

## INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS FOR BRASCH EXPLOSIONPROOF CONVECTION AIR HEATERS USED IN HAZARDOUS LOCATIONS

### I. GENERAL

BRASCH Explosion-proof Convection Air Heaters are cCSAus certified Class I, Division 1, Groups B, C & D, and Class II, Division 1, Groups E, F & G; Class I, Zone 1 & 2, Group IIB+H2. The heaters are also available in corrosion resistant construction, suitable for NEMA 3, and corrosive environments. The specific heater ratings are shown on the data plate. The heaters are intended for horizontal wall or floor mounting in industrial applications only. Surface temperatures of the cabinet may exceed those normally expected with residential equipment, so the heater should never be installed in a residential or similar environment where drapes or upholstery may come into contact with the heater or where unintended personnel contact may occur.

The maximum operating temperature ignition code is stamped on the data plate. NEVER operate the heater in an atmosphere with an ignition code temperature lower than this rating. The heaters are designed for convection airflow in a maximum ambient temperature of 40°C, 104°F. NEVER operate the heater in a vertical mounting orientation or where the ambient temperature may exceed 40°C, 104°F.

For details on the particular hazardous environments having the potential for explosion, refer to Articles 500 through 516 of the National Electrical Code, and/or Section 18 of the Canadian Electrical Code, Part I.

A. The BRASCH Explosion-proof Electric Convection Air Heaters are intended to be permanently mounted to a wall by mounting brackets supplied with the heater or floor mounted with the optional floor mounting brackets. A high temperature limit control is built into the heater. All heaters connected to a 3 phase voltage source and all single phase heaters above 277 Volts or 25 amps will require a control contactor, operated by the limit control, to control the heater. Certain optional controls such as a thermostat and/or contactor and control voltage transformer are available and when supplied with the heater they are supplied inside their own rated enclosures mounted on the right side of the cabinet or supplied as remotely mounted items. When mounted on the cabinet the enclosures are connected to the heater terminal box using rigid metal conduit and the controls are factory wired. Remotely located controls, outside the hazardous

area, may be in a standard enclosure, area permitting. All wiring connections to the heater must be made using rigid metal conduit, and an explosion-proof conduit seal must be located immediately adjacent to the heater. All wiring must comply with all national and local codes for equipment in hazardous locations.

The heaters are specifically designed for each application and should be properly installed, operated and maintained for optimum service life.

B. Disassembly of the unit for installation is not required or authorized. When installing:

1. Observe all heater nameplate ratings, warnings and notes.
2. Follow the wiring diagram supplied with the heater in making all electrical connections.
3. Keep all electrical connections tight.
4. Keep the heater terminal enclosure and heating elements clean.
5. Never cover the heater while in operation.
6. Carefully read and comply with all warnings and cautions.

### II. INSTALLATION

#### A. Site Selection.

- 1.) BRASCH Explosion-proof Convection Air Heaters are designed for use only while permanently mounted in a horizontal orientation at a minimum of 6" above the floor.
- 2.) The site must allow sufficient free space around the heater for safe and easy installation and maintenance access. Workspace for heater maintenance should be at least 3 feet all around the front of the heater cabinet and terminal box.
- 3.) Airflow through the heater should not be restricted or blocked in any manner.
- 4.) The site must have adequate means to support the weight of the heater, and provide physical protection to the heater.

#### **=WARNING=**

BRASCH strongly recommends this heater be installed by qualified personnel familiar with the National Electrical Code and/or the Canadian Electrical Code requirements for hazardous locations as well as any local codes. It is the responsibility of the installer to verify the safety and suitability of the installation.

**=WARNING=**

The heater must be mounted horizontally.

**=WARNING=**

Disassembly of the unit, for installation, is not required or authorized.

**=WARNING=**

Do not cover the heater or obstruct the free flow of air into or out of the heater.

**=WARNING=**

Do not install the heater in a residential or similar environment where drapes or upholstery may come into contact with the heater or where unintended personnel contact may occur.

B. Mechanical Installation. Once an acceptable location has been determined, follow these instructions to complete the mechanical installation.

**=WARNING=**

Disassembly of the unit for installation is not required or authorized.

- 1.) Wall mounted heater.
  - a.) Refer to Figure 1.
  - b.) Mark the mounting screw locations for the wall mounting brackets on the vertical surface.
  - c.) Center punch and/or pilot drill the mounting screw locations.
  - d.) Using four screws (not supplied with the heater) attach the wall mounting brackets to the vertical surface.
  - e.) Lift the heater up and then down over the mounting brackets so that the "V" lip at the top of the brackets engage the slots in the back of the heater cabinet.
  - f.) Make sure that the heater is resting in the bottom of the "V" lip so that the mounting holes at the bottom of the wall mounting bracket align with the mounting holes in the heater cabinet.
  - g.) Fasten the heater to the wall mounting brackets using the 2 screws, washers and nuts provided.

C. Electrical Installation. Follow these instructions to complete the electrical installation:

**=WARNING=**

Potentially lethal voltages are present. Be sure to lock the branch circuit disconnect switch in the off position and tag the circuit "Out for Maintenance" before working on this equipment.

- 1.) Follow the wiring diagram and any Code recommendations in making all electrical connections.
- 2.) Use only an approved explosion-proof means of wiring, such as insulated copper conductors in rigid metal conduit with threaded connections per the

NEC or the CEC to make the electrical connections to the heater.

- 3.) Determine the voltage, phase and KW rating of the heater from the heater data plate.
- 4.) The branch circuit voltage and phase must match the heater voltage and phase rating.
- 5.) Calculate the rated load current of the heater as follows:

$$\text{Single Phase Units} = \frac{\text{Kilowatts} \times 1000}{\text{Voltage}} = \text{Rated Load Current}$$

$$\text{Three Phase Units} = \frac{\text{Kilowatts} \times 1000}{\text{Voltage} \times 1.73} = \text{Rated Load Current}$$

- 6.) Use branch circuit supply wires rated for 75°C and the rated load current to connect the heater.
- 7.) For heaters without optional built on thermostat or contactor:

**=WARNING=**

When making electrical connections to the heater, be sure to follow the wiring diagram provided with the heater. The heater must not be operated without the safety high temperature limit cutout properly connected in the circuit.

- a.) All 3 phase heaters and all single phase heaters above 277 volts or 25 amps must have a magnetic contactor to disconnect the power if the temperature high limit opens. The contactor must be 250,000 cycles with a resistive rating per pole equal to or greater than the heater rated load current. The holding coil voltage rating of the contactor cannot exceed 277 volts.
- b.) Install an appropriately rated explosion-proof conduit sealing fitting in the 3/4" NPT connection hub in the bottom of the heater terminal box.
- c.) Remove the terminal box cover.
- d.) Pull the heater power connection wires labeled L1, L2 and if 3-phase L3 and the high temperature control wires labeled C1 and C2 out of the terminal box through the cover nipple.
- e.) Run the branch circuit supply wires and the contactor control wires, if any, through the conduit and conduit sealing fitting into the bottom of the terminal box and out through the cover nipple.
- f.) Select the appropriate wiring diagram that matches the installation and make the wiring connections using approved wiring connectors.
- g.) Push the wires back into the heater terminal box.
- h.) Install the terminal box cover, making sure it is screwed tightly in place.
- i.) Pour the explosion-proof seal in the sealing fitting.
- j.) Before application of electrical power, recheck all connections to ensure compliance with the wiring diagram and any code requirements. Remove any foreign objects from the terminal enclosure. Reinstall cover tightly.
- k.) See operating instructions, Section IV, before operating the heater.

8.) For heaters with optional built on thermostat or contactor follow the instructions provided with the control(s).

**=WARNING=**

When making electrical connections to the heater, be sure to follow the wiring diagram provided with the heater.

**III. FIELD INSTALLED CONTROLS**

**=WARNING=**

When making electrical connections to the heater, be sure to follow the wiring diagram provided with the heater. The heater must not be operated without the safety high temperature limit cutout properly connected in the circuit.

- 1.) All 3 phase heaters and all single phase heaters above 277 volts or 25 amps rated load current must have a safety contactor to disconnect the power if the temperature high limit opens. The contactor, such as a Products Unlimited 3100 series, must be UL/CSA approved for 250,000 cycles with a resistive rating per pole equal to or greater than the heater rated load current. The holding coil voltage rating of the contactor cannot exceed 277 volts.
- 2.) Any field installed controls cannot exceed the electrical ratings of the high temperature limit switch, which is rated for 125 VA at 277 VAC maximum.

**IV. OPERATION**

The BRASCH Explosion-proof Convection Air Heater may be operated normally with ambient temperatures of 104°F (40°C) or less, and in atmospheres containing less than 21% oxygen by volume. The temperature classification of the heater must be less than the ignition temperature of the area hazard classification, and the hazardous group classification of the heater must match or exceed the area classification. All of these conditions must be met before attempting to operate the heater. The heater should never be operated in an oxygen-enriched atmosphere or with an ambient temperature above 104°F. At high ambient conditions the safety high temperature limit cutout may activate. If this occurs, the installation must include some means to de-energize the heater, such as an automatic temperature control thermostat or a manually operated disconnect switch, to prevent excessive cycling of the controls.

**=WARNING=**

NEVER operate the heater in an atmosphere with an ignition temperature lower than the heater marking.

**=WARNING=**

The heater must be mounted horizontally to maintain the ignition temperature rating.

1. Initial Operation. Check to make sure the mechanical and electrical installation is complete and that it is safe to operate the heater.

- a.) Air Supply. Airflow through the heater must not be blocked or obstructed in any manner. Make sure the area below the heater is clear, and that nothing is laying on top of or draped over the top of the heater cabinet.
- b.) Close the branch circuit or unit disconnect switch servicing the heater.
- c.) If a control thermostat is used turn the temperature set point above ambient temperature.

2.) High temperature limit switch. The high temperature limit switch is an automatic reset type. If it trips it will automatically reset once the temperature has dropped 20°F to 30°F below its trip point. The automatic reset high temperature limit control is also a fail safe device. If the sensing bulb is damaged or broken the automatic reset temperature limit control contacts will open and stay open, preventing heater operation until the control is replaced.

**=WARNING=**

The heater must not be operated without the safety high temperature limit cutout properly connected in the circuit.

**=WARNING=**

Replacement electrical components must be obtained from the factory to maintain the hazardous location rating.

3.) Normal Operation.

- a.) Inspect the heater installation for loose bolts, covers, signs of overheating or corrosion that could impair the ability of the heater to operate safely. Loose bolts should be tightened prior to operation.
- b.) Check the cabinet for restrictions, or blockages.
- c.) Place the heater in service.

**V. MAINTENANCE**

A. Electrical

**=WARNING=**

Potentially lethal voltages are present. Be sure to lock the branch circuit disconnect switch in the off position and tag the circuit "Out for Maintenance" before working on this equipment.

**=WARNING=**

Replacement of electrical components should only be done by authorized personnel familiar with the requirements of maintaining electrical equipment in an explosion-hazard area.

**=WARNING=**

Replacement electrical components must be obtained from the factory to maintain the hazardous location rating.

- 1.) Annually inspect all wiring connections and visible insulation for damage, looseness, fraying, etc., as applicable. Tighten any loose wiring connections and replace or repair damaged or deteriorated insulation.
- 2.) If reduced heat output is suspected verify the condition of the heating elements by using an ammeter to check the current draw of each input line. All input lines should draw approximately equal current which should agree with calculated rated load current. If they do not, one or more of the heating elements could be burned out.
- 3.) High temperature limit switch. The high temperature limit switch is an automatic reset type. If it trips, it will automatically reset once the temperature has dropped 20°F to 30°F below its trip point. The automatic reset high temperature limit control is also a fail safe device. If the sensing bulb is damaged or broken the automatic reset temperature limit control contacts will open and stay open, preventing heater operation until the control is replaced.

**=WARNING=**

The heater must not be operated without the safety high temperature limit cutout properly connected in the circuit.

**=WARNING=**

Replacement electrical components must be obtained from the factory to maintain the hazardous location rating.

B. Mechanical

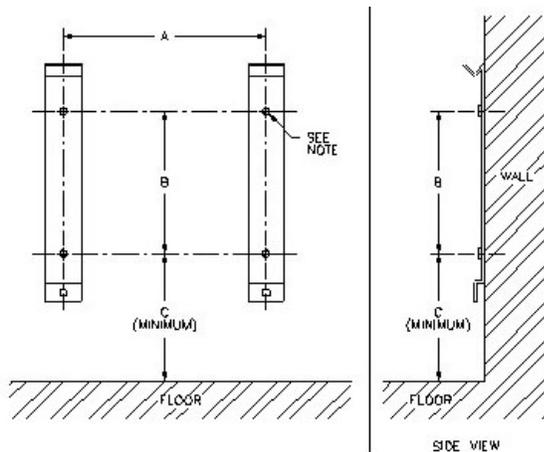
- 1.) Check the terminal enclosure, and conduit connections for evidence of water leaks or moisture collection. Tighten connections and check covers as required.
- 2.) The explosion-proof control box is designed with threaded joints and metal-to-metal contact at the cover joint to prevent an explosion. Do not attempt to install gasket material of any type at these joints.
- 3.) Annually check the tightness of all mounting bolts and nuts.
- 4.) Check the heating element fins for dirt build up or corrosion, and clean as required. Report signs of overheating or corrosion to the factory.

VI. REFERENCE DATA

- 1.) Wiring Diagrams. Please refer to the enclosed wiring diagrams in making all electrical connections to the heater and in performing any required maintenance.
- 2.) Data Plate Information. The data plate contains the catalog number and rating information. Please copy this information down and have it available when communicating with the factory.

[Keep these instructions with the heater for future reference.](#)

**WALL MOUNTING BRACKETS**



Cabinet Dimensions	A in (mm)	B in (mm)	C in (mm)	Approx. Weight lbs (kg)
26 x 4.44 x 6 660.40 x 112.78 x 152.40 mm	22 (558.8)	2 (203.2)	8.125 (206.38)	13.0 (5.90)
26 x 8.00 x 16 660.4 x 203.2 x 406.4 mm	14 (355.6)	9 (228.6)	9.5 (241.3)	27 (12.25)
39 x 8.00 x 16 990.60 x 203.20 x 406.40 mm	27 (685.8)	9 (228.6)	9.5 (241.3)	36 (16.33)
67.5 x 8.00 x 16 1714.50 x 203.20 x 406.40 mm	55.5 (1409.7)	9 (228.6)	9.5 (241.3)	60 (27.22)

**Note: Mounting screws/bolts are not supplied with heater maximum dia is 3/8" (9.65mm)**

**BRASCH**

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