

Touch miniPLC

Manual V1.0

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Warnings

Programmable control devices such as the EZTouch miniPLC are not fail-safe devices and as such must not be used for stand-alone protection in any application. Unless proper safeguards are used, unwanted start-ups could result in equipment damage or personal injury. The operator must be made aware of this hazard and appropriate precautions must be taken. In addition, consideration must be given to the use of an emergency stop function that is independent of the EZTouch miniPLC.

The diagrams and examples in this user manual are included for illustrative purposes only. The manufacturer cannot assume responsibility or liability for actual use based on the diagrams and examples.

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Manual part number EZ-MINIPLC-M

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EU Information

The EZTouch miniPLC is manufactured in compliance with European Union (EU) Directives and carries the CE mark. They been tested under CE Test Standard #EN55011, and is submitted for UL Certification. Products with CE marks perform their required functions safely and adhere to relevant standards as specified by EU directives provided they are used according to their intended purpose and that the instructions in this manual are adhered to. The protection provided by the equipment may be impaired if this equipment is not used in accordance with this manual. Only replacement parts supplied by AVG Automation or its agents should be used.

Technical Support

Consult Panel Editor Programming Software Help. You may also find answers to your questions in the operator interface section of our website @ flash.ezautomation.net. If you still need assistance, please call our technical support at 1-877-774-EASY or FAX us at 1-877-775-EASY.

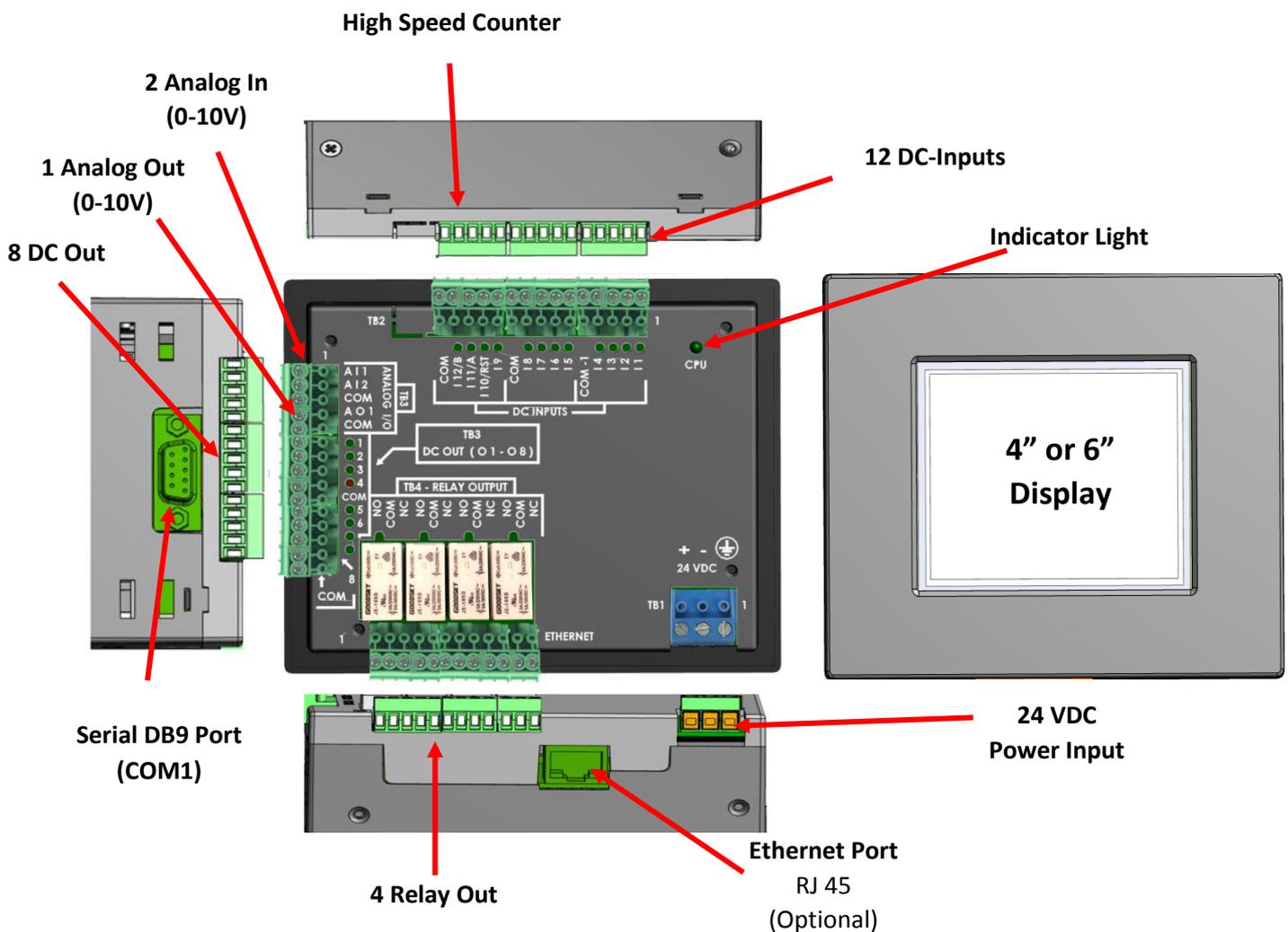
SELV Circuits

All electrical circuits connected to the communications port receptacle are rated as Safety Extra Low Voltage (SELV).

1 INTRODUCTION

- Integrated HMI and PLC in one compact unit
- 3.5 or 5.7 inch display options
- 1 RS232 serial port for programming
- Optional Ethernet Port with support for many popular industrial Ethernet protocols
- Fixed I/O with 12 In, 12 Out, 2 Analog In, 1 Analog Out
- High Speed counter with quadrature or pulse and direction inputs
- Easy to use EZTouch editor to program HMI as well as PLC

Thank You for using AVG Automation’s latest offering, the **EZTouch miniPLC** - a compact 3.5” or 5.7” Touch Panel integrated with a PLC (programmable logic controller). This guide covers information on the installation, wiring and specifications of the EZTouch miniPLC. It also outlines the troubleshooting and maintenance of an existing setup.



All the EZ Touch PLCs, including EZTouch miniPLC use ladder logic for programming and share the same programming environment. The ladder logic developed for one model can be used with other models by changing the target device. The software used to program the EZTouch miniPLC is: EZTouch Editor.

2 PART NUMBERS

All models listed below come with fixed I/O as shown below:

- 12 DC inputs (with 4 of the 12 being optically isolated),
- 12 outputs (8 DC + 4 Form C relay),
- 2 Analog Inputs (0-10VDC), 1 Analog Output (0-10VDC),
- High speed counter (quadrature or pulse and direction counting) (when used, counter would use 3 of the 12 inputs)

Mini PLC Part numbers

EZ-T4C-MINIPLC:	3.5" TFT display
EZ-T4C-MINIPLC-E:	3.5" TFT display, and Ethernet
EZ-T6C-MINIPLC:	5.7" TFT display
EZ-T6C-MINIPLC-E:	5.7" TFT display, and Ethernet

Programming software and cable

EZTOUCH-EDIT:	Programming software for Windows OS
EZ-PGMCBL:	Programming cable Serial

3 SPECIFICATIONS

3.1 GENERAL

Power	
Input Power	24 VDC (Outputs draw from unit VDC)
Max Power Consumption	30 Watts
Short Circuit Protection	When output draw exceeds 1A then all IO turn OFF and cycle ON after short time

Mechanical	
EZ-T4C External Dimensions	5.06" x 4.08" x 1.75" (128.52mm x 103.63mm x 44.45mm)
EZ-T6C External Dimensions	8.05" x 6.15" x 2.80" (204.47mm x 156.21mm x 71.12mm)
Enclosure	Nema 4, 4x (indoor)
Mounting	Din Mount (using 4 metal brackets)

Display	
Display Size EZ-T4C	3.5"
Display Size EZ-T6C	5.7"
Resolution	QVGA (320x240)
Brightness / Life	400 nits / 75,000 hours
Touch Screen	48 Resistive Touch Cells (8x6)

Memory	
User Program Memory	400 K
Total Number of Registers	8192 (256 registers retained on power down)

Communications	
Com Port	1 RS-232 port (9 pin D-Sub)
Ethernet Port	(Optional) RJ 45
Protocol Support	EZ Serial Protocols - RS-232 Popular Industrial Ethernet Protocols – RJ 45

Environmental	
Operating Temperature	-10 °C to 60 °C
Storage Temperature	-20 °C to 70 °C
Relative Humidity	5 to 95 %, Non-Condensing
Vibration	5 to 55Hz, 2g for 2 hours in X, Y, and Z axis
Shock	10g for under 12ms in the X, Y, and Z axis
Noise Immunity	Nema ICS 2-230 Showering arc, ANSI C37.90a SWC; Level C Chattering Relay Test

3.2 INPUT SPECIFICATIONS

Input Specification	
Total Number Of Inputs	Total 12 <i>Isolated: 4 Source or Sink (1-4)</i> <i>Non-isolated: 8 Sourcing (5-12)</i>
Input Voltage Range	10 – 28 VDC
Peak Voltage	40 VDC
Input Current	1.92 mA @ 12 VDC 4.0 mA @ 24 VDC
Maximum Input Current	5 mA @ 28 VDC
Input Impedance	5.6k @ 10-28 VDC
ON Voltage Level	> 10 VDC
OFF Voltage Level	< 2 VDC
Min. ON Current	1.5 mA
Min. OFF Current	0.2 mA
OFF to ON Response	<i>Inputs 1-10: 2-4 ms, typical 3 ms</i> <i>Inputs 11, 12: <1 uS (High Speed Counter Input)</i>
Status Indicators	<i>Inputs 1-4: Red LED for Source, Green LED for Sinking</i> <i>Inputs 5-12: Red LED</i>
Commons	<i>Inputs 1-4: 1 point (COM-1)</i> <i>Inputs 5-12: 2 points, labelled COM</i>
Optical Isolation	<i>Inputs 1-4: 2500 Volt</i> <i>All other inputs: None</i>
Wires	14 to 24 AWG

3.3 OUTPUT SPECIFICATIONS

Output Specification	
Number Of Outputs	8 Sourcing
Output Voltage Range	24 VDC
Peak Voltage	50 VDC
Maximum Steady State Output Current	0.5 A max per output 1.0 A max per TB3 @ 50°C
Maximum Leakage Current	100 μ A @ 50 VDC @ 50°C
ON Voltage Drop	2 VDC @ 0.5A
Maximum Inrush Current	0.8 A for 10 ms
OFF to ON Response	< 2 μ s
ON to OFF Response	< 10 μ s
Status Indicators	Red LED for each output
Commons	2 Commons
Short Circuit Protection	1 Amp for miniPLC
Optical Isolation	2500 Volt
Wires	14 to 24 AWG

Relay Output Specification	
Number Of Outputs	4
Output Voltage Range	5 – 30 VDC or 20 – 250 VAC
Output Type	4 Form C (SPDT)
Output Terminals	12
Peak Voltage	30 VDC / 380 VAC
AC Frequency	47 – 63 Hz
Maximum Current (resist.)	5A / point
Maximum Leakage Current	0.5mA @ 130 VAC @ 60 Hz
Maximum Switch Current	5A
Electromagnetic Shield	2 pF between contact and shield
Dielectric Strength	1000VAC between contacts 4000VAC between contacts and coil
OFF to ON Response	< 1 ms (typical)
ON to OFF Response	< 1 ms (typical)
Status Indicators	Red LED for each output

3.4 COUNTER SPECIFICATIONS

Counter Specification	
Number Of Inputs	3 Input 10: RST (Reset) Input 11: A Input 12: B
Maximum Input Frequency	250 KHz
Counter Range	16 million (24 bits)
Minimum Pulse Width	0.5 μ s
Count Modes	User configurable: 1X, 2X, 4X Quadrature, Up/Down Counter (Pulse on Input A, Direction on input B) RST input to load a preset value in all count modes
Preset Modes (RST Input)	User configurable to load preset values when on RST input High, RST Rising Edge, or RST falling Edge
Presets	Physical input (RST), Program Bit
Number of Set points	Up to 4 Set point pairs (ON and OFF limits based on count value)
Limit Outputs	Up to 4 outputs (any 4 from total 12 on the unit) can be assigned to limit setpoints

3.5 ANALOG SPECIFICATIONS

Analog Specification		
Analog Voltage Input Specs	Number Of Inputs	2 single ended
	Input Range	0 – 10 V
	Resolution	12 bit (0 - 4095)
	Crosstalk	½ count max, -80db
	Input Impedance	>20kΩ
	Absolute Max Ratings	± 15V
	Converter Type	Successive approximation
	Linearity Error	± 3 counts
	Total Unadjusted Error (TUE)	Typical ± 4 counts Max ± 7 counts
	Gain Error	± 2 counts
	Offset Calibration	± 5 counts
	Max Inaccuracy	± 0.2% at 25°C ± 0.4% at 0-60°C
	Accuracy vs. Temperature	± 50 ppm/°C typical
Analog Voltage Output Specs	Number Of Channels	1 single ended
	Output Range	0 – 10 V
	Resolution	12 bit (0 - 4095)
	Crosstalk	½ count max, -80db
	Peak Output Voltage	± 18 VDC
	Offset Error	± 0.8% of range
	Gain Error	± 0.6% of range
	Linearity Error	± 8 counts
	Output Stability	± 2 counts
	Load Impedance	2k Ω min.
	Load Capacitance	.01 microF max
	Accuracy vs. Temperature	± 50 ppm/°C typical

4 INSTALLATION

4.1 GUIDELINES

Safety Considerations

Please follow all applicable local and national codes to ensure maximum safety of the equipment and personnel. The installation and operational environment must be maintained per the latest revision of these codes.

You are responsible to determine the codes to be followed and to verify the compliance of equipment, installation, and operation with the latest revision of these codes.

It is an absolute must to follow all applicable sections of:

- The National Fire Code
- The National Electrical Code (NEC)
- The National Electrical Manufacturer's Association (NEMA) codes

Safety Guidelines

Safety is the most important element of a proper system installation. Adhering to these safety considerations ensures the safety of yourself and others, as well as the condition of your equipment. We recommend reviewing the following safety guidelines:

1) *Disconnecting Main Power*

The main power switch should be easily accessible to the operators and maintenance personnel. It is important to make sure that all other sources of power including pneumatic and hydraulic are de-energized before starting the work on a machine or process controlled by an EZ EZTouch miniPLC.

2) *Safety Circuits*

Most of the machines are installed with safety circuits such as limit switches, emergency stop push buttons, and interlocks. These circuits should always be hardwired directly to the EZTouch miniPLC. These devices must be wired in series so that when any one device opens, the PLC is automatically de-energized. This removes power to the machine. These circuits should not be altered in any case, since this could result in serious injury or damage to the machine.

3) *Fail-Safe Operation*

Our products are not fault-tolerant. They are not designed or intended for use as online control equipment in hazardous environments requiring fail-safe performance, such as in operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life-support machines, weapons systems, clutch control systems on presses, in which the failure of the product could lead directly to death, personal injury or severe physical or environmental damage. External fail-safe and/or redundant components are required to make your control system fail-safe.

Installation Considerations

Our products have been designed and tested for operation in the most demanding industrial environments. Modern solid-state industrial controls are complex electronic equipment that operate at low levels of voltage and current, co-existing with components that operate at much higher levels of power. The difference in operating power characteristics between the high and low power control devices creates the possibility of unwanted signals being generated, thus causing interference. The interference, which is a by-product of electrical noise, is not present at all times. However, if it appears at random and for brief periods of time, it can cause disruptions and errors in the operation of a control system.

Enhancement of a system's noise level immunity and its tolerance to other environmental hazards can be accomplished by following proper system installation guidelines. The recommendations are of a general nature and constitute good industrial installation practice.

General Environmental Considerations

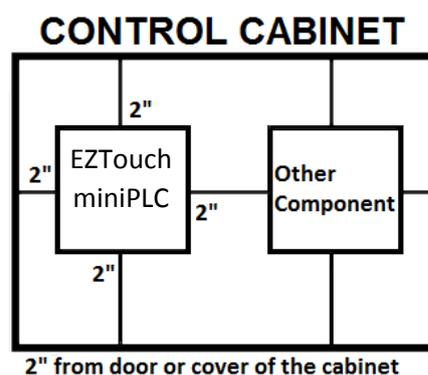
Avoid installing EZTouch miniPLC in areas where the following conditions may exist:

- Environmental temperatures above or below those specified by the EZTouch miniPLC
- Prolonged exposure to humidity and liquids which may be sprayed or splashed on the equipment
- Dusty environments where airborne particles may accumulate on equipment causing reduction of heat dissipation and reduction in effective electrical spacing between components
- Areas with excessive vibration
- Areas with high-radiated electrical noise, such as near fields of transmitting antennas and areas in close proximity of arc welding stations

Physical Layout in a Control Cabinet

When possible, cabinets housing electronic equipment should be designed with provisions for natural or forced ventilation to facilitate heat dissipation. Observe the following rules for cabinet installation:

- Heat generating equipment (power supplies and other heat inducing components) should be installed toward the top of the cabinet. The lower space in the cabinet is cooler than the top area.
- Install heat-sensitive components in the lower section.
- Provide enough space between components to allow a free flow of air for better heat dissipation.
- Provide the maximum possible physical separation between solid state and electromechanical controls. If possible, the electromechanical controls (motors, starters, solenoids, etc.) should be housed separately or at the farthest point when enclosed within the cabinet.
- We recommend that the EZTouch miniPLC have a minimum clear space of 2" on all sides for adequate ventilation as shown in the image on the left.



Electrical Considerations

This section is designed to provide you with a very basic understanding of electrical noise and how to keep it away from CPUs. Industrial plants have a number of generators of electrical noise that are sometimes also referred to as Radio Frequency Interference (RFI). Anytime an inductive load like a motor, motor starter, or solenoid is turned off, it generates a burst of excess energy that has to flow back to ground, just like electrical energy from a lightning storm has to flow back to Earth. RFI is short bursts of electrical energy at very high frequencies. Other sources include RF Welders or Radio Transmitters.

Effect of RFI on Electronic Automation Equipment

Electronic controls use faster and faster CPUs today. These CPUs are also operating at 2.5V to 5VDC logic level power supply. RFI, if allowed to enter the CPU inside, is a killer of logic. A CPU under this environment loses its brain and behaves erratically. A smart industrial-grade CPU like the EZTouch miniPLC Card Engine, when faced with RFI, halts its operation instead of giving false outputs.

Types of RFI

RFI enters electronic controls in two ways: radiated RFI or conducted RFI. For most practical purposes, electronic devices, unless sitting right next to a powerful RFI transmitter, will not be affected by noise because air space severely attenuates such interference. On the other hand, conducted RFI travels over conductive surfaces such as power supply wires, electrical wiring of field devices, and worst of all; improper ground planes.

Equipment cabinets usually incorporate one or two doors and/or hinged cabinet panels. Relying on door hinges and swinging panels for a good metallic bond between hinged parts and the main body of the cabinet does not insure adequate grounding. Instead, the use of ground straps is recommended. It is vital for the reliable operation of any electronic device to have any of its metallic surfaces well ground to Earth. This not only provides for safe operation, it will also drain out any conducted RFI to Earth, away from the CPU's signal ground.

Shielding from RFI

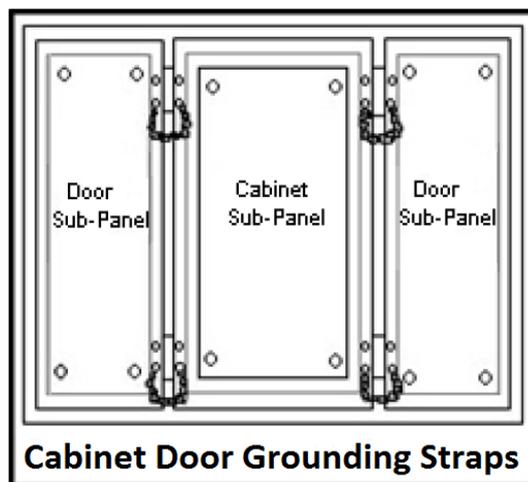
Shielded Cables

Power cables, I/O cables or wiring, and communication cables should all be separate so that they do not couple the conducted RFI on any of these wires/cables. Another path for RFI into the PLC is through its RS232 port. Hence, the cables to this port must be shielded properly.

Equipment Cabinets

As mentioned, equipment cabinets typically incorporate one or two doors and/or hinged cabinet panels. In addition, sub-panels may be utilized on those electronic controls and electromechanical items that are mounted. The goal is to create a medium for mounting the equipment and ensure grounding of the control's chassis to it. However, the door hinges and swinging panels by themselves are not enough to ensure adequate grounding.

Similarly, the equipment enclosures are generally either painted or anodized. Mounting of painted or anodized



enclosures to like surfaces also does not ensure good metallic contact between the equipment chassis and cabinet. It is imperative that the equipment chassis are grounded such as through the use of grounding straps as illustrated below.

Cabinet Wiring

The wiring of the EZTouch miniPLC to the “field” outside the cabinet must be by design. The wiring cannot be random in order to get the various points of the cabinet and the “field” electrically connected. Below are some general rules that apply in most situations:

Provide a separate power source to electronic controls and keep this power bus away from any I/O power.

The cabinet should be wired with a safety ground (the main safety ground wire gauge is determined by the cabinet’s total current consumption) and in accordance with all electrical code requirements.

Once the cabinet doors, stationary sub-panels and swing-out sub-panels have been “strapped” to the main cabinet, it is not necessary to run safety ground wires from the equipment chassis terminals to the main safety ground connection.

The safety ground terminal of each component can, and should be, connected with the shortest wire possible, to the cabinet or sub-panel frame.

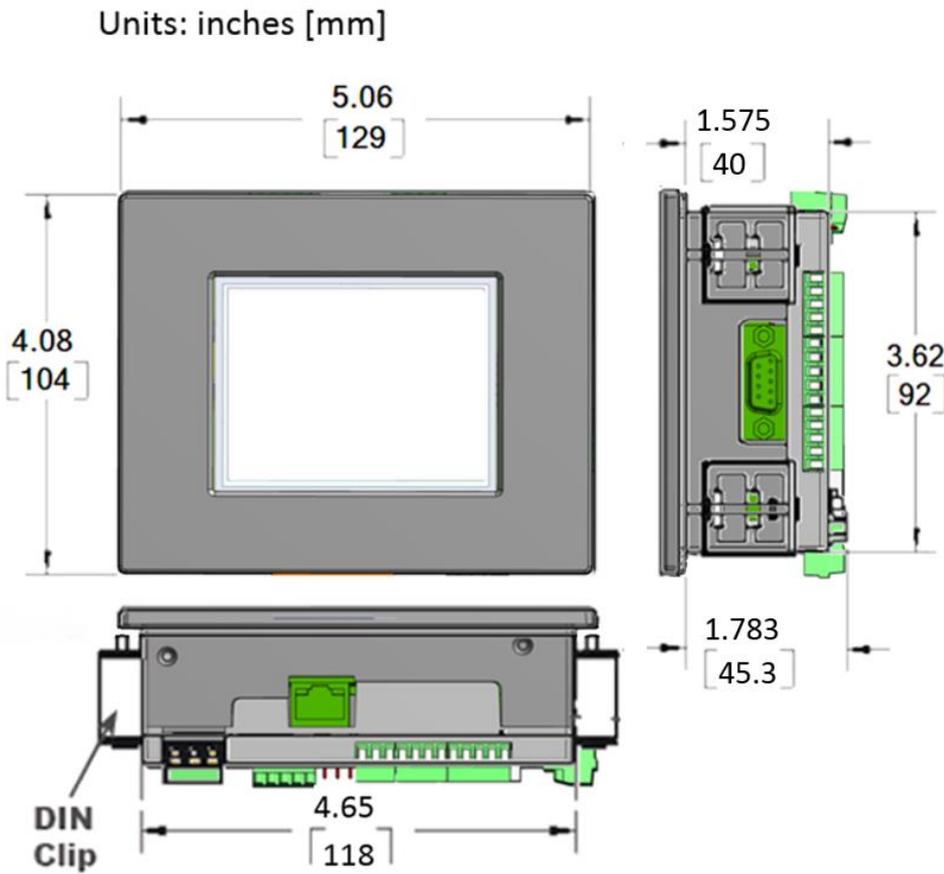
Plan the wiring routing. Keep all switched power in separate ducts and if there is AC and DC power being switched, keep the wiring of each branch separate from all wires and cables carrying low level signals.

Keep all three phase power outside of the cabinet, but if it becomes necessary, keep the runs as short as possible and maintain the maximum possible distance between the three phase bus and all other wiring.

Primary power leads to the control equipment (Base power terminals) should be made with a two wire twisted cable with approximately 12 turns per foot. The length of these cables should be kept to a minimum, and to the greatest extent possible, such cable runs should be kept separate from other wiring.

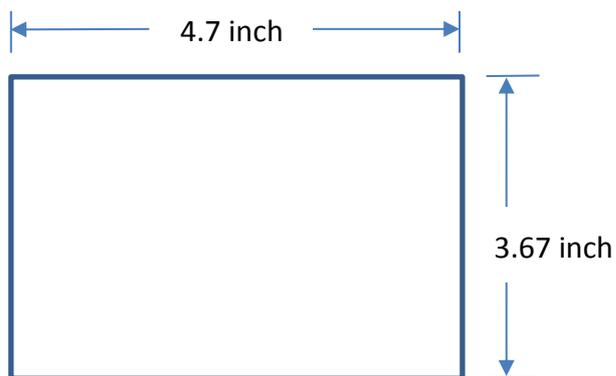
4.2 DIMENSIONS

4.2.1 3.5" Model Dimensions (EZ-T4C-MINIPLC or EZ-T4C-MINIPLC-E)



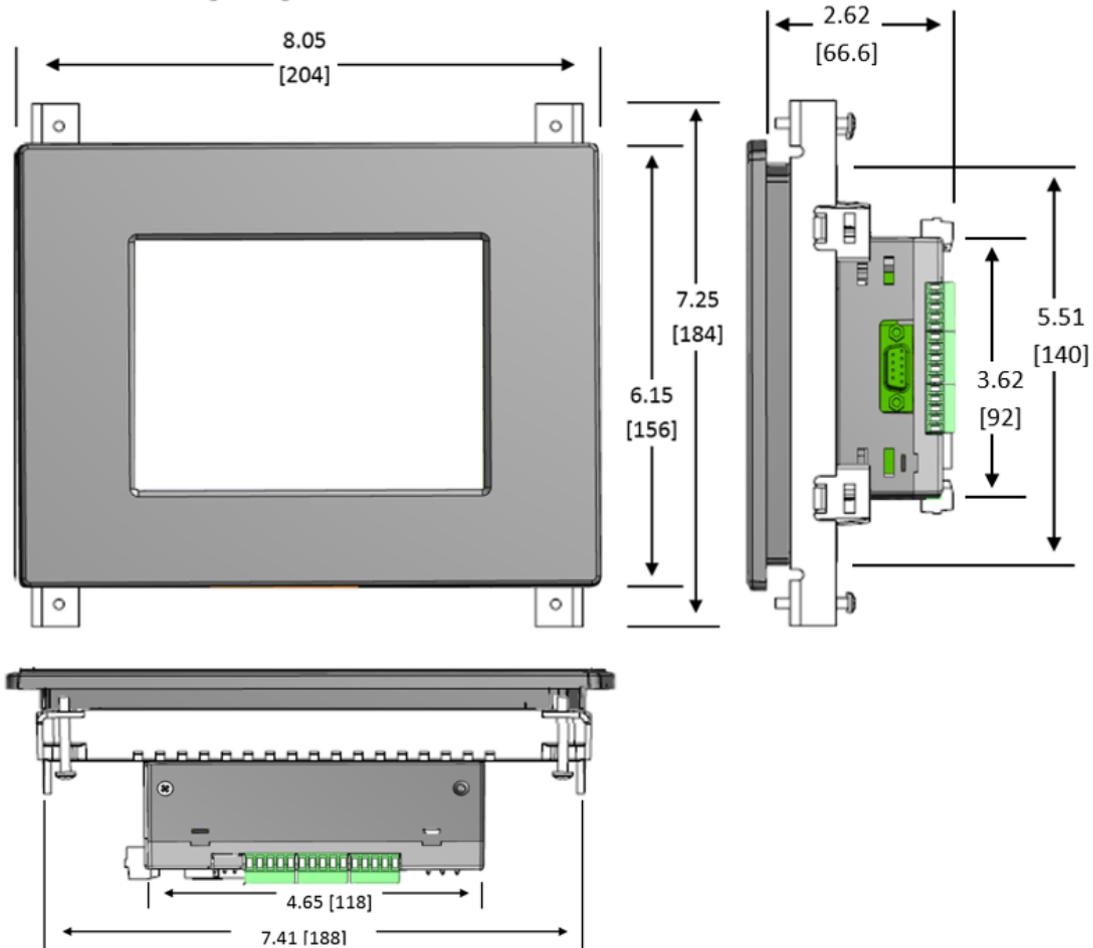
4.2.2 Panel Cut-out Dimensions

The unit uses DIN Clip mounting, requiring only a rectangular cutout:



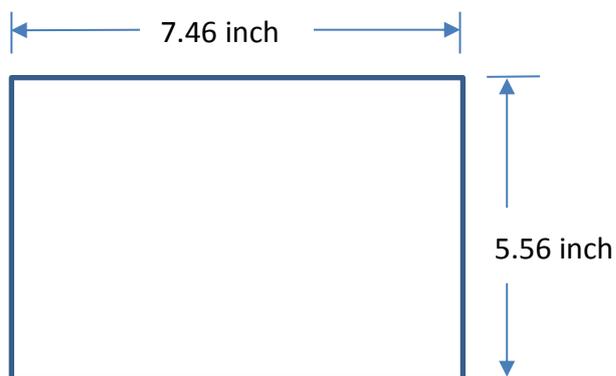
4.2.3 6" Model Dimension (EZ-T6C-MINIPLC or EZ-T6C-MINIPLC-E)

Units: inches [mm]



4.2.4 Panel Cut-out Dimensions

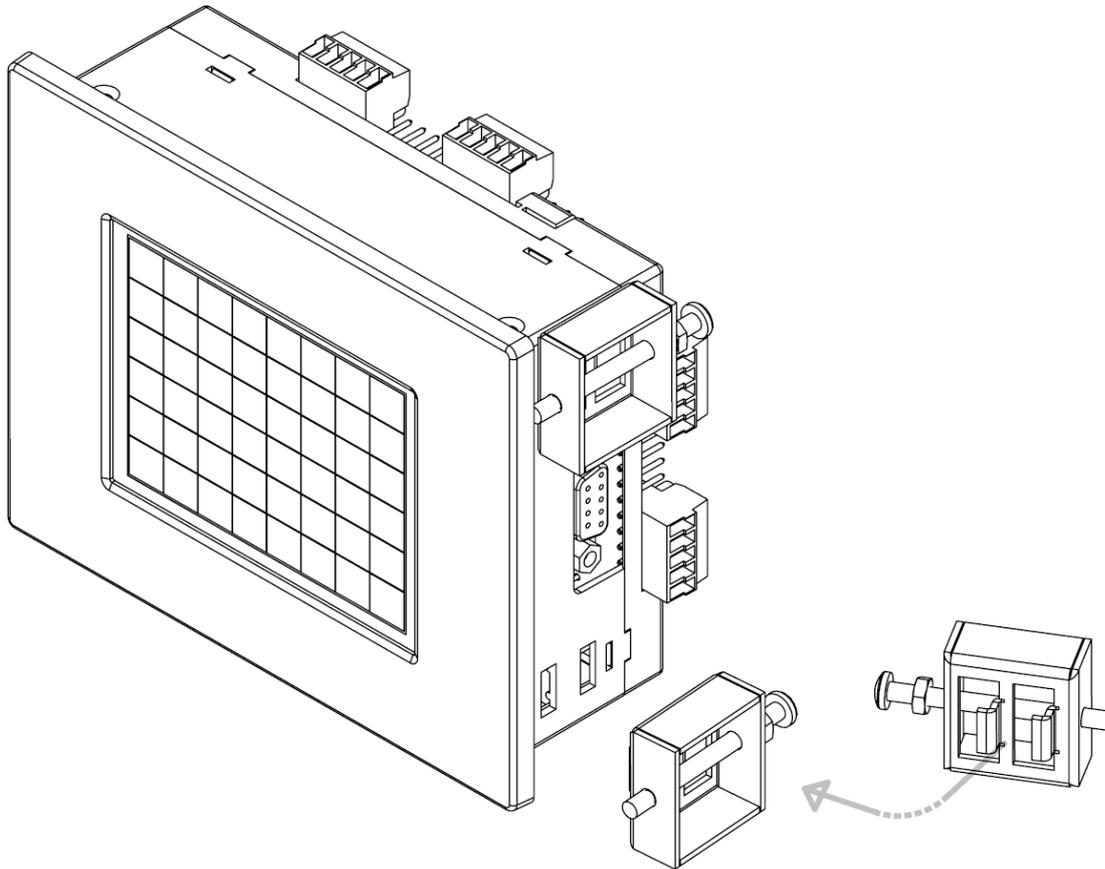
The unit uses DIN Clip mounting, requiring only a rectangular cutout:



4.3 MOUNTING INSTRUCTIONS

4.3.1 3.5" Mounting Instructions

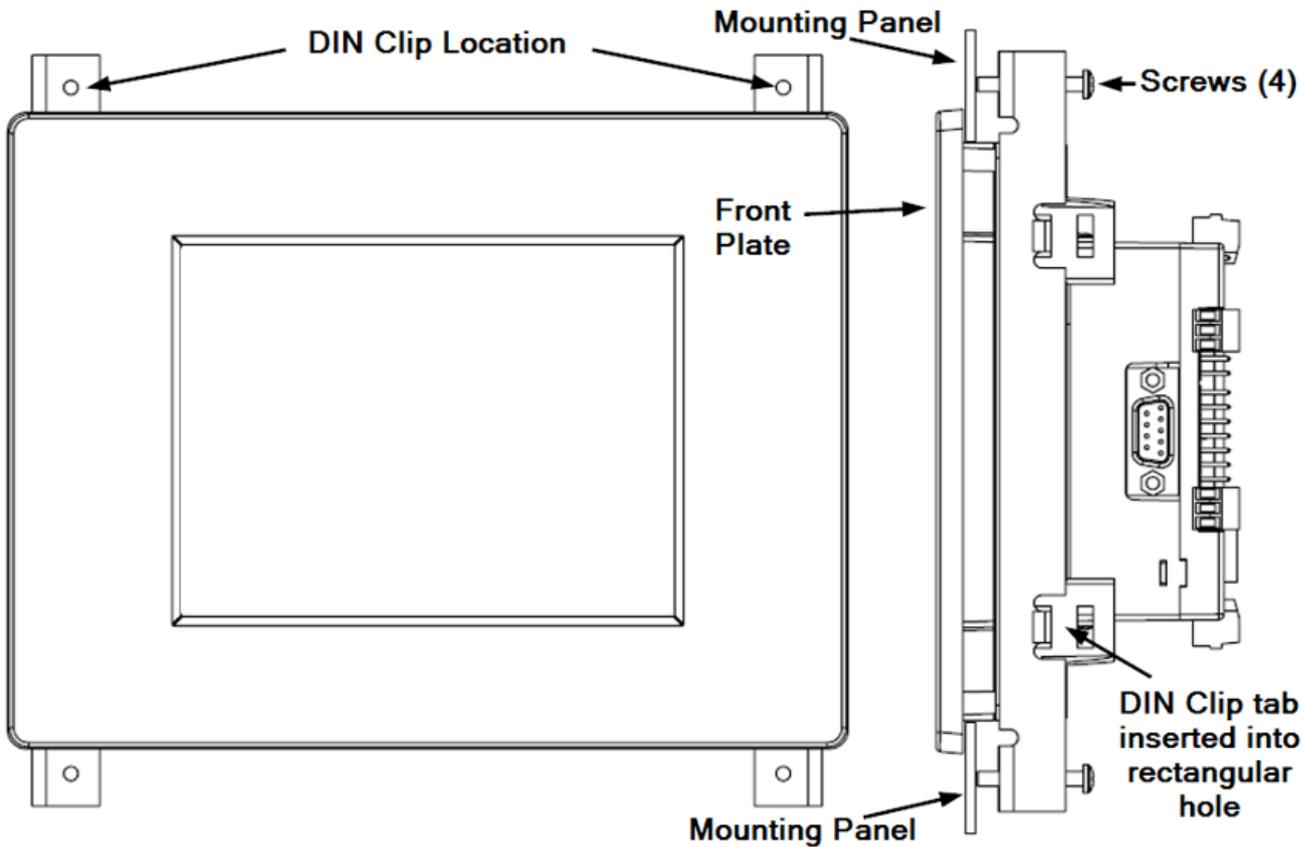
EZTouch miniPLC uses 4 DIN clips for mounting the unit. If not, please put the screw and nut as shown. In the diagram below. Screw requires a Phillips #1 screw driver.



1. DIN Clips should have come with a screw and nut already threaded in it. If not, prepare the DIN clip assembly first by placing the nut on the screw. Insert the screw into the DIN clip in the non-threaded end first using the Phillips #1 screwdriver if necessary. Leave a gap between the DIN clip and the head of the screw.
2. After ensuring the cut-out is sized properly and allows for adequate ventilation, place the EZTouch miniPLC unit into the cut-out horizontally.
3. Once in place, use the hooks on the DIN clip to locate the DIN clip assembly onto the side of the EZTouch miniPLC unit. Tighten the screw into place. Then rotate the nut until it is snug against the DIN clip to prevent it from vibrating loose. Repeat this process with the other 3 DIN clip assemblies until the EZTouch miniPLC unit is secure.

4.3.2 5.7" Mounting Instructions

The 6-inch models must be mounted using DIN Clips. DIN Clips are metal brackets (P/N EZ-BRK-1, package of 2 brackets and 4 screws) that attach to the panel and secure the front panel to a mounting surface with 4 screws. Use the diagram and instructions below to mount the miniPLC unit using DIN Clips.



1. There are 4 rectangular holes in each side (two at the top and two at the bottom) of the chassis as shown in the following figure. Choose the holes that allow the appropriate space for your mounting panel thickness.
2. On each DIN Clip there are two metal tabs (bent inward) that fit into these holes. Insert the two clip tabs into two holes (top and bottom) and secure the panel by alternately tightening the DIN Clip screws (4) until the back edge of the unit's front plate is flush with the mounting panel.

5 WIRING

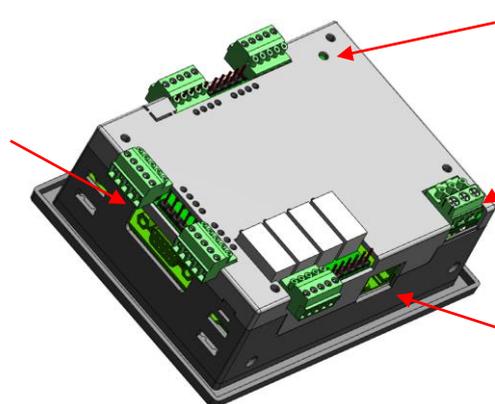
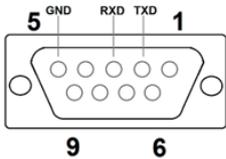
5.1 POWER AND COMMUNICATION

Power Terminal block can accept wire size 14 AWG to 26 AWG.

Serial Port (Com 1)

9 Pin D-Sub

- RS232C
- For Programming the unit
- Use EZ-PGMCBL cable to program the unit serially



Indicator Light
(see below)

3 Terminal Power Connector
24 VDC

TB1 24 VDC	
1	Earth GND
2	Negative (-)
3	Positive (+)

Optional Ethernet Port (RJ 45)

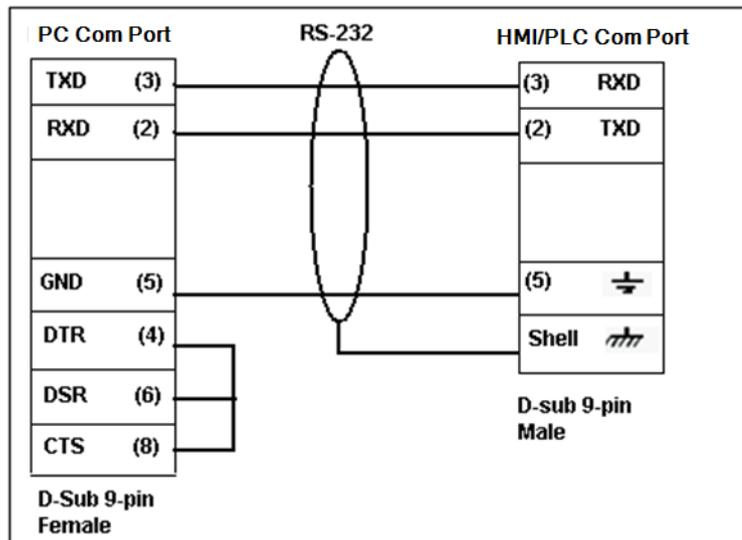
- For Programming, and
- Ethernet protocols, such as Ethernet/IP

Indicator Light	
Blinking Green	Power connected
Blinking Red	Some problem. Please try a power cycle, if that does not fix the issue please contact Tech Support.
No Light	Power source not connected or inadequate

EZ-PGMCBL: Programming Cable Wiring



CAUTION! Keep the signal reference GND wire well protected from external noise by using shielded cable.

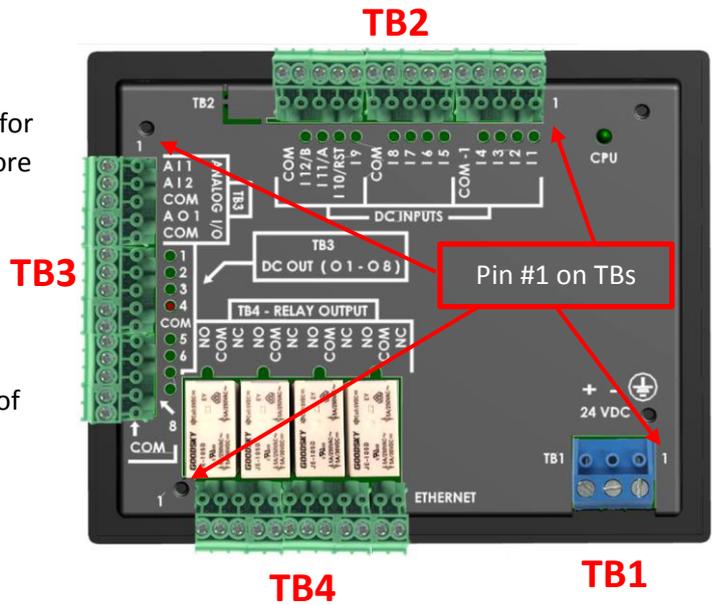


5.2 IO WIRING

The diagram below gives the basic wiring information for the EZTouch miniPLC. Each Table (TB) is outlined in more detail in the following sections.

The terminals and functions are screen printed on the unit. Pin 1 is also marked on each terminal block.

Terminal blocks can use 1 of 14 AWG, 2 of 18 AWG, 4 of 22 AWG gage wires.



TB2-Pinout Information	
Isolated Inputs	
1	Input (1)
2	Input (2)
3	Input (3)
4	Input (4)
5	COM – 1 (Optically Isolated common)
Non-isolated inputs	
6	Input (5)
7	Input (6)
8	Input (7)
9	Input (8)
10	COM
11	Input (9)
12*	Input (10) / RST
13*	Input (11) / A
14*	Input (12) / B
15	COM

TB3-Pinout Information	
Analog Inputs (0-10VDC)	
1	Analog Input (1)
2	Analog Input (2)
3	Com for Analog In
Analog Outputs (0-10VDC)	
4	Analog Output (4)
5	Com for Analog out
Discrete Sourcing Outputs	
6	Output (1)
7	Output (2)
8	Output (3)
9	Output (4)
10	COM
11	Output (5)
12	Output (6)
13	Output (7)
14	Output (8)
15	COM

TB4-Pinout Information	
Relay outputs	
1	NO (1)
2	Com (1)
3	NC (1)
4	NO (2)
5	Com (2)
6	NC (2)
7	NO (3)
8	Com (3)
9	NC (3)
10	NO (4)
11	Com (4)
12	NC (4)

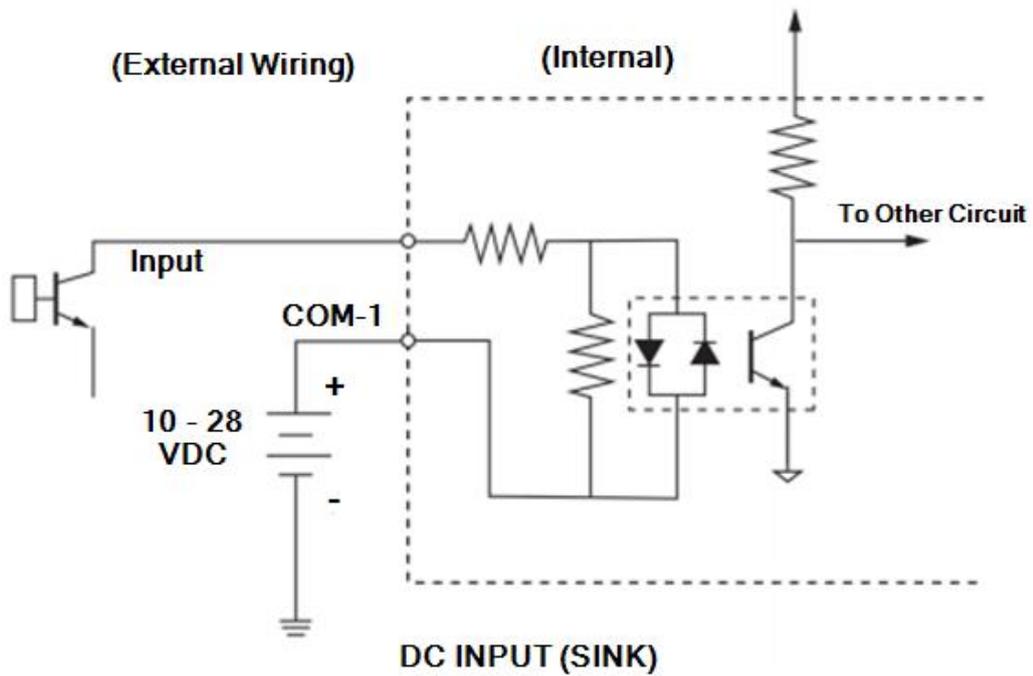
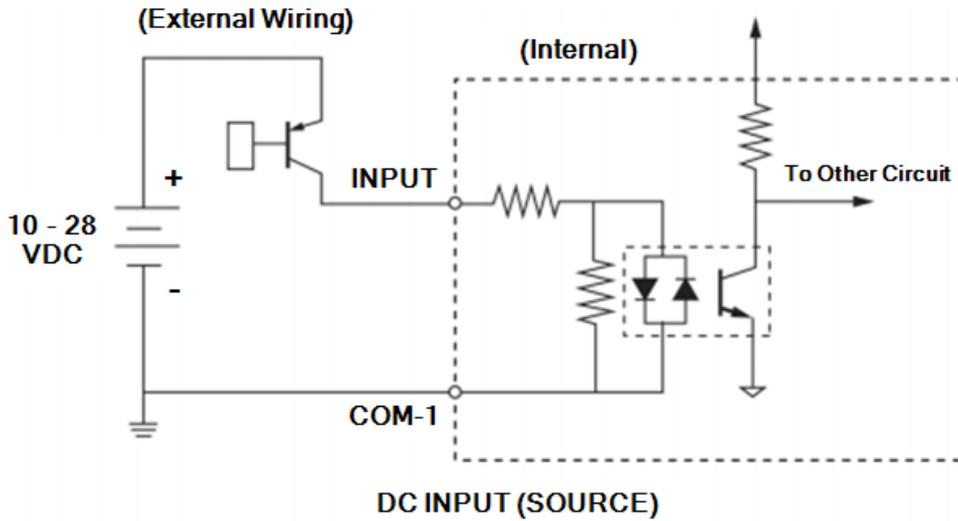
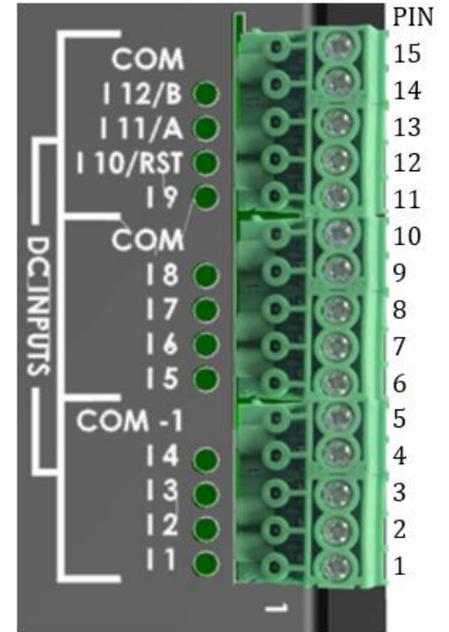
NO: Normally Open
 NC: Normally Closed
 COM: Common

*TB2, Pins 12, 13 14 have alternate functions:

- Default: Pins 12, 13, 14 are normal discrete inputs
- When High speed counter is used, pins 12-14 are counter inputs

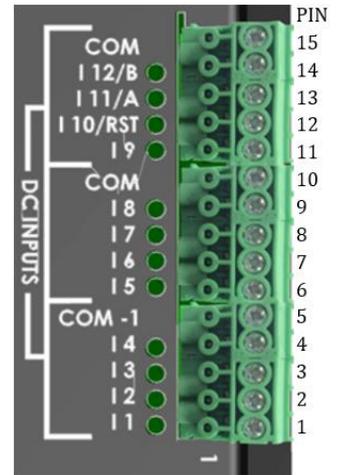
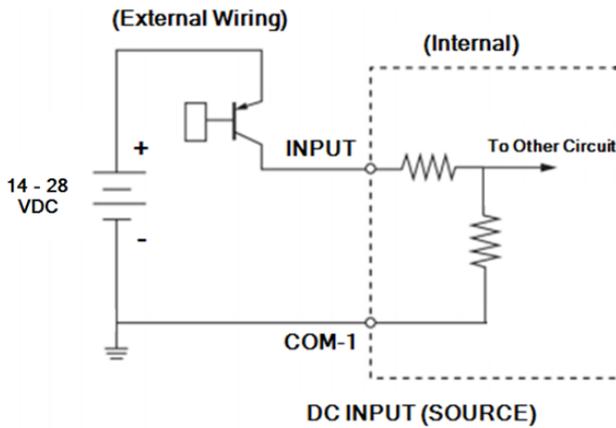
5.2.1 Isolated Inputs 1 - 4 (TB2) (Address I1-I4)

Inputs 1-4 (Pins 1-5) are isolated inputs, and can be used as source or sink inputs based on its common connection (COM-1). The common COM-1 can be connected to ground or to positive power. Since these inputs are isolated they can operate at a voltage level different than that of other inputs.



5.2.2 Input 5 – 12 (TB2) (Address I5-I12)

Inputs 5 – 12 (pins 6-15) are not isolated, and are only sourcing. Inputs 10 – 12 have an alternate function. As a default, Input 10-12 are discrete inputs. If High Speed Counter is enables, inputs I10, I11, and I12 are used for as Counter inputs.



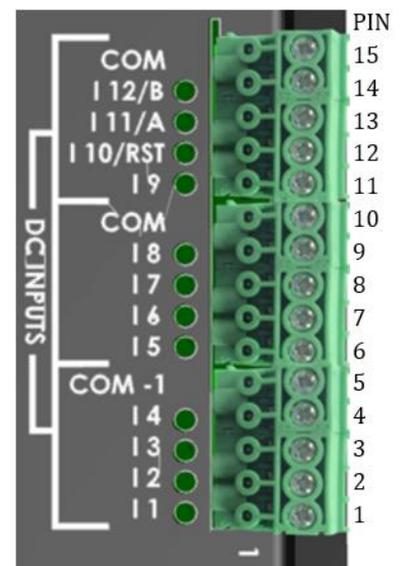
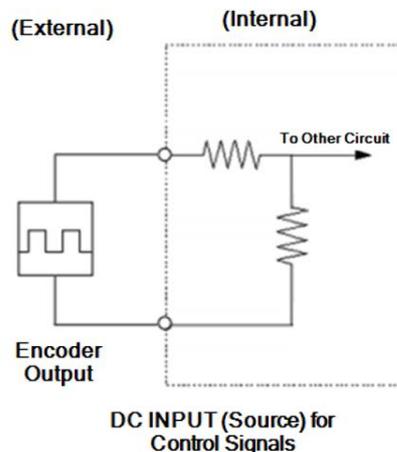
5.2.3 HSCNT (Input 10 – 12) (TB2) (Address IR3-7, OR2-OR23)

The EZTouch miniPLC provides High Speed Counter function. The HS function is disabled as default. Once counter function is enabled using EZTouch Editor, Inputs 10 – 12 (pins 12-14) offer alternate function. The HSCNT also has an option to use up to 4 Outputs as PLS outputs directly controlled by the High Speed Counter.

All the outputs can be used in this functionality with this option being user selected in the software. Please see Output 1 – 12 for wiring info (Discrete or Relay).

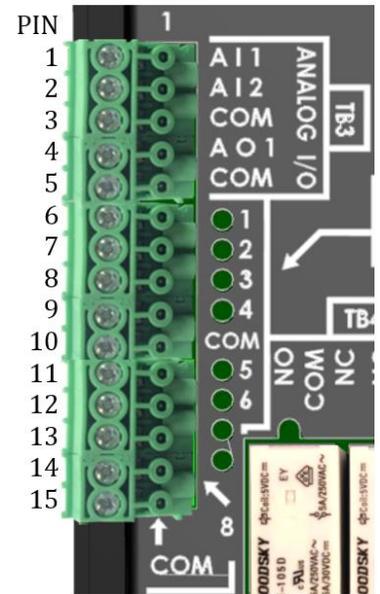
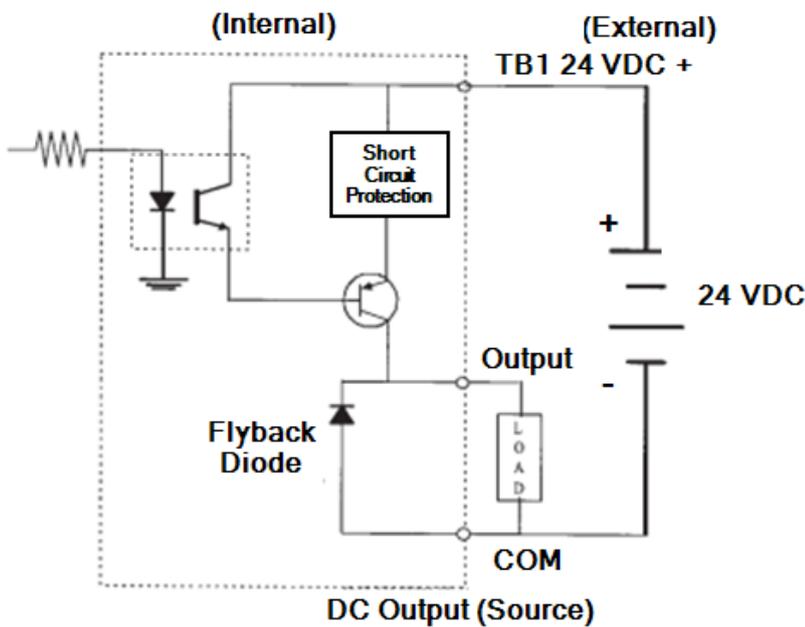
Output response varies from discrete to relay due to their specs but response time to actual counts is 100 μ s.

Pinout Information (TB2)	
12	Input (10) / RST (Reset to Preset Input)
13	Input (11) / A (Quad A or Pulse Input)
14	Input (12) / B (Quad B or Direction Input)
15	COM



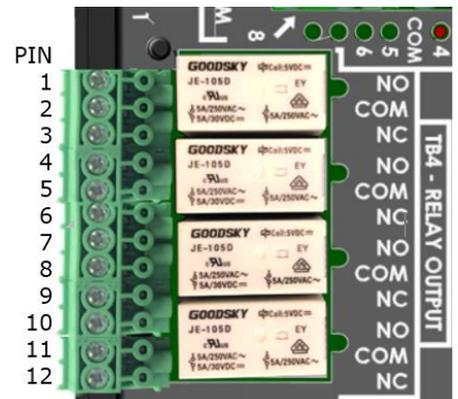
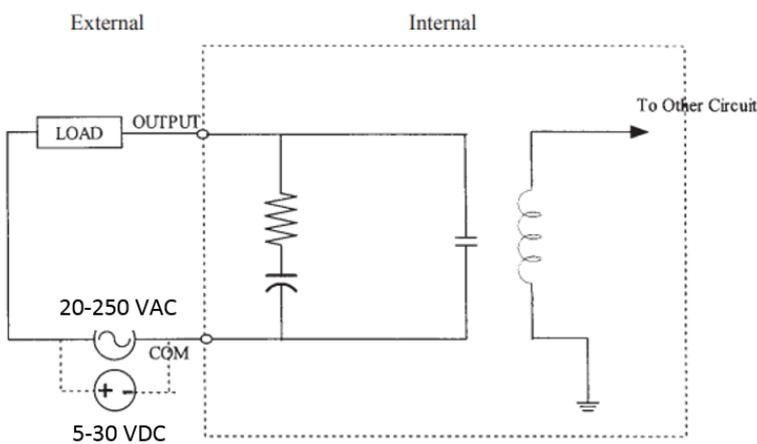
5.2.4 Output 1 – 8 (TB3) (Address 01-08)

There are 8 Outputs (pins 6-15) all Sourcing of which between 0 – 4 can be used as High Speed PLS Outputs. Like mentioned in the HSCNT section this is selectable in the software please see the next section for more information. All the other outputs that are not used are controlled from the ladder logic.



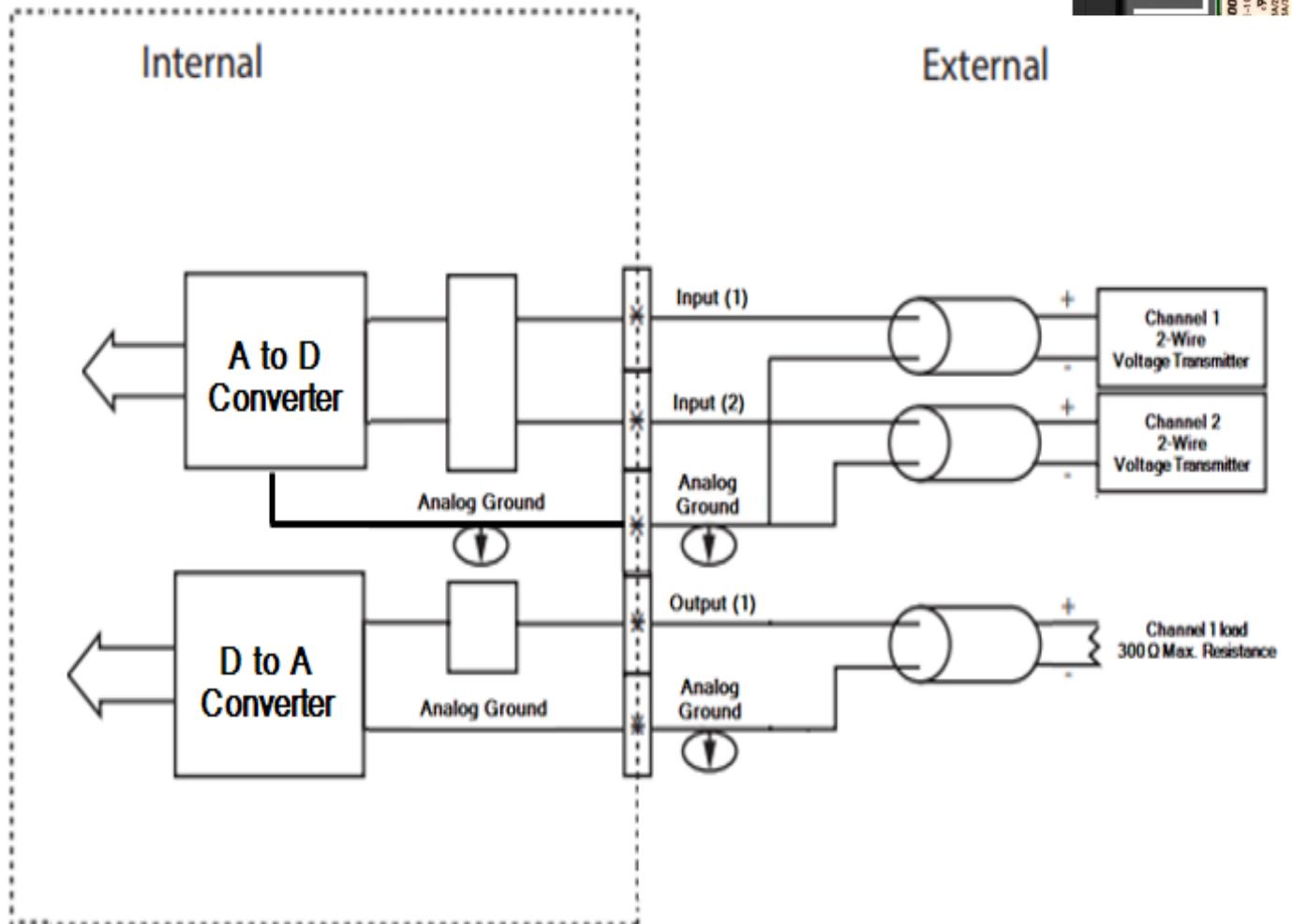
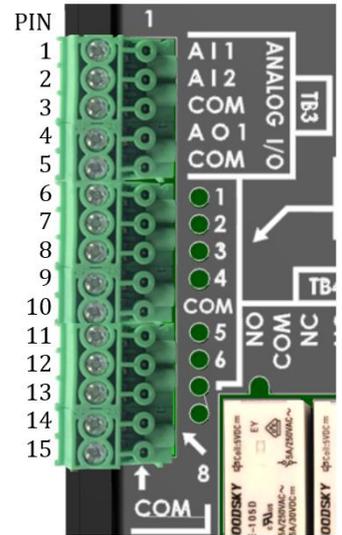
5.2.5 Relay Outputs 1 – 4 (TB4) (Address 09-012)

There are 4 relay outputs (pins 1-12). The relays are form C, i.e. each with its own normally open, normally closed, and common connection. Listed below is the wiring of the Relay Outputs.



5.2.6 Analog Input / Output (TB3) (Address IR1, IR2, OR1)

There are 2 Analog Voltage Inputs and 1 Analog Voltage Output (pins 1-5) on the EZTouch miniPLC. Listed below is the wiring of the Analog I/O.



6 PROGRAMMING THE EZTOUCH MINIPLC

6.1 QUICK START

If you have used other EZAutomation products, such as EZTouch, EZPLC, or EZTouchPLC, you would be up and running within no time. Even if you are using an EZ product for the first time, you should be able to use EZTouch miniPLC very quickly.

EZTouch miniPLC requires EZTouch Editor for programming. The editor runs on Windows PC. Windows version 7 or later is preferred.

EZTouch Editor allows you to design both HMI Screens and ladder logic in the EZTouch miniPLC. Once designed, the project needs to be transferred to unit. EZTouch Editor can transfer project to the unit using serial or Ethernet port.

System Components

It is always recommended to make sure you have all the right parts to build your system. This is what you will need to get started:

- EZTouch miniPLC unit
- PC Running Windows 7 or higher version
- If programming unit serially: Programming cable (P/N EZ-PGMCBL) *
(If the Programming Computer does not include a 9 pin RS-232 port, USB to serial port adapter may be used)
- Programming unit using Ethernet (for units with Ethernet Option): A CAT5 cable to connect to your network.
- EZTouch Editor Programming Software*
- 24VDC Power Supply*

**These accessories have to be purchased separately*

Step 1: Wire Power, Communication cable, and optionally Input / Outputs,

Please connect the power input wires to the EZTouch miniPLC unit's as outlined in the [Wiring](#) section. Supply 24VDC power to the system and ensure the indicator LED located behind the EZTouch miniPLC base is blinking green LED. If not, remove power from the system and check all the wiring. Please refer to the [IO Wiring](#) for information on wiring the Input/Outputs to the Touch mini PLC. Connect the PC to the 9-pin RS-232 [COM1 PORT](#) on the EZTouch miniPLC unit using the serial programming cable (P/N: **EZ-PGMCBL**), or setup your IP address and connect to your Ethernet network.

Step 2: Install Programming Software,

Install EZTouch Software version 2.1.0 or later.

Step 3: Design Project and transfer to the EZTouch miniPLC

Install the programming software EZTouch Editor on your Personal Computer (PC). Use the EZTouch Editor to design your project that includes HMI Screens and PLC Ladder logic, and transfer to the unit.

6.2 MEMORY TYPES AND RANGES

Memory Types

The EZTouch miniPLC system handles many numbers representing different types of information regarding processes/machine parameters. These processes/machine parameters may be anything from status of the input or output devices, timers/counters, or other data values. Before you start programming the EZTouch miniPLC, it would be helpful if you took a moment to familiarize yourself with how the system represents and stores the various types of data.

The [Mapping Conventions](#) section outlines the specific memory types used in the EZTouch miniPLC in greater detail. The EZTouch miniPLC supports the same instructions as the ones handled by the standard Touch PLC with a few minor exceptions. Refer to the [Appendix](#) section for the complete set of the available instructions. The memory types can be used to store a variety of information and can be used within various RLL instructions. Each memory type falls in one of two general categories:

- **[Discrete Memory Type](#)**
A discrete memory type is one bit that can be either a 1 or a 0 (On or Off). Discrete memory area is used for inputs, outputs, control relays, and timer/counter bits.
- **[Word Memory Type](#)**
A word memory type is a 16-bit location that is normally used to store and manipulate numeric or ASCII data. A word memory location is also called a Register.

Since the EZTouch miniPLC relies on flash memory, the only values saved are the ones associated with the registers/discretes that are retained during a power cycle. The specific registers/discretes available on a power cycle are listed in the table below. The following table also displays all the Register/Discrete types supported by the EZTouch miniPLC along with their address range, syntax etc.

EZTouch miniPLC Memory Map					
Syntax: TAAAA T – Type AAAA – Address of Memory Type in Decimal					
Memory Type	Address Range	I/O Type	Value Type	Examples	Retained on Power Cycle
I – Discrete Inputs	1 – 128*	READ_ONLY	Discrete	I5	NONE
O – Discrete Outputs	1 – 128*	READ_WRITE	Discrete	O6	O1 – O32
S – Discrete Internals	1 – 1024	READ_WRITE	Discrete	S4	S1 – S128
IR – Input Registers	1 – 64*	READ_ONLY	Word	IR3	NONE
OR – Output Registers	1 – 64*	READ_WRITE	Word	OR2	OR1 – OR64
R – Register Internals	1 – 8192	READ_WRITE	Word	R100	R1 – R256
SR – System Registers	1 – 20	READ_WRITE	Word	SR1	SR1 – SR20
SD – System Discrete	1 – 16	READ_WRITE	Discrete	SD10	SD1 – SD16
XR – Index Registers	1 – 4	READ_WRITE	Word	XR2	NONE
#R – Value Registers	1 – 4	READ_WRITE	Word	#R1	#R1 – #R4
Note: Does not Support Access to a Bit of Word (E.g. R100/0, R100/5, etc.)					
*Only the specific number of physical IO that exist on the miniPLC are used (I1-I12, O1-O12, IR1-IR8, OR1-OR24).					

6.3 TAGS

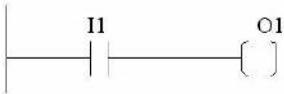
Memory organization of the EZTouch miniPLC is described in previous section. Project editor allows using a tag name (instead of raw memory address) to refer to address location and their associated information. Tag names can be any user defined phrase (less than 40 char). Tag names are more convenient as they can be meaningful names compared to raw address. For example, using START_MOTOR compared to, say I1 or S1 is more meaningful. In addition, if you need to change, a memory location or I/O point, you would need to change it only at one place—in tag definition—instead of every occurrence of the address in ladder logic or in HMI objects.

6.4 MAPPING CONVENTIONS

Discrete Inputs/Outputs

Discrete Inputs

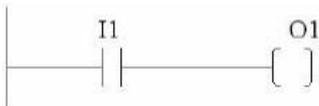
Discrete Inputs are denoted using an “I” pre-fix (e.g. I1, I4, etc.). The number of physical Inputs available in an EZTouch miniPLC is 12. Discrete inputs are Read only type.



Note: All the discrete type EZ Inputs are mapped to Discrete Input bits. In the example above, the output bit O1 will be turned on when input I1 allows power through the rung.

Discrete Outputs

Discrete Outputs are denoted using an “O” pre-fix (e.g. O1, O4, etc.). The number of programmable Outputs available is 1 through 128. Although, the number of discrete physical outputs available in an EZTouch miniPLC is 12 (O1-O12), the remaining “O” registers can be used as ‘Scratch bits’ in the main logic. Discrete Outputs are Read-Write type.



Note: All the discrete type EZ Outputs are mapped to Discrete Outputs bits.

Word Inputs/Outputs

Input Register (Word)

Input Registers are denoted using an “IR” pre-fix (e.g. IR1, IR4, etc.). These are 16-bit Word data types (registers). The maximum number of Input Registers available is 1 through 64. The maximum number of physical Analog Inputs available in an EZTouch miniPLC is 2. Hence, you may only use IR2, IR3 in your main logic. You can only Read from an IR register. If the HSCNT is enabled you have further IR which have the count and setpoint status (IR4-IR8) **Note: All the EZ Analog Inputs are mapped to Input Registers.**

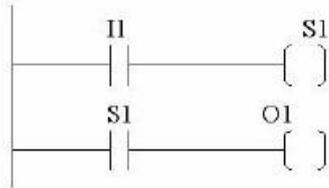
Output Register (Word)

Output Registers are denoted using an “OR” pre-fix (e.g. OR1, OR4, etc.). These are 16-bit Word data types. The maximum number of Output Registers available is 1 through 64. The EZTouch miniPLC uses OR2 to connect to physical Analog output. OR are Read-Write type of Word registers. If the HSCNT is enabled then further OR are used for configuration (OR3-OR24). **Note: All the EZ Analog Outputs are mapped to Output Registers**

Internals

Discrete Internals (Discrete)

Discrete Internals are denoted using “S” pre-fix (e.g. S1, S4, etc.). There are 1024 Discrete Internals available in the EZTouch miniPLC Discrete Internals are Read-write type and are used as “Scratch bits”. Discrete internal bits are mainly used to control the user logic program. They do not represent a real physical device, like a switch, output coil, etc. They are only internal to the CPU. You cannot program discrete internals as discrete inputs or discrete outputs for the physical inputs or outputs.



Note: In this example, memory location S1 will be powered when input I1 turns on; you can then use a discrete internal as an input in another rung.

Register Internals (Word)

Internal Registers are denoted using an “R” pre-fix (e.g. R1, R4, etc.). These are 16-bit Word data types (registers). There are 8192 Internal Registers available in the EZTouch miniPLC R are Read-Write type of data registers.

System

System Discrettes (Discrete)

System Discrettes are denoted using an “SD” prefix (e.g. SD1, SD4, etc.). SDs are discrete memory locations with pre-assigned functionality. There are many different types of System Discrettes. They are used to help in logic program development, provide system operating status info and more.

Note: Only SD1- 4 is used by the EZTouch miniPLC while programming.

System Discrettes	Read/Write	Description
SD1	Read Only	First Scan Bit. Bit is On ONLY during the first scan of logic.
SD2	Read Only	Bit toggles every 100 millisecond. i.e. the bit is ON for 100 ms, and then off for 100 ms.
SD3	Read Only	Bit toggles every second, i.e. the bit is ON for 1 Sec, and then OFF for 1 sec.
SD4	Read Only	Run Bit: Bit is ON or 1 while PLC is executing ladder logic; can be monitored by an HMI

System Registers (Word)

System Registers are denoted using an “SR” prefix (e.g. SR1, SR4, etc.). These are 16-bit Word data types (registers). System registers are Read-Write type data points.

Note: Although, there are 20 System Registers available in the programming software, only SR 1-9 are used by the EZTouch miniPLC

System Register	Read/Write	Description
SR1	N.A.	Reserved
SR2	N.A.	Reserved
SR3	Read Only	Firmware Major Revision
SR4	Read Only	Firmware Minor Revision
SR5	Read Only	Firmware Build Number
SR6	Read Only	Watchdog Timer Register; Increments every 10ms
SR7	Read Only	Scan Time in ms
SR8	Read Only	Status-used to indicate some errors-See below for defined bits
SR9	Read Only	Error Message Number (see below for defined errors)

The PLC reports its errors in two system registers: SR8 and SR9. SR8 uses bits for indicating errors, while SR9 uses values to indicate the same errors. When these errors occur, the PLC halts the execution of ladder logic, but continues to communicate. So an HMI can be used to detect these errors. When PLC halts execution of ladder logic, the outputs are disabled.

Status Reported in SR8 (PLC stops executing ladder logic if error detected)	
Error Type	Bit Set to 1
Invalid User Program	Bit 0 (lsb)
No Label for Jump	Bit 1
Invalid Move data range	Bit 2
System Error	Bit 3

Error Number Reported in SR9 (PLC stops executing ladder logic if error detected)	
Error Number	Description
0	No Error
1	Invalid User Program
2	No Label for Jump
3	Invalid Move data range
4	System Error
5	Either FOR without NEXT, or NEXT without FOR

Index and Value Registers (Word)

The Index Register data type is represented by an “XR” prefix (e.g. XR1, XR2 etc.). There are 4 XR memory locations available in EZTouch miniPLC “XR” is a Read-Write data type and it is mainly used to point to the correct address of “R” registers. The pointed-to “R” registers data value is stored in “#R” registers.

Value Register data type is represented by a “#R” prefix (e.g. #R1, #R2 etc.). There are 4 #R memory locations available in EZTouch miniPLC “#R” is a Read-Write data type and it is mainly used to read/write value of “R” registers as pointed out by “XR” registers.

Both XR and #R registers are used in conjunction with each other and provide a convenient way of addressing R registers.

Example:

Let's assume data values: R59=9874, R8000=32

If XR1=59

Then #R1=9874 (the actual data value of R59)

If XR2=8000

Then #R2=32 (the actual data value of R8000)

XR contains the address of the operand (or specifies a register that contains the effective address), #R is used to read or write the actual operand. Indirect addressing is often combined with pre- or post-increment (or decrement) addressing. This allows the address of the operand to be increased or decreased by the specified number either before or after using it. Proper usage of XR variables often saves a lot of programming.

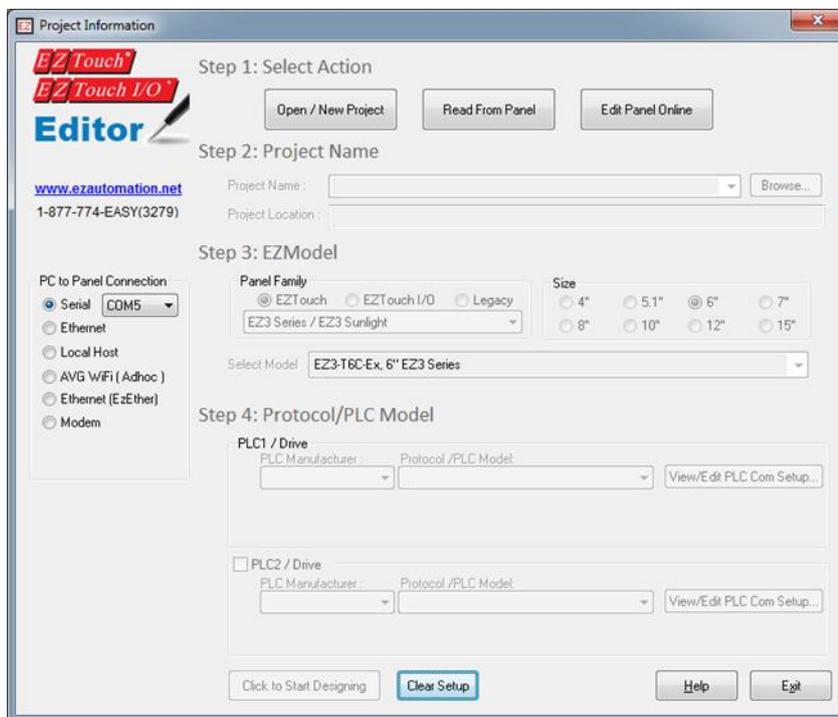
6.5 CREATE A PROJECT

This section outlines the basics of creating a project using the **EZTOUCH-EDIT** software. Further programming information for the EZTouch miniPLC is located in the **EZ Touch Editor Software Manual** and the **EZ PLC Software Manual**. The EZTouch miniPLC uses a subset of the instructions described in the manual. For a complete listing of all RLL instructions supported by the EZTouch miniPLC please review the [Appendix](#).

Launch your EZTouch Editor and select how you would like the program to link to the EZTouch miniPLC unit. For this scenario, you can select “Open / New Project”. This will enable you to create a program without having the EZTouch miniPLC unit connected through the serial port or the Ethernet connection.

Note: The steps outlined below are based on the EZTouch Editor version 2.1.0 and may vary slightly between versions.

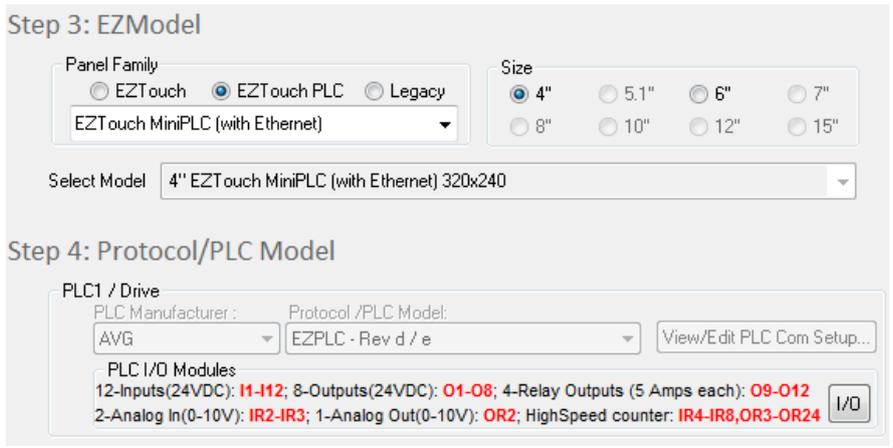
- 1) Open the EZTouch Editor Software. You will see the Project Information screen, example below.



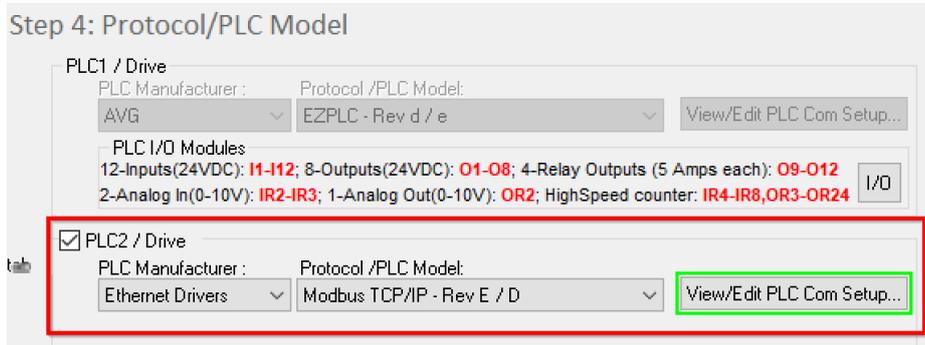
- 2) Click on Open / New Project then enter a project name (e.g. Test). Then press enter.



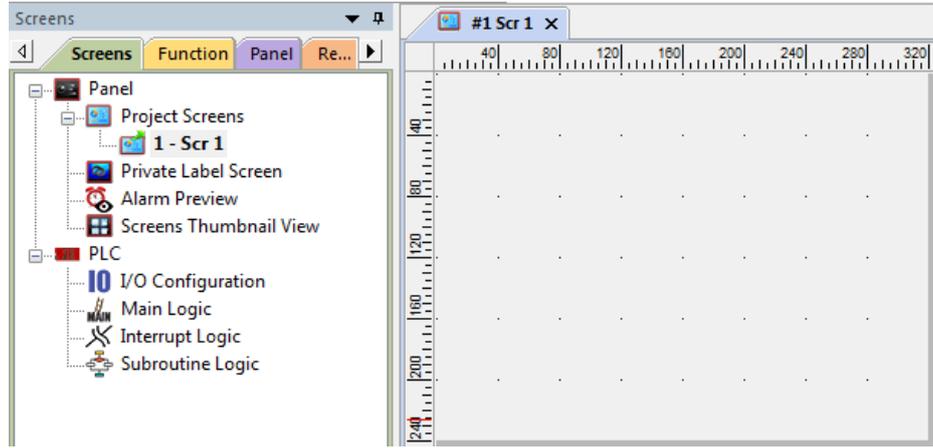
- Next select EZTouch PLC in the radio buttons below Panel Family. Then select EZTouch miniPLC, with or without (wo) Ethernet based on purchase; from the drop-down list. Once EZTouch miniPLC is selected, the other fields will populate.



- If you want to use High Speed counter function, click on **I/O** button, and follow High Speed Counter Setup before proceeding to step 5. You can do High Speed Counter setup later on from this dialog box.
- EZTouch miniPLC can also communicate with another controller over one of the supported Ethernet drivers (units with Ethernet option). If you need miniPLC to communicate to another PLC, check PLC2, and select the protocol:



- Click "Click to Start Designing" to launch the editing software program. The Main Project Window will then appear showing both the PLC and Panel sides to the program. These two sections of the program work together to create an EZTouch miniPLC project.

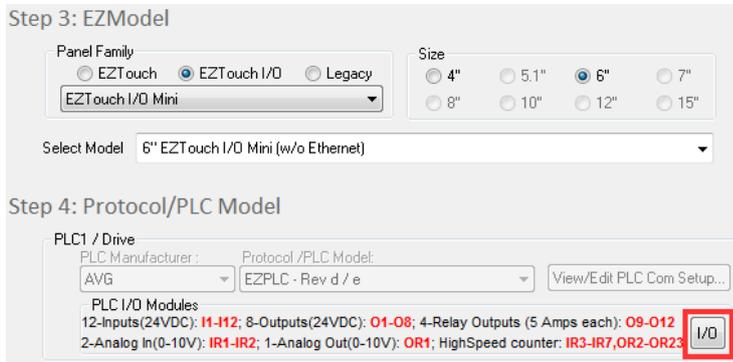


6.5.1 High Speed Counter Setup

This section gives an overview of how to change options for the I/O and High Speed Counter function for the EZTouch miniPLC.

6.5.1.1 Enable HSCNT

1. In Project Information Screen Click on the "I/O" button.



2. Resulting dialog box shows I/O addresses, and a check box to enable counter function. Click the Enable High Speed / Quadrature Counter checkbox. Counter related tabs will appear. Click on the counter tab.

IO Configuration

Use High Speed/Quadrature Counter Option (OR23 Bit 3)
 (With counter option enabled, Input I0 - I2 functions as Counter inputs)

Inputs	Label	Address
Input 1	I1	I1
Input 2	I2	I2
Input 3	I3	I3
Input 4	I4	I4
Input 5	I5	I5
Input 6	I6	I6
Input 7	I7	I7
Input 8	I8	I8
Input 9	I9	I9
Input 10	I10	I10
Input 11	I11	I11
Input 12	I12	I12

Outputs	Label	Address
Output 1	O1	O1
Output 2	O2	O2
Output 3	O3	O3
Output 4	O4	O4
Output 5	O5	O5
Output 6	O6	O6
Output 7	O7	O7
Output 8	O8	O8
Output 9	NO (1) NC (1)	O9
Output 10	NO (2) NC (2)	O10
Output 11	NO (3) NC (3)	O11
Output 12	NO (4) NC (4)	O12

Analog	Label	Address
Analog Input 1	AI1	IR2
Analog Input 2	AI2	IR3
Analog Output 1	AO1	OR2

HSCNT	Label	Address
Reset	I10/RST	IR4-IR8, OR3-OR24
Input A	I11/A	
Input B	I11/B	

IR1 and OR1 are reserved addresses.

6.5.1.2 Counter Options and Setup

The initial setup is done in the IO Configurations. The information below outlines all the options for the HSCNT. The entire HSCNT can be enabled and setup from the ladder logic. For information on how to setup using ladder please see the Output and Input Register Information.

Count Mode Setup
Please see Count Mode below.

PLS Output Setup
Input the ON/OFF Value for each setpoint. Any setpoint can go to any output. Please see Setpoints below for more info.

Preset Mode Setup
Please see Preset Mode below.

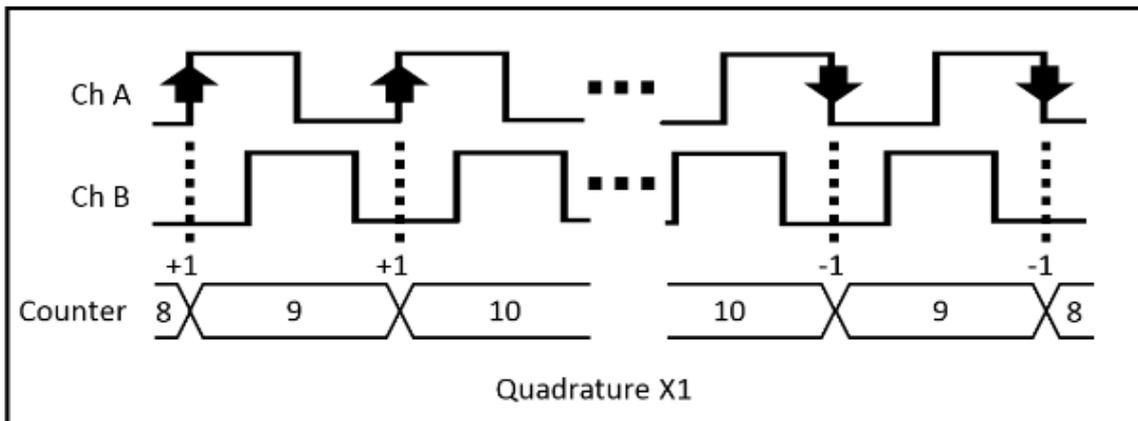
Use drop down to select the output this setpoint will control. Multiple setpoints can go to the same output.

6.5.1.3 Count Mode

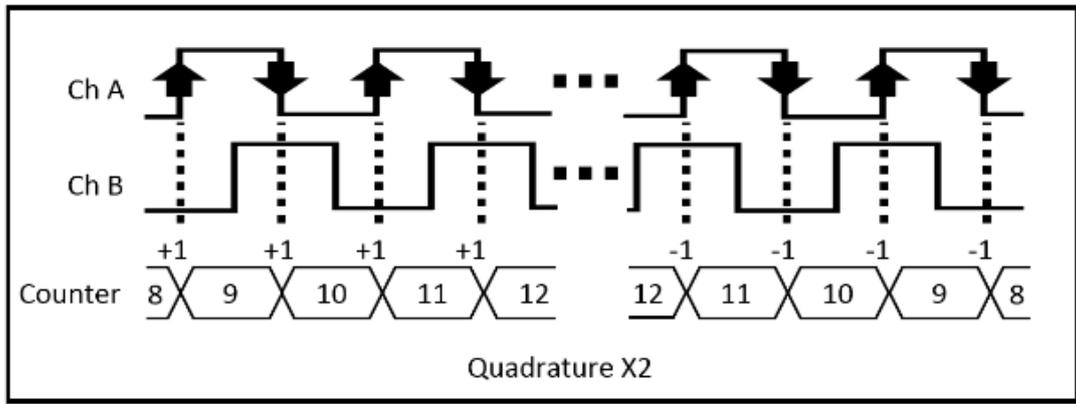
The Counter supports 4 Counting Modes as described below. Select the desired mode. As shown in the dialog box, bits b2-b0 of the configuration register stores the count mode of the counter.

Quadrature Counting

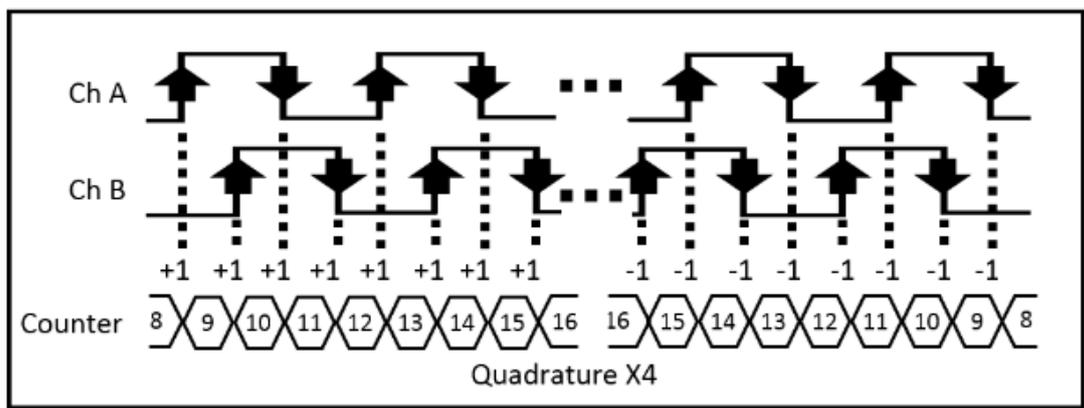
Quadrature x1 - This mode will give 1 count for every quadrature period. When channel A leads channel B, the increment occurs on the rising edge of channel A. When channel B leads channel A, the decrement occurs on the falling edge of channel A. Phase relation of A & B determines the direction.



Quadrature x2 - This mode will give 2 counts for every quadrature period, giving the user twice the resolution of 1X.Count increments or decrements on each edge of channel A, depending on which channel leads the other. Phase relation of A & B determines the direction.



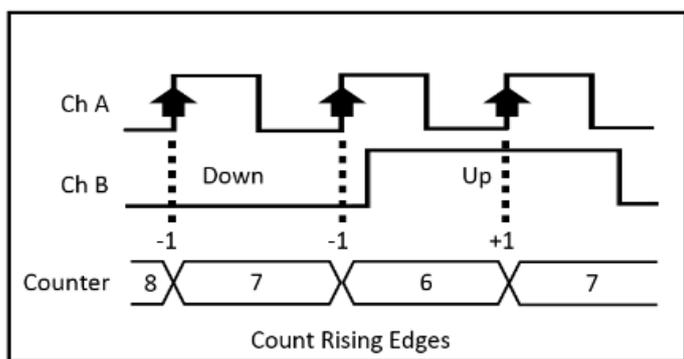
Quadrature x4 - This mode will give 4 counts for every quadrature period, giving the user twice the resolution of 2X. Count increments or decrements on each edge and direction depends on which channel leads the other. Phase relation of A & B determines the direction.



Pulse and Direction Counting

Count Rising Edges

This mode only counts Signal A. The signal from B establishes the direction. This mode will count for the rising edge of Signal A from Encoder 1. If direction is high, then the counter will be incremented by 1. If direction is low, then the counter will be decremented by 1. Count only rising edges.



6.5.1.4 Outputs / Set Points (1-4)

The Counter Module provides 4 programmable Limit Switch Outputs. Please enter the ON & OFF values for each of the setpoints. The dialog box shows the registers used for setpoints. Each setpoint can be set using the dropdown to whatever output you would like to use. Multiple setpoints can go to the same output.

E.g. If Setpoint 1 is set it to Output 1 it controls Output 1.

Set Point 1			
ON Value	<input type="text" value="100"/>	Address	<input type="text" value="OR2"/> Base+0
OFF Value	<input type="text" value="200"/>	Address	<input type="text" value="OR4"/> Base+2
Output No.	<input type="text" value="1"/>	Address	<input type="text" value="OR23 Bits b3 to b0"/>

Output 1 is ON when the count value is greater than or equal to the ON value (100), but is less than the OFF value (200). Each value is a 24-bit value but takes up two 16-bit registers. ON values are inclusive, OFF values are not inclusive.

Output = ON if $ON\ Value \leq Count < OFF\ Value$

6.5.1.5 Preset

Preset Value

When the preset input is triggered (see preset mode below). The value in the Value (Long) field will replace the current count of Counter 1. The count then starts with this value. Preset is a 24 bit value, but takes up 2 16-bit registers.

Preset Mode

Load Preset value when Preset Input is...

High
 On rising edge
 On falling edge

Counter config register (base+20)

Bits b7 to b6 (lsb) control preset mode

Bits b7b6 =

Preset Value

Address (Counter base +16)

Value (Long)

Soft Preset

The bit b4 of OR23 (Configuration Register) is a Soft Preset. If this bit is high then preset is loaded and you can't count. When this bit goes low then you can count. It is not effected by Preset Mode.

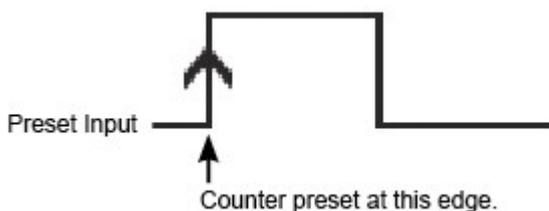
Preset Mode

As shown in the dialog box, preset mode is saved in bits b7 and b6 of the Counter configuration register. Counter 1 uses bits 6, 7. Note: Use Counter RST connection for preset signal.

High

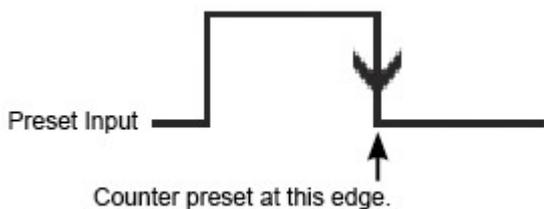
This option will set the counter to the preset value while being held high. While the preset signal is high, no new count signals will be counted.

On Rising Edge



This option will preset on the rising edge of the preset signal.

On Falling Edge



This option will wait for the falling edge of the preset input to trigger a preset pulse.

6.5.1.6 Ladder Logic Counter Setup

In addition to the I/O dialog box, the counter functions can be set up programmatically using ladder logic. To configure the HSCNT in the ladder logic please refer to the Output and Input Register Information. These screens outline all the options that you need to configure in IR and OR registers to control and monitor your HSCNT.

IO Configuration
Counter
Output Register Information
Input Register Information

Output Registers

Output Base Register	Base	OR3
Setpoint1, ON (32 bit)	Base+0	OR3
Setpoint1, OFF (32 bit)	Base+2	OR5
Setpoint2, ON (32 bit)	Base+4	OR7
Setpoint2, OFF (32 bit)	Base+6	OR9
Setpoint3, ON (32 bit)	Base+8	OR11
Setpoint3, OFF (32 bit)	Base+10	OR13
Setpoint4, ON (32 bit)	Base+12	OR15
Setpoint4, OFF (32 bit)	Base+14	OR17
Preset Value (32 bit)	Base+16	OR19
Configuration Register	Base+20	OR23
Setpoint1, Output No.	Base+21	OR24 Bits b3 to b0
Setpoint2, Output No.	Base+21	OR24 Bits b7 to b4
Setpoint3, Output No.	Base+21	OR24 Bits b11 to b8
Setpoint4, Output No.	Base+21	OR24 Bits b15 to b12

Configuration Register (OR23)

16 bit Register, Only Bits b7,b6,b4 to b0 (lsb) used:

Bits	Function
b2b1b0	Count Mode, Counter 000 Quadrature x 1 001 Quadrature x 2 010 Quadrature x 4 100 Rising edges with Direction
b3	Use High Speed Counter With b3=1, counter feature is enabled, Inputs I10 - I12 are counter inputs. With b3=0, counter feature is not used, Inputs I10 - I12 are normal digital inputs.
b4	Soft Preset Input. Loads preset value to counter when b4=1 Counting function resumes only when b4=0
b7b6	Preset Mode Preset when Preset Input is ... 00 High 01 On rising edge 10 On falling edge

IO Configuration
Counter
Output Register Information
Input Register Information

Input Registers

Input Base Register	Base	IR4
Counts (32 bit)	Base+0	IR4
Output Status	Base+4	IR8

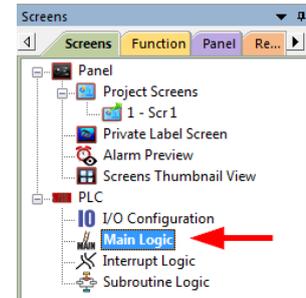
Output Status Word Details

16 bit word; Only bits b3-b0 used.
Status bits are 1 if On setpoint <= Count < Off setpoint.

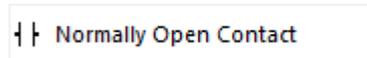
Bit 0 (lsb)	Output 1, Controlled by Setpoint 1
Bit 1	Output 2, Controlled by Setpoint 2
Bit 2	Output 3, Controlled by Setpoint 3
Bit 3	Output 4, Controlled by Setpoint 4

6.5.2 Create PLC Program

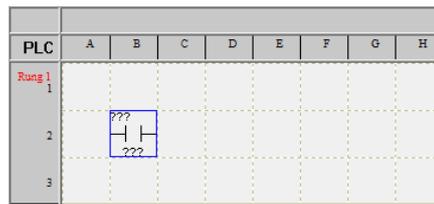
Click on "PLC" and select "Main Logic" to start creating a sample PLC Ladder Logic program as described in the example below.



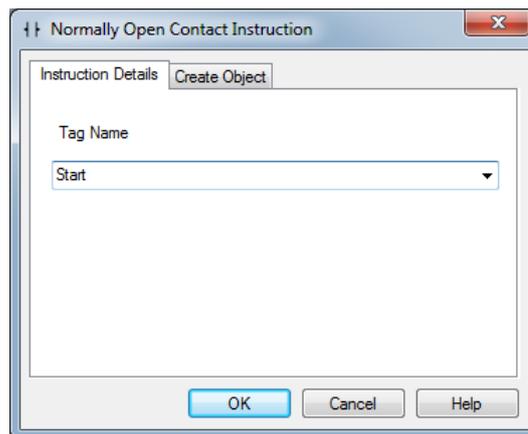
- 1) Select the "Relay/Boolean" type instruction set in the instruction toolbar (located on the right side of the EZTouch Editor programming screen). Click on "[NO Contact.](#)"



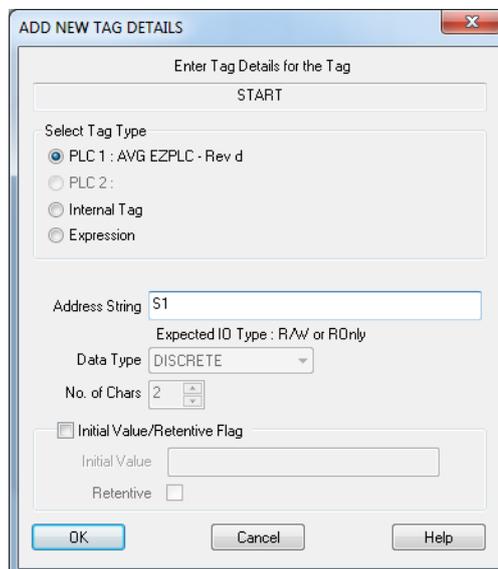
- 2) Click on the main ladder logic programming window to place the instruction as shown in the image below.



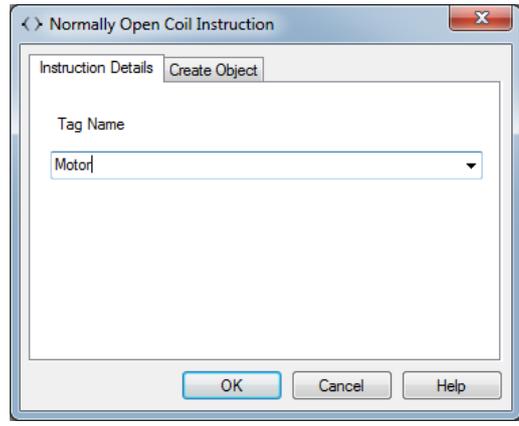
- 3) Once placed, double-click on the icon and enter the tag name as "Start". Click OK.



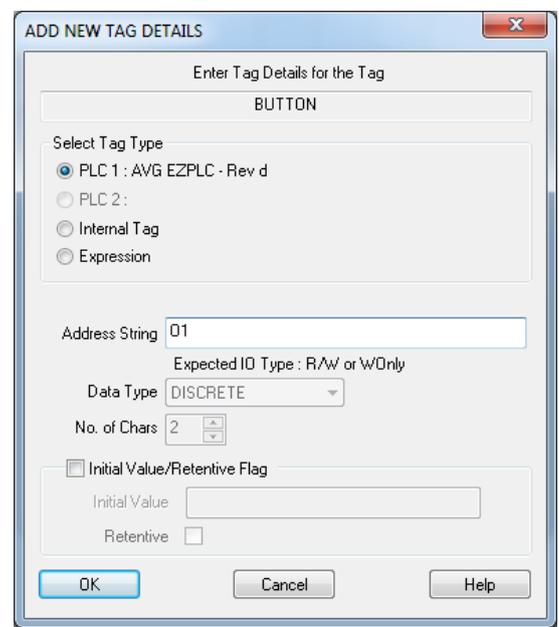
- 4) A new dialog box will appear asking for the PLC address (memory location). Enter "S1" in the field to the right of "Address String." The Data Type should be marked as DISCRETE. Click OK.



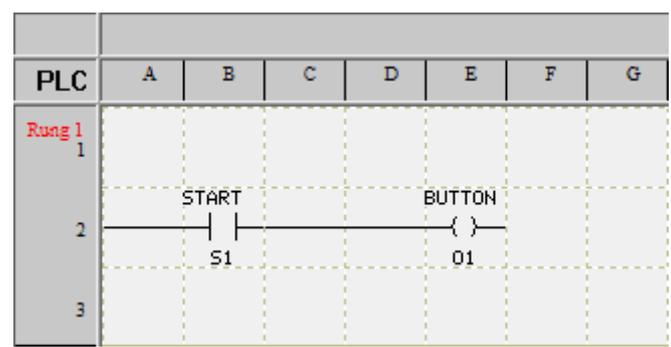
- 5) Similarly, click on **“NO Coil”** under the Relay/Boolean instructions and place the instruction in the ladder logic programming window. Double-click the icon to select the tag name as **“Motor.”**



- 6) Once again, a dialog box will appear. Enter **“O1”** as the address string. Click OK.

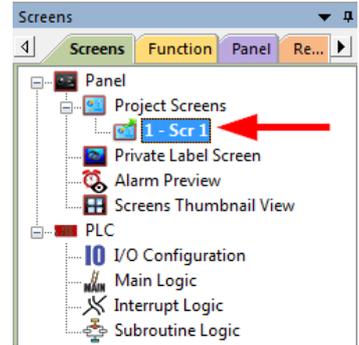


- 7) Click on **Instructions > Line** to wire **“NO Contact”** and **“NO Coil.”**
- 8) Your screen should look like this when finished:

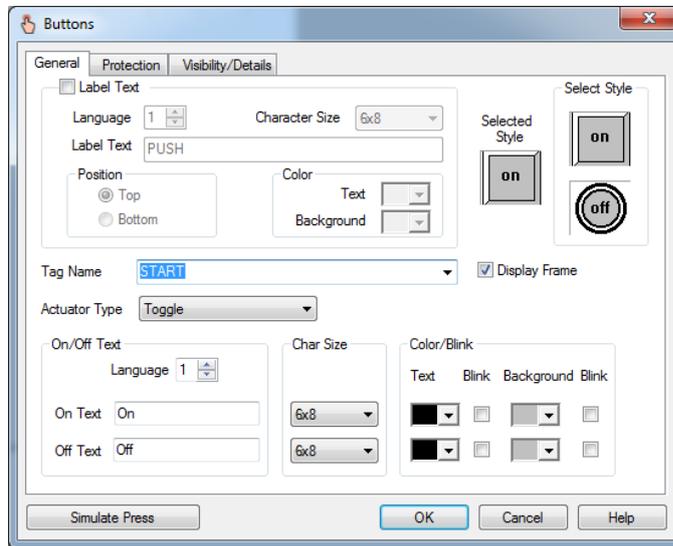


6.5.3 Create a Panel Program:

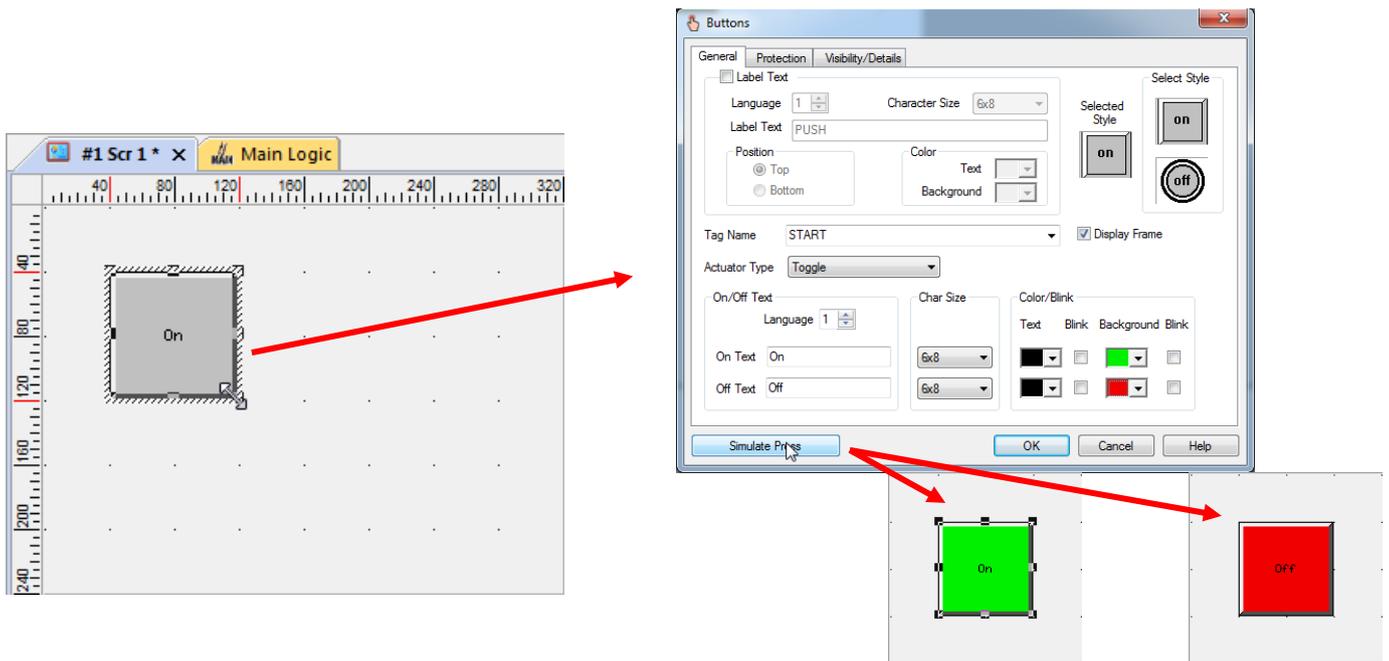
Click on "Panel" and "Scr 1" to create the Panel display screen as explained in the sample below.



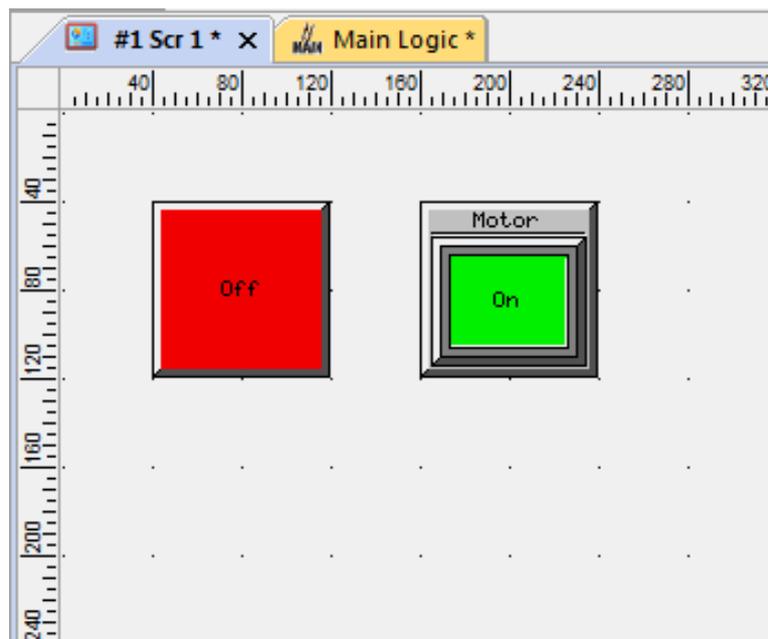
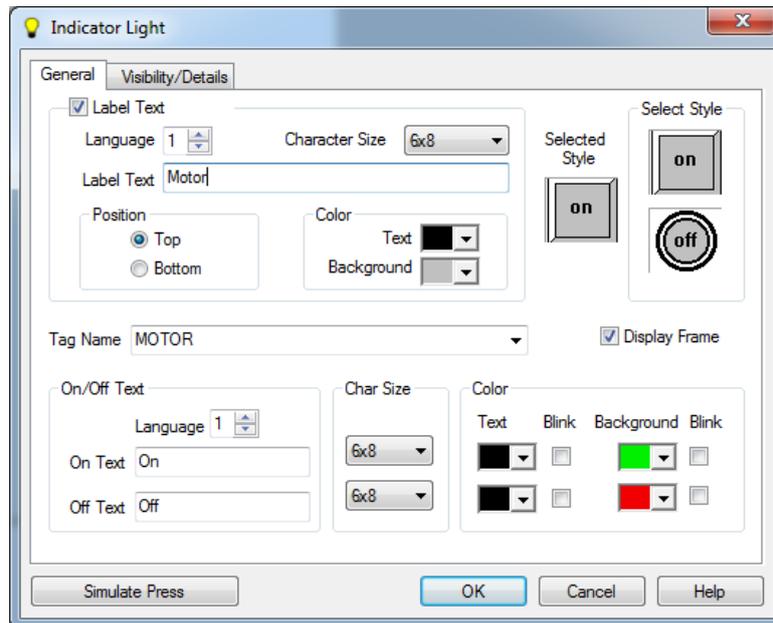
- 1) On the right side of the screen find Buttons and click on the icon. The screen below will appear. Enter **START** for Tag Name. Click OK.



- 2) If you right click on the tag name START then you will see that it already has the address "S1" in the field to the right of "Address String" from your ladder logic. Click OK.
- 3) Click anywhere on the screen to place the Button object. Double click the icon to open its object dialog box if you need to make any adjustments to the object's appearance or attributes. Clicking "Simulates Press" will allow you to toggle between On and Off states.



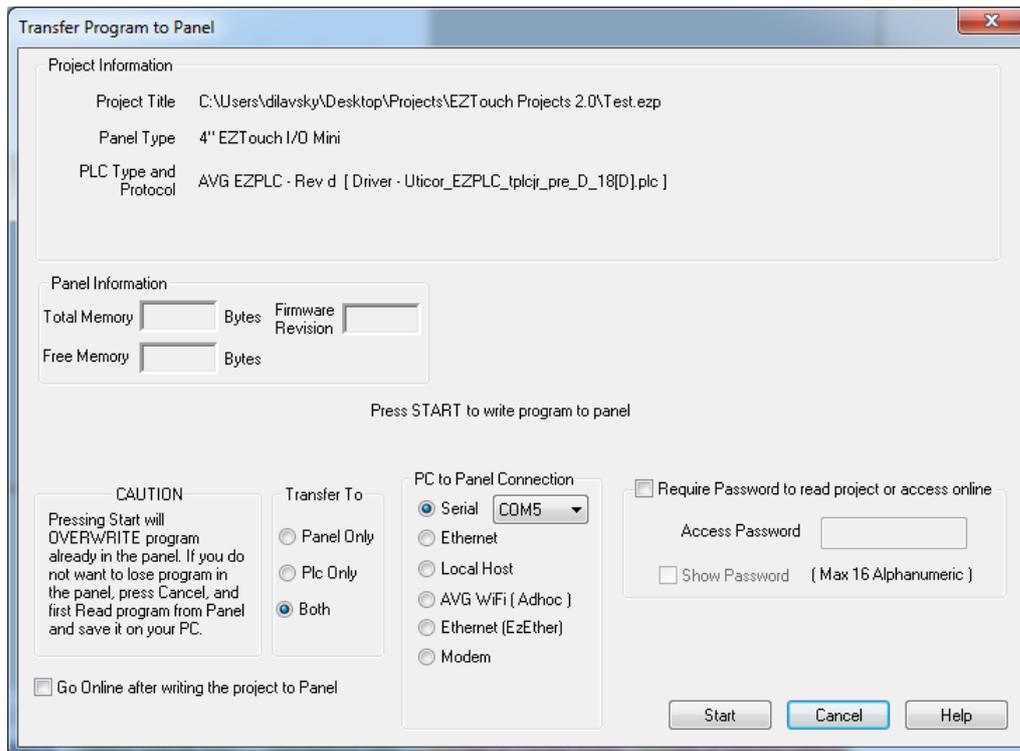
- 4) Similarly, you can create an Indicator Light Object by selecting **Objects > Buttons > Indicator Buttons**. Enter **Motor** for Tag Name. Click OK. Place the object on the panel. Your screen should look like the picture below.



6.6 TRANSFER PROJECT TO EZTOUCH MINIPLC

After a project is complete, the next step is to transfer the project to the EZTouch miniPLC. When editing projects online, programming information is automatically sent to the EZTouch miniPLC unit once the project is saved. When editing in an off-line mode, the project information will need to be transferred. More details about the transfer process is available in our **EZ Panel Enhanced Software Manual** and the **EZ PLC Software Manual**. The basic instructions are as follows:

From the Project drop down menu, select **File > Transfer to Panel**. A dialog box similar to the one below will appear.



There are two connections available to transfer the program.

6.6.1 Serial Port (COM1):

- 1) Verify the RS-232C cable (**P/N: EZ-PGMCBL**) is connected between the unit and the PC. In the absence of an RS-232 port on the PC, a USB to RS-232 converter may be used to connect the programming cable to the PC.
- 2) Select *Serial (COM5 in this example, but your port could be different)* as PC to Panel Connection. And then click **Start**.



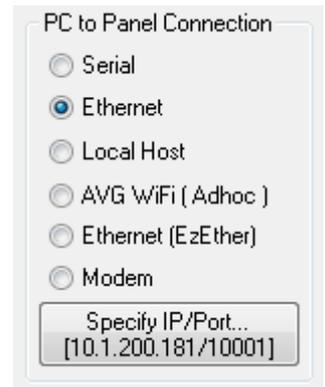
Note: If the PLC is running, a dialog box will appear to ask if you would like to stop the PLC. If you would like the PLC to stop so the new program can be transferred, select yes.

When finished, a Transfer Completed message will be displayed. Click OK to continue and the project is now transferred.

6.6.2 Ethernet

NOTE: This feature is only available on models purchased with Ethernet capabilities.

- 1) Verify the EZTouch miniPLC is connected through the Ethernet connection.
- 2) A dialog box will request confirmation of the IP Address associated with the EZTouch miniPLC.
 - a. Until the IP Address has been [changed](#) to match the LAN, the Ethernet connection won't be able to be used to program the unit.
 - b. If you are unsure of IP Address associated with the EZTouch miniPLC unit, the unit's current IP Address is displayed during the power up sequence.
- 3) Select *Ethernet* as method of transfer.
- 4) After confirming the mode to transfer the project, click *Start* to write the project data from the PC to the EZTouch miniPLC.



Note: If the PLC is running, a dialog box will appear to ask if you would like to stop the PLC. If you would like the PLC to stop so the new program can be transferred, select yes.

When finished, a Transfer Completed message will be displayed. Click OK to continue and the project is now transferred.

6.7 SET IP ADDRESS

This section applies only to the units purchased with Ethernet capabilities. Each EZTouch miniPLC unit with Ethernet comes with a factory-programmed IP Address that may need edited to be compatible with your LAN network. The [serial port \(COM1\)](#), in combination with the editing software, can be utilized to update the IP Address information. Alternatively, you can download our free IP Config Utility to make the necessary changes to the IP parameters.

6.7.1 Setup from Panel

- 1) When you receive the miniPLC it will come preloaded with a project which you can use to setup the IP address of the Panel.
- 2) Please power up the unit and once the main screen comes up you will press the Setup IP button.



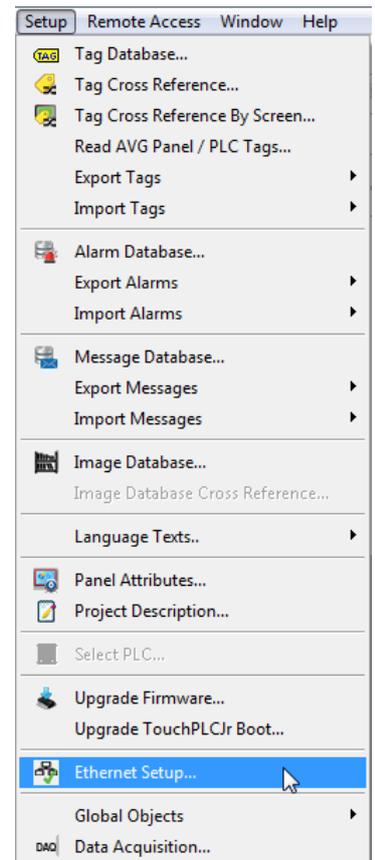
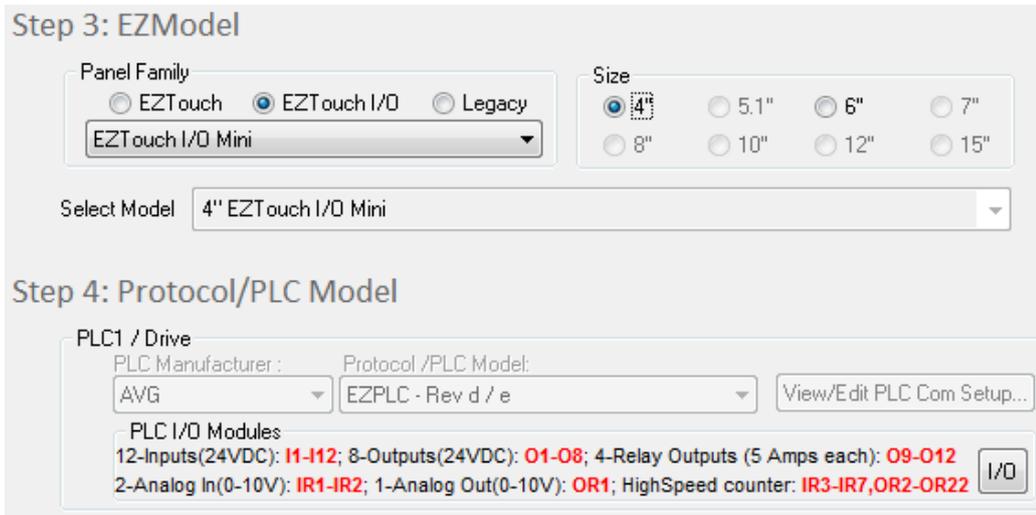
- 3) In the Setup IP screen you can change the IP Address, Subnet and Gateway. Then press Save & Exit. For the change to take effect please power cycle the unit.

6.7.2 Serial Port (COM1) Method

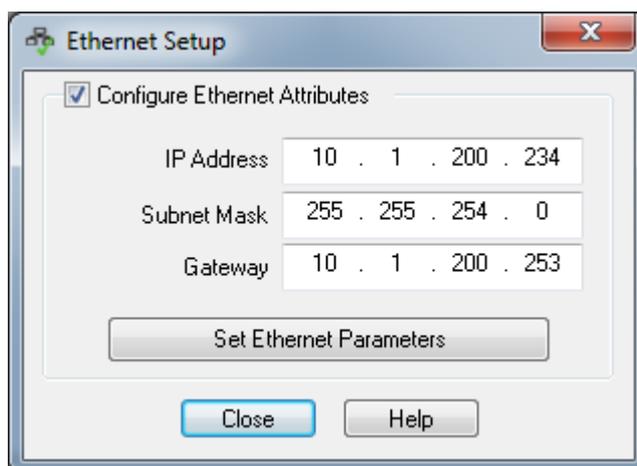
- 1) Run EZTouch Editor and connect PC to the EZTouch miniPLC serially using cable (P/N: EZ-PGM CBL).
- 2) Click on Open / New Project then enter a project name (e.g. Test). Then press enter.



- 3) Next select EZTouch I/O in the radio buttons below Panel Family. Then select EZTouch I/O Mini from the drop-down list. Once EZTouch miniPLC is selected, the other fields will populate.
- 4) Next click the “Click to Start Designing” button. Now you will be in the Main Programming Window.
- 5) Click **Setup > Ethernet Setup**. A dialog box will appear displaying the current IP parameters.



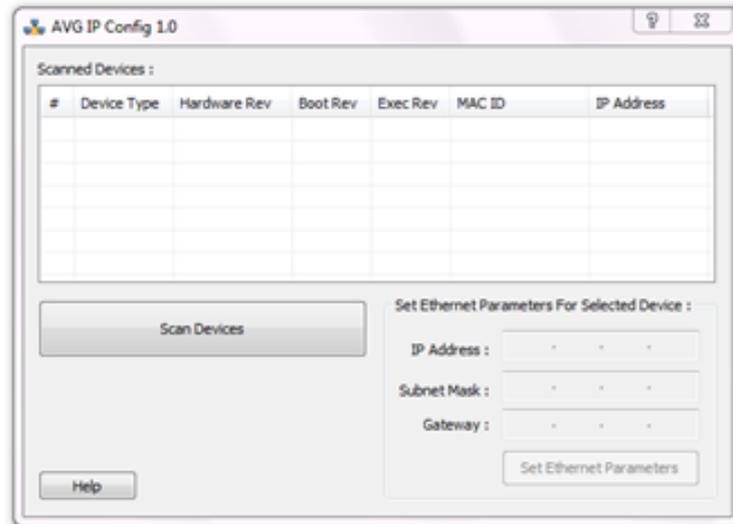
- 6) Once the dialog box appears, select 'Configure Ethernet Attributes.' Type in the necessary changes and click 'Set Ethernet Parameters.' Click OK.



6.7.3 IP Config Utility Method

The IP Config Utility enables IP parameter editing through the Ethernet connection and allows automatic discovery of AVG devices connected to the local area network (LAN) even if a device's IP address is not on the same subnet. To download this free utility please visit our website at www.ezautomation.net and click on the downloads tab.

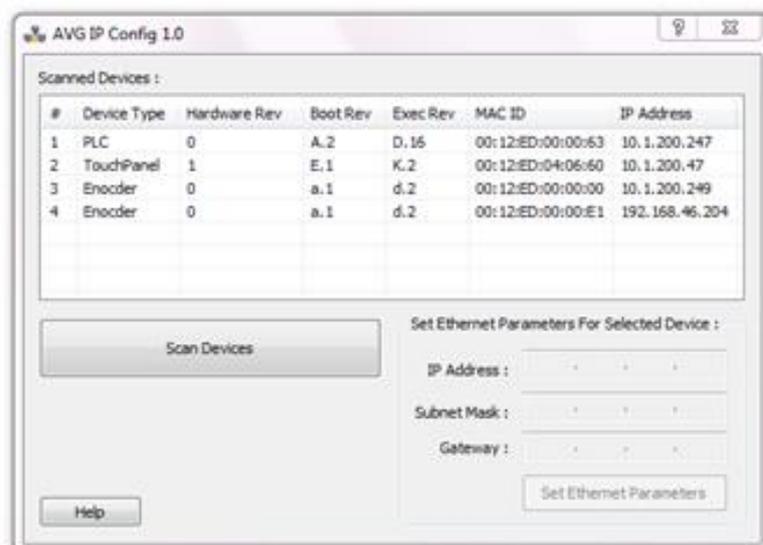
- 1) Install the IP Config Utility.
- 2) Once installed, launch the software by clicking on its icon or loading it from the Start Menu. A dialog box similar to the one shown below will appear.



- 3) Click 'Scan Devices' to locate available AVG devices on the network. While the utility scans, a dialog box will appear temporarily.

Note: If the computer has multiple networks, the utility will prompt you to choose one. Please select the network connected to the EZTouch miniPLC unit.

- 4) When the utility is finished scanning, a list of AVG devices will populate the field similar to the example shown below.



- 5) Next, identify the device in the list that you would like to edit. For example, if you know its current IP address, MAC-ID, or it's the only device of its type, use this information to select it from the list.

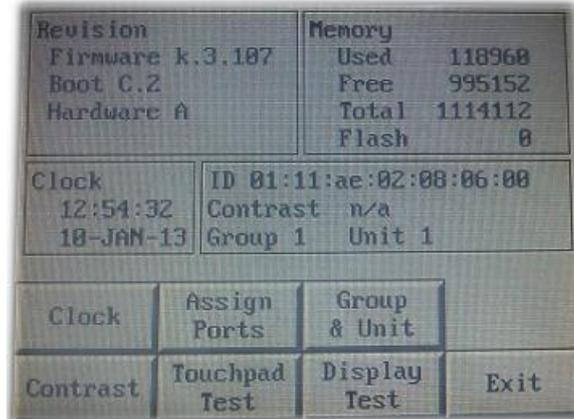
Note: The EZTouch miniPLC displays the MAC-ID address and current IP address at start up.

- 6) Once selected, the current IP address information for the unit will appear in the IP address field. Type in the necessary changes.
- 7) Click 'Set Ethernet Parameters' to save the new values for the device.

Once the IP Address has been changed, the EZTouch miniPLC can receive programming instructions through either the serial port (COM1) connection or via the Ethernet.

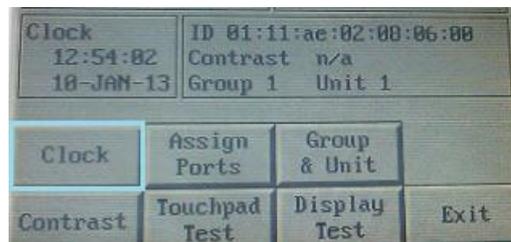
6.8 SETTING DATE/TIME

The EZTouch miniPLC maintains a Real Time Clock (RTC) which can be adjusted from the EZTouch miniPLC unit itself. Simultaneously pressing the upper left corner and the bottom left corner of the screen will direct you to the language selection menu. After selecting the appropriate language for the unit, the screen below will appear displaying the current firmware, the available memory as well as the time and date set on the unit.

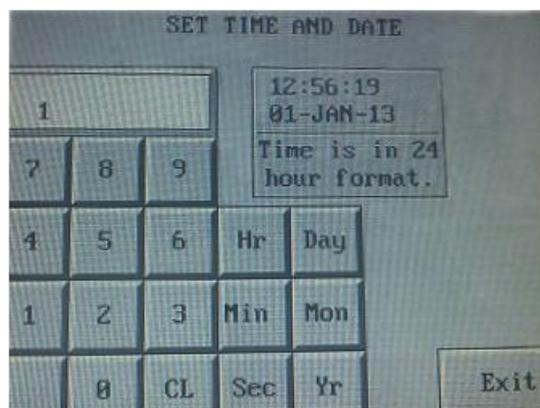


To change the Time/Date from miniPLC:

1. Press the *Clock* button.



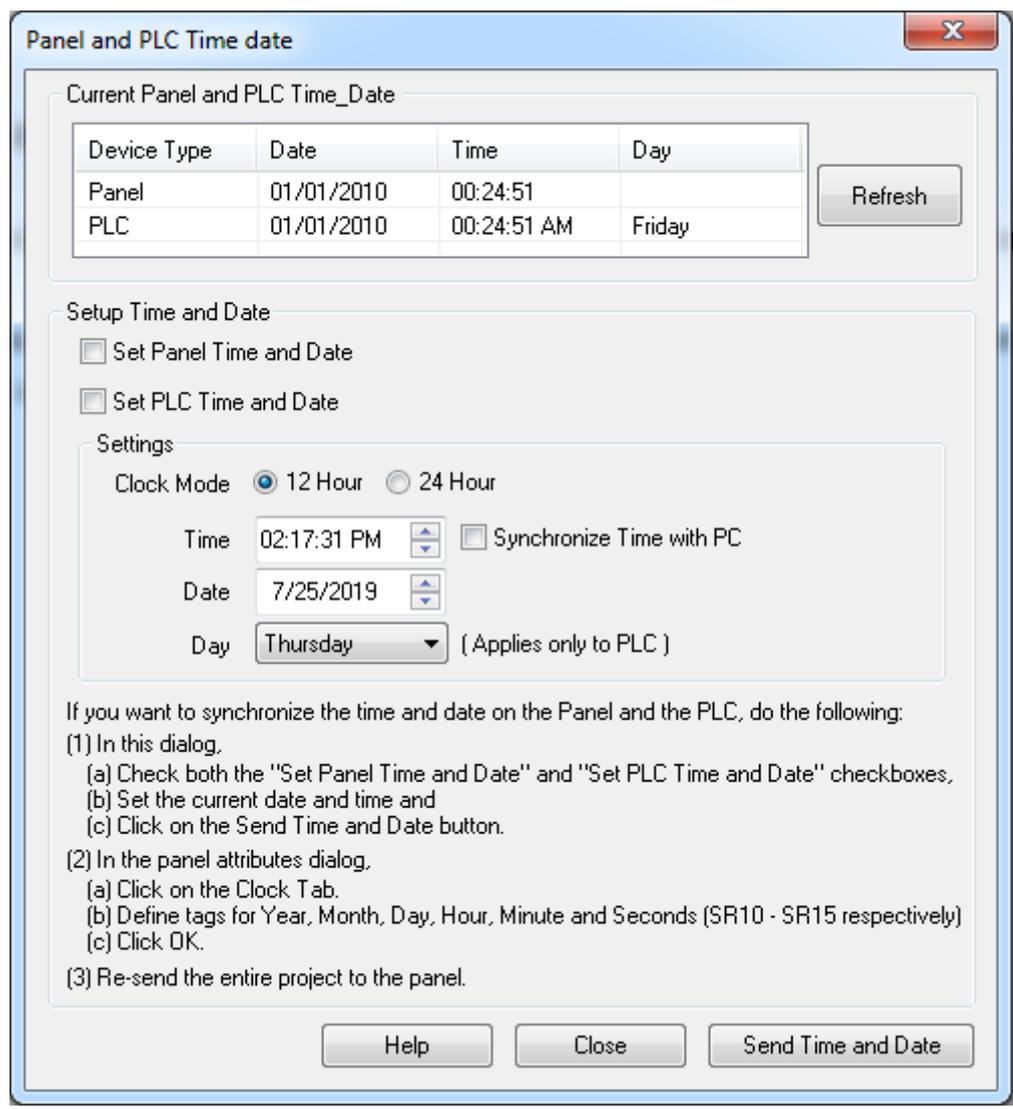
2. A new screen loads which displays a numeric keypad. Enter the hour first, then select *Hr* to change the hour. Do the same to enter the minutes. Time is displayed in a 24 hour format.
 - i. **NOTE:** If at any time during this process, an incorrect number is pressed, you may use the *CL* button to clear the entry.
 - b. For example, to enter a time of 8:34 am you would press *8* then the *Hr* button.
 - c. Press *3* then *4* followed by the *Min* button. (Seconds can be inputted as well.)



3. Similarly to change the date, enter the correct day and then press the *Day* button. Do the same for Month and Year.
 - i. **NOTE:** Since the selection is limited to two digits, only the last two digits from the year may be entered and displayed.
 - b. For example, to change the date to January 1, 2013 you would press *1* then *Day*.
 - c. Press *1* then *Mon*.
 - d. Press *1* then *3*, followed by *Yr*.
4. Once finished, press *Exit* to return to the previous screen. Pressing *Exit* again will bring you back to the main screen.

To change the Time/Date from EZTouch Editor:

1. Make sure you are connected to the panel serial or over Ethernet. In the main screen click on the Panel > Time/Date option.
2. You will get the screen below. Here you can see the current time/date and you can set either Panel and/or PLC time to an arbitrary time or to your PC's time.



7 MAINTENANCE AND TROUBLESHOOTING

Hardware Maintenance

Routine maintenance checks should be performed on the unit to avoid any risk of hardware problems. The EZTouch miniPLC is designed to be a very rugged controller so that just a few checks periodically will help keep it up and running.

The key points to be checked include:

- Ambient operating conditions
- Wiring and connections

Maintaining the Ambient Operating Conditions

Keeping the EZTouch miniPLC's environment within specified operating conditions is the best method to minimize the maintenance.

1. Always ensure that ambient temperature inside the cabinet is within EZTouch miniPLC's temperature ratings.
2. If any other equipment inside or outside of the cabinet is producing heat, employ cooling methods like a blower fan to reduce 'hot spots' around the EZTouch miniPLC.
3. Periodically inspect and clean if there are any air filters on the cabinet. Ensure that the PLC is free from dust, humidity and corrosive gases.

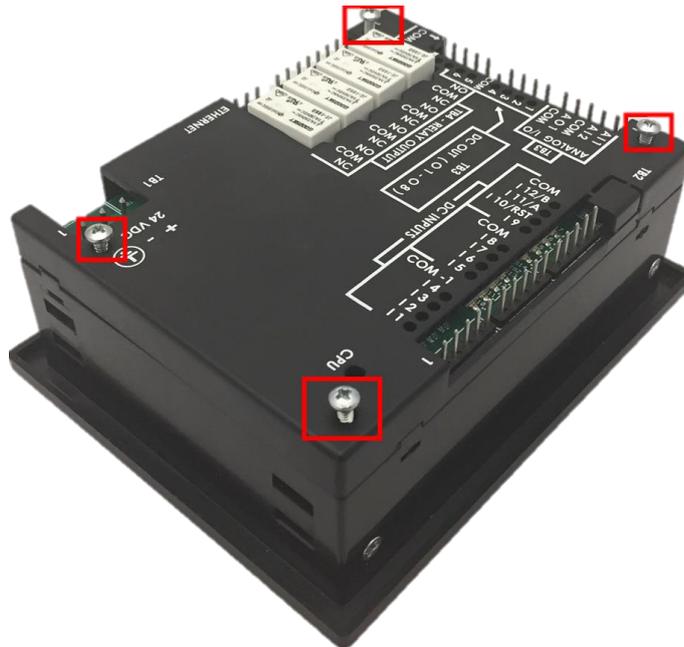
Environmental Specifications	
Operating Temperature	-10 °C to 60 °C
Storage Temperature	-20 °C to 70 °C
Relative Humidity	5 to 95 %, Non-Condensing
Vibration	5 to 55Hz, 2g for 2 hours in X, Y, and Z axis
Shock	10g for under 12ms in the X, Y, and Z axis
Noise Immunity	Nema ICS 2-230 Showering arc, ANSI C37.90a SWC; Level C Chattering Relay Test

7.1 CHANGING THE BATTERY

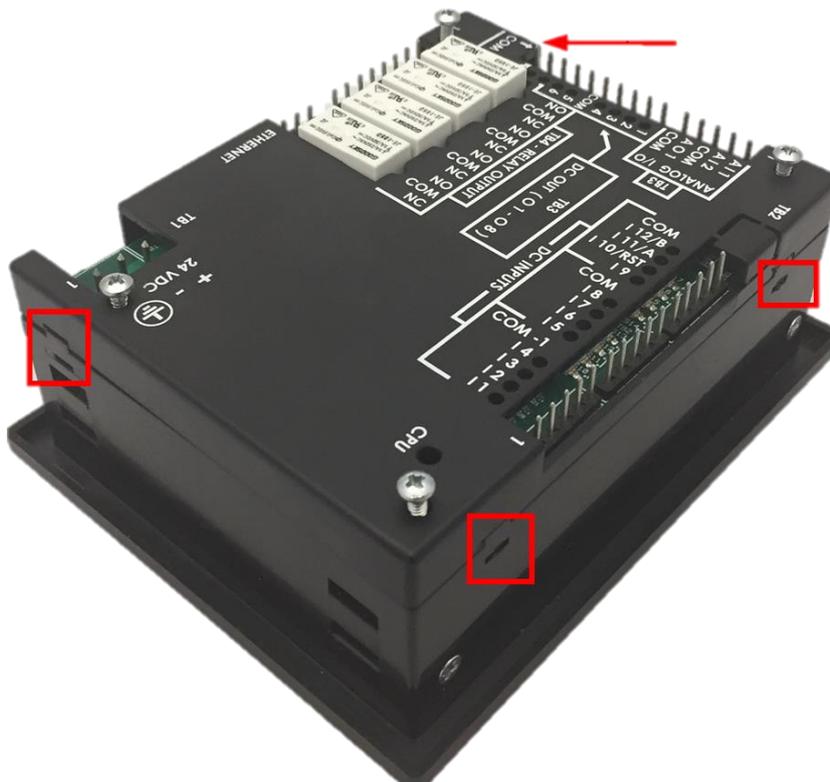
The EZTouch miniPLC units come with a built in Lithium coin cell battery with a 5 year life expectancy. The steps below outline the process to change the battery in the EZTouch miniPLC units. Since only the information saved to the registers/discretes available on a power cycle will remain intact, please save pertinent information before attempting to change the battery. Then remove power from the unit.

Necessary Equipment: Philips and Flat head screw driver, Lithium Ion CR1220 3V Battery

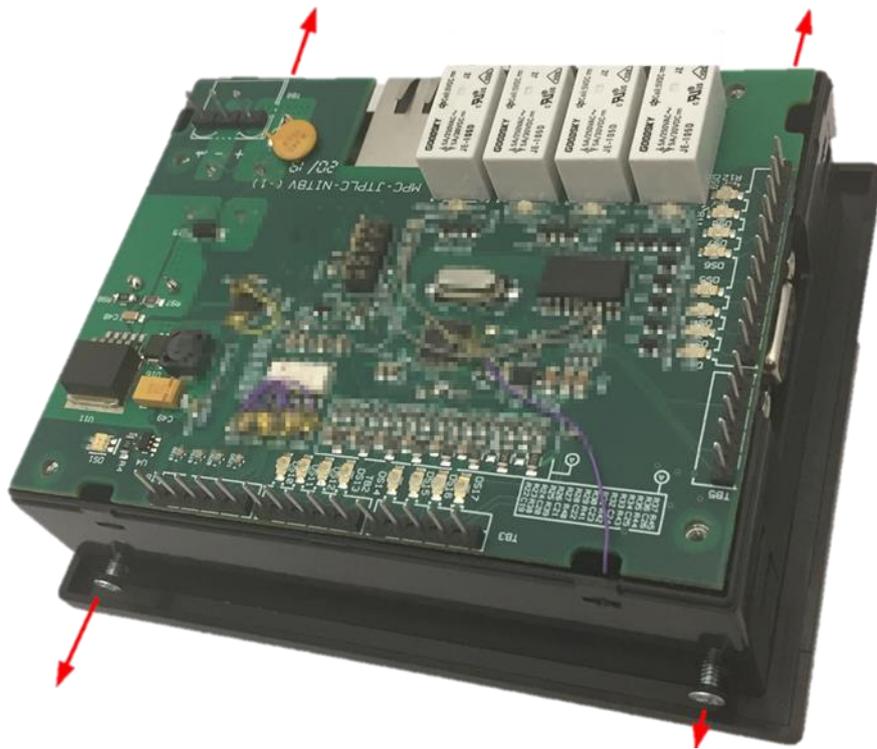
1. Using a Philips head screw driver remove the 4 screws holding the back plate on the unit.



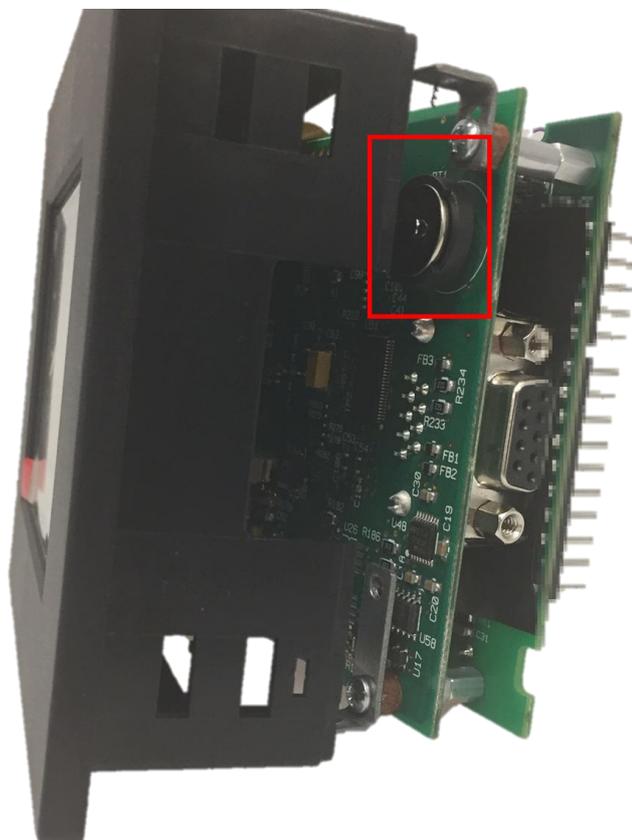
2. Next make sure clips come loose (4 clips are holding the back to the front). You can loosen them with a flat heard screw driver.



3. Next, lift off the back cover straight up and set the back cover aside. Then you will need to remove the 4 side screws using the Philips head screw driver.



4. Lift the circuit board assembly output side up so that you have access to the battery.



- 5.

6. Remove the depleted battery and insert a new CR1220 3V lithium battery (or equivalent) with the positive side facing up into the coin cell battery holder.

Note: If necessary, use the small blade screwdriver to remove the old battery.

7. Return the circuit board assembly back into the unit and screw in the side screws first. Then put the back cover on and snap it in place. Finally screw the back cover screws in.

Note: Once inserted, the back cover retainer snaps will click into place.

The Real Time Clock (RTC) will need reset after the battery has been replaced. All information saved to the registers/discretes available on a power cycle will remain intact. Data not saved to registers/discretes available during a power cycle will be lost. For information on registers/discretes available during a power cycle, please review this table.

7.2 TOUCHPAD AND DISPLAY TESTS

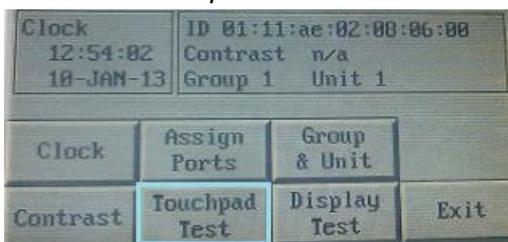
The EZTouch miniPLC allows for you to run display verification tests in the field that can check the pixel display and the response of the touchscreen interface. Follow the steps outlined below to utilize these tests.

First, simultaneously press the upper left corner and the bottom left corner of the screen to reach the language selection screen. After selecting the appropriate language for the unit, the screen below will appear displaying the current firmware, the available memory as well as the time and date set on the unit.

Revision		Memory	
Firmware	k.3.107	Used	118968
Boot	C.2	Free	995152
Hardware	A	Total	1114112
		Flash	0
Clock		ID 01:11:ae:02:08:06:00	
12:54:32		Contrast	n/a
10-JAN-13		Group 1	Unit 1
Clock	Assign Ports	Group & Unit	
Contrast	Touchpad Test	Display Test	Exit

To test the touchpad response:

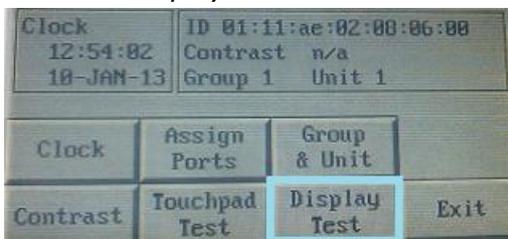
1. Press the *Touchpad Test* button.



2. A new screen will appear. Press each box individually to ensure that the touchscreen is properly responding.
3. Once finished, press *Exit* to return to the previous screen. Pressing *Exit* again will bring you back to the main screen.

To test the pixel display:

1. Press the *Display Test* button.



2. The screen will then automatically go through a variety of colors. Verify if all elements of the screen are lighting up appropriately.
3. Once finished, press *Exit* to return to the previous screen. Pressing *Exit* again will bring you back to the main screen.

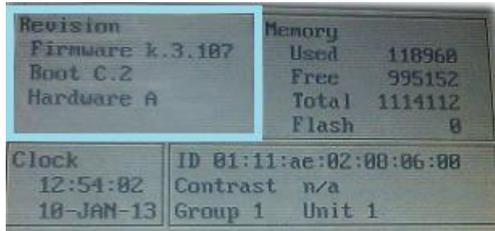
7.3 UPDATE FIRMWARE

Typically when power flows to the EZTouch miniPLC unit's power terminals, the indicator LED (located on the back of the unit) displays a blinking green LED. If the indicator LED is blinking red, then the firmware on the unit needs updated.

NOTE: Back up the user program stored on the EZTouch miniPLC unit prior to updating the firmware. Existing programs that are saved to Flash memory must be resaved to Flash after the upgrade.

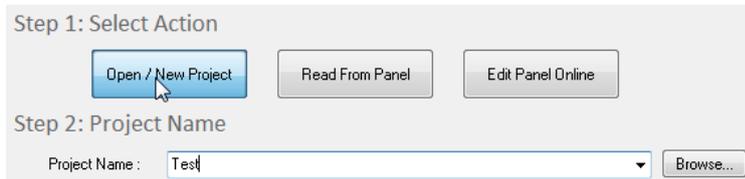
To check firmware version:

1. Simultaneously press the upper left corner and the bottom left corner of the screen to reach the language selection screen. Select the appropriate language.
2. The upper left corner will then display the firmware currently enabled on the unit.

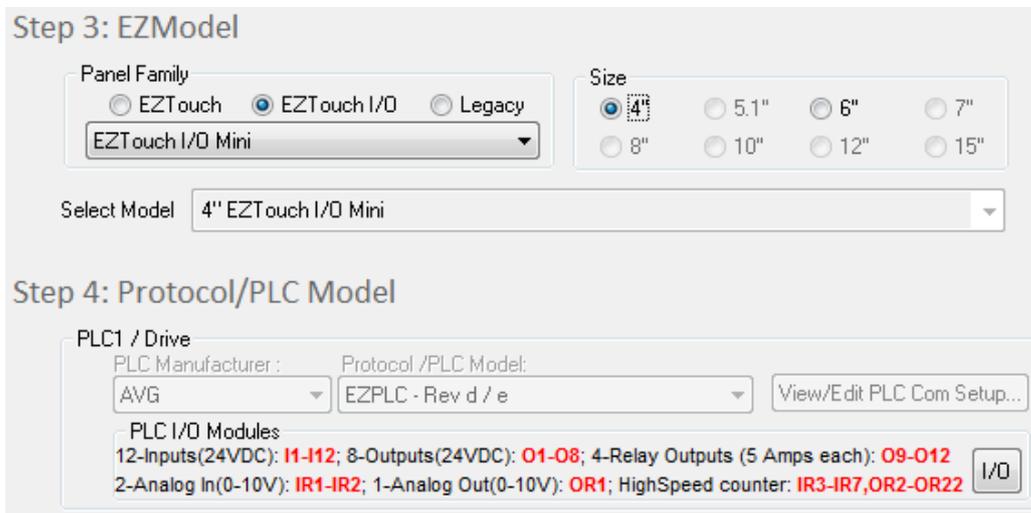


To update firmware:

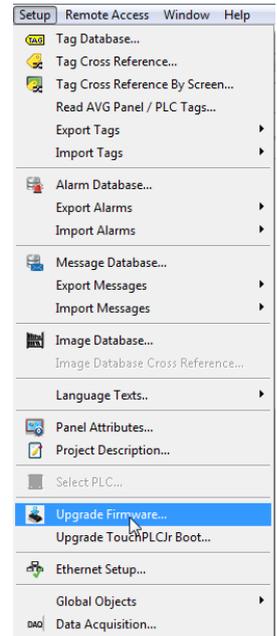
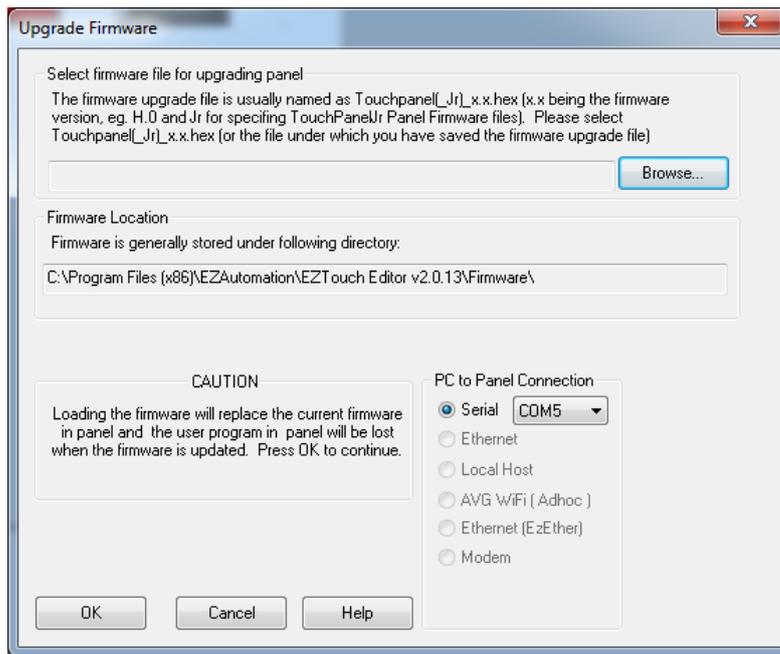
- 1) Insert a RS-232C cable (**P/N: EZ-PGMCBL**) into the serial port (COM1) and launch the editing software EZTouch Editor.
- 2) Click on Open / New Project then enter a project name (e.g. Test). Then press enter.



- 3) Next select EZTouch I/O in the radio buttons below Panel Family. Then select EZTouch I/O Mini from the drop-down list. Once EZTouch miniPLC is selected, the other fields will populate.



- 4) Click **Setup > Upgrade Firmware**. A dialog box will appear displaying the Upgrade Firmware Dialogue.



- 5) Use *Browse* to locate the appropriate firmware version. Verify Serial (COM5) is selected under the PC to Panel Connection, then click OK.
- 6) On the next screen click continue. The firmware will upgrade and let you know when it is done. Please do not disconnect the cable or power cycle the unit since this could cause the unit to stop functioning.

7.4 TROUBLESHOOTING

If you encounter difficulties while using our EZTouch miniPLC device, please consult the table below. Additional assistance is also available within the **Panel Editor Programming Software Help**. Alternatively, you may also find answers to your questions on our website www.ezautomation.net.

Problem		Possible Cause	Suggested Action
Operation	Indicator LED is off	Disconnected or faulty power source	Check and repair power source. Also check the wiring for loose contacts and secure them if found. Finally ensure that proper polarity is observed.
		Input power level is outside of EZTouch miniPLC's power rating specifications	Ensure that the power being presented to the EZTouch miniPLC terminal is within the specified range .
	Indicator LED is blinking red	Outdated firmware	Update firmware for unit.
	Real Time Clock function not enabled	Low Battery	Remove old battery and insert new CR1220 3V lithium battery.
Communication	No communication with PC via Ethernet	Disconnected or loose cable	Check the wiring for loose contacts and secure them if found.
		Wrong IP Address	Update IP address associated with unit and reattempt a connection.
	No communication with the PC (RS232 Port error)	Disconnected or loose cable	Check the wiring for loose contacts and secure them if found.
		Wrong/broken cable	Ensure the correct communication cable is being used (EZ-PGMCBL).
		Wrong communication port settings	Check and correct the COM port attributes.
		Wrong COM port assignment on the computer	Check if correct Serial Port (Com1) assignments on the computer have been made.

8 STILL NEED HELP?

Technical Support

Most of the frequently encountered problems regarding the EZTouch miniPLC unit's operation are answered in the sections above. However, if you still need answers to your questions, please call our technical support at 1-877-774-EASY.

Warranty Repairs

If your EZTouch miniPLC is under warranty, contact us at 1-877-774-EASY.

Out of Warranty Services

If your EZTouch miniPLC is out of warranty, contact EZ Automation at 1-877-774-EASY for an evaluation of repair costs. You can then decide whether it is more economical to proceed with the repairs or to upgrade your system with a new unit.

9 APPENDIX

The following table provides a quick reference to all RLL instructions supported by the EZTouch miniPLC, as well as a brief description regarding the function of each instruction.

Instruction	Description
Relay/Boolean Instructions	
NO Contact	When the memory bit is a 1 (on) it will allow power flow through this element
NC Contact	When the memory bit is a 0 (off) it will allow power flow through this element
Positive Transition	If the bit has changed from 0 (off) to 1 (on) in the current scan, power flows through this element
Negative Transition	If the bit has changed from 1 (on) to 0 (off) in the current scan, power flows through this element
NO Coil	As long as the power flows to the instruction, corresponding memory bit remains 1 (on)
NC Coil	As long as the power flows to the instruction, corresponding bit to remains 0 (off)
Set Coil	When power flows to the instructions, corresponding bit is set to 1 (on) and remains 1 (on) even if the rung condition goes to false (Use RESET COIL instruction to turn the corresponding bit Off.)
Reset Coil	When power flows to the instructions, corresponding bit is set to 0 (off) and remains 0 (off) even if the rung condition becomes false (Use SET COIL instruction to turn the corresponding bit On.)
NO Immediate Input	PLC reads the addressed bit immediately from the input module (instead of memory). The power flows through the instruction if the read bit is 1 (on). (Please note all the bits corresponding to the input module are updated with the read value.)
NC Immediate Input	PLC reads the addressed bit immediately from the input module (instead of memory). The power flows through the instruction if the read bit is 0 (off). (Please note all the bits corresponding to the input module are updated with the read value.)
NO Immediate Output	The bit status is immediately written to corresponding output module. The bit remains 1 (on) as long as the power flows to the instruction.
NC Immediate Output	The bit status is immediately written to corresponding output module. The bit remains 0 (off) as long as the power flows to the instruction.
Compare Instructions	
Equal To	Allows power flow through this element if the data value of "Opr1" register is Equal to "Opr2" register
Not Equal to	Allows power flow through this element if the data value of "Opr1" register is NOT Equal to "Opr2" register
Greater Than	Allows power flow through this element if the data value of "Opr1" register is Greater Than "Opr2" register
Less Than	Allows power flow through this element if the data value of "Opr1" register is Less Than "Opr2" register
Greater Than or Equal To	Allows power flow through this element if the data value of "Opr1" register is Greater Than or Equal to "Opr2" register
Less Than or Equal to	Allows power flow through this element if the data value of "Opr1" register is Less Than or Equal to "Opr2" register
Limit	Allows power flow through this element if the data value of "Input" register is within the data values of "High Limit" and "Low Limit" registers

Math Instructions	
Add	Adds two data values in “Opr1” and “Opr2” registers and stores the result in “Result” register
Subtract	Subtracts “Opr2” register data value from “Opr1” register data value and stores the result in “Result” register
Multiply	Multiplies two data values in “Opr1” and “Opr2” registers and stores the result in “Result” register
Divide	Divides “Opr1” register data value by “Opr2” register data value and stores the result in “Result” register
Modulo	Divides “Opr1” register data value by “Opr2” register data value and stores only the remainder in “Result” register
Absolute	Converts a negative data value from “Opr1” register to a positive value and stores it in “Result” register
X=Y Conversion	Copies the data value of “Opr” register, converts it into “Result” registers data type, and stores the data value in “Result” register
Binary Conversion	Converts the data value of “Source” register in Binary, BCD, or GRAY code to the data value of “Result” register in Binary, BCD or GRAY Code
Bitwise Instructions	
AND	Performs a bitwise AND operation between the data values of two registers “Opr1” and “Opr2”. The result is stored in “Result” register
OR	Performs a bitwise OR operation between the data values of two registers “Opr1” and “Opr2”. The result is stored in “Result” register
XOR	Performs a bitwise XOR operation between the data values of two registers “Opr1” and “Opr2”. The result is stored in “Result” register
NOT	Performs a bitwise NOT operation on the data value of “Source” register and stores the result in “Destination” register
Shift Left	Performs a logical Shift Left on the data value of “Opr1” register by the data value of “Opr2” register and stores the result in “Result” register
Shift Right	Performs a logical Shift Right on the data value of “Opr1” register by the data value of “Opr2” register and stores the result in “Result” register
Rotate Left	Performs a logical Rotate Left on the data value of “Opr1” register by the data value of “Opr2” register and stores the result in “Result” register
Rotate Right	Performs a logical Rotate Right on the data value of “Opr1” register by the value of “Opr2” register and stores the result in “Result” register
Move Instructions	
Move Data	Moves data value of “Source” register to “Destination” register
Bit Move	Moves either words to bits or bits to words with user-specified length for the number of words to move. Maximum of 16 words can be moved at a time
Move Block	Moves a block of memory area. “Source” register defines the starting area of memory address/register to Move from and “Destination” register defines the starting area of memory address/register to move to. The number of elements to move is user defined
Block Fill	Fills a block of memory area. “Source” register defines the data value to Fill with and “Destination” register defines the starting area of memory address/register to Fill to. The number of elements to move is user defined. The number of elements to Fill is user defined
Move Table of Constants	Loads a table of user defined constants to a consecutive memory/register locations with the starting memory address/register location defined by “Destination” register

Timer/Counter Instructions

Timer	This instruction starts timing when called and once it reaches the preset value as defined by the data value of "Timer Preset Value" register, it will stop timing and will allow power flow through the element
Counter	This instruction starts counting either Up or Down by the increments of one until the counter reaches the data value of "Counter Preset Value" register. The Counter will then allow power flow through the element

Program Control

Jump	Skips the rung containing Jump instruction (after execution of the rung) to a rung with the label specified in the JUMP instruction and continues executing the program thereafter
For Loop	Executes the logic between the FOR Loop and NEXT instructions by the data value of "Loop Count" register
Next Statement	Specifies the return/end point for the FOR Loop instruction
Call Subroutine	Calls a Subroutine specified by the label in CALL Subroutine instruction and is terminated by the RETURN instruction
Return	Terminates a subroutine and returns back to the main logic

String Instructions

String Move	Moves the data value (string type) of "Source" register to "Destination" register by the number of characters specified by the user
String Compare	Allows power flow through this element if the data value (string type) of "Source1" register is Equal to "Source2" register by the number of characters specified
String Length	Computes the length of a null-terminated "String" register (string type) and stores the result in "Save Length in" register

Miscellaneous Instructions

Drum	Time and/or Event driven drum type sequencer with up to 16 steps and 16 discrete outputs per step. The outputs are updated during each step. Counts have a specified time base (1MSec to 1 Sec) and every step has its own counter along with an event to trigger the count. After the time expires for one step, it transitions to the next step and completes up to 16 steps total. After the completion of all the steps this element allows power flow through it
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