Electric Duct Heater with HECM

Specification and Installation Instructions

Models

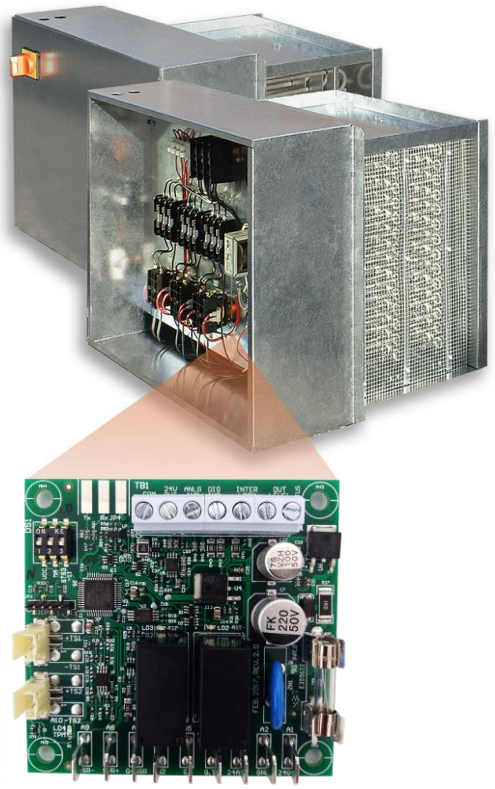
Electric Duct Heater

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

Universal Heater Controller

- **HECM000:** Modulating Mini Heater Controller
- **HECM002:** 2-Stage Mini Heater Controller



Description

The HECM Universal Heater Controller is an integral part of our electric duct heaters. The HECM accepts most standard control input signals available in the industry and converts it to a modulating output to the SSR and/or staged (on/off) signal output to the electric heater relays.

Unique in the industry, the HECM features our patented iHCS (Intelligent Heater Control System), which measures the heater element's differential temperature to accurately calculate the air velocity (as low as 50FPM) without requiring air flow switches.

The HECM controller can override the thermostat demand if the air velocity is insufficient. This provides continuous and precise modulation of the heater even at extremely low air velocities (100 FPM), which is ideal in VAV applications.

Applications

- HVAC systems with VAV boxes
- Make-Up Air / Air Handlers
- Fan Coil Units
- Load Banks Testing
- Transport / Railcar / Marine

Electric Duct Heater

- Custom design with online heater selection software
- Horizontal or vertical air flow
- Slip-in, flanged or round corner installation
- Integrated HECM controller
- Zero clearance construction
- Control panel door with removable hinges
- CSA, UL and ETL approved
- **Open Coil**
  - Excellent heat dissipation
  - Minimal pressure drop
  - Fast response time
  - Up to 40kW per sq. ft.
  - Quick delivery
- **Tubular / Finned Tubular**
  - Less sensitive to humidity and dust
  - Suited for demanding environments
  - Excellent mechanical resistance
  - Heating element not in direct contact with air
  - Up to 15kW per sq. ft.

HECM Controller

- Accepts any industry standard input signal
- Quick and simple input signal selection via DIP switches
- Modulating, on/off, and/or up to 2 stages
- Eliminates the use of expensive staged thermostats
- Zero voltage crossing SSR
- **Patented iHCS (US 7,012,223)**
  Intelligent Heater Control System
  - Accurate air flow readings without using air flow switches
  - Intelligently lowers output if velocity is insufficient as opposed to air flow switches that simply shut down the heater
  - Operates as low as 50FPM (ideal for VAV applications)
  - Additional heater element overheat protection
  - Eliminates need to define air flow orientation

Electric Duct Heater Specifications

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)	
Clearance 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	Electric - On/Off, AC pulse, modulating, or Neptronic Signal (see Control Signals on page 7)	
Air flow direction	Horizontal or Vertical (refer to name plate)	
Contact delay (ON/OFF stage(s))	ON: 5 seconds; OFF: 5 seconds	
Voltage, Current, Power and Control Voltage	See name plate	
Minimum air velocity	Ensure minimum air flow – as marked on name plate.	

HECM Input Signals

Input Type	Input Signal	Output Signal	Details
Electric	0-10Vdc, 2-10Vdc, or 4-20mA	1-24Vdc for SSR (TPM) and/or Dry contacts (up to 2 stages)	-
	AC pulsed to ground, AC pulsed to 24 Vac		
Neptronic signal	External Setpoint (Analog): STS3-11		User accessible setpoint..

Warnings

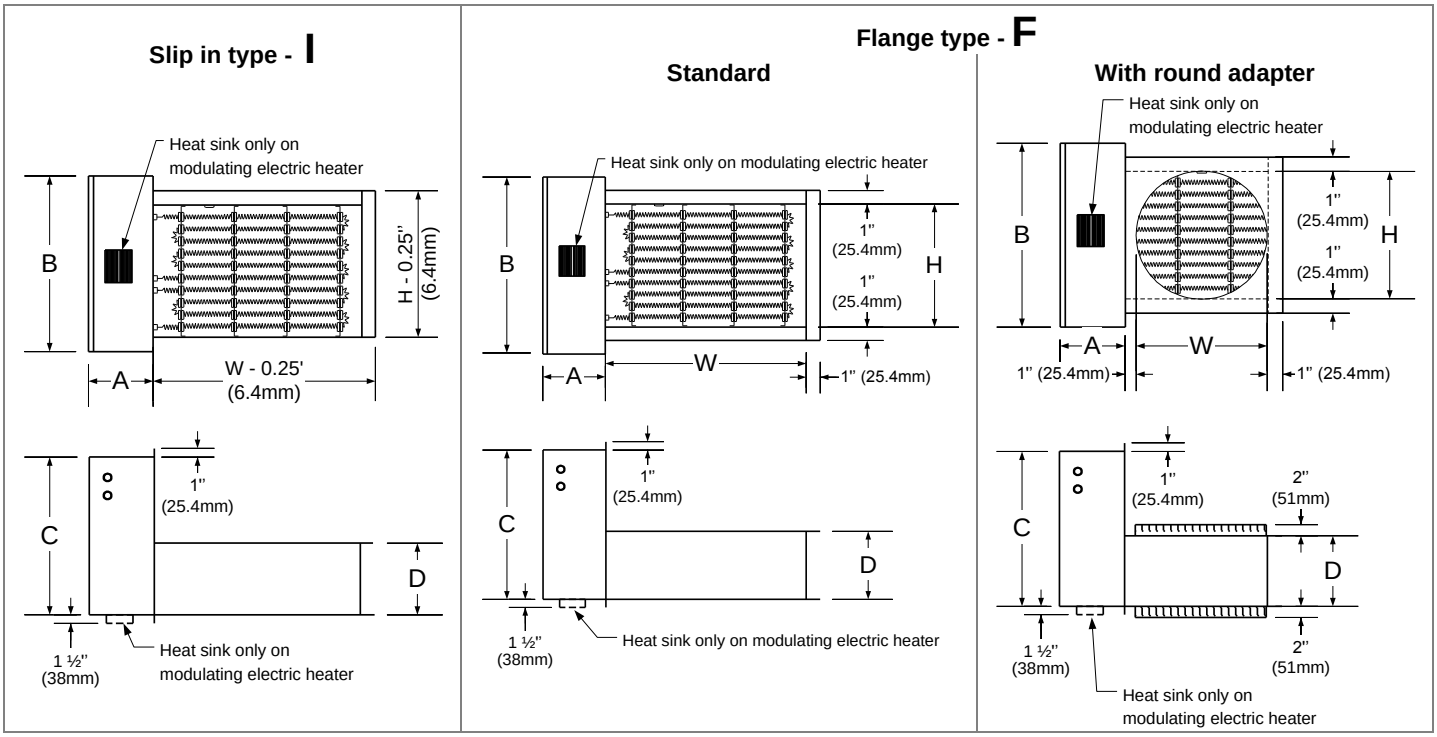
Caution, Risk of malfunction, In case of alteration (drilling holes or other) to the electrical compartment, ensure proper protection of all electrical components installed. Chips may cause short circuit or affect operation of electrical components.

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 sensors (HECM) 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 connections or components of the electric heater. Any non-authorized modification will void the warranty.

Dimensions

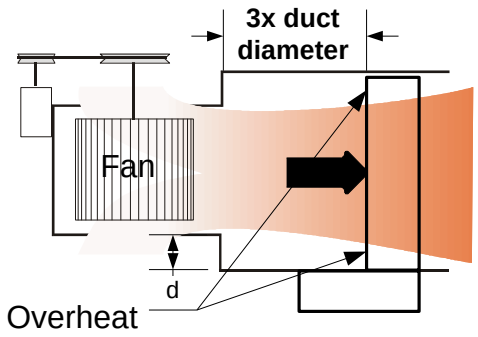


Installation Tips

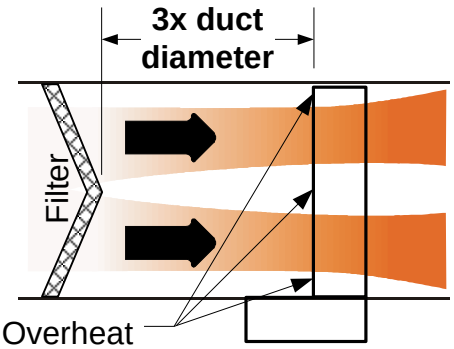
Air flow condition to avoid:

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

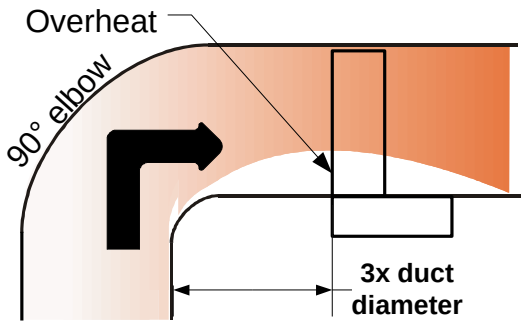
Electric heater too close to Fan.
Avoid any abrupt transition after a fan



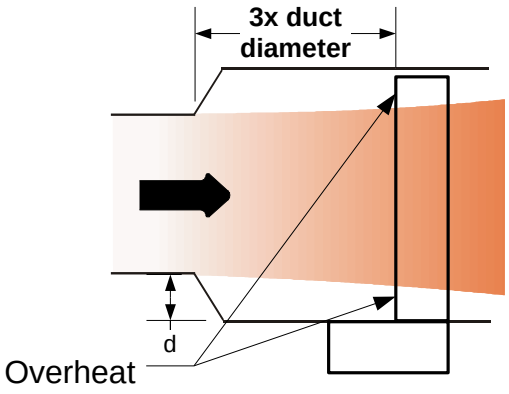
Electric heater too close to filter.



Electric heater too close to elbow.



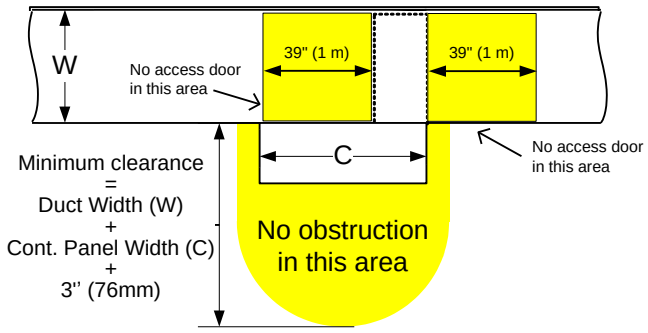
Electric heater too close to transition.



Minimum clearance to access control panel

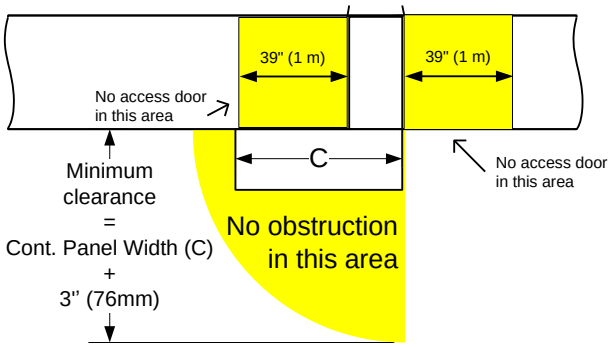
Caution, for safety reasons, minimum clearance to the access control panel should respect local electric codes.

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.

Handling

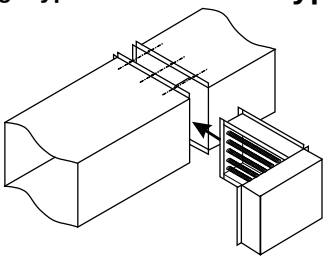
Warning, Risk of failure or malfunction. Do not operate electric heater if heating elements have been damaged during transport or handling.

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

Mechanical Installation

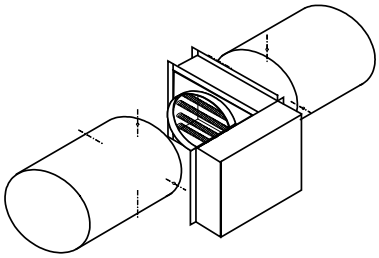
Caution, Risk of damage and malfunction, Do not block air flow to heating elements, insufficient airflow may damage heating elements and controls.
Important, direction of installation (refer to arrow on name plate) must be respected. Failure to do so will impair proper operation of thermal cut-out and/or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

Flange type electric heater - Type F



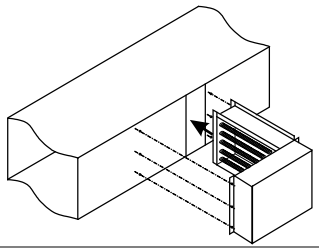
1) Position electric heater in front of the duct flange.
2) Secure electric heater to the duct by using metal screws or bolts through the duct flanges.
3) If necessary, install supports to hold the electric heater.

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 hold 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. Two flanges of 1'' (25.4mm) are provided on each side of control panel.
4) If necessary, reinforce the duct by installing appropriate support(s).

Electrical Installation

- **DANGER: Risk of electric shock**. Disconnect all electrical 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 with 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.

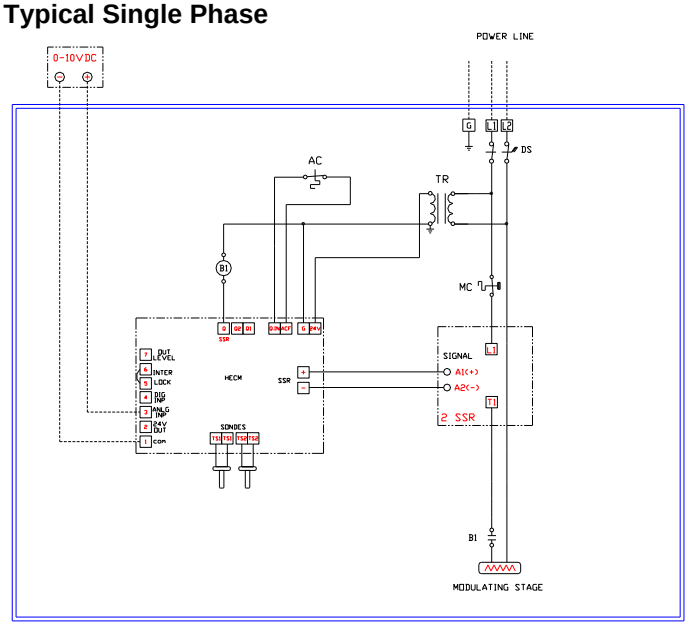
Power supply wiring

See the name plate for information for voltage and current.

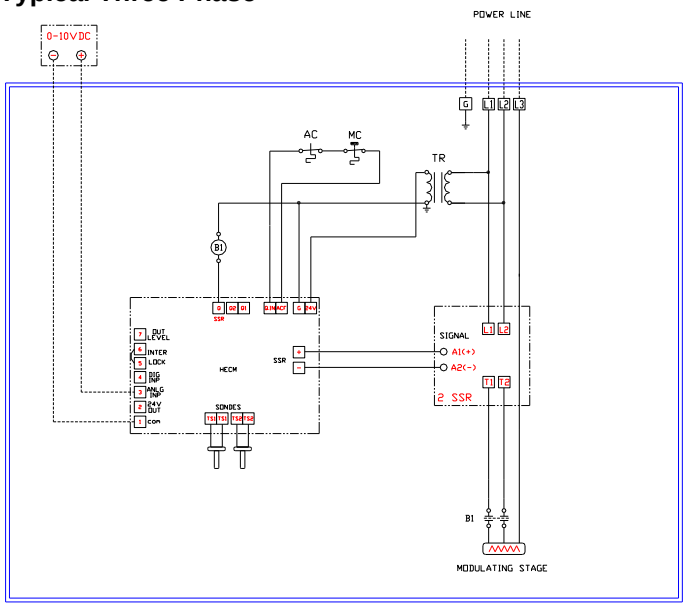
- Connect all wires to appropriate terminals as per **electrical diagram** affixed inside the control panel door.
- Correct connection and proper tightening should be verified before start up, and after a short period of operation (typically after 2 weeks).

Typical electrical diagram and legend

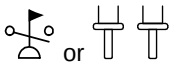
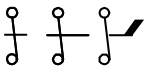
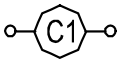
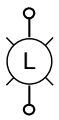
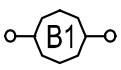
Typical Single Phase



Typical Three Phase

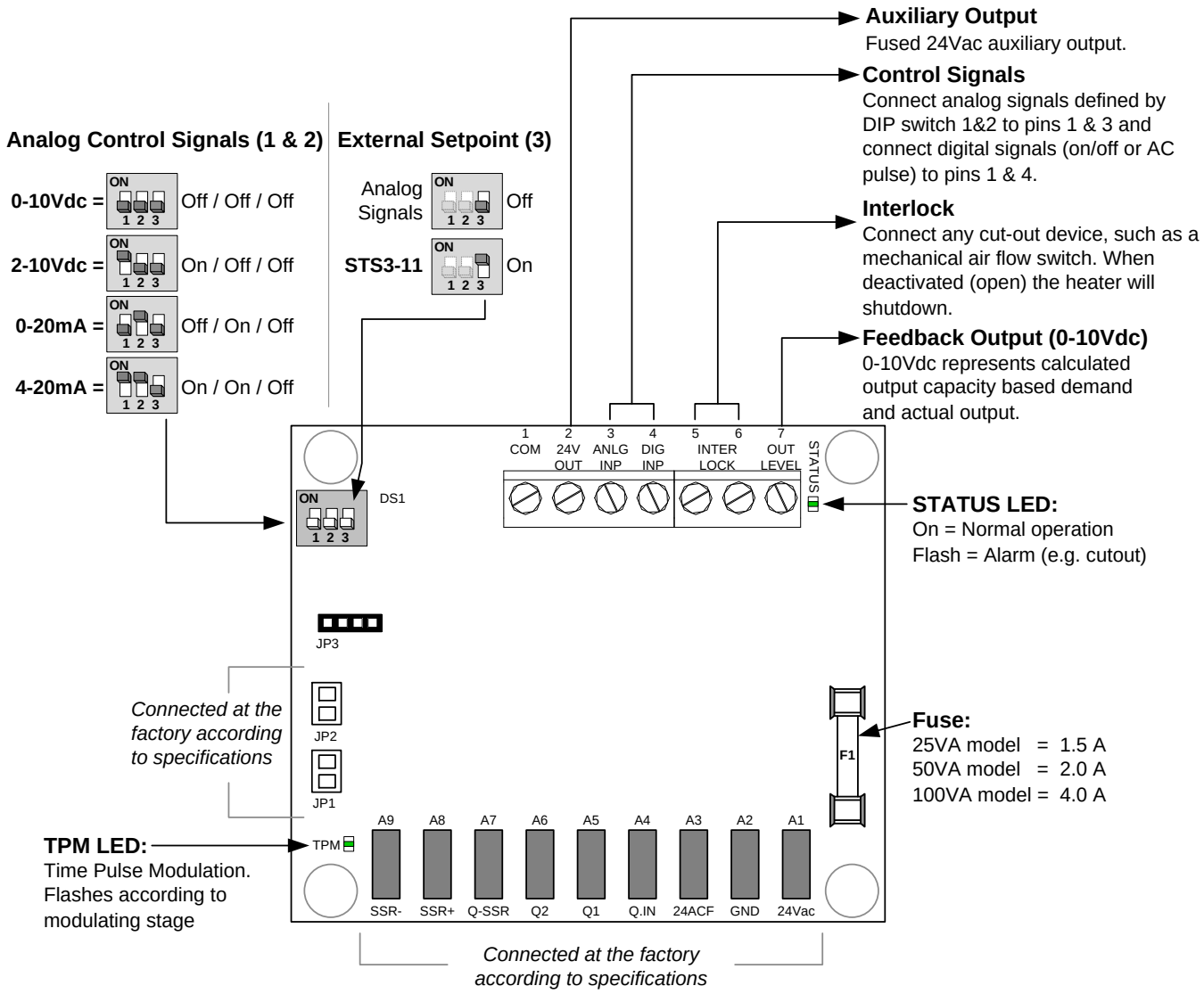


Typical Legend

	Thermal cut-out automatic reset		Air flow switch or EAS**	or L1 L2 L N	Single phase power supply terminals
	Thermal cut-out Manual reset		Disconnect switch	L1 L2 L3	3 phases power supply terminals
	Normally open contact		Heating element		Ground terminal
	Normally closed contact		Transformer	T T	Control circuit supply
	Contactor coil		Pilot light	C	Common
	Back-up safety contactor coil				

**Note: Intelligent Heater Control System (iHCS) is available/installed for heaters with less than 50A and dimensions less than 48” x40”. Some restrictions may apply.

PCB Overview

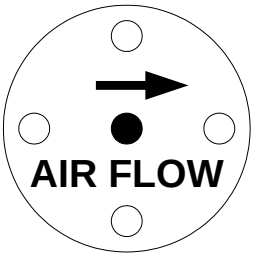


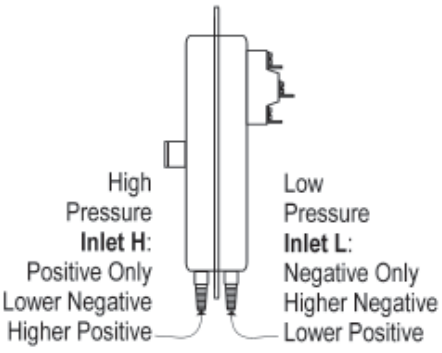
Mechanical Air Flow Switch Installation

Installation of a mechanical air flow switch is not required with Neptronic`s Intelligent Heater Control System (iHCS), which is available/installed for heaters with less than 50A and dimensions less than 48”x40” (some restrictions may apply).

Upon application of 0.05”w.c. (12Pa) minimum pressure, the mechanical air flow switch (PDN or PDA) will activate internal normally open and normally closed contacts.

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

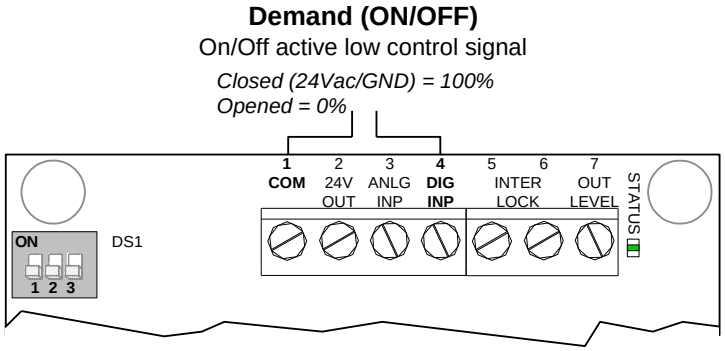




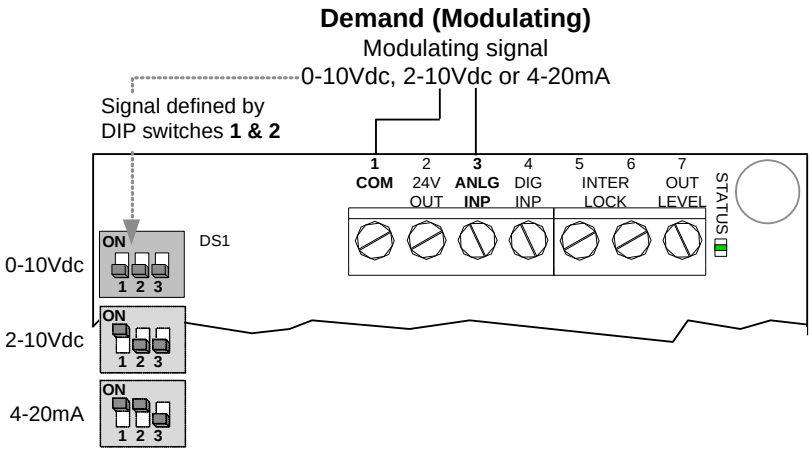
Control Signals

The HECM Universal Heater Controller accepts most input signals used in the HVAC industry and converts it to a modulating and/or ON/OFF control signal to a solid state relay(s) and contactor(s). If the Universal Heater Controller is equipped with only one modulating stage, the part number is HECM000; and if equipped with two stages, the part number is HECM002.

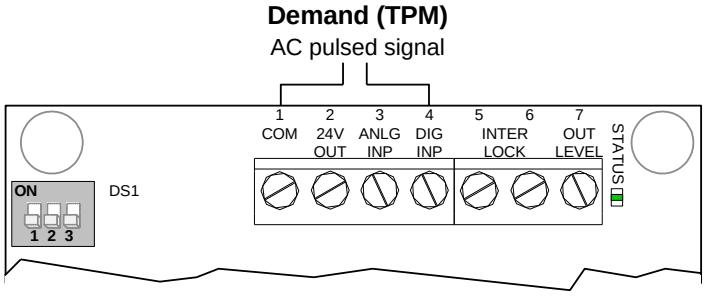
ON/OFF signal



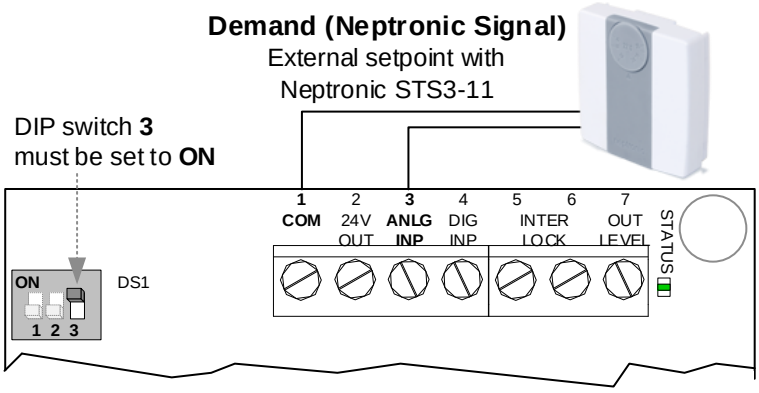
Modulating signal (0-10Vdc, 2-10Vdc or 4-20mA)



Electric signals: AC pulse



Electric Neptronic® signal, resistive



Operational Conditions

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 particles, 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.

Maintenance

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

1. Visual inspection

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

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

2. Electrical inspection

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

- Verify that electrical connections are correct and properly tightened.
- Verify the condition of fuses.
- Verify resistance of each circuit against ground.
- Verify correct operation of contactor(s).
- *If necessary, electrical components should be replaced only with identical origin components.*

Technical Support

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