STROBIC AIR TECHNOLOGIES

user manual

SAFE™ controller

INSTALLATION - OPERATION - TROUBLESHOOTING

SA-SAFE-IOM-23 ISSUED 12/2023

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT

installation

SAFE Controller

This user manual is for the installation and general operation of the SAFE Controller as well as some troubleshooting, it is not an exhaustive description of functions and principles.

This user manual does not contain wiring diagrams, these are external to this document. Description will be provided on which external documents are required for each section and how to properly utilize any external references.

Installation

There are two terms that are used in this manual:

- By Factory – this device has been programed by Strobic or a Strobic authorized vendor/manufacturer.
- By Others – this device must be installed on location by a representative of the site and will not be installed by Strobic or Strobic representatives.

These terms/intents may be overridden by an explicit statement in an approved project submittal.

SAFE Controller Mounting and Enclosure

- The SAFE controller should be installed so that the HMI (human machine interface) is reachable and viewable for a solid floor/platform without any significant gaps. The controller should be installed as to not be obstructed by any other device or structures and at a convenient height to be viewed and interacted with. There should be a minimum of 16" (40cm) of free space below the enclosure for incoming piping.
- The SAFE controller has four (4) mounting holes; two (2) above and two (2) below the enclosure. All four (4) holes are to be used to secure the SAFE controller to a solid surface. Any bolt/screw utilized shall also use a fender washer to distribute the load.

Plenum Mounted — The SAFE controller may be installed on the plenum either at the factory or by others. In this case, the SAFE controller should be installed so that the number of fans is equally distributed to either side.

Remote Mounted — The SAFE controller may be installed at any location that conforms to the requirements in the Installation above. The location must be within 1000 feet (50 meters) of the plenum.

installation

Junction Box (JB-xx) —The purpose of the junction box is to provide a single point connection for all plenum mounted devices to be routed to the SAFE controller .If a SAFE controller is plenum mounted, a junction box may not be provided. The junction box should not be installed so that it is obstructed by any other device or structure and should be installed with a minimum of 16" (40cm) of free space below for incoming piping. The junction box has four (4) mounting holes, two (2) above and two (2) below the enclosure. All four (4) holes are to be used to secure the junction box to a solid surface.

Jumper Box (JMP-xx) — may be provided on larger plenums that required shipping splits. If provided, will always be factory mounted near a shipping split and also utilizing flexible conduit to provide an easy reliable reconnection across a slipping split. Jumper boxes are not to be used for any other purpose.

Building Duct Pressure Sensor (BU-xx) — is to be installed by others. It should be installed outside of the plenum, before any diverging branches, and in the middle of a straight section of duct that has at least three duct diameters up and down-stream. The Building Duct Pressure Sensor installation shall conform to the mounting requirements set forth by the sensor manufacturer. The tubing shall be connected to the minus (—) port. More than one pressure sensor may be utilized to better accommodate duct branches and/or to facilitate redundancy.

Plenum Pressure Sensor (PL-xx)— is installed by the factory and shall conform to the mounting requirements set forth by the sensor manufacturer. The tubing should be connected to the minus (—) port. On Single Fan Systems the plenum pressure sensor should be mounted in an appropriate location for that system. On Multi-Fan Systems – The plenum pressure sensor should be mounted near to the averaging manifold, which is mounted in either the SAFE controller or the junction box.

Isolation (ISO-xx)— is installed by the factory.

Bypass (BP-xx)— is installed by the factory.

Variable Frequency/Speed Drive (VFD/VSD)— can be either plenum mounted by the factory or remote mounted by others

Fan Flow Sensor (FF-xx)— is mounted and installed by the factory.

Digital Vibration Senor (VIB-D)— is mounted and installed by the factory.

Analog Vibration Sensor (VIB-A)— is mounted and installed by the factory.

Wind Monitoring (WD)— is mounted and installed by others.

Building Flow Sensor (BF-xx)— is mounted and installed by others. All mounting requirements set forth by the sensor manufacturer shall be adhered to.

Piping Best Practices

All piping should be either EMT or MFC. All piping bends should be replaced with accessible junctions. If bends cannot be replaced, then no continuous section may have more than a total of 180° of bends between accessible junctions. All accessible junctions should have a gasket to seal against the weather and where possible, exit the bottom of the enclosure. All piping should have a minimum of 40% free space after all wiring/plumbing has been run.

Pipe Size

Isolation, Building Pressure Sensor or VFD to either a SAFE controller or a Junction Box.

- One set – 1.00" conduit
- Two sets – 1.25" conduit
- Three or four sets – 2.00" conduit
- More than four sets – add conduit according to the above

Building Pressure Sensor to a SAFE controller or a junction box

- 0.50" Conduit

Plenum Pressure Sensor to a SAFE controller or a junction box

- 0.50" conduit

Fan Flow Sensor to an Isolation

- 0.50" conduit

Building Flow Sensor to a SAFE controller or a junction box

- 0.50" conduit

SAFE controller or a junction box

SAFE controller to a Wind Monitor

- 1.00" conduit

Analog Vibration Sensor to an Isolation

- 1.00" conduit

A piping guide may have been provided for a specific project. The piping guide will show approximate locations of enclosures and sensors, it will not show exact locations. It will provide expected pipe sizes, standard pipe routing, and an approximate number of required accessible junctions.

Connections

Usage of SAFE controller wiring diagrams.

SS	AS	001.1	A	
				REVISION
				nnn.m - PAGE # & SUBPAGE #
				DRAWING TYPE
				AS - ASSEMBLY
				EL - INTERNAL WIRING
				FD - FIELD WIRING
				ME - MECHANICAL DRAWINGS
				PACKAGE ID
				SS - SAFE CONTROLLER MAIN PANEL
				JB1 - JUNCTION BOX 1
				VFD - DRIVES
				ISO - ISOLATION
				BP - BYPASS
				PO - POWER MODULE
				BU - BUILDING DP TRANSDUCER
				PL - PLENUM DP TRANSDUCER
				MA - MANIFOLD ASSEMBLY
				BF - BUILDING FLOW
				FF - FAN FLOW
				VI - VIBRATION
				WD - WIND

The primary drawing type to focus on is Field Wiring which shows all connections between boxes that are not wired by the factory.

On drawings that have multiple possible devices such as the ISO drawings, there may be a wire number with a lower case n (ex: 4n0) the n in these cases, is to be replaced with either the Fan Number or whichever device iteration. This is not limited to ISO but is also to be used for BP, VFD, BU, PL, FF, VIB-D, VIB-A, and WD.

Usage of Riser Diagrams

RI	3	R	B	002	001.1	A	
							REVISION
							nnn.m - Page # & Subpage #
							OPTIONS (SUM OF ALL SELECTED)
							000 - NO OPTIONS
							001 - FAN FLOW
							002 - WIND MONITORING
							004 - VIBRATION
							008 - BUILDING FLOW
							VFD MOUNTING
							A - PLENUM MOUNTING
							B - REMOTE MOUNTING
							SAFE CONTROLLER MOUNTING
							P - PLENUM MOUNTING
							R - REMOTE MOUNTING
							NUMBER OF FANS
							PACKAGE ID
							RI - RISER DIAGRAM

The Riser Diagrams consist of five major sections

- Section 001 – Control Layer

  This section will generally cover what connection will be made between each of the devices. Detailed information can be found by referencing the corresponding device in the SAFE wiring diagrams.

- Section 002 – AC Power Layer

  This section will cover the MCA and MOCP for each device that requires a connection to the buildings power grid.

  MCA – Minimum Circuit Ampacity is calculated by taking the maximum continuous current draw (also known as the Full Load Amps, FLA) of the device on this line and multiplying it by 1.25. This is the MCA of this line. Any conductor used to energize this line must be capable of 100% duty cycle at this amperage or higher.

  MOCP – Maximum Over-Current Protection (same as MOP) is calculated by taking the maximum continuous current draw (also known as the Full Load Amps, FLA) of the device on this line and multiplying it by 2.25. This is the MOCP of this line. Any circuit protect device such as fuses or circuit breaker that are intended to protect this line shall not exceed this value. This circuit protection may be less than this value. Inrush current must be considered when deciding the tripping characteristics.

installation

- Section 003 – Pneumatic Layer

  This section shows different locations that require pneumatic tubing to be connected.

  Multi-Fan systems must have a ¼" EVA tube from the pitot in each ISO to the SAFE of JB, whichever contains the averaging manifold. The averaging manifold is then passes through a barbed bulkhead fitting to the outside of the enclosure, and connects to the minus (–) port of the PL sensor

  Single-Fan systems: the pitot may or may not be located in the ISO enclosure, either way there will not be an averaging manifold and the pitot should be plumbed using the shortest route, connecting to the minus (–) port on the PL sensor.

  There must be a ¼" EVA tube connecting the BU sensor to the pitot in the ducting it is meant to sense. If this system has FF sensors, ¼" EVA tubing must be connected as shown, ensuring the plus (+) and minus (–) ports are connected correctly. If this system has a BF sensor, connection must be made in accordance with the manufacturers flow grid that is supplied and installed by others

- Section 004 – Communication Layer

  Each line on this diagram represents Foil Shielded Twisted Pair of 18-22 AWG wire. There are arrows on each line to indicate the direction of that cable. There is a table that indicates the terminal in each enclosure this cable is connected. It must follow a very specific path, any mislanded wire will result in communication failure of part or the whole network.

- Section 005 – Piping Guide

  This document is meant to be viewed in color to indicate the different suggested pipe diameters and shows approximate locations of each enclosure that is mounted on the plenum. It indicates each enclosure included with this system and the recommended pipe size for that enclosure. It also shows the approximate number of accessible junctions, their type and size, that are required to create this piping arrangement.

Modbus Communication:

The SAFE Controller utilizes a Modbus network to communicate to each device that is connected to this system. This connection is not to be used for any form of building communication. It exists as a second layer of information for the SAFE controller and will pass many of the pertinent values through to the BMS.

BACnet Communication:

Each SAFE Controller ships with the ability to communicate BACnet MS/TP and IP. The MS/TP connection is jumped out to terminal block for convenience.

The IP connection is to be made on the ethernet port on top of the Carel cPco. These connections cannot be used simultaneously and must be configured on the HMI. The system ships with the IP selected as the default option

If this system must utilize MS/TP instead, after the parameters have been changed, the whole panel must be power cycled.

Sensor Configuration

Building DP (BU) **Sensor**(s)

The Belimo Brand Pressure / Mass Flow sensor has three sets of DIP switches that must be properly configured for correct functionality. When changing these dip switches, the sensor must not be energized. Reference drawing package SS3-BU. Drawing BU-AS-004 shows the approximate location of Switch 1, Switch 2, and S1. Drawing BU-EL-005 on the right hand side shows the default values for each of these switches for this sensor.

If there are multiple BU sensors, Switch 1 must have a unique address assigned to it, reference **Default Modbus Address** of this document for the list of default Modbus addresses. By default, the SAFE Controller can handle up to four (4) BU sensors.

Plenum DP (PL) **Sensor**(s)

The Belimo Brand Pressure / Mass Flow sensor has three sets of DIP switches that must be properly configured for correct functionality. When changing these dip switches, the sensor must not be energized. Reference drawing package SS3-PL. Drawing PL-AS-004 shows the approximate location of Switch 1, Switch 2, and S1. Drawing PL-EL-005 on the right hand side shows the default values for each of these switches for this sensor.

If there are multiple PL sensors, Switch 1 must have a unique address assigned to it, reference **Default Modbus Address** of this document for the list of default Modbus addresses. By default, the SAFE Controller can handle up to four (4) PL sensors.

Fan Flow (FF) **Sensor**(s)

The Belimo Brand Pressure / Mass Flow sensor has three sets of DIP switches that must be properly configured for correct functionality. When changing these dip switches, the sensor must not be energized. Reference drawing package SS3-FF.

Drawing FF-AS-004 shows the approximate location of Switch 1, Switch 2, and S1. Drawing FF-EL-005 on the right hand side shows the default values for each of these switches for this sensor.

Each fan must have its own FF sensors, Switch 1 must have a unique address assigned to it, reference **Default Modbus Address** of this document for the list of default Modbus addresses.

Building Flow (BF) **Sensor**

The Belimo Brand Pressure / Mass Flow sensor has three sets of DIP switches that must be properly configured for correct functionality. When changing these dip switches, the sensor must not be energized. Reference drawing package SS3-PL. Drawing BF-AS-004 shows the approximate location of Switch 1, Switch 2, and S1. Drawing BF-EL-005 on the right hand side shows the default values for each of these switches for this sensor.

Reference **Default Modbus Address** in this document for the list of default Modbus addresses.

WD IO Expansion

The Carel Branded expansion Module has two sets of DIP switches. When changing these dip switches, this device must not be energized. Reference drawing package SS3-WD. Drawing WD-AS-004 shows the approximate location of the Address switches and the Configuration switches. Drawing WD-EL-005 shows the default values for each of these switches for this device.

Reference **Default Modbus Address** in this document for the list of default Modbus addresses.

VIB-D/A Expansion

The Carel Branded expansion Module has two sets of DIP switches. When changing these dip switches, this device must not be energized. Reference drawing package SS3-VIB. Drawing VIB-AS-004 shows the approximate location of the Address switches and the Configuration switches. Drawing VIB-EL-005 shows the default values for each of these switches for this device.

Each Fan must have its own Vibration Switch of set of Force Sensors. Reference **Default Modbus Address** in this document for the list of default Modbus addresses.

Actuator Configuration

Requires Belimo's ZTH-US Configuration Tool

MIN – UNCHANGED

MAX – UNCHANGED

RUNNING TIME – CHANGES TO '70s'

CONTROL SIGNAL – CHANGES TO 'DC 0.5 - 10V'

FEEDBACK U5 – CHANGES TO 'U5 0.5 – 10V'

ACT VALUE – UNCHANGED

ADDRESS – Reference Section '4' of this document for the appropriate address

BAUDRATE – 38400 – UNCHANGED

PARITY – 1-8-N-2 – UNCHANGED

TERMINATION – 'OFF' EXCEPT FOR THE LAST DEVICE IN THE CHAIN

BUS PROTOCOL – 'MODBUS' – UNCHANGED

SETPOINT SOURCE – CHANGES TO 'ANALOG'

MESSAGES – NO MESSAGES

START PICCV – UNUSED

BACnet Configuration

Reference **BMS Setup** in the **Screens** section of this document

SAFE Operation

Navigation — Each screen, except the overview screens and the splash screen have the following:

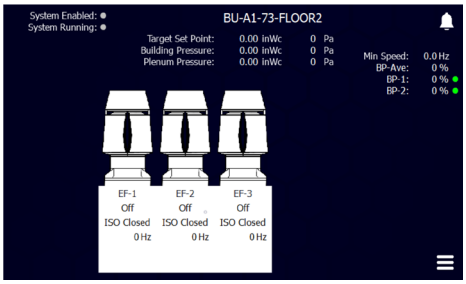
Path Bar: This will display the series of buttons that were pressed to get to this location.

Back Button: This button will go one screen in the Path Bar.

Screens

The Splash or start-Up screen briefly appears when starting up the HMI. After several seconds, the HMI is directed to the Overview.

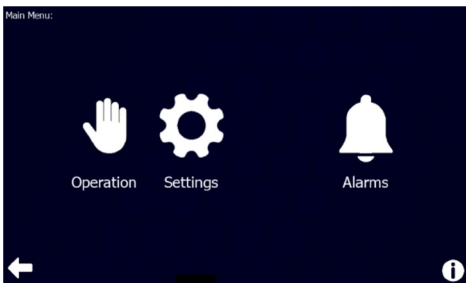
The Overview screen is a high level overview of this system that shows the Enabled/Running status of the system, the current Setpoint, the current measured values for the Plenum and the Building and the current calculated Minimum Speed and Bypass positions.



Certain options, such as building flow and wind monitoring, will also be displayed if they are installed on the system. This screen will change dynamically based on certain parameters and selected options.

Main Menu Screen is accessed by tapping the menu button.

The Main Menu has the following options.



Operation – Command the system from here

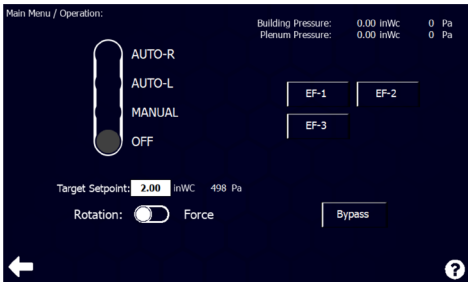
Settings – Configure this controller for this specific system

Alarms – Displays any current alarms

Info – The Info button will provide contact and system information.

Operation

Mode Selection – System Change



Off – Commands the fans to be off, commands the ISOs to be closed and the Bypasses to their default position. Will not respond to any command from the BMS.

Manual – Allows each component to be individually commanded manually. Will not respond to commands from the BMS

Auto Local – The whole system runs automatically using set points and parameters that are set locally on the HMI. Will not respond to commands from the BMS.

Auto Remote – The whole systems runs automatically using setpoints and parameters that are set by the BMS. Will respond to commands from the BMS.

Target Setpoint — Locally set target for control

Rotation – Force the system to rotate fan priority

Building Pressure – the current measured Building Pressure

Plenum Pressure – the current measured Plenum Pressure

Fan Buttons

Bypass Button

Settings

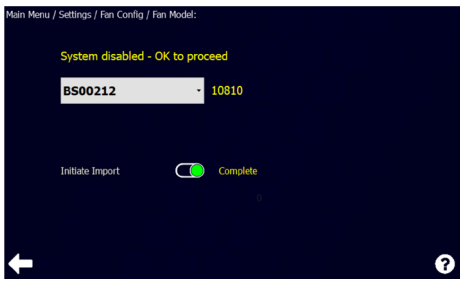
This is the main hub of parameters to configure the SAFE Controller to the attached fan(s). Not all of these options may be available by default. If you do not see an option that you think you should have access to, please contact your Strobic sales representative for assistance.

Fan Config

- Run at Start-Up – if enabled the fan system will automatically start spinning up fans when controller power is restored after a power cycle/loss.
- Total Fans – the total number of fans that are connected to this specific controller (range is 1 to 6).
- Redundant Fans – the number of fan(s) to remain off but in standby (range is 0 to 5).
- Increment Time – the amount of time, in seconds, to delay after it is decided an additional fan needs to turn on.
- Decrement Time – the amount of time, in seconds, to delay if it is decided that a fan should be turned off.
- Rotation Hours – the number of hours difference that any two fans may have before the system will automatically rotate the order of the fans.
- Safe Rotation Time – the acceptable hour of the day that this system may rotate to cause the least amount of interference in normal operation.
- Min. Nozzle Velocity – default minimum nozzle velocity
- Alarm Timer:
  - — VFD Start/Stop: The amount of time the system will wait for a VFD to start/stop before failing it.
  - — VFD Unres: The amount of time the system will wait if there is a mismatch between the run command and running status of any VFD.
  - — ISO FTO/FTC: The amount of time the system will wait for any isolation actuator to Open/Close before failing it.
  - — ISO OOP: The mount of time the system will wait if there is a mismatch in the command and feedback position of any isolation actuator before it is failed.

Fan Model

- — Select the model of fan that is attached to this system
- — Tap the **Initiate Import** button
- — The system is now configured for that fan mode.

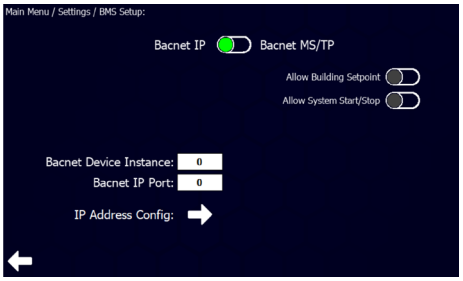


Bypass Setup

- Open at Start-up – In some situations it could be beneficial to have the bypass dampers open before startup.
- Open When Off – In some situations it could be beneficial to have the bypass dampers open when the system is off.
- Total Bypass Dampers
- Bypass Dead band
- Bypass CMD Interval
- Increment Threshold
- Bypass Addresses

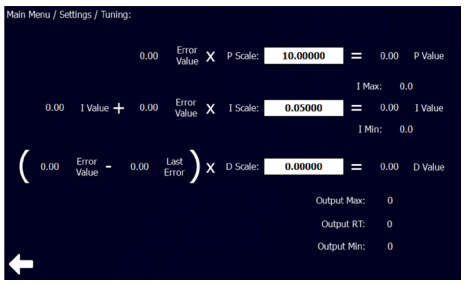
BMS Setup

- Common Elements
  - — Allow Building Setpoint
  - — Allow System Start/Stop
  - — BACnet Device Instance
- BACnet IP
  - — BACnet IP Port
  - — IP Address Configuration
- BACnet MS/TP
  - — BACnet MS/TP Address
  - — BACnet Max Master
  - — BACnet Max Info Frames
  - — BACnet Baud

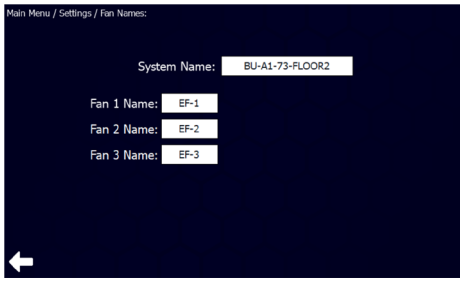


Tuning

- P-Scale – The Proportional Scale value – reaction to sudden changes in the system.
- I-Scale – The Integral Scale value – drives this system to precisely dial in on a setpoint.
- D-Scale – Derivative Scale value – provides a dampening effect against large changes or fast swings in changes (default value is zero).



Fan Names



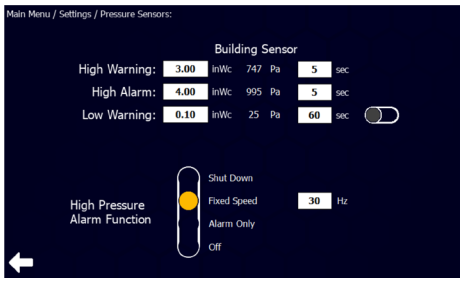
- This Screen will display a field for each fan that is attached to this system including a name for the system as a whole.
- These names will be displayed across any screen that requires a description of a specific fan. This includes, but is not limited to, the Overview and Operation Screens.

Save/Restore Configs

- Save all system parameters to external non-volatile memory
- Restore all system parameters from a previously saved file. If no file was previously saved this process will do nothing.

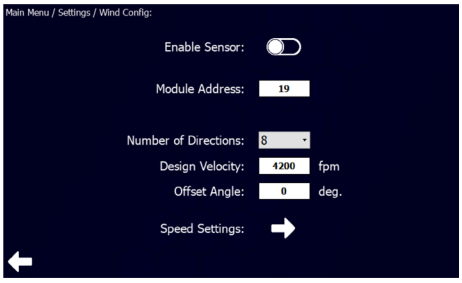
Pressure Sensors

In the occurrence that there are multiples of either the Building or Plenum DP Sensors, these values are used across all sensors.



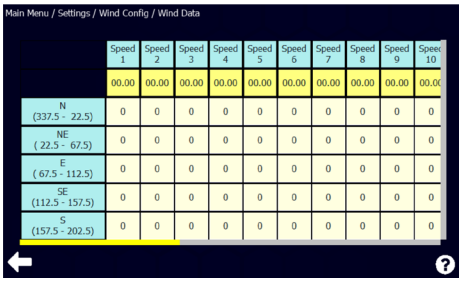
- Each of the following setpoints has a corresponding delay
- High Warning
- High Alarm
  - — Off – The system will take no action if the High Alarm setpoint is exceeded
  - — Alarm Only – The system will only produce an alarm value if the High Alarm setpoint is exceeded for the designated amount of time.
  - — Fixed Speed – After any pressure exceeds the High Alarm setpoint for the designated time the system will lock the output speed of any running fans to the user defined value. It will remain this way until after this alarm is cleared on the HMI.
  - — Shut Down - After any pressure exceeds the High Alarm setpoint for the designated time the system will shut down and will not start back up until this alarm is cleared on the HMI.
- Low Warning
  - — This warning can be disabled

Wind Config



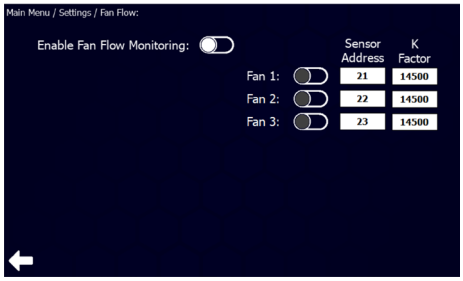
- Wind Monitor Enable – Enable or Disable the use of Wind Monitoring for this system.
- Module Address – The Modbus address of the expansion module for this Wind Monitor.
- Number of Directions – The number of directions the Wind Data table is to be divided: 4, 8, 16, or 18; corresponding to 90, 45, 22.5, and 20 degree arcs respectively.
- Number of Speeds – The number of different speeds the Wind Data table is to be divided. There are two additional values that every table will have regardless; below the lowest number and above the highest number.
- System Design Velocity – the designed nozzle velocity for this system.
- Offset Angle – programmatically adjust the rotation of this senor, in the event that it was not installed correctly and cannot be easily accessed.
- Tapping the arrow next to Speed Settings will take you to the Wind Data table.

Wind Data



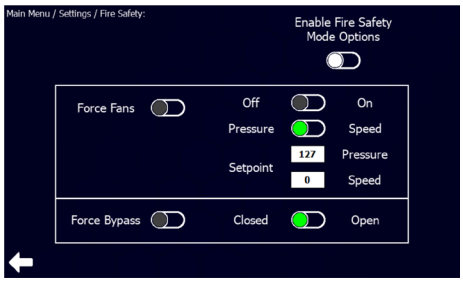
- This table automatically configures rows and columns to the number of speeds and directions that were selected on the previous screen.
- The direction ranges are fixed based on the number of directions selected. All directions display the degrees that correspond to that row of speed and most display the corresponding compass direction.
- The speeds are adjustable and start with the lowest speed on the left and the highest speed on the right. They must be in order from the lowest to the highest going left to right. Speed 1 should not be zero during normal operation. The speed 1 value is used as a low end check which means speed lower than that is treated as that speed. Similarly, the speed with the highest number is used as a high end check, speed that is higher than that value is treated as that value.

Fan Flow



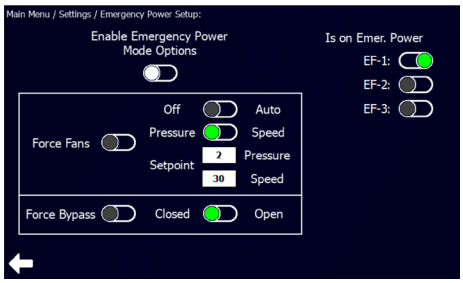
- Enable Fan Flow Monitoring – Enable or disable the use of Fan Flow Monitoring for this system
- Sensor Enable – Enable or disable individual Fan Flow Sensors
- Sensor address – The specific Modbus address for this sensor
- Sensor K-Factor – the specific K-factor for this fan

Fire Safety



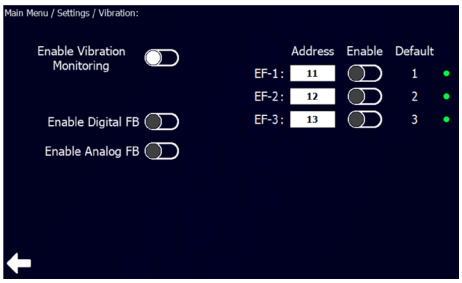
- If fire safety mode is enabled the behavior of this system can be modified based on the desired functionality.
- The fans can be forced into a different operating state, either off or on. If forced on fans can maintain a separate static pressure than other sources or to run at a specific speed.
- The bypasses can be forced open or closed
- Fire Safety mode will override all other modes of operation

Emergency Power Setup



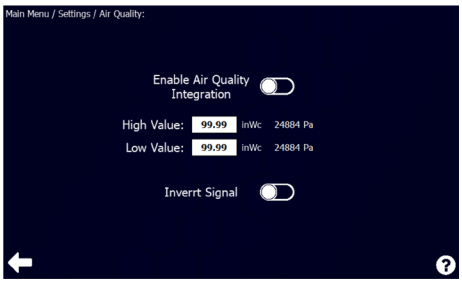
- This mode operates in the same manner as Fire Safety Mode with the addition of designating which fans will be receiving emergency power.
- If both this mode and Fire Safety Mode are active at the same time this mode will be overridden by the Fire Safety Mode, except for the fans designated for emergency power.

Vibration



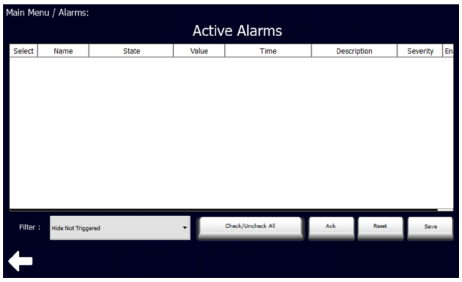
- Digital Vibration monitoring will continuously check for an instantaneous high value that will shut down the fan it is attached to.
- Analog vibration will continuously monitor five force sensors that are in direct contact with the motor to provide a source of trend data on a premotor basis.
- Both of these methods can be attached simultaneously.

Air Quality



- Air Quality monitoring can be attached to this system (supplied by others).
- It will function on a digital basis (high for clean, low for dirty).
- Different static set points can be configured for the clean and dirty states.

Alarms



- Any alarms that are thrown by the system will be displayed here.
- This is also the only place that latching alarms can be acknowledged and/or cleared.

Default Modbus Address

Device	Channel	Address	Device	Channel	Address
Vibration 1		1	Isolation Actuator 1.1		31
Vibration 2		2	Isolation Actuator 2.1		32
Vibration 3		3	Isolation Actuator 3.1		33
Vibration 4		4	Isolation Actuator 4.1		34
Vibration 5		5	Isolation Actuator 5.1		35
Vibration 6		6	Isolation Actuator 6.1		36
Expansion 1		9	Bypass Actuator 1		39
Expansion 2		10	Bypass Actuator 2		40
Wind Sensor 1		11	VFD 1		41
Wind Sensor 2		12	VFD 2		42
Building Pressure Sensor 1		13	VFD 3		43
Building Pressure Sensor 2		14	VFD 4		44
Building Pressure Sensor 3		15	VFD 5		45
Building Pressure Sensor 4		16	VFD 6		46
Plenum Pressure Sensor 1		17	Bypass Actuator 3		49
Plenum Pressure Sensor 2		18	Bypass Actuator 4		50
Plenum Pressure Sensor 3		19	Isolation Actuator 1.2		51
Plenum Pressure Sensor 4		20	Isolation Actuator 2.2		52
Fan Flow Sensor 1		21	Isolation Actuator 3.2		53
Fan Flow Sensor 2		22	Isolation Actuator 4.2		54
Fan Flow Sensor 3		23	Isolation Actuator 5.2		55
Fan Flow Sensor 4		24	Isolation Actuator 6.2		56
Fan Flow Sensor 5		25	HRU Actuator 1		59
Fan Flow Sensor 6		26	HRU Actuator 2		60
Building Flow Sensor 1		29	HRU Actuator 3		61
Building Flow Sensor 2		30	HRU Actuator 4		62
			HRU Actuator 5		63
			HRU Actuator 6		64
			HRU Actuator 7		65
			HRU Actuator 8		66
			HRU Actuator 9		67
			HRU Actuator 10		68
			HRU Actuator 11		69
			HRU Actuator 12		70

BACnet Points

Instance	Tag	Description	Data Type	R/W	Comment
AO77	BMS_SET_POINT	Settable Target Static Pressure	REAL	R/W	inWc
AV2	HMI_STAT_BP_POS[1]	Bypass 1 Current Position	REAL	R	%
AV3	HMI_STAT_BP_POS[2]	Bypass 2 Current Position	REAL	R	%
AV4	HMI_STAT_BP_POS[3]	Bypass 3 Current Position	REAL	R	%
AV5	HMI_STAT_BP_POS[4]	Bypass 4 Current Position	REAL	R	%
AV6	HMI_STAT_BP_POS[0]	Current Average Bypass Position	REAL	R	%
AV7	HMI_VAL_BUILDING_DP	Current Building Diff. Pressure	REAL	R	inWc
AV9	HMI_VAL_PLENUM_DP	Current Plenum Diff. Pressure	REAL	R	inWc
AV37	HMI_STAT_FAN_FLOW[1]	Fan 1 Current Flow	REAL	R	CFM
AV38	HMI_STAT_FAN_FLOW[2]	Fan 2 Current Flow	REAL	R	CFM
AV39	HMI_STAT_FAN_FLOW[3]	Fan 3 Current Flow	REAL	R	CFM
AV40	HMI_STAT_FAN_FLOW[4]	Fan 4 Current Flow	REAL	R	CFM
AV41	HMI_STAT_FAN_FLOW[5]	Fan 5 Current Flow	REAL	R	CFM
AV42	HMI_STAT_FAN_FLOW[6]	Fan 6 Current Flow	REAL	R	CFM
AV43	HMI_STAT_FAN_FLOW[7]	Fan 7 Current Flow	REAL	R	CFM
AV44	HMI_STAT_FAN_FLOW[8]	Fan 8 Current Flow	REAL	R	CFM
AV53	HMI_STAT_WIND_SPD	Current Wind Speed	REAL	R	m/s
AV56	HMI_STAT_SYS_MIN_SPD	Current Calc. Minimum Speed	REAL	R	Hz
AV59	VAL_SETPOINT	Current Static Pressure Target	REAL	R	inWc
BO112	BMS_START_RQ	Settable System Run Request	BOOL	R/W	0 = OFF 1 = YES
BV87	SYSTEM_READY	System is ready to run	BOOL	R	0 = OFF 1 = YES
BV88	SYSTEM_STARTING	System is starting	BOOL	R	0 = OFF 1 = YES
BV89	SYSTEM_STOPPING	System is stopping	BOOL	R	0 = OFF 1 = YES
BV90	SYSTEM_ON	System is on	BOOL	R	0 = OFF 1 = YES
BV92	HMI_STAT_FF_EXISTS	This system has Fan Flow Monitoring	BOOL	R	0 = OFF 1 = YES
BV93	HMI_STAT_BF_EXISTS	This system has Building Flow Monitoring	BOOL	R	0 = OFF 1 = YES
BV94	HMI_STAT_WIND_EXISTS	This system has Wind Monitoring	BOOL	R	0 = OFF 1 = YES
BV95	HMI_STAT_VI_EXISTS	This system has Vibration monitoring	BOOL	R	0 = OFF 1 = YES
BV96	FAN_1_STAT_RUNNING	Fan 1 is Running	BOOL	R	0 = OFF 1 = YES

BACnet Points

Instance	Tag	Description	Data Type	R/W	Comment
BV97	FAN_2_STAT_RUNNING	Fan 2 is Running	BOOL	R	0 = OFF 1 = YES
BV98	FAN_3_STAT_RUNNING	Fan 3 is Running	BOOL	R	0 = OFF 1 = YES
BV99	FAN_4_STAT_RUNNING	Fan 4 is Running	BOOL	R	0 = OFF 1 = YES
BV100	FAN_5_STAT_RUNNING	Fan 5 is Running	BOOL	R	0 = OFF 1 = YES
BV101	FAN_6_STAT_RUNNING	Fan 6 is Running	BOOL	R	0 = OFF 1 = YES
BV102	FAN_7_STAT_RUNNING	Fan 7 is Running	BOOL	R	0 = OFF 1 = YES
BV103	FAN_8_STAT_RUNNING	Fan 8 is Running	BOOL	R	0 = OFF 1 = YES
BV104	gbALM_VFD_GEN_FLT[1]	Fan 1 is Faulted	BOOL	R	0 = OFF 1 = YES
BV105	gbALM_VFD_GEN_FLT[2]	Fan 2 is Faulted	BOOL	R	0 = OFF 1 = YES
BV106	gbALM_VFD_GEN_FLT[3]	Fan 3 is Faulted	BOOL	R	0 = OFF 1 = YES
BV107	gbALM_VFD_GEN_FLT[4]	Fan 4 is Faulted	BOOL	R	0 = OFF 1 = YES
BV108	gbALM_VFD_GEN_FLT[5]	Fan 5 is Faulted	BOOL	R	0 = OFF 1 = YES
BV109	gbALM_VFD_GEN_FLT[6]	Fan 6 is Faulted	BOOL	R	0 = OFF 1 = YES
BV110	gbALM_VFD_GEN_FLT[7]	Fan 7 is Faulted	BOOL	R	0 = OFF 1 = YES
BV111	gbALM_VFD_GEN_FLT[8]	Fan 8 is Faulted	BOOL	R	0 = OFF 1 = YES
IV1	VFD_CMD_SPEED	Current Commanded VFD Speed	INT	R	Hz
IV11	FANORDER_ORDER[1]	Position of Fan 1 start order	INT	R	1-8
IV12	FANORDER_ORDER[2]	Position of Fan 2 start order	INT	R	1-8
IV13	FANORDER_ORDER[3]	Position of Fan 3 start order	INT	R	1-8
IV14	FANORDER_ORDER[4]	Position of Fan 4 start order	INT	R	1-8
IV15	FANORDER_ORDER[5]	Position of Fan 5 start order	INT	R	1-8
IV16	FANORDER_ORDER[6]	Position of Fan 6 start order	INT	R	1-8
IV17	FANORDER_ORDER[7]	Position of Fan 7 start order	INT	R	1-8
IV18	FANORDER_ORDER[8]	Position of Fan 8 start order	INT	R	1-8
IV19	ISO_1_PSEUDO_STAT	Current Status of ISO Damper 1	INT	R	Table A
IV20	ISO_2_PSEUDO_STAT	Current Status of ISO Damper 2	INT	R	Table A
IV21	ISO_3_PSEUDO_STAT	Current Status of ISO Damper 3	INT	R	Table A
IV22	ISO_4_PSEUDO_STAT	Current Status of ISO Damper 4	INT	R	Table A

BACnet Points

Instance	Tag	Description	Data Type	R/W	Comment
IV23	ISO_5_PSEUDO_STAT	Current Status of ISO Damper 5	INT	R	Table A
IV24	ISO_6_PSEUDO_STAT	Current Status of ISO Damper 6	INT	R	Table A
IV25	ISO_7_PSEUDO_STAT	Current Status of ISO Damper 7	INT	R	Table A
IV26	ISO_8_PSEUDO_STAT	Current Status of ISO Damper 8	INT	R	Table A
IV27	TOTAL_FANS	Total number of fan on this system	INT	R	1-8
IV28	REDUNDANT_FANS	Redundant fans on this system	INT	R	0-7
IV29	FAN_1_RUNTIME	Fan 1 Run Time	INT	R	Hours
IV30	FAN_1_RUNTIME	Fan 2 Run Time	INT	R	Hours
IV31	FAN_1_RUNTIME	Fan 3 Run Time	INT	R	Hours
IV32	FAN_1_RUNTIME	Fan 4 Run Time	INT	R	Hours
IV33	FAN_1_RUNTIME	Fan 5 Run Time	INT	R	Hours
IV34	FAN_1_RUNTIME	Fan 6 Run Time	INT	R	Hours
IV35	FAN_1_RUNTIME	Fan 7 Run Time	INT	R	Hours
IV36	FAN_1_RUNTIME	Fan 8 Run Time	INT	R	Hours

Table A

Value	Definition
0	Closed
1	Open
2	Closing
3	Opening
4	FTO (Failed to Open)
5	OOP (Out of position but was Open)
6	FTC (Failed to Close)
7	OOP (Out of position but was Closed)
8	Failed to initialize Status Monitor
9	Disabled
10	IO feedback is disconnected
11	Holding Position (something other than Open or Closed)
12	Overridden

SAFE controller

USER MANUAL

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