

Installation instructions for the spiral membrane module box

Type: DS10-30

Status: 10/2020



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1 INTRODUCTION:

The installation instructions contain the most important instructions and information for the use of the product. Keep the installation instructions safely so that they are accessible for all users and available to any new owner of the product.

The **German installation instructions** can be found in the internet at: www.spiraltecgbh.com/de/download. The **English installation instructions** can be found in the internet at: www.spiraltecgbh.com/en/downloads-en.

1.1 Terminology:

The terms 'product' or 'module box' used in these instructions always refer to the spiral membrane module box DS10-30 containing spiral membrane module of the series WD-AR10, further also called membrane module, made by Spiraltec GmbH. The term 'system' in these instructions always stands for the peripheral equipment provided by the operator for the supply and operation of the spiral membrane module box.

1.2 Product-specific datasheet:

A **product-specific datasheet** with information for the product is enclosed with every product. These instructions must be observed. The **module specific datasheet and general safety instructions** must also be observed. If you no longer have the datasheet, you can find it in the internet at: www.spiraltecgbh.com/en/downloads-en.

1.3 Presentation:

The following presentation styles are used in these instructions:



DANGER!

Warns of immediate danger!
Disregard results in death or severe injuries.



WARNING!

Warns of a potentially dangerous situation.
Disregard can result in serious death or injuries.



CAUTION!

Warns of a potential hazard.
Disregard can result in moderate or minor injuries.

NOTE:

(Warns of property damage).

REFERS TO INFORMATION IN THESE INSTALLATION INSTRUCTIONS OR IN OTHER DOCUMENTATION.

- Indicates a general explanation.
- > Indicates an instruction for avoiding a hazard, which you must observe.

WARNING!



Important information for safety. Read through the installation instructions carefully. First and foremost, observe the 'Proper intended use' and 'Basic safety instructions' chapters.

The installation instructions must be read and understood.

2. PROPER INTENDED USE:

In the event of improper use of the spiral membrane module box DS10-30, this could represent a hazard for persons, systems in the vicinity and for the environment.

- The product is designed for the partition of metallic salts from free acids from process baths.
- For deployment, the operating and usage conditions specified in the contractual documentation, the product-specific datasheet and the module-specific datasheet must be observed.
- Prerequisites for the faultless and safe operation are proper transportation, storage and installation as well as careful operation and maintenance.
- Only use the product in accordance with its proper intended use.

3. BASIC SAFETY INSTRUCTIONS:

These safety instructions do not take into account

- Coincidental or random eventualities that could arise during the installation, operation or maintenance of the product.
- Location-specific safety provisions where the operator is responsible for compliance, also in relation to operating personnel.

DANGER!



Danger of injury through high pressure in the system/product.

- Before working on the system or product, shut off the pressure and empty the product and lines.



DANGER!

Intoxication, chemical burns, contamination due to media escape.

- > Check the product for leaks before commissioning.
- > With hazardous media, ensure that corresponding protective measures are implemented and wear personal protective equipment in accordance with the requirements of the media.
- > Before loosening lines, ensure that the medium has been flushed out of the whole system.

General hazard situations:

The following must be observed to avoid injuries:

- > The product may only be used in perfect condition.
- > Installation work shall be performed only by authorised specialist personnel with suitable tools.
- > After an interruption in the diffusion dialysis processes, a controlled re-start of the system must be assured.
- > Comply with general good engineering practise when operating the product.

The following must be observed to avoid damage to the product:

- > Protect the product from UV radiation and frost.
- > Ensure that the product does not come into contact with organic substances.
- > Do not subject the product to shocks.
- > Always keep the membrane modules moist after filling.
- > Do not exceed the maximum operating pressure.
- > Avoid pressure being applied on a single side.
- > Do not exceed the maximum operating temperature.
- > Do not carry out any external alterations to the product.
- > Do not apply mechanical loads to the product (e.g. do not use it as a step).
- > Only media listed in chapter 5.3 shall be fed into the media connections.
Use of unlisted media is the sole responsibility of the user.
- > Avoid mixing up the media connections.

4. GENERAL INFORMATION:

4.1 Contact address:

Spiraltec GmbH

Heinzenberger Weg 34
74343 Sachsenheim
Germany

Technical Support: +49 7147 9670 204
E-Mail: info@spiraltecgmbh.de
www.spiraltecgmbh.com

4.2 Warranty:

Prerequisite for the warranty is the proper use of the product under consideration of the specified conditions of use (see Chapter 2 Intended Use). Any other or additional use is considered improper. No liability can be assumed for damage resulting from this or thorough improper use.

Structural changes to the product:

- > No changes or modifications may be made to the product without the approval of Spiraltec GmbH.
- > Only with spare parts that are obtained from Spiraltec GmbH the function and the resistance in the product can be guaranteed.
- > In principle, our "General Terms and Conditions of Sale" apply, which can be downloaded at the following address: www.spiraltecgmbh.com/en/downloads-en. These are available to the operator at the latest when the contract is signed. Warranty and liability claims for personal injury and property damage are excluded if they can be traced back to one or more of the following causes, such as:
 - Improper use of the product or product parts.
 - Improper assembly, commissioning, operation and maintenance of the product.
 - Operating the product with defective safety devices or improperly fitting or non-functional safety and protection devices.
 - Inobservance the valid rules of technology and / or instructions in the assembly instructions regarding transport, storage, assembly, commissioning, operation and maintenance of the product.
 - Unauthorized structural changes to the product or product parts.
 - Inadequate monitoring of product parts that are subject to wear and tear or regular subject to maintenance.
 - Use of media other than those intended.

- Disasters caused by the effects of foreign bodies and force majeure.
- Operation of the system by untrained or uninstructed personnel.

4.3 Information on the Internet:

Installation instructions, *product-specific datasheets* and *module-specific datasheets* can be found in the internet at: www.spiraltecgbmh.com/en/downloads-en.

5. TECHNICAL DATA:

5.1 Product data:

For product data, please refer to the *product-specific datasheet* and the *module-specific datasheet*.

5.2 Conditions for operation and service:

NOTE:

- > The operating conditions (flow rates, operating pressures) are dependent on the respective application and should be defined and optimised at laboratory and pilot scale!
- > The limit values for operating pressure and operating temperature shall not be exceeded.
- > Ambient temperature not higher than operating temperature, always frost-free.

Please refer to the *product-specific datasheet* for further information on the conditions for operation and service.

5.3 Suitable media:

If using media that are not cited on the *product-specific datasheet*, please consult with a representative of Spiraltec GmbH beforehand.

In the event of unlisted media being used without prior consultation, the responsibility lies with the operator and the warranty for the product is voided!

5.4 Forbidden media:

- Organic liquids (e.g. solvents)
- Oxidants (e.g. H₂O₂)
- Liquids with particles > 10 µm
- There may be additional media on the *module-specific datasheet*

6. INSTALLATION AND COMMISSIONING:

Danger!



Intoxication, chemical burns, contamination due to media escape.

- > Check the product for leaks before commissioning.
- > With hazardous media, ensure that corresponding protective measures are implemented and wear personal protective equipment in accordance with the requirements of the media.
- > Before loosening lines, ensure that the medium has been flushed out of the whole system.



Danger of injury through high pressure in the system/product.

- > Before working on the system or product, shut off the pressure and empty the lines.

Risk of injury due to improper operation.

Improper operation can lead to injuries as well as damage to the product and its surroundings.



- > Before commissioning, it is necessary to guarantee that the operating personnel are familiar with the content of the installation instructions and that they understand these fully.
- > The safety instructions and the proper intended use must be observed.
- > Only appropriately trained personnel are permitted to commission the system/product.

Warning!



Risk of injury with improper installation.

- > Installation work shall be performed only by authorised specialist personnel with suitable tools.

Danger of injury through switching the system on unintentionally and uncontrolled re-start.

- > Secure the system from unintentional actuation.
- > After the installation, ensure that the re-start is carried out in a controlled manner.

6.1 Before installation:

- Check the product for external mechanical damage.
- Remove transport locks. To do this, all sides must be freely accessible (refer to chapter 6.2).
- New spiral membrane modules are delivered dry and are already installed in the module box.
- Ensure a secure footing: Only set up the module box on a flat surface. If this is not the case, the height of the optionally available adjustable feet must be adjusted or the module box must be underlaid.

6.2 Removal of the transport locks:



Figure 1: Open module box with transport locks



Figure 2: Removal of transport lock

- Remove the rear transparent cover and both side plates by loosening the screws (2.5mm allen key).
- First remove the cardboard boxes between the side wall and the spiral membrane modules (on both sides).
- Remove the drain cocks.
- Carefully pull out the cardboard boxes between the middle wall and the spiral membrane modules (on both sides) through the opening in the back.
- Refit the drain cocks.
- Check the position of all ball cocks and open or close if necessary (refer to section 6.3).
- Reassemble the rear transparent cover and side plates (tighten the screws by hand only).

6.3 Various setup variants:

Depending on the connections described, the product can be integrated into the system in various variants. The system builder/operator must always ensure that the system is operating safely. The following general principles apply to all variants:

1. DI water (in)
2. Feed (in)
 - 1.1 Diffusate (out)
 - 2.2 Dialysate (out)



Figure 3: Connections module box

- > Ensure that the module box is connected in accordance with the labelling.
- > Ensure that the diffusate (connection 1.1) and the dialysate (connection 2.2) are able to flow out without pressure. Observe the geodetic altitude when carrying out piping work.
- > Minimum diameter of drain pipes: DN 15mm.
- > Drain valves V4.1 and V4.2 must be closed.

6.3.1 Connection variants for individual module boxes:



Figure 4: Connection variant A



Figure 5: Connection variant B

The individual variants can also be connected back-to-front.

6.3.2 Connection variants for multiple module boxes:

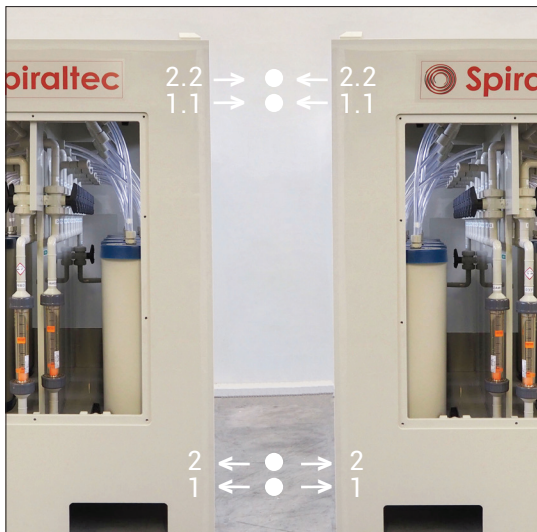


Figure 6: Variant 1 (module boxes side by side)



Figure 7: Variant 2 (module boxes stacked)

Further variants are possible in consultation with Spiraltec GmbH.

6.4 Before commissioning:

NO organic substances (e.g. oils) and NO particles > 10 microns are permitted to enter the spiral membrane module box. The operator must provide suitable prefiltration upstream of the inlet to the spiral membrane module box.

6.4.1 Filling a module box:

- > Depending on the connection variant, the following ball cocks within the module box must be opened at the connections:

Variant A: V0.1; V0.2; V3.1; V3.2

Variant B: V0.3; V0.4; V3.1; V3.2

Variant 1: V0.1; V0.2; V3.1; V3.2 (Module box 1)
V0.3; V0.4; V3.3; V3.4 (Module box 2)

Variant 2: V0.1; V0.2; V3.3; V3.4 (Module box 1)
V0.1; V0.2; V3.3; V3.4 (Module box 2)

- > The DI water channel (connection 1) and the feed channel (connection 2) must be filled simultaneously.
- > Venting the spiral membrane module box: The displaced air must be able to escape without hindrance via outputs 1.1 and 2.2.
- > The spiral membrane modules must be left filled for ca. 48 hours to condition the membrane film. In doing so, it is essential that the module box outputs remain open as otherwise pressure will build up in the individual spiral membrane modules and this will destroy the module.
- > After the initial filling, the interior of the spiral membrane module must remain damp throughout the whole of its service life.



Figure 8: Open inlet valve V0.1 and V0.2



Figure 9: Open outlet valve V3.1 and V3.2

6.4.2 Emptying a module box:

- > To empty the module box, remove the rear transparent cover.
- > Close ball cocks V0.1 to V0.4 at the inputs.
- > By opening ball cock V4.1 the DI water can be drained into the piping.
- > By opening ball cock V4.2 the feed can be drained into the piping.
Attention, acid!
- > Dispose of drained media in accordance with legal regulations.
- > Then close ball cocks V4.1 and V4.2 again.



Figure 10: Draining the liquids

6.5 Operation of a module box:

- > Ensure that the diffusate (connection 1.1) and the dialysate (connection 2.2) are able to flow out without pressure.
- > Avoid single-sided flow through the spiral membrane modules.
- > The prescribed limit values for operating pressure and operating temperature shall not be exceeded!
- > Recommended pre-pressure at the DI water and feed inputs to the module box: 1.8 - 2.2 bar.
- > The flow rates are determined by the flow limiters used. The nominal flow rate is reached from an operating pressure of 1.8 bar. In the pressure range from 1.0 bar to 1.8 bar it is possible to regulate the flow rates slightly. This must be carried out by on-site services. The prescribed limit values for operating pressure and operating temperature must be observed!

- The maximum performance of the module box is only reached after the stationary phase has been reached. This occurs approximately 90 minutes after the system starts up. Constant starting and stopping of the system should therefore be avoided.

7. MAINTENANCE/SERVICE:

7.1 Regular checks:

With every system start:

- Check the system for leaks. Small leaks in the hose connections can be rectified directly by retightening the compression fittings.

Weekly checks:

- Check the crap screw connections on the ball cocks for leaks and tighten them if necessary.
- Check the performance of the spiral membrane modules by analysis of diffusate and dialysate.
- Check all hoses for embrittlement and crack formation and replace them if necessary.

Hoses:

- The PVC hoses must be replaced every 2 years or when required. For safety reasons, whenever any damage is detected on a hose, all hoses must be replaced.

Service contract:

- If a service contract has been concluded with Spiraltec GmbH, the hoses will be replaced by employees of Spiraltec GmbH. The materials required for this will be invoiced.

7.2 Replacing the flow limiters:

The individual spiral membrane modules are maintenance-free. However, it should be noted that impurities (particles) in the media can block the flow limiters. This leads to a drop in flow at individual spiral membrane modules and results in reduced performance. In extreme cases, this can also lead to damage to the affected spiral membrane module. Should this be the case, the affected flow limiters must be removed and flushed.

On a freely accessible module box:

DI water side:

- > Close DI water inlets V0.1 and V0.3.
- > Open DI water drain cock V4.1 and unconnected DI water inlet to empty the pipeline.
Place suitable containers underneath first.
- > Close stop cocks V1.1 - V1.10 above the flow limiters.
- > Then open all lower screw cap fittings on the flow limiter.
- > Loosen the upper screw cap fitting on valve V4.1 (if necessary, loosen the fastening screws on the ball cock (see figure 12)) and the upper screw cap fitting on the rotameter.
- > Remove the entire pipe strip with the flow limiters through the rear opening.
- > Remove the appropriate flow limiter and carefully backflush it (see Figure 13/14).
- > Then reinsert the flow limiter. When doing so, observe the direction of flow.
- > Reinsert the pipe strip and retighten all screw cap fittings.
- > Open all ball cocks relevant for operation.
- > Check for leaks during reoperation and tighten the screw cap fittings if necessary.

Feed side:

- > Close feed inlets V0.2 and V0.4.
- > Open feed drain cock V4.2 and unconnected feed inlet to empty the pipeline.
Place suitable containers underneath first. Attention, acid is escaping!
- > Close stop cocks V2.1 - V2.10 above the flow limiters.
- > Connect DI water to the open input and flush the pipeline.
- > Drain rinse water and dispose of it properly.
- > Then open all lower screw cap fittings on the flow limiter.
- > Loosen the upper screw cap fitting on valve V4.2 (if necessary, loosen the fastening screws on the ball cock (see figure 12)) and the upper screw cap fitting on the rotameter.
- > Remove the entire pipe strip with the flow limiters through the rear opening.
- > Remove the appropriate flow limiter and carefully backflush it (see figure 13/14).
- > Then reinsert the flow limiter. When doing so, observe the direction of flow.
- > Reinsert the pipe strip and retighten all screw cap fittings.

- Open all ball cocks relevant for operation.
- Check for leaks during reoperation and tighten the screw cap fittings if necessary.



Figure 11: Loosening screw caps



Figure 12: Mounting drain valves



Figure 13: Inserted flow restrictor

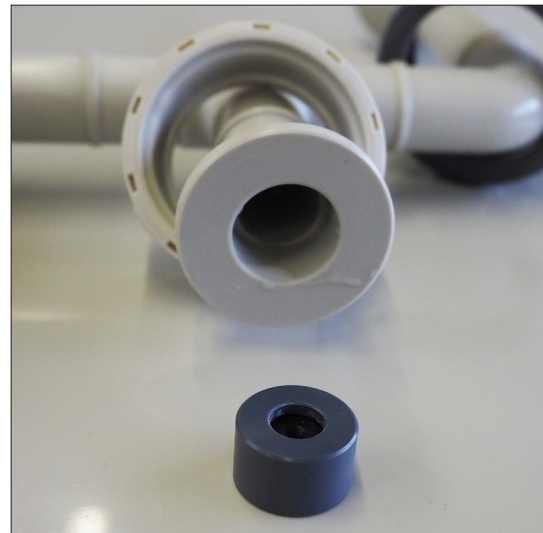


Figure 14: Removed flow restrictor

7.3 Replacing the spiral membrane modules:

When working on the module box, the prescribed protective equipment must be worn in accordance with the safety datasheet of the medium!

Before individual spiral membrane modules can be replaced, the entire module box must be rinsed with DI water. Proceed as follows to flush the module box:

- > Close the feed inlet and the diffusate drain.
- > Connect DI water to the free feed input.
- > Connect the free diffusate and dialysate outputs together (or collect the splash water at the free diffusate output in a separate container).
- > Open the 3 corresponding ball cocks of the inputs/outputs for flushing.
- > Flush the module box for at least 120 minutes.
- > Empty the module box as completely as possible.

Exchange of spiral membrane modules:

- > Open the corresponding side cover.
- > Loosen the compression fittings on the spiral membrane module to be replaced and remove the individual hoses. **Attention, medium is escaping!**
- > Remove the spiral membrane module from the module box and unscrew the compression fittings. **Attention, the spiral membrane module is still filled with medium!**
- > Empty spiral membrane modules by turning them upside down until they stop dripping and dispose of them properly in accordance with legal regulations.
- > Open the sealing plugs on the new spiral membrane module.
- > Screw the compression fittings with the new seal (located at the sealing plug, see figure 18) into the spiral membrane module.
- > Insert the new spiral membrane module (observe connection direction).
- > Connect the hoses as per the inscription and hand-tighten with the compression fitting.
- > Seal the old spiral membrane module with the old seals and the sealing plug. Dispose of the old spiral membrane module properly, paying attention to legislative provisions!
- > Start the system as usual.
- > After recommissioning, check the connections for leaks (tighten the connections if there are leaks).
- > Close the side cover again.

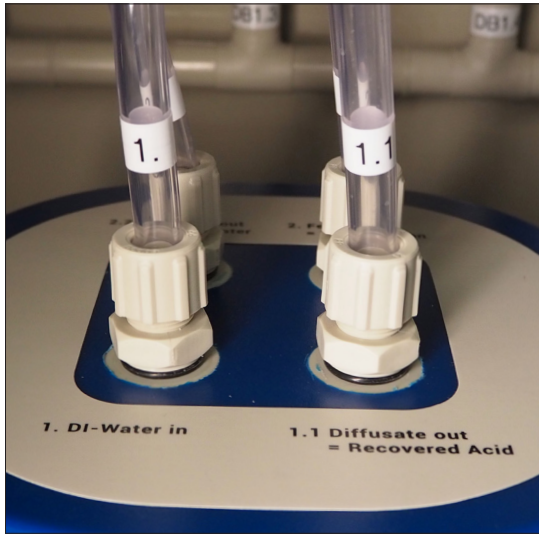


Figure 15: Connected membrane module

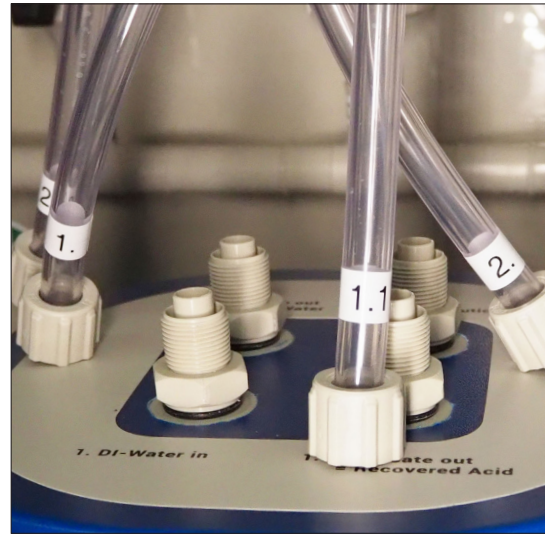


Figure 16: Disconnected membrane module

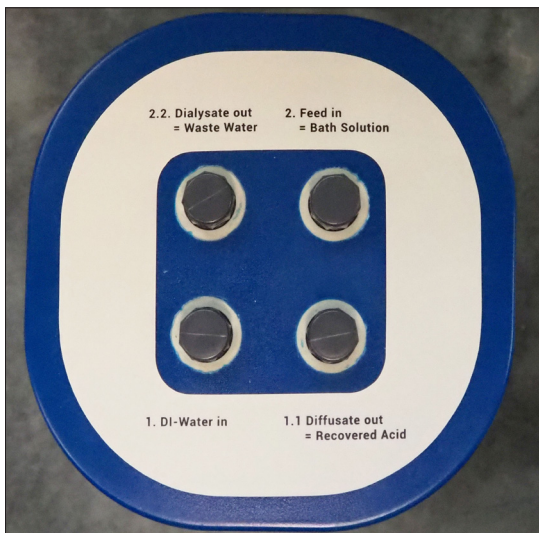


Figure 17: New membrane module



Figure 18: Sealing plug with seal

8. REMOVAL:



Danger!

Intoxication, chemical burns, contamination due to media escape.

- With hazardous media, ensure that corresponding protective measures are implemented and wear personal protective equipment in accordance with the requirements of the media.
- Before loosening lines, ensure that the medium has been flushed out of the whole system.



Danger of injury through high pressure in the system/product.

- Before working on the system or product, shut off the pressure and empty the lines.

Risk of injury with improper removal.

- Only appropriately trained personnel are permitted to remove the product.

- Flush the module box for 120 minutes with DI water. Dispose of the water used for flushing in accordance with the applicable environmental regulations.
- Empty the module box (insofar as possible).
- Remove the spiral membrane modules (refer to chapter 7.2).
- Empty spiral membrane modules by turning them upside down until they stop dripping and dispose of them in accordance with legal regulations.
- Loosen the connections to the module box and close the connections with the end caps supplied.
- Since the module box can possibly be reused, please contact an employee of Spiraltec GmbH or dispose of the module box in accordance with the legal regulations.

9. SHUTDOWN/STORAGE:

Used spiral membrane modules must be kept continuously moist. In order to prevent bacterial growth during downtimes or storage, the spiral membrane modules should be flushed through with diluted salt-free acid. We recommend carrying out the preservation with the spiral membrane modules in the module box.

> Store only in a vertical position with the connections upwards.

9.1 Short-term storage:

Shutdowns up to 7 days in length:

- > No measures necessary.
It is only necessary to ensure that the outlets remain open so that no pressure can build up.
- > Depending on the construction of the system by the customer, it may be necessary to close the ball cocks of the inlets.

9.2 Long-term storage:

Shut-downs between 7 days and 6 months in length:

- > Carefully flush the whole system for 120 minutes with DI water (see chapter 7.2).
Dispose of the water used for flushing in accordance with the applicable environmental regulations.
- > Flush the spiral membrane box for 60 minutes, with highly diluted, salt-free acid.
Dispose of the water used for flushing in accordance with the applicable environmental regulations.
- > It is only necessary to ensure that the outlets remain open so that no pressure can build up.
- > Storage temperature 5 °C – 30 °C.

Shut-downs longer than 6 months:

- > Every 6 months, flush the spiral membrane box once again, for 60 minutes with highly diluted, salt-free acid.
- > It is only necessary to ensure that the outlets remain open so that no pressure can build up.
- > Storage temperature 5 °C – 30 °C.

10. PACKAGING/TRANSPORT:

Note:

Transport damage.

Inadequately protected products can be damaged by transport.

- > Protect the product from light, moisture and dirt and transport in impact-resistant packaging.
- > Ensure that the permissible storage temperatures are not infringed.
- > Storage temperature 5 °C - 30 °C.

Environmental damage due to product parts contaminated with media.

- > Dispose of product and packaging in an environmentally friendly manner.
- > **Observe applicable disposal regulations, transport provisions and environmental regulations.**

11. RETURNING A MODULE BOX:

If a product is to be returned, please contact a representative of Spiraltec GmbH beforehand. First rinse the box with DI water and empty the individual spiral membrane modules. Send the spiral membrane box, well-packaged, to Spiraltec GmbH and please enclose a reason along with a description of the application (media used, etc.) in writing.

- > **Observe applicable disposal regulations, transport provisions and environmental regulations.**

12. ACCESSORIES:

The following accessories can be obtained from Spiraltec GmbH:

- Flow limiters in various sizes (9 l/h; 12 l/h; 15 l/h)
- Adjustable feet
- Spare spiral membrane modules

Please contact a representative of Spiraltec GmbH.

13. NOTES:

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13. NOTES:

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13. DECLARATION OF INCORPORATION:

Version: 2019-01
Datum: 22.07.2019
Verfasser: F. Moser

EG-Einbauerklärung:

Einbauerklärung nach EG-Richtlinie CE 2006/42/CE

Declaration of Incorporation according to EC directive CE 2006/42/CE

Déclaration d'incorporation Selon directive CE 2006/42/CE

Wir **Spiraltec GmbH**
We/Nous (Name des Anbieters / supplier's name / nom du fournisseur)

Heinzenberger Weg 34
D-74343 Sachsenheim
(Anschrift / address / adresse)

erklären in alleiniger Verantwortung, dass (die) Produkt(e) / declare under our sole responsibility that the product(s) / Déclarons sous notre seule responsabilité, que le(s) produit(s)

Type: DS10-30
Bezeichnung: Membranspiralwickelmodulbox
Spiral Membrane Box

(Bezeichnung, Typ oder Modell / name, type or model / nom, type ou modèle,)

den folgenden grundlegenden Anforderungen der Maschinen-Richtlinie (2006/42/EG) entspricht:
is complying with all essential requirements of the Machinery Directive (2006/42/EC) / est conforme aux dispositions fondamentales de la directive Machines (2006/42/EC) suivantes
Anhang I, Artikel /Annexe I, Sections/ Annexe I, Article **1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4** und/and/et **1.5.1**.

Die unvollständige Maschine darf erst dann in Betrieb genommen werden, wenn festgestellt wurde, dass die Maschine, in die die unvollständige Maschine eingebaut werden soll, den Bestimmungen der Maschinen-Richtlinie (2006/42/EG) entspricht. / The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of Directive 2006/42/EC on Machinery. / La machine à incorporer ne peut être mise en service qu'au moment où il fut constaté que la machine, dans laquelle la machine à incorporer doit être intégrée, est conforme aux dispositions de la directive (2006/42/CE).

Folgende harmonisierte Normen wurden angewandt: / The following harmonized standards were applied: / Normes harmonisées appliquées:

EN 12100:2010 Sicherheit von Maschinen / Safety of machinery. General principles for design. Risk assessment and risk reduction. / Sécurité des machines - Principes généraux de conception - Appréciation du risque et réduction du risque.
EN 60204-1 Sicherheit von Maschinen - Allgemeine Anforderungen / Safety of machinery. General principles for design. Risk assessment and risk reduction. / Sécurité des machines - Exigences générales - Principes généraux de conception - Appréciation du risque et réduction du risque.

Der Hersteller verpflichtet sich, die speziellen Unterlagen zur unvollständigen Maschine einzelstaatlichen Stellen auf Verlangen elektronisch zu übermitteln. The manufacturer shall, upon request, transmit electronically the relevant technical documentation to the competent national authorities. / Le fabricant s'engage pour transmettre électroniquement sur demande la documentation spéciale concernant la machine à incorporer aux organismes nationaux

Die zur Maschine gehörenden speziellen technischen Unterlagen nach Anhang VII Teil B wurden erstellt. / The relevant technical documentation of the machine have been compiled in conformity ANNEX VII, Part B. / La documentation technique faisant partie selon l'annexe VII, partie B de la machine a été établie.

Sachsenheim, 22.07.2019

(Ort und Datum der Ausstellung)
Place and date of issue
Lieu et date de l'édition

H.P. Härter,

(Name und Unterschrift des Geschäftsführers/ Name and signature of the managing director / Nom et signature de l'administrateur délégué)



AFTER EVERY MALFUNCTION,
CONTACT YOUR APPOINTED ADVISOR.
CONTACT DETAILS BELOW

Spiraltec GmbH
Heinzenberger Weg 34
74343 Sachsenheim
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