

**IOM -  
INSTALLATION, OPERATION AND MAINTENANCE  
MANUAL FOR EF.. DUCT HEATERS (HVAC)**



**For installation in hazardous areas**

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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 referring to your personal safety


 <b>DANGER</b>	Indicates that death or severe personal injury will result if proper precautions are not taken
 <b>WARNING</b>	With a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken
<b>CAUTION</b>	Without a safety alert symbol, indicates that property damage can result if proper precautions are not taken
<b>NOTICE</b>	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.

### Proper use of JEVI products

 <b>WARNING</b>	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.

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

The English IOM is JEVI's standard version

## List of abbreviations

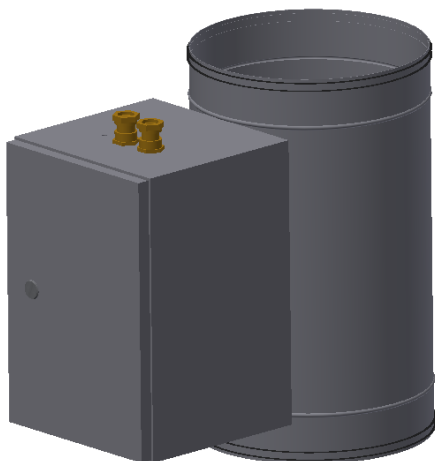
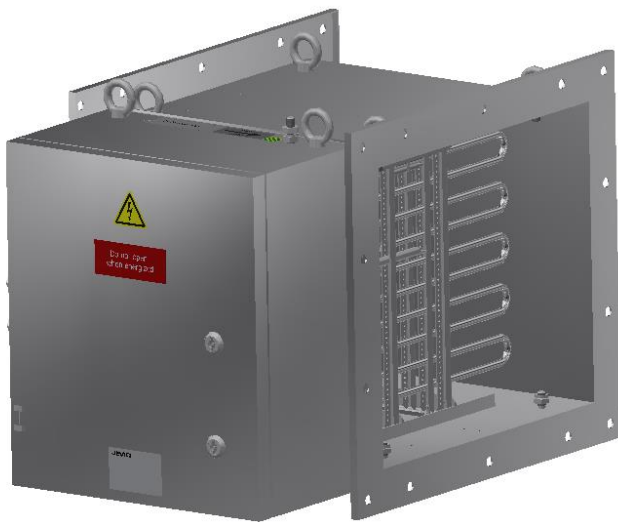
ACBR	- Air Cooled Braking Resistor
CoG	- Centre of Gravity
EF...	- Electrical Duct heater
GA	- General Arrangement (Drawing)
HVAC	- Heating, ventilation, Air Conditioning
IOM	- Installation, Operating and Maintenance Manual
JB	- Junction Box
VLE	- Fan heater with integrated controls for temperature control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

The purpose of this document is to introduce a reader to installation, operation and maintenance procedure and most importantly to 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.



## 2.0 Description of product

The duct heater is designed for heating of air.

Reference should be made to the general drawing of this item for the intended use:

Drawing no. : Refer to equipment drawing GA  
Electric supply : See electrical diagram  
Voltage : See electrical diagram  
Ref. number : Same as order number and item number

The heater consists of an enclosure (IP rating according to GA and/or Datasheet).

Containing:

Certified electric heating elements (Ex e II) max load of 1,3 W/cm<sup>2</sup>.

A protective device with manual reset (TSHH) Ex de IIC Gb. Optional, protective device with auto reset (TSH) Ex de IIC Gb Alternative protective device, TSHH, thermocouple sensor type K connected to certified transmitter, Ex ia IIC T4...T6 Ga end user applies barrier, reset must be done by hand. Temperature sensors are placed at the highest temperature areas of the heating bundle. In case of no airflow the TSHH will cut off the heater.

Optionally the certified equipment mentioned below may be fitted into the junction box.

A certified Ex ia IIC T4 temperature transmitter.

A certified Ex d IIC T5 anti-condensation heater.

A certified Ex de IIC T6 or Ex d IIC T6 or Ex e IIC T6 control device.

Marking hazardous area certification:

ATEX: II 2G Ex e IIC T3 Gb  
II 2G Ex e [ia] IIC T3 Gb

IECEX: Ex e IIC T3 Gb  
Ex e [ia] IIC T3 Gb

Standards :

ATEX:	IECEX:
EN 60079-0	IEC 60079-0
EN 60079-7	IEC 60079-7
EN 60079-11	IEC 60079-11
EN 60079-14	IEC 60079-14

IECEX group and category:	Ex II 2 G
Certificate number:	IECEX TUN 13.0036X
ATEX group and category:	Ex II 2 G
Certificate number:	TÜV 13 ATEX 131672X

## **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 JEV 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**

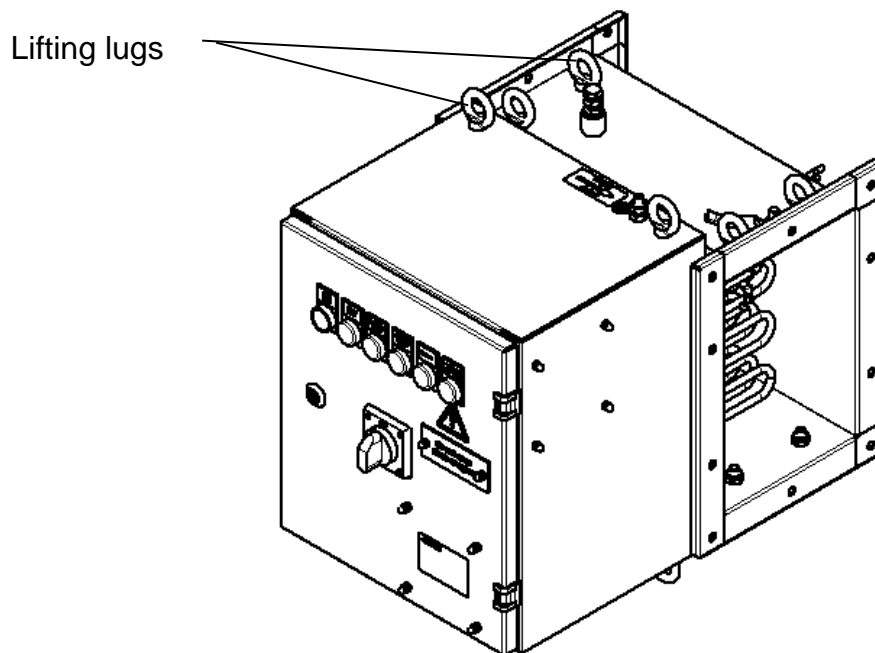
**For weight, see GA or rating plate**

**For COG - if any, see GA**

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

All Heaters and inserts weighing > 25kg are supplied with lifting devices.



## 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.**

<b>CAUTION</b>	During storage, prior to installation the unit must be stored dry with a relative humidity <60 %, temperature >15°C.
<b>CAUTION</b>	Replace desiccant bag in junction boxes and enclosures (if any) every 6 months. Keep a log of the replacements as documentation.
<b>CAUTION</b>	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.

<b>CAUTION</b>	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:

<b>PRESERVATION SPECIFICATION &amp; RECORD</b>									
Record No.:		Tag No.:		Description:				<b>Record page 1 of 1</b>	
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:					Accepted by:				
Date/Sign:					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

### 6.1 General

The user must ensure that his employees are fully trained and supervised in the proper working procedures in order to ensure their safety. The plant must be maintained in a safe condition.

Ensure that the equipment is correctly installed in a suitable location by technically qualified personnel.

Installation has to meet the requirements of EN/IEC 60079-0, EN/IEC 60079-7, EN/IEC 60079-14 or equal valid standards.

### 6.2 Special conditions for safe use

- Only suitable certified cable glands may be used
- Heating elements may be rated up to 1,3 W/cm<sup>2</sup>
- Safety device TSHH must be permanently set at max 130°C in order to maintain T3
- Titanium heating elements may be used only when protected against impact.
- Ambient temperatures are: -25°C to +75°C
- End-user must ensure compliance between intrinsically safe parameters


### 6.3 Heater Installation

Before unpacking the equipment ensure that all items are available and that all crates / or packages are in good condition and undamaged. Any damages must be reported to the site manager and subsequently to JEVI A/S.

After removing the packing material, check all items for damage. If any damages: report this to the site manager and subsequently to JEVI A/S.

For installation mounting and sealing materials have to be used which are suitable for the medium to be heated and the prevailing temperatures that will occur. Please refer to the GA-drawing for precise data and indications of fitting positions.

1. Open the junction box.
2. Connect the electric power cables to the terminals or bus bar system as indicated on the electrical diagram and connect the earthing provisions on the mounting plate.
3. Connect the protective conductor to the earthing terminal.
4. Follow the instructions that have been provided by the supplier of the cable glands if these are present and/or applicable.
5. Close the cover.

	<b>WARNING</b>	Do not open the junction box when energized.
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<b>NOTICE</b>	<ul style="list-style-type: none"> <li>- During non-operation the unit must be stored dry. Relative humidity &lt;60%, temperature &gt;15°C.</li> <li>- If applicable connect and switch on the space heater.</li> <li>- When dismantled it is advisable to place a desiccant bag inside the junction box</li> </ul>
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#### 6.4 Adjusting Thermal couple / RTD, TSH thermal switch with auto reset

The TSH is adjusted to 80% of maximum.

If an adjustment is needed, then load the heater with maximum power and the lowest airflow according to specification.

Set the TSH on maximum temperature.

Wait until airflow and temperature is constant.

Adjust the temperature scale down on the TSH step by step with app 10°C at the time; wait to see if TSH switches off for 10 min. adjust again 10°C continue this procedure until TSH cuts off the heater.

Adjust the TSH scale up with 10°C and add the difference between the inlet

Test the heater with full load and switch off airflow. TSH must switch off before maximum allowed temperature for heater is reached.

The mechanical TSHH is nonadjustable.

Eg.

Inlet temperature according to datasheet/heater specification: 10°C

The TSH cuts off at inlet temperature of 5°C. Adjust the TSH 15°C (inlet temperature 10°C plus difference between test inlet temperature and spec. inlet temperature)

#### 6.5 Adjusting TSHH thermal cut-off (Thermal couple / RTD)

Adjusting TSHH thermal cut-off (Thermal couple / RTD) has been done by JEVI if the transmitter is mounted in the heater.

The max temperature must be set according to the wiring diagram, and the IOM for the transmitter.

This TSHH thermal cut-off (Thermal couple / RTD) must be with manual reset.

## 7.0 Start up

Remove desiccant bag from JB before starting up

Before the initial start-up of the heater the following will have to be checked:

1. The heater has been correctly installed as described in the GA drawing and if necessary, a leakage test has been performed.
2. The protective conductor (PE) has been connected and, if necessary, the external connection between housing and ground has been effected, e.g. for avoiding electrostatic discharging.
3. The earthing connection has been effected and properly secured.
4. The electrical connections have been performed in accordance with the relevant regulations and wiring diagram.
5. The heater has been properly installed and all studs and nuts are properly tightened.
6. All electrical connections between control panel and heater are correctly installed e.g. power cable, temperature transmitter.

### 7.1 Before energizing the heating elements

1. Check the supply voltage.  
Check the control voltage.  
Voltages are specified on the wiring diagrams of this equipment.
2. Check whether the monitoring system has been actuated e.g. 'Overheat Protection'.  
(thermostat, thermocouple sensor fixed to an element sheath).

### 7.2 Shutting down the heater.

De-energize the heater before shutting down the flow.

## 8.0 Operating instructions

Before initial start-up of the heater it should be checked whether:

1. The heater is properly installed and, if necessary, a leakage test must be conducted.
2. The electrical connection is performed in accordance with the relevant rules and regulations.
3. The protective conductor (PE) has been connected and, if necessary, the external earth connection between housing and ground has been effected, e.g. for avoiding electrostatic discharge.
4. Monitoring systems have been actuated e.g., "Flow Monitoring" and "Overheat Protection".
5. The medium to be heated, is in accordance with the heater design.

At the cable entries temperatures exceeding 70°C are not admissible.  
The minimum temperature rating for all incoming cables is 70°C

<b>NOTICE</b>	<p>Before switching the heater on, check that the rated process flow is running.</p> <p>The construction materials used are chosen in accordance with the operating conditions specified.</p> <p>Should the heater be operated with other media or temperatures than those specified, warranty expires immediately.</p>
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## 9.0 Maintenance instructions

The one-year service interval only applies if the heater is installed in a dry and clean environment. If installed in environment which does not meet these requirements, the service intervals might have to be reduced.

The 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 ceramic insulators on the elements for damage.
2. Check the insulation resistance of the heating elements.  
Connect the Megger to an earth bolt and one of the phases U1, V1 or W1. If the measured value is less than 2 Mega ohms, each heating element will have to be checked separately. Minimum value is 10 Mega ohms at 1000 volts.

*\*The Ex certificate together with the IOM is documentation and as soon as equipment is ATEX and/or IECEx-marked and certified, shall the manufacturer always be contacted before any repair jobs are planned to get the correct instruction or approval to make the repair job.*

*If this is not followed, the certification will be voided.*

*\*Text also references to page 18*

### 9.1 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 desiccant bag in the storage period		●		
	Cleaning interior and exterior with compressed air		○		
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			○	

**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 JEV I A/S for assistance.

<b>Problem</b>	<b>Possible cause</b>	<b>Possible correction</b>
Heater/Resistor failure	Loose bus bar Heater/Resistor element burned out	Tighten failed resistor bank. Disconnect element and use spare
Temperature switch trip	Heater/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.

*\*See text on page 16*

## **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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