iWorx by Taco Electronic Solutions

Installation Guide

502-028

LCU2 Logic Controller

Self-Contained Interoperable Controller Model UCP-1

SUPERSEDES: New

EFFECTIVE: April 5, 2011

Plant ID: 001-3995

Table of Contents

LCU2

The LCU2 is a self-contained device for controlling logic. The unit can control up to eight logic zones and supports up to eight switches that enable occupants to override system control of the logic. The LCU2 also supports a photosensor for control of exterior lighting.

Overview

The LCU2 controls each logic circuit through digital outputs in the form of triacs. Digital inputs from dry contact switches can override automatic control of logic zones. The LCU2 provides a universal input for photosensor input.

Features

- Configurable Logic Zones
- Controls up to 8 logical zone outputs based on any of the inputs.
- Multiple units can be networked together
- Scheduled on and off times
- LonWorks interface to building automation systems
- Occupancy Inputs for individual zones
- Automatic configuration through the LCI
- Photosensor operation (one per system)

PURPOSE OF THIS GUIDE

The *iWorx® LCU2 Application Guide* provides application information for the Logic Controller.

The reader should understand basic logic control 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

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APPLICABLE DOCUMENTATION

Table 1: Applicable Documentation

Description	Audience	Purpose
iWorx® LCU2 Application Guide, Document No. 505-028	– Application Engineers – Wholesalers – Contractors – Start-up Technicians – End user	Provides instructions for setting up and using the iWorx® Logic Controller.
iWorx® LCI2 Application Guide, Document No. 505-002	– 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	– 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	*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. 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 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 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 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 document are for the LCU2 module which controls facility logic.

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 20 feet of all flow and temperature sensors 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.

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The controller and sensor power supplies 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.

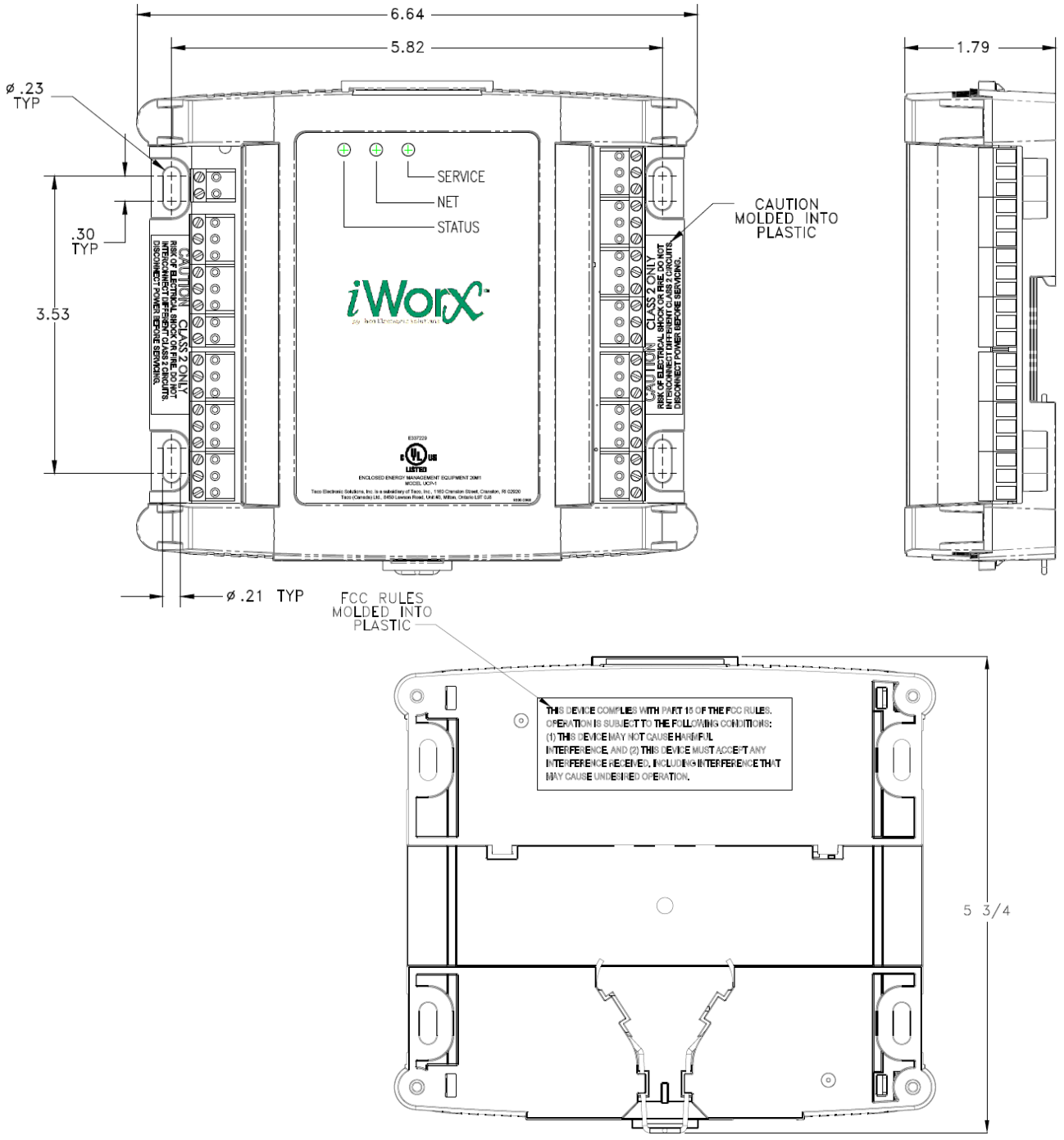
INSTALLATION

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.

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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 6, 9, 12, 15, and 18 are connected internally on all Logic Controller controllers. Disconnect **ALL** power sources when installing or servicing this equipment to prevent electrical shock or equipment damage.

Figure 2: Typical LCU2 Power Sourcing

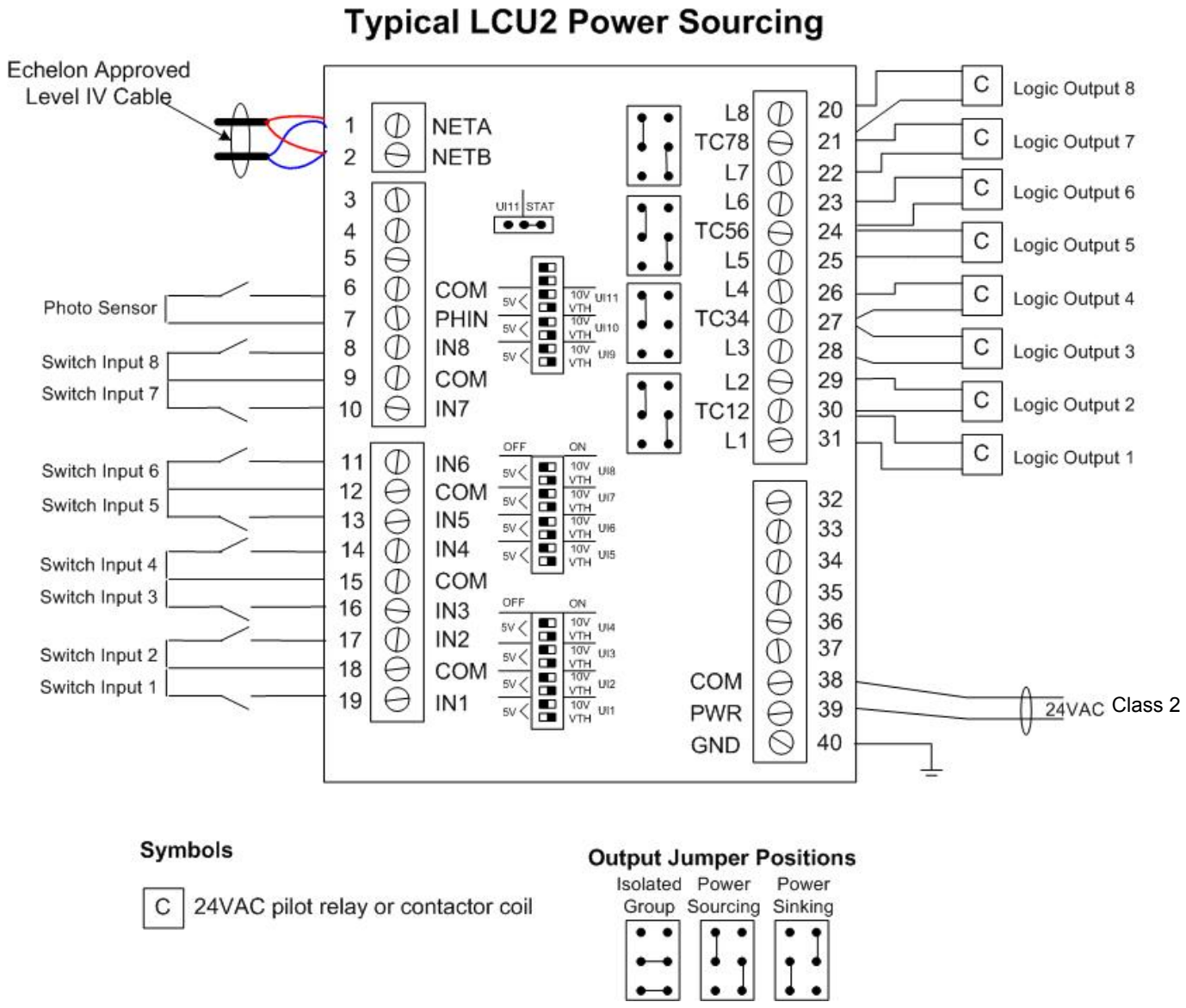

Figure 3: Typical LCU2 Power Sinking

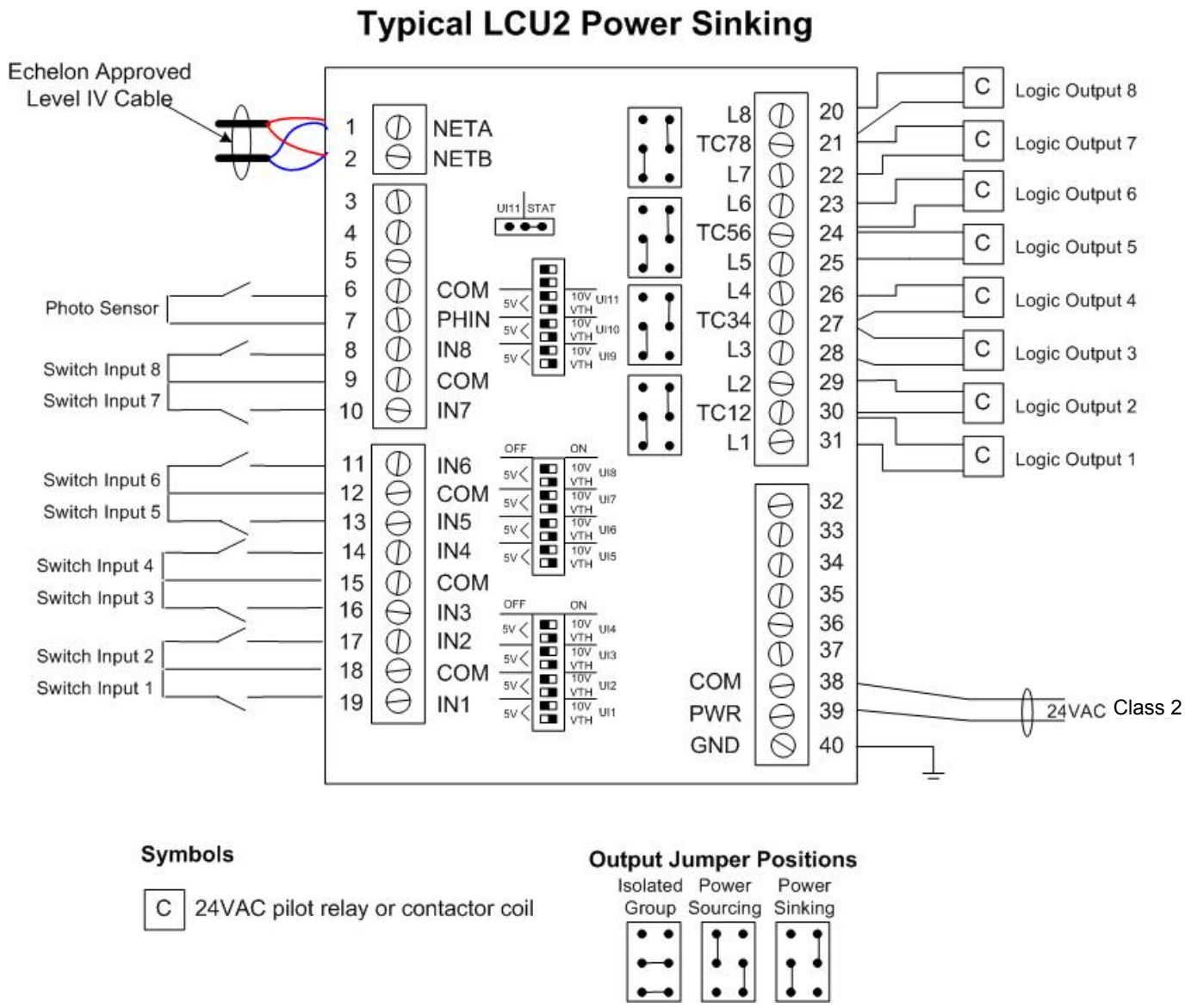

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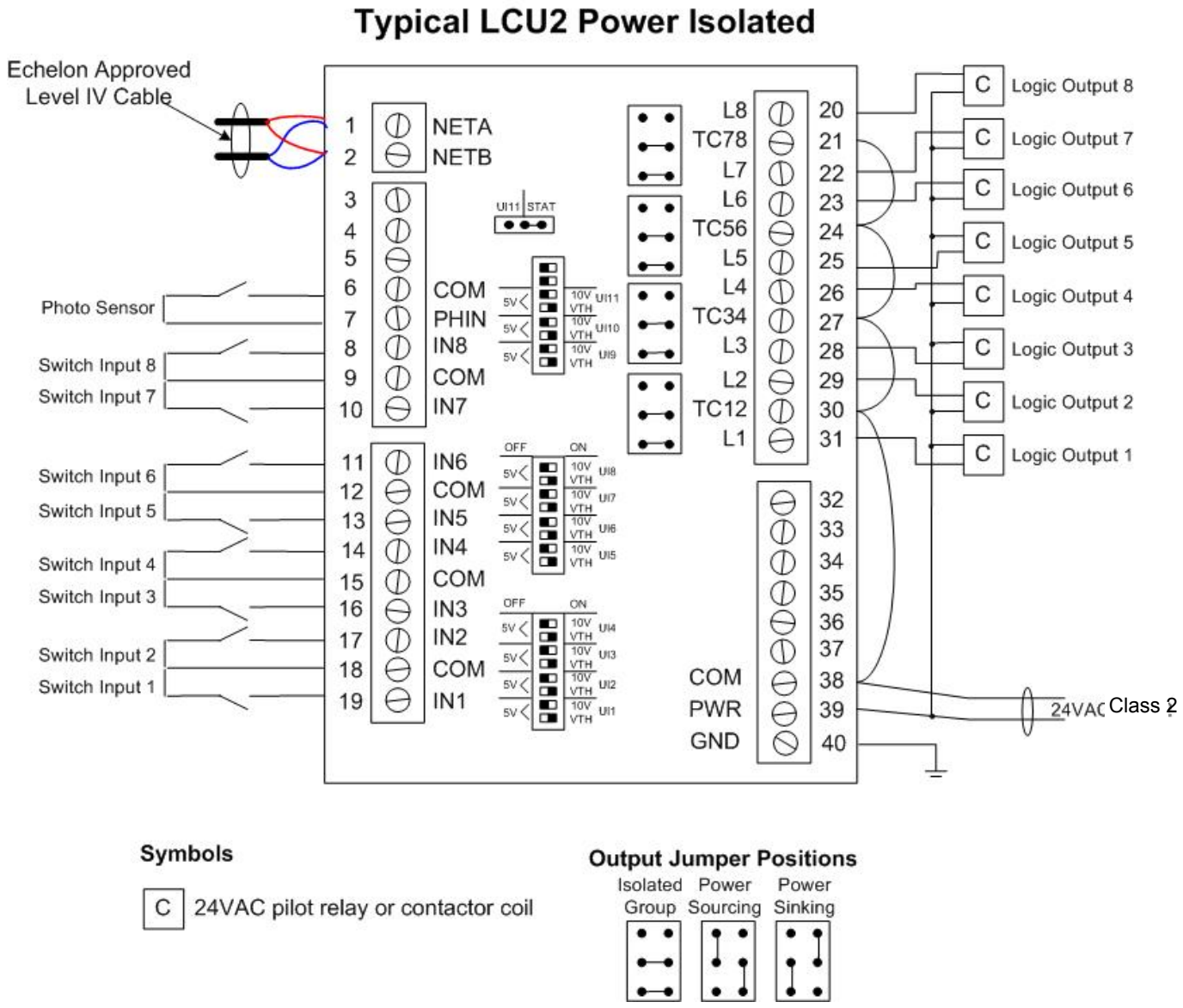
Figure 4: Typical LCU2 Power Isolated



Connecting Input Devices

Remote Inputs (IN1, IN2, IN3, IN4, IN5, IN6, IN7, IN8)

Connect each input to an input terminal (T19, T17, T16, T14, T13, T11, T10 and T8) and the adjacent common terminal. Refer to the figures above for details.

Photosensor (PHIN)

The photosensor must be a switch-type photosensor similar to “The Watt Stopper” model EM-24A2. To connect the photosensor to the unit, connect one wire from the sensor to PHIN (T7) and the other to the adjacent common (T6). Some photosensors require that you observe polarity while wiring. If the system uses several networked LCU2s, there may only be one photosensor in the entire system, and it must be installed on the first LCU2. See the *LCU2 Application Guide* for more details.

Connecting Output Devices

Logic Outputs (L1, L2, L3, L4, L5, L6, L7, L8)

The outputs must be connected to 24 VAC relays or contactors. Refer to the above figures for details.

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

Photosensor

- Cabling: twisted shielded pair, 18 AWG recommended—500 feet max. (152 meters)
- Dry Contact

Override inputs

- Dry Contact
- Normally Open

Outputs

Logic Zone Outputs

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

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).

Power Requirements

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

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Power Consumption

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

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

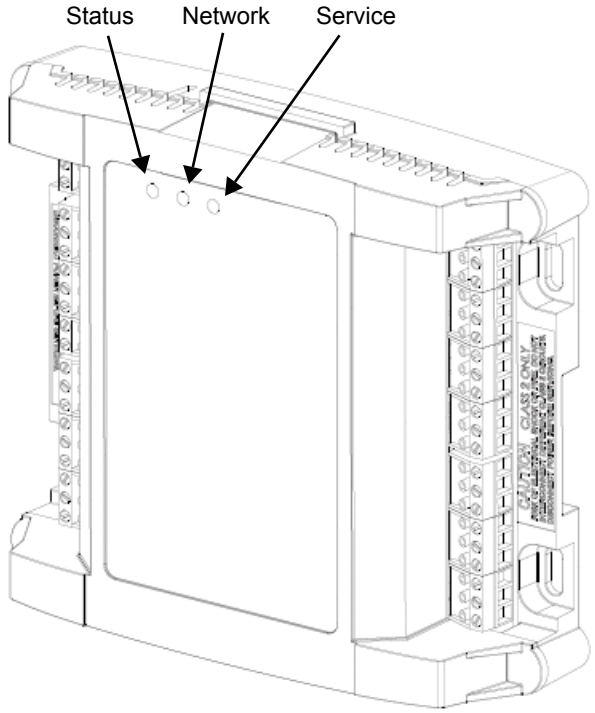
TROUBLESHOOTING

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	– 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	– 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	– Illuminated when the service pin is depressed or when a controller gets configured by the LCI.

Figure 5: LCU2 Controller LEDs



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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.
Status LED flashing even after the LCU2 is recognized by the LCI.	Even after the LCU2's service pin has been pressed and the signal has been received by the LCI, the Status LED of the LCU2 will continue to flash green until at least one logic zone has been configured through the LCI, and the LCU2 has been added to a logic zone. Once the configuration is saved in the LCI and the LCI sends zone information to the LCU2, the LED will display normal status.
The logic zones do not turn on, though the LCI indicates they are on.	Ensure that the controller has been powered with 24 VAC and the logic outputs have been correctly wired to the coils of the logic contactors. Also ensure that the contactors have 24 VAC coils.
Logic zones do not come on as scheduled.	There are several reasons the logic may not cycle on and all should be checked. – Is the logic zone part of a group, and is the group occupied? – Is a photosensor controlling the logic zone and is it bright outside? – Is a timed photosensor in use? Zones set to use a timed photosensor use the backup schedule that is stored in the LCU2, not the group's schedule.
Logic will not turn off, even using input overrides.	– If no backup schedule was set in the LCU2 and communication with the LCI is lost for more than 10 minutes all logic default to ON. Verify communication between the LCI and LCU2, and that the LCU has a backup schedule. – Is the Status LED blinking Green? If so, the LCU has not been configured by the LCI and the default state for the outputs is ON. – Verify that the switches are configured properly and are each part of a logic zone. – If the controller has an improper system time setting, the logic will automatically be turned ON. An improper system time is most often caused by a power outage. The time is usually reset by the LCI, but if the LCU2 cannot communicate with the LCI, it will have the incorrect time. – Is the zone override enabled on the LCI? This network override forces all contactors in the zone to ON, which is useful for testing purposes.
Logic zones are on when they should be off and off when they should be on.	Check the contactor polarity through the device setup page of the LCI. Use that page to change the polarity, if necessary.
I don't understand the difference between the three types of switches.	– SPDT Momentary - Uses 2 inputs (switches) to control a logic circuit. Odd input switches turn the zone 'ON' and even input switches turn the zone 'OFF'. – SPST Momentary - Pressing the switch changes the zone's occupancy state. – SPST Continuous - Every change of state toggles the zone to its opposite state, like a 3-way switch.
Photosensor Problems	The photosensor must be a switch-type photosensor similar to "The Watt Stopper" model EM-24A2. If you are experiencing problems with the photosensor input verify the following: – Have you installed more than one photosensor? Only 1 photosensor is allowed for the entire system. – Is the photosensor enabled? – Is the polarity inverted on the configuration screen? – Is a zone configured to use the photosensor? – Is a contactor in the photosensor controlled zone and is it configured for photosensor operation?

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 application software.

   Device and/or 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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