

## Supplement

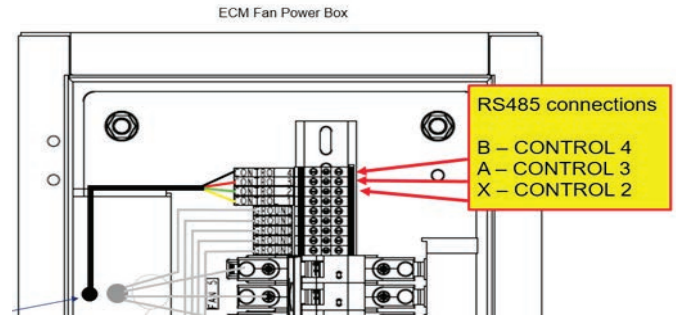
### REQUIREMENTS AND PROCEDURE FOR MODBUS ADDRESSING OF EBM-PAPST EC MOTORS USING EC-CONTROL<sup>1</sup>

1. Equipment Requirements
  - a. Laptop PC:
    - 1) Windows 7, 8.1, or 10
    - 2) At least Pentium IV 1GHz or comparable
    - 3) Approximately 80 MB available capacity on hard drive
    - 4) Minimum 1 GB memory, recommended 2 GB
    - 5) Laptop screen with at least 1024 x 768 resolution and 16-bit color depth
    - 6) Open USB port
  - b. Software: EC-Control, version 3.20 Build 343, software from ebm-papst. This can be downloaded from the ebm-papst website.  
[https://www.ebmpapst.us/en/support\\_1/software\\_downloads/digital\\_solutions.html](https://www.ebmpapst.us/en/support_1/software_downloads/digital_solutions.html)
  - c. Literature: EC-Control 3.20 manual, February 2019 can be used as reference material if an issue should arise. This can be downloaded from the ebm-papst website.  
[https://www.ebmpapst.us/en/support\\_1/software\\_downloads/digital\\_solutions.html](https://www.ebmpapst.us/en/support_1/software_downloads/digital_solutions.html)
  - d. USB to RS485 converter. There are many USB to RS485 converters that can be purchased on-line. Depending on which converter is purchased make sure to download and install the appropriate USB to RS485 driver onto the laptop PC. See Fig. 1.



**Fig. 1 — USB to RS485 Converter**

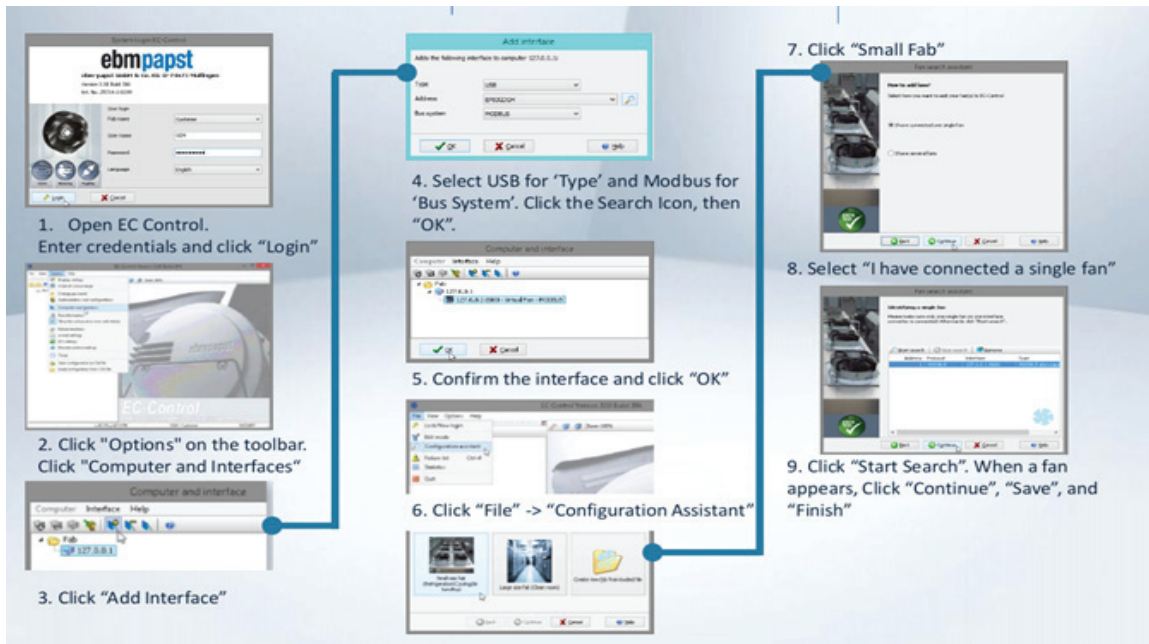
- 1) Connect fan control input wiring to the run test PC and ECMFPB by using USB to RS485 converter (Fig. 1).
- 2) Connect test control wiring to the converter terminals and the ECMFPB terminals as described and as shown in Fig. 2:
  - a) USB to laptop PC
  - b) RS485 X terminal (ground) to ECMFPB Control 2 terminal
  - c) RS485 A terminal to ECMFPB Control 3 terminal
  - d) RS485 B terminal to ECMFPB Control 4 terminal



**Fig. 2 — ECMFPB Control Terminals for RS485 Converter Connections**

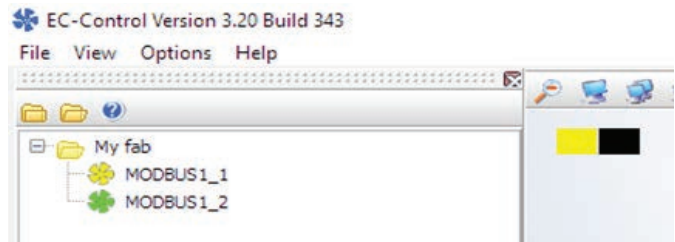
2. Fan Addressing Procedure
  - a. Ensure all fan power circuit breakers are turned OFF.
  - b. Turn the ECMFPB switch ON.
  - c. Turn main power ON.
  - d. On the run test PC, open the EC-Control program by double clicking on this shortcut on the desktop or from the taskbar: click Start/Programs/EC-Control/EC-Control.
  - e. In EC-Control program windows (Fig. 3) perform the following:
  - f. In “System login EC-Control” window (Fig. 3, Item1), (Reference EC-Control Manual, sect. 3):
    - 1) Enter username: Administrator
    - 2) Enter password: ECisCOOL.
    - 3) Click on “Login”.
  - g. In “EC-CONTROL Version 3.20 Build 343” window (Fig. 3, Item 2):
    - 1) On the toolbar, click on “Options”.
    - 2) In the drop-down menu, click on “Computer and Interfaces”.
    - 3) In “Computer and Interface” window (Fig. 3, Item 3):
    - 4) Click on “127.0.0.1”
    - 5) On the tool bar icons, click on “+” to add an interface.

1. EC-Control is a trademark of ebm-papst Inc.



**Fig. 3 — EC-Control, Configuration Windows**

- h. In “Add Interface” window (Fig. 3, Item 4):
  - 1) Click in “Type” box and select USB.
  - 2) Click on the “Address” search icon.
  - 3) Click in “Bus Type” box and select MODBUS.
  - 4) Click on “OK”.
- i. In “Computer and Interface” window (Fig. 3, Item 5):
- j. Click on the newly added interface.
- k. Click on “OK”.
- l. In “EC-CONTROL Version 3.20 Build 343” window (Fig. 3, Item 6):
  - 1) On the toolbar, click on “File”.
  - 2) In the drop-down menu, click on “Configuration Assistant”.
- m. In “Fan Search Assistant” window (Fig. 3, Item 7), (Reference EC-Control User Manual, section 3.1)
  - 1) Click on “Small Size Fab”.
  - 2) Click on “Continue”.
- n. Consult the fan numbering label on the inside of the ECMFPB (Fig. 7, Item D) for fan number locations.
- o. Start with fan #1 and address all fans in numerical order per label.
- p. In the ECMFPB, turn ON matching fan # circuit breaker.
- q. In “Fan Search Assistant” window (Fig. 3, Item 8) (Reference EC-Control User Manual, Section 3.3.1):
  - 1) Click on “I have connected a single fan” and continue.
  - r. In “Fan Search Assistant” window (Fig. 3, Item 9):
    - 1) Click on “Start search”.
  - s. When the fan appears in the list, click on “Continue”.
    - 1) Click on “Save”.
    - 2) Click on “Finish”.
  - t. In “EC-CONTROL Version 3.20 Build 343” window (Fig. 4):
    - 1) Double click on the fan just added to the list.



**Fig. 4 — EC-Control, Configured Fan List Window**

- u. In “Fan Settings” window (Fig. 4):
  - 1) In the “Device status” structure, under “Settings”, click on “Communication Parameters”.
  - 2) Click in “Device Address” box and enter the number of the fan being addressed (Fig. 5). Click on “Set”
- v. In “Fan Settings” window (Fig. 6):
  - 1) In the “Device status” structure, under “Settings”, click on “IO Configuration”, change the “Source of set value” to “RS485/Bus”
  - 2) Click on “Set”.

**CAUTION**

ALL FAN CIRCUIT BREAKERS MUST BE OFF EXCEPT FOR THE ONE CIRCUIT BREAKER FOR THE ONE FAN BEING ADDRESSED.

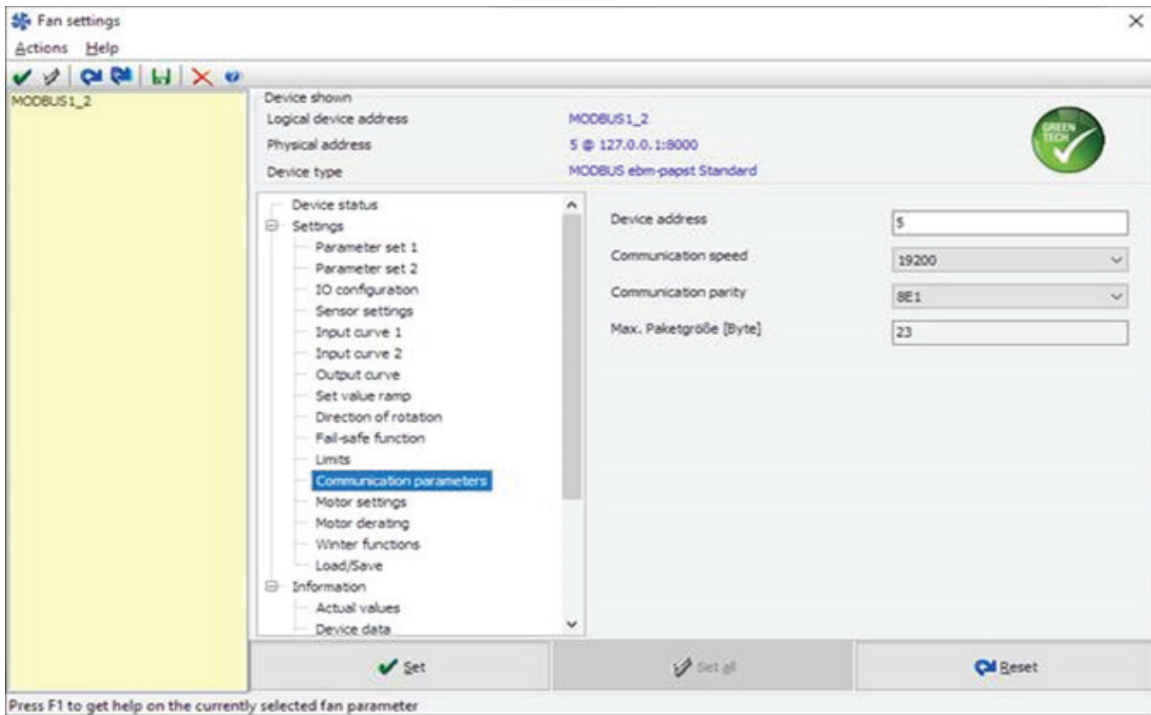


Fig. 5 — EC-Control, Fan Settings Window, Communication Parameters

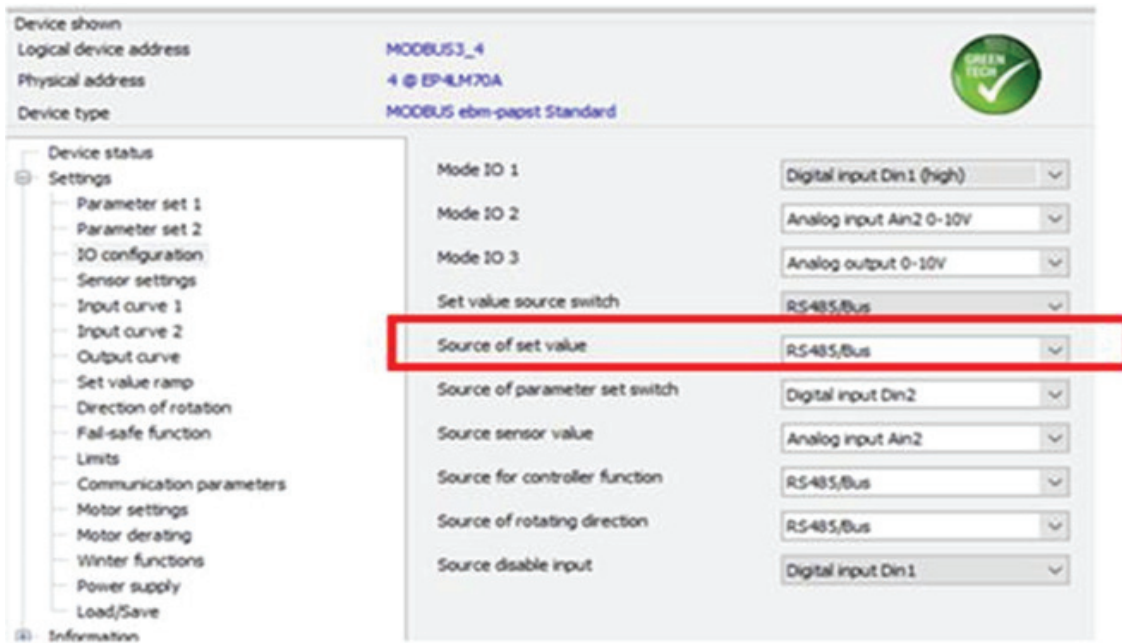
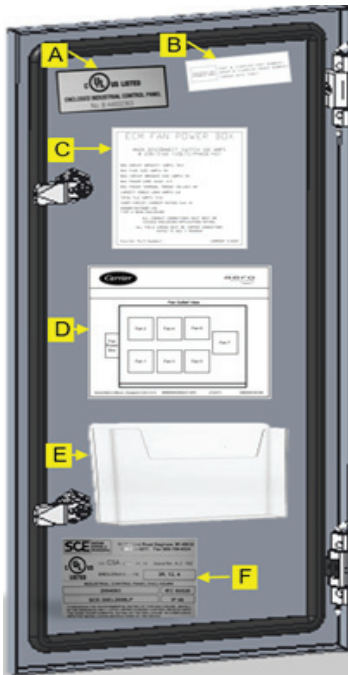


Fig. 6 — EC-Control, Fan Settings Window, IO Configuration

- w. In the ECMFPB, turn circuit breaker to the fan number just addressed OFF.
  - x. Add 1 to the fan number.
  - y. Return to Step 2.14 to address each fan in numeric order as shown on fan location label until all fans have been addressed. When all fans have been addressed, continue.
3. Fan Addressing Verification Procedure
- a. This section shall be performed for each fan in the array individually.
  - b. This procedure requires the use of EC-Control software provided by ebm-papst.
  - c. Start with fan #1 as identified on Fan Numbering Label (see Fig. 7, Item D below).



**Fig. 7 — Fan Labels**

- d. Turn all fan motor CBs ON.
  - e. Click on fan icon of matching fan number.
  - f. Increase fan control signal to 3 VDC.
  - g. Verify fan number being tested, and only fan number being tested, starts.
  - h. Decrease fan control signal to 0 VDC and verify fan stops.
  - i. Return to Step 4.3 and continue for each fan number consecutively until all fans' addresses have been verified.
  - j. If all fans pass all tests, continue. Else, correct cause(s) of test failure and retest.
4. Procedure for Verification of Total Fan Array Operation
- a. This procedure requires the use of fan control software provided by the fan supplier.

- b. Ensure incoming main power is OFF and proper lock-out/tag out procedure is followed.
- c. Ensure the ECMFPB switch is ON.
- d. Ensure all fan power CBs in the ECMFPB are ON.
- e. Using the appropriate software, ensure fan control signal is 0 VDC.
- f. Connect main power to ECMFPB.
- g. Turn main power ON.
- h. Verify that no fans rotate.
- i. Using the appropriate software, increase fan control signal to 3 VDC and run long enough to verify:
  - 1) All fans start and continue to rotate.
  - 2) All fans rotate in the proper direction.
- j. If fan backdraft dampers installed, ensure all damper blades are partially open.
- k. Using the appropriate software, decrease fan control signal to 0 VDC and verify all fans stop.
- l. If fan backdraft dampers installed, ensure all damper blades are fully closed.

### EBM Papst Points List

- Identification
- Maximum number of bytes
- Software name of bus controller
- Software version of bus controller
- Software name of commutation controller
- Software version of commutation controller
- Actual speed
- Motor status
- Warning
- DC-link voltage
- DC-link current
- Module temperature
- Motor temperature
- Electronics temperature
- Current direction of rotation
- Current modulation level
- Current set value
- Sensor actual value
- Enable input status
- Current parameter set
- Current controller function
- Reserved
- Reserved
- Current power
- Reserved
- Sensor actual value 1
- Sensor actual value 2

# REQUIREMENTS AND PROCEDURE FOR MODBUS ADDRESSING OF ZIEHL-ABEGG ECM MOTORS USING ZASET<sup>1</sup>

## 1. Equipment Requirements

### a. PC

- 1) Windows XP, 7, 8, 10
- 2) At least Dual-Core 1.6 GHz clock frequency
- 3) 100 MB available capacity on hard drive
- 4) Minimum 4 GB RAM
- 5) Monitor with at least 1024 x 768 resolution and 16-bit color depth
- 6) Open USB port
- 7) Microsoft .NET Framework 4-Webinstaller package

### b. Software: Zaset version 1.2018.718.3404 from Ziehl-Abegg will need to be installed on the PC. This can be downloaded from the Ziehl-Abegg website.

<https://www.ziehl-abegg.com/en-us/product-range/digital-solutions/software/zaset>

### c. Literature: Zaset Manual, L-BAL-E208-GB 1650, Index 005, will be installed on the PC. This can be downloaded from the Ziehl-Abegg website.

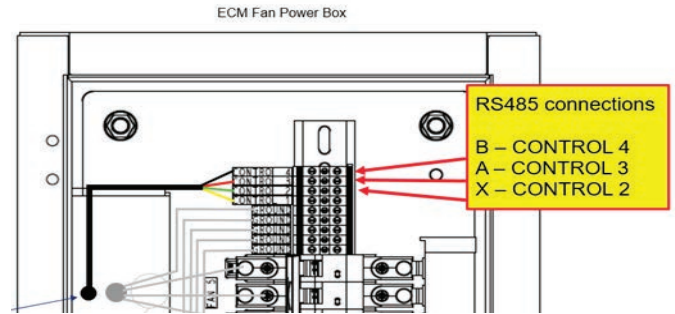
<https://www.ziehl-abegg.com/en-us/product-range/digital-solutions/software/zaset>

### d. USB to RS485 converter. There are many USB to RS485 converters that can be purchased on-line. Depending on which converter is purchased make sure to download and install the appropriate USB to RS485 driver onto the laptop PC. See Fig. 8.



**Fig. 8 — USB to RS485 Converter**

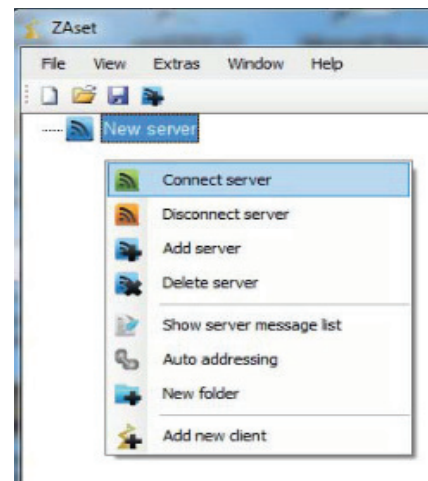
- 1) Connect fan control input wiring to the PC and ECM-FPB by using USB to RS485 converter (Fig. 8).
- 2) Connect test control wiring to the converter terminals and the ECMFPB terminals as described and as shown in Fig. 9:
  - a) USB to laptop PC
  - b) RS485 X terminal (ground) to ECMFPB Control 2 terminal
  - c) RS485 A terminal to ECMFPB Control 3 terminal
  - d) RS485 B terminal to ECMFPB Control 4 terminal



**Fig. 9 — ECMFPB Control Terminals for RS485 Converter Connections**

## 2. Fan Addressing Procedure

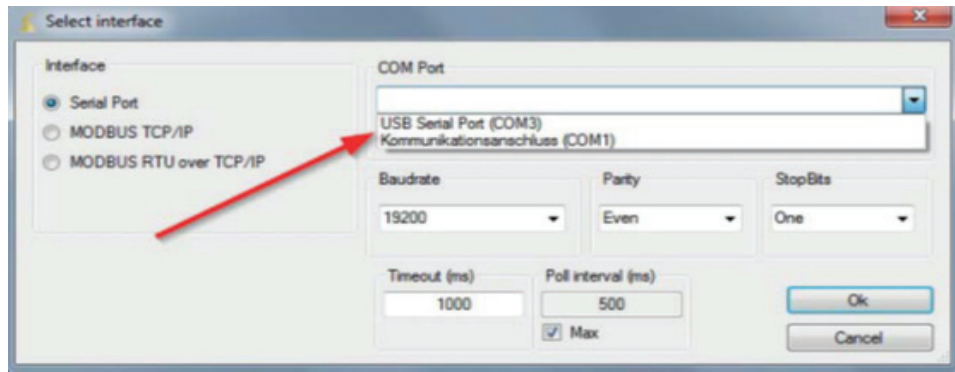
- a. Ensure all fan power circuit breakers are turned OFF.
- b. Turn the ECMFPB switch ON.
- c. Connect main power to ECMFPB.
- d. Turn main power ON.
- e. On the PC, open the Zaset program by double clicking on this shortcut icon on the desktop.
- f. In “Zaset” window (see Fig. 10):
  - 1) Right click on “New server”.
  - 2) Click on “Connect server”.



**Fig. 10 — Zaset window**

- g. In “Select interface” window (Fig. 11):
  - 1) Select Interface as “Serial Port”.
  - 2) Select COM Port as “USB Serial Port”.
  - 3) Keep baud rate as default, 19200.
  - 4) Keep Parity as default, Even.
  - 5) Keep Stop Bits as default, One.
  - 6) Keep Timeout as default, 1000.
  - 7) Keep Poll interval as default, Max.
  - 8) Click on “OK”.

1. Zaset is a trademark of Ziehl-Abegg.



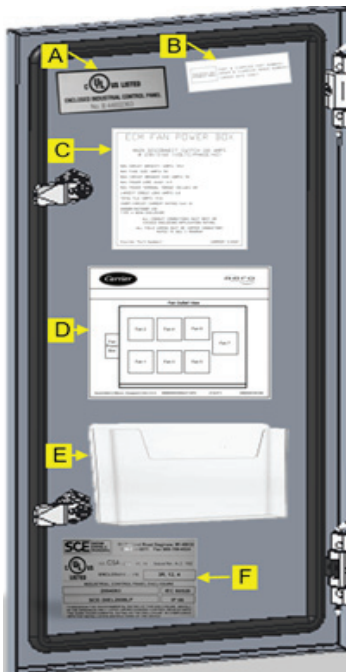
**Fig. 11 — Zaset “Select Interface” window**

- 9) Check the connection. Connection is successful when the server icon changes color to green (Fig. 12).



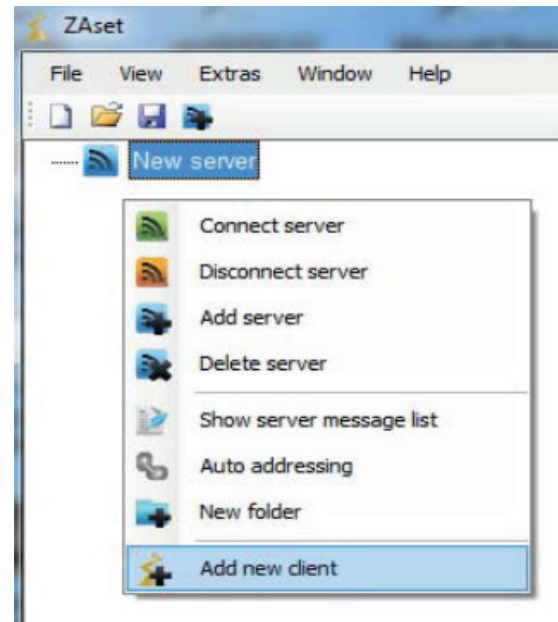
**Fig. 12 — Zaset Successful Connection**

- h. Consult the fan numbering label on the inside of the ECMFPB (see Fig. 13, Item D below) for fan number locations.



**Fig. 13 — Fan Numbering Label**

- i. Start with fan #1 and address all fans in numerical order per label.  
 j. In the ECMFPB, turn ON matching fan # circuit breaker.



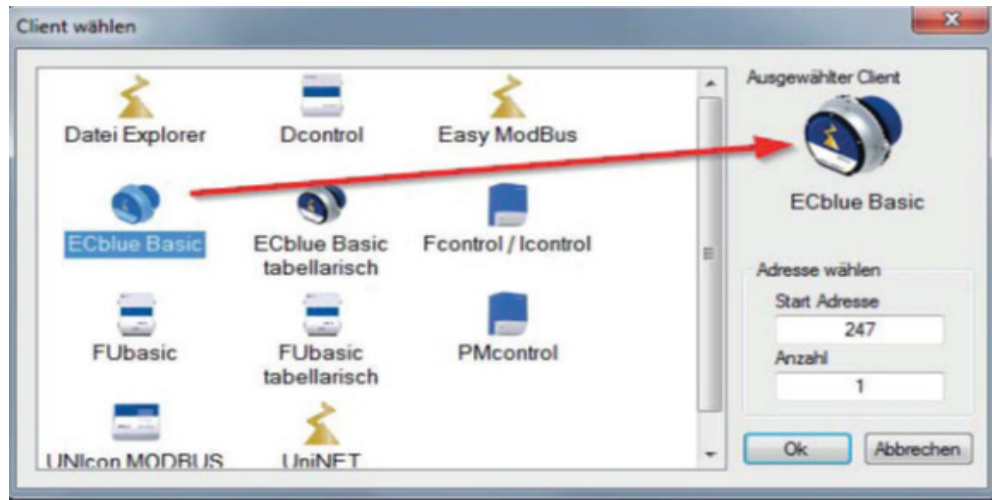
**Fig. 14 — Zaset Window**

- l. In “Select client” window (Fig. 15):  
 1) Click “ECblue Basic” icon.  
 2) Change start address to match the fan # being addressed.  
 3) Change “Count” to 1.  
 4) Click “OK”.

**⚠ CAUTION**

ALL FAN CIRCUIT BREAKERS MUST BE OFF EXCEPT FOR THE BREAKER FOR THE ONE FAN BEING ADDRESSED.

- k. In Zaset window (Fig. 14), click on “Add new client”.



**Fig. 15 — ZAsset “Select client” Window**

- m. Turn OFF circuit breaker for fan number being addressed.
  - n. Add 1 to the fan number.
  - o. Return to Step 2.i and address each fan in numeric order as shown on label until all fans have been addressed. When all fans have been addressed, continue.
3. Fan Addressing Verification Procedure
- a. This section shall be performed for each fan in the array individually.
  - b. This procedure requires the use of ZAsset software provided by Ziehl-Abegg.
  - c. Start with fan #1 as identified on Fan Numbering Label (see Step 2.h).
  - d. Turn all fan motor CBs ON.
  - e. Click on fan icon of matching fan number.
  - f. Increase fan control signal to 3 VDC.
  - g. Verify fan number being tested, and only fan number being tested, starts.
  - h. Using the appropriate software, decrease fan control signal to 0 VDC and verify fan stops.
  - i. Return to Step 3.c and continue for each fan number consecutively until all fans' addresses have been verified.
  - j. If all fans pass all tests, continue. Else, correct cause(s) of test failure and retest.
4. Procedure for Verification of Total Fan Array Operation
- a. This procedure requires the use of fan control software provided by the fan supplier.
  - b. Ensure incoming main power is OFF and is LOTO.
  - c. Ensure the ECMFPB switch is ON.
  - d. Ensure all fan power CBs in the ECMFPB are ON.
  - e. Using the appropriate software, ensure fan control signal is 0 VDC.
  - f. Connect main power to ECMFPB.
  - g. Turn main power ON.
  - h. Verify that no fans rotate.
  - i. Using the appropriate software, increase fan control signal to 3 VDC and run long enough to verify:
    - 1) All fans start and continue to rotate.
    - 2) All fans rotate in the proper direction.
  - j. If fan backdraft dampers installed, ensure all damper blades are partially open.
  - k. Using the appropriate software, decrease fan control signal to 0 VDC and verify all fans stop.
  - l. If fan backdraft dampers installed, ensure all damper blades are fully closed.

### Ziehl-Abegg Points List

- Firmware
- Product code 1
- Parameterset ID
- Unique Device Signature 0 - 5
- Parameterset index
- Operation condition 1
- Operation condition 2
- Speed
- Motorcurrent
- DC voltage
- Line voltage
- IGBT-temperature
- inside temperature
- MCU temperature
- E1 input
- Modulation
- MSW Event
- LSW Event
- Event number
- power factor
- Motor input power
- LSW operation time
- MSW operation time
- reactor temperature
- LSW air flow
- MSW air flow
- Motor voltage
- Motorcurrent phase U
- Motorcurrent phase V
- Inquiry PIN protect level
- Remaining lifetime
- Motor installation position
- vibration velocity X-axis [1st order]
- vibration velocity Y-axis [1st order]
- vibration velocity Z-axis [1st order]

## FAN ADDRESSING REQUIREMENTS AFTER FAN REPLACEMENT

If fan motors are controlled using Modbus<sup>1</sup> or BACnet<sup>2</sup>, then the replacement fan assembly must be addressed to match the number of the fan removed. Consult the fan numbering label on the inside of the ECM Fan Power Box for fan number locations.

### EBM-PAPST REPLACEMENT FAN ADDRESSING

1. All replacement ECM fan assemblies supplied by ebm-papst are addressed as #1 by default.
2. Do not attempt auto-addressing of all fans. Having a duplicate fan number can lead to unintended consequences up to and including loss of all fan data.
3. Verify all fan power circuit breakers are OFF except for the one matching the fan number being replaced.
4. In “Fan Search Assistant” window (Reference EC-Control User Manual, Section 3.3.1):
  - a. Click on “I have connected a single fan” and continue.
5. In “Fan Search Assistant” window:
  - a. Click on “Start search”.
  - b. When the fan appears in the list, click on “Continue”.
    - 1) Click on “Save”.
    - 2) Click on “Finish”.
  - c. In “EC-CONTROL Version 3.20 Build 343” window: Double click on the fan just added to the list.
6. In “Fan Settings” window:
  - a. In the “Device status” structure, under “Settings”, click on “Communication Parameters”.
  - b. Click in “Device Address” box and enter the number of the fan being addressed.
  - c. Click on “Set”.
7. In “Fan Settings” window:
  - a. In the “Device status” structure, under “Settings”, click on “IO Configuration”, change the “Source of set value” to “RS485/Bus”.
  - b. Click on “Set”.
8. Turn OFF fan power circuit breaker for fan number just added.
9. Turn ON all fan power circuit breakers.
10. In “Fan Search Assistant” window:
  - a. Click on “Start search”. All fans should now appear in the fan search.

### ZIEHL-ABEGG REPLACEMENT FAN ADDRESSING

1. All replacement ECM fan assemblies supplied by Ziehl-Abegg are addressed as #247 by default.
2. Verify all fan power circuit breakers are OFF except for the one matching the fan number being replaced.
3. In ZAsset window (Reference ZAsset Manual, Section 5.5):
  - a. Click on “Add new client”.
4. In “Select Client” window:
  - a. Click on icon for the available device.
  - b. The start address box should contain the number 247 indicating this is the newly added fan.

- c. Click in the “Start Address” box and enter the fan number.
  - d. Click in the “Count” box and enter “1”, the number of fans being addressed.
5. Turn OFF fan power circuit breaker for fan number just added.
  6. Turn ON all fan power circuit breakers.
  7. All fans should be visible in ZAsset window TreeView

## ECM FAN REMOVAL/INSTALLATION PROCEDURE - HORIZONTAL CONFIGURATION

### Fan Assembly Removal

#### ⚠ CAUTION

The fan assembly may weigh up to 132 lbs. The fan on top row of array may be ~ 8' ft above the unit floor. Use appropriate methods and safeguards to safely remove and install fans.

It is strongly recommended to download, read, understand and follow the Operating Manual and Application Guide for EC Motors from the applicable fan supplier before providing power to the motors.

Strong vibrations due to erratic operation (unbalanced), can lead to failure.

Follow local Lock-Out/Tag-Out procedures.

If fan/motor failure was identified electronically, verify the specific fan in the array by matching the failed fan address number to the location in the unit by consulting the Fan Numbering Label on the ECM Fan Power Box.

Remove the motor's rear cover plate to access power and control wiring. Disconnect all wiring and tag appropriately. See Fig. 16.

Remove any wire ties securing wires to affected fan assembly.

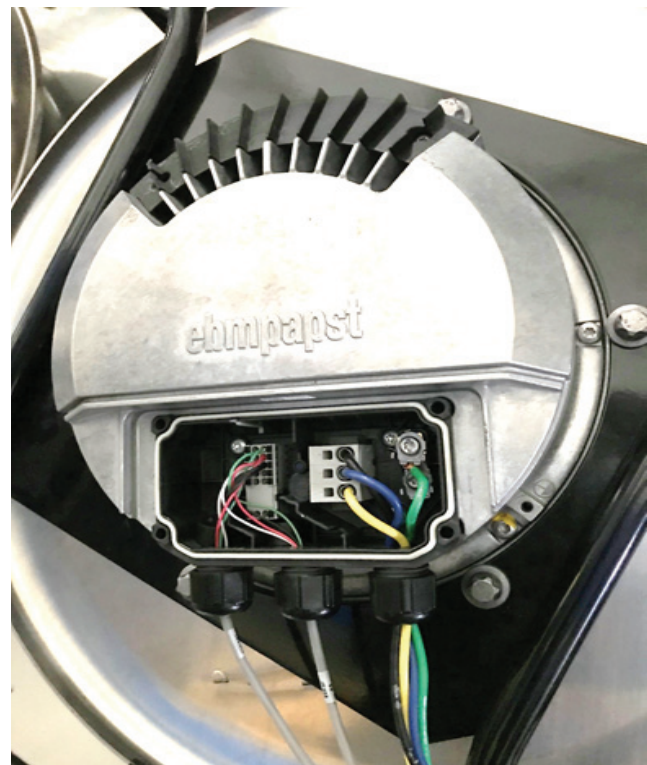
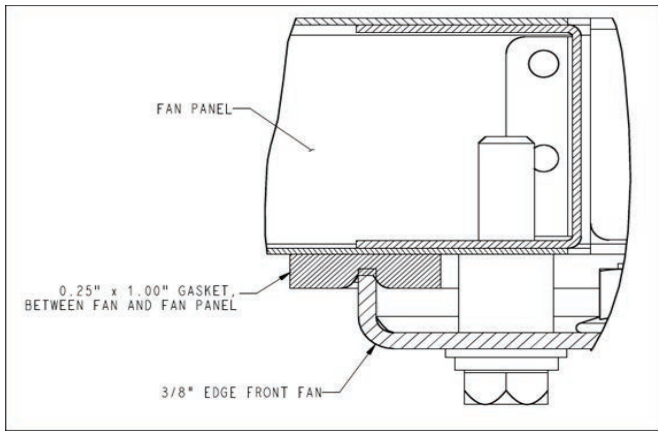


Fig. 16 — ECM Fan Wiring - Example

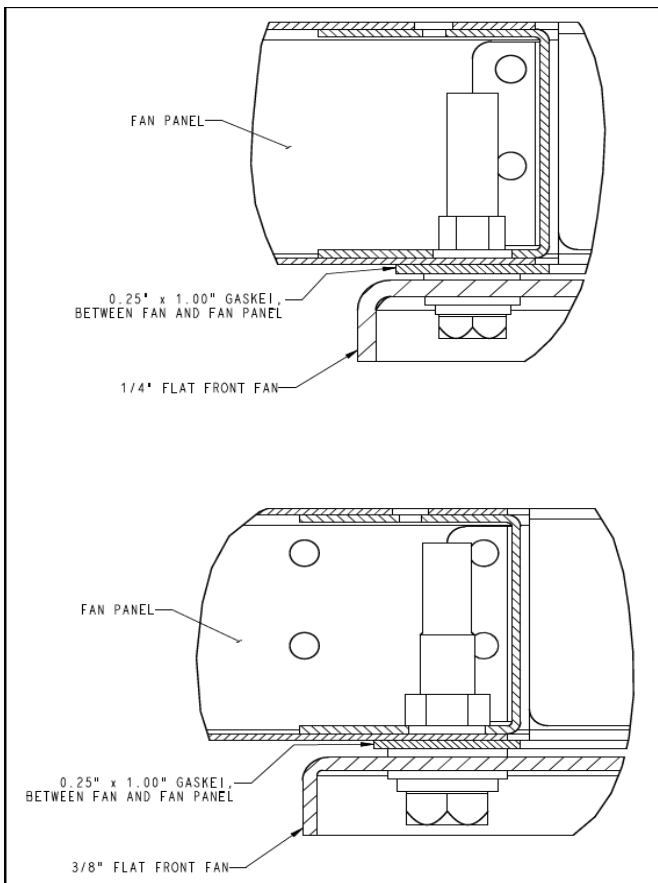
The fan assembly will either have an edge-front of a flat-front configuration. See Fig. 17 and 18 for examples.

1. Modbus is a registered trademark of Schneider Electric.  
2. BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).



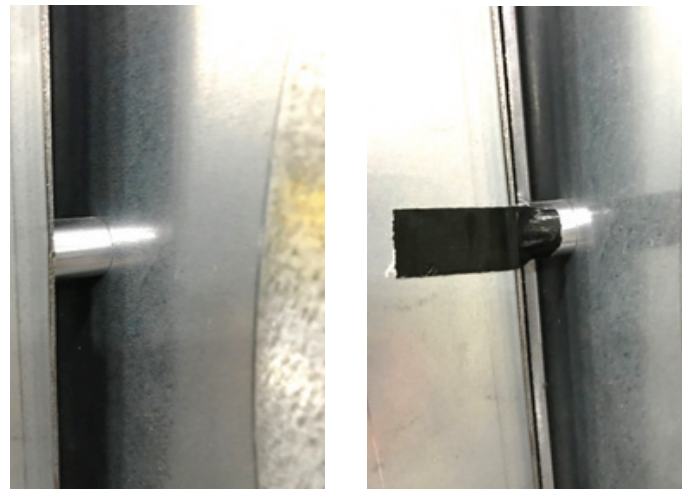


**Fig. 17 — Edge-Front Configuration**



**Fig. 18 — Flat-Front Configuration**

The edge-front configuration will have spacers installed between the front plate of the fan and the mounting panel. The mounting bolts go through these spacers. When the mounting bolts are removed these spacers will fall. Therefore, if possible, access these spacers from the upstream section and secure these spacers in place by applying a thin piece of tape to the side of the spacer and the front mounting panel. See Fig. 19.



**Fig. 19 — Spacer with Tape Applied**

Depending on the unit size there may be a vertical frame support that may need to be temporarily removed to allow greater access to the ECM fan assembly. The vertical frame support is attached to the top frame and bottom base rail with two (2) screws at each end. Remove these screws to temporarily remove the vertical frame support. See Fig. 20.



**Fig. 20 — Vertical Frame Support**

Remove the fan mounting bolts from the top corners of the fan assembly. Depending on the fan type and size, replace these bolts with either 1/4-20 x 6" or 3/8"-16 x 6" long threaded steel rod. Jam nuts may be needed to install the threaded rod. After the threaded rod is installed remove any jam nuts from the threaded rod.

Remove the remaining fan mounting bolts. The fan is now resting on the two (2) threaded rods.

With two technicians, one on each side of the fan, grasp the top and bottom rails of the ECM fan assembly (Do NOT use the fan wheel, motor, or mounting plate to lift the fan assembly) and pull the fan straight back to break the adhesion caused by the gasket on the perimeter of the fan inlet. Pull far enough back to pass the end of the threaded rod.

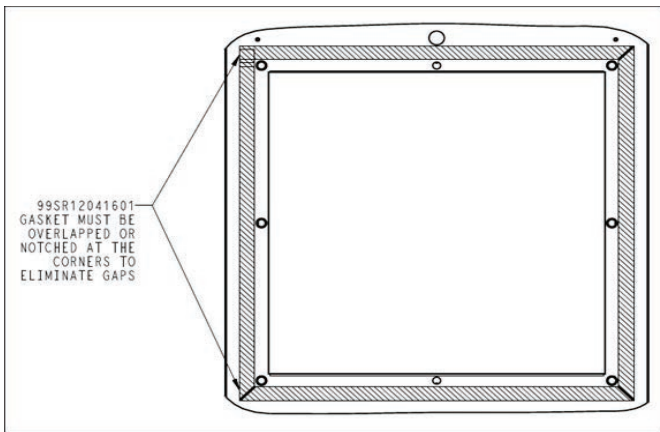
Table 1 shows typical weights for each fan based on the supplier and the fan assembly number.

**Table 1 — Weights and Dimensions**

ASSEMBLY NUMBER	FAN SUPPLIER	ASSEMBLY WEIGHT (lb)	ASSEMBLY HEIGHT (in.)	ASSEMBLY LENGTH (in.)	ASSEMBLY WIDTH (in.)
K3G310-PG57-26	EBM	47.19	19.7	13.78	19.7
K3G310-PV68-13	EBM	46.31	19.7	14.06	19.7
K3G310-PV69-03	EBM	46.31	19.7	14.06	19.7
K3G400-HB41-01	EBM	80	19.7	17.83	19.7
K3G400-HBxx-xx	EBM	80	19.7	17.83	19.7
K3G400-PA27-03	EBM	66	19.7	16.37	19.7
K3G400-PA41-13	EBM	66	19.7	16.37	19.7
K3G450-PA29-13	EBM	81.4	24.8	17.88	24.8
K3G450-PA31-03	EBM	81.4	24.8	17.88	24.8
K3G450-PB30-09	EBM	103.64	24.8	22.46	24.8
K3G450-PB35-19	EBM	103.64	24.8	22.46	24.8
K3G500-PB24-09	EBM	111.1	24.8	23.66	24.8
K3G500-PB38-19	EBM	108.7	24.8	23.66	24.8
GR31C-ZID.DC.1R_113670H01	ZA	35.28	18.5	11.61	18.5
GR31C-ZID.DC.1R_113672H01	ZA	35.28	18.5	11.61	18.5
GR31C-ZID.DC.1R_113674H01	ZA	35.28	18.5	11.61	18.5
GR31C-ZID.DG.1R_172393H01	ZA	41.9	17.7	13.0	17.7
GR35C-ZID.DC.1R_113676H01	ZA	37.49	19.69	12.44	19.69
GR35C-ZID.DC.1R_113678H01	ZA	37.49	19.69	12.44	19.69
GR40C-ZID.GG.1R_114034H01	ZA	79.38	21.65	14.49	21.65
GR40C-ZID.GG.1R_114036H01	ZA	79.38	21.65	14.49	21.65
GR40C-ZID.GG.1R_114771H01	ZA	79.38	21.65	14.49	21.65
GR40Z-ZID.GG.XR_177873H01	ZA	77.18	21.65	13.58	21.65
GR45C-ZID.GG.1R_114040H01	ZA	88.2	24.8	15.61	24.8
GR45C-ZID.GG.1R_114772H01	ZA	88.2	24.8	15.61	24.8
GR50C-ZID.GL.1R_114773H01	ZA	110.25	26.38	17.74	26.38
GR56C-ZID.GL.1R_114774H01	ZA	132.3	28.74	19	28.74

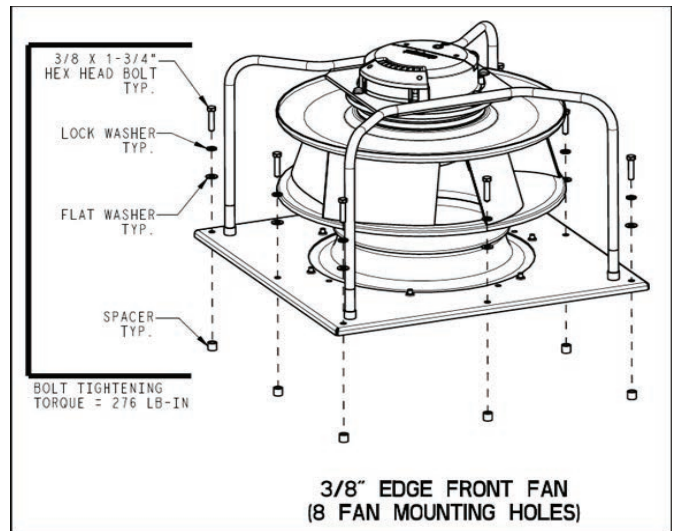
**ECM Fan Installation**

Inspect the gasket between the fan assembly and the fan panel. The part number is 99SR12041601. If needed, order replacement gasket from RC. See Fig. 21 below.

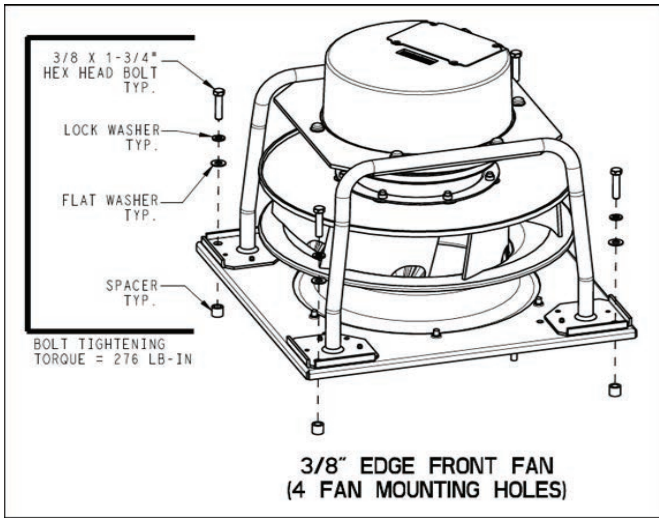


**Fig. 21 — Fan Assembly Gasket**

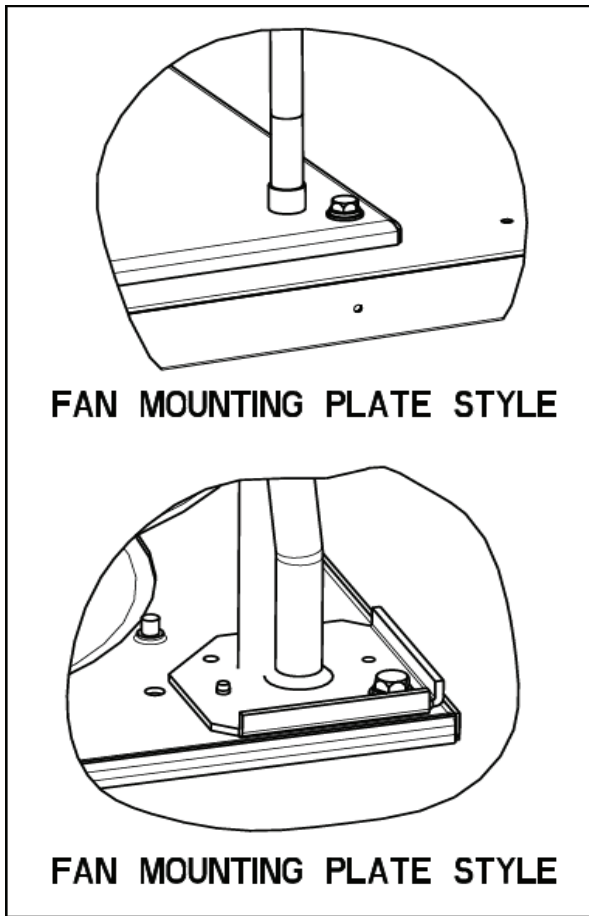
When installing the fan assembly see Fig. 22-27 for an exploded view of how the mounting hardware is installed and the torque requirements.



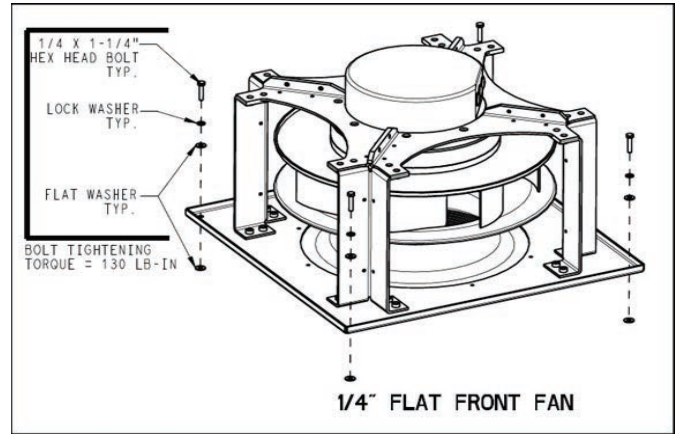
**Fig. 22 — 8 Mounting Holes**



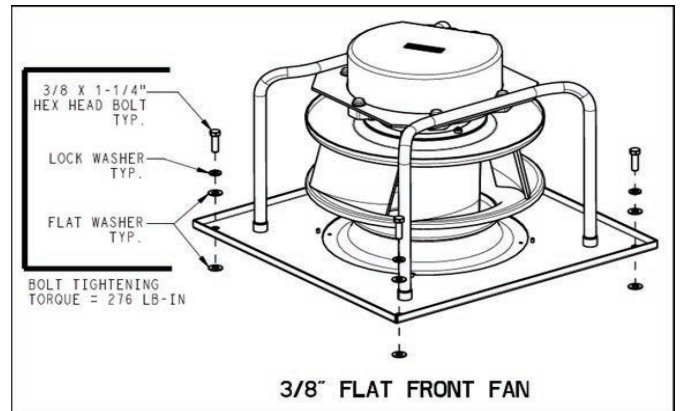
**Fig. 23 — 4 Mounting Holes**



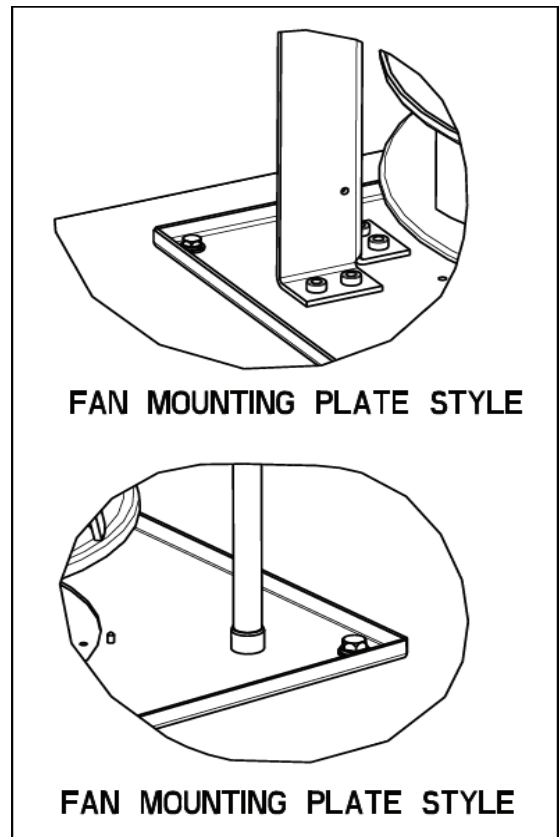
**Fig. 24 — Fan Mounting Styles**



**Fig. 25 — 1/4" Flat Front Mounting**



**Fig. 26 — 3/8" Flat Front Mounting**



**Fig. 27 — Fan Mounting Plate Style**

## **ECM FAN REMOVAL/INSTALLATION PROCEDURE - VERTICAL CONFIGURATION**

Due to many variations for vertical units there are no specific instructions for removing an ECM fan assembly. None the less, it is recommended all panels be removed to allow the greatest amount

of access to the ECM fan section. There may or may not be room to install a gantry to facilitate the ECM fan removal.

The mounting hardware and the torque requirements are the same as with horizontal units.