



## BZU2 Hydronic Zoning Control *Self-Contained Interoperable Controller Model UCP-1*

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## BZU2

The BZU2 hydronic zoning control is a microprocessor-based controller for adding additional heating zones to hydronics systems that are being controlled by an iWorX BLM Series boiler controller. It may also be used as a stand-alone zone controller. This application includes control of up to five heating zones and a general heat demand.

### Overview

Five analog inputs are provided for zone temperature sensors. A digital input is available for a plant alarm. Up to five zone valves or pumps are controlled by digital outputs. An additional digital output is provided for a heat demand output.

The controller is based on the LONWORKS® networking technology, and communicates with the BLM Series controller over the network. The controller can also be networked to a higher-level control system for monitoring and control applications.

### Features

- Control of up to five heating zones with individual sensor inputs and outputs
- Networking capability of up to 24 units (120 zones)
- Individual temperature setpoints for occupied heating of each zone
- Common temperature setpoint for unoccupied heating
- Proportional plus integral (P+I) control of heating
- Heat demand output for a common pump or non-networked heat source
- Heat demand and zone demand are communicated to a BLM Series boiler control
- Outdoor cutoff temperatures available when used with a BLM Series or ASM2 Controller
- LONWORKS® interface to building automation systems and host products
- Automatic configuration with a Local Control Interface (LCI) touchscreen
- Alarm/Event reporting
- LonWorks interface to building automation systems

## PURPOSE OF THIS GUIDE

The *iWorX BZU2 Application Guide* provides application information for the BZU2 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

## 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](http://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 BZU2 shall only be used for the applications identified in the product specifications and for no other purposes. For example, the iWorX BZU2 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](http://www.taco-hvac.com).

## APPLICABLE DOCUMENTATION

Part Number	Audience	Purpose
<i>iWorX BZU2 Application Guide</i> , Document No. 505-006 (this document)	<ul style="list-style-type: none"> <li>– Application Engineers</li> <li>– Wholesalers</li> <li>– Contractors</li> </ul>	Provides specific application information about the BLM series, including sequence of operation and configuration information.
<i>iWorX LCI2 Application Guide</i> , Document No. 505-002	<ul style="list-style-type: none"> <li>– Application Engineers</li> <li>– Installers</li> <li>– Service Personnel</li> <li>– Start-up Technicians</li> <li>– End user</li> </ul>	Provides instructions for setting up and using the iWorX Local Control Interface.
<i>iWorX DXU3 Application Guide</i> , Document No. 505-004	<ul style="list-style-type: none"> <li>– Application Engineers</li> <li>– Installers</li> <li>– Service Personnel</li> </ul>	Provides specific application information about the DXU series, including sequence of operation and configuration information.
<i>iWorX DXU4 Application Guide</i> , Document No. 505-005	<ul style="list-style-type: none"> <li>– Start-up Technicians</li> <li>– End user</li> </ul>	
<a href="http://iWorxWizard.taco-hvac.com">http://iWorxWizard.taco-hvac.com</a>	<ul style="list-style-type: none"> <li>– Application Engineers</li> <li>– Wholesalers</li> <li>– Contractors</li> </ul>	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.	

## INSTALLATION GUIDE

### 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 only copper conductors.

## 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 BZU2 module, which supports five heating zones.

### 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.

The equipment must be installed indoors unless 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. It must be within 200 feet of any connected thermostats.

### Selecting a Power Source

This equipment requires a UL recognized 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

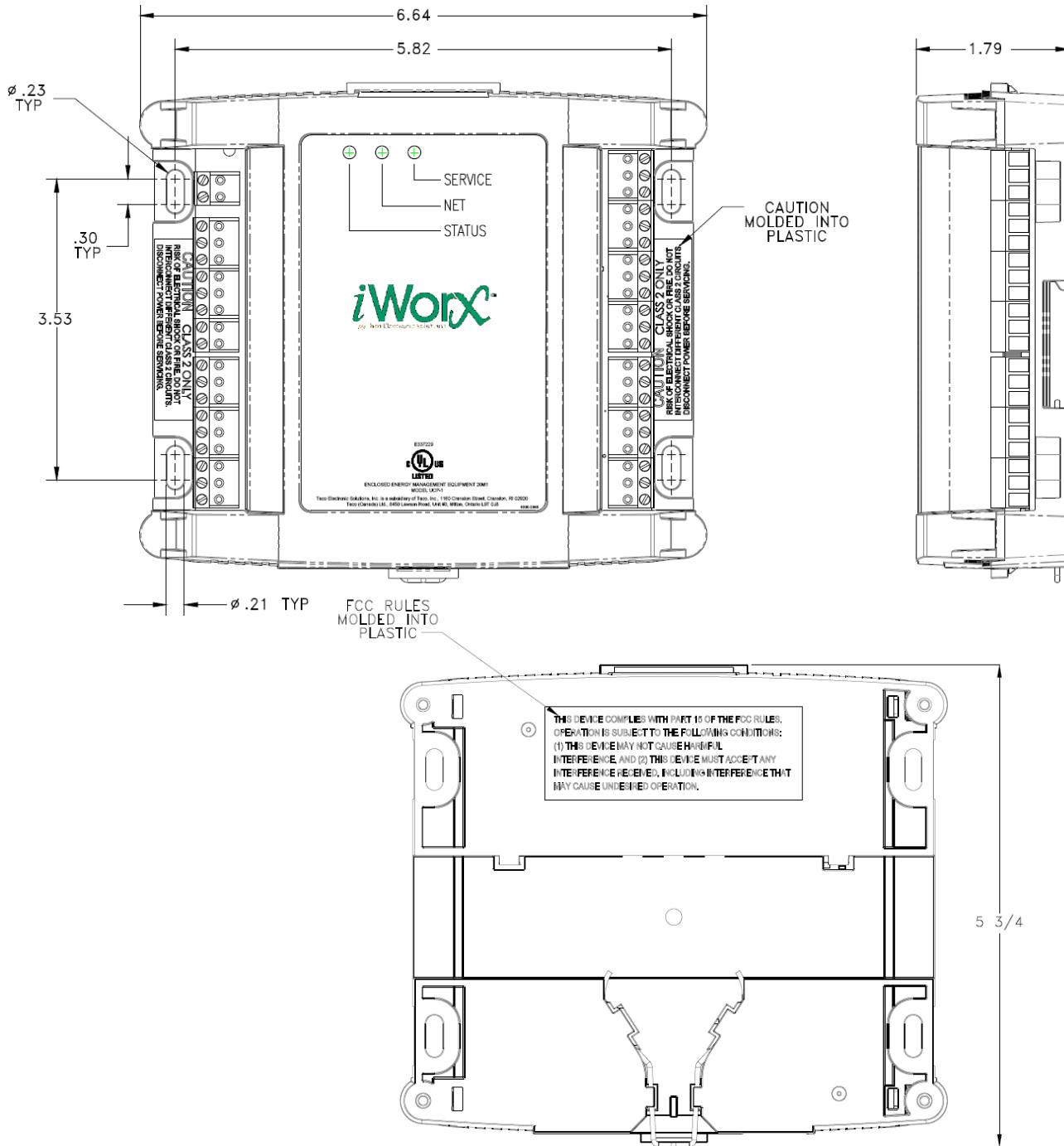


**Warning:** Electrical shock hazard. To prevent electrical shock or equipment damage, disconnect **ALL** power sources to controllers and loads before installing or servicing this equipment or modifying any wiring.

### 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).

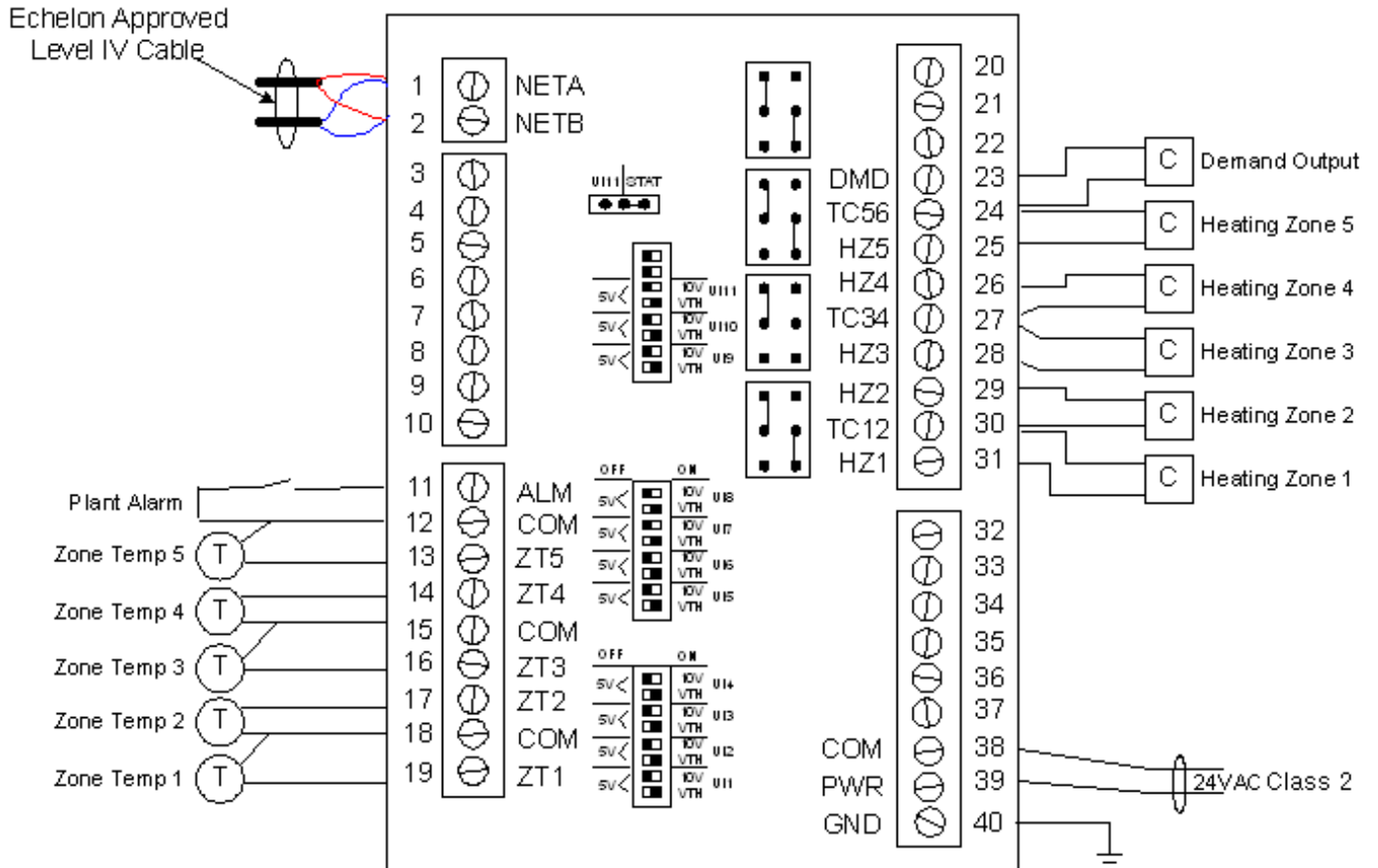
## WIRING INFORMATION



**WARNING:** Terminals 12, 15, 18 and 38 are connected internally on all BZU2 controllers. Disconnect **ALL** power sources when installing or servicing this equipment to prevent electrical shock or equipment damage.

Figure 2: BZU2 Power Sourcing

### Typical BZU-2 Power Sourcing



**Symbols**

10 K ohm Precon Type III thermistor

24VAC pilot relay or contactor coil

0-10 VDC signal

**Output Jumper Positions**

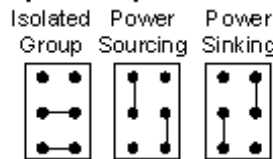


Figure 3: BZU2 Power Sinking

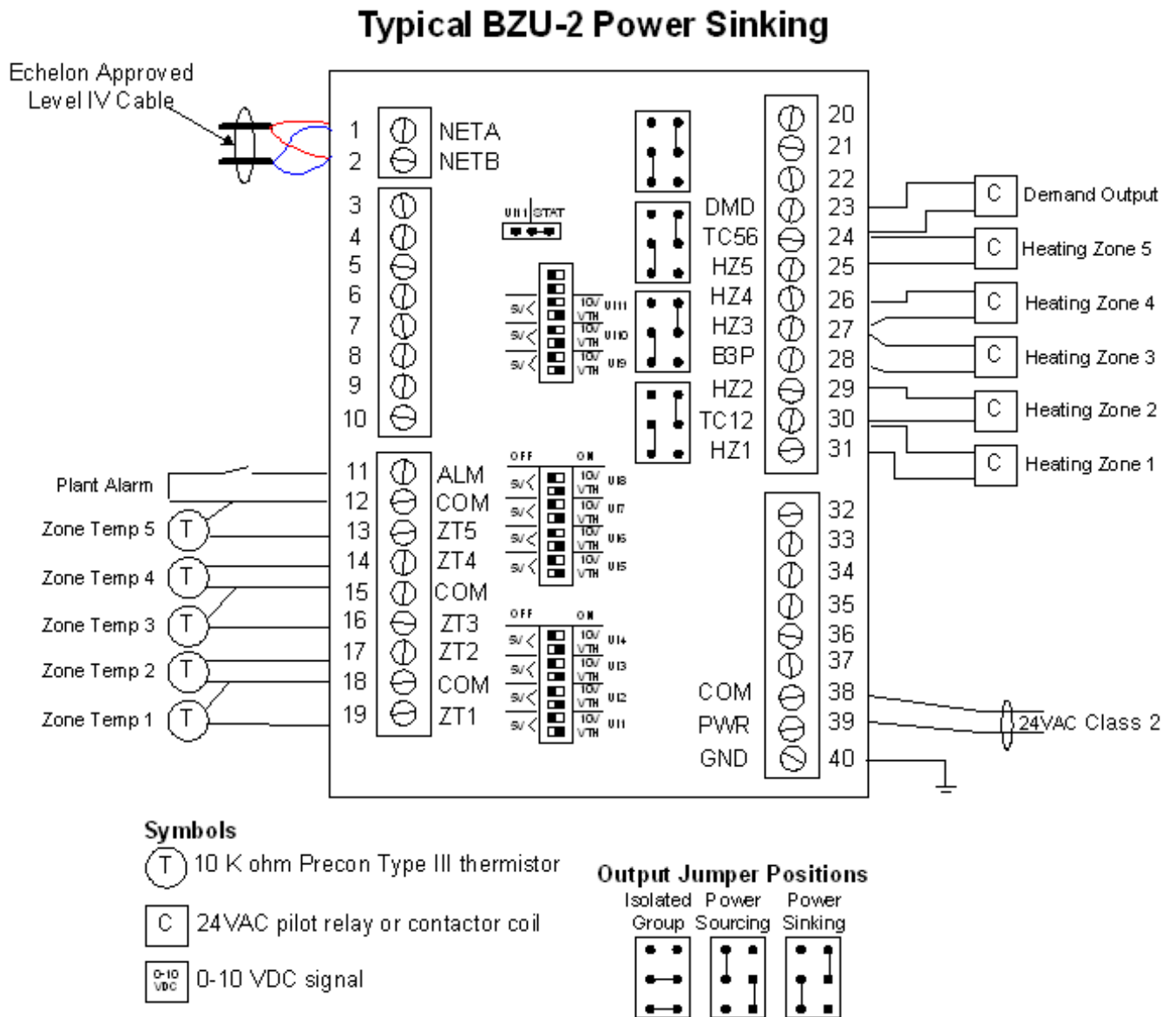
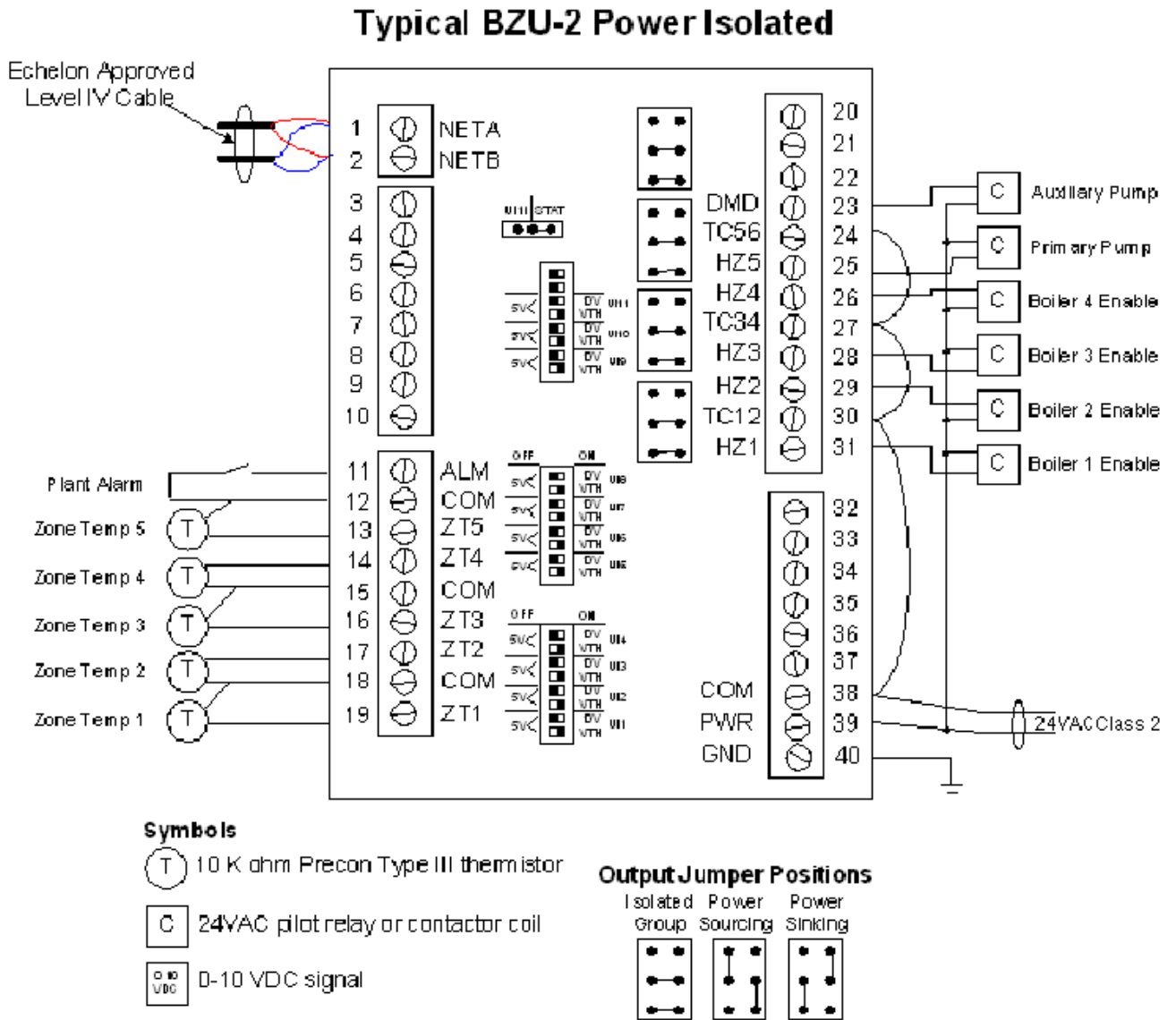


Figure 4: BZU2 Power Isolated



## Connecting Input Devices

### Zone Temperature Sensors (ZT1, ZT2, ZT3, ZT4, ZT5)

To connect the Zone Temperature thermistor to the unit, attach one wire from the thermistor to a ZT terminal (T13, T14, T16, T17, T19) and the other wire to an adjacent common (T12, T15, T18). See Figure 2, Figure 3, or Figure 4 for details. The thermistors used must be 10K Precon Type III.

### Plant Alarm (ALM)

To connect the plant alarm to the digital input, attach one wire of the contact to ALM (T11) and the other wire to the adjacent common (T12).

## Connecting Output Devices

### Heating Zones (HZ1, HZ2, HZ3, HZ4, HZ5)

The outputs for the zone valves or pumps must be connected to 24 VAC pilot relays. See Figure 2, 3 or 4 for details.

- Connect HZ1 (T31) to load. Use TC12 as common.
- Connect HZ2 (T29) to load. Use TC12 as common.
- Connect HZ3 (T28) to load. Use TC34 as common.
- Connect HZ4 (T26) to load. Use TC34 as common.
- Connect HZ5 (T25) to load. Use TC56 as common.

### Heating Demand (DMD)

This output may be used to operate a supply pump for the zone circuits or to signal a heat demand to a non-networked boiler control or other heat source. For most applications, this output must be connected to a 24 VAC pilot relay. See Figure 2, 3 or 4 for details.

- Connect DMD (T23) to load. Use TC56 as common.

## 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, precon type II 10K thermistor or Taco Series T101 thru 103

#### Switch Input

- Dry Contact
- Normally closed; software selectable
- 5 Volts DC Max

## Outputs

- 24 VAC
- 1A @ 50C, 0.5A @ 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](http://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 iWorX BZU2 is a self-contained interoperable controller for open/close zone valves or on/off pumps in a hydronics system. The BZU2 maintains the temperature of up to five zones by operating zone valves or pumps in conjunction with a BLM Series boiler controller. It may also be used as a stand-alone zone controller with a non-networked heat source.



This product is not intended for safety or limiting functions.

The temperature in each zone is controlled individually. Separate occupied temperature setpoints can be set for each zone, and an unoccupied temperature setpoint is common to all zones. Occupancy is determined by the associated LCI group.

A temperature sensor is monitored in each zone. The pump/valve output for each zone is operated based on a proportional plus integral (P+I) control loop that determines a heat demand value. The heat demand output is turned on when any zone demand output is on.

The “zones” may be indoor spaces with room temperature sensors or other radiant panels with embedded or surface sensors. The BZU2 may be set to communicate its heat demand to the BLM Series boiler controller, which then provides the appropriate supply temperatures.

When associated to a BLMR The BZU2 may be configured for a secondary loop supply, which uses the injection functions of the BLM, or it may be set to use only the primary loop as a supply.

The commissioning switch displayed on the LCI can be set to turn on all five zone outputs and the heat demand output simultaneously for test purposes.

The plant alarm input may be used to send an alarm to the LCI when the digital input changes state.

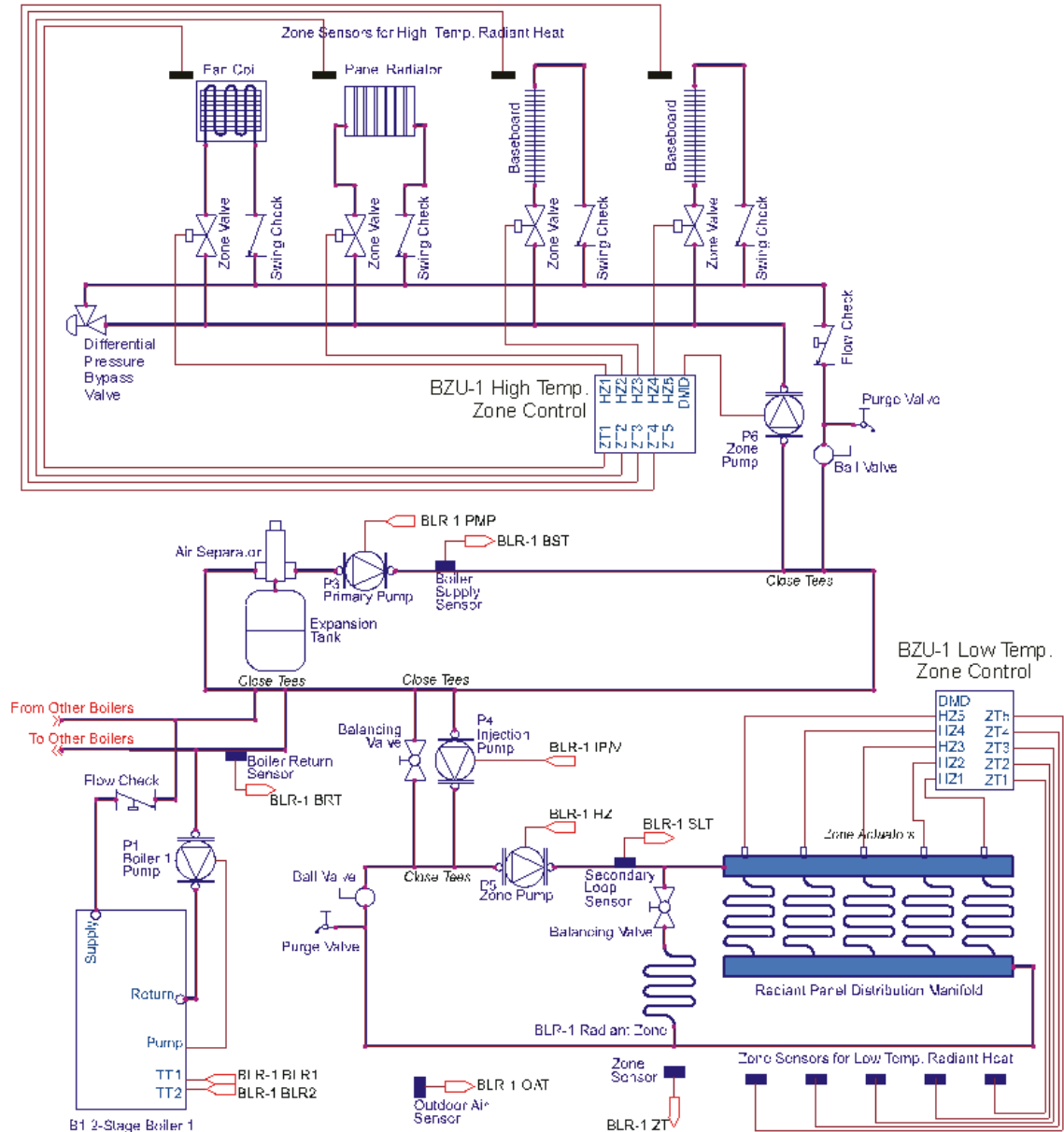
The outputs are capable of switching low voltage, low current; therefore, auxiliary relays or contactors are required for pumps or valves that exceed the output ratings.

## Application Example

Figure 5 represents a possible application for the BZU2 controller. This application shows two BZU2 controllers, one on a secondary loop and one on the primary loop of a hydronics system. When connected to a BLMR the BZU2 on the secondary loop could be used for indoor heating.

Note that this is a generalized drawing. It may not be appropriate for some installations, and is not intended to show all piping components and detail. Relays are not shown for line voltage devices; for clarity, only the controlling signal is shown. Systems must be designed in accordance with basic hydronic principles as well as local and national codes. The system designer must ensure safety requirements and protection of the system components.

**Figure 5: Multizone Radiant Heat System**





## SEQUENCE OF OPERATION

This section describes the detailed sequence of operation for the BZU2 control strategy. The italicized terms refer to the settings available on the LCI. (See “Controller Identification” on page 20.)

### Occupancy and Zone Setpoints

#### Indoor Zone Control

The BZU2 is always in an indoor zone control mode. The occupancy of all five zones is determined by the group occupancy status communicated from the LCI. At the LCI group level, the occupancy may be scheduled or manually set to the occupied state. At the BZU2 zone level, each zone may be individually forced on by turning the *Zone 1/2/3/4/5 Override* switch to “On”. When in the unoccupied state, each zone is controlled to the common *Unoccupied Setpoint*. When occupied, each zone is controlled to its individual *Zone 1/2/3/4/5 Occupied Setpoint*.

### Outdoor Temperature Limits

The outdoor air temperature (OAT) is communicated from the BLM Series boiler controller to allow for warm weather shutdown. When the OAT is greater than the *OAT Heating Cutoff*, zone heating is disabled.

At the BZU2 zone level, turning “On” the *Zone 1/2/3/4/5 Override* switch overrides the outdoor limits for the individual zones.

If there is not a BLM series controller on the network, the OAT is received from an ASM-2 auxiliary sensor module.

### Zone Output Operation

The five zone outputs may be used for on/off valves, on/off pumps or other heat sources. If not disabled by the outdoor limits, the outputs for each zone are operated to maintain the zone setpoints established above. The outputs are controlled by proportional plus integral (P+I) feedback loops that compare the individual zone temperatures (*Zone 1/2/3/4/5 Temperature*) with the respective setpoints (*Zone 1/2/3/4/5 Setpoint*).

When the demand for a zone reaches at least 10%, the output is turned on to open the valve or operate the pump. The output remains on until the demand drops to 5% or less. For each output, a five-second on-delay and a minimum on time of one minute to protect against short cycling. The status of each output is displayed on the LCI (*Zone 1/2/3/4/5 Output*).

#### Proportional + Integral Tuning

The zone demands are calculated as a percentage such that the value is 1% for every degree centigrade that the temperature is below the setpoint, multiplied by the proportional gain. The integral term is added to that percentage to eliminate any offset. The proportional gains and integral times are adjustable by using the corresponding LCI settings (*Zone 1/2/3/4/5 Proportional Gain* & *Zone 1/2/3/4/5 Integral Time*). The proportional gain determines the effective temperature differential for the zone. For example, with a proportional gain of “20”, the demand reaches 10% at 0.5°C (0.9°F) below the setpoint (output turned on), and drops to 5% when within 0.25 °C (0.45 °F) of setpoint (output turned off). To operate with a wider differential (less frequent cycling of the output), decrease the proportional gain. The integral time determines how quickly an offset is corrected. To allow the offset to remain for a longer period (resulting in less cycling of the output), set the integral time to a longer period (or set it to zero to disable the integral function).

### Demand Outputs & BLM Communication

When any of the zones outputs are turned on, the *Heat Demand* output is turned on. This may be used to operate a supply pump for the zone circuits or to signal a heat demand to a non-networked boiler control or other heat source. If the *BLM Heat Demand* setting is “On”, then the status of this output is communicated to the BLM as a primary loop demand. If the outdoor temperature is below the OAT heating cutoff of the BLM, the primary pump is turned on and the boilers are controlled to provide water at the appropriate outdoor reset setpoint.

The greatest of the five zone demands is displayed as the *Maximum Zone Demand*. If the *BZU2 Zone Demand* setting is “On”, then this maximum value is communicated to the BLMR as a sub-zone demand for the secondary loop. If the outdoor temperature is below the OAT heating cutoff of the BLM or BLMR, the BLM pump is operated and the injection output is controlled (only with BLMR) to provide the appropriate outdoor reset temperature in the secondary loop. The boilers and primary pump are operated as needed to meet the injection demand.

If the BZU2 zones are on the secondary loop of a BLMR, only the *BLM Zone Demand* setting needs to be “On”, since the demand for the boiler is dictated by the injection requirements. This method fires the boiler only as needed. However, both BLMR settings, the *BZU2 Heat Demand* and the *BZU2 Zone Demand* may be turned “On”. The effect of this is to create a demand for the boiler whenever a BZU2 zone is calling. This serves to keep the boiler in a standby mode that could reduce cycling as the demand from the secondary loop varies.

## Networking Controllers

Associations can only be done in a network with an LCI2 present. Please refer to the LCI2 Application Manual for detailed instructions.

### Setting the Hydronic Zone

To associate a DXU type Controller to a BZU2, you start from the BZU2 control screen. Press “Members” to display a list of DXU units on the network. The member status of each is shown in the right-hand column. A member unit is one that operates with shared settings from the BZU2. To change the member status of a DXU controller, just press that controller. It will toggle member or non-member with each press. If a DXU has been selected or deselected, you must press “Save” afterward to confirm the new setting. Only one DXU can be associated to a BZU2.

The BZU will always transmit the first zone settings and space temperature to the DXU.

### Associating a BZU2 to a BLMC

Since multiple BLMC and BZU2x controllers can be a part of an iWorX system, it is necessary to group these controllers so that the BLMC knows which BZU2x controllers it may receive a demand from. To associate a BZU2 Controller to a BLM Series Controller start from the BLM control screen. Press “Members” to display a list of the BZU units on the network. The member status of each is shown in the right-hand column. A member unit is one that communicates its demand to the BLM. To change the member status of a BZU2 controller, just press that controller. It will toggle member or non-member with each press. If a BZU2 has been selected or deselected, you must press “Save” afterward to confirm the new setting. Up to 24 BZU2 controllers can be associated to one BLM Series controller.

## Local Backup Schedule

The LCI normally determines the operating mode. You can define local weekday and weekend backup schedules for situations when the LCI is not available. When the controller detects that the LCI is not available (after 10 minutes without communication), it resorts to the local backup schedules that you have configured. If the local backup schedules are disabled, the controller defaults to the occupied mode.

You configure the occupied and unoccupied times that are used in determining the current operating mode of the controller when it is running a backup schedule. By default, both the unoccupied and occupied time are set to zero, which disables the local backup schedule. This causes the controller to default to the occupied mode of operation if it cannot communicate with the LCI.

## Additional Features

### Commissioning Switch

To allow simple commissioning, a single switch setting can be set at the LCI. By setting the *Commissioning Switch* to "On", all six digital outputs are turned on simultaneously.

### Alarms Monitoring

The controller will detect certain conditions and send them to the LCI as alarms. These alarms are displayed and recorded for later access, but do not alter the system operation.

#### Temperature Sensor Alarm

If the analog input from a thermistor is outside of the expected range of the thermistor (-29 °F to 230 °F [-33 °C to 110 °C]), this alarm will be sent to the LCI. An alarm of this type is most likely due to a wiring fault causing the input to be shorted or open. An open sensor results in a reading of -29 °F (-33 °C), while a short appears as 230 °F (110 °C).

#### Zone Temperature Alarms

The BZU2 generates an alarm for a Zone if the Temperature is well above or below the Setpoint. For occupied mode, the deadband is 1.5 °F (0.83 °C). For unoccupied mode the deadband is 1.5°F (0.83 °C). If the mode changes from unoccupied to occupied, an alarm delay of 30 min will be enforced in order to let the space heat up after a lower temperature setpoint.

#### Plant Alarm

A digital input is available to monitor an alarm signal from the system. This may be derived from multiple sources such as limit switches or motor overloads. A dry contact is used to change the state of the BZU2 input. If the alarm is enabled on the inputs screen, the signal generates an alarm at the LCI. The alarm is cleared when the contact returns to the normal state, which may be selected as "Normally Open" or "Normally Closed" on the inputs screen.

## System Tuning

### P+I Loops

These parameters control the proportional gain and integral time of the controller's proportional plus integral (P+I) control loops. Refer to "Proportional + Integral Tuning" on page 17 before changing these settings. the PI Loop parameters are part of the individual Zone Settings on page 22.

## Automatic Configuration

The BZU2 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 BZU2 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 BZU2 with LNS or other LONWORKS tools if they wish.

The LCI also provides network supervision of the BZU2. The LCI periodically sends a "ping" message to the BZU2, 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 BZU2 is properly installed and recognized by the LCI, the LCI touchscreen can be used to configure the settings of the controller and to monitor the Inputs, Outputs and Alarms. This section describes the commands available on the LCI for monitoring/configuration of the BZU2, and the meanings and suggested values for controller parameters. For more information on using the LCI, see the *iWorX LCI User's Guide*.

### Inputs

This screen list all the inputs on the BZU-2. These values cannot be changed.

Setting	Range	Description
Outside Temp	-29 to 230 °F (-33 to 110 °C)	Measured OAT as reported from the ASM-2 controller
Zone 1 Temp	-29 to 230 °F (-33 to 110 °C)	Measured temperature of each zone. -29°F relates to an open sensor 230°F relates to a shorted sensor
Zone 2 Temp		
Zone 3 Temp		
Zone 4 Temp		
Zone 5 Temp		
Occupancy	Occ, Unocc	Occupancy status of the zone according to schedule or override.
Plant Alarm	Normal, Alarm	Status of the plant alarm.

### Outputs

This screen list all the outputs of the BZU-2. These values cannot be changed.

Setting	Range	Description
Zone 1 Output	Off, On	Status of each zone output.
Zone 2 Output		
Zone 3 Output		
Zone 4 Output		
Zone 5 Output		
Heating Demand	Off, On	Status of the heat demand output.
Max Zone Demand	0.00% to 100.00%	Highest demand of the five zones.
Zone 1 Setpoint	23 to 203 °F (-5 to 95 °C)	Current setpoint for each zone.
Zone 2 Setpoint		
Zone 3 Setpoint		
Zone 4 Setpoint		
Zone 5 Setpoint		

## Configuration

### All Settings

This screen lists adjustments that system managers may modify periodically during normal operation.

Setting	Range	Default	Description
Zone 1 Settings	Structure		Individual Zone Settings display
Zone 2 Settings	Structure		same settings as Zone 1
Zone 3 Settings	Structure		
Zone 4 Settings	Structure		
Zone 5 Settings	Structure		
Unoccupied SP	23 to 203 °F (-5 to 95 °C)	60.0 °F (15.0 °C)	Setpoint to maintain in each zone when unoccupied (or idling in snow melt mode).
BLR Heat Demand	Off, On	Off	If set to "On", the heat demand is communicated to the BLM as a demand for the reset temperature from the primary loop.
BLR Zone Demand	Off, On	Off	If set to "On", the max. zone demand is communicated to the BLMR as a sub-zone demand for the injection pump (secondary loop).
OAT Heat Cutoff	32 to 80 °F (0 to 27 °C)	69.0 °F (20.0 °C)	Outside air temperature above which heating is disabled.
Commissioning	Off, On	Off	If set to "On", all outputs are turned on simultaneously.
Plant Alarm Enable	Disabled, Switch (Open), Switch (Closed)	Disabled	The alarm can be disabled or set to use a NO (Controller will report an alarm if the input is <i>not</i> in the selected state) or NC switch
Zone 1 Name	Max 17 Characters	Zone 1	Name of Zone
Zone 2 Name	Max 17 Characters	Zone 2	Name of Zone
Zone 3 Name	Max 17 Characters	Zone 3	Name of Zone
Zone 4 Name	Max 17 Characters	Zone 4	Name of Zone
Zone 5 Name	Max 17 Characters	Zone 5	Name of Zone
Day Of Week	Not set, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday	Not set	Number of the Day (0=Not set, 1=Sunday, etc),
WDay Occ Time	Structure		Time to begin occupied period for the local backup schedule on weekdays.
WDay Unocc Time	Structure		Time to begin unoccupied period for the local backup schedule on weekdays.
WEnd Occ Time	Structure		Time to begin occupied period for the local backup schedule on weekends.
WEnd Unocc Time	Structure		Time to begin unoccupied period for the local backup schedule on weekends.

## Zone 1 - 5 Settings

Setting	Range	Default	Description
Zone Ovrld	No, Yes	No	If set to "Yes", heating is enabled for that zone at the occupied setpoint, regardless of outside air temperature or occupancy status.
Zone Occ SP	32 to 203 °F(0 to 95 °C)	69.0 °F(20.0 °C)	Setpoint to maintain in each zone when occupied (or when there is a snow melt demand)
Zone Offset	+/- 99 °F(55 °C)	0.0 °F(0.0 °C)	Number of degrees to add to each temperature reading.
Kp	0 to 20%	10.0%	Gain used in the P+I loop that controls the output for zone 1.
Ki (min)	0 to 1000 min	10 min	Response time of the Integral function for zone 1.
Stat Type	Precon II, Precon III, Not used	Precon III	Thermistor type, used in Wall mount or reference location

## Backup Occ Time / Backup Unocc Time for weekdays and weekend

Setting	Range	Default	Description
Hours	0-23	0	Military time for the hour of the day when the occupied or unoccupied state starts
Minutes	0-59	0	Minute, when occupied or unoccupied state starts

## Alarms

Alarm	Range	Alarm Trigger	Alarm Reset
Temperature Sensor Alarm	Normal, Alarm	Any one of the attached Sensors is Open or Short	Sensor Reading is within the specified Sensor range or faulty sensor gets replaced
Space Temperature Alarm	Normal, Alarm	Any one of the Zone Temperature readings is: above Space Occ Setp +1.5°F or below Space Unocc Setp -1.5°F	The Zone Temperature reading of the Zone in Alarm is: below Space Occ Setp -1.5°F or above Space Unocc Setp +1.5°F *
Plant Alarm	Normal, Alarm	The contact for the Plant Alarm Input closes	The contact for the Plant Alarm Input opens

\* When the controller enters from Unoccupied to Occupied state the alarm gets delayed for 30 min, to give the space some time to heat up.

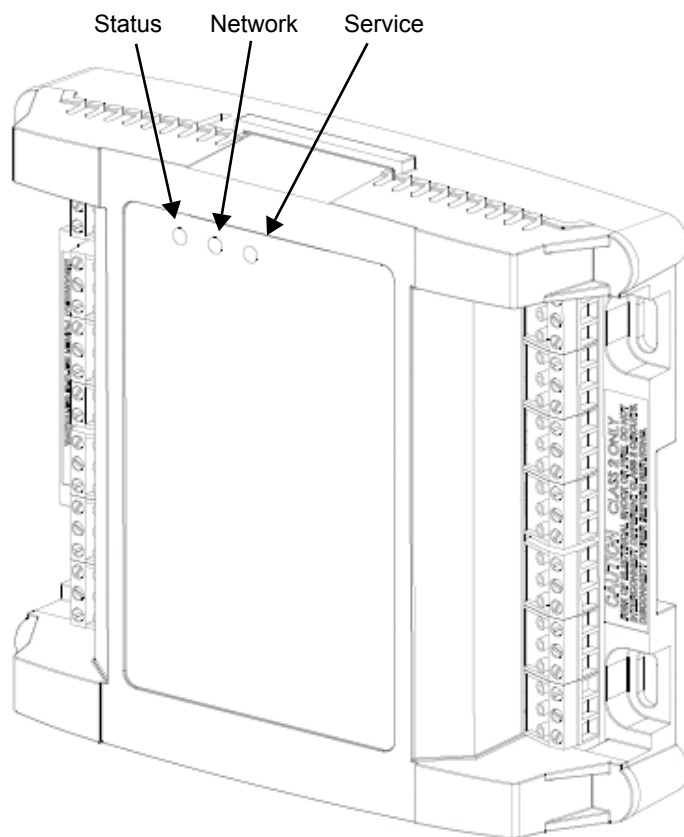
# TROUBLESHOOTING

## 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"> <li>- Solid green when running and configured by an LCI (networking)</li> <li>- Flashing green when running and NOT configured by an LCI (stand-alone)</li> <li>- Solid red when a fault condition exists (control shut down)</li> <li>- Blinking Red - the controller has a device failure</li> <li>- Solid Amber - The controller has not received a LCI ping message in over 10 minutes and is part of a network.</li> </ul>
Network	<ul style="list-style-type: none"> <li>- Yellow while the controller is transmitting data onto the FTT-10A network</li> <li>- Green when there is network activity</li> <li>- Off when there is no network activity</li> </ul>
Service	<ul style="list-style-type: none"> <li>- Illuminated when the service pin is depressed or when a controller gets configured by the LCI.</li> </ul>

**Figure 6: BZU2 Controller LEDs**



## Troubleshooting Tips

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 zone 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 jumpers are in the right position for this application (isolated group, power sourcing or power sinking).
The 10K thermistor reading is out of range.	The input is either shorted or open.
Thermistor readings fluctuate rapidly, sometimes by several degrees.	The controller is not 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.
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).
Why is my pump short cycling?	Ensure that the temperatures are properly grounded and that the PI Parameters are set properly. Kp should be between 5-10% and Ki should be set between 5-10Min.
Why is my space cold in the morning? The setpoint is at 70 °F but the room is still at the Unoccupied Temperature.	When a radiant zone enters the occupied mode after a night setback, the room needs to heat up and this takes longer than a conventional forced air heating. To avoid situations like that, schedule your occupied time 30 min (or the desired warm-up time for your individual situation) before you get up or expect the temperature to have reached the comfort point.

## Getting Help

Components within iWorX BZU2 controller cannot be field repaired. If there is a problem with a controller, follow the steps below before contacting your local TES representative or TES technical service.

1. Make sure controllers 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:**

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**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.

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**Taco Electronic Solutions, Inc.**, 1160 Cranston Street, Cranston, RI 02920  
Telephone: (401) 942-8000 FAX: (401) 942-2360.

**Taco (Canada), Ltd.**, 8450 Lawson Road, Unit #3, Milton, Ontario L9T 0J8.  
Telephone: 905/564-9422. FAX: 905/564-9436.

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