Operations Manual

OM 1329-1

Group: **Applied Air Systems**

Part Number: **OM 1329-1**

Date: **October, 2023**

Vision®/Skyline® EC Fan Controller

Models: CAH, CAC, OAH, OAC

Table of Contents

VISION/SKYLINE INTRODUCTION

This manual provides operating information about the Vision/Skyline Daikin Applied EC Fan array with premium controls. This document includes controller operation sequences and start-up procedures. For overall array installation and/or maintenance procedures, refer to the following IMs:

- Vision CAC/CAH – IM 672
- Vision Extended Sizes CAC/CAH – IM 915
- Skyline OAC/OAH – IM 777
- Non-Daikin Applied: See vendor manuals

Example Delta Motor Label

Example EBM Motor Label

Figure 1: Example Motor Labels

CONTROL PANEL LOCATIONS

Figure 2 shows control and power panel locations on a typical section. Figures 3 and 4 show the layout of the components within the power box and low voltage control box, respectively.

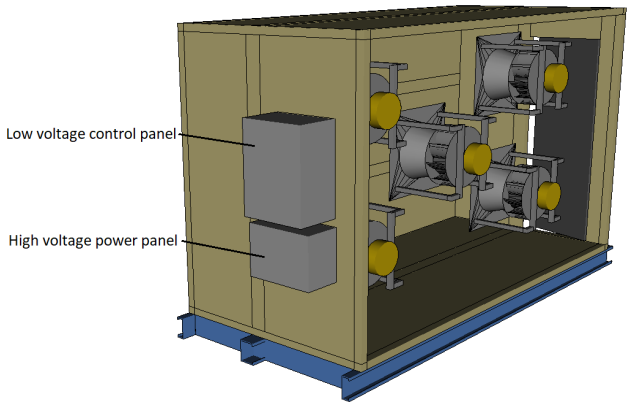


Figure 1: Example Panels Locations

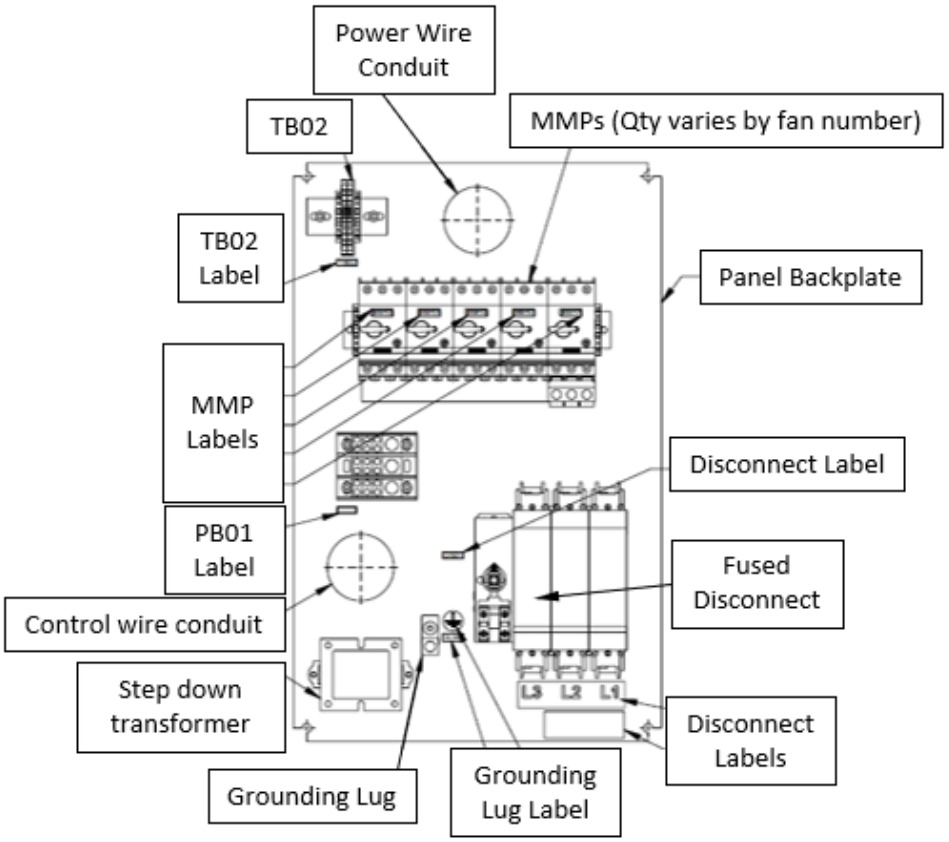


Figure 3: Example Power Box Control Panel

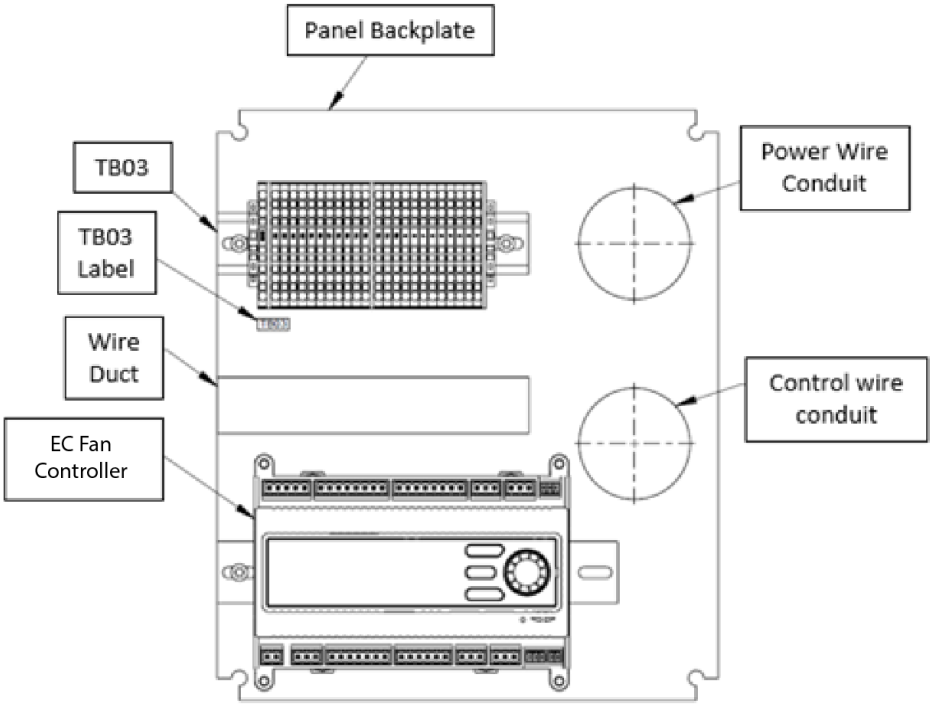


Figure 4: Example Low Voltage Control Panel

CONTROLLER FUNDAMENTALS

Getting Started

This manual contains information designed to assist the field technician with the Daikin Applied EC fan array setup when premium controls are provided. The technician will need to be familiar with the following topics at a minimum to successfully set up the Daikin Applied EC fan array operation.

- Keypad navigation/editing/passwords
- Control Mode
- Demand Source

The keypad/display consists of a 5 line by 22-character display, three keys and a "push and roll" navigation wheel. There is an Alarm Button, Menu (Home) Button, and a Back Button. The wheel is used to navigate between lines on a screen (page) and to increase and decrease changeable values when editing. Pushing the wheel acts as an Enter Button.

The first line on each page includes the page title and the line number to which the cursor is currently "pointing". The line numbers are X/Y to indicate line number X of a total of Y lines for that page. The left most position of the title line includes an "up" arrow to indicate there are pages "above" the currently displayed items, a "down" arrow to indicate there are pages "below" the currently displayed items or an "up/down" arrow to indicate there are pages "above and below" the currently displayed page.

Each line on a page can contain status only information or include changeable data fields. When a line contains status only information and the cursor is on that line all but the value field of that line is highlighted meaning the text is white with a black box around it. When the line contains a changeable value and the cursor is at that line, the entire line is highlighted. Each line on a page may also be defined as a "jump" line, meaning pushing the navigation wheel will cause a "jump" to a new page. An arrow is displayed to the far right of the line to indicate it is a "jump" line.

The keypad/display Information is organized into Menu groups; Main Menu, Quick Menu, View Status, Commission Array, Manual Control, Service Menus, BMS Communications, Alarm List, and About This Array.

NOTE: Only menus and items that are applicable to the specific array configuration are displayed.

The Main Menu allows the user to enter a password, access the Quick Menu pages, view the current array state, access the Alarm List Menu as well as access information about the fan array. The Quick Menu provides access to status information indicating the current operating condition of the fan array. The View Status Menus include basic fan array operating status menus and information about current operation. The Commission Array menu includes commissioning/configuration menus to set up the fan array for operation. The Manual Control Menu allows service personnel to test fan array operation directly from the HMI. The Service Menus allow service personnel to review Modbus status and current fan operation hours. The BMS Communications menus allow service personnel to view and set building management system parameters such as the IP address. The Alarm List Menu includes active alarm and alarm log information. The About This Array menu allows service personnel to view information about the fan array including SO Number and Software Build Version.

Passwords

Various menu functions are accessible or inaccessible, depending on the access level of the user, and the password they enter, if any. There are four access levels, including no password, Level 2, Level 4, and Level 6, with Level 2 having the highest level of access. Without entering a password, the user has access only to basic status menu items and the About this Array menu group. Entering the Level 6 password (5321) adds access to the Alarm List, Quick Menu, and the View Status menu groups to the "no password" level. Entering the Level 4 password (2526) adds access to the Service Menu and Manual Control menu groups to the Level 6 access level. Entering the Level 2 password (6363) adds access to the Commission Array and BMS Communications menu groups to the level 4 access level.

NOTE: Alarms can be acknowledged without entering a password.

The main menu is displayed when the keypad/display is first accessed, the Home Key is pressed, the Back Key is pressed multiple times, or if the keypad/display has been idle longer than the Password Timeout (default 10 minutes). The main menu provides access to enter a password, access the Quick Menu, view the current Array State, access the alarm lists or view information about the array.

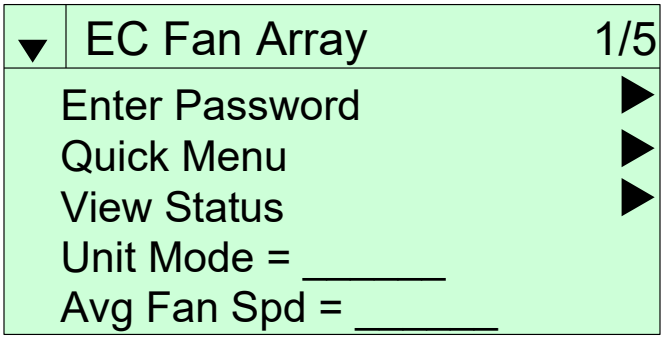


Figure 5: Password Main Menu

The password field initially has a value **** where each * represents an adjustable field. These values can be changed by selecting the Enter Password menu item.

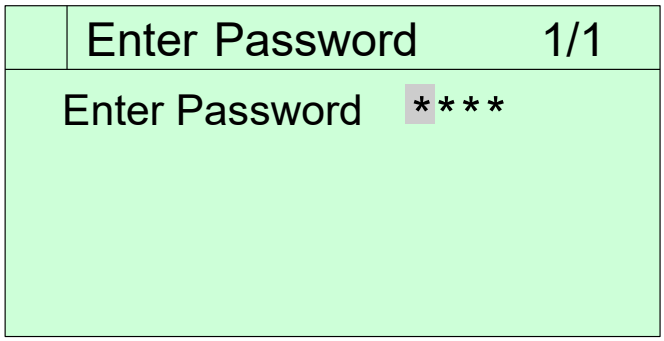


Figure 6: Password Entry Page

Entering an invalid password has the same effect as continuing without entering a password. Once a valid password has been entered, the controller allows further changes and access without requiring the user to enter a password until either the password timer expires or a different password is entered. The default value for this password timer is 10 minutes.

Navigation Mode

In the Navigation Mode, when a line on a page contains no editable fields, all but the value field of that line is highlighted, meaning the text is white with a black box around it. When the line contains an editable value field the entire line is inverted when the cursor is pointing to that line.

When the navigation wheel is turned clockwise, the cursor moves to the next line (down) on the page. When the wheel is turned counterclockwise the cursor moves to the previous line (up) on the page. The faster the wheel is turned the faster the cursor moves.

When the Back Button is pressed the display reverts to the previously displayed page. If the Back button is repeated pressed the display continues to revert one page back along the current navigation path until the “main menu” is reached.

When the Menu (Home) Button is pressed the display reverts to the “main page.”

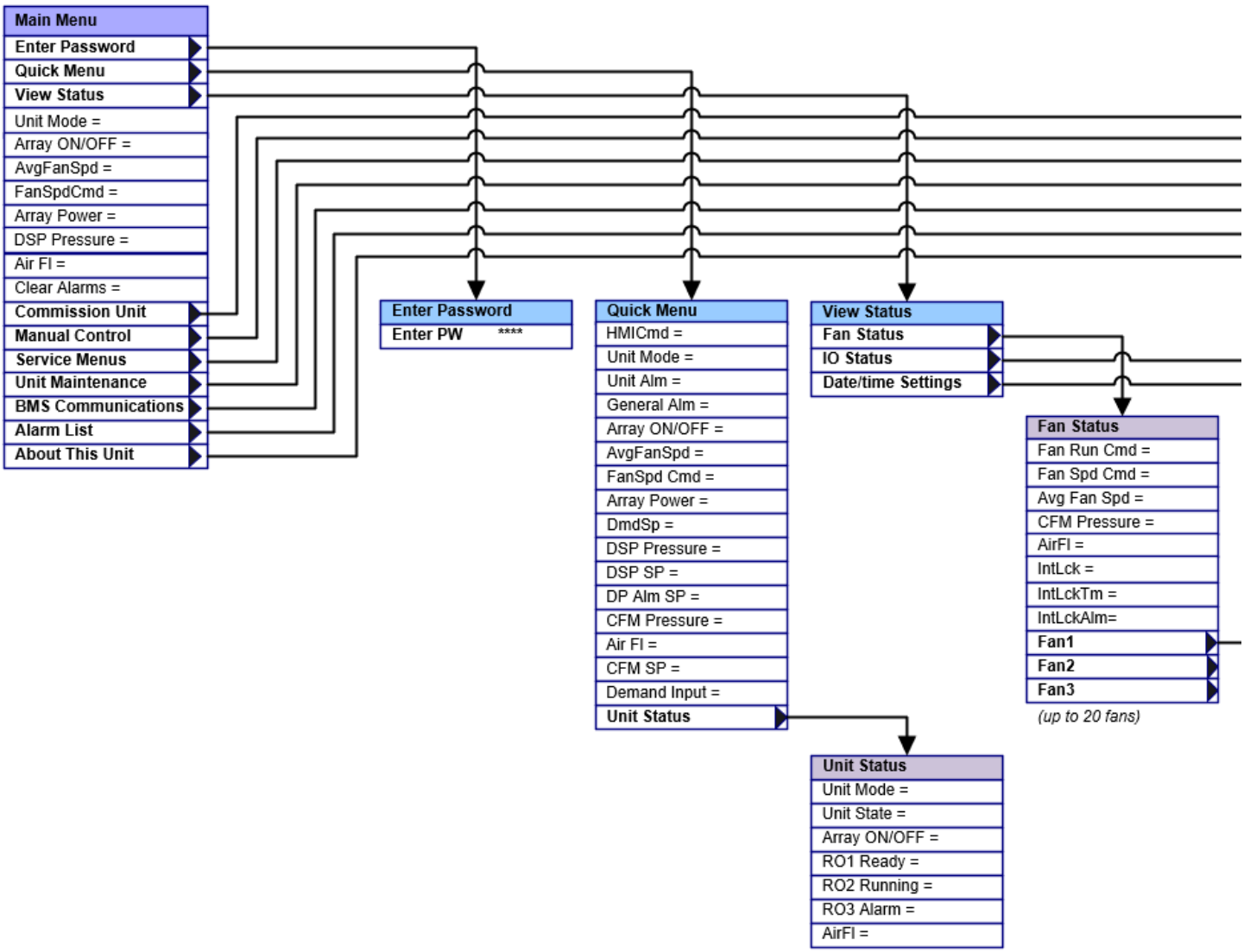
When the Alarm Button is pressed, most recent active alarm is displayed.

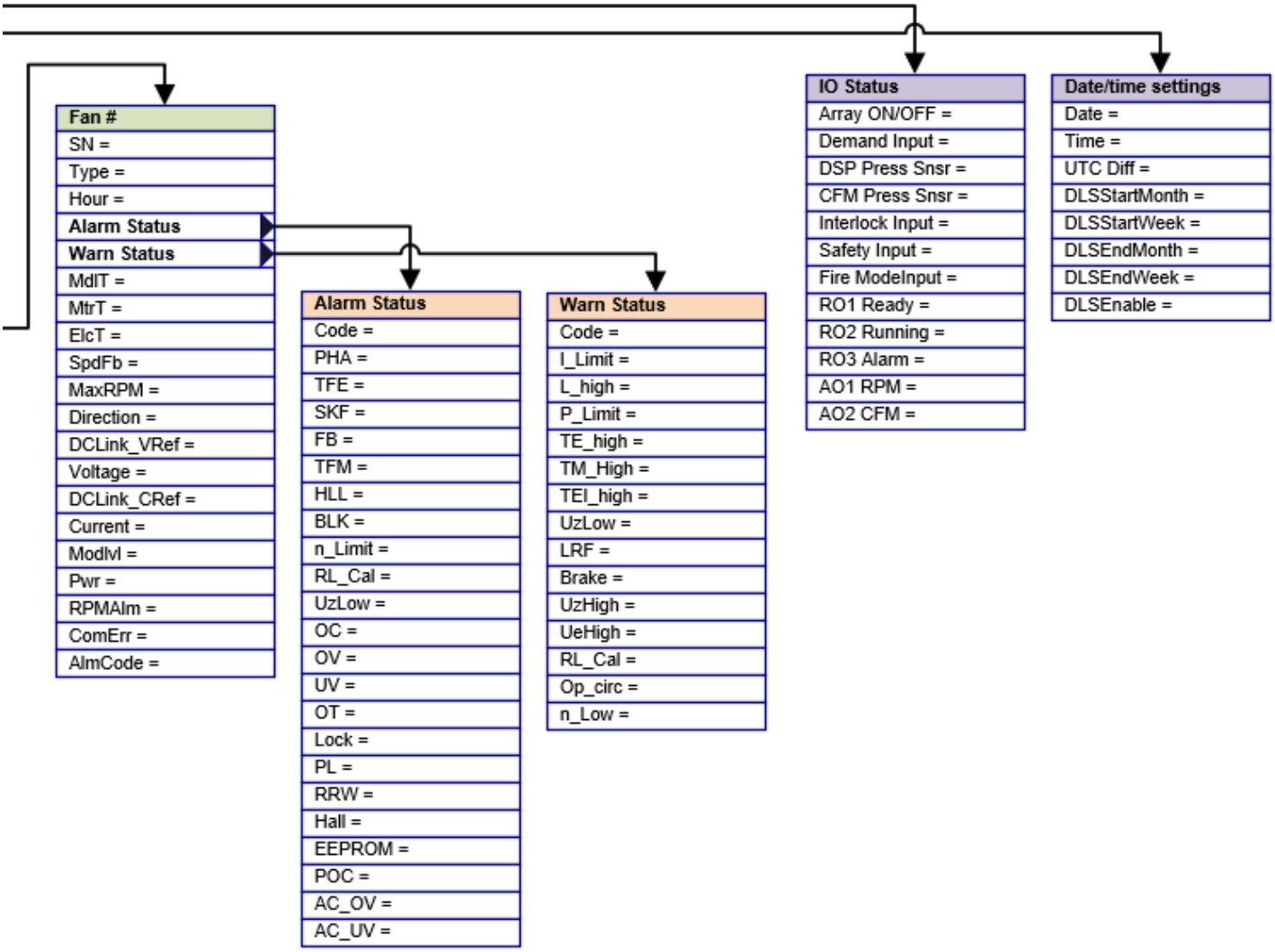
Edit Mode

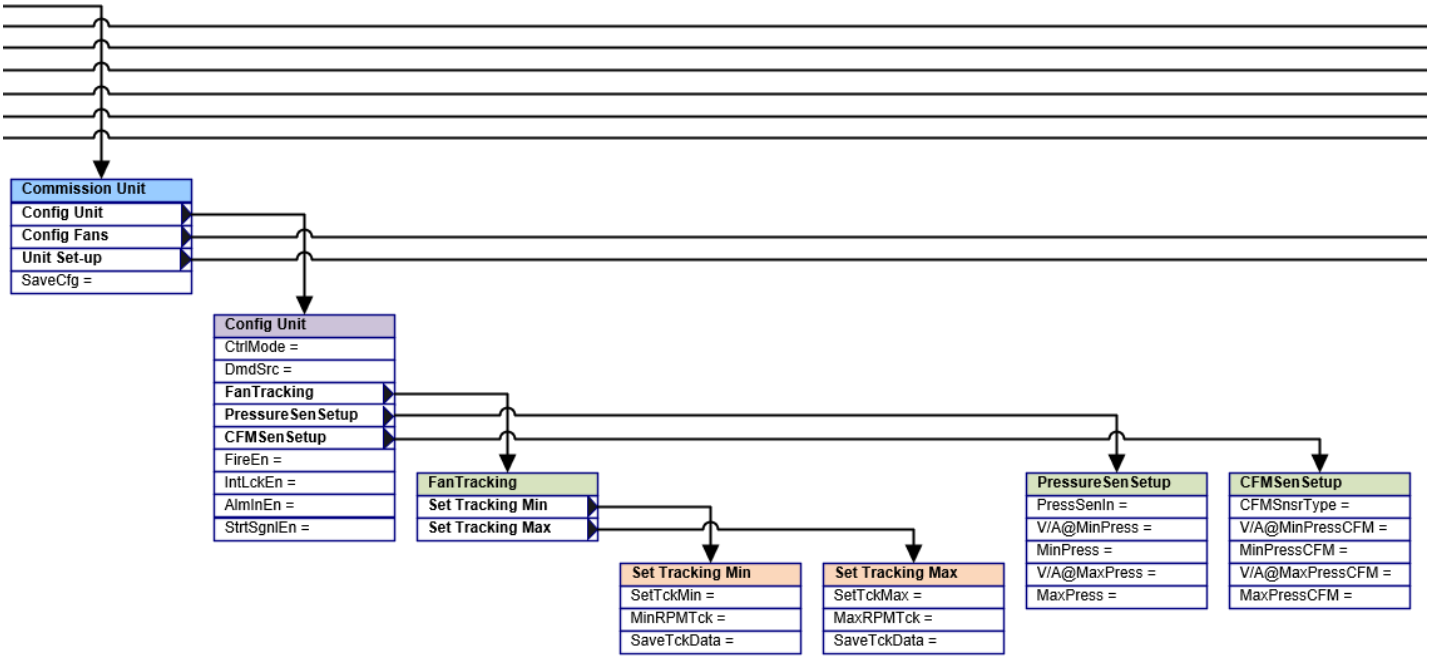
The Editing Mode is entered by pressing the navigation wheel while the cursor is pointing to a line containing an editable field. Turning the wheel clockwise while the editable field is highlighted causes the value to be increased. Turning the wheel counterclockwise while the editable field is highlighted causes the value to be decreased. The faster the wheel is turned the faster the value is increased or decreased. Pressing the wheel again causes the new value to be saved and the keypad/display to leave the edit mode and return to the navigation mode

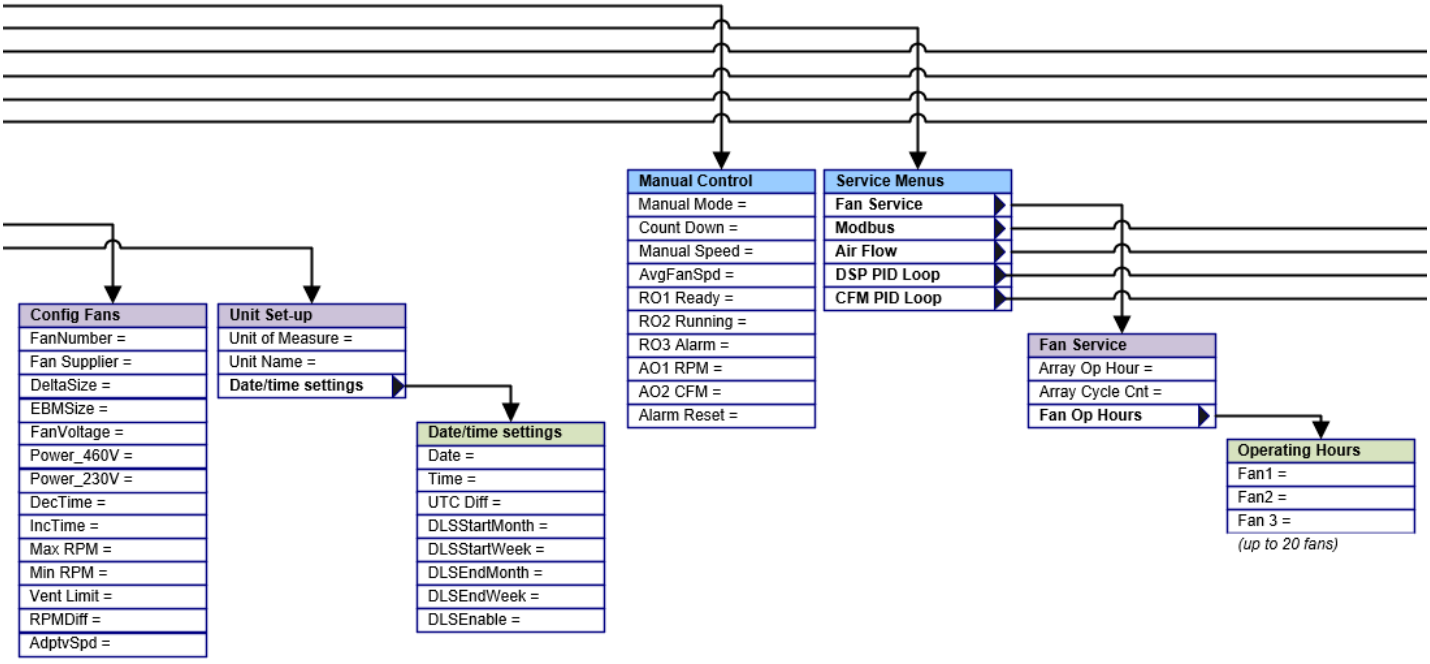
KEYPAD AND DISPLAY MENU STRUCTURE

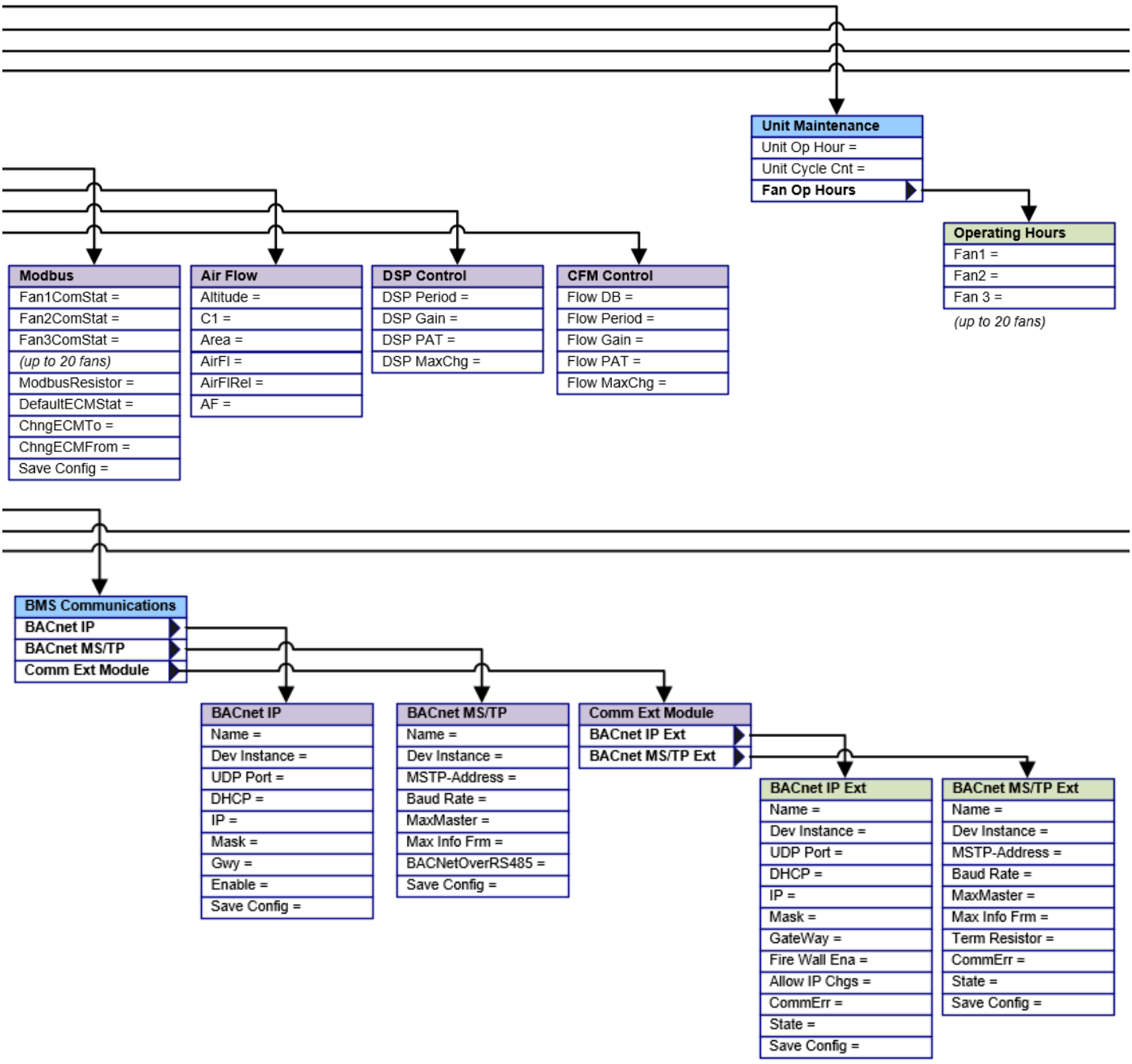
The following is a description of the Vision/Skyline Fan-Only Controller menu structure. These menus and items can all be viewed on the keypad/display. Menu items displayed will change based on the array configuration.

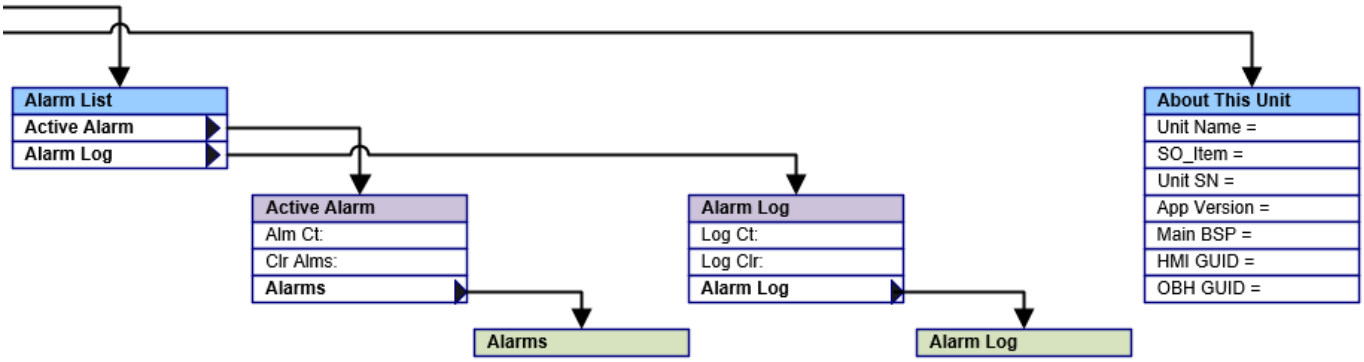


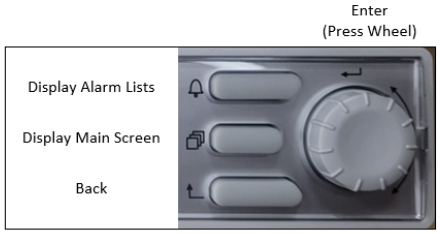

Fan #
SN =
Type =
Hour =
Alarm Status
Warn Status
MdlT =
MtrT =
ElcT =
SpdFb =
MaxRPM =
Direction =
DCLink_VRef =
Voltage =
DCLink_CRef =
Current =
ModIvl =
Pwr =
RPMAlm =
ComErr =
AlmCode =
Alarm Status
Code =
PHA =
TFE =
SKF =
FB =
TFM =
HLL =
BLK =
n_Limit =
RL_Cal =
UzLow =
OC =
OV =
UV =
OT =
Lock =
PL =
RRW =
Hall =
EEPROM =
POC =
AC_OV =
AC_UV =
Warn Status
Code =
I_Limit =
L_high =
P_Limit =
TE_high =
TM_High =
TEI_high =
UzLow =
LRF =
Brake =
UzHigh =
UeHigh =
RL_Cal =
Op_circ =
n_Low =
IO Status
Array ON/OFF =
Demand Input =
DSP Press Snsr =
CFM Press Snsr =
Interlock Input =
Safety Input =
Fire ModeInput =
RO1 Ready =
RO2 Running =
RO3 Alarm =
AO1 RPM =
AO2 CFM =
Date/time settings
Date =
Time =
UTC Diff =
DLSStartMonth =
DLSStartWeek =
DLSEndMonth =
DLSEndWeek =
DLSEnable =


Commission Unit
Config Unit
Config Fans
Unit Set-up
SaveCfg =
Config Unit
CtrlMode =
DmdSrc =
FanTracking
PressureSenSetup
CFMSenSetup
FireEn =
IntLckEn =
AlmInEn =
StrtSgnlEn =
FanTracking
Set Tracking Min
Set Tracking Max
Set Tracking Min
SetTckMin =
MinRPMTck =
SaveTckData =
Set Tracking Max
SetTckMax =
MaxRPMTck =
SaveTckData =
PressureSenSetup
PressSenIn =
V/A@MinPress =
MinPress =
V/A@MaxPress =
MaxPress =
CFMSenSetup
CFMSnsrType =
V/A@MinPressCFM =
MinPressCFM =
V/A@MaxPressCFM =
MaxPressCFM =


Manual Control
Manual Mode =
Count Down =
Manual Speed =
AvgFanSpd =
RO1 Ready =
RO2 Running =
RO3 Alarm =
AO1 RPM =
AO2 CFM =
Alarm Reset =
Service Menus
Fan Service
Modbus
Air Flow
DSP PID Loop
CFM PID Loop
Config Fans
FanNumber =
Fan Supplier =
DeltaSize =
EBMSize =
FanVoltage =
Power_460V =
Power_230V =
DecTime =
IncTime =
Max RPM =
Min RPM =
Vent Limit =
RPMDiff =
AdptvSpd =
Unit Set-up
Unit of Measure =
Unit Name =
Date/time settings
Date/time settings
Date =
Time =
UTC Diff =
DLSStartMonth =
DLSStartWeek =
DLSEndMonth =
DLSEndWeek =
DLSEnable =
Fan Service
Array Op Hour =
Array Cycle Cnt =
Fan Op Hours
Operating Hours
Fan1 =
Fan2 =
Fan 3 =
(up to 20 fans)


Unit Maintenance
Unit Op Hour =
Unit Cycle Cnt =
Fan Op Hours
Operating Hours
Fan1 =
Fan2 =
Fan 3 =
(up to 20 fans)
Modbus
Fan1ComStat =
Fan2ComStat =
Fan3ComStat =
(up to 20 fans)
ModbusResistor =
DefaultECMStat =
ChngECMTo =
ChngECMFrom =
Save Config =
Air Flow
Altitude =
C1 =
Area =
AirFl =
AirFlRel =
AF =
DSP Control
DSP Period =
DSP Gain =
DSP PAT =
DSP MaxChg =
CFM Control
Flow DB =
Flow Period =
Flow Gain =
Flow PAT =
Flow MaxChg =
BMS Communications
BACnet IP
BACnet MS/TP
Comm Ext Module
BACnet IP
Name =
Dev Instance =
UDP Port =
DHCP =
IP =
Mask =
Gwy =
Enable =
Save Config =
BACnet MS/TP
Name =
Dev Instance =
MSTP-Address =
Baud Rate =
MaxMaster =
Max Info Frm =
BACNetOverRS485 =
Save Config =
Comm Ext Module
BACnet IP Ext
BACnet MS/TP Ext
BACnet IP Ext
Name =
Dev Instance =
UDP Port =
DHCP =
IP =
Mask =
GateWay =
Fire Wall Ena =
Allow IP Chgs =
CommErr =
State =
Save Config =
BACnet MS/TP Ext
Name =
Dev Instance =
MSTP-Address =
Baud Rate =
MaxMaster =
Max Info Frm =
Term Resistor =
CommErr =
State =
Save Config =





This navigation map represents all possible Fan Array menus and menu items. Not all menus and items shown here will appear on the HMI display depending on the specific Fan Array configuration. Those that do not appear are not applicable to this Array.

CONNECTION FIELD WIRED INPUTS

Field Control Wiring

After the array has been installed, EC Fan Arrays may require low voltage field wiring to connect the BMS to the EC fan controller, along with any additional sensors that may be required. Use the schematic provided on the door of the control panel to determine where field control connections required for the application are located. Figure 7 is a graphical representation of TB03, and Table 1 shows the possible field connections that can be made.

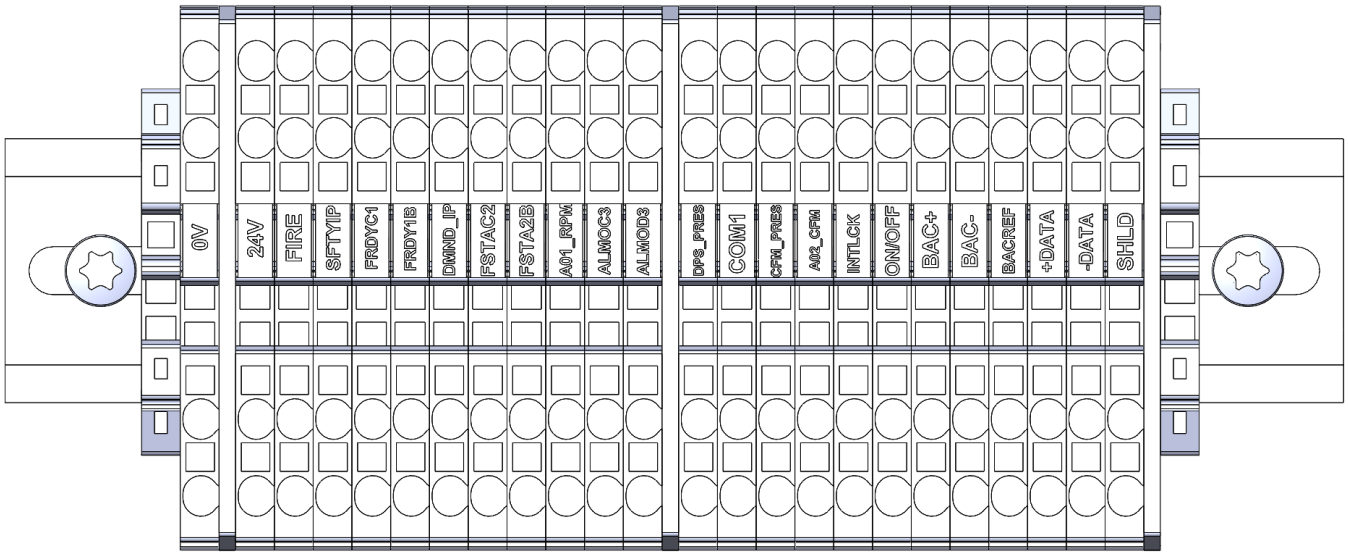


Figure 7: Graphical representation of TB03

Table 1: Potential Field Connections and Locations on TB03 (Terminal Block Label 1 is Rightmost Terminal Block)

Terminal Block Label	Terminal Block Name	Description	Signal
1	SHLD	MODBUS to Fans	RS485
2	-DATA	MODBUS to Fans	RS485
3	+DATA	MODBUS to Fans	RS485
4	BACREF	BACnet Ground	RS485
5	BAC-	BACnet Negative	RS485
6	BAC+	BACnet Positive	RS485
7	ON/OFF	Array ON/OFF	Contact Closure
8	INTLCK	Interlock Input	Contact Closure
9	A02_CFM	CFM Output	0-10V DC
10	CFM_PRES	CFM Pressure Sensor	Configurable (4-20mA/0-10V)
11	COM1	DC Ground	GND
12	DPS_PRES	DSP Pressure Sensor	Configurable (4-20mA/0-10V)
13	ALMOD3	Alarm	Contact Closure
14	24VC3	Alarm	Contact Closure
15	A01_RPM	RPM Output	0-10V DC
16	24VC2	Fan Status	Contact Closure
17	FSTAC2	Fan Status	Contact Closure
18	DMND_IP	Demand Input	Contact Closure
19	FRDY1B	Fan Ready	Contact Closure
20	24VC1	Fan Ready	Contact Closure
21	SFTYIP	Safety Input	Contact Closure
22	FIRE	Fire Mode Input	Contact Closure
23	24V	Power Supply	24V
GROUND	0V	GND	GND

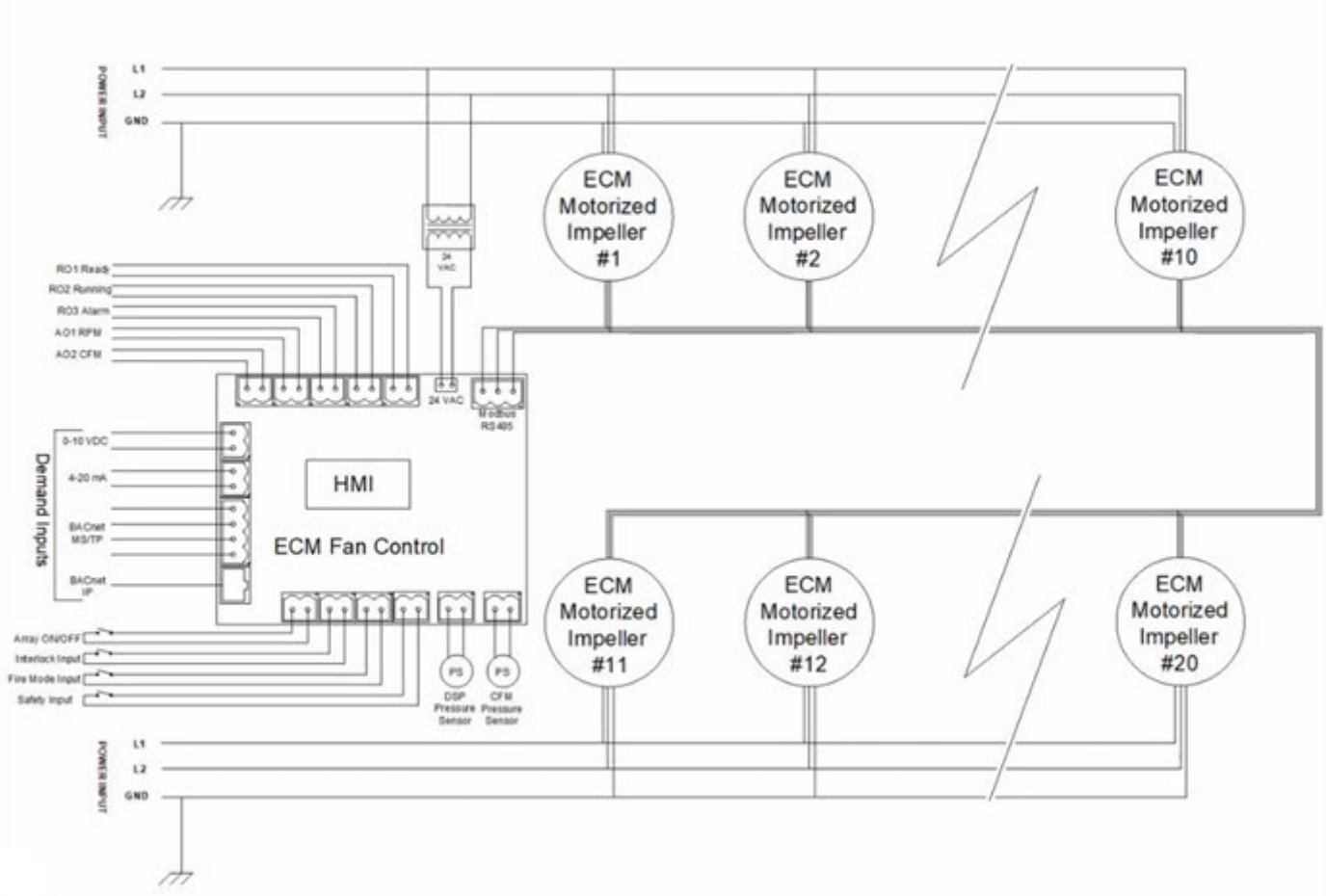


Figure 8: System Block Diagram

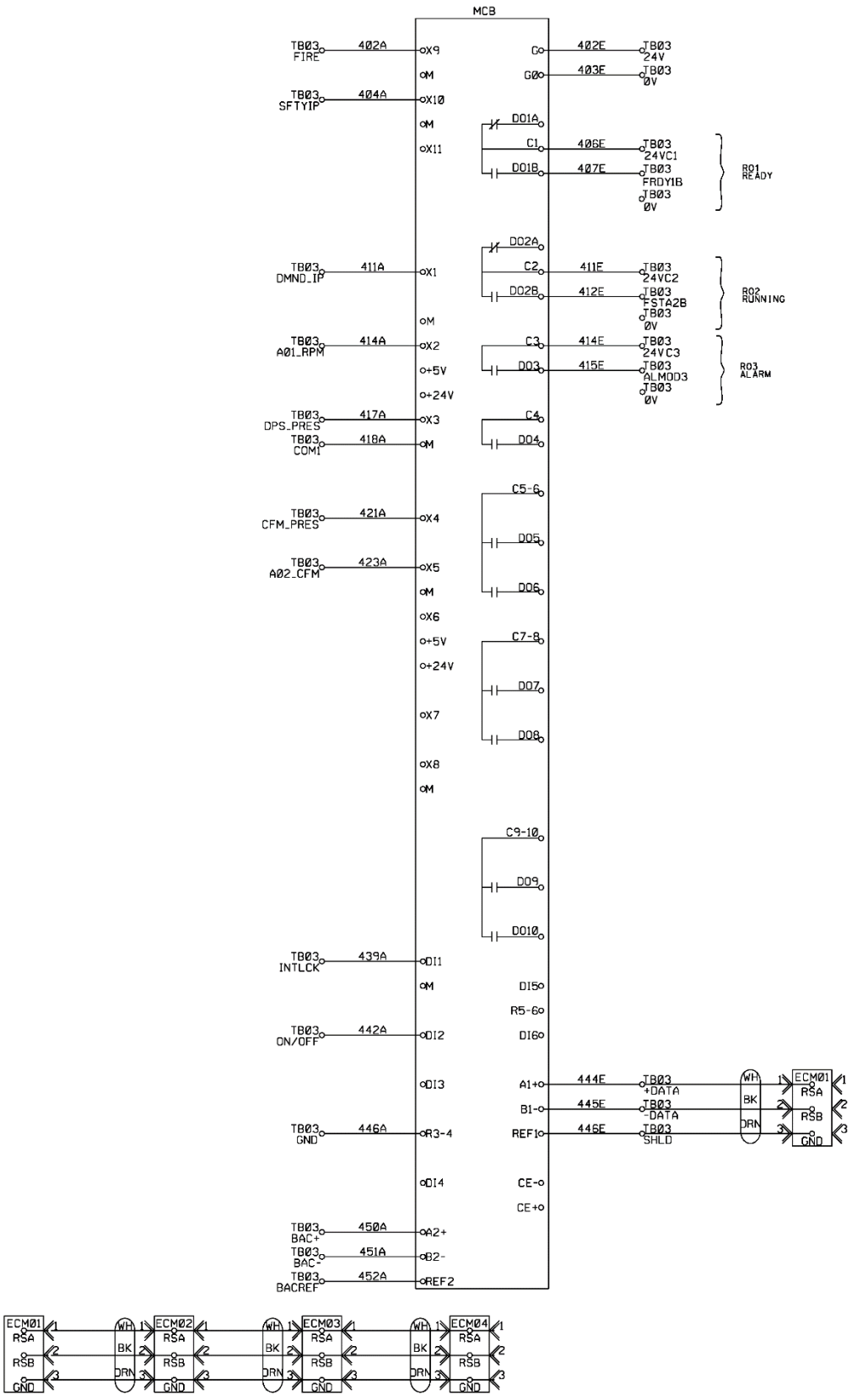


Figure 9: Control Schematic

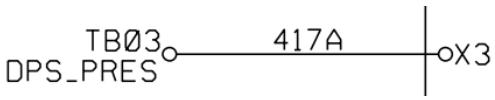
Fan Array Sensors

The EC fan controller can be wired to the following sensors:

- Duct Pressure Sensor
  - Field provided and installed
- Array CFM Pressure Transducer
  - Factory Installed, Daikin Applied PNs: 2061282 -04 through -07
  - (1) transducer per array

Duct Pressure Sensor

The Duct Pressure Sensor is used by the EC fan controller to calculate duct static pressure downstream of the fan. The Pressure Range Limit will be selected in the controller through the *Main Menu**Commission Array**Configure Array**PressureSensSetup* menu. The sensor measurement range can be entered into the controller in the Pressure Sensor Setup menu (up to 10" w.c.), and the pressure sensor output signal can be either in VDC or mA – the output range of the sensor can also be entered into the controller in the same menu.

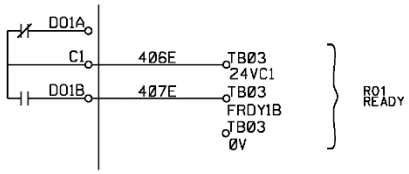


Main Menu* \ *Commission Array* \ *Config Array* \ *PressureSenSetup

Menu Display Name	Default	Range	Description
PressSnsrType	None	None mA VDC	**PressSenIn** is an adjustable item that selects the input signal type to the controller from the Duct Static Pressure sensor.
V/A@MinPress	0	0-20	**V/A@MinPress** is an adjustable item that informs the controller what the VDC or mA signal magnitude is at the sensor's minimum pressure threshold.
MinPress	0	0-10	**MinPress** is an adjustable item that informs the controller what the sensor's minimum pressure threshold is.
V/A@MaxPress	10	0-20	**V/A@MaxPress** is an adjustable item that informs the controller what the VDC or mA signal magnitude is at the sensor's maximum pressure threshold.
MaxPress	8	0-10	**MaxPress** is an adjustable item that informs the controller what the sensor's maximum pressure threshold is.

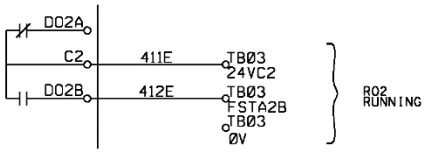
Ready Relay

The controller has a Ready Relay contact that provides a digital output that will close when the fan array is ready to run.



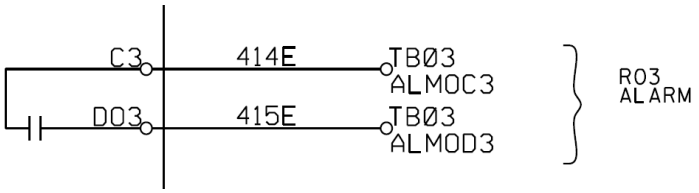
Running Relay

The controller has a Running Relay contact that provides a digital output that will close when the fan array receives a request to run from the specified demand input.



Alarm Output

The controller has an Alarm Output contact that provides a digital output anytime an alarm is active on the controller. The alarm output will close whenever there are any alarms on the EC fan controller.



COMMISSIONING AND OPERATIONS

Array Set-Up

General array set-up configurations are used to adjust the controller's units of measure and the array name.

Array Set-Up Menu:

Main Menu \ Commission Array \ Array Set-Up

Menu Display Name	Default	Range	Description
Unit of Measure	US	US SI CA	**Unit of Measure** is an adjustable item to indicate if the unit is to display US, Metric, or Canadian units of measure.
Array Name	-	-	**Array Name** is an adjustable item that allows each controller to be given a unique name. This may be useful when multiple arrays are connected to a single remote HMI. The limit for this value is ten alphanumeric characters.

Units

The units of measure can be set to US, Metric, or Canadian units. For all units of measure, the units will be as follows:

Unit of Measure	English Units	Metric Units	Canadian Units
Weight	lb	kg	kg
Temperature	˚F	˚C	˚C
CFM	ft^3/min	m^3/hr	l/s
Pressure	inWc	Pa	Pa
Electrical Power	kW	kW	kW

Date/Time Settings

Controller Date and Time

The controller uses the date and time to timestamp events. The current time and date will not be lost if the array is turned off for up to forty-eight hours. The time and date can be set from the HMI. The time of day can be set by entering the hour (00-23), minute (00-59), and second (00-59) into the appropriate menu item. The current date can be set by entering the day (01-31), month (01- 12) and year (2000-2050) into the appropriate menu item.

Date/Time Menu:

Main Menu \ Commission Array \ Array Set-up \ Date/Time Settings

Menu Display Name	Default	Range	Description
Date	-	01.01.2000 – 12.31.2050	**Date** is an adjustable item that details the current date
Time	-	00:00:00 - 23:59:59	**Time** is an adjustable item that details the time
UTC Diff	6h	-12 - 14	**UTC-difference** is an adjustable parameter that can be set to indicate how the local time where the array is situated differs from the Coordinated Universal Time (adjustable in one hour increments).
DLSStartMonth	Mar	NA Jan-Dec	**DLS Start Month** is an adjustable item that sets the month for daylight savings time to begin.
DLSStartWeek	2ndWeek	1stWeek 2ndWeek 3rdWeek 4thWeek 5thWeek	**DLS Strt Week** is an adjustable item that sets the week of the month for daylight savings time to begin.
DLSEndMonth	Nov	NA Jan-Dec	**DLS End Month** is an adjustable item that sets the month for daylight savings time to end.
DLSEndWeek	1stWeek	1stWeek 2ndWeek 3rdWeek 4thWeek 5thWeek	**DLS End Week** is an adjustable item that sets the week of the month for daylight savings time to end.
DLSEnable	Enable	Disable Enable	**DLS Enable** is an adjustable item that sets whether daylight savings time is enabled.

ENABLE THE ARRAY

Configure Array Menu

The Configure Array Menu is a commissioning menu that provides adjustable parameters to set the fan operating controls.

Control Mode

Daikin Applied EC fan arrays will be controlled using a factory EC motor for each fan. Each motor is controlled via a Modbus interface when selected with the premium control package.

The fan array will control between an adjustable minimum and maximum fan capacity. EBM fans have a minimum speed of 8% of maximum capacity while Delta fans have a minimum of 200 RPM fan speed. Maximum speed for both fan styles is 100% of fan capacity. The setpoints can be adjusted at the array controller interface or via a network input signal.

- **RPM Control (RPM*):*** An RPM control type controls the fan array capacity to a fixed speed value.
- **Duct Pressure Control (DSP):** Duct pressure control operates the array to maintain duct conditions. The fan array is modulated to maintain a duct static pressure setpoint, based on an external pressure sensor (field supplied and installed).
- **CFM Control:** The array is equipped with a fan airflow measuring system. When the array is configured to CFM control, the fan array capacity is modulated to maintain an adjustable airflow (CFM) setpoint.
- **Fan Tracking Control (Tracking):** When the array is set to *Tracking,* the fan array is determined to be the Secondary Fan Array and its capacity is varied to maintain an adjustable offset between the Primary Fan Array capacity and the Secondary Fan Array capacity. The user specifies the offset at maximum primary fan array capacity and the offset at minimum primary fan array capacity, and the secondary fan array controls linearly between the two points. In this configuration the fan array that is set to *Tracking* will only operate off a 0-10V demand signal.

Digital Inputs

The EC fan controller has several digital inputs – a Start Signal Input, an Interlock Input, a Fire Input, and an Alarm Enable Input. Inputs can be landed on terminal block TB03 inside the low voltage control box as shown in the master wiring diagram shown in the Field Control Wiring section of this OM.

Main Menu \ Commission Array \ Config Array

Menu Display Name	Default	Range	Description
CtrlMode	RPM	DSP RPM CFM Tracking	**CtrlMode** is an adjustable item used to select how the fan array is to be controlled. The fan array can normally be controlled by a duct pressure (DSP), constant CFM setpoint (CFM), or RPM which allows the fans to either be set at constant speed or adjusted with a building automation system. The fan array can also be controlled with fan tracking (Tracking), which allows the speed of a Secondary fan array to be controlled based on the output of a Primary fan array.
DmdSrc	0-10	4-20 mA 0-10 VDC Bacnet HMI	**DmdSrc** is an adjustable item that defines the demand input source. This will be fixed to 0-10 VDC if CtrlMode is set to Tracking.
FireEn	No	Yes No	**FireEn** is an adjustable item that allows the controller to ignore the Fire Mode Input when set to "No". When enabled, if a contact connected to this input is opened, all alarm contacts are closed and alarm signals are sent out through BACnet and the controller HMI.
IntLckEn	No	Yes No	**IntLckEn** is an adjustable item that allows the controller to ignore the Interlock Input when set to "No". When enabled, this input delays fan operation until an external contact is closed.
SafetyEn	No	Yes No	**SafetyEn** is an adjustable item that allows the controller to ignore the Safety Input when set to "No". When enabled, if a contact connected to this input is opened, the fan will not operate under any circumstances.
OnOffEn	No	Yes No	**OnOffEn** is an adjustable item allows the controller to ignore the Array ON/OFF Input when set to "No". When enabled, this input allows the fan array operation to be controlled on/off with an external contact closure (closing this contact enables fan operation).

Fan Tracking Menu

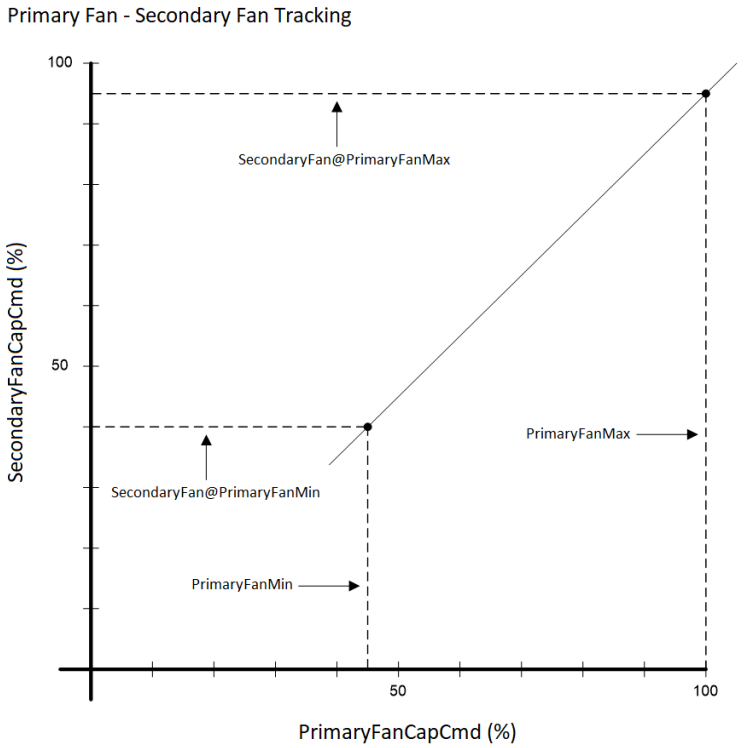
The Fan Tracking Menu is a commissioning menu that provides adjustable parameters to set the fan operating controls – this menu is only visible when the control mode is set to Tracking (**Main Menu \ Commission Array \ Config Array \ CtrlMode**).

Main Menu \ Commission Array \ Configure Array \ Fan Tracking \ Set Tracking Min

Menu Display Name	Default	Range	Description
SetTckMin	No	Yes No	**SetTckMin** is an adjustable item allows the user to change the Maximum Tracking RPM value when set to Yes
MinRPMTck	0	355mm: 0-3300 450mm: 0-2600 560mm: 0-1900 630mm: 0-1950	**MinRPMTck** is an adjustable item that controls the speed of the secondary fan array to balance the secondary fan array when the primary fan array is at its minimum set point. The range varies depending on the impeller size selected in the Commission Array \ Config Fans menu, but cannot exceed the MaxRPMTck value.
SaveTckData	No	Yes No	**SaveTckData** is a menu item that must be set to Yes after any adjustable items in this menu are changed to save those changes.

Main Menu \ Commission Array \ Configure Array \ Fan Tracking \ Set Tracking Max

Menu Display Name	Default	Range	Description
SetTckMax	No	Yes No	**SetTckMax** is an adjustable item allows the user to change the Maximum Tracking RPM value when set to Yes.
MaxRPMTck	355mm: 3300 450mm: 2600 560mm: 1900 630mm: 1950	355mm: 0-3300 450mm: 0-2600 560mm: 0-1900 630mm: 0-1950	**MaxRPMTck** is an adjustable item that controls the speed of the secondary fan array to balance the secondary fan array when the primary fan array is at its maximum set point. The default and range vary depending on the impeller size selected in the Commission Array \ Config Fans menu, but cannot be set below the MinRPMTck value.
SaveTckData	No	Yes No	**SaveTckData** is a menu item that must be set to Yes after any adjustable items in this menu are changed to save those changes.



The field process for setting these parameters will be as follows:

1. The Primary fan array shall be set to maximum air flow conditions and allowed to stabilize.
2. The Secondary fan array shall be balanced while the Primary fan is at maximum airflow conditions as follows:
    a. On the Secondary fan array, set the *SetTckMax* parameter to Yes.
    b. The *MaxRPMTck* value will then be adjusted until the desired balance is obtained.
    c. The parameters shall be saved by selecting *SaveTckData*.
3. The Primary fan array shall be set to minimum air flow conditions and allowed to stabilize.
4. The Secondary fan array shall be balanced while the Primary fan is at minimum airflow conditions as follows:
    a. On the Secondary fan array, set the *SetTckMin* parameter to Yes.
    b. The *MinRPMTck* value will then be adjusted until the desired balance is obtained.
    c. The parameters shall be saved by selecting *SaveTckData*.

Note: Ideally the minimum and maximum conditions should be checked with the outdoor dampers (if present in the array) at minimum and maximum positions to assure there are not significantly different requirements depending on the outdoor damper position. If the differences are significant then the parameters may be manually adjusted to compromise between the two conditions. If the differences are too great it may be necessary to change to a different control method for the application.

Note: Setting the minimum and maximum tracking points will not necessarily establish minimum and maximum Primary fan array air flow modulation ranges but rather simply establishes the slope of the tracking curve. The curve line will be projected up to effective max Primary fan array air flow capacity and down to the effective minimum Primary fan array air flow capacity.

CFM Sensor Setup

The CFM Sensor Setup Menu allows the user to set the parameters for the specific sensor installed in the array. The Array CFM Pressure Transducer is used by the EC fan controller to calculate the total CFM delivered by the array. The Pressure Range Limit will be selected in the controller through the *Main Menu\Commission Array\Configure Array\CFMSensSetup* menu. The sensor measurement range can be entered into the controller in the CFM Sensor Setup menu (up to 40" w.c.), and the pressure sensor output signal can be either in VDC or mA – the output range of the sensor can also be entered into the controller in the same menu.

Main Menu \ Commission Array \ Config Array

Menu Display Name	Default	Range	Description
CFMSnsrType	mA	None mA VDC	**CFMSnsrType** is an adjustable item that selects the input signal type to the controller from the CFM sensor.

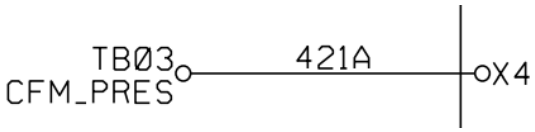
Main Menu \ Commission Array \ Config Array \ CFMSenSetup

Menu Display Name	Default	Range	Description
V/A@MinPressCFM	4	0-20	**V/A@MinPressCFM** is an adjustable item that informs the controller what the VDC or mA signal magnitude is at the sensor's minimum pressure threshold.
MinPressCFM	0	0-40	**MinPressCFM** is an adjustable item that informs the controller what the sensor's minimum pressure threshold is.
V/A@MaxPressCFM	20	0-20	**V/A@MaxPressCFM** is an adjustable item that informs the controller what the VDC or mA signal magnitude is at the sensor's maximum pressure threshold.
MaxPressCFM	5	0-40	**MaxPressCFM** is an adjustable item that informs the controller what the sensor's maximum pressure threshold is.

Note: If CFMSnsrType is set to None, the CFMSenSetup menu will be hidden the next time that the controller is power cycled.

Daikin Applied PN	Pressure Range Limit
206128207	0-5" W.C.
206128204	0-10" W.C.
206128205	0-20" W.C.
206128206	0-40" W.C.

Table 2: Pressure Range Limits for Daikin Applied Pressure Transducers



CONFIGURE FANS MENU

The Configure Fans Menu allows the user to configure the fan-specific settings for the array.

Main Menu \ Commission Array \ Config Fans

Menu Display Name	Default	Range	Description
FanNumber	4	1-20	**FanNumber** is an adjustable item that informs the controller of the number of fans in the array.
Fan Supplier	Delta	EBM Delta	**Fan Supplier** is an adjustable item that informs the controller of the brand of fans installed in the array.
FanSize	355	355 450 560 630	**FanSize** is an adjustable item that informs the controller of the nominal diameter of the fan impellers installed in the array. Units are in mm.
FanVoltage	460	208/230 460	**FanVoltage** is an adjustable item that informs the controller of the voltage of the fans installed in the fan array. Units are in VDC
FanPower	- -	0.0 – 15.0	**FanPower** is an adjustable item that informs the controller of the nameplate power rating of the fans installed in the fan array. Units are in kW.
DecTime	60	0-100	**DecTime** is an adjustable item that controls the time it will take to change the fan speed from maximum RPM to minimum RPM.
IncTime	60	0-100	**IncTime** is an adjustable item that controls the time it will take to change the fan speed from minimum RPM to maximum RPM.

MaxRPM	355mm: 3300 450mm: 2600 560mm: 1900 630mm: 1950	355mm: 3300 450mm: 2600 560mm: 1900 630mm: 1950	**MaxRPM** is an adjustable item that sets the maximum fan speed for the application. The controller adjusts the range of this value based on the fan impeller size selected.
MinRPM	0	355mm: 0-3300 450mm: 0-2600 560mm: 0-1900 630mm: 0-1950	**MinRPM** is an adjustable item that sets the minimum fan speed for the application. The controller adjusts the range of this value based on the fan impeller size selected.
Vent Limit	780	355mm: 0-3300 450mm: 0-2600 560mm: 0-1900 630mm: 0-1950	**Vent Limit** is an adjustable item that sets the fan speed when the vent limit is activated. The controller adjusts the range of this value based on the fan impeller size selected. Note that this value cannot exceed the MaxRPM value.
RPMDiff	300	0-3000	**RPMDiff** is an adjustable item that sets the maximum differential between the RPM setpoint and the actual RPM of the fans in the array. If this differential is exceeded, an alarm will be displayed.
AdptvSpd	Yes	Yes No	**AdptvSpd** is an adjustable item that enables or disables adaptive speed. If enabled, when a fan in the array is lost or disabled, the remaining fans will increase their RPM to compensate.

QUICK MENU

Items in the Quick Menu contain basic array operating status and control set point parameters. The items shown in the Quick Menu are Read Only if a valid password has not been entered. The following are brief descriptions of the Quick Menu items. No password is required to view the Quick Menu.

Main Menu \ Quick Menu

Menu Display Name	Default	Range	Description
HMICmd	--	0-100%	**HMICmd** is an adjustable item that sets the HMI demand setpoint.
Array Mode	--	Off Normal Manual Emergency	**Array Mode** is a read only item that displays the status of operation in which the array is currently operating. The array mode can be any of the status values shown.
Array Alm	No Alarm	No Alarm Fan #1 Alarm Fan #2 Alarm … Fan #19 Alarm Fan #20 Alarm Sensor Error Fire Alarm External Safety Alarm Interlock Alarm Pressure Alarm	**Array Alm** is a read only item which displays if, and what, alarm is active.
General Alm	Off	Off On	**General Alm** is a read only item that indicates the state of the Alarm Output relay contacts (AO3)
Array ON/OFF	Off	Off On	**Array ON/OFF** is a read only item that displays the current state of the array on/off digital input
AvgFanSpd	--	0-3300	**AvgFanSpd** is a read only item that displays the average speed of all fans in the array in RPM
FanSpd Cmd	0	0-100%	**FanSpd Cmd** is a read only item that displays the fan array speed demand setpoint
Array Power	--	--	**Array Power** is a read only item that displays the total power usage of the array in kilowatts
DmdSp	0	0-100%	**DmdSp** is an adjustable item that sets the demand setpoint for either CFM or DSP control mode
DSP Pressure	0	0.0-40.0	**DSP Pressure** is a read only item that displays the pressure reading when control mode is set to DSP

DSP SP	0	0.0-40.0	**DSP SP** is an adjustable item that sets the duct static pressure setpoint when control mode is DSP
DSP Alm SP	0	0.0-40.0	**DSP Alm SP** is an adjustable item that sets the static pressure setpoint that triggers an alarm
CFM Pressure	--	0.0-40.0	**CFM Pressure** is a read only item that displays the CFM pressure
Air Fl	--	--	**Air Fl** is a read only item that displays the total airflow of the fan array in CFM
CFM SP	0	0-200,000	**CFM SP** is an adjustable item that sets the CFM setpoint when control mode is CFM
Demand Input	0	0-100%	**Demand Input** is a read only item that displays the fan array speed command input

ARRAY STATUS

The "Array Status" menu provides a summary of basic array status and control items. This menu summarizes the current operating state of the array, giving the operating state the array is in, along with the current capacity level of that operating state.

Main Menu \ Quick Menu \ Array Status

Menu Display Name	Default	Range	Description
Array Mode	--	Off Normal Manual Emergency	**Array Mode** is a read only item that displays the status of operation in which the array is currently operating. The array mode can be any of the status values shown.
Array State	--	Off Ready Running Manual Alarm Emergency	**Array State** is a read only item that displays the current state of the array. The array state can be any of the values shown
Array ON/OFF	Off	Off On	**Array ON/OFF** is a read only item that displays the current state of the array on/off digital input
RO1 Ready	Off	Off On	**RO1 Ready** is a read only item displays the state of the Fan Ready relay
RO2 Running	Off	Off On	**RO2 Running** is a read only item that displays the state of the Fan Running relay
RO3 Alarm	Off	Off On	**RO3 Alarm** is a read only item that displays the state of the Fan Alarm relay
AirFl	--	--	**Air Fl** is a read only item that displays the total airflow of the fan array in CFM

VIEW STATUS

The "View Status" menu provides a series of read-only menus to observe the status of individual fans, IO status, and the current date and time settings.

FAN STATUS

The Fan Status Menu displays the fan operation and the relevant current control parameters.

Main Menu \ View Status \ Fan Status

Menu Display Name	Default	Range	Description
Fan Run Cmd	Off	On Off	**Fan Run Cmd** is a read only item that displays the fan array run command output
Fan Spd Cmd	--	0-100%	**FanSpd Cmd** is a read only item that displays the fan array speed command output

Avg Fan Spd	--	0-3300	**AvgFanSpd** is a read only item that displays the average speed of all fans in the array in RPM
CFM Pressure	--	0.0-40.0	**CFM Pressure** is a read only item that displays the CFM pressure
AirFl	--	0-200,000	**Air Fl** is a read only item that displays the total airflow of the fan array in CFM
IntLck	Off	Off On	**Intlck** is a read only item that displays the interlock switch status
IntLckTm	180s	0-180 seconds	**IntLckTm** is the timer delay between the interlock relay being activated and the interlock digital input being received before the interlock alarm timer is activated
IntLckAlm	Off = 0	Off = 0 On = 1	**IntLckAlm** indicates if the array is in interlock alarm status because the interlock timer ran down to 0 seconds

Fan Menus

The Fan Menus display each individual fan operation status.

Main Menu \ View Status \ Fan Status \ Fan# (1-20)

Menu Display Name	Default	Range	Description
SN	--	--	**SN** is a read only item that displays the fan motor serial number.
Type	--	--	**Type** is a read only item that displays the motor model number.
Hour	--	--	**Hour** is a read only item that displays the runtime of the fan in hours.
MdlT	--	--	**MdlT** is a read only item that displays the winding temperature within the motor.
MtrT	--	--	**MtrT** is a read only item that displays the motor temperature.
ElcT	--	--	**ElcT** is a read only item that displays the temperature of the internal electronics.
SpdFb	--	0-3300	**SpdFb** is a read only item that displays the RPM feedback from the motor.
MaxRPM	--	0-3300	**MaxRPM** is a read only item that displays the maximum RPM of the motor.
Direction	CW	CW CCW	**Direction** is a read only item that displays the rotational direction setting of the fan wheel.
DCLink_VRef	--	--	**DCLink_VRef** is a read only item that displays the DC Link reference voltage.
Voltage	--	--	**Voltage** is a read only item that displays the motor voltage.
DCLink_CRef	--	--	**DCLinkCRef** is a read only item that displays the DC Link reference current.
Current	--	--	**Current** is a read only item that displays the motor current.
Modlvl	--	0-100%	**Modlvl** is a read only item that displays the modulation level.
Pwr	--	--	**Pwr** is a read only item that displays the motor power.
RPMAlm	--	OK Flt	**RPMAlm** is a read only item that displays whether there is a RPM alarm present.
ComErr	--	OK Flt	**ComErr** is a read only item that displays whether there is a communication error present.
AlmCode	Online	--	**AlmCode** is a read only item that displays the alarm code active (if any), otherwise will display “Online”.

Alarm Status

The Alarm Status Menu displays alarm information for individual fans. Damage could occur if any alarms are ignored.

Main Menu \ View Status \ Fan Status \ Fan# (1-20) \ Alarm Status

Menu Display Name	Default	Range	Description
PHA	Inactive = 0	Active = 1 Inactive = 0	**PHA** is the phase failure (3-phase devices) or line undervoltage (single-phase devices) alarm for EBM fans
TFE	Inactive = 0	Active = 1 Inactive = 0	**TFE** is the output stage overheating alarm for EBM fans

SKF	Inactive = 0	Active = 1 Inactive = 0	**SKF** is the communication error between master controller and slave controller alarm for EBM fans
FB	Inactive = 0	Active = 1 Inactive = 0	**FB** is the fan bad alarm, which is a general error for EBM fans
TFM	Inactive = 0	Active = 1 Inactive = 0	**TFM** is is the motor overheating alarm for EBM fans
HLL	Inactive = 0	Active = 1 Inactive = 0	**HLL** is the hall sensor error alarm for EBM fans
BLK	Inactive = 0	Active = 1 Inactive = 0	**BLK** is the motor blocked alarm for EBM fans
n_Limit	Inactive = 0	Active = 1 Inactive = 0	**n_Limit** is the speed limit exceeded alarm for EBM fans
RL_Cal	Inactive = 0	Active = 1 Inactive = 0	**RL_Cal** is the rotor position sensor calibration error alarm for EBM fans
UzLow	Inactive = 0	Active = 1 Inactive = 0	**UzLow** is the DC-link undervoltage alarm for EBM fans
OC	Inactive = 0	Active = 1 Inactive = 0	**OC** is the DCbus average over protection current alarm for Delta fans
OV	Inactive = 0	Active = 1 Inactive = 0	**OV** is the DCbus average over protection voltage alarm for Delta fans
UV	Inactive = 0	Active = 1 Inactive = 0	**UV** is the DCbus average under protection voltage alarm for Delta fans
OT	Inactive = 0	Active = 1 Inactive = 0	**OT** is the EE over protection temperature alarm for Delta fans
Lock	Inactive = 0	Active = 1 Inactive = 0	**Lock** is the fan lock alarm for Delta fans
PL	Inactive = 0	Active = 1 Inactive = 0	**PL** is the 3~ AC lose phase alarm for Delta fans
RRW	Inactive = 0	Active = 1 Inactive = 0	**RRW** is the fan reverse run alarm for Delta fans
Hall	Inactive = 0	Active = 1 Inactive = 0	**Hall** is the hall signal abnormal alarm for Delta fans
EEPROM	Inactive = 0	Active = 1 Inactive = 0	**EEPROM** is the EEPROM read/write fail alarm for Delta fans
POC	Inactive = 0	Active = 1 Inactive = 0	**POC** is the DCbus peak over current alarm for Delta fans
AC_OV	Inactive = 0	Active = 1 Inactive = 0	**AC_OV** is the AC bus over protection voltage alarm for Delta fans
AC_UV	Inactive = 0	Active = 1 Inactive = 0	**AC_UV** is the AC bus under protection voltage alarm for Delta fans

Warn Status

The Warn Status Menu displays warning information for individual EBM fans. Damage could occur if any warnings are ignored.

Main Menu \ View Status \ Fan Status \ Fan# (1-20) \ Warn Status

Menu Display Name	Default	Range	Description
I_Limit	Off	On Off	**I_Limit** is the current limitation is engaged
L_High	Off	On Off	**L_High** is the line impedance too high (DC-link voltage unstable)
P_Limit	Off	On Off	**P_Limit** is the power limiter is currently engaged
TE_high	Off	On Off	**TE_high** is the output stage temperature is high
TM_High	Off	On Off	**TM_High** is the motor temperature is high
TEI_high	Off	On Off	**TEI_high** is the temperature inside electronics is high
UzLow	Off	On Off	**UzLow** is the DC-link voltage is low

LRF	Off	On Off	**LRF** is shedding function is active
Brake	Off	On Off	**Brake** is triggered in instances where an external force causes the fan/motor to run in the wrong direction at high speed for a prolonged period of time, so the motor is unable to start properly
UzHigh	Off	On Off	**UzHigh** is the DC-link voltage is high
UeHigh	Off	On Off	**UeHigh** is the line voltage is high
RL_Cal	Off	On Off	**RL_Cal** is the calibration of the rotor position sensor is in progress
Op_circ	Off	On Off	**Op_cir** is triggered when the analog input voltage is less than the open circuit limit value
n_Low	Off	On Off	**n_Low** is the actual speed is less than the speed limit set for speed monitoring

IO STATUS

The IO Status Menu displays the status of all the I/O variables.

Main Menu \ *View Status* \ *IO Status*

Menu Display Name	Default	Range	Description
Array ON/OFF	Off	On Off	**Array ON/OFF** is a read only item that displays the current state of the array on/off digital input
Demand Input	0	0-100%	**Demand Input** is a read only item that displays the fan array speed command input
DSP Press Snsr	0	--	**DSP Press Snsr** is a read only item that displays the DSP pressure sensor reading
CFM Press Snsr	0	--	**CFM Press Snsr** is a read only item that displays the CFM pressure sensor reading
Interlock Input	Off	On Off	**Interlock Input** is a read only item that displays the interlock switch status
Safety Input	Off	On Off	**Safety Input** is a read only item that displays the external safety alarm input status
Fire Mode Input	Off	On Off	**Fire Mode Input** is a read only item that displays the fire alarm input status
RO1 Ready	Off	On Off	**RO1 Ready** is a read only item displays the state of the Fan Ready relay
RO2 Running	Off	On Off	**RO2 Running** is a read only item that displays the state of the Fan Running relay
RO3 Alarm	Off	On Off	**RO3 Alarm** is a read only item that displays the state of the Fan Alarm relay
AO1 RPM	0%	0-100%	**AO1 RPM** is a read only item that reports the RPM value being sent from the controller to the fans in the array.
AO2 CFM	0%	0-100%	**AO2 CFM** is a read only item that reports the CFM value being sent from the controller to the fans in the array.

OTHER CONFIGURATIONS

Damper Control

When the array is equipped with a set of dampers, the damper can be set up with an end switch that is connected to the EC fan controller Interlock Input. This can be used to signal the controller that the damper is in the proper position for fan startup. The RO2 Running can also be used to send a command signal to the damper actuator(s) to adjust the damper(s) between two positions. Reference the Field Control Wiring section of this OM for specific control locations on TB03.

Manual Array Operation

Manual Control can be initiated during start up to control individual features of the fan array independent of the control sequence. Place the array into Manual Control mode through the controler keypad menu *Main Menu**Manual Control**Manual Mode = Manual.* Once in manual control, fans can be activated manually.

Note: Manual Operation is not intended for extended operation beyond troubleshooting or initial start-up. After 60 minutes, the controller will automatically revert to normal operation.

Main Menu \ Manual Control

Menu Display Name	Default	Range	Description
Manual Mode	Normal	Off Normal Manual	**Manual Mode** is an adjustable item that allows the array to be placed in normal mode, manual control mode, or turned off completely.
Count Down	0	0-60	**Count Down** is a ready only item that reports how many minutes are left before the controller reverts back to normal operation.
Manual Speed	0%	0-100%	**Manual Speed** is an adjustable item that manually drives the array to a specified capacity.
AvgFanSpd	- -	0-3300 RPM	**AvgFanSpd** is a read only item that reports the average speed of all fans in the array
RO1 Ready	On	Off On	**RO1 Ready** is an adjustable item that sets the output to the Ready Relay (A value of On here will close the contact).
RO2 Running	On	Off On	**RO2 Running** is an adjustable item that sets the output to the Running Relay (A value of On here will close the contact).
RO3 Alarm	Off	Off On	**RO3 Alarm** is an adjustable item that sets the output to the Alarm Relay (A value of On here will close the contact).
AO1 RPM	0%	0-100%	**AO1 RPM** is a read only item that reports the RPM value being sent from the controller to the fans in the array.
AO2 CFM	0%	0-100%	**AO2 CFM** is a read only item that reports the CFM value being sent from the controller to the fans in the array.
Alarm Reset	Off	Off On	**Alarm Reset** is an adjustable item will reset all alarms on the controller when set to On.

BMS COMMUNICATIONS

Reference ED Protocol Document – ED 19122 Vision ECM Fan Controller for additional detail on BMS Communications.

BACnet IP Set-Up

Main Menu \ BMS Communications \ BACnet IP

Menu Display Name	Default	Range	Description
Name	MT4_DFA_#### '####' is the instance ID	-	Up to a 13 Character Device Object Name. This value is read-only.
Dev Instance	####, default is the last 4 digits of the serial number	0-4194302	Device Instance of the BACnet communication module
UDP Port	47808	0-65535	**UDP Port** is the User Datagram Protocol. The UDP Port allows host to host communication via the IP network and is used to identify the application process in the destiniation array. Only change the UDP Port if there are multiple subnets. See a network administrator before modification.
DHCP	Passive	Active Passive	**DHCP** is the Dynamic Host Configuration Protocol. The DHCP is a network protocol that enables a server to automatically assign an IP Address. Set to Passive if a static IP address is needed.
ActIP	0.0.0.0	-	**ActIP** Is a read-only item that displays the active IP Address of the BACnet Communication module.
ActMask	0.0.0.0	-	**ActMask** is a read-only item that displays the active Subnet Base of the BACnet Communication Module.
ActGwy	0.0.0.0	-	**ActGwy** is a read-only item that displays the active gateway address.
GvnIP	127.0.0.1	-	**GvnIP** is an adjustable item to set the IP Address of the BACnet Communication module.
GvnMask	255.255.255.0	-	**GvnMsk** is an adjustable item to set the Subnet Base of the BACnet Communication Module

GvnGwy	127.0.0.1	-	**GvnGwy** is an adjustable item to set the gateway address.
Unit System	SI	SI US CA	**Unit System** is an adjustable item to indicate if the BACnet communication uses US, Metric, or Canadian units of measure.
Save Config	No	No Yes	**Save Config** saves the configuration changes made in the menu items above

BACnet MSTP Set-Up

Main Menu \ BMS Communications \ BACnet MS/TP

Menu Display Name	Default	Range	Description
Name	MT4_DFA_#### '####' is the instance ID	-	Up to a 13 Character Device Object Name. This value is read-only.
Dev Instance	####, default is the last 4 digits of the serial number	0-4194302	Device Instance of the BACnet communication module
MSTP Address	18	1-127	This is the MST/TP address of the BACnet communication module.
Baud Rate	38400	9600 19200 38400 57600 76800 115200	**Baud Rate** is an adjustable item that is the Data Transfer speed.
Max Master	127	1-127	**Max Master** is an adjustble item that specifies the highest possible address for master nodes and shall be less than or equal to 127.
Max Info Frm	10	1-32	**Max Info Frm** is an adjustible item that specifies the maximum number of information frames the BACnet communmication module may send before it must pass the token.
BACNetOverRS485	Passive	Active Passive	**BACnetOverRS485** is an adjustable item that enables BACnet MSTP communication to the controller. This should be set to Passive if BACnet IP is used, Active if BACnet MS/TP is used.
Unit System	SI	SI US CA	**Unit System** is an adjustable item to indicate if the BACnet communication uses US, metric, or Canadian units of measure.
Save Config	No	No Yes	**Save Config** saves the configuration changes made in the menu items above

SERVICE MENUS

The Service Menus section covers several menus that will be useful while maintaining the equipment.

Fan Service

Main Menu \ Service Menus \ Fan Service

Menu Display Name	Default	Range	Description
Fan Array Op Hour	-	--	**Fan Array Op Hour** indicates the number of run hours on the array
Fan Array Cycle Cnt	-	--	**Fan Array Cycle Cnt** indicates the number of operational cycles on the array (number of times the array has been started/stopped)

Operating Hours Menu

Main Menu \ Service Menus \ Fan Service \ Operating Hours

Menu Display Name	Default	Range	Description
Fan1	-	0-999,999h	**Fan Hours** is a status only item that displays the number run hours on the Fan
Fan2	-	0-999,999h	**Fan Hours** is a status only item that displays the number run hours on the Fan
…	-	0-999,999h	**Fan Hours** is a status only item that displays the number run hours on the Fan
FanXX (max 20 fans)	-	0-999,999h	**Fan Hours** is a status only item that displays the number run hours on the Fan

Modbus

The Modbus menu is to be used for addressing the fans in the field.

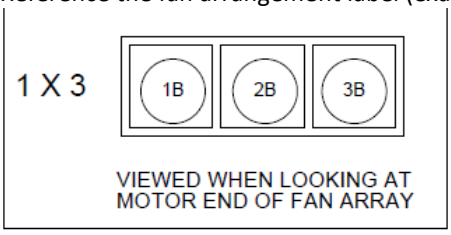
Main Menu \ Service Menus \ Modbus

Menu Display Name	Default	Range	Description
Fan1CommStat	-	Fault OK	**Fan1CommStat** is a status only item that displays the current communication status for fan 1
Fan2CommStat	-	Fault OK	**Fan2CommStat** is a status only item that displays the current communication status for fan 2
….			
FanXX (max 20 fans)	-	Fault OK	**FanXXCommStat** is a status only item that displays the current communication status for fan XX
ModbusResistor	-	0x0000	**ModbusResistor** indicates the bus pull up/pull down resistor, termination resistor configuration
DefaultECMStat	-	No Yes N/A	**DefaultECMStat** indicates if there is a fan with a default factory address available
ChngECMTo	Default	Default 1-20	**ChgECMTo** is an adjustable item that sets which master fan address will be changed to during the field addressing process
ChngECMFrom	Default	Default 1-20	**ChgECMFrom** is an adjustable item that sets which master fan address will be changed from during the field addressing process
Save Config	No	No Yes	**Save Config** saves the configuration changes made in the menu items above

To address the fans in the field, follow the procedure below:

1. Ensure the controller has power (requires a 24V power supply if not powered from the transformer in the fan array power box).
2. Ensure the fan(s) have power - the fans can be powered one at a time, or the whole array can be powered simultaneously. If powered individually, the fans need a minimum of 15W @ 110V single phase power in order to to be addressed.
3. Confirm that the array is configured for the correct number of fans in the fan service menu (Main Menu \ Commission Array \ Config Fans)
4. Disconnect the modbus communication harnesses from all of the fans in the array except for one (ideally the fan closest to the control panel), leaving that fan connected to the MT4 controller.
5. Navigate back to the Modbus menu (*Main Menu \ Service Menus \ Modbus)*, and check to see if the fan is ready to be addressed – the DefaultECMStat should show “Yes” and all FanCommStat variables should say “Flt”.

6. Reference the fan arrangement label (example shown below) to determine the fan number being addressed.



7. Set ChgnECMTo to be the number of the fan to be addressed, and set ChngECMFrom to “Default”.
8. Set Save Config to “Yes”. After a short delay, the FanCommStat entry corresponding to the fan being addressed should change from Flt to OK.
9. Cycle power to the fan that was just addressed (or the entire array), then cycle power to the EC Fan Controller.
10. The next fan to be addressed can be connected back into the Modbus control “daisy chain”.
11. Repeat steps 5-10 until all fans have been addressed.

Air Flow

The Air Flow menu is used to define the constants utilized when the fan array control mode is constant CFM. These values are used with the pressure sensor on the leading fan to calculate the airflow. The fan array total airflow is then calculated by multiplying the calculated airflow by the quantity of running fans. “Altitude” is the only field set item in this menu. The other variables are defined by other parameter inputs – e.g. fan size.

Main Menu \ Service Menus \ Air Flow

Menu Display Name	Default	Range	Description
Altitude	0	0-32,808 ft	**Altitude** should be set to the altitude of the jobsite
C1	--	355mm – 1372.74 450mm – 2226.07 560mm – 3224.71 630mm – 4058.68	**C1** is the coefficient factor for free and ducted inlet, using the standard density method. The C1 value depends on the impeller size of the ECM fan
Area	--	355mm – 0.485 450mm – 0.778 560mm – 1.341 630mm – 1.667	**Area** is the inlet funnel throat area, defined by the fan impeller size
Airfl	--	0-200,000 CFM	**Airfl** is the airflow of the array
AirFlRel	--	0-100%	**AirFlRel** is the relative airflow of the array from 0-100%
AF	--	0.70-1.00	**AF** is the altitude factor, dependent on the defined altitude

DSP Control

Main Menu \ Service Menus \ DSP Control

Menu Display Name	Default	Range	Description
DSP DB	3%	0-100%	**DSP DB** is an adjustable item that sets the “deadband” used in the PI control function to vary the supply fan speed when duct static pressure (DSP) control is selected.
DSP Period	5s	0-999s	**DSP Period** is an adjust able item that sets the “sample time” used in the PI control function to vary the fan capacity when duct static pressure (DSP) control is selected.
DSP Gain	0.2	0.0-100.0	**DSP Gain** is an adjustable item that sets the “gain” used in the PI control function to vary the fan capacity when duct statuc pressure (DSP) control is selected.
DSP PAT	30s	0-999s	**DSP PAT** is an adjustable item that sets the “project ahead time” used in the PI control function to vary the fan speed when DSP Control is selected .
DSP MaxChg	4%	0-100%	**DSP MaxChg** is an adjustable item that sets the maximum value of increase or decrease of the fan capacity each period used in the PI control function to vary the fan capacity when duct static pressure (DSP) control is selected .

CFM Control

Main Menu \ Service Menus \ CFM Control

Menu Display Name	Default	Range	Description
Flow DB	3%	0-100%	**Flow DB** is an adjustable item that sets the "deadband" used in the PI control function to vary the supply fan speed when CFM control is selected.
Flow Period	30s	0-999s	**Flow Period** is an adjustable item that sets the "sample time" used in the PI control function to vary the supply fan speed when CFM control is selected.
Flow Gain	0.1	0.0-100.0	**Flow Gain** is an adjustable item that sets the "gain" used in the PI control function to vary the supply fan speed when CFM control is selected.
Flow PAT	60s	0-999s	**Flow PAT** is an adjustable item that sets the "project ahead time" used in the PI control function to vary the fan speed when CFMControl is selected .
Flow MxChg	5%	0-100%	**Flow MxChg** is an adjustable item that sets the maximum value of increase or decrease of the supply fan speed each period used in the PI control function to vary the supply fan speed when CFM control is selected.

ARRAY MAINTENANCE

Main Menu \ Array Maintenance

Menu Display Name	Default	Range	Description
Array Op Hour	-	--	**Array Op Hour** indicates the number of run hours on the array
Array Cycle Cnt	-	--	**Array Cycle Cnt** indicates the number of cycles on the array

Main Menu \ Array Maintenance\Operating Hours

Menu Display Name	Default	Range	Description
Fan 1		0.0-999999.0h	**Fan Hours** is a status only item that displays the number run hours on the Fan
Fan 2		0.0-999999.0h	**Fan Hours** is a status only item that displays the number run hours on the Fan
….			
Fan XX (Max 20 fans)		0.0-999999.0h	**Fan Hours** is a status only item that displays the number run hours on the Fan

ALARMS

Alarms provide the user with information about abnormal conditions that affect array operation. The cause of the alarm should be investigated and eliminated before the array or any disabled equipment in it is placed back into service.

Viewing Alarms

The Active Alarms menu displays up to 10 active alarms and is located in the menu at *Main Menu \ Alarm List \ Active Alarms.* Pushing the scroll wheel in, will show details about the alarm as well as when it occurred. The Alarm Log (located in the menu at *Main Menu \ Alarm List \ Alarm Log*), shows the same information, but up to 50 of the latest alarms both active and previous alarms.

All active alarms as well as the date and time that they were detected are displayed on the Active Alarm menu. The last fifty alarm "events" detected as well as the date and times that they were detected are displayed on the Alarm Log menu. An alarm "event" is either an alarm becoming active or being cleared. A "+" symbol precedes the active alarm event and a "-" symbol precedes the cleared alarm event. These alarms are displayed in the order that they were detected. The alarm that was detected most recently is displayed first. Multiple occurrences of the same alarm may appear.

OTHER MENU ITEMS

About This Array

Main Menu \ About This Array

Menu Display Name	Default	Range	Description
Array Name	-	-	**Array Name** is an adjustable field that allows the user to name the fan section
SO_Item	-	-	**SO_Item** displays the array order number and is programmed from the factory
Array SN	-	-	**Array SN** displays the array serial number and is programmed from the factory
App Version	-	-	**App Version** displays the installed version of the controller software code
Main BSP	-	-	**Main BSP** displays the installed version of the controller operating system
HMI GUID	-	-	**HMI GUID** displays the installed version of the controller HMI
OBH GUID	-	-	**OBH GUID** displays the installed version of the controller OBH

MICROTECH 4 INPUTS/OUTPUTS

The complete set of Inputs and Outputs that are possible on a Vision EC Fan Controller are listed below.

Main Control Board

I/O Location	Description	I/O Type	I/O Voltage	Module	Comments
D1	Interlock Input	DI	Dry Contact	MT4	Optional, if it's available, ON- Ready, OFF-Not ready;
D2	Array ON/OFF	DI	Dry Contact	MT4	Optional, if it's available, ON- Start, OFF-Stop;
DU1	Spare	DI	24VAC Active DI	MT4	
DU2	Spare	DI	24VAC Active DI	MT4	
DL1	Spare	DI	110VAC Active DI	MT4	
DL2	Spare	DI	110VAC Active DI	MT4	
X1	Demand Input	AI	0-10V / 4-20mA	MT4	depending on control method, get auto configured based on control method (RPM/Tracking) and control source.
X2	AO1 RPM	AO	0-10V Output	MT4	RPM output, fan speed command sending to the secondary controller
X3	DSP Pressure Sensor	AI	0-10V / 4-20mA	MT4	DSP pressure sensor, sensor signal type as well as sensor scaling shall be done in sensor config menu.
X4	CFM Pressure Sensor	AI	0-10V / 4-20mA	MT4	CFM pressure sensor sensor signal type as well as sensor scaling shall be done in sensor config menu.

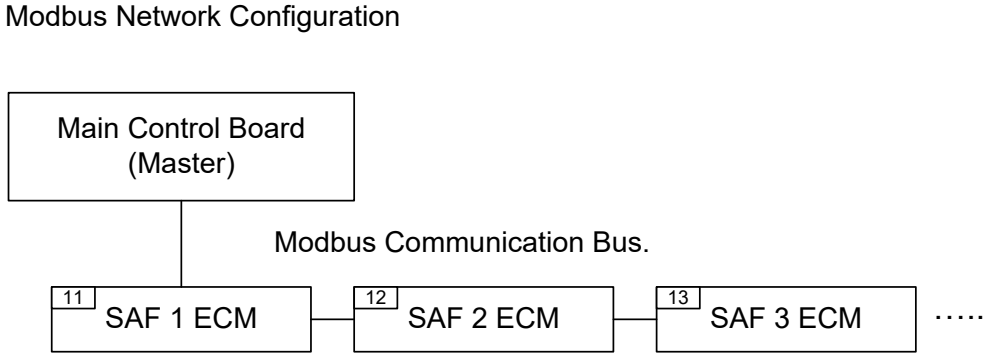
X5	AO2 CFM	AO	0-10V Output	MT4	CFM output
X6	Spare	XIO		MT4	
X7	Spare	XIO		MT4	
X8	Spare	XIO		MT4	
X9	Fire Mode Input	XI	Dry Contact	MT4	Optional, if it's available, ON- alarm, OFF-OK;
X10	Safety Input	XI	Dry Contact	MT4	Optional, if it's available, ON- alarm, OFF-OK;
X11	Spare	XI		MT4	
Q1	RO1 Ready	DO	Relay Output	MT4	
Q2	RO2 Running	DO	Relay Output	MT4	
Q3	RO3 Alarm	DO	Relay Output	MT4	
Q4	Spare	DO	Relay Output	MT4	
Q5	Spare	DO	Relay Output	MT4	
Q6	Spare	DO	Relay Output	MT4	
Q7	Spare	DO	Relay Output	MT4	
Q8	Spare	DO	Relay Output	MT4	
DO1	Spare	DO	TRAIC	MT4	
DO2	Spare	DO	TRAIC	MT4	
Ethernet Port	BACnet IP		IP Port	MT4	Need to enable / config manually by technician
T6	BACnet MSTP		RS485	MT4	Need to enable / config manually by technician
T14	ECM Fan Modbus Control		RS485	MT4	Enabled by default

APPENDIX

Modbus I/O

The EC fans in the array are controlled via an RS-485 bus built into the array controller using Modbus protocol.

- One or more ECM Fans:



Daikin Applied Training and Development

Now that you have made an investment in modern, efficient Daikin Applied equipment, its care should be a high priority. For training information on all Daikin Applied HV1 and click on Training, or call 540-248-9646 and ask for the Training Department.

Warranty

All Daikin Applied equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied representative for warranty details. To find your local Daikin Applied representative, go to www.DaikinApplied.com.

Aftermarket Services

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787). To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

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