Minimum ON Current: 2 mA, OFF Current: 0.2mA
Red LED Status Indicators
(See Digital Input Section for more info)

Digital Output specifications (Relay)

Number: 8
Max Switching Voltage: 277VAC or 30VDC
Max Switching Power: 300W
Rated Switching Current: 10A
Red LED Status Indicators
(See Digital Output Section for more details)

Shielding from RFI

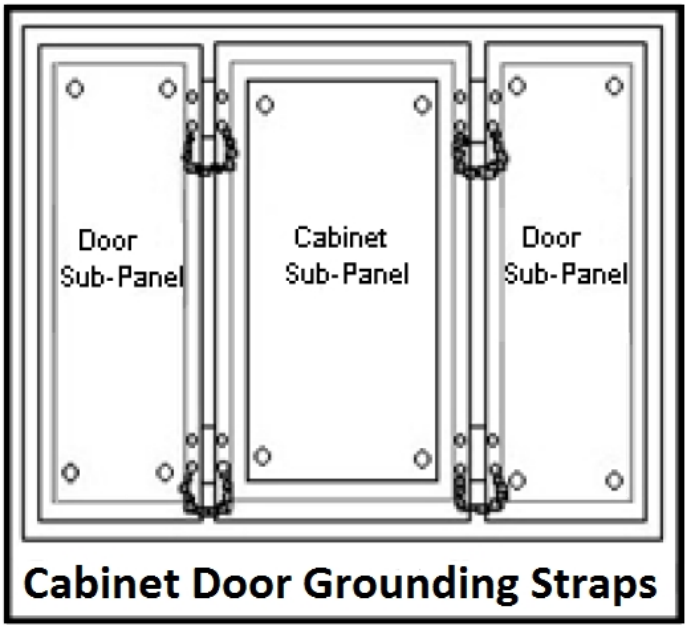
Shielded Cables

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.



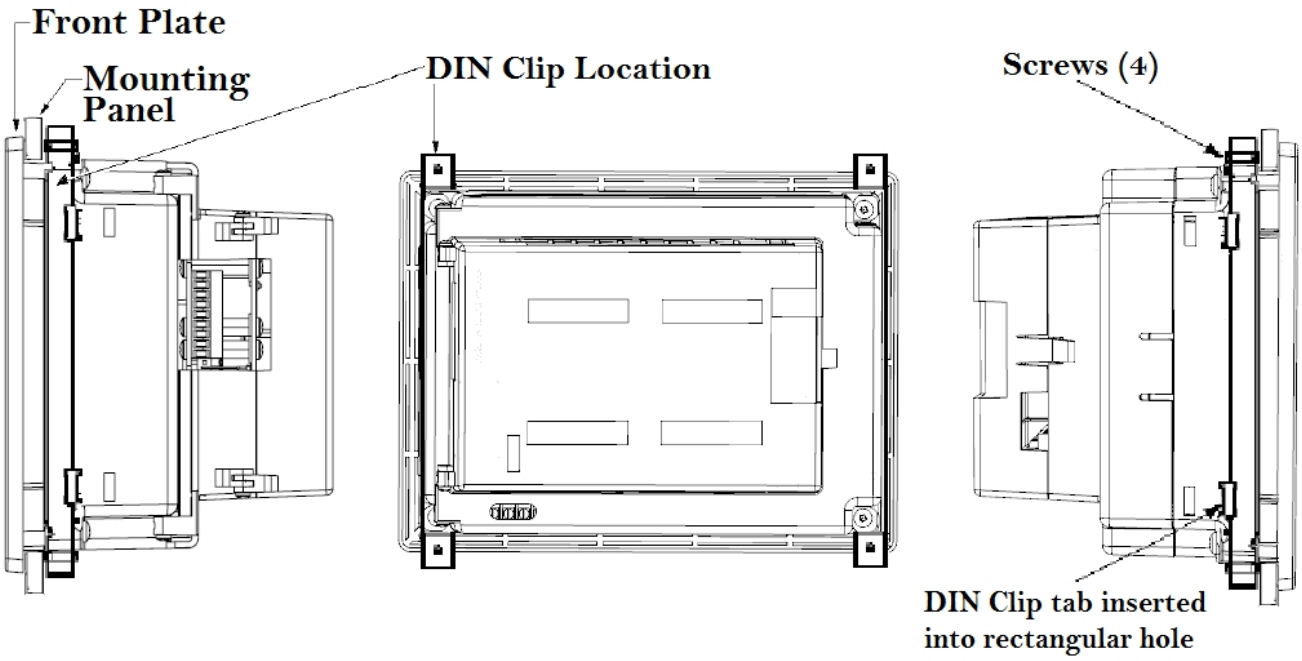
Cabinet Door Grounding Straps

Mounting Instructions (6 Inch Model)

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 EZ Touch Nano 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 EZSeries Touch Panel front bezel is flush with the mounting panel.



Terminal Pinouts

TB3 Pinout Information	
Pin No.	**Pin Function**
1	DC Input(1)
2	DC Input(2)
3	DC Input(3)
4	DC Input(4)
5	DC Input(5)
6	DC Input(6)
7	DC Input(7)
8	DC Input(8)
9	DC Input(9)
10	DC Input(10)
11	DC Input(11)

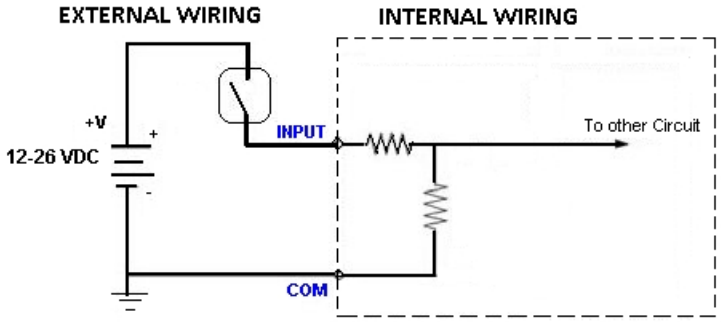
TB4 Pinout Information	
Pin No.	**Pin Function**
1	DC Input(12)
2	DC Input(13)
3	DC Input(14)
4	DC Input(15)
5	DC Input(16)
6	DC Input COM
7	DC Input COM
8	--
9	--
10	--
11	--

TB1 Pinout Information	
Pin No.	**Pin Function**
1	Output (1)_Normally open
2	Output (1)_COM
3	Output (1)_Normally closed
4	Output (2)_Normally open
5	Output (2)_COM
6	Output (2)_Normally closed
7	Output (3)_Normally open
8	Output (3)_COM
9	Output (3)_Normally closed
10	Output (4)_Normally open
11	Output (4)_COM

TB2 Pinout Information	
Pin No.	**Pin Function**
1	Output (5)_Normally open
2	Output (5)_COM
3	Output (5)_Normally closed
4	Output (6)_Normally open
5	Output (6)_COM
6	Output (6)_Normally closed
7	Output (7)_Normally open
8	Output (7)_COM
9	Output (7)_Normally closed
10	Output (8)_Normally open
11	Output (8)_COM

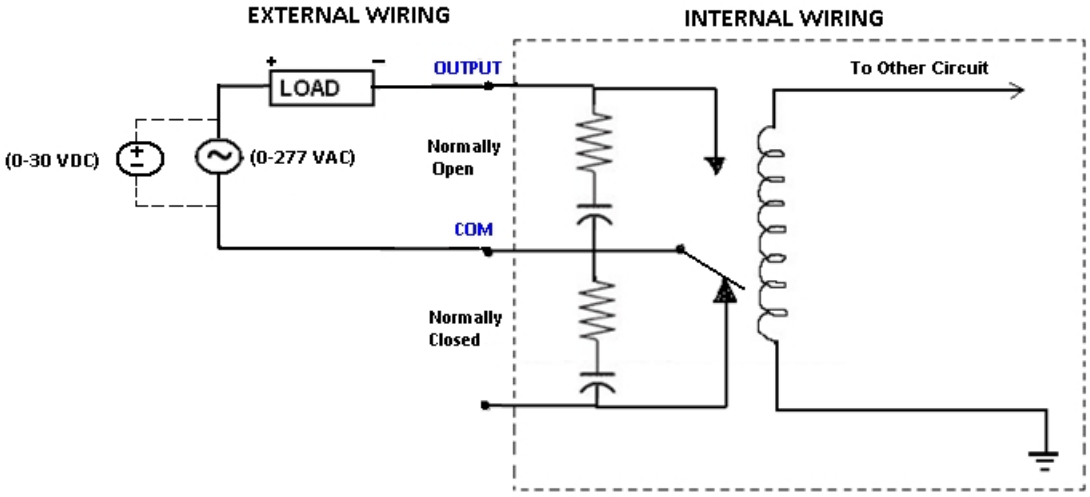
I/O Specifications

Digital Input Specifications	
Number of Inputs	16
Input Voltage Range	12-26 VDC
Input Current	1.92 mA @12 VDC 4.0 mA @ 24VDC
Maximum Input Current	4.3 mA @ 26 VDC
Input Impedance	11.5k @ 12-26 VDC
ON Voltage Level	>12 VDC
OFF Voltage Level	<2 VDC
Min. ON Current	2mA
Min. OFF Current	0.2 mA
OFF-ON Response	2-4 ms. Typical 3 ms
ON to OFF Response	2-4 ms. Typical 3 ms
Status Indicators	Red LED for each input
Commons	2 points
Fuse	No Fuse
Wires	1 of 14 AWG, 2 of 18 AWG 4 of 22 AWG



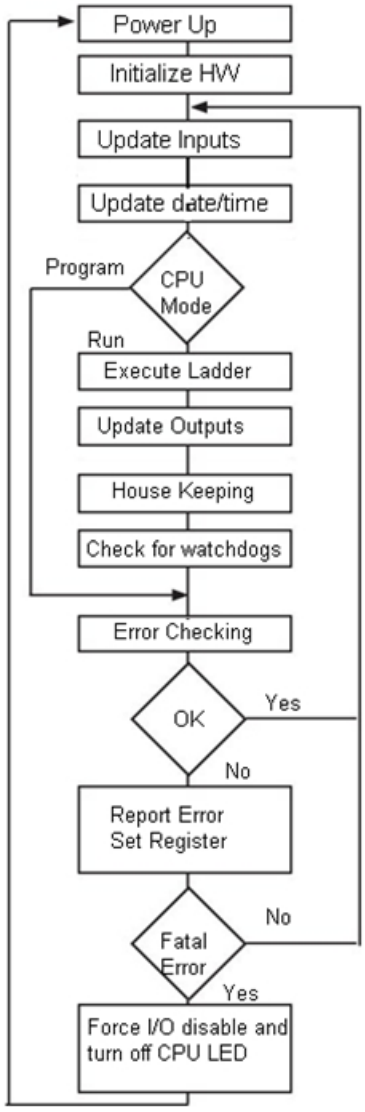
Discrete Input Wiring

Relay Output Specifications	
Number of Outputs	8
Max Switching Voltage	277 VAC or 30 VDC
Max Switching Power	2770 VA or 300 W
Rated Switching Current	10A
Contact Resistance	100mΩ (at 1A 6VDC)
Insulation Resistance	100MΩ Min. at 500VDC
Dielectric Strength	1500VAC between Coil & Contact, for 60sec
	750VAC between Contacts for 60sec
Operate Time	Max 10ms
Release Time	Max 5ms
Status Indicators	Red LEDs



Relay Output Wiring

PLC Operation Sequence



A good understanding of the EZ TouchPLC's CPU operating sequence will help you achieve the proper control for your equipment or process. The flow chart on the left shows how the CPU controls all aspects of system operation.

Power-up Initialization

On power-up, the CPU initializes the internal electronic hardware. It also checks if all the memories are intact and the system bus is operational. It sets up all the communication registers. If all registers are go, the CPU begins its cyclic scan activity as described below.

Read Inputs

The CPU reads the status of all inputs, and stores them in an image table. **Image Table** is EZ TouchPLC's internal storage location where it stores all the values of inputs/outputs for ONE scan while it is executing ladder logic. The CPU uses this image table data when it solves the application logic program.

Execute Logic Time

This segment is also called Ladder Scan. The CPU evaluates and executes each instruction in the logic program during the ladder scan cycle. The rungs of a ladder program are made with instructions that define the relationship between system inputs and outputs. The CPU starts scanning the first rung of the ladder program, solving the instructions from left to right. It continues, rung by rung, until it solves the last rung in the Main logic. At this point, a new image table for the outputs is updated.

Write Outputs

After the CPU has solved the entire logic program, it updates the output image table. The contents of this output image table are written to the corresponding output points.

Immediate Inputs/Outputs

There is a possibility that an input changes after the CPU has read the inputs. If you have an application that cannot wait until the CPU returns for the next input scan, you can use **Immediate Instructions.** These instructions do not use the status of the input from the image table to solve the application program. The Immediate Instructions immediately read the input status directly from I/O modules and update the image table with appropriate status of input module read. Similarly, Immediate Output instructions do not wait for the CPU to complete the ladder scan. Immediate outputs are directly written to the image table and Outputs are updated accordingly.

Subroutines

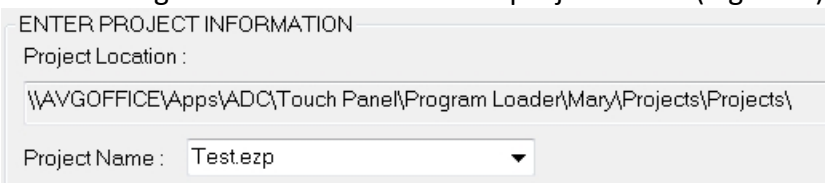
The CPU executes subroutines when called for in the ladder program. These subroutines are useful in performing the same logic operation time and time again just upon one call so you do not have to repeat the rung logic over and over again.

Editing IP Address

This section applies only to the units purchased with Ethernet capabilities. Units with Ethernet capabilities arrive with a factory-programmed IP Address that may need edited to be compatible with your LAN network. The COM1 Port 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.

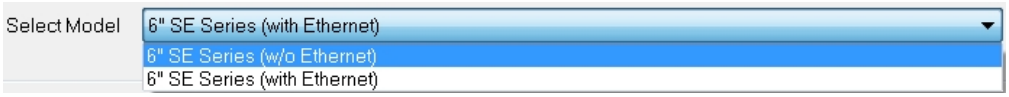
Serial Port (COM1) Method

1. Insert a RS-232C cable into the serial port (COM1) and launch the editing software EZPanel Editor.
2. Select Edit Program ON-LINE and enter a project name (e.g. Test). Click OK.

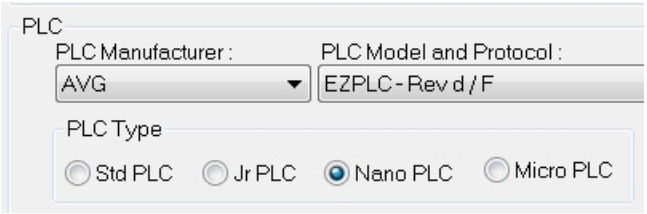


3. Next select EZ-SE Series under Panel Family and then select the appropriate unit size.

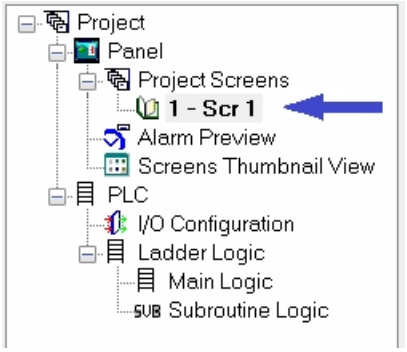
4. Using the drop-down under Select Model, select the model with Ethernet.



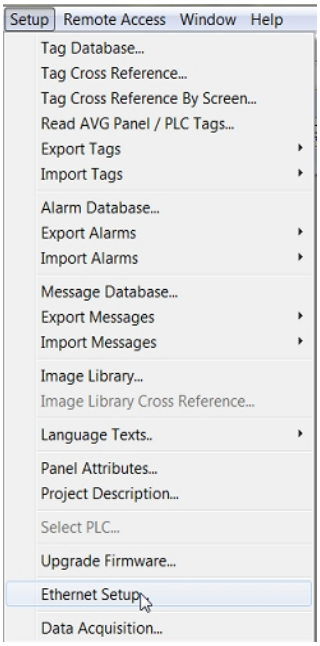
5. Select PLC Manufacturer as AVG. This will then allow you to select NanoPLC from under PLC Type.



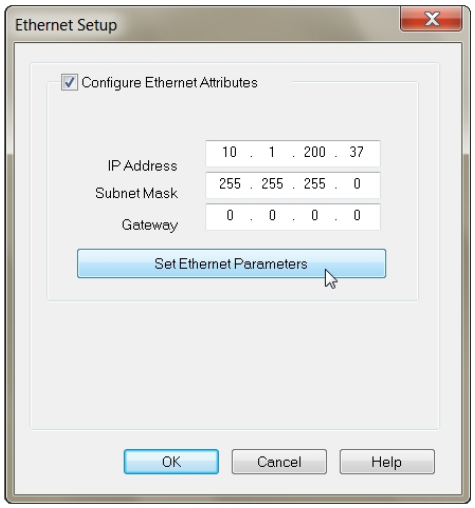
6. Click OK to launch the editing software program. The Main Project Window will then appear. Click on the Panel side.



7. Click **Set-up** > **Ethernet Set up**. A dialog box will appear displaying the current IP parameters.



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

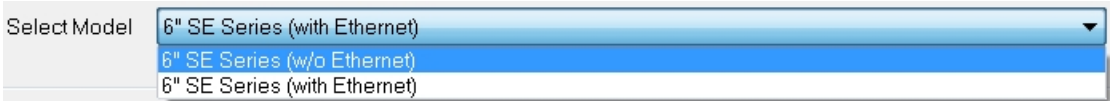


9. Next, save the project.

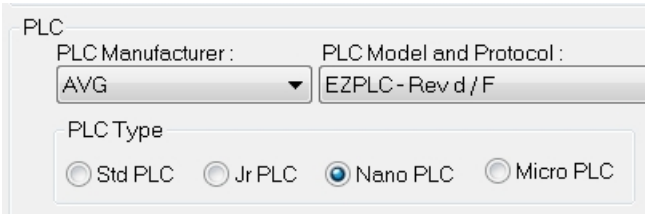
IP Config Utility Method

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.



4. Select PLC Manufacturer as AVG. This will then allow you to select NanoPLC from under PLC Type.

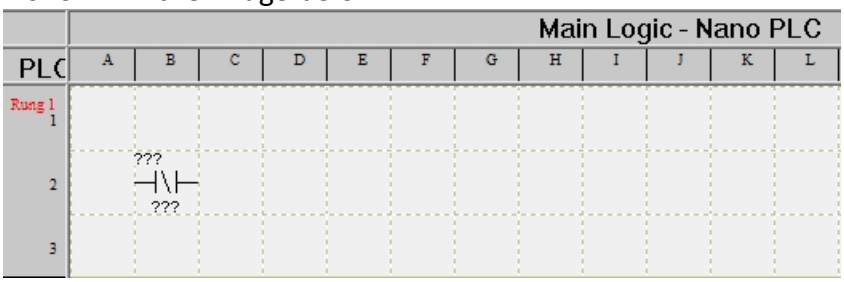


5. Click OK to launch the editing software program. The Main Project Window will then appear. The steps below outline how to create a sample PLC Ladder Logic program.

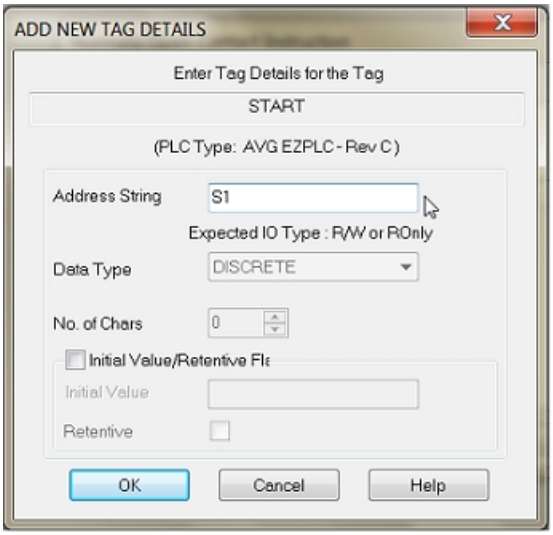
Create PLC Program: Click on “PLC” and select "Main Logic" to start creating a sample PLC Ladder Logic program as described in the example below.

1. Select the “Relay/Boolean” type instruction set in the instruction toolbar (located on the right side of the 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.

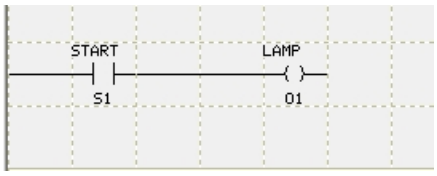


5. Similarly, click on “NO Coil” under the Relay/Boolean instructions and place the instruction in the ladder logic programming window. Double-click the icon to select

the tag name as "Button."

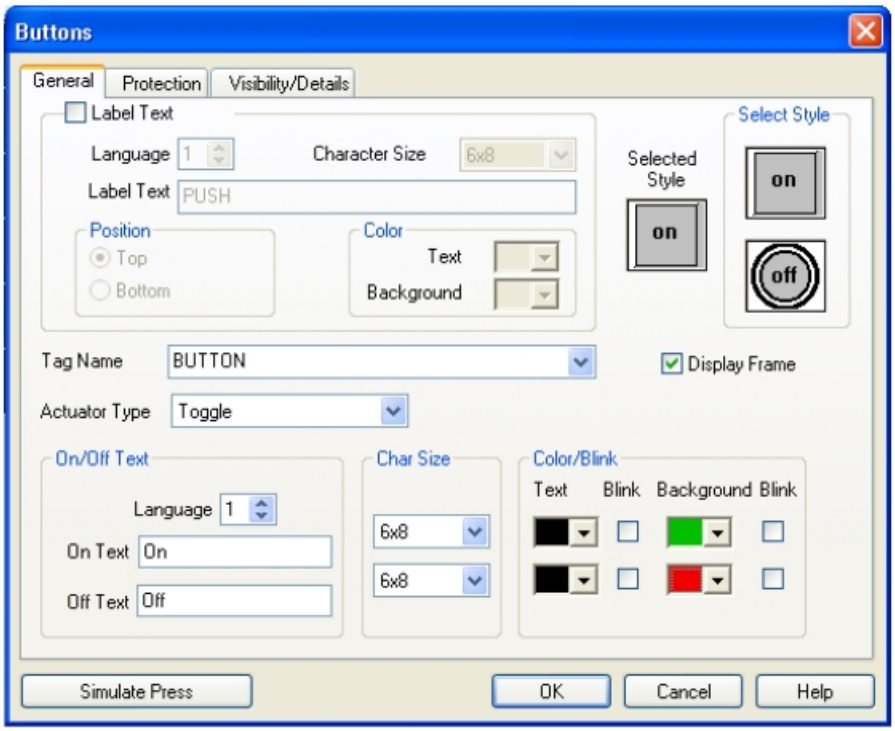
6. Once again, a dialog box will appear. Enter "O1" as the address string. Click OK.
7. Click on **Instructions** > **Line** to wire “NO Contact” and “NO Coil.”

Your screen should look like this when finished:

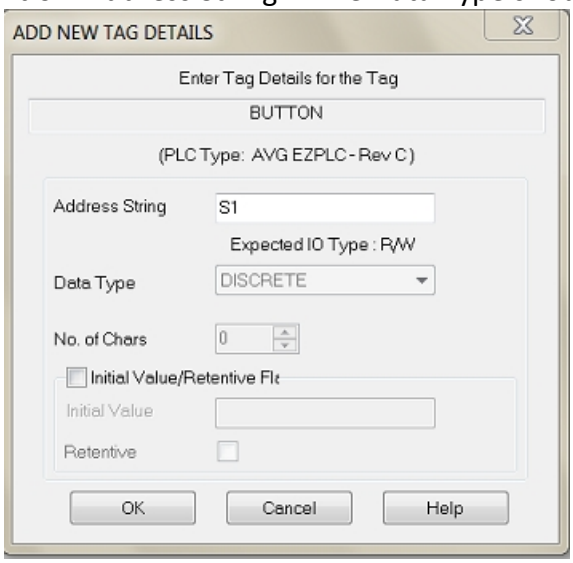


Create a Panel Program: Click on “Panel” and "Scr 1" to create the Panel display screen as explained in the sample below.

1. In the Main Menu, click on **Objects** > **Buttons** > **Buttons**. The screen below will appear. Enter **BUTTON** for Tag Name. Click OK.

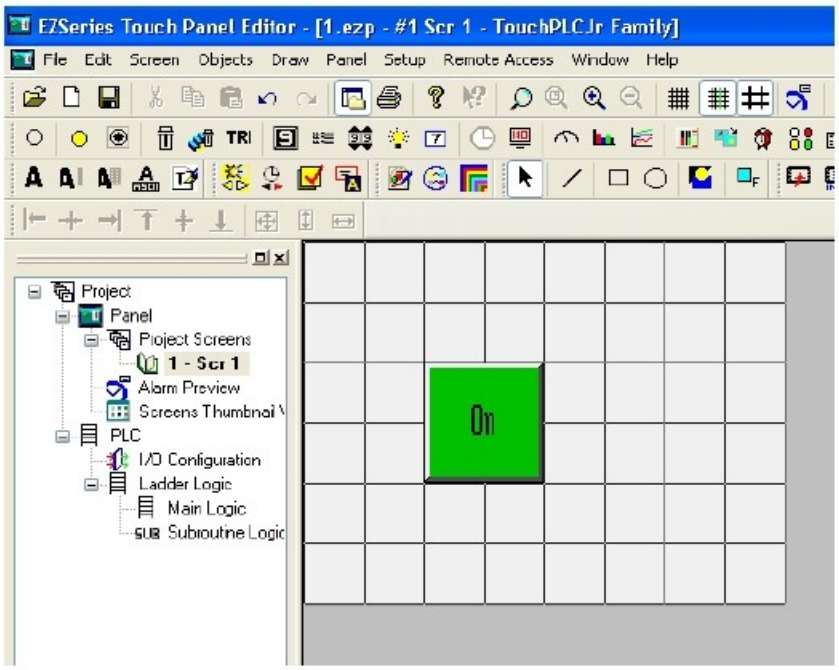


2. A dialog box will appear requesting the memory location. Enter "S1" in the field to the right of "Address String." The Data Type should be marked as DISCRETE. Click OK.

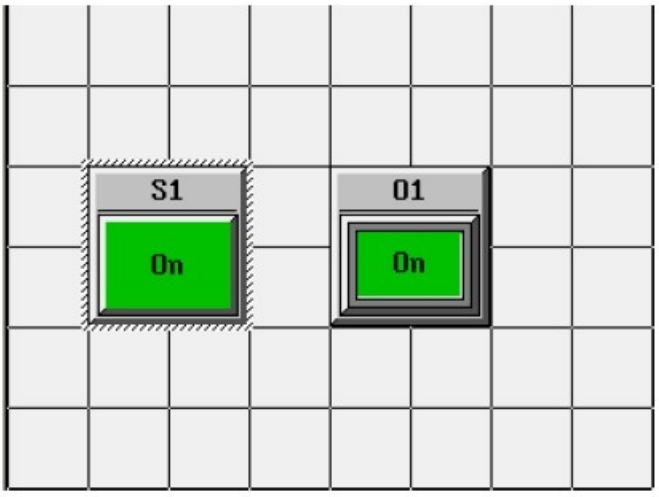


3. Click anywhere on the screen to place the Button object. Double click the icon to open its object dialog box if you need to make any adjustments to the object's

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 **O1** for Tag Name. Click OK. Place the object on the panel. Your screen should look like the picture below.



High Speed Counter

Overview

The NanoPLC and MicroPLC possess the following new High Speed Counter feature. High speed counting allows either two 32-bit up counters, or one 32-bit up-down counter, or one 32-bit quadrature encoder. These features involve use of newly added SR registers and SD bits. Both the NanoPLC and MicroPLC have a maximum count frequency of 40KHz.

The following table summarizes the availability of these features for various models:

Feature	Nano	Micro
Program Loader	PLC Editor 1.8.6, uwin2.0.11, ezpanel 5.10.11	
Firmware	c.3.75 or above	
Counter function		
Up Counter	2x32 bit (Counter A Input on I15 Counter B Input on I16)	2x32 bit (Counter A Input on I23 Counter B Input on I24)
Up/Down Counter	1x32 Bit (Counter A Input on I15 Direction Input on I16)	1x32 Bit (Counter A Input on I23 Direction Input on I24)
Quadrature Encoder	1x32 bit Quadrature A on I15 Quadrature B on I16 (Increasing counts when A leads B)	1x32 bit Quadrature A on I15 Quadrature B on I16 (Increasing counts when A leads B)

SR Registers for high speed counter function

Following table describes the registers used for High Speed counting function:

Register	Description
SR21	Counter configuration word
SR22	Reserved (Do not use)
SR23-SR24	Lower Limit of Quadrature Range (signed 32-bit number)
SR25-SR26	(Upper Limit+1) of Quadrature Range (signed 32 bit number)
SR27-SR28	Counter A Counts (signed 32 bit number)
SR29-SR30	Counter B Counts (signed 32 bit number)
SR31-SR32	Setpoint 1 for Counter A (signed 32 bit number)
SR33-SR34	Setpoint 2 for Counter A (signed 32 bit number)

Lower and Upper Limits:
User programs these registers as per their requirements. As an example, if you would like to count from 0 to 359, set lower limit register to 0, and upper limit register to 360 (i.e. 359+1).

- When count value equals the Lower Limit, the next input to decrease the counts would rollover the count value to Upper Limit value.

- When count value equals to the Upper Limit, the next input to increase the count would roll over the count value to Lower Limit.

SD bits for high speed counter function

Following SD bits have been used for counter functions:

Bit	Description
SD15	Pause Counter A
SD16	Pause Counter B
SD17	Reset Counter A
SD18	Reset Counter B
SD19	Setpoint 1 Match Bit: The Bit is set whenever Counter A is greater than or equal to Setpoint 1 Whenever the bit goes from 0 to 1 (clear to set), the PLC executes logic programmed in the interrupt routine.
SD20	Setpoint 2 Match Bit: The Bit is set whenever Counter A is greater than or equal to Setpoint 2 Whenever the bit goes from 0 to 1 (clear to set), the PLC executes logic programmed in the interrupt routine.

7 Memory Map 2					
SYNTAX: TAAAA **T - TYPE** **AAAA - Address of Memory Type in Decimal**					
MEMORY TYPE	**ADDRESS RANGE**	**I/O TYPE**	**VALUE TYPE**	**SYNTAX EXAMPLES**	**DISCRETES / REGISTERS 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 Register	1-64	READ_ONLY	WORD	1R3	**NONE**
OR- Output Register	1-64	READ_WRITE	WORD	OR2	**OR1 - OR64**
R- Register Internals	1-8192	READ_WRITE	WORD	R100	**R1 – R256**
SR- System Registers	1-64	READ_WRITE	WORD	SR1	**SR1 –SR64**
SD- System Discrete	1-64	READ_WRITE	DISCRETE	SD10	**SD1 –SD64**
XR- Index Registers	1-4	READ_WRITE	WORD	XR10	**NONE**
#R – Value Registers	1-4	READ_WRITE	WORD	#R6	**#R1 - #R4**
Note: Does not Support Access to a Bit of Word (E.g.: R100/ 0, R100/5…etc)					

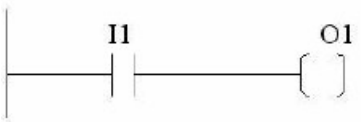
Please Note: Since the PLC Editor is a common programming platform for all the models offered by the AVG PLC family, it may allow you to include 128 Inputs (I), 128 Output (O), 64 input Registers (IR) and 64 Output Registers (OR) in the main logic. However, the Nano only physically supports 16 inputs and 8 K outputs; hence it is recommended that you only use I1- I16 and O1-O8 while programming the Nano. The remaining O bits may be used as "Scratch bits" . Similarly, only IR1-IR4 and OR1- OR4 should be used to address the I/O Registers, while the rest of the Output Registers may be used as "Scratch Registers" . Although there are 64 System Registers (SR) and 64 System Discretes (SD) available in the programming software, some of them are preassigned a function.

Mapping Conventions

Discrete Inputs/Outputs

Discrete Inputs

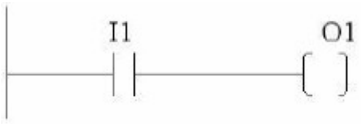
Discrete Inputs are denoted using an "I" pre-fix (e.g. I1, I4, etc.). The maximum number of physical Inputs available in an EZTouch I/O Nano is 16. Hence, you may only use I1 – I16 in your main logic. Discrete inputs are Read only type.



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 maximum number of programmable Outputs available is 1 through 128. Although, the number of discrete physical outputs available in an EZTouch I/O Nano is 8, the remaining "O" registers can be used as 'Scratchbits ' 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. You can only Read from an IR register.

Note: All the EZ Analog Inputs (if available) are mapped to Input Registers.

Output Register (Word)

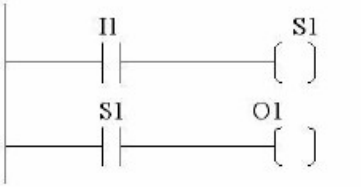
Output Registers are denoted using an "OR" pre-fix (e.g. OR1, OR4, etc.). These are 16-bit Word data types. The maximum number of Output Registers available is 1 through 64. OR are Read-Write type of Word registers.

Note: All the EZ Analog Outputs (if available) 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 I/O Nano. Discrete Internals are Read-write type and are used as "Scratchbits" . 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



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 I/O Nano. R are Read-Write type of data registers.

System

System Discretes (Discrete)
System Discretes 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 Discretes. They are used to help in logic program development, provide system operating status info and more.

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.

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 I/O Nano. "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 I/O Nano. "#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.

Maintenance and Troubleshooting

Hardware Maintenance

Routine maintenance checks should be performed on the unit to avoid any risk of hardware problems. The EZTouch I/O Nano 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 EZ TouchPLC'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 I/O 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 I/O Nano
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.

Error Checking Process

The EZTouch I/O Nano performs a standard diagnostic routine during each CPU scan. This is called the error-checking step. The primary task of this step is to identify various types of CPU and I/O failures. We classify these errors/failures broadly into two categories: Fatal and Non-Fatal.

Fatal Errors

These errors are the ones that lead to the system failure. During the CPU scan if a fatal error is detected, PLC is automatically switched out of Run mode and all I/O points are disabled. Some instances of fatal errors include: Wrong parity value, Programming errors, etc. The EZTouch I/O Nano will not go into Run mode from Program if it detects a fatal error.

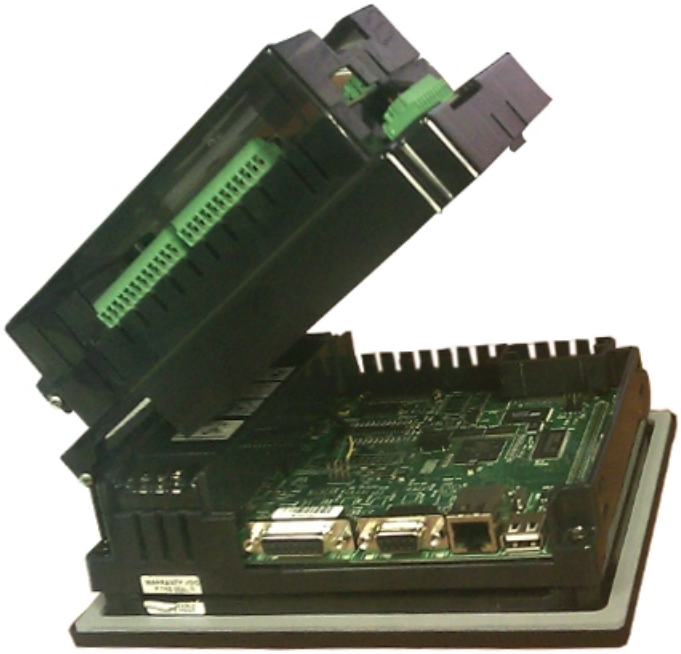
Non-Fatal Errors

These errors just need your attention and are not detrimental to PLC operation. Unlike fatal errors, the PLC will continue in Run mode despite an occurrence of non-fatal errors. When you identify such errors, you can proceed with an orderly shutdown and take the required corrective action. An example of non-fatal error is – a minor programming error.

Changing the Battery

The unit comes 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 inside the 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.

1. Open the back cover to access the battery.



2. The battery is located in the upper-left hand corner as shown in the figure below. Remove the old battery and replace with a new 1/2 AA, 3.6 V Lithium Battery (Part Number: **EZP-BAT**).

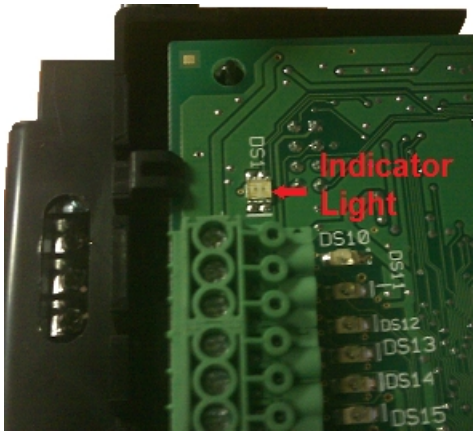
3. Close rear cover and ensure that the door latches.
4. Reconnect power source. Connect to PC and run the Programming Software to transfer back the user program to the TouchPLC.

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.

Indicator Light

Indicator Light Status

Indicator Light	Status Description	Possible Error
Blinking Red	PLC running in Boot Mode only	Missing firmware / Outdated firmware installed
Blinking Red and Green	Data abort Power cycle	Bad or corrupted program
Red	PLC locked up	Hardware trouble
Blank - No Light	No program loaded or PLC in "Stop Mode"	Power source not connected or inadequate
Green	Program loaded and running	



Troubleshooting

If you encounter difficulties while using our EZTouch I/O Nano device, please consult the table below. Additional assistance is also available within the **EZTouch Editor Software Help**. Alternatively, you may also find answers to your questions in the operator interface section of our website @ www.ezautomation.net.

Problem		Possible Cause	Suggested Action
Operation	CPU Status LED is off	Disconnected or faulty power source	Check and repair power source.
			Check the wiring for loose contacts and secure them if found.
			Ensure that proper polarity is observed.
		Input power level is outside of TouchPLC's power rating specifications	Ensure that the power being presented to the PLC terminal is within the specified range.
	CPU LED is blinking red and green	Bad or corrupted program	Check the logic program
			Pay special attention to Program Control Instructions and make sure there is a Next or Return statement at the end of Jump and Subroutine Instructions
	CPU LED is red	Electrical Noise	Power cycle the PLC once to see if an intermittent high frequency noise has caused the failure.
			Follow instructions to avoid electrical noise.
			Consider installing an Isolation Transformer if you think the noise is making its way through the Power source.
			Check to ensure that RS232 signal GND is not connected to Earth ground and the shield is

			connected to Earth ground on both sides.
			If problem persists, call AVG Automation for assistance.
Communication	No communication with EZTouch I/O Nano	Disconnected or loose cable	Check the wiring for loose contacts and secure them if found.
			Ensure you are using a correct communication cable.
	No communication with the PC (RS232 Port error)	Wrong/broken cable	Ensure the correct communication cable is being used (PGMCBL).
		Wrong communication port settings	Check and correct the COM port attributes.
			Open the PLC Editor and click on the configuration button
		Wrong COM port assignment on the computer	Check if correct Serial Port (COM1) of the computer has been selected.

Still Need Help?

Technical Support

Most of the frequently encountered problems regarding the EZTouch I/O Nano 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 I/O Nano is under warranty, contact us at 1-877-774-EASY.

Out of Warranty Services

If your EZTouch I/O Nano 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.