

Installation Instructions


IMPORTANT: Read these instructions completely before attempting to install this accessory.

SAFETY CONSIDERATIONS

Installation, start-up and servicing of this equipment can be hazardous due to system pressures, electrical components and equipment location (roofs, elevated structures, etc.)

Untrained personnel can perform the basic maintenance functions. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies a hazard which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could cause personal injury or death.

Before performing service or maintenance operations on unit, turn off main power switch to unit and install lockout tag. Ensure electrical service to rooftop unit agrees with voltage and amperage listed on the unit rating plate.

CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to equipment.

When removing panels from the unit, be careful not to damage the roof or other surfaces with the panels.

GENERAL

Motormaster I solid-state head pressure control regulates fan speed. A temperature sensor, mounted on a return bend of the condenser (outdoor) coil, controls the speed of approved condenser (outdoor) fan motors in order to maintain a constant head pressure in the condenser (outdoor) coil. When properly installed, the control will maintain the appropriate head pressure at low ambient temperatures down to -20°F (-28°C).

PACKAGE CONTENTS

CALOWAMBO												ITEM	
12A00	13A00	14A00	15A00	16A00	17A00	18A00	19A00	20A00	21A00	22A00	23A00		
1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	Motormaster I Control/Sensor
		1 qty			1 qty			1 qty				1 qty	Transformer, 575V to 460V
1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	Mounting Bracket
2 qty	2 qty	2 qty	2 qty	2 qty	2 qty	2 qty	2 qty	2 qty	2 qty	2 qty	2 qty	2 qty	Outdoor Fan Motor
1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	Low Ambient Temperature Switch
								1 qty				1 qty	Fan Motor Capacitor
1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	1 qty	Low Ambient Relay
1 qty	1 qty	1 qty	2 qty	2 qty	2 qty	1 qty	1 qty	1 qty	2 qty	2 qty	2 qty	2 qty	Time Delay Relay
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	Mounting Supplies
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	Wiring Supplies

PACKAGE USAGE

SIZE	COIL	VOLTAGE	PART NUMBER
15 Ton	Single Circuit	208/230-3-60	CALOWAMB012A00
15 Ton	Single Circuit	460-3-60	CALOWAMB013A00
15 Ton	Single Circuit	575-3-60	CALOWAMB014A00
15 Ton	Dual Circuit	208/230-3-60	CALOWAMB015A00
15 Ton	Dual Circuit	460-3-60	CALOWAMB016A00
15 Ton	Dual Circuit	575-3-60	CALOWAMB017A00
20 Ton	Single Circuit	208/230-3-60	CALOWAMB018A00
20 Ton	Single Circuit	460-3-60	CALOWAMB019A00
20 Ton	Single Circuit	575-3-60	CALOWAMB020A00
20 Ton	Dual Circuit	208/230-3-60	CALOWAMB021A00
20 Ton	Dual Circuit	460-3-60	CALOWAMB022A00
20 Ton	Dual Circuit	575-3-60	CALOWAMB023A00

INSTALLATION

1. Disconnect power to the unit.
2. Disconnect condenser (outdoor) fan motor (OFM) wires at the contactor and capacitor. Note position of fan blades in relation to fan orifice.
3. Remove OFM(s) from unit.
4. Remove fan blade(s) from motor(s).
5. Replace the OFM(s).
6. Re-install fan blade(s). Ensure that fan blade is properly located in the orifice. Refer to the base unit installation instructions for further details.
7. In some cases the OFM change out also requires the capacitor it uses to change. Refer to the Package Usage table (above), to determine if the capacitor needs to be changed.

Unscrew the capacitor strap carefully so that it can be reused. Remove the capacitor and store it in a safe place or discard properly. Using the capacitor strap, safely secure the new correct capacitor in the same location the old one was. Connect the wires the same way they were disconnected.

8. Install the mounting bracket in the position shown in Fig. 1 using the sheet metal screws included with the accessory.
9. Mount Motormaster® I controller on the mounting bracket. (See Fig. 1.) The controller must be mounted vertically with leads at the bottom. To ensure electrical

ground, use the serrated head mounting screws provided.

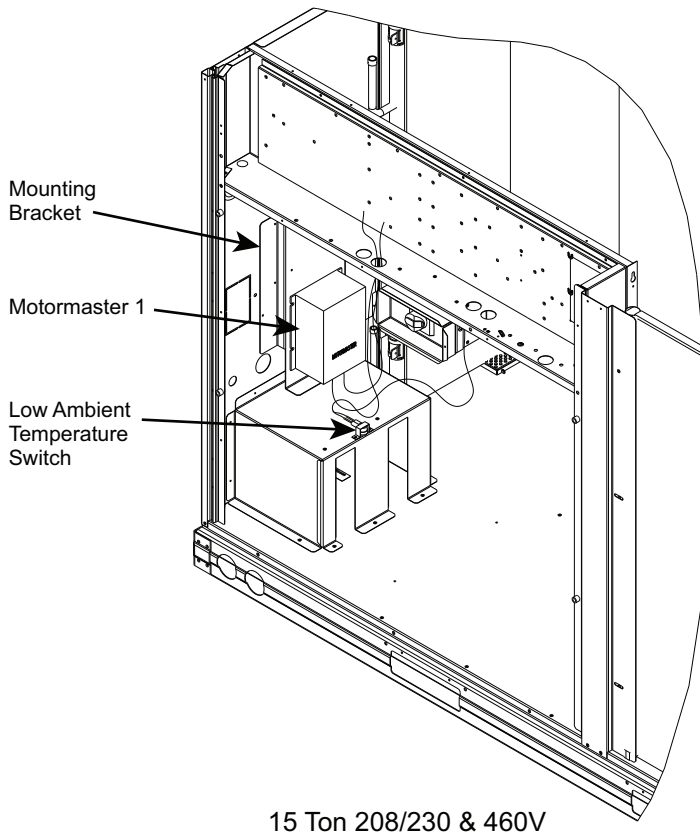
For 575 V units, the supplied transformer (575 V to 460 V) also mounts to the bracket.

10. Route sensor wire from bottom of Motormaster I control to sensor location as specified in Fig. 2. On round-tube plate fin (RTPF) coils, fasten the sensor to the defined location on the piping connection end of the coil with the provided bolt. On microchannel (MCHX) coils, fasten the sensor to the defined location on the opposite piping connection end of the coil with wire tie(s).
11. Mount the supplied time delay relay(s) (TDR) in the control box. See Fig. 7 & 8 for location(s).
12. Mount the low ambient temperature switch (LAS) to the top of the service valve housing (see Fig. 2). Connect one of the yellow wires to Y1 on the connection board (TB) and connect the other yellow wire to terminal 2 of the low ambient relay (LAR). See Fig. 3 - Fig. 6 for details, depending on unit type and voltage.
13. Rewire unit for the new or replaced parts (outdoor fan motors, Motormaster control, plus time delay relays, low ambient relay, low ambient temperature switch and 575 to 460V transformer, as applicable). Use the provided wiring diagrams (see Fig. 3 - Fig. 6) and the unit label wiring diagram for details.

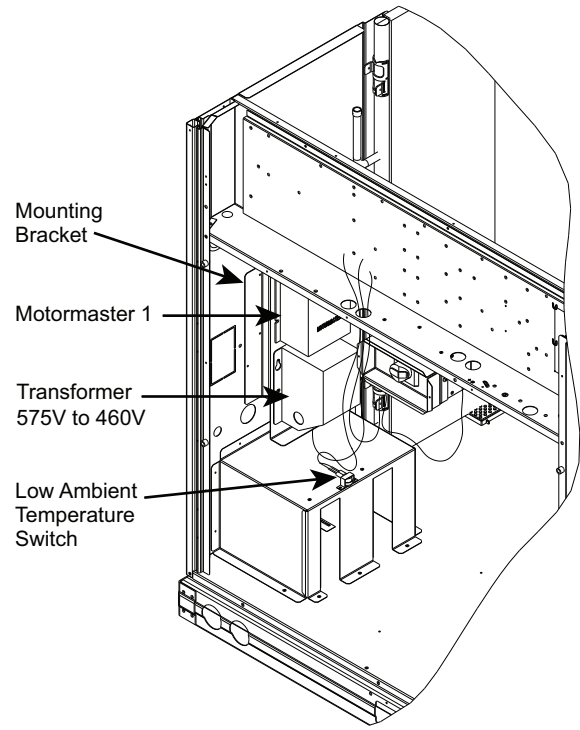
NOTE: The 575V to 460V transformer (HT01AH858) is used as an auto-transformer (buck boost transformer), not as a traditional step down isolation transformer therefore it must be wired as per Fig. 4 (15 ton units) or Fig. 6 (20 ton units).
14. Coil up all excess wire and secure it next to the controller.
15. Wind baffles are required to prevent wind cross currents from causing abnormally low condensing temperatures.
 - Use 20-gauge sheet metal to fabricate wind baffles (see Fig. 9 and Table 1) and mounting brackets (see Fig. 10)

NOTE: Mounting brackets are for use on 15 ton units only.

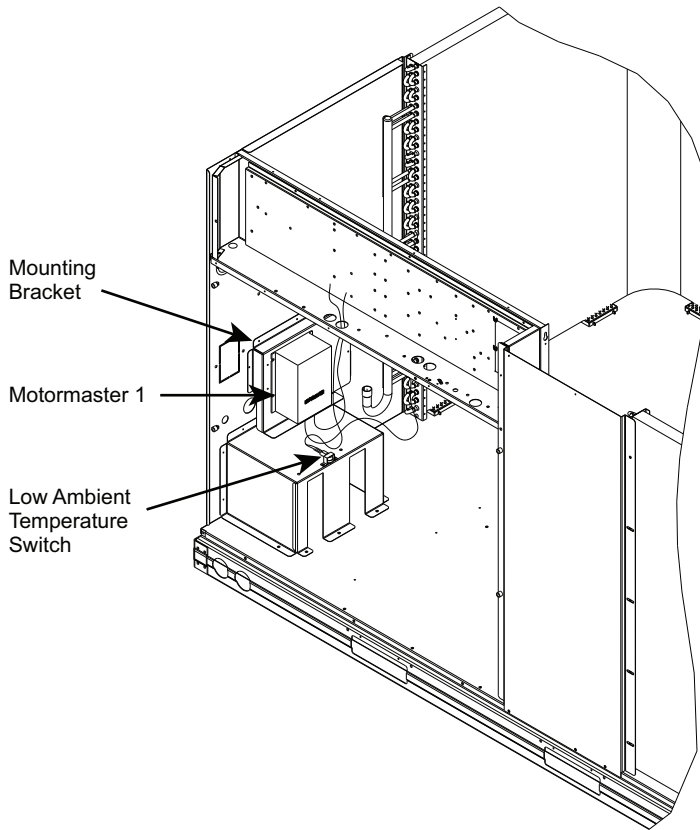
 - Install the wind baffles as show in Fig. 11, for 15 ton units and Fig. 12, for 20 ton units .
16. Reconnect power to the unit.



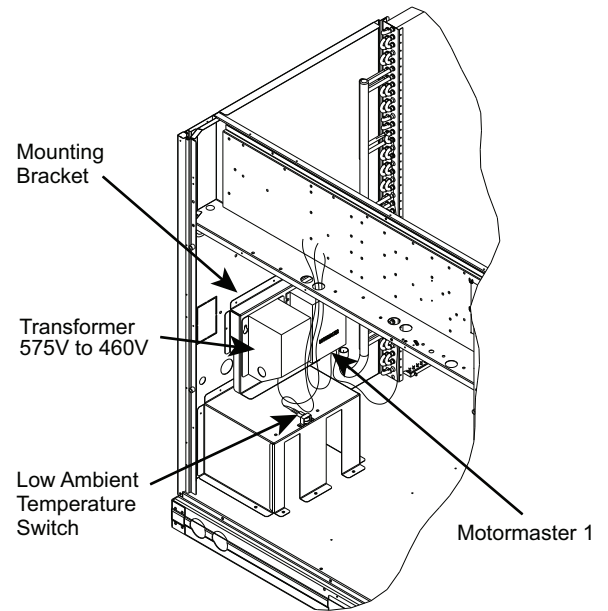
15 Ton 208/230 & 460V



15 Ton 575V



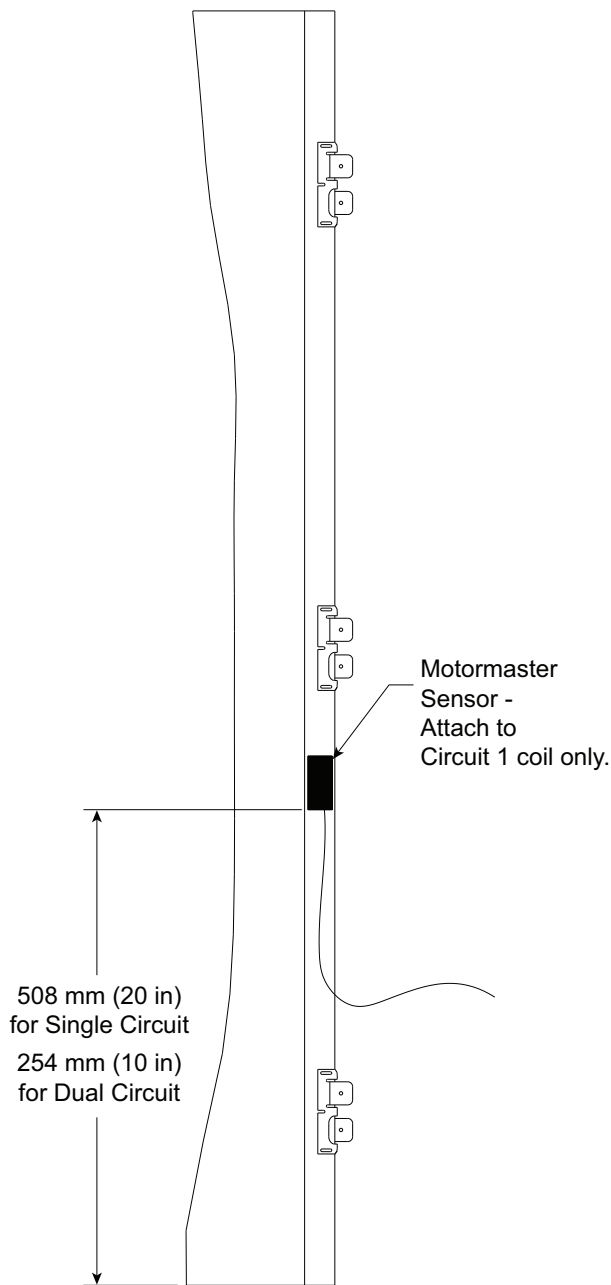
20 Ton 208/230 & 460V



20 Ton 575V

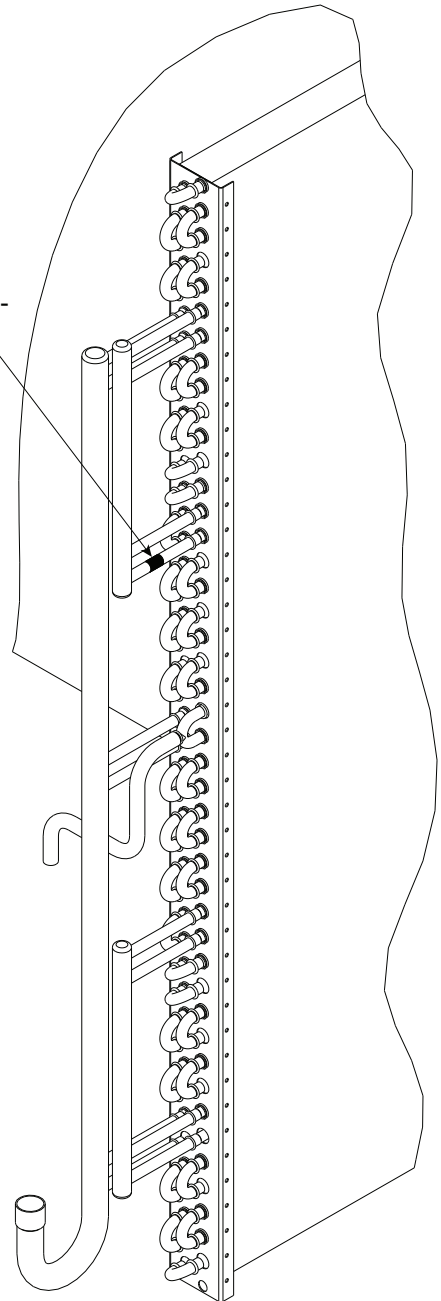
Fig. 1 - Motormaster Controller Mounting

C10525



Motormaster Sensor Location -
MCHX Coil, 15 Ton Units Only

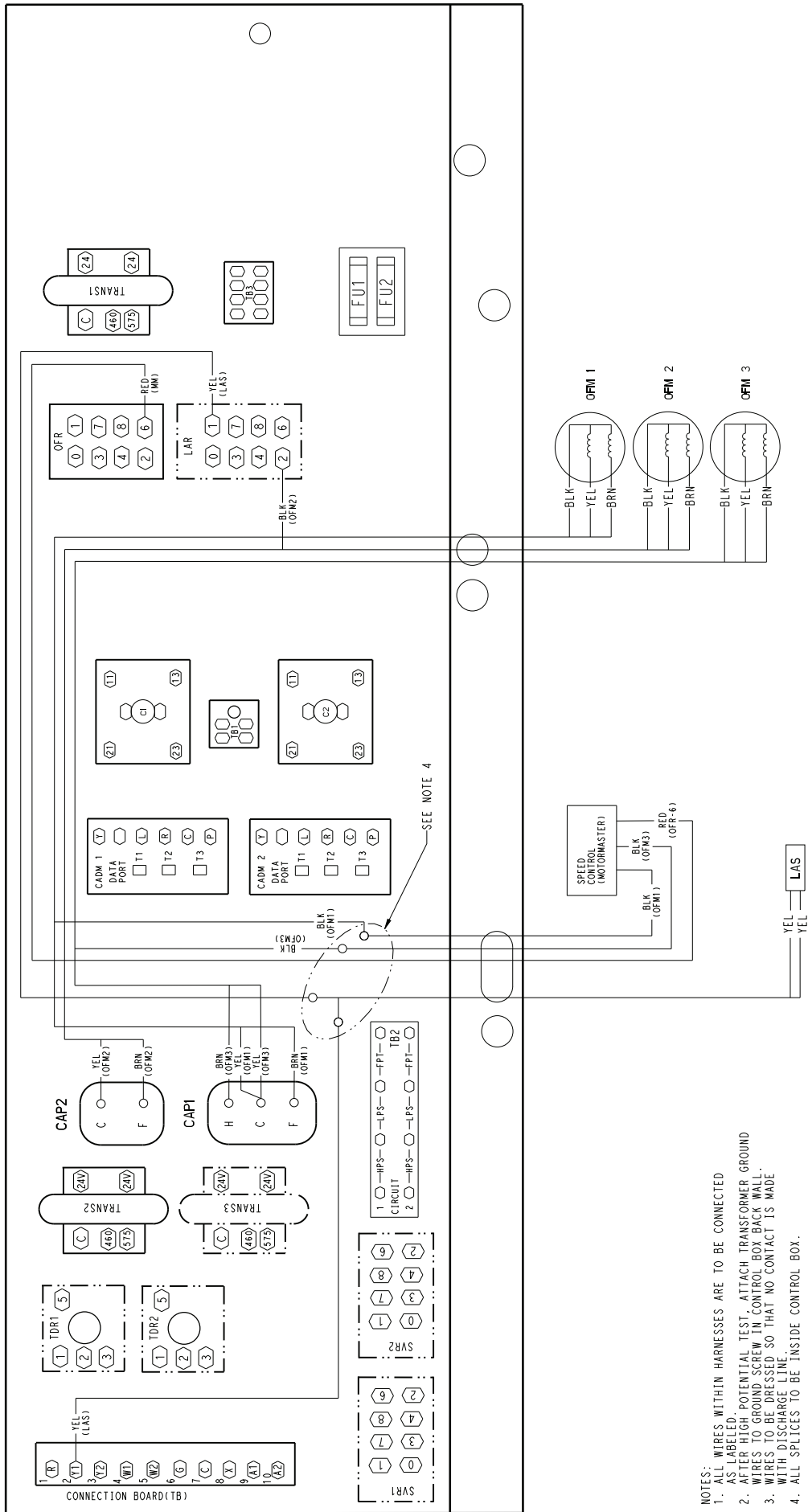
Motormaster Sensor -
Must be positioned
on Vapor Stub of
Circuit 1 coil only.



Motormaster Sensor Location -
RTPF Coil Units Only, 15 & 20 Ton Units

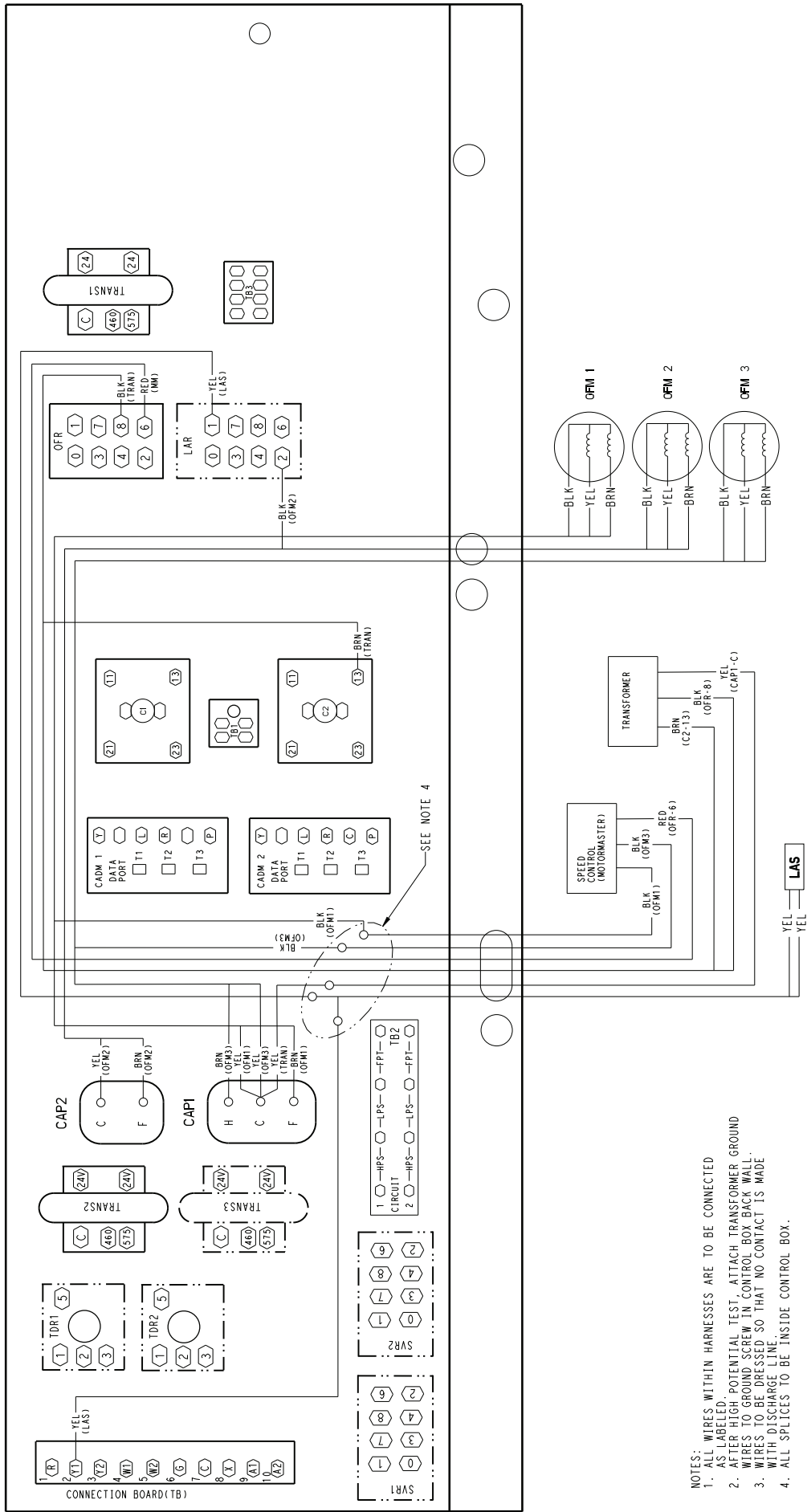
C10524

Fig. 2 - Sensor Location



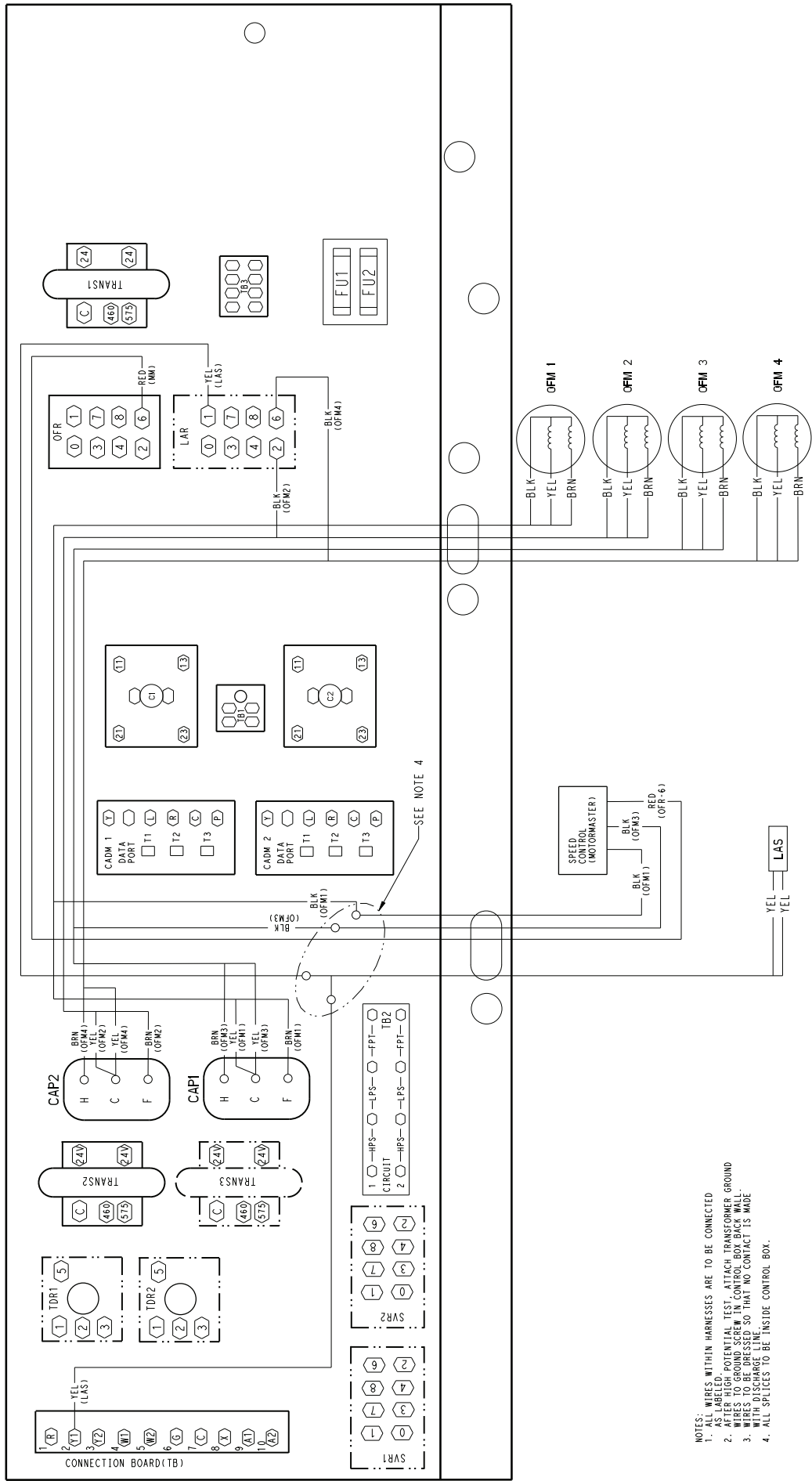
- NOTES:
1. ALL WIRES WITHIN HARNESS ARE TO BE CONNECTED AS LABELED. POTENTIAL TEST. ATTACH TRANSFORMER GROUND.
 2. WIRES TO GROUND SCREW IN CONTROL BOX BACK WALL.
 3. WIRES TO BE DRESSED SO THAT NO CONTACT IS MADE WITH DISCHARGE LINE.
 4. ALL SPLICES TO BE INSIDE CONTROL BOX.

Fig. 3 - Motormaster Wiring Details: 208/230/460V, 15 Ton Units



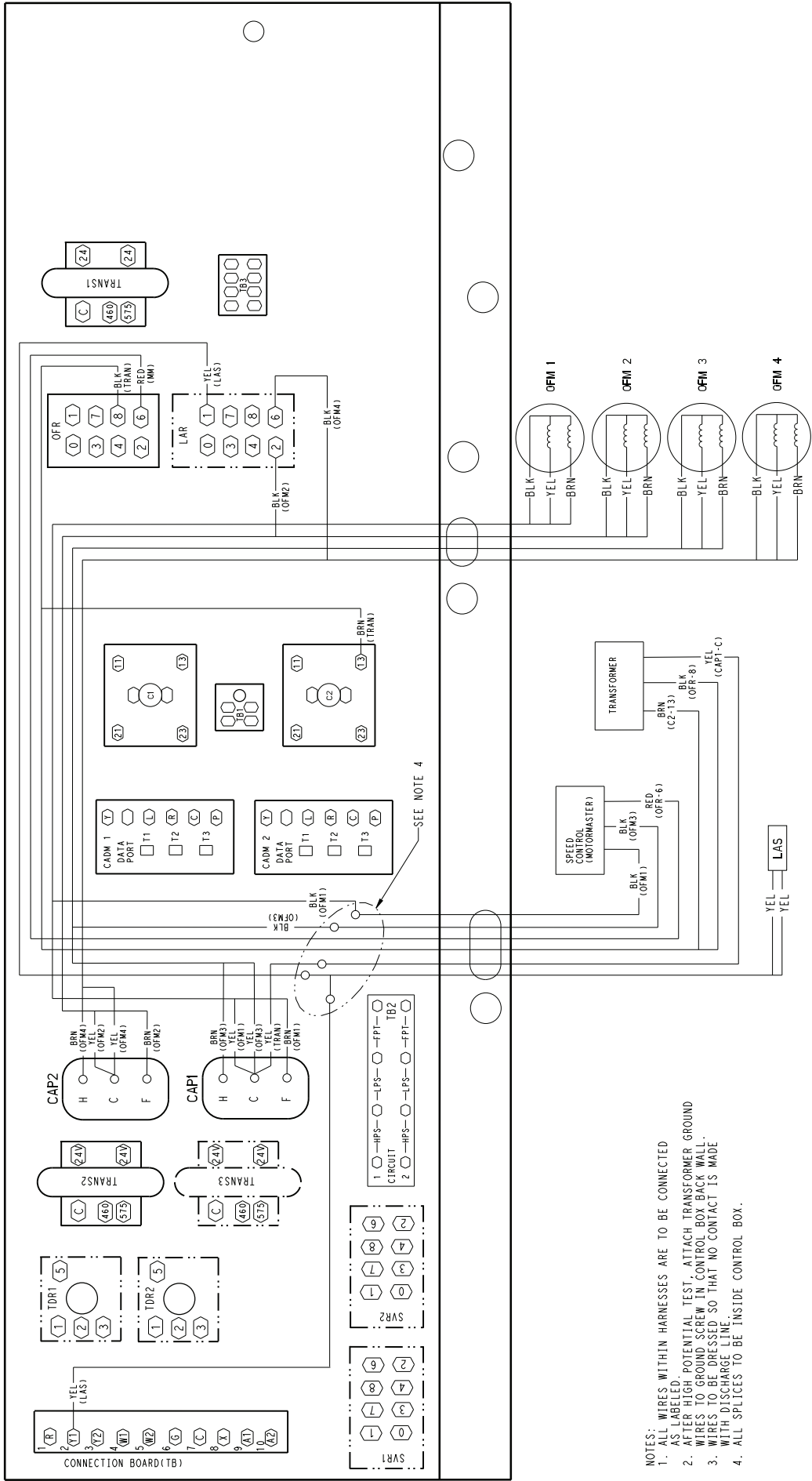
- NOTES:
1. ALL WIRES WITHIN HARNESSES ARE TO BE CONNECTED AS LABELED.
 2. AFTER HIGH POTENTIAL TEST, ATTACH TRANSFORMER GROUND WIRES TO GROUND SCREW IN CONTROL BOX BACK WALL.
 3. WIRES TO BE DRESSED SO THAT NO CONTACT IS MADE WITH DISCHARGE LINE.
 4. ALL SPLICES TO BE INSIDE CONTROL BOX.

Fig. 4 - Motormaster Wiring Details: 575V, 15 Ton Units



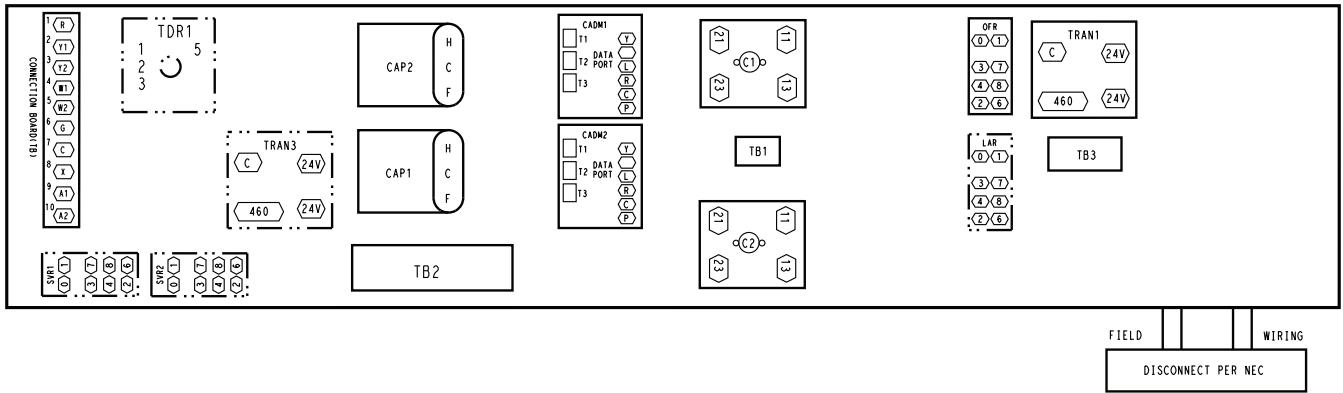
- NOTES:
1. ALL WIRES WITHIN HARNESS ARE TO BE CONNECTED AS LABELED.
 2. AFTER HIGH POTENTIAL TEST, ATTACH TRANSFORMER GROUND WIRES TO GROUND STRIP IN CONTROL BOX BACK WALL.
 3. WITH DISCHARGE LINE MADE.
 4. ALL SPLICES TO BE INSIDE CONTROL BOX.

Fig. 5 - Motormaster Wiring Details: 208/230/460V, 20 Ton Units



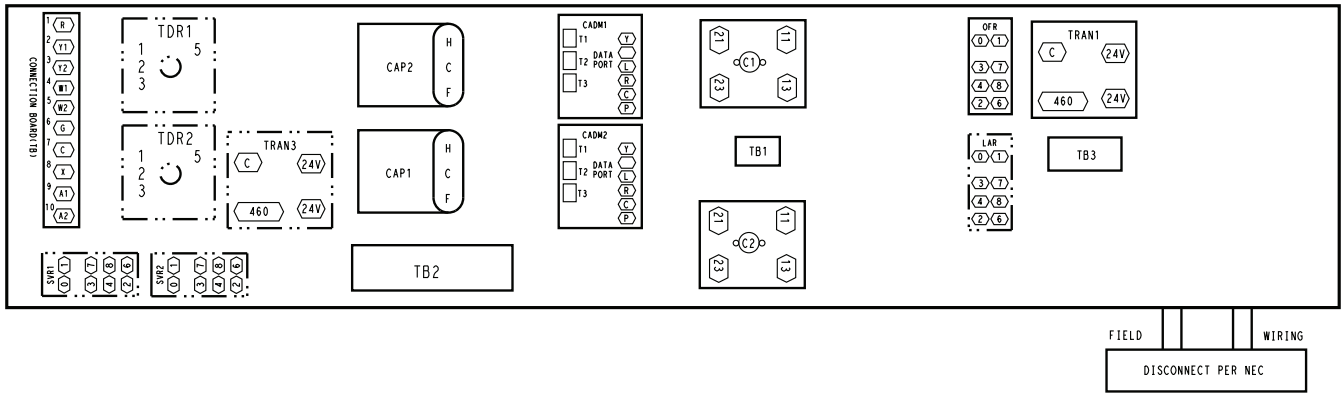
- NOTES:
1. ALL WIRES WITHIN HARNESSSES ARE TO BE CONNECTED AS LABELED. POTENTIAL TEST, ATTACH TRANSFORMER GROUND.
 2. AFTER HIGH POTENTIAL TEST, ATTACH TRANSFORMER GROUND.
 3. WIRES TO BE DRESSED SO THAT NO CONTACT IS MADE WITH DISCHARGE LINE.
 4. ALL SPLICES TO BE INSIDE CONTROL BOX.

Fig. 6 - Motormaster Wiring Details: 575V, 20 Ton Units



C10533

Fig. 7 - Time Delay Relay (TDR) - Location in Control Box for Single Coil Units



C10534

Fig. 8 - Time Delay Relay (TDR) - Location in Control Box for Dual Coil Units

Table 1 – Wind Baffle Dimension

DIMENSIONS – INCHES										
UNIT	BAFFLE	A	B	C	D	E	F	G	H	J
15 TON A/C	LEFT SIDE	19 ³ / ₄	20 ¹ / ₂	21 ¹ / ₄	43 ¹ / ₈	8 ³ / ₈	18	27 ¹ / ₄	40	–
	BACK	80 ¹ / ₄	81	81 ³ / ₄	43 ¹ / ₈	8 ³ / ₈	18	27 ¹ / ₄	40	–
	RIGHT SIDE	38 ³ / ₄	39 ¹ / ₂	40 ¹ / ₄	43 ¹ / ₈	8 ³ / ₈	18	27 ¹ / ₄	40	–
	FRONT	34 ¹ / ₈	34 ⁷ / ₈	35 ⁵ / ₈	43 ¹ / ₈	6 ⁷ / ₈	16 ¹ / ₂	25 ³ / ₄	38 ¹ / ₂	–
20 TON A/C	LEFT SIDE	32 ⁷ / ₈	33 ⁵ / ₈	34 ³ / ₈	43 ¹ / ₈	4 ¹ / ₄	13 ¹ / ₄	22 ¹ / ₄	31 ¹ / ₄	40 ¹ / ₄
	BACK	47 ³ / ₄	48 ¹ / ₂	49 ¹ / ₄	43 ¹ / ₈	4 ¹ / ₄	13 ¹ / ₄	22 ¹ / ₄	31 ¹ / ₄	40 ¹ / ₄
	RIGHT SIDE	61 ¹ / ₈	61 ⁷ / ₈	62 ⁵ / ₈	43 ¹ / ₈	3 ³ / ₄	12 ³ / ₄	21 ³ / ₄	30 ³ / ₄	39 ³ / ₄
	FRONT	20 ¹ / ₈	20 ⁷ / ₈	21 ⁵ / ₈	43 ¹ / ₈	3 ³ / ₄	12 ³ / ₄	21 ³ / ₄	30 ³ / ₄	39 ³ / ₄

DIMENSIONS – MM										
UNIT	BAFFLE	A	B	C	D	E	F	G	H	J
15 TON A/C	LEFT SIDE	501	520	539	1095	212	457	694	1015	–
	BACK	2037	2056	2075	1095	212	457	694	1015	–
	RIGHT SIDE	983	1002	1021	1095	212	457	694	1015	–
	FRONT	866	885	904	1095	174	419	656	977	–
20 TON A/C	LEFT SIDE	834	853	872	1095	108	337	565	794	1022
	BACK	1214	1233	1252	1095	108	337	565	794	1022
	RIGHT SIDE	1551	1570	1589	1095	95	324	552	781	1010
	FRONT	510	530	549	1095	95	324	552	781	1010

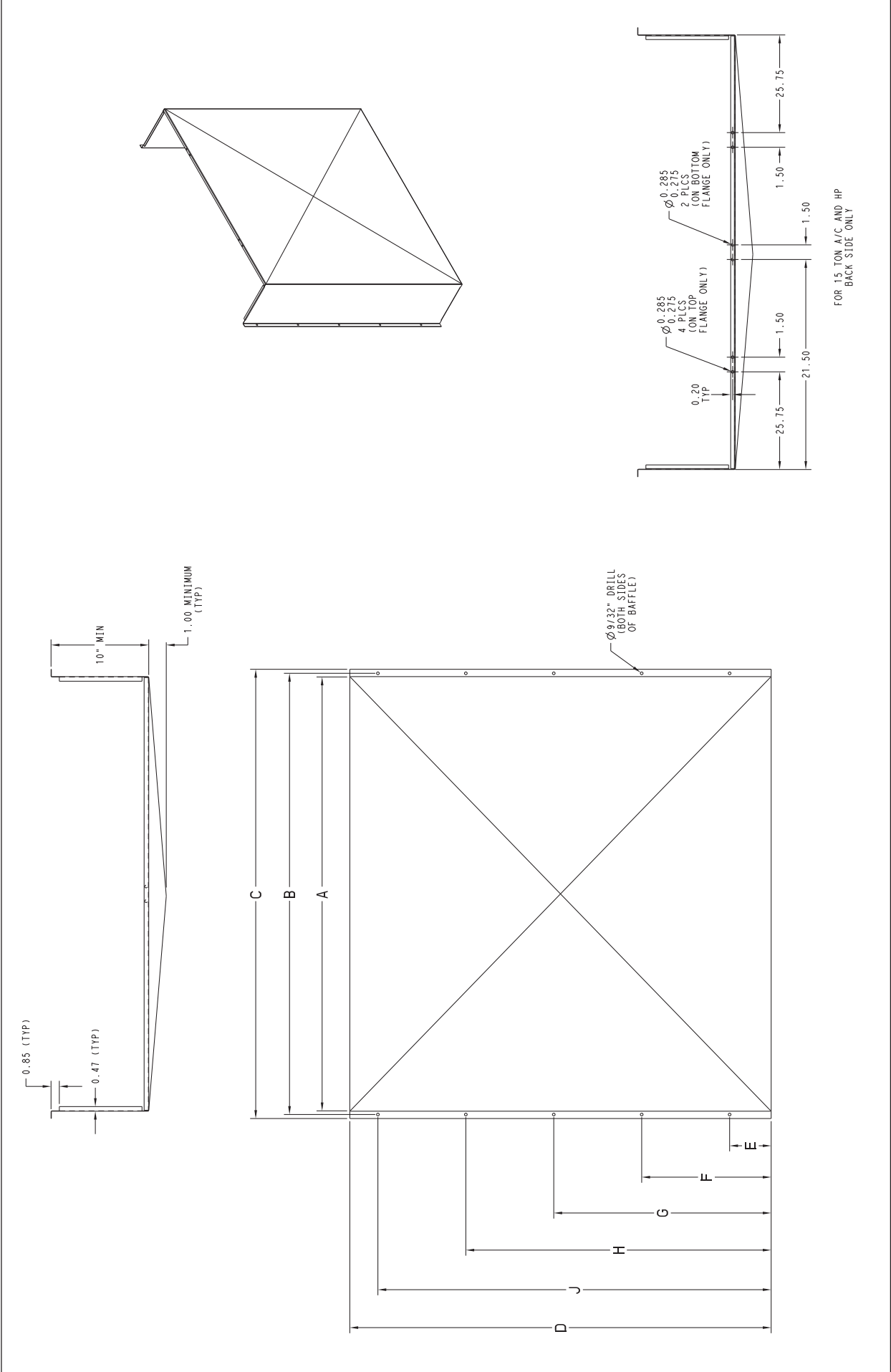


Fig. 9 - Wind Baffles - Fabrication

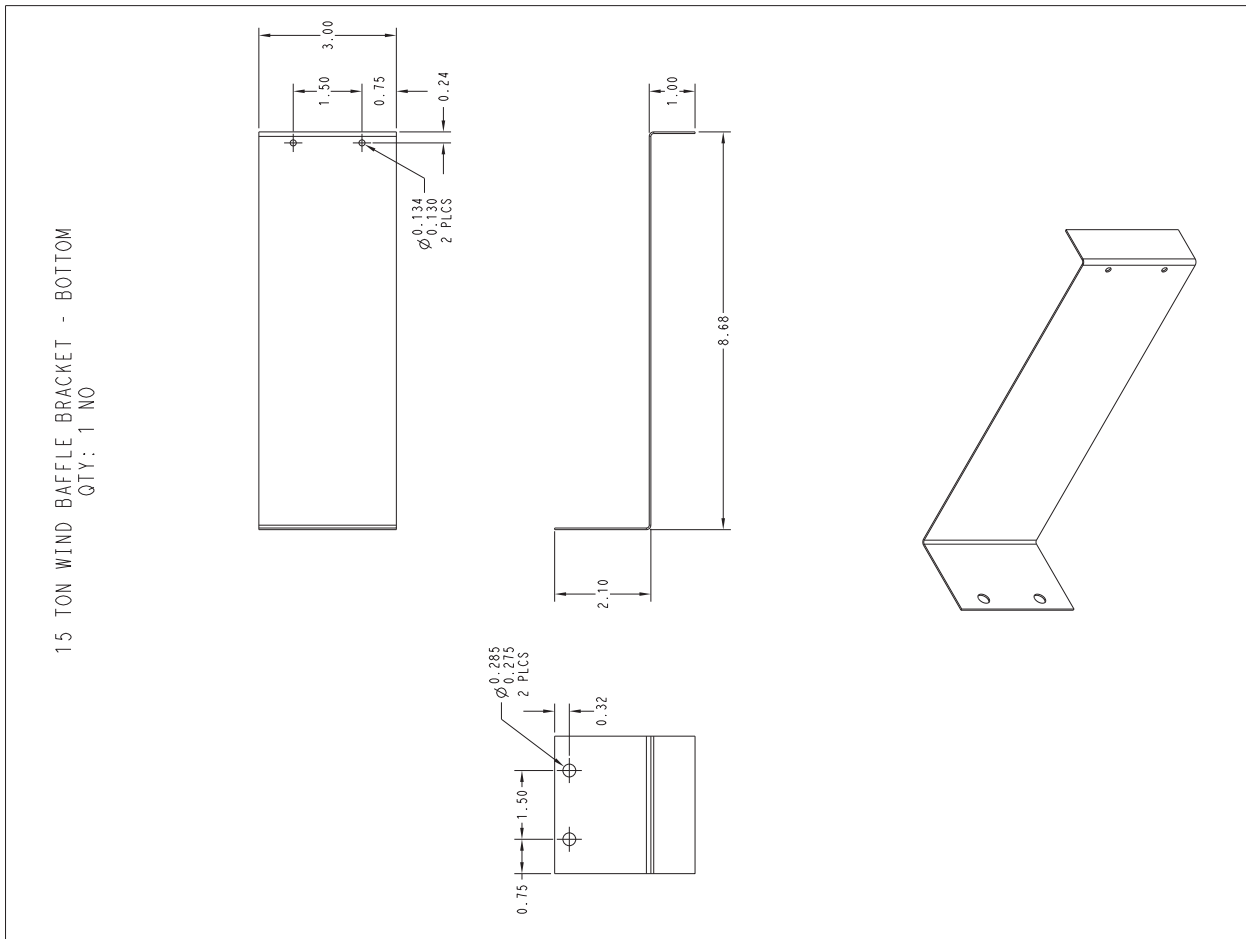
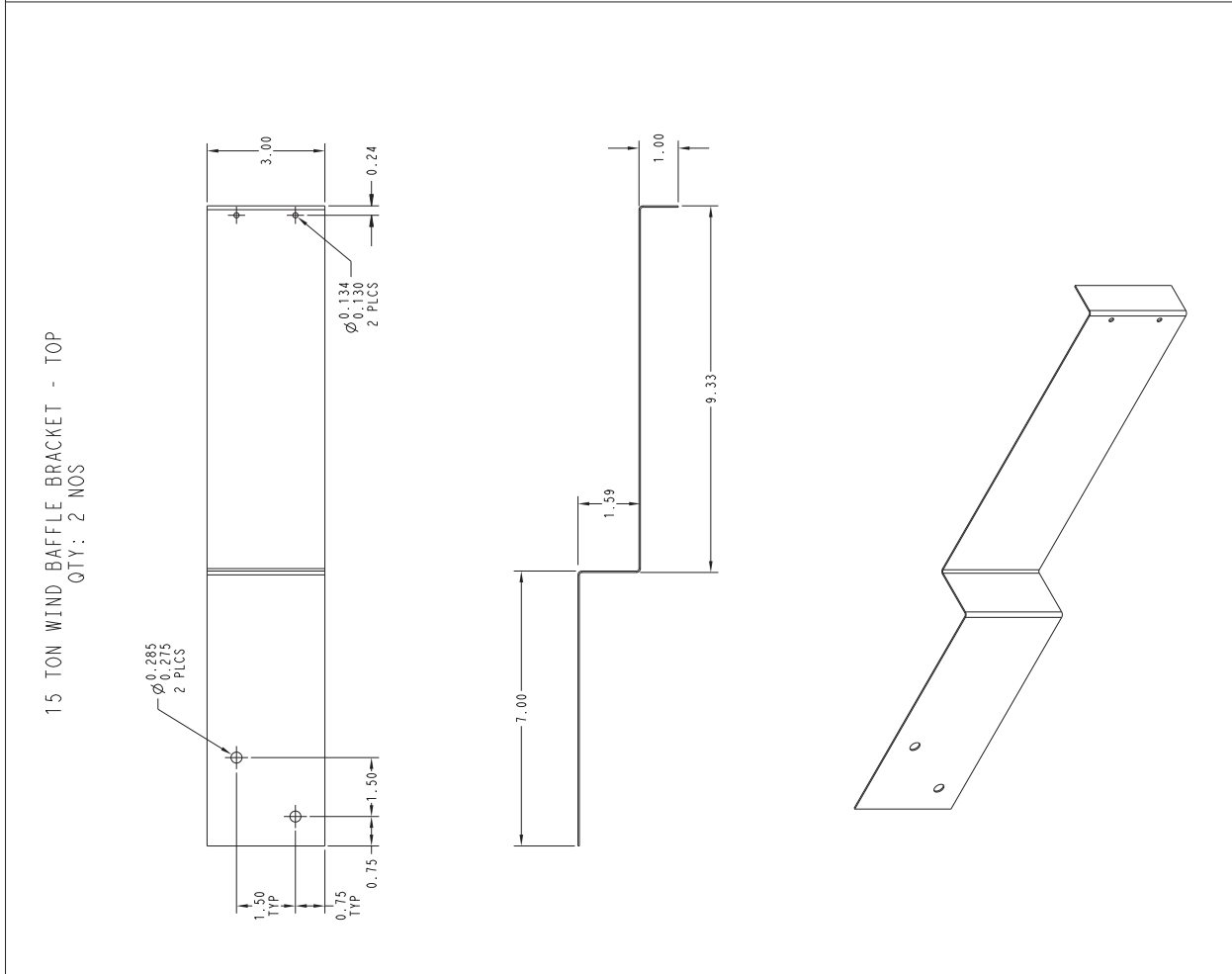


Fig. 10 - 15 Ton Wind Baffle Brackets - Fabrication

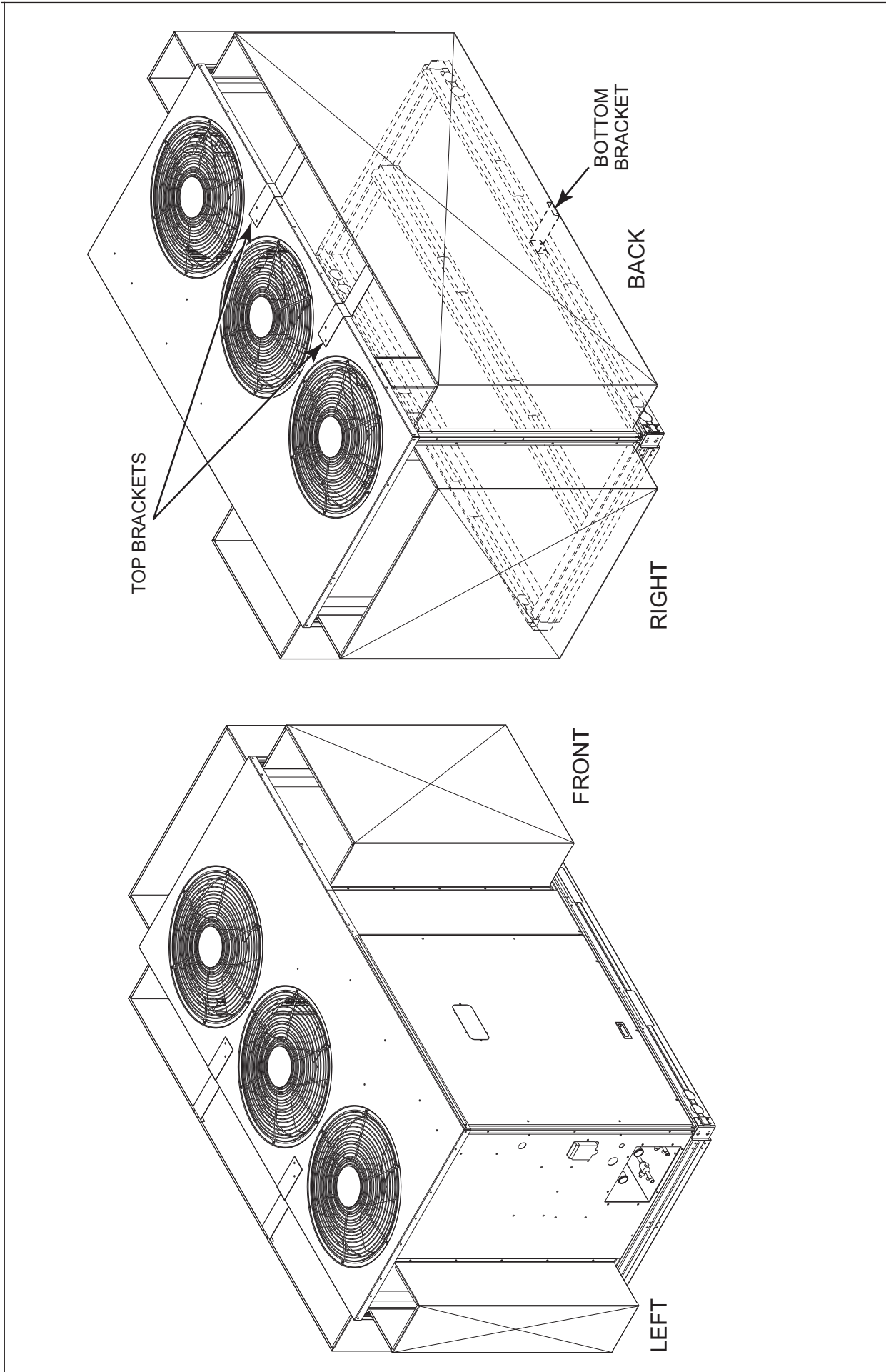
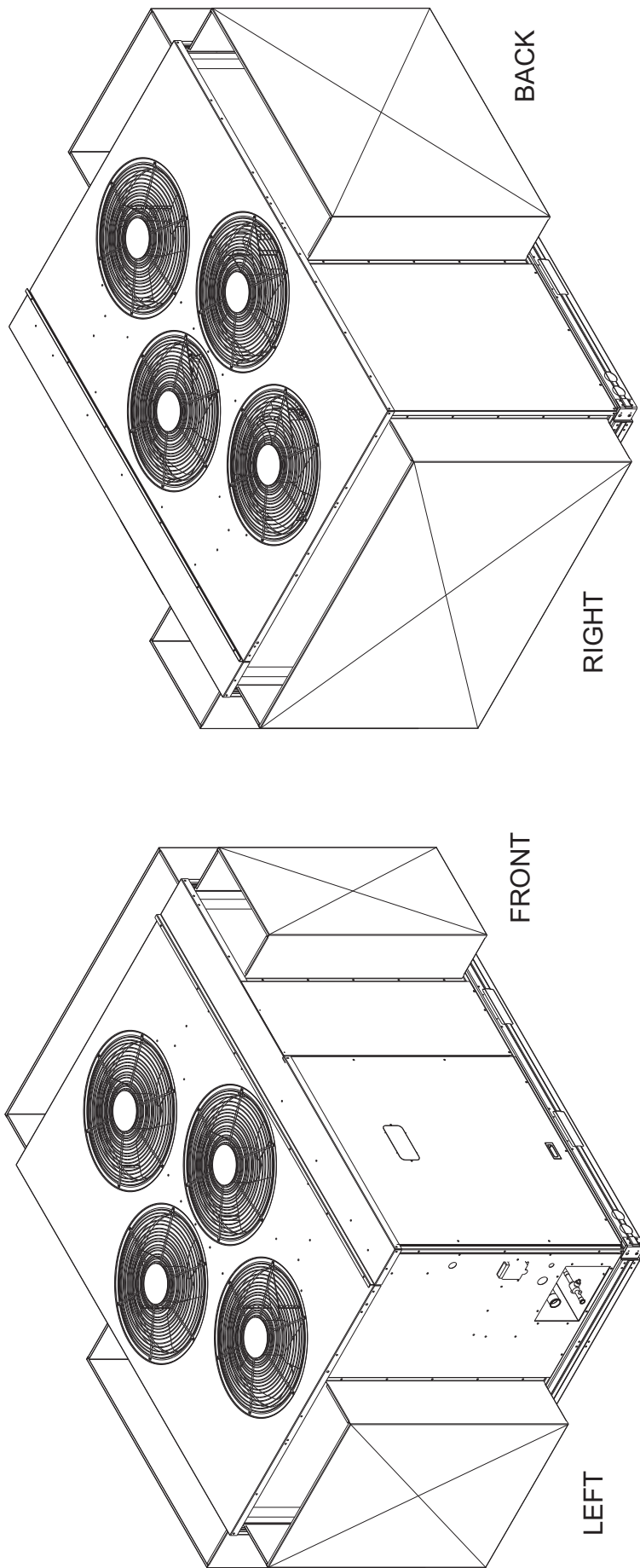


Fig. 11 - Wind Baffle Installation — 15 Ton Units



C10368

Fig. 12 - Wind Baffle Installation — 20 Ton Units

CALOWAMB

OPERATION

Fan on/off control in cooling-only units is provided by an outdoor fan relay (OFR).

In cooling mode, fan motor speed of outdoor motors OFM1 and OFM3 is regulated by the speed control temperature sensor on outdoor coil 1 for a minimum coil condensing temperature of approximately 100°F (38°C) at higher outdoor ambient temperature and 80°F (27°C) at lower ambient. Additionally, outdoor fan motor OFM2 and OFM4 are turned on/off by the low ambient temperature switch, LAS, operating the low ambient relay (LAR). The LAS control temperatures are open 42°F +/- 5°F, close 57°F +/- 5°F (open 5.5°C +/- 2.8°C, close 13.9°C +/- 2.8°C).

To override the speed control for full fan speed operation during service or maintenance, either:

- a. remove sensor and place in hot water >120°F (>49°C), or
- b. rewire to bypass control by connecting speed control input and output power wires.

CALOWAMB

TROUBLESHOOTING

OBSERVATION	POSSIBLE REMEDY
Fans won't start	All fans: Check power & wiring Check outdoor fan relay (OFR) OFM1, OFM3 only: Check speed control sensor location Check speed sensor resistance OFM2, OFM4 only: Check low ambient switch (LAS) Check low ambient relay (LAR)
Cooling – Center outdoor fans (OFM2, OFM4) off below approximately 60°F (16°C) outdoor ambient.	Normal operation
Cooling – Center outdoor fans (OFM2, OFM4) not on above approximately 60°F (16°C) outdoor ambient	Check low ambient switch (LAS) Check low ambient relay (LAR)
Cooling – Slow fan speed for outer fans (OFM1, OFM3) at start or during low outdoor ambient	Normal operation
Cooling – Slow fan speed for outer fans (OFM1, OFM3) above 85°F (29°F) outdoor ambient (should be full speed)	Check speed control sensor location Check speed control sensor resistance Check fan motor capacitor
Cooling – motor current into speed control is greater than motor name-plate FLA	Normal operation Up to 30% higher A at partial speed at low ambient

Speed Control Sensor Resistance —

TEMPERATURE		RESISTANCE
°F +/- 2°F°	°C +/- 1C	Ohms, nominal
-22	-30	88350
-4	-20	48485
14	-10	27650
32	0	16325
50	10	9950
68	20	6245
77	25	5000
86	30	4028
104	40	2663
122	50	1801
140	60	1244
158	70	876

