



INDUSTRIAL
COMMERCIAL
EQUIPMENT
MANUFACTURING LTD.

Commercial Heating

DATA SHEET COM 189 C

BMA-E

Electric Heat-Vent & Make-Up Air Units



INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Please read this manual carefully before
installing and operating the furnace.

Always retain the manual with the unit
in the event of a change of ownership.

Model _____ Serial Number _____

Job: _____

Unit(s) _____

WINNIPEG, MANITOBA

BOLVAR, TENNESSEE

INSTALLATION & SERVICE INSTRUCTIONS

HEATING AND VENTILATING

ICE MFG. LTD. Electric heating and ventilating unit with cabinet enclosed blowers, rubber isolated for quiet vibration free operation, are designed for indoor and outdoor installation. (outdoor models have suffix OD).

This equipment shall be installed and wired in accordance with the regulations of the NATIONAL BOARD OF FIRE UNDERWRITERS, CANADIAN ELECTRIC CODE and local governing bodies and applicable provincial regulations for the class which should be followed carefully in all cases. Authorities having jurisdiction should be consulted before installations are made.

LOCATION OF UNIT & DISTRIBUTION

This unit is designed for full ventilation or full recirculating air controlled by a return air duct

stat., or a discharge duct stat., or remote manual controller. (see wiring diagram supplied with the unit)

FRESH AIR INLET

The intake shall be designed and located to prevent snow, rain, flammable gases, toxic gases and other deleterious materials from entering the unit. Less than 500 F.P.M. is an accepted velocity. Screen should be large enough to prevent frost build up. Insulate all duct from inlet to unit.

POWER SUPPLY

(a) 115, 208, 220 volt one phase or 208, 230, 440, 460, 550, 600 volt three phase main power supply (see rating plate) or take from Fig. 1 below.

| OPTIONAL MAIN FUSED DISCONNECT | | | | | | | | | | | | | | | |
|---|--|--------------|-----------|-----|-----|---|-------|---|------|------|-------|------|------|---|--|
| Note: Installed by others. Must be located according to national & local codes. | | | | | | | | | | | | | | | |
| MAIN FUSED DISCONNECT SIZE = TOTAL AMPS OF A, B, C & D x 125% | | | | | | | | | | | | | | | |
| A | HEATING ELEMENT (from selection table) | | | | | 1 Ph. = $\frac{KW \times 1000}{Amps \text{ VOLTAGE}}$ | | 3 Ph. = $\frac{KW \times 1000}{Amps \text{ VOLTAGE} \times 1.73}$ | | | | | | | |
| B | BLOWER MOTOR | HORSEPOWER - | A M P S | | | 1 | 1-1/2 | 2 | 3 | 5 | 7-1/2 | 10 | 15 | | |
| | | | 1/3 | 1/2 | 3/4 | NOT AVAILABLE | | | | | | | | | |
| | | | 240V 1Ph. | 3.6 | 4.9 | 6.9 | 8.0 | 10.0 | 12.0 | 17.0 | | | | | |
| | | | 208V 3Ph. | 1.8 | 2.2 | 3.1 | 4.0 | 5.7 | 7.5 | 10.6 | 16.7 | 24.2 | 30.8 | — | |
| | | | 240V 3Ph. | 1.6 | 2.0 | 2.8 | 3.6 | 5.2 | 6.8 | 9.6 | 15.2 | 22.0 | 28.0 | — | |
| 480V 3Ph. | 0.8 | 1.0 | 1.4 | 1.8 | 2.6 | 3.4 | 4.8 | 7.6 | 11.0 | 14.0 | 21.0 | | | | |
| 600V 3Ph. | — | 0.8 | 1.1 | 1.4 | 2.0 | 2.6 | 4.0 | 6.0 | 9.0 | 11.0 | 16.0 | | | | |
| C | STEP CONTROLLER AND CONTACTORS | | | | | ALLOW 5 AMPS | | | | | | | | | |
| D | CONTROL TRANSFORMER | | | | | ALLOW 5 AMPS | | | | | | | | | |

- (e) Complete wiring to thermostat or remote control panel (see wiring diagram with unit).
- (f) Install fused disconnect switches (to be supplied by installer) and connect power supply to disconnect switch(s) mounted on unit. Voltage must correspond to voltage marked on the rating plate.
- (g) Complete all wiring to accessories as per wiring diagram provided with the unit.

SEQUENCE OF OPERATION

Heating:

- (a) Main disconnect in the ON position.
- (b) Thermostat brings on the blower on call for heat.
- (c) Air flow switch closes, powering stage controller.
- (d) Stage controller brings on heating element as required.

- (e) Thermostat satisfied elements shutdown, blower runs a short time to cool down heating elements, then blower stops.

Ventilating:

- (a) Manual on switch starts blower in operation.
- (b) Damper modulating motor is powered.
- (c) Heating elements are staged on as required by a discharge controller.
- (d) Return air duct stat. or manual remote controller sets modulating dampers to required fresh air.
- (e) Thermostat may override discharge air controller to increase discharge air from space heating (optional).
- (f) Air flow switches insure proper C.F.M.
- (g) When space thermostat is satisfied, heating element returns to the discharge controller to keep a required discharge temperature (approx. 70°F)

START UP PROCEDURE

- (a) Check to insure all connections are secure and the duct is connected and free of obstructions.
- (b) Check air flow, correct C.F.M. is marked on the rating plate.
- (c) Check discharge air controller and set to required temperature.
- (d) If a space thermostat is used, insure unit temperature will not exceed limit settings.
- (e) Insure air flow switch will shut down unit when air flow is restricted (dirty filters).
- (f) Balance all distribution ducts to insure all are open to requirements.
- (g) Check mixing dampers to insure they are operating freely.

CARE AND MAINTENANCE

Filters: It is extremely important that the filters be checked and cleaned regularly. Clogged filters will reduce air flow through the unit and possibly cause nuisance shutdowns. The service interval for filters varies considerably from application to application so it will be necessary to check the filters very regularly during the period immediately following installation of the unit in order to determine the service interval for the filters. The filters may have to be removed in winter to prevent clogging with frost. Nuisance shutdowns may also result from a heavy frost buildup on the intake screen. If the intake has been properly located, then conditions which cause intake hood frosting should occur rarely if ever.

Lubrication: Both motor and blower bearings are permanently lubricated.

Temperature adjustment: The installer should instruct the owner on how to alter the discharge temperature of the unit so that the owner can make minor adjustments himself.

INSTALLATION & SERVICE INSTRUCTIONS

100% MAKE-UP AIR

ICE MFG. LTD. Electric Make-Up Air unit with cabinet enclosed blowers are factory designed and weather sealed for outdoor & indoor uses. (outdoor model has suffix OD)

This equipment shall be installed and wired in accordance with the regulations of the NATIONAL BOARD OF FIRE UNDERWRITERS, CANADIAN ELECTRIC CODE and local governing bodies and applicable provincial regulations for the class; which should be followed carefully in all cases. Authorities having jurisdiction should be consulted before installations are made.

LOCATION OF UNIT & DISTRIBUTION

Remember this unit is designed to deliver air at or near the temperature of the space. If this air is

NOTE: This unit has a blower delay relay that keeps the motor running to cool down the heating elements when the switch is turned to the off position.

TROUBLE GUIDE

- (1) If blower fails to come on. CHECK THE FOLLOWING.
 - (a) Main disconnect.
 - (b) Fuses — main and control panel.
 - (c) On-off switch on control panel and remote panel.
 - (d) Low limit if used.
 - (e) Overload in motor starter if used.
- (2) Blower is running but unit will not heat. CHECK THE FOLLOWING.
 - (a) Insure power to heater coil is connected and on.
 - (b) Thermostat is wired and O.K.
 - (c) Check C.F.M. through unit (dirty filters) inlet to unit blocked.
 - (d) Duct stat. in discharge duct.
- (3) Blower is running, heating coil is on but no fresh air. CHECK THE FOLLOWING.
 - (a) Check damper motor and linkage.
 - (b) Check return air sensing controller or manual remote controller (see wiring diagram)
- (4) Unit working but will not increase discharge temperature when space thermostat calls for heat. CHECK THE FOLLOWING.
 - (a) Insure thermostat is wired accordingly to wiring diagram.
 - (b) Check discharge controller reset relay (optional)
 - (c) Adjust if necessary.

played directly on people in the space they may not feel comfortable. Generally air delivery should be as high as possible in the space and into lightly occupied areas in order to provide maximum mixing with the air already in the space and minimum velocity before reaching the occupants.

Locate the unit as far as possible from the exhaust system in order to provide maximum sweep of fresh air through the space.

INLET

All air handled by this unit is brought directly from outdoors. The intake shall be designed and located to prevent snow, rain, flammable gases, toxic gases and other deleterious materials from

entering the unit. Less than 500 F.P.M. is an accepted velocity.

EXHAUST INTERLOCK

This unit shall be electrically interlocked so that it will operate only when the associated exhaust system is functioning. See wiring diagram for electrical hookup.

POWER SUPPLY

(a) 115, 208, 220 volt, one phase or 208, 230, 440, 460, 550, 600 volt three phase main power supply (see rating plate) or take from Fig. 1 below.

| OPTIONAL MAIN FUSED DISCONNECT | | | | | | | | | | | | | | | |
|---|--|--------------|-----------|-----|-----|--|-------|------|------|--|---------------|------|------|---|--|
| Note: Installed by others. Must be located according to national & local codes. | | | | | | | | | | | | | | | |
| MAIN FUSED DISCONNECT SIZE = TOTAL AMPS OF A, B, C & D x 125% | | | | | | | | | | | | | | | |
| A | HEATING ELEMENT (from selection table) | | | | | 1 Ph. = $\frac{KW \times 1000}{Amps \times VOLTAGE}$ | | | | 3 Ph. = $\frac{KW \times 1000}{Amps \times VOLTAGE \times 1.73}$ | | | | | |
| B | BLOWER MOTOR | HORSEPOWER - | | | | | | | | | | | | | |
| | | | 1/3 | 1/2 | 3/4 | 1 | 1-1/2 | 2 | 3 | 5 | 7-1/2 | 10 | 15 | | |
| | | A | 240V 1Ph. | 3.6 | 4.9 | 6.9 | 8.0 | 10.0 | 12.0 | 17.0 | NOT AVAILABLE | | | | |
| | | M | 208V 3Ph. | 1.8 | 2.2 | 3.1 | 4.0 | 5.7 | 7.5 | 10.6 | 16.7 | 24.2 | 30.8 | — | |
| | | P | 240V 3Ph. | 1.6 | 2.0 | 2.8 | 3.6 | 5.2 | 6.8 | 9.6 | 15.2 | 22.0 | 28.0 | — | |
| S | 480V 3Ph. | 0.8 | 1.0 | 1.4 | 1.8 | 2.6 | 3.4 | 4.8 | 7.6 | 11.0 | 14.0 | 21.0 | | | |
| | | 600V 3Ph. | — | 0.8 | 1.1 | 1.4 | 2.0 | 2.6 | 4.0 | 6.0 | 9.0 | 11.0 | 16.0 | | |
| C | STEP CONTROLLER AND CONTACTORS | | | | | ALLOW 5 AMPS | | | | | | | | | |
| D | CONTROL TRANSFORMER | | | | | ALLOW 5 AMPS | | | | | | | | | |

- Complete wiring to summer-off-winter switch as shown on wiring diagram.
- Install fused disconnect switches (to be supplied by installer) and connect 3 phase power supply to disconnect switch mounted on unit. Voltage must correspond to voltage marked on rating plate.
- Complete all wiring to accessories as per wiring diagram provided with the unit.

START-UP PROCEDURE

- Check to insure all connections are tight and the duct is connected and clear.
- Check for air flow, correct C.F.M. is marked on the rating plate.
- Insure motor is running in the right direction. Reverse 3 phase leads to change direction.
- Check discharge air temperature and set discharge controller at desired temperature.
- Insure that modulating controller is working.

CARE AND MAINTENANCE

Filters: It is extremely important that the filters be checked and cleaned regularly. Clogged filters will reduce air flow through the unit and possibly cause nuisance shutdowns. The service interval for filters varies considerably from application to application so it will be necessary to check the filters very regularly during the period immediately following installation of the unit in order to determine the service interval for the filters. The filters may have to be removed in winter to prevent clogging with frost. Nuisance shutdowns may also result from a heavy frost buildup on the intake screen. If the intake has been properly located, then the conditions which cause intake

hood frosting should occur rarely, if ever.

Lubrication: Both motor and blower bearings are permanently lubricated.

Temperature adjustment: The installer should instruct the owner on how to alter the discharge temperature of the unit so that the owner can make minor adjustments himself.

NOTE: This unit has a blower delay relay that keeps the motor running to cool down the heating elements when the switch is turned to the off position.

SEQUENCE OF OPERATION

Summer operation:

- Switch in the ON position.
- Summer-winter switch in SUMMER position.
- When exhaust interlock closes, the dampers open.
- Damper end switch closes powering blower motor starter.
- Blower motor auxillary contacts close.
- Air flow switch closes.
- Blower light indicates blower is running.

Winter operation:

- Switch in the ON position.
- Summer-winter switch in the WINTER position.
- Exhaust interlock closes, the damper open.
- Damper end switch closes powering blower motor starter.
- Blower motor auxillary contacts close.
- Air flow switch closes.
- Blower light indicates blower is running.
- Heat light indicates switch is in the winter position.

- (9) Modulating 8 step controller is powered.
- (10) Temperature is controlled by a discharge controller mounted in the blower discharge.
- (11) High limit control opens if temperature increases above 200 degrees F.

TROUBLE GUIDE

- (1) If inlet damper fails to open when exhaust is turned on. **CHECK THE FOLLOWING CONTROLS.**
 - (a) Main disconnect.
 - (b) Fuses — main and control panel.
 - (c) On-off switch on control panel and remote panel.
 - (d) Damper motor linkage.
 - (e) Low limit if used.
 - (f) Replace damper motor.
- (2) Dampers open but blower will not start. **CHECK THE FOLLOWING CONTROLS.**
 - (a) Blower belts.
 - (b) Motor starter (reset).
 - (c) Damper end switch.
 - (d) Replace blower motor.
- (3) Blower running but burner will not come on. **CHECK THE FOLLOWING CONTROLS.**
 - (a) High limit control (manual reset) mounted in heating coil cabinet. (Disconnect main power before removing cover).
 - (b) Insure summer-winter switch is in the winter position.
 - (c) Check modulating controls (replace defective parts).
- (4) Unit operating but discharge temperature to high.
 - (a) Adjust discharge controller to desired temperature.
 - (b) Adjust remote controller if used.
 - (c) Check air flow for proper C.F.M.
- (5) Unit operating but discharge temperature to low.
 - (a) Adjust discharge controller.
 - (b) Adjust remote controller if used.
 - (c) Check for proper C.F.M.
 - (d) Replace defective controls.

WARRANTY

ICE Mfg. Ltd. warrants its heater resistance elements against any defect in workmanship and materials for a period of two years, and other built in components for a period of one year starting from date of shipment from its factory.

ICE Mfg. Ltd. will supply to or repair for the purchaser of this package heater installed in Canada. The electric element or parts which shall on the manufacturer's examination disclose to have been defective. F.O.B. their Winnipeg factory.

This Warranty does not include any freight, labour, or sales taxes that may be incurred by the purchaser and is subject to the following conditions.

1. The unit shall be installed by a qualified heating contractor in accordance with the provisions of the service manual.
2. The unit shall have been installed in accordance with all Provincial and local codes.
3. The unit shall have been subject to only normal use in service and shall not have been misused, neglected, altered or otherwise damaged.
4. The unit shall have been operated within its published capacity and with the proper power voltage.
5. All automatic controls shall have been operative at all times.
6. The unit has not been allowed to exceed its proper temperature limits due to control malfunction or inadequate air circulation.
7. There is no evidence of tampering or deliberate destruction.

No representative of ICE Mfg. Ltd., nor any of its distributors or dealers, is authorized to assume for ICE Mfg. Ltd., any other obligations or liability in connection with this product, nor alter the terms of this warranty in any way. This warranty is limited to the express provisions contained herein and does not extend to liability for labour costs incurred in replacing defective parts.

Authorization to return any alleged defective parts must be obtained from the factory before the part is transported and the transportation charges for any alleged defective parts shall be prepaid by the owner. ICE Mfg. Ltd. will not accept charges for parts purchased unless the conditions of this warranty have been satisfied.

The express warranties herein contained are in lieu of any other warranties, expressed or implied, including the warranty of merchantability and of fitness for any particular purpose. ICE Mfg. Ltd. shall not be liable for damages, including special, incidental, or consequential damages arising out of or in connection with the performance of the electric heat and vent unit or its use by the owner. ICE Mfg. Ltd., liability is limited exclusively to repair and/or replacement of the defective part. Parts can be obtained from ICE Mfg. Ltd. Winnipeg, Manitoba on the basis that credit will be issued if defective parts returned qualify for replacement pursuant to the terms and conditions of this warranty.



WINNIPEG, MANITOBA

BOLIVAR, TENNESSEE