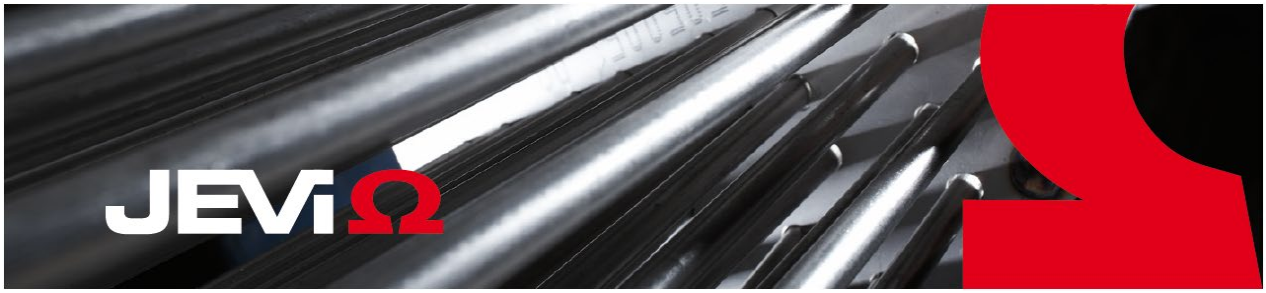
IOM 08099936
EN
03-2026



EN
Installation, operation and maintenance manual
For installation in hazardous areas

PRESSURIZED WATER-COOLED BRAKING RESISTOR - WCBR

All rights reserved. Reproduction or issue to third parties of this manual or part of it in any form is not permitted without prior written authorisation of the proprietor

JEVI A/S GODTHÅBSVEJ 32 DK-7100 VEJLE T:+45 75 83 02 11 JEVI@JEVI.DK WWW.JEVI.COM

Safety information 3
Disclaimer 4
List of abbreviations 5
1.0 Introduction....6
2.0 Description of product 7
2.1 Reference documents 7
2.2 Hazardous certifications 7
2.3 Marking plate....8
2.4 Instrumentation....8
2.4.1 Safety temperature limiter 8
2.4.2 Outlet temperature sensor with transmitter....8
2.4.3 Pressure sensor with transmitter 9
2.4.4 Safety valve and air eliminator 9
2.4.5 Burst disc (only sea water cooled)....9
2.4.6 Level switch....9
3.0 Packing 10
3.1 Choice of the Packing Type....10
3.2 Wood treatment....10
3.3 Pallets....10
3.4 Handling 10
3.5 Centre of gravity 10
3.6 Labelling and tagging of equipment / Identification 10
3.7 Shipping marks / labelling 10
4.0 Transportation 11
4.1 Single tank....11
4.2 Rack - vessel mounted side/side....12
4.3 Rack - vessel mounted over/under....13
4.4 Module WCBR....14
4.5 Frame mounted module WCBR 15
5.0 Storage and preservation 17
5.1 Preservation during the transportation and pre-installation period 17
5.2 Preservation during the installation/construction period 17
5.3 Suggestion for preservation specification & record: 19
6.0 Installation instructions 21
6.1 Water quality 21
6.2 Mechanical installation 21
6.3 Recommended tightening torque according to thread size 23
6.4 Electrical installation....23
7.0 Start up....26
7.1 Start-up 26
7.2 How to switch off the WCBR 27
7.3 Spare parts....27
8.0 Operating instructions 28
8.1 Operating temperature 28
9.0 Maintenance instructions....29
9.1 Disassembly of WCBR insert 31
9.2 Disassembly of insert – module WCBR....31
9.3 Re-installation of WCBR insert (s) – module WCBR 34

9.4 cleaning elements 35
9.5 Maintenance and service plan.....36
10.0 Trouble shooting.....37
11.0 Disposal instructions 38

Safety information

To secure your personal safety, as well as prevent damages to property, this manual contains notices you have to observe. The notices refer to your personal safety.

DANGER	Indicates that death or severe personal injury will result if proper precautions are not taken
WARNING	With a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken
CAUTION	Without a safety alert symbol, indicates that property damage can result if proper precautions are not taken
NOTICE	Indicates that an unintended result or situation can occur if the corresponding information is not considered

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety symbol may also include a warning relating to property damage.

Qualified Personnel

Only personnel qualified for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions may operate the product described in this documentation. Qualified personnel are those who, based on their training and experience, can identify risks and avoid potential hazards when working with these products/systems.

This adds up to the following requirements to the Operator:
Qualification - Certified electrician
Level of complexity – Basic action / preventive / corrective

Requirements to the fitter of the pressure vessel:
Qualification - Certified plumber or similar (engine fitter)
Level of complexity – Basic action / preventive / corrective

Proper use of JEVI products

WARNING	Proper transport, storage, installation, assembly, commissioning, operation and maintenance is required to ensure that the product operates safely and without any problems. The permissible ambient conditions must be adhered to. Observe the information in the relevant documentation.

Disclaimer

JEVI A/S assumes no responsibility for any additions placed by the customer that can inflict our product. Additions or alterations implemented by the customer are not covered by our warranty.

IMPORTANT: These instructions should be read thoroughly before installation and operation. All warnings and precautions should be observed for both personal safety and for proper equipment performance and longevity. Failure to follow these instructions could result in equipment failure and/or serious injury to personnel.

Braking resistors operate under high voltages when connected to the inverter and are lethal when not handled with care. It is very important to ensure that inverter is not energized, when installing or servicing this unit. Always allow adequate time after removing inverter power before touching any components.

NB! THIS IOM IS A STANDARD DOCUMENT AND IS NOT PROJECT SPECIFIC.

The English IOM is JEVI's standard version

List of abbreviations

ACBR - Air Cooled Braking Resistor

CoG - Centre of Gravity

EF… - Electrical Duct heater

GA - General Arrangement (Drawing)

HVAC - Heating, ventilation, Air Conditioning

IOM - Installation, Operating and Maintenance Manual

JB - Junction Box

SWL - Safe working load

VLE - Fan heater with integrated controls for temperature control

VLEx - Fan heater for explosive areas

WCBR - Water Cooled Braking Resistor

TSH - Temperature Switch High

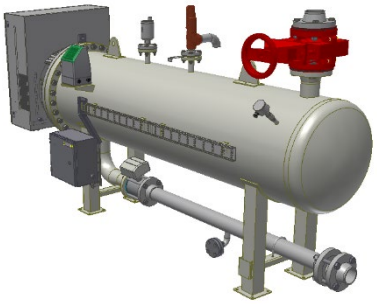
TSHH -Temperature Switch High High

1.0 Introduction

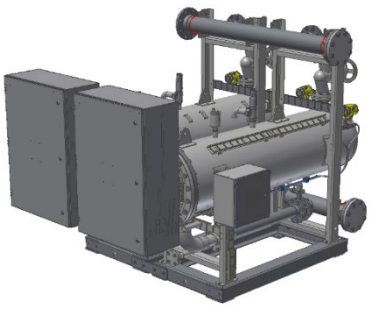
This manual is valid for the following models of Water-cooled Braking Resistors (WCBR), both including sea water-cooled and fresh water-cooled systems.

The purpose of this document is to introduce a reader to installation, operation and maintenance of pressurized WCBR and most importantly to introduce general safety precautions, which are not necessarily related to any specific part or procedure, and do not necessarily, appear elsewhere in the publication. These precautions must be thoroughly understood and applied to in all phases of operation and maintenance.

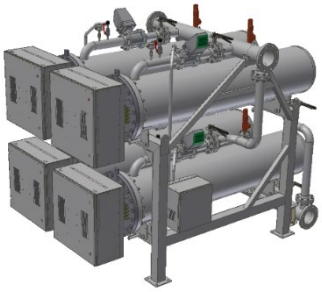
Descriptions in this manual are generic and are not project specific. Pictures may show other equipment and options than in the actual project.



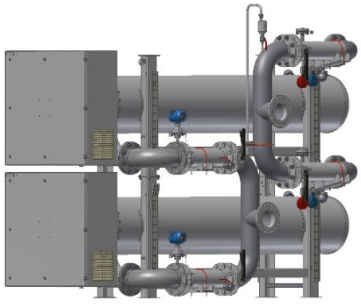
Single vessel



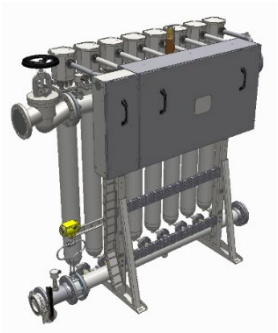
Rack s/s (side by side)



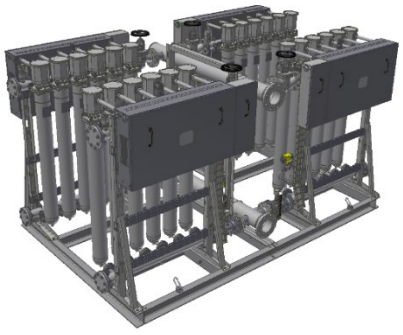
Rack o/u (over/under) and s/s (side by side)



Rack o/u (over/under)



Module



Frame mounted module

2.0 Description of product

A WCBR acts as a load bank in motion systems where a motor is controlled by a drive. When decelerating, the motor becomes a generator where it produces electrical energy. When braking, energy surplus is being dissipated as heat by a WCBR

2.1 Reference documents

The following documents are referenced in the below text. It is advised to have these documents available when reading this document.

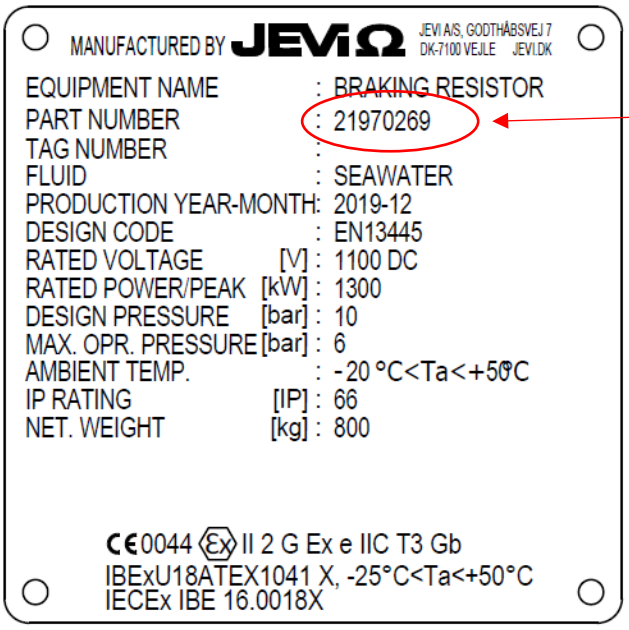
Document description
GA-Drawing
Electrical Wiring Diagram
WCBR Data Sheet
WCBR FAT record (if any)
WCBR Spare Part List
WCBR P & ID

2.2 Hazardous certifications

Marking hazardous area certification:
Ex e IIC T6 to T1 with additions d and/or [ia] when applicable.

Standards:	EN-IEC 60079-0 EN-IEC 60079-7 EN-IEC 60079-1 EN-IEC 60079-11
ATEX group and category:	Ex II 2 G.
Certificate number:	IBExU ATEX IECEX IBE 16.0018x

2.3 Marking plate



Please refer to part number at any enquiry

Example of marking plate

2.4 Instrumentation

2.4.1 Safety temperature limiter

The TSHH safety thermostat is mounted in a sensor tube and attached on the resistor element and the temperature set 90°C for IECEx / ATEX.
If the TSHH cuts out, it must be reset in order to restart the system.

If a TSH thermostat is mounted in the insert, the temperature must be set according to electrical wiring diagram. If the water temperature rises above set temperature, the resistor elements cut off until the temperature is below the set temperature. The TSH is sealed at the set temperature from JEVI.

2.4.2 Outlet temperature sensor with transmitter

If the vessel is installed with a PT-100 or a K sensor with transmitter, it can be mounted in a sensor tube inside the vessel or in the outlet pipe. The transmitter converts the temperature measuring to a 4-20mA signal, according to the electrical diagram.

2.4.3 Pressure sensor with transmitter

It is recommended to monitor the pressure in the vessel by means of a pressure transmitter. If installed, the pressure transmitter is adjusted according to the pressure specified in datasheet. If the ingoing pressure becomes too high the pressure transmitter alerts. The signal can be either analogue or digital.

2.4.4 Safety valve and air eliminator

If the vessel is supplied with a valve (outlet) and a valve (inlet) it is mandatory to equip the vessel with a safety valve and an air eliminator in order to ensure a correct pressure in the vessel.

CAUTION	**VENTING IS IMPORTANT!** Vent the heater to allow remaining air to escape from the vessel. Ensure correct position of any venting solution allowing venting to take place vertically. An air eliminator is not a standard part of JEVI's scope of supply.

2.4.5 Burst disc (only sea water cooled)

If the vessel is equipped with a safety valve it is recommended to mount a burst disc in order to avoid fouling. If the burst disc is released due to too high pressure, it must be replaced immediately.

2.4.6 Level switch

If installed the level switch is mounted in top part of the vessel.

Note, not all instruments may be supplied.

IOM for Flange heater/ Flange resistor (insert), can be viewed at www.Jevi.com

3.0 Packing

All packing is in accordance to the specific requirements of the individual purchase order or contract as well as to the regulations of the country of destination.

3.1 Choice of the Packing Type
The choice of the packing type and the requirement of particular protections depend on characteristics of the equipment and material to be packed, its handling requirements and kind of transport chosen.
The packing provides both mechanical and environmental protection.

3.2 Wood treatment
All solid wood, used for packing (including wooden pallets) is treated (heat treatment or fumigation) according to the international standard ISPM 15 (IPPC), latest revision.
As these rules are not the same for all countries, the procedure is to meet the demands of a country of final destination.

3.3 Pallets
Equipment is packed on pallets that provide adequate load support during transportation and storage. The pallets have a dynamic load capacity, enough to carry the mass loaded on the pallet.
Where feasible the top surface of the pallet must be flat.
The pallet must be tight on all sides with steel or synthetic straps on each side.
Bolts, clamps, supporting beams, etc. will properly fix all equipment and materials.
Fragile, easily damageable and loose parts will be pertaining to the equipment securely and properly packed in a separate case.

3.4 Handling
Under no circumstances may the equipment itself be used as a platform for gaining access to installation and construction areas above. If such access is required then suitable scaffolding must be established, the equipment may not be used as a support.

3.5 Centre of gravity
If required, large and heavy equipment are marked with Centre of Gravity (COG).

3.6 Labelling and tagging of equipment / Identification
If no specific identification is required, (see the Purchase Order for the technical specifications) the labeling is in accordance to JEVI standard.
On demand the identification label is in accordance with the final packing list/delivery note.

3.7 Shipping marks / labelling
All packages are marked or labelled in accordance with the data shown in the packing list/delivery note

4.0 Transportation

The product is packed according to agreement, with indication of CoG if required by customer.
The product is packed on pallets. The packing is easily moved either by forklift or by use of crane, handled by authorised personnel.

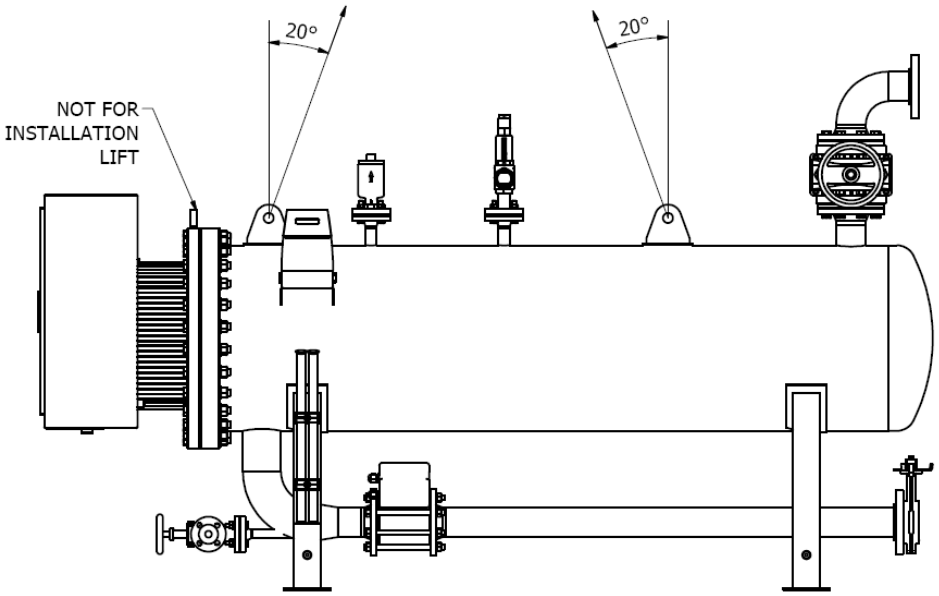
For lifting lugs, see GA
For weight, see GA or rating plate
For COG, see GA

CAUTION	Heating elements must NOT be used for lifting, this causes damage on the elements
CAUTION	Do NOT use the lifting eye on main flange of the insert
WARNING	Never lift a unit filled with water.

4.1 Single tank

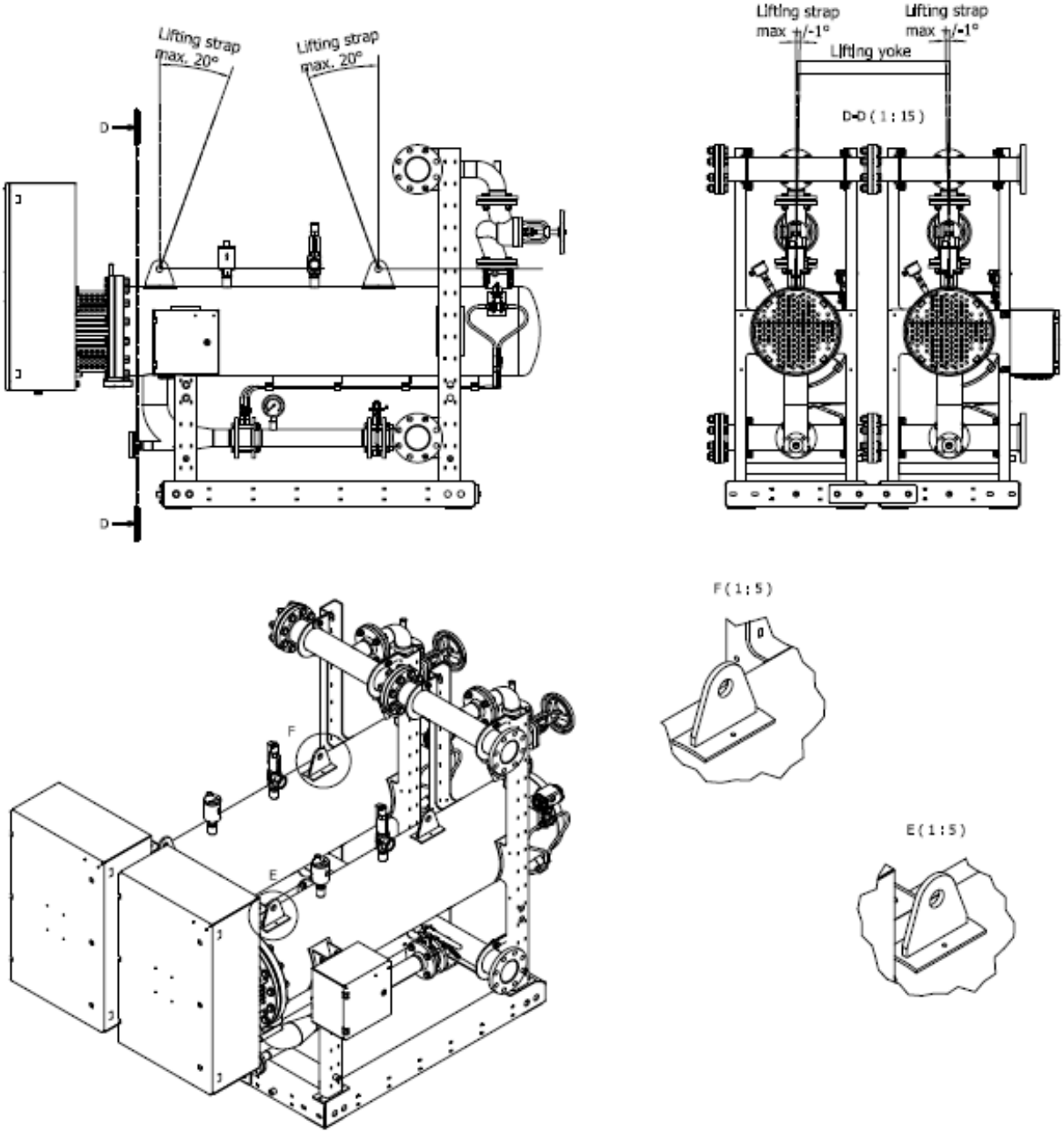
For lifting, use the two lifting eyes on top of the pressure vessel.

SWL: 1500 kg at two lifting eyes at an angle of 20° of the wire in relation to vertical.



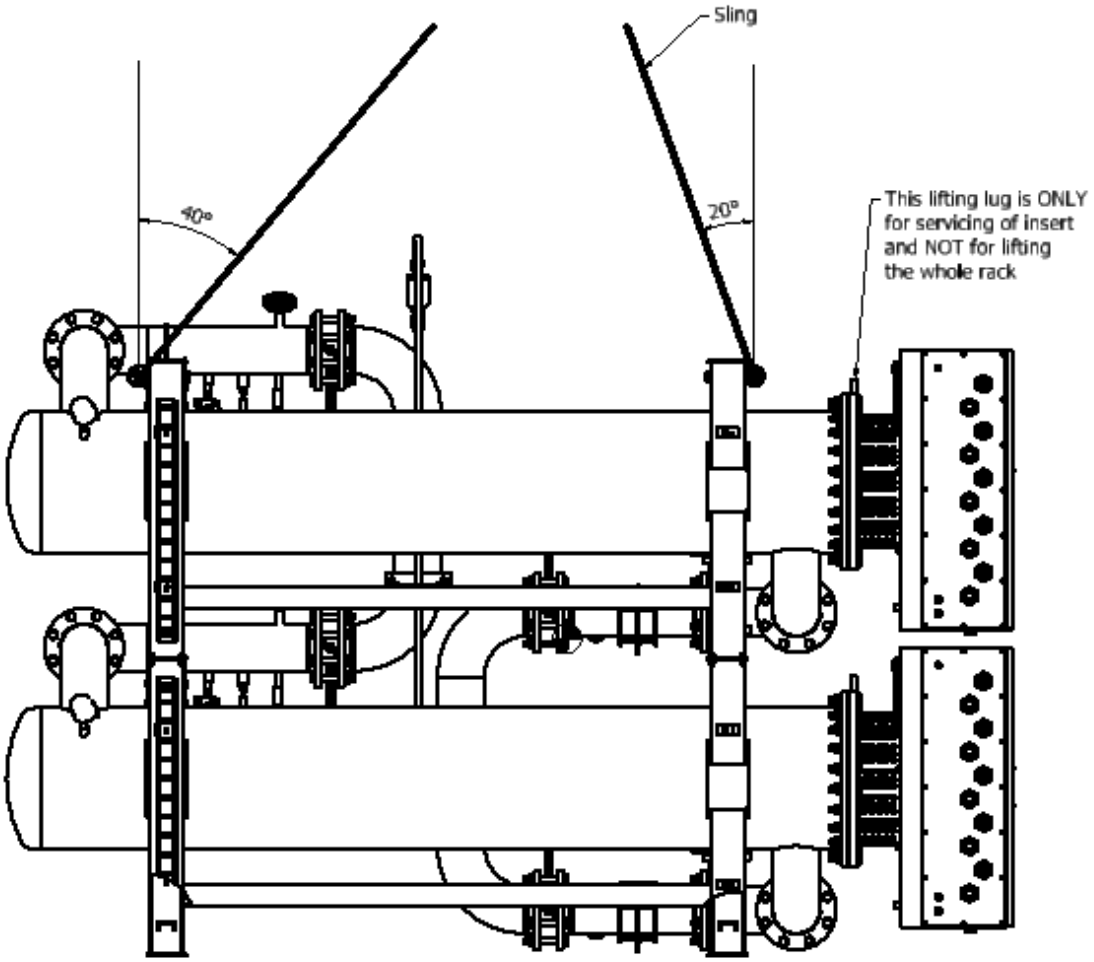
4.2 Rack - vessel mounted side/side

When the vessels are mounted side by side in a frame, use the lifting lugs on the vessel combined with a lifting beam as sketched below.



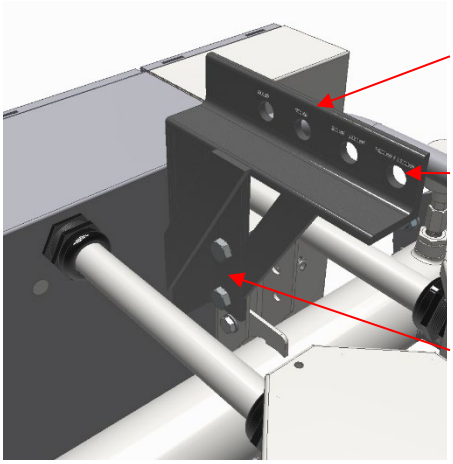
4.3 Rack - vessel mounted over/under

When the vessels are mounted over/under in a rack, the lifting lugs on the rack are used combined with a lifting beam.

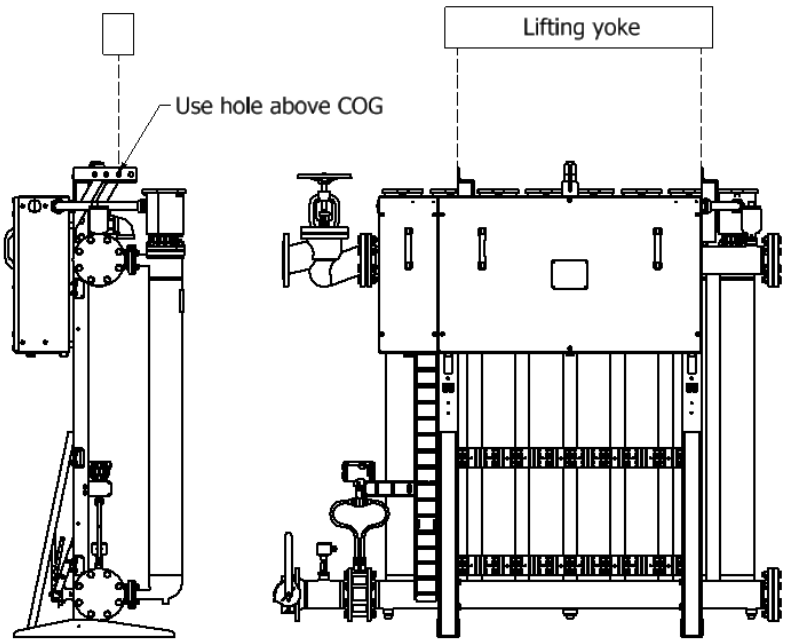


4.4 Module WCBR

The WCBR(s) will be supplied with a set of lifting brackets which must be fitted to the WCBR leg as shown below. If more than one WCBR is ordered the lifting brackets must be used on all single WCBRs

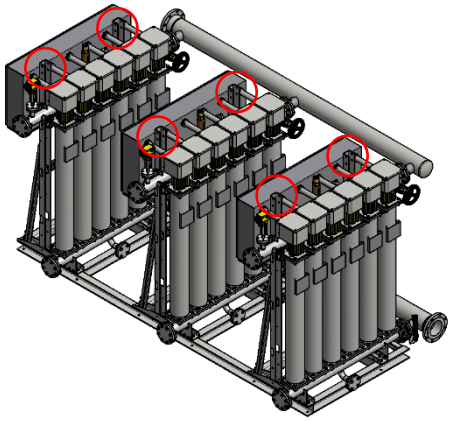


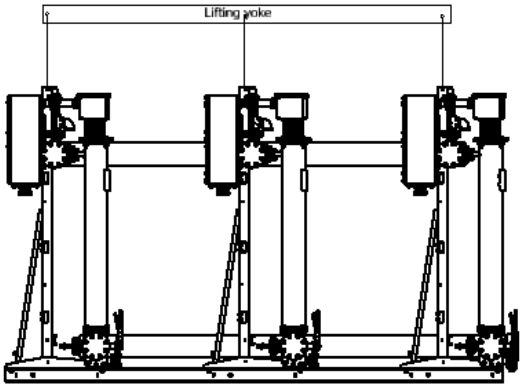
Lift the WCBR with a lifting yoke as shown below.

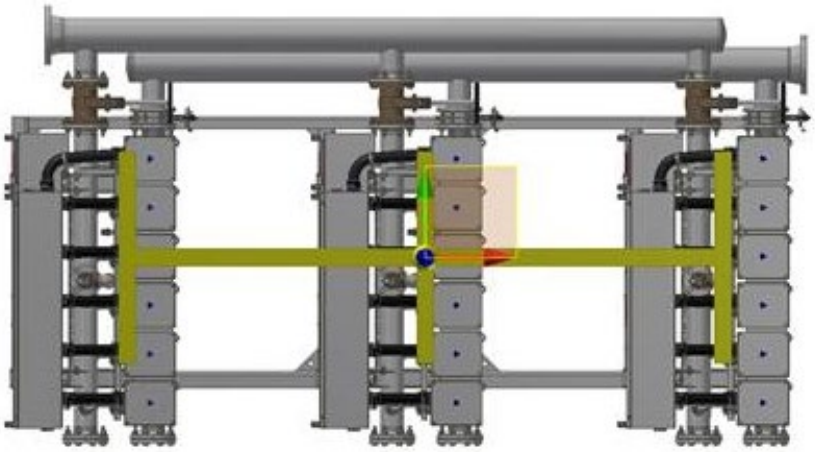


4.5 Frame mounted module WCBR

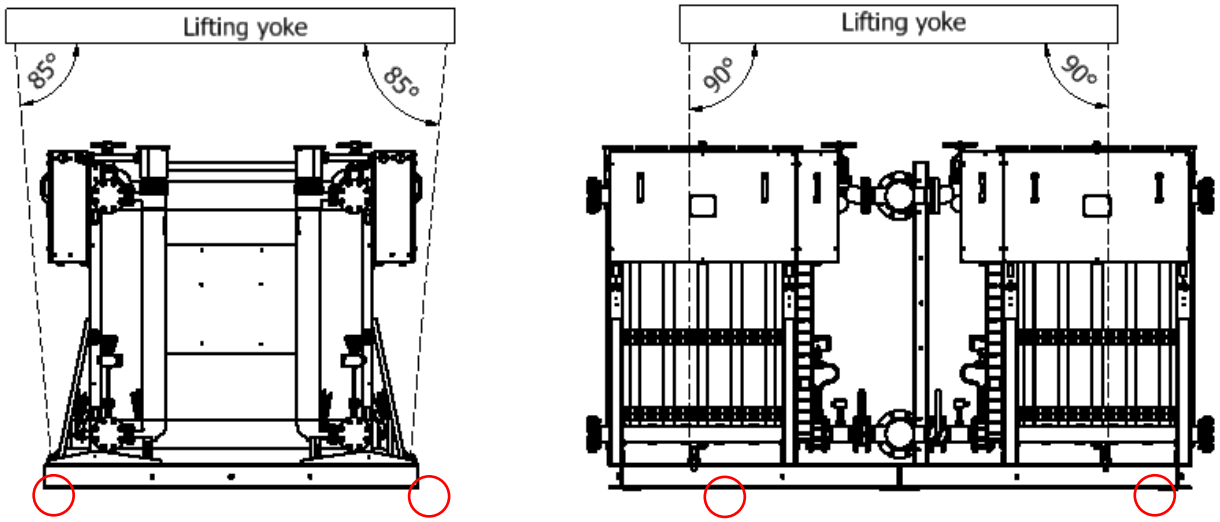
In order to lift the frame unit, rig each beam of the modules (marked in red) with a shackle and lift vertically using a yoke







Lifting can also be conducted by mounting shackles on the bottom rack; see sketch:



5.0 Storage and preservation

The purpose of this chapter is to specify how to handle and preserve a product from the day of shipment until the equipment is installed and commissioned.

Following conditions shall be observed for the installation/construction period.

CAUTION	During storage, prior to installation the unit must be stored dry with a relative humidity <60 %, temperature >15ºC.
CAUTION	Replace desiccant bag in junction boxes and enclosures (if any) every 6 months. Keep a log of the replacements as documentation.
CAUTION	The Anti condensation heater, if any, must be powered up and connected at all time.

5.1 Preservation during the transportation and pre-installation period

The packaging provides both mechanical and environmental protection. If the equipment is intended for service in an outdoor environment, to avoid any risk of harmful metallic dust during storage it is protected with enveloping plastic foil.
All openings such as cable entry holes are adequately sealed.

Packages must not be opened, or their integrity disturbed during the transport.
Packing may only be opened when the equipment has been taken from storage and has been transported to its intended location of installation, or to connect the anti-condensation heater, after which the packing must be resealed. Storage preservation measures are immediately invalidated as soon as the packaging is disturbed.

One shall inspect packages on receipt at the storage warehouse and at regular monthly intervals during the storage period in regard to external damages. Any visible damage that may have a consequence to the condition of the contents or integrity of the preservation must be immediately documented and reported. In case of such an event, the supplier must be contacted immediately for advice

5.2 Preservation during the installation/construction period

The product must be unpacked only when the equipment is to be installed, or to connect the anti-condensation heater. It is recommended to maintain the integrity of the packaging during transport from the storage warehouse to the installation site.
Inspect the equipment within each package for damage and condition as soon as the package is opened. Report and document any damage immediately. In case of such an event, the supplier must be contacted immediately for advice.

Installation and handling of the equipment once unpacked must be performed in accordance with the relevant elements of the documentation for the equipment delivered.

Damages caused by bad workmanship or failure to adhere to the installation instructions are not covered by the equipment warranty.

If the equipment is installed in an area where ongoing construction work of a nature that causes airborne pollution or other adverse conditions take place, the equipment must be suitably protected**.** Under no circumstances can the equipment be placed in the vicinity of any activity, which involves grinding, welding, painting, fireproofing, spraying, etc. without taking necessary precautions to protect it.
When cable termination is completed, a fresh desiccant bag must be placed in the enclosure. The desiccant bag must be replaced every 6 month or until commissioning, has been initiated.

All openings such as cable entry holes must be adequately sealed until the interfacing cables or pipes are installed.

During installation, always keep the equipment in a clean condition. Remove debris from cable installation activities at once. Take precautions to avoid any small pieces of a conductive nature from being left in the termination enclosures.

Under no circumstances may the equipment itself be used as a platform for gaining access to installation and construction areas above. If such access is required then suitable scaffolding must be established, the equipment may not be used as a support.

During installation the equipment must be thoroughly inspected at regular weekly intervals with regards to external damages, cleanliness and internal condition. Report and document immediately if any visible damage or adverse condition occurs. In case of such an event, the supplier must be contacted immediately for advice.

On completion of the installation work the condition of the equipment must be inspected. Report and document any damage immediately if any visible damage. In case of such an event, the supplier must be contacted immediately for advice.

CAUTION	It is extremely important that no debris enters the vessel as this may lead to a blockage of the return, or overflow pipes**.**

5.3 Suggestion for preservation specification & record:

PRESERVATION SPECIFICATION & RECORD								
Record No.:		Tag No.:	Description:					**Record page 1 of 1**
Activity No.:	Intervals (Months)	Description of Preservation Activity	Recommended Preservative	Initial Preservation	Date/Sign Preserved (2)	Date/Sign Preserved (3)	Date/Sign Preserved (4)	Date/Sign Preserved (5)
1	1	Check that protection structure is undamaged.						
2	6	The desiccant bag inside the Junction boxes replaced.						
3	1	Check the storage conditions. Relative humidity < = 60 %, temp. > = 15˚C						
4	12	If stored for more than one year from packing date, then the supplier must be contacted for advice regarding renewal of the desiccant bag.						
5	12	Check the paintwork.						
6	12	Check that there are no visual damages to the equipment.						
7	12	Verify that the general condition of the equipment is satisfactory.						
8	12	All openings such as cable entry holes are adequately sealed. Junction Boxes as well.						
9	12	All loose items/removed parts preserved, stored and marked.						
10	6	Verify no water leakages, condensation or moisture where applicable.						
11	6	The Anti-condensation heater in the equipment must be powered up and connected at all times.						
Comments:								
Performed by: Date/Sign:			Accepted by: Date/Sign:					

Note: *These procedures are considered normal maintenance and are performed at the owner's expense.*

* Depending on the environment, inspection frequency can vary.

6.0 Installation instructions

Installation has to meet the requirements of EN-IEC 60079-14

The one responsible for the installation must ensure that his employees are fully trained and supervised in the proper installation and working procedures to ensure their safety.

Before unpacking the WCBR ensure that all crates or packaging are in good condition and undamaged. Any damage must be reported to the site manager and subsequently to JEVI A/S and the shipping company.
After removing the wooden box check all items for damage and, if any, report to the site manager and subsequently to JEVI A/S.

Cover the WCBR with a blanket or similar until all metal work has been completed on the nearby installations. Not doing so might lead to local corrosion in the stainless surfaces.

6.1 Water quality

Sea Water

User must ensure that any cooling water used for testing and/or when unit is in service operation, is free of fluoride salts and hydrofluoric acid as these chemicals can damage the titanium elements. Maximum allowed particle size in the cooling water is 1 mm. If resistors tank has been emptied and it is planned to stop operations for an extensive period, the tank must be cleaned with fresh water and fully drained.

Fresh Water

User must ensure that any cooling water used for testing and/or when unit is in service operation, is free from chlorides and with a PH-value between 6 and 8. De-mineralized water are not to be used as cooling water, due to the risk of corrosion. If resistors tank has been emptied and it is planned to stop operations for an extensive period, the tank must be cleaned with fresh water and fully drained.

6.2 Mechanical installation

Reference is made to the GA-Drawing for the WCBR.
For lifting instructions please see section Transportation

Single vessels and racks

- Mount the WCBR to the deck with bolts as specified in the GA-Drawing. The bolts are not supplied with the WCBR. The yard must ensure that the correct torque is applied to the type of bolts chosen.

- Remove the protective plates from the inlet and outlet.

- Connect the cooling water system to the flanges according to the GA-Drawing.

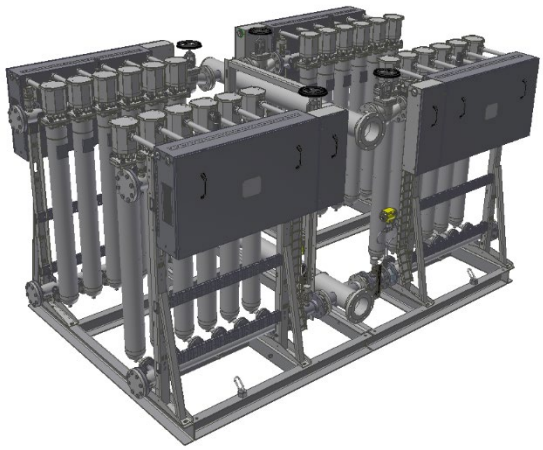
CAUTION	Note that the Inlet and Outlet is not designed to obtain forces from the piping system. It is therefore recommended to use flexible joints on inlet and outlet!

- *Fresh-water model with flow transmitter only:* When water is present in the system, it must be ensured that no air is trapped in the piping and vessel. This will secure correct signal from the flow transmitter.

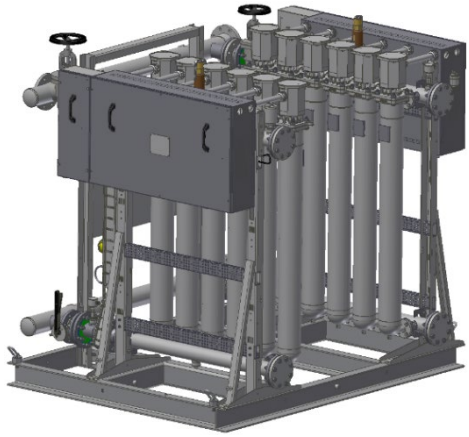
- Cover the WCBR with a blanket or similar if there is any steel grinding or welding near the WCBR. Not doing this will result in contamination of the stainless steel, which will lead to corrosion.

Module WCBR and base frame mounted WCBR

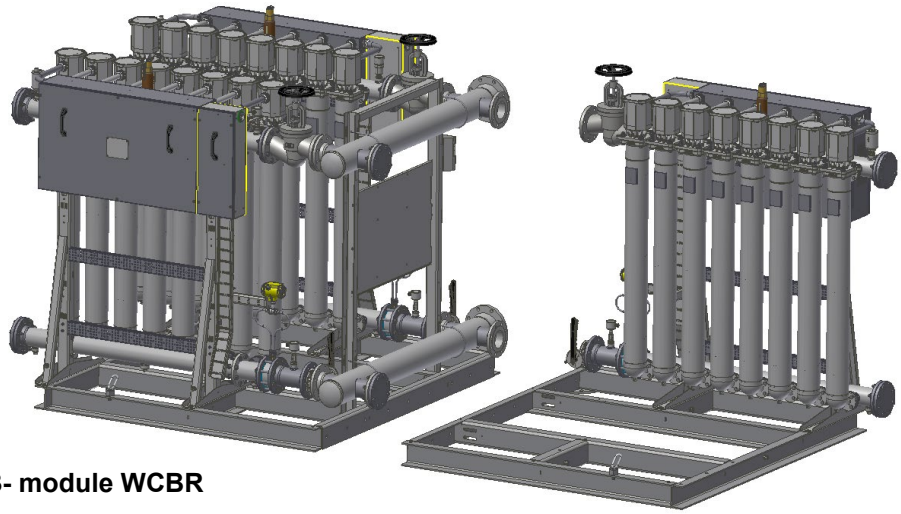
1. Place the gasket on the flanges first and mount the flanges with 8 M16 bolts on each flange.
2. Assemble the frames (if more than one frame ordered) with 9 pcs. M16 bolts and tighten according to 6.3 Recommended tightening torque according to thread size before lifting the WCBR.



4- module WCBR



2- module WCBR



3- module WCBR

6.3 Recommended tightening torque according to thread size

Thread size	Torque (Nm)
M4	2,0
M5	3,2
M6	5
M8	10
M10	16
M12	25
M16	50

6.4 Electrical installation

Single vessels and racks

WARNING	Do not open the junction box when energized.

Follow the electrical wiring diagram

1. Connect the protective conductor to the earth bosses on WCBR leg, and on the Junction boxes. The earth bosses are marked with green/yellow labels.

2. Open the junction boxes by unlocking the cover with the supplied door lock key.

3. Remove the protection plate, if any, inside the junction box by unscrewing the bolts.

4. Connect the main power cables and the earth cable to the copper bus bars or to connectors. Follow the electrical wiring diagram. The bus bars, if installed, are designed for IEC standard 1 and 2-hole cable lugs dimensions as mentioned in GA Drawing. The M12 bolts must be tightened according to table in section 6.3 Recommended tightening torque according to thread size

5. Connect the instrument cables to the terminals inside the AUX junction box. Follow the electrical diagram.

6. Note that all boxes are supplied cable connection possibilities as mentioned in GA Drawing. The Glands are only supplied if they are shown in the GA Drawing

7. If any, power up the anti-condensation heater in the WCBR junction box and the AUX junction box and check that all heaters are functional. The powers for the anti-condensation heaters must be kept on at all times until the ship/rig are in operation. If this is not possible place desiccant bags inside the boxes until the anti-condensation heaters can be turned on. Before proper installation, it shall be checked regularly that the desiccant bags are still functional.

8. *Fresh-water model with flow transmitter only:* Remember to reset the flow transmitter when starting up.

9. Mount the protective plate inside the junction box.

10. Close the cover by using the door lock key that is supplied with the WCBR or tightening the screws in the lid. (according to Junction box design)

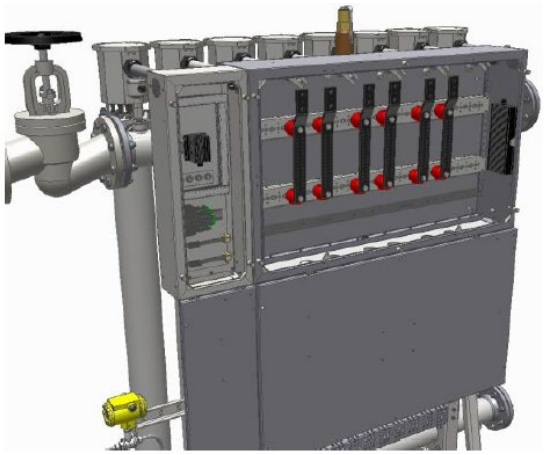
Module WCBR

WARNING	Do not open the junction box when energized.

Follow the electrical wiring diagram.

1. Connect a 70 mm^2 protective conductor to the earth boss on WCBR leg or on the base frame (depending on delivered version). The earth bosses are marked with green/yellow labels.

2. Open the junction boxes by removing the bolts on the lid. The lid can be hanged on the gland plate as shown below.



3. Remove the protection plate inside the junction box by unscrewing the bolts.

4. Connect the main power cables and the earth cable to the copper bus bars. Follow the electrical wiring diagram. The bus bars are designed for IEC standard 1 and 2-hole cable lugs dimensions as mentioned in GA drawing. The M12 bolts must be tightened according to table in section 6.3 Recommended tightening torque according to thread size

5. Connect the instrument cables to the terminals inside the AUX junction box. Follow the electrical diagram.

6. Note that all boxes are supplied with undrilled gland plates. Glands or pre-drilled gland plate are only supplied if they are shown in the GA drawing and ordered separately.

7. Power up the anti-condensation heater in main- and AUX junction box and check that all heaters are functional. The power for the anti-condensation heaters must be kept on at all times. If this is not possible place desiccant bags inside the boxes until the anti-condensation heaters can be turned on. It must be checked regularly that the desiccant bags are still functional. See table in section 5.3 Suggestion for preservation specification & record:

8. Mount the protection plate inside the junction box.

9. Close the lids by using the bolts removed earlier

7.0 Start up

Remove desiccant bag from JB before starting up.

WARNING	Do not power up the WCBR until the below points have been completed

7.1 Start-up

Before initial start-up of the WCBR it shall be checked that:

1. The WCBR has been properly installed and all drains have been closed. (If any)

2. The system has been filled with cooling water.

3. There is flow to the system. The flow can be monitored on the display located on each flow sensor (if supplied). Each WCBR should not have a flow exceeding the values given in the data sheet. A +/-5% variation in flow is acceptable. Any adjustment in the flow on pressurized systems shall be done on the outlet valve (If applicable).

4. The resistors must never be powered up without having a cooling water flow through the resistor. If the resistor is supplied without flow sensor, it is recommended that the yard monitors that sufficient flow is supplied.

5. The control system has been powered up (Do not power up the WCBR).

6. *Only applies for relevant instruments*: The Element monitoring systems have been actuated, e.g. TSHH, Element temperature transmitter/relay.

7. The system is pressurized, see data sheet for max pressure.

8. *Only applies for fresh water WCBRs with flow sensor*: the piping for the differential flow transmitter are water filled (this is done by loosening the hose connectors at the differential flow transmitter, until water is trickling out beside the connector, and re-tighten afterwards).

9. There are no leaks at gasket joints. If necessary, re-tighten the bolts torques according to section 6.3 Recommended tightening torque according to thread size

10. All temperature sensors are showing the same temperature within +/- 2 °C. (*This can be done by moving the display panel on the PR-4131 temp. relays if these are supplied*)

11. The electric connection has been done in accordance to relevant regulations and the WCBR has been properly connected.

12. The protective conductor has been connected and if necessary, the external connection between housing and earth has been effected, e.g. to avoid electrostatic discharging.

13. The insulation resistance of the WCBR element is more than 3 Mega Ohm. Connect the Megger to an earth bolt and one of the phases. If the measured value is less than 3 M Ohm, each heating element should be checked separately. Minimum value 3 M Ohm at 1000 Volts. Read maintenance instruction, section if lower values are observed.

The WCBRs are now ready for load.

7.2 How to switch off the WCBR

1. De-energize the WCBR before shutting down the flow.

2. Retighten the bolted joints after the WCBR has cooled down.

7.3 Spare parts

Spare parts are ordered at JEVI with reference to spare part list.

8.0 Operating instructions

- Connect the cooling water system to the flanges according to the GA drawing. Note that the Inlet and Outlet flanges are not designed to obtain any kinds of forces from the piping system. It is therefore recommended to use flexible joints on inlet and outlet.

- Cover the WCBR with a blanket or similar if there is any steel grinding or welding near the WCBR. Not doing this will result in contamination of the stainless steel, which will lead to corrosion.

8.1 Operating temperature

For specific operating temperature see Data Sheet.

CAUTION	Recommended operating temperature: Sea water cooled WCBR 65°C Fresh water cooled WCBR 75°C

It is not necessary to make any adjustments or changes of settings during normal operation. It is however recommended to check/monitor the following values on a continuous basis.

1. Outlet temperature not to exceed the operational values mentioned in the data sheet at any time.

2. *Only applies if supplied with element temperature transmitter:* Element temperature does not exceed the value mentioned in the data sheet.

3. Pressure is not to exceed the Design Pressure mentioned in the datasheet at any time. If the pressure exceeds the Design pressure at any time it shall be checked that the safety valves and burst plate are intact. (*Only If supplied with safety valve and burst plate*)

4. Rated flow is within rated limits +/- 5%. The WCBRs must never be powered up without having a cooling water flow through the WCBR.

NOTICE	(*Only applies for flow sensors on fresh water cooled WCBR*) Each time the system is filled with water it is important to loosen the hose connectors at the differential flow transmitter till water is trickling out beside the connector, and then re-tighten afterwards. The differential flow transmitter is not able to give a correct read-out if the piping is not water-filled.

9.0 Maintenance instructions

* *Sea Water Model only*: The one-year service interval for cleaning the WCBR elements only applies if the WCBRs are used in clean sea water. If used in very muddy water near the coast, the WCBR vessel shall be cleaned with shorter intervals if there is a risk of mud build-up inside the vessel.

* *Fresh water models only:* The one-year interval for cleaning the WCBR elements can be extended to two years if the first inspection shows that there is little (<0.5 mm) or no build-up of scale on the WCBR elements. Scale is minerals deposited on the surface of the elements and is dependent on the load of the WCBR and the hardness of the water.

The one responsible for the maintenance must ensure that his employees are fully trained and supervised in the proper working procedures to ensure their safety.

1. Check the insulation resistance of the element. Connect the Megger to the Earth bar and each of the phases. If the measured value is less than 3 Mega Ohm, each heating element should be checked separately. Minimum value is 3 Mega Ohm at 1000 Volts. Make sure that the safety regulations for this test are observed properly.

   If the insulation resistance is less than 3 Mega Ohm, it could be a sign that the anti-condensation heater is not operating correctly or the gaskets for the lids needs to be checked for possible leaks.

NOTICE	If the insulation resistance has changed to an unacceptable level, it is recommended to open the WCBR junction box in a dry room and let the element connections dry out by means of a hot-air blower (note: air < 80 º C).

2. Check the resistance of each WCBR module and cross reference with the test record for the individual WCBRs. If the value has changed more that 10% from its original value, it should be checked if any of the WCBR elements have failed. Failed elements must be electrically disconnected and replaced by the spare elements. (Marked SPARE)

3. Drain the system by opening the drain valve (if supplied) or removing the lowest blind flange on the system.

4. Check the resistance of each WCBR module and cross reference with the test record for the individual WCBRs. If the value has changed more than 10% from its original value, it should be checked if any of the WCBR elements have failed. Failed elements must be electrically disconnected and replaced by the spare elements.

5. Close and open all valves to see that they are still functional. Check for any leaks on the valves.

6. *Seawater model Only:* Check that the burst plate under the pressure safety valve is not ruptured. This can only be done by removing the safety valve. If the Burst plate has been ruptured it must be replaced. The WCBRs can be safely operated without the burst plate, but this requires monthly removal and inspection of the safety valve, to ensure that no marine growth is restricting the function of the valve.

7. Separate the WCBR module from the vessels, see section 9.1 and 9.2 and check for visual damage (see instruction below). Also check that the no unintended objects are blocking the flow of cooling water. Clean the surface of the WCBR elements using a piece of hard wood. App. Dimension 50x15x1000 mm. Never use metal tools for the cleaning. It is recommended to have one spare main gasket for each WCBR insert before removing the WCBR module. (In case the gasket is damaged during the process). High pressure cleaning of the WCBR can also be used. The part number for the main gasket can be found in the WCBR Spare Part List.

8. *Seawater model only*: Change the anodes. The part no. for the anodes can be found in the WCBR Spare Part List.

9. *Seawater model Only*: Clean the Vessel and inspect the coating for any defects. If it is required to repair the coating, for a coating repair coating kit see Spare Parts List.

10. Re-install the WCBR insert and tighten the bolts according to table in section 6.3 Recommended tightening torque according to thread size. Lubricate or grease the bolts before mounting with a suitable Anti-seize product (e.g. Molykote D paste)

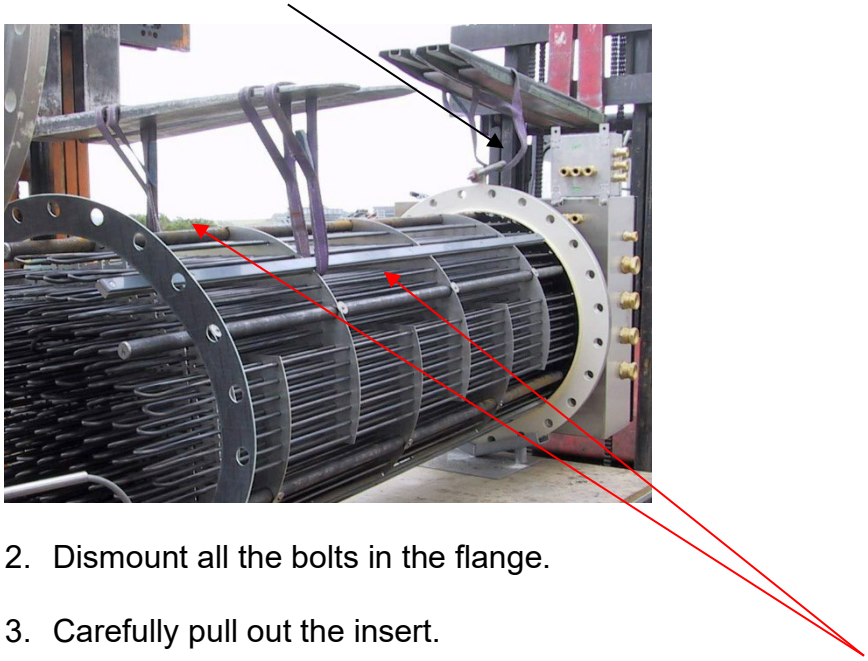
11. Fill the system with cooling water.

12. Check that the automatic air valve is functional. This is easiest done by visual inspection of the valve when the system is being filled with cooling water. A small amount of water should escape on top of the valve before it closes.

Note: (Only seawater models)
When the WCBR is out of use it must be filled with liquid so that the anodes are in contact with the liquid. If the WCBR is not in operation for more than one week it must be drained and dried, and the bottom rinsed with fresh water. This is to avoid sea water trapped in the bottom of the tank without contact to the anodes.

9.1 Disassembly of WCBR insert

1. Ensure the lifting lug is used before dismounting the WCBR insert from the vessel. The weight of the WCBR insert might be found on the GA-Drawing.



2. Dismount all the bolts in the flange.
3. Carefully pull out the insert.
4. When the insert is pulled about 2/3 out of the vessel, lift at the 2 points shown.
5. On reassembly of vessel and insert please follow steps 1-4 in reversed order. Use a tightening torque according to table in section 6.3 Recommended tightening torque according to thread size

9.2 Disassembly of insert – module WCBR

The module WCBR insert can be removed in two ways.

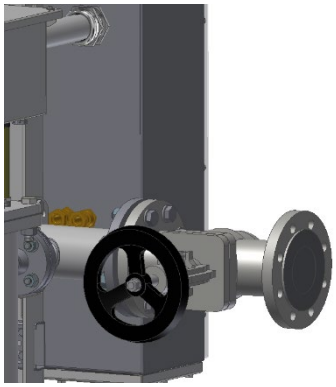
A: By removing the insert and leaving the vessel on the manifold (see point 1 to 9 below).

B: By removing both vessel and insert together. This is normally only done if there is insufficient service space above the WCBR to perform the above operation. (See point 11 to 14 below)

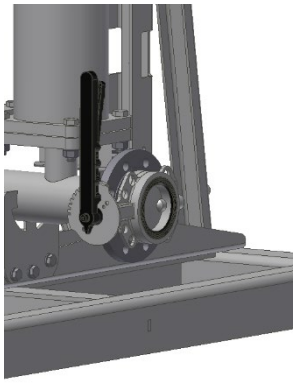
1. Make sure that the WCBRs cannot be powered up before starting up the work.

2. Document the flow level (m^3/h) for the WCBR before proceeding to the next step.

3. Close Inlet and Outlet valve in this order.



Outlet valve in top

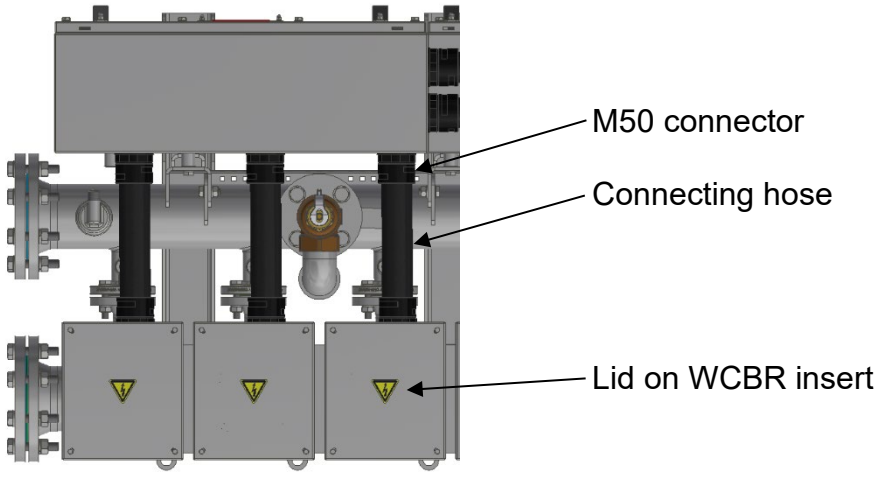


Inlet valve in bottom

4. Drain the WCBR by removing one of the plugs in the inlet manifold or remove the lowest blind flange. (The yard might have replaced the plug with a valve).

5. Remove the lid from the WCBR insert and remove the internal wiring from the terminals on the WCBR elements.

6. Remove the clips from the M50 connector in the WCBR insert

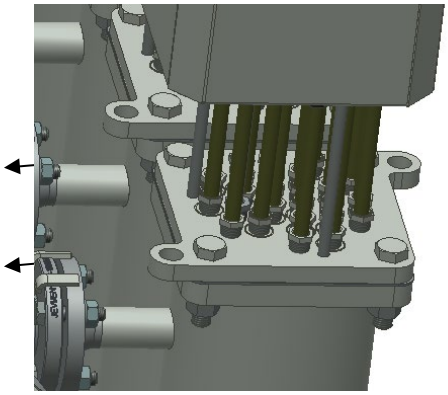


Top view of vessels

7. Remove the lid on the main junction box and pull the wires back into the main junction box until they are clear from the insert.

8. Remove the 4 pcs. M16 bolts on the WCBR insert.

9. In case of more than 1.8 meters free space above WCBR remove the insert from the vessel using the two lifting eyes on the square flange. The weight of the insert is app. 35 kg.

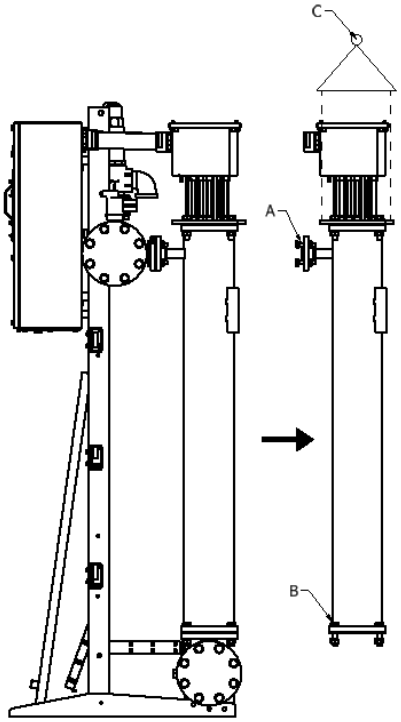


Lifting eye(s)
(weight of insert app. 35 kg)

M16 Bolts

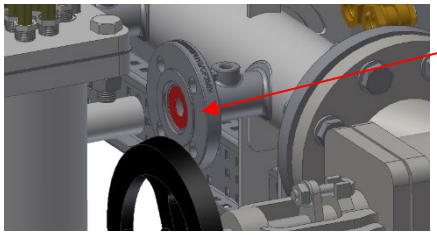
Single units

10. In case of less than 1.8 meters free space above WCBR remove the insert horizontally from the rack by means of a lifting yoke**.**



11. Remove insert and vessel as <u>one</u> assembly, by removing the 4 pcs. M12 bolts (A) and the 4 pcs M16 bolts (B) on the vessel. It is recommended to use the two lifting eyes on the square flange. The weight of the vessel and the insert is app. 50 kg.

12. Make sure not to lose the gaskets and flow reducing plate(s)



13. Separate the WCBR insert from the vessel by removing the M16 bolts between the vessel and the WCBR insert.

9.3 Re-installation of WCBR insert (s) – module WCBR

To reassemble vessel and insert(s) please follow steps 1-13 in section 9.2 Disassembly of insert – module WCBR, in reversed order.
Use a tighten torque according to table in section 6.3 Recommended tightening torque according to thread size

Adjust the outlet valve to the flow, documented in item 2 above.

CAUTION	Remember to re-install the flow reducing plate described under point 13 above. Not doing so, can result in overheating of the WCBR module. There is only one flow reducing plate for each vessel and it must be installed on the outlet manifold.

9.4 cleaning elements

1. Inspect the resistor elements for marine growth and excessive scaling.

   If the elements are covered with marine growth, the resistor inserts must be removed from the vessel according to section 9.1 Disassembly of WCBR insert and 9.2 Disassembly of insert – module WCBR and cleaned as described below.

Clean the surface of the resistor elements using a non-metallic tool. It is also possible to clean it by using high pressure water cleaning.

Example of insert with marine growth which cannot be removed by using high pressure water cleaning but requires cleaning by using non-metallic tools in order to remove the dirt hanging on the heating elements.

9.5 Maintenance and service plan

○ Check or clean
● Spare/replacements parts

System	Item	Periodic maintenance interval			
		Weekly (first 4 weeks)	**Every 6 months**	**Every 12 months**	**Every 36 months**
Whole	Visual inspection the exterior	○			
	Tightening all major bolts and nuts	○			
	Change silica gel in the storage period		●		
	Cleaning interior and exterior with fresh water		○		
Cooling system	Inspection/function of all valves			○	
Insert	Cleaning heating elements			○	
	Main gasket			●	
	Marine growth *			○	
	Thickness of anodes *			●	
Electrical system	Measurement of Ohm values according to test record (max deviation 10%)			○	
	Checking the wiring connections			○	
	Measurement of voltage on condense heater			○	
	Measurement of insulation resistance <3 m Ohm at 1000 VDC			○	
	JB cooling fan filters	○			
Vessel	Inside coating (if sea water cooled)				●

Note: *These procedures are considered normal maintenance and are performed at the owner's expense.*
* Depending on the environment, inspection frequency can vary.

10.0 Trouble shooting

Disconnect all power sources prior to any inspection, service, or cleaning. Hazard for electric shock exists while the equipment is connected.

For maintenance requiring repair or replacement of components, contact the factory immediately for further instruction. Only the failures within the scope of normal maintenance are listed below. If a problem is not listed or it is not eliminated by listed corrective measures, immediately contact JEVI A/S for assistance.

Problem	**Possible cause**	**Possible correction**
Heater/Resistor failure	Loose bus bar	Tighten failed resistor bank.
	Resistor element burned out	Disconnect element and use spare
Temperature switch trip	Resistor over temperature	Ensure sufficient water level in the system
Pressure differential trip	Loose connections.	Check all connections.
	Intake obstruction	Remove and clean.

11.0 Disposal instructions

Equipment containing electrical components shall not be disposed together with domestic waste. Collect separately with other electrical and electronic waste, according to local legislation.

JEVI A/S
Godthåbsvej 32
DK-7100 Vejle
T: +45 75 83 02 11
jevi@jevi.dk
www.jevi.com