



OPERATION MANUAL

DUCT HEATER TYPE DH-R

INTRODUCTION

This manual covers heaters listed on the title page. It is a source of information necessary for the safety and proper use. Please read it carefully before any use of the device, comply with the requirements set out in it, and keep in a place with easy access for service staff and other company services. In case of any doubt about the use of the heater, please contact the manufacturer.

After receiving the heater, please check:

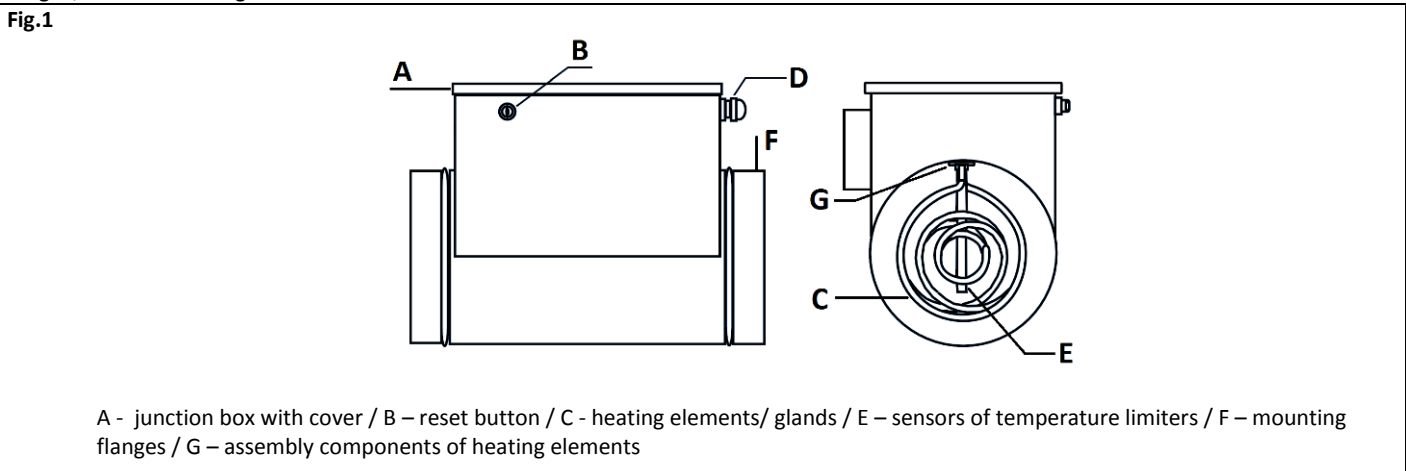
- whether the device is in compliance with order
- whether the data on the rating plate of the heater are the same as desired (power, voltage etc.)
- whether the heater was not damaged during transport (e.g. there are no dents/cracks or no loose parts inside).

In case of any irregularities, please contact your dealer or Service Department of Venture Industries Sp. z o.o. service.

1. GENERAL INFORMATION

1.1 Information about device

- Electric duct heaters DH-R are designed for heating of premises after installation in round ducts.
- The device is designed for use by trained, qualified adult persons in industrial environment and it is not designed for household or similar use.
- The device is designed for the transport of the clean air. **Do not transport the explosive mixtures**, solid elements, liquids, **substances that cause abrasion**, chemically reactive compounds - we recommend the use of suitable filters. Minimal temperature of transported medium is 0°C, the **maximum temperature of the outlet air of the heater may not exceed + 60 ° C and + 40 ° C at the place of supply to the room. The minimum velocity of the air flowing through the heater is 1.5 m / s.**
- The heater is designed for installation inside the room. Surrounding the heater may not contain explosive mixtures, substances that cause abrasion, chemically aggressive compounds, viscous substances, liquids, substances with high humidity. The ambient temperature should be between 0 ° C to + 40 ° C.
- The device must not be exposed to radiation (such as microwave, UV, laser, x-ray).
- Housing heater is made of galvanized sheet metal, heating rods are made of stainless steel.
- The heater is fitted as standard with dual protection against overheating - automatic limiter (temp. + 75 ° C) and manual limiter with manual reset (temp. + 85 ° C). The device requires an external system disconnecting the the power at the moment of limiter activation (see Chapter - 3).
- The heater is equipped with a control system AHR-15T, which requires to correct operation additional external devices sold separately, including temperature sensor (see Chapter - 3).
- The heater has following markings:
 - warnings and information pictograms: information on the risks connected with the high temperature and on the risks of electric shock.
 - rating plate of the heater containing: voltage, frequency, electric power, the article number (Art. No) and serial number (No.)
 - direction arrow: information about the correct direction of air flow
- Fig. 1, a schematic diagram of the heater:



- To gain access to the inside of the machine, please disconnect the power, then unscrew the screws and remove the cover. The cover is additionally grounded using PE wire.

1.2 General risk and guidelines

During entire life cycle of the heater pay particular attention to the **risk and guidelines** presented below:

1.2.1 sharp edges

- At the production stage the sharp ends of the heater were grinded, but it may have edges which touching can cause injury. It is recommended to use appropriate protective gloves.

1.2.2 fall over

- Conveying equipment and support structures of the heater must maintain its weight and ensure that it will not move. During transport, do not approach the transferred charge.

1.2.3 materials

- In case of fire or transport of improper medium – heater parts can generate fumes hazardous to health.

1.2.4 temperature

• Housing and parts of the device during operation and for some time after switching off the device have a very high temperature. Necessary steps must be taken to protect against scalding and occurrence of fire. **In the event of a fire, to extinguish a fire, use a fire extinguisher approved to extinguish electrical equipment and follow the instructions of the fire brigade.**



1.2.5 unexpected start / connecting power supply

• Before undertaking any kind of work on heater (e.g. installation, maintenance and inspection, disassembly), it has to be completely and reliably disconnected (isolated) from power supply (minimum 3 mm isolating gap). It must be ensured, that power supply will not be connected during operation of the heater and that heating elements have cooled down to ambient temperature.



ATTENTION!
BEFORE REMOVING THE COVER DISCONNECT POWER TO THE DEVICE

- The appropriate steps have to be made in order to provide protection against electric shock and to prevent access to electrical components by unauthorized person.
- The heater is equipped with a control system, however, connecting the power supply results in immediate work of heating elements.
- The device is not equipped with a control system, which switch it off permanently in case of temporary power supply loss. It has to be ensured, that any dangerous or unpermitted event does not occur in case of temporary loss of power supply.
- After disconnecting from power supply, heating elements and housing, under influence of the produced heat energy, still keep the high temperature for a certain time. It should be considered during operation.
- Automatic temperature limiter (75°C), located in the heater, after operation (opening of the circuit) due to overheating, returns, after cooling down, to its original state. It has to be ensured, that any dangerous or unpermitted event does not occur in case of activation of temperature sensor and after its cooling down.

1.2.6 use

- Improper installation and/or use may lead to damage of the device and occurrence of dangerous situation. The unit can be installed, maintained, dismantled and used only by qualified and authorized personnel, in accordance to safety rules and current regulations in the country of use (including proper electrical authorization). Personnel need to be familiar with reactions caused by the heater.
- If there is a need to open the junction box or remove the cover (eg. for maintenance or review) - involved staff must be informed about potential hazards and these items should be re-closed / re-assembled as soon as the maintenance / review is completed.

Using of the device in dismantled/uncompleted state is forbidden, e.g. without the cover.

- Any modifications of the unit are forbidden. Complicated maintenance work (such as demanding disassembly of heating elements) need to be always made by Venture Industries Sp. z o.o. service or with it permission - according to additional guidance. Improper assembly may lead to reduce the fan parameters, damage the unit and lead to the dangerous situation.

1.2.7 Accumulation of dust

- Please prevent the build up of dust deposits on and in the heater. Accumulation on dirt and dust can cause unpleasant odours and risk of ignition. It is recommended to use appropriate air filters.

1.2.8 explosive atmospheres

- Contact of the heater with explosive atmospheres will cause an ignition. It is forbidden to contact the heater with explosive atmospheres. It is forbidden to use and store the heater in the event of the occurrence of an explosive atmosphere inside and / or around the unit.



ATTENTION!
ANY FLOW OF MEDIA CONTAINING A MIXTURE OF EXPLOSIVE GAS / DUST IS PROHIBITED.

2. TRANSPORT AND STORAGE

2.1 transport and storage guidelines

- The heater must be transported and stored in original packaging, without exposure to excessive shock. The device must be sheltered against adverse weather conditions, stored in a dry and ventilated environment, free from substances harmful to the device – it must not be transported or stored in a room where fertilizers, chlorinated lime, acids and other aggressive chemicals are collected. The heater has to be protected from entering of foreign objects.
- During transport and storage heater must be protected from mechanical damages, including crushing.
- The device must be always lifted by grasping the housing parts, using protective gloves.

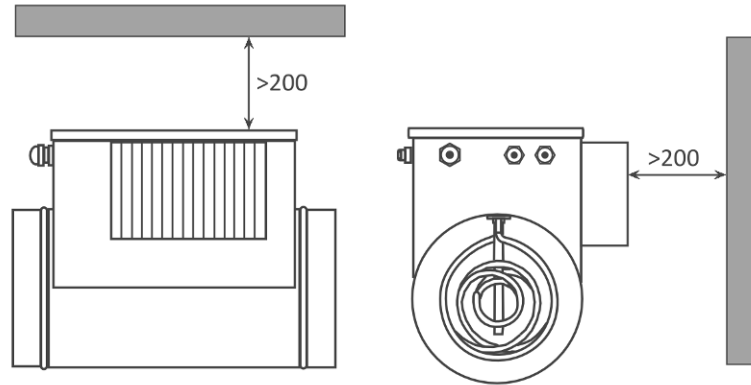
- It is recommended, that the time period of storage of the device does not exceed one year. After a long storage before installation, please check condition of the heater (Chapter 5).

3. ASSEMBLY AND INSTALLATION

3.1 Assembly information

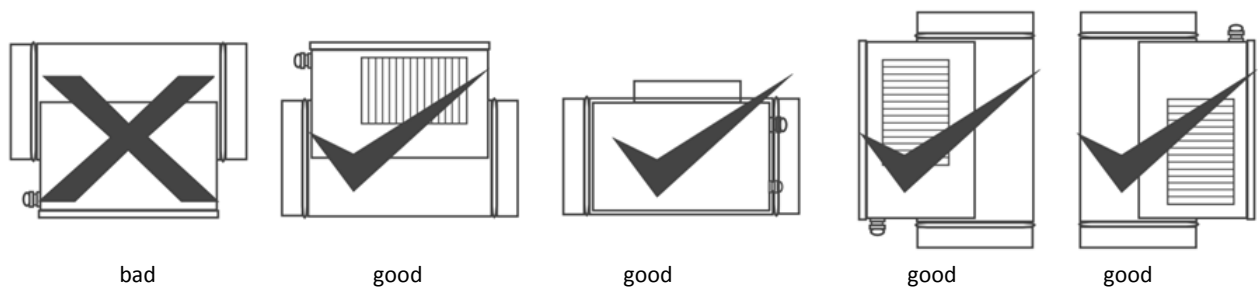
- Installation of the heater should be performed according to the guidelines set out in section 1.2.
- Before installation please remove temporary items that protect the heater from dirt (e.g. box, foil) – leaving them during operation may cause damage to the device. Make sure that the device is not damaged.
- Ensure adequate cooling for the automation control system by maintaining minimum distances from the heat sink of 200 mm.

Fig. 2 Minimum distances from the heat sink [mm]



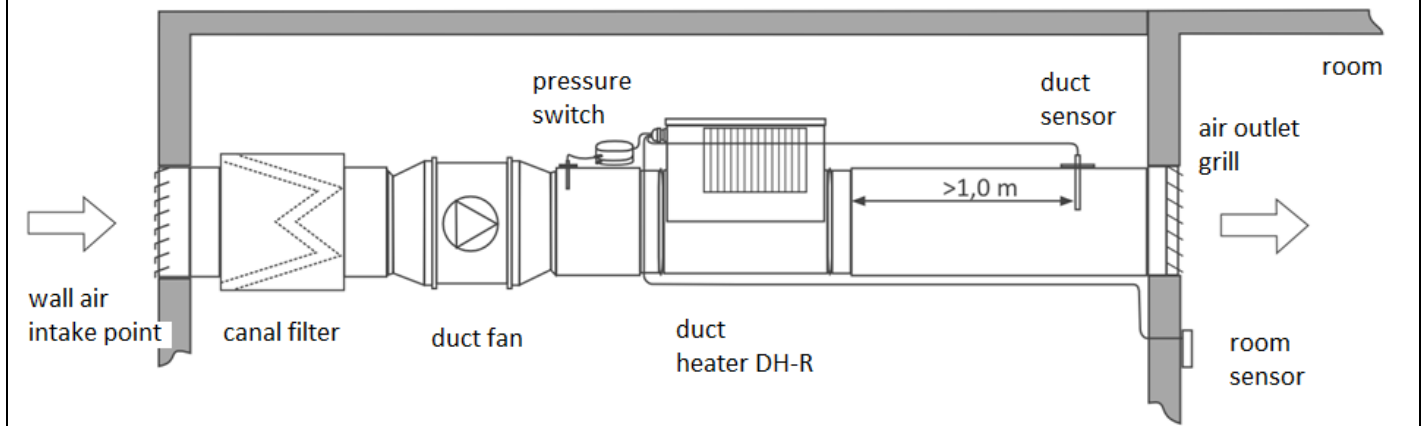
- The heater can be installed in any position, in round ducts, except for the installation of the junction box facing down.

Fig. 3 Installation of the heater



- The heater is to be installed in such a way as to prevent of touching the heating elements of the working device. Applied protection must at least be in accordance with ISO 13857.
- It must be used appropriate covers to protect the device against entering of foreign element into device.
- It is recommended to apply protective measures to minimize the transmission of vibration to the heater.
- The device must be installed at a safe distance from the elements which may cause the ignition. Do not install the heater in the immediate vicinity of materials, which are flammable or not resistant to high temperatures. Fittings, connectors or other devices (in particular including plastic components) may not be mounted at a distance of less than 0.5 m from the heater.
- **The heater is to be installed in such a way as the direction of air flow was in line with the arrow on the heater housing.** The use of improper air flow direction will result in loss of thermal protection enabled by limiters (sensors placed behind the last series of heating elements).
- The recommended assembly order of heater in the ventilation system (in the direction of air flow) is: air filter - fan - heater.

Fig. 4 Recommended assembly order



- It is recommended to ensure, between the channel inlet and the system components such as elbows, reducers and fan, a distance of minimum 3 channel width.
- It is recommended that the channel sensor was placed at least 1 meter from the heater outlet. Fixing the heater should be performed in such a way that the "RESET" button on the housing is visible and available.
- Electrical connection of the heater should be performed after fixing the unit.
- After the installation is completed, please ensure, that no foreign objects (e.g. assembly components, tools) are near and inside the heater, and the unit has been properly secured after installation (closed and secured cover, tighten fasteners and glands).

3.2 Electrical connection guidelines

- The heater and power supply network must be protected in accordance with local law requirements
- The electrical connection must be made in accordance with electric scheme (Fig. 5). It is necessary to use a circuit disconnecter with minimum 3mm gap insulation, protection against short circuits and against the effects of voltage unbalance. **Appropriate shock protection measures should be used. The heater must be connected to the grounding system with the help provided for this purpose grounding point (PE) located in the connection box.**
- **The heater has a double thermal protection provided by limiters connected in series, which outputs are connected to the terminal block (activation of limiters will cause the opening of the security circuit). It is required to use the circuit disconnecting (eg. by contactor or relay) the power supply of the heater and, optional signalling overheating at the moment of activation of any of the temperature limiters.**
- The connection should ensure disconnection of power supply to the heater when the fan stops, interrupt the flow of air through the heater, or when the speed of air flowing through the heater drops below 1.5 m / s.
- The power supply system should provide disconnecting the power supply when the fan, or the air flow through the heater stops or when the air flow velocity drops below 1,5 m/s.
- Voltage and frequency of supply network cannot exceed those indicated on the heater nameplate.
- Electrical cables should be brought to the heater by the glands. Cables must be laid so as they do not adhere directly to the metal housing of the device and a liquid (eg. accidental condensation) does not run over them in the direction of the junction box.
- The cross section of the wires should be selected in accordance with applicable standards and regulations in Poland, based on the power of the heater.
- **The cover of the junction box and the housing are connected by cable to preserve the continuity of galvanic protection circuit PE. Do not remove this connection under no circumstances!**



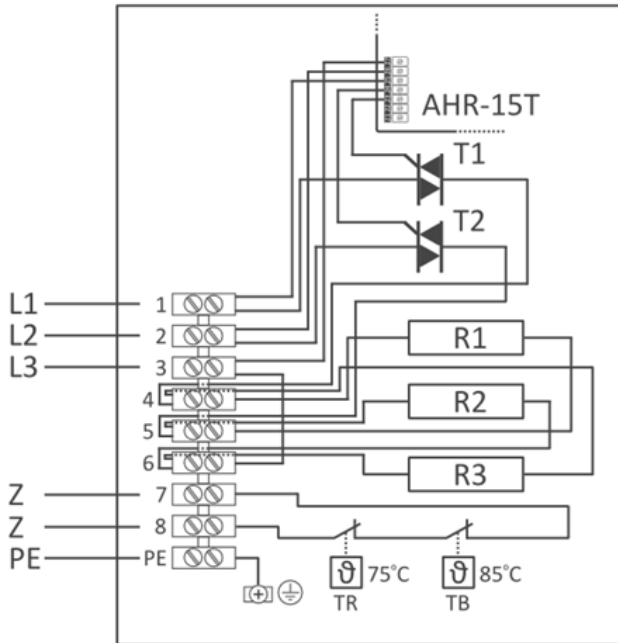
ATTENTION!

FOR OPERATION THE HEATER REQUIRES AN EXTERNAL TEMPERATURE SENSOR NTC – FOR DETAILS SEE CONTROL GUIDELINES 3.3.

Duct heater DH-R

Fig. 5 Scheme of power supply connections

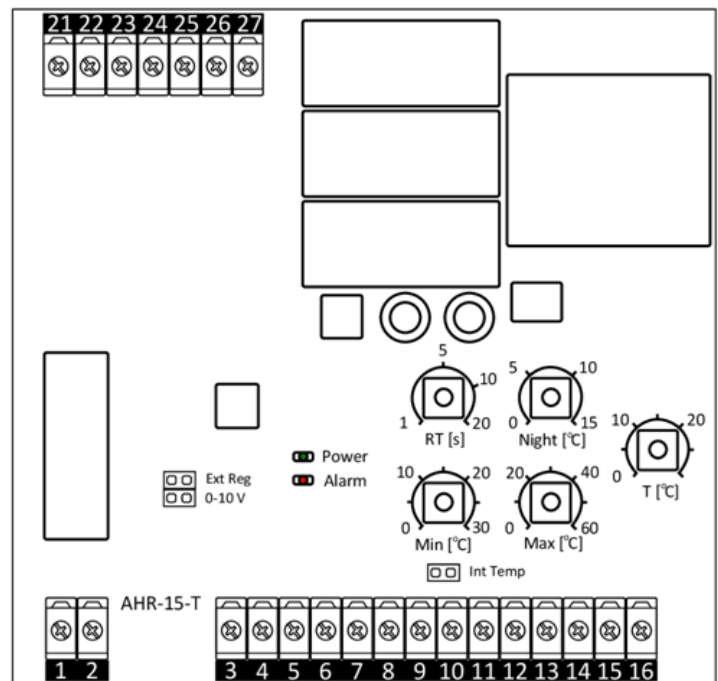
5.1 DH-R - power supply:



DESCRIPTION OF PINS:

- L1, L2, L3 – three-phase power supply of the heaters
- Z – terminals of the set of temperature limiters
- PE – protective conductor
- TR – automatic limiter
- TB – limiter with manual reset (manual limiter)
- T1 – triacs

5.2 AHR-15T – control system:



DESCRIPTION OF POTENTIOMETERS:

- RT [s] - cycle length adjustment control
- Night [°C] – night setback setpoint
- T [°C] – internal setpoint of the reference value of the temperature
- Min [°C] – setpoint of the minimum temperature
- Max [°C] - setpoint of the maximum temperature

Attention! Setting min and max are taken into account only when the temperature limit sensor is connected. To terminals 13-14, the sensor is automatically detected.

FUNCTIONS OF JUMPERS:

- Int Temp – active internal setpoint adjuster T [oC]
- 0-10 V – active input of analog signal 0-10V DC
- Ext Reg – control by an external controller (0-10V)



DESCRIPTION OF PINS:

- 1-2 ALARM OUTPUT POTENTIAL-FREE NO, max. 1,0A, 250V.
 - 3-4 OUTPUT NC, OPERATION PERMISSION (SWITCH)
 - 5-6 INPUT NO, NIGHT SETBACK
 - 7-8 INPUT ANALOG CONTROL SIGNAL 0-10V
 - 9-10 MAIN INPUT TEMPERATURE SENSOR
 - 11-12 INPUT TEMPERATURE CONTROLLER
 - 13-14 INPUT TEMPERATURE SENSOR MIN-MAX
 - 15-16 INPUT OF TEMPERATURE SENSORS TRIACS
- OUTPUTS 15-16 AND 21..27 SA ARE FACTORY CONNECTED AND SHOULD NOT BE CHANGED**

3.3 CONTROL GUIDELINES

- The heaters DH-R are equipped with the internal control system AHR-15T.
- For proper operation the system requires adequate connection of external accessories (eg. temperature sensor), which are not included with the device.
- Automatic control system cooperates with sensors type NTC ($15 \pm 10k\Omega / 0 \pm 30^\circ C$) and potentiometric temperature adjusters ($0 \pm 5k\Omega / 0 \pm 30^\circ C$).
- The microprocessor controls the switching of 2 triacs in a time cycle, by changing the activation time of heating elements of the heater in the way to keep the setpoint temperature settings. The length of the cycle is set by a potentiometer RT [s] in the range 1 ± 20 s (according to a logarithmic scale). Depending on strength of error signal (the difference between setpoint temperature and the measured value) the activation time changes in the range from $0 \pm 100\%$ of the time cycle, according to the control algorithm of the controller type PI. It is not recommended to set up too long time cycle of RT.

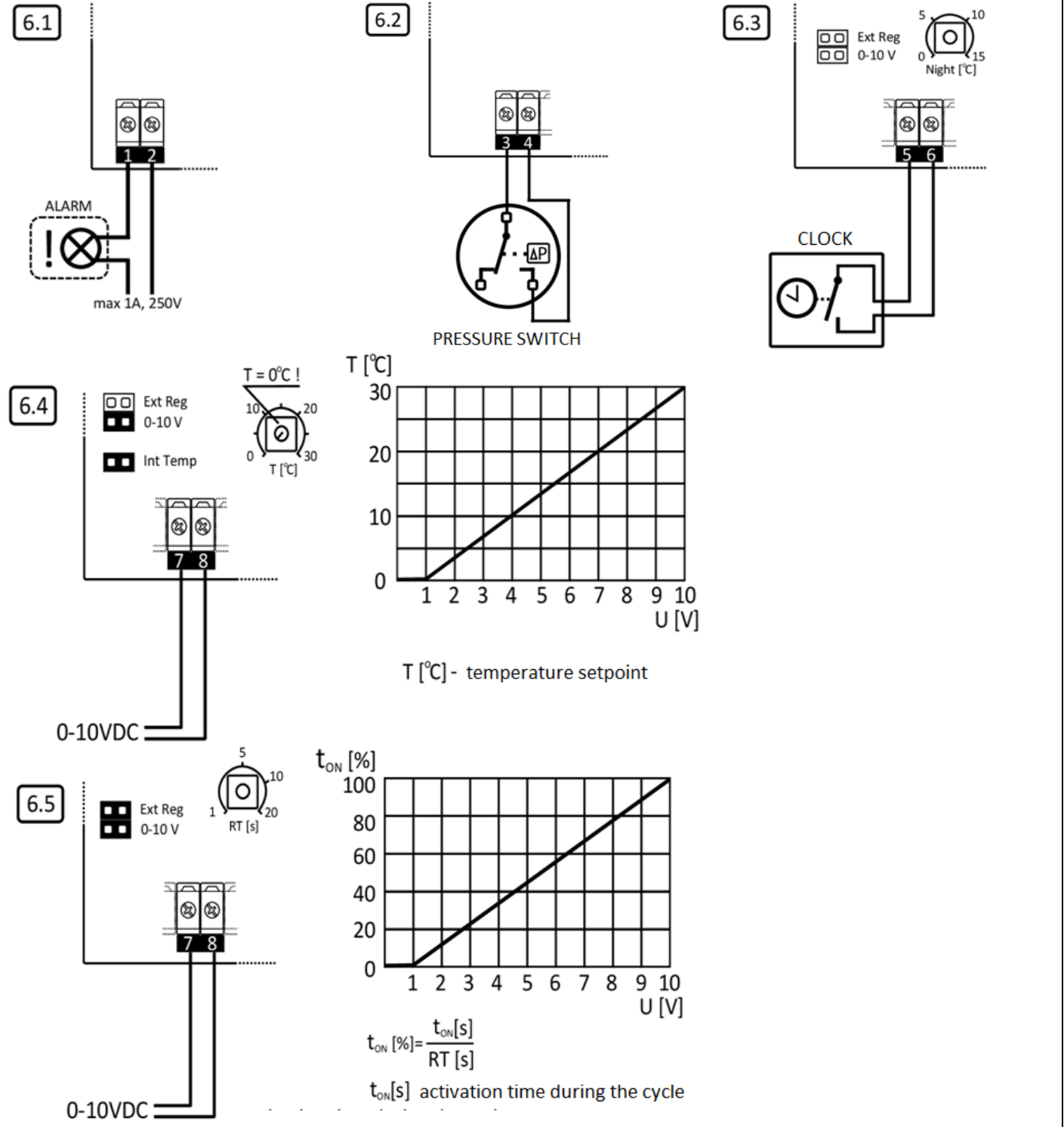
- To select the setpoint temperature in the range, for example, $0 \div 30^{\circ}\text{C}$, it can be used the internal potentiometer T [$^{\circ}\text{C}$] located on the PCB controller AHR-15T (see diagram No. 6.6) or external potentiometric adjuster 0-5k Ω (eg. TBI-30, TG R430) connected to terminals 11-12 on the PCB (see diagrams No. 6.7 and 6.8). Selecting the internal or external temperature controller is via a jumper Int Temp on the PCB (see diagrams No. 6.6, 6.7 and 6.8).
- The device is equipped with a feature night setback (NO contacts, marked 5-6 on the PCB control). As a result of a short circuit contact, temperature value will be reduced by the value set on the potentiometer Night [$^{\circ}\text{C}$] (see diagram No. 6.3). Setting nightly reductions may vary in the range of $0 \div 15^{\circ}\text{C}$.
- The device can be controlled by external voltage signal $0 \div 10\text{V DC}$ attached to terminals 7-8 on the PCB of the controller. Selecting the control voltage signal is performed by setting jumpers 0-10 V. There are two control modes selectable by a jumper Ext Reg:
 - With the Ext Reg jumper removed, heater is set at the desired temperature using an external analog signal in the range of $0 \div 30^{\circ}\text{C}$. The signal below <1V- will cause the turn off of the heater, and the 10V the maximum setting, ie. $+ 30^{\circ}\text{C}$. To work in this mode, it is required to connect an external temperature sensor, placing of the Int Temp. jumper and setting of the potentiometer T [$^{\circ}\text{C}$] in the extreme left position (0°C). In this mode, the function of night setback is active (see diagram No. 6.4).
 - With the Ext Reg jumper, the heater is set by an external control system in the range $0 \div 100\%$ of the operation cycle. The signal below <1V- will cause the turn off of the heater, and the 10V activation by the time $t_{\text{ON}} = 100\%$ of the operation cycle. To work in this mode, it is not required to connect an external temperature sensor. In this mode, the function of night setback is not active (see diagram No. 6.5).
- In the case of heater control with a room sensor, it has to be used an additional temperature sensor in the channel, so as to limit the maximum air temperature at the outlet of the heater to $+ 60^{\circ}\text{C}$ and $+ 40^{\circ}\text{C}$ at the point the heater is blowing. For those purposes it should be used a potentiometer Max [$^{\circ}\text{C}$] and to limit the minimum temperature in the channel can also be used the temperature sensor (potentiometer Low [$^{\circ}\text{C}$]). Channel sensor 15 to 10k / $0 \div 60^{\circ}\text{C}$ must be connected to terminals 13-14 on the PCB of the controller. The controller detects the sensor automatically (see diagram No. 6.9 and 6.10).
- The heater is equipped with the potential free operation enable input (pins 3-4 on the PCB), the recommended way of use of it is to connect them to the pressure switch, which controls the air flow through the heater (see scheme No. 6.2.). If this input is free, it must be bridged. Opening input will shut down the system and issue an alarm signal (ALARM LED blinks once and the relay output 250V/1A, pins 1-2 on PCB is shorted). operation, ALARM LED blinks twice signalling an alarm and relay output is shorted 250V/1A, pins 1-2 on the PCB control. Alarm reset is performer automatically after the operation enable input (pressure switch) is shorted.
- In case of improper connection or damage of sensors the system stops operation, ALARM LED blinks twice signalling an alarm and relay output is shorted 250V/1A, pins 1-2 on the PCB control. **The reset of the incorrect connection or sensor damage alarm requires disconnecting the power supply, remediation of cause and re-application of voltage.**
- Other alarms are described in the table below:

Table of alerts:

Alert cause	No. of flashes of ALARM LED	Remedy the cause	Deactivation method
Opening the line of the pressure switch	1	Short circuit terminals 3-4 on PCB	automatic
None / temperature sensor failure	2	temperature sensor connection / replacing	power supply reset
Triacs overheating	3	Triacs cool down, lowering the ambient temperature of the heater	power supply reset
Triacs damage	4	replacement of damaged components - Service Venture Industries	power supply reset
Incorrect setting of MIN / MAX	5	setting MIN<MAX	automatic

Duct heater DH-R

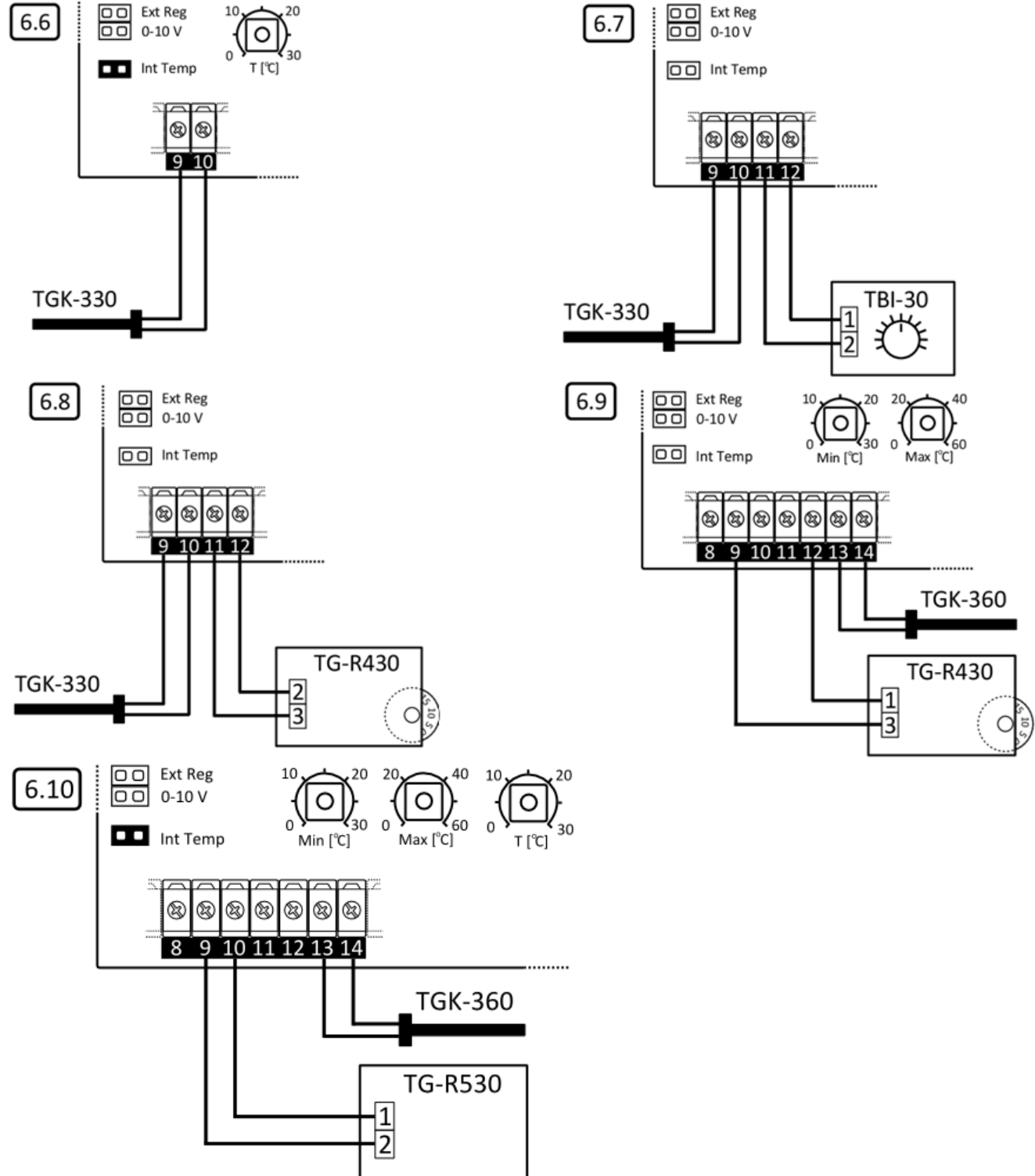
Fig. 6.1-5 Connection schemes of control system



DESCRIPTION OF SCHEMES

- 6.1. Connection of a relay output ALARM – NO contact 1A/250V max
- 6.2. Connection of a high-pressure switch – potential free input
- 6.3. Connection of clock controller for night setback - potential free input
- 6.4. Connection of an external temperature setpoint - input analog control signal 0-10VDC
- 6.5. Connection of an external power setpoint - input analog control signal 0-10VDC

Fig. 6.6-10 Connection scheme of the steering system cont.



DESCRIPTION OF SCHEMES

- 6.6. connection of the temperature sensor TGK-330, internal setpoint
- 6.7. connection of the temperature sensor TGK-330, external setpoint TBI
- 6.8. connection of the temperature sensor TGK-330, external setpoint TG-R430
- 6.9. connection of the temperature sensor with the setpoint TG-R430 and the temperature limit sensor TGK-360
- 6.10. connection of the temperature sensor TG-R530 and the temperature limit sensor TGK-360, external setpoint

4. USE

4.1 Use guidelines

- Make sure that turning on of the device does not make any hazard for personnel and property. Follow the guidelines featured in section 1.2.
- **Too low flow of the heated fluid may lead to an excessive increase in temperature inside the heater, the heater must be prevented from operation, if the flow rate drops below 1.5 m / s.**
- **Use only the appropriate elements of the heater control, so that the maximum temperature of the air leaving the heater does not exceed the value of + 60°C and +40°C at the point the heater is blowing.**
- The heater must not be operated with the voltage, amperage other than those specified on the nameplate.
- In case of activation of any electrical protection, detection of damage, unit must by immediately turn off use. The inspection device can start only after it has cooled down.
- In the case the manual limiter is activated (85°C), protection circuit is opened, until the closure of the circuit by pressing the "RESET" buton on the housing.
- In the event, the alarm operation controller AHR-15T is activated, the alarm output terminals are closed (terminals 1-2 on the PCB) and until the alarm is reset, the device stops operation (heating). Resetting the alarm takes place, depending on its cause of activation, either after the cause is remedied or after the device is reconnected to the power supply. See table of alarms - section 3.3.
- Before first use of the device please follow the steps defined in Chapter 5.



ATTENTION!
THE DUCT HEATERS ARE DESIGNED FOR A MINIMUM AIR FLOW VELOCITY OF 1,5 m/s!



ATTENTION!
MAXIMUM TEMPERATURE OF THE OUTLET AIR MUST NOT EXCEED +60°C!

5. MAINTENANCE, REVIEW

5.1 Maintenance guidelines

- During maintenance and review please follow the guidelines contained in point 1.2
- The heater has to be subject to regular and thoroughly review and maintenance (point 5.2).
- To clean the heater, use a slightly moistened cloth. Using detergents and liquids under pressure and tools that may scratch the surface of the device is prohibited.
- Prevent the build up of dust deposits on and in the heater. Accumulation on dirt and dust can cause unpleasant odours and risk of ignition. If the device is protected by an air filter, the condition of its purity should be checked regularly, and if necessary, it should be replaced with a new one.
- The service intervals between routine examinations and inspections should be determined by the user, based on the observation of the device and adjusted to obtain the specific conditions of work and operation. In case of any irregularities, the device should be taken out of service and repaired immediately.
- After maintenance and review please ensure that there are no foreign objects (e.g. assembly components, tools) are not found inside the heater, the unit is dry and properly secured.

5.2 Review and maintenance

During reviews, and in particular before the first operation and after long periods of storage of the device, special attention should be paid to:

- cleanness of the device,
- stability of the unit, if it does not wear signs of damage, its structure is complete,
- foreign objects or loose parts inside the heater,
- occurrence of corrosion,
- whether the electric cables are not damaged,
- whether the safety equipment is set and functioning properly and whether the shock protection is effective,
- occurrence of mechanical damages of the heater (heating elements, junction box, etc.),
- whether there is no short circuit in the junction box (humidity, etc.),
- the value of the insulation resistance of electric heating elements (not lower than 1,0M Ω),
- The appropriate condition of fasteners (fasteners are tightened).

During operations of the device, and in particular at the first operation, special attention should be paid to:

- if the device is functioning properly,
- whether there are excessive amount of leakage current. Large leakage current may indicate, among other things, poor insulation of heating elements or damaged cable insulation.

If during operation of the device, power device specified on the rating plate is exceeded, please check following:

- whether the given voltage and frequency corresponds to the nominal,
- if there is no mechanical damage of the heater (heating elements, junction box, etc.),
- if there is no short circuit in the junction box (humidity, etc.)..

5.3 Examples of reasons for activation heater's limiters

- air flow below 1,5m/s,
- too high air temperature in the heater,
- incorrect electrical connection,
- solid inside the heater or the fan unit.

6. REPAIR, WARRANTY

Use only original spare parts and original accessories. Heaters repairs need to be carried out by Venture Industries Sp. z o.o. service or outside, after manufacturer permission only. Warrantee conditions are described in guarantee card.

7. DISMANTLING AND RECYCLING

Disconnect unit from its power supply, and dismount according to the guidelines from section 1 of this instruction. Therefore, please deposit all left-over material and packaging in their corresponding recycling containers and hand in the replaced machines to the nearest to the nearest company dealing with waste disposal.

APPENDIX - A (Declaration of Manufacturer)

EC/EU Declaration of Conformity

Manufacturer:

Venture Industries Sp. z o.o.
ul. Mokra 27
05-092 Łomianki-Kielpin
Polska



doc. no. N1.2.16082018_EN

declares that the product described below:

Name: Duct heater
Type: DH-R / RH-R
Model and serial no.: all manufactured
CE marking date: 2015

complies with the requirements of:

- Electromagnetic Compatibility Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU

Following standards were applied:

PN-EN 60335-1 PN-EN 61000-6-1 PN-EN 61000-6-3

Furthermore:

- Quality system is in accordance with ISO 9001:2015.

Date: 16.08.2018
Kielpin



Wojciech Stawski
Managing Director