ENERVEX
MODS™ - MODULATING OVER-DRAFT SYSTEM

3940010 06.16 **Installation & Operating Manual**

READ AND SAVE THESE INSTRUCTIONS!

ENERVEX Inc.
1685 Bluegrass Lakes Parkway
Alpharetta, GA 30004
USA

P: 770.587.3238
F: 770.587.4731
T: 800.255.2923
info@enervex.com
www.enervex.com

ENERVEX®
VENTING DESIGN SOLUTIONS

Symbol Legend

The following terms are used throughout this manual to bring attention to the presence of potential hazards, or to important information concerning the product.

DANGER: Indicates an imminent hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.

WARNING: Indicates an imminent hazardous situation which, if not avoided, may result in personal injury or property damage.

DANGER: Indicates an imminent electrical shock hazard which, if not avoided, will result in death, serious injury or substantial property damage.

How to use this manual

This installation manual does not contain any system design documentation. System design documentation is available from any authorized ENERVEX representative. Accessories, fans, and motor speed controllers are not covered by this manual. Please refer to these component's individual manuals.

TO REDUCE THE RISK OF FIRE, ELECTRICAL SHOCK OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

1. Use this unit in the manner intended by the manufacturer. If you have questions, contact the manufacturer at the address or telephone number listed on the front of the manual.
2. Before servicing or cleaning the unit, switch off at service panel and lock service panel to prevent power from being switched on accidentally.
3. Installation work and electrical wiring must be done by a qualified person(s) in accordance with applicable codes and standards.
4. Follow the appliance manufacturer's guidelines and safety standards such as those published by the National Fire Protection Association (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and the local code authorities.
5. This unit must be grounded.

Content

1. GENERAL INFORMATION

1.1 INTRODUCTION

ENERVEX's MODS Modulating Over-Draft System regulates and maintains proper draft in stack systems where the natural draft exceeds the appliance requirements. All MODS™ include an ENERVEX model MDF multi-blade, modulating damper to control the draft. An EBC 31 Constant Pressure Regulator controls the system. The ENERVEX MODS can be integrated with other ENERVEX venting systems including the CASI™, CASV™ and MCAS™. Some or all of the following components described below are used in the ENERVEX MODS Modulating Over-Draft System.

1.2 COMPONENT DESCRIPTION

a. MDF Modulating Damper

The MDF is a stainless steel, multi-blade damper powered by an actuator. The actuator operates on 24 VAC and is equipped with a failsafe system that will fully open the damper during a mechanical or electrical failure. The housing is made of flanged, stainless steel stack and can be connected to most standard pressure stack. The MDF comes in standard diameters from 12" ID to 48" ID.

b. EBC 31 Constant Pressure Regulator and MODS Power Module

The EBC 31 Constant Pressure Regulator modulates the system to maintain the required pressure set-point. The MODS Module mounted inside the EBC 31 control box includes a transformer and delay-off timer. The transformer is used to power the actuator on the MDF and is equipped with a 3A circuit breaker on the secondary winding. The delay-off timer is connected to the over pressure switch to prevent nuisance alarms during appliance light-off.

c. Exhaust Fan

An ENERVEX fan will be used in some MODS. The type of fan needed is determined based on application constraints. If the fan operates on 3-phase voltage, an EDrive (MSC) will be used to modulate fan speed. The MSC will be connected in between the fan junction box and EBC 31. If the fan in use operates on single phase voltage, an EBC 12x will be connected between the fan junction box and the EBC 31.

d. XTP Sensor

The XTP Sensor is an external pressure transducer used in the system to monitor pressure in the stack. The transducer converts measured pressure into a corresponding voltage. This voltage is relayed to the control to modulate the damper position and/or fan speed, tho regulate the pressure at the set point.

e. OPS

An over-pressure switch (OPS) is used in every MODS to measure differential pressure in the stack. The switch is interlocked with a delay-off timer to prevent nuisance lock-outs caused by pressure spikes that occur during start up or other points of operation. If the pressure in the stack exceeds the set-point on the OPS, it will send a signal to start the timer. If the pressure has not been reduced to operating level within the set time period, the draft safety circuit will open.

f. Pulsation Filter

A pulsation filter is used to create a more laminar flow to the XTP Sensor and OPS. This allows the two devices to output a more accurate pressure reading. One end of the pulsation filter is connected to the stack probe while the opposite ends are connected to the OPS and XTP Sensor.

1.3 SYSTEM DESCRIPTION

There are three basic set-ups of the MODS; a negative pressure application, a MODS with an integrated CASV, and a positive pressure application.

a. Negative Pressure Application

The MODS is set-up for a negative pressure application if a negative pressure is maintained in the common stack. This set-up does not require a fan and is typically used to vent multiple appliances of the same category. For negative pressure applications, the MDF will be placed in the common manifold between the vertical stack and the appliance closest to the vertical stack. See Fig. 1 below.

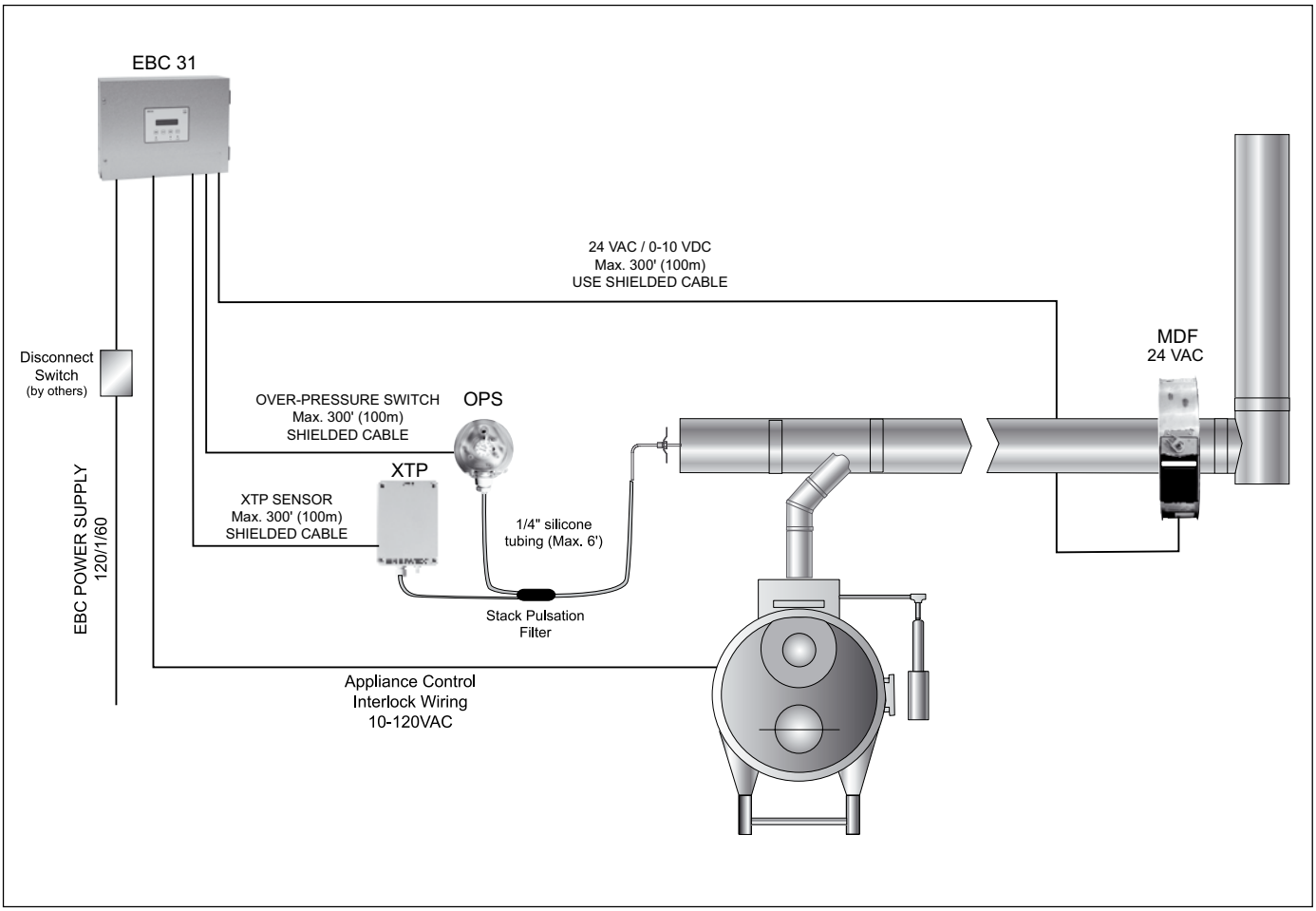


Fig 1

b. MODS with CASV Application

A MODS is installed with a CASV, Chimney Automation System, if an exhaust fan is required to maintain a negative pressure in the system.

For MODS integrating a CASV in a system, the MDF will be placed in the common manifold between the fan and the appliance closest to the fan.

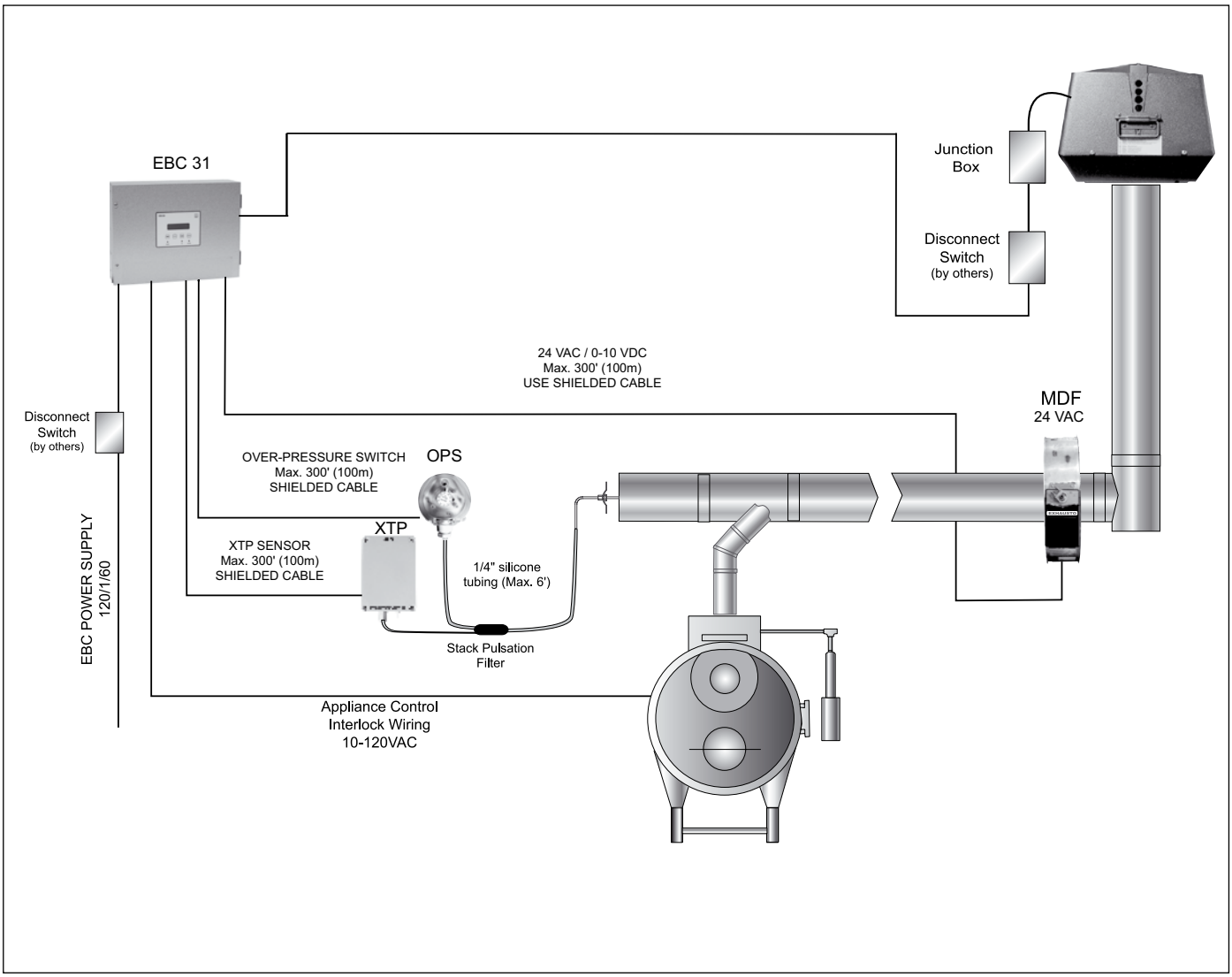


Fig 2

c. Positive Pressure Application

The MODS is set-up for a positive pressure application if a positive pressure is maintained in the common stack. This set-up does not require a fan and is used to vent single appliances only. For positive pressure applications, place the MDF in the connector of the appliance. Place the stack probe between the appliance and the MDF. See Fig. 3 below.

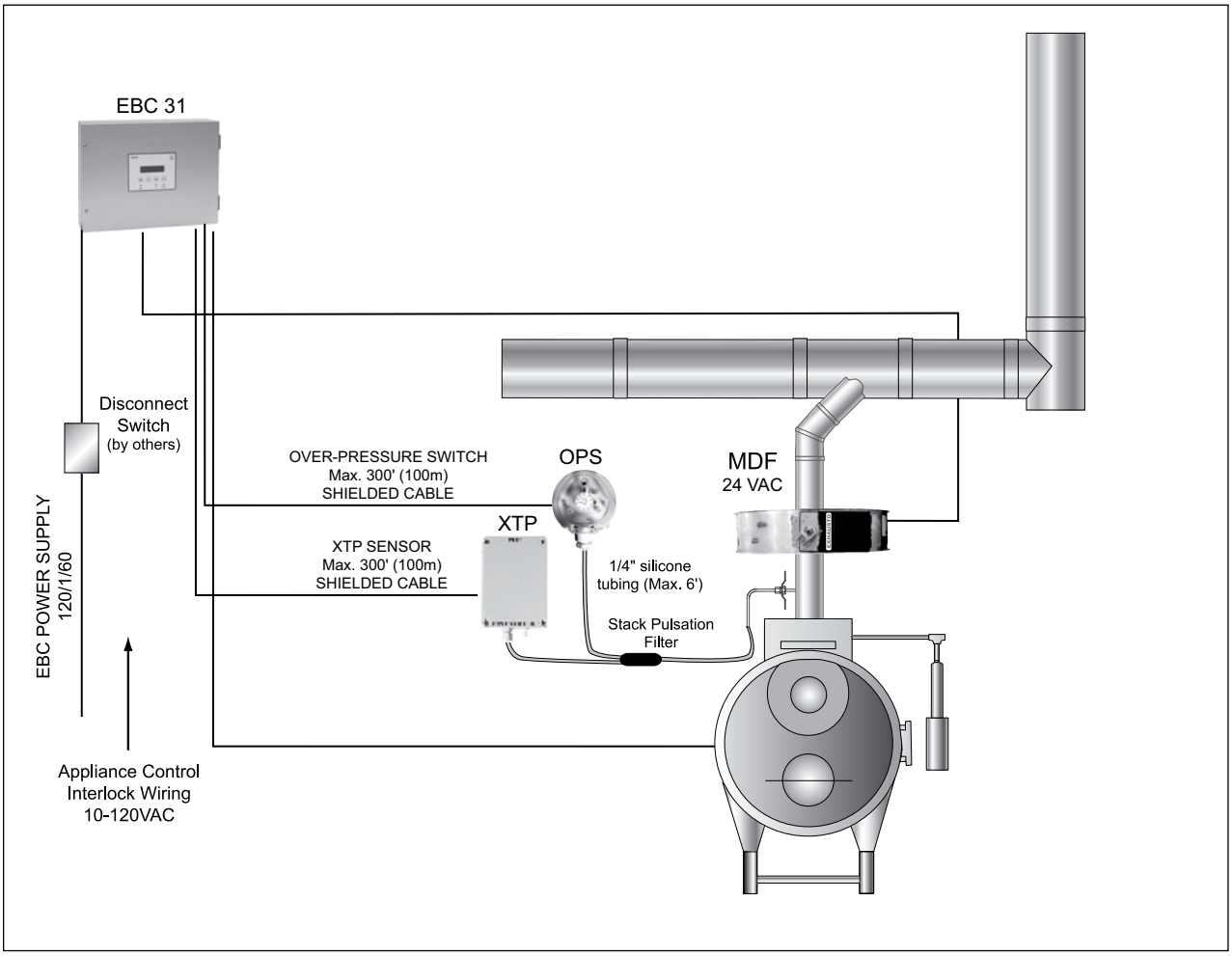
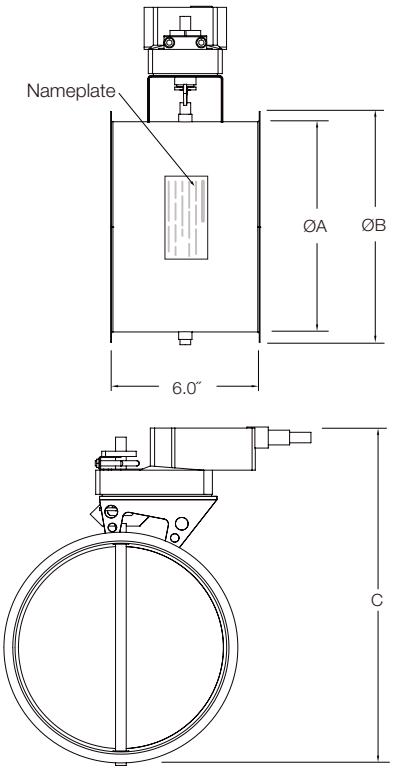


Fig 3

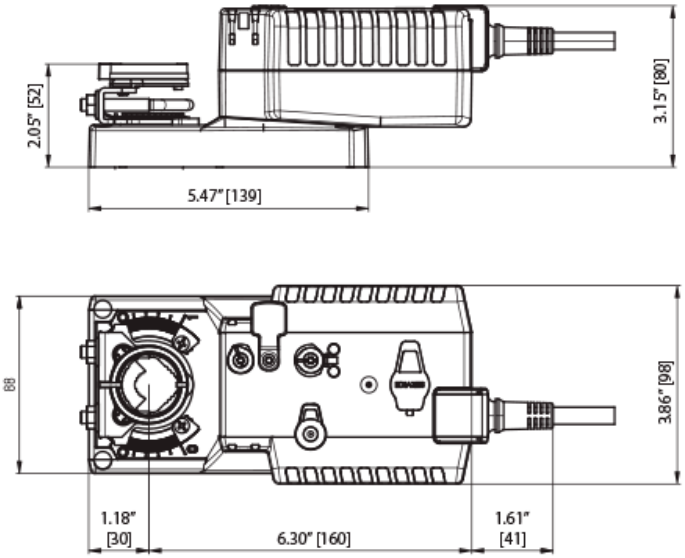
2. DIMENSIONS & CAPACITIES

2.1 MDF



Model	Stack ID in / mm	Dim. A in / mm	Dim. B in / mm	Dim. C in / mm	# Blades
MDF 4	4	3.94 / 100	4.88 / 124	8.86 / 225	1
MDF 6	6	5.91 / 150	6.85 / 174	10.83 / 275	1
MDF 8	8	7.87 / 200	8.82 / 224	12.80 / 325	1
MDF 10	10	9.84 / 250	10.79 / 274	14.76 / 375	1
MDF 12	12	11.81 / 300	12.76 / 324	16.73 / 425	2
MDF 14	14	13.78 / 350	14.72 / 374	18.70 / 475	2
MDF 16	16	15.75 / 400	16.69 / 424	20.67 / 525	2
MDF 18	18	18.00 / 457	19.00 / 483	23.00 / 584	3
MDF 20	20	20.00 / 508	21.00 / 533	25.00 / 635	3
MDF 22	22	22.00 / 559	23.00 / 584	27.00 / 686	3
MDF 24	24	24.00 / 610	25.00 / 635	29.00 / 737	3
MDF 26	26	26.00 / 660	27.00 / 686	31.00 / 787	4
MDF 28	28	28.00 / 711	29.00 / 737	33.00 / 838	4
MDF 30	30	30.00 / 762	31.00 / 787	35.00 / 889	4
MDF 32	32	32.00 / 813	33.00 / 838	37.00 / 940	4
MDF 34	34	34.00 / 864	35.00 / 889	39.00 / 991	4
MDF 36	36	36.00 / 914	37.00 / 940	41.00 / 1041	5

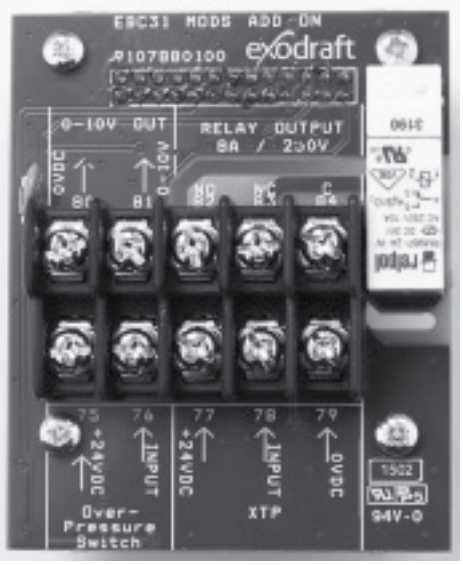
Belimo Model NKQX24-MFT
Damper Actuator, Electronic Fail-Safe



2.2 MODS MODULE

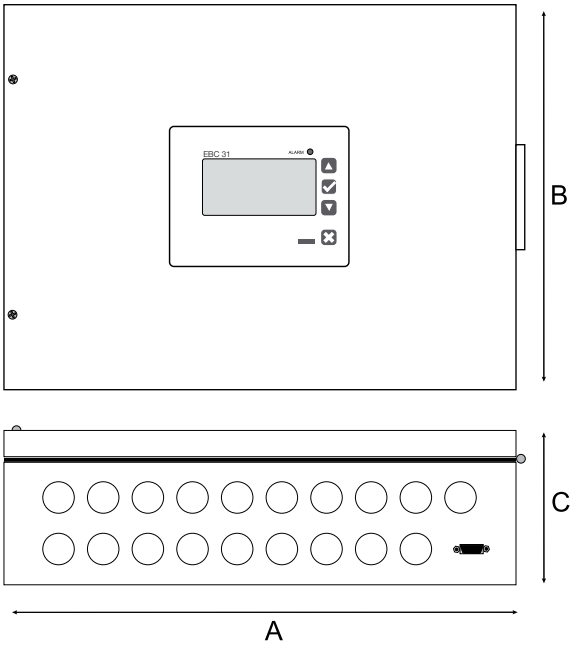
A MODS add on board is used to control the damper in a CASV + MODS/MODS system. It provides a 0-10V signal out. During start-up the EBC31 will detect the board.

MODS™ Module		
Power Consumption	VDC	0-24
Weight	lbs/kg	3.0/1.4
Timer Setting	sec.	0-20
Voltage Input	V	115VAC, 50/60 Hz
Voltage Output	V	24V/2.0A
Dimensions	A in/mm	6.3/160
	B in/mm	3.0/76
	C in/mm	2.8/71



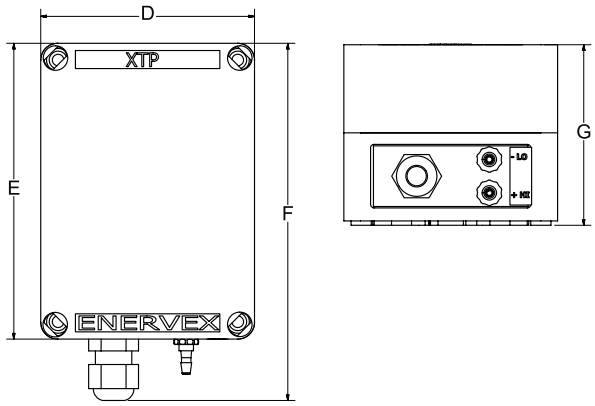
MODS Board

2.3 EBC 31 CONTROL



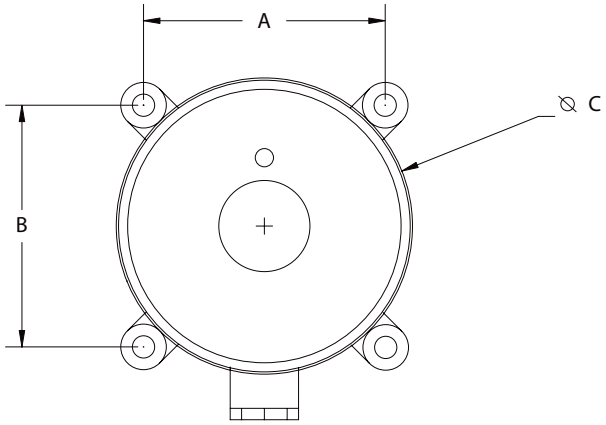
EBC 31 Control		
Power Supply	V	1x120VAC
Amperage	A	6.3
Operating Temperature	°F/°C	-4 to 122/-20 to 50
Range of Operation	inWC/Pa	0-0.6/0-150
Tolerance	inWC/Pa	0.01/3 +/-10%
Control Signal	mA	max. 10
Control Relay		Max. 120 VAC/8A
Output	VAC	10-36
	VDC	0-10
Dimensions	A in/mm	14.7/372
	B in/mm	11.0/280
	C in/mm	4.2/107
Weight	lbs/kg	9.0/4.0
EMC Standard	Emission	EN 50 081-1
	Immunity	EN 50 082-2

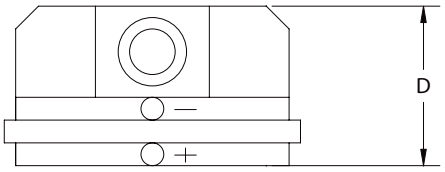
2.4 XTP SENSOR



XTP Sensor		
Power supply	VDC	12-36
Amperage	mA	<20
Output	VDC	0-10
Operating temperature	°F/°C	0 to 160 / -18 to 71
Accuracy		+/- 0.08%
Dimensions	D in / mm	3.70 / 94
	E in / mm	5.12 / 130
	F in / mm	6.18 / 157
	G in / mm	3.13 / 80
Weight	lbs / kg	.6 / .3

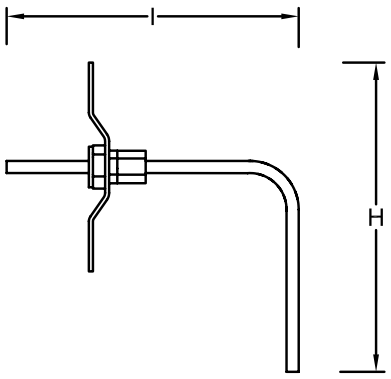
2.5 OPS





OPS		
Maximum Load		1.5 Amps @ 120-240 V AC
Range of Operation		.08 to .60”W.C. (20 to 200 Pa)
Temperature Limits		-5°F to +185°F (-20 to +85°C)
Max. Pressure		1.4 PSI (100 mbar)
Conduit Connection		1/4” Solderless Quick Connect Terminals
Pressure Connections		Two plastic tubes, outside diameter of 1/4” (6.0mm)
Weight		4.9 oz. (0.14kg)
Dimensions	A in/mm	2.56/65.0
	B in/mm	2.56/65.0
	C in/mm	3.25/82.6
	D in/mm	2.15/54.6

2.6 STACK PROBE



Stack Probe		
Dimensions	H in/mm	4.25/108
	I in/mm	3.50/89

3. SYSTEM INSTALLATION AND SET UP GUIDELINES

3.1 GENERAL

General mechanical installation procedures are described below. For more detailed instructions, please refer to that component's installation manual. The installation instructions in this chapter are broken down by the set-up type.

> The MDF should always be placed at least the distance 3 times the vent diameter away from any tee or fitting.

> DO NOT mount the transducer inside an airtight enclosure. It uses the boiler room pressure as reference pressure.

3.2 MECHANICAL INSTALLATION FOR A NEGATIVE PRESSURE APPLICATION

The procedure that follows describes the mechanical installation of a MODS negative pressure application as described in Chapter 1.3a.

a. Installing the MDF

The MDF connects to most standard pressure stack using v-bands and silicone sealant. Follow the procedures outlined in the stack manufacturer's installation manual for specific instructions.

Install the MDF between the vertical stack and the appliance closest to the vertical stack. Place the MDF in the common horizontal manifold at least a distance of 3 times the vent diameter of the common away from any connector or tee. A 45º tee should be used between the appliance connector and common stack. See Fig. 4 below.

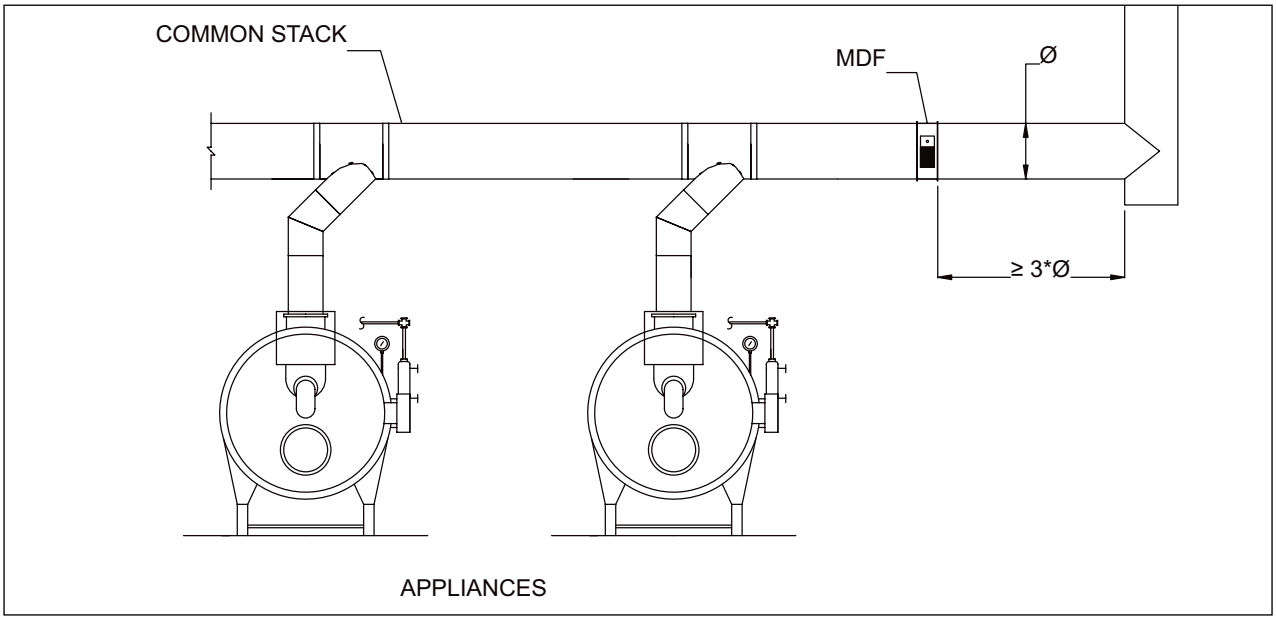


Fig 4

b. Installing the EBC 31

Install the EBC 31 indoors, preferably in the same room as the MDF. Check local codes for the maximum distance the EBC 31 may be located from the actuator on the MDF. Once located, mount the EBC 31 directly to a wall via the mounting holes located inside the control.

c. Installing the XTP Sensor and OPS

Install the XTP Sensor indoors within 300 feet (100 meters) of the EBC 31 and 6 feet (2 meters) of the stack pulsation filter. The distance between the stack probe and XTP may be increased to 25 feet (7.6 meters) if rigid plastic or metal conduit (1/4" diameter) is connected. The XTP Sensor should be installed with the pressure ports pointing down. Connect the tubing to the NEGATIVE port of the sensor. Leave the positive port open to the mechanical room.

Connect the OPS no more than 6 feet away from the stack probe. Install the switch indoors within 300 feet (100 meters) of the EBC 31 Control. The OPS may be installed in the vertical or horizontal position. See Appendix A or the OPS Installation Manual for more information. Connect the silicone tubing to the ports marked “P1” or “+”. Remove the protective cap from the other port, marked “P2” and leave it open to the mechanical room.

d. Installing the Stack Pulsation Filter

Connect the stack pulsation filter* between the stack probe and the OPS and XTP Sensors. Connect the inlet with the supplied 6 feet of silicone tubing. The two outlets should be connected to the XTP and OPS Sensors via silicone tubing. The maximum distance from probe to either sensor should not exceed 6'.

*Also known as a splitter or “T”.

3.3 MECHANICAL INSTALLATION FOR A MODS WITH CASV APPLICATION

The procedure that follows describes the mechanical installation of a MODS with CASV application as described in Chapter 1.3b.

a. Installing the MDF

The MDF connects to most standard pressure stack using v-bands and silicone sealant. Follow the procedures outlined in the stack manufacturer’s installation manual for specific instructions. Install the MDF between the fan and the appliance closest to the fan. Place the MDF in the common horizontal manifold at least a distance of 3 times the vent diameter of the common away from any connector or tee. A 45^{o} tee is recommended to transition from each appliance connector to the common stack. Refer to Fig. 4 in Section 3.2.

b. Installing the EBC 31

Install the EBC 31 indoors, preferably in the same room as the MDF. Check local codes for the maximum distance the EBC 31 may be located from the actuator on the MDF. Once located, mount the EBC 31 directly to a wall using the mounting holes located inside the control.

c. Installing the XTP Sensor and OPS

See Chapter 3.2c.

d. Installing the Stack Pulsation Filter

See Chapter 3.2d.

e. Installing the Exhaust Fan

Install the fan in accordance with the fan manual.

3.4 MECHANICAL INSTALLATION FOR A POSITIVE PRESSURE APPLICATION

The procedure that follows describes the mechanical installation of a MODS positive pressure application as described in Section 1.3c.

a. Installing the MDF

The MDF connects to most standard pressure stack using v-bands and silicone sealant. Follow the procedures outlined in the stack manufacturer's installation manual for specific instructions. The MDF should be located in the connector of each appliance in the system. Place the MDF at least 3 times the connector diameter from the appliance or common stack. A 45^{O} tee should be used to transition from the appliance connector to the common stack.

b. Installing the EBC 31

See Chapter 3.2b.

c. Installing the XTP Sensor and OPS

See Chapter 3.2c.

d. Installing the Stack Pulsation Filter

See Chapter 3.2d.

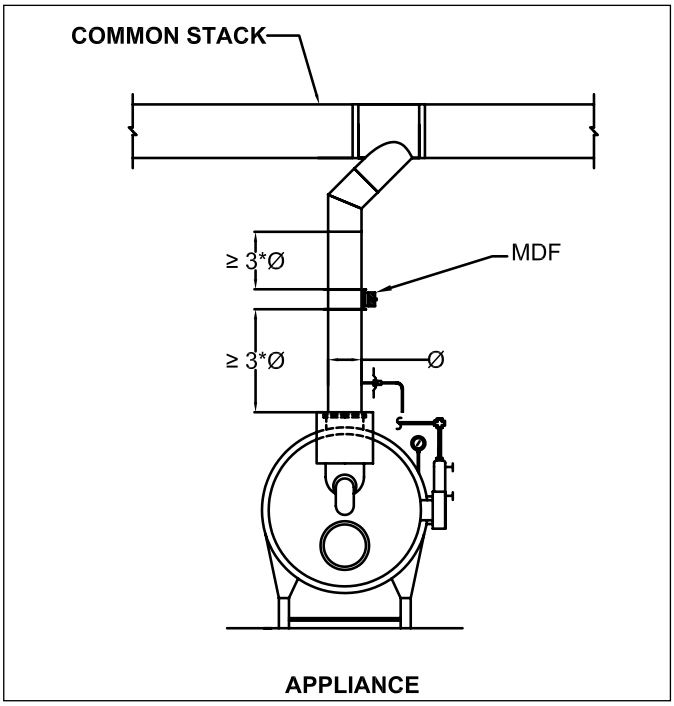


Fig 5

4. ELECTRICAL CONNECTIONS AND INSTALLATIONS

4.1 GENERAL

The wiring instructions in this chapter are broken down by the set-up type.

DANGER

Turn off electrical power before servicing. Contact with live electric components can cause shock or deatjh

EBC 31 is designed for 1x120VAC power supply only. Fan output is regulated on the neutral side and cannot be connected to other circuits

The wiring in this manual is in accordance with NFPA 70. All field wiring must be installed in flecible or rigid metal conduit and comply with local codes, or in their absence, the National Electrical Code, NFPA 70.

The MODS Module is pre-wired inside the EBC 31. Verify the wiring matches that in Fig. 6 below.

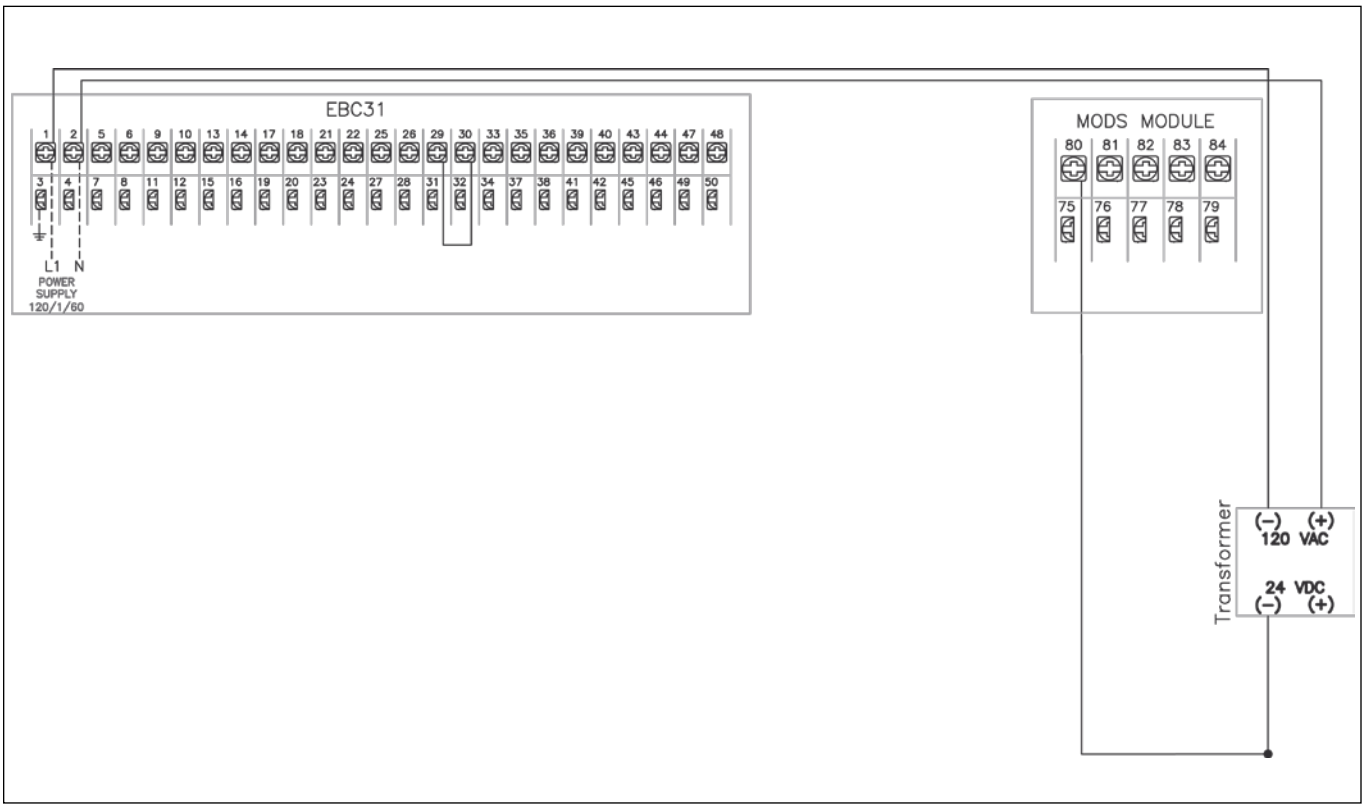


Fig 6

4.2 WIRING INSTRUCTIONS FOR NEGATIVE PRESSURE APPLICATION

a. Connecting the Actuator

The actuator will be wired onto the MODS Module and the exhaust terminals of the EBC 31 as specified in Fig. 7. See the appendix for descriptions of the terminals on the EBC 31 circuit board.

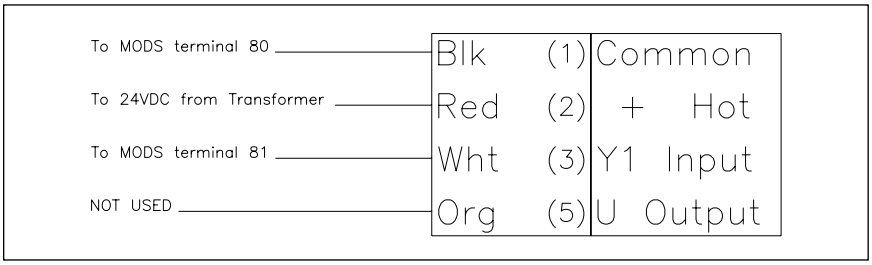


Fig 7

b. Connecting the OPS

Wire the OPS in the normally closed position (use terminals 1 and 3 only) using a minimum of 18 gauge, shielded wire. Connect terminal 3 of the OPS to terminal #83 on the terminal block located on the MODS Power Module. Connect terminal 1 of the OPS to terminal #82 of the same terminal block.

c. Connecting the XTP Sensor

Use 18-22 gauge, shielded wire to connect the XTP Sensor. Connect the XTP to terminals #39, #40, and #41 on the EBC 31 board as shown in Fig. 8.

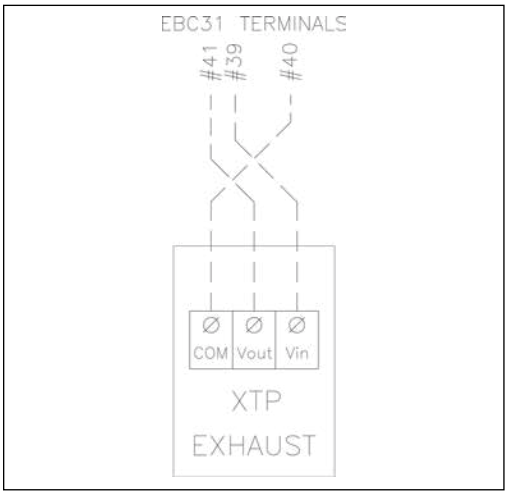


Fig 8

d. Connecting the MODS Module

Connect terminal #81 of terminal block on the MODS™ Module to terminal #38 on the EBC 31 circuit board. Use shielded wire, 18 gauge minimum. Verify wiring of the EBC 31, MODS Power Module, XTP Sensor, and OPS in Fig. 9.

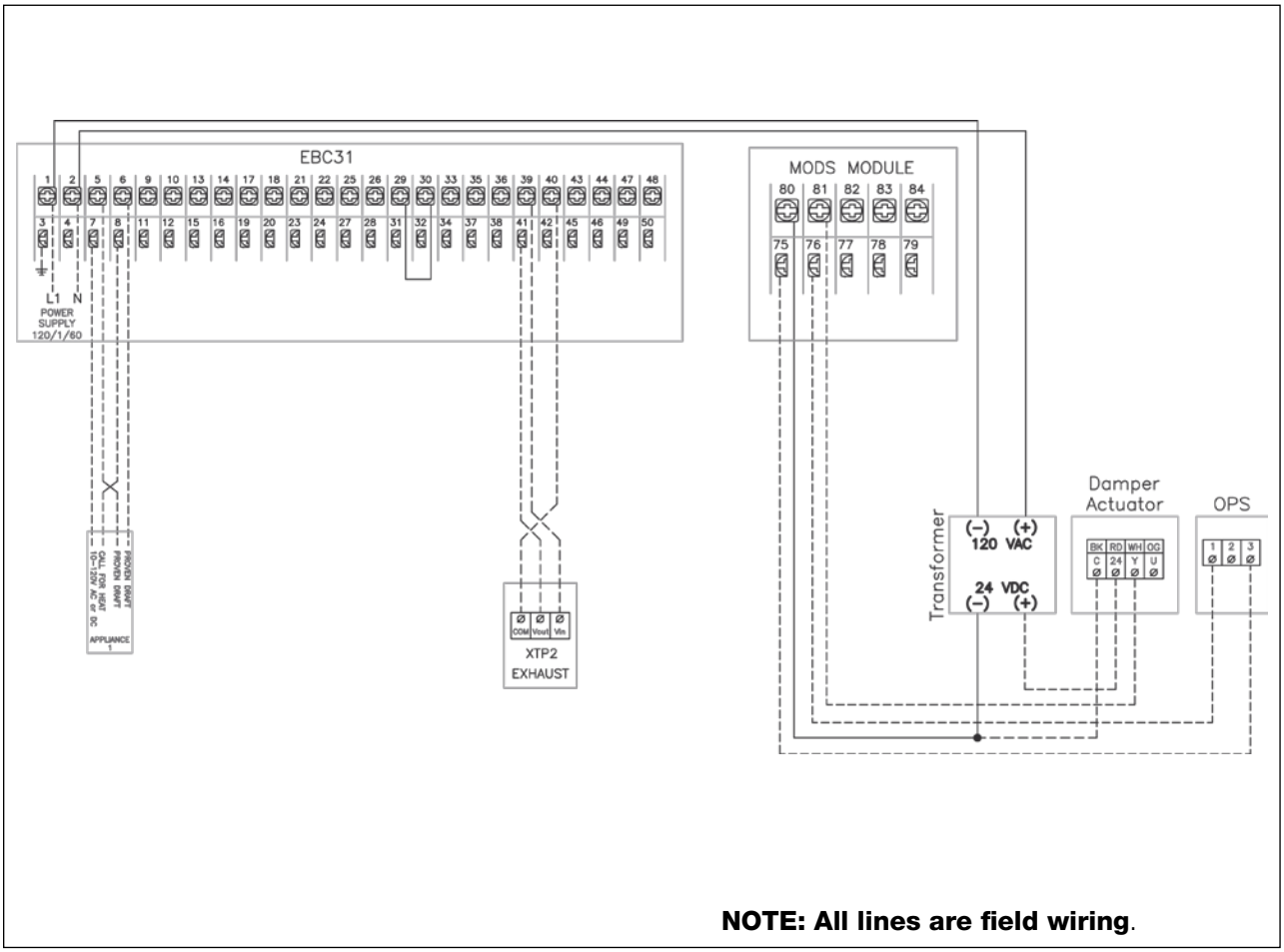


Fig 9

4.3 WIRING INSTRUCTIONS FOR MODS WITH CASV APPLICATION

a. Connecting the Actuator

See Chapter 4.2a.

b. Connecting the OPS

See Chapter 4.2b

c. Connecting the XTP Sensor

See Chapter 4.2c

d. Connecting the MODS Module

Connect a wire from terminal #81 of terminal block on the MODS Module to terminal #46 on the EBC 31 circuit board. Use shielded wire, 18 gauge minimum. Verify wiring of the EBC 31, MODS Module, XTP Sensor, and OPS in Fig. 11.

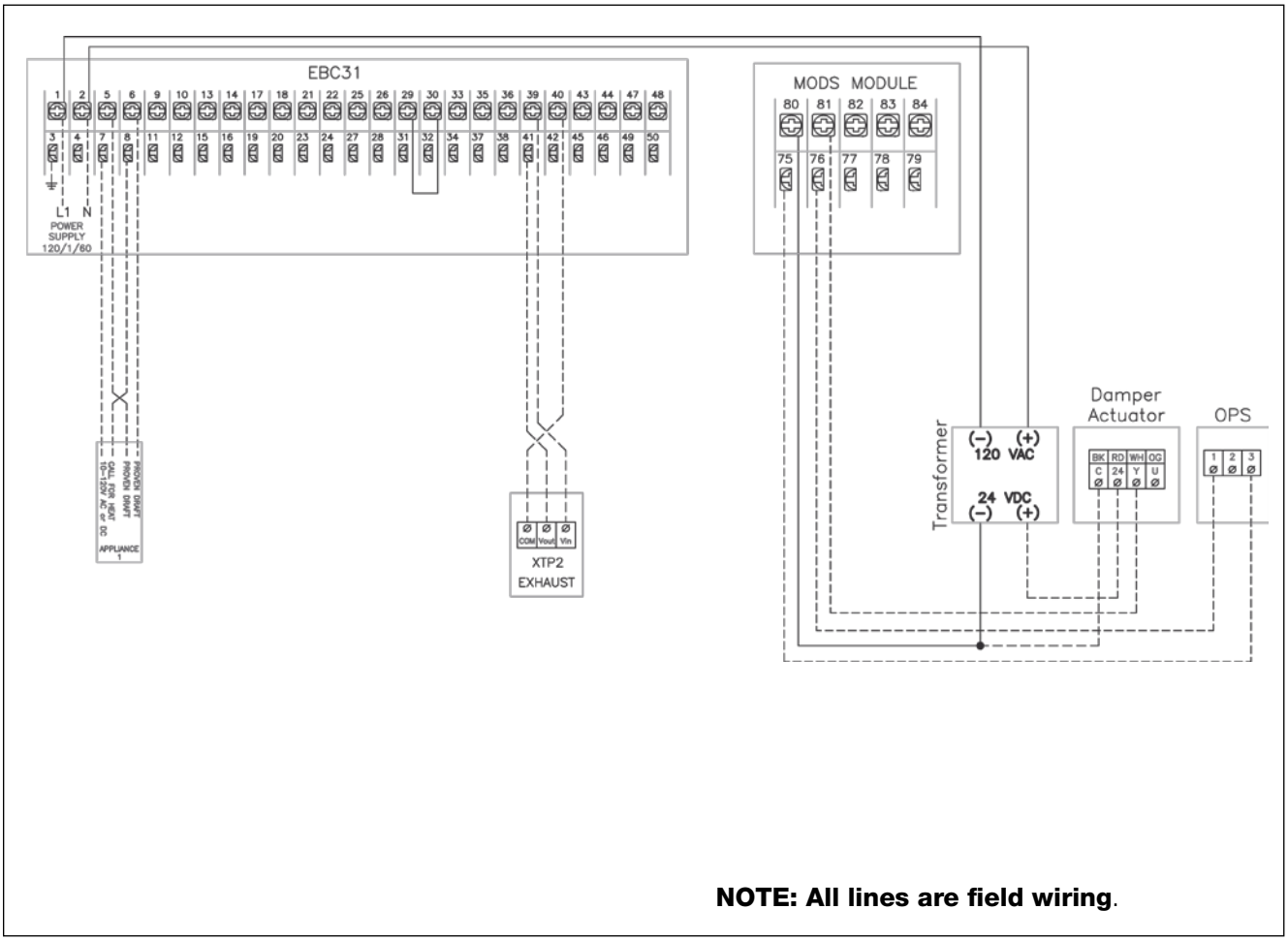


Fig 10

e. Connecting the Fan

Connect the fan in accordance with the job-specific wiring diagram provided by ENERVEX. Examples are provided in Appendix B.

4.4 WIRING INSTRUCTIONS FOR A POSITIVE PRESSURE APPLICATION

a. Connecting the Actuator

See Chapter 4.2a.

b. Connecting the OPS

See Chapter 4.2b.

c. Connecting the XTP Sensor

See Chapter 4.2c.

d. Connecting the MODS Power Module

See Chapter 4.2d.

5. START-UP AND CONFIGURATION

5.1 ACTUATOR SET-UP

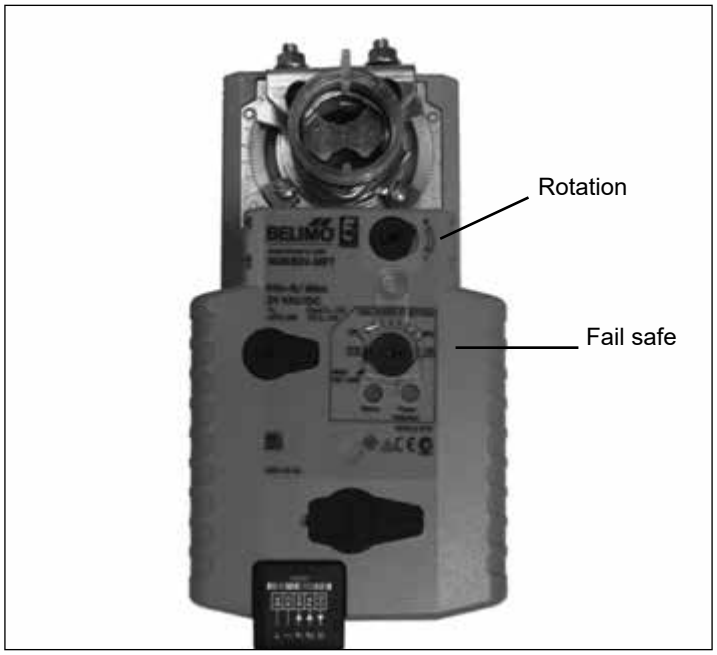
Supply power to the actuator to check for binding with the damper blades. Binding occurs if the actuator and damper blades are rotating in opposite directions. If binding is occuring, follow the procedure below:

1. Remove the cover and loosen the hex nuts on the bracket holding the damper shaft in place.
2. Press in the black button while simultaneously rotating the actuator shaft to the desired position.
3. Release the button and apply power to the actuator to verify it is functioning properly.

NOTE: The actuator should always be fully open when no power is supplied.

Clutch Rotation Direction: To change rotation, change switch on actuator.

Fail/Safe Open Direction: To change Fail/Safe change switch on actuator.



See Appendix B5 for settings

5.2 DELAY-OFF TIMER SETTING

The delay-off timer setting is the EBC 31 used to prevent nuisance trips during appliance light-off. The timer allows the system a set amount of time to stabilize after an increase in system pressure. The maximum recommended time setting for the delay-off timer is 10-15 seconds for most systems. If the pressure in the system is outside of range for longer than this time, the OPS will send a signal to open the draft safety circuit and shut down the system.

5.3 NEGATIVE PRESSURE APPLICATION

Sequence of Operation

1. Upon call for heat, the draft system goes through a time adjustable pre-purge cycle (45 seconds recommended with standard damper/actuator). This will allow the damper to move to its fully-open position.

2. After pre-purge, the 'boiler out' contacts on the draft control close and allow the burner to sequence through its pre-purge and firing cycles. During this time, the draft controller should be in its "Prime Cycle". The prime cycle is time adjustable and should be set for the total time required for the burner to go through pre-purge plus the time required to establish draft in the vent system (usually a total of around two minutes). During the prime cycle, the standard alarm limits are inactive to allow time for draft to develop naturally.

NOTE: The Over Pressure Switch (OPS) is active during the prime cycle. If the pressure in the system exceeds the setting of the OPS for longer than the time set on the delay-off timer, the burner will be shut down.

3. After the prime cycle is complete, the draft control goes into normal operation. During this period, the control will modulate the damper to eliminate excessive draft above the preset negative pressure. At this time, all standard alarm limits are active.

4. When the call for heat is discontinued, the burner normally goes through a post-purge cycle. The draft system is still active and modulating during the burner's post-purge.

5. When the burner(s) has cycled though the post-purge cycle, the draft system will cycle off, and the damper should be in the fully open position.

Actuator Set-Up

1. Verify wiring per system application in Chapter 4 of this manual.

2. Verify the direction rotation of the actuator by observing the indicator mark on the end of the damper shaft. When the damper is energized with 0 VDC input voltage, the damper should be in the closed position. If the damper is open at 0 VDC, change the rotation switch on the actuator control board to reverse the rotation.

3. Verify the Failsafe Position by removing input power to the damper actuator. When power is cut to the system, the damper should return to the fully open position. If the damper does not open, reverse the rotation by changing the position of fail-safe positioning switch located on the actuator

XTP Sensor and OPS Connections

1. Connect the stack probe to the pulation filter using silicone tubing. Connect silicone tubing to the two ports at the other end of the pulsation filter (one will run to the OPS, the other to the XTP).

2. Connect silicone tubing to the positive port of the OPS leaving the negative port opened to room pressure. Once connected, adjust the pressure setting by using the dial located on the front of the switch. Set the pressure equal to the maximum outlet pressure allowed by the appliance manufacturer.

3. Connect silicone tubing to the negative port of the XTP Sensor and leave the positive port opened to room pressure.

Control Settings

The parameters at right need to be set on the EBC 31 when connecting a MODS for a Negative pressure application.

	Control Settings for Negative Pressure Applications	
	Parameter	**Setting**
11	Draft Set-point	*To Be Determined at Start-Up
22	Exhaust Mode	Intermittent
232	Pre-purge Speed Mode	100%
262	Alarm Delay	15 Seconds
231	Post Purge Time	0
242	Post Purge Speed Mode	Variable
453	Prime Time	*To Be Determined at Start-Up

*Draft Set-point depends on system set-up and stack probe location.

NOTE: Variable settings are estimates.

5.4 MODS WITH CASV APPLICATION

Sequence of Operation

1. Upon call for heat, the draft system goes into operation and begins to modulate. Under high load demand, the fan(s) modulate to maintain proper draft and pressure with the damper in the fully open position. During low load demand, the damper will modulate the blade position to maintain proper draft and pressure with the fans running a minimum speed.

2. When the call for heat is discontinued, the burner normally goes through a post-purge cycle. The draft system is still active and modulating during the burner's post purge.

3. When all burners have cycled though the post-purge cycle, the draft system will cycle off to de-energize the fan(s) and damper (damper should be fully open).

Actuator Set-Up

1. Verify wiring per system application in Section 4 of this manual.

2. Verify the direction rotation of the actuator by observing the indicator mark on the end of the damper shaft. When the damper is energized with 0 VDC input voltage, the damper should be in the open position. If the damper is closed at 0 VDC, change the setting of rotation switch on the actuator control board to reverse the rotation.

3. Verify the Failsafe Position by removing input power to the damper actuator. When power is cut to the system, the damper should return to the fully open position. If the damper does not open, reverse the rotation by changing the position of fail-safe switch located on the actuator.

XTP Sensor and OPS Connections

1. Connect the stack probe to the pulation filter using silicone tubing. Connect silicone tubing to the two ports at the other end of the pulsation filter (one will run to the OPS, the other to the XTP).

2. Connect the stack probe tubing to the positive port of the OPS leaving the negative port opened to room pressure. Once connected, adjust the pressure setting by using the dial located on the front of the switch. Set the pressure equal to the maximum outlet pressure allowed by the appliance manufacturer.

3. Connect the stack probe tubing to the negative port of the XTP Sensor and leave the positive port opened to room pressure.

Control Set Point

Set the MODS set point at the desired level.

Control Set Point

The parameters will be set for an exhaust system. The EBC 31 will control to the set point. If the draft exceeds the set point, the fan will slow down and the MODS portion of the system will go into operation.

5.5 POSITIVE PRESSURE APPLICATION

Sequence of Operation

1. Upon call for heat, the draft system goes through a time adjustable pre-purge cycle (45 seconds recommended with standard damper/actuator). This will allow the damper to open to the fully-open position.

2. After pre-purge is complete, the draft control goes into normal operation in which the control will modulate the damper to maintain the adjustable preset positive pressure. At this time, all standard alarm limits are active. The boiler out contacts on the draft control close and allow the burner to sequence through its pre-purge and firing cycle.

NOTE: The Over Pressure Switch (OPS) is active during the prime cycle. If the pressure in the system exceeds the setting of the OPS for longer than the time set on the delay-off timer, the burner will be shut down.

3. When the call for heat is discontinued, the burner normally goes through a post-purge cycle. The draft system is still active and modulating during any of the burner' post purge.

4. When the burner(s) has cycled though the post-purge cycle, the draft system will cycle off and the damper should be in the fully open position.

Actuator Set-Up

1. Verify wiring per system application in Chapter 4 of this manual.

2. Verify the direction rotation of the actuator by observing the indicator mark on the end of the damper shaft. When the damper is energized with 0 VDC input voltage, the damper should be in the closed position. If the damper is open at 0 VDC, change the rotation switch on the actuator to reverse the rotation.

3. Verify the Fail-safe Position by removing input power to the damper actuator. When power is cut to the system, the damper should return to the fully open position. If the damper does not open, reverse the rotation by changing the position of dip switch located on the actuator control board.

XTP Sensor and OPS Connections

1. The stack probe tubing is connected to a tee fitting that will also connect the OPS switch and XTP Sensor. See the connection diagram in Chapter 4.

2. Connect the stack probe tubing to the positive port of the OPS leaving the negative port opened to room pressure. Once connected, adjust the pressure setting by using the dial located on the front of the switch. Set the pressure equal to the maximum outlet pressure allowed by the appliance manufacturer.

3. Connect the stack probe tubing to the positive port of the XTP Sensor and leave the negative port opened to room pressure.

Control Settings

The parameters at right need to be set on the EBC 31 when connecting a MODS for a Positive pressure application.

	Control Settings for Positive Pressure Applications	
	Parameter	**Setting**
	Exhaust Set-point	*To Be Determined at Start-Up
	Exhaust Mode	Intermittent
	Pre-purge Time	60 Seconds
	Pre-purge Speed Mode	100%
	Alarm Delay	30 Seconds
	Post Purge Time	30 Seconds
	Post Purge Speed Mode	100%
	Pressure MOD	Positive

*Draft Set-point depends on system set-up and stack probe location.

NOTE: Variable settings are estimates.

APPENDIX

APPENDIX A

A1. Installing the XTP Sensor

Install the XTP Sensor indoors, in the vertical postion, with the pressure ports pointing down as shown in the figures below.

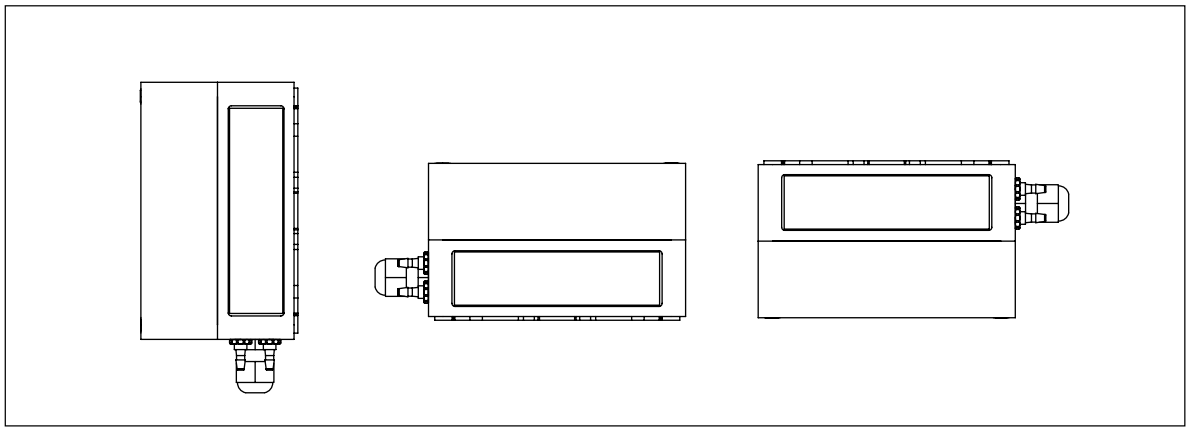


Fig A1

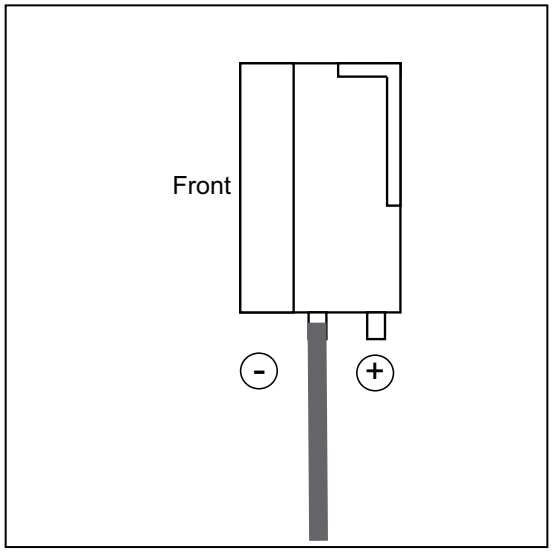


Fig A2 - Negative Pressure

A2. Installing the OPS

The OPS may be installed in the vertical or horizontal position. If mounted horizontally, the set-point knob must face upwards.

NOTE: If mounted horizontally, deduct 0.08 in W.C. (20 Pa) from the setpoint for offset adjustment. Do not use this mounting arrangement if the setpoint is at the bottom range of the pressure switch.

If mounted in the vertical position, the pressure ports must be pointing down as shown in Fig. A3.

Secure the switch by using the mounting holes. Use only two holes located diagonally from
each other. Do not over-tighten the mounting screws.

After installation connect the tubing to the stack probe and the port marked “P1” and “+”.

IMPORTANT! REMOVE THE PROTECTIVE CAP ON THE PORT MARKED “P2” AND “-”. THE SWITCH WILL NOT WORK PROPERLY UNLESS IT HAS BEEN REMOVED.

NOTE: Do not make any adjustments to the calibration screw located next to the dial.

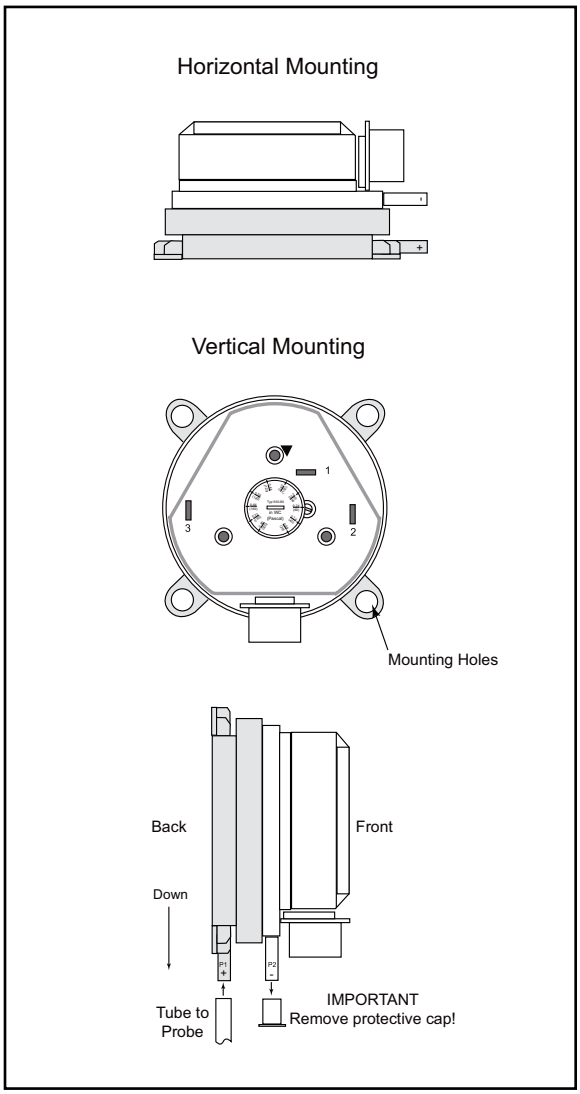


Fig A3

APPENDIX B

B1. EBC 31 Terminal Connections

An EBC 31 Constant Pressure Regulator is used in all MODS applications. Below is a description of each terminal and a diagram showing the locations of the terminal.

Terminal	Use
1	Power Supply-L1 (Phase)
2	Power Supply-N (Neutral)
3, 4	Ground
5, 6	AUX1 Dry Contact (Normally Open) Output to Appliance 1 (0-250V, 8A)
7	AUX1 Input - Boiler 1 Thermostat Input 10-250VAC/DC (Load, Pos.)
8	AUX1 Input - Boiler 1 Thermostat Input (Common, Neg.)
9, 10	AUX2 Dry Contact (Normally Open) Output to Appliance 2 (0-250V, 8A)
11	AUX2 Input - Boiler 2 Thermostat Input 10-250VAC/DC (Load, Pos.)
12	AUX2 Input - Boiler 2 Thermostat Input (Common, Neg.)
13, 14	AUX3 Dry Contact (Normally Open) Output to Appliance 3 (0-250V, 8A)
15	AUX3 input - Boiler 3 Thermostat Input 10-250VAC/DC (Load, Pos.)
16	AUX3 Input - Boiler 3 Thermostat Input (Common, Neg.)
17, 18	AUX4 Dry Contact (Normally Open) Output to Appliance 4 (0-250V, 8A)
19	AUX4 Input - Boiler 4 Thermostat Input 10-250VAC/DC (Load, Pos.)
20	AUX4 Input - Boiler 4 Thermostat Input (Common, Neg.)
21, 22	AUX5 Dry Contact (Normally Open) Output to Appliance 5 (0-250V, 8A)
23	AUX5 Input - Boiler 5 Thermostat Input 10-250VAC/DC (Load, Pos.)

Terminal	Use
24	AUX5 Input - Boiler 5 Thermostat Input (Common, Neg.)
25,26	AUX6 Dry Contact (Normally Open) Output to Appliance 6 (0-250V, 8A)
27	AUX6 Input - Boiler 6 Thermostat Input 10-250VAC/DC (Load, Pos.)
28	AUX6 Input - Boiler 6 Thermostat Input (Common, Neg.)
29	Draft Input - Supply to EXTERNAL switch (24 VDC)
30	Draft Input - Return from EXTERNAL switch (24 VDC)
31	Override Input - (positive) - 0-250VAC/DC
32	Override Input - (common)
33, 34	Alarm Relay - Dry Contact (Normally Open) Close on Alarm Condition, (0-250VAC, 8A)
35, 36	MSC1 Relay - Dry Contact (Normally Open) for Exhaust (0-250V)
37	Output to Exhaust MSC1 - (positive) 0-10V
38	Output to Exhaust MSC1 - (common)
39	Power Supply to Exhaust Transducer (positive) - 24VDC
40, 42	Output to Exhaust Transducer - (common)
41	Input from Exhaust Transducer - (positive) 0-10V
43, 44	MSC2 Relay - Dry Contact (Normally Open) for Intake (0-250V)
45	Output to Intake MSC - (positive) 0-10V
46	Output to Intake MSC - (common)
47	Power Supply to Intake Transducer (positive) - 24VDC
48, 50	Output to Intake Transducer - (common)
49	Output to Intake Transducer - (positive) 0-10V

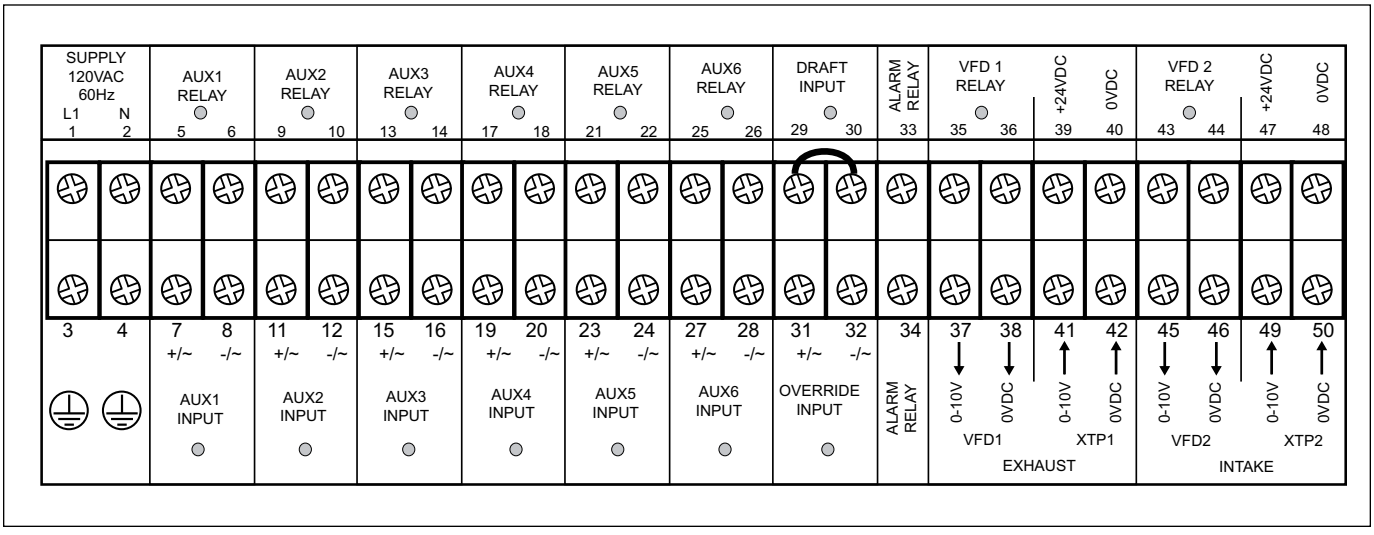


Fig B1

B2 MODS with CASV

The connection diagram below shows a typical MODS system with a three phase exhaust fan, MSC control, EBC 31 control and MDF modulating damper. In the event a single phase fan is used in this system, a MSC would not be used. Instead, the cable running from the fan junction box would be connected directly to the EBC 31.

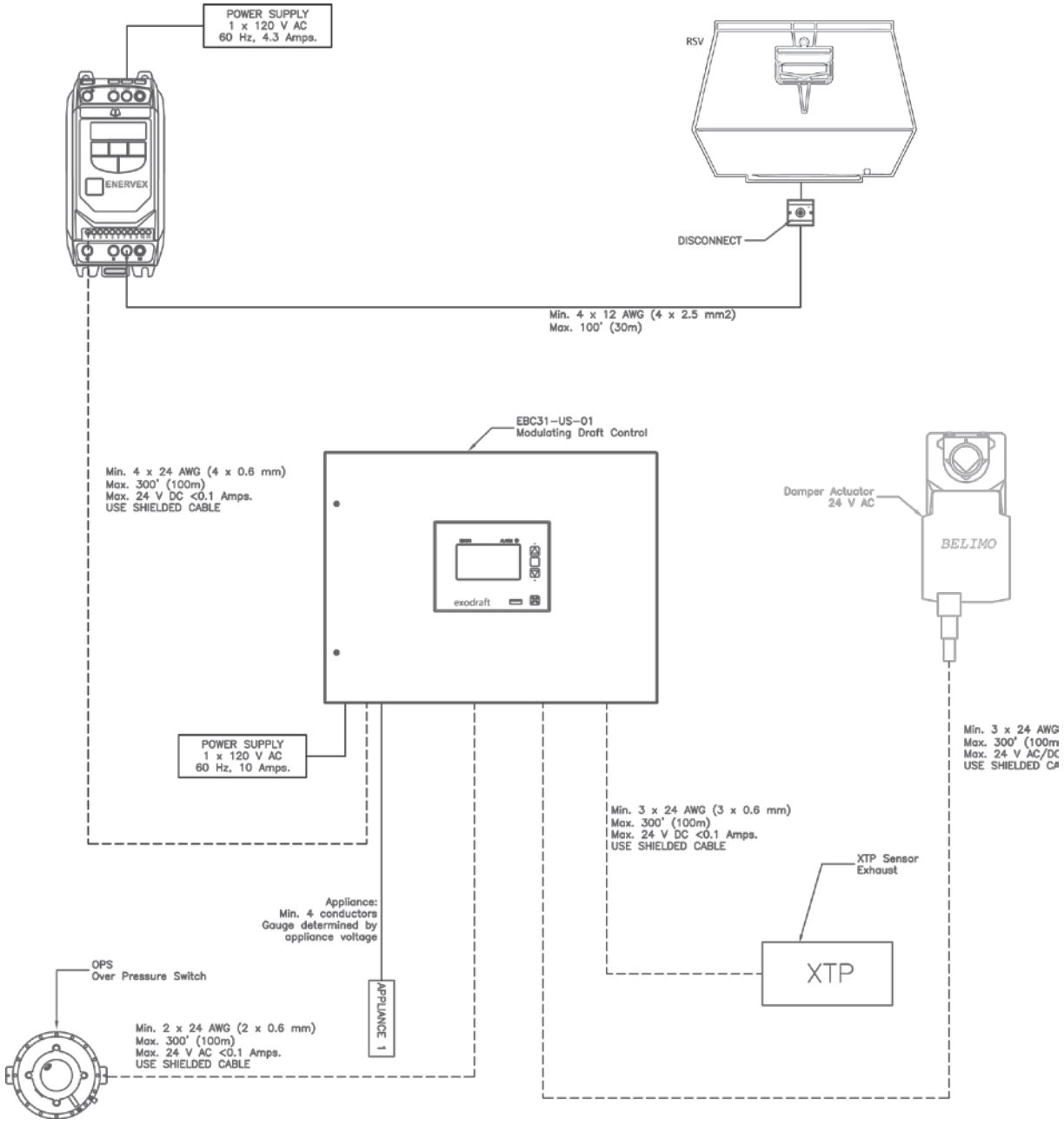


Fig B2

B3. Wiring a Single Phase Exhaust Fan

Wire the single phase fan to terminals 70 and 71 as shown in the diagram below.

NOTE: This wiring diagram is provided for reference only. Please refer to the job specific wiring diagram provided by ENERVEX for specific connection detail.

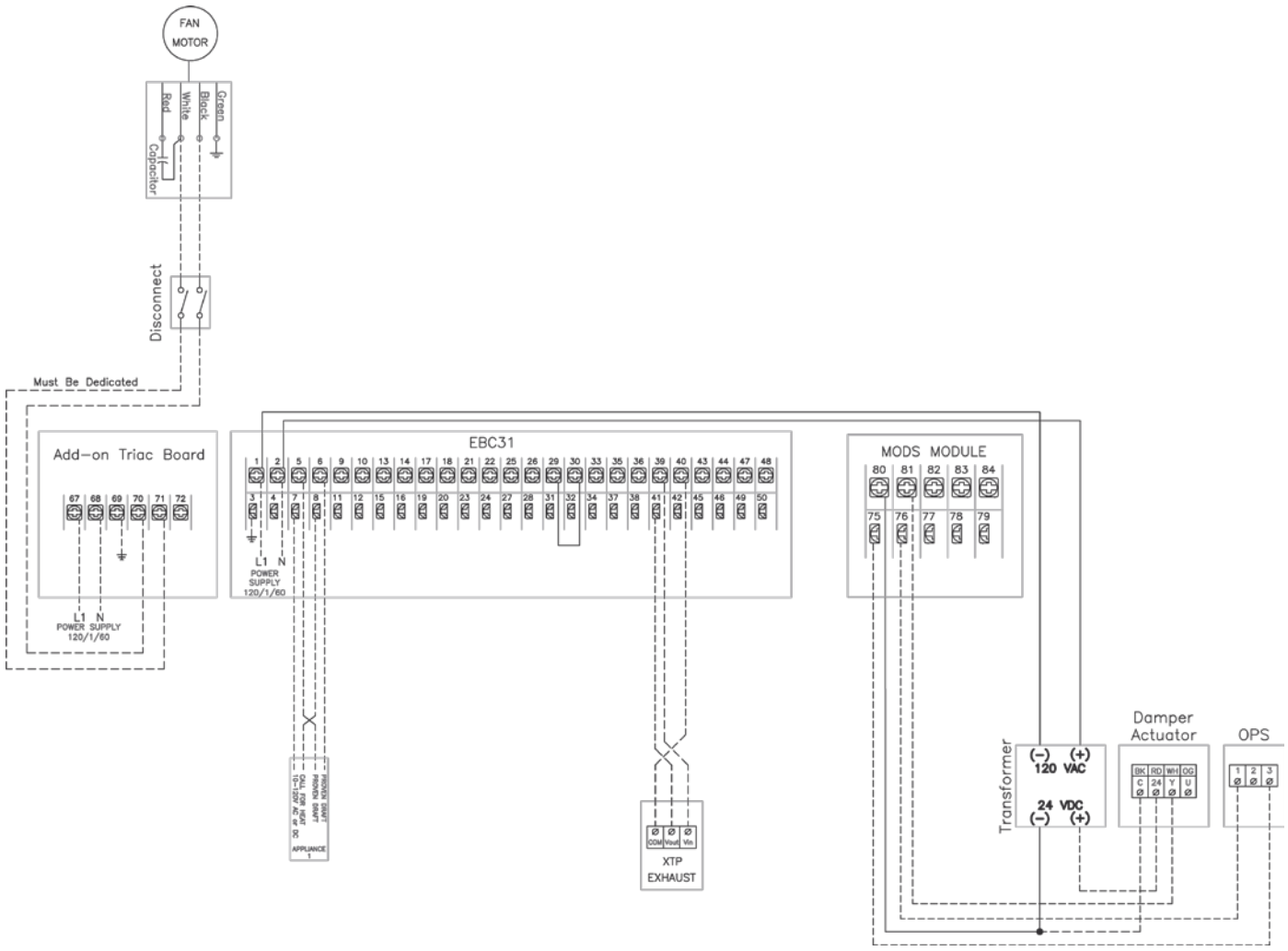


Fig B3

B4 Wiring a 3-Phase Exhaust Fan

Wire a 3-phase exhaust fan to the system via the MSC. The fan will be wired to terminals U, V, and W of the MSC. Terminals 2, 3, 10, 13 of the MSC will connect to exhaust terminals 35, 36, 37 and 38 as shown in the figure below. Use shielded wire for these connections.

NOTE: This wiring diagram is provided for reference only. Please refer to the job specific wiring diagram provided by ENERVEX for specific connection detail.

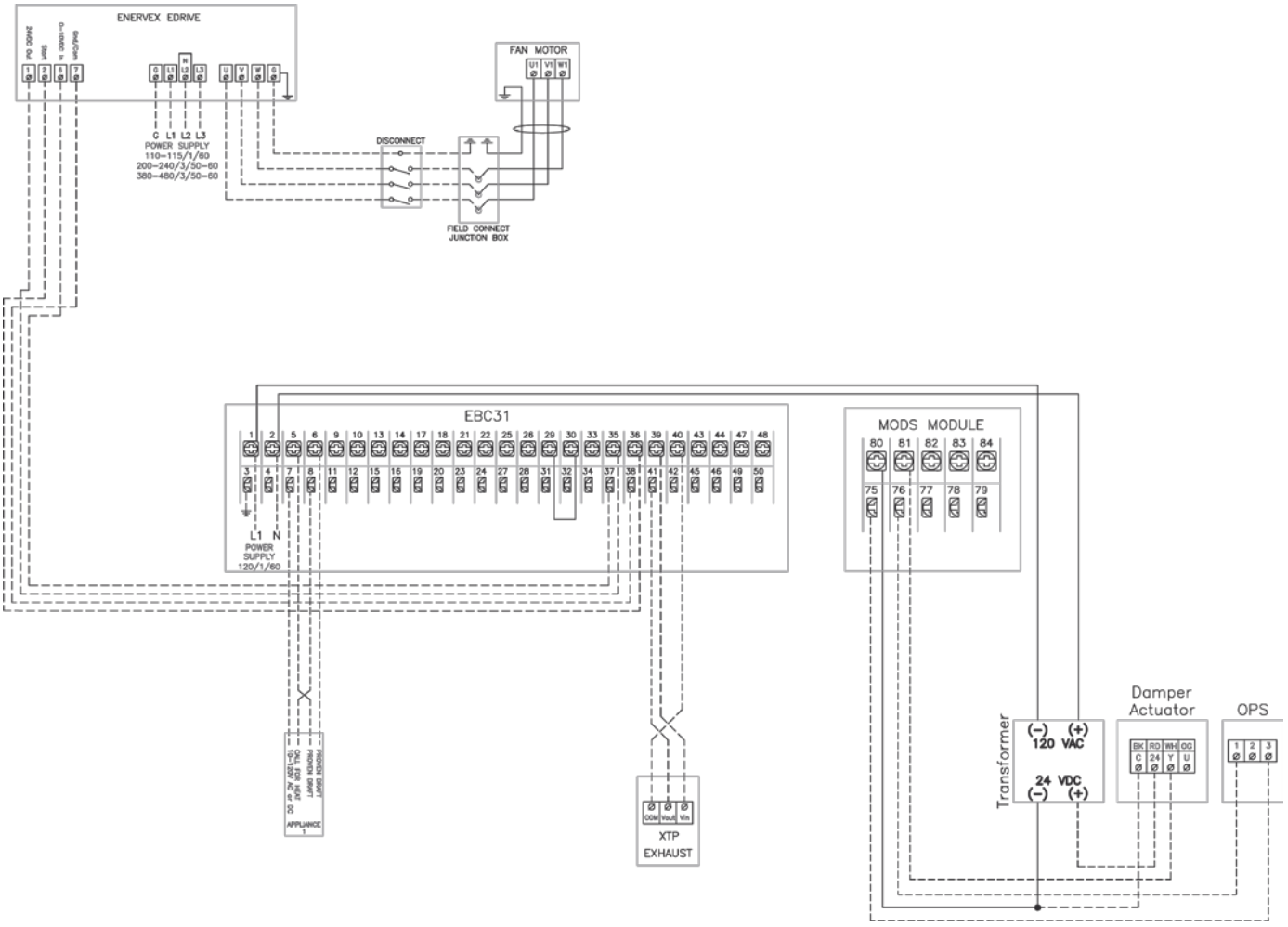


Fig B4

B5. Actuator Settings

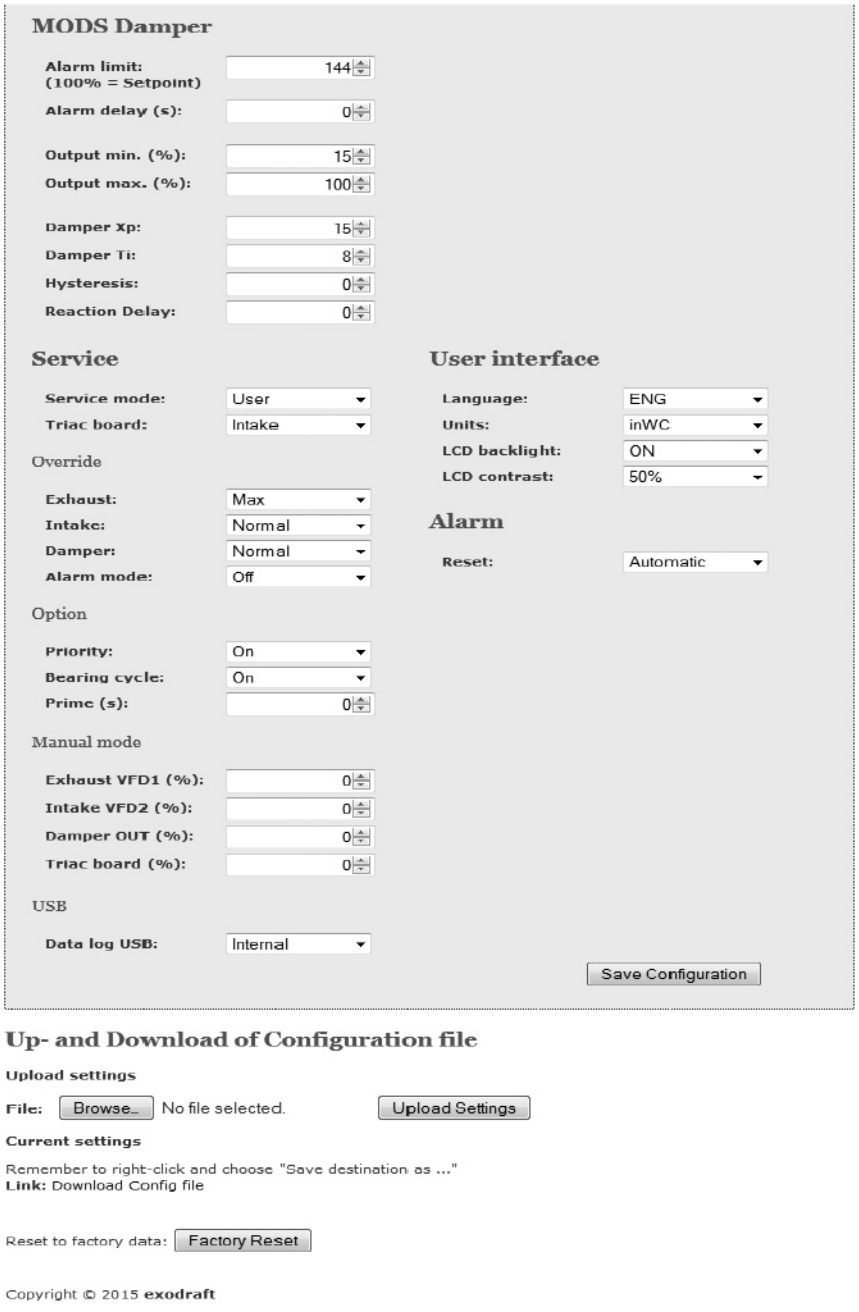


Fig B5

3940010 12.15

ENERVEX Inc.
1685 Bluegrass Lakes
Parkway
Alpharetta, GA 30004
USA

P: 770.587.3238
F: 770.587.4731
T: 800.255.2923
info@enervex.com
www.enervex.com

ENERVEX®
VENTING DESIGN SOLUTIONS