid if the T-CUT PP tubular/pipe module is used correctly in accordance with the specified usage conditions.

4.3 Information on the Internet

The operating instructions and data sheets for the T-CUT PP tubular/pipe module can be found on the Internet at:
www.cut-membrane.com

5 PRODUCT INFORMATION

5.1 Intended Use

The intended use of the T-CUT PP tubular/pipe module is to concentrate or filter medium components by separating the solvent in which they are to be found.

The T-CUT PP tubular/pipe module has been designed for media that does not attack the membrane material (refer to product-specific data sheet).



This product may only be used following detailed consultation with a representative of Bürkert Fluid Control Systems.

We recommend practical testing to support the theoretical basis for successful substance separation. Advance laboratory or pilot reference trials will provide information on the flow rates and purity of the permeate.

5.2 Handling of the Module

5.2.1 Protection against UV

Do not subject the module to long-term exposure to direct sunlight or other UV sources (e.g. UV disinfection lamps).

Store the module in a dark place.

5.2.2 Protection against Frost

Store and use the module in a place protected against frost. If the module freezes, this will damage the membrane and result in brittle fractures.

5.2.3 Protection against Solvents

If the module housing comes into contact with organic solvents, the housing may break.

To remove soiling from the housing, it should be cleaned with water or alcohol (e.g. ethanol or isopropanol).

5.2.4 Careful Transport

If the module falls or is subjected to other collisions, this may result in fractures in and on the module and on the connectors. Therefore, the module must be transported and handled with care.

6 STRUCTURE AND FILTRATION

The product is designed for the cross-flow mode. If you intend to operate the module in dead-end mode, you must consult a representative from Bürkert Fluid Control Systems.

6.1 Design of the Pipe Module

T-CUT tubular/pipe modules are modules with open flow channels (Diameter 5.5 mm per flow channel). Pipe modules are manufactured as a single pipe or in bundled configurations and are installed in housings.

The membrane is symmetrical and consists of a polymer material only. The product to be filtered flows through the pipe module at a flow rate of approx. 3–4 m/s. The ultrafiltrate (permeate) flows radially through the membrane and reaches a permeate collecting chamber from where it is discharged. The specific cross-flow rate is elementary for operation of the module and must be taken from the specific data sheet.

The major advantage of the pipe modules is their ability to achieve a high concentration without blockages even when media have a high solids content. Pipe module systems do not require any expensive prefiltration which is essential with other systems which have a thinner channel cross-section. Another major advantage of the pipe modules is that they can be cleaned thoroughly and they are extremely stable for highly concentrated acids and alkalis.



Figure 1: Pipe module

6.2 Filtration

T-CUT PP tubular/pipe modules are used mainly for cross-flow filtration. Unlike so-called dead-end filtration, which usually forms a performance-limiting filter cake, this effect is greatly reduced during cross-flow filtration by the tangential flow control of the liquid to be filtered. Suspended particles or emulsified liquids can be effectively separated by this method.

Apart from the reduction in the top layer by the flow-induced surface turbulence on the membrane surface, a recurring periodic backwashing with permeate enhances performance in many cases. In the case of amorphous top layers (waxy or gelatinous; oil films) periodic backwashing is not effective. As not all modules are suitable for backwashing on the permeate side, contact the manufacturer or consult the specific data sheet for the module.



In the case of the membrane separation method, we recommend practical testing to support the theoretical viewpoints for successful substance separation. Preliminary laboratory and pilot reference trials will provide information on the flow rates and purity of the permeate (filtrate) and therefore on the efficiency of the separation process.

6.2.1 Cross-flow Filtration

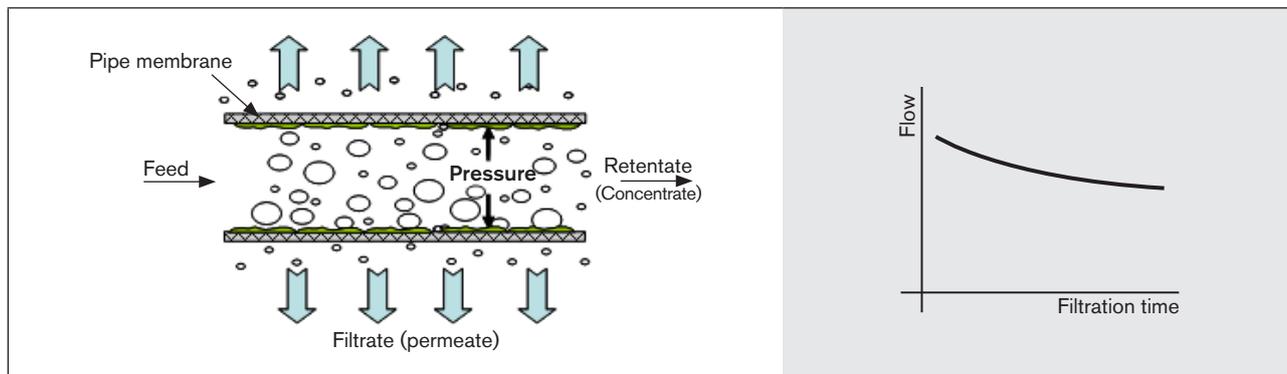


Figure 2: Cross-flow filtration

In cross-flow filtration, the product to be filtered flows through the membrane installed in the filter module. The difference in pressure between the membrane pipes which the product crosses and the filtrate void causes part of the fluid to flow as a filtrate (permeate) through the membrane. The remaining part is fed into the circuit as concentrate or retentate.

More heavily contaminated water is frequently treated using the cross-flow operation. In comparison with dead-end operation, a higher volume flow is fed into the module here. The main part of the water which is fed in washes over the membrane (cross-flow) and is recirculated. The resulting flow and turbulence reduces the formation of a covering layer and ensures a consistent permeate output.

To avoid concentration and to reduce the backwashing frequency, some of the recirculating water is discharged.

6.2.2 Trans-membrane Pressure

The trans-membrane pressure is identified by the pressure loss over the module.

Drop in pressure through the module: $\Delta p = p_{IN} - p_{OUT}$

Trans-membrane pressure:
$$p_{TMP} = \frac{p_{IN} + p_{OUT}}{2} - p_{Perm}$$

The permeate flow increases with the trans-membrane pressure.

Please note that while high trans-membrane pressures produce a thicker and denser covering layer, the permeate flow increases only slightly and membrane fouling may result in a decline in the permeate flow in the long term.

Therefore, while moderate trans-membrane pressures mean that there are no peak permeate flow rates at the start phase of filtration, this will pay off in the form of high and stable permeate flow rates in the long term.

6.2.3 Cross-flow Rates

Higher cross-flow rates will limit the thickness of the developing covering layer and enable the flow rate of the permeate to be kept high.

The standard flow rate (cross-flow rate) per module can be found in the specific data sheet. The cross-flow rate of 3–4 m/s is usually indicated here. The optimum flow rates for membrane applications will vary and are dependent on the composition of the fluid to be filtered.

7 TECHNICAL DATA

7.1 Product Data

Please refer to the product-specific data sheet for the product data.

7.2 Operating and Usage Conditions

In order to monitor the flow rate and pressure for the membrane application, the system must be fitted with control valves for cross-flow, pressure control etc.

When planning and constructing a membrane system, ensure that the module is not exposed to any external mechanical loads. By using flexible supply lines, vibrations and thermal material expansion of the pipes and the module can be absorbed without damaging the module (in particular the connections).

NOTE!

- The operating conditions (cross-flow and trans-membrane pressure) are dependent on the specific filtration application and should be optimized by means of laboratory or pilot tests!
- The limit values for pressure and temperature must not be exceeded.
- The ambient temperature must not exceed the medium temperature and must not give rise to frost.

Please refer to the product-specific data sheet for further information on operating and usage conditions.

7.2.1 Compatible Media

Aqueous media (within certain pH and temperature ranges – please refer to product-specific data sheet for precise information).

When using media not specified in the product-specific data sheets, please consult a representative of Bürkert Fluid Control Systems beforehand. The use of unnamed media without such prior consultation is the responsibility of the user.

Never expose the module to media which contain free chlorine.

8 INSTALLATION

8.1 Safety Instructions



DANGER!

Risk of poisoning, chemical burns, contamination from escaping medium.

- ▶ Check the product for leak-tightness prior to commencing use.
- ▶ When handling hazardous substances, always take appropriate precautionary measures and wear personal protective equipment in accordance with the requirements of the medium.
- ▶ Before disconnecting lines, the medium must be flushed from the entire system.

Risk of injury from high pressure in the system/product.

- ▶ Before working on the system or product, switch off the pressure and vent/drain the lines.



WARNING!

Risk of injury from improper installation.

- ▶ Installation may be carried out by authorized technicians only and with the appropriate tools.

Risk of injury from unintentional activation of the system and uncontrolled restart.

- ▶ Secure system against unintentional activation.
- ▶ Following installation, ensure a controlled restart.

8.2 Before Installation

- Only remove the module from its packaging immediately before installing it in the system. Once removed from the packaging, the module must be treated with particular care.
- Examine the module for any external physical damage.
- Clean the system and pipelines to ensure that soiling and oily substances cannot be flushed into the module from the system.

New modules are supplied dry or filled with a preservative fluid.

8.2.1 Modules supplied dry

Polypropylene as a membrane-forming polymer is hydrophobic, i.e. liquids which have a high surface tension (e.g. water) do not penetrate the membrane under normal pressure. Modules supplied dry must therefore be wetted before they are operated for the first time with liquid:

Wetting the modules using pressure

- Fill both sides of the module with bubble-free water outside or in the equipment.
- Pressurize both sides of the module for 1 minute to 6 bar pressure.
- Drain module.

Repeat this process twice; the module is then wetted. Secondary flushing is not required.

Wetting the modules using isopropanol

Liquids which can be used are e.g.

- mixture of water and **at least** 50 % vol. isopropanol
 - mixture of water and **at least** 25 % vol. tert-butanol (this mixture is not flammable)
- Fill both sides of the module with bubble-free liquid outside or in the equipment.
- Flush module again with water or with the solution to be filtered.

The water has then wetted the membrane; the module can now be used.



If neither of the wetting options is possible for your application, please contact a representative of Bürkert Fluid Control Systems.

8.2.2 Modules with preservative liquid

Pre-wetted modules can be supplied when calculating the cost. The preservative must be flushed out with water when starting up the equipment.

As long as the PP membrane remains in the liquid, the membrane is activated. If the membrane dries out, it must be re-activated using one of the methods described. Drying does not change the separation characteristics of the membrane.

In the case of highly gas-emitting liquids, a counterpressure must be built up on the permeate side to prevent degasification of the liquid.

If some of the permeate from the storage tank is forced back with a compressed gas (e.g. air) during back-washing, ensure that no gas is forced through the membrane.

8.3 Installation in a Filtration System

NOTE!

Risk of material breaking.

- ▶ Attach and connect the module in such a way that vibrations from the system cannot be transferred to the module.

The module must be attached horizontally on the frame of the filtration system by a holder (e.g. 2 clamps).

It is not adequate to attach the module by the connections only.

Modules less than 2,000 mm in length should be installed preferably upright.

- Check the seals to ensure that they are clean. Only use clean seals.
- **Loosely** connect the feed inlet first, then the concentrate outlet, and finally the permeate outlets of the pipe.
- Ensure that the seals are not displaced when establishing the connections.
- Check that none of the connections is subject to mechanical stresses.
- Check that the seals are seated correctly.
- Alternately tighten the connections.

NOTE!

Damage to the connections.

- ▶ Do not use force to tighten the connections! Use of excessive force in tightening may cause fractures in the connections.

9 PREPARATION FOR USE

These instructions are limited to the correct treatment of the T-CUT PP tubular/pipe module. Please refer to the operating instructions of the filtration system to prepare the filtration system for use safely and securely.

9.1 Safety Instructions



DANGER!

Risk of poisoning, chemical burns, contamination from escaping medium.

- ▶ When handling hazardous substances, always take appropriate precautionary measures and wear personal protective equipment in accordance with the requirements of the medium.
- ▶ Before disconnecting lines, the medium must be flushed from the entire system.

Risk of injury from improper operation.

Improper operation may result in injuries as well as damage to the product and the surrounding area.

- ▶ Before start-up, ensure that the operating personnel are familiar with and completely understand the contents of the operating instructions.
- ▶ Observe the safety instructions and intended use.
- ▶ Only adequately trained personnel may start up the equipment/the product.



Compared to pumps and pipelines, the membrane in the filtration system is a relatively sensitive component. Therefore, every effort should be made when planning and operating the system to avoid pressure surges, sudden increases in the solid content of the feed, heavy cross-flow drops and temperature shocks. Pressure surges and vibrations in particular may damage the module and impair its performance.

NOTE!

Damage to the Module.

- ▶ Do not exceed the value specified in the product-specific data sheet for the maximum backwashing pressure on the permeate side.
- ▶ Media with non-permissible pH values, oxidants or other products that would attack the membrane must not be used (please refer to the data sheet for compatible media – alternatively, contact a representative of Bürkert Fluid Control Systems).
- ▶ Do not exceed the maximum pressure drop.
- ▶ At the maximum permitted temperature, the module may only be operated at permitted pressure values (please refer to product-specific data sheet).
- ▶ We recommend keeping the pressure at the module outlet to at least 0.5 bar. The filtration system must be designed so that negative pressure cannot arise in the feed chamber.
- ▶ The limit values for pressure and cross-flow rate must not be exceeded.
- ▶ Quickly opening the valves may cause pressure surges, damaging the module.

9.2 Prior to Preparation for Use

If modules are pre-wetted, the modules should be flushed with water for 15 minutes before they are operated for the first time in order to convey residual preservative fluid out of the module. Then the water flow can be determined or transferred immediately for filtration.

Irrespective of whether the system is used for **rinsing**, **filtering** or **cleaning**, please proceed as described below in "9.3 Filtration".



CAUTION!

Mildly toxic preservative fluid.

- ▶ Avoid contact with eyes and skin.



The water used for flushing purposes must satisfy certain purity requirements. These are product-specific and must be inquired about.

Any concentrate and permeate generated during rinsing will be rejected. Please observe any applicable national environmental regulations.

9.2.1 Determining the Water Flow Rate

The water flow rate is the maximum achievable permeate flow rate for a certain trans-membrane pressure value. As no separation of substances takes place at the membrane, no covering layer will develop and the permeate flow rate is determined solely by the hydrodynamic properties of the membrane.

The effectiveness of cleaning the membrane can be defined by measuring the water flow rate before and after cleaning and then comparing both measurements.

The use of demineralized water, pre-filtered to 10 µm, is recommended for determining the water flow rate.

Please consult a representative of Bürkert Fluid Control Systems if you wish to use tap water.



To avoid pressure surges, we recommend operating the module for around 2 minutes at low pressure before gradually increasing the pressure to the recommended values (refer to product-specific data sheet).

9.3 Filtration

→ Ensure that the permeate can flow out at zero pressure (open permeate valve(s)!).

When using centrifugal pumps for the feed:

→ Close the feed valve

→ Open the concentrate outlet valve

When using displacement pumps for the feed:

→ Leave the feed valve **slightly open**

→ Open the concentrate outlet valve

With either type of pump:

→ Switch on pump. Select low frequency for speed-controlled pump.

→ Open feed valve **deliberately slowly** to avoid pressure surges when deaerating the system.



The limit values for pressure and cross-flow rate must not be exceeded.

→ Ensure that the entire system (in particular the permeate areas of the modules) is deaerated.

→ Gradually increase the cross-flow rate and rinsing water pressure by carefully opening the feed valve further.

→ Adjust the trans-membrane pressure by carefully and gradually closing the valve on the concentrate outlet (pressure sustaining valve).

→ Check connections of the module for leaks. If leaks are determined, stop the operation and take countermeasures (if the seal is correctly positioned, it is usually adequate to tighten the clamps hand-tight).

NOTE!

Damage to the connections.

- ▶ If the surfaces of the seals on the connector and supply line are not flat on top of one another, do not use excessive force to tighten the connecting elements to ensure leak-tightness. Using excessive force may cause the connections to break.

→ After rinsing, drain the system and start filtration.



There is usually the option of measuring the pressure drop through the module and the cross-flow rate of the module from the system.

If the cross-flow rate of the module cannot be measured, the operating point is simply adjusted by slowly increasing the pressure drop to its recommended value.

In any case, the concentrate outlet valve (pressure sustaining valve) must be closed enough for the concentrate pressure on the module outlet to always be greater than 0.5 bar.

The cross-flow rate specified in the data sheets for the recommended pressure drop applies to water (temperature 25 °C, viscosity 1 mPas). Please note that the maximum permissible pressure drop with feed solutions of a higher viscosity is reached with a considerably lower cross-flow rate.



Please consult a representative of Bürkert Fluid Control Systems if you have questions surrounding the preparation of the module for use.

10 CLEANING AND MAINTENANCE

Fouling of the membrane surface may result in a decline in the flow rate of the permeate. In most cases, the coatings can be removed from the membrane and the permeate flow rate can be for the most part restored.

The cleaning procedure must take into consideration the type of fouling and the resilience of the module type in question.



The ideal cleaning method should be determined by means of pre-trials. As an alternative to commercial cleaning agents, the pH value can also be modified during the cleaning phase with the use of lyes or acids.

Only use the cleaning agents recommended by us in Section [“12 Recommended auxiliary materials”](#). Please contact our technical support service before using cleaning agents not listed in these operating instructions.

Cleaning is generally conducted under the stress limits of the module. Therefore, each cleaning activity reduces the life of the module.

10.1 Cleaning Methods

10.1.1 Cleaning by Water Circulation

- Flush residual process solution out of the pipelines and the module by rinsing with DI water and convey out of the system via the concentrate outlet.
- Switch off feed pump, drain system.
- Fill feed tank with DI water.
- Switch valves in the system so that concentrate and permeate are fed back into the feed tank (cleaning mode).
- Leave water to circulate in the system for approx. 20 min. An increased cross-flow rate and temperature will improve the cleaning effect. However, the maximum permitted values for module inlet pressure and temperature must not be exceeded.
- Drain the system.

If cleaning with water does not produce the expected results, the system can then be chemically cleaned.

10.1.2 Chemical Cleaning

NOTE!

Damage to the diaphragm.

- ▶ Never expose the module to media which contain free chlorine.

The system can be chemically cleaned once a week up to once a year depending on the raw water quality. Chemical cleaning can be performed under cross-flow conditions or statically by filling the permeate area.

- Add a cleaning agent – see [“12 Recommended auxiliary materials”](#) – or different chemicals such as acids, alkalis or surfactants to the cleaning circuit.
- Type and amount of cleaning agent must be determined in preliminary tests and is the responsibility of the user.

The option of cross-flow cleaning prevents a gradual blockage of the membrane.

10.1.3 Cleaning by feed reversal

If pre-filtration is inadequate or concentration is impermissibly high, the pipe membranes at the feed inlet may become blocked. In particular, fibrous materials and particles, which are larger than the inner diameter of the membrane, may significantly reduce the effectiveness of the separating process. For this cleaning method it is not usually necessary to interrupt filtration operation. To obtain especially good cleaning effects, this method can be used in combination with backwashing.

10.1.4 Backwashing with permeate

The backwashing pump pumps permeate through the membrane opposite to the filtration direction. Backwashing is used to detach material (fouling), which has adhered to the surface of the diaphragm, and to remove it from the system through the concentrate outlet.

Backwashing frequency depends on the solids content of the raw water and its fouling properties. The frequency varies between four times an hour and once a day (for very clean raw water).

Only MF filtrate (permeate) may be used for backwashing! To improve backwashing efficiency, chemicals compatible with the diaphragm (e.g. alkali or acid) can be added to the backwash water.

Instead of backwashing with a pump, a gentle backwashing effect can also be obtained at the concentrate outlet by closing the permeate outlets. However, this process may be used only on modules which can be backwashed (particularly in systems with feed reversal).

10.1.5 Soaking with Chemicals

In the microfiltration of water with high concentrations of organic material, regular soaking with chemicals may be required in addition to backwashing. This step occurs every 4 to 10 hours.

In doing so, the module is filled with a chemical solution by backwashing. Permeate with acid up to pH 2 or alkali up to pH 11 is used for this. The solution remains in the module for 5 to 15 minutes and is then removed by backwashing (static cleaning).

10.2 Water for Flushing and Diluting/Dilution

Water used for flushing and diluting/dilution is subject to certain requirements that must be met:

- free of particles
- low hardness
- partially deionized

10.3 Maintenance

No maintenance is necessary. The product may need to be cleaned in accordance with "[10.1 Cleaning Methods](#)".

If the permeate flow rate and separation characteristics can no longer be restored by cleaning the module, the product has reached the end of its service life.

To order new T-CUT tubular/pipe modules, please contact a representative of Bürkert Fluid Control Systems.

11 DISASSEMBLY



DANGER!

Risk of poisoning, chemical burns, contamination from escaping medium.

- ▶ When handling hazardous substances, always take appropriate precautionary measures and wear personal protective equipment in accordance with the requirements of the medium.
- ▶ Before disconnecting lines, the medium must be flushed from the entire system.

Risk of injury from high pressure in the system/product.

- ▶ Before working on the system or product, switch off the pressure and vent/drain the lines.

Risk of injury from improper disassembly.

Improper disassembly may result in injuries as well as damage to the product and the area around it.

- ▶ Before removal, ensure that the operating personnel are familiar with and completely understand the contents of the operating instructions.
- ▶ Observe the safety instructions and intended use.
- ▶ Only adequately trained personnel may remove the product.



If the T-CUT PP tubular/pipe module is to be used further after removal, certain conditions must be adhered to regarding storage (refer to ["13 Non-use/Module Storage"](#)).

Procedure:

- Completely drain the system.
- Flush out the rest of the feed solution with water (normal cold tap water) until the concentrate is clear.
- Flush the entire system for 20 minutes using warm water. Any concentrate or permeate generated is to be disposed of.
- Completely drain the system.
- Disconnect the connections.
- Remove the product.



Please consult a representative of Bürkert Fluid Control Systems if you have any questions.

12 RECOMMENDED AUXILIARY MATERIALS

We recommend the use of the following substances for the installation, disinfection and cleaning of the T-CUT PP tubular/pipe module.

Use	Product	Manufacturer
Lubricant	Glycerin anhydrous, suitable for DI use as excipient emprove EXP PH EU	
Disinfectant	Sodium metabisulfite 1.0%	
	Formalin 0.5%	
	Propanoic acid 1.0%	
Cleaning agent	LiquiCUT	CUT Membrane Technology GmbH www.cut-membrane.com

13 NON-USE/MODULE STORAGE

13.1 Unused Products

NOTE!

Incorrect storage may damage the product.

- ▶ Store product horizontally in a dark and frost-protected room.
- ▶ Storage temperature 5 ... 30 °C.
- ▶ Use only DI water to make preservative solutions.

The T-CUT tubular/pipe module is well packed and supplied with sealed connections. Please store the unused module in this sealed bag, unopened.

13.2 Used Products

To inhibit bacterial growth during periods of non-use or module storage, moist membranes should be rinsed using suitable disinfectants (refer to [“12 Recommended auxiliary materials”](#)).

We recommend storing the module inside the system.

13.2.1 Short-term Storage

Non-use up to 24 hours

→ No measures required.

Non-use between 24 hours and 7 days

→ Carefully rinse the module with disinfectant (please refer to [“12 Recommended auxiliary materials”](#)).

→ Perform a filtration once a day using clean water, permeate or cleaning agent.

13.2.2 Long-term Storage

Non-use between 7 days and 12 months

→ Clean the module prior to disinfection (refer to [“10.1 Cleaning Methods”](#)).

→ Fill module with 1.0 % caustic soda. Causing a brief and slight cross-flow through the modules will ensure that the permeate chamber is completely filled with preservative solution.

→ Leave the fluid in the module.

Non-use Lasting Several Months/Years

→ Clean the module prior to disinfection (refer to [“10.1 Cleaning Methods”](#)).

→ Fill the entire system with 1.0 % caustic soda, leave the fluid in the module.

14 RETURNING A MODULE

Please contact a representative of Bürkert Fluid Control Systems before sending back a module.

Prepare the module as if you were preparing it for long-term storage (“13.2.2 Long-term Storage”). Send the module well-packed to Bürkert Fluid Control Systems with an enclosed written statement of the faults identified.

15 PACKAGING AND TRANSPORT

NOTE!

Transport damage.

Inadequately protected products may be damaged during transportation.

- ▶ Protect the product against light, moisture and dirt in shock-resistant packaging during transportation.
- ▶ Prevent the temperature from exceeding or dropping below the permitted storage temperature.
- ▶ Storage temperature 5 ... 30 °C.

Damage to the environment caused by parts of the product contaminated with media.

- ▶ Dispose of the product and packaging in an environmentally friendly manner.
- ▶ Observe applicable waste disposal and environmental regulations.

