

# MSC-20

## 4 Natural zones with Poly-vent Curtain

Configuration#:20MF23V5

### Inputs/Outputs Table

Inputs	Qty	Outputs	Qty
Inside temperature	4	Variable speed fan	6
		Natural Poly-vent curtains	2
		Winch type curtains	2
		Cooling	1
		Heater	1

### Equipment required:

Item	Description	Qty
MSC-20*	Multistage 20 Computer	1
CM10-2	Control Module 10 Amp	1
CM3-2	Control Module 3 Amp	2
CIM-1	Curtain/Inlet Module	2
VSM-2	Variable Speed Module	3
2004-1k	Temperature Probe	4

\* MSC software 228 and up only.

### Configuration Versions:

Version	Date	Modification
V0	94-06-16	New configuration created to meet the request as detailed in Multifan Fax #118 dated 94-06-14.
V1	94-11-18	Rectifies the fan 1 stopping during minimum ventilation
V2	94-12-21	Fan 2 is tied to Fan #1 and turns at min. speed below DRT
V3	95-08-31	From v1, duplicates the Fans 1 and 2
V4	95-02-23	From v3, min speed of Fan 1 and 2 can be adjusted separately.
V4b	96-07-09	Prevent curtain #2 to inflate under some undesired conditions.
V5	99-09-24	Remove Poly-vent curtain 1&3 and replace them with regular winch type curtains.

# CONTROL LOGIC DESCRIPTION

## CONFIGURATION 20MF23V5

### 1. GENERAL

#### 1.1 Definitions.

In the following MSC-20 control logic description, we used the following terminology:

**DRT** → **Desired Room Temperature**. This is the temperature goal for the room. It is also the reference temperature for all relative set points.

**RSP** → **Relative Set Point**. Number of degrees relative to the DRT where a function is activated

**Differential**: Range of temperature where two conditions are possible. The output depends on whether the temperature was increasing or decreasing when it enters that range. For example, for a differential of 2°F in ventilation, the controller will turn on the fan at the RSP when temperature increases, but it will turn off the fan only at RSP-2°F when the room is cooling down.

**Bandwidth**: Temperature range where a fan speeds up as the temperature increases. It turns at min. speed at the RSP and reaches the max. speed at RSP + Bandwidth.

-Every expression in *italic* is a control value which can be changed on the control.

#### 1.2 Ventilation System Overview

This configuration controls the ventilation of a building having 4 natural zones and where 2 curtains are Poly-vent type and the 2 other curtains are regular winch type curtains.

### 2. LOGIC DESCRIPTION

#### 2.1.Heater

- Works on the average of all of the 4 temperature sensors
- The heater will turn on at its Relative Set Point (RSP) when the temperature decreases.
- Differential = 2 °F : if heater turns on at 70°F, it will shut off at 72°F

#### 2.2. FAN #1, Minimum Ventilation

- 2 outputs with the same function
- Below DRT, the fan#1 runs at minimum speed
- At DRT , the fan speeds up to reach the maximum speed at the end of the Bandwidth.
- Above DRT + BW, the fan runs at maximum speed if the *FANS #1&2 NAT. SHUTOFF = 0 (Off)*; otherwise (*SHUTOFF=1*), this fan shuts off after **all** the curtains have reached their respective *NAT. STG#1 DEFLATE RSP* and it turns back on at the instant that **one** curtain is below *NAT. STG#1 DEFLATE RSP*.
- The controller uses the average of temperature sensors **1 and 2** to determine the room temperature .

#### 2.3 FAN #2, Second stage of min. ventilation

- 2 outputs with the same function
- Below DRT + RSP, the fan #2 is OFF.
- Between RSP and RSP + Band Width (BW), the fan speeds up to reach the maximum speed at the end of the BW.
- Above RSP + BW, the fan runs at maximum speed if the *FANS #1&2 NAT. SHUTOFF = 0 (Off)*; otherwise (*SHUTOFF=1*), this fan shuts off after **all** the curtains have reached their respective *NAT. STG#1 DEFLATE RSP* and it turns back on at the instant that **one** curtain is below *NAT. STG#1 DEFLATE RSP*.
- The controller uses the average of temperature sensors **1 and 2** to determine the room temperature.

#### 2.4 FANS #3, #4 , Circulation ventilation

- Below DRT + RSP, the fan #3(or 4) is OFF.
- Between RSP and RSP + Band Width (BW), the fan speeds up to reach the maximum speed at the end of the BW.
- Above RSP + BW, the fan runs at maximum speed.
- The controller uses the average of temperature sensors **1 and 2** to determine the room temperature.

#### 2.5 Natural Poly-vent Ventilation

- 2 stages
- The **first stage** of natural ventilation begins at the *NAT. STG#1 DEFLATE RSP*. At this point and as the temperature increases, the **lower section** of the poly-vent curtain is deflating by turning off the blower motor.
- The **second stage** of natural ventilation begins at the *NAT. STG#2 DEFLATE RSP*. At this point and as the temperature increases, the **upper section** of the poly-vent curtain is deflating by turning off the blower motor. However, there is a delay for the upper section to deflate after the lower section has deflated.
- The delay is at least 1 minute but maximum 2.
- Differential = 2°F: as the zone is cooling down, the poly-vent starts to inflate at its DRT +RSP - 2°F.
- Each Poly-vent operates independently with its own respective sensor.

#### 2.6 Natural Curtain Ventilation

- The natural curtains will open on a timer when the temperature reaches *NAT. STG#1 DEFLATE RSP* and above.
- The natural curtains will close on a timer as soon as the temperature reach down *NAT. STG#1 DEFLATE RSP - 2°F* (because of the differential).
- The natural curtains will move according to a 5 minute timer which as an adjustable duty cycle (*ZONE 1&3 NAT TIMER (5min) % RUN*).
- Differential = 2°F: as the zone is cooling down, the curtain starts to close at its DRT +RSP - 2°F.
- Each curtain operates independently with its own respective sensor.
- The heater is interlocked with the natural curtains. When the heater turns on, both natural curtains will be forced to close continuously (without a timer).

## 2.7 Cooling

- Works on a 20 minute timer (adjustable Duty Cycle)
- Differential is 2.0°F.
- The controller uses the average of the four temperature sensors to determine the room temperature.

## 3. INSTALLATION NOTES

The guidelines in the **Varifan MSC-20 Installation and User's guide** shall be followed for a safe installation. In addition, that manual provides you with more details on temperature sensor installation and on the power source connection. Also, it is strongly recommended to use a separate thermostat, such as an ECS-1, on the fan #3 for instance, in order to provide an alarm relay and to provide a back up to MSC.

Refer to the **Wiring diagram** and the **Building layout diagram** in attachment for a typical installation.

## ATTACHMENTS

- Control setting Table
- Labels
- Building layout diagram
- Wiring Diagram

# MSC-20 CONTROL SETTINGS

DESCRIPTION	CONTROL VALUES						
	MIN	MAX	PRESET				
1. CURTAIN #1 READ TEMP (°F)	41.5	111.0	*****				
2. CURTAIN #2 READ TEMP (°F)	41.5	111.0	*****				
3. CURTAIN #3 READ TEMP (°F)	41.5	111.0	*****				
4. CURTAIN #4 READ TEMP (°F)	41.5	111.0	*****				
5. DESIRED ROOM TEMP. DRT (°F)	41.5	111.0	70.0				
6. HEAT STAGE ON RSP	-2.0	-15.0	-4.0				
7. FAN #2 STAGE ON RSP	-10.0	30.0	0.0				
8. FAN #1 MIN. SPEED %	12	100	30				
9. FAN #2 MIN. SPEED %	12	100	30				
10. FANS #1&2 BAND WIDTH (°F)	1.0	10.0	2.0				
11.FAN #3 STAGE ON RSP	-10.0	30.0	2.0				
12.FAN #4 STAGE ON RSP	-10.0	30.0	4.0				
13.FANS #3&4 MIN. SPEED %	12	100	30				
14.FANS #3&4 BAND WIDTH (°F)	1.0	10.0	2.0				
15.NAT STG#1 DEFLATE+CURT#1&3 RSP	0.0	30.0	5.0				
16.NAT STG #2 DEFLATE RSP	0.0	30.0	6.0				
17.COOLING STAGE ON RSP	0.0	30.0	15.0				
18.COOLING CYC. (20 MIN.) %	0	100	50				
19.FANS #1&2 NAT. SHUTOFF	0 (OFF)	1(ON)	1(ON)				
20.ZONE 1&3 NAT. TIMER (5min) % RUN	0	100	20				

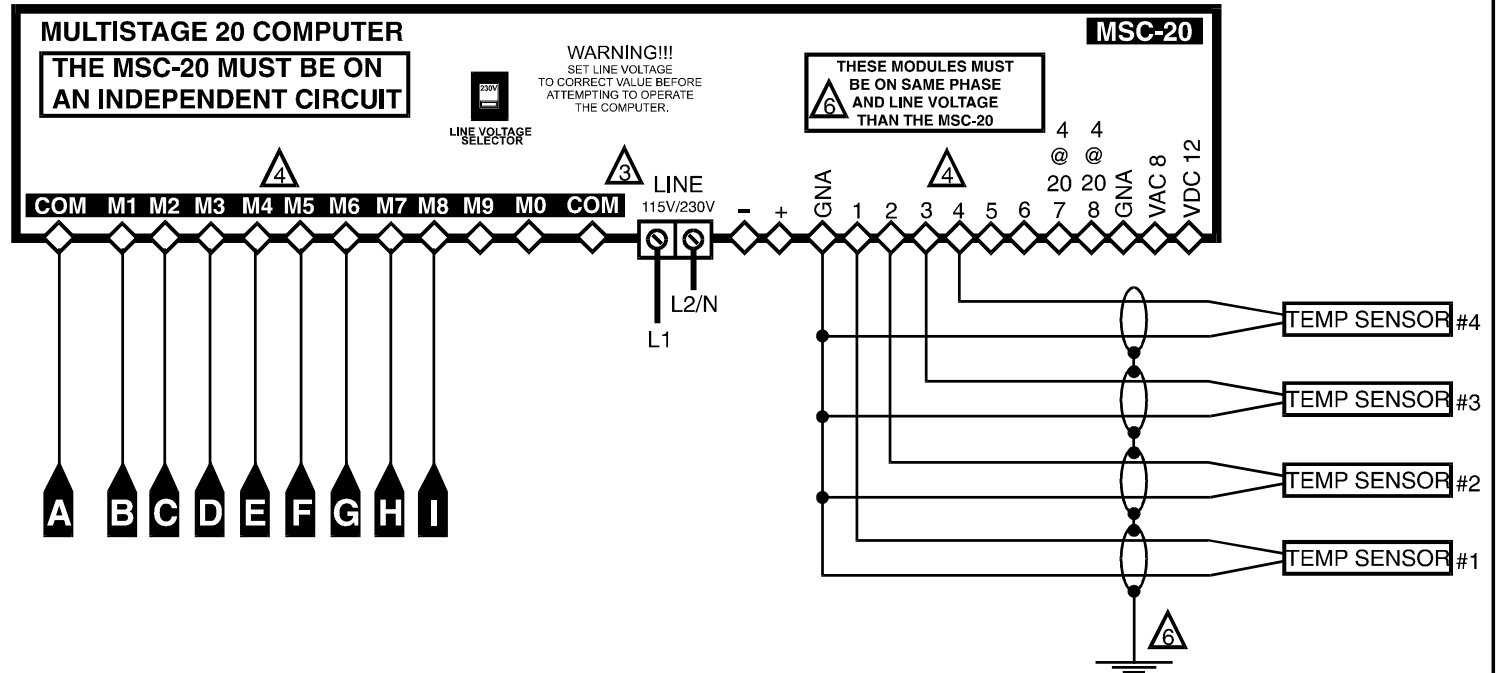
NOTES:-The PRESET values are factory set. This is the initial state of the computer.  
 -Use the blank spaces for your personal values

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|20MF23V5 Configuration|
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|
Input 1 |CURTAIN #1 READ TEMP °F|<23 character wide
2       |CURTAIN #2 READ TEMP °F|
3       |CURTAIN #3 READ TEMP °F|
4       |CURTAIN #4 READ TEMP °F|
5       |DESIRED ROOM TEMP. DRT|
6       |HEAT STAGE ON      RSP|
7       |FAN #2 STAGE ON    RSP|
8       |FAN #1 MIN.SPEED  %|
9       |FAN #2 MIN.SPEED  %|
10      |FANS #1&2 BAND WIDTH °F|
11      |FAN #3 STAGE ON    RSP|
12      |FAN #4 STAGE ON    RSP|
13      |FANS #3&4 MIN.SPEED %|
14      |FANS #3&4 BAND WIDTH °F|
15      |NAT.STG#1 D+CURT1&3 RSP|
16      |NAT.STG#2 DEFLATE RSP|
17      |COOLING STAGE ON   RSP|
18      |COOLING CYC.(20 MIN.) %|
19      |FANS #1&2 NAT. SHUTOFF |
20      |ZONE1&3 NAT TIMER CYC% |
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output 1 |HEAT STAGE ON      |
2       |COOLING STAGE ON   |
3       |CURTAIN #1 OPEN    |
4       |CURTAIN #1 CLOSE   |
5       |CURTAIN#2 LOWER INFLATE|
6       |CURTAIN#2 UPPER INFLATE|
7       |CURTAIN #3 OPEN    |
8       |CURTAIN #3 CLOSE   |
9       |CURTAIN#4 LOWER INFLATE|
10      |CURTAIN#4 UPPER INFLATE|
11      |FAN #1 STAGE ON    |
12      |FAN #2 STAGE ON    |
13      |FAN #1 STAGE ON    |
14      |FAN #2 STAGE ON    |
15      |FAN #3 STAGE ON    |
16      |FAN #4 STAGE ON    |
17      |
18      |
19      |
20      |
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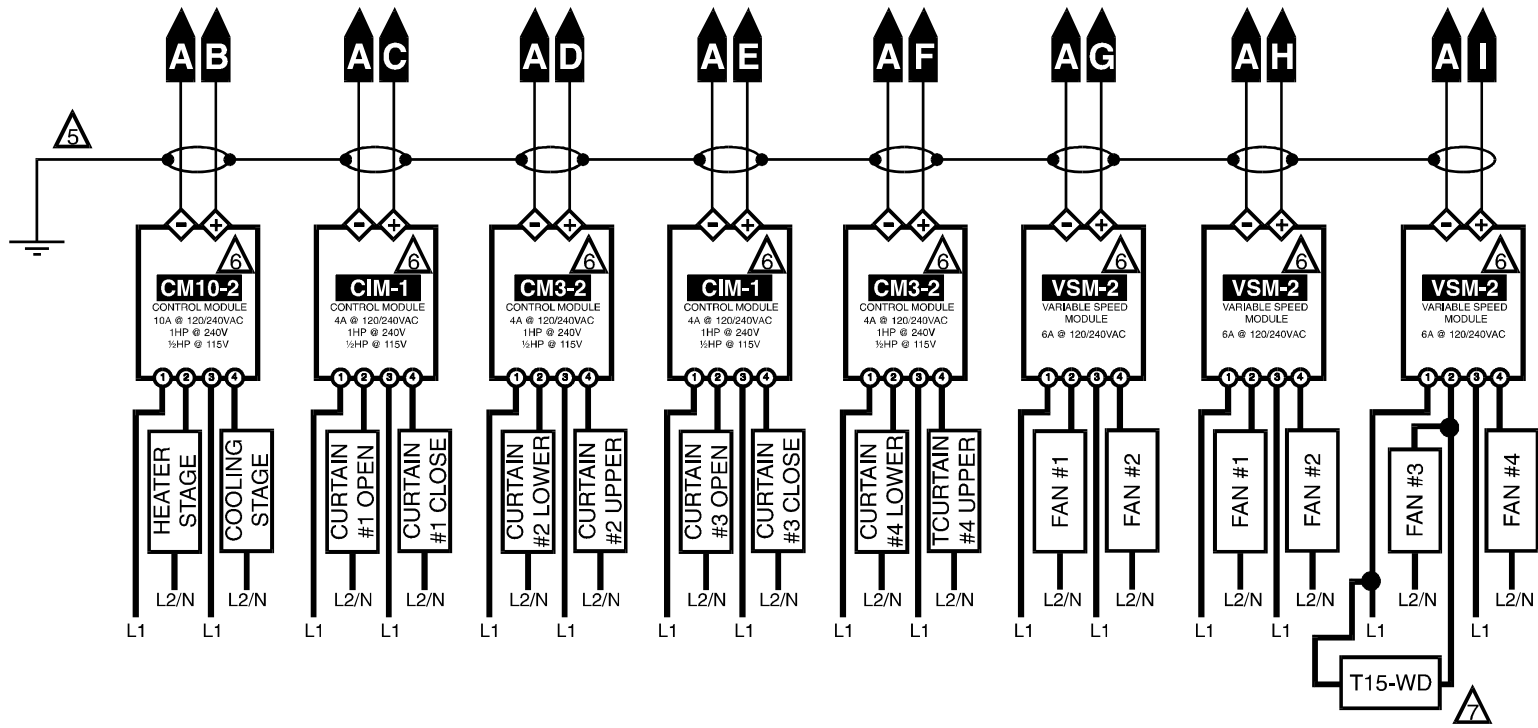
# WIRING DIAGRAM CONFIGURATION 20MF23V5



SEE NOTES ON PAGE 9

<h2 style="margin: 0;">Varifan<sup>®</sup></h2>			
<b>WIRING DIAGRAM</b>			
20/09/99	DRAWN Yanick Alain	FILE /CIN/IC/20MF23V5	
	CONFIGURATION 20MF23V5	WIR	REV 0

## WIRING DIAGRAM FOR MODULES CONFIGURATION 20MF23V5



SEE NOTES ON PAGE 9

<b>Varifan<sup>®</sup></b>			
WIRING DIAGRAM			
20/09/99	DATE	Yanick Alain	FILE
	CONFIGURATION	20MF23V5	WIR
			REV 0











## 20M23V5

# Electrician's notes

## wiring tips and hints

(SEE CONTROL MANUAL FOR DETAIL)

- NOTES: 1-  = LOW VOLTAGE WIRE, #AWG 18 OR 22, SHIELDED (SUPPLIED BY ELECTRICIAN), REFER TO USER'S GUIDE PROBE WIRE MUST BE #AWG 18, AND MUST NOT EXCEED 500ft (150 METRES)
- 2-  = HIGH VOLTAGE WIRE, MUST BE INSTALLED ACCORDING TO LOCAL WIRING CODE
-  - MAXIMUM 2 WIRES OF SAME SIZE PER TERMINAL, NOT BIGGER THAN #AWG 12, NOT SMALLER THAN #AWG 22
-  - 1 WIRE ONLY PER TERMINAL. USE WIRE CONNECTOR IF YOU WANT TO CONNECT MORE THAN 1 WIRE
-  - USE SHIELD FOR SHIELDING PURPOSE ONLY. CONNECT THE SHIELD TO THE CONTROL CIRCUIT COMMON END ONLY NEVER LEAVE THE SHIELD UNCONNECTED AT BOTH ENDS. NEVER CONNECT BOTH ENDS OF THE SHIELD TO COMMON.
-  - THESE MODULES MUST BE ON SAME POWER PHASE AND LINE VOLTAGE THAN THE MSC-20
-  - THE WIRING IS FOR AN ALARM SYSTEM THAT DETECTS AN OPEN CIRCUIT.
-  - REFER TO FIGURE 2.2 IN THE INSTALLATION GUIDE FOR OTHER DETAILS.