

ALM-1

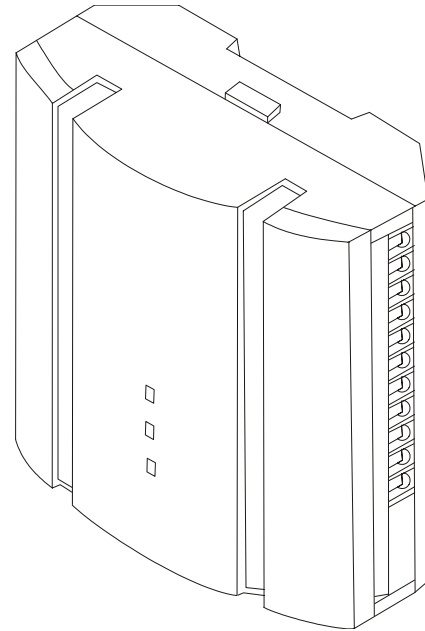
The iWorX ALM-1 alarm module is a stand-alone microprocessor based controller for alarm generation. The application would be for commercial heating, ventilating, and air conditioning (HVAC) equipment.

Overview

The ALM-1 provides alarm detection and reporting by monitoring up to eight inputs. Each input can be configured to support a temperature reading using a thermistor or a switch contact reading.

Each alarm event detected is reported to the network. Digital outputs are provided to drive external alarm indication such as lamps or buzzers.

The controller is based on the LONWORKS® networking technology. The controller can be networked to a higher-level control system for monitoring and control applications.



Features

- Temperature based alarms
- Digital based alarms using dry contacts
- Alarm-controlled triac outputs
- LONWORKS interface to building automation systems.
- Automatic configuration with the iWorX Local Control Interface (LCI)

Purpose of This Guide

The *iWorX ALM-1 Application Manual* provides application information for the ALM-1 Controller.

The reader should understand basic HVAC concepts, intelligent environmental control automation, and basic LONWORKS networking and communications. This Application Manual is written for:

- Users who engineer control logic
- Users who set up hardware configuration
- Users who change hardware or control logic
- Technicians and field engineers



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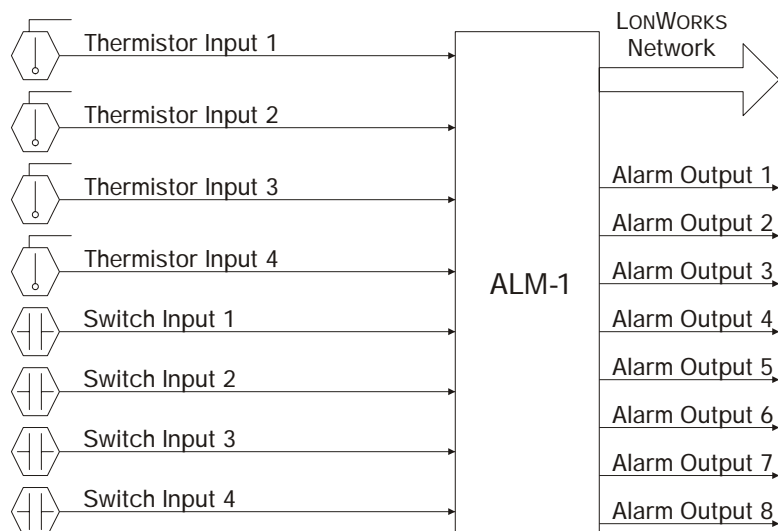
Applicable Documentation

Part Number	Description	Audience	Purpose
iWorX-XYZ-INS-100	iWorX ALM Series Installation Instructions	<ul style="list-style-type: none"> – Application Engineers – Installers – Service Personnel – Start-up Technicians 	Provides instructions for setting up and using the iWorX ALM-1 Controller.
iWorX-LC11-USR-100	iWorX LCI User's Guide	<ul style="list-style-type: none"> – Application Engineers – Installers – Service Personnel – Start-up Technicians – End user 	Provides instructions for setting up and using the iWorX Local Control Interface.
Additional Documentation	<i>LonWorks FTT-10A Free Topology Transceiver User's Guide</i> , published by Echelon Corporation. It provides specifications and user instructions for the FTT-10A Free Topology Transceiver.		

Application Description

The ALM-1 provides alarm detection and reporting by monitoring up to eight inputs. Each input can be configured to support a thermistor reading or a switch contact reading. Each alarm event detected is reported to the network. Digital outputs are provided to drive external alarm indication such as lamps or buzzers, or to drive larger loads when used with pilot relays.

Figure 1: ALM-1 Application



Each of the unit's eight inputs can be configured to accept either digital or analog information. Digital inputs are provided from dry contact switches, and either normally open or normally closed switches may be used. Analog inputs are provided from thermistors.

If an input is configured to read from an analog thermistor, the temperature reading is compared to a high and a low limit. If the temperature is above the high limit or below the low limit, the controller generates a temperature alarm for that input.

Sequence of Operation

This section describes the detailed sequence of operation for the controller.

Temperature Alarms

Thermistors are used for temperature inputs. The ALM-1 reads the sensor and converts it to temperature once every execution cycle. The converted value is made available as a network variable output. The temperature reading is compared to two threshold levels: an upper threshold and a lower threshold. If the reading is below the lower threshold or above the upper threshold then an alarm is generated. Four different detection methods are available by manipulating the threshold levels.

Table 1: ALM-1 Temperature Alarm Detection Methods

Detection Method	Lower Threshold	Upper Threshold
Out of Range	Low Setpoint	High Setpoint
Over Limit	High Setpoint	Maximum Setting (230.0 °F, 110.0 °C)
Under Limit	Minimum Setting (-29.9 °F, -34.4 °C)	Low Setpoint

Disable temperature detection by disabling the input.

The ALM-1 also provides adjustable hysteresis on the threshold comparisons to prevent excessive alarm output jitter. There is one “master” hysteresis adjustment for all thermistor alarm detectors, while the upper and lower thresholds are adjustable for each input. The threshold and hysteresis adjustments are adjustable via the LCI.

Switch Status Alarms

Switch inputs are read and converted to “On” or “Off” readings once every execution cycle. The converted values are made available as network variable outputs. If the switch reading is “On” then an alarm is generated. The polarity of each switch is configurable. The default polarity is “Normally Open”, meaning that the switch is “Off” when open, and “On” when closed. By setting the inverted polarity option, then the switch is read as “On” when its contacts are open, and “Off” when they are closed.

Alarm Outputs

When any of the temperature or switch alarms are triggered, the corresponding alarm output is enabled. This output can be used to directly drive a status panel indicator lamp, or to drive a larger load using a pilot relay. Each alarm input is fixed to drive a specific output. The alarm associated with input 1 drives the first output, the alarm associated with input 2 is drives the second output, etcetera.

When an output is enabled, an event message is sent to the Local Control Interface. The name of the input that triggered the alarm can be set so that the error message that is displayed at the LCI describes the error detected (e.g.: “Freezer #1 Temperature Alarm” or “Fan #3 Contact Alarm”).

Automatic Configuration

The ALM-1 and iWorX Local Control Interface (LCI) use a self-configuring network management scheme requiring no external tools, binding, or LONWORKS knowledge. The LCI recognizes and configures the ALM-1 when the controller’s service pin is pressed. The controller’s status light flashes green until the controller is configured, and will be solid green after the controller is configured. Once the service pin has been pressed, no further action is required by the user; the controller is fully accessible to the LCI. Users may bind to SNVTs on the ALM-1 with LNS or other LONWORKS tools if they wish.

The LCI also provides network supervision of the ALM-1. The LCI periodically sends a “ping” message to the ALM-1, which elicits a response. If the response fails, an alarm is displayed on the LCI. The LCI also uses the “ping” message to refresh the occupancy mode and other system wide data.

ALM-1 Configuration

Once the ALM-1 is properly installed and recognized by the Local Control Interface (LCI), the LCI can be used to configure the settings of the controller. This section describes the commands available on the LCI for configuration of the ALM-1, and the meanings and default values for controller parameters. For more information on using the LCI, see the *iWorX LCI User's Guide*.

Setup

Copy and Paste

Use **Copy** to place a copy of this controller's settings onto the clipboard. You can then **Paste** these settings onto another ALM-1 controller.

List All Settings

This screen displays the settings used by the controller. Use the up and down arrow keys to select a value to change, then use **-** or **+** to increase or decrease the value (or utilize **USE KEYS** to directly enter the desired value). Press **Save** to save your changes, or **Back** to return to the Setup screen.

Table 2: All ALM-1 Settings

Setting	Range	Default	Description
Input #1 Type	Disabled, Thermistor, Switch (Open), Switch (Closed)	Disabled	Operating mode for each input. For switch inputs, the word in parentheses indicates the normal state of the switch.
Input #2 Type			
Input #3 Type			
Input #4 Type			
Input #5 Type			
Input #6 Type			
Input #7 Type			
Input #8 Type			
Input #1 Low Limit	-29.9 to 230.0 °F (-34.4 to 110.0 °C)	32.0 °F (0.0 °C)	Threshold temperature below which the controller will report a temperature alarm.
Input #2 Low Limit			
Input #3 Low Limit			
Input #4 Low Limit			
Input #5 Low Limit			
Input #6 Low Limit			
Input #7 Low Limit			
Input #8 Low Limit			
Input #1 High Limit	-29.9 to 230.0 °F (-34.4 to 110.0 °C)	50.0 °F (10.0 °C)	Threshold temperature above which the controller will report a temperature alarm.
Input #2 High Limit			
Input #3 High Limit			
Input #4 High Limit			
Input #5 High Limit			
Input #6 High Limit			
Input #7 High Limit			
Input #8 High Limit			
Hysteresis	0.0 to 9.0 °F (0.0 to 5.0 °C)	0.9 °F (0.5 °C)	Amount of hysteresis used during thermistor data comparisons.

Table 2: All ALM-1 Settings

Setting	Range	Default	Description
Input #1 Name	Each string may have up to 16 characters.	Alarm 1	Descriptive text string associated with an alarm when reporting an alarm from the particular input.
Input #2 Name		Alarm 2	
Input #3 Name		Alarm 3	
Input #4 Name		Alarm 4	
Input #5 Name		Alarm 5	
Input #6 Name		Alarm 6	
Input #7 Name		Alarm 7	
Input #8 Name		Alarm 8	

Inputs

The Inputs screen displays the current values of the ALM-1's inputs. These values cannot be changed. Since the names and types of all eight inputs are user-configurable, this table only refers to the types of inputs. Refer to "List All Settings" on page 5 for details on how to view and set the input type and name for each input.

Table 3: ALM-1 Inputs

Input Type	Range	Description
Thermistor	-29.9 to 230.0 °F (-34.4 to 110.0 °C)	Measured temperature from the input.
Switch	Off, On	Current state of the digital input.

Outputs

This screen displays the current values of the ALM-1's outputs. These values cannot be changed.

Table 4: ALM-1 Outputs

Output	Range	Description
Alarm Output #1	Off, On	Status of each alarm output.
Alarm Output #2		
Alarm Output #3		
Alarm Output #4		
Alarm Output #5		
Alarm Output #6		
Alarm Output #7		
Alarm Output #8		

Troubleshooting

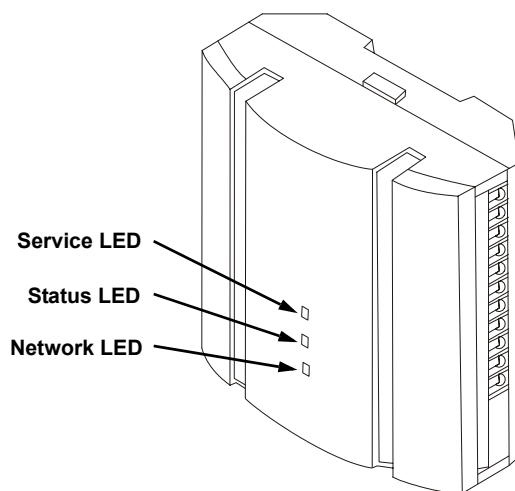
Diagnostic LEDs

The controller has 3 LED indicators. These indicators can aid in troubleshooting equipment operation problems. The following table lists the functions of the controller's LEDs in the order they appear from top to bottom on the unit.

Table 5: Diagnostic LEDs

LED	Indication
Service	– Illuminated when the service pin is pushed
Status	– Solid green when running and configured by an LCI – Flashing green when running and NOT configured by an LCI – Solid red when a fault condition exists
Network	– Yellow while the controller is transmitting data onto the FTT-10A network – Green when there is network activity – Off when there is no network activity

Figure 2: Diagnostic LEDs



Troubleshooting Tips

Controller is not running and Status LED is not illuminated.

No power to controller. Verify the voltage on the controller's power connector (24 VAC).

How do I reset the controller?

The controller can be reset by the LCI, or you can cycle power to the controller. Refer to the LCI documentation for more information on resetting the controller using the LCI.

A pilot relay will not come on even though the LCI indicates it is on.

Ensure that the controller and output pilot relay have been powered with 24 VAC and the output has been correctly wired to the coil of the pilot relay. Also ensure that the pilot relay has a 24 VAC coil.

A temperature reading is at its minimum or maximum value.

The input is either shorted or open. Check the wiring for the indicated sensor.

Thermistor readings fluctuate rapidly, sometimes by several degrees.

The controller may not be properly grounded. The controller's ground (GND) pin (T28) must be connected to earth ground.

Also ensure that the controller's digital inputs are dry contacts and that no voltage is being applied or switched to the inputs.

Can I have a different hysteresis for each input?

No, the same hysteresis applies to all analog inputs, as well as to the high and low limits.

An alarm indicator is on when it should be off, and off when it should be on.

Make sure that you are using the correct type of switch (normally open or normally closed) and that the configuration of the input as shown at the LCI matches the type of switch you are using.