## Electric Heater
### Installation instructions

**Nomenclature:**
- **D:** Open coil element
- **F:** Tubular element
- **H:** Finned tubular element
- **C:** Slip in type
- **I:** Flange type
- **0:** No screen left of the heater
- **1:** Screen left of the heater
- **0:** No screen right of the heater
- **1:** Screen right of the heater
- **H:** Horizontal air flow
- **V:** Vertical air flow

**Features:**
- Zero clearance construction
- Horizontal or Vertical air flow
- Standard control panel door with removable hinges
- Approved to CSA and UL standards

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**READ AND SAVE THESE INSTALLATION INSTRUCTIONS**

<table>
<thead>
<tr>
<th>Technical data</th>
<th>Model C Open Coil Elements</th>
<th>Models T or F Tubular Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Inlet air temperature</td>
<td>95°F (35°C)</td>
<td></td>
</tr>
<tr>
<td>Maximum outlet air temperature</td>
<td></td>
<td>81°F (27°C)</td>
</tr>
<tr>
<td>Minimum distance from obstacle or obstruction in duct</td>
<td>48” (1.2m) upstream and downstream of electric heater</td>
<td></td>
</tr>
<tr>
<td>Inlet bushing</td>
<td></td>
<td>2 knock out 7/8” (22.2mm) or 1 ¾” (34.9mm)</td>
</tr>
<tr>
<td>Control signal</td>
<td></td>
<td>Signal pneumatic or electric - On/Off or modulating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>See Electric diagram</td>
</tr>
<tr>
<td>Air flow direction</td>
<td></td>
<td>Horizontal or Vertical (refer to name plate)</td>
</tr>
<tr>
<td>Contact delay (ON/OFF stage(s))</td>
<td></td>
<td>ON: 1 minute; OFF: 30 seconds</td>
</tr>
<tr>
<td>Voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum air velocity</td>
<td></td>
<td>Ensure minimum air flow – as marked on name plate.</td>
</tr>
</tbody>
</table>

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**Caution, Risk of malfunction,** In case alteration (drilling holes or other) to the electrical compartment, ensure proper protection of all electrical components installed. Chips may cause short circuit or affect operation of electrical components.

**Caution, Risk of damage and malfunction,** Ensure minimum air flow, insufficient airflow will lead to opening of mechanical air flow switch (PDN or PDA) or electronic air flow switch sensors (HEC) and automatic thermal cut-out. This may damage heating elements and controls.

**Important,** direction of installation (refer to arrow on name plate) must be respected. Failure to do so will impair proper operation of thermal cut-out and/or cause overheating of solid state relay(s).

**Caution, Risk of malfunction,** Do not proceed with modification or alteration to internal electric connection or component of the electric heater. Any non-authorized modification will void the warranty.
# Neptronic Electric Heater

## Installation instructions

## 1 Dimensions

<table>
<thead>
<tr>
<th>Slip in type - I</th>
<th>Standard</th>
<th>Flange type - F</th>
<th>With round adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Dimensions**

- **Slip in type - I**
  - Heat sink only on modulating electric heater
  - **A**
  - **B**
  - **C**
  - **D**
  - **W** - 0.25’ (6.4mm)
  - **H** - 0.25’ (6.4mm)
  - **1 ½”** (38mm)

- **Standard**
  - Heat sink only on modulating electric heater
  - **A**
  - **B**
  - **C**
  - **D**
  - **W**
  - **1”** (25.4mm)

- **Flange type - F**
  - Heat sink only on modulating electric heater
  - **A**
  - **B**
  - **C**
  - **D**
  - **W**
  - **1”** (25.4mm)

- **With round adapter**
  - Heat sink only on modulating electric heater
  - **A**
  - **B**
  - **C**
  - **D**
  - **W**
  - **2”** (51mm)

## 2 Installation Tips

### 2.1 Air flow condition to avoid:

- **Electric heater too close from Fan.**
  - 48” mini (1.2m) or (6xd)
  - Overheat
  - **d**
  - Avoid any abrupt transition after a fan

- **Electric heater too close from filter.**
  - 48” minimum (1.2m)
  - Overheat

- **Electric heater too close from elbow.**
  - 90° elbow
  - **48” minimum (1.2m)**
  - Overheat

- **Electric heater too close from transition.**
  - 48” mini (1.2m) or (6xd)
  - **d**
  - Overheat
2.2 Minimum clearance to access control panel

**Caution**, for safety reason, minimum clearance to access control panel should respect local electric code.

### Slip-in type electric heater - Type I

<table>
<thead>
<tr>
<th>Minimum clearance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duct Width (W) + Cont. Panel Width (C) + 3” (76mm)</td>
<td>No obstruction in this area</td>
</tr>
</tbody>
</table>

Provide a minimum clearance equal to \( W + C + 3” \) (76mm).

### Flange type electric heater - Type F

(with or without round adapter)

<table>
<thead>
<tr>
<th>Minimum clearance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cont. Panel Width (C) + 3” (76mm)</td>
<td>No obstruction in this area</td>
</tr>
</tbody>
</table>

Provide a minimum clearance equal to \( C + 3” \) (76mm).

**Caution**, Risk of electric shock and burns. A minimum distance of 39” (1m) must be maintained between heating section and any opening or access door in the duct. This applies to all types of heaters. If such distance cannot be maintained, a protective guard (C22.2 No.155 section 4.1.8) must be installed to protect personnel from contact to heating elements and bare live parts.

3 Handling

**Warning**, Risk of failure or malfunction. Do not operate electric heater if heating elements have been damaged during transport or handling.

- ✓ Protective packaging should be kept until installation.
- ✓ Electric heater should be handled with care, particularly Open Coil electric heater.

4 Mechanical installation

**Caution**, Risk of damage and malfunction, Do not block air flow to heating elements, insufficient airflow may damage heating elements and controls.

**Important**, direction of installation (refer to arrow on name plate) must be respected. Failure to do so will impair proper operation of thermal cut-out and/or cause overheating of solid state relay(s).

### Flange type electric heater - Type F

1) Position electric heater in front of the duct flange.
2) Secure electric heater to the duct by using metal screws or bolts through the duct flanges.
3) If necessary, install supports to maintain the electric heater.

### With round adapter option

1) Insert electric heater between the two sections of the round duct.
2) Secure electric heater by using metal screws through round flanges.
3) If necessary, install supports to maintain the electric heater.

### Slip-in type electric heater - Type I

1) Cut an opening in the duct. Please allow \( \frac{1}{4}” \) (6.3mm) more than the frame width “D”.
2) Insert electric heater through the opening.
3) Secure electric heater onto the duct using metal screws. 2 flanges 1” (25.4mm) are provided on each side of control panel.
4) If necessary, re-enforced the duct rigidity by installing appropriate support(s).
5 Electrical Installation

- **DANGER:** Risk of electric shock. Disconnect all supplies before working on any circuit.
- **CAUTION:** Risk of malfunction. Use only copper wires suitable for 105°C (221°F).
- **CAUTION:** Electric installation should be done by qualified electrician and should conform to local electrical code.
- **CAUTION:** If a disconnect switch and/or fuses have not been supplied on control panel of electric heater, disconnect switch and/or fuses should be installed on supply.
- **CAUTION:** Gauge of electric supply wires should be of appropriate section, function of line current, as per local electrical code.

### 5.1 Power supply wiring

*See the name plate for information on voltage and current.*

- ✓ Connect all wires to appropriate terminals as per electrical diagram affixed inside the control panel door.
- ✓ Correct connection tightening should be verified before start up, and after short period of operation (typically after 2 weeks).

### 5.2 Typical electric diagram & legend

**Note:** Electronic air flow sensor (EAS) is available/installled for heaters less than 40kW and dimensions less than 48” x40”. Some restriction may apply.
5.3 Control signal selection and connection

5.3.1 Electric ON/OFF signal
Connect the contact demand wires to terminals com & 1, 2, 3, etc…of the electric heater.

*Information about mechanical Air flow switch (PDN or PDA)*
Upon application of 0.05”w.c. (12Pa) minimum pressure, mechanical airflow switch will activate internal normally open and normally closed contact.

Install pitot tube into the air duct up flow of electric heater.
Make sure that arrow is in direction of air flow.

5.3.2 Pneumatic ON/OFF signal
Connect a Ø¾” (6mm) pneumatic signal tube onto pneumatic electric switch to activate each of the heating stage.

*Information about Pneumatic electric switch (PSO or PSC)*
Upon application of demand pressure, pneumatic switch will activate internal normally open (PSO) or normally closed (PSC) contact.
Set point is adjustable from 2 to 20PSI (14 to 138kPa)

5.3.3 Electrical modulating signal, 0-10 or 2-10Vdc or 4-20mA
Connect the control signal demand wires to terminals & of the electric heater.

*Information about Neptronic® electronic controller (HEC)*
Neptronic® electronic controller (HEC) is a universal controller accepting any input signal used in the HVAC industry and converting it to a modulating and/or ON/OFF control signal to solid state relay(s) and contactor(s).
If electric heater is equipped with only one modulating stage, part number is HEC0000; and if electric heater is equipped with more than one stage part number is HEC0002 or HEC0005.
5.3.4 Electric digital signal, AC or DC

Connect the control signal demand wires to terminals A16 & A19 for an AC signal or & for a DC signal.

**Information about Neptronic® electronic controller (HEC)**

If electric heater is equipped with only one modulating stage, part number is HEC0000; and if electric heater is equipped with more than one stage part number is HEC0002 or HEC0005.

**AC Digital Input (Hot to 24 VAC)**

The position on J1 and J2 will not matter. The signal on A19 will be priority.

**AC Digital Input (Ground)**

The position on J1 and J2 will not matter. The signal on A19 will be priority.

**DC Pulse Input**

Internal set point option:

Temperature set point is adjustable directly on the electric heater, preventing from over adjustment by user. Part number of the electronic controller is HEC000P

**Internal set point & STC8-13 or STR1-13**

Control range: 61°F to 100°F [16°C to 38°C]

Adjustment of the internal set point:

Adjust potentiometer INT SP at the desired temperature as measured in the duct (if you use a STC8-13) or in the room (if you use a STR1-13).

**Note:** Internal set point option is available with the following limitations:
1. Model open coils only
2. 1 heating stage only of 10 kW maximum.
3. Dimension of W=48” (1.2m) and H=40”(1m) maximum

**No internal set point**

If electric heater is equipped with only one modulating stage, part number of electronic controller is HEC0000; and if electric heater is equipped with more than one stage part number is HEC0002 or HEC0005.

5.3.5 Electric Neptronic® signal, resistive

Connect the control signal demand wires to terminals A17 & A18 of the electric heater.

**Internal set point option:**

Temperature set point is adjustable directly on the electric heater, preventing from over adjustment by user. Part number of the electronic controller is HEC000P

**Internal Set Point**

(only on model HEC0000P)

**No internal set point**

If electric heater is equipped with only one modulating stage, part number of electronic controller is HEC0000; and if electric heater is equipped with more than one stage part number is HEC0002 or HEC0005.
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5.3.6 *Pneumatic modulating signal, 0-15 PSI*

Connect the tube of the pneumatic signal to the port high pressure and leave the other port free.

**Information about pneumatic electric controller (PCD or PCR)**

Upon a pneumatic signal from 0-15 PSI (0 to 103kPa); and a minimum differential of 4 PSI (27kPa), pneumatic electric controller will send a 0 to 10Vdc electric signal to HEC. Direct (PCD) or reverse (PCR) acting preset at factory.

Part number of the Neptronic® electronic controller when used with pneumatic electric controller is HEC1000

**Operation:**

![Pneumatic Modulating Signal Diagram]

6 **Operation condition**

**Air Flow:**
- Air flow should not be lower than the minimum air flow indicated on name plate.
- Air flow going through the electric heater should be free of combustible particle, flammable vapour or gas.
- **Open Coil**: Air flow going through the electric heater should be free of dust.

**Zero clearance construction:**
- Neptronic electric heaters are designed and approved for zero clearance to combustible material. Insulation material may be installed directly onto electric heater surfaces or onto air duct. However control panel should be accessible for maintenance.

⚠️ **Warning, Risk of fire and/or malfunction**, Do not install insulation directly on heating elements.

7 **Maintenance**

Neptronic® electric heater does not require specific maintenance; however we recommend a **yearly** inspection, typically before winter season or after a long term shut down.

1) **Visual inspection**

⚠️ **Risk of electric shock**. Disconnect all supplies before any visual inspection.

- Verify good condition of heating element.
- Heating element should be clean, free of dust or lint.
- **Open Coil**: Verify carefully that there is no dust accumulation. Any dust of lint accumulation can lead to fire hazard.
- Verify any indication of overheating condition (discoloration) as well as any trace of oxidation (rust).

2) **Electrical inspection**

⚠️ **Risk of electric shock**. Disconnect all supplies before any electrical inspection.

- Verify correct of electrical connection tightening.
- Verify the good condition of fuses (if any).
- Verify resistance of each circuit against ground.
- Verify correct operation of contactor(s).

*If necessary, electrical component should be replaced only with identical origin component.*
8 Quick Trouble shooting guide

Risk of electric shock. Disconnect all supplies before any electrical inspection and trouble shooting. Any service and trouble shooting should be done by a qualified electrician.

Symptom: Electric heater does not react to heating demand

Trouble shooting steps
Note: following steps should be followed as presented, failure to do so will lead to improper and incorrect diagnostic.

1. Check that automatic and manual reset thermal cut-out is in closed position.
2. Check for 24Vac (control voltage) at the secondary fuse.

If Electric ON/OFF signal

3. Check for air flow in air duct and for proper action of air flow switch (refer to 5.3.1 of this manual). If air flow switch does not react (closing the normally open contact) to air flow, verify air flow switch and pitot tube installation, and if air flow switch still not react to air flow, this one is defective and should be replaced.

If Electric modulating signal

3. Depending on the control signal (refer to the appropriate section from 5.3.3 to 5.3.6 of the manual) verify that control signal jumper(s) setting and connections are correct.
4. Check for control signal to the appropriate control signal input terminal on the HEC Pcb. If control signal is not present, check for control wirings between thermostat and electric heater.
5. If electric heater is equipped with electronic air flow sensor, disconnect the sensor Ts1 and Ts2 one at a time and then both of them, if heater starts to operate, then search for short in wiring or in sensors them selves. The sensors should be replaced.
6. Verify proper operation of HEC Pcb, when control demand is at 50% the TPM green LED (LD5) should blink accordingly. If LED is not blinking, HEC Pcb is defective and should be replaced.
7. Verify proper action of Solid state relay(s) (SSR), when demand is at 0% output voltage to SSR at the output terminals on HEC Pcb should be between 0 to 0.2Vdc, when demand is 100% output voltage should be 25Vdc. If output voltage to SSR does not correspond to these values, HEC Pcb is defective and should be replaced.
8. If electric heater is equipped with more than one modulating heating stage (typically first stage is modulating and supplemental stage are on/off), verify operation of on/off relay(s), when 100% heating demand, 24Vac should be present to corresponding contactor coil and contactor contact should close. If control voltage (24Vac) is not present or contactor contact is not closing HEC Pcb or wiring are defective.

9 Technical support

For any question or specific request please consult our web site: www.neptronic.com
Or call: 1 800 361-2308, ask for Electric Heater Department.
or (514) 333-1433
Fax : (514) 333-3163