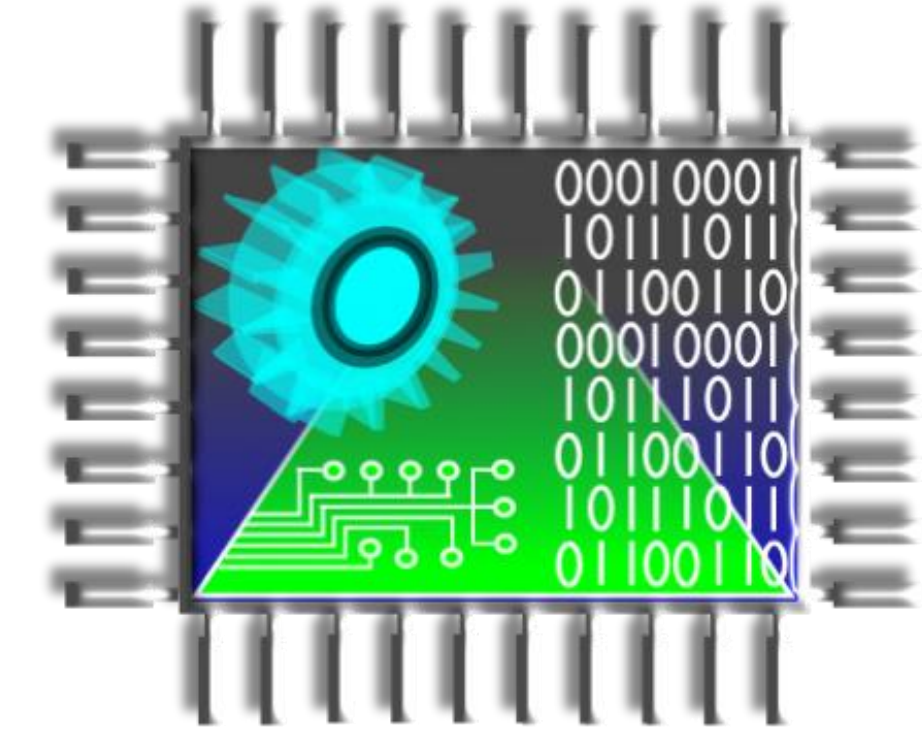


FULTEK

CPU ONE PLC

PLC USER'S MANUAL

A. GENERAL FEATURES

CPU One is the programmable control devices which are designed according to the automation needs by considering the tough conditions of the industry.

CPU One has 115KB programming memory space. Also, Ethernet (Modbus TCP), 1xRS485 Modbus RTU connection as well as webserver with 512KB file space in CPU One PLCs, the entire memory space can be used for program memory or persistent type variables (Data blocks). Flag (1024 bytes) is also available as a temporary variable. Inputs that are not connected to the PLC (max. 1024 bytes) and outputs (max. 1024 bytes) can also be used as temporary variables.

CPU One PLC can be programmed with ladder method via Speed Plc program. Please visit our website for more information. Although the Speed Plc is paid software for other platforms, you can use it freely with Fultek brand PLCs.

B. USAGE AND SAFETY

GENERAL FEATURES	
Supply Voltage & Power Consumption	— 24V DC %15 tolerance band — 2,4W power consumption (standby)
Digital Input / Output	4 digital input and 4 digital output.
Analogue Input / Output	2 analogue input.
RS 485	1xRs485 ports with 1200-230400 bps speed range. Modbus RTU support.
Ethernet	10/100 MBit Full duplex, DHCP support, WebServer support (10 socket), TCP Modbus support(5 socket)
WebServer	512KB file space for webserver
Program Cycle Time	Max cycle frequency 65KHz.
I/O Capacity	2 Expansion modules can be added.
RTC	Real Time Clock (Runs 30 days without) Accuracy temperature 25°C ±100 ms./day
Working Conditions	-20 +60 °C / %5-95 Humudity

SAFETY NOTES

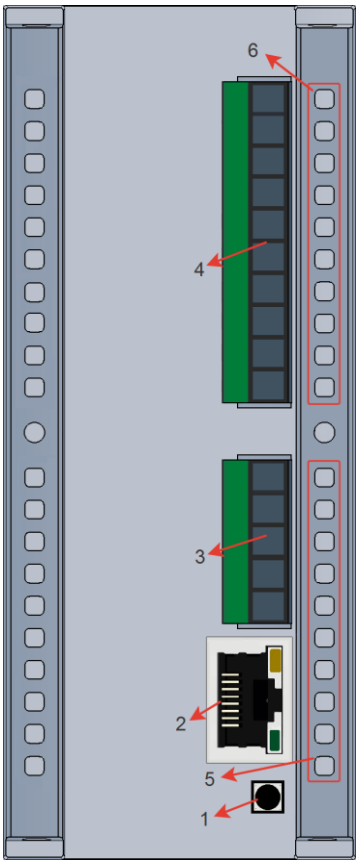
PLC must be de-energized before wiring. Wiring must be done in accordance with the connection diagram.

Attention should be paid to the cross-sections of the cables to be connected to the terminals, and the cables to be connected must be opened up to the point where they can enter into the terminal. Caution must be taken as long drop cables may come into contact with cables in other terminals.

Disassembling and installing cables in the terminal and plugging , unplugging of the expansion modules can cause damage to the PLC.

Please read the instructions in the manual before energizing the appliance.

C. OVERVIEW

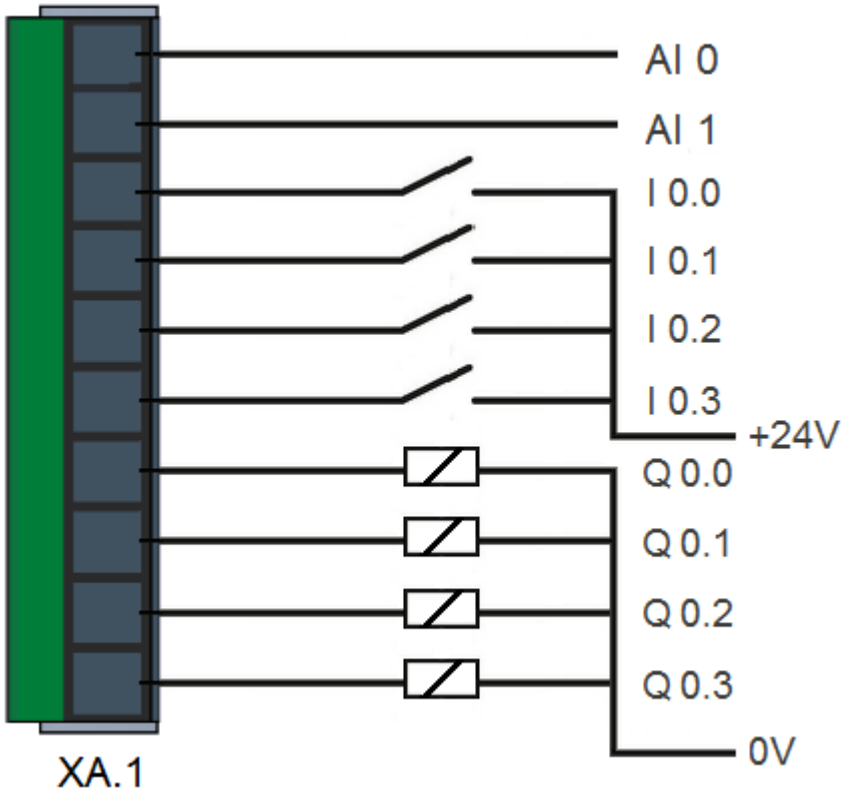


No	Connection Port		Description
1			PLC Run/Stop Button
2	Ethernet	Socket	10/100M Full duplex Ethernet Connection Point
		Green Led	Ethernet Link led
		Yellow Led	Ethernet Communication led
3	xA.0 Con. Terminal	1	+24V terminal supply
		2	COM0 RS485 A
		3	COM0 RS485 B
		4	Ground endpoint
		5	
4	xA.1 Connection Terminal	1	Analog Input 0
		2	Analog Input 1
		3	I 0.0 input
		4	I 0.1 input
		5	I 0.2 input
		6	I 0.3 input
		7	Q 0.0 output
		8	Q 0.1 output
		9	Q 0.2 output
		10	Q 0.3 output
5	sA.0 led block	1	Power on Led
		2	----
		3	COM0 TX led
		4	COM0 RX led
		5	----
		6	----
		7	----
		8	----
		9	----
		10	PLC Stop led
6	sA.1 led block	1	PLC RUN led
		2	System Fault led
		3	I 0.0 input led
		4	I 0.1 input led
		5	I 0.2 input led
		6	I 0.3 input led
		7	Q 0.0 output led
		8	Q 0.1 output led
		9	Q 0.2 output led
		10	Q 0.3 output led

D. TECHNICAL SPECIFICATIONS

Scannig Time: The scanning time varies according to the size of the program, the blocks and functions used in the program and operations and the types of the inputs - outputs that used. You can see the real time and maximum scan times in the Speed Plc program's Plc Status section. The maximum scanning speed is 65KHz.

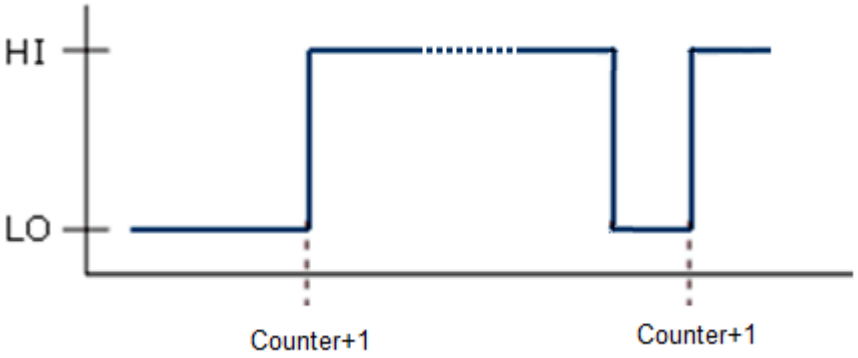
Digital Inputs: There are 4 inputs on the CPU module. The input sampling frequency 50kHZ . The sampling frequency is the speed at which the signal from the input is detected by the PLC. When defined as normal digital input, it is read once in each plc cycle.



Usage of Digital Inputs

Digital inputs may be used as digital inputs or they can also be used as rising edge counter, rising edge directional counter, falling edge counter, falling edge directional counter, AB Encoder 2X, ABZ Encoder 2X, AB Encoder 4X, ABZ Encoder 4X, Frequency 1000ms, Period Rising Edge, Period Falling Edge, Period Rising and Falling Edge, Interrupt Block Rising Edge, Interrupt Block Falling Edge, Interrupt Block Rising and Falling Edge.

Rising Edge Counter: It is the digital input type which increases the counter in the rising edge of the signal applied to the input. The value in the counter increases by 1 when the signal applied to the input increases to the logical 1 level. The value in the counter does not change until the signal goes back to the logic 0 and the logic goes back to 1.

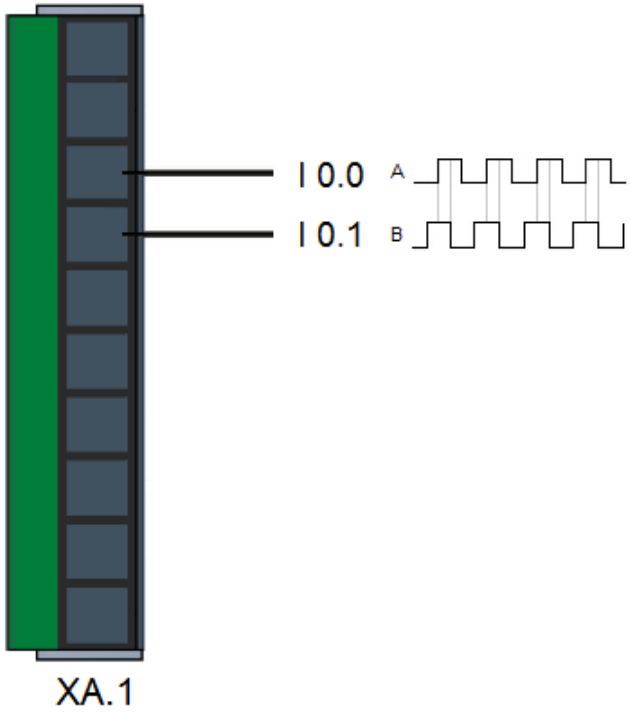


Rising Edge Directional Counter: When this type is selected, the next input is automatically assigned as the direction identifier. When logic 0 is applied to the direction identifier input, the counter moves in the negative direction, and when the logic 1 is applied, it moves in the positive direction. Signals are detected on the rising edge.

Falling Edge Counter: It is the digital input type which increases the specified counter at the falling edge of the signal applied to the input. When the signal applied to the input falls from logic 1 to logic 0, the value in the counter increases by 1. The value in the counter does not change until the signal raises to logic 1 and falls to logic 0.

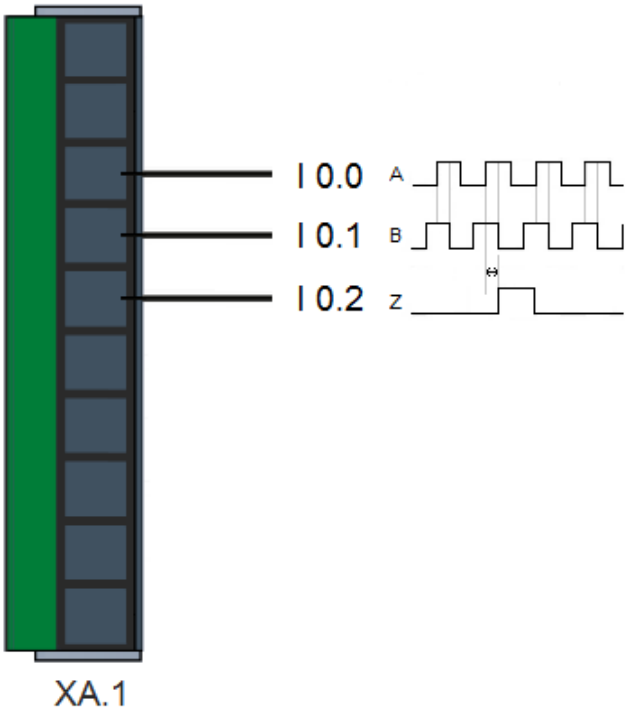
Falling Edge Directional Counter: When this type is selected, the next entry is automatically assigned as the navigator. When logic 0 is applied to the direction identifier input, the counter moves in the negative direction, and when the logic 1 is applied, it moves in the positive direction. The signals are detected on the falling edge.

AB Encoder 2x: When the AB type 2x Encoder is selected, the A end of the Encoder should be inserted in the pin where the selection is made and the B end should be inserted in the next input.



AB Encoder Connection

ABZ Encoder 2x: When ABZ type 2x Encoder is selected, A end of the Encoder should be inserted into the pin where the selection is made, B end should be inserted into the next input and Z pin should be inserted into the next input.



ABZ Encoder Connection

AB Encoder 4x: When the AB type 4x Encoder is selected, the A end of the Encoder should be inserted in the pin where the selection is made and the B end should be inserted in the next input.

ABZ Encoder 4x: When ABZ type 4x Encoder is selected, A end of the Encoder should be inserted into the pin where the selection is made, B end should be inserted into the next input and Z pin should be inserted into the next input.

Frequency 1000ms. : It is the input type which counts the pulses applied to the input within 1000 ms. The count is updated every 1000ms and the value in the counter is updated.

Period Rising Edge: It is a type of input that measures the time difference between periods. The measurement is found by the time difference between the rising edge in the first signal and the rising edge of the subsequent signal. The measurement is done in microseconds. The measurement resolution is 1 microsecond. The minimum continuous measurement period is 10 microseconds.

Period Falling Edge: It is a type of input that measures the time difference between periods. The measurement is found by the time difference between the falling edge in the first signal and the falling edge of the subsequent signal. The measurement is done in microseconds. The measurement resolution is 1 microsecond. The minimum continuous measurement period is 10 microseconds.

Period Rising and Falling Edge: It is the type of input that measures the period length. The measurement is found by calculating the time difference between the rising edge or falling edge and the subsequent falling or rising edge in the signal. The measurement is done in microseconds. The measurement resolution is 1 microsecond. The minimum continuous measurement period is 10 microseconds.

Interrupt Block Rising Edge: The interrupt block works by detecting the rising edge of the signal applied to its input.

Interrupt Block Falling Edge: The interrupt block works by detecting the falling edge of the signal applied to its input.

Interrupt Block Rising and Falling Edge: The interrupt block works by detecting both the rising edge and the falling edge of the signal applied to the input.

Fast Counter : PLC CPU ONE Module inputs can read up to 50 KHz.

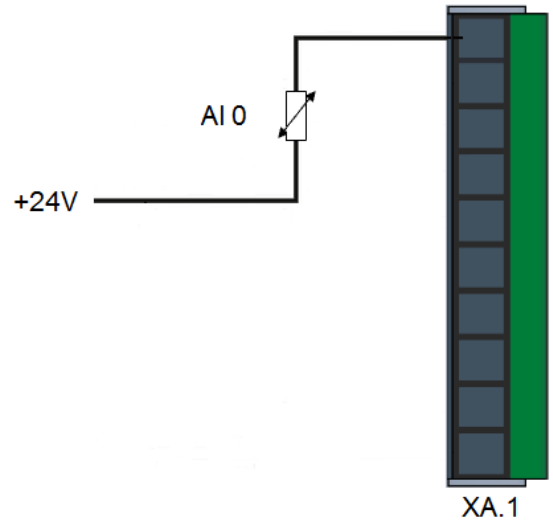
Analog Inputs: Sampling time is the period of writing the values of the analog inputs to the corresponding variable. The total sampling frequency of the analog inputs is 66.5 kHZ. The sampling time of the used analog inputs is found by dividing the total sampling frequency by the number of analog inputs used.

$$f_{\text{analogue channel sample freq}} = \frac{\text{Total sampling frequency}}{\text{Number of analog channels using}}$$

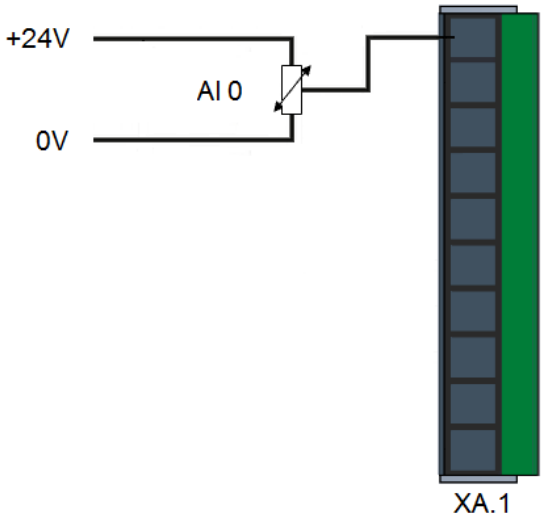
Analog inputs are 12bit resolution, ie the value to be read is between 0-4095. Analog inputs can be used as 0-10V input and/or 0-20mA.

The internal resistance in the voltage measurement is 14.3kΩ. The 0V value is 0, and for the 10V value, the 3925 value is read. Max readable voltage (4095 value) is 10.47V.

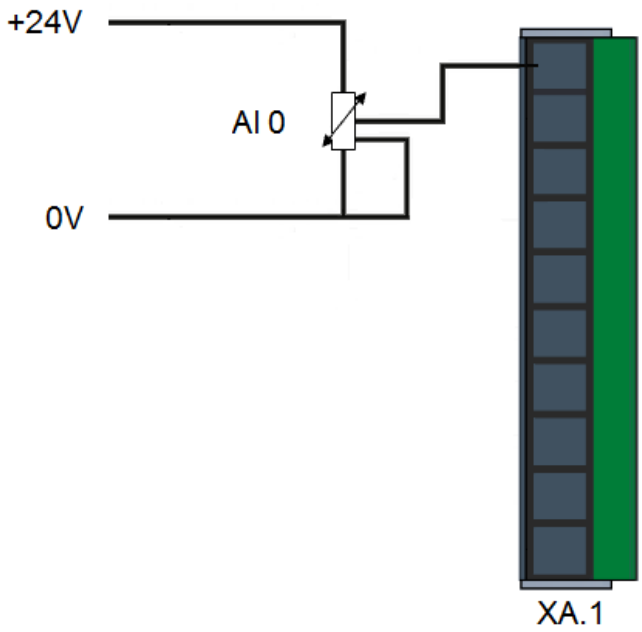
In the measurement of the current, the internal resistance is 150Ω. The value 0mA corresponds to 0 and value 3930 is read for 20mA. The maximum readable current (4095 value) is 20,8mA.



2 wired transmitter connection



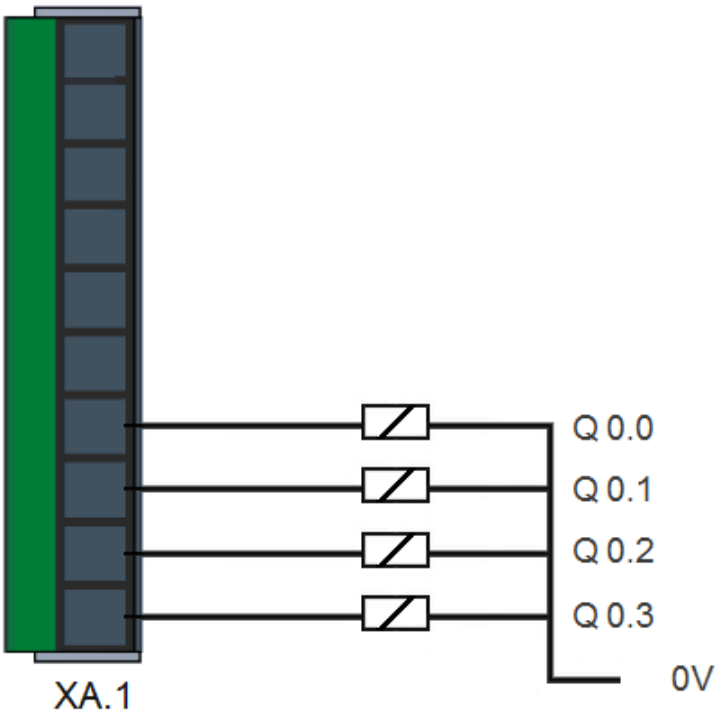
3 wired transmitter connection



4 wired transmitter connection

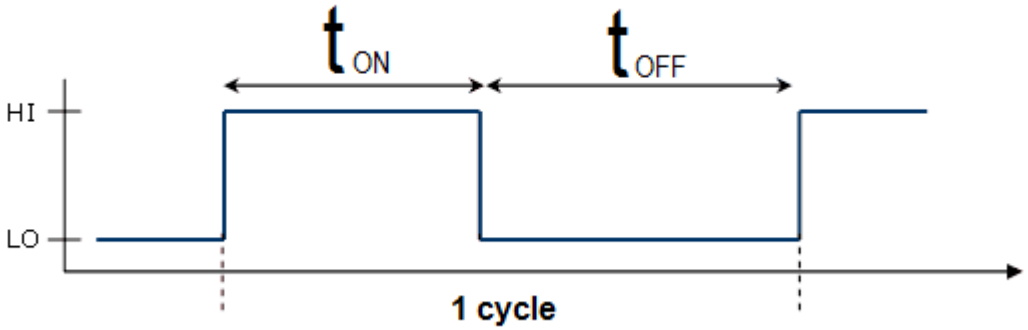
Use of Analog Inputs

Dijital Çıkışlar: There are 4 outputs on PLC CPU One. The maximum output current is 0.5Amper and the Maxium output frequency is 40KHz.



Use of Digital Outputs

PWM Output: Hardware PWM (Pulse Width Modulation) is a function that allows effect control to be made by changing the **logic 1** state intervals of the square waves produced at a specific frequency.



PWM control is done by checking period length and activity status. The period length is controlled by the PWM frequency. The maximum output frequency for CPU One PLC is 655KHz. PWM channels are grouped in pairs. There are different frequency variables for each group. This variable's value can be 0 to 65535. The frequency will be 10 times the value of this variable.

$$f_{\text{PWM output freq}} = \text{Set. value x10}$$

Period is the one cycle of the frequency.

$$t_{\text{Period Duration (sec.)}} = \frac{1}{f_{\text{PWM output freq.}}}$$

The set value %tON, which controls the PWM logic high status, can be up to 16-bit resolution (between 0-65535) depending on the frequency. When the frequency rises, the resolution decreases. The set value %tON must be 65535 in order to get 100% output even if the resolution decreases.

$$\text{Resolution} = \frac{84000000}{f_{\text{PWM Output freq.}}}$$

<u>Note:</u> In the Speed Plc program, except for hardware Pwm, software Pwm is also available. The hardware Pwm described in this section. For the software Pwm, you can refer to the help pages of Speed Plc software.

PTO Output : PTO (pulse train output); is a function that gives a certain number of square wave outputs. After the set number of square wave outputs is operated, output logic will be 0. The process frequency is determined by multiplying the value of the frequency variable of the square wave by 10. In the first cycle of the process frequency, output is logic 1 and in the other cycle output is logic 0. Thus, the pto output frequency is half of the process frequency.

$$f_{\text{PTO Output freq}} = \frac{\text{Set. value}}{2} \text{ x10}$$

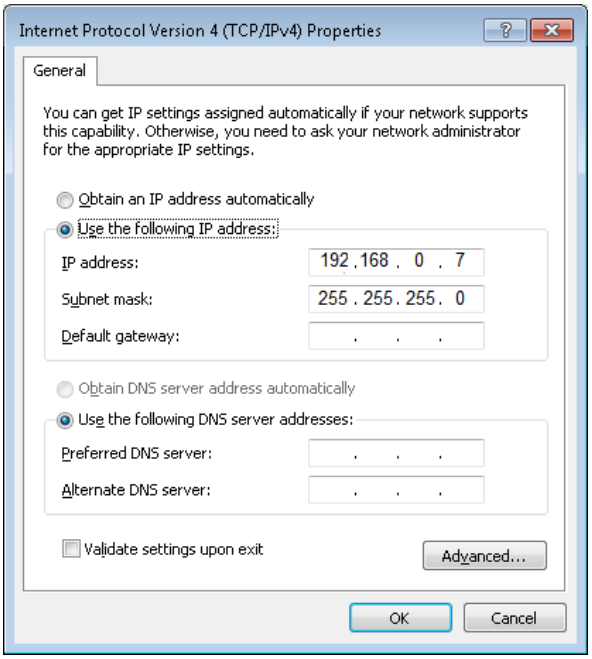
When multiple PTO channels are used at a very high frequency at the same time, the PLC may switch to stop mode because the PLC cycle time will increase. There is no such risk below 100 KHz.

E. OTHER FEATURES

Modbus Communication: Fulmatic 7 - Silver Series PLC CPU modules support Modbus RTU and Modbus TCP communication. 5 connections can be provided simultaneously with Modbus TCP. Up to 32 devices can be connected with the Modbus RTU from each serial port.

SpeedPLCBUS: With the SpeedPLCBUS communication protocol which developed by Fultek Control Systems, intelligent read and the ability to write different data fields features provides faster communication. Further information can be found in the help pages of Speed Plc.

MAC Address: The Mac address of the PLC CPU module is available on the product label. If you wish, you can change the MAC address of the PLC CPU module in the DB0 data block with the Speed Plc program. Check the same MAC address on the network not exist when changing the MAC address. Please note that there may be communication problems with the PLC CPU module if there is a MAC address conflict.



Ethernet Connection: If you wish, you can connect your PLC CPU module on your local network or connect it directly on your computer without cross cable. To make a direct connection to your computer, you must set your network adapter settings as follows and then connect the Ethernet cable.

Factory Settings: Off the power of PLC CPU module, supply the PLC CPU module while pressing and holding the PLC Run/Stop button. Release the button when the PLC Run LED is turned on, the PLC CPU will return to the factory settings. COM0 Serial port at factory settings: 115200 bps, none parity, 1 stop bit, 8 data bit. IP address factory setting: 192.168.0.10. Modbus Plc address factory setting: 0.

RTC: Real Time Clock life span is 30 days, during this time if the PLC is not energized, System Fault led lights on. You can remove this warning by updating system time in Speed PLC DB0.