



EN

Installation, operation, and maintenance manual for air-cooled braking resistors.
For installation in non-hazardous areas.



ACBR

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Safety information

In order 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 avoiding 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

Proper use of JEVl 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 too. Observe the information in the relevant documentation.
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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 and fan motor (relevant to an air-cooled braking resistor) are not energized, before 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 JEVl's standard version

List of abbreviations

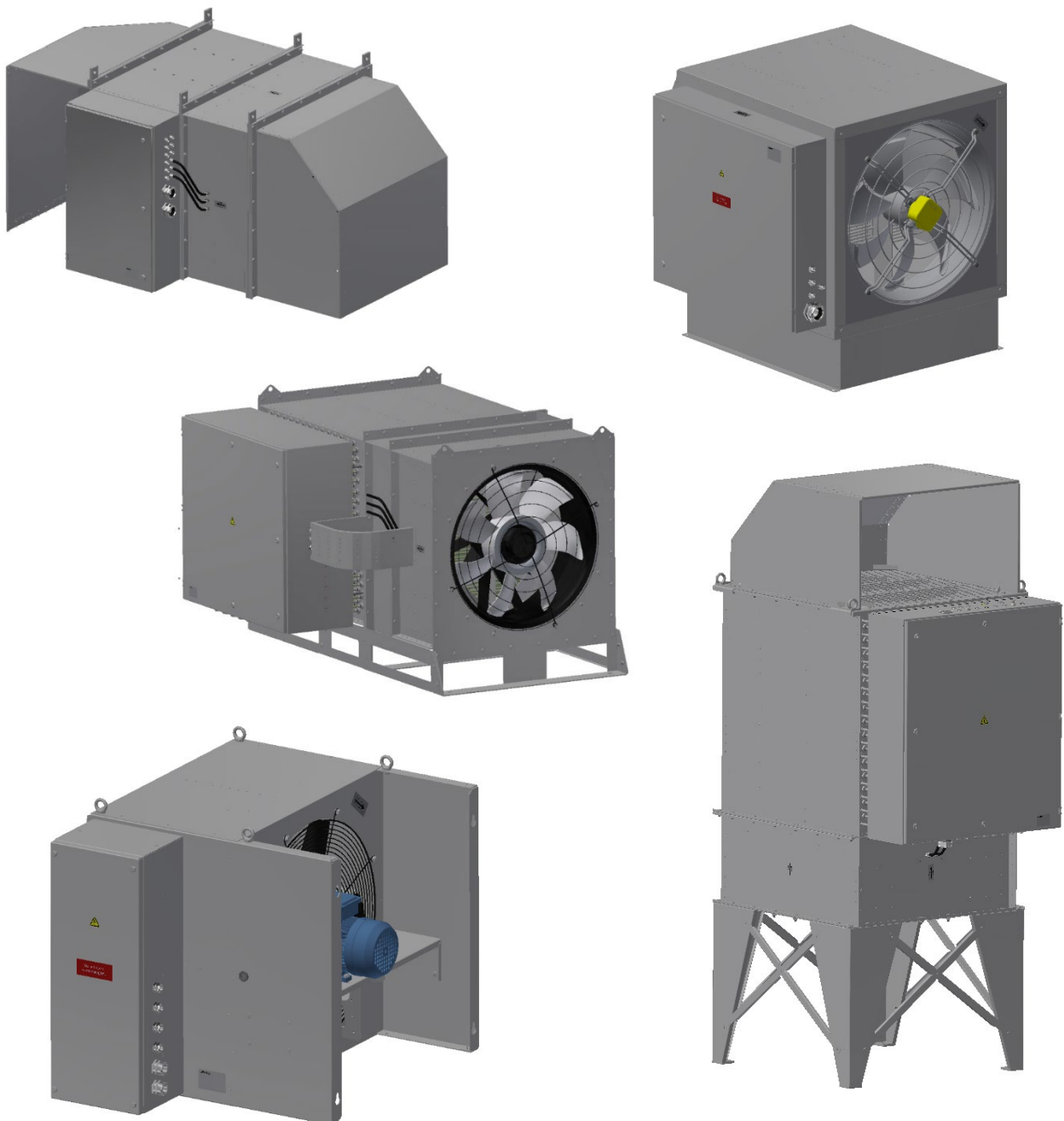
ACBR	- Air Cooled Braking Resistor
CoG	- Centre of Gravity
EF...	- Electrical Duct heater
GA	- General Arrangement (Drawing)
HVAC	- Heating, ventilation, Air Conditioning
IOM	- Installation, Operating and Maintenance Manual
JB	- Junction Box
VLE	- Fan heater with integrated controls for temperature control
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 Air-cooled Braking resistors (ACBR).

The purpose of this document is 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 general and not specific for the actual project. Pictures may show other equipment and options than in the actual project.



2.0 Description of product

JEVI A/S air cooled braking resistors are designed to match the Drive and Braking Module characteristics that are specified by the customer. The energy generated by the motor during a fast deceleration of the drive typically causes the voltage to rise in the drive module intermediate DC circuit. The chopper connects the brake resistor to the intermediate DC circuit whenever the voltage in the circuit exceeds its maximum limit. Energy consumption by the resistor losses lowers the voltage until the resistor can be disconnected.

WARNING: The system designer is responsible for the safety of this equipment and should install adequate back-up controls and safety devices with this electrical resistor equipment. The consequences of failure could result in personal injury or property damage, back-up controls are essential.

The resistors used in the unit are a series of tubular resistor elements placed perpendicular to the air flow. When the unit is in operation, a fan located at the air intake of the unit draws air and directs it over the resistor bank. The heat, developed in the resistors by dissipation of the regulative braking energy, is carried off by the flow of air over the resistors surface. The hot air is then exhausted through the exhaust grid.

WARNING: Keep away from the exhaust while the unit is in operation. Exhaust air can reach temperatures more than 100°C (212°F) when power is applied. Also sucked in particles can be present and forced out with the hot air.

JEVI A/S ACBR is a forced air-cooled, high-powered Braking Resistor designed for outdoor use. The highly efficient design and fan motor assembly is safeguarded by a differential air pressure switch and thermal monitoring sensors. Simple to operate, these units should provide years of operation yet are field repairable should a failure occur with a resistor element or any other component. The terminal box cover is removable for accessing power connections and safety circuits.

If ACBR is required with anti-condensation, Anticondensation must always be connected.

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, 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 with JEVl 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.

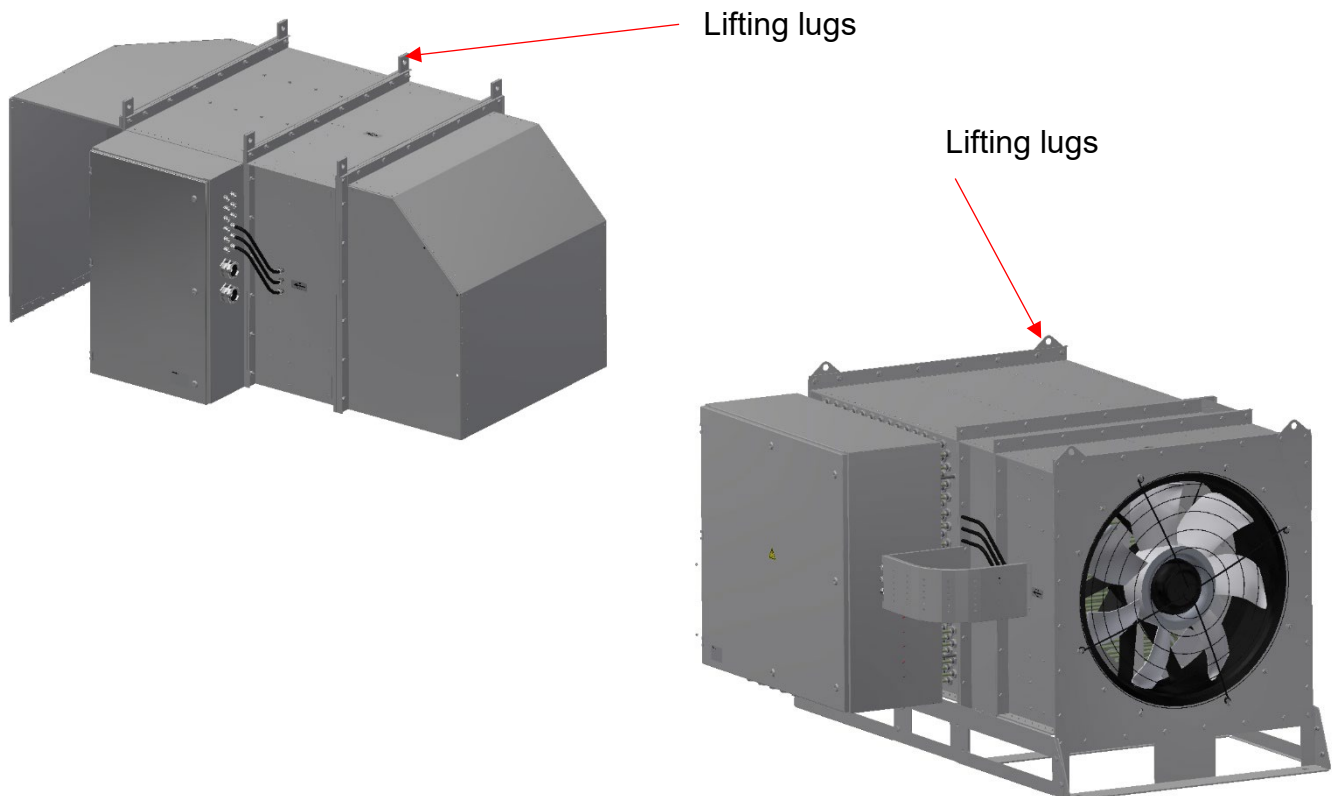
The product is packed on pallets. The packing is easily moved either by forklift or by use of crane handled by authorised personnel.

For lifting lugs, see GA.

For weight, see GA or rating plate.

CAUTION	Heating elements must <u>NOT</u> be used for lifting, this causes damage on the elements.
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4.1 ACBR



ACBR comes in various designs; some to be lifted in lifting lugs and some designed for forklift - some have both. When using forklift, fork must be supporting the entire length of the ACBR.

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.

The 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 >15°C.
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, it is protected with enveloping plastic foil to avoid any risk of harmful metallic dust during storage.
All openings such as cable entry holes are adequately sealed.

Packages must not be opened, or their integrity might be disturbed during transport. Packing may only be opened when the equipment has been taken from storage and 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 when 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, 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 regard 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 occurs. 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.
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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 performed at the owner's expense.

* Depending on the environment, inspection frequency can vary.

6.0 Installation instructions

6.1. Equipment installation

The enclosure should be mounted on a level and solid surface with a minimum clearance of thirty centimetres (30 cm) or twelve inches (12") on any side of the enclosure for proper cooling space.

The top mounted exhaust hood should blow out to open air without restrictions or threat to personnel or other equipment. All clearances are recommended factory minimums. Clearances less than specified should be discussed with the factory before mounting.

Air enters through the grid at the fan unit end and leaves through exhaust grid. Blocking either of these openings during operation will cause overheating and the possibility of unit failure.

Recommended free intake 1,5 x fan diameter. Recommended free outlet 1,5 x duct size.

6.2 Mechanical installation

Mount the Resistor to the floor or deck with bolt dimensions as specified in the GA-Drawing. The bolts are not part of the supply. Make sure that correct bolting materials, suitable for the materials used for the design of the ACBR, are used.

The purpose of the lifting eyes at the top corners is setting the unit in place. The enclosure is designed to be lifted using all four lifting eyes. Ensure all lifting eyes are utilized. Do NOT use the lifting eyes on one side only.

ACBR comes in various designs: some to be lifted in lifting lugs and some for forklift, some have both. When using forklift, fork must be supporting the entire length of the ACBR.

To avoid damage to the enclosure and internal components, do not lift the enclosure in any manner with covers removed. Not using all the bottom mounting holes for anchoring the connection will lower the permissible wind load and mechanical integrity and may result in equipment damage or harm to personnel.

For weight and C.O.G. (Centre of Gravity) information of the ACBR refer to the GA-Drawing.

After the unit is securely mounted, remove covers and ensure that all packing materials and any other foreign particles are removed. Re-install covers and torque bolts to 50Nm.

6.3 Electric installation

The cover of the junction boxes can be a hinged or bolted version and must be opened or removed for performing the electrical connections. A protective plate behind the cover must be removed by unscrewing the mounting bolts.

Follow the electrical wiring diagram for electrical connections on the resistor banks and safety equipment installed.

Connect the protective conductor to the earth rail in each resistor bundle. These are marked with earth and connected with green/yellow wiring.

Connect the main power cables and the grounding cable to the copper bus bars. Follow the electrical wiring diagram. The M12 connection bolts must be tightened according to the table in section 6.5.

Connect the instrument cables to the terminals inside the junction box according to the electrical diagram.

Power up the anti-condensation heater in the resistor junction box and check that it is functional. The power for the anti-condensation heaters must always be switched on until the ship or rig is in operation. If this is not possible, place desiccant bags inside the boxes until the anti-condensation heaters can be switched on. It shall be checked regularly that the desiccant bags still function and not completely saturated.

When all connections have been carried out, remount the protective plate, if any, inside the main junction boxes. These boxes are labelled and indicated on the wiring diagram with the terminal connecting positions.

After all cables are connected and tested, the junction boxes must be closed with the cover.

6.4 FAN and safety circuit connection

See the wiring diagram detailing the Fan & Safety Circuits.

Check all control voltages before operation. A voltage that is rated too high will damage the components. The wiring diagram indicates voltages to be applied.

6.5 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

7.0 Start up

Remove desiccant bag from the junction box before starting up.

7.1 Start-up

Before the initial start-up of the air-cooled brake resistor this must be checked:


1. The resistor has been properly installed.
2. The supply voltage corresponds with the data stated on the name plate of the resistor.
3. The protective conductor (PE) is connected and, if necessary, the external connection between housing and ground has been effected.
4. The electrical connections are performed in accordance with the relevant regulations and wiring diagram.
5. Make sure that air flow is present before switching on the resistor. If this is not the case, it is strictly prohibited to energise the resistor elements.
6. Check setting of temperature safety device (temperature setting is stated on the wiring diagram).
7. Check setting of temperature controller for medium temperature.
8. The fan motor on some ACBRs demands constant power connection, temp <- 10°C to contain internal heating. These motors must also start/stop on signal connecting to have immediate start. See wiring diagram.

7.2 How to switch off the ACBR

De-energise the resistor before shutting down the air flow. The resistor elements will take some time to cool down. If the flow is switched off together with the resistor, the accumulated heat will cause the unit to overheat.

8.0 Operating instructions

Ensure that all connections are properly tightened and all covers are installed.

 WARNING	Do not open the junction box when energized.
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Power On/Power Off switching is not required for operation.

As all components of the braking resistor are controlled remotely, the presence of an operator is not required.

Operation of the unit with any of the covers removed will disrupt air flow and allow foreign particles to travel through the resistor with the possibility of damaging the equipment. Operation of the unit with any covers removed will pose a shock hazard to personnel.

An air differential pressure switch is always provided to switch off the resistors when there is no air flow present. An **automatic reset thermal cut-out (TSH)** is required to de-energize elements whenever discharged temperature is excessive. The resistor elements will resume operation when discharge temperature has decreased.

An optional **manual reset thermal cut-out (TSHH)** will protect the resistor elements in the event of a thermal cut-out failure and prevent the resistor elements from operating until qualified service personnel can carry out repairs.

Each resistor battery is executed with a sensor that has been wired to terminals. The sensor can be either directly connected to an external controller or via a temperature transmitter to a control system. The sensor can be used for monitoring resistor element temperatures and/or safeguarding.

Anti-condensation heaters are used to avoid condensation problems in shielded electrical installations, boards, and control cabinets. The power to the anti-condensation heater in the resistor junction box must be kept on at all times.

The fan motor on some ACBRs demands constant power connection, temp $< -10^{\circ}\text{C}$ to contain internal heating. These motors must also start/stop on signal connecting to have immediate start. See wiring diagram.

JEVI A/S ACBR can optionally be manufactured with a control system (safe area) for the different signals that come from sensors in the unit.

IMPORTANT: Before switching on the resistor, always make sure that air flow is present. Without the presence of flow, the air-cooled braking resistor can overheat. The power for the resistor must be switched off for at least 5 minutes before the power for the fan is switched off (to ensure that resistance elements are completely cooled down).

8.1 Environmental conditions

The equipment is intended for outdoor installation and operation. The surrounding air must be free of contaminants or particles that could be drawn into the air intakes.

The unit should be placed where adequate space is available for air circulation. Recommended free intake 1.5 x fan diameter, recommended free outlet 1.5 x duct size. Do not enclose the unit in a small room or within 300 mm of other surfaces that may prevent proper ventilation. In small rooms or restricted areas, the heat given off by the unit may increase the ambient temperature to an unacceptable level, which may cause insufficient cooling of the resistors and surrounding equipment.

WARNING: Do not touch enclosure surfaces during operating conditions. Surfaces can reach temperatures in excess of 100°C (212°F) when power is connected.

9.0 Maintenance instructions

9.1 Preventive maintenance

For optimum performance and service life, preventive maintenance is a key factor. It is recommended that during scheduled inactiveness, reactivation from storage, or unit relocation the following maintenance steps are carried out:

1. The outside surface of the unit should be wiped or blown free from dust and dirt. It is safe to pressure clean the enclosure. Ensure air intake and exhaust areas are clean and free from foreign particles. Blast or sand any noticeable corrosion areas and cover with a suitable coating.
2. Open junction box and ensure that all resistor terminal connections including wire, busbars and bushings are tightened. Inspect bushings and isolators for cracks. Ensure that fan and all safety component connections are tight at the terminal board. If required, it is safe to blow any dust from this compartment. Re-install terminal compartment cover before proceeding with maintenance on the duct.
3. If resistor elements are extremely dirty, elements can be pressure cleaned. Pressures up to 140 bar/2000 PSI at 0.6 meters /2 feet or more may be used when cleaning the resistor elements. Pressure should be reduced to less than 70 bar/1000 PSI for the connection points, and the distance from the nozzle to any insulator should not be closer than 1.2 meters/4 feet to prevent damage.
4. Clean all isolators.
5. If the ACBR is placed near seawater, the stainless-steel surface must be cleaned regularly with freshwater to avoid corrosion resulting from salty pollution caused by salty mist or spray.



WARNING

Handling of the equipment must meet the requirements of DS/EN 50110-1:2013 (electrical safety).

9.2 Safety regulations prior to maintenance and repair work

Repairs on Air Cooled Braking Resistors (ACBR) are not always warranted; the decision of welding repairs must be taken with due consideration to the location of the defect and must be carefully evaluated and interpreted.

Maintenance and repair work must always be carried out by qualified and authorized personnel only.

Allow the ACBR or the entire system to cool down to less than 50°C (122°F) before starting maintenance activities.

Disconnect the main power supply and power supply for fan motor, control and sensor equipment.

Take care not to damage seals.

NOTE: Before commencing on welding activities make sure to dismount the instrumentation (Air flow switch, PT100 etc.), as these may be damaged by the welding.

9.3 Working on electric or electronic assemblies

Take the following precautions into account!

Keep away from live circuits

Operating personnel must always observe all required safety regulations. Do not replace components or adjust equipment with inverter power turned on. To avoid casualties, always cut off power from the entire drive system.

Shock hazard

Braking resistors contain lethal voltages when connected to the inverter or braking module. Power to the inverter must be removed before servicing the braking resistor. Allow adequate time after turning off power prior to servicing or touching any components. Consult your drive manufacturer for adequate discharge times.

Do not service or adjust on your own

Under no circumstances should any person reach into an enclosure for the purpose of service or adjustment of equipment except in the presence of someone who can help or do first aid.

Safety grounding

An uninterruptible earth ground connection must be supplied from the main power source. Serious injury or death can occur if this grounding is not properly carried out. Grounding of this equipment should be done by qualified personnel only and must be installed in accordance with all applicable national and local electrical codes and regulations.

9.4 Welding activities

Never carry out any welding on the assembled ACBR or its parts. Cover the ACBR when welding in its vicinity to prevent welding spatter from contaminating the equipment.

Separate the electrical ground connections on the electronic equipment from the ground of the ACBR.

No other maintenance or repair work must be carried out in the vicinity of the ACBR while welding is being performed.

Do not use the ACBR's ground terminal.

Before welding it is **very important** that cracked welds are removed and that cracks are cleaned. If possible, use a grinding tool or angle grinder to clean out the cracks and sharpen the edges of the plate.

Do not route the welding lead over or near the wiring harnesses of the ACBR while welding activities are carried out.

Do not weld on parts, chassis etc. with coated surfaces. Temperature higher than 150°C (302°F) will damage the coating.

9.5 Pickled and passivated surfaces

All products from JEVİ A/S are pickled and passivated according to ASTM A380. If additional welding is carried out, the welding area must be passivated to avoid corrosion – e.g. spray passivated.

After welding the surface procedure from chapter 9.4 must be followed. Added parts, if any, must not have any sharp edges.

JEVİ A/S cannot guarantee the strength and durable properties for welded parts or bolted joints if these add-ons are needed. JEVİ A/S can be contacted for advice on engineering and construction or construction changes.

Always obtain permission from the person in charge, before commencing maintenance and repair work or switching off any part of the electronic system.

Make sure not to damage cabling during removal. When reinstalling, ensure that the wiring is not damaged from contact with sharp objects, by rubbing against other components or from encountering a hot surface.

Perform a check of all functions when repair on the device or system has been completed. Most importantly check the function of the emergency stop.

9.4 Bolted joints installation

All bolts and other types of fasteners must be installed in accordance with common industrial practice or supplier requirements.

Location

The proper position of the hole pattern on the posts is verified. The hole pattern should not be located closer to bends, corners, or edges than a minimum of 3x the hole diameter.

Drilling

Anchor bolt holes in the base plate should be 1 to 2 mm larger than the bolt diameter. After drilling, the surfaces must be pickled and passivated according to chapter "9.3. Pickled and passivated surfaces".

Bolt and rivets material

Stainless steel fasteners must be supplied from AISI 316 material. Nuts and washers should match the material grades for the bolt or fastener. Stainless steel fasteners should be compliant to the requirements of ASTM F593, "Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs" and ASTM F594 "Standard Specification for Stainless Steel Nuts." Stainless steel bolts are supplied either hot finished or cold finished. Cold finished grade 316 bolts have an ultimate tensile strength of 620 MPa (90

ksi), versus 516 MPa (75 ksi) for hot finished types. However, cold finished bolts are only supplied if specifically specified and are not standard stock items.

Because installed tension for stainless steel fasteners is not as high or as well controlled as for high strength steel bolts, the use of lock washers is common with stainless steel fasteners. Lock washers are placed under the nut and help to prevent loosening because of structure vibrations and load fluctuations.

Corrosion

Stainless steel is generally corrosion resistant and will perform satisfactorily in most environments. The limit of corrosion resistance of a given stainless steel depends on its constituent elements which mean that each grade has a slightly different response when exposed to a corrosive environment. Attention is therefore needed to select the most appropriate grades of stainless steel for a given application. As well as careful material grade selection, good detailing and workmanship can significantly reduce the likelihood of staining and corrosion.

Please consult JEV I A/S for the correct selection of material for overhaul and repairs.

Inspection

A final inspection must be carried out to inspect material grades used and if the method of assembly applied was performed correctly.

9.6 Recommended 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		○		
Insert	Cleaning heating elements			○	
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			○	
Fan unit	Clean fan blades		○		

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 JEVİ A/S for assistance.

Problem	Possible cause	Possible correction
Fan not operating	No power to the motor	Loose connection at terminal block. Motor power source disconnected.
Heater/Resistor failure	Loose bus bar Resistor element burned out	Tighten failed resistor bank. Disconnect element and connect spare
Temperature switch trip	Resistor over temperature	Ensure air intake and exhaust are clear of foreign particles or blockage. Check fan operation
Pressure differential trip	Loose connections. Intake obstruction	Check all connections. 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.

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