

ALM2 Alarm Module

Self-Contained Interoperable Controller Model UCP-1

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ALM2

The iWorX® ALM2 alarm module is a stand-alone microprocessor based controller for alarm generation. The application is for heating, ventilating, and air conditioning (HVAC) equipment.

Overview

The ALM2 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 dry 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 ALM2 Application Guide* provides application information for the ALM2 Controller.

The reader should understand basic HVAC concepts, intelligent environmental control automation, and basic LONWORKS networking and communications. This Application Guide 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 of Taco Electronic Solutions, Inc.

REPRESENTATIONS AND WARRANTIES

This Document is subject to change from time to time at the sole discretion of Taco Electronic Solutions, Inc. All updates to the Document are available at www.taco-hvac.com. When installing this product, it is the reader's responsibility to ensure that the latest version of the Document is being used.

The iWorX® ALM2 shall only be used for the applications identified in the product specifications and for no other purposes. For example, the iWorX® ALM2 is not intended for use to support fire suppression systems, life support systems, critical care applications, commercial aviation, nuclear facilities or any other applications where product failure could lead to injury to person, loss of life, or catastrophic property damage and should not be used for such purposes.

Taco Electronic Solutions, Inc. will not be responsible for any product or part not installed or operated in conformity with the Document and instructions or which has been subject to accident, disaster, neglect, misuse, misapplication, inadequate operating environment, repair, attempted repair, modification or alteration, or other abuse. For further information, please refer to the last page of this Document for the company's Limited Warranty Statement, which is also issued with the product or available at www.taco-hvac.com.

APPLICABLE DOCUMENTATION

See the table below for additional documentation that may be applicable to this controller.

Description	Audience	Purpose
<i>iWorX® LCI2 Application Guide</i> , Document No. 505-002	<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.
http://iWorxWizard.taco-hvac.com	<ul style="list-style-type: none"> – Application Engineers – Wholesalers – Contractors 	An on-line configuration and submittal package generator based on user input. Automatically generates bill of materials, sequence of operations, flow diagrams, wiring diagrams, points and specifications.
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. See also: www.echelon.com/support/documentation/manuals/transceivers .	

INSTALLATION INSTRUCTIONS

PRECAUTIONS

General



This symbol is intended to alert the user to the presence of important installation and maintenance (servicing) instructions in the literature accompanying the equipment.



WARNING: Electrical shock hazard. Disconnect ALL power sources when installing or servicing this equipment to prevent electrical shock or equipment damage.

Make all wiring connections in accordance with these instructions and in accordance with pertinent national and local electrical codes. Use copper conductors only.

Static Electricity

Static charges produce voltages that can damage this equipment. Follow these static electricity precautions when handling this equipment.

- Work in a static free area.
- Touch a known, securely grounded object to discharge any charge you may have accumulated.
- Use a wrist strap when handling printed circuit boards. The strap must be secured to earth ground.

Location

Avoid locations where corrosive fumes, excessive moisture, vibration or explosive vapors are present.

Avoid electrical noise interference. Do not install near large contactors, electrical machinery, or welding equipment.

This equipment is suitable for indoor or outdoor use. Preferably, or as required by National Electrical Code, the unit is intended to be installed within an electrical control enclosure. Operate where ambient temperatures do not exceed 140 °F (60 °C) or fall below 32 °F (0 °C) and relative humidity does not exceed 90%, non-condensing.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference. This equipment can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to a power source different from that to which the receiver is connected.
- Consult the equipment supplier or an experienced radio/TV technician for help.

You are cautioned that any changes or modifications to this equipment not expressly approved in these instructions could void your authority to operate this equipment in the United States.

BEFORE INSTALLING

About this Document

The instructions in this manual are for the ALM2 module, which provides auxiliary alarm capabilities to an iWorX® system.

Inspecting the Equipment

Inspect the shipping carton for damage. If damaged, notify the carrier immediately. Inspect the equipment for damage. Return damaged equipment to the supplier.

What is Not Included with this Equipment

- A power source for the equipment electronics and peripheral devices.
- Tools necessary to install, troubleshoot and service the equipment.
- The screws or DIN rail needed to mount the device.
- Peripheral devices, such as sensors, actuators, etc.
- Cabling, cabling raceway, and fittings necessary to connect this equipment to the power source, FTT-10A network and peripheral devices.

Equipment Location



Abide by all warnings regarding equipment location provided earlier in this document.

Optimally, the equipment should be installed within a secure enclosure.

If the equipment is to be installed outdoors, it must be contained within a protective enclosure. The enclosure must maintain internal temperature and humidity within the ranges specified for this equipment.

The equipment must be installed within 500 feet of all input peripherals (smoke detectors, sensors, etc.) that will be connected to the equipment.

Selecting a Power Source

This equipment requires a UL recognized Class 2 external power source (not supplied) to operate. The controller power input requires a voltage of 24 Volts AC.

To calculate power source current requirements, add the power consumption of all peripheral devices to that of the controller.

The controller and triac output loads can use the same power source. If both are using the same power source, the loads must have EMF protection. This protection can be integral to the load, or installed in the 24 VAC wiring across the load's coil.

To provide necessary RFI and transient protection, the controller's ground (GND) pin (T40) must be connected to earth ground or the earth ground of the packaged unit's enclosure ground. Failure to properly ground the controller may cause it to exceed FCC limits. Excessive noise could also produce inaccurate sensor data. The power source must be capable of operating with this connection to ground.

INSTALLATION

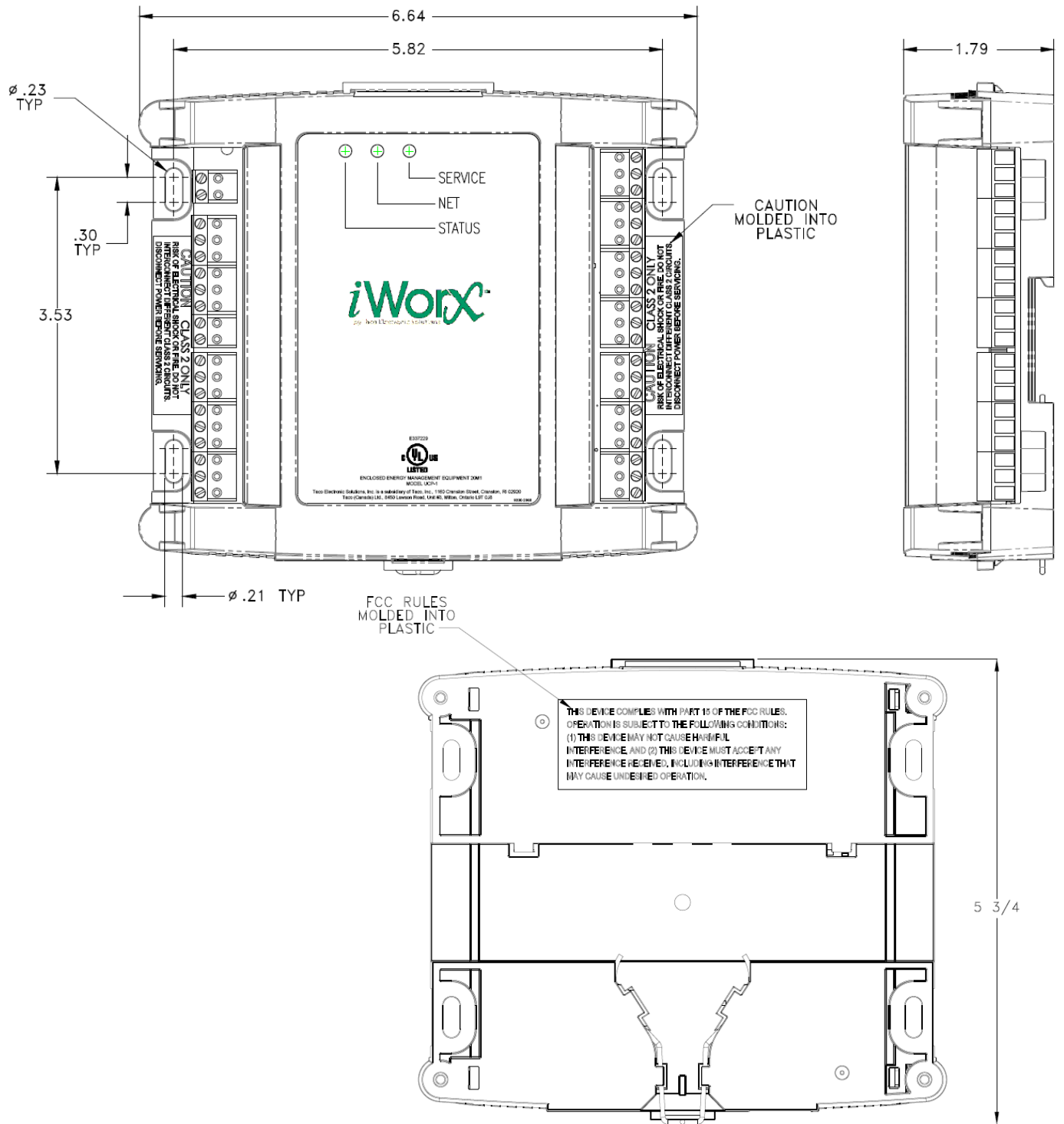


Warning: Electrical shock hazard. To prevent electrical shock or equipment damage, disconnect ALL power sources to controllers and loads before installing or servicing this equipment or modifying any wiring.

Mounting the Device

1. Select a mounting location. Enclosure mounting is recommended.
2. Hold the controller on the panel you wish to mount it on. With a marker or pencil mark the mounting locations on the panel.
3. Using a small drill bit pre-drill the mounting holes.
4. Using two #6 pan head screws, mount the controller to the panel.
5. Wire the controller (See Routing Cabling to the Device).

Figure 1: Mounting Dimensions



Routing Cabling to the Device



Cabling used to connect the power source and cabling used to connect the FTT-10A network must remain separated within the control enclosure and wiring conduit.

Grounding the Device



The ground terminal (T40) must be securely connected to earth ground. Failure to properly ground this equipment will result in improper operation. Improper grounding may also increase the risk of electrical shock and may increase the possibility of interference with radio/TV reception.



For best performance, connect the power supply common terminal (T38) to the same external point as the ground terminal (T40).

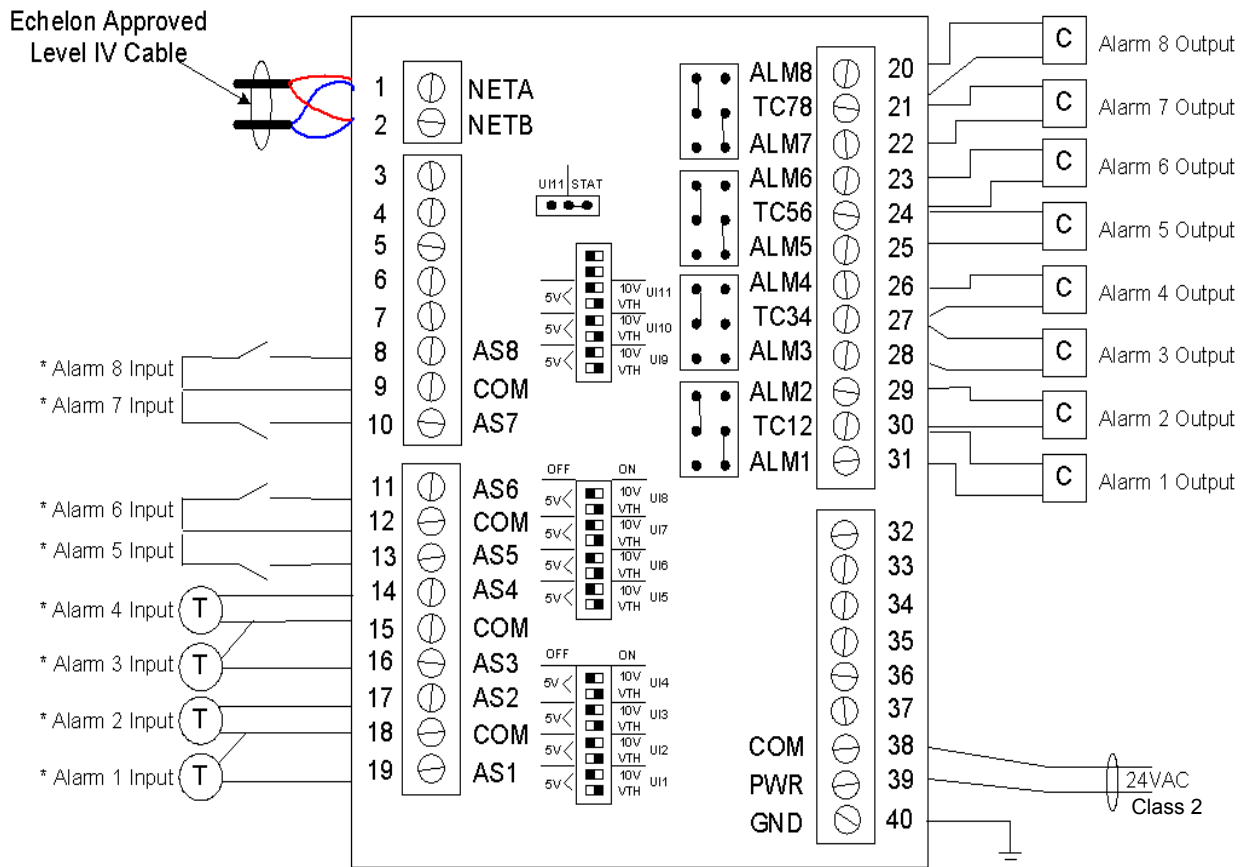
WIRING INFORMATION



WARNING: Terminals 9, 12, 15, 18 and 38 are connected internally on all ALM2 controllers. Disconnect ALL power sources when installing or servicing this equipment to prevent electrical shock or equipment damage.

The Figures below show a typical ALM2 installation with four thermistor inputs and four switch inputs. All outputs are connected to loads. These are only examples. Not all applications will require one of these wiring configurations.

Figure 2: Typical ALM2 Wired as Power Sourcing



Symbols

Note:

* Connect switch or thermistor; switch stays in same position

T 10 K ohm Precon Type III thermistor

C 24VAC pilot relay or contactor coil

0-10 VDC 0-10 VDC signal

Output Jumper Positions

Isolated Group Power Sourcing Power Sinking

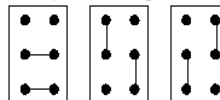
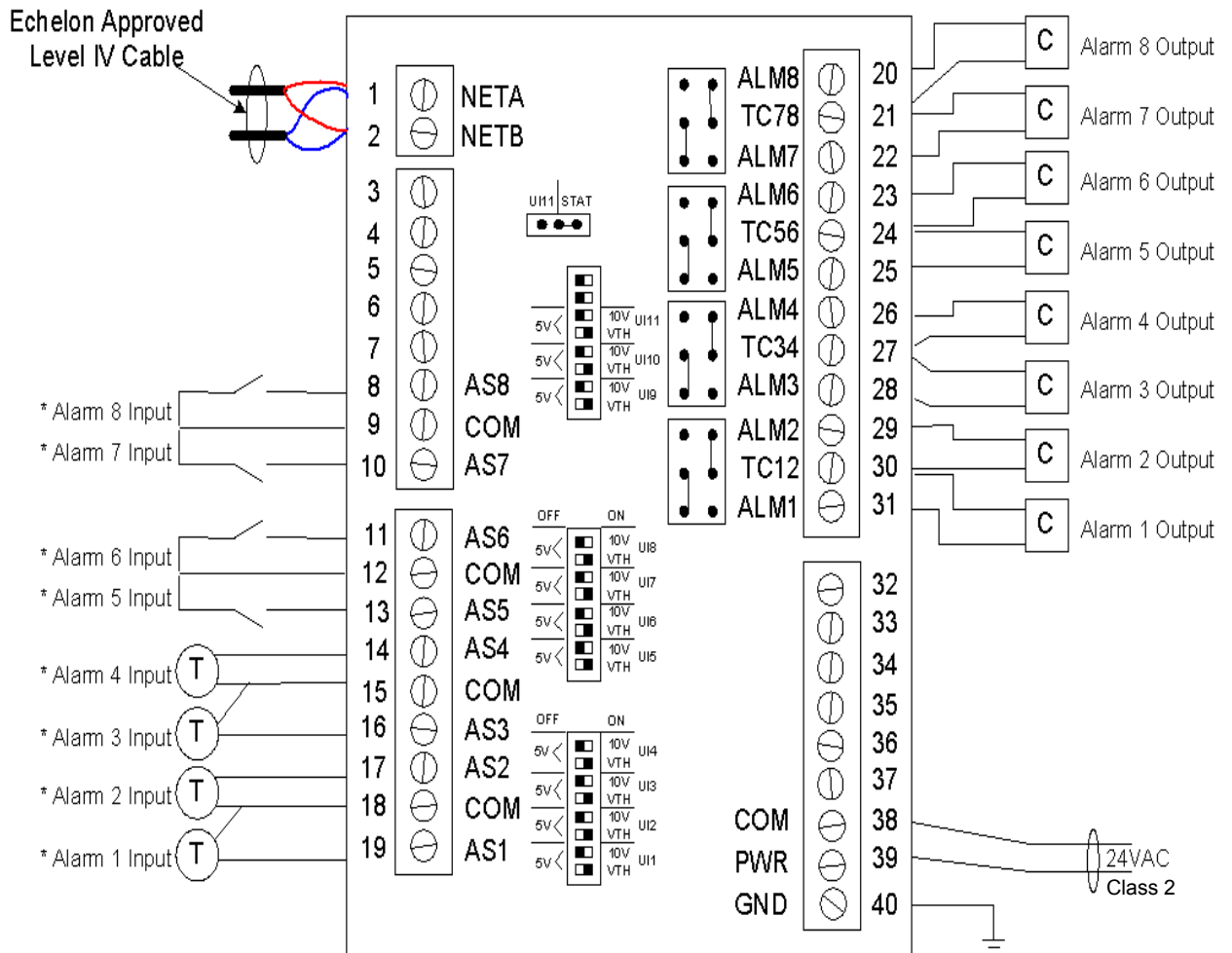


Figure 3: Typical ALM2 Wired as Power Sinking



Symbols

Note:

* Connect switch or thermistor; switch stays in same position

(T) 10 K ohm Precon Type III thermistor

(C) 24VAC pilot relay or contactor coil

0-10 VDC 0-10 VDC signal

Output Jumper Positions

Isolated Power Power
Group Sourcing Sinking

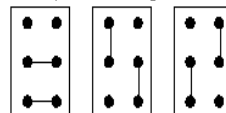
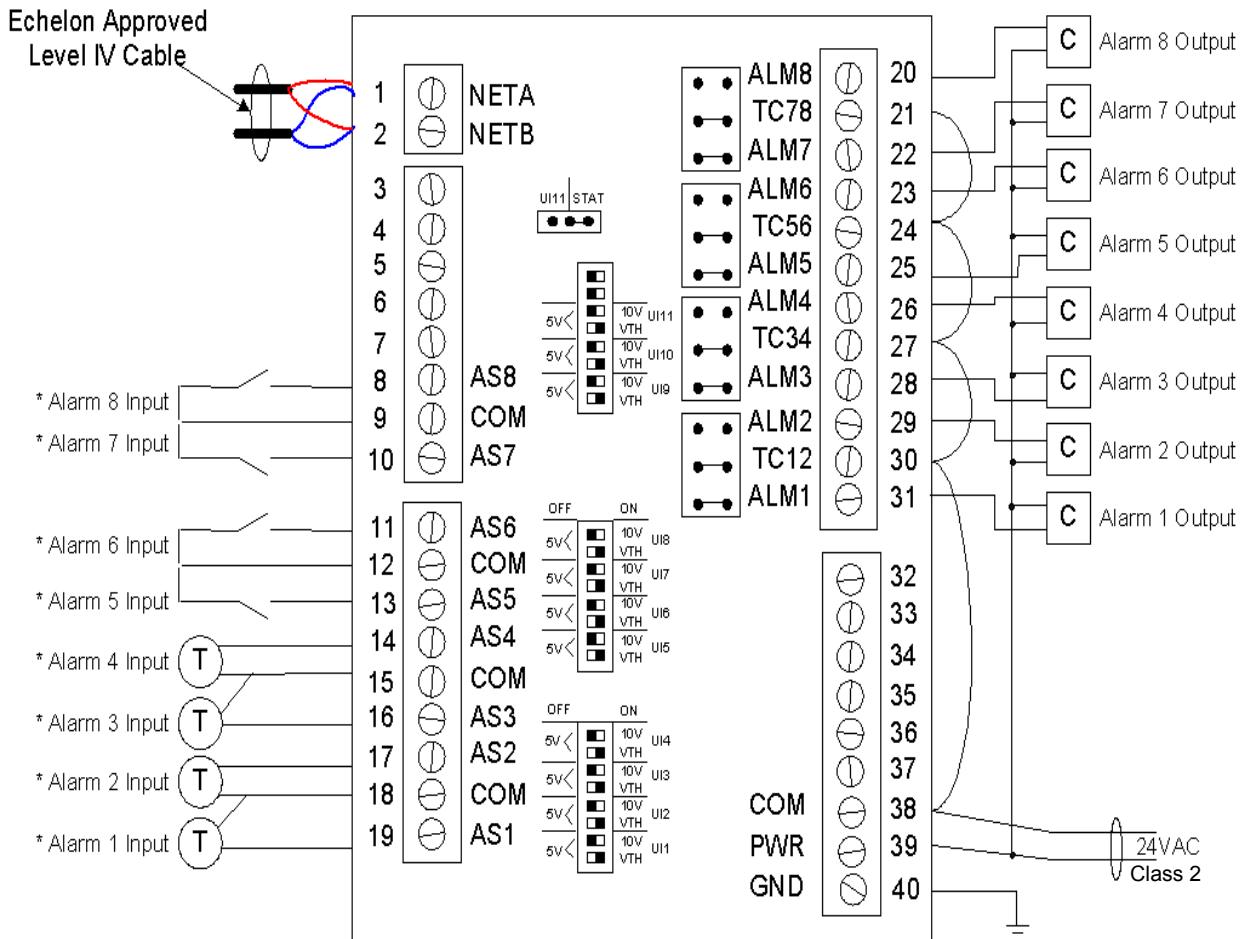


Figure 4: Typical ALM2 Wired as Power Isolated



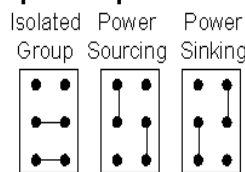
Symbols

Note:

* Connect switch or thermistor; switch stays in same position

- 10 K ohm Precon Type III thermistor
- 24VAC pilot relay or contactor coil
- 0-10 VDC signal

Output Jumper Positions



Connecting Input Devices

All inputs can be used for either analog thermistors or digital contact switches. The software configuration of the controller determines whether a particular input is read as a temperature or digital input.

Temperature Inputs

To connect a temperature sensor to the unit, attach one wire from the thermistor to an input terminal, (T8, T10, T11, T13, T14, T16, T17, or T19) and the other wire to an adjacent common (T9, T12, T15, or T18). The thermistor used must be 10K Precon Type III.

Digital Inputs

The contacts for digital inputs may be either normally closed or normally open digital switches. To connect a contact to the unit, connect one wire from the contact to an input terminal, dry, and the other wire to an adjacent common (T9, T12, T15, or T18).

Connecting Output Devices

Each output is directly linked to a specific input. The alarm associated with input 1 (if there is to be one) must be connected to the first output, the alarm associated with input 2 must be connected to the second output, etcetera. This is not configurable.

All eight outputs are triac outputs. The outputs can only switch loads that can be energized by 24 VAC. If an output is being used to light an indicator, a 24 VAC lamp must be used. If an output is being used to enable a larger load, the output must be connected to 24 VAC pilot relays.

Other Connections

Network (LON)

Network wiring must be twisted pair. One network wire must be connected to terminal NETA (T1) and the other network wire must be connected to terminal NETB (T2). Polarity is not an issue since an FTT-10A network is used for communications.

Power (PWR)

Connect one output wire from a 24 VAC power supply to PWR (T39) and the other output wire from the power supply to the adjacent common terminal (T38).

Ground (GND)



Terminal GND (T40) must be connected to earth ground. Failure to properly ground this equipment will result in improper operation. Improper grounding may also increase the risk of electrical shock, and may increase the possibility of interference with radio and TV reception.

SPECIFICATIONS

Electrical

Inputs

- Cabling: twisted shielded pair, 18 AWG recommended—500 feet max. (152 meters)
- Resolution: 10 bit

Thermistor Inputs

- Precon Type III 10K thermistor

Switch Inputs

- Dry Contact
- Normally closed or normally open
- 5 Volts DC Max

Outputs

- 24 Volts AC
- 1 Amp @ 50C, 0.5 Amp @ 60C, limited by the Class 2 supply rating

Power

Power Requirements

- 24VAC (20VAC to 28VAC), requires an external Class 2 supply

Power Consumption

- 7.2W with no external loads, maximum limited by the Class 2 supply rating

Recommended Sensor Wire

Cable Type	Pairs	Details	Taco Catalog No.
18AWG	1	Stranded Twisted Shielded Pair, Plenum	WIR-018

FTT-10A Network

- Speed: 78KBPS
- Cabling: Maximum node-to-node distance: 1312 feet (400 meters)
- Maximum total distance: 1640 feet (500 meters)

Cable Type	Pairs	Details	Taco Catalog No.
Level 4 22AWG (0.65mm)	1	Unshielded, Plenum, U.L. Type CMP	WIR-022

For detailed specifications, refer to the *FTT-10A Free-Topology Transceiver User's Guide* published by Echelon Corporation (www.echelon.com/support/documentation/manuals/transceivers).

Mechanical

Housing

- Dimensions: 5.55" (141mm) high, 6.54" (166 mm) wide, 1.75" deep (44 mm)
- ABS

Weight

- Controller Weight: 0.70 pounds (0.32 kilograms)
- Shipping Weight: 1.0 pounds (0.46 kilograms)

Electronics

- Processor: 3150 Neuron 10 MHz
- Flash: 48 Kilobytes
- SRAM: 8 Kilobytes
- Termination: 0.197" (5.0 mm) Pluggable Terminal Blocks, 14-22 AWG

Environmental

- Temperature: 32 °F to 140 °F (0 °C to 60 °C)
- Humidity: 0 to 90%, non-condensing

Agency Listings

- UL Listed for US and Canada, Energy Management Equipment PAZX and PAZX7.

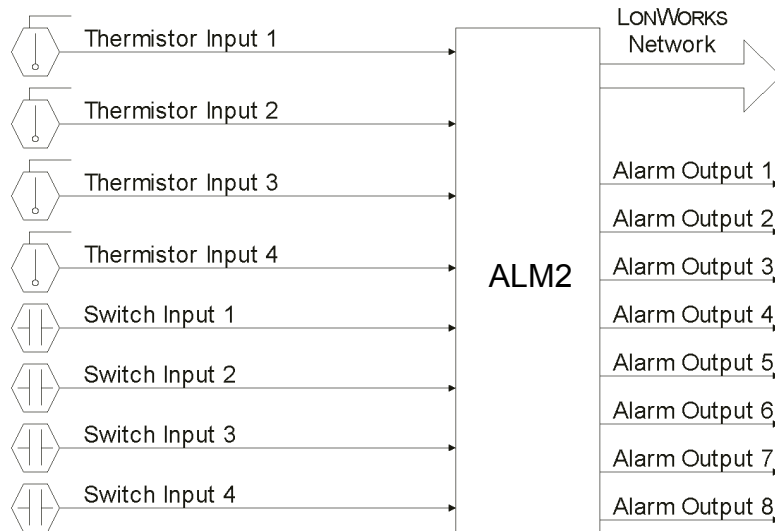
Agency Compliances

- FCC Part 15 Class A

APPLICATION DESCRIPTION

The ALM2 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 5: ALM2 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 ALM2 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.

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 ALM2 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 drives the second output, and so on.

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 Hi Limit” or “Fan #3 Contact Alarm”).

Automatic Configuration

The ALM2 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 ALM2 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 ALM2 with LNS or other LONWORKS tools if they wish.

The LCI also provides network supervision of the ALM2. The LCI periodically sends a “ping” message to the ALM2, 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.

CONTROLLER IDENTIFICATION

Once the ALM2 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 ALM2, and the meanings and default values for controller parameters. For more information on using the LCI, see the *LCI2 Application Guide*.

Inputs

The Inputs screen displays the current values of the ALM2’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 “All Settings” on page 15 for details on how to view and set the input type and name for each input. The default name for each configured input is *Alarm #*, where # is the reference number that was configured for the given input.

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 ALM2's outputs. These values cannot be changed from this screen. The default name for each configured output is *Output #X*, where X is the output reference number that was configured for the given output.

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

Configuration

All Settings

This screen displays the settings used by the controller.

Setting	Range	Default	Description
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.
Input #1 Lo 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 Lo Limit			
Input #3 Lo Limit			
Input #4 Lo Limit			
Input #5 Lo Limit			
Input #6 Lo Limit			
Input #7 Lo Limit			
Input #8 Lo Limit			
Input #1 Hi 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 Hi Limit			
Input #3 Hi Limit			
Input #4 Hi Limit			
Input #5 Hi Limit			
Input #6 Hi Limit			
Input #7 Hi Limit			
Input #8 Hi Limit			
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			

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	

LIMITED WARRANTY STATEMENT

Taco Electronic Solutions, Inc. (TES) will repair or replace without charge (at the company's option) any product or part which is proven defective under normal use within one (1) year from the date of start-up or one (1) year and six (6) months from date of shipment (whichever occurs first).

In order to obtain service under this warranty, it is the responsibility of the purchaser to promptly notify the local TES stocking distributor or TES in writing and promptly deliver the subject product or part, delivery prepaid, to the stocking distributor. For assistance on warranty returns, the purchaser may either contact the local TES stocking distributor or TES. If the subject product or part contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination and repair.

Any TES product or part not installed or operated in conformity with TES instructions or which has been subject to accident, disaster, neglect, misuse, misapplication, inadequate operating environment, repair, attempted repair, modification or alteration, or other abuse, will not be covered by this warranty.

TES products are not intended for use to support fire suppression systems, life support systems, critical care applications, commercial aviation, nuclear facilities or any other applications where product failure could lead to injury to person, loss of life, or catastrophic property damage and should not be sold for such purposes.

If in doubt as to whether a particular product is suitable for use with a TES product or part, or for any application restrictions, consult the applicable TES instruction sheets or in the U.S. contact TES at 401-942-8000 and in Canada contact Taco (Canada) Limited at 905-564-9422.

TES reserves the right to provide replacement products and parts which are substantially similar in design and functionally equivalent to the defective product or part. TES reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

TES OFFERS THIS WARRANTY IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW INCLUDING

WARRANTIES OF MERCHANTABILITY OR FITNESS IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE.

THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR STATUTORY, OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF TES.

TES WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS OR ANY INCIDENTAL COSTS OF REMOVING OR REPLACING DEFECTIVE PRODUCTS.

This warranty gives the purchaser specific rights, and the purchaser may have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts or on the exclusion of incidental or consequential damages, so these limitations or exclusions may not apply to you.

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Telephone: (401) 942-8000 FAX: (401) 942-2360.

Taco (Canada), Ltd., 8450 Lawson Road, Unit #3, Milton, Ontario L9T 0J8.
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Alarms

Alarm	Range	Alarm Trigger	Alarm Reset
Input # Contact Alarm (when configured as a switch input)	Normal, Alarm	Occurs when the input changes to the opposite state. For example, if the alarm is configured as Normally Open, an alarm will be generated when the input senses a contact closure.	Automatic
Input # Hi Limit	Normal, Hi Limit	Occurs when the temperature goes above the programmed setpoint.	Cleared when the temperature goes below (Setpoint - Hysteresis).
Input # Lo Limit	Normal, Lo Limit	Occurs when the temperature goes below the programmed setpoint.	Cleared when the temperature goes below the (Setpoint + Hysteresis).

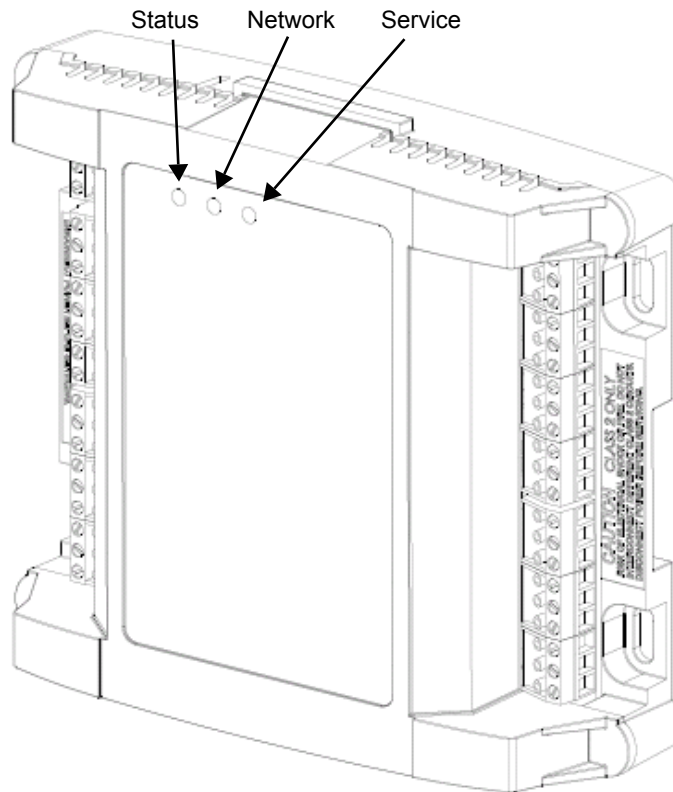
TROUBLESHOOTING

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 left to right on the unit.

LED	Indication
Status	<ul style="list-style-type: none"> – Solid green when running and configured by an LCI (networking) – Flashing green when running and NOT configured by an LCI (stand-alone) – Solid red when a fault condition exists (control shut down) – Blinking Red - the controller has a device failure – Solid Amber - The controller has not received a LCI ping message in over 10 minutes and is part of a network.
Network	<ul style="list-style-type: none"> – 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
Service	<ul style="list-style-type: none"> – Illuminated when the service pin is depressed or when a controller gets configured by the LCI.

Figure 6: Diagnostic LEDs



Troubleshooting Tips

The following table provides tips on resolving common issues.

Problem	Solution
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. Ensure that the output jumper is configured for how the output is wired; for example Power Isolated vs Power Sourcing.
A temperature reading is at its minimum or maximum value.	The input is either shorted or open. Check the wiring for the indicated sensor. Ensure that the input switch is in the proper position for dry contact or thermistor.
Thermistor readings fluctuate rapidly, sometimes by several degrees.	The controller may not be properly grounded. The controller's ground (GND) pin (T40) 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.

Getting Help

Components within an iWorX® controller, sensor, or power supply cannot be field repaired. If there is a problem with a unit, follow the steps below before contacting your local TES representative or TES technical service.

1. Make sure controllers, sensors, and power supplies are connected and communicating to desired devices.
2. Record precise hardware setup indicating the following:
 - Version numbers of applications software.
 - Controller firmware version number.
 - A complete description of difficulties encountered.

Notes:

LIMITED WARRANTY STATEMENT

Taco Electronic Solutions, Inc. (TES) will repair or replace without charge (at the company's option) any product or part which is proven defective under normal use within one (1) year from the date of start-up or one (1) year and six (6) months from date of shipment (whichever occurs first).

In order to obtain service under this warranty, it is the responsibility of the purchaser to promptly notify the local TES stocking distributor or TES in writing and promptly deliver the subject product or part, delivery prepaid, to the stocking distributor. For assistance on warranty returns, the purchaser may either contact the local TES stocking distributor or TES. If the subject product or part contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination and repair.

Any TES product or part not installed or operated in conformity with TES instructions or which has been subject to accident, disaster, neglect, misuse, misapplication, inadequate operating environment, repair, attempted repair, modification or alteration, or other abuse, will not be covered by this warranty.

TES products are not intended for use to support fire suppression systems, life support systems, critical care applications, commercial aviation, nuclear facilities or any other applications where product failure could lead to injury to person, loss of life, or catastrophic property damage and should not be sold for such purposes.

If in doubt as to whether a particular product is suitable for use with a TES product or part, or for any application restrictions, consult the applicable TES instruction sheets or in the U.S. contact TES at 401-942-8000 and in Canada contact Taco (Canada) Limited at 905-564-9422.

TES reserves the right to provide replacement products and parts which are substantially similar in design and functionally equivalent to the defective product or part. TES reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

TES OFFERS THIS WARRANTY IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW INCLUDING

WARRANTIES OF MERCHANTABILITY OR FITNESS IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE.

THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR STATUTORY, OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF TES.

TES WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS OR ANY INCIDENTAL COSTS OF REMOVING OR REPLACING DEFECTIVE PRODUCTS.

This warranty gives the purchaser specific rights, and the purchaser may have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts or on the exclusion of incidental or consequential damages, so these limitations or exclusions may not apply to you.

CONTROLS MADE EASY®

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