High Amp Contactor Relay

Specifications

Input Power	5 W @ 12-24Vdc ⎓ Class II / Limited Energy Power Supply
Max Switching Current	20A per point @ 1277Vac ~ 10A per point @ 24Vdc ⎓
Max Switching Voltage	277Vac ~ or 24Vdc ⎓
Independent Contacts	3x Normally Open
Status Indicators	Red LEDs
Enclosure Knock-Outs	(2) dia. 7/8"
Enclosure Rating	TYPE 12K NEMA
Minimum Cycle Time	1 second
Interface	GrowNET™, MODBUS
Relay Ratings	100,000 cycles
Relay Cycle Counters	Up to 4 billion cycles per relay

Modbus

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KEEP THESE INSTRUCTIONS

This product is intended for commercial use only.

REV 03/26

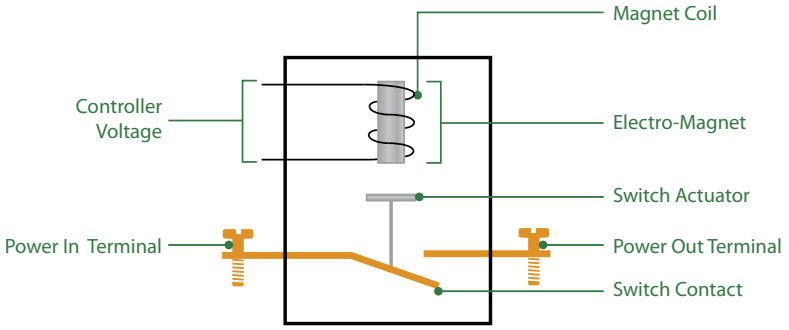
Introduction

GrowControl CX series dry-contact relays interface Agrowtek's intelligent controllers to devices in your growing environment to control high-amperage or multi-leg loads such as motors, heaters, lights, etc. The CX3 can be operated as three independent contacts or as a unified three-phase contactor.

How "Dry-Contact" Relays Work

A relay consists of a mechanical switch and an electro-magnet to turn-on (close) a switch contact. A spring opens the switch when the electromagnet is no longer powered.

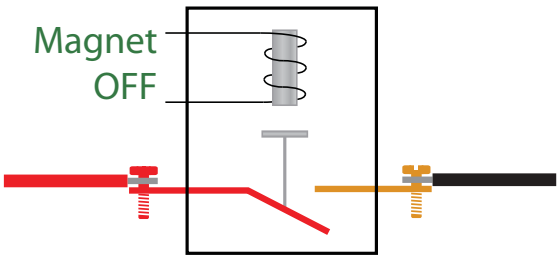
The microprocessor controls power to the magnet coil to open or close the switch contact as required by the controller program.

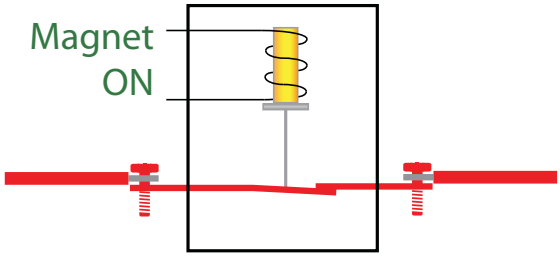


Dry-contact relays can be thought of like a wall-switch:

- Each relay "contact" has a pair of screw terminals just like a wall-switch does.
- A wall-switch (or relay contact) does not supply power, it only allows it through.
- Each switch is independent and can operate different circuits or voltages.

A dry-contact relay is exactly the same as a wall switch, however, instead of operating the switch manually with your finger, an electromagnet operates the switch.





What CX Relays Control

Many types of devices can be operated with a dry-contact switch. A dry-contact interface allows Agrowtek controls to integrate with building controls, high amperage loads and other custom devices such as:

High-Amp Motors & Fans

Electric Heaters

Lighting Loads

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Warnings & Notices

This is a precision electronic instrument which requires proper installation and care to maintain reliability.

⚠ READ & UNDERSTAND ENTIRE MANUAL PRIOR TO INSTALLATION OR OPERATION.
Failure to read, understand and comply with warnings and installation requirements may result in property damage, personal injury or death.

⚠ DANGER Electrocution Hazard ⚠

Disconnected all power sources before servicing or wiring. For continued protection against electric shock ensure the enclosure is properly grounded at the marked chassis ground terminal. Install all electrical equipment and wiring in accordance with national and local electric codes. For indoor use in dry locations only (0-75% RH non-condensing.) Replace serviceable parts only with those recommended by Agrowtek Inc.

⚠ DANGER Risque d'électrocution ⚠

Débranchez toutes les sources d'alimentation avant l'entretien ou le câblage. Pour une protection continue contre les chocs électriques assurer l'enceinte est correctement reliée à la borne de terre du châssis marquée. Installez tous les équipements électriques et le câblage conformément aux codes électriques nationaux et locaux. Pour une utilisation en intérieur dans des endroits secs seulement (0-80% RH sans condensation.) Remplacer les pièces réparable seulement avec ceux recommandés par Agrowtek Inc.

⚠ THIS PRODUCT IS NOT INTENDED FOR LIFE SAFETY APPLICATIONS.
Do not install in hazardous locations or rely soley on this equipment for control over life safety.

⚠ INSTALL IN ACCORDANCE with all national and local plumbing and electrical codes.

Information in this manual is intended for use by individuals possessing adequate backgrounds of electrical and mechanical experience and who comply with all federal, state, and local laws, rules, orders, or regulations related to the installation, service, or repair of electrical, HVAC and related equipment. Any attempt to install, service, or repair equipment may result in personal injury and/or property damage. The manufacturer or seller cannot be responsible for the interpretation of the information contained herein, nor can it assume any liability in connection with its use.

⚠ DANGER: ELECTROCUTION HAZARD
Disconnect power before maintenance or service on the system or system components to prevent equipment damage or electrical shock. Use caution when servicing plumbing to drain the system off away from electrical components and connections. Connect the system and components to GFCI fault protected energy sources to reduce risk of electric shock.

⚠ INDOOR LOCATIONS ONLY
This system is designed for indoor mounting only and must be protected from weather and direct sunlight.

⚠ PREVENT OVER HEATING
Keep air space around the system cool and ventilated to prevent overheating of system components.

⚠ WARNING
This product may contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Installation Instructions

It is recommended to install relays and other switching equipment outside of a grow room in the hallway when ever possible for improved access to the equipment without entering the growing space. Locating equipment in lower humidity areas will also extend the life of the equipment.

General Notes:
1. Install with the connections facing down to reduce the risk of water permeating the enclosures.
2. For indoor installation only. Enclosures are not water-proof.
3. Do not place sensor in direct sunlight.

⚠ **Disconnect power from all devices before connecting or disconnecting cables to prevent damage to components.**

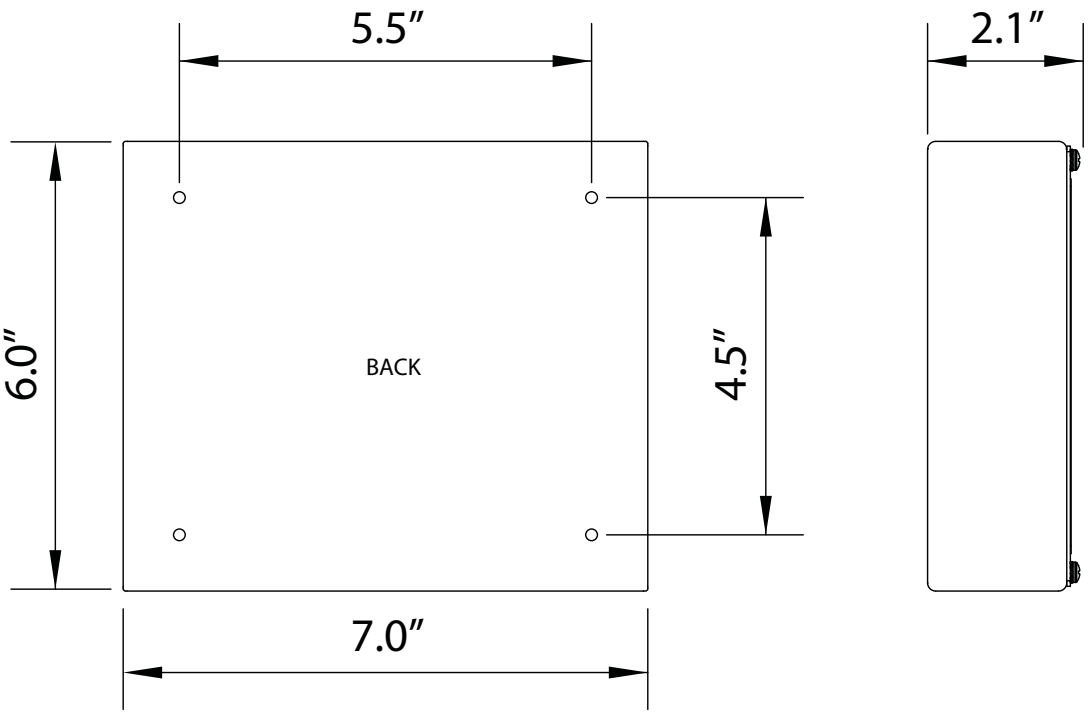
Installing the CX3i

The CX3 intelligent relay is to be securely installed to a vertical wall surface using the four mounting holes provided in the rear of the enclosure.

1. Remove the front cover panel using caution not to damage the LED light pipes.
2. Locate the relay box and mark the mounting hole locations or use the dimensions below.
3. Pre-drill and install anchors if necessary. Keep dust and debris away from the circuit board.

Ensure all dust and contaminants have been blown out of the enclosure.
Hardware is not provided. Drywall screws are recommended.

⚠ **Do NOT drill holes into the enclosure or enlarge holes. Metal chips from drills can cause short circuits on the PCB.**



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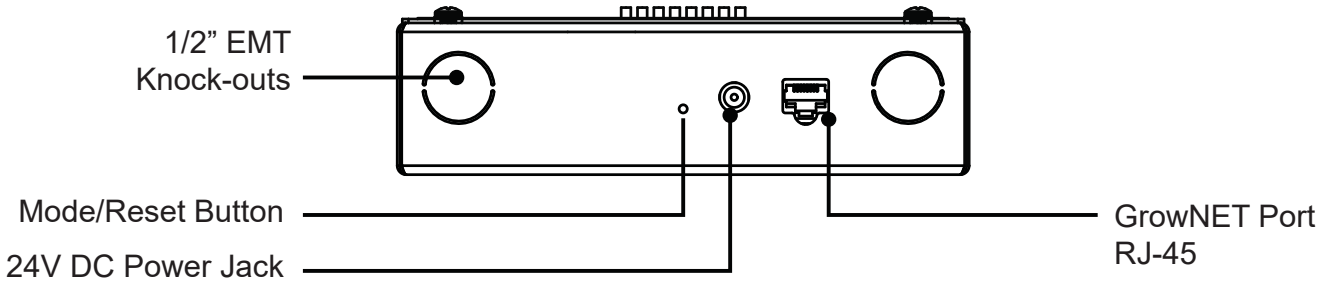
DC Power

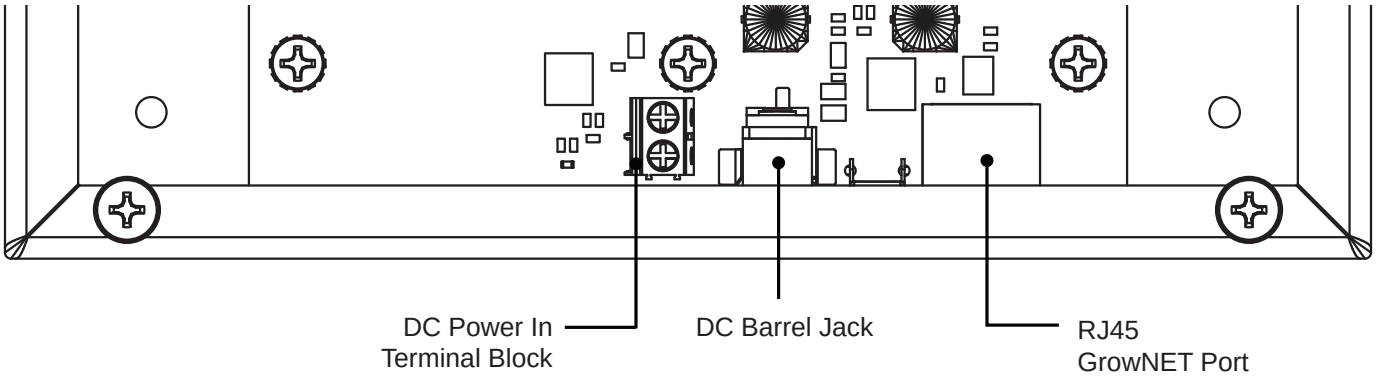
24Vdc is supplied to the CX3 via the RJ-45 port from a GCX controller or HX8 GrowNET™ hub.

An external DC power jack for auxilliary power located on the bottom of the relay but is **not required**.

Standard 7/8" diameter knock-outs are provided on either side for 1/2" EMT conduit fittings.



24Vdc is supplied to the RD8i via the RJ-45 cable when connected to a GCX control system or a GrowNET™ hub. **A seperate power supply is not required.**



⚠ **Do not connect AC power to the DC Power-In terminal block or the barrel jack; damage will occur to the unit.**

Dry Contact Terminals

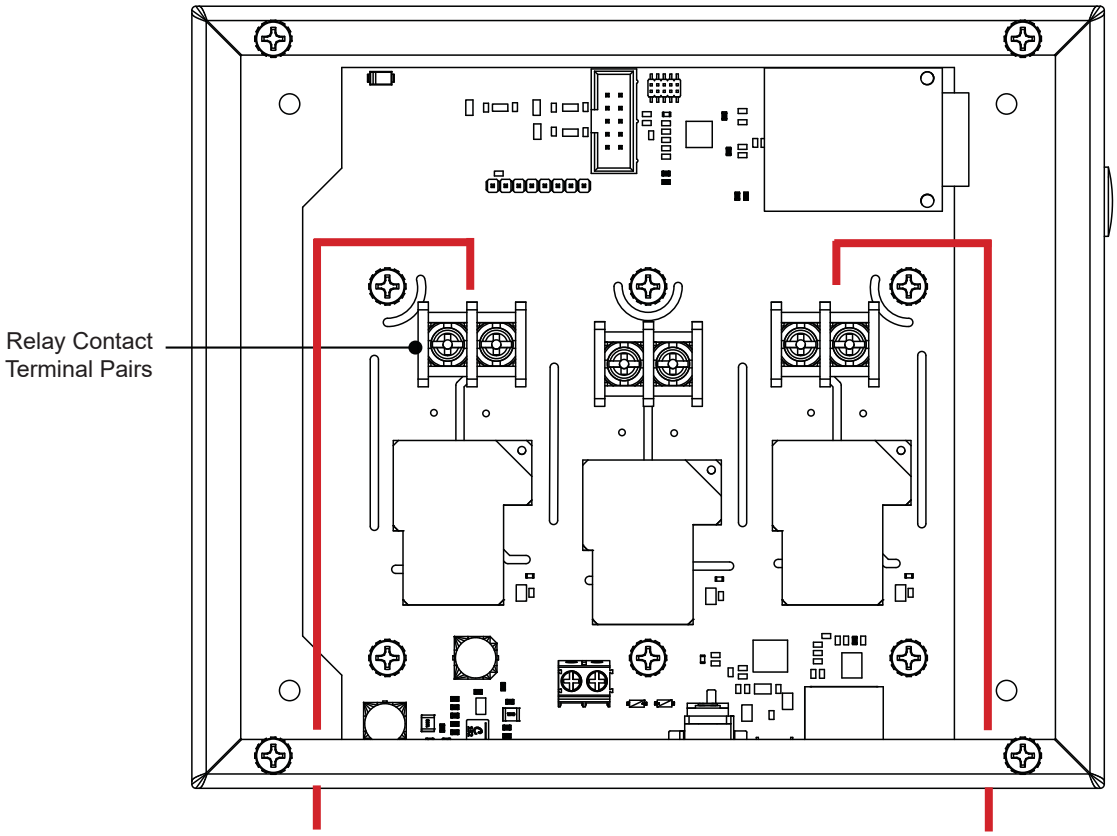
DANGER! Risk of injury or death from electric shock; disconnect all power before wiring or service.

Each relay has one pair of normally-open contacts which are labeled below each contact. Each relay terminal pair is independent allowing mixed signal control.

Routing Wires

Route wires from the conduit fittings along each side of the relay pcb and above the relays to the terminal blocks as indicated by the red lines in the diagram below.

Avoid routing wires above the terminal blocks; keep the processor area free of excess wiring.



General wire routing path shown by the bold red lines..

NOTICE: Install and connect equipment in accordance with all national and local electrical codes.

Operation Mode

The CX3i contactor relay has two modes of operation; 1) as three independent relays for single-phase loads, or 2) as a singular three-phase contactor with all three relay contacts working as one.

Mode 0 (three-phase contactor mode)
In this mode, which is factory default, the CX3i relay represents a singular output and all three relays operate together as one. This is used with three-phase AC loads such as 230V motors, or with 2-pole full-phase loads (240V).

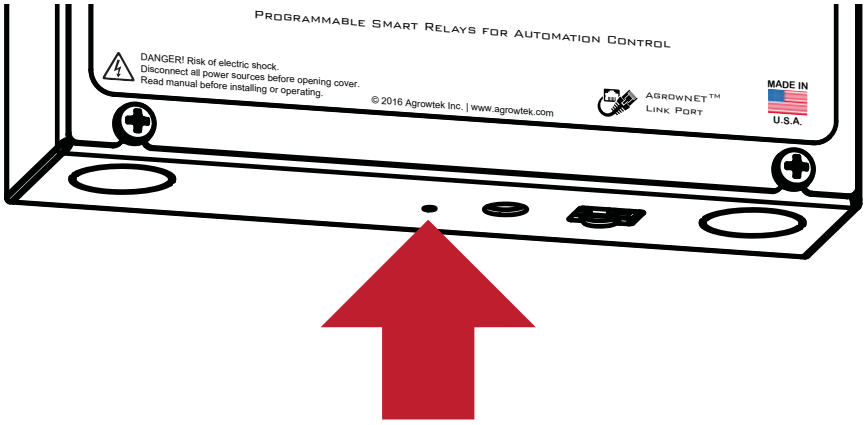
This mode can also be used with single phase loads wired in parallel through the contacts for loads greater than a single 20A contact rating.

Mode 1 (independent relay mode)
In this mode the CX3i relay represents three separate relay channels with independent control. This mode is used for high current single phase loads such as electric heaters, 120V motors, dehumidifiers, etc.

Set the Operation Mode

Changing between the modes requires a single momentary press of the reset/mode button with a paper-clip or similar object. The mode can be verified by removing the front cover and observing the LED labeled "D1" near the center of the PCB as the button is pressed.

1x Flash = Unified Contactor Mode (factory default)
2x Flash = Independent Relays Mode



Device Reset

Devices retain their "device address" in memory. If a device will not recognize it may have a conflicting address with another device that is in use.

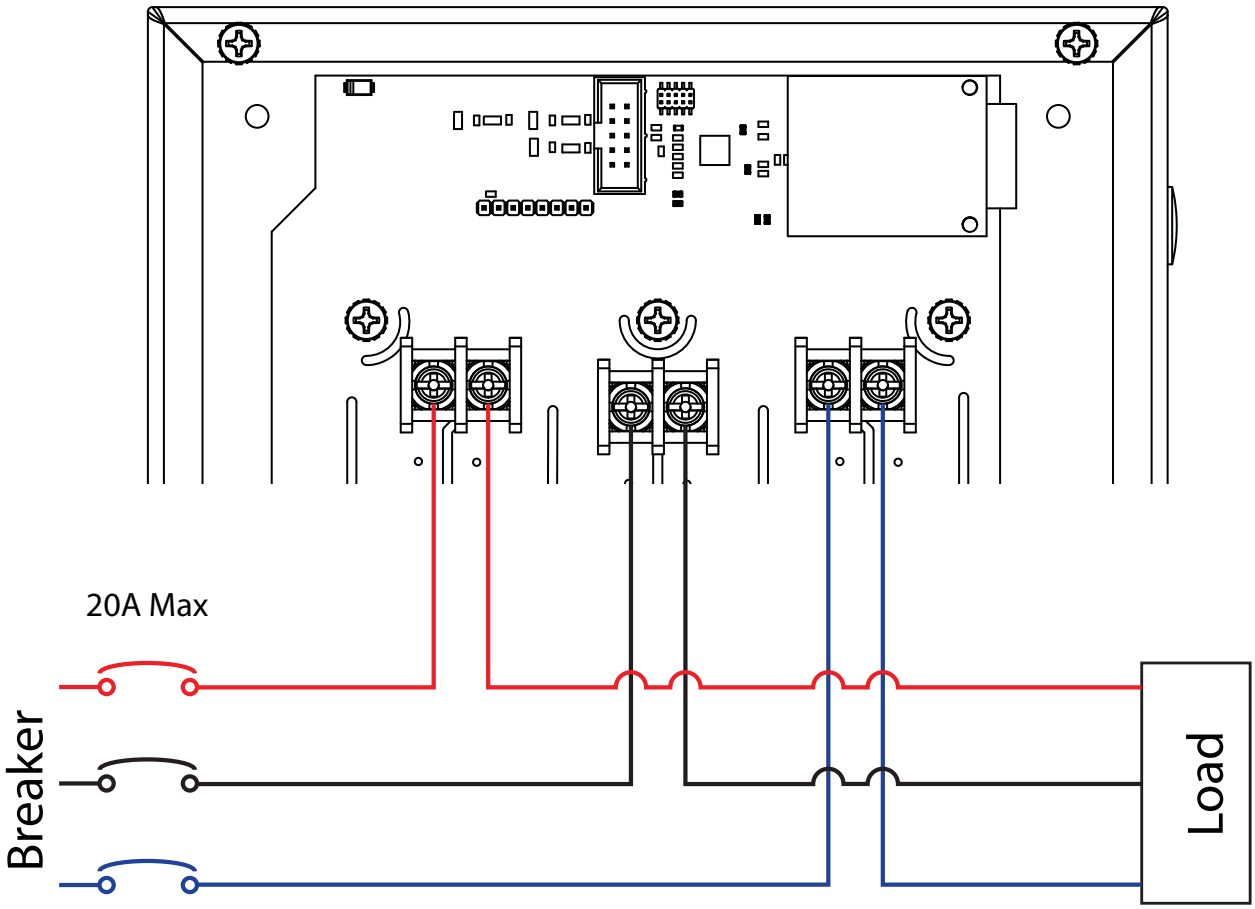
Reset the device by holding the reset/mode button in for three seconds while the device is plugged in. The status LED will flash three times to indicate it has reset.

Example Connections, Contactor Mode

Three phase loads require all three phases to be connected and disconnected simultaneously. Each terminal pair is designed to switch one of the phases according to the power ratings.

Connections should be made from a circuit breaker which limits the energy to within the ratings of the contacts or the equipment, which ever is lower.

A manual disconnect switch is recommended between the breaker and the CX3i input terminals.



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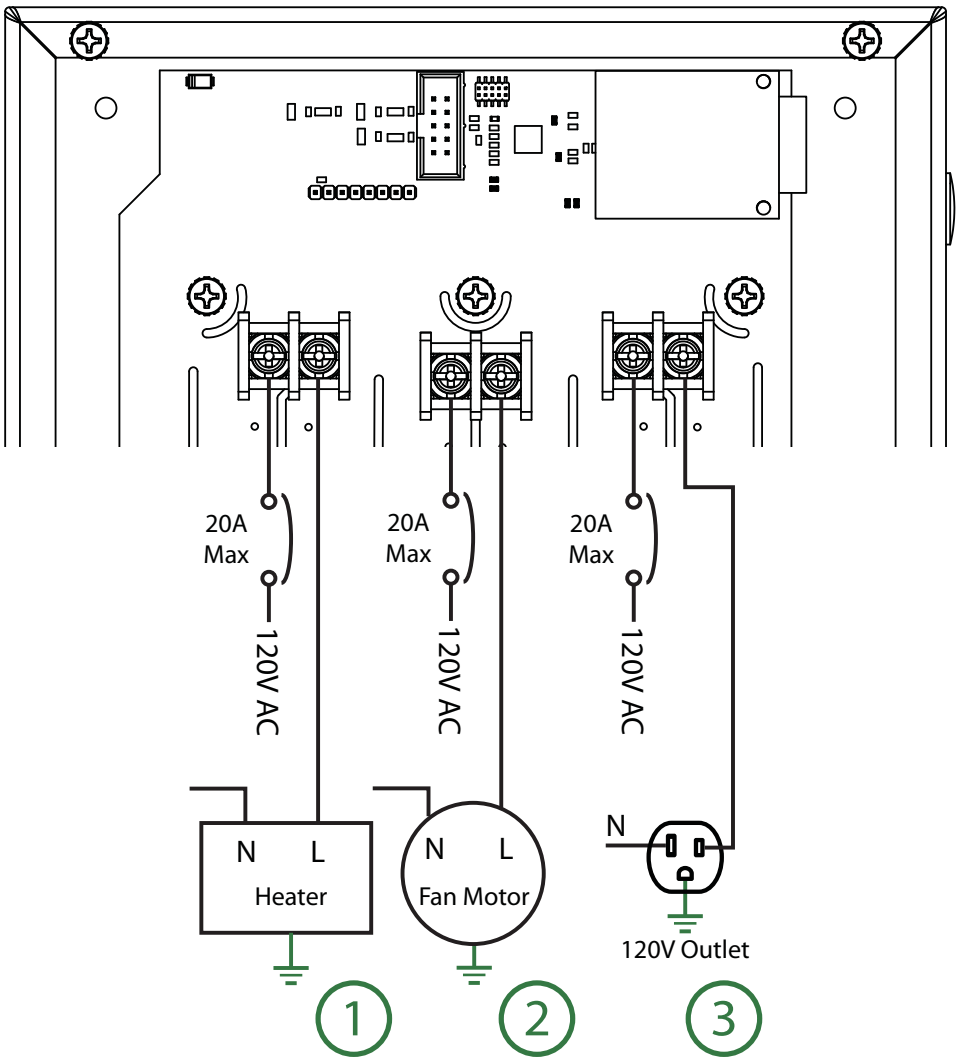
Example Connections, Relay Mode

Standard single phase AC or DC equipment can be controlled via each relay independently when the relay is in mode 1. Each relay has a single normally open contact pole. Line voltage is supplied to the terminals from an appropriately sized current limiting device such as a circuit breaker. The line voltage is switched through the relay from one terminal to the other where it is carried to the load. The neutral and ground connections are made at the load and do not pass through the CX3i relay.



1. Heaters

Standard electric heaters can be operated by controlling the line voltage to the heater with one or more contacts in the CX3i.

2. Fan Motors

Single phase motors typical for circulation and medium sized fans can be operated by controlling the line voltage to the fan(s) with one or more contacts in the CX3i.

3. 120V Outlets

Contacts can switch up to 20A to directly feed receptacles or other 120V equipment. Size the circuit overload protection properly for the receptacle that is being installed.

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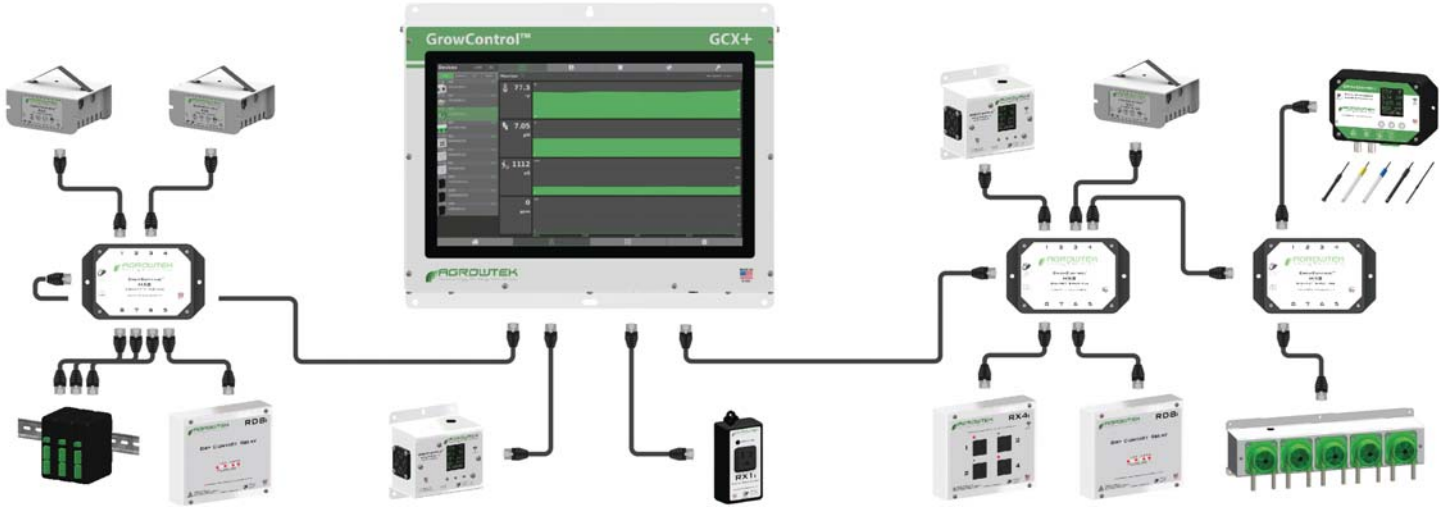
Connection to GrowControl™ GCX

All GrowNET™ devices are connected using standard CAT5 Ethernet cable with RJ-45 connections.

Devices can be connected directly to the GrowNET™ ports on the bottom of the controller, or through HX8 GrowNET™ hubs. It is typical to simplify cabling by locating hubs centrally in hall ways and rooms allowing single runs from an 8-port device hub back to a central hub or back to the controller.



Refer to the GCX controller manual for details on adding the device to the system.

GrowNET™ Hubs

HX8 GrowNET ™ hubs expand a single port into eight more ports. Hubs can be daisy-chained to form a network of up to 100 devices per GrowNET™ bus. Individually buffered port transcievers provide excellent signal integrity and extended communication strength and range.

Hubs provide up to 1A of power for operating sensors and most relays directly over the CAT5 cable. A DC jack on the hub provides 24Vdc power to the ports from the included wall power supply. A terminal block power option is also available.

Installation Notes

⚠ NOTICE

GrowNET™ ports use standard RJ-45 connections but are NOT compatible the Ethernet network equipment. *Do not connect GrowNET™ ports to Ethernet ports or network switch gear.*

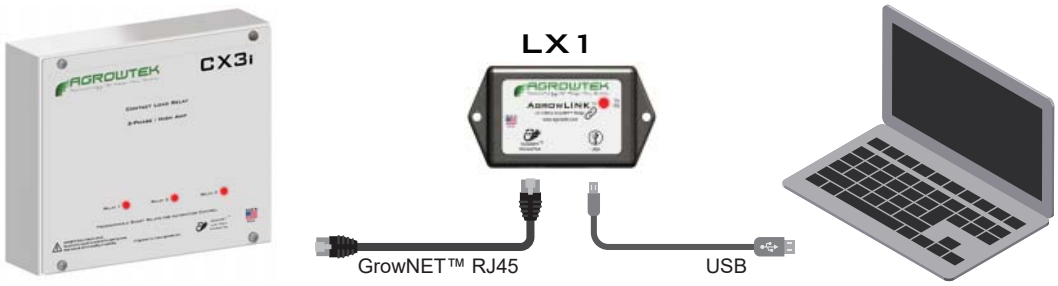
⚠ DIELECTRIC GREASE

Dielectric grease is recommended on RJ-45 GrowNET™ connections when used in humid environments. Place a small amount of grease onto the RJ-45 plug contacts before inserting into the GrowNET™ port. *Non-conductive grease is designed to prevent corrosion from moisture in electrical connectors.*

- Loctite LB 8423
- Dupont Molykote 4/5
- CRC 05105 Di-Electric Grease
- Super Lube 91016 Silicone Dielectric Grease
- Other Silicone or Lithium based insulating grease

Connection to USB AgrowLINK

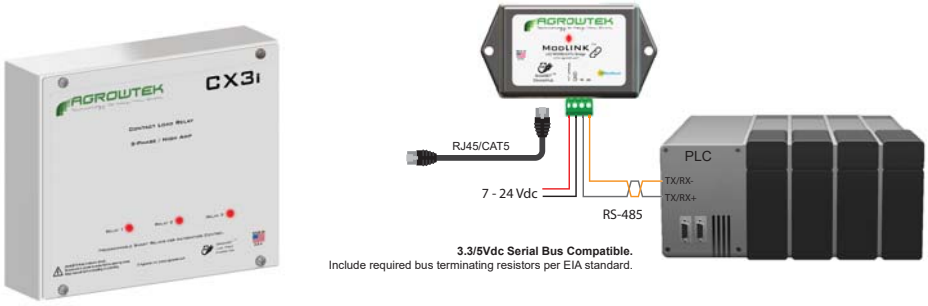
Agrowtek's intelligent relays may be connected to the LX1 USB AgrowLINK for firmware updates, communication protocol configuration, addressing and manual operation. Standard drivers automatically install in Windows for the LX1 USB AgrowLINK. GrowNET API is available for custom software applications.



Connection to MODBUS RTU

RS-485 / RS-422

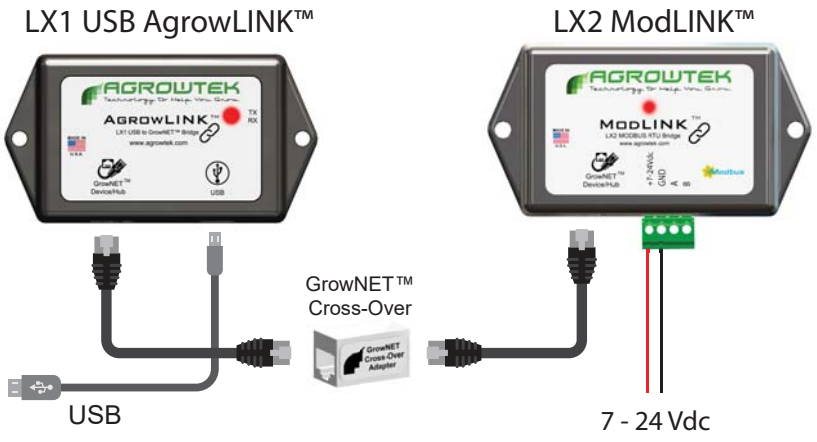
Use the LX2 ModLINK to connect MODBUS devices to the GrowNET™ port.

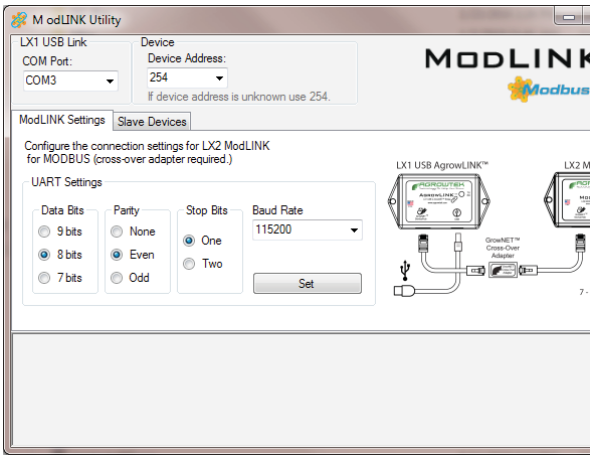


Serial Speed & Format

The default serial data format for the LX2 ModLINK interface is: **19,200 baud, 8-N-1**.

Alternate speeds and formats between 9,600 - 115,200 baud may be configured with the free AgrowLINK PC utility using a LX1 USB AgrowLINK and the cross-over adapter supplied with the LX2 ModLINK.





See MODBUS manual for more information.

MODBUS Manual

Supported Commands

0x01 Read Coils
0x03 Read Multiple Registers
0x05 Write Single Coil
0x06 Write Single Register
0x15 Write Multiple Coils

A request to use a function that is not available will return an illegal function error (0x01).

Register Types

Data registers are 16 bits wide with addresses using the standard MODICON protocol. Floating point values use the standard IEEE 32-bit format occupying two contiguous 16 bit registers. ASCII values are stored with two characters (bytes) per register in hexadecimal format. Coil registers are single bit values which control and indicate the status of a relay; 1 = on, 0 = off.

MODBUS Coil Registers

Parameter	Access	Address
Relay 1	R/W	1
Relay 2	R/W	2
Relay 3	R/W	3

A request to read or write coils that are not available will return an illegal address error (0x02.)

MODBUS Holding Registers

Parameter	Description	Range	Type	Access	Address
Address	Device Slave Address	1 - 247	8 bit	R/W	40001
Serial#	Device Serial Number	ASCII	8 char	R	40004
DOM	Date of Manufacture	ASCII	8 char	R	40008
HW Version	Hardware Version	ASCII	8 char	R	40012
FW Version	Firmware Version	ASCII	8 char	R	40016
Timeout (seconds)	Turn off relays if no communication	0 - 32767	16 bit, unsigned	R/W	41001
Relay Closure Count	Relay 1	Unsigned Int	32 bit, unsigned	R	49001
	Relay 2				49003
	Relay 3				49005

A request to read or write a register that is not available will return an illegal address error (0x02).

Technical Information

Dry contact relays are generally reliable when they are used in accordance with the load limitations. Overloading a relay will shorten it's life and can cause the relay to fail. Overloading causes excess heat and arcing on the relay contacts which can either burn them so that they no longer connect, or can permanently weld the contacts closed so that the relay can never be turned off.

Troubleshooting

⚠ WARNING
Disconnect all power to the relay contacts before performing any maintenance or testing.

Problem	Solution
Relays are not activating, none of the output LED's turn on.	Check if any LED's are illuminated on the PCB. If there are no LED's illuminated, the PCB is not receiving power. In most applications the PCB receives power from the RJ-45 connection. Check the RJ-45 connection for damage. Test the RJ-45 cable with a tester tool. Check the upstream device (HX8 hub or GCX controller) that the device is connected to. It should be providing power. If connected to an HX8 hub, ensure the hub's LED is illuminated to indicate it has power. Try an alternate hub port to ensure there is not a problem with the hub port. Try an alternate RJ-45 cable to ensure there is not a problem with the cable.
Relays are clicking & output LED's are ON but the connected device is not operating.	Check for continuity between the relay terminals when the relay is turned on. If the relay is conducting when energized, the problem lies with the device or power source that is connected to the relay output terminals, not with the relay.
All relays operate at the same time, or relays operate independently and should operate simultaneously.	Ensure the contactor is in the correct mode (three-phase contactor, or independent relay mode.) Check the mode configuration on the "Device Info" tab of the GCX control system when the CX device is selected, or toggle the mode using the instructions in the "Operation Mode" section of this manual.

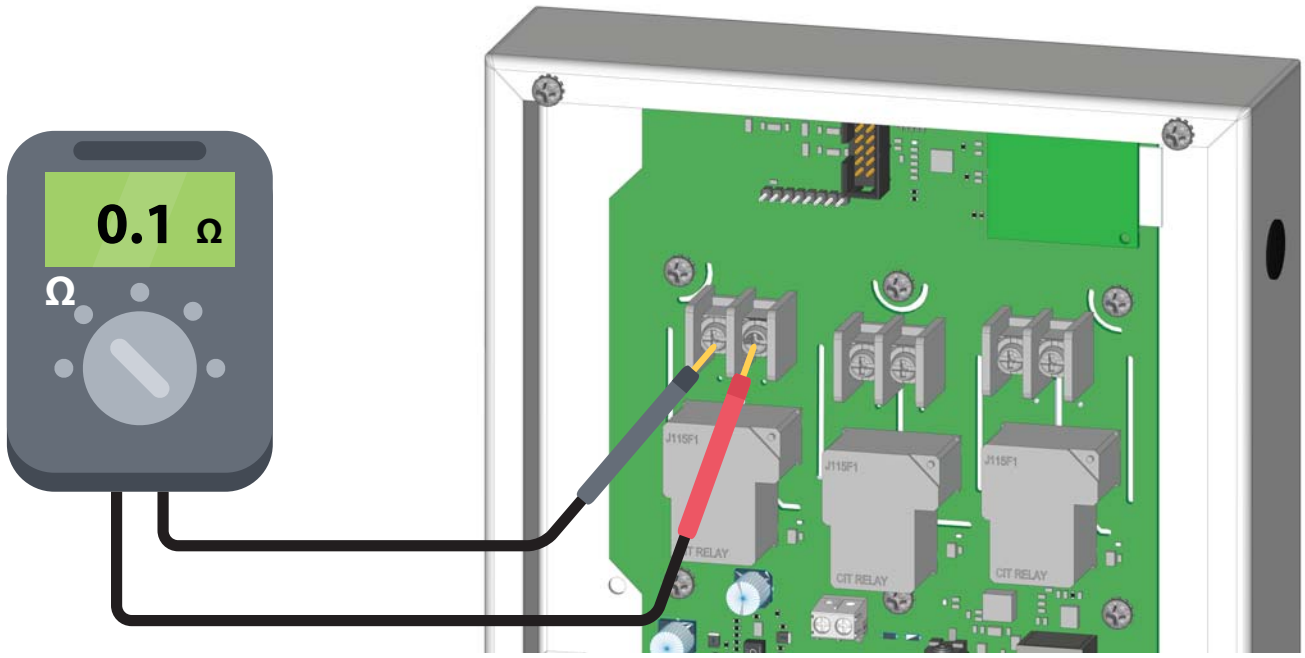
Checking Continuity

"Continuity" means there is a connection between the two contact terminals when the relay is activated. A relay should have continuity when on and should not have continuity when off.

A multimeter that can measure resistance (ohms Ω) is required to check continuity of a relay.

1. Set your volt meter to resistance (ohms Ω) mode.
2. Verify that the meter reading changes to 0 Ω when the red and black leads are connected together.
3. With the relay output turned off, check that the resistance reads greater than 1 Ω.
    a. If the resistance is less than 1 Ω, remove the wires from the terminals and check resistance again.
    b. If resistance is still less than 1 Ω, the contact may be physically stuck together.
4. With the relay turned on, check that the resistance is less than 1 Ω.
    a. If the resistance is greater than 1 Ω, ensure the screws are tight on the terminals and check again.
    b. If resistance is still greater than 1 Ω, the relay may not be closing due to failed coil or burned contacts.

⚠ WARNING
Disconnect all power to the relay contacts before performing any maintenance or testing.



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Maintenance & Service

Exterior Cleaning
Exterior may be wiped with a damp cloth wish mild dish detergent, then wiped dry. Disconnect power before cleaning the enclosure to prevent electrical shock.

Storage and Disposal

Storage
Store equipment in a clean, dry environment with ambient temperature between10-50°C.

Disposal
This indsutrial control equipment may contain traces of lead or other metals and environmental contaminants and must not be discarded as unsorted municipal waste, but must be collected separately for the purpose of treatment, recovery and environmentally sound disposal. Wash hands after handling internal components or PCB's.

Warranty

Agrowtek Inc. warrants that all manufactured products are, to the best of its knowledge, free of defective material and workmanship and warrants this product for one (1) year from the date of purchase. This warranty is extended to the original purchaser from the date of purchase. Returns not purchased directly from Agrowtek Inc. must include proof of purchase date otherwise purchase date is considered as date of manufacture. This warranty does not cover damages from abuse, accidental breakage, or items that have been modified, altered, or installed in a manner other than that which is specified in the installation instructions. This warranty is applicable only to products that have been properly stored, installed, and maintained per the installation and operation manual and used for their intended purpose. This limited warranty does not cover products installed in or operated under unusual conditions or environments including, but not limited to, excessive humidity or extreme temperature conditions outside of the specified limits. Agrowtek Inc. must be contacted prior to return shipment of any returns for a return authorization. No returns will be accepted without a return authorization. Customer is responsible for return shipment to Agrowtek Inc. for warranty service. Return authorization number(s) must be printed on the outside of the box or the return may be rejected and returned to the sender. Agrowtek Inc. is not responsible for supplying replacement products or parts in advance of return(s) for warranty claim. The products which have been claimed and comply with the aforementioned restrictions shall be replaced or repaired at the sole discretion of the Agrowtek Inc. at no charge. This warranty is provided in lieu of all other warranty provisions, express or implied. It is including but not limited to any implied warranty of fitness or merchantability for a particular purpose and is limited to the Warranty Period. In no event or circumstance shall Agrowtek Inc. be liable to any third party or the claimant for damages in excess of the price paid for the product, or for any loss of use, inconvenience, commercial loss, loss of time, lost profits or savings or any other incidental, consequential or special damages arising out of the use of, or inability to use, the product. This disclaimer is made to the fullest extent allowed by law or regulation and is specifically made to specify that the liability of Agrowtek Inc. under this limited warranty, or any claimed extension thereof, shall be to replace or repair the Product or refund the price paid for the Product.