Digital Irrigation Valve Controller
for 24V AC or DC Valves

Specifications

Input Power	Max 2.5A@24Vdc ⎓
Max Switching Current	1A per point / 1A combined
Max Switching Voltage	24Vdc ⎓ or 24V@50% PWM
Outputs	8 Sourcing FETS
Output Status Indicators	Red LEDs
PWM Mode	1kHz, 50% Duty
Inputs	4 Analog Inputs (VX12i Only)
Analog Input Type	0-5Vdc ⎓ / 0-20mA, 12-Bit Jumper Selectable
Analog Sensor Power	500mA @ 5Vdc ⎓
Enclosure Knock-Outs	(2) dia. 7/8"
Enclosure Rating	TYPE 12K NEMA
Minimum Cycle Time	1 second
Interface	GrowNET™, MODBUS

Contents

**KEEP THESE INSTRUCTIONS**

REV 02/24

Introduction

GrowControl VX series digital interface modules connect Agrowtek's intelligent controllers to irrigation valves in your growing environment. VX controllers feature eight ouputs for directly driving 24V A.C. or D.C. irrigation valves. VX valve controllers will opearte any standard 2-wire diaphragm valve or with 2-wire and 3-wire motorized ball valves.

Standard Diaphragm Valves
Standard irrigation valves such as Agrowtek's WX1 operate on 24V "AC" power and require a pressure differential across the valve to seal the diaphragm closed.
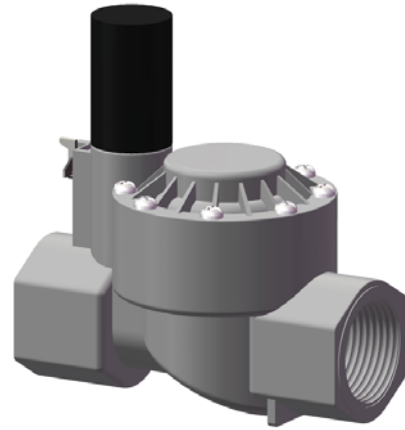
WX1

Motorized Ball Valves
Ball valves are a high-reliability option for water control which typically require 24V "DC" power with three-wire connections. Ball valves offer 100% closing with no pressure requirement and have low flow restriction with a large full-port opening.
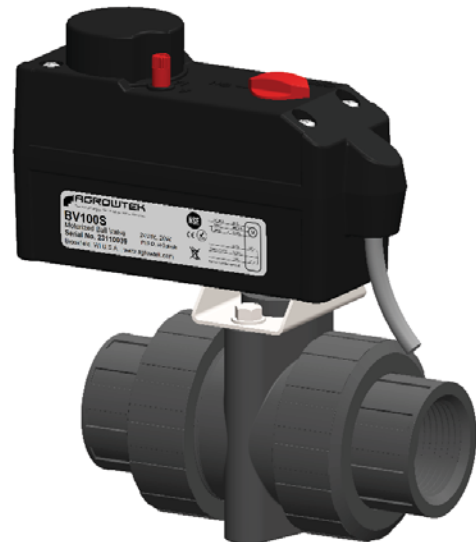
BV100

⚠ 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 (0-80% 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.

Component Locations

Remove the cover by looseneing the two bottom screws and removing the top two screws.
Tilt the cover back to clear the light pipes and then remove the cover.

The PCB has several connection and configuration options as described:
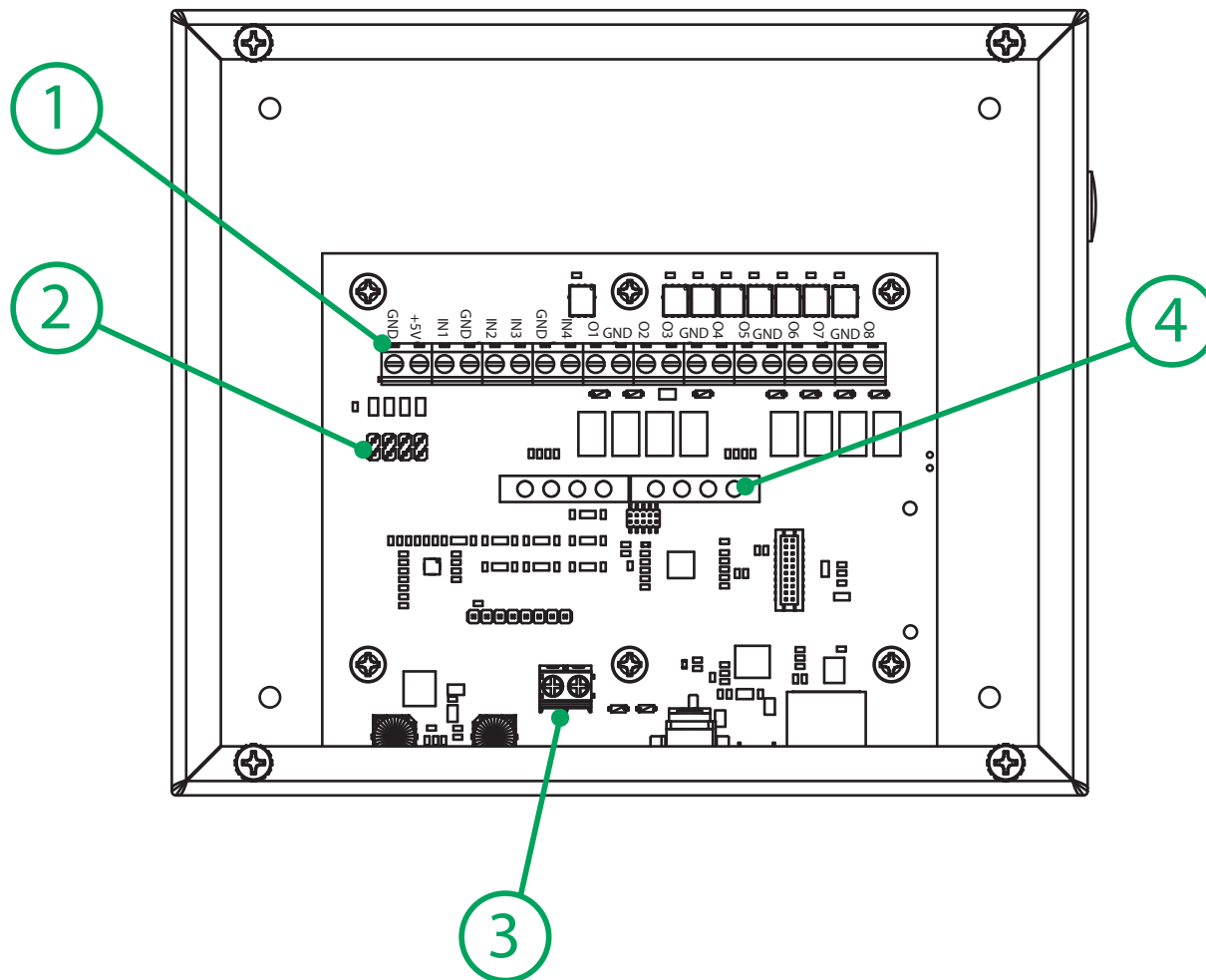
1. I/O Screw Terminal Block
Make connections to analog sensor inputs and transistor outputs.

2. Input Jumper Select Block
Set input channels to current mode (0-20mA) instead of voltage (VX12i only)

3. Power Input Terminals
Optional input power terminals for hard wire applications.

4. LED Light Pipes
Indicators for each of the eight (8) outputs; red when on. Pipes protrude through front panel openings.

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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.

Mounting the Enclosure

The intelligent interface module 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.**

5.5"   2.1"

6.0"   BACK   4.5"

7.0"
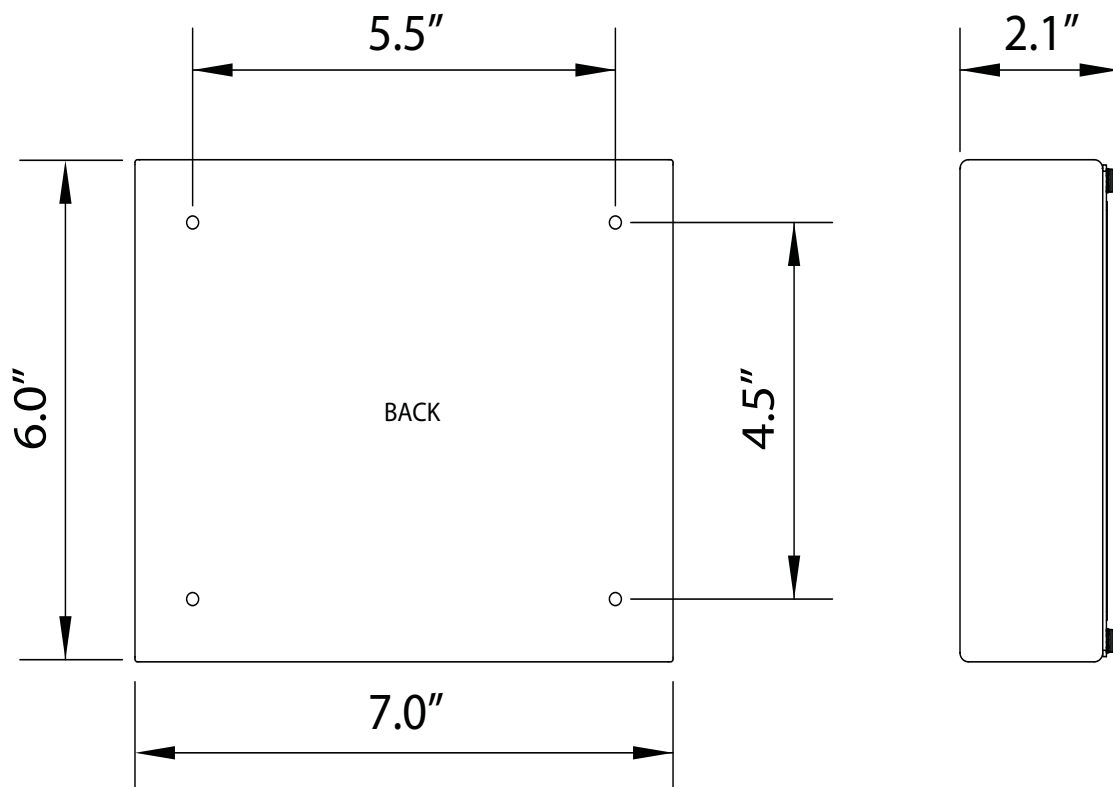
Power Connections

Input Power: **24 Vdc, 2.5A** is required to operate the unit which may be supplied via:

a) the 2.1/5.5mm DC barrel jack and standard power supply, or
b) the V-in terminal block on the circuit board (for industrial/DIN rail power supplies.)

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

1/2" EMT Knock-outs

Mode/Reset Button

24V DC Power Jack

GrowNET Port RJ-45
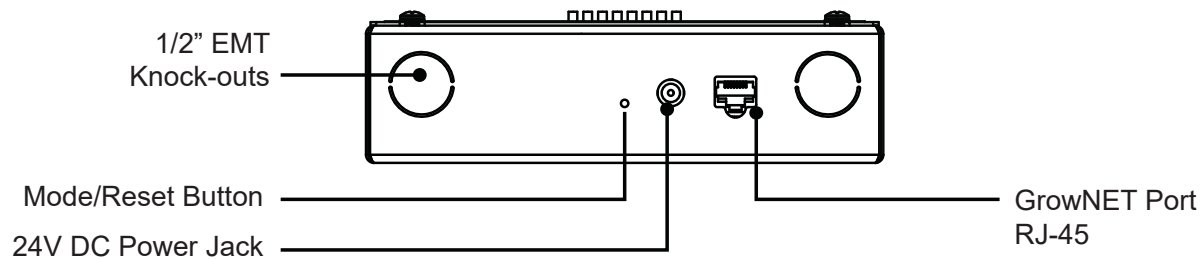
| ⚠ | **Maximum 2.5A power supply current!**
Input power protection required to prevent damage to the unit from overloading. |

I/O Terminals

| ⚠ | **DANGER! Risk of injury, short circuit, or equipment damage; disconnect all power before wiring or service.** |

Terminals are provided for connecting to the valves.

Terminal Specifications:
Acceptable Wire Size: 26-14 AWG
Tightening Torque 0.35-0.40 Nm
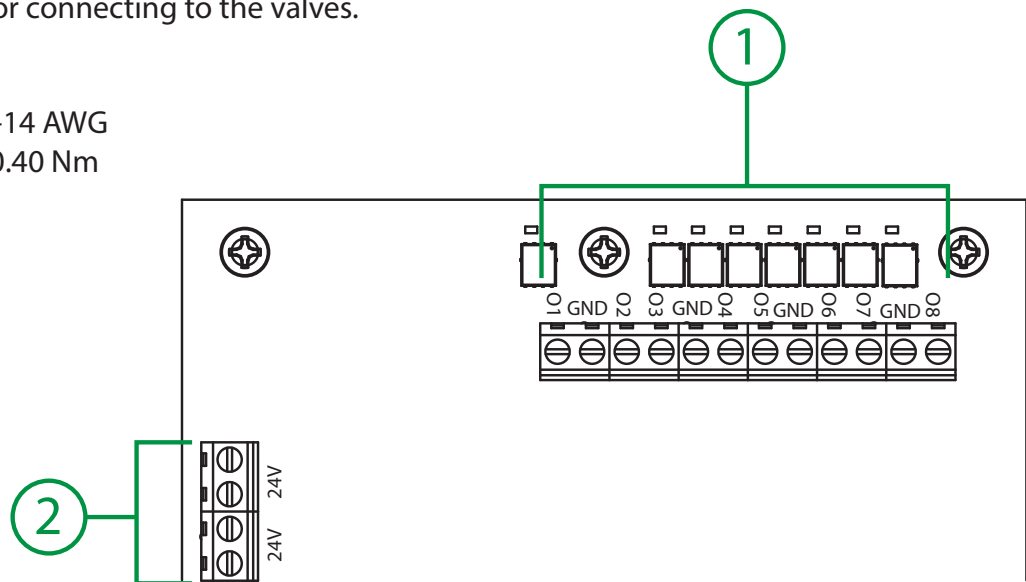
1. Outputs
There are eight (8) transistor outputs for driving solenoids with four common ground terminals. Two valves share a ground terminal.

2. 24V Power
Four terminals are provided for 24Vdc constant power for use with BV series and other 3-wire motorized ball valves.

Power Output Mode (AC or DC)

VX valve controllers will opearte any standard 24V AC or DC type of valve. The VX controller must be set in the proper mode in order to operate the valves reliably.

Standard AC Mode (Pulse Width Modulation, PWM)

Standard irrigation valves operate on 24V "AC" power which is "flickering" on and off at 50-60hz. The VX valve controllers mimick this flickering on and off by providing providing the power to the valve in a pulsed fasion (pulse width modulation, or "PWM.")

Note: The VX valve driver will deliver a continuous DC voltage for 1 second when opening valves to provide sufficient inrush current to magnet coils in diaphragm valves.

⚠️ | **VX controllers are shipped in AC mode by default.**

DC Power Mode

24V "DC" powered valves are also common and the VX valve controllers can be put into a "DC" output mode which does not flicker the power with PWM to mimick AC power.

Set the Power Mode

Changing between the power 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 = AC/PWM mode (factory default)
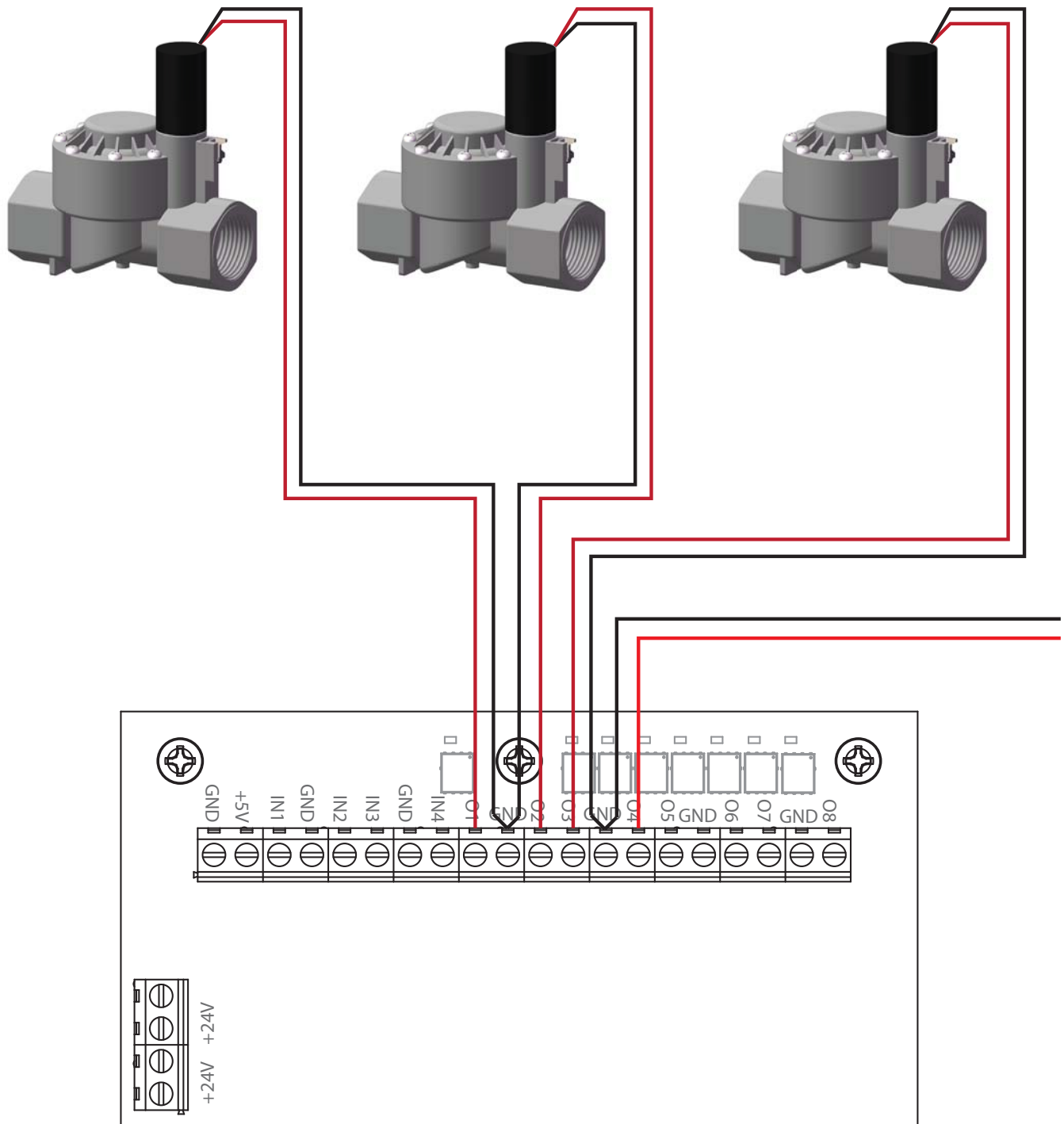2x Flash = DC Mode
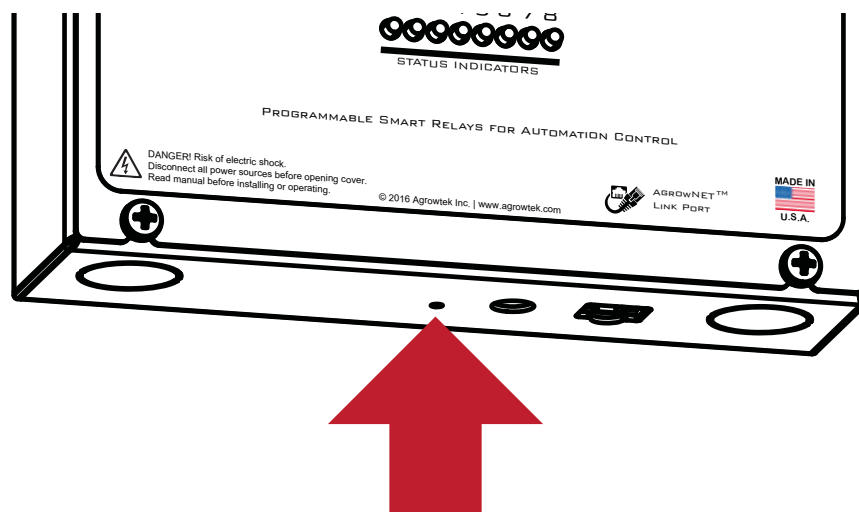
Output Connections, Diaphragm Valves

Standard 24Vac irrigation valves can be connected directly to the VX outputs when the unit is in the "AC" PWM output mode. Up to eight valves can be connected and up to four valves can be operated simultaneously.

⚠️ **Ensure the unit is in "AC" PWM output mode. LED on front panel should dim after valve is activated.**

Output Connections, BV 3-Wire Ball Valves

Agrowtek's BV series motorized ball valves are a high reliability option for managing water movement in a facility. BV series valves are 3-wire operated with powered open and close movement for high speed and short cycle time capability. BV valves require use of the 24V terminals on the side of the VX series PCB (rev F and newer models.)
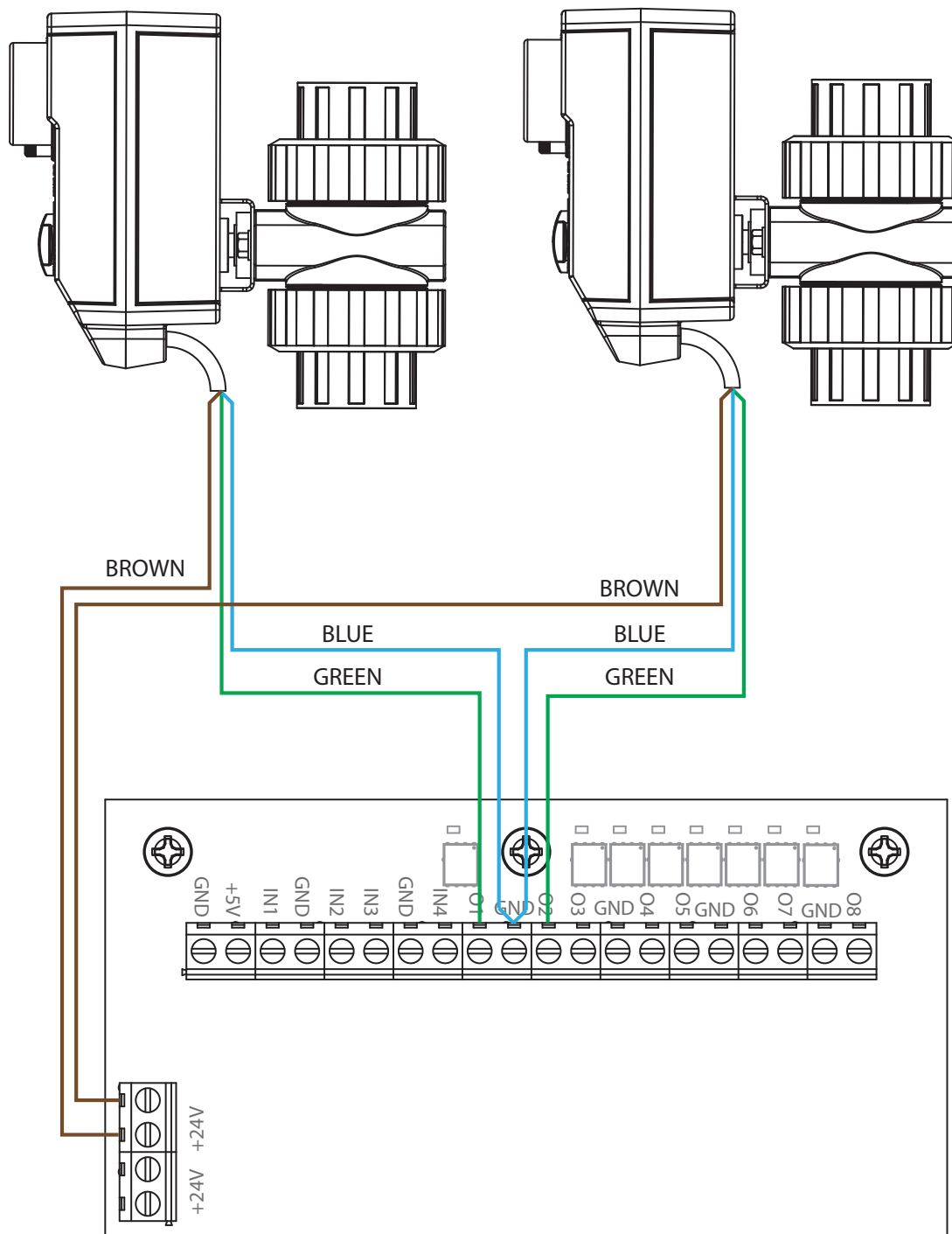

⚠ **Ensure the unit is in "DC" output mode. LED on front panel should NOT dim after valve is activated.**

Connection to GrowControl™ Cultivation Controllers

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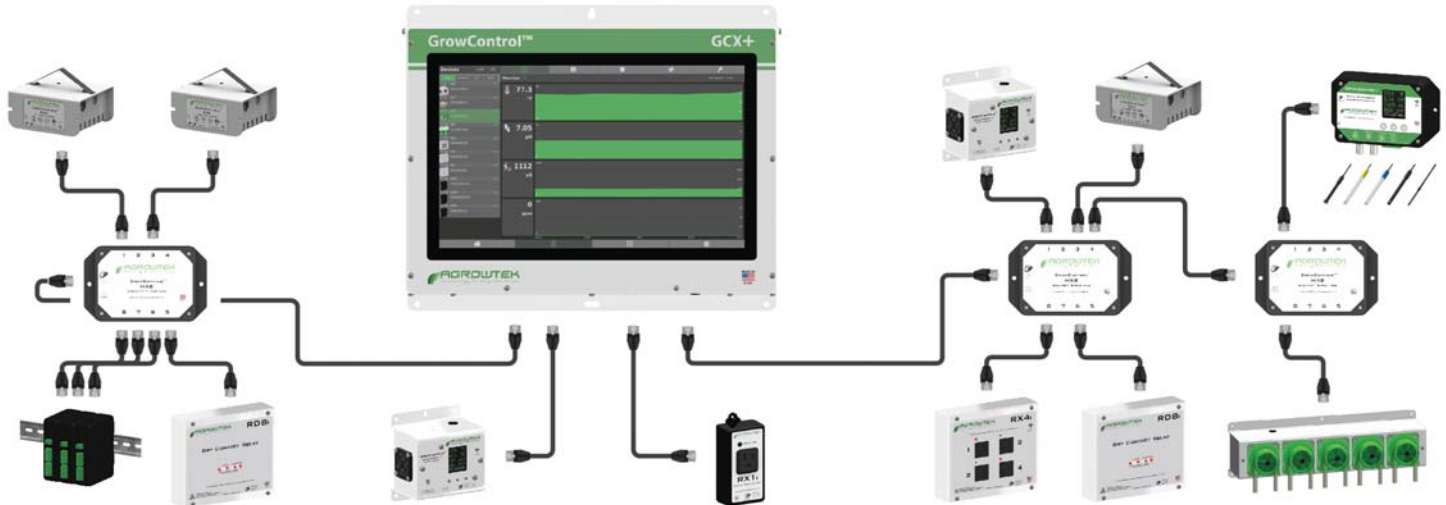
Refer to the GCX controller manual for details on adding the device to the system.

GrowNET™ Hub

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

24Vdc 12W
Power Supply
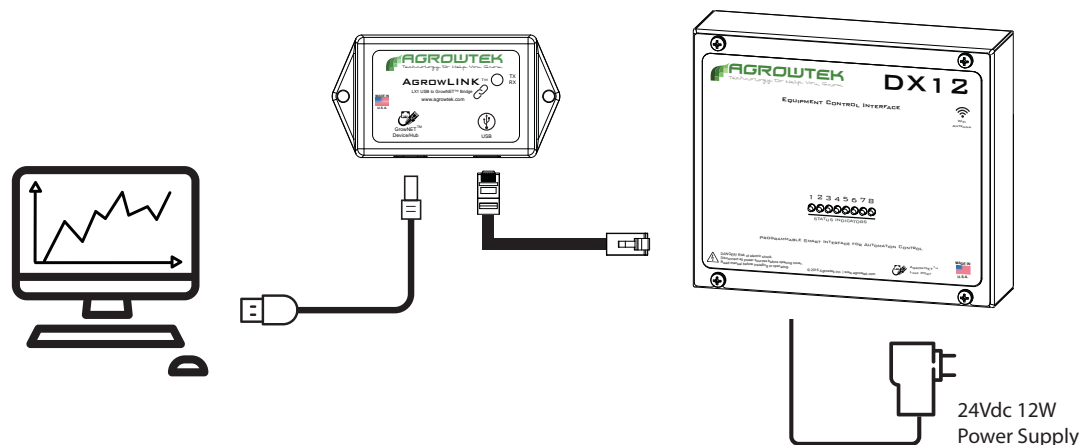
LX1 USB AgrowLINK connects Agrowtek's devices to a computer's USB port for:

- Firmware Updates
- Manual Operation
- API Based Control
- More

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.

MODBUS RTU

RS-485
Use the LX2 ModLINK to connect MODBUS devices to the GrowNET™ port.

RJ45 CABLE

PLC

7 - 24 Vdc

TX/RX-
TX/RX+

RS-485
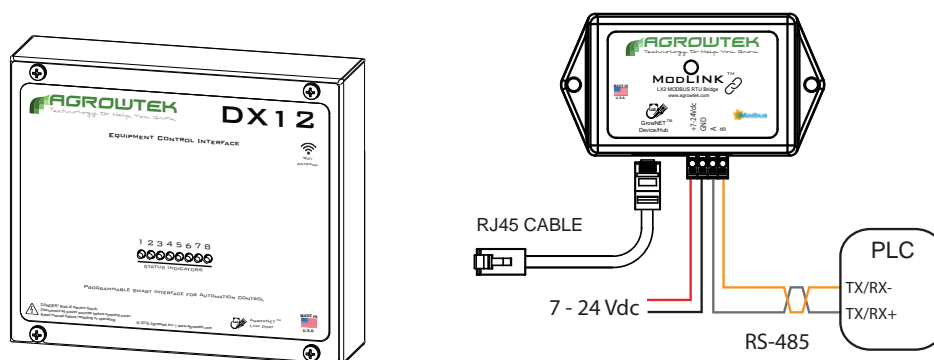
3.3/5Vdc Serial Bus Compatible.
Include required bus terminating resistors per EIA standard.

Serial Speed & Format

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

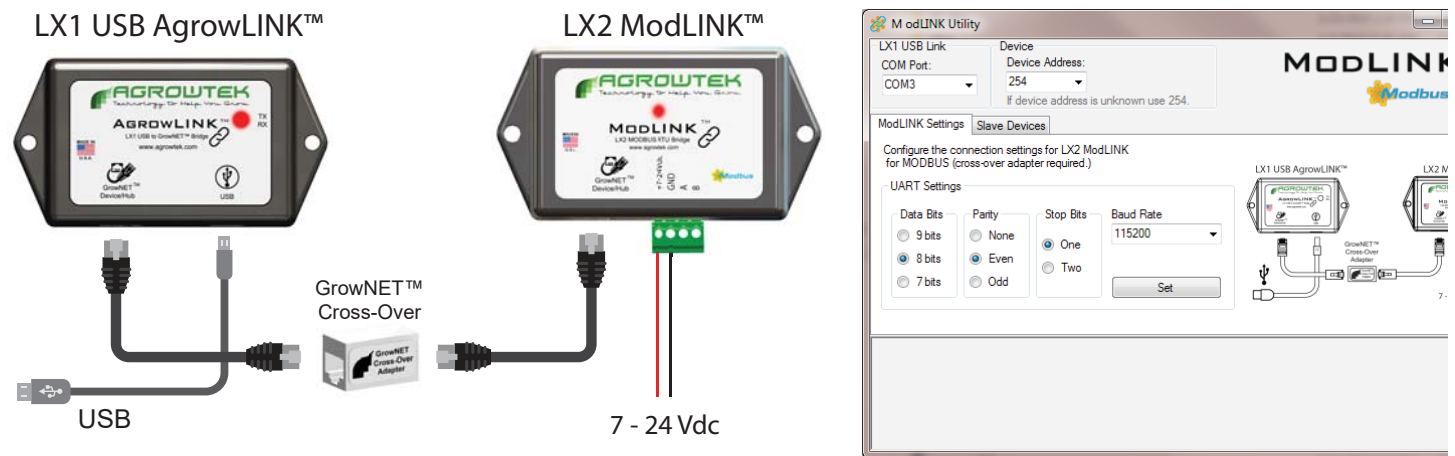Alternate speeds and formats between 9,600 - 115,200 baud may be configured with the free AgrowLINK PC utility using a LX1 USB AgrowLINK and the cross-over adapter supplied with the LX2 ModLINK.

LX1 USB AgrowLINK™   LX2 ModLINK™

GrowNET™
Cross-Over

USB   7 - 24 Vdc

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 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
Analog Input Value, Integer	Input 1	Signed Int	16 bit, signed	R	40101
	Input 2				40102
	Input 3				40103
	Input 4				40104
Analog Input Value, Floating Point	Input 1	Floating Point	32 bit, float	R	40201
	Input 2				40203
	Input 3				40205
	Input 4				40207
Timeout (seconds)	Turn off outputs if no communication	0 - 32767	16 bit, unsigned	R/W	41001
Output Closure Count, Discrete	Output 1	Unsigned Int	32 bit, unsigned	R	49001
	Output 2				49003
	Output 3				49005
	Output 4				49007
	Output 5				49009
	Output 6				49011
	Output 7				49013
	Output 8				49015

MODBUS Coil Registers

Parameter	Access	Address
Relay 1	R/W	1
Relay 2	R/W	2
Relay 3	R/W	3
Relay 4	R/W	4
Relay 5	R/W	5
Relay 6	R/W	6
Relay 7	R/W	7
Relay 8	R/W	8

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

Technical Information

Troublshooting

Outputs are not activating, no power LED on PCB
Ensure the input power has 12-24Vdc and are correctly wired for polarity. A dimliy lit red LED should illuminate when the circuit board has power.

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 1 year from the date of purchase. This warranty is extended to the original purchaser from the date of receipt. This warranty does not cover damages from abuse, accidental breakage, or units that have been modified, altered, or installed in a manner other than that which is specified in the installation instructions. Agrowtek Inc. must be contacted prior to return shipment for a return authorization. No returns will be accepted without a return authorization. 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, high humidity or high temperature conditions. 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.