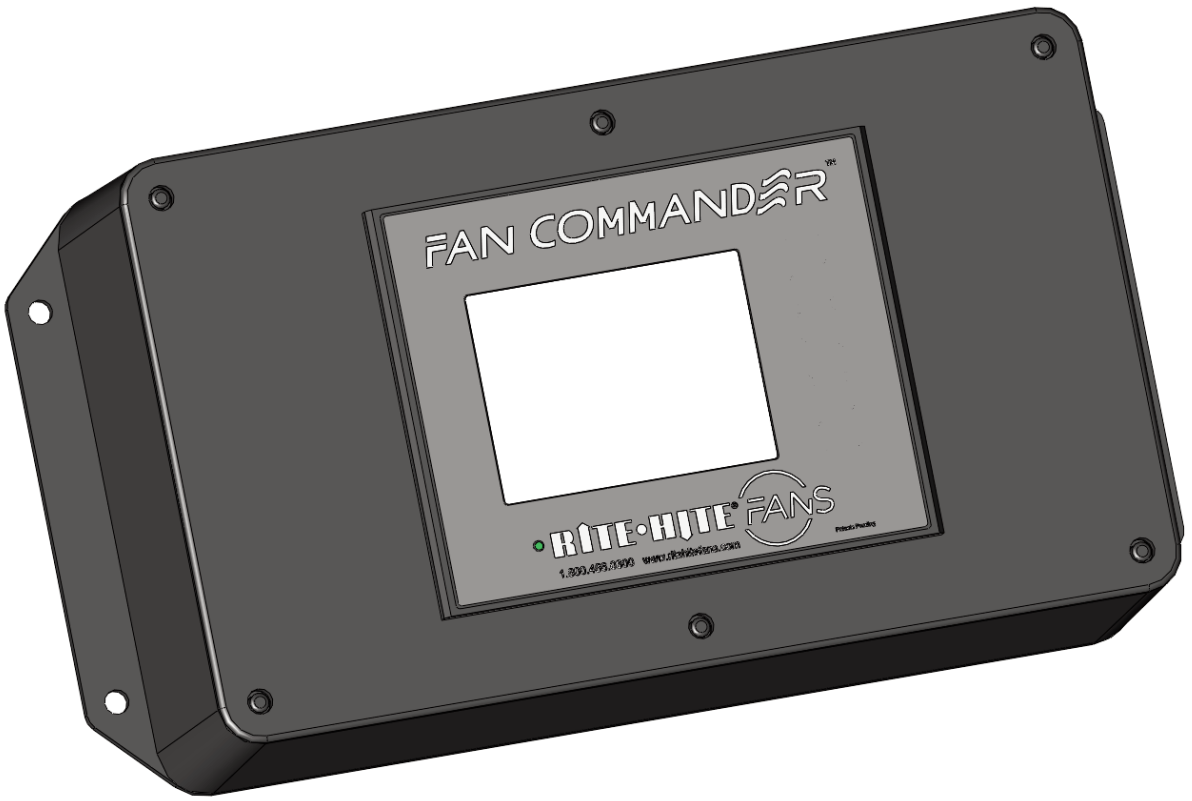
REVOLUTION®

HVLS FANS FROM RITE-HITE®

FAN-COMMANDER®

TOUCH SCREEN FAN CONTROLLER

INSTALLATION AND OWNER'S MANUAL



RITE-HITE® FANS

This Manual Covers All Fans Shipped May 2014 to Date

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PUBLICATION NO. FCTS- REV. 10

TABLE OF CONTENTS

PRODUCT INTRODUCTION

Thank you for purchasing the Fan-Commander® from RITE-HITE®.

IMPORTANT

Read and understand contents of this manual prior to installation or operation of this equipment.
For best results, have this product serviced by your authorized RITE-HITE®.

NOTICE TO USER

Your local RITE-HITE® Representative provides the Planned Maintenance Program (P.M.P.) which can be fitted to your specific operation. Call your local representative or RITE-HITE® at 1-414-355-2600 or toll free at 1-800-456-0600.

SAFETY

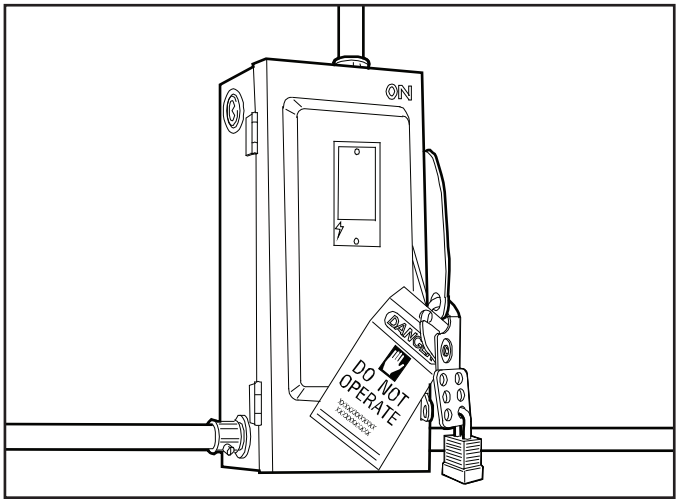


Figure 1

⚠ WARNING

When working with electrical or electronic controls, make sure that the power source has been locked out and tagged according to OSHA regulations or your country's local standards and approved local electrical codes.

LOCKOUT / TAGOUT PROCEDURES

The Occupational Safety and Health Administration (OSHA) requires that, in addition to posting safety warnings and barricading the work area, the power supply has been locked in the OFF position or disconnected. It is mandatory that an approved lockout device is utilized. An example of a lockout device is illustrated in Figure 1. The proper lockout procedure requires that the person responsible for the repairs is the only person who has the ability to remove the lockout device.

In addition to the lockout device, it is also a requirement to tag the power control in a manner that will clearly note that repairs are under way and state who is responsible for the lockout condition. Tagout devices have to be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or become unreadable.

RITE-HITE® Corporation does not recommend any particular lockout device, but recommends the utilization of a device that meets OSHA standards (refer to OSHA regulation 1910.147). RITE-HITE® Corporation also recommends the review and implementation of an entire safety program for the Control of Hazardous Energy (Lockout/Tagout). These regulations are available through OSHA publication 3120.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, *will* result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, *could* result in minor or moderate injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, *could* result in death or serious injury.

NOTICE

Indicates a situation which can cause damage to the equipment, personal property and/or the environment, or cause the equipment to operate improperly.

COMPONENTS AND TOOLS

UNPACKING OF THE COMPONENTS

All Fan-Commanders include one copy of the Owner's Manual and one copy of the electrical schematics. Distribute documentation as required.

TOOLS REQUIRED:

Drill
Hole saw or stepped drill bit
1/8" flat electrical screwdriver
Phillips screwdriver
Cable Cutters
Wire Strippers
Electrical Tape
Wire Nuts

CAUTIONS

⚠ CAUTION

The information provided Does Not replace a Variable Frequency Drive User Manual and is intended for qualified drive service personnel only.

⚠ CAUTION

The drive contains high voltage capacitors which take time to discharge after removal of mains supply. Before working on drive, ensure isolation of mains supply from line inputs [R, S, T (L1, L2, L3)]. Wait three minutes for capacitors to discharge to safe voltage levels. Failure to do so may result in personal injury or death.

Darkened display LED's is not an indication that capacitors have discharged to safe voltage levels.

⚠ CAUTION

Equipment damage and/or personal injury may result if Auto Restart or Start At Power Up parameters are enabled in this application. Do not use this function without considering applicable local, national and international codes, standards, regulations or industry guidelines.

⚠ CAUTION

Only qualified personnel familiar with adjustable frequency AC drives and associated machinery should plan or implement the installation, start-up and subsequent maintenance of the system. Failure to comply may result in personal injury and/or equipment damage.

⚠ CAUTION

This drive contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference A-B publication 8000-4.5.2, "Guarding Against Electrostatic Damage" or any other applicable ESD protection handbook.

⚠ CAUTION

An incorrectly applied or installed drive can result in component damage or a reduction in product life. Wiring or application errors, such as, under sizing the motor, incorrect or inadequate AC supply, or excessive ambient temperatures may result in malfunction of the system. The Fan-Commander can only be configured after all of the standard control boxes are powered. The RS-485 network connections must be completed per the wiring diagram

OVERVIEW

Revolution Fans ship with a standard control box containing a Variable Frequency Drive (VFD) to control the fan.

Revolution Fans may utilize either Allen Bradley PowerFlex or Schneider Electric Altivar VFDs. The Fan-Commander can communicate with both types of drives.

Revolution Fans use Allen Bradley (standard) and Schneider (optional) VFDs.
Revolution SP Fans use only Schneider VFDs.

The Touch Screen communicates with each VFD via Modbus RTU RS485.
RJ45 plugs with screw terminals are included with the Fan-Commander to wire the RS485 Network.

The Fan-Commander and all VFDs in the RS485 network must be connected in a “daisy-chain.” Devices must not be connected in a “T” or “star” pattern. The sum of all Modbus cable in the network may not exceed 4000ft (1200m).

The Standard Fan-Commander includes the standard features described in this manual.
The Ethernet Fan-Commander includes all of the standard features, plus allows for remote control via Modbus TCP/IP and/or via web browser.

The Relay Fan-Commander includes all of the standard features, plus includes an Input/Output block for remote signaling. Inputs are preconfigured to Start, Stop, and change speeds for each zone of the network. Outputs indicate network status, and can be configured to control other equipment such as exhaust fans for lights via the Fan-Commander.

NOTE: The power supply does not need to be fused when it is wired into a circuit with branch protection.

FIELD WIRING

REQUIRED CABLE

RS485 networks require low capacitance shielded twisted pair cable with a nominal impedance of 120Ω.
Note: Ethernet cable may <u>not</u> be used.

The following cable types are acceptable for a Fan-Commander network:

General Cable (Carol) C4841A.41.10
Lapp UNITRONIC BUS LD A 2170803
Belden 9841

NOTICE

Make any crossovers of the RS-485 network cables and any power cables at right-angles, if necessary.

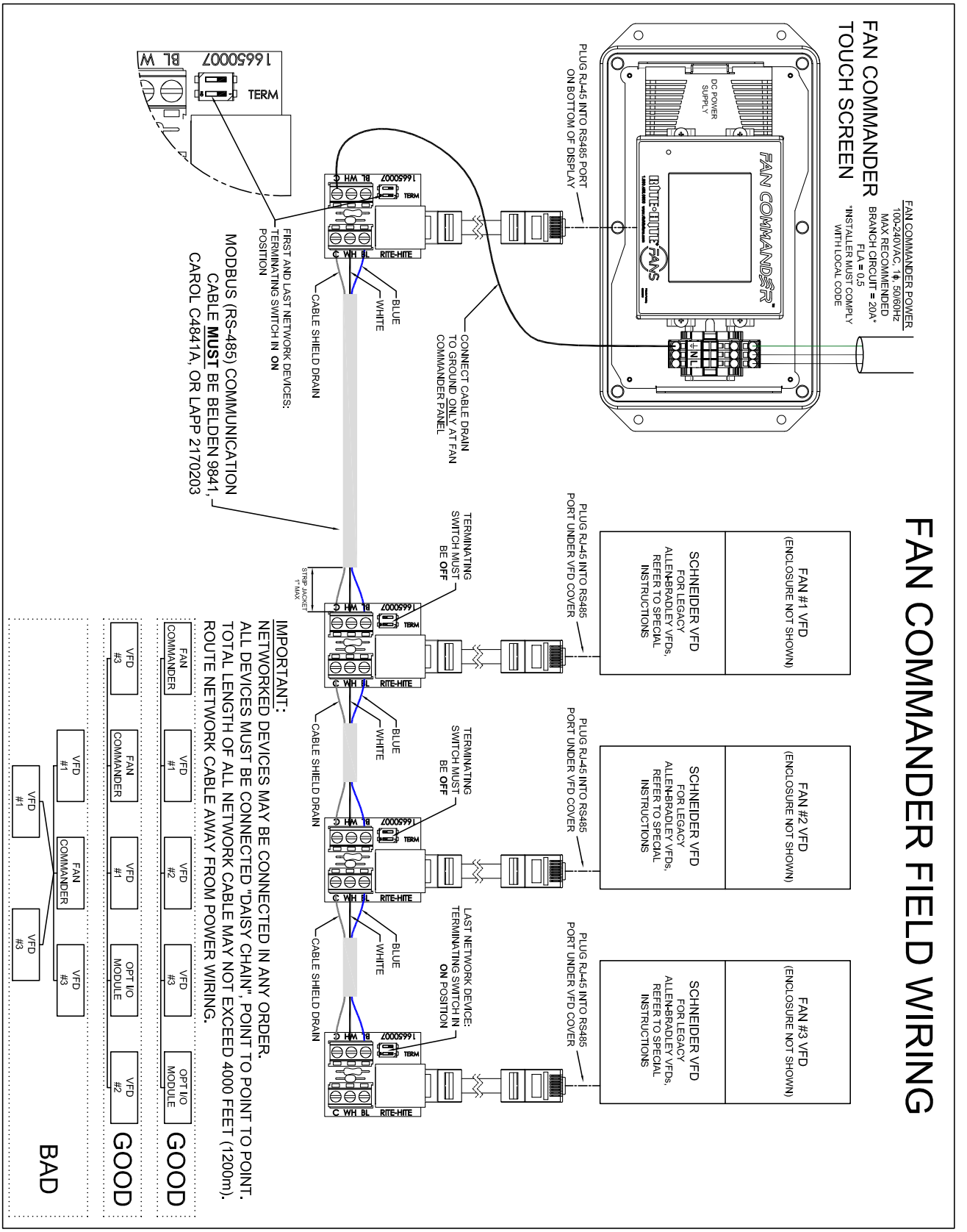
NOTICE

The Modbus network cable may not exceed 4000ft (1200m).

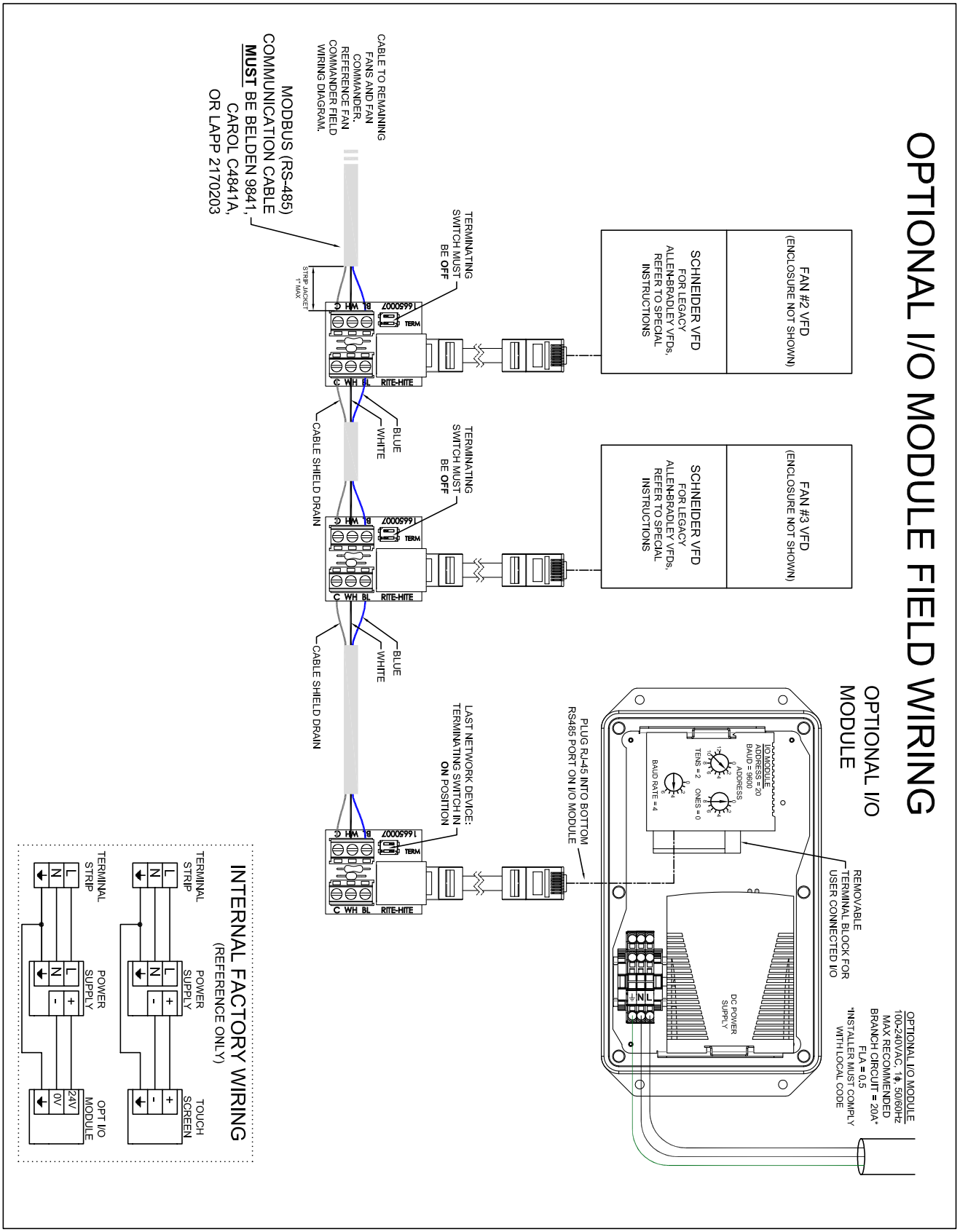
NOTICE

The RS-485 network must be grounded at a single location to eliminate system noise.

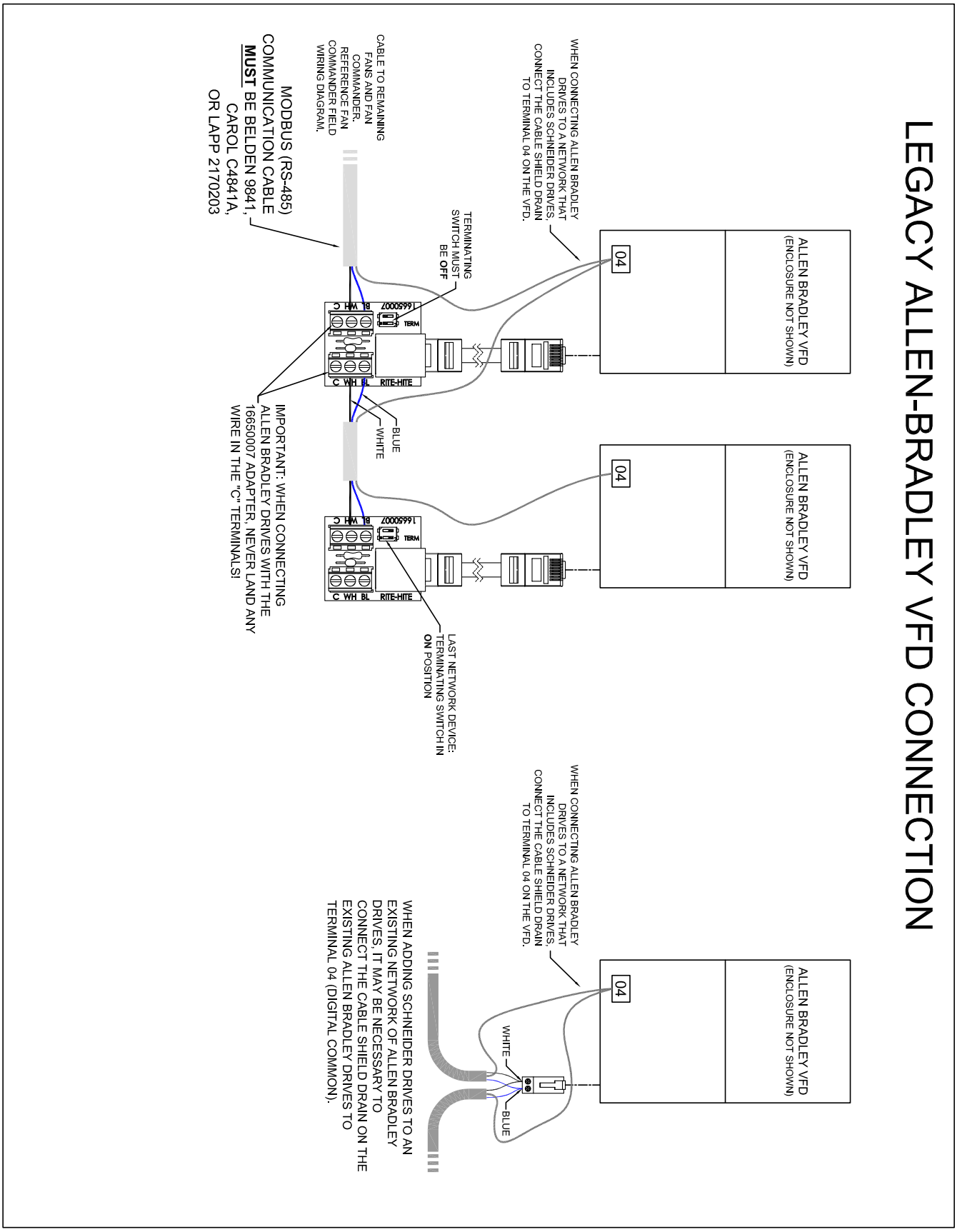
STANDARD AND ETHERNET WIRING DIAGRAM



RELAY OPTION WIRING



ALLEN-BRADLEY VFD WIRING



WIRING

See Appendix for Electrical Specifications

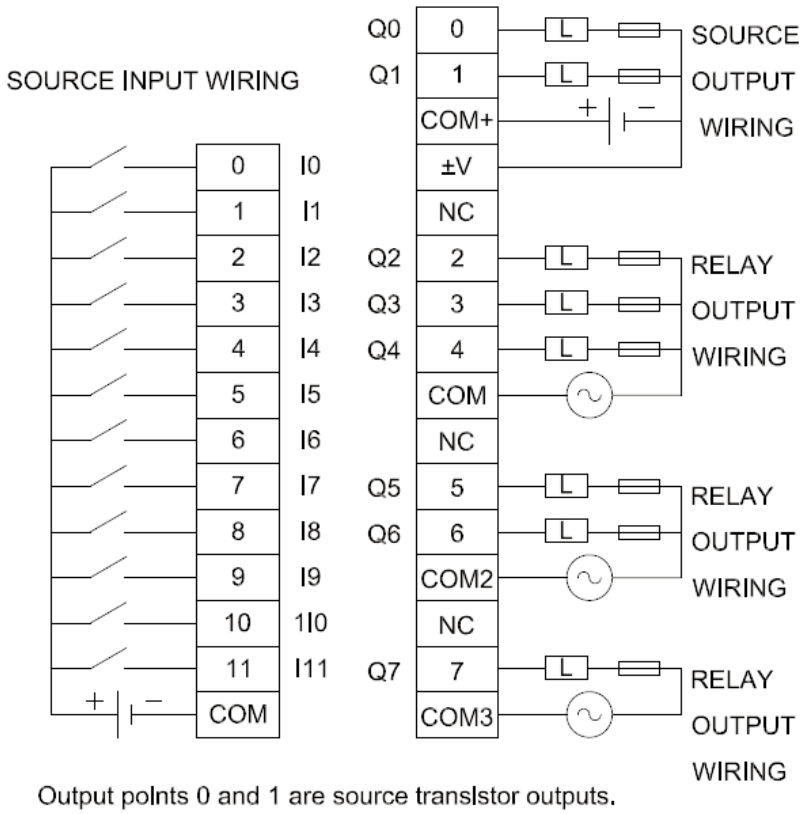
Schneider OTB 1S0DM9LP Modbus Remote I/O Interface
Modbus Address 20 Baud Rate 9600

INPUTS (TB1)

I0	Zone1 Stop	Stop all fans in Zone 1
I1	Zone1 Start	Start all fans in Zone 1
I2	Zone2 Stop	Stop all fans in Zone 2
I3	Zone2 Start	Start all fans in Zone 2
I4	Zone3 Stop	Stop all fans in Zone 3
I5	Zone3 Start	Start all fans in Zone 3
I6	Speed Set A	Changes Zone speed to a preset value
I7	Speed Set B	Changes Zone speed to a preset value
I8	Speed Set C	Changes Zone speed to a preset value
I9	Speed Set D	Changes Zone speed to a preset value
I10	User Output OFF	Turns off User Output Q0
I11	User Output ON	Turns on User Output Q0

OUTPUTS (TB2)

Q0	User Defined Output	May be used to control other equipment
Q1	User Defined Output	May be used to control other equipment
Q2	User Defined Output	May be used to control other equipment
Q3	User Defined Output	May be used to control other equipment
Q4	Zone 1 Active	On if any fan in Zone 1 is running
Q5	Zone 2 Active	On if any fan in Zone 2 is running
Q6	Zone 3 Active	On if any fan in Zone 3 is running
Q7	System Fault	On if any fan is faulted



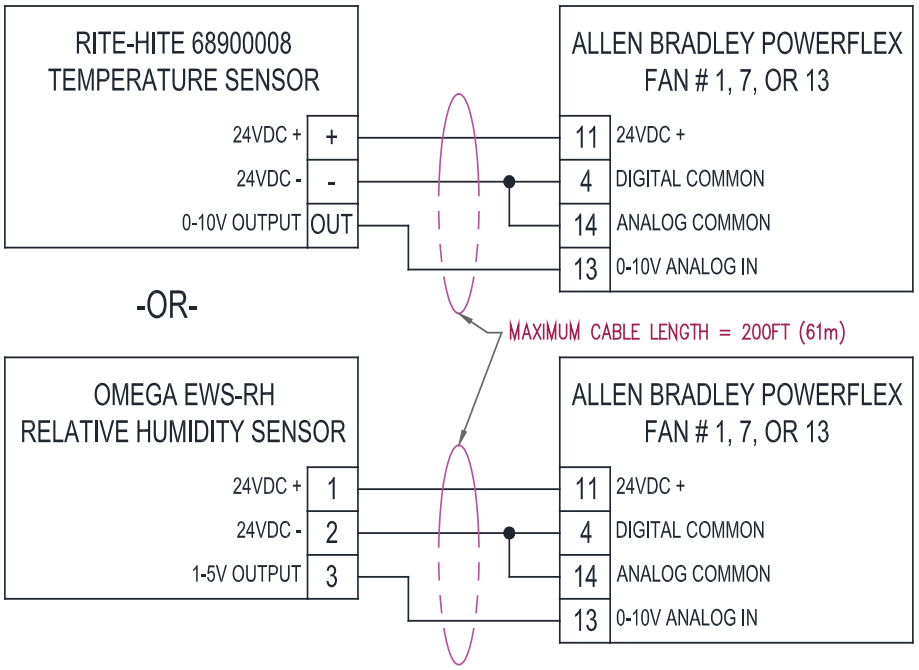
Output points 0 and 1 are source transistor outputs.
All other output points are relay.

ENVIRONMENTAL CONTROL

ALLEN BRADLEY VFD

The Fan-Commander has the ability to automatically control fan speed based on preset temperature (or humidity) settings. A remote temperature (or humidity) sensor is read by the first fan in each zone (Fan #1 in Zone 1, Fan #7 in Zone 2, Fan #13 in Zone 3).

Allen Bradley PowerFlex:



FAN COMMANDER ADVANCED SETUP SCREEN - REQUIRED SCALING VALUES

```
Custom Sensor Config:
| x=Volts on analog input   °C=Mx+B    M= 6.5   B= -17.7 |
| M=Volts/°C or V/%RH                                    |
| B=°C or %RH at 0V         %RH=Mx+B   M= 25.0  B= -1.0  |
```

NOTE:

For installations with Crouzet 89750150 temperature sensor (white case) use the following scaling values:

°C=Mx+B M= 5.0 B= −10.0

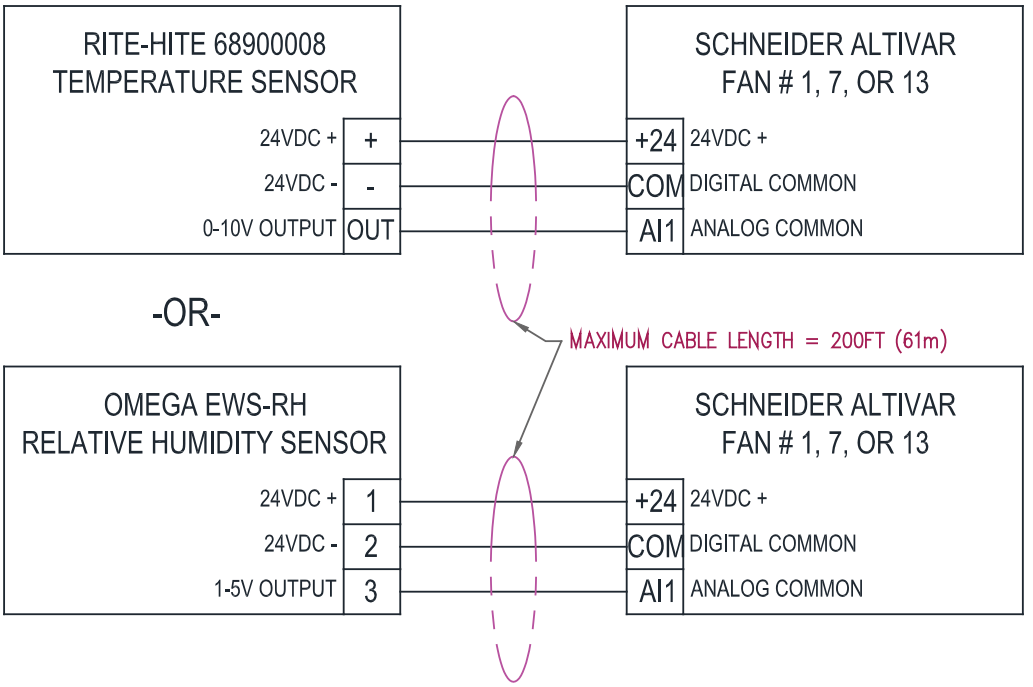
Disconnect speed control switch (membrane switch or speed potentiometer)
Isolate and secure disconnected wires
Install a jumper between VFD terminals 04 and 14

NOTICE
DO NOT remove the jumper between VFD terminals 01 and 11

ENVIRONMENTAL CONTROL

SCHNEIDER VFD

The Fan-Commander has the ability to automatically control fan speed based on preset temperature (or humidity) settings. A remote temperature (or humidity) sensor is read by the first fan in each zone (Fan #1 in Zone 1, Fan #7 in Zone 2, Fan #13 in Zone 3).



FAN COMMANDER ADVANCED SETUP SCREEN - REQUIRED SCALING VALUES

Custom Sensor Config:

x=Volts on analog input
M=Volts/°C or V/%RH
B=°C or %RH at 0V

°C=Mx+B M= 6.5 B= −17.7

%RH=Mx+B M= 25.0 B= −1.0

NOTE:

For installations with Crouzet 89750150 temperature sensor (white case) use the following scaling values:

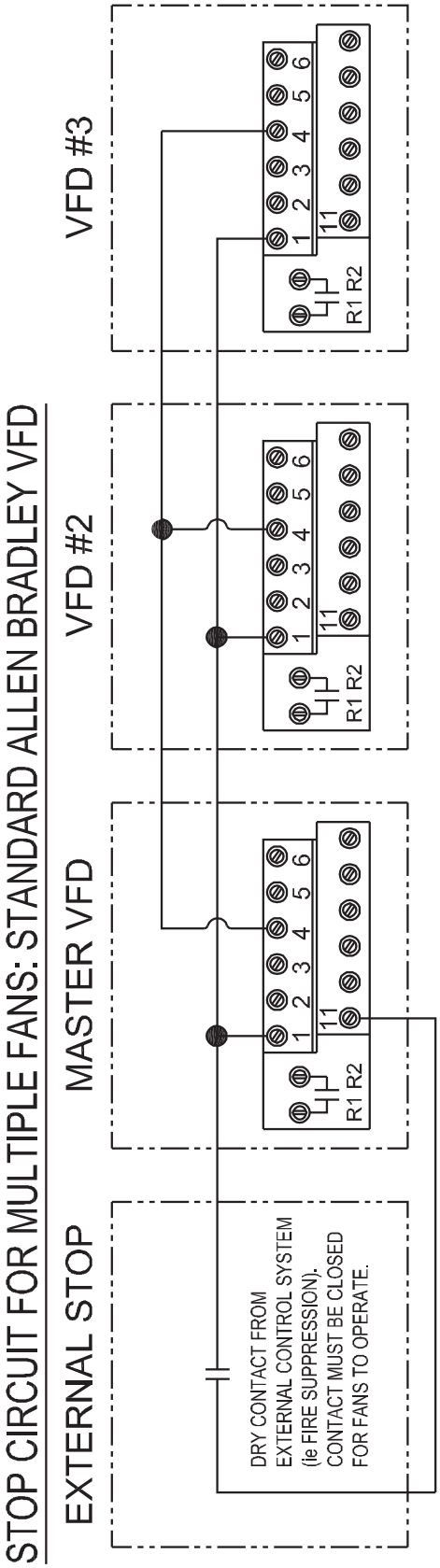
°C=Mx+B M= 5.0 B= −10.0

Schneider Altivar:

Disconnect speed control switch (membrane switch or speed potentiometer)
Isolate and secure disconnected wires

FIRE SUPPRESSION

ALLEN BRADLEY VFD



FIELD WIRING INSTRUCTIONS

LOCK OUT AND TAG OUT ALL POWER SUPPLIES ACCORDING TO OSHA REGULATIONS & LOCAL CODES

REMOVE JUMPER WIRES FROM VFD 1 & 11 IN ALL STANDARD BOXES

CONNECT VFD TERMINAL 1 IN ALL STANDARD BOXES
CONNECT VFD TERMINAL 4 (COMMON) IN ALL STANDARD BOXES

INSTALL A RELAY BETWEEN 11 (+24VDC) AND 1 ON MASTER INVERTER ONLY.
ALL FANS WILL STOP WHEN RELAY OPENS

FIRE SUPPRESSION
SCHNEIDER VFD

FIELD WIRING INSTRUCTIONS

LOCK OUT AND TAG OUT ALL POWER SUPPLIES ACCORDING TO OSHA REGULATIONS & LOCAL CODES

CONNECT VFD TERMINAL COM IN ALL STANDARD BOXES
CONNECT VFD TERMINAL LI4 IN ALL STANDARD BOXES

INSTALL A RELAY BETWEEN +24V AND LI4 ON MASTER VFD ONLY.
ALL FANS WILL STOP WHEN RELAY OPENS

REQUIRED VFD PARAMETER CHANGE (FAN COMMANDER ONLY)
ATV12: CHANGE PARAMETER Fun- Stt- nSt = L4L
ATV312: CHANGE PARAMETER Fun- StC- nSt = LI4

VARIABLE FREQUENCY DRIVE CONFIGURATION

Revolution Fans are configured to use On/Off and speed control switches.
The Variable Frequency Drives must be reconfigured for Modbus communication.
This may make any existing switches non-functional.

Each VFD must be assigned a unique Modbus address number
Schneider VFD address are equal to the fan number (Fan 1 = Address 1)
AllenBradley VFD addresses are equal to the fan number + 100 (Fan 2 = Address 102)
Note: Fan number is independent of how a fan is physically wired in the network.

The Fan-Commander controls up to 18 fans in three zones.
Zone 1 includes fan numbers 1 through 6.
Zone 2 includes fan numbers 7 through 12.
Zone 3 includes fan numbers 13 through 18.

The Fan-Commander can communicate with both Allen Bradley and Schneider VFDs on the same network, however no two fans may have the same fan number.

NOTICE

After parameters have been updated, the VFD power must be cycled Off and back On to begin communication with the Fan-Commander.

Allen Bradley PowerFlex Parameters

P036 = 5	Start Source	5=Modbus
P038 = 5	Speed Reference	5=Modbus
A104 = *	Fan Address #	Value from 101 to 118
A106 = 30.0	Modbus Timout	Seconds
A107 = 1	Modbus Format	8bits, Even parity, 1 stop bit

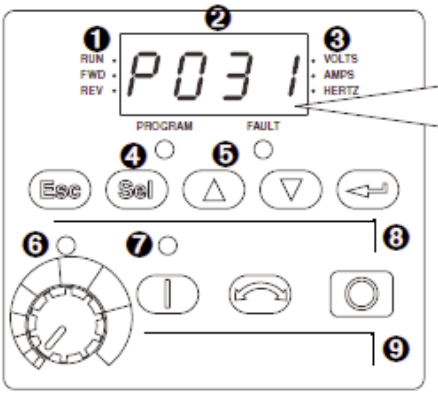
Schneider Altivar 12 Parameters

COnF \ FULL \ Ctl- \ Fr1 = Ndb	Command Source	Ndb = Modbus
COnF \ FULL \ COП- \ Add = *	Fan Address #	Value from 1 to 18
COnF \ FULL \ COП- \ tbr = 96	Baud rate	9 6 = 9600 baud

Schneider Altivar 312 Parameters

COП- \ Add = *	Fan Address #	Value from 1 to 18
COП- \ tbr = 9.6	Baud rate	9.6 = 9600 baud

ALLEN BRADLEY POWERFLEX VFD
INTEGRAL KEYPAD



Menu	Description
d	**Display Group (View Only)** Consists of commonly viewed drive operating conditions.
P	**Basic Program Group** Consists of most commonly used programmable functions.
A	**Advanced Program Group** Consists of remaining programmable functions.
F	**Fault Designator** Consists of list of codes for specific fault conditions. Displayed only when fault is present.

No.	LED	LED State	Description
❶	Run/Direction Status	Steady Red	Indicates drive is running and commanded motor direction.
		Flashing Red	Drive has been commanded to change direction. Indicates actual motor direction while decelerating to zero.
❷	Alphanumeric Display	Steady Red	Indicates parameter number, parameter value, or fault code.
		Flashing Red	Single digit flashing indicates that digit can be edited. All digits flashing indicates a fault condition.
❸	Displayed Units	Steady Red	Indicates the units of the parameter value being displayed.
❹	Program Status	Steady Red	Indicates parameter value can be changed.
❺	Fault Status	Flashing Red	Indicates drive is faulted.
❻	Pot Status	Steady Green	Indicates potentiometer on Integral Keypad is active.(1)
❼	Start Key Status	Steady Green	Indicates Start key on Integral Keypad is active. The Reverse key is also active unless disabled by A095 [Reverse Disable].

No.	Key	Name	Description
❽	Esc	Escape	Back one step in programming menu. Cancel a change to a parameter value and exit Program Mode.
	Sel	Select	Advance one step in programming menu. Select a digit when viewing parameter value.
	△ ▽	Up Arrow Down Arrow	Scroll through groups and parameters. Increase/decrease the value of a flashing digit. Used to adjust internal frequency of IP66, NEMA/UL Type 4X rated drives *only* when a Display Group parameter is shown and P038 [Speed Reference] is set to internal frequency, A069 [Internal Freq].
	↵	Enter	Advance one step in programming menu. Save a change to a parameter value.
❾		Potentiometer(1)	Used to control speed of drive. Default is active. Controlled by parameter P038 [Speed Reference].
		Start	Used to start the drive. Default is active. Controlled by parameter P036 [Start Source].
		Reverse	Used to reverse direction of the drive. Default is active. Controlled by parameters P036 [Start Source] and A095 [Reverse Disable].
		Stop	Used to stop the drive or clear a fault. This key is always active. Controlled by parameter P037 [Stop Mode].

VIEWING AND EDITING PARAMETERS

ALLEN BRADLEY POWERFLEX

The last user-selected Display Group parameter is saved when power is removed and is displayed by default when power is reapplied.
The following is an example of basic integral keypad and display functions. This example provides basic navigation instructions and illustrates how to program the first Program Group parameter.

Step	Key(s)	Example Displays
1. When power is applied, the last user-selected Display Group parameter number is briefly displayed with flashing characters. The display then defaults to that parameter's current value. (Example shows the value of d001 [Output Freq] with the drive stopped.)		
2. Press Esc once to display the Display Group parameter number shown on power-up. The parameter number will flash.	Esc	
3. Press Esc again to enter the group menu. The group menu letter will flash.	Esc	
4. Press the Up Arrow or Down Arrow to scroll through the group menu (d, P and A).	△ or ▽	
5. Press Enter or Sel to enter a group. The right digit of the last viewed parameter in that group will flash.	↵ or Sel	
6. Press the Up Arrow or Down Arrow to scroll through the parameters that are in the group.	△ or ▽	
7. Press Enter or Sel to view the value of a parameter. If you do not want to edit the value, press Esc to return to the parameter number.	↵ or Sel	
8. Press Enter or Sel to enter program mode to edit the parameter value. The right digit will flash and the Program LED will illuminate if the parameter can be edited.	↵ or Sel	
9. Press the Up Arrow or Down Arrow to change the parameter value. If desired, press Sel to move from digit to digit or bit to bit. The digit or bit that you can change will flash.	△ or ▽	
10. Press Esc to cancel a change. The digit will stop flashing, the previous value is restored and the Program LED will turn off. Or Press Enter to save a change. The digit will stop flashing and the Program LED will turn off.	Esc ↵	
11. Press Esc to return to the parameter list. Continue to press Esc to back out of the programming menu. If pressing Esc does not change the display, then d001 [Output Frequency] is displayed. Press Enter or Sel to enter the group menu.	Esc	

MENU STRUCTURE

SCHNEIDER STRUCTURE 12 VFD

Menu Structure

Parameters are arranged in a tree format.
For example, commonly used parameters are **Fr1, Add,** and **tbr**.

- **COnF** ← **Menu**
  - **FULL** ← **Menu**
    - **Ctl** ← **Menu**
      - **Fr1** ← **Parameter**
    - **СОП** ← **Menu**
      - **Add** ← **Parameter**
      - **tbr** ← **Parameter**

To navigate to **Add** (fan address number), press the MODE button until **COnF** is displayed
Press the dial to select **COnF**
Spin the dial until **FULL** is displayed. Press the dial to select **FULL**.
Spin the dial until **СОП** is displayed. Press the dial to select СОП.
Spin the dial until **Add** is displayed. Press the dial to select **Add**.
Spin the dial to select the desired address. Press the dial to set.
Press the ESC button to move back up the tree.

SCHNEIDER STRUCTURE 312 VFD

Menu Structure

Parameter navigation on the 312 is very similar to the 12, except that
the parameter tree has fewer levels.
For example, commonly used parameters are **Add** and **tbr**.

- **СОП** ← **Menu**
  - **Add** ← **Parameter**
  - **tbr** ← **Parameter**

To navigate to **Add** (fan address number), press the dial once to enter the menu
Spin the dial until **СОП** is displayed. Press the dial to select **СОП**.
Spin the dial until **Add** is displayed. Press the dial to select **Add**.
Spin the dial to select the desired address. Press the dial to set.
Press the ESC button to move back up the tree.

FAN-COMMANDER USER INTERFACE

GETTING STARTED

Before configuring the Fan-Commander, verify that all fans on the network are properly installed and that the blades are free of obstructions.

Verify that all control boxes are powered on, all VFDs are properly connected with RS485 cable, and that the Fan-Commander parameters have been changed in each VFD to enable Fan-Commander control.

Verify that each VFD has been assigned a unique address corresponding to it's fan number.

After initially powering up the Fan-Commander, the **MODBUS COMMUNICATION** screen will appear. This screen may be accessed again later by pressing the **MODBUS** button in the **SETUP** menu.

The numbers 1-18 correspond to Fan Number:

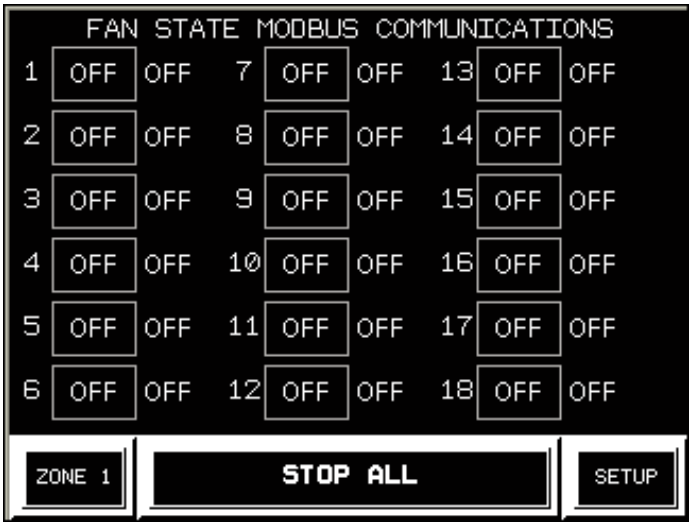
Fans 1-6	**Zone 1**
Fans 7-12	**Zone 2**
Fans 13-18	**Zone 3**

Pressing the box cycles through VFD type for each fan number:

OFF	**Fan number not used**
AB	**Allen Bradley VFD**
Sch	**Schneider VFD**

To the right of each box the VFD communication status is displayed.

OFF	**Fan number not used**
OK	**Communication Good**
BAD	**Communication Error**



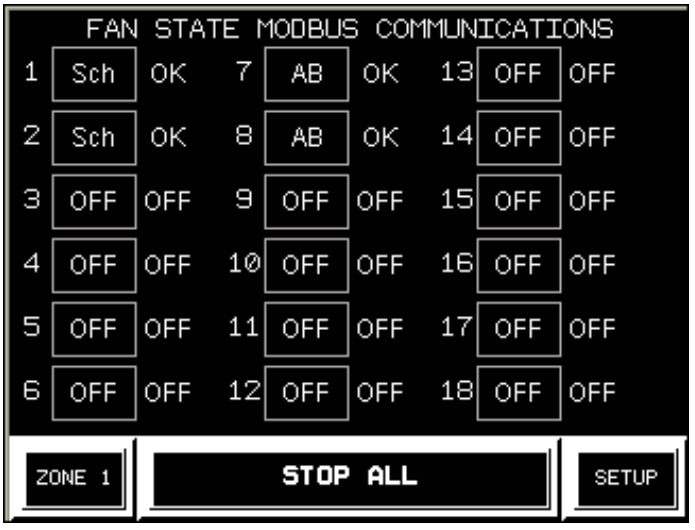
Example Network:

To configure two Schneider VFD fans in Zone 1, and two Allen Bradley VFD fans in Zone 2:

Set **MODBUS** addresses on the two Schneider VFDs to **1** and **2** (fan #1 and fan #2).

Set **MODBUS** addresses on the two Allen Bradley VFDs to **107** and **108** (fan #7 and fan #8).

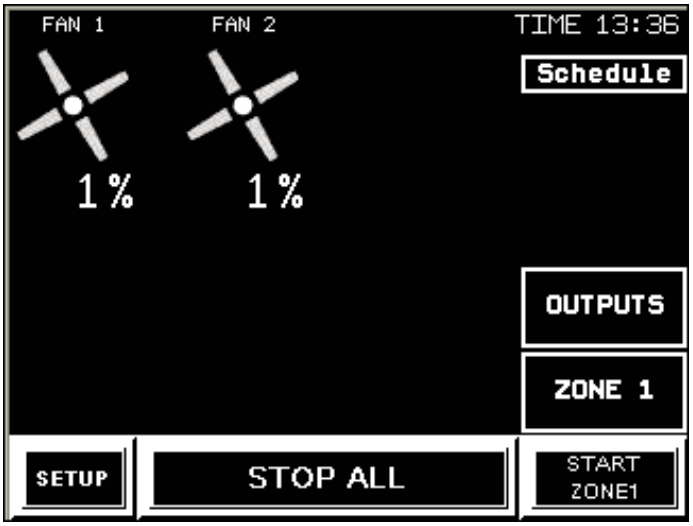
Press the boxes for fans 1, 2, 7, and 8 until they display the proper VFD types:



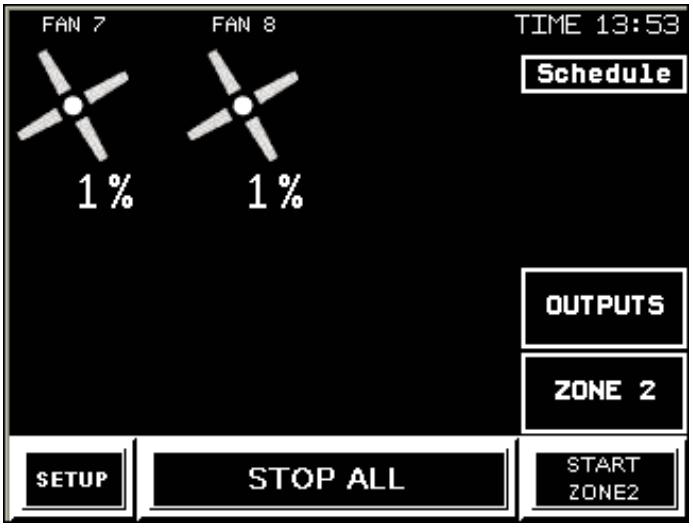
The network is now configured for four fans. The "**OK**" status indicates that each fan is successfully communicating with the Fan-Commander.

Press the **ZONE 1** button to go to the **ZONE CONTROL** Screen.

The **ZONE 1** screen shows the two fans operating in Zone 1.



To view Zone 2, press the **ZONE 1** button (lower right) to cycle to the next Zone. Fans 7 and 8 are displayed.



Press **ZONE 2** button to cycle to Zone 3. Press again to cycle back to Zone 1.

The fan names (FAN 1 and FAN 2) blink to indicate the VFDs are in fault. Press **STOP ALL** to clear all faults. When the fan names stop blinking, the fans are ready to run.

The **STOP ALL** button is available on each of the **ZONE CONTROL** screens. Pressing **STOP ALL** stops all fans, in all zones.

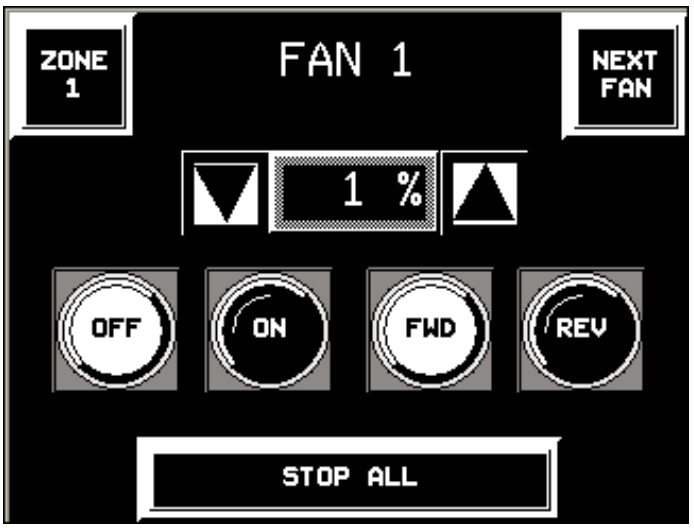
A pop-up will appear warning that **FANS MAY START AUTOMATICALLY** based on automatic environmental or scheduling settings.

Press **OK** to acknowledge and clear the message.

The set speed of each fan is displayed below the fan icon.

To start all fans in Zone 1, press the **START ZONE1** button in the lower right corner. **FAN 1** and **FAN 2** will begin to operate.

To control each fan independently, press the fan icon to navigate to the fan's control panel.



At the top of the screen is the Fan Name. On either side are navigation buttons to return to the **ZONE 1** screen, or proceed to the next fan control screen.

OPERATION / LOGIN

The speed control is in the center of the screen. Speed is displayed as a percentage of the total speed. To increase or decrease the speed, press the **UP** or **DOWN** arrows on either side. To enter a specific speed, press the number to bring up a keypad.

Enter the desired speed (1 to 100), and press **ENTER** to return to the previous screen.

Below the speed control are indicator buttons that display the fan's current status, and allow the user to toggle the fan **ON-OFF**, **FORWARD-REVERSE**.

LOGIN

Access to many Fan-Commander functions may be controlled by a user password.

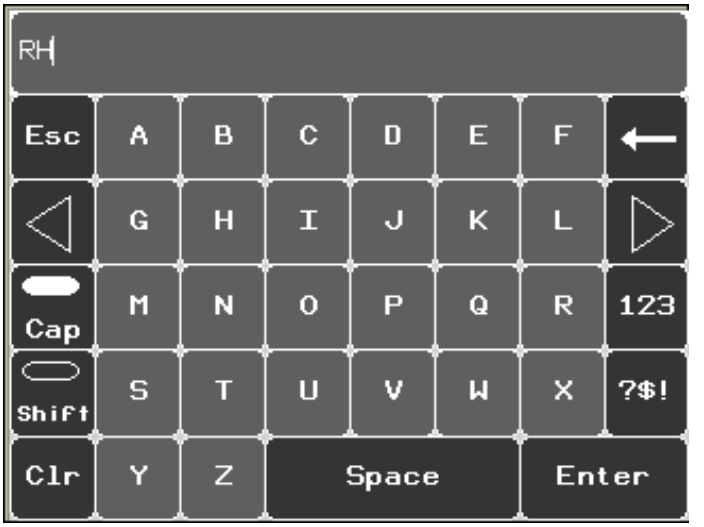
Pressing the **SETUP** button will prompt for a password.

In the center of the **LOGIN** screen is an **EXIT** button. This allows unauthorized users to return to the **ZONE CONTROL** screen.

The software version is displayed on the bottom right of the screen.

On Ethernet equipped models, the Fan-Commander's IP address is displayed at the bottom center of the screen.

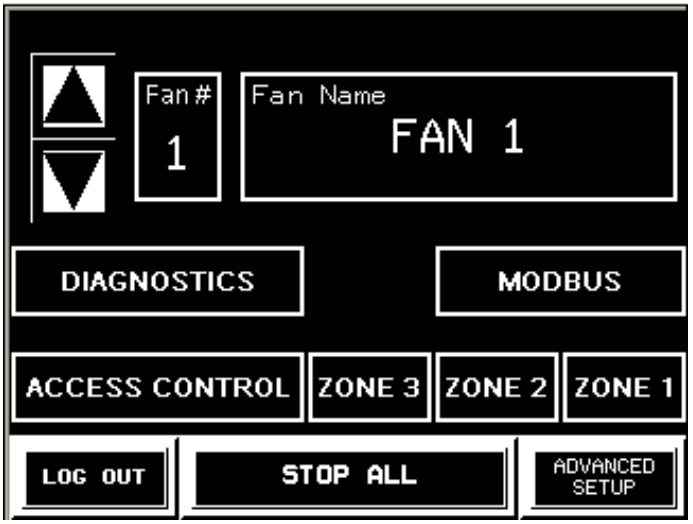
To enter the password, press the rectangle under "**Enter Password**." A keypad will appear. Enter the password and press **ENTER**.



The default password is "**RH**" (all caps).

A correct login will bring up the **SETUP** screen.

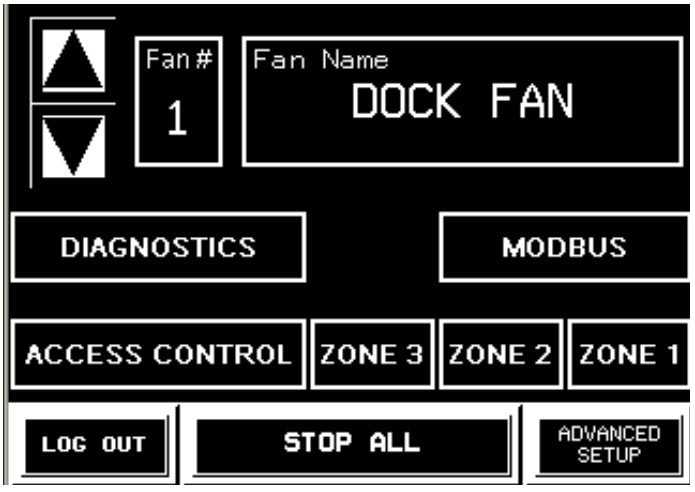
SETUP / DIAGNOSTICS



SETUP

The default fan names may be changed to better describe the fan's application. From the **ZONE CONTROL** screen, press the **SETUP** button (bottom left) to enter the **SETUP** screen.

To change the name of FAN 1, press the **Fan Name rectangle**. A keypad will appear. Enter the desired name *(for example, DOCK FAN)* and press **ENTER**. The new name is displayed:
To change the names of other fans, use the **UP** and



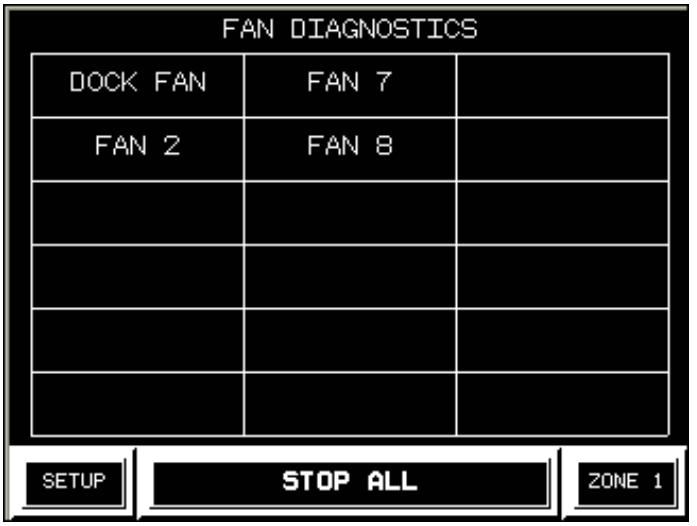
DOWN arrows to scroll through the fan numbers, or press the **Fan # rectangle** to rename a specific fan number.

To return to the **ZONE CONTROL** screen without logging out, press a **Zone** button in the lower right. Users will not be prompted for a password to re-enter the **SETUP** screen.

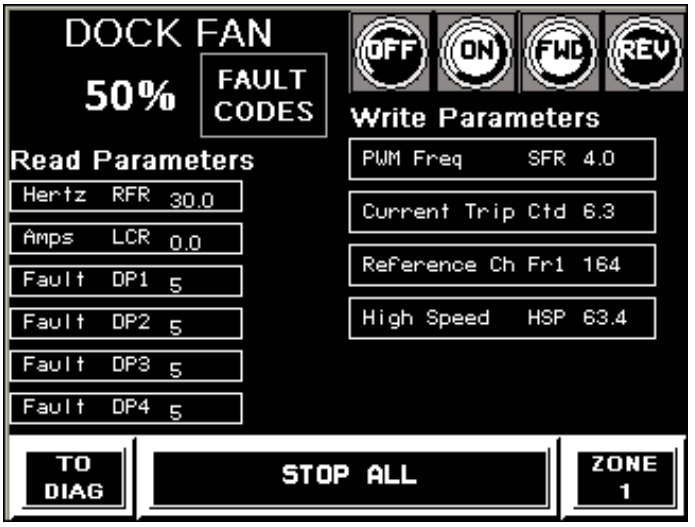
To log out, press the **LOG OUT** button on the bottom left. Users will not be able to access the **SETUP** screen without entering a valid password.

DIAGNOSTICS

To enter diagnostic mode, press the **DIAGNOSTICS** button on the **SETUP** screen (lower left).



Connected fans are displayed. If custom fan names were entered, they are displayed.



Select **DOCK FAN** to access the diagnostic screen:
In the upper left corner, the Fan Name and current speed setting are displayed.

In the upper right corner, the indicator buttons for **OFF-ON**, **FORWARD-REVERSE** are displayed (same as on the Fan Control screen).

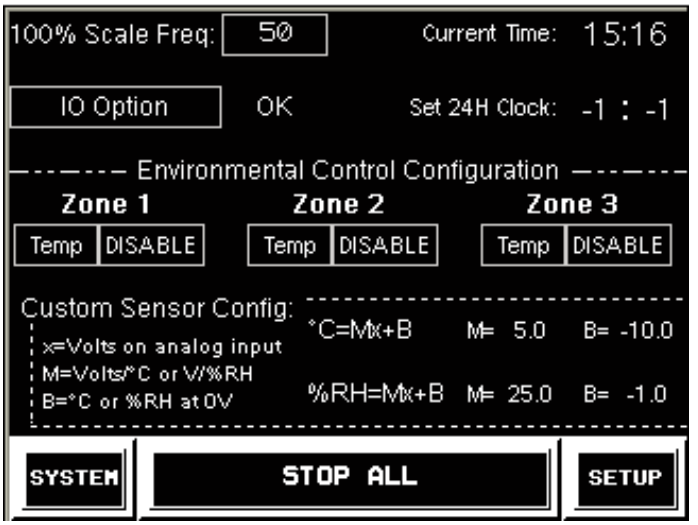
The **DIAGNOSTIC** screen displays VFD parameters required for troubleshooting. The parameters on the left are read only. The parameters on the right allow user input.

CONSULT RITE-HITE FANS CUSTOMER SERVICE PRIOR TO CHANGING ANY VFD PARAMETERS!

ADVANCED SETUP

ADVANCED SETUP

To enter the **ADVANCED SETUP** menu, press the **ADVANCED SETUP** button on the **SETUP** screen (lower right).



100% Scale Frequency:

The Fan-Commander is factory set to operate fans over a range of 10 to 50 Hz (1% corresponds to 10 Hz, 100% corresponds to 50 Hz). In some applications it is desirable to increase or decrease the maximum scaled speed. The Fan-Commander will scale the speed percentage from 10 Hz to the value displayed in this menu.

Note that this setting only affects the maximum speed the Fan-Commander outputs to each VFD. Each VFD is also governed by an independent programmed maximum speed (50Hz default). For example, to increase VFD speed to 55Hz, one must change the Scale Frequency to 55Hz and increase the maximum speed parameter in each VFD to 55Hz.

IO Option:

Fan-Commander is available with an optional IO block that allows it to interface with discrete signals from PLCs or other automation equipment.

Press the **IO OPTION** button to toggle communications **ON** or **OFF** to this device. Communication status is displayed to the right of the button.

Environmental Controls:

Each Zone can be configured to automatically control fan speed based on a 0-10V feedback from a temperature or humidity sensor. The sensor is wired to and read by the first drive in each zone (Fans 1, 7, and 13).

To enable a temperature sensor in Zone1, toggle the **Temp/Humidity** button under Zone1 until "**Temp**" is displayed. Toggle the button to the right of "Temp" from **DISABLE** to **ENABLE**.

Clock:

The Fan-Commander uses a real time clock to perform scheduling functions. The current time is displayed in the upper right corner (24 hour format).

To change the time from **11:26 am** to **5:00 pm**, press the "**-1**" shown in the hours position on the Set 24H Clock line. Enter **17 (for 5pm)** on the keypad. The Current Time will update to show the new hour.

Next, press the "**-1**" in the minutes position on the Set 24H Clock line. Enter **00**. The Current time will update to show **17:00**.

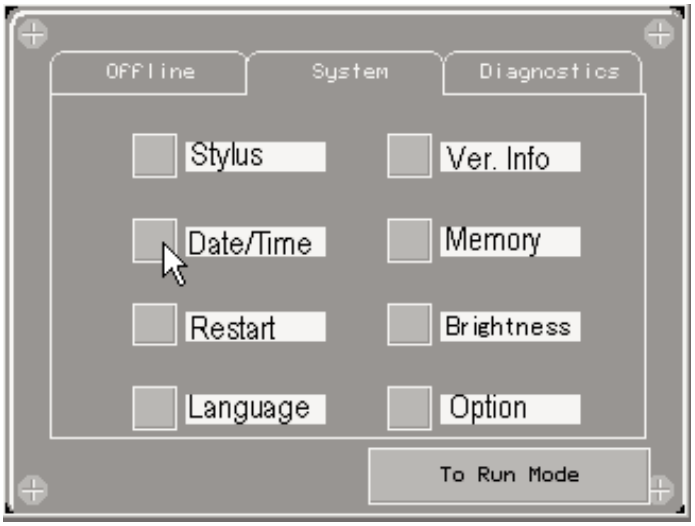
Custom Sensor Configuration:

When Environmental Controls are enabled, The Fan-Commander is factory scaled to read temperature from a Crouzet 89750150 sensor, and humidity from an Omega EWS-RH sensor (both provided by Rite-Hite). It is possible to use alternate sensors by changing the slope and intercept variables in this menu. Disabling environmental controls in all three zones restores factory default values.

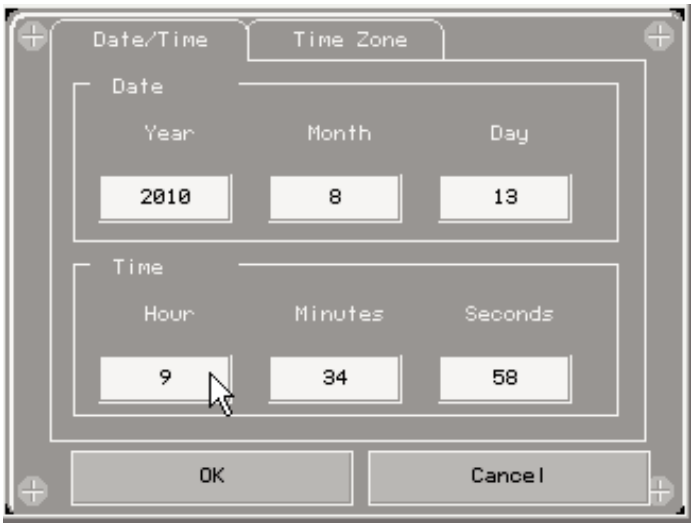
ADVANCED SETUP CONTINUED

System:

The **SYSTEM** button opens the hardware configuration menu, which is used to set the date for scheduling and configure network settings on Ethernet equipped models.



Press the **Date/Time** button to set the date and year.

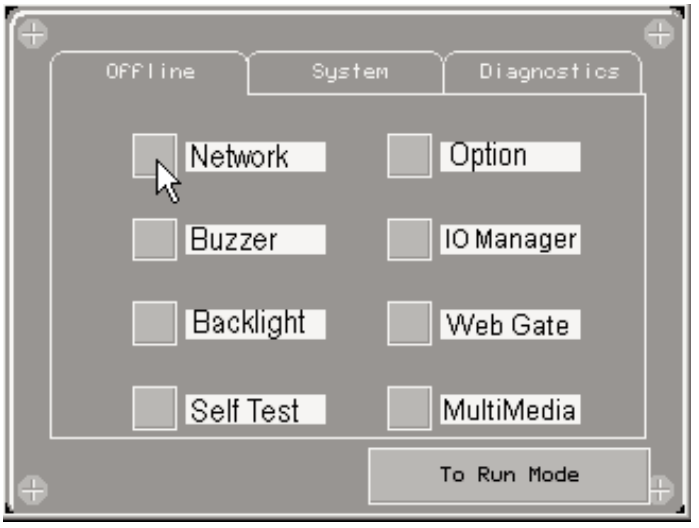


Daylight Savings Time preferences may be configured by pressing the **Time Zone** tab. Press **OK** when complete.

For standard non-Ethernet units, press **To Run Mode** to exit system configuration.

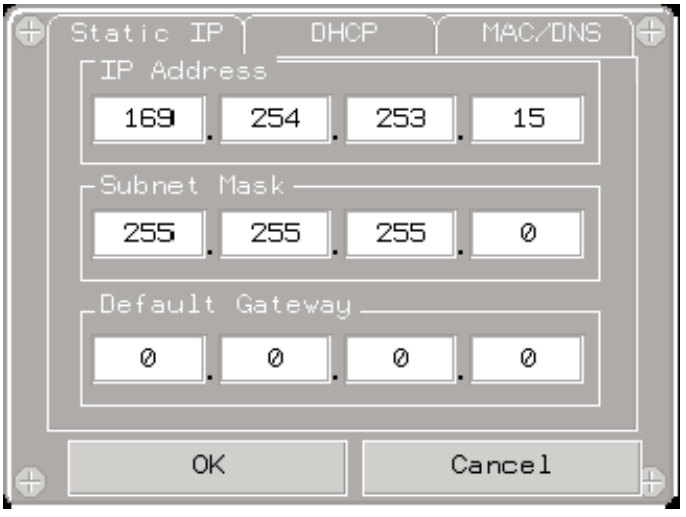
For Ethernet units, press the **Offline** tab to configure network settings.

Press the Network button:



Click **OK** when prompted to stop the user application (fan communication will stop).

Enter network address and press **OK**.

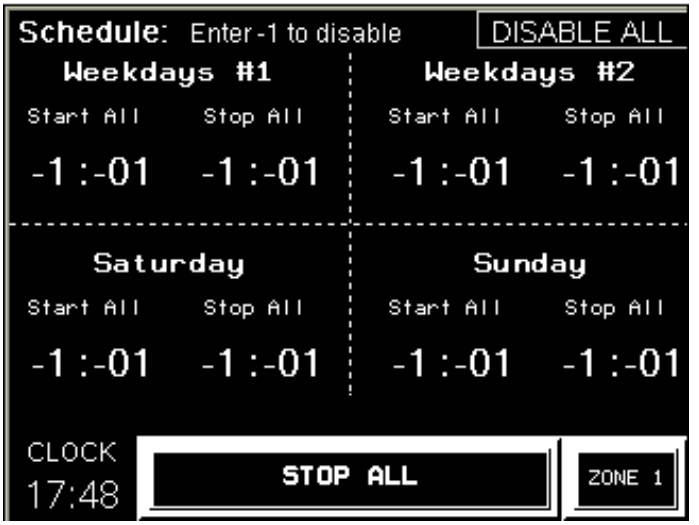


Press **OK** when prompted to restart.

SCHEDULING

SCHEDULING

From any of the three **Zone Control** screens, press the **Schedule** button in the upper right corner to access the Schedule screen:



The Fan-Commander can be configured to automatically start and stop the fans twice daily during the Weekdays (Monday-Friday), and once daily on Saturday and Sunday. All times are displayed in 24 hour format.

To disable a start or stop time, enter “-1”. To configure a start or stop time, press the hour position, enter the desired value, then repeat with the minute position.

Example:

In this example, the schedule will start all fans at 8am on Monday, Tuesday, Wednesday, Thursday, and Friday. The fans will stop at noon, start again at 12:30pm, and turn off at 6:30pm.

On Saturday, the fans will start at 7:30am and turn off at 1:45pm.The schedule will not operate the fans on Sunday. The fans may be manually started or stopped using the Fan Control screens at any time during the schedule. They will continue to run until the next scheduled start or stop time.

Continuing the previous example: If a fan is manually stopped at 9:30am on Tuesday, it will automatically start again at the next scheduled start time, 12:30pm Tuesday. If a fan is manually started at 8pm on Friday, it will continue to run until the next scheduled stop time, at 1:45pm on Saturday.

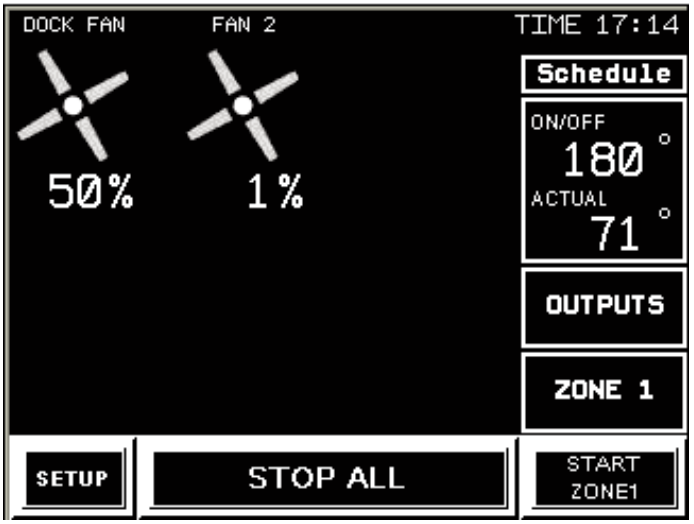
If both scheduling and environmental controls are enabled, the schedule determines the allowable run time of the fans. Between the scheduled start time and the scheduled stop time, the environmental controls will automatically start and stop the fans. After the scheduled stop time, the environmental controls will be disabled until the next scheduled start time.

OPTIONAL AUTOMATIC ENVIRONMENTAL CONTROLS

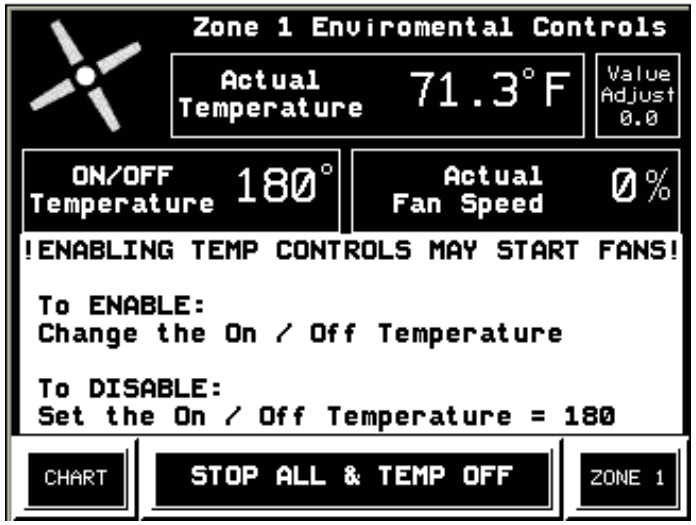
When temperature or humidity controls are enabled in the **ADVANCED SETUP** menu, an additional temperature/humidity box appears on the corresponding **ZONE CONTROL** screen.

Temperature:

If Temperature Control is enabled in Zone 1 (**ADVANCED SETUP**), the Zone 1 Control screen will display the **ON/OFF** and **ACTUAL** temperature:



To access temperature controls, press anywhere in the temperature feedback box.



If the temperature sensor is properly connected to the analog input on the first drive in the zone (Fan #1), the Actual Temperature will display at the top of the screen.

Actual Temperature is updated every 10 minutes during normal operation, more frequently when the Environmental Controls screen is active.

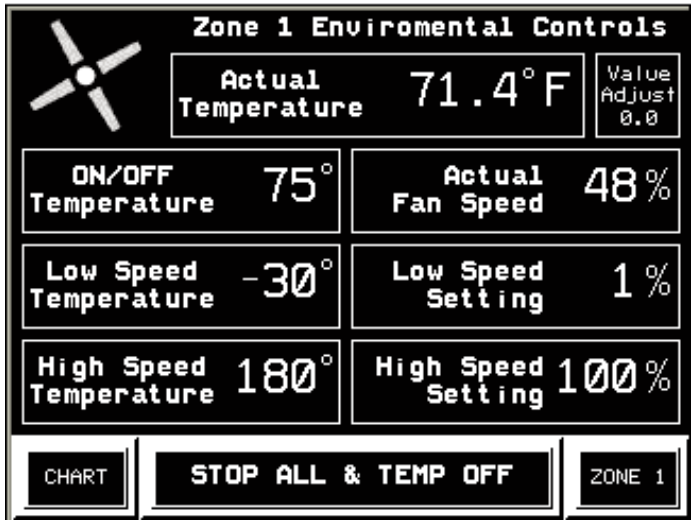
To toggle between Fahrenheit and Centigrade, press the "F" (or "C") to the right of the temperature reading.

NOTE: ***Changing between Fahrenheit and Centigrade sets the ON/OFF Temperature = 180 to avoid inadvertent starts.***

The Actual Temperature read from the temperature sensor may be calibrated by pressing the **Value Adjust** button (top right) and entering an offset from -9.0 to +9.0. This calibration is only accessible when the user is logged in.

Initially, the **ON/OFF** temperature threshold is disabled. To enable temperature control, press the **ON/OFF** Temperature button and enter the temperature at which the fans should cycle on or off (ie, 75˚).

Once an **ON/OFF** temperature is entered, additional fields will appear:



If the Actual Temperature is greater than the **ON/OFF** Temperature, the fans will turn **ON**.

If the Actual Temperature is less than the **ON/OFF** Temperature, the fans will turn **OFF**.

The Actual Fan Speed is calculated based on the user set Low Speed Temperature and High Speed Temperature. As the temperature rises, the fans will gradually increase in speed until the High Speed Temperature is reached.

Actual Fan Speed =

Low Speed Setting +
[(Actual Temp - Low Temp) /
(High Temp - Low Temp) *
(High Speed Setting – Low Speed Setting)]

OPTIONAL AUTOMATIC ENVIRONMENTAL CONTROLS

The Actual Fan Speed when the fans turn ON will vary based on three On/Off Temperature scenarios:

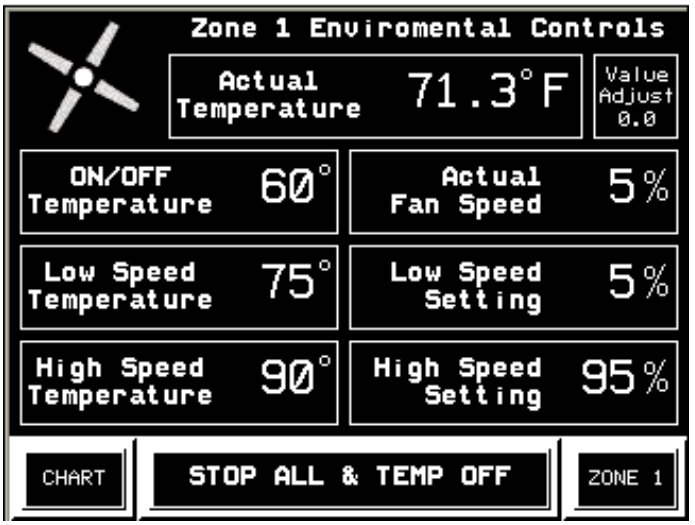
1. ON/OFF TEMPERATURE LESS THAN LOW SPEED TEMPERATURE

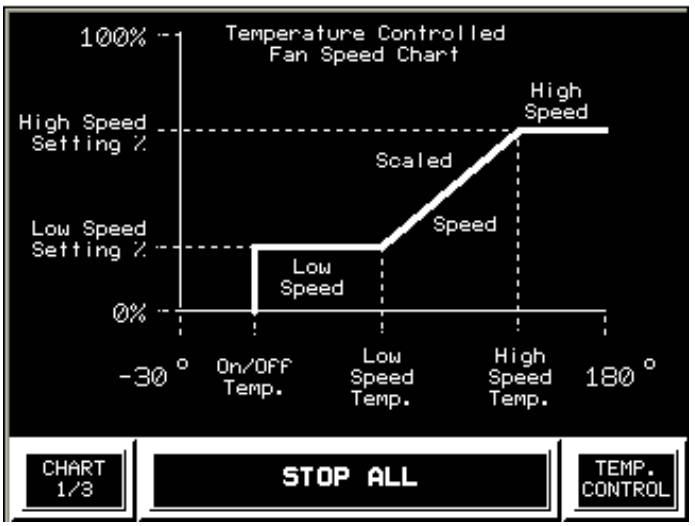
2. ON/OFF TEMPERATURE BETWEEN LOW SPEED TEMPERATURE AND HIGH SPEED TEMPERATURE

3. ON/OFF TEMPERATURE GREATER THAN HIGH SPEED TEMPERATURE

Examples:

1. ON/OFF TEMPERATURE LESS THAN LOW SPEED TEMPERATURE *(Typical application)*





In this example, the fans are off if the temperature is less than 60˚.

Between 60˚ and 75˚, the fans will operate at the Low Speed Setting (5% speed).

Between 75˚ and 90˚, the fans will gradually increase in speed from the Low Speed Setting to the High Speed Setting (5% to 95%).

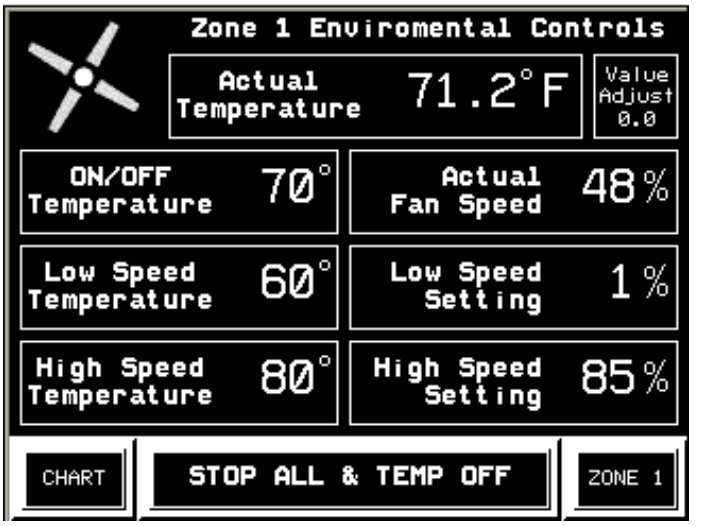
Over 90˚, the fans will operate at the High Speed Setting (95% speed).

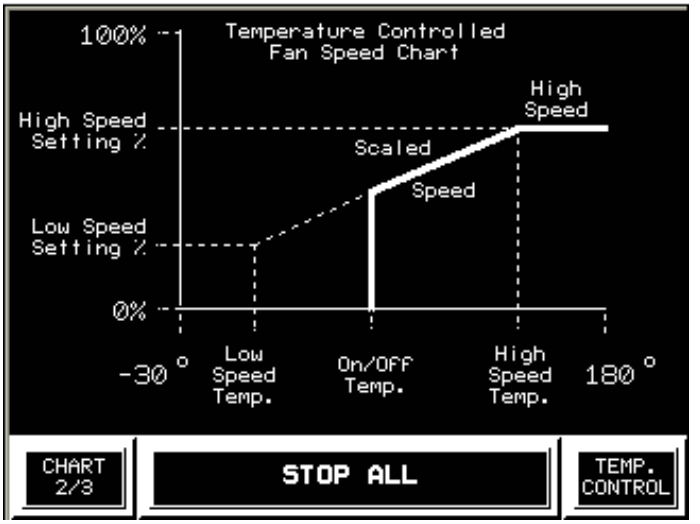
Since the Actual Temperature of 71.3˚ is greater than the **ON/OFF** Temperature, but less than the Low Speed Temperature, the Actual Fan Speed is 5%.

2. ON/OFF TEMPERATURE BETWEEN LOW SPEED TEMPERATURE AND HIGH SPEED TEMPERATURE

When the **ON/OFF** Temperature is set between the Low Speed Temperature and the High Speed Temperature, the Actual Speed when the fans will turn **ON** will be at a scaled speed between the Low and the High Speed Settings.

As the temperature changes, the fan will accelerate or decelerate accordingly.

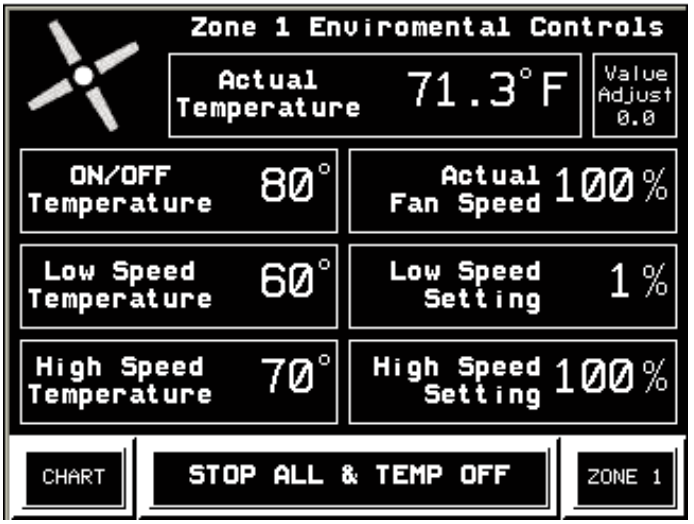


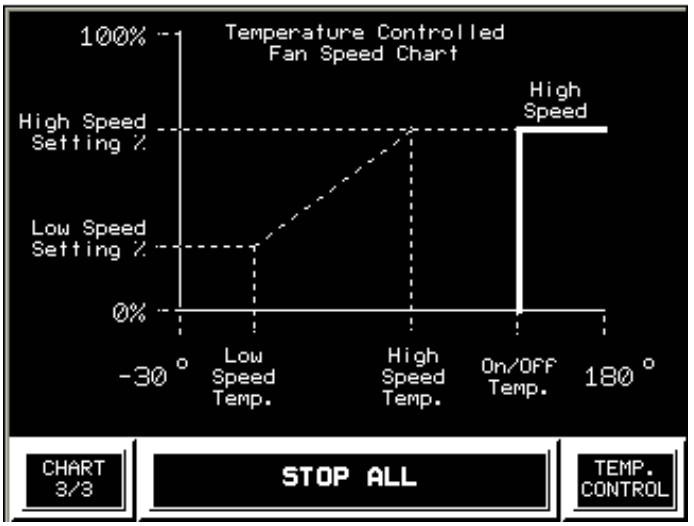


OPTIONAL AUTOMATIC ENVIRONMENTAL CONTROLS

3. ON/OFF TEMPERATURE GREATER THAN HIGH SPEED TEMPERATURE

If the ON/OFF Temperature is set equal to or greater than the High Speed Temperature, the Actual Fan Speed when the fans will turn ON will equal the High Speed Setting.





Humidity:

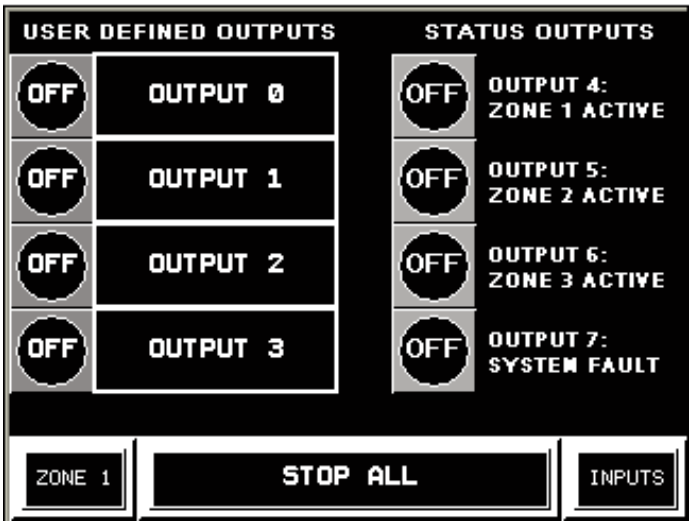
Humidity controls function the same as Temperature controls, except that ON/OFF and speed control react to relative humidity instead of temperature.

OPTIONAL I/O CONTROL

OUTPUTS:

If the optional IO block is installed, and IO Option is enabled in the **ADVANCED SETUP** menu, an **OUTPUTS** button will appear on each of the Zone menus.

Press the **OUTPUTS** button to access the **OUTPUTS** screen.



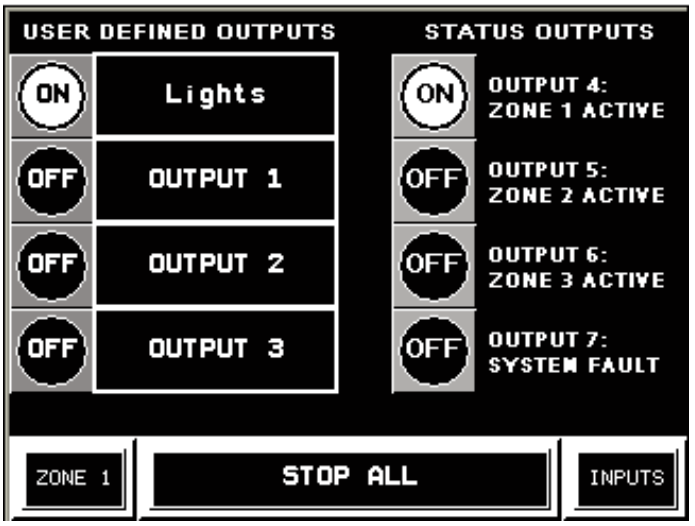
The first four outputs (shown on the left) are user configurable. Pressing the **OUTPUT 0** box will bring up a keypad to customize the name.

To the left of the four user defined outputs are indicator buttons that may be used to toggle the output **ON** or **OFF**.

Outputs 4-7 (right) are predefined status outputs. To the left of each output is an indicator light to show the state of the output.

The **ZONE ACTIVE** outputs energize if any fans are running in the respective zone. The **SYSTEM FAULT** output energizes if any fans in the network are faulted.

In the following example, the user has defined **OUTPUT 0** to control "**Lights**," and has toggled the output **ON** by pressing the indicator button. **Output 4** is **ON** indicating that at least one fan is currently running in Zone 1.



OPTIONAL I/O CONTROL

INPUTS:

Press the INPUTS button in the lower right corner of the OUTPUTS screen to access the inputs screen.

The inputs screen shows the status of each of the inputs.

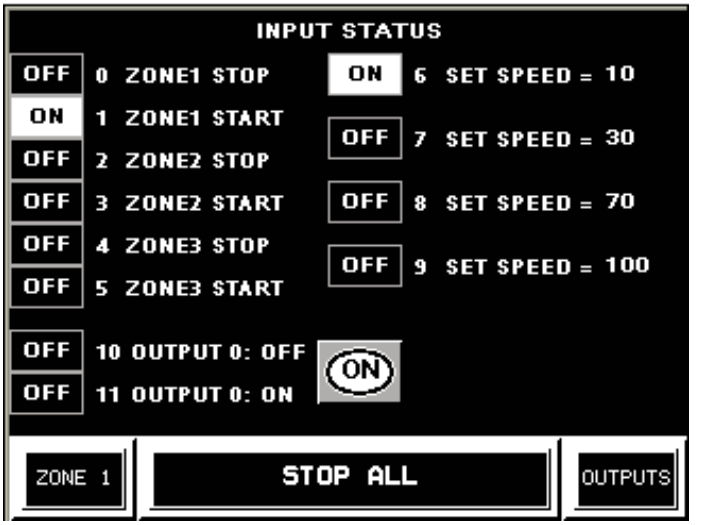
Inputs are sampled every 15 seconds. Allow at least 30 seconds for the Fan-Commander to sample an input and update the display.

Inputs 0-5 may be used to start or stop all fans in a particular zone.

Inputs 6-9 may be used to set four predefined speeds, and are used in conjunction with the Zone Start inputs (1, 3, & 5).

If a **SET SPEED** input is **ON** at the same time one or more **ZONE START** inputs are **ON**, the speed of each fan in the selected zones will change to the corresponding **SET SPEED** value.

In this example, the Fan-Commander is receiving a command to start all fans in Zone 1 (Input 1 on). Because a **SPEED SET** input is also on (Input 6) the speed of each fan in Zone 1 will be changed to 10%.



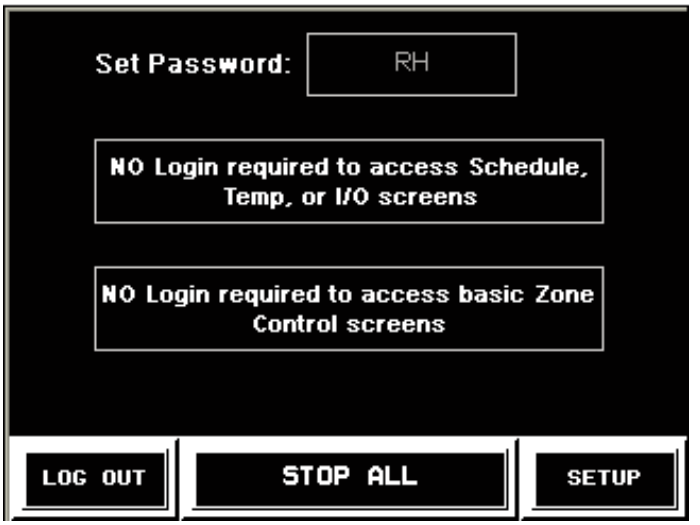
The **SET SPEED** values can be changed to any value between -100% and +100% by tapping the number on the screen. Negative values correspond to speeds in reverse.

Inputs 10 and 11 may be use to toggle User Defined Output 0 **ON** and **OFF**. The round indicator light to the right shows the current status of Output 0.

ACCESS CONTROL

ACCESS CONTROL:

Access to the **SETUP** menu always requires that the user be logged in. The advanced **ACCESS CONTROL** menu can be accessed by pressing the **ACCESS CONTROL** button on the **SETUP** screen.

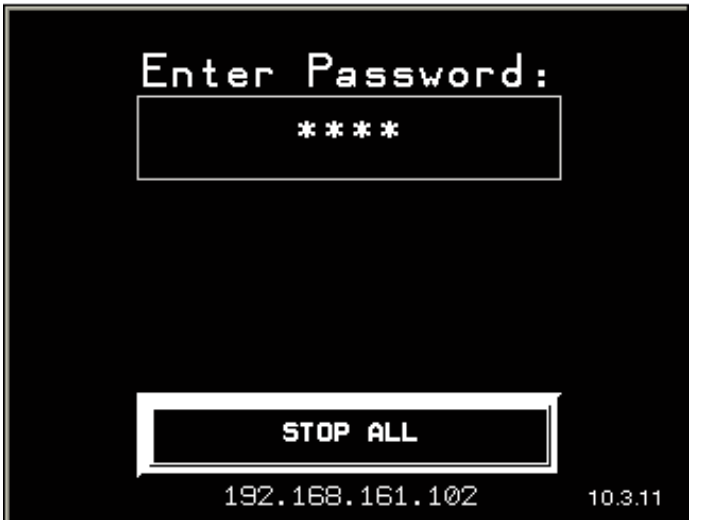


Set Password allows the user to define a custom password to access the Fan-Commander. Touch the box to enter the new password.

By default, the user is not required to log in to access Scheduling, Environmental Controls, or I/O menus. Unauthorized users can be restricted from these screens by toggling the access button.

By default, the user is not required to log in to access basic Zone Control screens (on/off, speed control). Unauthorized users can be restricted from **ALL** screens by toggling the access button:

To lock out the Fan-Commander, simply press the **LOG OUT** button. The correct password must be entered to return to the Zone Control screens. The ability to **STOP ALL** fans cannot be locked out.



OPTIONAL ETHERNET CONTROL

Ethernet equipped Fan-Commander units are able to communicate with other automation equipment using Modbus protocol over TCP/IP.

The packet of data embedded within TCP/IP is in a Modbus format.

All devices, including Ethernet switches, must be able to communicate Modbus over TCP/IP.

Each drive has an integer **COMMAND** register and an integer **STATUS** register. The **COMMAND** register is equal to the Fan number. The **STATUS** register is the Fan number + 100.

Example:

Fan #3 Command Register = %MW3
Fan #3 Status Register = %MW103

To command a fan to **STOP**, write a **0** to the command register.

To command a fan to **RUN FORWARD**, write a speed value from 1 to 100 to the command register.

To command a fan to **RUN REVERSE**, write a speed value from -1 to -100 to the command register.

After interpreting the command, the Fan-Commander will acknowledge receipt by writing the command register to 999.

The status register returns the current speed of the fan.

0	**=**	**fan stopped**
+50	**=**	**forward 50%**
-25	**=**	**reverse 25%**

The status register will return a value of 999 if a fault is present.

OPTIONAL WEB BASED CONTROL

Ethernet equipped Fan-Commander units include a web server for remote Fan control from PC.

Minimum System Requirements for Web Gate:

Operating System	Microsoft Windows XP Professional SP2, or Microsoft Windows 7 64 bit
Web Browser	Internet Explorer 6 or greater (32 bit version only)

To access the Fan-Commander via web browser, the Fan-Commander must first be assigned an IP address. In the **SYSTEM** menu (see **ADVANCED SETUP**), define an IP address and subnet for the Fan-Commander.

To connect via Web Gate, enter the Fan Commander's IP address in the Internet Explorer Address Bar.

Click on the "**Monitoring**" tab (top center of screen). On the left, under "**Web Gate**," select "**In Frame**" If Web Gate has not previously been installed, the following message and link will appear: **"You need to install the Vijeo Web Gate ActiveX control"**

Select the **"Vijeo Web Gate ActiveX control"** link to access the **Web Gate Installation Page**.

On the **Web Gate Installation page**, select the **Web Gate Installer link**.

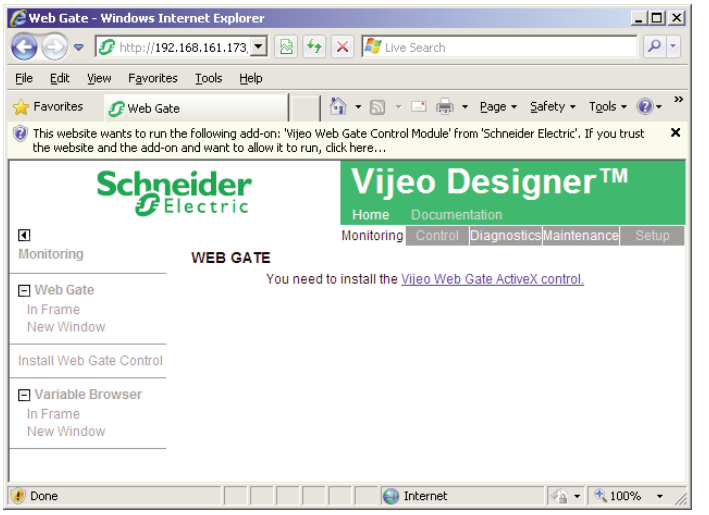
When prompted "**Do you want to run or save this file?**", select the "**Run**" button.

When prompted "**The publisher could not be verified. Are you sure you want to run this software?**" , select the "**Run**" button.

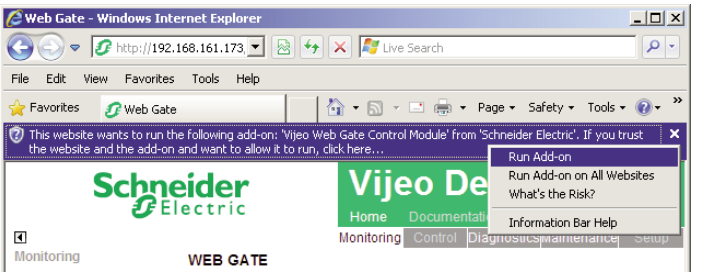
Follow the prompts for the installer (**Next, Next, Install, Finish**).

On the left, under "**Web Gate**," select "**In Frame**" to connect to the Fan Commander.

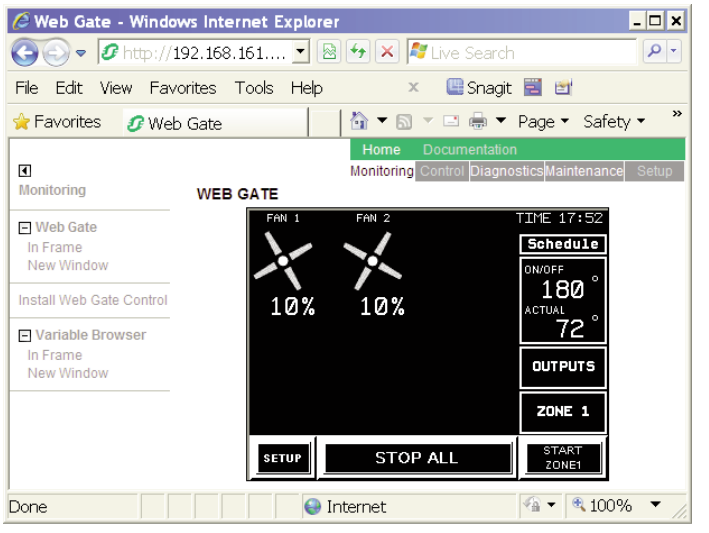
The first time the **Web Gate** is used, a security banner may appear across the top of the page: "This website wants to run the following add-on: 'Vijeo Web Gate Control Module' from 'Schneider Electric'. If you trust the website and the add-on and want to allow it to run, click here…"



Click on the warning message, and select "Run Add-on" from the drop down menu.



All of the Fan-Commander menus and functionality are now available on your browser.



Installation Troubleshooting:

1. In Internet Explorer, disable Protected Mode if applicable
2. Kaspersky Internet Security software is not compatible, and must be disabled
3. Ports 80 and 6000 must be open and forwarded from PC to Fan Commander

OPTIONAL MOBILE DEVICE CONTROL

Ethernet equipped Fan Commander units may be monitored and controlled remotely using an Android or iOS smartphone or tablet using the **Vijeo Design'Air** app.

The **Vijeo Design'Air** app is available for a nominal cost from Google Play and iTunes.

The **Vijeo Deisgn'Air FREE** app is available at no cost, with limited functionality.

Note that **Vijeo Design'Air Plus** is not supported.

To access the Fan Commander from a mobile device:

1. Connect Fan Commander to a wireless network or access point.

2. Download and install the Vijeo Design'Air app from the Google Play or the iTunes App Store.

3. Run the app on the smartphone/tablet, search for connected devices.

System Requirements:

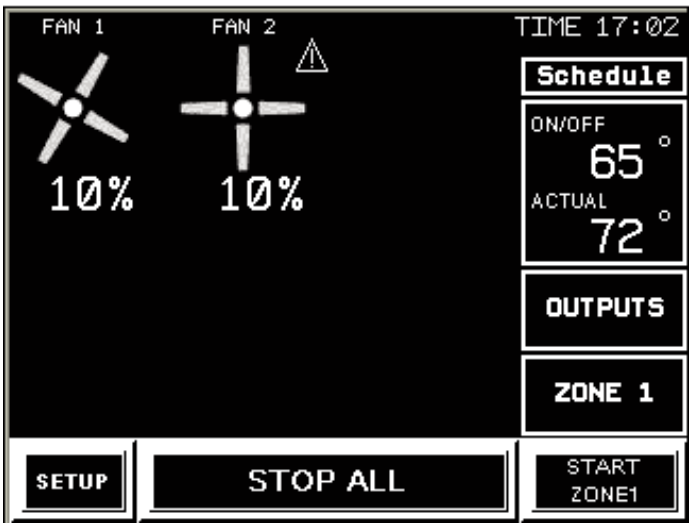
1. Ethernet Fan Commander with color screen (older monochrome versions are not supported)

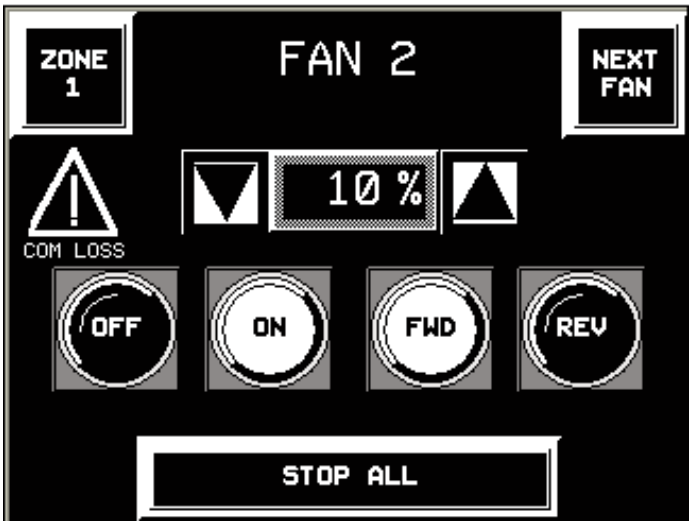
2. iOS Version 6.0 or later or Android OS Version 2.3.3 or later

TROUBLESHOOTING

COMMUNICATION ERROR

If a communication error is detected with a fan on the network, a triangle ⚠ is shown next to the fan icon on the Zone Control screen.





An error is also displayed on the Fan Control screen: A communication error with a single fan can greatly diminish network performance and cause other fans to have intermittent faults.

Fans requiring service should be removed from the network to improve network performance.

TO REMOVE A FAN FROM THE NETWORK

Press the **SETUP** button on the **ZONE CONTROL** screen.

Press the **ADVANCED SETUP** button on the **SETUP** screen.

Press the **MODBUS** button on the **ADVANCED SETUP** screen.

To remove Fan 2 from the network, press the box corresponding to Fan 2 until the VFD type cycles from **Sch** to **OFF**.

The status (right of the box) will update showing the FAN is no longer on the network.

TROUBLESHOOTING

TO RESOLVE THE COMMUNICATION ERROR

Verify the following:

- VFD is powered ON
- VFD parameters are set to enable Fan-Commander control.
- VFD Modbus address corresponds to configured fan number.
- Cycle control box power.

IF THE VFD HAS NEVER COMMUNICATED

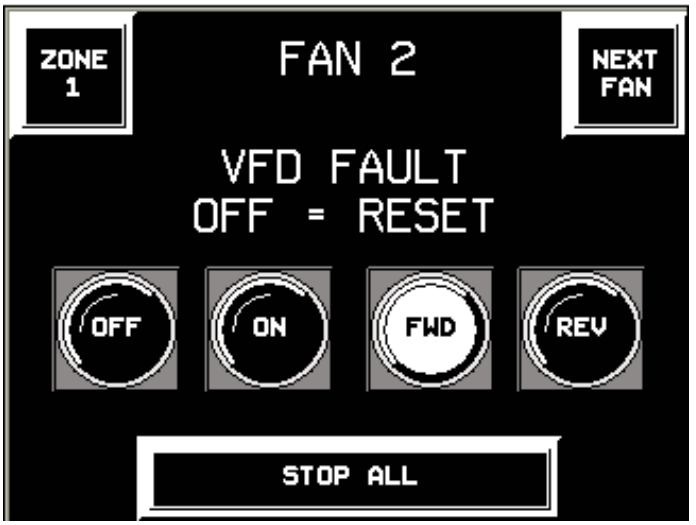
Verify the following:

- Wires on RJ45 plug are not swapped.

  Try swapping them.
- Wire strands or resistors are not shorted across RJ45 plug.
- Network is wired with compatible RS485 cable.
- Network is “Daisy Chain”, no “Ts”, spurs, or star configuration.
- One terminating resistor is installed at each end of the network.
- RS485 POLAR switch on bottom of Fan-Commander is ON.
- Fan network RJ45 plug is in RS485 socket on Fan-Commander, NOT in the Ethernet port (Ethernet models only)

If a fan name is **blinking** on the Zone Control screen, the fan’s VFD is in fault.

A fault will also be indicated on the fan control screen:



Verify that there are no visible causes for the fault (ie obstruction or impact) before resetting a fault.

To send a RESET command to the VFD, press the **OFF** button on the **Fan Control** screen, or any of the **STOP ALL** buttons.

If there is no **COM LOSS** triangle on the **Fan Control** screen, and the VFD will not reset, access the fan’s control box and call Rite Hite customer service.

APPENDIX

ELECTRICAL SPECS FOR OPTIONAL I/O MODULE

General

Network interface module	OTB 1 • ODM9LP
Rated power voltage	24 VDC
Allowable voltage range	20,4 ... 26.4 VDC (including ripple)
Consumed power	Communication module with 7 expansion modules 19 W (26.4 VDC)
Allowable momentary power interruption	10 ms (24 VDC)
Dielectric strength	Between power and ground terminals: 500 VAC, 1 min Between I/O and ground terminals: 500 VAC, 1 min
Insulation resistance	Between power and ground terminals: 10 M Ωminimum (500 VDC) Between I/O and ground terminals: 10 M Ω minimum (500 VDC)
Noise resistance IEC 1131-2	DC power terminals: 1 kV, 50 ns to 1 us I/O terminals (coupling clamp): 1,5 kV, 50 ns to 1 us
Inrush current	50 A maximum (24 VDC)
Ground wiring	1 mm ^{2} (AWG 18), 1.5 mm^2 (AWG 16)
Power supply wiring	0.14 mm ^{2} (AWG 26), 1.5 mm^2 (AWG 16)
Tightening torque of the 24 VDC supply terminals	0.8 Nm (7.08 lb-in)
Tightening torque of the I/O terminals	0.6 Nm (5.31 lb-in)

Input Specifications

Network interface module	OTB 1 • ODM9LP
Input points	12 inputs with common line
Rated input voltage	24 VDC source/sink input signal
Input voltage range	20.4 ... 26.4 VDC
Rated input current	I0, I1, I6, I7: 5 mA/input (24 VDC) I2 to I5, I8 to I11: 7 mA/input (24 VDC)
Input impedance	I0, I1, I6, I7: 5.7 k Ω I2 to I5, I8 to I11: 3.4 k Ω
Switching time at high status (ON Time)	I0 to I7: 35 us + filter value I8 to I11: 40 us + filter value
Switching time at low status (OFF Time)	I0, I1, I6, I7: 45 us + filter value I2 to I5, I8 to I11: 150 us + filter value
Isolation	Between input terminals: not isolated Internal circuit: isolated photocoupler (up to 500 VAC rms)
Filtering: 3 possibilities ● None ● 3 ms ● 12 ms	I0 to I11
Input type	Type 1 (IEC 61131)
External load for I/O interconnection	Not needed
Signal determination method	Static
Effect of improper input connection	The input signals can be both sink and source. But if any input exceeding the rated value is applied, permanent damage may be caused. (In all cases, the wiring is under the responsibility of the user.)
Input cable length	30 m (98.4 ft) for compliance with electromagnetic immunity
Connector insertion/removal durability	100 times minimum

Output Q0 & Q1 Specifications

Network interface module	OTB 1 • ODM9LP
Output type	2 source transistor outputs
Output points per common Line	2
Rated load voltage	24 VDC
Maximum load current	1 A per common line
Operating load voltage range	20,4 ... 28.8 VDC
Voltage drop (on voltage)	1 V maximum (voltage between COM and output terminals when output is on)
Rated load current	0.3 A per output
Inrush current	1 A maximum
Leakage current	0.1 mA maximum
Clamping voltage	39 V +/-1 V
Maximum lamp load	8 W
Inductive load	L/R = 10 ms (28.8 VDC, 1 Hz)
External current draw	100 mA maximum, 24 VDC (power voltage at the -V terminal)
Isolation	Between output terminal and internal circuit: photocoupler isolated (up to 500 VAC rms) Between output terminals: not isolated
Average number of connector insertions/removals	100 times minimum
Output delay - turn on time	300 us maximum
Output delay - turn off time	300 us maximum

Output Q2 to Q7 Specifications

Network interface module	OTB 1 • ODM9LP
Output type	6 relay outputs
Output points per common line - COM0	2 outputs
Output points per common line - COM1	3 NO contacts
Output points per common line - COM2	2 NO contacts
Output points per common line - COM3	1 NO contact
Maximum load current	2 A per output 8 A per common line
Minimum switching load	0.1 mA/0.1 VDC (reference value)
Initial contact resistance	30 m Ω maximum
Mechanical life	20,000,000 operations minimum (rated load 18,000 operations/h)
Dielectric strength	Between output to internal circuit: 1500 VAC rms, 1 min Between the output and terminals (COM): 1500 VAC rms, 1 min
Connector insertion/removal durability	100 times minimum
Closing delay	5 ms max
Opening delay	2 ms max
Closing bounce time	1 ms max

PARTS LIST

Part #	Description
CPHVLSFC	FAN COMMANDER (CONFIGURE PART)
68900008	PROBE TEMPERATURE
68900011	PROBE HUMIDITY
15650299	CABLE MODBUS (1000’ SPOOL)
16650007	PCB,MODBUS RJ-45 ADAPTER

RITE-HITE® WARRANTY

RITE-HITE® WARRANTY

RITE-HITE® warrants that its **FAN-COMMANDER®**, will be free from defects in design, materials and workmanship for a period of three (3) years parts and one (1) year labor from the date of shipment. All claims for breach of this warranty must be made within thirty (30) days after the defect is or can, with reasonable care, be discovered to be entitled to the benefits of this warranty, the products must have been properly installed, maintained, operated within their rated capacities, and not otherwise abused. Periodic lubrication and adjustment is the sole responsibility of the owner. This warranty is RITE-HITE® exclusive warranty. RITE-HITE® EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. Non-standard RITE-HITE® warranties, if any, must be specified by RITE-HITE in writing.

In the event of any defects covered by this warranty, RITE-HITE® will remedy such defects by repairing or replacing any defective equipment or parts, bearing all of the costs for parts, labor, and transportation. This shall be the exclusive remedy for all claims whether based on contract negligence or strict liability. Neither RITE-HITE®, ANY OTHER MANUFACTURER WHOSE PRODUCTS ARE THE SUBJECT OF THIS TRANSACTION, NOR ANY RITE-HITE® REPRESENTATIVE, SHALL IN ANY EVENT BE LIABLE FOR ANY LOSS OR USE OF ANY EQUIPMENT OR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND WHETHER FOR BREACH OF WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. The application of a manufacturer's specifications to a particular job is the responsibility of the purchaser. RITE-HITE® SHALL NOT IN ANY EVENT BE LIABLE FOR ANY LOSS OF THE USE OF ANY EQUIPMENT OR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND.

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