Tolomatic™
EXCELLENCE IN MOTION

Technical Note

ACS to Horner HMI Using Modbus TCP

For this Tech Note we have setup a basic integration of a Horner HMI to an ACS servo drive using the Modbus TCP communication protocol. The process would be the same for either ACS servo or stepper.

Hardware:

Tolomatic ACS Servo drive with Modbus TCP capabilities (36049663)

Horner XL7e-HW-XWIE2BB

PC

Software:

Tolomatic Motion Interface Version 3.7.0.15 & over

Cscape Version 9.60

Contents

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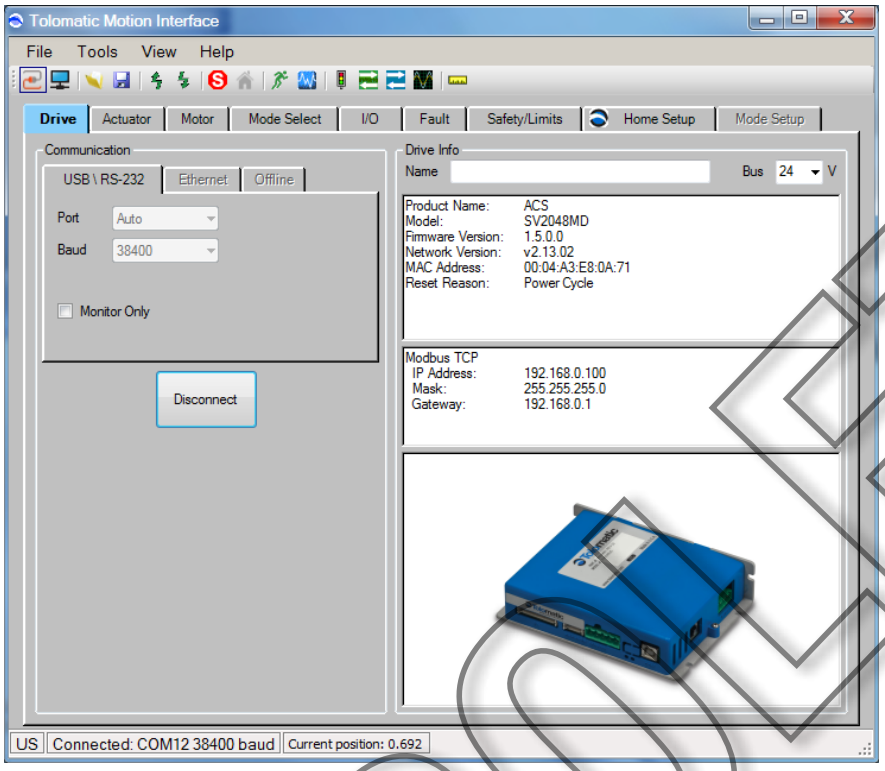
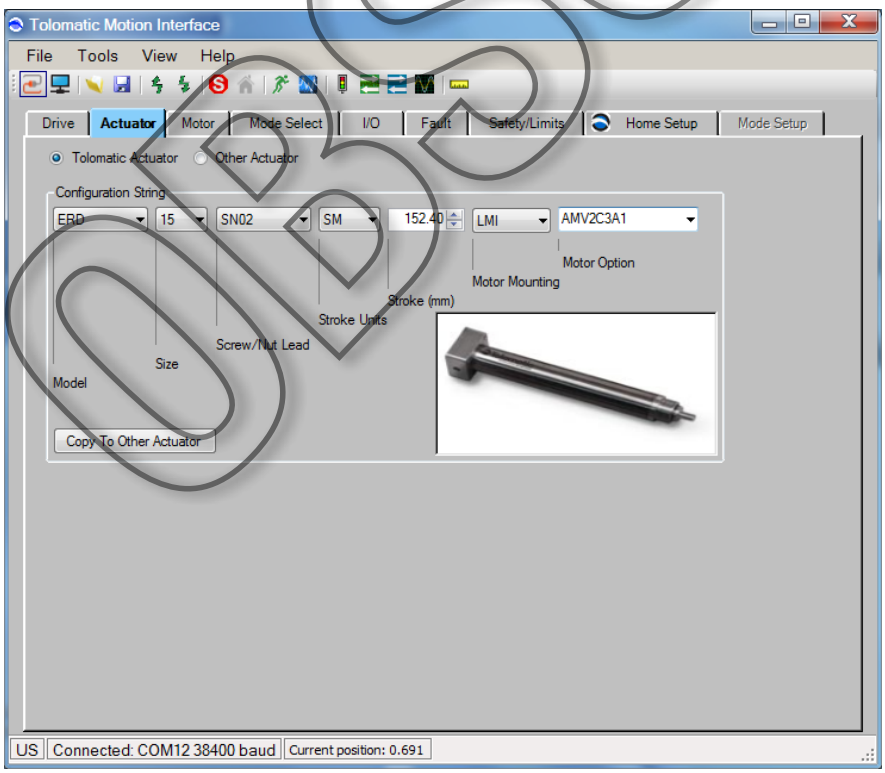
COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV = ISO 9001 =
Certified site: Hamel, MN

SETUP THE ACS DRIVE

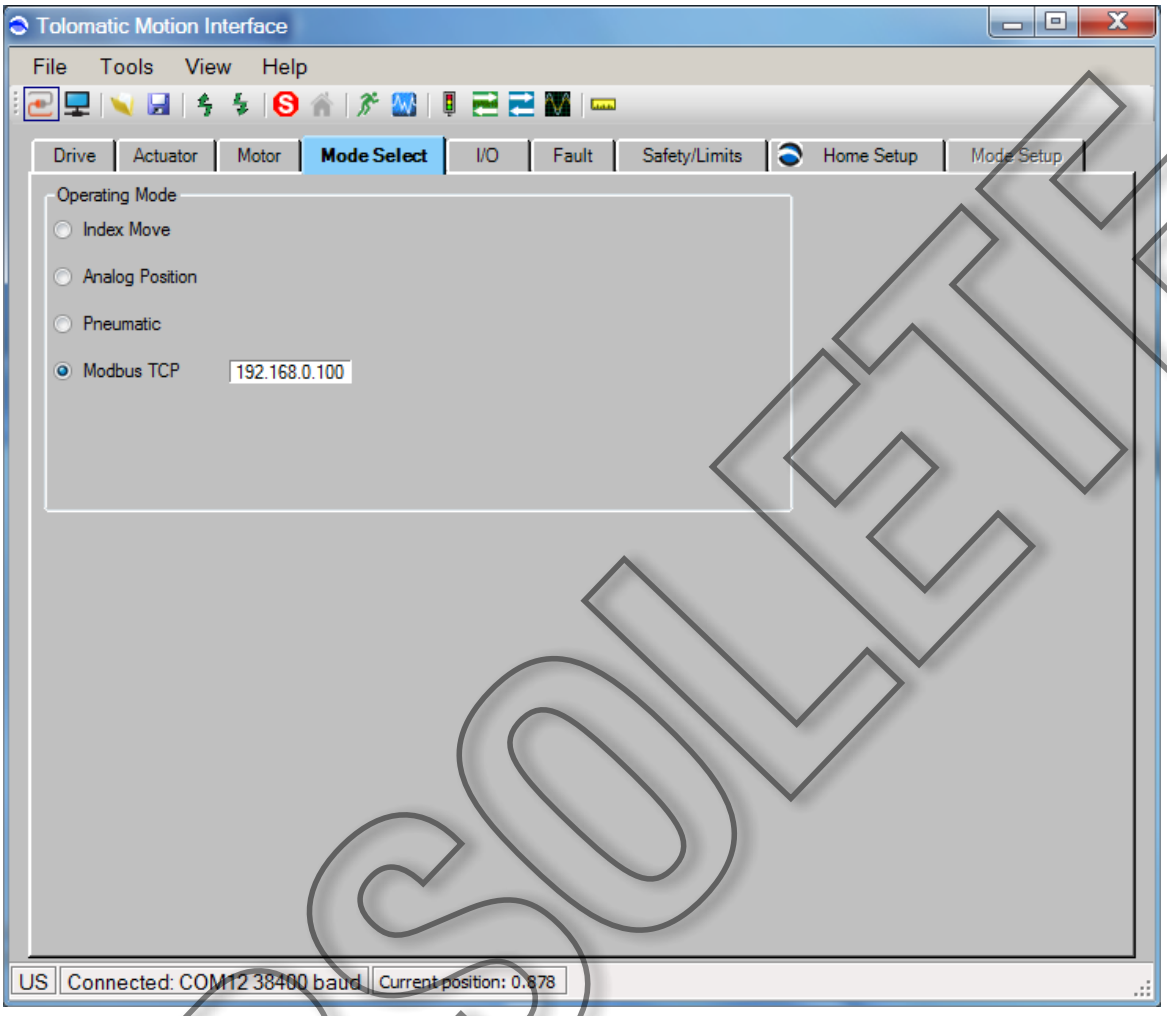
1. Connect to the ACS drive using Tolomatic Motion Interface.



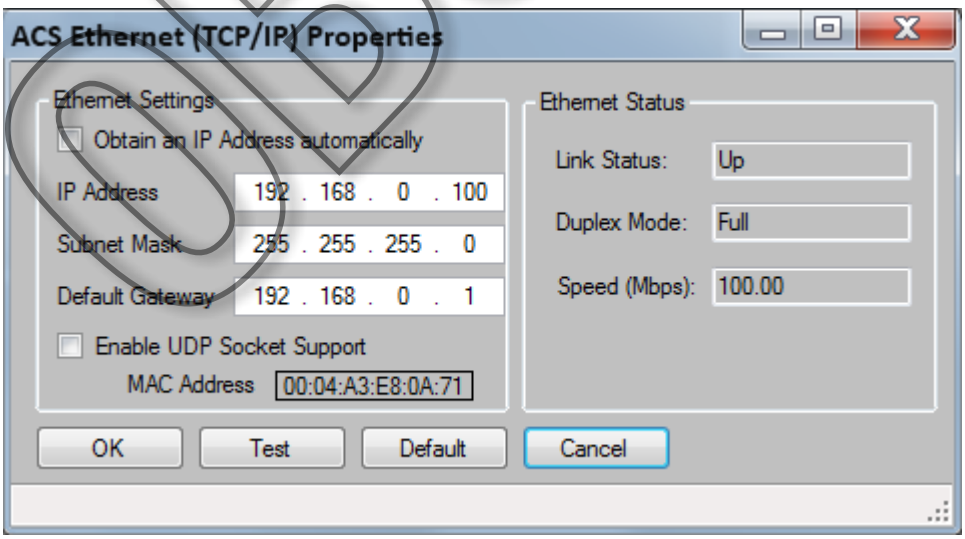
2. Configure the drive for the correct actuator and motor.



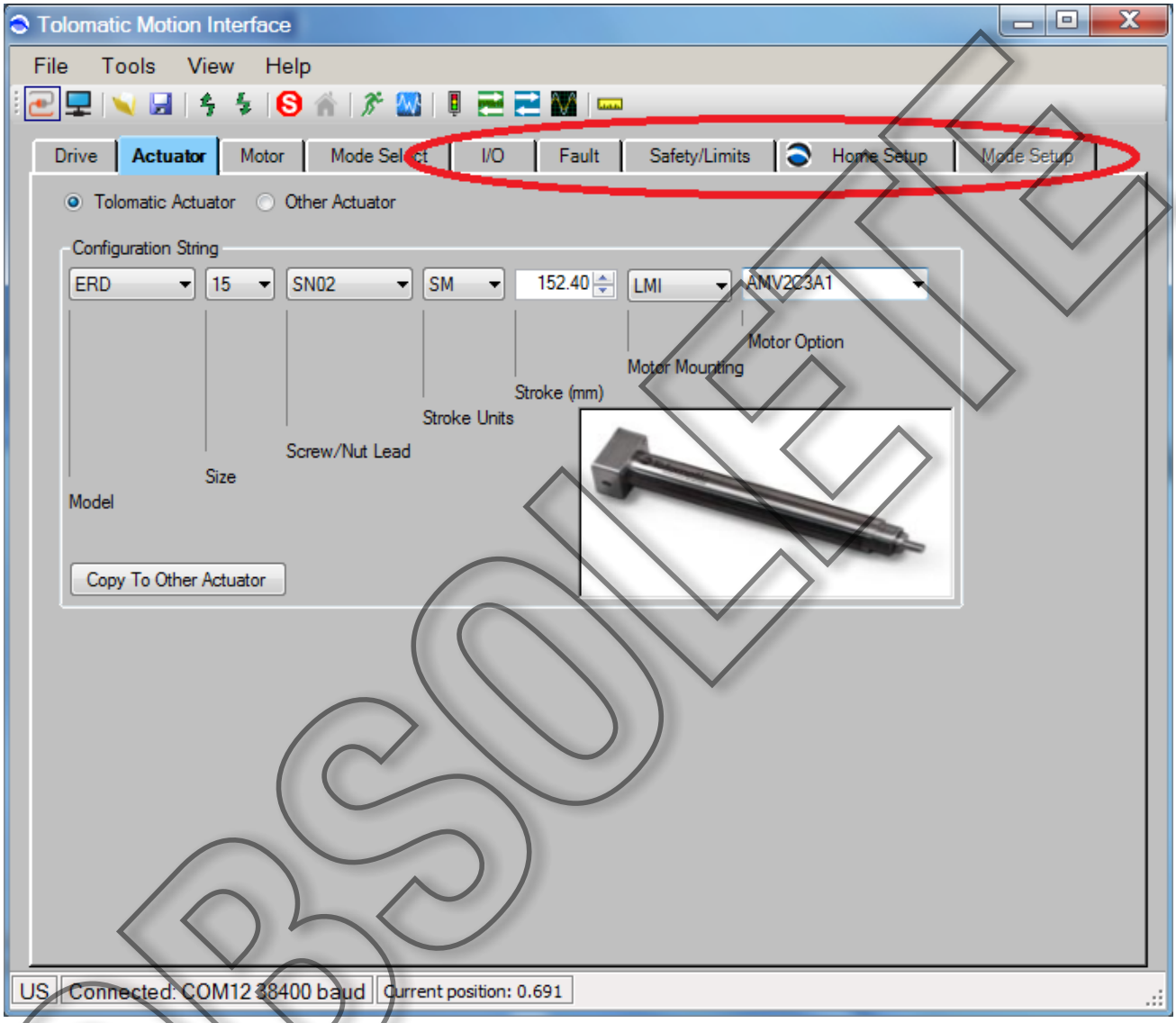
3. Configure to run in Modbus TCP mode.



4. Configure the IP address (Tools > Ethernet Setup) Click OK.



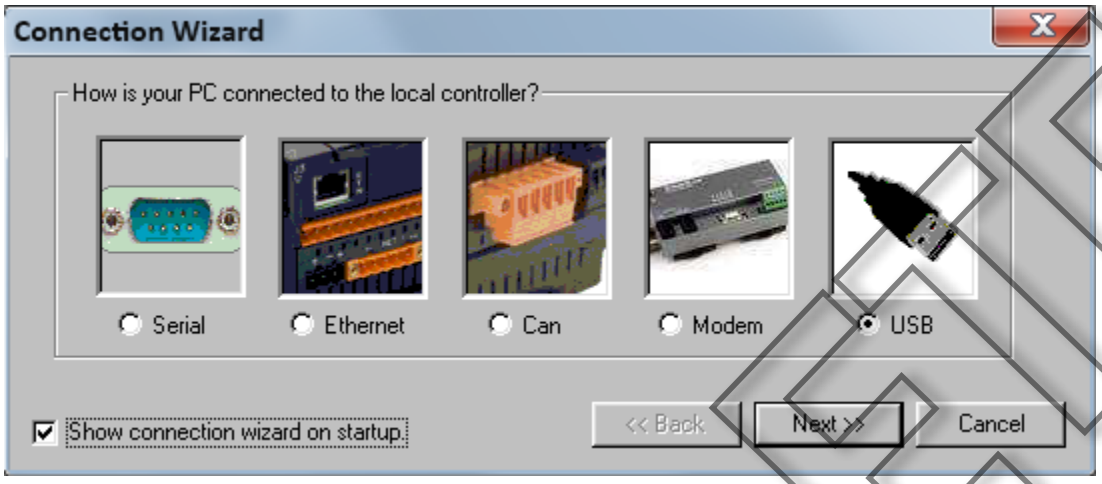
5. Work through the remainder of the ACS drive configuration for a complete setup. Write all of the settings to Drive Flash.



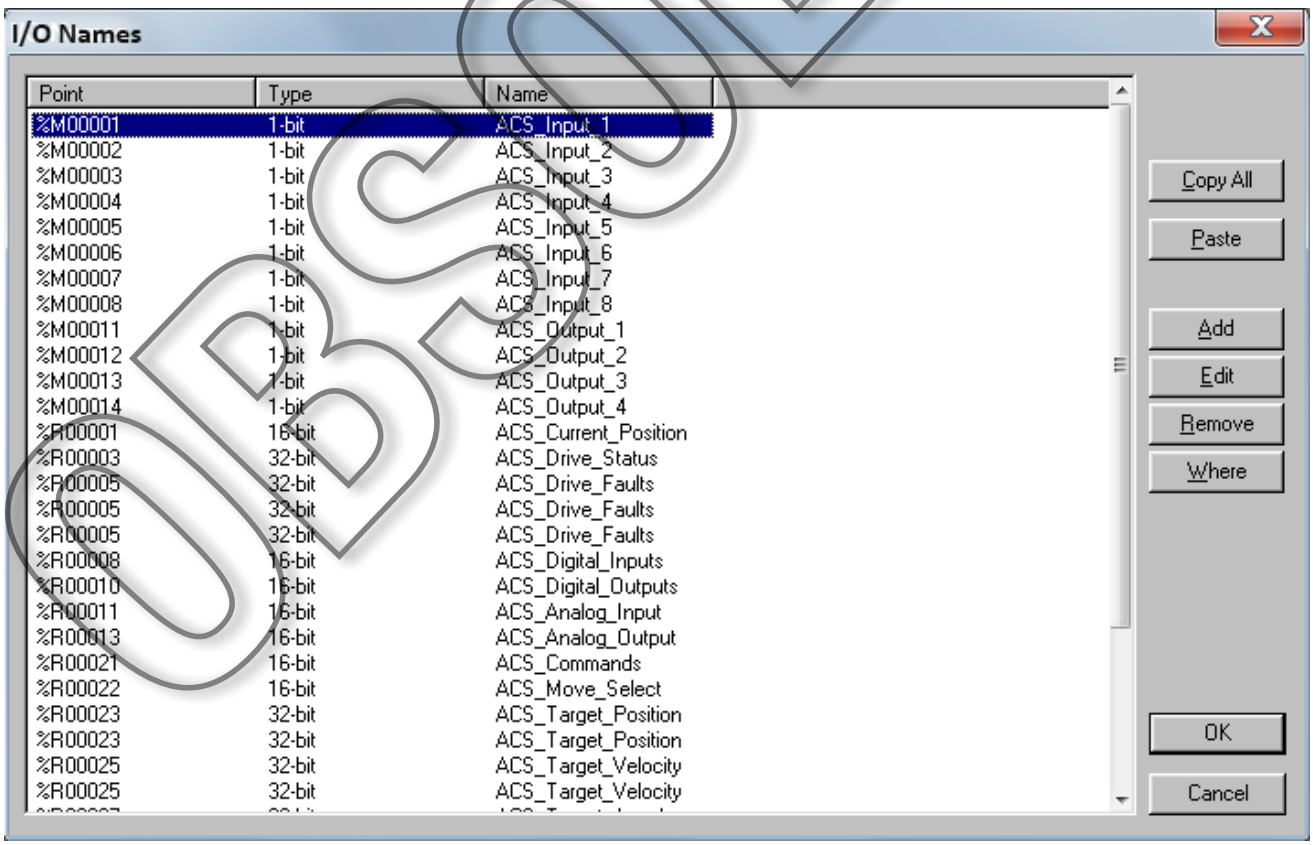
6. Power Cycle the ACS Drive

SETUP THE HORNER HMI

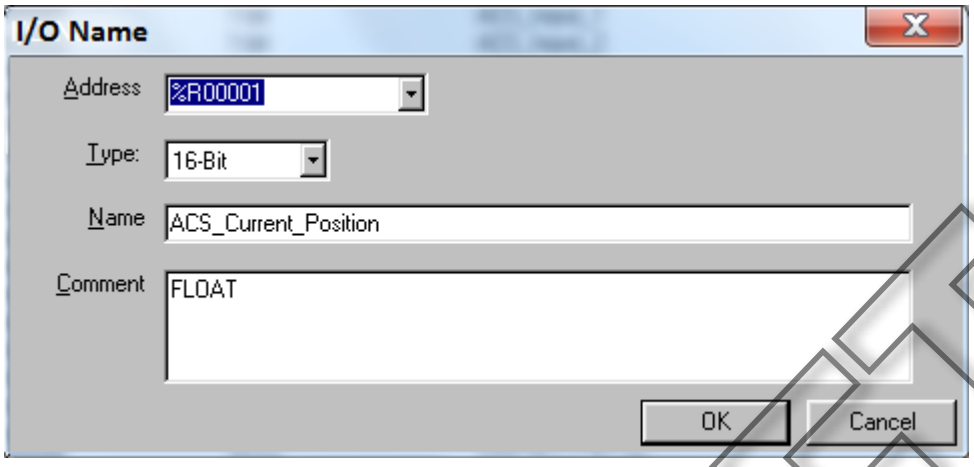
1. Connect the PC to the HMI.



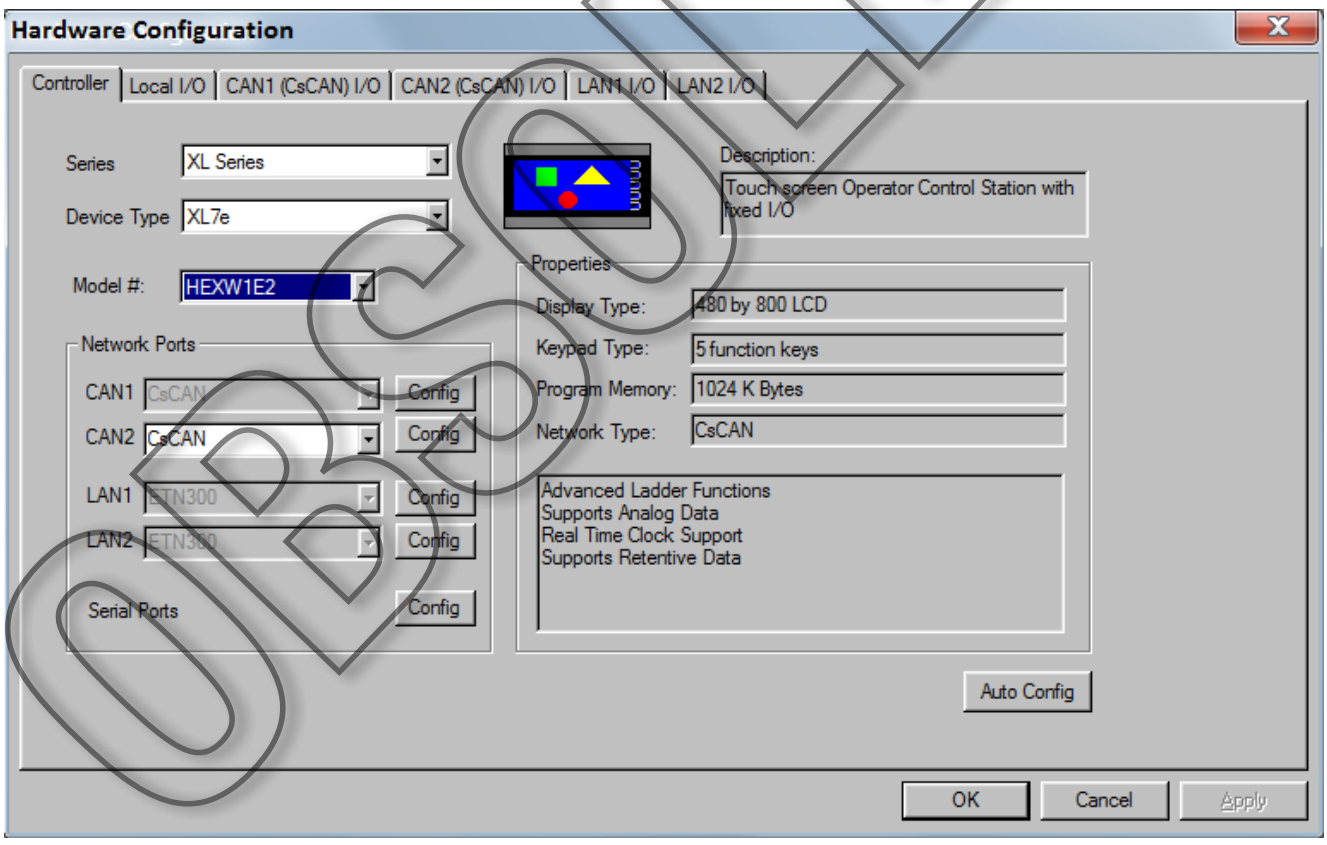
2. Go to the I/O Names to enter the local registers which will be populated from the ACS drive (Program > I/O Names).



The Type needs to match the size of each parameter to be stored



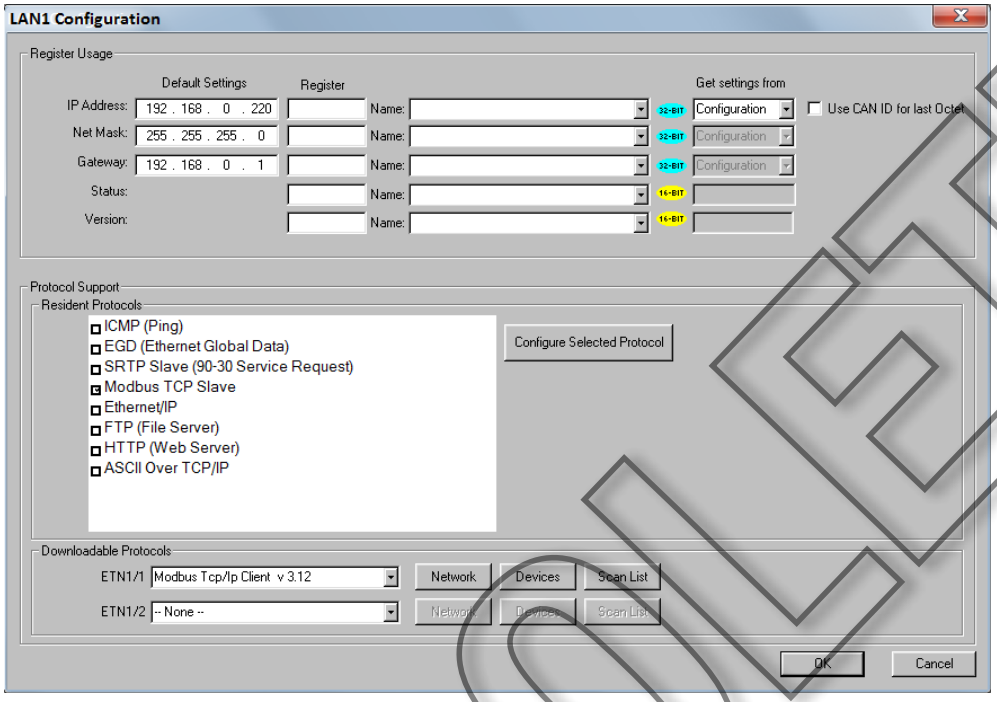
3. Open the Hardware Configuration window.



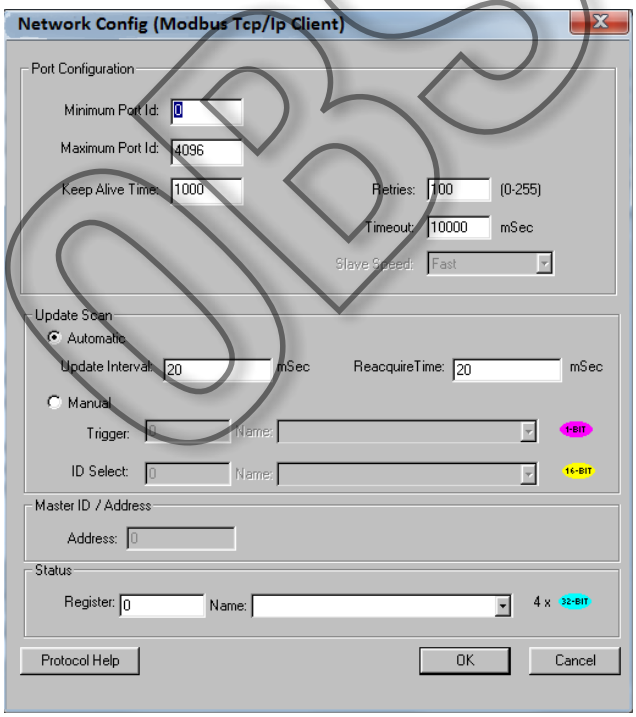
4. Click 'Config' to the right of the LAN1 Network Port.

Set the IP address, Net Mask and Gateway for the HMI under the Register Usage.

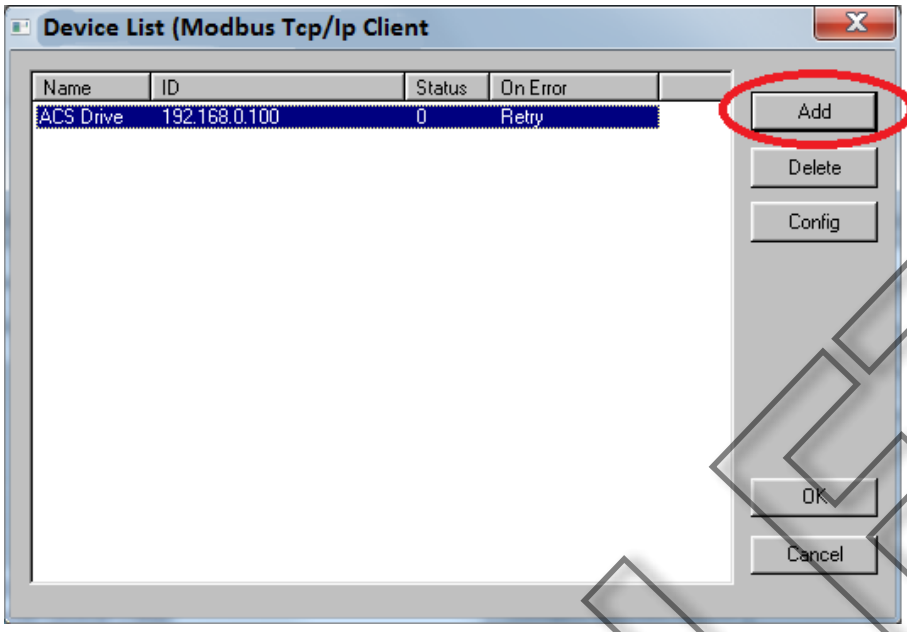
Check the Modbus TCP Slave box and pick the Modbus Tcp/Ip Client under Protocol Support.



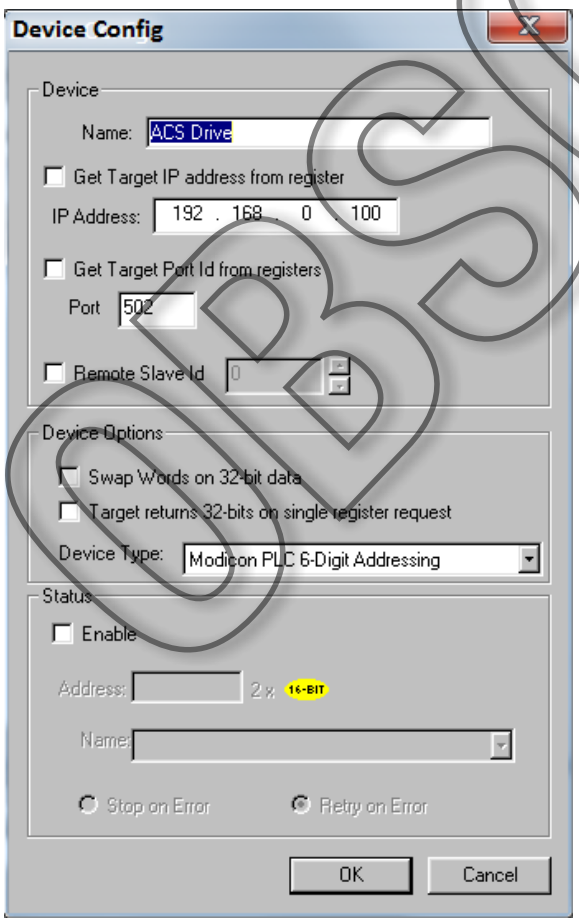
5. Open the Network window for ETN1/1 and set the Update Interval to 20mSec and the Reacquire time to 20mSec. The scan time settings is often application specific and will require adjustment to allow for additional registers. Notice the Protocol Help button for additional details. Click OK



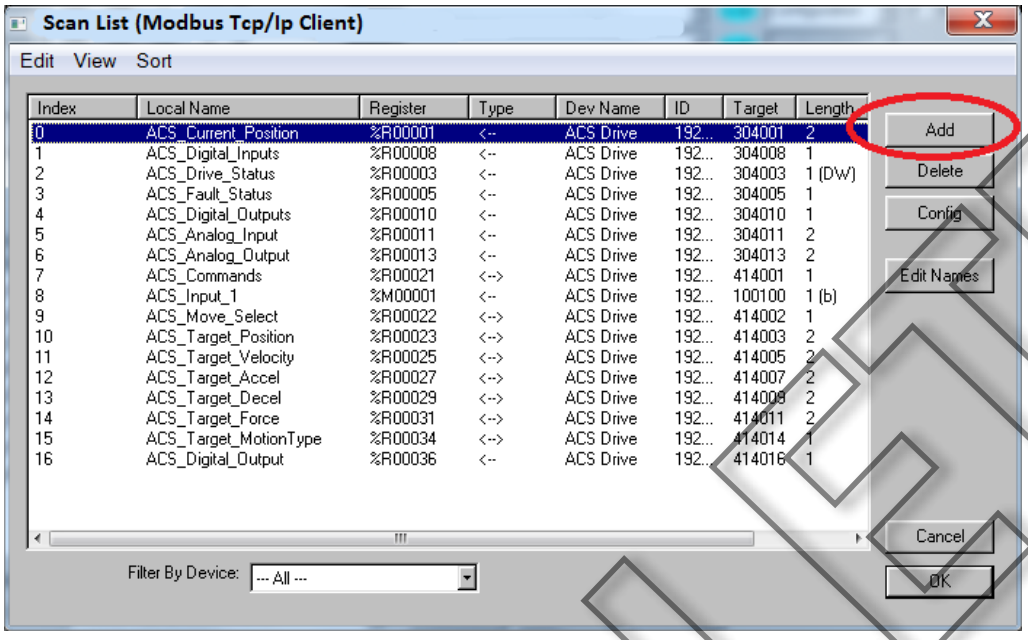
6. Open the Devices window for ETN1/1 and Add a new device.



Enter the IP Address and configure the Device Options to have the Modicon PLC 6-Digit Addressing selected. Click OK for Device Config and click OK for the Device List.

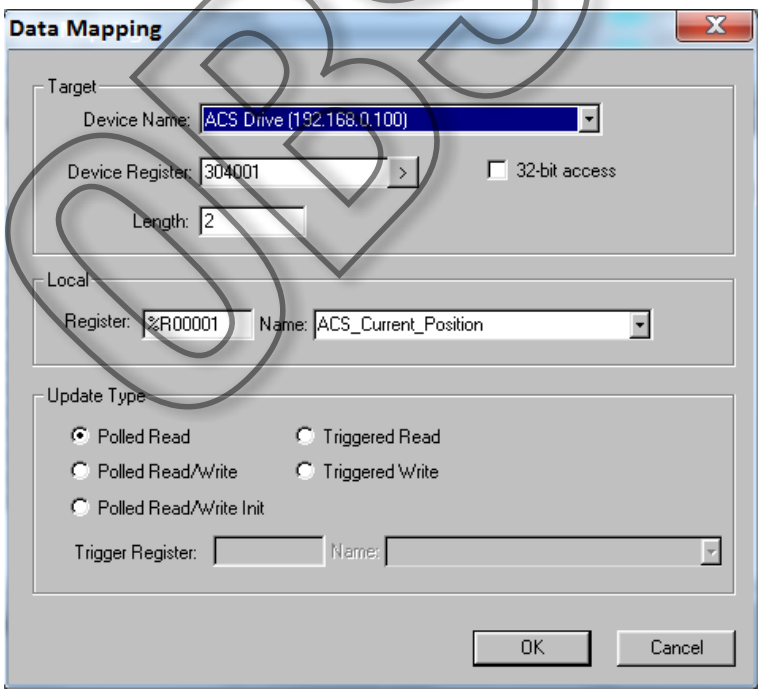


7. Open the Scan List for ETN1/1 and Add a new register to scan.

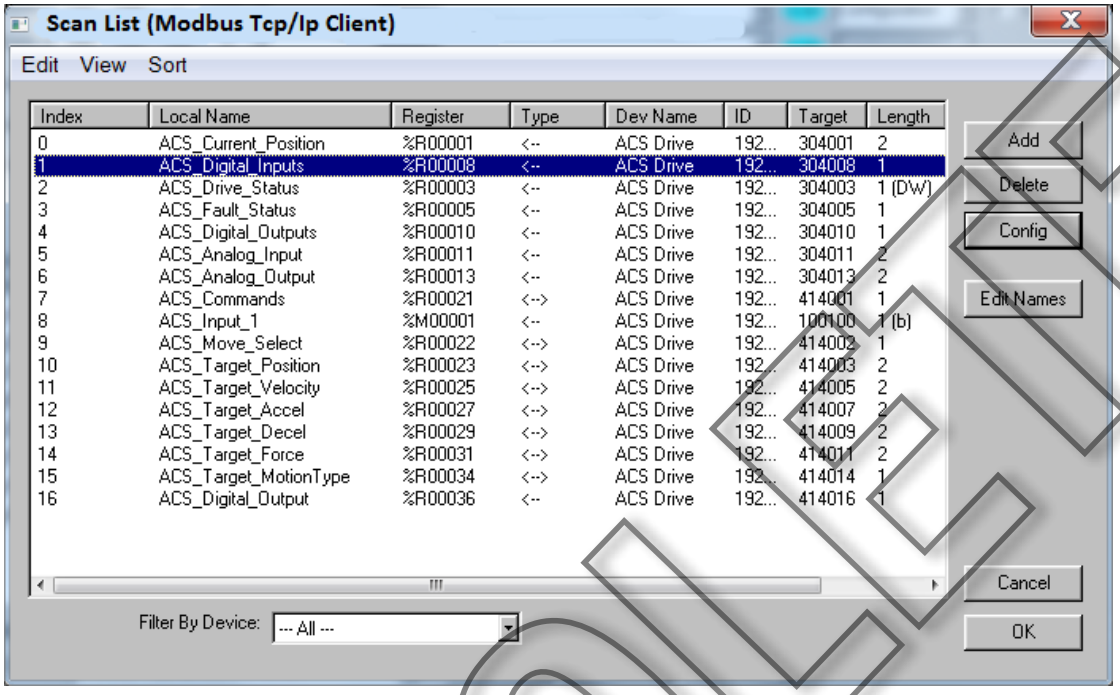


The Device Name will be selected. Now enter the register to monitor and the length based on the ACS Modbus Programmers guide. The value can be stored to a local Register available from the drop down list or by entering the corresponding local register. The Update Type should be either Polled Read or Polled Read/Write based on the register type. Click OK.

The Horner PLC uses Modicon PLC 6-Digit Addressing. As such, for Reading Input registers you must append '30' to the start of the register (i.e. Current Postition = '304001'; and drive faults = '304005'). To write to holding registers, you must append '4' to the start of the register (i.e. Drive Commands = '414001'; and Target 0 Motion Type = '414014').

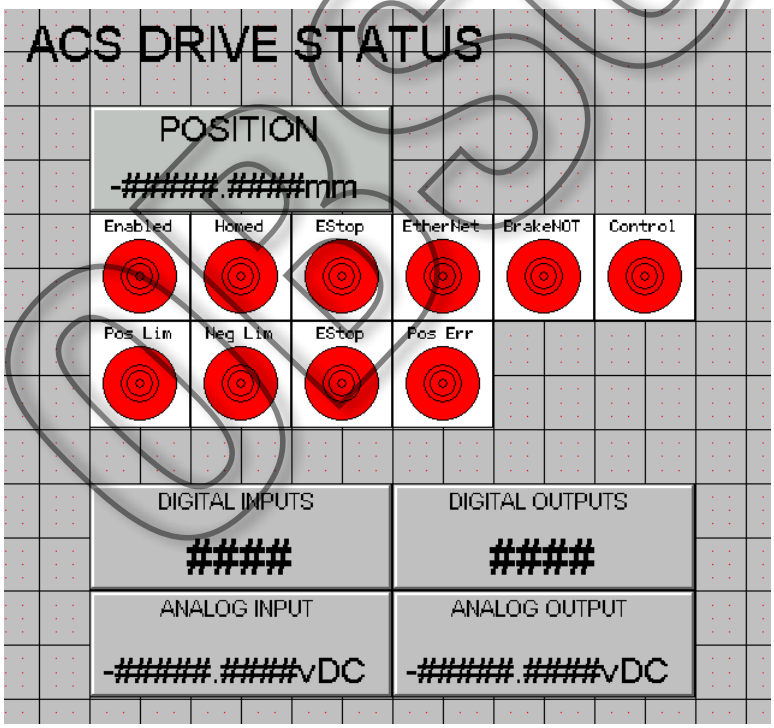


8. Enter all the remaining registers to be scanned by the HMI. Click OK for the Scan List, OK for the LAN1 Configuration, and OK for the Hardware Config.



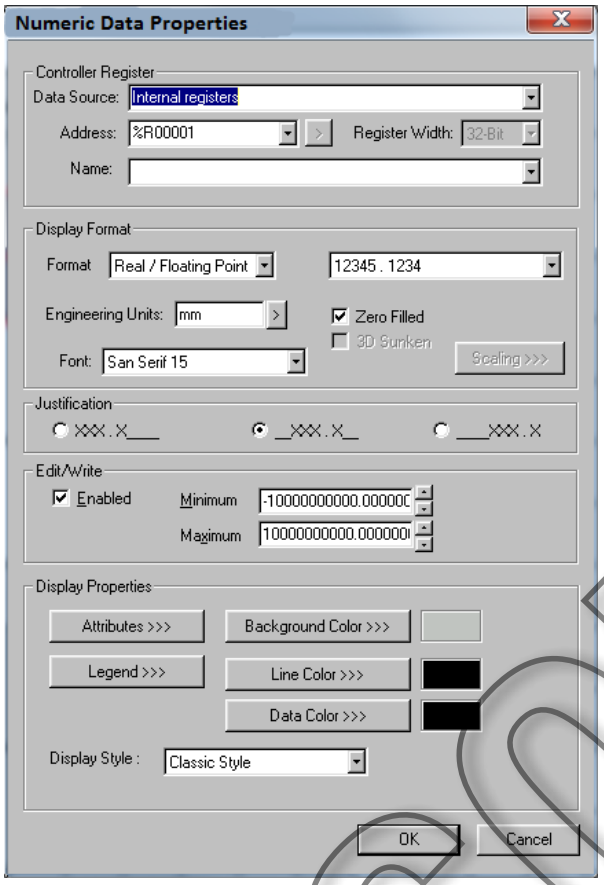
9. Open the graphics portion of the software to start the reading and writing of each register.

In this example we had two pages on the HMI, one for status and a second for control.

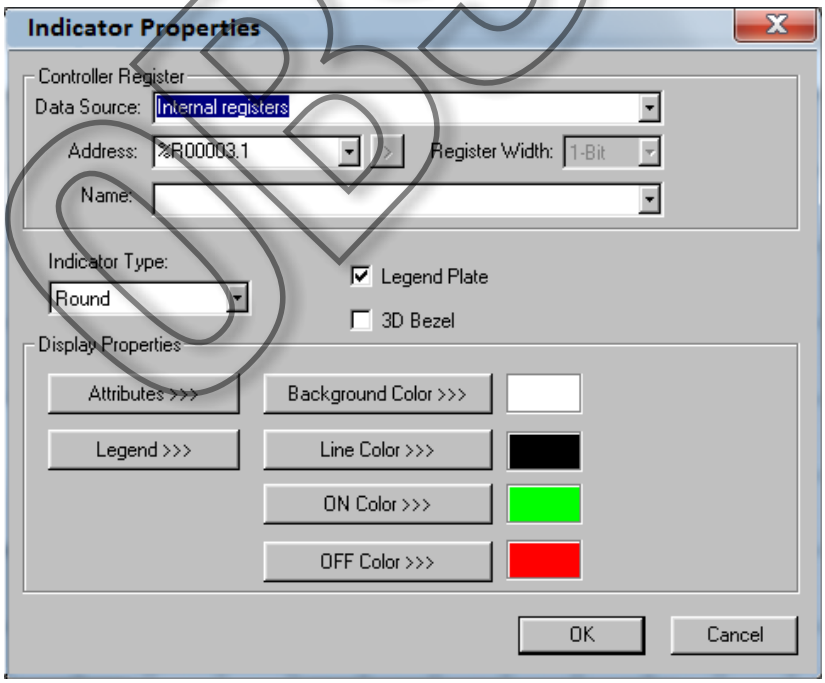


Start by creating a Numeric Data window and selecting the internal register %R00001 for ACS drive position. The display format should be Real/Floating Point and the units are Metric.

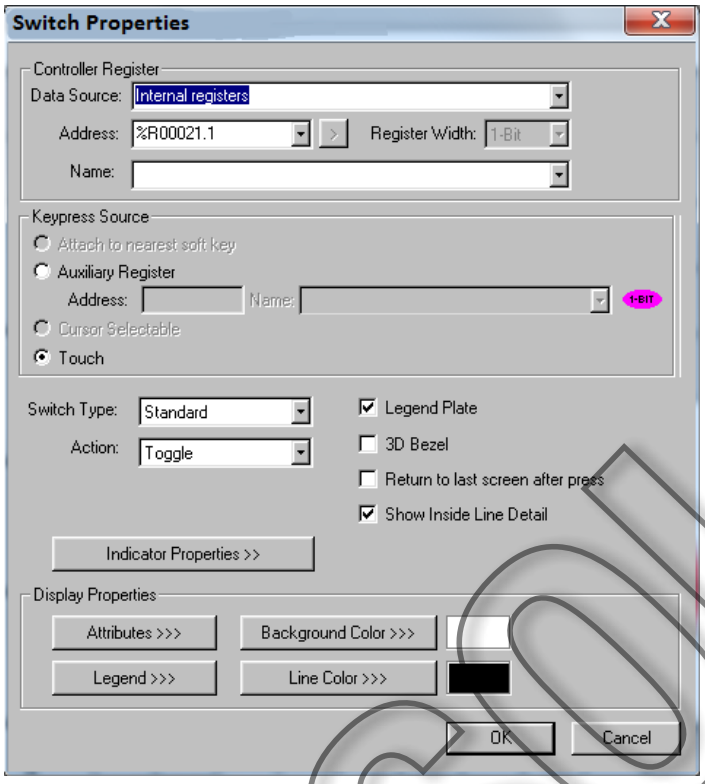
Once all of the text and format changes have been entered, Click OK.



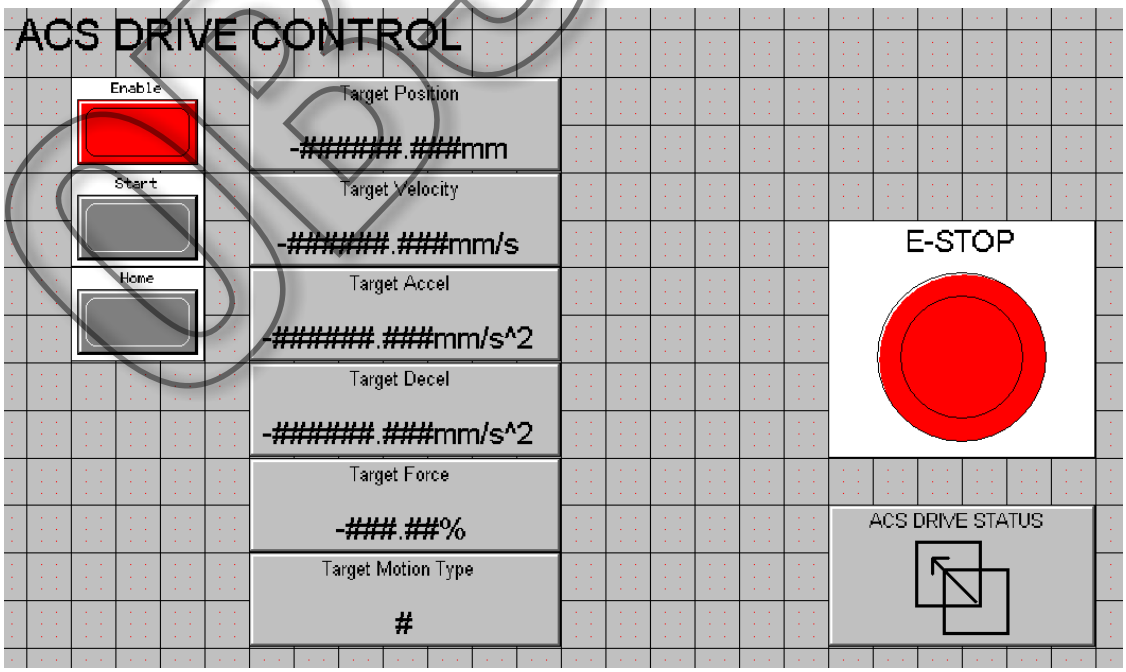
10. To monitor individual bits, such as Enabled, use the corresponding register with a decimal before the bit number (%R00003.1).



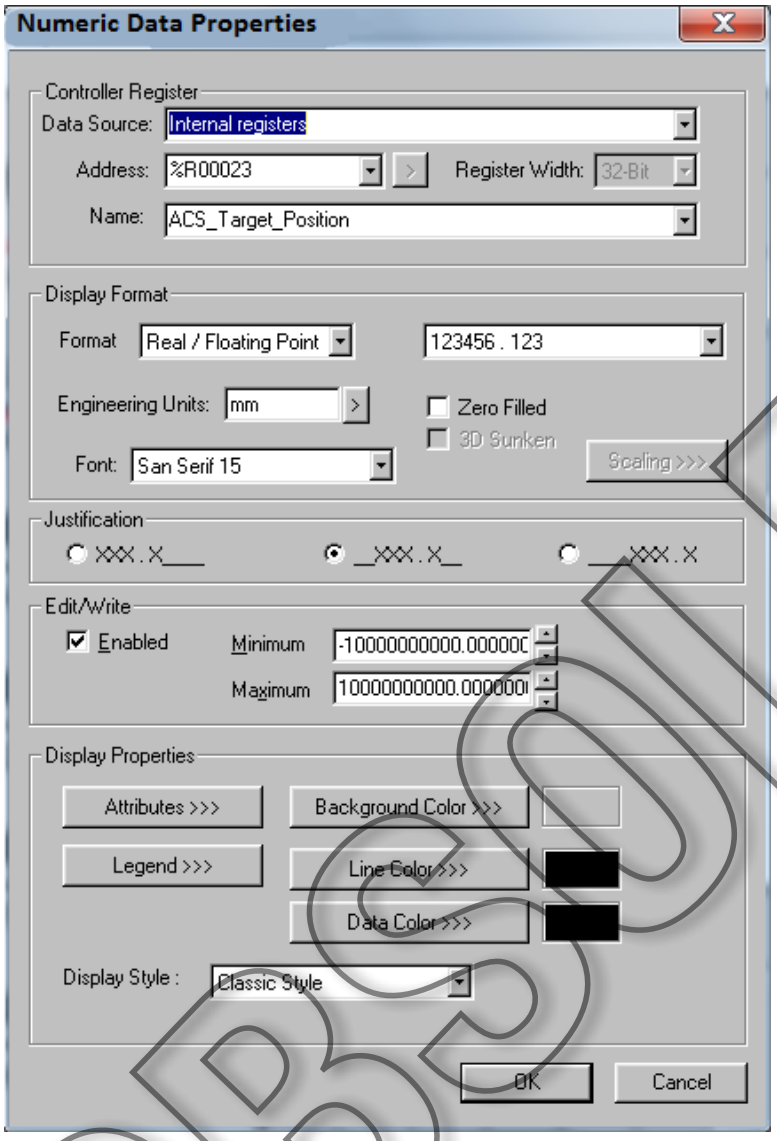
11. This example uses a Switch to toggle various bits to control the ACS drive. This is an example of the Enable bit (%R00021.1). The drive will enable when switched to active. There are some combinations that will not work based on the combination of bits depressed so plan accordingly. See Tolomatic Modbus Programmers Guide (#3600-4169), Read Holding Register for more detail.



12. Once homed, the ACS drive will need all of the motion data to be loaded for the first moves. Target Position, Velocity, Acceleration, Deceleration, Force and Motion Type are required to control the ACS from the HMI screen.



An example of the Target Position properties is as follows (%R00023).



13. To test the program, save it and download it to the HMI (Program>Download).

Enable (Toggle) and Home (Momentary) the drive using the switches. The values for each move profile can be entered into the Targets and a Start Motion (Momentary) can be triggered to start motion. Keep in mind that the units are in metric.

COMPLETE!

ACS MODBUS Register Quick Reference

Modicon PLC 6-Digit Addressing	Modbus Protocol Spec		Data Format	Bits	Name	Access
	Function Code	Register				
	1	100	BOOLEAN	1	Digital Input 1	Read Only
	1	101	BOOLEAN	1	Digital Input 2	Read Only
	1	102	BOOLEAN	1	Digital Input 3	Read Only
	1	103	BOOLEAN	1	Digital Input 4	Read Only
	1	104	BOOLEAN	1	Digital Input 5	Read Only
	1	105	BOOLEAN	1	Digital Input 6	Read Only
	1	106	BOOLEAN	1	Digital Input 7	Read Only
	1	107	BOOLEAN	1	Digital Input 8	Read Only
304001	3	4001-4002	FLOAT	32	Current Position	Read Only
304003	3	4003-4004	LONG	32	Drive Status	Read Only
304003.1			BOOLEAN	1	Drive Enabled	Read Only
304003.2			BOOLEAN	1	Drive Homed	Read Only
304003.3			BOOLEAN	1	Drive in Motion	Read Only
304003.4			BOOLEAN	1	Estop Active	Read Only
304003.21			BOOLEAN	1	Brake Not Active	Read Only
304005	3	4005-4006	LONG	32	Drive Faults	Read Only
304005.1			BOOLEAN	1	Positive Limit	Read Only
304005.2			BOOLEAN	1	Negative Limit	Read Only
304005.3			BOOLEAN	1	Estop	Read Only
304005.4			BOOLEAN	1	Position Error	Read Only
304005.5			BOOLEAN	1	Feedback Error	Read Only
304005.6			BOOLEAN	1	Overcurrent	Read Only
304005.7			BOOLEAN	1	Motor Overtemp	Read Only
304005.8			BOOLEAN	1	Drive Overtemp	Read Only
304005.9			BOOLEAN	1	Drive Overvoltage	Read Only
304005.10			BOOLEAN	1	Drive Undervoltage	Read Only
304005.11			BOOLEAN	1	Flash Error	Read Only
304008	3	4008	INTEGER	16	Digital Input	Read Only
304010	3	4010	INTEGER	16	Digital Output	Read Only
304011	3	4011-4012	FLOAT	32	Analog Input	Read Only
304013	3	4013-4014	FLOAT	32	Analog Output	Read Only
414001	4	14001	INTEGER	16	Commands	Read/Write
414002	4	14002	INTEGER	16	Move Select (0-16)	Read/Write
414003	4	14003-14004	FLOAT	32	Target 0 Position	Read/Write
414005	4	14005-14006	FLOAT	32	Target 0 Velocity	Read/Write
414007	4	14007-14008	FLOAT	32	Target 0 Acceleration	Read/Write
414009	4	14009-14010	FLOAT	32	Target 0 Deceleration	Read/Write
414011	4	14011-14012	FLOAT	32	Target 0 Force	Read/Write
414014	4	14014	INTEGER	16	Target 0 Motion Type	Read/Write
414016	4	14016	INTEGER	16	Digital Output	Read/Write
	5	1100	BOOLEAN	1	Digital Output 1	Read/Write
	5	1101	BOOLEAN	1	Digital Output 2	Read/Write
	5	1102	BOOLEAN	1	Digital Output 3	Read/Write
	5	1103	BOOLEAN	1	Digital Output 4	Read/Write