Altra-Air

GEARLESS *Sailfin*

ELECTRICAL INSTALLATION GUIDE

ALTRA-AIR SAILFIN GEARLESS FAN

All installation wiring must conform to your National Electrical Code and meet Local Codes. While we can't guarantee it, we believe that using Envira-North Systems controls and following our instructions will result in an installation that meets those requirements. Code compliance is ultimately the installer's and/or the user's responsibility.

Subject to Changes Without Notification.

ENVIRA-NORTH
SYSTEMS LIMITED

(519) 527-2198
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SAFETY PRECAUTIONS

All installations must be installed by a qualified person.
Do not work on live equipment. Use of lock-out procedures is a must.

IMPORTANT!
The installation of a wind sensor is mandatory in agricultural installations.

ELECTRICAL INSTALLATION

INCLUDED COMPONENTS
• Fan Mounted VFD
• VFD Mounting Plate
• Remote Keypad in Control Box
• Wiring Harness
• 100' CAT 5 Cable

REFERENCE ACRONYM KEY
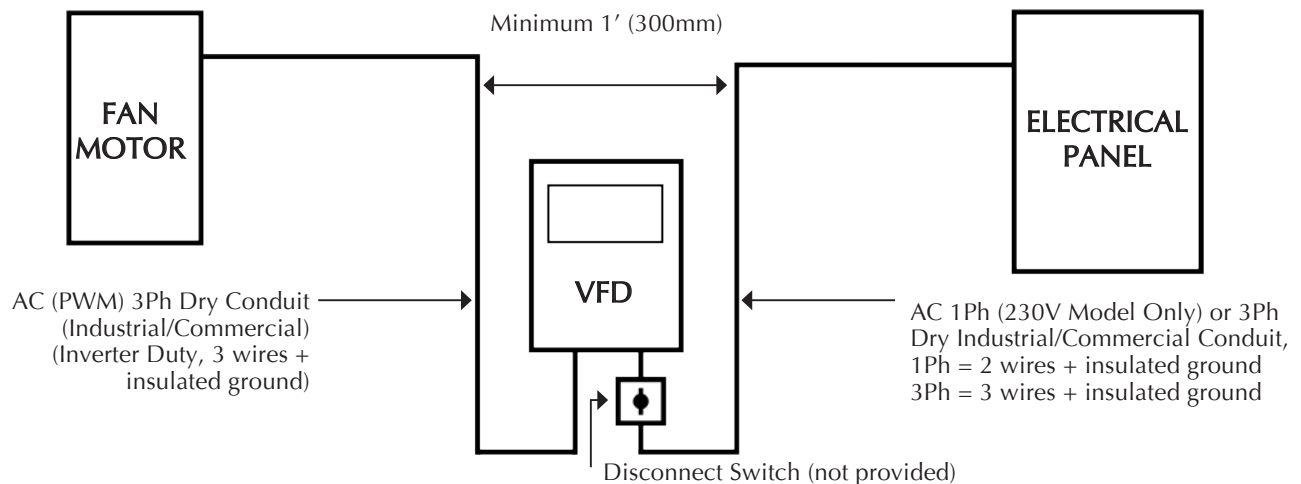• VFD - Variable Frequency Drive

WIRE REQUIREMENTS
• The size of the input and output wires depends on the length and current draw of the VFD and Motor.
• Use a continuous run of wires between the Motor and VFD (no splices or connections).
• Use adequately sized, shielded VFD cables for VFD to motor wiring.

A separate insulated ground must be provided to each VFD from the electrical panel.
This will reduce the noise from being radiated in other equipment.

Motor is rated with an Insulation Class F;
Ensure proper wiring is used as per current electrical codes.

WIRING SCHEMATIC

Minimum 1' (300mm)

FAN MOTOR

VFD

ELECTRICAL PANEL

AC (PWM) 3Ph Dry Conduit (Industrial/Commercial) (Inverter Duty, 3 wires + insulated ground)

AC 1Ph (230V Model Only) or 3Ph Dry Industrial/Commercial Conduit, 1Ph = 2 wires + insulated ground 3Ph = 3 wires + insulated ground
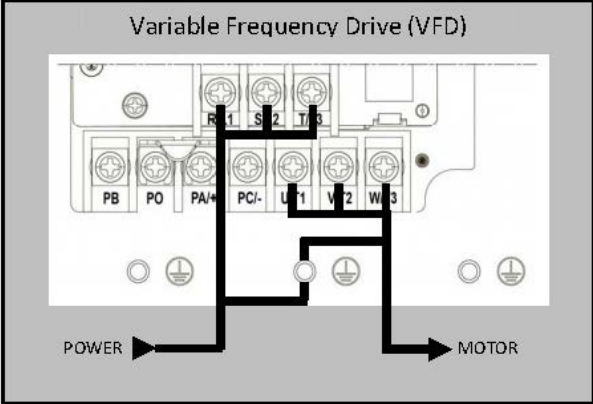
Disconnect Switch (not provided)

WIRE LOCATION
• DO NOT RUN input and output power cables in the same conduit
• DO NOT RUN control cables with any power cables in the same conduit
• DO NOT RUN different fan's output power cables in the same conduit

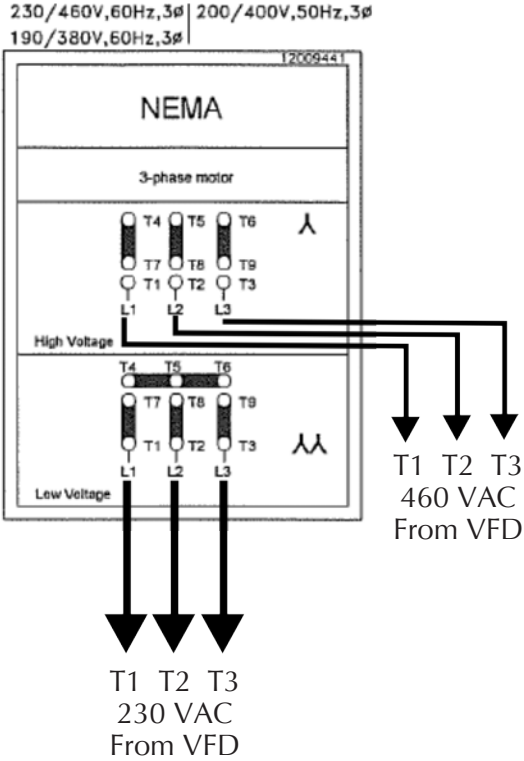## WIRE CONNECTIONS (VFD)

Input Power
- Single phase (1Ph) use L1 - L2 + PE (Ground)
- Three phase (3Ph) use L1 - L2 - L3 + PE (Ground)

WIRE CONNECTIONS (MOTOR)

The Variable Frequency Drive provides the over temperature and overload protection.

LED LIGHT
If unit is fitted with the optional LED light it is capable of being controlled through the VFD with the SmartAir control or by a suitable ON/OFF/Dimmer switch.

SmartAIR CONTROL
Wire the LED light to drive as pictured below to allow ON/OFF and Dimming control from the HMI.

*Depending on the mounting location of the VFD a junction box and additional wire may be required to complete the connection from the light to the VFD.
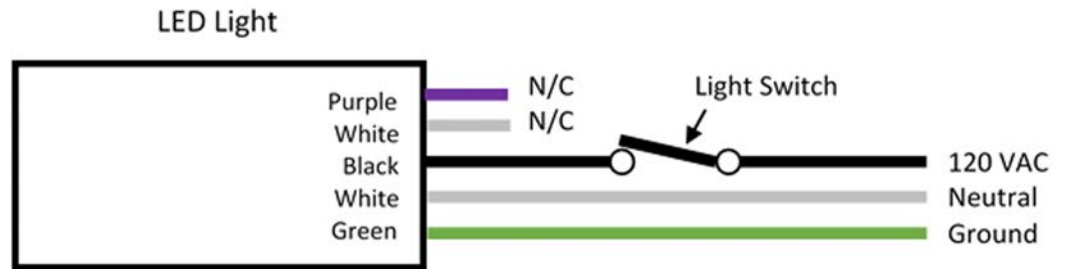
*The Light L1/L2 may be connected to the L1/L2 input for the VFD on 240V models only. 480V models must supply 120V or 240V from an external source.

120/240 VAC
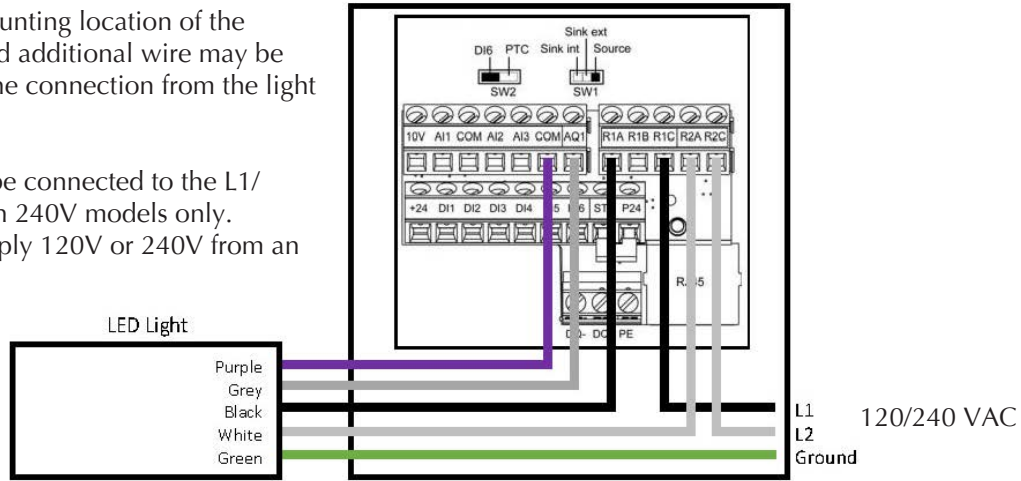
EXTERNAL SWITCH WITHOUT DIMMING
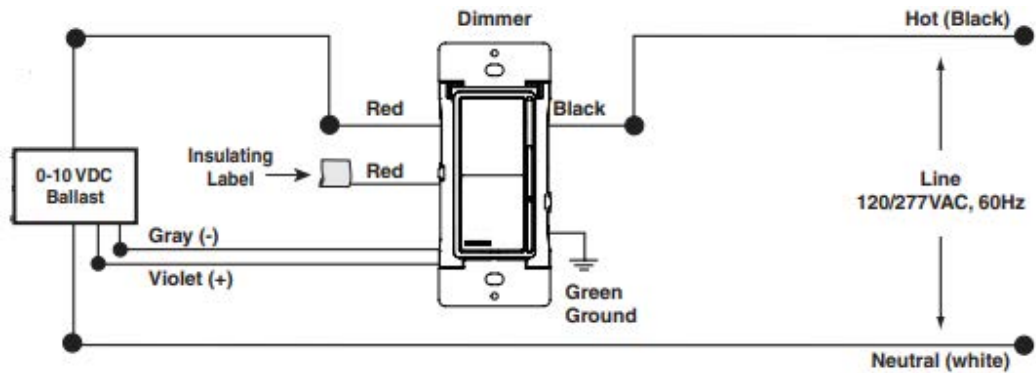A standard 120 VAC light switch can be used for ON/OFF light control without dimming.

The light will operate at 100% brightness when turned ON if no dimmer is connected.
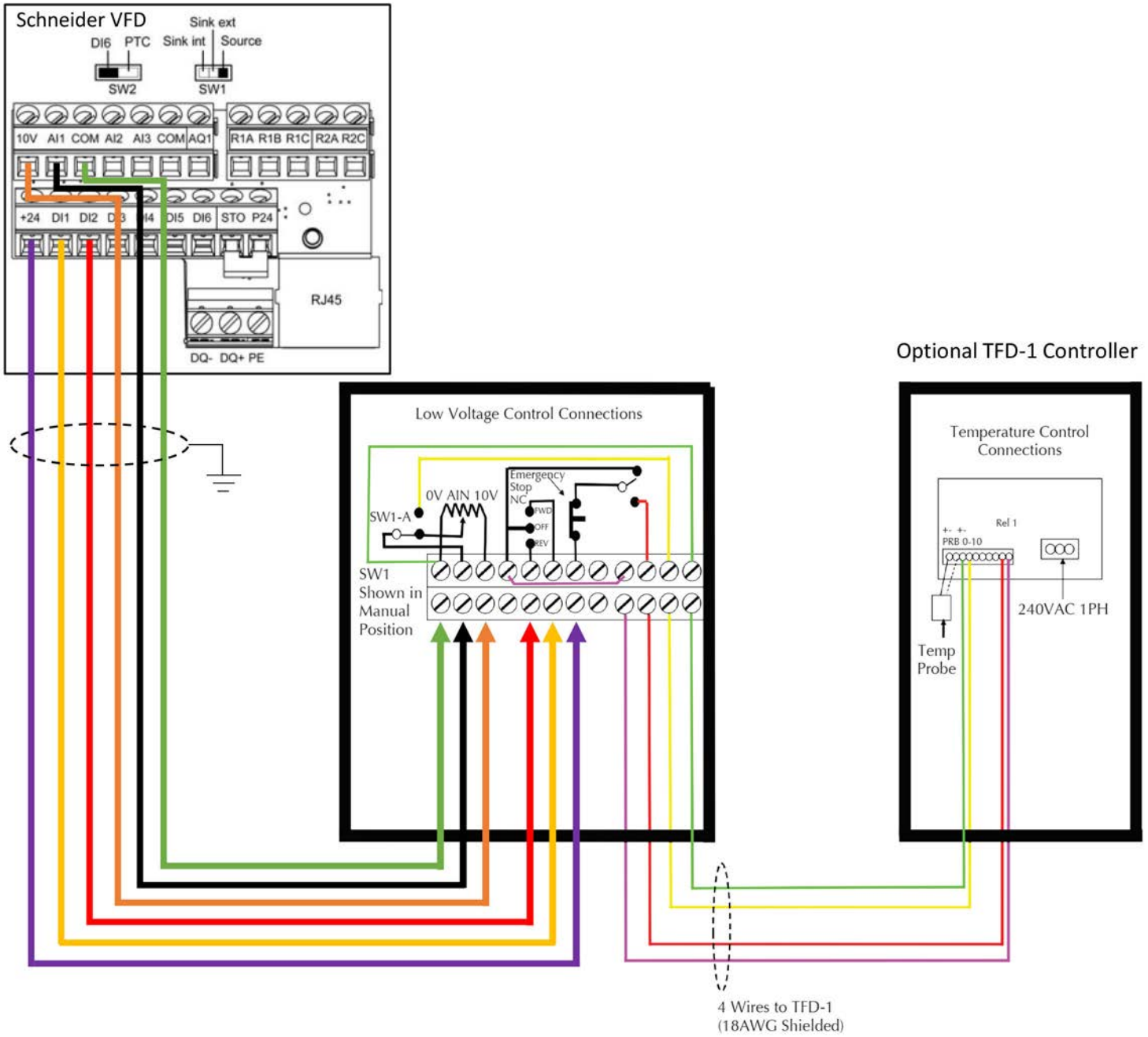

EXTERNAL SWITCH WITH DIMMING
A 0-10V LED compatible Dimmer switch must be used to control the light with dimming.

Leviton DS710-10Z or Lutron DVSTV-WH are examples of suitable 0-10V dimmer switches.

SCHNEIDER VFD TO LOW VOLTAGE CONTROLLER WIRING DIAGRAM
(OPTIONAL)

SmartAIR FAN CONTROL

INCLUDED COMPONENTS
- SmartAIR Graphic Interface
- RJ45 Coupler
- 100′ CAT5 Cable
- Split Cable Gland

REFERENCE ACRONYM KEY
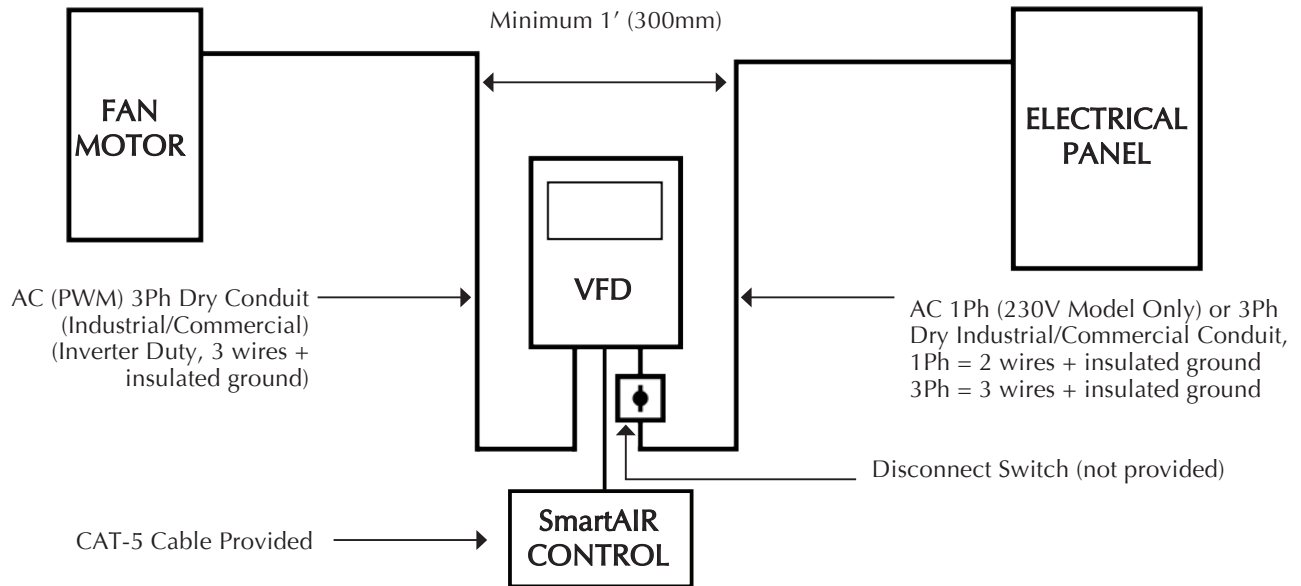- VFD- Variable Frequency Drive

CONTROL SCHEMATIC

Minimum 1' (300mm)

FAN
MOTOR

VFD

ELECTRICAL
PANEL

AC (PWM) 3Ph Dry Conduit
(Industrial/Commercial)
(Inverter Duty, 3 wires +
insulated ground)

AC 1Ph (230V Model Only) or 3Ph
Dry Industrial/Commercial Conduit,
1Ph = 2 wires + insulated ground
3Ph = 3 wires + insulated ground

Disconnect Switch (not provided)

CAT-5 Cable Provided

SmartAIR
CONTROL

CABLE LOCATION:
• DO NOT RUN control cables and any power cables in the same conduit.

CABLE CONNECTION (VFD)
Cat5 cable should be connected to the RJ45 port INSIDE
of the VFD enclosure, as not to be exposed to environmental
conditions. Do not connect to the external RJ45 port on the drive.
A minimum of Cat 5 cable must be used to connect between
devices.

If required cable length is greater than the 100' of Cat5 supplied
with the VFD, bulk cable should be used to make a cable with no
additional connections.

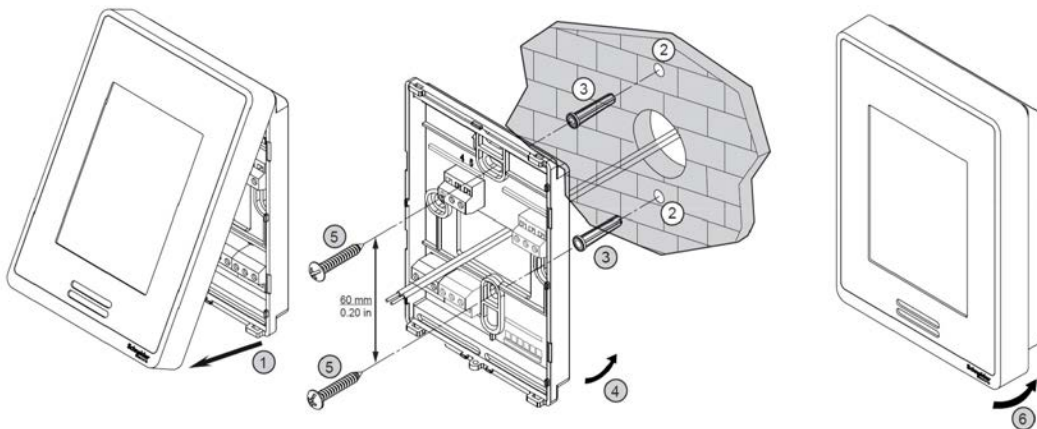***CONNECT CAT5 CABLE TO PORT INSIDE OF VFD
ENCLOSURE.**

INSTALLATION CONSIDERATIONS
- The HMI must be mounted in a safe and dry location.
- It should not be mounted in a location that it is exposed to direct liquid contact (i.e., splashing or washdown).
- If utilising the built-in temperature and/or humidity sensors of the HMI, placement of the HMI in a proper location to ensure its efficiency, accurate readings, and the proper automatic function of the fan is very important.
  If possible place the HMI away from:
- Direct sunlight, drafts, exterior doorways, skylights, windows, and exterior walls.
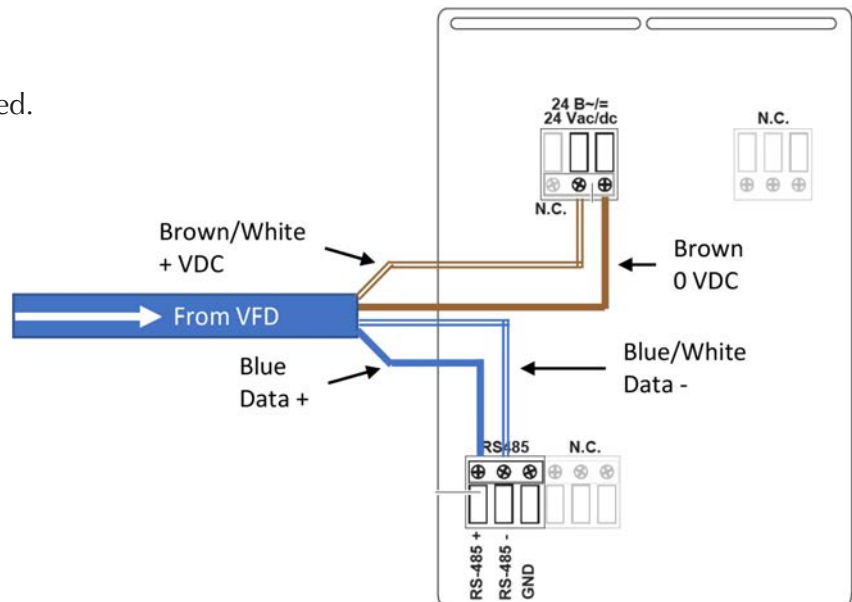
MOUNTING
The HMI can be mounted directly to a wall with or without the use of a electrical box in the wall.
If the HMI is to be mounted on a structural steel column or similar, a single gang weatherproof box is recommended to space the HMI off of the column to avoid inaccurate temperature readings.

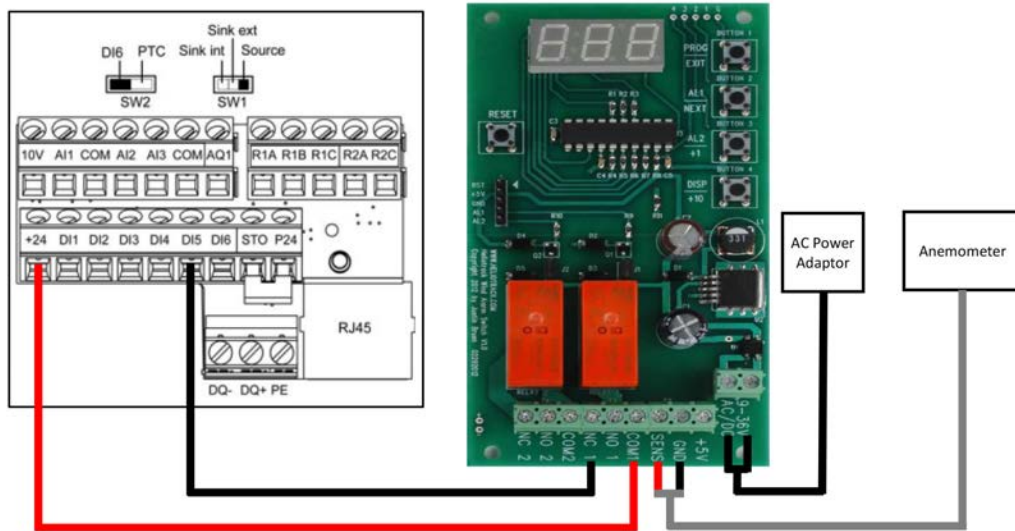## WIRING
The HMI comes with a Cat5 cable prewired.

In some cases it may be necessary to terminate the Cat5 cable from the VFD directly to the HMI.

WIND SPEED SWITCH (OPTIONAL)

If a Wind Speed Switch is to be used, the control must be wired as pictured below, to allow for automatic shutdown of the fan based on high wind speeds.


*Please refer to Wind Speed Switch supplement for further installation and operation details.

WIND SPEED ALARM

If high wind speeds are detected the fan will decelerate to a stop and a message will display on the HMI (pictured below.) Once the wind speed drops below the set point the fan will automatically restart.
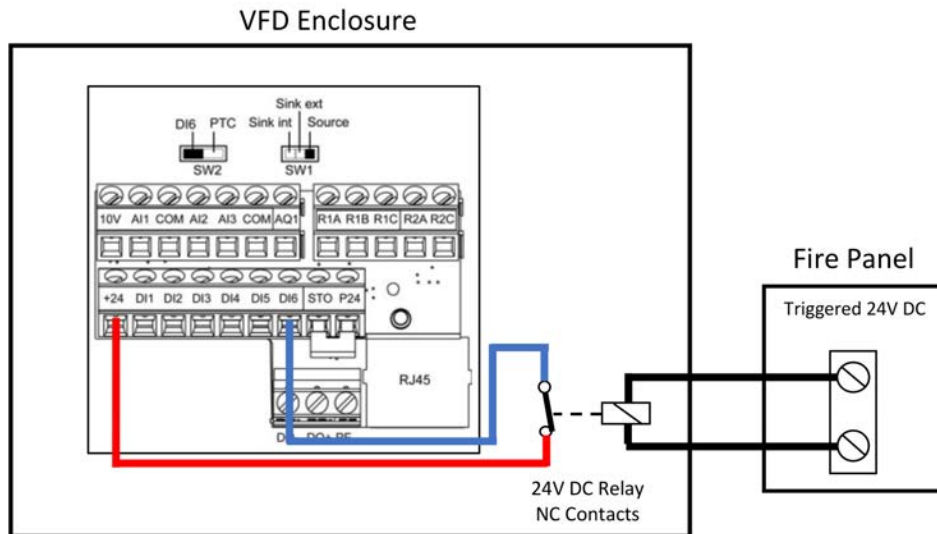
WIND SENSOR JUMPER

If no Wind Speed Sensor is to be installed a jumper MUST be installed as pictured below for the unit to operate with the SmartAir Control.
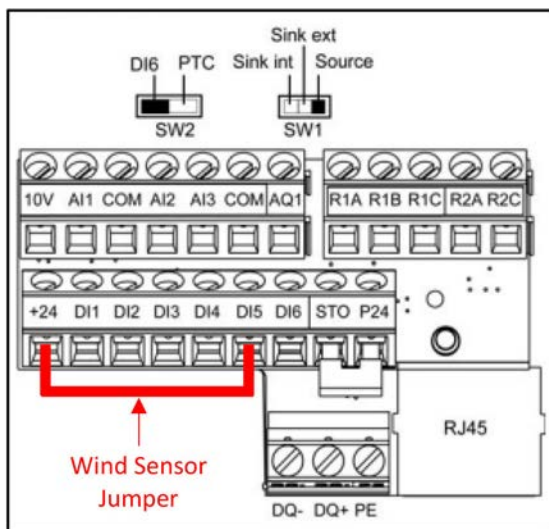
FIRE SUPPRESSION SYSTEM RELAY (OPTIONAL)

To integrate fan controls with a fire detection / suppression system wire fire panel to supplied relay in VFD enclosure as shown below.
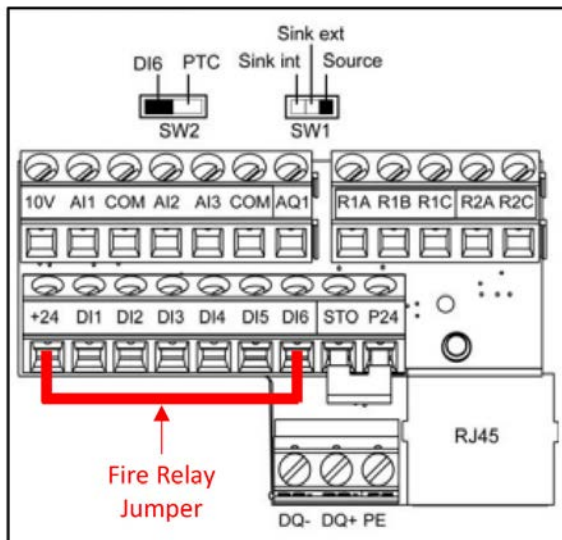

FIRE RELAY ALARM

If the Fire Relay is activated the fan will decelerate to a stop and a message will displayon the HMI (pictured below.) Once the Fire Relay is reset the fan will automatically restart.

FIRE RELAY JUMPER

If no Fire Relay is to be installed a jumper MUST be installed as pictured below for the unit to operate with the SmartAir Control.

OPERATION

Controlling the speed, direction of rotation, as well as the ON/OFF and intensity of the optional LED light is done through the screens on the SmartAIR HMI.

FAN CONTROL

Auto/Manual modes, speed and direction selections are done on this screen.

Fault Indicator:
The bar at the top and bottom of all screens indicates the status of the VFD.
Green: Normal
Red: Faulted

Manual Controls:
Operational control of fan, ON/OFF and FWD/REV.
Reset clears faults on drive.
Set desired fan speed by tapping number or with +/- buttons.

Readings Display:
Actual speed, Temperature, and Humidity readings displayed.
Temperature reading units can be displayed in °C or °F. Units can be selected on Setting page 2.

Navigation Buttons:
Navigate to the various pages on the display.

LIGHT CONTROL SCREEN

Control of the optional LED Light is done from this screen.
Note: This screen is only accessible if the unit is equipped with the LED light option.

Light Controls:
ON/OFF and Dimming control of light
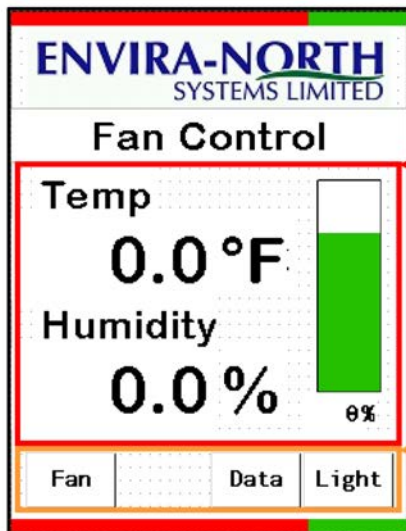Set desired light intensity by tapping number or with +/- buttons.

Navigation Buttons:
Navigate to the various pages on the display.

MAIN SCREEN

Selecting this page enters the control into Auto Mode.
This screen displays the sensor readings and the fans current speed as calculated based on the set-points set in the Settings screens.
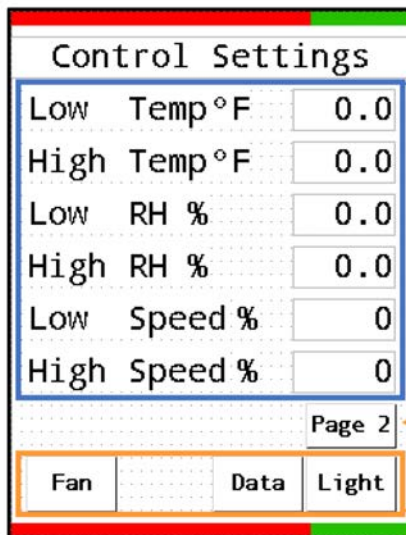

Readings Display:
Actual speed, Temperature, and Humidity readings displayed. Temperature reading units can be displayed in °C or °F. Units can be selected on Setting Screen 2.

Navigation Buttons:
Navigate to the various pages on the display.

SETTINGS SCREEN 1

Auto Mode speed is calculated based on the settings entered in the fields on this screen.

Set-point Entry:
Enter desired setpoint values in each of the respective fields.
*When changing temperature units the value will not automatically convert, the desired set-point value must be entered manually.

Setting Screen 2 Button:
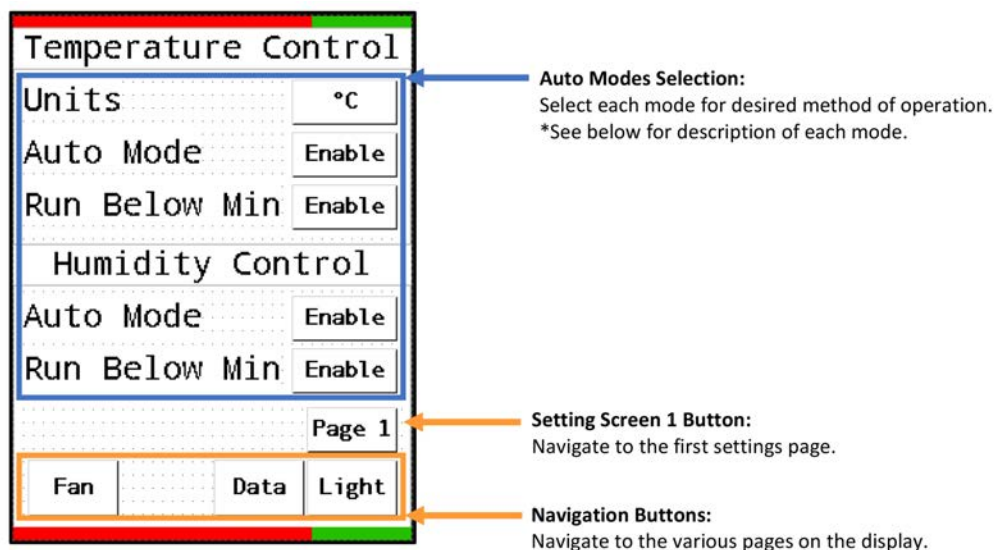Navigate to the second settings page.

Navigation Buttons:
Navigate to the various pages on the display.

SETTINGS SCREEN 2
Auto Mode functions are based on the settings enabled on this screen.

*The settings on this screen are not retentive, if power to the HMI is lost, they will reset to Disabled
  and must be re-enabled for fan to function in Auto Mode

CONTROLS MODES

UNITS
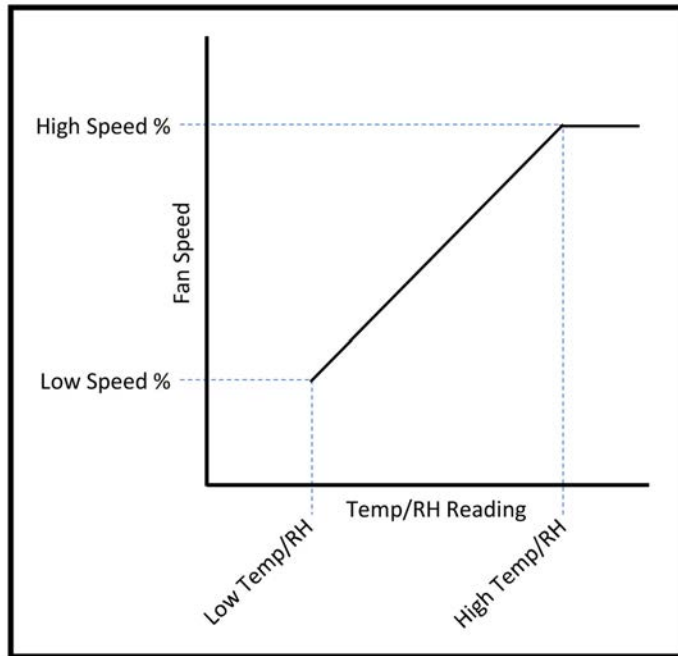Select temperature units displayed °C/°F.

AUTO MODE
- Enabling Auto Mode allows the fan to automatically start if the temperature or humidity rises to the Low Temp/RH set-point, beginning to run at the Low Speed % set-point.
- The fan speed will continue to increase to the High Speed % based on the sensed temperature or humidity until the High Temp/RH set-point is reached.
- The fan will continue to run at the High Speed % set-point if the sensed temperature or humidity is above the High Temp/RH set-point.
- If both Temperature and Humidity Auto Modes are enabled the fan will run at the higher calculated required speed.

RUN BELOW MIN
- Allows the fan to run at the Low Speed % set-point if the sensed temperature is below the Low Temp set-point.

This chart shows how the fan speed is calculated relative to the sensed temperature and humidity

DATA SCREEN

Realtime data from the drive is displayed on this page allowing live monitoring of fan performance

Readings Display:
Realtime data of drive and motor displayed.

Navigation Buttons:
Navigate to the various pages on the display.

SmartAIR FAN CONTROL

SmartAIR MULTI-FAN CONTROL INSTALLATION

INCLUDED COMPONENTS
- HMI Control
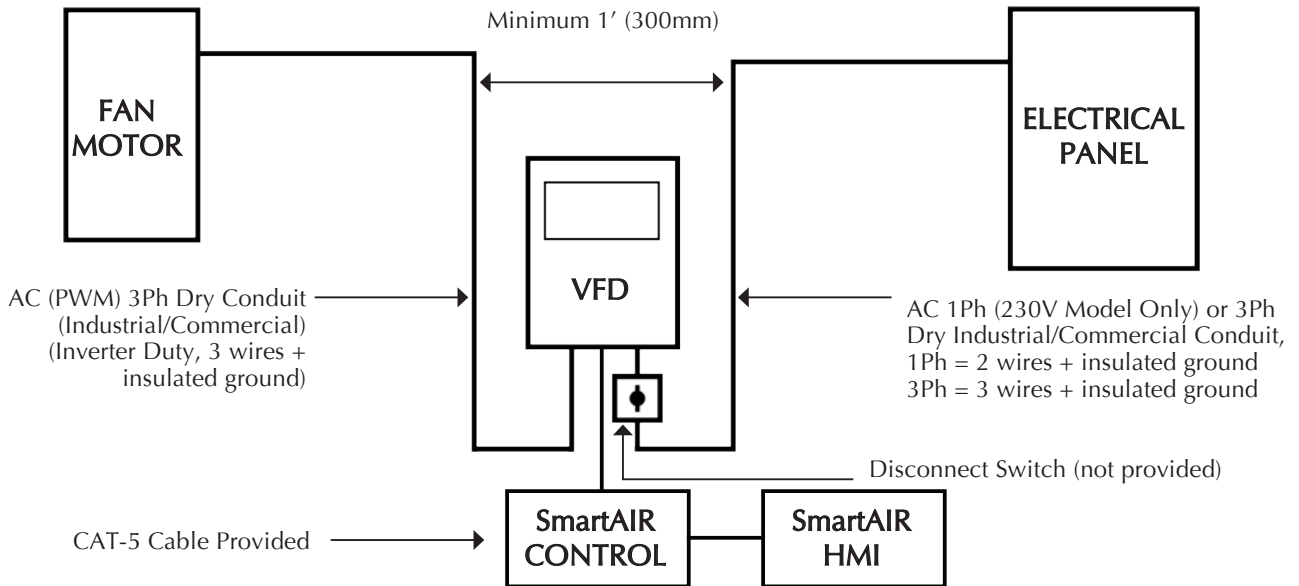- Control Box
- RJ45 Splitters
- 100' CAT5 Cable

REFERENCE ACRONYM KEY
- VFD- Variable Frequency Drive

CONTROL SCHEMATIC

Minimum 1' (300mm)

FAN
MOTOR

VFD

ELECTRICAL
PANEL

AC (PWM) 3Ph Dry Conduit
(Industrial/Commercial)
(Inverter Duty, 3 wires +
insulated ground)

AC 1Ph (230V Model Only) or 3Ph
Dry Industrial/Commercial Conduit,
1Ph = 2 wires + insulated ground
3Ph = 3 wires + insulated ground

Disconnect Switch (not provided)

CAT-5 Cable Provided

SmartAIR
CONTROL

SmartAIR
HMI

VFD MOUNTING AND ELECTRICAL CONNECTION:

Please refer to the Electrical Installation Guide for full recommended VFD mountibng and electrical connection instructions.
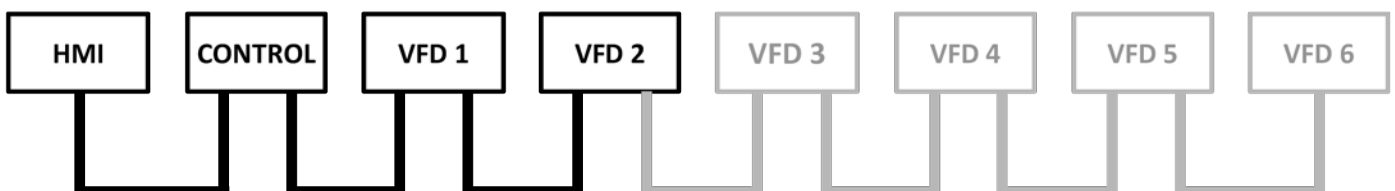
NETWORK CONFIGURATION

- Using the short CAT 5 cable in the VFD, connect the supplied RJ45 splitter as shown.
- Connect the CAT 5 cable from the control box to VFD 1 to one of the ports of the splitter.
- Connect a CAT 5 cable for VFD 2 to the remaining port of the splitter.
- Connect the remaining VFD's in the same manner.
- The last VFD in the network does not require a splitter. Remove the short CAT 5 cable from the VFD and connect the CAT 5 cable from the previous VFD directly the RJ45 port inside the VFD enclosure.

** All CAT 5 connections should be made inside of an enclosure.

The connection diagram below outlines how to create the fan control network.
It is important to connect the Cat5 cables in the control box to the correct field device.

HMI | CONTROL | VFD 1 | VFD 2 | VFD 3 | VFD 4 | VFD 5 | VFD 6

CABLE LOCATION:
•   DO NOT RUN control cables and any power cables in the same conduit.

CABLE CONNECTION (VFD)
Cat5 cable should be connected to the RJ45 port INSIDE of the VFD enclosure, as not to be exposed to environmental conditions. Do not connect to the external RJ45 port on the drive.
A minimum of Cat 5 cable must be used to connect between devices.

If required cable length is greater than the 100' of Cat5 supplied with the VFD, bulk cable should be used to make a cable with no additional connections.

The last fan on the network does not require a splitter to be installed, connect directly to internal RJ45 port.
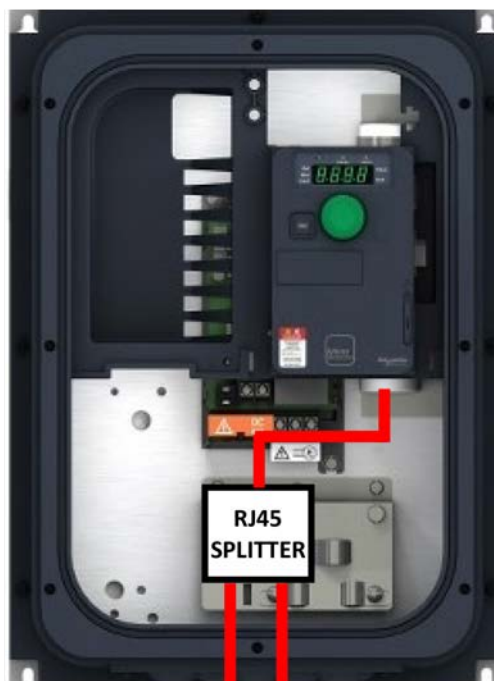
From Control Box /
previous VFD   To next VFD

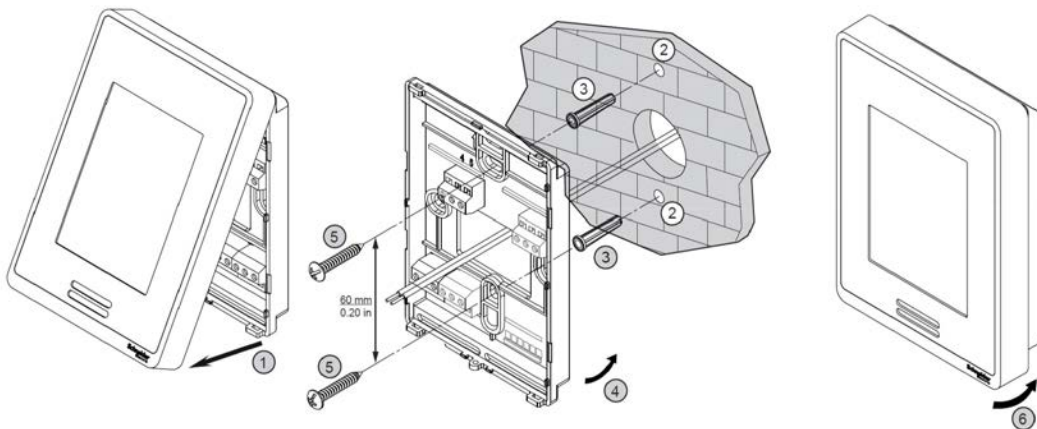*Connect Cat5 Cable and splitter to port inside of VFD enclosure

INSTALLATION CONSIDERATIONS
- The HMI must be mounted in a safe and dry location.
- It should not be mounted in a location that it is exposed to direct liquid contact (i.e., splashing or washdown).
- If utilising the built-in temperature and/or humidity sensors of the HMI, placement of the HMI in a proper location to ensure its efficiency, accurate readings, and the proper automatic function of the fan is very important.
  If possible place the HMI away from:
- Direct sunlight, drafts, exterior doorways, skylights, windows, and exterior walls.
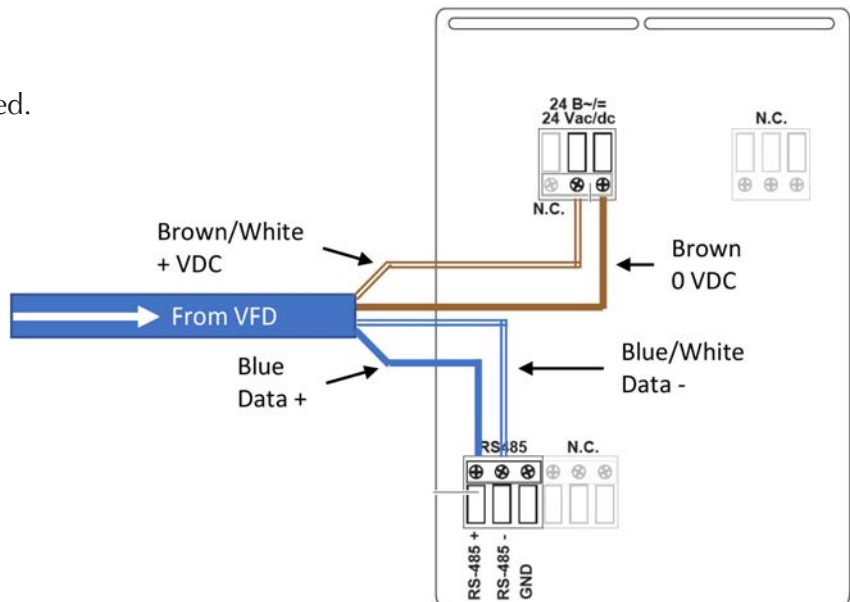
MOUNTING
The HMI can be mounted directly to a wall with or without the use of a electrical box in the wall.
If the HMI is to be mounted on a structural steel column or similar, a single gang weatherproof box is recommended to space the HMI off of the column to avoid inaccurate temperature readings.

## WIRING
The HMI comes with a Cat5 cable prewired.

In some cases it may be necessary to terminate the Cat5 cable from the VFD directly to the HMI.

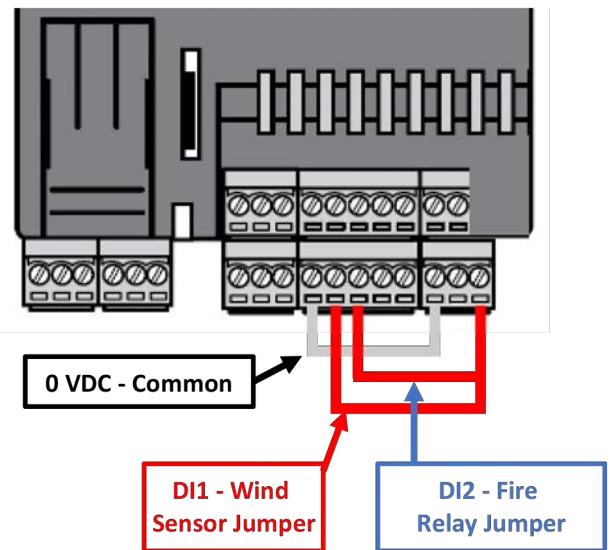## CONTROL BOX MOUNTING & CONNECTIONS

The control box should be mounted in a dry location, do not wash the control box with pressurized water.
Connect CAT 5 cables for the HMI and VFD #1 to labeled connectors inside control box.
Connect power supply to receiver on bottom of control box.

Optional Wind Speed Switch Shown

TO HMI
TO FANS
UP
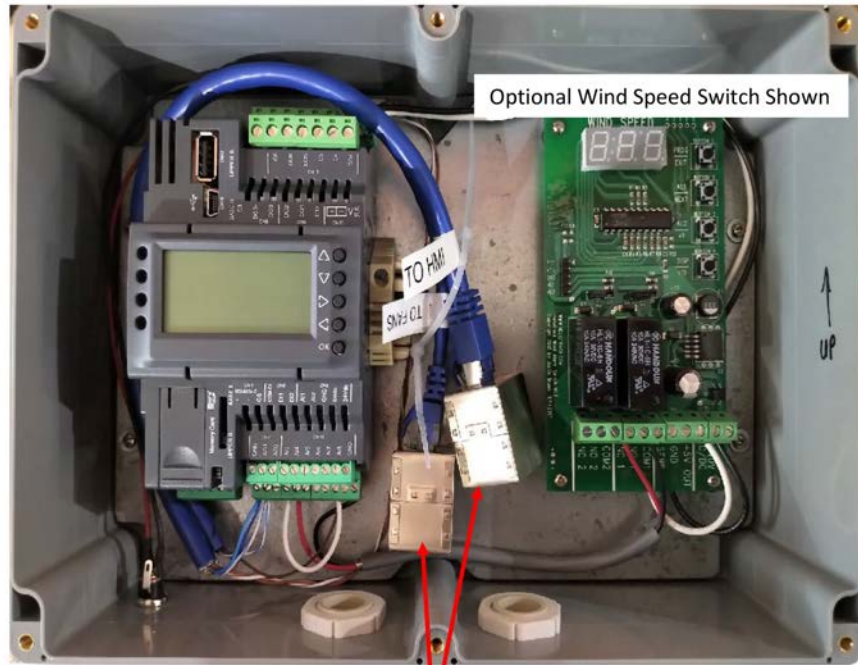
24 VDC Power Supply Connection   Labeled Cat5 Connections
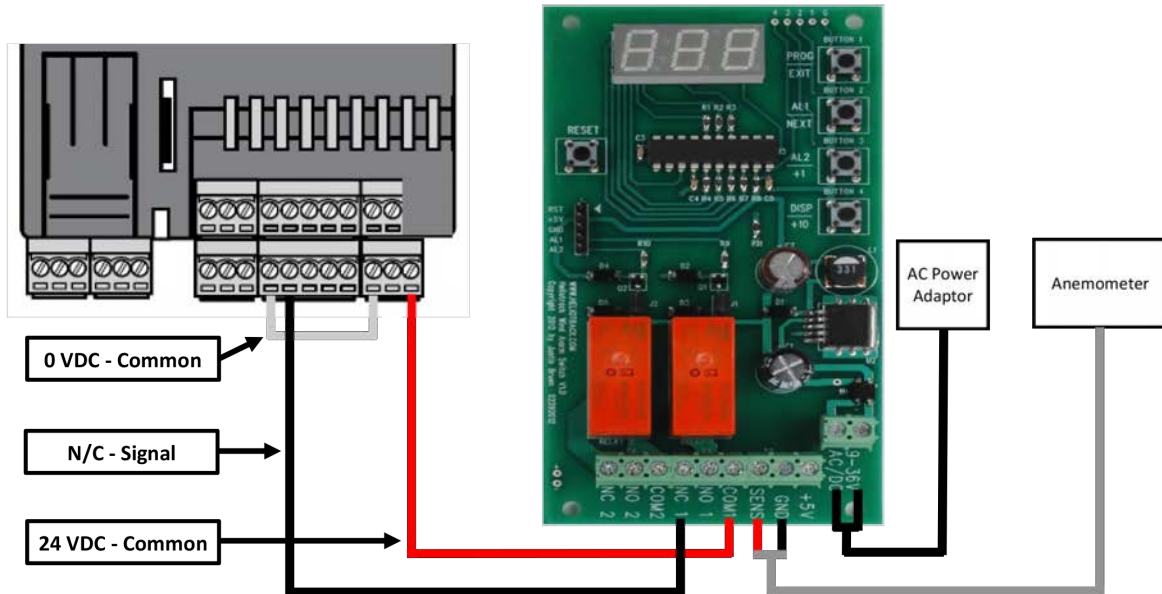
OPTIONAL EQUIPMENT

The controller is provisioned for integration with a wind speed sensor or fire suppression system.
If these options are not requested at time of manufacture, jumpers are installed to allow for normal operation of the fans.
The picture shows the jumper connections to the controller.

0 VDC - Common

DI1 - Wind
Sensor Jumper

DI2 - Fire
Relay Jumper

WIND SPEED SWITCH (OPTIONAL)

If a Wind Speed Switch is to be used, the control must be wired as pictured below, to allow for automatic shutdown of the fan based on high wind speeds.

*Please refer to Wind Speed Switch supplement for further installation and operation details.
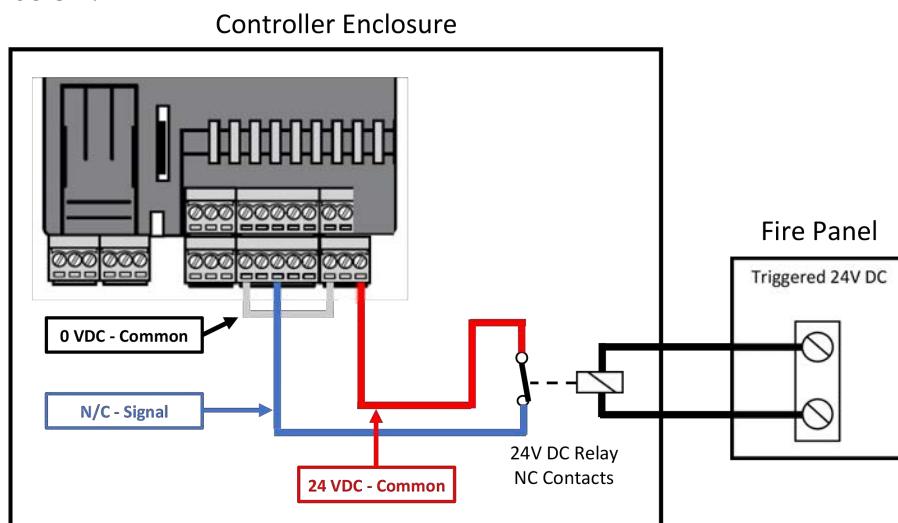
WIND SPEED ALARM

If high wind speeds are detected the fan will decelerate to a stop and a message will display on the HMI (pictured below.) Once the wind speed drops below the set point the fan will automatically restart.

FIRE SUPPRESSION SYSTEM RELAY (OPTIONAL)

To integrate fan controls with a fire detection / suppression system wire fire panel to supplied relay in VFD enclosure as shown below.

Controller Enclosure

Fire Panel

Triggered 24V DC

0 VDC - Common

N/C - Signal

24V DC Relay
NC Contacts

24 VDC - Common

FIRE RELAY ALARM

If the Fire Relay is activated the fan will decelerate to a stop and a message will displayon the HMI (pictured below.) Once the Fire Relay is reset the fan will automatically restart.

OPERATION
Controlling the speed, direction of rotation, as well as the ON/OFF and intensity of the optional LED light is done through the screens on the SmartAIR HMI.

FAN CONTROL
Auto/Manual modes, speed and direction selections are done on this screen.

Fault Indicator:
The bar at the top and bottom of all screens indicates the status of the VFD.
Green: Normal
Red: Faulted

Fan Selection:
Select which fan to adjust settings.

Manual Controls:
Operational control of fan, ON/OFF and FWD/REV.
Reset clears faults on drive.
Set desired fan speed by tapping number or with +/- buttons.

Readings Display:
Actual speed, Temperature, and Humidity readings displayed.
Temperature reading units can be displayed in °C or °F. Units can be selected on Setting page 2.

Navigation Buttons:
Navigate to the various pages on the display.

LIGHT CONTROL SCREEN
Control of the optional LED Light is done from this screen.
Note: This screen is only accessible if the unit is equipped with the LED light option.

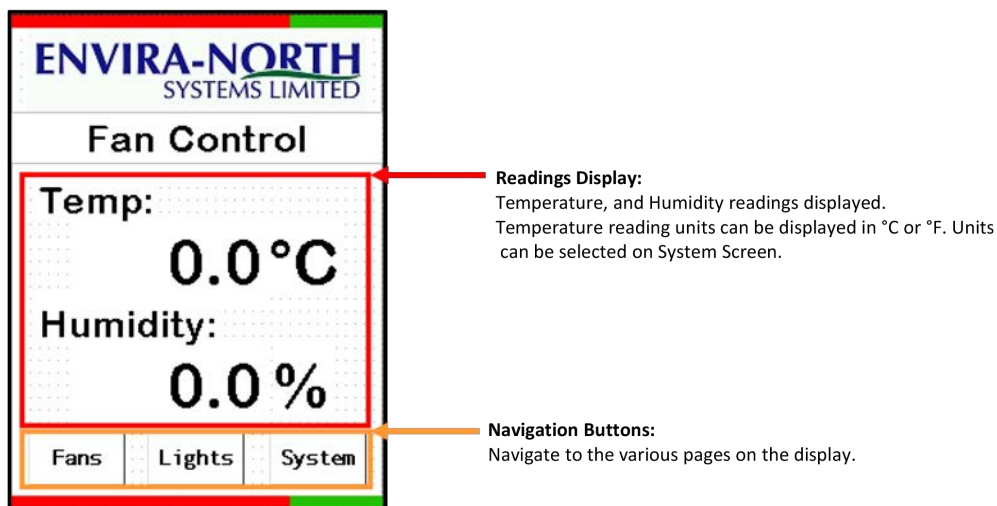**Fan Selection:**
Select which fan to adjust settings.

Light Controls:
ON/OFF and Dimming control of light
Set desired light intensity by tapping number or with +/- buttons.

Navigation Buttons:
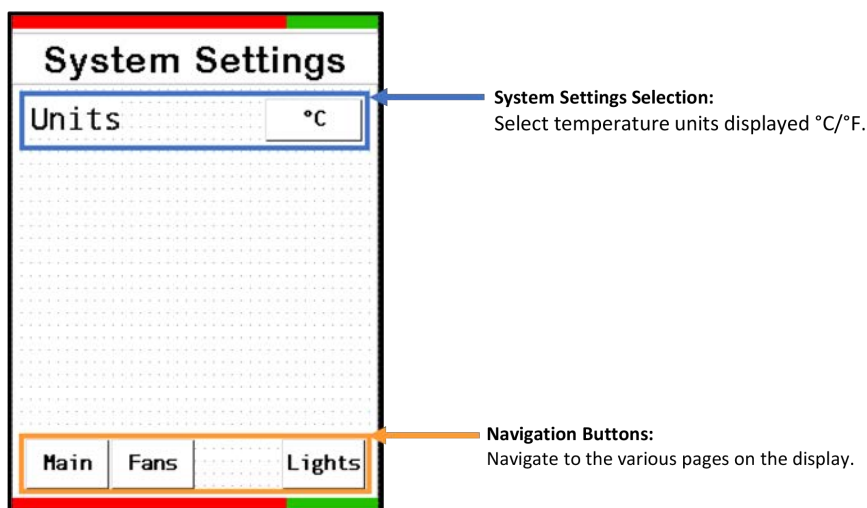Navigate to the various pages on the display.

MAIN SCREEN
Sensor readings displayed on this screen.

Readings Display:
Temperature, and Humidity readings displayed.
Temperature reading units can be displayed in °C or °F. Units
can be selected on System Screen.

Navigation Buttons:
Navigate to the various pages on the display.

SYSTEM SETTING SCREEN
This screen allows selection of system wide settings.

System Settings Selection:
Select temperature units displayed °C/°F.

Navigation Buttons:
Navigate to the various pages on the display.

SETTINGS SCREEN 1
Auto Mode speed is calculated based on the settings entered in the fields on this screen.

Set-point Entry:
Enter desired setpoint values in each of the respective fields.

*When changing temperature units the value will not automatically convert, the desired set-point value must be entered manually.
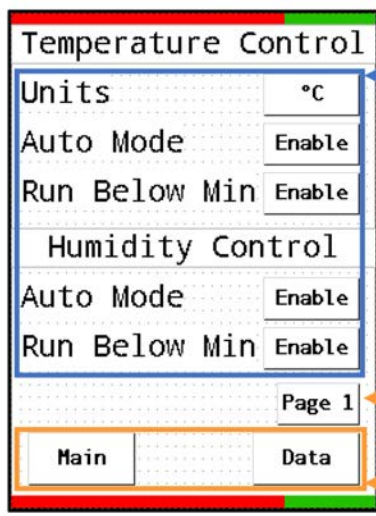
Setting Screen 2 Button:
Navigate to the second settings page.

Navigation Buttons:
Navigate to the various pages on the display.

SETTINGS SCREEN 2
Auto Mode functions are based on the settings enabled on this screen.
*The settings on this screen are not retentive, if power to the HMI is lost, they will reset to Disabled and must be re-enabled for fan to function in Auto Mode

Auto Modes Selection:
Select each mode for desired method of operation.
*See below for description of each mode.

Setting Screen 1 Button:
Navigate to the first settings page.

Navigation Buttons:
Navigate to the various pages on the display.
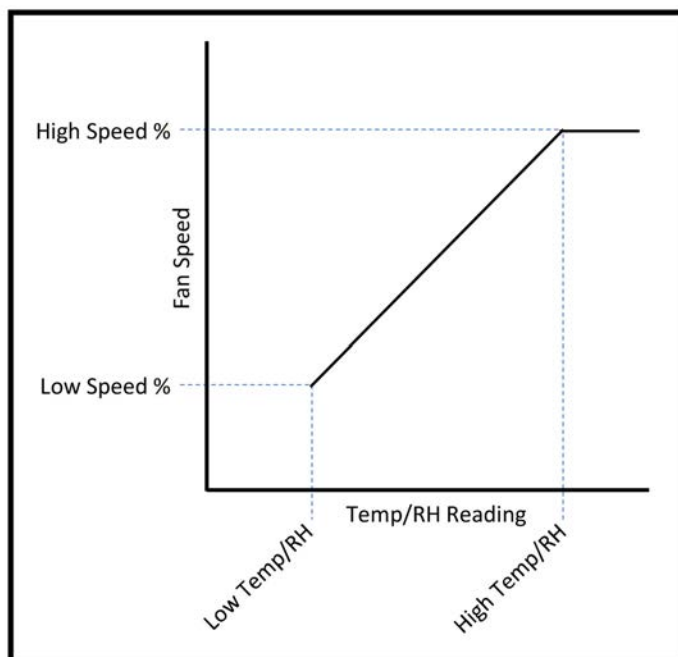
CONTROLS MODES

UNITS
Select temperature units displayed °C/°F.

AUTO MODE
- Enabling Auto Mode allows the fan to automatically start if the temperature or humidity rises to the Low Temp/RH set-point, beginning to run at the Low Speed % set-point.
- The fan speed will continue to increase to the High Speed % based on the sensed temperature or humidity until the High Temp/RH set-point is reached.
- The fan will continue to run at the High Speed % set-point if the sensed temperature or humidity is above the High Temp/RH set-point.
- If both Temperature and Humidity Auto Modes are enabled the fan will run at the higher calculated required speed.

RUN BELOW MIN
- Allows the fan to run at the Low Speed % set-point if the sensed temperature is below the Low Temp set-point.

This chart shows how the fan speed is calculated relative to the sensed temperature and humidity

DATA SCREEN
Realtime data from the drive is displayed on this page allowing live monitoring of fan performance

Readings Display:
Realtime data of drive and motor displayed.

Navigation Buttons:
Navigate to the various pages on the display.

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Toll Free: 1-886-771-7766

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