
BrewTroller Phoenix

Owners Manual

Updated - March 14, 2016



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1 Overview

BrewTroller is a series of open source, programmable controllers developed and manufactured by BrewTroller:

BrewTroller Phoenix: Features: DIN Rail mountable enclosure, 20x 12VDC Sourced Outputs (4 outputs supporting hardware controlled high frequency PWM), 4x 5VDC Analog Inputs, 8x 12VDC Digital Inputs + Dedicated E-Stop Input, 1-Wire bus interface, I2C bus interface, RS- 485 bus interface, USB (virtual serial port) interface and optional Ethernet interface.

1.1 Safety Information

Integration of the BrewTroller Phoenix into a control system requires electrical knowledge. It is solely the installer's responsibility to assure that the system is configured in a manner consistent with applicable safety requirements. BrewTroller, Inc. does not control how this board is integrated into the control system and cannot be responsible for guaranteeing the safety of your system.

This device is not guaranteed to be fail-safe. For example, the microcontroller could fail leaving an output active. The system into which the device is installed should provide fail-safe protection and emergency stop capability.

If the device is to be used with dangerous voltages care must be taken to prevent an operator or installer from coming into contact with these voltages. An enclosure that allows for modest ventilation, but prevents intrusion by operator's hands and foreign objects should be utilized with this board.

1.2 BrewTroller Phoenix Features

- Atmel 8-bit AVR RISC-based microcontroller with 128KB flash, 4KB EEPROM and 16KB SRAM
- (20) Transistor based sourced 12V DC Outputs
- (4) 5V DC Analog Inputs
- (8) 12V DC Digital Inputs + (1) Dedicated E-Stop Input
- I2C port for connection to expansion modules
- RS485 Communications port
- USB Communications port
- 1-Wire Communications port

1.3 Package Contents

- BrewTroller Phoenix Board

1.4 Before You Proceed

Please review all safety and connection information before attempting to connect and power on your BrewTroller Phoenix. BrewTroller is not responsible for damage caused to boards by improper connections. If you have any questions please do not hesitate to contact support. You can find phone numbers and contact forms on our website (<http://www.BrewTroller.com>).

2 Quick Start Guide

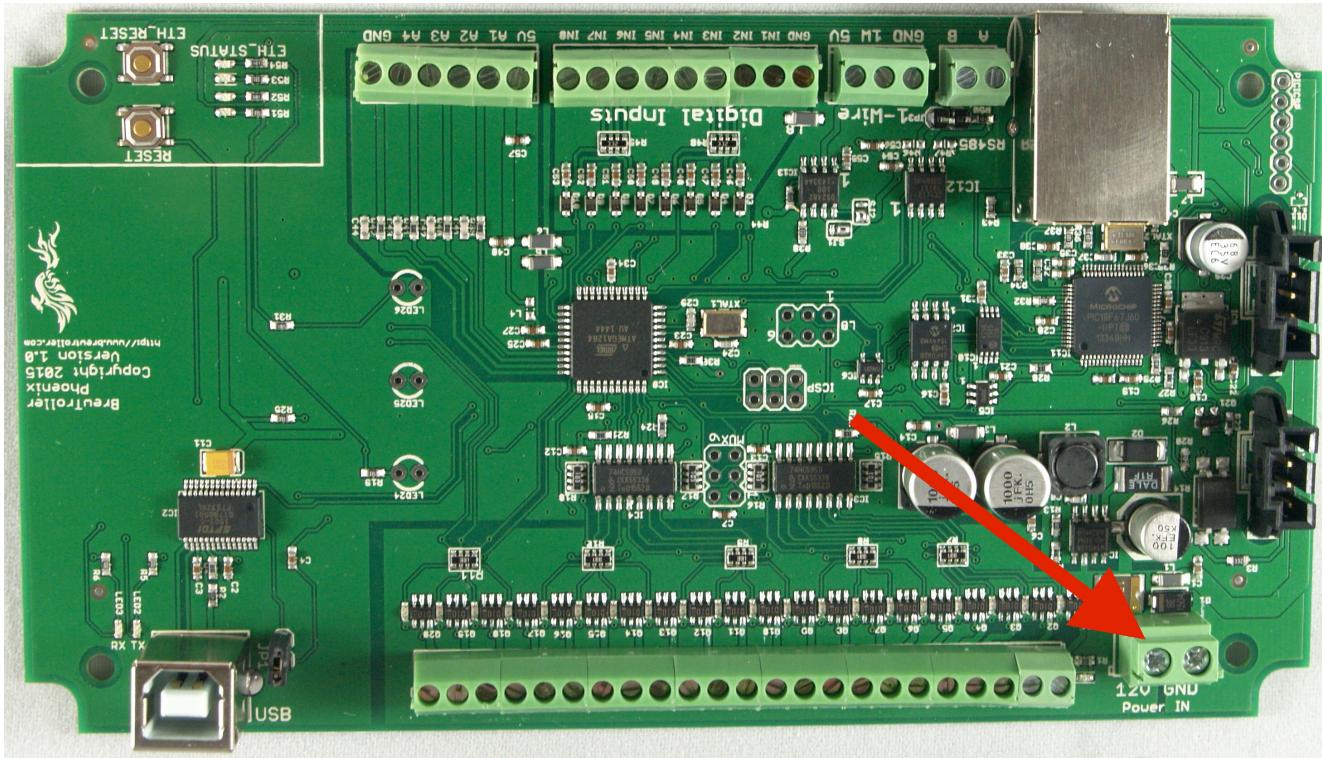
2.1 Connecting Power

Power is supplied to the BrewTroller Phoenix via the power connection JP2

The BrewTroller Phoenix requires a 12V DC power supply of at least 500mA. Additional devices such as relay boards will increase the power supply requirements. A 3A or greater power supply is recommended to ensure external device support.

It is recommended to measure the power supply output with a voltmeter prior to connecting it to the BrewTroller Phoenix. Damage caused by connecting the BrewTroller Phoenix to improper power supply voltages will not be covered under warranty.

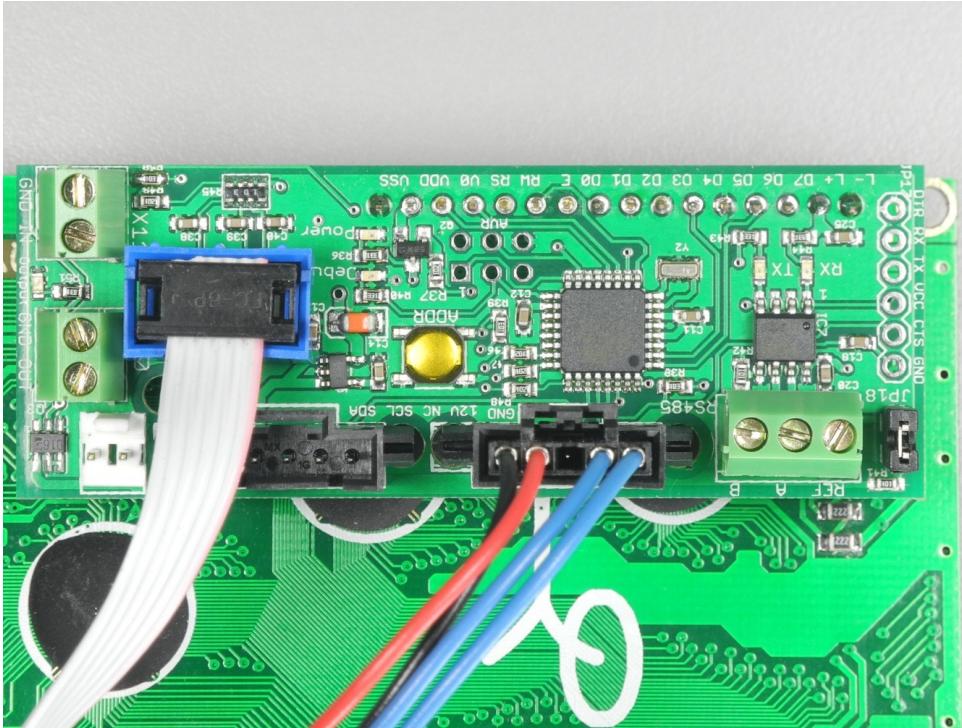
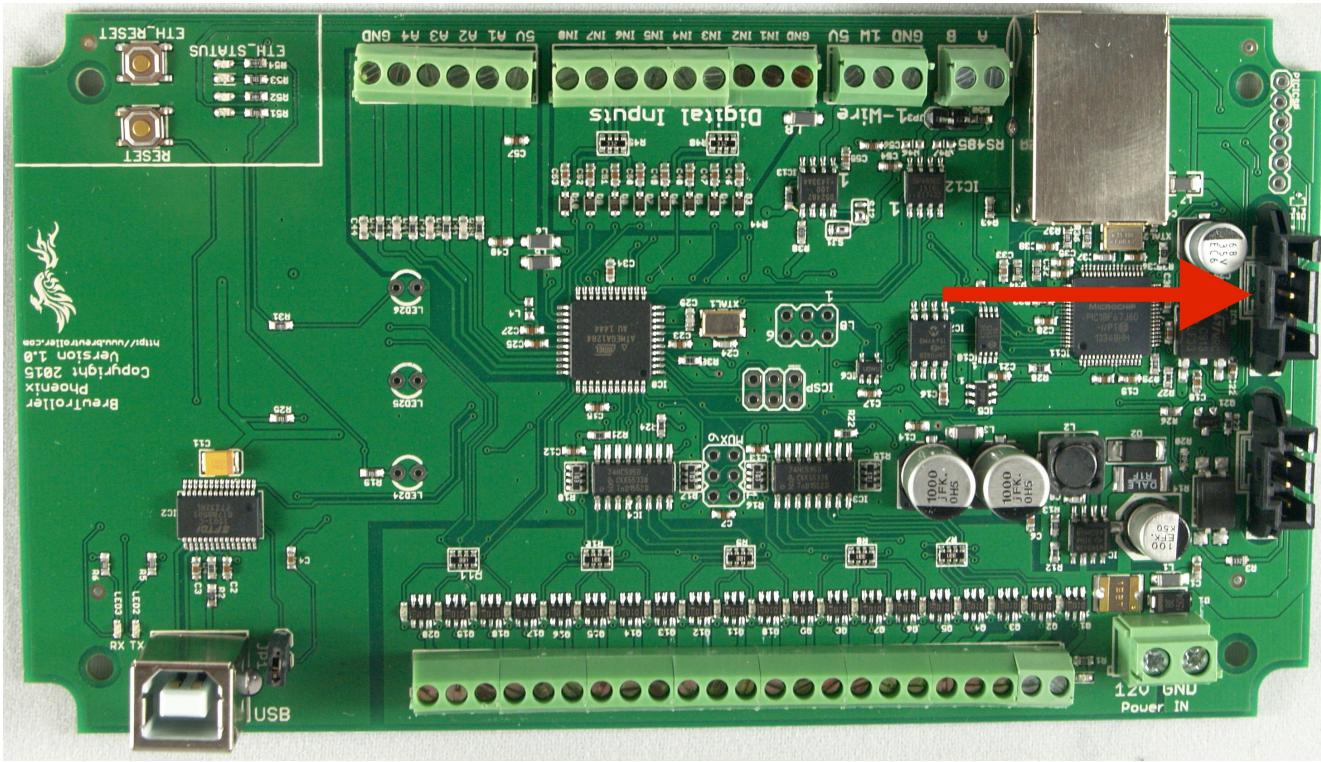
WARNING: NEVER CONNECT BREWTROLLER PHOENIX TO AC POWER OR DC POWER SUPPLIES GREATER THAN 12VDC.

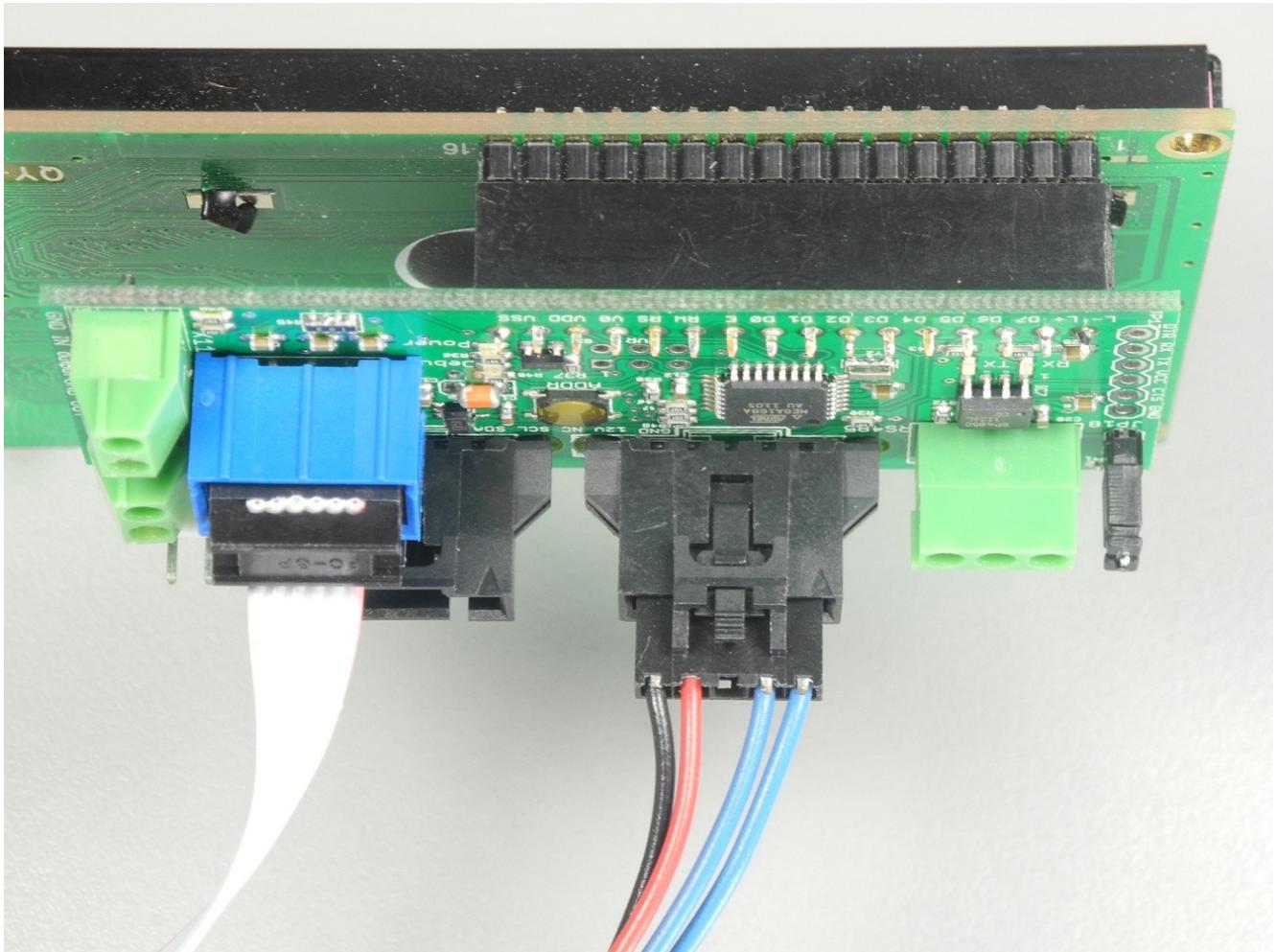


2.2 Connecting LCD Display and Encoder (Sold separately)

The BrewTroller Phoenix can be connected to a 20x4 character LCD and Encoder via the BrewTroller I2CLCD Display Module connected to the I2C port:

Connect the 5 pin polarized, locking I2C cable into the BrewTroller's I2C Port (Connector X4). Connect the other end to the I2C port on the display module. Connect the encoder to the encoder port of the display module and then connect the display module to the LCD using the 16-pin connector. Refer to the following examples:





2.3 Installing/Upgrading Firmware

Multiple firmware solutions are available for the BrewTroller platform to support specific applications. The latest stable release is always recommended for production systems however the following list identifies the minimum versions required to support the BrewTroller Phoenix:

- Brewtroller 2.6 Build 6
- FermTroller: TBD

2.3.1 Connect to PC

A mini-B USB cable is required to connect the BrewTroller Phoenix board to your PC/Mac for firmware upgrading. The BrewTroller Phoenix uses a FTDI FT232RL module that installs as a Virtual COM Port (VCP) device. Drivers are usually available within current versions of available Operating Systems. If necessary you may download drivers from the FTDI website (<http://www.ftdichip.com>).

2.3.2 Download Required Files

For Pre 3.X firmware versions: Arduino Integrated Development Environment (IDE) – A custom version of the Arduino IDE is required to support the BrewTroller Phoenix to provide support for the ATMEGA1284P microcontroller and external libraries used by the firmware. The customized IDE is available under the ‘Downloads’ section of the BrewTroller website (<http://www.brewtroller.com>). Extract the ZIP file to a location on your hard drive.

Firmware Source – The firmware source code for your target application (ie BrewTroller or FermTroller) is available under the ‘Downloads’ section of the BrewTroller website (<http://www.brewtroller.com>). There are often multiple versions of each firmware application available for download:

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- Stable – This is the current version recommended for production systems. Start with this release for a new system.
 - Testing – This is a feature-frozen release of the development firmware that is in the process of moving to stable. Often users are encouraged to download and test this release to help identify any bugs prior to the release being moved to ‘Stable’. It is important to start with ‘Stable’ first to ensure your system is working properly before installing a ‘Testing’ release.
 - Development (Trunk) – This is the current release still under development. It is recommended for developers only.

Extract the ZIP to a location on your hard drive.

For Firmware Versions 3.X and later Download the BrewTroller Update Utility from the Downloads section of the BrewTroller Website (<http://www.brewtroller.com>) COMING SOON

2.3.3 Select Hardware Profile (Pre 3.X Firmware)

Note: The following provides generic instructions not specific to either FermTroller or BrewTroller firmware. Your firmware download may contain multiple hardware profiles for the BrewTroller Phoenix. Refer to the specific firmware documentation for more details regarding selecting a hardware profile.

In the HWProfiles folder of the firmware source open the ‘BrewTroller Phoenix’ subfolder and copy the HWProfile.h file to the root folder of the firmware source (ie ‘FermTroller’ or ‘BrewTroller’ depending on the firmware used). You will replace the HWProfile.h included in the root folder of the firmware source.

2.3.4 Configure and Upload (Pre 3.X Firmware)

Note: The following provides generic instructions not specific to either FermTroller or BrewTroller firmware. Refer to the specific firmware documentation for more details regarding available compile options.

Launch the Arduino executable from the Arduino IDE folder extracted previously

Select ‘Open’ from the ‘File’ menu, browse to the folder where you extracted the firmware source and open the BrewTroller.pde or FermTroller.pde as appropriate.

Select the ‘Sanguino w/ ATMEGA1284P’ from the ‘Board’ menu under ‘Tools’.

Select the serial port for the device from the ‘Serial Port’ menu under ‘Tools’.

Review the Config.h tab for compile options if necessary (refer to firmware documentation) Select ‘Upload to I/O Board’ from the ‘File’ menu.

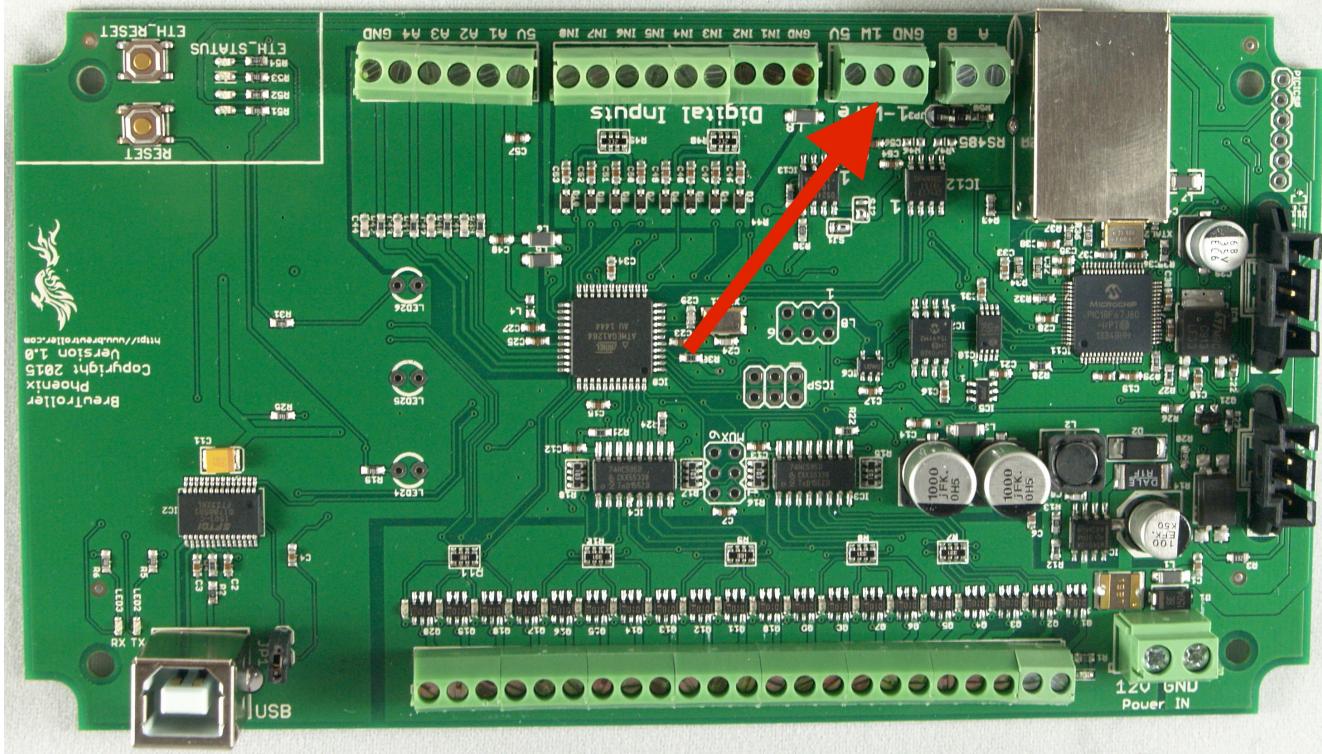
2.3.5 Using the BrewTroller Update Utility

Connect your BrewTroller to your PC and launch the utility. Follow the prompts to select your hardware type, and configuration options for your situation. At the end, the utility will detect, build, and load your Firmware for you.

2.4 Connecting 1-Wire Devices

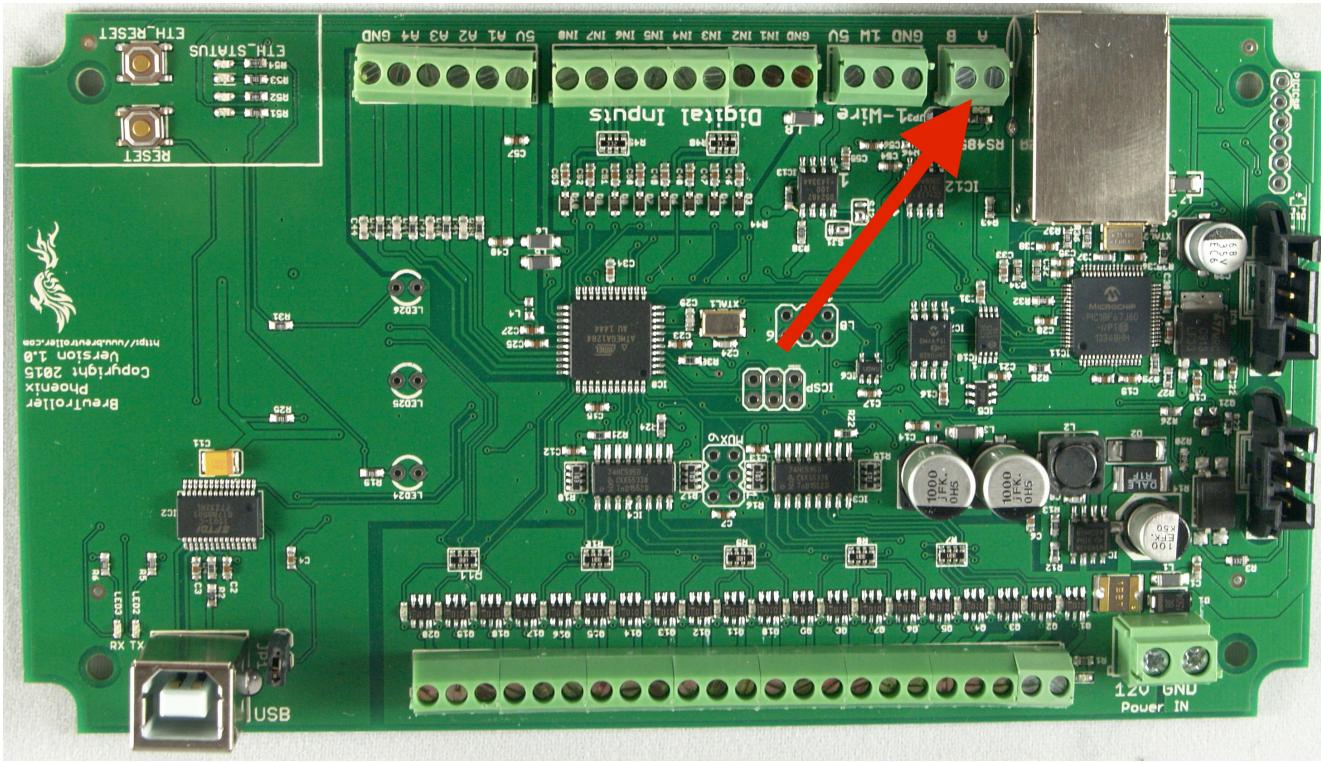
The BrewTroller provides a 1-Wire device bus to interface to temperature sensors and other IO devices. The 1-Wire network uses a single shared data line to communicate with many devices. Each 1-Wire device has a unique 48-bit address that is used to when sending and receiving data to individual network nodes. The JP4 connector provides access to the 1-Wire bus. A constant 5VDC (VCC) connection is provided in addition to the data and ground pins. The

recommended topology for 1-Wire networks is a bus. A single cable should connect from the BrewTroller to the first device with the smallest length stub for each device (~2m). The second device is connected via a cable from the first device and so on. BrewTroller sells a series of M12 cables and splitters that are perfect for connecting 1-Wire networks. For more information, visit www.BrewTroller.com.



2.5 Connecting RS485

The BrewTroller provides an RS485 serial bus to interface with other IO devices. RS485 uses a differential pair of lines (A and B) for communication. Connect the COM, A and B terminals to the same terminals on the external IO board. When connecting more than two devices a daisy chain or bus topology is recommended as illustrated below:



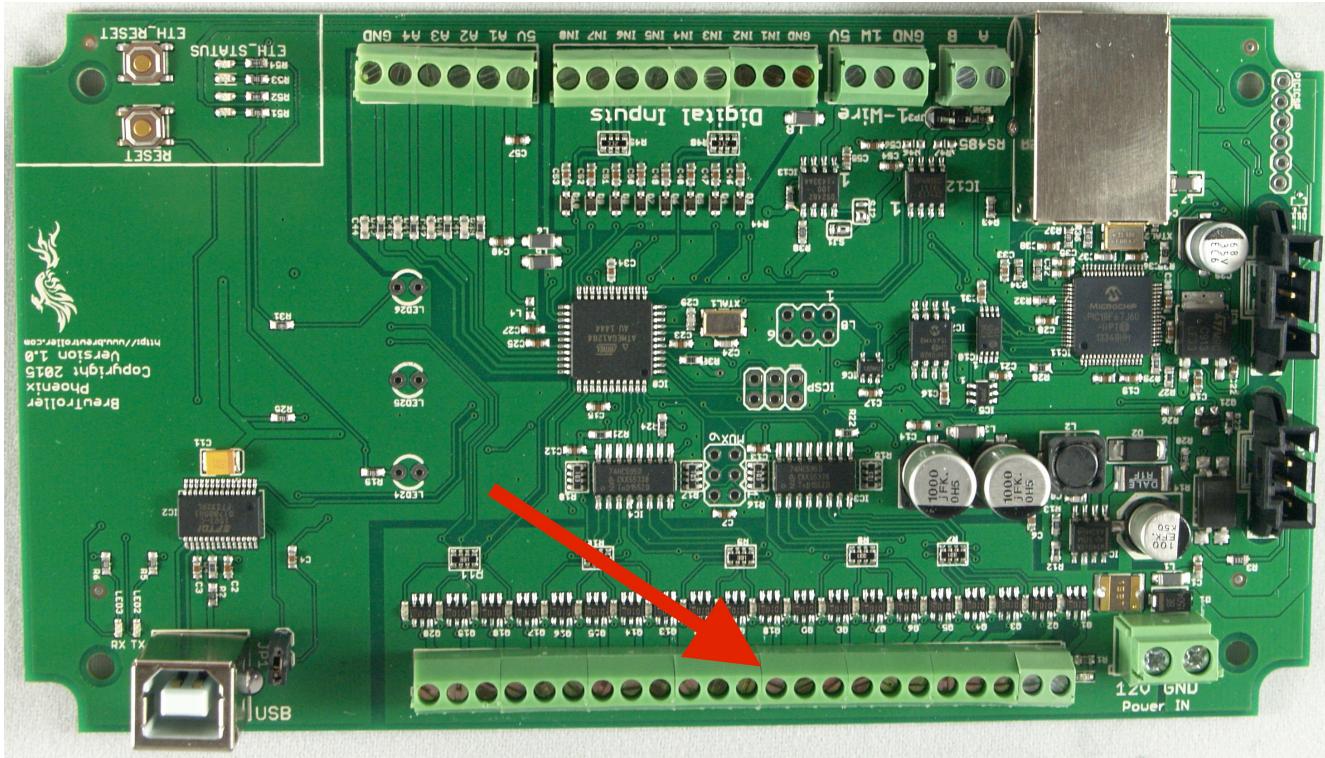
2.6 Connecting Outputs

The outputs on the BrewTroller Phoenix provide up to 100mA @ 12V per channel.

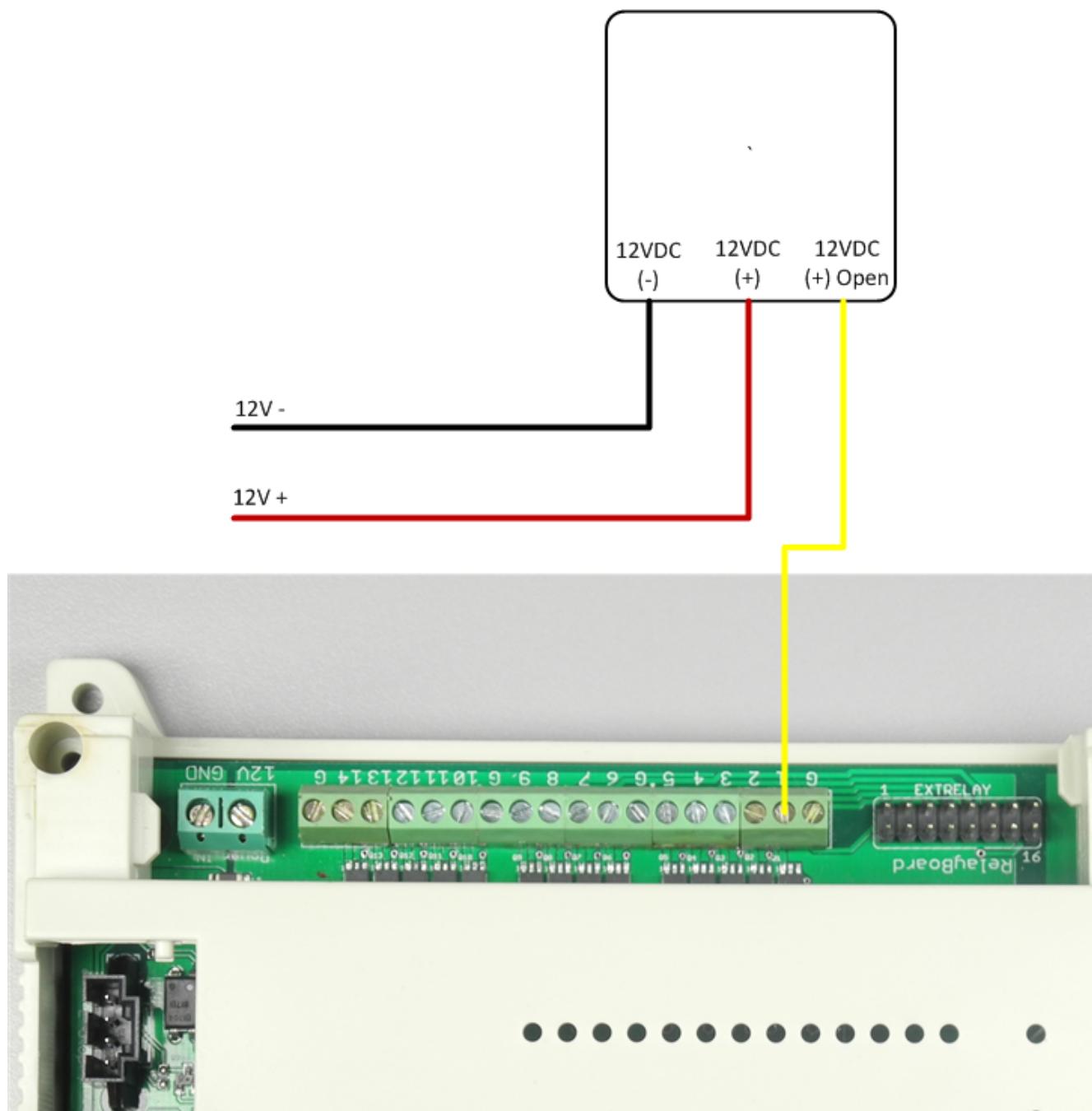
Important: The BrewTroller Phoenix does not provide any back EMF protection when used with standard mechanical relays. You must install a reverse protection diode onto the relay coil terminals to prevent noise and potential damage to the BrewTroller Phoenix.

2.6.1 Solid State Relay Example

To connect devices such as a solid state relay refer to the diagram below. Connect the BrewTroller output to the positive input terminal of the SSR. Connect the negative input terminal of the SSR to your power supply ground.



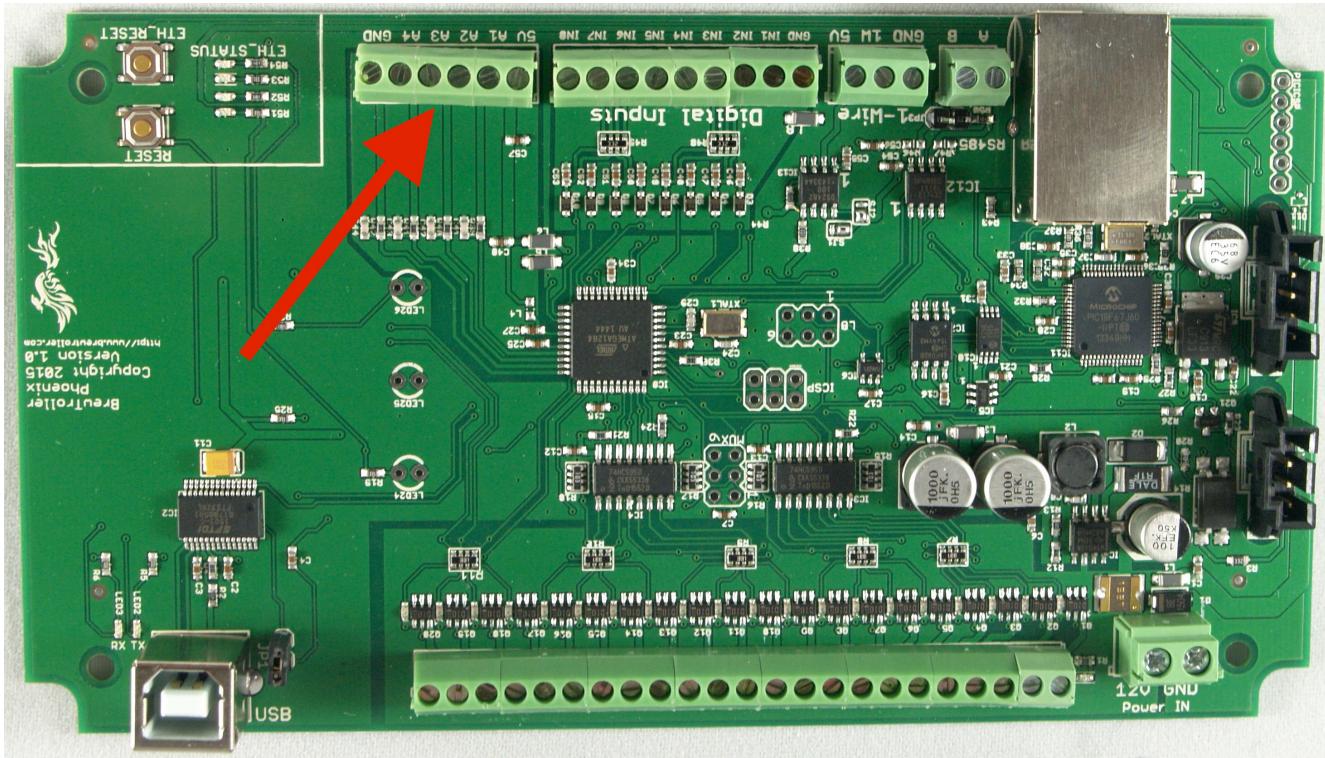
2.6.2 2 Way Motorized Ball Valve Example



2.7 Analog Inputs

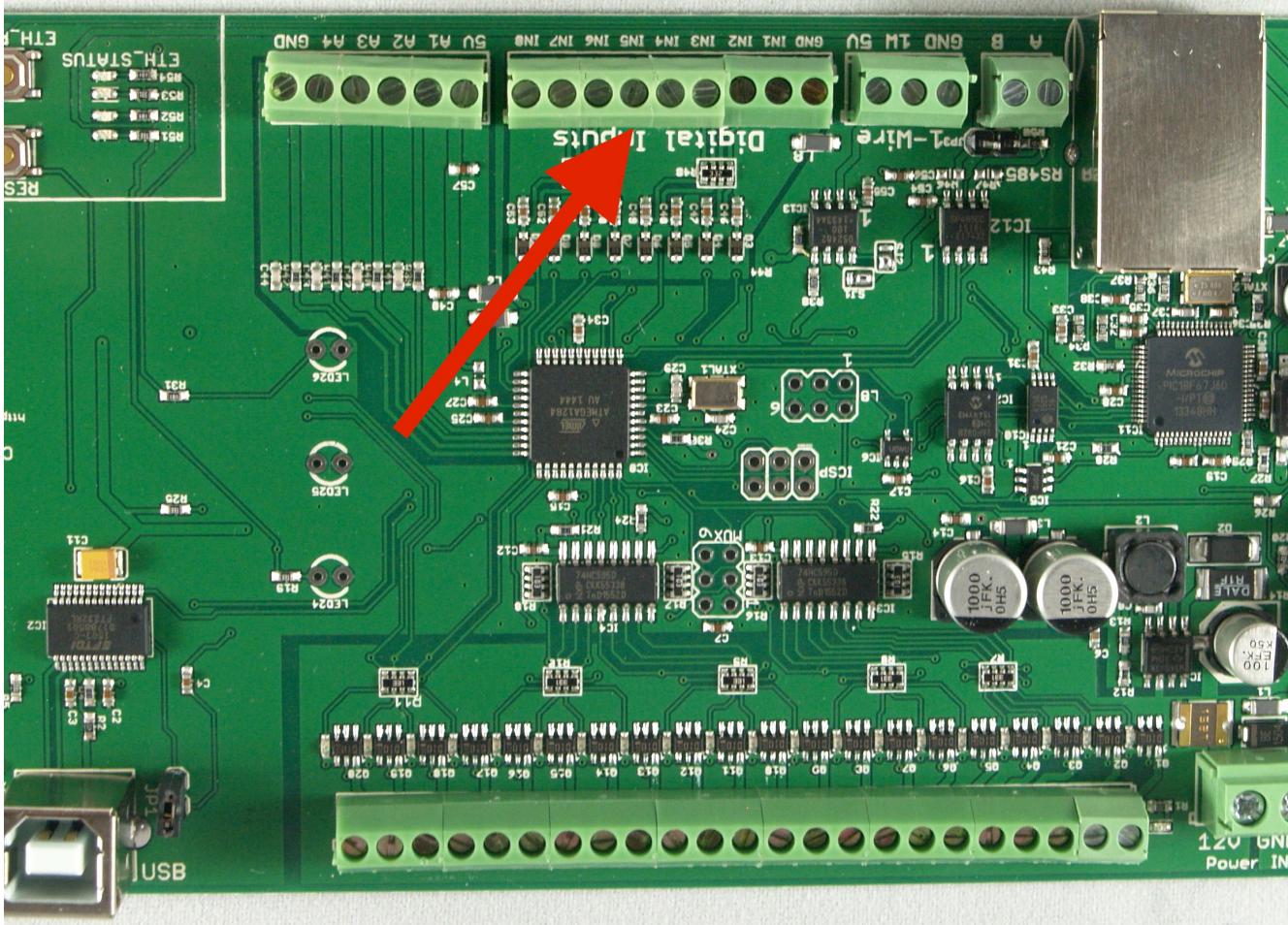
Any device that provides an analog 0-5V DC signal can be used as a volume sensor.

Volume sensors can be connected to the controller using the 6 pole analog input screw terminal block. Connect the 5f, Ground, and Signal Wires of Freescale MPX5010 pressure sensor here:



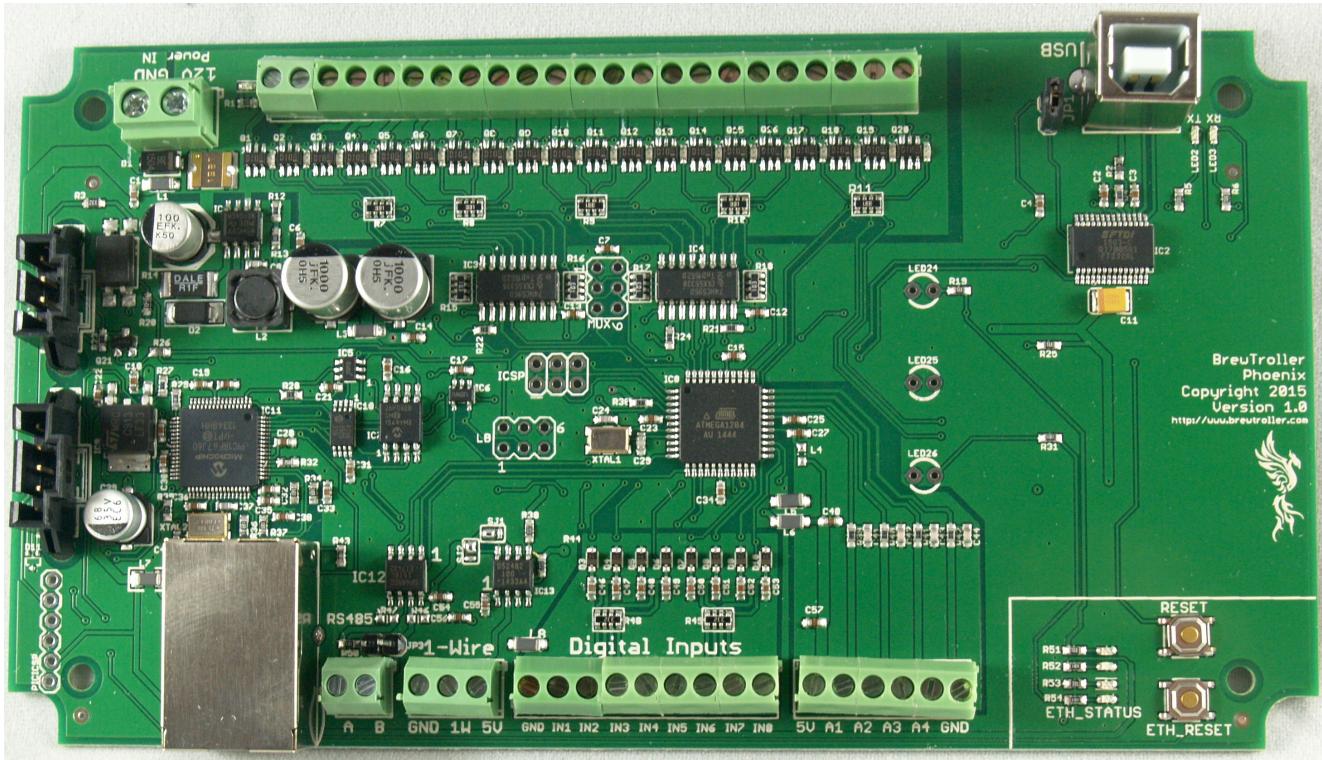
2.8 Digital Inputs

The BrewTroller Phoenix has eight opto-isolated digital inputs (Screw Terminals JP10). A 12VDC signal to a digital input is required to activate an input. All digital inputs share a common DC ground which must be supplied via the COM terminal on JP10.



3 BrewTroller Phoenix Reference

3.1 Layout



3.2 ETH_Reset Button

Used to restart the embedded Ethernet module.

3.3 BT_Reset Button

Used to restart (reboot) the firmware.

3.4 LED Indicators

Located next to the Reset Switches

3.4.1 Power

Indicates power is connected to controller.

3.4.2 BrewTroller Heartbeat

Indicates proper operation of the controllers firmware. The heartbeat indicator should toggle on/off every 750ms.

3.4.3 Ethernet Heartbeat

Indicates proper operation of embedded Ethernet module.

3.5 Jumpers

3.5.1 Auto-Reset

Allows automatic reset of board via serial port DTR for uploading firmware during microcontroller boot process. May be disconnected to avoid resets caused by serial port activation when not uploading firmware.

3.5.2 RS485 Termination

This jumper needs to be connected if the BrewTroller Phoenix is the first or last device on the RS485 bus.

4 Appendix A – Warranty

BrewTroller warrants that this hardware product is in good working condition, according to its specifications at the time of shipment, for a period of 90 days from the date it was shipped from BrewTroller. Should the product, in BrewTroller's opinion, malfunction within the warranty period, BrewTroller will repair or replace the product without charge. Any replaced parts become the property of BrewTroller. This warranty does not apply to the software component of a product or to a product which has been damaged due to accident, misuse, abuse, improper installation, usage not in accordance with product specifications and instructions, natural or personal disaster or unauthorized alterations, repairs or modifications.

All warranties for this product, expressed or implied, are limited to 90 days from the date of purchase and no warranties, expressed or implied, will apply after that period.

All warranties for this product, expressed or implied, shall extend only to the original purchaser.

The liability of BrewTroller in respect of any defective product will be limited to the repair or replacement of such product. BrewTroller may use new or equivalent to new replacement parts.

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In no event shall BrewTroller be responsible or liable for any damages arising

- . (a) from the use of the product;

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- . (b) from the loss of use of the product;
 - . (c) from the loss of revenue or profit resulting from the use of the product; or
 - . (d) as a result of any event, circumstance, action or abuse beyond the control of BrewTroller whether such damages be direct, indirect, consequential, special or otherwise and whether such damages are incurred by the person to whom this warranty extends or a third party.