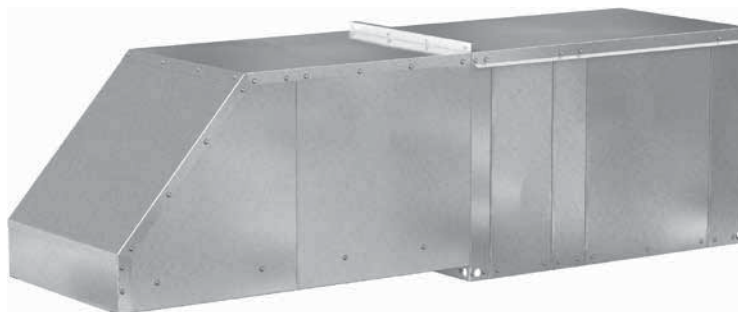


Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with these instructions will result in voiding of the product warranty and may result in personal injury and/or property damage.



General Safety Information

Only qualified personnel should install this unit. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. Other considerations may be required if high winds or seismic activity are present. If more information is needed, contact a licensed professional engineer before moving forward.

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC), the National Fire Protection Agency (NFPA), where applicable. Follow the Canadian Electrical Code (CEC) in Canada.
2. The rotation of the wheel is critical. It must be free to rotate without striking or rubbing any stationary objects.
3. Motor must be securely and adequately grounded.
4. Do not spin fan wheel faster than the maximum cataloged fan rpm. Adjustments to fan speed significantly affects motor load. If the fan RPM is changed, the motor current should be checked to make sure it is not exceeding the motor nameplate amps.
5. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces, or chemicals. Replace cord immediately if damaged.
6. Verify that the power source is compatible with the equipment.
7. Never open blower access doors while the fan is running.

DANGER

Always disconnect power before working on or near a unit. Use appropriate lockout tagout procedures to prevent accidental power up.

CAUTION

When servicing the unit, motor may be hot enough to cause pain or injury. Allow motor to cool before servicing.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

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General

Receiving

This product may have been subject to road salt during transit. If so, immediately wash off all visible white residue from all exterior surfaces. Upon receiving the product, check to ensure all line items are accounted for by referencing the delivery receipt or packing list. Inspect each crate or carton for shipping damage before accepting delivery. Alert the carrier if any damage is detected, **do not refuse shipment**. The customer shall make notation of damage (or shortage of items) on the delivery receipt and all copies of the bill of lading should be countersigned by the delivering carrier. If damaged, immediately contact your manufacturer's representative. Any physical damage to the unit after acceptance is not the responsibility of the manufacturer.

Handling

Units are to be rigged and moved by the lifting brackets provided or by the skid when a forklift is used. Location of brackets varies by model and size. Handle in such a manner as to keep from scratching or chipping the coating. Damaged finish may reduce ability of unit to resist corrosion.

Unpacking

Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts. Sometimes it is not possible that all items for the unit be shipped together due to availability of transportation and truck space. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Storage

Units are protected against damage during shipment. If the unit cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the unit during storage. The user assumes responsibility of the unit and accessories while in storage. The manufacturer will not be responsible for damage during storage. These suggestions are provided solely as a convenience to the user.

The ideal environment for the storage of units and accessories is indoors, above grade, in a low humidity atmosphere which is sealed to prevent the entry of blowing dust, rain, or snow. Units designed for outdoor applications may be stored outdoors. All accessories must be stored indoors in a clean, dry atmosphere.

Indoor

Maintain temperatures evenly to prevent condensation. Remove any accumulations of dirt, water, ice, or snow and wipe dry before moving to indoor storage. To avoid condensation, allow cold parts to reach room temperature. Leave coverings loose to permit air circulation and to allow for periodic inspection.

The unit should be stored at least 3½ in. (89 mm) off the floor. Clearance should be provided to permit air circulation and space for inspection.

Outdoor

The fan should be placed on a level surface to prevent water from leaking into the unit. The unit should be elevated so that it is above water and snow levels. Ensure sufficient support to prevent unit from settling into soft ground. Locate parts far enough apart to permit air circulation, sunlight, and space for periodic inspection. To minimize water accumulation, place all unit parts on blocking supports so that rain water will run off.

Do not cover parts with plastic film or tarps as these cause condensation of moisture from the air passing through heating and cooling cycles.

Inspection and Maintenance

While in storage, inspect fans once per month. Keep a record of inspection and maintenance performed.

If moisture or dirt accumulations are found on parts, the source should be located and eliminated. At each inspection, rotate the fan wheel by hand ten to fifteen revolutions to distribute lubricant on motor. If paint deterioration begins, consideration should be given to touch-up or repainting. Fans with special coatings may require special techniques for touch-up or repair.

Machined parts coated with rust preventive should be restored to good condition promptly if signs of rust occur. Immediately remove the original rust preventive coating with petroleum solvent and clean with lint-free cloths. Polish any remaining rust from surface with crocus cloth or fine emery paper and oil. Do not destroy the continuity of the surfaces. Wipe thoroughly clean with Tectyl® 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl® 511M Rust Preventive, WD-40® or the equivalent.

Removing from Storage

As units are removed from storage to be installed in their final location, they should be protected and maintained in a similar fashion, until the equipment goes into operation.

Prior to installing the unit and system components, inspect the unit assembly to make sure it is in working order.

1. Check all fasteners, set screws on the fan, wheel, bearings, drive, motor base, and accessories for tightness.
2. Rotate the fan wheel(s) by hand and assure no parts are rubbing.

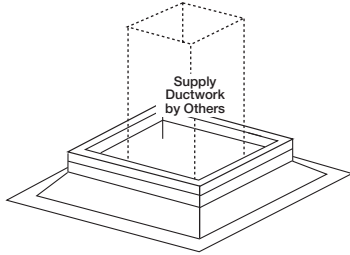
Installation

Outdoor Unit Mounting

Standard Curb

1. Install Curb

Position curb on the roof (reference the CAPS submittal for placement in relation to the unit). Verify that unit is level, shim if necessary. Attach curb to roof and flash into place using appropriate methods.



2. Install Ductwork

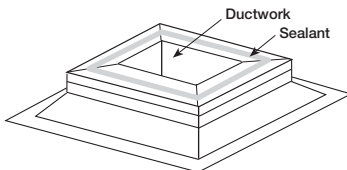
Good duct practices should be followed for all ductwork. All ductwork should be installed in accordance with SMACNA and AMCA guidelines, NFPA 96 and all local codes. Reference the CAPS submittal for ductwork sizes.

The use of a duct adapter is recommended on a downblast (DB) arrangement to align the ductwork with the supply unit. The duct adapter is only a guide and is not to be used as a support for the ductwork.

Model	Duct Size
XMSF-P113-H10	13x13
XMSF-P115-H20	15x15
XMSF-P117-H30	17x17

3. Apply Sealant

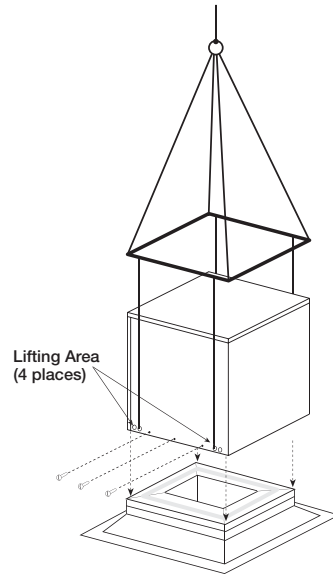
Apply an appropriate sealant around the perimeter of the curb and duct adapter(s) to isolate fan vibration and prevent water penetration.



4. Install Unit

Use a crane and a set of spreader bars hooked to the factory lifting lugs to lift and center the unit on the curb. The use of all lifting lugs and a set of spreader bars is mandatory when lifting the unit.

Fasten the unit to the curb using appropriate methods. The installer is responsible for determining appropriate support and fastening methods to ensure compliance with all applicable codes.



Installation

Electrical Wiring

Before connecting power to the unit, read and understand the following instructions and wiring diagrams. Complete wiring diagrams are attached on the inside of the control center door(s).

All wiring should be done in accordance with the latest edition of the National Electric Code ANSI/NFPA 70 and any local codes that may apply. In Canada, wiring should be done in accordance with the Canadian Electrical Code.

The equipment must be properly grounded. Any wiring running through the unit in the airstream must be protected by metal conduit, metal clad cable or raceways.

If replacement wire is required, it must have a temperature rating of at least 105°C.

High voltage electrical input is needed for this equipment. This work should be performed by a qualified electrician.

Any wiring deviations may result in personal injury or property damage. Manufacturer is not responsible for any damage to, or failure of the unit caused by incorrect final wiring.

Manufacturer's standard control voltage is 24VAC. Control wire resistance should not exceed 0.75 ohms (approximately 285 feet total length for 14 gauge wire; 455 feet total length for 12 gauge wire). If the resistance exceeds 0.75 ohms, an industrial-style plug-in relay should be wired in place of the remote switch. The relay must be rated for at least 5 amps and have a 24 VAC coil. Failure to comply with these guidelines may cause motor starters to chatter or not pull in, resulting in contactor failures and/or motor failures.

Optional Exhaust Fan Starter

1. Verify Exhaust Fan Compatibility

Compare the voltage, frequency, and phase on the unit label with the exhaust fan label. Additionally, compare the exhaust HP on the unit label with the exhaust fan label. The unit has been sized to provide power for the exhaust fan and all values must match.

2. Determine the Size of the Exhaust Fan Power Lines

Size the exhaust fan power lines appropriately per the exhaust fan voltage, and amps.


3. Connect power to the Exhaust Fan

Connect the power lines to the exhaust fan disconnect switch. The electrical supply line must conform to local and national electrical codes. Electrical wires must be located so as not to rub on moving components.

Line Voltage

1. Determine the Size of the Main Power Lines

The unit's nameplate states the voltage and the unit's MCA. The main power lines to the unit should be sized accordingly.

		CONFORMS TO UL STD 705 POWER VENTILATORS	
58310			
VOLTS	<input type="text"/>	PHASE	<input type="text"/>
MCA	<input type="text"/>	HZ	<input type="text"/>
SUPPLY MOTOR	HP	<input type="text"/>	AMPS
SUPPLY MOTOR LOCKED ROTOR CODE		<input type="text"/>	
EXHAUST MOTOR#1	HP	<input type="text"/>	AMPS
EXHAUST MOTOR#2	HP	<input type="text"/>	AMPS
SUITABLE FOR OUTDOOR USE		<input type="text"/>	
FOR GENERAL VENTILATION USE ONLY			
DO NOT USE TO EXHAUST DIRT, DUST, GREASE OR LINT-LADEN AIR			
695066			

2. Install Solid State Speed Controller

If the unit was supplied with a ship loose solid state speed controller, it must be installed to control the fan RPM.

NOTE: Units with VG or VFD in the model name or units with a control center do not require a field installed solid state speed controller.

3. Connect the Main Power

Connect the main power lines to the disconnect switch. The electrical supply must be compatible with the fan motor with regards to voltage, phase, and amperage capacity. Moreover, the electrical supply line must be properly fused and conform to local and national electrical codes. Electrical wires must be located so as not to rub on moving components.

NOTE: If fan motor is not thermally protected, remote overload protection must be installed having the adequate rating as to voltage, frequency horsepower, and full load current per phase.

Pre-Start-Up

Checklist

Tool List

- Voltage Meter (with wire probes)
- Amperage Meter
- Tachometer

WARNING

Disconnect and lock-out all power and gas before performing any maintenance or service to the unit. Failure to do so could result in serious injury or death and damage to equipment.

WARNING

Check the housing, blower, and ductwork for any foreign objects before running the blower.

Motor Identification

Check the metal nameplate located near the disconnect for the model number.

Suffix of the model number will identify the motor type that is referenced in the *Start-Up, Checklist, Start-Up Checklist* sections:

- XMSF-P1##-H## (no suffix) - refer to PSC motor with solid state speed control
- XMSF-P1##-H##-VG - refer to Vari-Green® motor
- XMSF-P1##-H##-VFD - refers to Variable Frequency Drive (VFD) controlled motor

Pre-Start-Up Checklist

1. Check Fasteners for Tightness

Check fasteners, set screws and locking collars on the fan, motor base and accessories for tightness.

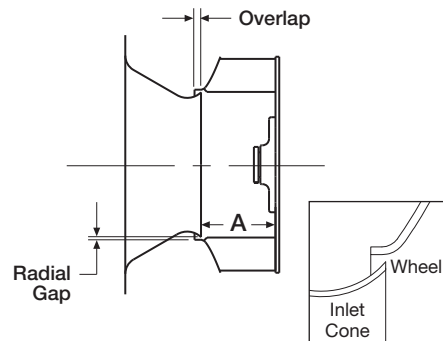
2. Check the Voltage

Before starting the unit, compare the supplied voltage, hertz and phase with the unit and motor nameplate information.

3. Check Wheel Overlap

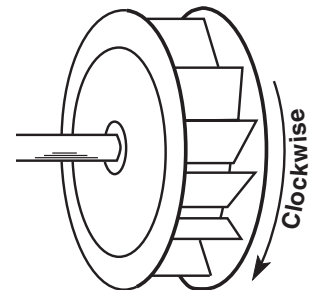
Wheel position is preset and the unit is tested at the factory. Movement may occur during shipment and realignment may be necessary. Wheel and inlet cone overlap can be adjusted by loosening the setscrews in the wheel and moving the wheel to the desired position.

Model	Overlap
XMSF-P113-H10	1/4 in.
XMSF-P115-H20	
XMSF-P117-H30	



4. Wheel Rotation

Rotate the wheel by hand and make sure the wheel does not rub on any parts. Verify wheel rotation by momentarily energizing the unit. Rotation should be clockwise as shown below and correspond to the rotation decal on the unit.



- ☐ Motor Type _____
- ☐ Check fastener tightness _____
- ☐ Check Supply Voltage
 - L1 - L2 _____ Amps
 - L2 - L3 _____ Amps
 - L1 - L3 _____ Amps
- ☐ Check Wheel Overlap _____
- ☐ Wheel Rotation _____



Start-Up

Checklist

Start-Up Checklist

1. Set Fan and Motor RPM

Motors with either solid state speed control or Vari-Green motor must be field balanced to the design fan RPM.

PSC Motor with Solid State Speed Control (XMSF-P1XX-HXX)

To adjust the speed of a motor with solid state speed control, adjust the speed controller dial until the fan is at its design fan RPM. The speed controller is shipped loose on units without a control center and is factory mounted and wired on units with a control center.

Vari-Green Motor (XMSF-P1XX-HXX-VG)

To adjust the speed of a Vari-Green motor, adjust the built-in potentiometer on the motor. To increase the speed, rotate the dial clockwise. To decrease the speed, rotate the dial counterclockwise.

VFD Controlled Motor (XMSF-P1XX-HXX-VFD)

The VFD will be factory programed for the design fan RPM. If VFD adjustments are required please see the Variable Frequency Drive section for additional information.

2. Check for Vibration

Check for unusual noise, or vibration. Excessive vibration may be experienced during initial start-up. Left unchecked, it can cause a multitude of problems, including structural and/or component failure.

Generally, fan vibration and noise is transmitted to other parts of the building by the ductwork. To minimize this undesirable effect, the use of heavy canvas connectors is recommended.

3. Motor Check

Measure the motor's voltage, and amps. Compare to the specifications. Motor amps can be reduced by lowering the fan and motor RPM

4. Air Volume Measurement and Check

Measure the unit's air volume (cfm) and compare it with its rated air volume. If air volume does not match the rated air volume, adjust the fan and motor RPM as necessary. The most accurate method for measuring the air volume is a pitot traverse method downstream of the blower. Other methods can be used, but should be proven and accurate.

Unit Model Number _____
(e.g. XMSF-P113-H10)

Unit Serial Number _____
(e.g. 10111000)

Start-Up Date _____

Start-Up Personnel Name _____

Start-Up Company _____

Phone Number _____

Start-Up Blower Checklist

☐ Check line voltage L1-L2 _____
L2-L3 _____
L1-L3 _____

☐ Check blower rotation

☐ Check for vibration

☐ Supply fan RPM _____ RPM

☐ Motor nameplate amps _____ Amps

☐ Actual motor L1 _____ Amps
L2 _____ Amps
L3 _____ Amps

☐ Actual CFM delivered _____ CFM

Maintenance

General

Filters

Filter maintenance is generally limited to cleaning and replacement.

If aluminum mesh filters are installed, they can be washed in warm soapy water.

An adhesive spray can be added to aluminum mesh filters to increase their efficiency.

If disposable filters are installed, they can be checked by holding up to a light source. If light cannot pass through the filter, it should be replaced.

When reinstalling filters, be sure to install them with the airflow in the correct direction. An airflow direction arrow is located on the side of the filters.

Replacement filters should be from the same manufacturer and the same size as the original filters provided with the unit.

Model	Filter Size	Filter Qty
XMSF-H10	19x19x1	2
XMSF-H20	21x21x1	2
XMSF-H30	24x24x1	2

Fan Wheels

Wheels require little attention when moving clean air. Occasionally oil and dust may accumulate on the wheel causing imbalance. When this occurs, the wheel and housing should be cleaned to assure proper operation.

Motors

Motor maintenance is generally limited to cleaning and lubrication (where applicable).

Cleaning should be limited to exterior surfaces only. Removing dust and grease build-up on the motor assures proper motor cooling.

Motors supplied with grease fittings should be greased in accordance with the manufacturer's recommendations.

Do not allow water or solvents to enter the motor or bearings. Motors and bearings should never be sprayed with steam, water or solvents.

Greasing motors is only intended when fittings are provided. Many motors are permanently lubricated, requiring no additional lubrication.



Reference

Vari-Green® Motors

Vari-Green® Motor Features

The Vari-Green motor is an electronically commutated (EC) motor that uses AC input power and internally converts it to a DC power supply which provides built-in control of motor speed down to 20% of design RPM.

Soft Start

All motors feature soft start technology which eliminates inrush current at start-up. The motors will reliably start at any speed setting

Overload Protection

If the motor becomes overloaded, it will automatically reduce its speed until it is no longer overloaded. This means that the motor will never operate in the “service factor” which is possible with many AC motors. The motor and control are electrically protected with lightning surge protection.

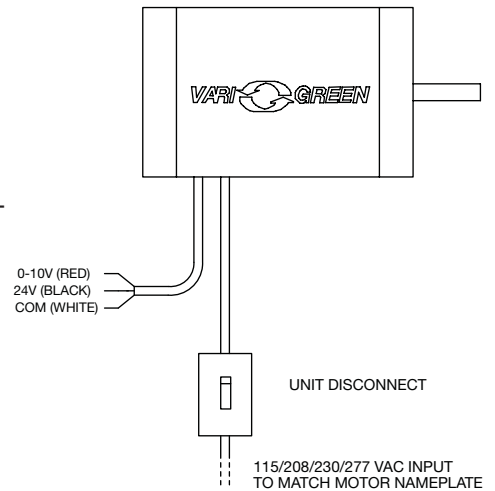
1/2 HP and 1 HP Motors

These motors have both a potentiometer dial on the motor for speed adjustment and the ability to accept a 0-10 VDC signal for remote speed control.

Electrical Wiring

The motor is prewired at the factory and cannot be changed inside the motor.

Connect single-phase power at the voltage listed on the nameplate. If remote control is desired, connect the 0-10 VDC and 24V signal for remote speed control.



Operation

There is a 4 second delay between the application of power and the motor starting. Motor speed is controlled as follows:

Dial on Motor

A small screwdriver can be used to make speed adjustments. To increase speed, rotate the dial clockwise. To decrease speed, rotate the dial counterclockwise. There is no need to connect the control wires.



0-10 VDC Signal

The dial on the motor will act as a maximum speed limiter. During start-up this should be adjusted for rated air volume.

24 VAC/DC power is required to control the motor with a 0-10 VDC signal. Without the 24 VAC/DC power the motor will be controlled by the dial on the motor. The motor will consume 0.7VA at 24 VAC or 25mA at 24 VDC.

From 0-1.9V the motor will be off. From 2-10V the motor will operate.

A low voltage wiring harness is needed to supply the 0-10V signal to the motor. This harness is available from the factory if conversion is necessary.

Reference

Vari-Green® Motors

2 HP Motors

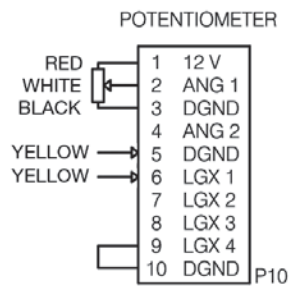
These motors have both a potentiometer dial on the motor for speed adjustment and the ability to accept a 0-10 VDC signal for remote speed control.

Electrical Wiring

All high and low voltage wiring connections are made inside the motor control box at the factory. Normally, there is no reason to enter the control box of the motor. If there is a need to enter the control box, disconnect power and wait at least five minutes to allow the capacitors to discharge.

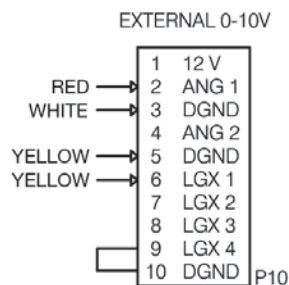
The motor is prewired at the factory and cannot be changed inside the motor. Connect single-phase power at the voltage listed on the nameplate. If remote control is desired connect the 0-10 VDC signal for remote speed control. Inside the control motor control box wiring will be dependent on the selected operation:

Dial on Motor - the dial is factory-wired into the low voltage terminal block inside the control box. The wires are connected as shown.



Dial on motor connection inside control box

0-10 VDC Signal - a two-wire pigtail is factory-wired into the low voltage terminal block. The wires are connected as shown.



0-10 VDC signal connection inside control box

If the motor needs to be tested before the 0-10 VDC signal is available, a jumper can be placed between terminals 1 and 2. This will force the motor to run at full speed.

Operation

There will be up to a 30 second delay between the application of power and the motor starting. The motor will “rock” back and forth upon startup as part of its normal operation.

Dial on Motor

Turn the dial with your fingers to adjust. To increase the speed, rotate the dial clockwise. To decrease the speed, rotate the dial counterclockwise. Turning the dial fully counterclockwise will turn the motor off.



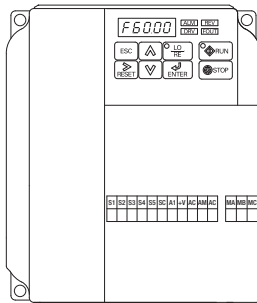
0-10 VDC signal

From 0-1.9 V the motor will be off. From 2-10V the motor will operate. 10V will correspond to the nameplate motor RPM, regardless of the position of the dial on the motor.



VFD Features

The factory installed wired and programmed VFD is used to control the speed of the fan as either a constant speed, multi-speed or modulating speed control. A Yaskawa model J1000 VFD will be located in the unit control center. This section contains basic information on operation and changing VFD speed settings. For more detailed information including fault codes see the Yaskawa VFD manual. For additional information on wiring please refer to the unit specific wiring diagram located inside the unit control center.



J1000

Changing the VFD Access Level

With factory default settings, the VFD will be configured to restrict access to the majority of the VFD parameters. To view or change any of these parameters, change the access level (A1-01) to 2. This will allow access to the all VFD parameters.

Operation

VFDs will be configured from the factory to operate in one of three modes:

Constant Speed

The VFD will control the motor to operate at constant speed. The VFD will run at Frequency Reference 1 (D1-01). The factory default setting is unit specific for design fan RPM.

Multi-Speed

Digital contact closures (by others) command the VFD to run at multiple speed settings:

- **Open** – VFD runs at frequency reference 1 (D1-01).
Factory default is unit specific for design fan RPM.
- **SC to S5** – VFD runs at frequency reference 3 (D1-03).
Factory default is unit specific for one-half design fan RPM.

Modulating

A 0-10 VDC signal wired in the field by others varies the speed of the fan. 10V results in design fan RPM and 0V results in one-half design fan RPM, per the factory default settings.

Changing VFD Speed Settings

Before making any changes, ensure the drive is stopped and the access level (A1-01) is set to 2.

Maximum and Minimum Frequency Limits

Maximum frequency will be indicated by a label on the unit.

Minimum recommended frequency is 18 Hz.

SUPPLY FAN

PRD ORDER

MAX FREQUENCY

XX Hz

695064

Constant Speed and Multi-Speed

Maximum speed – Change frequency reference 1 (D1-01) to the desired frequency. If the desired frequency is greater than 60Hz, adjust the max output frequency (E1-04) to the desired frequency first.

Minimum speed (multi-speed only) – Change frequency reference 3 (D1-03) to the desired frequency.

Modulating

Maximum Speed (Desired frequency \geq 60Hz) – Change the upper reference (D2-01) and the terminal A1 gain (H3-03) to 100%. Adjust the max output frequency (E1-04) to the desired frequency.

Maximum Speed (Desired frequency <60Hz) - Change the upper reference (D2-01) and the terminal A1 gain (H3-03) to desired % of 60 Hz (i.e. for 48 Hz set to 80%).

Minimum Speed – Change the lower reference (D2-02) and the terminal A1 bias (H3-04) to the desired % of 60 Hz (i.e. for 24 Hz set to 40%)

Reference

Maintenance Log

Date _____ Time _____ AM/PM

Notes: _____

Date _____ Time _____ AM/PM

Notes: _____

Date _____ Time _____ AM/PM

Notes: _____

Date _____ Time _____ AM/PM

Notes: _____

Date _____ Time _____ AM/PM

Notes: _____

Date _____ Time _____ AM/PM

Notes: _____

Our Commitment

As a result of our commitment to continuous improvement, Accurex reserves the right to change specifications without notice.

Product warranties can be found online at accurex.com, either on the specific product page or in the Warranty section of the website at Accurex.com/Resources/Warranty.



P.O. Box 410 Schofield, WI 54476
Phone: 800.333.1400 • Fax: 715.241.6191
Parts: 800.355.5354 • accurex.com