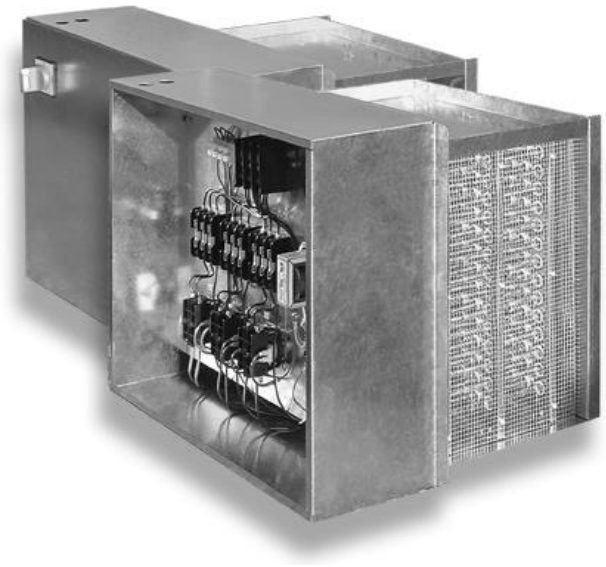
neptronic®

Electric Duct Heater

Specification and Installation Instructions



Nomenclature:

D	F	C	I	0	0	H

- C: Open coil element
  T: Tubular element
  F: Finned tubular element
- I: Slip in type
  F: 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

READ AND SAVE THESE INSTALLATION INSTRUCTIONS

Technical data	Model C Open Coil Elements	Models T or F Tubular Elements
Maximum inlet air temperature	95˚F (35˚C)	81˚F (27˚C)
Maximum outlet air temperature	200˚F (93˚C)	
Minimum distance from obstacle or obstruction in duct	3x duct diameter upstream and downstream of electric heater	
Inlet bushing	2 knock out 7/8'' (22.2mm) or 1 ⅜'' (34.9mm)	
Control signal	Signal pneumatic or electric - On/Off or modulating See Electric diagram	
Air flow direction	Horizontal or Vertical (refer to name plate)	
Contact delay (ON/OFF stage(s))	ON: 1 minute; OFF: 30 seconds	
Voltage	See the name plate	
Current		
Power		
Control voltage		
Minimum air velocity	Ensure minimum air flow – as marked on name plate.	

Caution, Risk of malfunction, In case of 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.

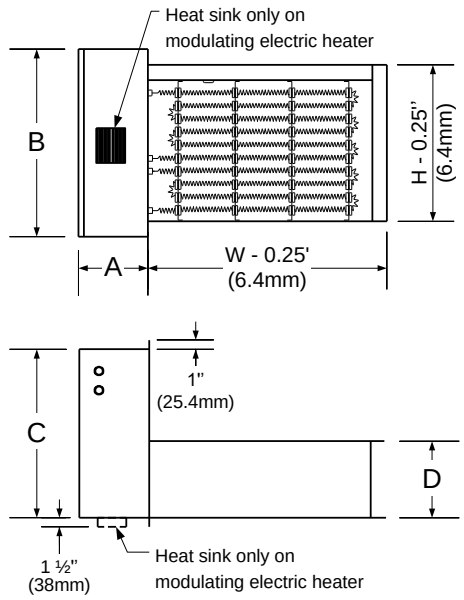
Caution, Risk of damage and malfunction, Ensure minimum air flow, insufficient airflow will lead to opening of mechanical air flow switch (PDN or PDA) or electronic air flow switch sensors (EAS) and automatic thermal cut-out. This may damage heating elements and controls.

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.

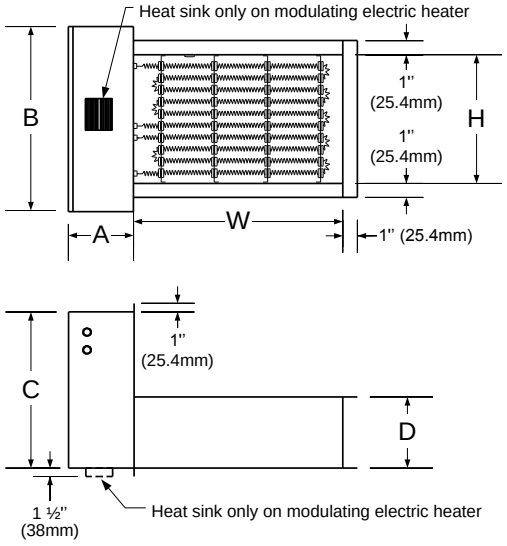
1 Dimensions

Slip in type - I

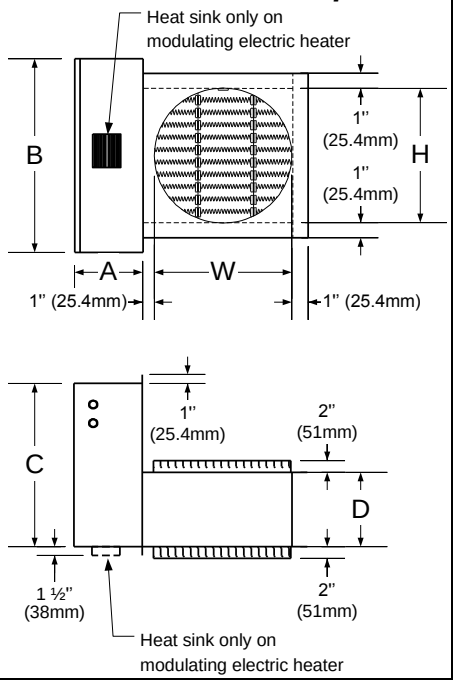


Flange type - F

Standard



With round adapter

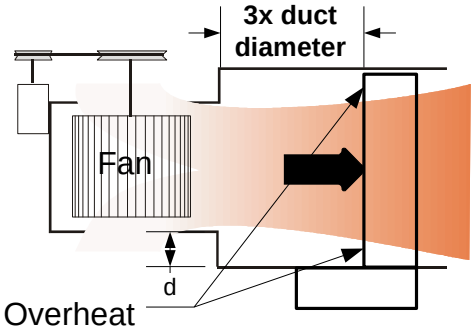


2 Installation Tips

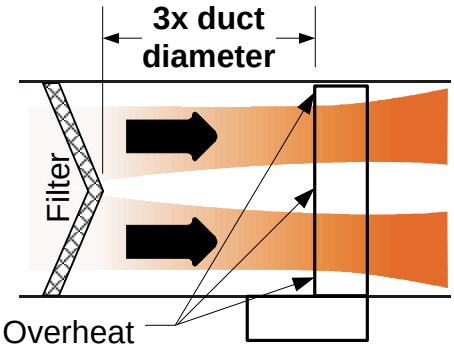
2.1 Air flow condition to avoid:

Minimum distance for the conditions below is **3 times the duct diameter**.

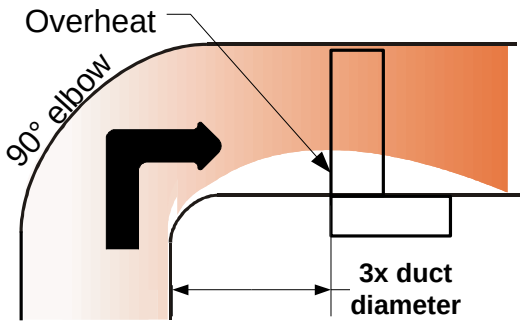
Electric heater too close to Fan.
Avoid any abrupt transition after a fan.



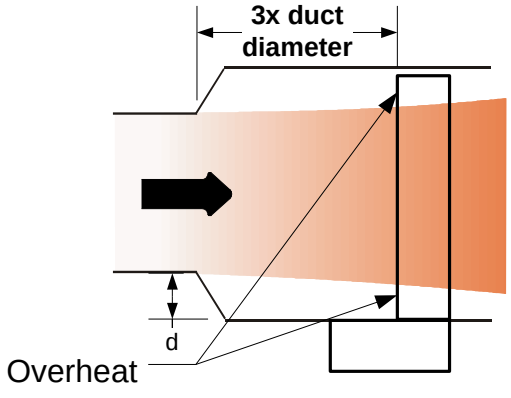
Electric heater too close to filter.



Electric heater too close to elbow.



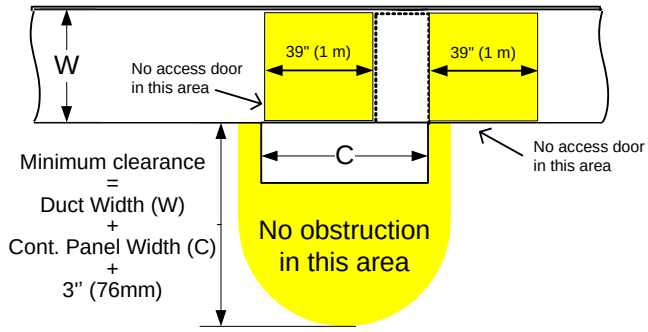
Electric heater too close to transition.



2.2 Minimum clearance to access control panel

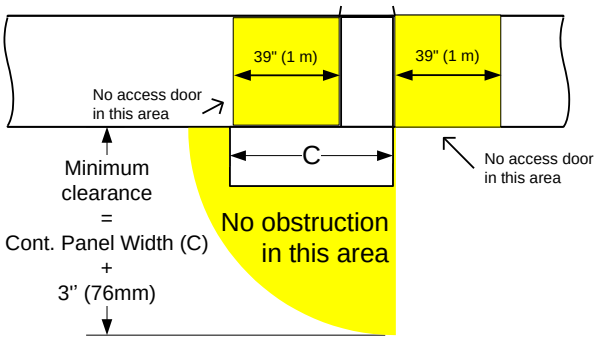
Caution, for safety reasons, minimum clearance to access control panel must respect local electric code.

Slip-in type electric heater - Type I



*Provide a minimum clearance equal to **W** + **C** + 3" (76mm).*

Flange type electric heater - Type F
(with or without round adapter)



*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

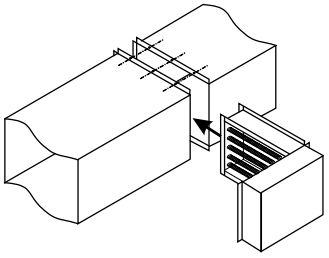
Warning, Risk of failure or malfunction. Do not operate electric heater if heating elements have been damaged during transport or handling.

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

4 Mechanical installation

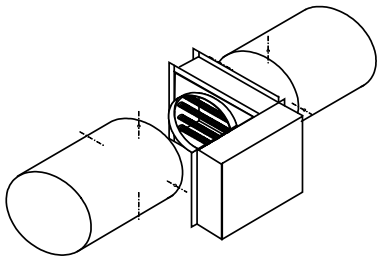
Caution, Risk of damage and malfunction, Do not block air flow to heating elements, insufficient airflow may damage heating elements and controls.
Important, direction of installation (refer to arrow on name plate) must be respected. Failure to do so will impair proper operation of thermal cut-out and/or cause overheating of solid state relay(s),

Flange type electric heater - Type F



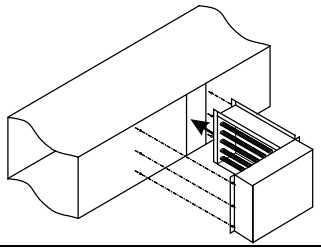
1) Position electric heater in front of the duct flange.
2) Secure electric heater to the duct by using metal screws or bolts through the duct flanges.
3) If necessary, install supports to maintain the electric heater.

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.
   Allow ¼'' (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 of 1'' (25.4mm) are provided on each side of control panel.
4) If necessary, re-enforce the duct rigidity by installing appropriate support(s).

5 Electrical Installation

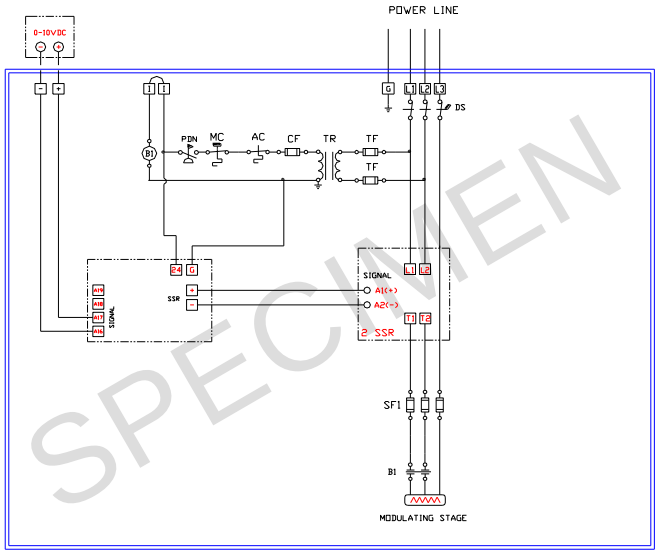
- **DANGER: Risk of electric shock**. Disconnect all supplies before working on any circuit.
- **CAUTION: Risk of malfunction**. Use only copper wires suitable for 221˚F (105˚C).
- **CAUTION**: Electric installation must be done by a qualified electrician and must conform to local electrical codes.
-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

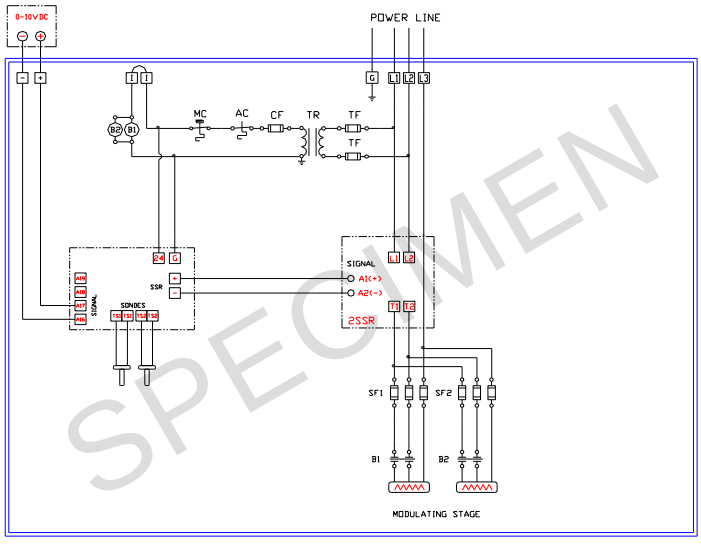
5.1 Power supply wiring

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

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

5.2 Typical electric diagram & legend





Thermal cut-out automatic reset		Air flow switch or EAS**	or	Single phase power supply terminals	or L1 L2 L N
Thermal cut-out Manual reset		Disconnect switch		3 phases power supply terminals	L1 L2 L3
Normally open contact		Fuse		Ground terminal	G
Normally closed contact		Heating element		Interlock	I
Contactor coil	C1	Transformer		Control circuit supply	T T
Back-up safety contactor coil	B1	Pneumatic electric switch (ON/OFF)		Common	C
Pilot light	L	Pneumatic electric controller (modulating)		Solid State Relay input terminal	A A
				Solid State Relay output terminal	B B

**Note: Electronic air flow sensor (EAS) is available/installed for heaters less than 50A and dimensions less than 48”x40”. Some restriction may apply.

5.3 Control signal selection and connection

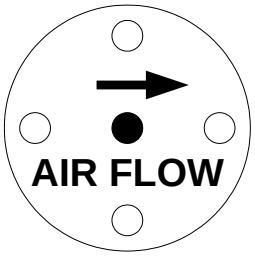
5.3.1 Electric ON/OFF signal

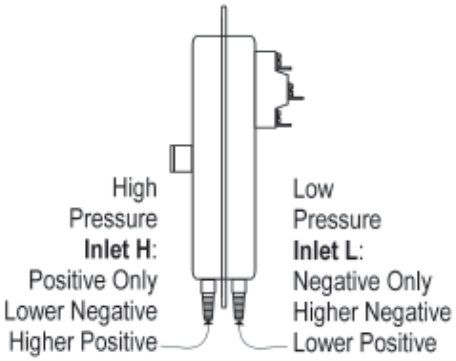
Connect the contact demand wires to terminals com & 1, 2, 3, etc…of the electric heater.

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 the arrow is in the direction of air flow.



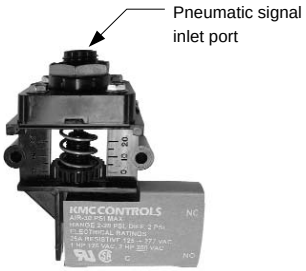


5.3.2 Pneumatic ON/OFF signal

Connect a Ø¼'' (6mm) pneumatic signal tube onto pneumatic electric switch to activate each of the heating stages.

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)



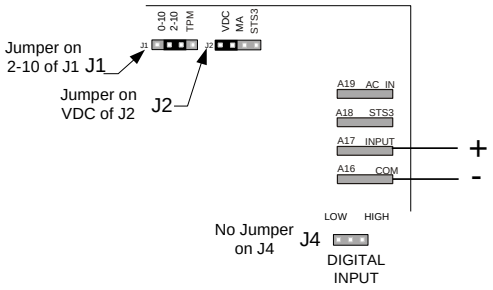
5.3.3 Electrical modulating signal, 0-10 or 2-10Vdc or 4-20mA

Connect the control signal demand wires to terminals ⊕ & ⊖ of the electric heater.

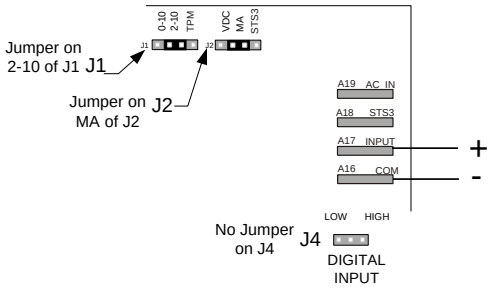
Information about Neptronic® electronic controller (HEC)

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

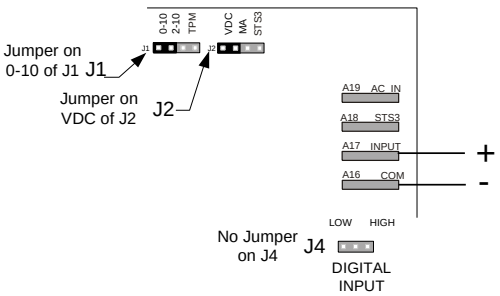
Signal 2-10 Vdc



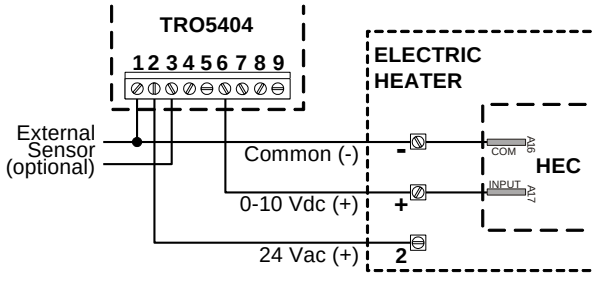
4-20mA Input



Signal 0-10 Vdc



Signal 0-10 Vdc by Neptronic® thermostat TRO5404



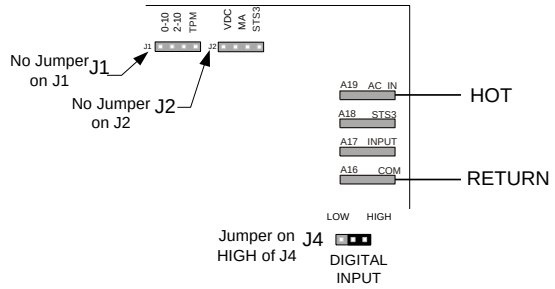
5.3.4 *Electric digital signal, AC or DC*

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)

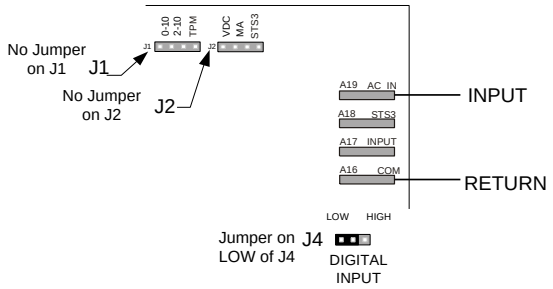
If the electric heater is equipped with only one modulating stage, part number is HEC0000; and if the electric heater is equipped with more than one stage, part number is HEC0002 or HEC0005.

AC Digital Input (Hot to 24 VAC)



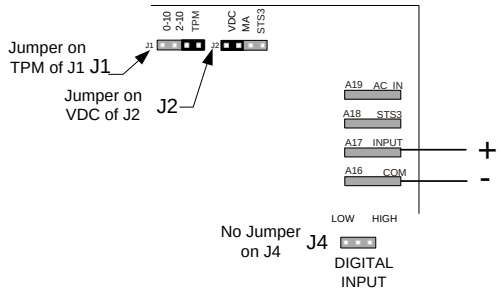
The position on J1 and J2 will not matter. The signal on A19 will be priority.

AC Digital Input (Ground)

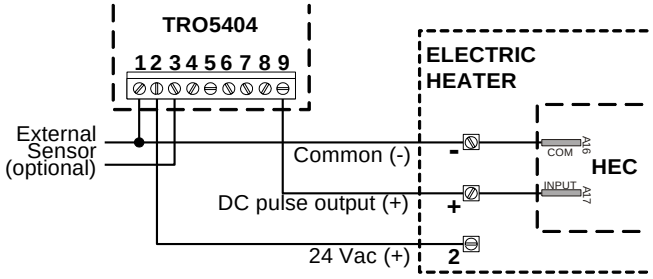


The position on J1 and J2 will not matter. The signal on A19 will be priority.

DC Pulse Input



Signal pulse by Neptronic® thermostat TRO5404



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 over adjustment by user.

Part number of the electronic controller is HEC000P.

Internal set point & STC8-13 or STR1-13

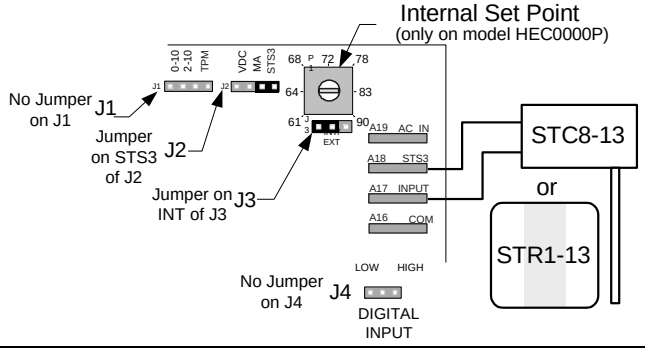
Control range: 61ºF to 100ºF [16ºC to 38ºC]

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:

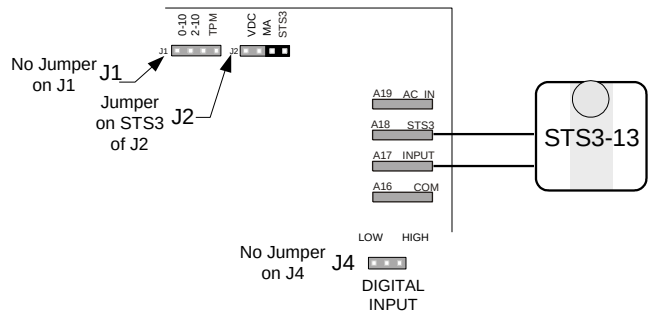
1. Model open coils only.
2. 1 heating stage only of 10 kW maximum.
3. Dimension of W=48'' (1.2m) and H=40''(1m) maximum.



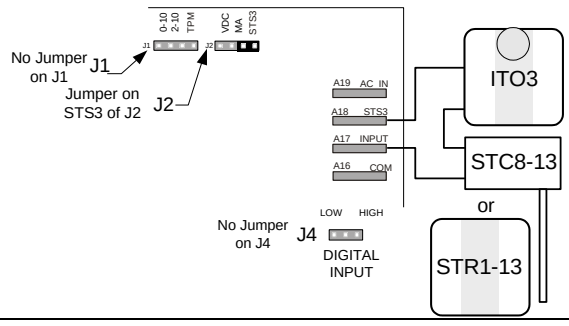
No internal set point

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

STS3-13



ITO3 & STC8-13 or STR1-13



5.3.6 ***Pneumatic modulating signal, 0-15 PSI***

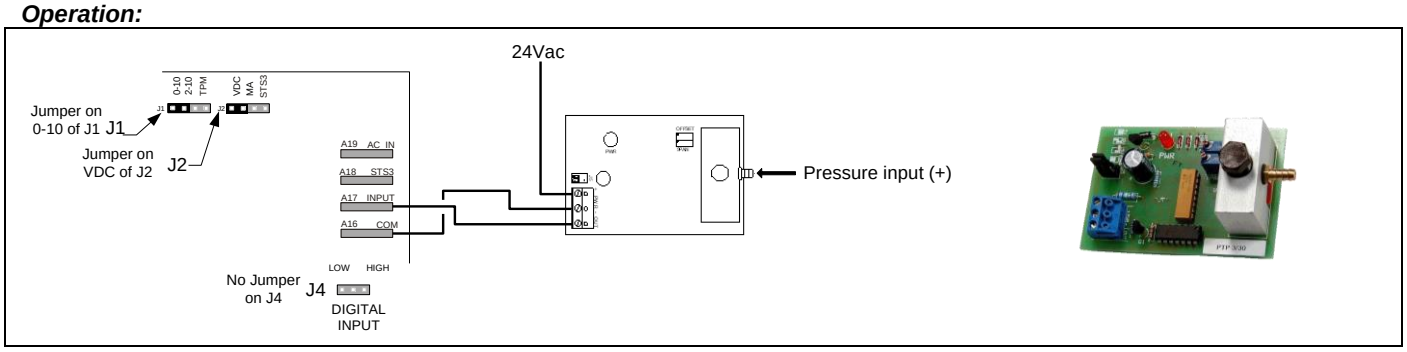
Connect the tube of the pneumatic signal to the port high pressure and leave the other port free.

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:



6 Operation condition

Air Flow :

- Air flow must not be lower than the minimum air flow indicated on name plate.
- Air flow going through the electric heater must be free of combustible particle, flammable vapour or gas.
- **Open Coil**: Air flow going through the electric heater must 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 must 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 must 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 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 must be replaced only with identical original component.

8 Quick Troubleshooting Guide

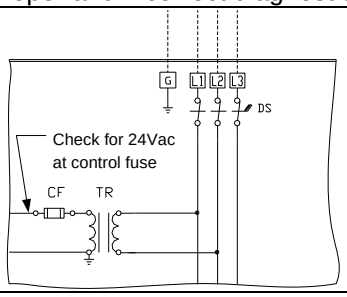
Risk of electric shock. Disconnect all supplies before any electrical inspection and troubleshooting. Any service and troubleshooting must be done by a qualified electrician.

Symptom: Electric heater does not react to heating demand.

Troubleshooting steps

Note: these steps must 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.

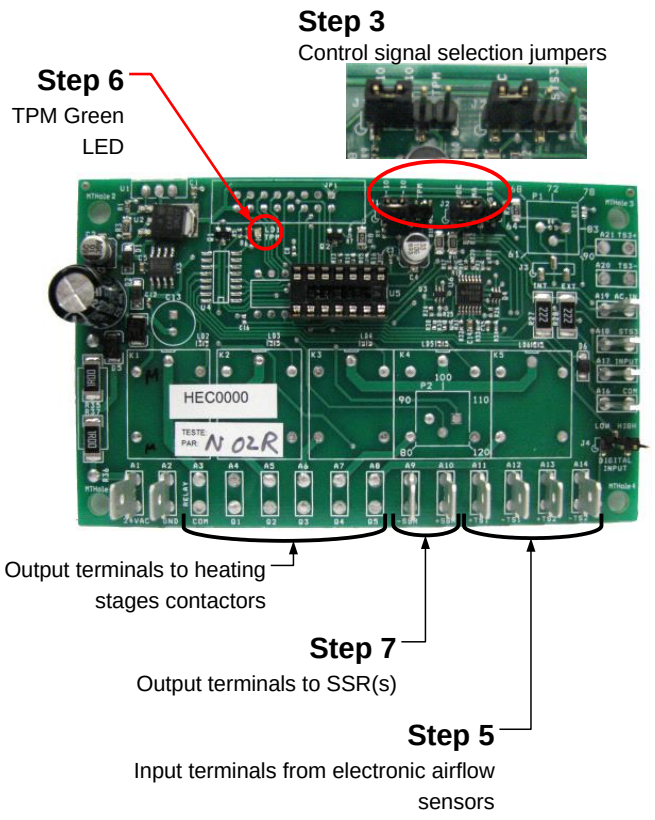


If Electric ON/OFF signal

3. Check for air flow in air duct and for proper action of air flow switch (refer to section 5.3.1 of this manual). If the air flow switch does not react (closing the normally open contact) to air flow, verify the air flow switch and pitot tube installation. If the air flow switch still does not react to air flow after being verified, it indicates that it is defective and must 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 the electric heater is equipped with the electronic air flow sensor, disconnect the sensor Ts1 and Ts2 one at a time and then both simultaneously. If the heater starts to operate, search for a short in wiring or in the sensors themselves. The sensors may have to be replaced.
6. Verify proper operation of HEC Pcb. When control demand is at 50%, the TPM green LED (LD5) must blink accordingly. If LED is not blinking, HEC Pcb is defective and must 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 must be between 0 to 0.2Vdc. When demand is 100%, output voltage must be 25Vdc. If output voltage to SSR does not correspond to these values, HEC Pcb is defective and must be replaced.
8. If the electric heater is equipped with more than one modulating heating stage (typically first stage is modulating and supplemental stages are on/off), verify operation of on/off relay(s). When heating demand is at 100%, 24Vac must be present to corresponding contactor coil and the contactor contact must close.
   If control voltage (24Vac) is not present or contactor contact is not closing, the HEC Pcb or wiring is defective.



9 Technical Support

For any questions or specific requests, please consult our website: **www.neptronic.com**
Or call: **1 800 361-2308**, and ask for the Electric Heater Department.
or **(514) 333-1433**
Fax : (514) 333-3163