

# MULTI-PROBE ALARM SYSTEM OPERATING INSTRUCTIONS



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This warranty will be void if repairs or alterations are made or attempted without factory authorization; or if the item has been subject to misuse, negligence or accident.

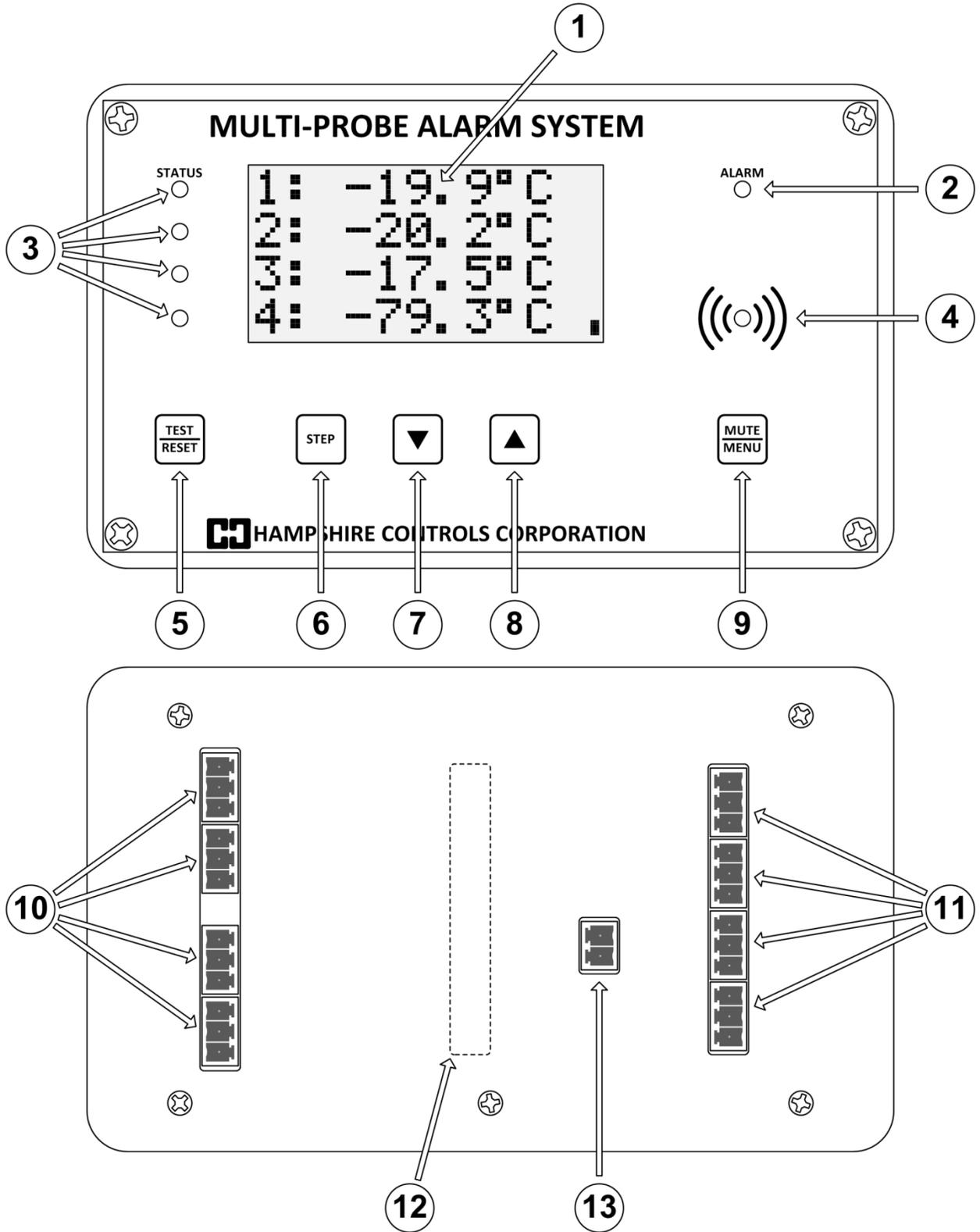
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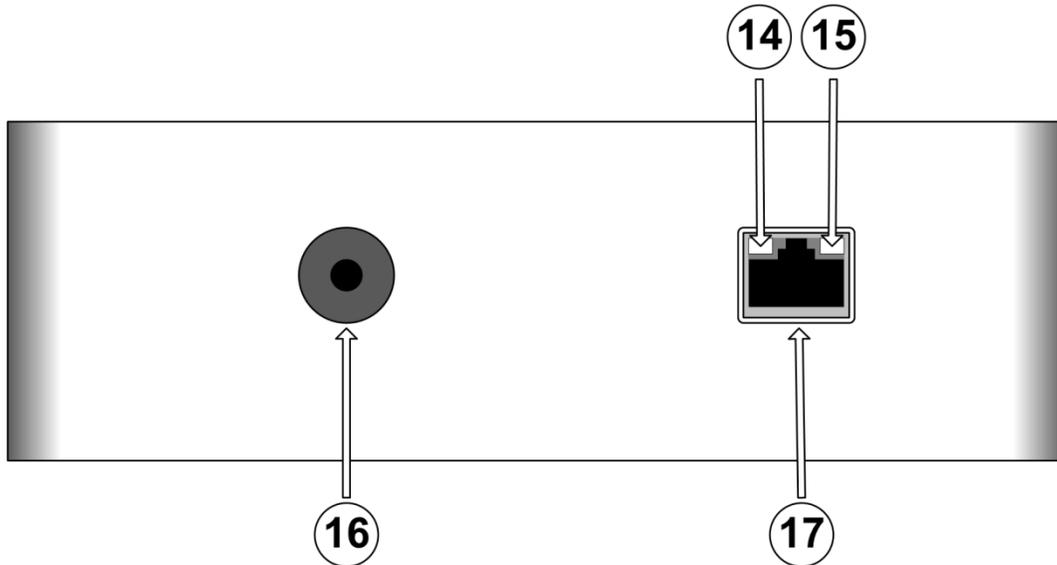
Hampshire Controls Corporation makes no other warranty, whether expressed or implied, in connection with the sale or use of its products.

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### Multi-Probe Alarm System Components





The Multi-Probe Alarm System consists of the following:

**FRONT**

1. Backlit 128x64 pixel graphic LCD
2. High-brightness alarm status LED
3. Three-color (green/amber/red) channel status LEDs
4. Audible alarm indicator, 3600Hz piezo beeper
5. TEST/RESET button
6. STEP button
7. Decrement button (and alarm limit display)
8. Increment button (and min/max display)
9. MUTE/MENU button

**BACK**

10. Four 3-pin pluggable terminal blocks (probe channels 1 to 4)
11. Four 3-pin pluggable terminal blocks
  - a. Probe channels 5 to 8 (MPS-8)
  - b. NO/NC (Form-C) relay connections (MPS-2/3/4 with more than one relay)
12. Four 3-pin pluggable terminal blocks (MPS-2/3/4 with voltage or current output)
13. One 2-pin pluggable terminal block
  - a. Switch input (MPS-2/3/4 with more than one relay)
  - b. Selectable NO or NC relay contact (MPS-2/3/4/8 with single relay)

**NOTE:** This is currently a factory selectable option! You must specify NO/NC when ordering.

**BOTTOM**

14. Amber network activity LED (flashes when transmitting/receiving data)
15. Green network link LED (solid green when network connection is established)
16. Power cord entry (grommet)
17. RJ-45 10/100 base-T Ethernet connector

## Sensor Probe

The probes supplied with your system may vary depending on custom options. Commonly used probes are:

- Pt100 (100 ohm platinum) RTD
- Type-T thermocouple
- Type-K thermocouple
- HX-71 relative humidity transmitter (voltage output)
- Heated cryogenic Pt100 RTD (for LN2 level sensing)
- Switch (mechanical or magnetic reed)

The most common probe option is the Pt100 RTD, a highly accurate resistive temperature device. The sensor element is enclosed in a 4 inch long and 3/16 inch diameter stainless steel sheath. The standard lead length is 10 feet of FEP jacketed 3-conductor wire. Custom lead lengths may be specified when ordering. The probe sheath may be placed in water or other mild aqueous solutions from -100°C to 100°C.

The probes will be pre-wired to terminal-block plugs which mate with the pluggable terminal-block sockets on the back of the MPS. Each connection will be marked with identifying information about the probe or relay connection and any other pertinent electrical information.

Please take care when making connections, as the terminal-block sockets are all physically identical but may be VERY different electrically. For instance, with an MPS-2HT (humidity and temperature) the MPS supplies 15VDC to the humidity transmitter. If you were to plug the Pt100 RTD probe into the socket for the humidity transmitter you may permanently damage the RTD element or the MPS electronics due to Electrical Over-Stress (EOS).

**NOTE:** Avoid submerging the probe in solvents or harsh chemicals. Use protective thermowells when monitoring such materials.

**NOTE:** The warranty does NOT cover damage to probes or electronics that is caused by exceeding temperature limitations, or damage to probes caused by using them in solvents or other unsuitable environments.

**NOTE:** If the displayed temperature shows a consistent high (> 100°C) or low (< -100°C) value, most likely, the probe has failed. The unit should be returned for probe replacement and recalibration.

## Probe Installation

The probe may be used in air, water, or simulated product (usu. glycol or glass beads).

If installing the sensor in a cabinet or enclosure (particularly freezers), make sure to use good techniques to prevent room moisture from getting into the cabinet. Whenever possible, install the probe through an existing access port provided by the cabinet manufacturer, then reseal the port. Alternatively, the probe can be run under, over, or through the door-sealing gasket. Often a door gasket will have a joint at one or more corners. Open that joint slightly by carefully making a slit with a razor blade. Insert the probe wire and then reseal the joint with flexible silicone sealing compound. Inside the cabinet, run the probe wire so that it will not become snagged during loading, unloading or cleaning procedures.

## Probe Location

Install the sensor probe in a location where it will respond to the average temperature of the space being monitored and not to local conditions caused by door openings, ventilation fans, etc.

The object of the probe location is to provide some safety for the area being monitored without generating “false” or nuisance alarms. For example, locating the sensor probe on the bottom of a chest freezer will result in the alarm being sounded later than if it was located near the top.

However, locating the sensor too close to the top of the chest freezer could result in the alarm being sounded due to routine lid opening. Choose a probe location that offers the safety desired for the enclosure contents.

## Power

### Power-up

During power-up, the MPS will show a “splash” screen with the firmware revision.

If the splash screen flashes continuously, or the display shows `NO BATTERY` the internal lithium-polymer (LiPo) battery may be disconnected or require replacement.

When a battery is properly installed, a status icon will show in the bottom right corner of the display (see Current Readings).



BATTERY ICON	STATUS
Up Arrow	Charging
Solid block	Fully charged
Flashing block or block with blank lines	Battery problem



### Power-down

The MPS contains a lithium polymer (LiPo) battery connected through an auto-latching disconnect circuit. During shipping, this circuit prevents the battery from supplying power to the MPS. When you plug in the MPS power supply for the first the time, the circuit will activate, preventing the device from turning off when power is disconnected.

In order to completely power-down the MPS you must follow this procedure:

- Press-and-hold the TEST/RESET button until the MPS is in the reset state (backlight and all LEDs are off)
- With the TEST/RESET button held, unplug the power supply
- Continue to hold the TEST/RESET button for 5 seconds
- Release the TEST/RESET button

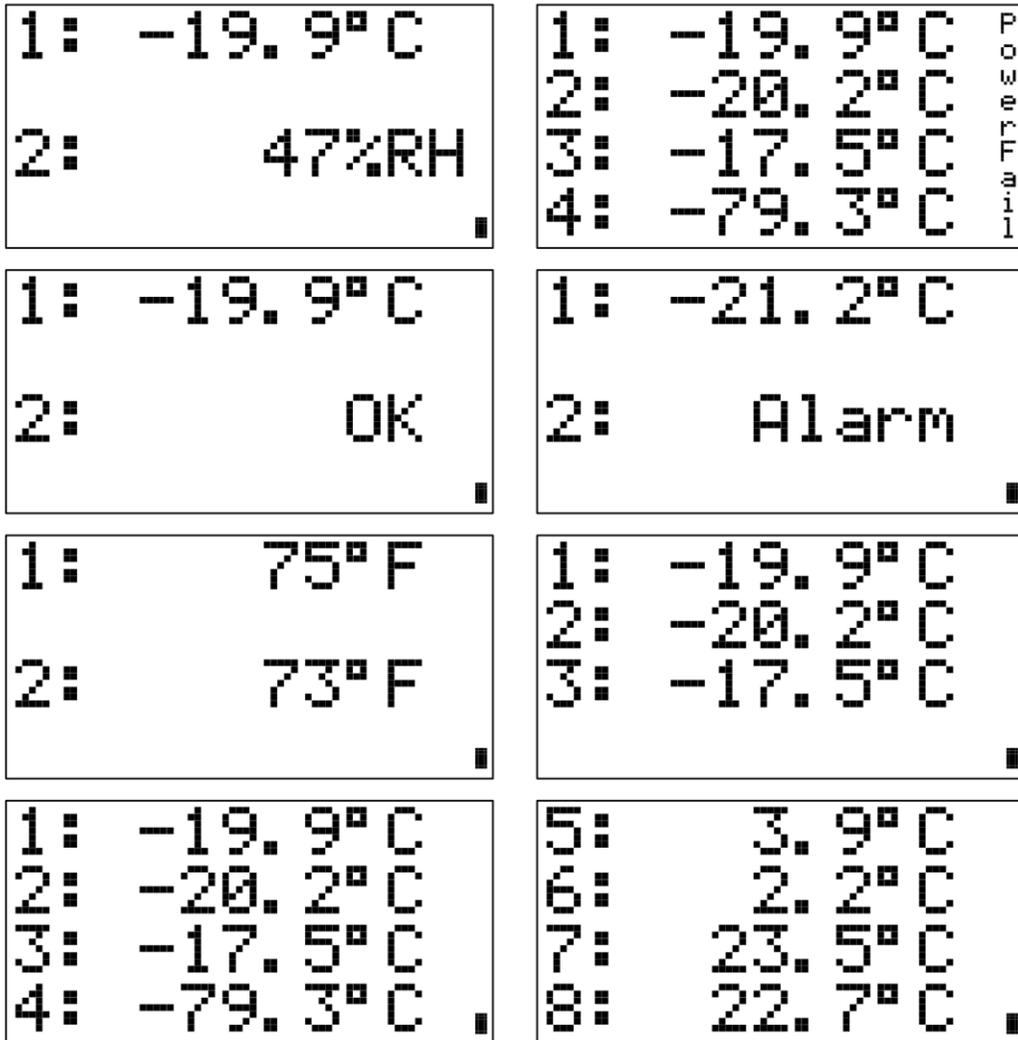
If the MPS turns back on (in a PowerFail state) you will need to repeat the procedure by first plugging in the power supply. Then, be sure to **HOLD DOWN the TEST/RESET button during the entire procedure**. You may also increase the time you keep the button held down after unplugging the power supply. This allows any capacitors in the power supply to completely drain their charge. If they are not fully drained there may be enough power remaining to enable the battery latch circuit when you release the TEST/RESET button.

## Sensor Readings Display

### Current Readings

During normal operation the display will show the current sensor readings of 2, 3 or 4 probes. On an MPS with 5 or more probes, the display will automatically alternate between displaying probes 1-4 and 5-8 (force the display to change by tapping the STEP button).

Example sensor reading displays are shown below.



## Alarm Limits and Min/Max Readings

To view the low and high alarm limits tap the DOWN ARROW. To view the minimum and maximum readings (since last power-up or reset) tap the UP ARROW.

1	AlarmLow	-40.0°C
	AlarmHigh	-10.0°C
2	AlarmLow	-40.0°C
	AlarmHigh	-10.0°C
3	AlarmLow	-40.0°C
	AlarmHigh	-10.0°C
4	AlarmLow	-90.0°C
	AlarmHigh	-65.0°C

1	ActualMin	-27.3°C
	ActualMax	-15.7°C
2	ActualMin	-25.4°C
	ActualMax	-12.8°C
3	ActualMin	-22.6°C
	ActualMax	-5.7°C
4	ActualMin	-82.9°C
	ActualMax	-75.2°C

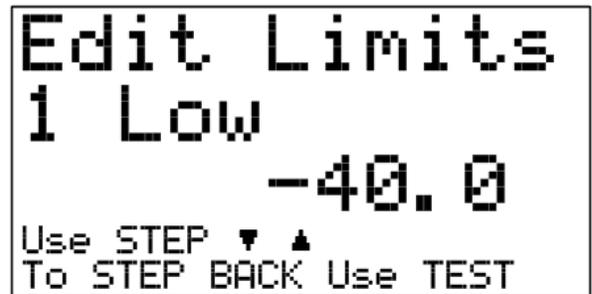
To manually reset the Min/Max readings, while the Min/Max readings are shown on the display, tap the TEST/RESET button. You will be asked to repeat TEST/RESET to confirm.

## System Configuration

### Setting Alarm Limits

To configure the system's alarm parameters press the MUTE/MENU button while the display is showing the probe readings. The display will show the first parameter 1 Low.

Use the STEP button to go to the next parameter, or the TEST/RESET button to go to the previous parameter.



To change the currently displayed parameter, use the UP and DOWN arrow buttons. The value is given in the units configured for the probe being edited (i.e. °F, °C, %RH).

While in the Edit Limits menu, the STEP button will advance through Low and High limits for each probe.

Continue to the Edit Times menu by pressing the MUTE/MENU button once, or return to the sensor readings by pressing the MUTE/MENU button twice.

## Setting Alarm Delays

To configure alarm delays and other system timings, press the MUTE/MENU button twice while the system is showing the probe readings, or once if you are already in the Edit Limits menu.

Use the STEP button to go to the next parameter, or the TEST/RESET button to go to the previous parameter.



To change the currently displayed parameter, use the UP and DOWN arrow buttons. All delays are given in minutes.

While in the Edit Times menu, the STEP button will advance through an AlarmDelay for each enabled probe, then a RelayDelay and finally a Mute time.

Return to the probe readings by pressing the MUTE/MENU button once.

## Door Switch Alarm (Optional)

A single dry-contact switch input is available as an option on certain Multi-Probe Alarm Systems. Additionally, some units have the capability to have their probe inputs configured as switch inputs. Either of these options must be specified during ordering, it is not available on all units, and is not user configurable.

Typically the door switch input is used in conjunction with a magnetic reed switch mounted to a refrigerator or freezer door. If the door is left open for longer than the Edit Times parameter DoorAlarmDly, an alarm condition is generated. The switch input can be used with either normally open (NO) or normally closed (NC) contacts.

The user should set the Setup parameter DoorAlarm to activate this feature. To view the current status of the Door Input, tap the STEP button.

For units that have multiple probe inputs configured as dry-contact switch inputs, the normal probe configuration parameters are used to configure the alarms and delays.

## Configuration Parameter Descriptions

### Edit Limits Menu

1 Low, 2 Low, ..., 8 Low

Low alarm limit for probes 1 to 8. The maximum number shown will depend on the system configuration and the value defined by the # Channels parameter. The low limit parameter is defined in the same units as shown in the sensor readings for each probe.

1 High, 2 High, ..., 8 High

High alarm limit for probes 1 to 8. The maximum number shown will depend on the system configuration and the value defined by the # Channels parameter. The high limit parameter is defined in the same units as shown in the sensor readings for each probe.

### Edit Times Menu

1 AlarmDelay, 2 AlarmDelay, ..., 8 AlarmDelay

Alarm delay (in minutes) for probes 1 to 8. The maximum number shown will depend on the system configuration and the value defined by the # Channels parameter. This value defines the delay between the time the probe reading exceeds the alarm limits and the time the alarm is activated. The range is 0 to 30, with a default of 0.

DoorAlmDelay

For units equipped with a single dry-contact input, this parameter specifies the alarm delay (in minutes) for that function. The range is 0 to 30, with a default of 10. This parameter will not show up unless the DoorAlarm parameter is enabled.

RelayDelay or 1 RelayDelay, 2 RelayDelay, ..., 4 RelayDelay

Relay delay (in minutes) for a single relay or relays 1 to 4. The maximum number shown will depend on the system configuration and the values defined by the # Channels and Relay Def parameters. This value defines the delay between the time the alarm is activated and the time the relay changes state. Therefore, the time from the probe reading exceeding the limits to the time the relay changes state is equal to the sum of the AlarmDelay and the RelayDelay for each probe. The range is 0 to 120, with a default of 0.

Mute

This parameter configures the alarm mute time (in minutes). When the MUTE/MENU button is pressed during an alarm condition, the beeper will be silenced (periodic chirp only) until either the alarm condition goes away, or the mute time elapses. The range is 0 to 120, with a default of 15.

## Edit\*SETUP\* Menu

### 1 Offset, 2 Offset, ..., 8 Offset

Offset calibration value for probes 1 to 8. The maximum number shown will depend on the system configuration and the value defined by the # Channels parameter. This value defines an offset that is added to the sensor reading prior to display of the reading.

### # Channels [FACTORY CONFIGURED]

This parameter configures the number of probes actually present on the device. Probes must be populated in order, starting from channel 1. If a probe is missing from an active channel, that channel will be in a persistent alarm state. The range is 1 to 4 (or 1 to 8), with a default defined by the model ordered (MPS-2, MPS-3, MPS-4, or MPS-8).

### 1 Define, 2 Define, ..., 8 Define [FACTORY CONFIGURED]

Channel definition for probes 1 to 8. The maximum number shown will depend on the system configuration and the value defined by the # Channels parameter. This value defines the units and/or type of probe that is present on the specified channel.

- 0 = Tenth degree Celsius ( 0. 0° C )
- 1 = Whole degree Celsius ( 0° C )
- 2 = Tenth degree Fahrenheit ( 0. 0° F )
- 3 = Whole degree Fahrenheit ( 0° F )
- 4 = Percent relative humidity ( %RH )

### Relay Def

This parameter configures the relay operation.

- 0 = Single relay (default)
- 1 = One relay per channel (up to 4)

### DoorAlarm

This parameter configures the optional dry-contact input (aka. door switch input).

- 1 = Normally open (NO) contacts, or “alarm on closed circuit”
- 0 = Disabled (default)
- 1 = Normally closed (NC) contacts, or “alarm on open circuit”

### Unit ID

**NOTE:** This parameter is for the future use described below, but is not currently implemented.

This is a numeric value that can be used as a unique identifier if you have more than one MPS on site. The range is 1 to 999, with a default of 1.

### IP1, IP2, IP3, and IP4

The IP parameters define the four octets of the static IP address for the MPS. The default values are 192, 168, 0, and 141 respectively.

## NetworkCode

This numeric value is used as the password for the “setupadmin” account, when logging into the configuration web page (<http://192.168.0.141/setup.html>).

The range is  $-30000$  to  $30000$ , with a default of  $-22718$  (please note the minus sign).

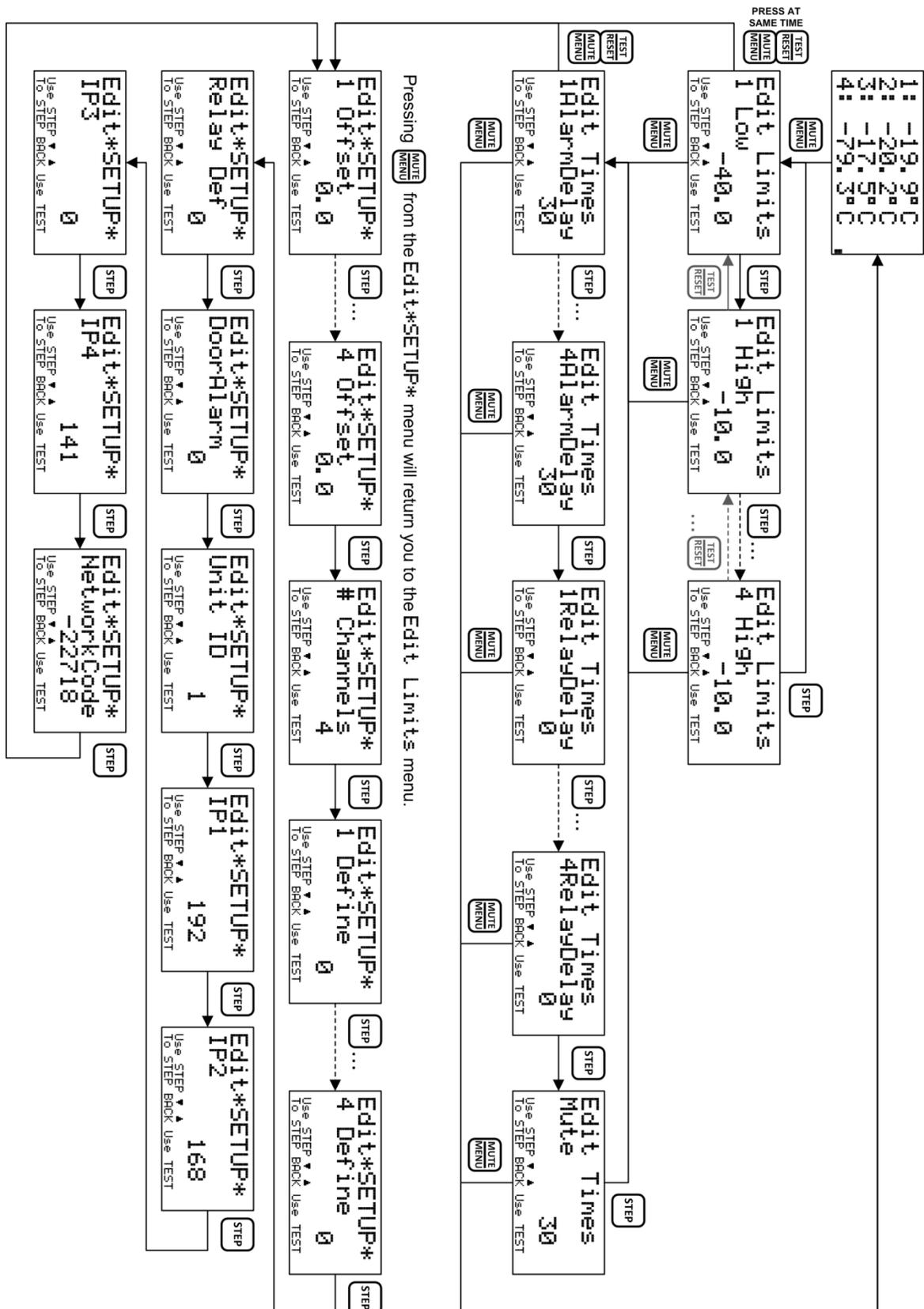
## Netmask1, Netmask2, Netmask3, and Netmask4

These parameters define the four octets of the subnet mask for the MPS. The default values are  $255$ ,  $255$ ,  $255$ , and  $0$  respectively. They are only available as parameters on MPS units configured to work with our *ALERT Monitoring System*. For other units, this value is specified in the configured web page (<http://192.168.0.141/setup.html>).

## Gateway1, Gateway2, Gateway3, and Gateway4

These parameters define the four octets of the network gateway. The default values are  $192$ ,  $168$ ,  $0$ , and  $1$  respectively. They are only available as parameters on MPS units configured to work with our *ALERT Monitoring System*. For other units, this value is specified in the configured web page (<http://192.168.0.141/setup.html>).

### Configuration Parameter Flowchart



## Alarms

### Power Loss

When the MPS loses line-power it will continue to operate on the internal LiPo battery. However, the following changes in operation will occur:

- Display and backlight will turn off to save power (press any button to enable)
- Display will show `PowerFail` down the right edge (when display is enabled)
- Status LEDs will turn off (press any button to enable)
- Alarm LED will flash until power is restored
- Alarm beeper will sound (press any button to mute)
- Relay will change to alarm state
  - If equipped with multiple relays, this will be the channel 1 relay

No action is required when power is restored; the MPS will resume normal function.

### Sensor Limits

If the probe readings are within the alarm limits (less than the high limit and greater than the low limit), the STATUS LED will blink green.

When the temperature reading meets or exceed the temperature limits the STATUS LED will blink red.

After the probe's alarm delay time is exceeded the unit will blink the ALARM LED and beep the buzzer.

The user can MUTE the buzzer by tapping the MUTE/MENU button. The unit will reduce the audible signal from a loud beep, to a quieter and less frequent chirp. It will remain muted until the `Mute` time expires or a different probe goes into alarm.

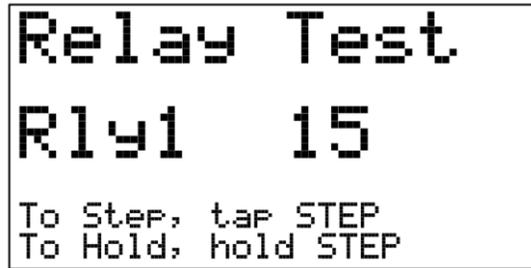
Once the Alarm state has been signaled the unit will wait the `RelayDelay` time before tripping the appropriate relay. Units with individual channel relays, have individual `RelayDelay` times. Units with a single relay have one `RelayDelay` time that applies to any alarm condition.

### Door Switch Alarm

For units equipped with the optional door switch input, the door alarm condition will preempt the normal sensor reading display with the door switch input status display (`Door Input`). This display will show the door status (`Open` or `Closed`) and the alarm state (`OK`, `Delay`, or `Alarm`).

## Alarm Relay Testing

An alarm condition can be simulated by tapping the TEST/RESET button. When the button is pressed, either the 1<sup>st</sup> channel relay (multi-relay units) or the only relay (single relay units) will change to the alarm state and a 15 second countdown will show on the display. When the counter expires, the relay will toggle back to the non-alarm state, and the next relay will toggle into the alarm state (multi-relay units) or the display will return to the sensor readings (single relay units). While any of the relays are in the alarm-test state, you may tap STEP to cycle to the next relay, or *HOLD* the STEP button to keep the relay in the alarm state for longer than 15 seconds.



## MPS Email Notification Feature

A standard feature of the MPS is the ability to send temperature alarm notifications and daily temperature reports via email.

The MPS sends email on:

- Power-up (or after a reset)
- Alarm
- Continued alarm
- Recovery from alarm

Should an email failure-to-send occur, the MPS will attempt to send again after 5 minutes and repeat every 10 minutes after that.

Once daily, it sends a report to the first email address in the contact list. This report contains the last 24 hours of hourly temperatures for each channel and any alarms that may have occurred during that time.

When an alarm condition occurs, the system will send an alert email. The subject line of the message will report the current temperature. The body of the message contains a listing of the last 10 minutes of data.

All mail settings are configured using web pages accessed by the IP assigned to the unit.

## Email Server Requirements

When configuring the email alerts you will need to supply access to an email server with the following capabilities:

- Must support SMTP
- Must allow unencrypted connections
- May require authentication

## Email Notification Configuration

To configure the Email feature you must access the configuration web pages on the MPS. To do this, you will first need to connect a computer with a 10/100/1000 base-T network adapter to the MPS using a standard Ethernet patch cable.

Configure the computer's Ethernet adapter with a static IP of 192.168.0.140 and subnet mask of 255.255.255.0.

To display the main informational web page, open a web browser and type `http://192.168.0.141` into the address bar. You will be presented with a web page much like the example shown on the right.

Before clicking any of the links on the main page, you should first access the setup page. Type `http://192.168.0.141/setup.html` into the address bar of your web browser. An example of the setup page is shown on the following page.

You will be prompted for a username and password. The username is "setupadmin" and the password is configured by the `NetworkCode` parameter (the default is `-22718`).

### MPS Email Alarm Notification v2.0

Server:    Address:

#### Last Data Reported

```
--  
--  
--  
--  
--  
--  
--  
--  
02/10/2021 14:59..Ok 21.7'C 21.7'C 21.1'C 20.2'C *Reset  
02/10/2021 15:00..Ok 21.6'C 21.6'C 21.0'C 21.4'C  
[02/10/2021 15:00]
```

#### Contact List

- 1:
- 2:
- 3:
- 4:
- 5:
- 6:
- 7:
- 8:

[Edit Contact List](#)

[Send test email \(to all\)](#) --click once and please wait

[View Test/Email/Time Log](#)      [Clear Log](#)

[View Single Email Debug](#)

[retry\\_nist\\_time](#) --click once, wait 1 minute, then check log

The setup page is a simple HTML form where you can define the network parameters (other than the IP address), the SMTP server information, the email contact list username and password, the time zone, Daylight Saving Time information, and the hour to send the daily report.

If you change the network parameters to comply with your on-site network, you will then need to configure the appropriate IP address in the **Edit\*SETUP\*** menu, and reset the MPS (press-and-hold the TEST/RESET button until the backlight and LEDs turn off), prior to attempting to connect to the web pages again using the newly assigned IP address from computers on your local network.

The Daylight Saving Time start and end dates will need to be updated on an annual basis after DST ends in November and before it starts again in March.

- Sun. Mar. 14, 2021 – Sun. Nov. 7, 2021
- Sun. Mar. 13, 2022 – Sun. Nov. 6, 2022
- Sun. Mar. 12, 2023 – Sun. Nov. 5, 2023
- Sun. Mar. 10, 2024 – Sun. Nov. 3, 2024
- Sun. Mar. 9, 2025 – Sun. Nov. 2, 2025

<b>Setup Info</b>	
Subnet Mask	255.255.255.0
Gateway IP	192.168.0.1
DNS Server IP	192.168.0.1
NTP Server	pool.ntp.org
SMTP Server	
SMTP Port	0
SMTP auth user	
SMTP password	
List/Log User	listadmin
List/Log Password	idoemaillist
Timezone(EST:-5,PST:-8)	-5
DST *starts (mm/dd/yy)	3/10/19
DST *ends (*Sunday)	11/3/19
Daily Report Time(0-23)	8

Submit Reset

<b>Edit Contact List</b>	
1	
2	
3	
4	
5	
6	
7	
8	

Submit Reset

The final configuration step is to add email addresses to the contact list. To access the email list configuration page, click the “Edit Contact List” hyperlink on the main web page. You will be prompted for a username and password. Both of these values are defined in the setup.html page. The default username is “listadmin” with the password “idoemaillist”.

The email contact list page is a simple HTML form with locations for up to 8 email addresses, as shown to the left.

The 1<sup>st</sup> entry will get both daily reports and any alert notifications and should be a “true” email address that goes to an email account. Should you also want to receive alerts as text messages (SMS), you may configure any of the other entries with your 10-digit mobile phone number and your providers’ email-to-SMS gateway (e.g. 8885551234@txt.att.net). Contact your service provider for the gateway name.

## Testing Email Transmission

On the main MPS web page ([http://\[IP address of MPS\]](http://[IP address of MPS])) click the “Send test email (to all)” hyperlink and wait (up to 2 minutes, depending if the SMTP connection is successful or times out).

Now click the "View Test/Email/Time Log" hyperlink. At the end of the log you should see the result of the test.

### Failing log entry:

```
02/11/2021 09:44      User Email Test 1fail
```

### Passing log entry:

```
02/11/2021 09:50      User Email Test 1sent
```

If the result is 1sent, you may check your email for the received message.