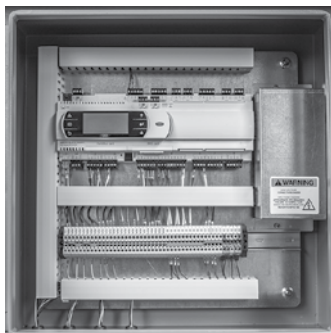


Installation, Operation and Maintenance Manual

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.



Control Box



Variable Frequency Drive (VFD)



Pressure Transducer

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. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces, or chemicals. Replace cord immediately if damaged.
3. Verify the power source is compatible with the equipment.

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DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

CAUTION

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

CAUTION

Precaution should be taken in explosive atmospheres.

DANGER

Pour écarter les risques d'incendie, de choc électrique ou de blessure grave, veiller à toujours débrancher, verrouiller et étiqueter la source de courant avant l'installation ou l'entretien.

ATTENTION

Lors de toute intervention sur la soufflante, le moteur peut être suffisamment chaud pour provoquer une douleur voire une blessure. Laisser le moteur refroidir avant toute maintenance.

ATTENTION

Faire preuve de précaution dans les atmosphères explosives.

Receiving

Upon receiving the components, check to ensure all 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 of any damage detected. The customer will make a notation of damage (or shortage of items) on the delivery receipt and all copies of the bill of lading which is countersigned by the delivering carrier. If damaged, immediately contact your local sales representative. Any physical damage to the unit after acceptance is not the responsibility of the manufacturer.

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.

Handling

Handle in such a manner as to keep from scratching or chipping the coating. Damaged finish to parts may reduce ability of unit to resist corrosion.

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.

INDOOR - 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. Temperatures should be evenly maintained between 30°F (-1°C) and 110°F (43°C) (wide temperature swings may cause condensation and “sweating” of metal parts). All accessories must be stored indoors in a clean, dry atmosphere. Remove any accumulations of dirt, water, ice, or snow and wipe dry before moving to indoor storage. To avoid “sweating” of metal parts, allow cold parts to reach room temperature. To dry parts and packages use a portable electric heater to eliminate any moisture build up. Leave coverings loose to permit air circulation and to allow for periodic inspection. The unit should be stored at least 3-1/2 in. (89 mm) off the floor on wooden blocks covered with moisture proof paper or polyethylene sheathing. Aisles between parts and along all walls should be provided to permit air circulation and space for inspection.

Inspection and Maintenance during Storage

While in storage, inspect equipment 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.

Removed 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. Check all fasteners and accessories for tightness.

Vektor System Control (VSC) Components



Control Box (1 per fan system)



Variable Frequency Drive (VFD) (1 per fan)



Pressure Transducer



5 Pin, 5 meter cable (2 per fan)
8 Pin, 10 meter cable (3 per fan system)

Customer-Supplied System Components

Quantity	Description
Varies	Wiring, conduit, miscellaneous fittings
1	Static pressure probe
Varies	Tubing to connect static pressure probe to pressure transducer

Variable Frequency Drive Operation

For operation with a variable frequency drive (VFD) always check motor amps when adjusting the operating frequency. Motor may be sized for the original selected operating speed under 60 Hz. Bypassing the VFD or increasing the speed from this original selection, even if less than 60 Hz, may cause motor to overload or fail. Consult factory with fan serial number before increasing the upper limiting frequency.

Always check the fan RPM when adjusting the operating frequency. Do not exceed maximum class fan RPM of the wheel.

NOTE

It is the responsibility of the installing body to perform coast-down tests and identify any resonant frequencies after the equipment is fully installed. These resonant frequencies are to be removed from the operating range of the fan by using the “skip frequency” function in the VFD programming. Failure to remove resonant frequencies from the operating range will decrease the operating life of the fan and void the warranty.

Quick Installation Guide

System Mounting & Wiring

Steps may need to be repeated for multiple fan systems.

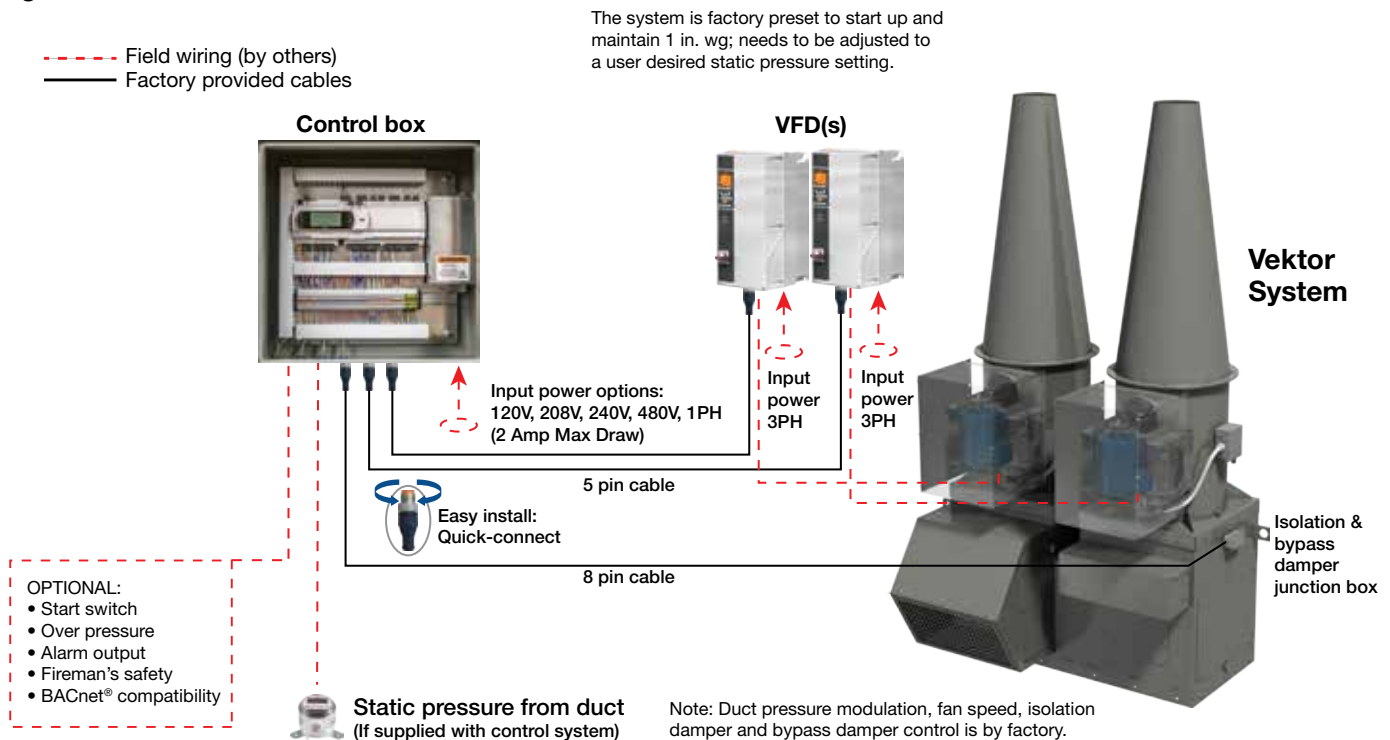
All wiring done by others to be per local code (see figure 1).

1. Mount control box upright with connectors down on structural support within 50 ft (15.2 m) of fan plenum.
2. Mount Variable Frequency Drive(s) (VFD) within 20 ft (6.1 m) of control box.
3. Connect 5 pin cable from VFD1 to control box VFD1.
4. Connect 8 pin cable from damper junction box on fan plenum to control box.
5. Wire static pressure sensor to control box. Plumb pressure probe to transducer.
6. Wire optional connections on terminal strip.
7. Wire incoming power to VFD1. Wire incoming power to control box.
8. Wire from VFD1 to motor on fan 1.

Start-up:

1. Apply power to VFD(s).
2. Turn on disconnect located on VFD(s).
3. Press the Auto On button on the VFD(s) keypad.
4. Apply power to the control box.
5. Confirm pressure transducer is powered on; the digital display on the pressure transducer will illuminate.
6. Using Carel keypad located in control box, use up and down arrows to navigate to On. Press enter button to turn the system on.
7. The system is factory preset to start up and maintain 1 in. wg; this will need to be adjusted to the user desired static pressure setting.

Figure 1

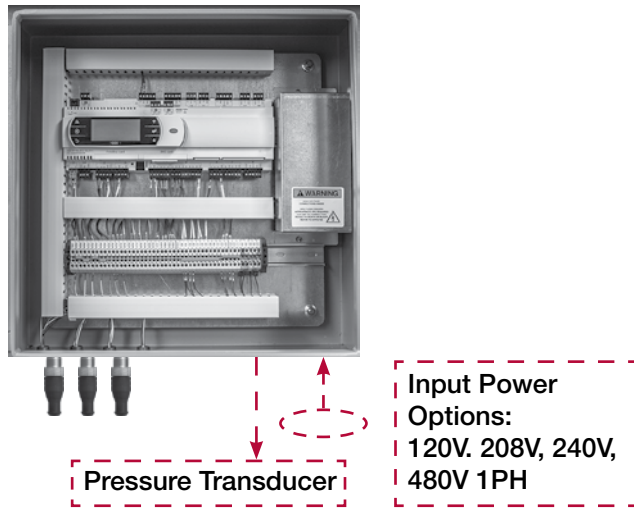


Vektor System Control (VSC) Function Overview

Vektor System Control (VSC) is a complete factory controls package for use in controlling the dampers and motors on a Vektor fan system. Hardware includes a control box, pressure transducer, and variable frequency drive(s) (VFD) for field mounting. The system operates by receiving an input signal from a duct static pressure sensor and depending on the relation to the set point, adjusts the fan speed and dampers. This system can control up to one bypass and one isolation damper per fan.

Each VSC package will come with one control box that is preprogrammed, ready to control the fan system it was ordered with (see figure 2). A multi-tap transformer will accept single phase 120V, 208V, 240V or 480V input power field wired to a terminal strip. The connections to the VFD(s), isolation damper(s), and bypass damper(s) are made easy with quick disconnect cables. The pressure transducer connection will be field wired to the terminal strip located in the control box. Systems may not have isolation or bypass dampers; the control box will be programmed accordingly.

Figure 2



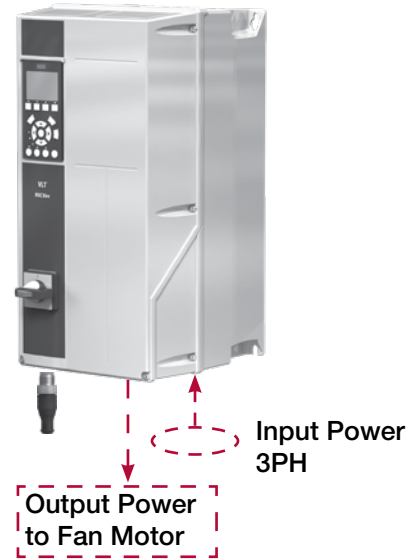
Field Wiring (by others)



Quick Connect Cabling

Each VSC package will come with one VFD per fan that is preprogrammed to communicate with the control box, ready to control the fan motor it was ordered with (see figure 3). Incoming power and output power to the fan motor will be field wired. The connection from the control box to the VFD is made easy with a quick disconnect cable.

Figure 3



Field Wiring (by others)

Each VSC package will come with one pressure transducer that is preprogrammed, ready to control the fan system it was ordered with (see figure 4). Three wires will be field wired from the control box terminal strip to the pressure transducer terminal strip. The pressure transducer will receive power from the control box, no additional power source is required. A static pressure probe and tubing to connect the probe to the pressure transducer is field supplied.

Figure 4



Field Wiring (by others)

Component Mounting

Mounting the Vektor System Control (VSC) Box

- Mount VSC box upright with connectors down on structural support within 50 ft (15.2 m) from center of fan plenum.
- Cables and wiring will be connected to the bottom of the box. It must have a minimum of 12 in. (305 mm) of clearance from any obstructions.
- VSC control box is a NEMA-3R enclosure suitable to be mounted indoors or outdoors.

Mounting of Variable Frequency Drive(s) (VFD)

- The mounting hole pattern can be found in the manual supplied with the VFD.
- Place the VFD within 20 ft (6.1 m) of the VSC control box.
- Place the VFD as near to the motor as possible, keeping the motor cables as short as possible. Maximum motor cable length to be less than 100 ft (30.5 m).
- Mount the VFD vertically to a solid structure; always use the provided sheet metal backing plate.
- A minimum clearance of 9 in. (229 mm) above and below, 3 in. (76 mm) on each side is required.
- If mounting outdoors, installation of the weathershield is required.

Mounting VFD weathershield:

- Weathershield attaches to the top of the VFD using M6x1 fasteners (supplied).

VFD Weathershield Mounting

The weathershield is only required if the VFD is mounted outdoors.

1. Slide the bracket between the VFD mounting surface and the back of the VFD (see figure 5).
2. Tighten the upper mounting bolts to secure the bracket and VFD.
3. Slide the shield onto the bracket (see figure 6).
4. Fasten the shield to the bracket with supplied screws.

Figure 5

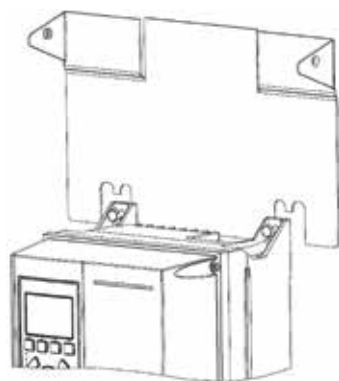
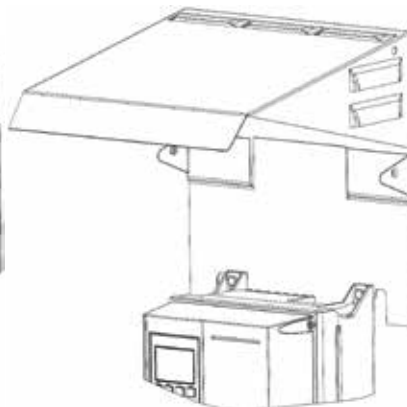


Figure 6



Pressure Transducer Mounting

- The pressure transducer is housed in a NEMA-4X rated enclosure suitable to be mounted indoors or outdoors.
- Locate the pressure transducer within 200 ft (61 m) of the VSC control box. Two hundred feet is the maximum control wire length for this pressure transducer.
- The pressure transducer should be mounted on a flat vertical surface with the connections directed down to prevent moisture from entering either the pressure ports or the electrical cable entry. The diaphragm must be vertical to minimize gravity effects on the diaphragm.
- The pressure transducer should be mounted higher than the static pressure probe to ensure that any moisture or condensation drains back into the duct.

- Pressure transducer plumbing options:

Negative static pressure measurement.

Connect the pressure probe to the negative (-) port, as indicated on the transmitter. Leave positive (+) port open to atmosphere.

Positive static pressure measurement.

Connect the pressure probe to the positive (+) port, as indicated on the transmitter. Leave negative (-) port open to atmosphere.

Component Hardwiring (continued)

NOTE

All field installation and wiring of electrical equipment must be done to meet NEC, CEC and local codes.

Be sure to use appropriately sized wire for the full load amp draw.

Once the following hardwiring is complete, please refer to the Building Management System (BMS) Communication Protocol Setup section on pages 10-12 for details on programming the BMS to communicate with the VGN controller via the hard wire connections.

Make sure the numbering of the fans is consistent during the entire wiring installation; fan 1 will require wiring specific to fan 1, fan 2 will require specific wiring, if applicable.

Control Box Incoming Power

(hard wire connections)

The control box will function on 120, 208, 240 or 480V single-phase 50/60 Hz AC. Each control box will draw a maximum of 2 amps. Remove the metal cover located on the right side of the control box to access the terminal strip for incoming power (reference wire diagram for details on terminal strip landing points). Once the wiring is complete, reinstall the metal cover.

Control Box to VFD Quick Disconnect

Connect the factory supplied 5 pin cable (shipped in the control box) to the 5 pin threaded bulkhead on the bottom of the control box; connect the other end to the 5 pin threaded bulkhead on bottom of the VFD. Each fan is provided with two (2) - 10 meter cables that can be connected together to extend the length; use as required per fan.

NOTE

Repeat this step for fan 2, if applicable.

Control Box to Damper Junction Box

Connect the factory supplied 8 pin cable (shipped in the control box) to the 8 pin threaded bulkhead on bottom of the control box; connect the other end to the 8 pin threaded bulkhead on the damper junction box that is mounted on the fan plenum. Each fan is provided with three (3) - 10 meter cables that can be connected together to extend the length; use as required.

Control Box to Pressure Transducer

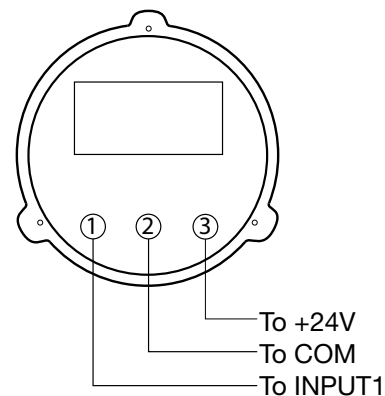
(hard wire connections)

Keep control wires as short as possible [100 ft (30.5 m) or less] and separate from high power cables to minimize interference.

Remove the face cover of the pressure transducer by rotating the face cover counterclockwise and pulling outward to access the wiring terminals.

- Connect INPUT1 on the control box terminal strip to terminal 1 on the pressure transducer.
- Connect COM on the control box terminal strip to terminal 2 on the pressure transducer.
- Connect +24V on the control box terminal strip to terminal 3 on the pressure transducer.

Pressure Transducer



VFD to Motor Wiring Procedure

(hard wire connections)

Danfoss FC102 3R:

Remove the eight fasteners on the cover of the VFD using T20 Torx® or flat head screwdriver. An extension may be needed to reach the fasteners. Remove the cover.

- Connect incoming 3-phase AC input power to terminals T1, T2 and T3 on the master disconnect.
- Connect ground cable to the nearest grounding terminal located on the body of the enclosure. Connect the 3-phase motor wiring to terminals 96 (U), 97 (V) and 98 (W).
- Connect ground wire to the nearest grounding terminal located on the body of the enclosure.
- Use a cable clamp to relieve pressure from connections.
- Replace VFD cover reusing fasteners.

Optional Hard Wire Connections Digital Input Hard Wiring

NOTE

All field installation and wiring of electrical equipment must be done to meet NEC, CEC and local codes.

Be sure to use appropriately sized wire for the full load amp draw.

Once the following hardwiring is complete, please refer to the BMS Communication Protocol Setup section on page 11 for details on programming the BMS to communicate with the Vektor System Control via the hard wire connections.

Remote Enable/Disable (on/off) Switch

(Customer supplied switch; hard wire connections)

A switch can be wired to the control box to remotely enable or disable the Vektor System Control (VSC). Wiring this switch is optional; if remote enable/disable is not required, no action is required and the system can be enabled and disabled on the Programmable Logic Controller (PLC) in the control box.

Wiring remote switch:

- Connect SYON+ on the control box terminal strip to one side of the remote switch.
- Connect +24V to the other side of the remote switch.
- Connect SYON- on the control box terminal strip to COM on the terminal strip.
- See Digital Input Programming section of this manual for details on enabling this feature.

Remote Safety Enable/Disable (on/off) Switch

(Customer supplied switch; hard wire connections)

A safety switch can be wired to the control box to remotely enable/disable the VSC. This feature is primarily used for emergency stop buttons or duct static pressure safety switches; if the static pressure in the duct work is too high, the switch will open or close to disable the fan system. Wiring this switch is optional; if remote safety enable/disable is not required, no action is required.

Wiring remote safety switch:

- Connect SAFE+ on the control box terminal strip to one side of the remote safety switch.
- Connect +24V to the other side of the safety switch.
- Connect SAFE- on the control box terminal strip to COM on the terminal strip.
- See Digital Input Programming section of this manual for details on enabling this feature.

Fireman Override

(Customer supplied switch; hard wire connections)

A fireman override switch can be wired to the control box to remotely adjust the fan speed. In the event of a fire, the VCS can receive an input from the fireman override switch and force the fan system to a user adjustable setpoint between 0 and 100%. Wiring this switch is optional; if fireman override is not required, no action is required.

Fireman override switch:

- Connect FIRE+ on the control box terminal strip to one side of the fireman override switch.
- Connect +24V to the other side of the fireman override switch.
- Connect FIRE- on the control box terminal strip to COM on the terminal strip.
- See Digital Input Programming section of this manual for details on enabling this feature.

Alarm Output

(Hard wire connections)

If a component of the VSC triggers an alarm, a relay within the Carel will close or open (user adjustable) a dry contact to alert the Building Management System (BMS). The alarm can be diagnosed on the Carel PLC in the control box; BACnet can also be used to diagnose the issue.

Wiring alarm output:

- Connect ALRM+ on the control box terminal strip to BMS.
- Connect ALRM- on the control box terminal strip to BMS.
- See Digital Input Programming section of this manual for details on enabling this feature.

BACnet

(Hard wire connections)

BACnet IP and BACnet MS/TP are both supported by the VSC.

BACnet IP:

- Use CAT-5 STP shielded cables
- The PLC has two Ethernet ports that are connected internally, making it easy to daisy-chain units together.
- See the BMS Setup and BACnet Objects section of this manual for additional details.

BACnet MS/TP:

- The J25 BMS2 connector on the PLC is used to connect the BACnet MS/TP.
- To improve immunity against electromagnetic interference, the serial connection cable should be a 3-wire shielded twisted pair.
- Connect the twisted pair wires to the J25 BMS2 connector - and + on the PLC to the appropriate BMS connections.
- The third wire of the shielded twisted cable should be used to connect the J25 BMS2 GND connection to the BMS RS485 ground reference.
- The shielding on the twisted pair 3-wire cable should only be connected to ground on one end of the cable; the green/yellow GND terminal in the VSC box is a suitable location to ground the shielding of the cable.
- See the BMS Setup and BACnet Objects section of this manual for additional details.

NOTE

This PLC does not contain any internal terminating resistors.

Digital Input Programming

Controller PLC Introduction and Tutorial

The VSC Programmable Logic Controller (PLC) is located in the main control panel. The PLC has factory set points that can be modified to configure the system for job specific functions. The directions for the setup screens are shown in this section.






The face of the controller has six buttons, allowing the user to view unit conditions and alter parameters. The PLC is pre-programmed with easy-to-use menus.



Operator Interface and Keypad Navigation



Digital Input Programming (cont.)

Keypad Navigation		
	Escape	Allows the user to exit the current menu, jumping to the Main Menu.
	Up Down	The arrow buttons allow the user to scroll through different screens and adjust parameters.
	Alarm	Button will blink red, indicating an alarm condition. Press to review current alarms. To review previous alarms, access the DATA LOGGER through the main menu.
	Enter	A. In screens with adjustable parameters, pressing the Enter button moves the cursor from the upper left corner of the screen to the parameter. The arrow buttons can then be used to adjust the parameter. B. To move to the next parameter on the same screen, press the Enter button. C. To save the change, press the Enter button until the cursor moves back to the upper left corner of the screen.
	Program	Pressing the Program button allows the user to enter the Main Program Menu.

Log In

The PLC requires a log in code to access the menu structure. Adjustments should only be made by qualified personnel.

1. Press the *Program* key.
2. Use the *Up* and *Down* arrows to highlight Log-in.
3. Press the *Enter* key.
4. Use the *Up* and *Down* arrows to enter in the password: 9998.
5. The PLC will return to the Main Menu.
6. Press the *Escape* key to return to the Status home screen.

Turning Fan System On and Off

The PLC does not require a log-in to turn the fan on or off

1. Press the *Program* key.
2. Use the *Up* and *Down* arrows to highlight “Unit On Off”.
3. Press the *Enter* key.
4. Use the *Up* and *Down* arrows to highlight On or Off.
5. Press the *Enter* key.
6. The controller will return to the Main Menu after executing the command.
7. Press the *Escape* key to return to the Status home screen.

Adjusting the Static Pressure Set Point

The PLC will arrive with a factory preset static pressure of 1 in. wg.

1. Log in (See above).
2. Use the *Up* and *Down* arrows to highlight “Test & Bal”.
3. Press the *Enter* key to enter the Test and Balance menu.
4. Press the *Enter* key to highlight the “Press 1 set point”.
5. Use the *Up* and *Down* arrows to select the desired set point.
6. Press the *Enter* key.
7. Press the *Escape* key to return to the Main Menu.
8. Press the *Escape* key to return to the Status home screen.

System Fine Tuning

Test and Balance can be used to fine tune the system operation to enable the fan to start at a set speed, this will allow the system to stabilize faster at start up. The fans minimum and maximum speed can also be adjusted in the Test and Balance menu to aid in system stabilization and minimize fan speed hunting. Prior to adjusting these parameters, the systems minimum and maximum fan speed will need to be determined along with the most common steady state fan speed. These settings are very useful for systems that do not fluctuate widely or run at a steady speed.

1. Log in (See page 10).
2. Use the *Up* and *Down* arrows to highlight “Test & Bal”.
3. Press the *Enter* key to enter the Test & Balance menu.
4. Use the *Up* and *Down* arrows to access the “Fan Start %” menu.
5. Press the *Enter* key to highlight the “Fan Start %”.
6. Use the *Up* and *Down* arrows to select the desired set point.
7. Press the *Enter* key to advance to “Min Fan %”.
8. Use the *Up* and *Down* arrows to select the desired set point.
9. Press the *Enter* key to advance to “Max Fan %”.
10. Use the *Up* and *Down* arrows to select the desired set point.
11. Press the *Enter* key.
12. Press the *Escape* key to return to the Status home screen.

Building Management System (BMS) Communication Protocol Setup

BACnet IP, BACnet MS/TP, Modbus RTU and Modbus TCP are all supported by the Vektor System Control.

1. Log in (See page 10).
2. Use the *Up* and *Down* arrows to highlight “BMS Settings”.
3. Press the *Enter* key.
4. Use the *Up* and *Down* arrows to access the “Protocol Type” menu.
5. Press the *Enter* key to enter the Protocol Type menu.
6. Use the *Up* and *Down* arrows to select the desired protocol type.
7. Press the *Enter* key.
8. Use the *Up* and *Down* arrows to select the desired BMS units of measure.
9. Press the *Enter* key.
10. Use the *Up* and *Down* arrows to select the desired device instance number.
11. Press the *Enter* key.
12. Pressing the *Down* arrow again will access the menu to adjust the device address and baud rate.
13. To adjust the address press *Enter*.
14. Use the *Up* and *Down* arrows to select the desired address number.
15. Press *Enter* (this will save the address and advance the cursor to baud rate).
16. Use the *Up* and *Down* arrows to select the desired baud rate.
17. Press the *Enter* key three (3) times.
18. Press the *Escape* key to return to the Main Menu.
19. Press the *Escape* key to return to the Status home screen.

BACnet Objects

The following objects are available through BACnet.

Type	Instance	Name	Read (VSC to BMS) Write (BMS to VSC)	Description [Units]
AnalogInput	1	Pressure1_Program	Read Only	Static Pressure 1 [IN H2O]
	2	Pressure2_Program	Read Only	Static Pressure 2 [IN H2O]
	3	Pressure3_Program	Read Only	Static Pressure 3 [IN H2O]
	4	Pressure4_Program	Read Only	Static Pressure 4 [IN H2O]
	5	BypassDampFB1.Val	Read Only	Not Used
	6	BypassDampFB2.Val	Read Only	Not Used
	7	BypassDamp1.Val	Read Only	Bypass Damper 1 Position [0-100%]
	8	BypassDamp2.Val	Read Only	Bypass Damper 2 Position [0-100%]
	9	Fan1_Aout.Val	Read Only	Fan 1 Speed [0-100%]
	10	Fan2_Aout.Val	Read Only	Fan 2 Speed [0-100%]
	11	Fan3_Aout.Val	Read Only	Fan 3 Speed [0-100%]
	12	Fan4_Aout.Val	Read Only	Fan 4 Speed [0-100%]
	13	FiremanInputPct	Read Only	User Defined Speed of Fan When Fireman's Override is Enabled [0-100%]
	14	AllPressuresInAlarmPct	Read Only	User Defined Speed of Fan When All Pressure Transducers are in Alarm [0-100%]
	15	NumberOfPressTrans_REAL	Read Only	Number of Press Transducers [1-4]
	16	NumberOfFans_REAL	Read Only	Number of Fans [1-4]
	17	NumberOfPrimaryFans_REAL	Read Only	Number of Primary Fans [1-4]
	18	NumberOfBypassDampers_REAL	Read Only	Number of Bypass Dampers [1-4]
	101	Fan_Msk[1].Power_KW	Read Only	Fan 1 Power [KW]
	102	Fan_Msk[1].Power_HP	Read Only	Fan 1 Power [Hp]
	103	Fan_Msk[1].MotorVolt	Read Only	Fan 1 Motor Voltage [V]
	104	Fan_Msk[1].MotorCurrent	Read Only	Fan 1 Motor Current [A]
	105	Fan_Msk[1].Freq	Read Only	Fan 1 Frequency [HZ]
	106	Fan_Msk[1].Freq_Perc	Read Only	Fan 1 Frequency Percent [%]
	107	Fan_Msk[1].Speed_RPM	Read Only	Fan 1 Motor Speed [RPM]
	108	Fan_Msk[1].Torque_Nm	Read Only	Fan 1 Torque [Nm]
	109	Fan_Msk[1].Torque_Perc	Read Only	Fan 1 Torque Percent [%]
	110	Fan_Msk[1].DCLink_Volt	Read Only	VFD 1 DC Link Voltage [V]
111	Fan_Msk[1].HeatsinkTemp	Read Only	VFD 1 Heatsink Temp [C]	
112	Fan_Msk[1].InvNomCurrent	Read Only	VFD 1 Inv Nom Max [A]	
113	Fan_Msk[1].InvMaxCurrent	Read Only	VFD 1 Inv Max Current [A]	
114	Fan_Msk[1].ControllerCardTemp	Read Only	VFD 1 Controller Card Temp [C]	
201	Fan_Msk[2].Power_KW	Read Only	Fan 2 Power [KW]	
202	Fan_Msk[2].Power_HP	Read Only	Fan 2 Power [Hp]	

Type	Instance	Name	Read (Unit to BMS) Write (BMS to Unit)	Description [Units]
AnalogInput	203	Fan_Msk[2].MotorVolt	Read Only	Fan 2 Motor Voltage [V]
	204	Fan_Msk[2].MotorCurrent	Read Only	Fan 2 Motor Current [A]
	205	Fan_Msk[2].Freq	Read Only	Fan 2 Frequency [HZ]
	206	Fan_Msk[2].Freq_Perc	Read Only	Fan 2 Frequency Percent [%]
	207	Fan_Msk[2].Speed_RPM	Read Only	Fan 2 Motor Speed [RPM]
	208	Fan_Msk[2].Torque_Nm	Read Only	Fan 2 Torque [Nm]
	209	Fan_Msk[2].Torque_Perc	Read Only	Fan 2 Torque Percent [%]
	210	Fan_Msk[2].DCLink_Volt	Read Only	VFD 2 DC Link Voltage [V]
	211	Fan_Msk[2].HeatsinkTemp	Read Only	VFD 2 Heatsink Temp [C]
	212	Fan_Msk[2].InvNomCurrent	Read Only	VFD 2 Inv Nom Max [A]
	213	Fan_Msk[2].InvMaxCurrent	Read Only	VFD 2 Inv Max Current [A]
	214	Fan_Msk[2].ControllerCardTemp	Read Only	VFD 2 Controller Card Temp [C]
	301	Fan_Msk[3].Power_KW	Read Only	Fan 3 Power [KW]
	302	Fan_Msk[3].Power_HP	Read Only	Fan 3 Power [Hp]
	303	Fan_Msk[3].MotorVolt	Read Only	Fan 3 Motor Voltage [V]
	304	Fan_Msk[3].MotorCurrent	Read Only	Fan 3 Motor Current [A]
	305	Fan_Msk[3].Freq	Read Only	Fan 3 Frequency [HZ]
	306	Fan_Msk[3].Freq_Perc	Read Only	Fan 3 Frequency Percent [%]
	307	Fan_Msk[3].Speed_RPM	Read Only	Fan 3 Motor Speed [RPM]
	308	Fan_Msk[3].Torque_Nm	Read Only	Fan 3 Torque [Nm]
	309	Fan_Msk[3].Torque_Perc	Read Only	Fan 3 Torque Percent [%]
	310	Fan_Msk[3].DCLink_Volt	Read Only	VFD 3 DC Link Voltage [V]
	311	Fan_Msk[3].HeatsinkTemp	Read Only	VFD 3 Heatsink Temp [C]
	312	Fan_Msk[3].InvNomCurrent	Read Only	VFD 3 Inv Nom Max [A]
	313	Fan_Msk[3].InvMaxCurrent	Read Only	VFD 3 Inv Max Current [A]
	314	Fan_Msk[3].ControllerCardTemp	Read Only	VFD 3 Controller Card Temp [C]
	401	Fan_Msk[4].Power_KW	Read Only	Fan 4 Power [KW]
	402	Fan_Msk[4].Power_HP	Read Only	Fan 4 Power [Hp]
	403	Fan_Msk[4].MotorVolt	Read Only	Fan 4 Motor Voltage [V]
	404	Fan_Msk[4].MotorCurrent	Read Only	Fan 4 Motor Current [A]
	405	Fan_Msk[4].Freq	Read Only	Fan 4 Frequency [HZ]
	406	Fan_Msk[4].Freq_Perc	Read Only	Fan 4 Frequency Percent [%]
	407	Fan_Msk[4].Speed_RPM	Read Only	Fan 4 Motor Speed [RPM]
	408	Fan_Msk[4].Torque_Nm	Read Only	Fan 4 Torque [Nm]
409	Fan_Msk[4].Torque_Perc	Read Only	Fan 4 Torque Percent [%]	
410	Fan_Msk[4].DCLink_Volt	Read Only	VFD 4 DC Link Voltage [V]	
411	Fan_Msk[4].HeatsinkTemp	Read Only	VFD 4 Heatsink Temp [C]	
412	Fan_Msk[4].InvNomCurrent	Read Only	VFD 4 Inv Nom Max [A]	
413	Fan_Msk[4].InvMaxCurrent	Read Only	VFD 4 Inv Max Current [A]	
414	Fan_Msk[4].ControllerCardTemp	Read Only	VFD 4 Controller Card Temp [C]	

Type	Instance	Name	Read (Unit to BMS) Write (BMS to Unit)	Description [Units]
AnalogValue	101	Pressure1_BMS	Read Only	Pressure 1 From BMS [0-15 IN H2O] - Depending upon the settings in the Binary Values, this pressure may be used for pressure 1 rather than the analog input.
	201	Pressure2_BMS	Read Only	Pressure 2 From BMS [0-15 IN H2O] - Depending upon the settings in the Binary Values, this pressure may be used for pressure 2 rather than the analog input.
	301	Pressure3_BMS	Read Only	Pressure 3 From BMS [0-15 IN H2O] - Depending upon the settings in the Binary Values, this pressure may be used for pressure 3 rather than the analog input.
	401	Pressure4_BMS	Read Only	Pressure 4 From BMS [0-15 IN H2O] - Depending upon the settings in the Binary Values, this pressure may be used for pressure 4 rather than the analog input.
BinaryInput	502	AI_Prb_Pressure1.Active	Read Only	Alarm/OK
	503	AI_Prb_Pressure2.Active	Read Only	Alarm/OK
	504	AI_Prb_Pressure3.Active	Read Only	Alarm/OK
	505	AI_Prb_Pressure4.Active	Read Only	Alarm/OK
	506	AI_Prb_DamperFB1.Active	Read Only	Alarm/OK
	507	AI_Prb_DamperFB2.Active	Read Only	Alarm/OK
	508	AI_SafetyInput.Active	Read Only	Alarm/OK
	509	AI_Device_Test.Active	Read Only	Alarm/OK
	510	AI_VFD1_Offline.Active	Read Only	Alarm/OK
	511	AI_VFD2_Offline_2.Active	Read Only	Alarm/OK
	512	AI_VFD3_Offline_3.Active	Read Only	Alarm/OK
	513	AI_VFD4_Offline_4.Active	Read Only	Alarm/OK
BinaryValue	1	OnOffUnitMng.BmsOnOff_Enabled	Read Only	Disable/Enable - If enabled, the BMS On/Off variable must be ON for the unit to start.
	2	OnOffUnitMng.BmsOnOff	Read Only	Off/On
	3	BMSPressures	Read Only	No/Yes - If yes, the next variables are used to say whether the pressures are coming from and analog input or from the BMS
	101	Pressure1FromBMS	Read Only	No/Yes
	201	Pressure2FromBMS	Read Only	No/Yes
	301	Pressure3FromBMS	Read Only	No/Yes
	401	Pressure4FromBMS	Read Only	No/Yes

Type	Instance	Name	Read (Unit to BMS) Write (BMS to Unit)	Description [Units]
MultiStateInput	1	UnitStatus	Read Only	1 = Unit on 2 = Unit switched off due to alarm 3 = Unit switched off by BMS 4 = Unit switched off by schedule 5 = Unit switched off from the local keypad 6 = Fans rotating 7 = Unit off by digital input 8 = Unit off by safety input 9 = Operating in FIREMAN OVERRIDE 10 = Operating in FAILSAFE
	101	FanStateProg[1]	Read Only	1 = OFF 2 = Startup 3 = Rotation at Minimum 4 = Rotating in, ramping 5 = Running 6 = Rotating out, ramping down 7 = Rotating out, at minimum 8 = Shutdown 9 = Off by alarm
	201	FanStateProg[2]	Read Only	1 = OFF 2 = Startup 3 = Rotation at Minimum 4 = Rotating in, ramping 5 = Running 6 = Rotating out, ramping down 7 = Rotating out, at minimum 8 = Shutdown 9 = Off by alarm
	301	FanStateProg[3]	Read Only	1 = OFF 2 = Startup 3 = Rotation at Minimum 4 = Rotating in, ramping 5 = Running 6 = Rotating out, ramping down 7 = Rotating out, at minimum 8 = Shutdown 9 = Off by alarm
	401	FanStateProg[4]	Read Only	1 = OFF 2 = Startup 3 = Rotation at Minimum 4 = Rotating in, ramping 5 = Running 6 = Rotating out, ramping down 7 = Rotating out, at minimum 8 = Shutdown 9 = Off by alarm

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