Rev 3_2023

DTHE SERIES

INDIRECT GAS-FIRED MAKE-UP AIR HEATER

Indoor and Outdoor Installation

INSTALLATION AND OPERATION MANUAL

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Warning

FIRE OR EXPLOSION HAZARD

- Failure to follow safety warnings exactly, could result in serious injury, death or property damage.
- Be sure to read and understand the installation, operation and service instruction in this manual.
- Improper installation, adjustment, alteration, service or maintenance can cause serious injury, death or property damages.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

- **WHAT TO DO IF YOU SMELL GAS**
  - Do not try to light any appliance;
  - Do not touch any electrical switch;
  - Do not use any phone in your building;
  - Leave the building immediately;
  - Immediately call your gas supplier from a phone remote from the building. Follow the gas supplier's instructions;
  - If you cannot reach your gas supplier, call the fire department;

- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

This instruction manual should be kept with the unit and be readable.

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The features, illustrations and description in this document were, to our knowledge, accurate at the time they were approved for printing. We reserve the right to change or stop offering some feature as well as stop producing a given model without prior notice and commitment on our part.

Codes and regulations

Important

This product is intended for installation on positive pressure side of the circulating air blower. This heating unit is designed for industrial or commercial use only. The installation must comply with the latest laws and regulation for heating units; CSA B149.1, ANSI Z223.1 / NFPA 54, to the electrical code C22.1/ NFPA 70 and to local regulations. All inside and outside electrical installation must comply with the unit's electrical diagrams.

The electrical, gas and air flow ratings are described on the rating plate applied on the unit. Following these rating is mandatory for a safe usage of the unit. To learn more, refer to the start-up instructions of this manual and gas heating section manual included with the unit.

Clearances to combustible materials

A minimum clearance of **1** inch between the unit walls and any combustible material is required on all side and top. A minimum clearance of **36** inches is required in front of the door to access controls and **18** inches around the flue vent. Install the unit on a non-combustible floor.

Allocate enough space around the unit for maintenance and around the combustion air intake and the inlet air hood to prevent harmful accumulation of snow.

Clearances to combustible materials	
Position	**Inch [mm]**
Controls	36 [914]
Top	1 [25]
Back	1 [25]
Flue vent	18 [457]
Floor	Non-combustible

Caution

- Installation, alteration, setting or improper maintenance can cause property damage, injury or death. Read carefully the installation, start-up and maintenance instruction before installing or repairing the unit.
- Units installed within a building must have fresh air for combustion in enough quantity to get a good combustion. Refer to CSA B149.1 installation code for Canada and ANSI Z223 for USA for more information and minimum requirements.
- Gas units must be connected to a flue vent properly sized to ensure proper and safe operation.
- When required to pipe to outdoor the regulator vent pipes must be terminated with a downward elbow and a fine mesh screen in order to prevent blockage.
- **The above instructions show the recommended installation and usage that we have tested and get listed. If the installer decides to not follow these instructions, it will be his responsibility to test safety, functionalities and make it listed by approval agency.**

Installation guidelines

- The air intake must be located in order to avoid snow, rain, flammable, toxic gases and other harmful substances from entering the heater.

- When the unit is suspended over a work area, the installation must be at a suitable height. A maintenance platform installation may be necessary.

- In heating mode, the unit must maintain a temperature rise between 50°F (28°C) and 120°F (67°C) and an average supply temperature of 130°F (54°C) maximum. Note that the temperature high limit protection is factory set at 160°F (71°C)

- The outlet ducting must have the same cross-sectional area as the outlet connection. These ducts must have a removable access panel. These panels shall be sized to permit inspection of the heat exchanger at start-up on routine inspection.

- If fire dampers are used, they must be equipped with switches connected to the safety control circuit in order to interrupt the heater if there is a fire or high temperature in the ventilation duct. The electric actuators must be adjusted in order to close the safety loop on the flame safeguard only when the dampers are fully open.

IMPORTANT NOTICE

- **In certain conditions these units can produce condensate. This corrosive liquid must be treated and drain correctly with provision to prevent freezing.**
- **It is necessary to mechanically attach the unit to the roof base or other support structure with screws or other suitable fasteners to prevent wind or earthquake damage.**

If the unit is not supplied with a low temperature limit protection, the installer should add this type of probe to prevent freezing.

WARNING

All electrical connections must be performed by a qualified electrician in accordance with the electrical diagram provided with the unit following applicable local laws and regulations. Also refer to Electrical codes CSA C22.1 for Canada and ANSI/NFPA #70 for the United States. In addition, the operation sequence must never be changed without the approval of the manufacturer.

Always use a copper wire of the correct size for the application and approved to withstand a temperature of 105°C inside the unit.

WIRING SEQUENCE:

1. The unit name plate shows the voltage and amps that are required. The main power supply cable must be sized to meet those requirements.
2. The main power cable must be connected to the disconnect switch. Make sure that the clamping screws of the terminal are tight.
3. Wire the remote panel (option) to the terminals provided for this purpose in the main control box of the unit.
4. Wire the discharge temperature sensor. The wiring must be shielded type.

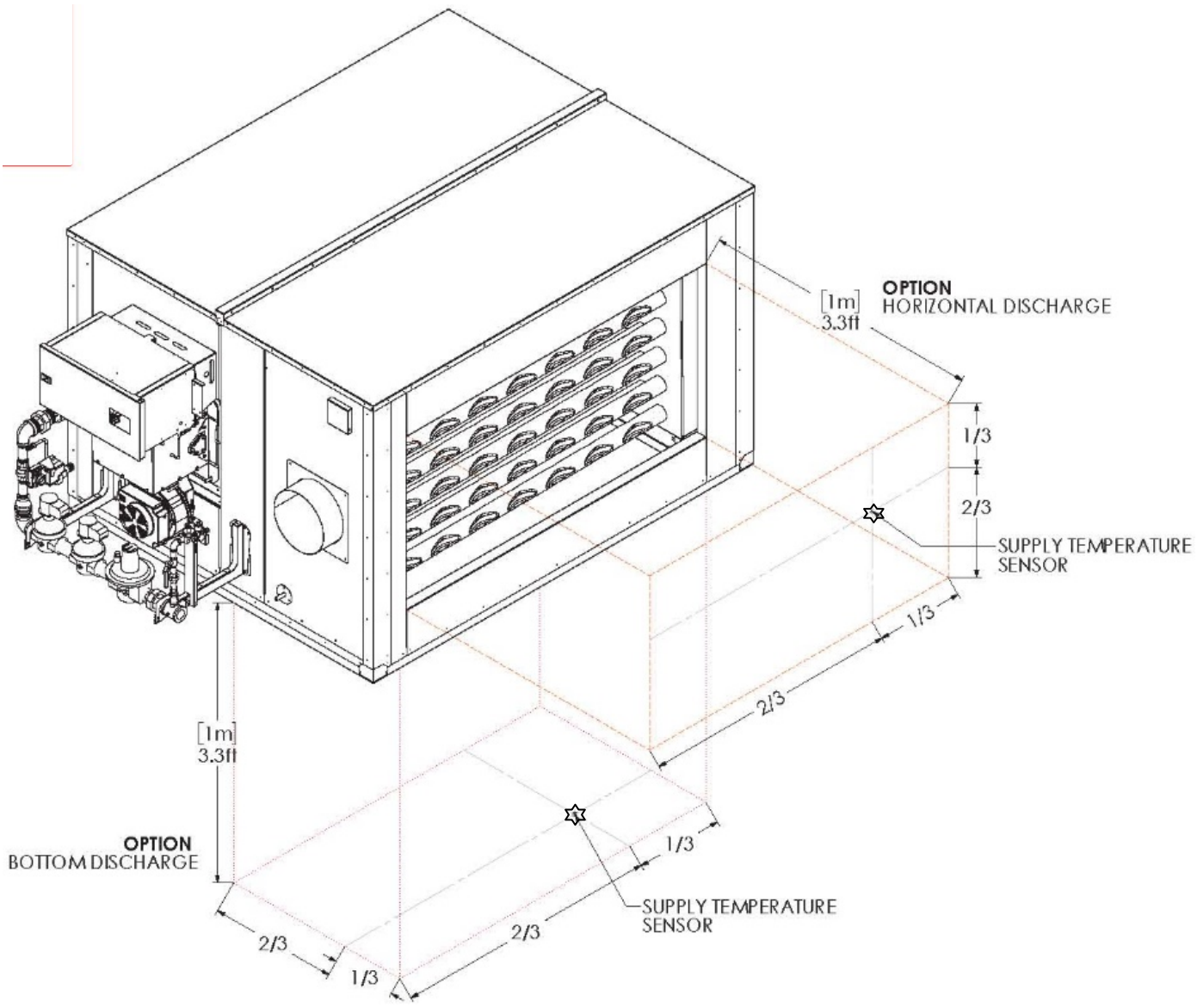
WARNING

Any modification to the original wiring may result in personal injury and property damage. Nagas Innovation is not responsible for damage or failure caused by improper electrical installation of the unit.

Positioning of the sensor controlling the supply temperature

WARNING

The positioning of the supply temperature sensor is **essential** for the proper operation of the unit. Improper positioning of the supply temperature sensor could result in high temperatures in the supply ducts, a thermal protection shutdown, the closing of the fire damper and may result in damage to the unit and void the warranty. In addition, the control system (PID) must also be calibrated to prevent temperature overruns.



Gas supply

Gas connection :

Size DTHE Model	Gas train connections (NPT)										
	35	40	50	55	65	75	85	100	125	150*	150**
Ø Gas	1	1	1	1	1	1	1-1/2	1-1/2	1-1/2	1-1/2	2
Ø Regulator Vent***	N/A: Vent limiter factory installed***										1/2
Ø Vent valve	N/A: Valve proving system included with IRI gas train option.										

Note :

- This table should not be used to size the gas supply line.
- If supply gas pressure exceeds 14 inches w.c., a high-pressure regulator must be installed at gas piping inlet. The regulator must be suitable for modulation ratio of 40:1 to properly regulate gas pressure at low fire.
- The regulator vent must be piped separately towards the outside of the building as stated by CSA B149.1 for Canada and ANSI Z223 for USA and local codes.

****Refer to the heating section manual for details. ****

Start-up instruction

BLOWER ADJUSTMENT:

- Check the voltage at the main disconnect switch.
- Check blower rotation.
- Make sure that the contactor overload relays are set to the maximum current (FULL LOAD AMPS) indicated on the nameplate attached to the motor.
- Check the alignment and tension of the belts.
- When the dampers are fully open, and the burner controller is not activated, read the voltage and amperage of the blower motor.

OPERATING SEQUENCE:

Operating sequence of a SINGLE VOLUME/CONSTANT FLOW unit (as an example only)

STARTING UP THE BLOWER

1- Set the STOP/BLOWER/BURNER switch to BLOWER.
2- The fresh air intake damper opens.
3- The damper end switch closes.
4- The blower motor starter is energized.
5- The blower is in operation.
6- The gas heating section can start.

HEATING START-UP:

Important

Start-up can only be performed by a qualified technician qualified to install gas heating system (with accreditation) with knowledge in electricity and ventilation.

Warning

- Do not smoke during start-up.
- Do not try to light the burner if the gas has accumulated in combustion chamber or in the area, if the combustion chamber is filled with vapors or if it is very hot.

**** Refer to the heating section manual for gas start-up instructions ****

Start / stop recommendations

In emergency situation

When it is necessary to stop the heater in case of emergency, turn the main switch to the **OFF** position and close the gas supply by closing the manual supply valve on the outside of the heater.

Extended shutdown

When the heater is not to be used for a long period of time, it is recommended to close the gas supply valve.

Before starting the unit after a shutdown, it is recommended to do an inspection to make sure everything is in order.

Restarting after an extended shutdown

- **Ventilation section**

1. Make sure the disconnect switch is in **OFF** position (stop).
2. Check fan belts and adjust if necessary.
3. Check the condition of filters and replace if necessary.
4. Make sure nothing partially or completely obstructs the air inlet and outlet of unit.
5. Ensure that nothing stops the proper functioning of the inlet damper and/or air outlet (if applicable).
6. Select the **ON** (run) position on the ventilation disconnect switch.

- **Heating burner section**

1. Make sure that all gas valves are open.
2. Check for alarms on the flame safeguard (see **Flame safeguard alarms** in the gas burner section manual).
3. Check for alarm messages on HMI touch screen panel of the burner.
4. Create a heat request (contact and modulation signal over 2.5Vdc).
5. Make sure that the burner blower motor operates.
6. Make sure the burner ignites correctly. Repair if needed.
7. Repeat the start-up procedure.

Refer to the heating section manual for recommandations

Unit maintenance

Perform the following verifications at the necessary frequency required to maintain the unit in good working order. However, do not limit the inspection to this list as some environmental conditions may require other or more frequent inspections.

Verification list	Recommended audit frequency			
	Weekly	Monthly	Semi-annual	Annual
Make sure there is no flammable materials near the unit.	•			
Make sure the air inlet (ventilation and combustion) and flue vent are not blocked or obstructed.	•			
Inspect the filters an replace them if necessary.	•			
Check bets and adjust or replace if necessary.		•		
Lubricate the blower and motor bearings as needed.		•		
Verify the flame state and combustion.		•		
Check the full opening of fresh air dampers.			•	
Verify that all safety controls are operational.			•	
Verify that high temperature limit thermostat proper functioning.				•
Make sure there's no gas leak in the burner and gas supply line.				•
Inspect all electrical connections.				•
Inspect flame sensor and igniter. Replace if necessary.				•
Verify the burner installation and tighten bolts and screws if necessary.				•
Replace the PLC battery back-up.				**2 years**
Check heat exchanger for cracks or deformations.				•

Warranty

Subject to the terms and conditions hereof, during the first (1) year after the original installation of the product or eighteen (18) months from date of shipment by Nagas Innovation whichever occurs first, we will supply free of charge any component part(s) of our product found to be defective in material or workmanship. Any replacement part(s) so supplied will be warranted for the balance of our product's original warranty. The part(s) to be replaced must be available in exchange for the replacement part(s). Any labor, material, transportation, freight or other charges incurred in connection with the performance of this warranty will be the responsibility of the owner at the hourly rates and prices then in force. This limited warranty is only applicable to new and unused products purchased from us or from our authorized distributors, provided that our user instructions contained in our user guide have been adhered to. You recognize and understand that our obligation is limited to replacing the part found to be defective and that you have no further recourse against us.

In addition, if in the five (5) years that follows the initial installation of the device, the guarantor states that the heat exchanger perforated for reasons of improper assembly or of manufacturing defects, it will be replaced or repaired under the terms of the guarantee.

THIS WARRANTY DOES NOT COVER:

(a) damages caused by accident, abuse, negligence, misuse, riot, fire, flood or Acts of God (b) damages caused by operating the product in a corrosive atmosphere (c) damages caused by any unauthorized alteration or repair of the system affecting the product's reliability or performance (d) damages caused by improper matching or applications of the product or the product's components (e) damages caused by failing to provide routine and proper maintenance or service to the product (f) expenses incurred for erecting, disconnecting or dismantling the product (g) parts used in connection with normal maintenance, such as filters or belts (h) products no longer at the site of the original installation (i) products installed or operated other than in accordance with the printed instructions, with the local installation or building codes or with good trade practices (j) products lost or stolen. No one is authorized to change this WARRANTY or to create for us or on our behalf any other obligation or liability in connection with our product(s). There is no other representation, warranty or condition in any respect, expressed or implied, made by or binding upon us other than the above, nor will we be liable in any way for incidental, consequential, or special damages however caused such as but not limited to: loss of productivity, damages caused by delays, loss of profits and management time.

In order to obtain replacement parts under this product's warranty, contact the dealer or contractor who installed or services our products. Only dealers or contractors who are registered with us are authorized to perform this warranty. Should the dealer or the contractor need assistance, the authorized agent for Nagas Innovation is available for support, and we, at Nagas Innovation, in turn, support our agent's efforts.

RETAIN THIS WARRANTY IN YOUR FILES FOR FUTURE REFERENCE

This warranty is expressly given and accepted in lieu of any and all other warranties, expressed or implied, including without any limitation any warranty of merchantability or fitness for a particular purpose. Some states/provinces do not allow for the disclaimers, limitations and exclusions identified above; as a result, they may not apply to you.