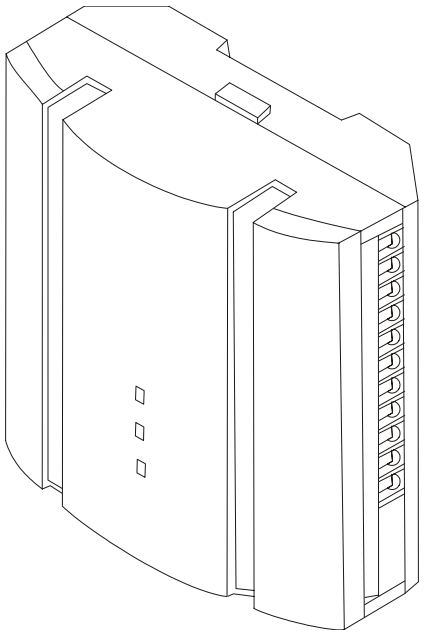
iWorX BLR Series
Installation Instructions

BLR-1



The iWorX BLR-1 is a self-contained interoperable controller for single stage and two-stage boilers. The BLR-1 can control up to four stages of heating using 2 two-stage boilers or up to 4 single stage boilers. Individual occupied and unoccupied temperature setpoints for interior radiant heating are provided.

Additionally, the BLR-1 can control an exterior snow melt system using a pavement mounted snow switch or temperature sensor.

Application

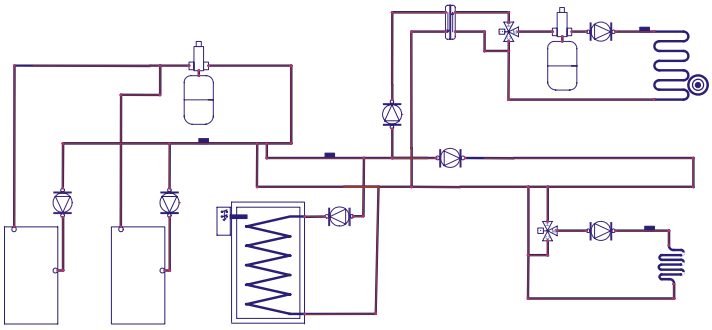
BLR Series controllers support thermistors for temperature inputs. Basic to each unit is a removable electronics module with LED indicators. Coupled to this module is a DIN rail or panel-mount base module with wiring terminal blocks.

They function in standalone mode or as part of a LonWorks® Network using the integral FTT-10 Free Topology communications transceiver. This network interface enables the controllers to be integrated with a building automation system.

Applicable Documentation

Description	Audience	Purpose
iWorX LCI User's Guide	– Application Engineers – Installers – Service Personnel – Start-up Technicians – End user	Provides instructions for setting up and using the iWorX Local Control Interface.
iWorX BLR-1 Application Manual	– Application Engineers – Wholesalers – Contractors	Provides specific application information about the BLR-1, including sequence of operation and configuration information.
Additional Documentation	*LonWorks FTT-10A Free Topology Transceiver User's Guide,* published by Echelon Corporation. It provides specifications and user instructions for the FTT-10A Free Topology Transceiver.	

Typical Use



Innovex Technologies
511 Braddock Avenue
Turtle Creek, PA 15145
www.innovextechnologies.com

Printed in the USA 2006.04.17

iWorX-BLR-INS-100

Copyright Notice

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 that are suitable for 167 °F (75 °C).

Static Electricity

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

- Work in a static free area.
- Touch a known, securely grounded object to discharge any static charge you may have accumulated.
- Use a wrist strap when handling printed circuit boards. The wrist 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 intended for indoor use only. 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 185 °F (85 °C) or fall below -40 °F (-40 °C) and relative humidity does not exceed 90%, non-condensing.

For Installation in the United States

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.

For Installation in the European Community

This equipment meets the requirements of the European Community Directives for Electromagnetic Compatibility (EMC Directive 89/336/EE).

Before Installing

About this Document

The instructions in this document are for the BLR Series modules which control hydronics systems for facility heating.

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 that will be connected to the equipment.

Selecting a Power Source

This equipment requires a UL recognized or CE marked (as appropriate) external power source (not supplied) to operate. The controller power input requires a voltage of 24 Volts AC. Innovex Technologies recommends that the controller use a separate power source from any peripheral devices.

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. Also, be sure to observe proper polarity if wiring to external loads.

To provide necessary RFI and transient protection, the controller's ground (GND) pin (T28) must be connected to earth ground. Failure to properly ground the controller may cause it to exceed FCC & CE limits. Excessive noise could also produce inaccurate sensor data. The power source must be capable of operating with this connection to ground.

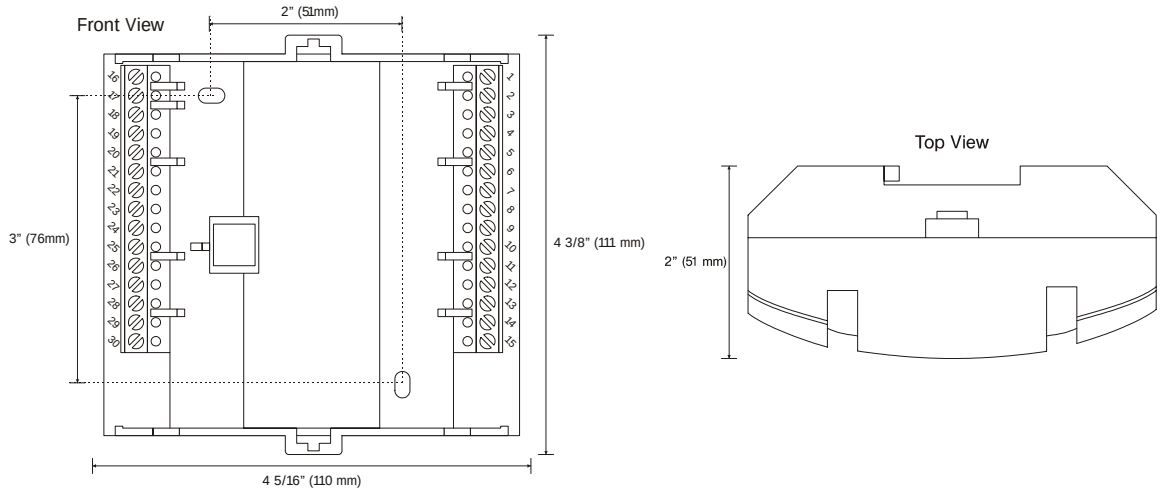
Installation

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 mounting location. Enclosure mounting is recommended.
2. Squeeze the controller at the top and bottom to release the cover tabs, and gently separate the controller base (back) from the electronics module (front).
3. Do one of the following:
   a. Using two #6 pan head screws, mount base of controller to a panel.
   b. Snap controller base on a 35 mm DIN mounting rail (not provided). Multiple units can be mounted side by side on a DIN mounting rail.
4. Wire controller base (See “Wiring Information” on page 5).
5. After wiring:
   a. Line up terminal pins with the correct sockets on the terminal blocks.
   b. Insert cover tabs into brackets on the base of the controller.
   c. Push gently until the cover snaps into place.

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

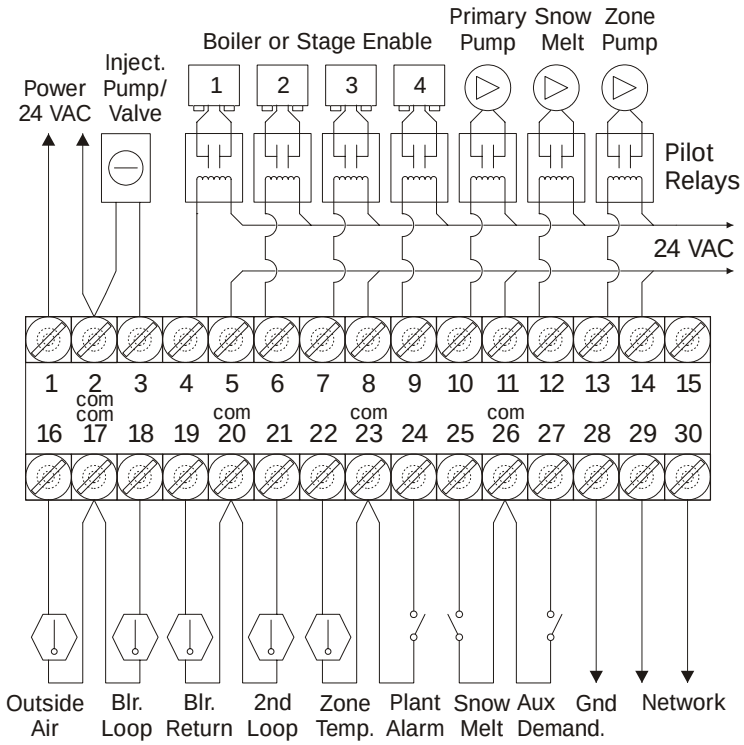
The ground terminal (T28) must be securely connected to earth ground. Failure to properly ground this equipment may increase the risk of electrical shock and may increase the possibility of interference to radio/TV reception.

Connecting the device commons to earth ground will also connect the power source to earth ground.

Wiring Information

WARNING: Terminals 2, 17, 20, 23, and 26 are connected internally on all BLR Series controllers. Disconnect **ALL** power sources when installing or servicing this equipment to prevent electrical shock or equipment damage.

Figure 2: BLR Terminal Connections.



Connecting Input Devices

Outside Air Temperature (OAT)

To connect the outdoor air thermistor to the unit, attach one wire from the thermistor to OAT (T16) and the other wire to the adjacent common (T17). The thermistor used must be 10K Precon Type III.

Boiler Supply Temperature (BST)

To connect the boiler loop thermistor to the unit, attach one wire from the thermistor to BST (T18) and the other wire to the adjacent common (T17). The thermistor used must be 10K Precon Type III.

Boiler Return Temperature (BRT)

To connect the Boiler Return thermistor to the unit, attach one wire from the thermistor to BRT (T19) and the other wire to the adjacent common (T20). The thermistor used must be 10K Precon Type III.

Secondary Loop Temperature (SLT)

To connect the Secondary Loop Temperature thermistor to the unit, attach one wire from the thermistor to SLT (T21) and the other wire to the adjacent common (T20). The thermistor used must be 10K Precon Type III.

Zone Temperature (ZT)

To connect the Zone Temperature thermistor to the unit, attach one wire from the thermistor to ZT (T22) and the other wire to the adjacent common (T23). If the BLR is being used for snow melt control with temperature, connect the Slab Temperature thermistor to this input. The thermistor used must be 10K Precon Type III.

Plant Alarm (ALM)

To connect the plant alarm to the digital input, attach one wire of the normally open contact to ALM (T24) and the other wire to the adjacent common (T23).

Snow Melt Sensor (SMS)

To connect the snow switch to the digital input, attach one wire of the normally open contact to SMS (T25) and the other wire to the adjacent common (T26).

Auxiliary Demand (AUX)

To connect the auxiliary heat demand to the digital input, attach one wire of the normally open contact to AUX (T27) and the other wire to the adjacent common (T26).

Connecting Output Devices

Injection Pump / Valve (INJ)

The injection pump / valve output can be set to 0-10 V or 2-10 V through the control logic. The positive signal input to the injection pump or valve should be connected to the output terminal INJ (T3) and the other wire from the injection pump or valve should be connected to the adjacent common terminal (T2).

The 2-10 V signal may be easily converted to 4-20 mA by increasing the total load impedance to 500 Ω. Common line voltage circulators require a signal converter for proper pump speed control. Use only devices approved by the pump manufacturer.

Peripheral devices that are powered by 24 VAC and internally full-wave rectify their input power are not compatible with, and will damage, the controller when powered from the same supply transformer. Either use peripheral devices that internally half-wave rectify their input power, or power the full-wave device from a separate transformer.

Boiler Enable 1 through 4 (BLR1, BLR2, BLR3, BLR4)

The boiler stage outputs must be connected to 24 VAC pilot relays. The outputs may be connected to 4 single-stage boilers, 3 single-stage boilers, or 2 two-stage boilers. If using two single-stage boilers, connect boiler number one to BLR1 and boiler number two to BLR3. See Figure 2 on page 5 for details.

Primary Loop Pump (PMP)

The output for the primary loop pump must be connected to a 24 VAC pilot relay. See Figure 2 on page 5 for details.

Snow Melt Enable (SME)

The output for the snow melting system must be connected to a 24 VAC pilot relay. See Figure 2 on page 5 for details.

Zone Pump (HZ)

The output for the mixed zone pump must be connected to a 24 VAC pilot relay. See Figure 2 on page 5 for details.

Other Connections

Network (LON)

Network wiring must be twisted pair. One network wire must be connected to one LON (T29) terminal and the other network wire must be connected to the other LON (T30) terminal. 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 (T1) and the other output wire from the power supply to the adjacent common terminal (T2).

Specifications

Electrical

Inputs

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

Outside Air Temperature, Boiler Loop Temperature, Boiler Return Temperature, Secondary Loop Temperature, Zone Temperature

- Precon Type III 10K thermistor

Plant Alarm, Auxiliary Demand

- Dry Contact
- Normally Open
- 5 Volts DC Max

Snow Melt Sensor

- Environmental Technology, Inc. HSC-3 or equivalent

Outputs

Injection Pump / Valve

- 0-10 Volts or 2-10 Volts DC (configurable)
- 2K Ohm minimum load
- 8 bit resolution

Boiler Enable 1 through 4, Primary Loop Pump, Snow Melt Enable, Zone Pump

- 24 Volts AC
- 1 Amp at 50 °C, 0.5 Amps at 85 °C

FTT-10A Network

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

Table 1: Network Wire Specifications

Cable Type	Pairs	Details	Connect Air Catalog No.
Level 4 22AWG (0.65mm)	1	Unshielded, Plenum, U.L. Type CMP	W221P-2001
Level 4 22AWG (0.65mm)	1	Unshielded, Non-Plenum, U.L. Type CM	W221P-1002

For detailed specifications, refer to the FTT-10A Free-Topology Transceiver User's Guide published by Echelon Corporation. For information on ordering Connect Air items, contact Connect Air International; 4240 B Street; Auburn, WA 98001 <www.connect-air.com>.

Power

Power Requirements

- 24 VAC nominal (requires an external supply)

Power Consumption

- With no external loads: 15 VA

Mechanical

Housing

- Dimensions: 4 3/8” high, 4 5/16” wide, 2” deep (111 mm high, 110 mm wide, 51 mm deep)
- ABS Polycarbonate

Electronics

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

Weight

- Controller Weight: 0.45 pounds (0.22 kilograms)
- Shipping Weight: 0.60 pounds (0.28 kilograms)

Environmental

- Temperature: -40 °F to 185 °F (-40 °C to 85 °C)
- Humidity: 0 to 95%, non-condensing

Agency Listings

- UL916

Agency Compliances

- FCC Part 15 Class A
- CE

Troubleshooting

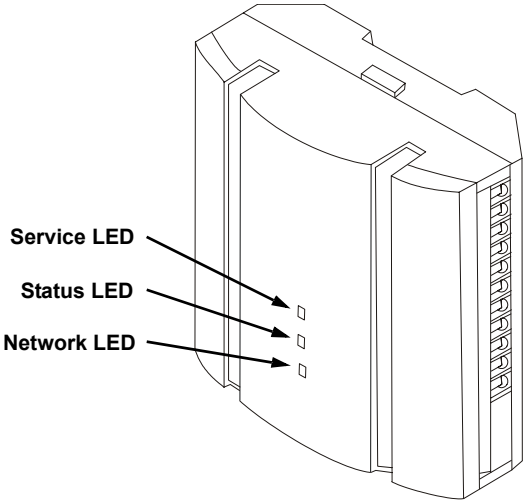
Diagnostic LEDs

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 2: Controller LED Indicators.

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
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 3: BLR Series Controller 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 boiler or pump 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.

There is a "Temperature Sensor Alarm" on the LCI.

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

Thermistor readings fluctuate rapidly, sometimes by several degrees.

The controller is not 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.