MoldMonitor Setup Guide

Products, Inc.
N8779 Hwy X
Watertown, WI 53094, U.S.A.

22-MM-S-24-REV. B-1

MoldMonitor Set-up Guide

Introduction

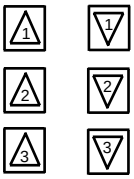
The MoldMonitor Control System consists of the MoldMonitor temperature controller, the mold temperature sensor and the StackValve electric water valve. The temperature sensor signals the temperature of the mold surface to the MoldMonitor. The MoldMonitor interprets and processes the signal and, based on the program of operation, will energize the StackValve allowing chilled water to flow to the zone.

Using the MoldMonitor

Operating Controls and Indicating Instruments

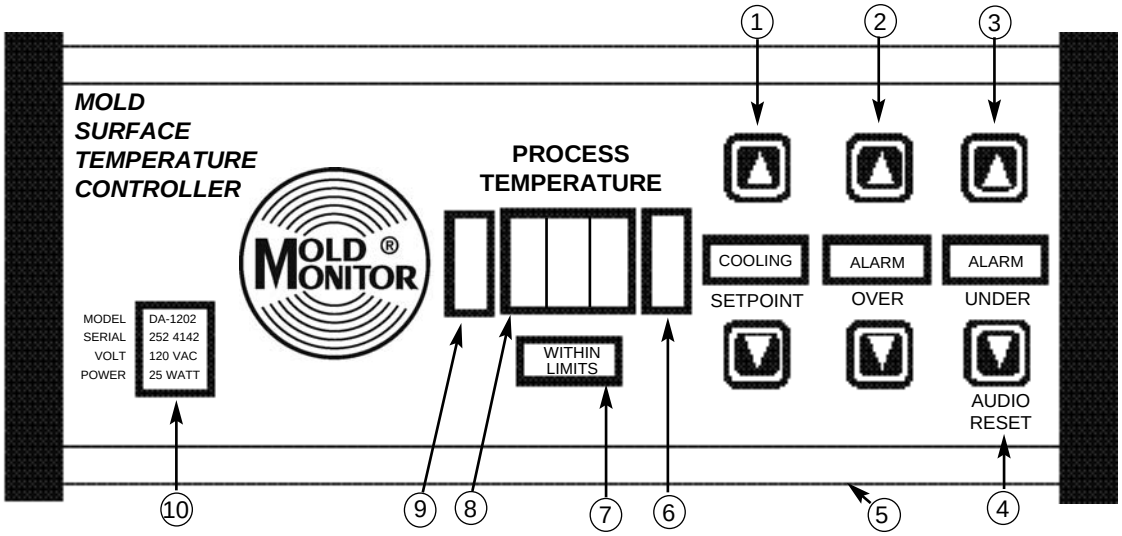
Figure 1 lists the operating controls and the indicating instrumants on the MoldMonitor. Included in *Figure 1* are the front panel nomenclature, device type and function. *Careful study of each operating control and indicating instrument will increase operating efficiency*. The operating controls listed in *Figure 1* are set and used according to plant procedures and parameter set-up procedures. Page 13 & 14, in the appendix, list the different functions of the buttons when in differ-

Operating Controls and Indicating Instruments *Figure 1*

Front Panel Nomenclature	Device Type	Function
A. Operating Controls		
ON OFF	Toggle Switch	Turns MoldMonitor on or off
Calibration Test	Red Pushbutton	Calibrates/tests MoldMonitor. MoldMonitor should display 77°F, (25°C)
	Front Panel Button	Allow operator control of MoldMonitor. Refer to *Figures 3 & 4* for button functions when depressed in different combinations.
B. Indicating Instruments		
COOLING V1	Lamp	Indicates power signal to water valve
ALARM OVER TEMP	Lamp	Indicates mold overtemperature condition
ALARM UNDER TEMP	Lamp	Indicates mold undertemperture condition
WITHIN LIMITS	Lamp	Indicates process temperature within set limits
COOLING V2	Lamp	Indicates V2 Flood Cooling signal to water valve
PROCESS TEMPERATURE	LED Display	Indicates mold process temperature
AUDIBLE ALARM	Alarm Speaker	Sounds to indicate over or under temperature condition or sensor malfunction

Control and Indicating Instrument Location

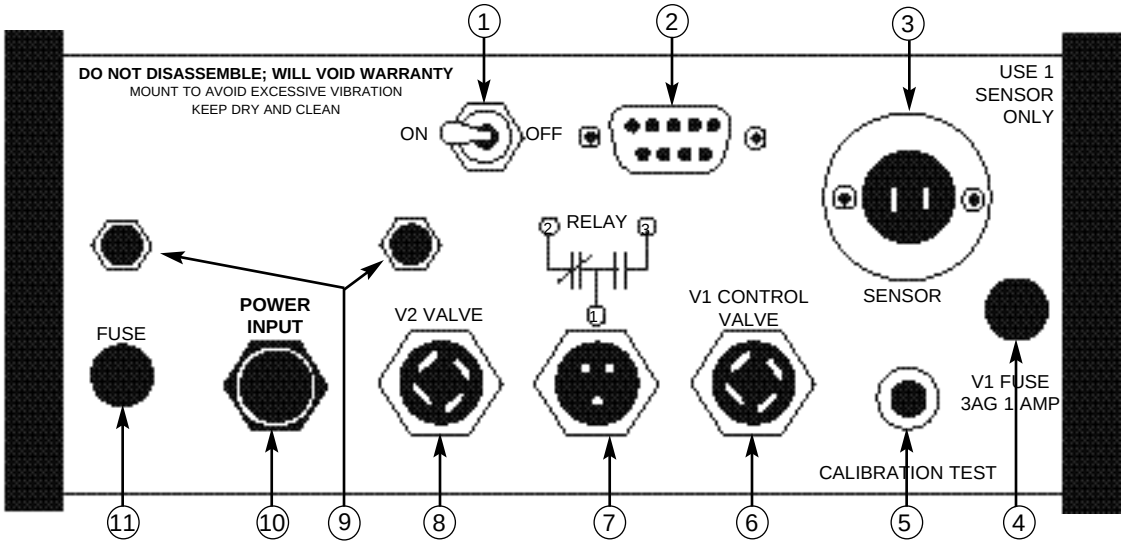
Figure 2



1. Set Point Control Section
2. Over Temp Alarm Control Section
3. Under Temp Alarm Control Section
4. Temporary Audio Reset
5. Removable Instruction Card
6. F/C Temp & Program No. Indication
7. Process Within Set Limits Indicator
8. Digital Mold Temperature Display
9. V2 Cooling Active Indicator; Models DM/DA
10. Unit Information Legend

Accessory Equipment Connection

Figure 3



1. ON/OFF Toggle Switch
2. D9 Communications Port; DA Model Only
3. Mold Sensor Connector
4. V1 Output Fuse, 3AG 1 AMP
5. Calibration Test Button
6. V1 Control Valve Connector
7. Relay Output Connector
8. V2 Valve Connector; DM/DA Models Only
9. MoldMonitor Mounting Studs
10. Line Voltage Input
11. Power Fuse 120V 3AG 1A; 240V 5X20mm 1/2A 250V

MoldMonitor Hook-up

1. Mount MoldMonitor(s) in an easily accessible location.
2. Install sensor(s) in tool (see sensor placement guide).
3. Mount StackValve(s) for easy plumbing to mold.
4. Connect mold sensor(s) to MoldMonitors' sensor connector located on the back of the MoldMonitor(s) ***or*** to the sensor connector located on the StackValve(s).
5. Connect valve connection cable(s) from StackValve(s) to MoldMonitors' V1 CONTROL VALVE output connector.

NOTE:Verify that corresponding sensor and valve connection cable are connected to the correct MoldMonitor and StackValve.

6. Connect valve connection cable(s) from corresponding V2 Flood Cooling StackValve (if applicable, Models DM/DA ONLY) to MoldMonitors' V2 VALVE output connector.
7. Connect RELAY output if desired.
8. Connect D9 connector communications if applicable (Model DA ONLY).
9. Connect power to unit; see unit legend on front panel for operating voltage specification.
10. Turn unit ON and verify that connection cables and sensors are connected to the cor responding MoldMonitor and StackValve for each zone.

MoldMonitor Start-Up

Follow the instructions shown on *Figure 4* when starting the MoldMonitor.

NOTE: The ON/OFF switch is on the rear of the MoldMonitor control unit.

Set the mold temperature setpoint and the upper and lower limit alarms according to the mold process set-up sheet or guidelines. Ensure that the audio alarm is set (see *Figure 4*).

Testing the MoldMonitor Alarms

Make sure Audio Alarm is Enabled (see *Figure 4*).

Testing OVER Temp Alarm

Run Set point Temp DOWN below OVER Temp Alarm window; OVER Temp light should flash and 10 sec. later the audio alarm will sound.

Testing UNDER Temp Alarm

Run Set Point Temp UP above UNDER Temp Alarm window; UNDER Temp light should flash and 10 sec. later the audio alarm will sound.

Testing Sensor Alarms

Disconnect sensor from MoldMonitor; MoldMonitor display will read "EEE 4" and an audible alarm will sound immediately indicating OPEN Sensor condition.

With sensor disconnected from MoldMonitor, short sensor connector terminals together; MoldMonitor display will read "EEE 5" and an audible alarm will sound immediately indi cating SHORTED Sensor condition.

Start Up

Figure 4

MoldMonitor Start Up Routine:	After a 7 second test routine, the sensor temperature will be displayed
Start Up Set Point Temperature:	Push to read temperature ▲1 or ▽1
To Rest:	Push all 4 corner buttons at the same time. ▽1 ▽3 ▲1 ▲3
Reset Temperatures:	Setpoint 100°F (38°C)
	Over Temperature 110°F (38°C) *Note: Will reset to program #1*
	Under Temperature 90°F (33°C)
Change Set Point:	Push and hold (5 sec.) To increase ▲1 To decrease ▽1
Over Temp Alarm Setpoint:	Push and hold (5 sec.) To increase ▲2 To decrease ▽2
Under Temp Alarm Setpoint:	Push and hold (5 sec.) To increase ▲3 To decrease ▽3
Over Temp Alarm:	Light will turn on when over temperature setpoint is exceeded. Audio will sound after 10 seconds. May be reset at anytime.
Under Temp Alarm:	Light will turn on when temperature falls below under temperature set point. Audio will sound after 10 seconds. May be reset at anytime.
Automatic Alarm Activation:	Temperature must reach set point - This will "arm" the under temp. alarm.
Audio Alarm Disable:	Push ▽2 and ▽3 - Both alarm lights will flash every 4 seconds.
Activate Audio Alarm:	Push ▲2 and ▲3 - Both alarm lights will flash upon activation.

Program #1 ▲1 ▽1 alternately.

For Low Temperature Mold Applications; "ON" "OFF" Cooling.
To Activate: Push **BOTH GREEN** buttons. Yellow display will show F/1, (C/1)

Program #2 ▲2 ▽2

For Specialty Mold Applications Only. Sensor must see an increase in mold temperature by at least 1°F and then a minimum 1°F decrease in mold temper ature for each ***injection cycle*** for program #2 to function properly. MoldMonitor will then sync onto the molding cycle and provide a cooling pulse as the melt is injected into the tool.
Do NOT use with hot runner tools.
To Activate: push **BOTH RED** buttons. Display will show F/2, (C/2).

Program #3 ▲3 ▽3

For Slow Cycles; 15 seconds or longer.
To Activate: push **BOTH BLUE** buttons. Display will show F/3, (C/3).
For Weak Signal Input.
If sensor is farther than.1", (2.5mm) from the molding surface.
For Magnetic Sensor.
Place as close as possible to molding surface.

Program #4 ▲1 ▲2

For Pulse Advance Cooling.
Use with external wet probe.*To Activate:* push **GREEN UP & RED UP** buttons.
Display will show F/4, (C/4).

MoldMonitor Program Selection

Program #1

Program #1 was designed to accommodate low temperature mold applications with high cooling requirements. It would best be described as an “ON/OFF” controller.

Operation Explanation: When the mold temperature rises above the Set Point temperature the MoldMonitor will turn the valve “ON” until the temperature falls below the Set point temperature, at which time it will turn the valve “OFF”.

Program #2

Program #2 was designed to accommodate special high temperature mold applications or applications requiring very low cooling quantities. Program #2 should be use cautiously as specific process param eters must be maintained for proper operation. The sensor must see an increase in the mold tempera ture by at least 1°F and then a minimum of 1°F decrease in mold temperature for each *injection cycle* for program #2 to function properly. MoldMonitor will then sync onto the molding cycle and provide a cooling pulse as the melt is injected into the tool. Program #2 *should not be used with hot runner tools* as the hot runner heat may trigger unnecessary cooling pulses.

Operation Explanation: When the melt is injected into the tool, the MoldMonitor studies the heat input and calculates the correct cooling pulse to counter the heat input. Upon the next shot it will deliver the calculated cooling pulse.

Program #3

Program #3 was designed to accommodate slow molding cycles or applications which generate weak signal inputs. A slow cycle can be categorized as a cycle longer than 15 seconds. A weak signal input be categorized as a signal from a sensor which is farther than .100” (2.5 mm) from the molding sur face or from a magnetic sensor. Program #3 compensates for the lag time involved in these molding cycles. It studies the heat input and updates the calculated cooling pulse every 10 seconds, thus fol lowing and compensating for the changing conditions.

Operation Explanation: Program #3 looks at the mold temperature every 10 seconds and increases the cool ing pulse if the temperature is above the set point or it will decrease the cooling pulse if temperature is below set point.

Program #4

Program #4 “Pulse Advance” was designed to accommodate tools unable to have sensors installed in the steel. It is used with external wet probes which provides a 1/10 of a second cooling pulse which allows the warmed-up coolant to flow pass the sensor, thus turning on the valve as long as the cooling temperature is above the set point.

Operation Explanation: The sensor is installed in the outgoing water line for the zone. Every 10 seconds pro gram #4 delivers a 1/10 of a second cooling pulse which advances warmed-up water to the external sensor. When the water temperature is above the set point the valve is turned on until it falls below the set point.

Production Runs Using MoldMonitor

Once set, the MoldMonitor will automatically adjust to compensate for changes in water temperature, water pressure and ambient temperature. This automatic self adjustment minimizes human interaction, production interruptions and assures consistant part quality. If there is a dramatic change in production parameter, MoldMonitor will alert personnel by its various alarm indicators. Quality control data can be obtained by utilizing the communications option found on the DA Model or through use of the relay output found on all versions. Additional process data may be obtained through the use of a three channel chart recorder.

•After MoldMonitor has been initially started up, verify that all cooling zones are functioning properly.

•Set initial mold temperature set point using predetermined set-up value or material manufactures specifications and adjust as necessary.

•Preheat or eject part sooner than normal to bring mold up to quality molding temperature.

•Adjust setpoint temperature ad cure time for optimum part quality and cycle time.

•Observe molding cycle and lower over temperature alarm to minimum desired.

•Observe molding cycle and raise under temperature alarm to maximum desired.

•Step back and let MoldMonitor do the work!

Relay Output

The MoldMonitor Relay Output can be used to perform a variety of tasks from quality control or machine shut down. MoldMonitor's Relay Output can be configured through a jumper setting to meet specific control requirements. Three setting choices are available by removing the left end cap and moving the jumper into the desired output position. The MoldMonitor comes shipped from the factory in the WITHIN LIMITS relay output mode.

Relay energized when process is in the OVER TEMP condition

Relay energized when process is in the WITHIN LIMITS condition

Relay energized when process is in the UNDER TEMP condition

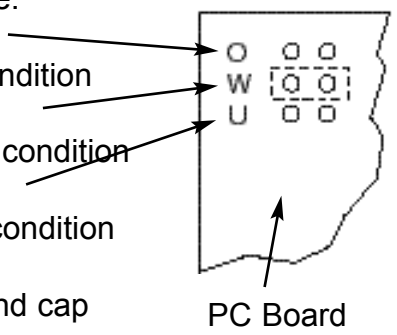


Figure 5

Note: To change relay output mode; remove lift end cap

Figure 6

WITHIN LIMITS Usage
QUALITY CONTROL
Jumper with the W Position

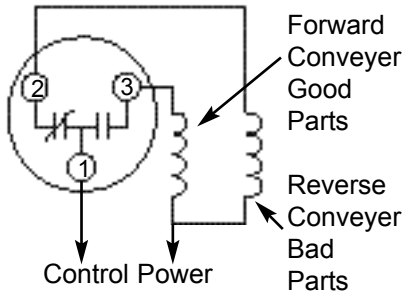
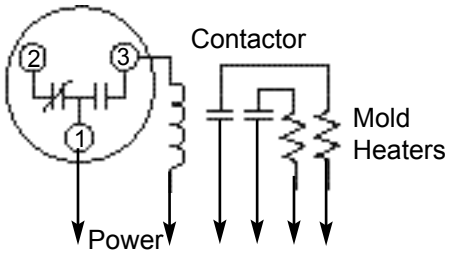


Figure 7

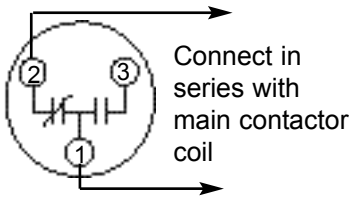
UNDER TEMP Usage
MOLD PREHEATING
Jumper with the U Position



Note: 3 Amp. Max Draw

Figure 8

OVER TEMP Usage
MACHINE SHUTDOWN
Jumper with the O Position



MoldMonitor Shutdown

Turn MoldMonitor power switch to OFF position, setpoint values and alarm limit values are automatically stored in nonvolatile memory and will reappear upon power up.

MoldMonitor Troubleshooting

If the alarm sounds for overtemperature:

CAUTION

Do not turn up the setpoint just to silence the alarm. The alarm sounds to indicate a cooling problem. Increase the cooling time or shut down the job until the cooling problem can be determined. Turning up the setpoint to silence the alarm may result in defective finished parts.

- If the water is turned on, check to see if there is enough flow through the tool.
- Check water valve for proper operation and flow.
- Check to see if the cooling water is the correct temperature.
- If the actions above do not work, slow the cycle time of the tool down to allow more cure time for adequate cooling.

Undertemperature Alarms

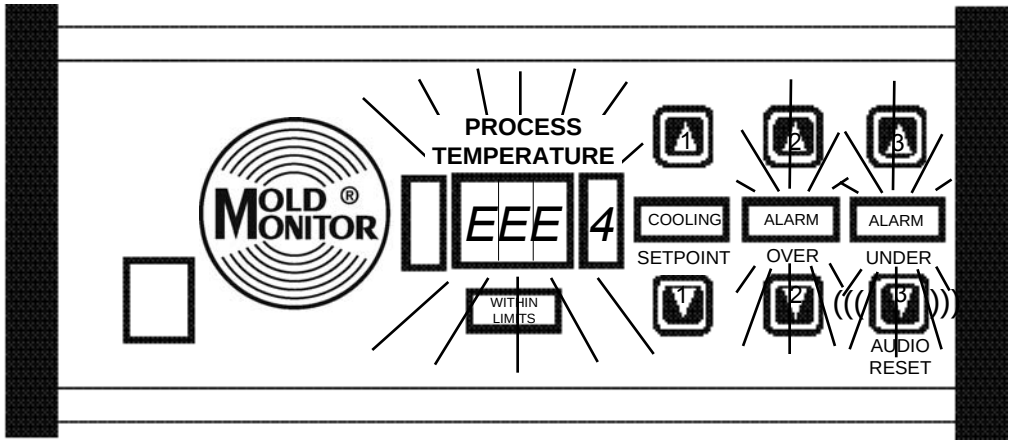
If the alarm sounds for undertemperature:

CAUTION

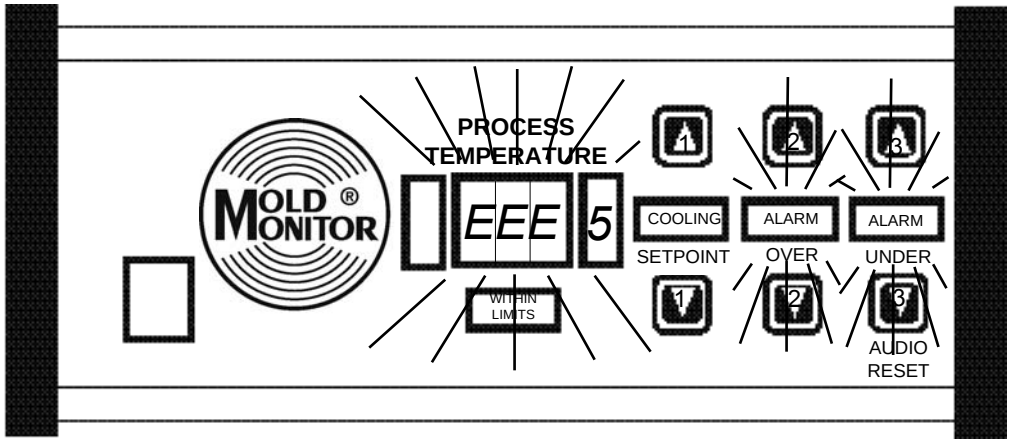
Do not turn down the setpoint just to silence the alarm. The alarm sounds to indicate a cooling problem. Decrease the cooling time or shut the job down until the cooling problem can be determined. Turning down the setpoint to silence the alarm may result in defective finished parts.

- If the cycle has been interrupted; nozzle froze off, runner stuck in mold, one cavity froze off, etc. These conditions could indicate a drop in Btu input thus resulting in the activation of the alarm.
- Chiller water getting cold enough to trigger alarm setpoint (wet probe).
- If overcooling every few cycles check program mode of operation and change if necessary.

Probe Alarms

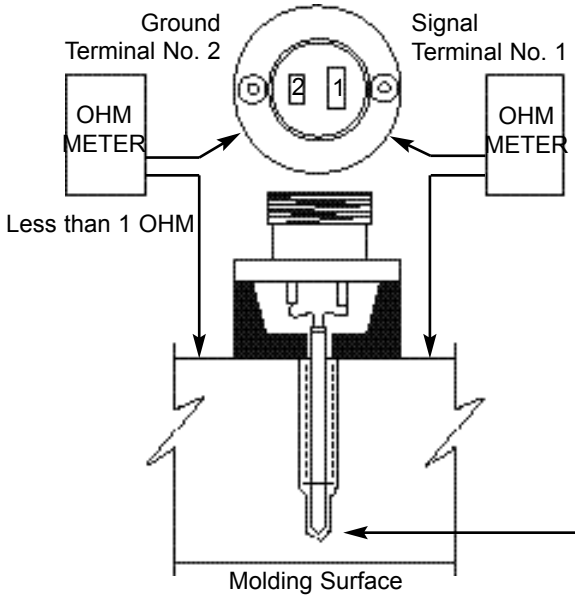


EEE 5; Sensor Shorted or input higher than 400°F (200°C). *Figure 10*



Sensor Test

Figure 11



All MoldMonitor sensors may be tested with an OHM meter. Check resistance across terminals from terminal No. 1 to ground.

Temperature Degrees F	Sensor Resistance	Temperature Degrees C
50°F	39,798 OHM	10°C
59°F	31,422 OHM	15°C
68°F	24,984 OHM	20°C
77°F	20,000 OHM	25°C
86°F	16,113 OHM	30°C
95°F	13,062 OHM	35°C
104°F	10,652 OHM	40°C
113°F	8,736 OHM	45°C
112°F	7,204 OHM	50°C

Sensor must be seated on bottom of hole. For best performance, use heat transfer compound on tip.

Water Valve Test

Correct operation of the water valve is essential for proper operation of the MoldMonitor system. Therefore, follow these steps to assure that the value is operating correctly or find the “Valve Troubleshooting” section in the appendix.

- •Check V1 output fuse (see *Figure 3* item #4).
- •Check to see if Valve LEDs are illuminated (if applicable).
- •Check Valve connection cable for proper operation and double check that it is hoked up to the correct MoldMonitor output.
- •Make sure that the flow is turned on to the valve and the return is open
- •Check for flow through the valve ahead of the tool.
- •Check for blockage or deadheaded cooling loops in the tool
- •Disassemble valve and clean

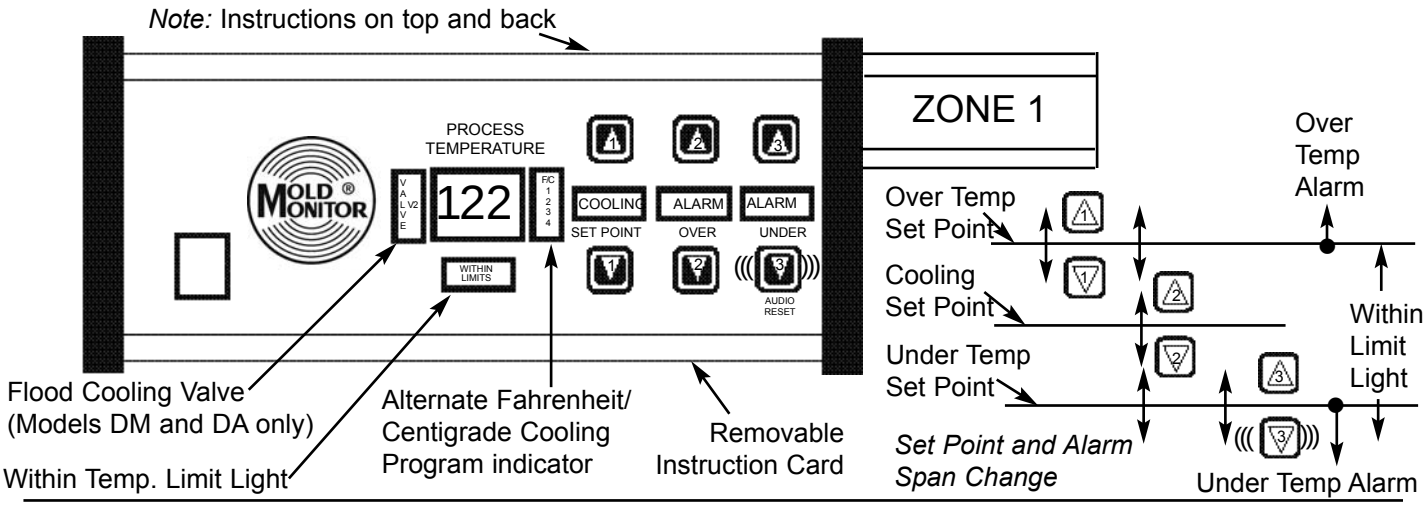
MoldMonitor Quick Check

The MoldMonitor is a highly reliable electronic device which should require little or no routine maintenance. However, there are a few items which can be checked.

- •Check power fuse (see *Figure 3* item #11)
- •Depress calibration button (see Figure 3 item #5) display should read 77^{o}F (25^{o}C) + - 1^{o}.
- •Check V1 output fuse (see *Figure 3* item #4).

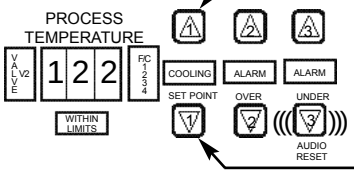
Appendix

MoldMonitor Keyboard Function - Models DD, DM and DA



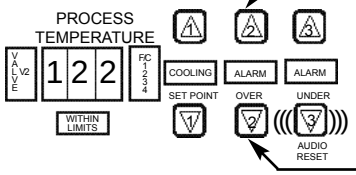
Temperature Set Point Selection

Cooling Temp. Set



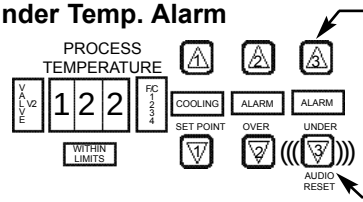
Push top (or bottom) to read Set Point Temp. Hold for 5 sec. to change alarm Set Point

Over Temp. Alarm



Push top (or bottom) to read Over Temp. Hold for 5 sec. to change alarm Set Point

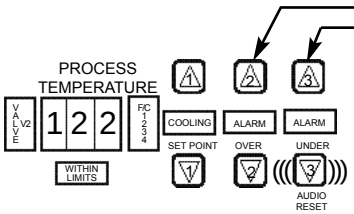
Under Temp. Alarm



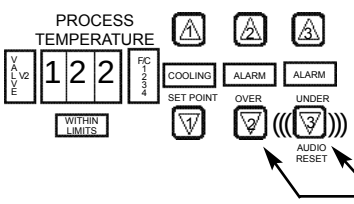
Push top (or bottom) to read Under Temp. Hold for 5 sec. to change alarm Set Point

Note: Alarm span will remain when cooling set point is changed

Audio Alarm



Push Both to Enable

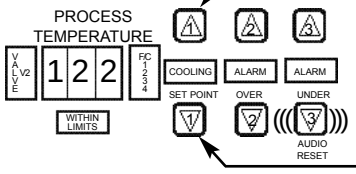


Push Both to Disable

Note: Over and Under Temp. light will blink every 4 sec. Indicating that audio is disabled

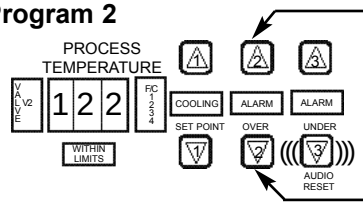
Cooling Program Selection

Program 1



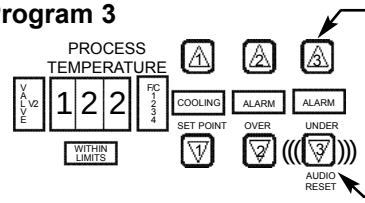
Push Both

Program 2



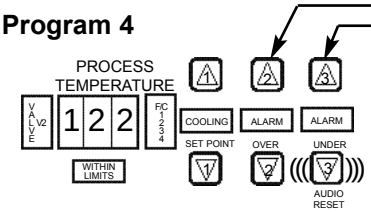
Push Both

Program 3



Push Both

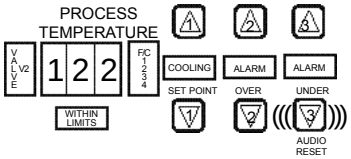
Program 4



Push Both

Note: Light will blink during cooling pulse advance

Audio Reset (Temporary)

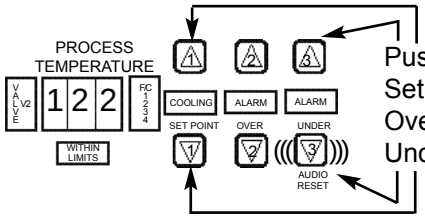


Push momentarily

Note: Audio will automatically re-arm when temperature reaches set point

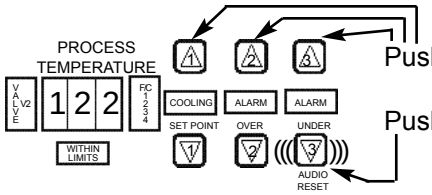
MoldMonitor Keyboard Functions Continued - Models DD, DM and DA

Memory Reset



Push corner (4) buttons simultaneously
Set Point 100°F
Over Temp. 110°F
Under Temp. 90°F

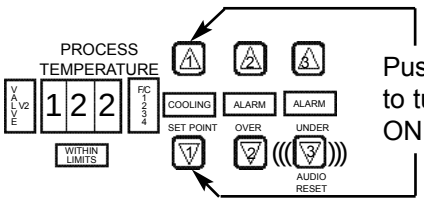
BCD Code Read Out



Push top row and hold

Push momentarily

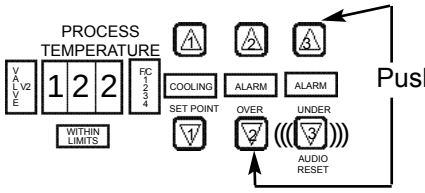
Valve ON/OFF



Push top (or bottom) to turn switch valve ON and OFF

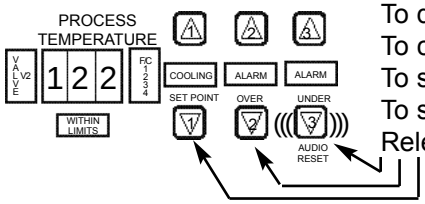
MoldMonitor Keyboard Functions - Model DA ONLY

F/C Switch



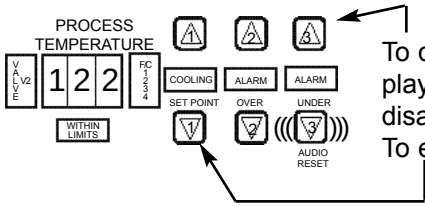
Push both

Address



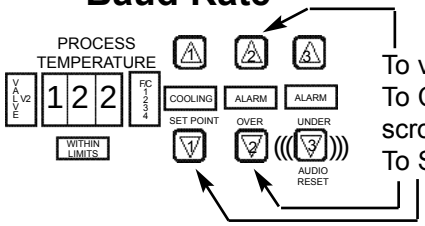
To display set address: Push all 3 buttons
To change address: Hold all 3 buttons for 3 sec.
To scroll up: Release buttons 1 and 3 (keep pressure on 2)
To scroll down: Release buttons 1 and 2 (keep pressure on 3)
Release all 3 buttons when desired address is displayed

Keyboard Disable



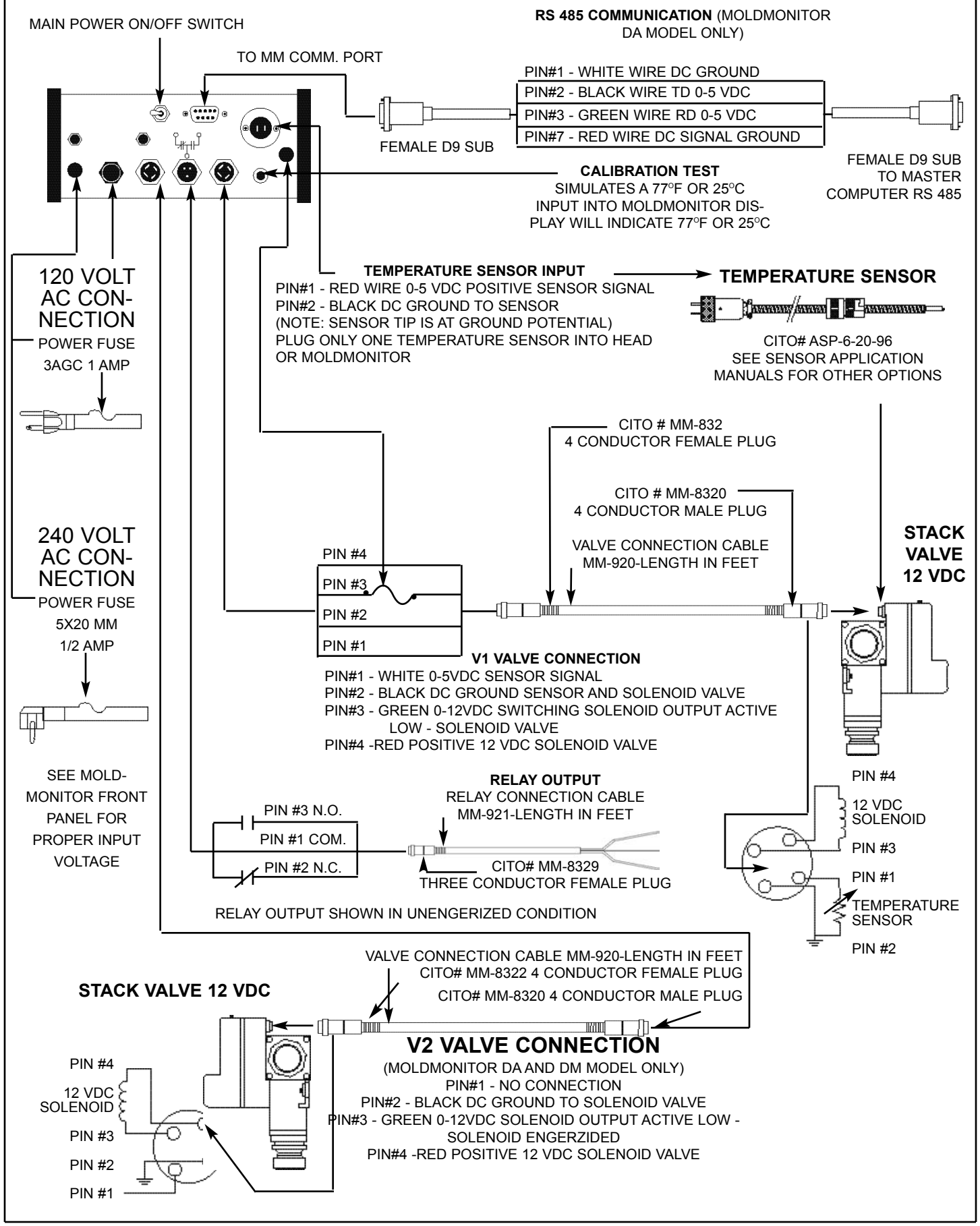
To disable: Push both buttons momentarily (display will flash 000 0 momentarily to indicate disabled condition).
To enable: Repeat

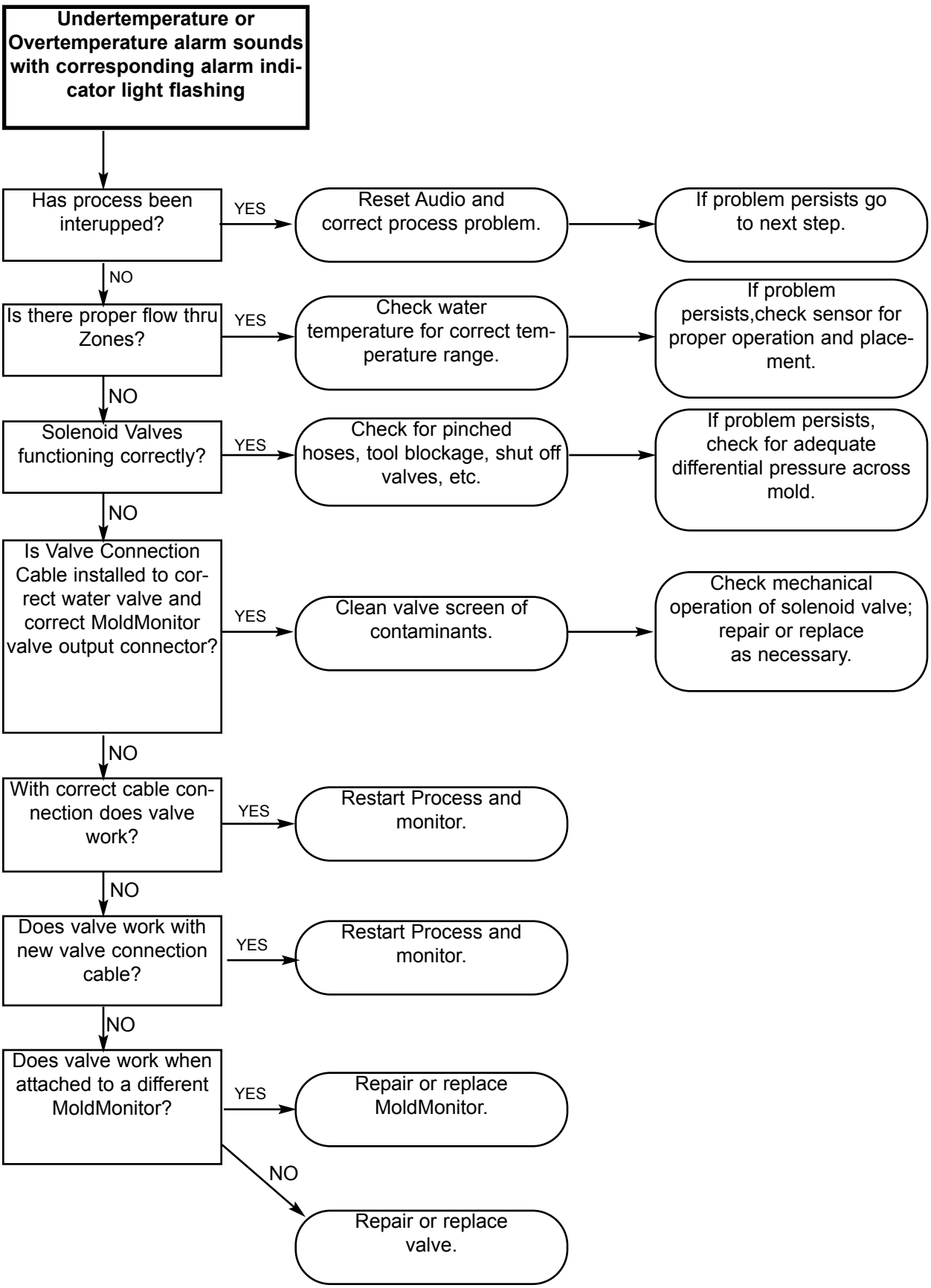
Baud Rate

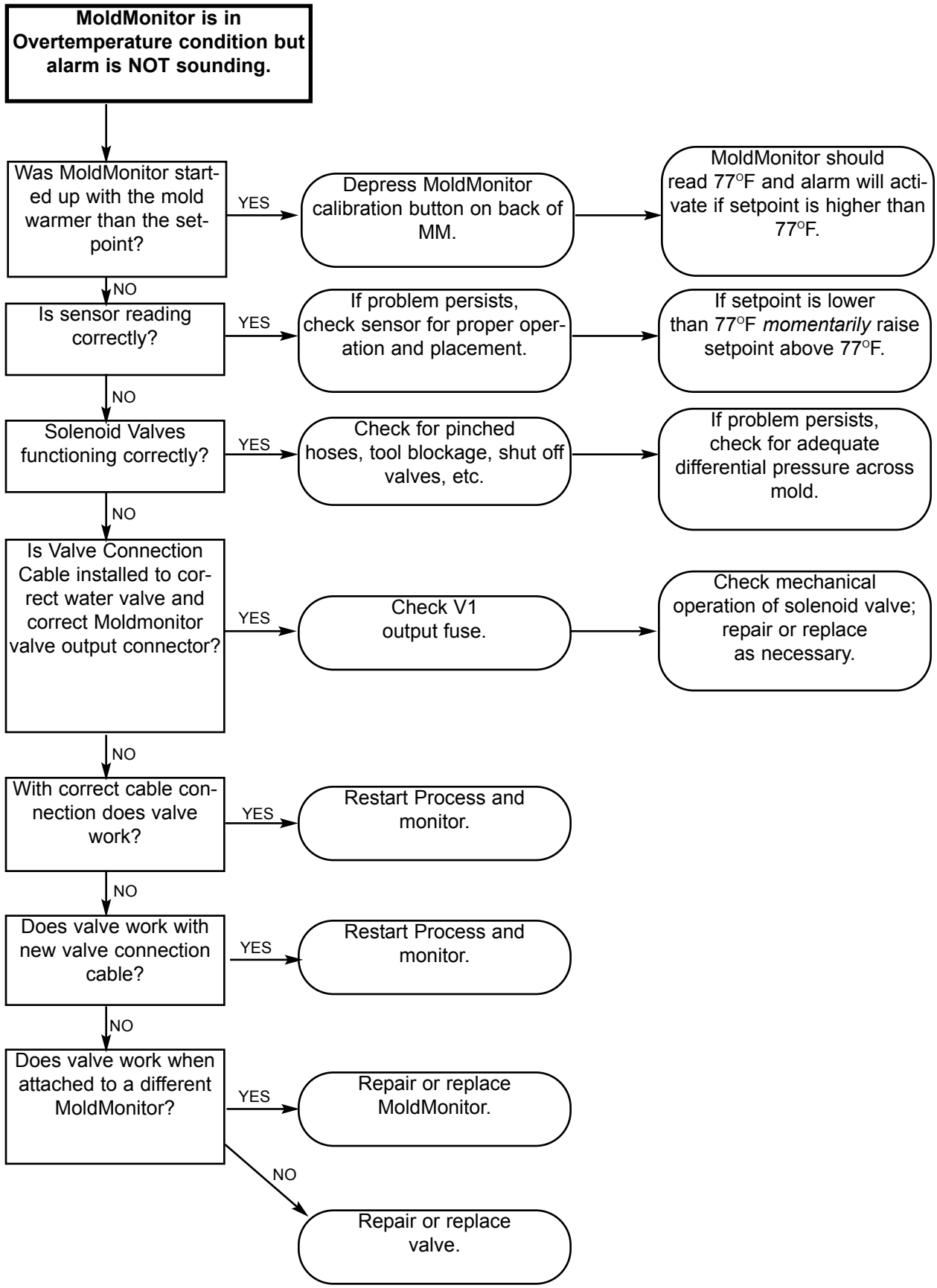


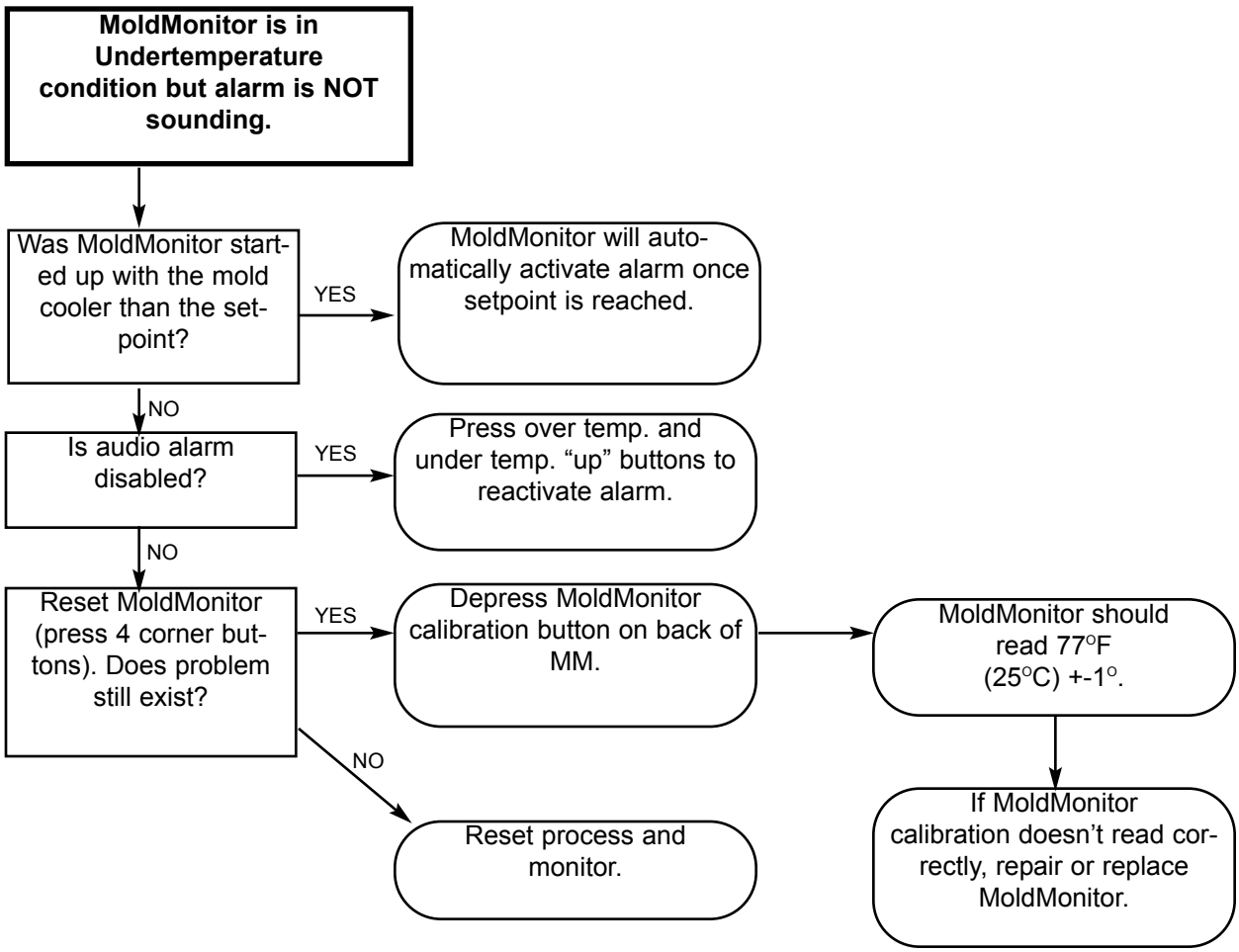
To view Baud Rate: Push momentarily
To Change: Hold all 3 buttons for 3 sec. (The MoldMonitor will scroll Baud Rate 1/sec.)
To Set Baud Rate: Release button when desired rate is displayed

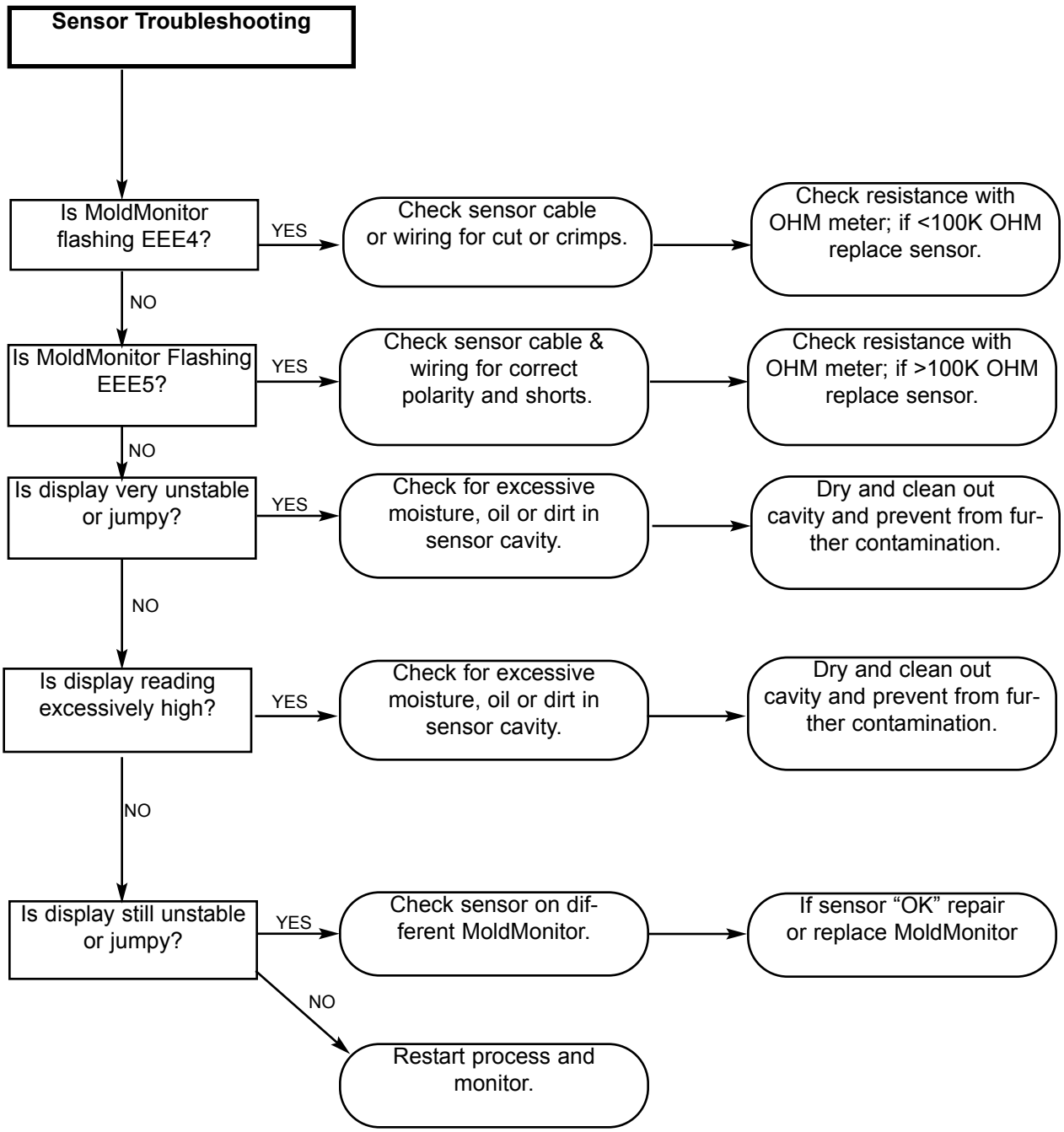
MoldMonitor Equipment Connections

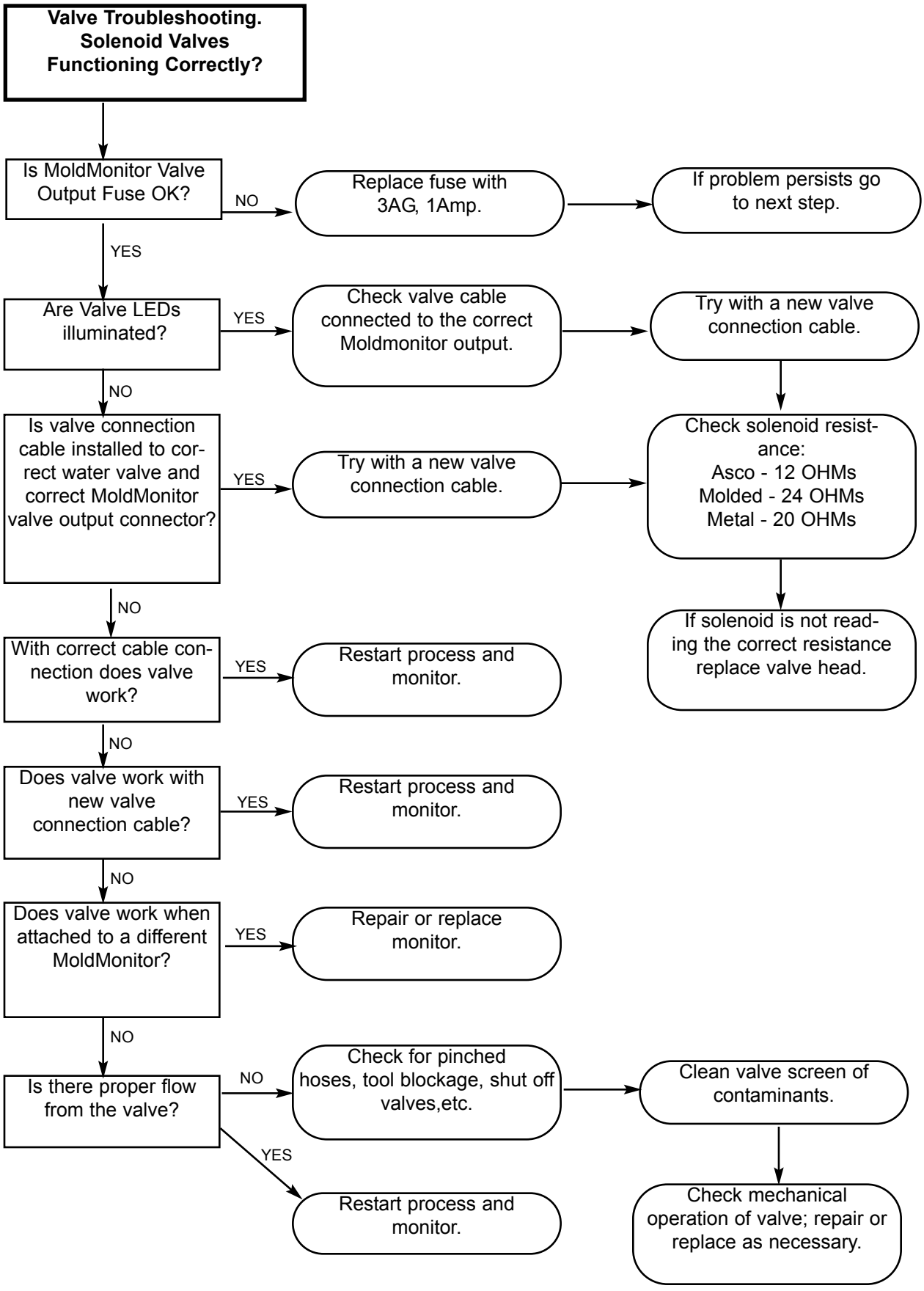



Undertemperature or Overtemperature alarm sounds with corresponding alarm indicator light flashing
Has process been interupped?
YES
Reset Audio and correct process problem.
If problem persists go to next step.
NO
Is there proper flow thru Zones?
YES
Check water temperature for correct temperature range.
If problem persists,check sensor for proper operation and placement.
NO
Solenoid Valves functioning correctly?
YES
Check for pinched hoses, tool blockage, shut off valves, etc.
If problem persists, check for adequate differential pressure across mold.
NO
Is Valve Connection Cable installed to correct water valve and correct MoldMonitor valve output connector?
YES
Clean valve screen of contaminants.
Check mechanical operation of solenoid valve; repair or replace as necessary.
NO
With correct cable connection does valve work?
YES
Restart Process and monitor.
NO
Does valve work with new valve connection cable?
YES
Restart Process and monitor.
NO
Does valve work when attached to a different MoldMonitor?
YES
Repair or replace MoldMonitor.
NO
Repair or replace valve.


MoldMonitor is in Overtemperature condition but alarm is NOT sounding.
Was MoldMonitor started up with the mold warmer than the setpoint?
YES
Depress MoldMonitor calibration button on back of MM.
MoldMonitor should read 77°F and alarm will activate if setpoint is higher than 77°F.
NO
Is sensor reading correctly?
YES
If problem persists, check sensor for proper operation and placement.
If setpoint is lower than 77°F momentarily raise setpoint above 77°F.
NO
Solenoid Valves functioning correctly?
YES
Check for pinched hoses, tool blockage, shut off valves, etc.
If problem persists, check for adequate differential pressure across mold.
NO
Is Valve Connection Cable installed to correct water valve and correct Moldmonitor valve output connector?
YES
Check V1 output fuse.
Check mechanical operation of solenoid valve; repair or replace as necessary.
NO
With correct cable connection does valve work?
YES
Restart Process and monitor.
NO
Does valve work with new valve connection cable?
YES
Restart Process and monitor.
NO
Does valve work when attached to a different MoldMonitor?
YES
Repair or replace MoldMonitor.
NO
Repair or replace valve.


MoldMonitor is in Undertemperature condition but alarm is NOT sounding.
Was MoldMonitor started up with the mold cooler than the set-point?
YES
MoldMonitor will automatically activate alarm once setpoint is reached.
NO
Is audio alarm disabled?
YES
Press over temp. and under temp. “up” buttons to reactivate alarm.
NO
Reset MoldMonitor (press 4 corner buttons). Does problem still exist?
YES
Depress MoldMonitor calibration button on back of MM.
MoldMonitor should read 77°F (25°C) +-1°.
If MoldMonitor calibration doesn’t read correctly, repair or replace MoldMonitor.
NO
Reset process and monitor.


Sensor Troubleshooting
Is MoldMonitor flashing EEE4?
YES
Check sensor cable or wiring for cut or crimps.
Check resistance with OHM meter; if <100K OHM replace sensor.
NO
Is MoldMonitor Flashing EEE5?
YES
Check sensor cable & wiring for correct polarity and shorts.
Check resistance with OHM meter; if >100K OHM replace sensor.
NO
Is display very unstable or jumpy?
YES
Check for excessive moisture, oil or dirt in sensor cavity.
Dry and clean out cavity and prevent from further contamination.
NO
Is display reading excessively high?
YES
Check for excessive moisture, oil or dirt in sensor cavity.
Dry and clean out cavity and prevent from further contamination.
NO
Is display still unstable or jumpy?
YES
Check sensor on different MoldMonitor.
If sensor “OK” repair or replace MoldMonitor
NO
Restart process and monitor.


Valve Troubleshooting.
Solenoid Valves
Functioning Correctly?
Is MoldMonitor Valve Output Fuse OK?
NO
Replace fuse with 3AG, 1Amp.
If problem persists go to next step.
YES
Are Valve LEDs illuminated?
YES
Check valve cable connected to the correct Moldmonitor output.
Try with a new valve connection cable.
NO
Is valve connection cable installed to correct water valve and correct MoldMonitor valve output connector?
YES
Try with a new valve connection cable.
Check solenoid resistance:
Asco - 12 OHMs
Molded - 24 OHMs
Metal - 20 OHMs
NO
With correct cable connection does valve work?
YES
Restart process and monitor.
If solenoid is not reading the correct resistance replace valve head.
NO
Does valve work with new valve connection cable?
YES
Restart process and monitor.
NO
Does valve work when attached to a different MoldMonitor?
YES
Repair or replace monitor.
NO
Is there proper flow from the valve?
NO
Check for pinched hoses, tool blockage, shut off valves,etc.
Clean valve screen of contaminants.
YES
Restart process and monitor.
Check mechanical operation of valve; repair or replace as necessary.

STACKVALVE X SECTION (SV-1200-D)