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## 1. INTRODUCTION

The purpose of this document is to show how to implement a Modbus/TCP communication link between an ABB CP600 HMI panel and an ACS880 variable frequency drive. This network topology will always follow the client/server model where the CP600 HMI panel will always be the client. That is to say the CP600 will always initiate the request for network data, and the drive will only send data when requested.

This tutorial will show how use basic HMI objects to control a drive using **the ABB Drives Profile**. Other profiles may be better suited to your application but are beyond the scope of this document. Consult the Modbus/TCP sections of the FENA-x1 or ACS880 manual for more information on using drive profiles.

A basic knowledge of ABB Panel Builder software is assumed, as is familiarity with ACS880 drive setup and functionality.

## REFERENCE DOCUMENTS

Ref	PDM Vault ID / Other	Rev.	Type	Title
	3AUA0000085967	M	User Manual	ACS880 FIRMWARE MANUAL
	3AUA0000093568	C	User Manual	FENA-01/-11/-21 Ethernet adapter module
	3ADR059001M0207	2.0	User Manual	PB610 Panel Builder 600 software for programming CP600 control panels
	3ADR059056M0201	2.0	User Manual	PB610-B Panel Builder 600 software for programming CP600-eCo control panels

## 2. REQUIREMENTS

- a) ABB CP600 or CP600-eCo series HMI panel
- b) ABB Automation Builder or Panel Builder software
- c) ABB ACS880 drive
- d) ABB FENA-11 or FENA-21 communication module
- e) Two CAT-5 Ethernet cables (shielded cables are recommended).

### 3. HARDWARE SETUP

- 3.1. Remove the drive cover and install the FENA-x1 communication module in one of the three FIG bus slots.
- 3.2. Connect grounding, the motor cable and input power per the ACS880 manual.
- 3.3. Connect the CP600 to a +24V supply as shown in the CP600 instruction manual.
- 3.4. Connect one Ethernet cable between the FENA-x1 module and CP600. It does not matter which port is used on either of the devices.
- 3.5. Connect the second Ethernet cable between the CP600 and PC with Panel Builder software.

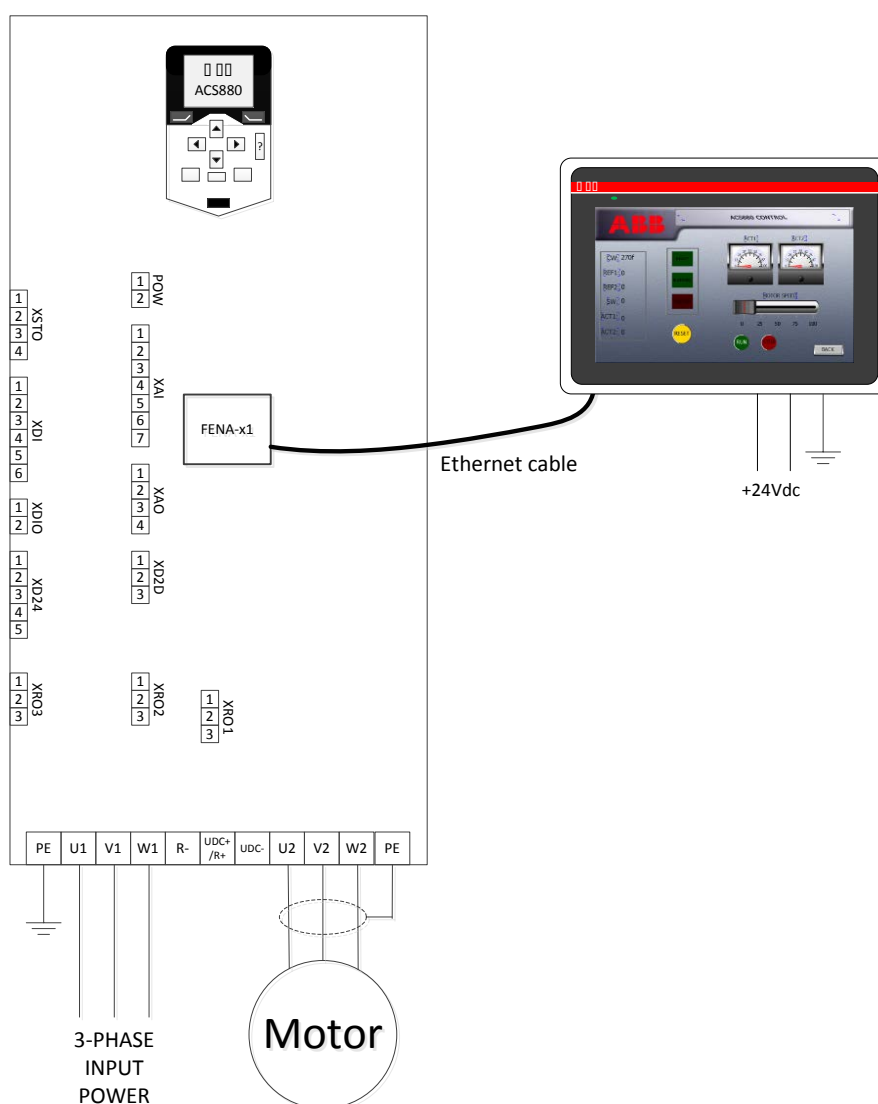


Figure 1- Hardware setup

## 4. Configure the CP600

- 4.1. Apply power to the CP600 panel and allow it to boot up.
- 4.2. Press and hold a spot on the screen for several seconds until the contextual menu appears. Tap *"Show system settings"*.
- 4.3. Tap *"Back"* or *"Next"* in the circular menu until *"Network"* is highlighted then, tap to configure the network settings. Ensure the *"Specify and IP address"* radio button is selected. Change the IP address if desired. The Subnet Mask and Default Gateway should both be 255.255.255.0.

For Reference record the IP address here: \_\_\_\_\_ . \_\_\_\_\_ . \_\_\_\_\_ . \_\_\_\_\_

- 4.4. Tap [OK] in the upper right of the Network settings window, then tap the close icon, [X] at the upper right of the System Settings window.

## 5. Configure the PC Ethernet Adapter

- 5.1. To configure the computer Ethernet port open the Network and Sharing center as shown in Figure 2, below.

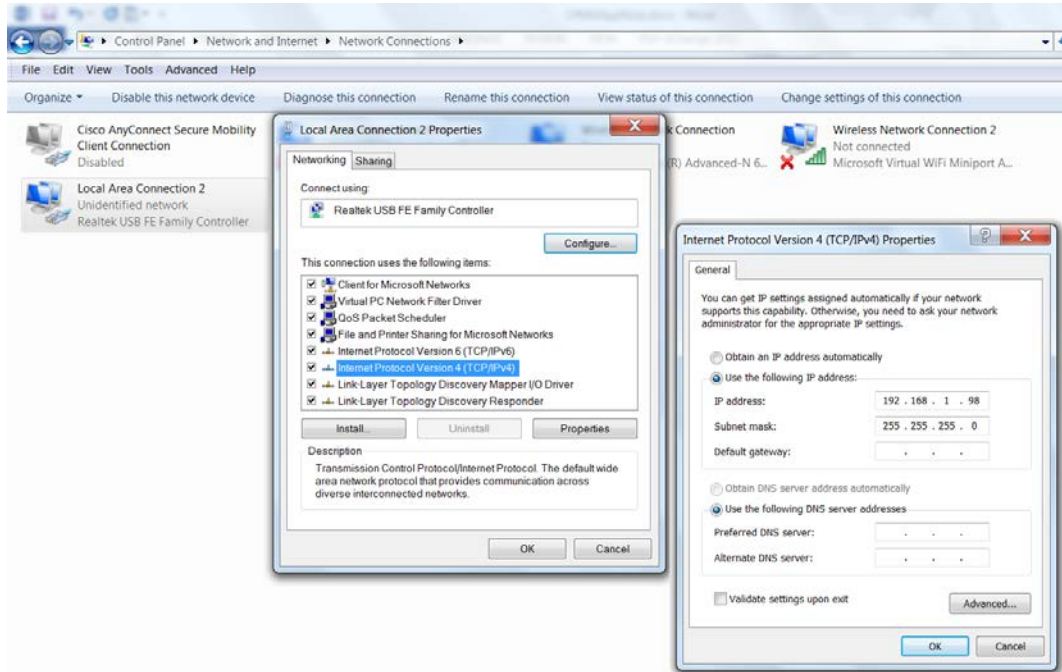


Figure 2- Configuring the PC Ethernet port

- 5.2. For the Ethernet port which the CP600 is to be connected highlight *“Internet Protocol V4 (TCP/IP4)”* and click *Properties*.
- 5.3. Ensure the *“Use the following IP address:”* radio button is selected and enter an IP address. The first three octets of the IP address, reading from the left, must match the first three octets of CP600 IP address recorded in step 4.3. The right most octet must be different from the CP600 IP address. For example, if the IP address of the panel is 192.168.001.010 the IP address of the PC Ethernet adapter must be 192.168.001.[a value between 1 and 255 other than 010]. Click [OK] in the Internet Protocol properties window, then click [OK] in the Ethernet adapter properties and close the control panel window.
- 5.4. If everything is connected and configured correctly you should be able to ping the CP600.

## 6. Configure the ACS880

6.1. Apply power to the ACS880 drive

6.2. Set parameters according to table 1 below:

*Table 1- ACS880 parameter configuration*

PARAMETER	PARAMETER DESCRIPTION	VALUE
19.11	Ext1/Ext2 selection	[0] Ext1
20.01	Ext1 commands	[12] Fieldbus A
22.11	Speed ref1 source	[4] FB A ref1
22.12	Speed ref2 source	[5] FB A ref2
50.01	FBA A enable	<i>Set to slot where FENA-x1 module is installed</i>
51.02	Protocol/profile	OMB/TCP ABB C
51.03	Commrate	Auto
51.04	IP configuration	0 Static IP
51.05	IP Address 1	<i>First (left-most) octet. Must be same as CP600</i>
51.06	IP Address 2	<i>Second octet. Must be same as CP600</i>
51.07	IP Address 3	<i>Third octet. Must be same as CP600</i>
51.08	IP Address 4	<i>Fourth octet. Must be different from CP600 and PC</i>
51.09	Subnet CIDR	24
51.27	FBA A par refresh	[1] Refresh
99.03-99.10	<i>Motor data</i>	Per motor nameplate

6.3. Use the drive keypad to set the drive to Local mode, then press Start to initiate the ID Run. When the ID run has completed set the drive back to Remote mode.



## 7. Create the Panel Builder Project

- 7.1. Open Panel Builder 600, version 1.80 or later.
- 7.2. Create a new project.
- 7.3. Double click “*Protocols*” in the project tree to open the “*Protocol*” tab.
- 7.4. Create a new protocol of the type “*Modbus TCP*”. Set up the Protocol Configuration per table 2, below.

Table 2 - CP600 Protocol Configuration

CONFIGURATION PARAMETER	VALUE
PLC Network	Used if the CP600 will control more than one drive. Leave unchecked.
Alias (optional)	Arbitrary name for the protocol
IP address	IP address of the drive. Set in parameters 51.05 -51.08
Port	502
Timeout (ms)	Leave at default
Modbus ID	Leave at default
Max read block	Leave at default
Max read bit block	Leave at default
Write Holding REG	16
Write Coils	15
PLC Models	Modicon Modbus (1-based)

- 7.5. As shown in Figure 3 create tags for the CP600 project. First, double click “*Tags*” in the Project tree to open the “*Tag*” tab.

- 7.6. Select “*Modbus TCP*” from the drop down menu in the Tag tab (Figure 3, step 2).

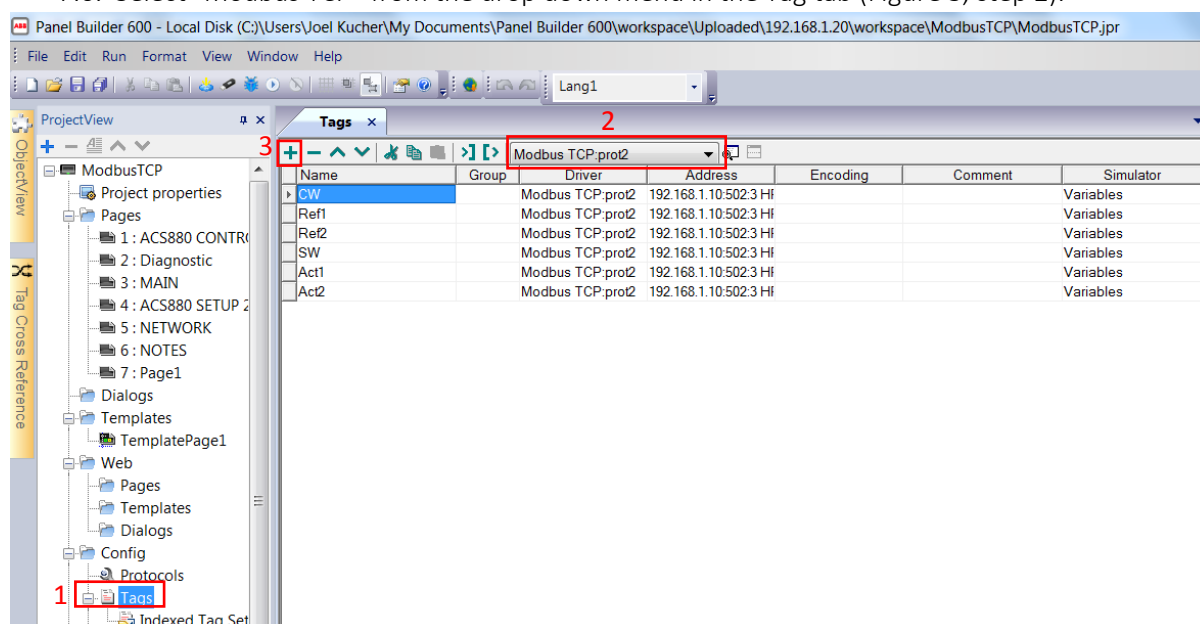


Figure 3- Creating tags

- 7.7. Create 6 tags (Figure 3, step 3) and configure them per table 3. Note: to access the Modbus register setup click in the Address column for the tag you wish to edit and then click the ellipsis [...]

Table 3- CP600 tag configuration

Name	Driver	Address		
		Memory Type	Offset	Data Type
CW	Modbus TCP:prot1	Holding registers	400001	short
Ref1	Modbus TCP:prot1	Holding registers	400002	short
Ref2	Modbus TCP:prot1	Holding registers	400003	short
SW	Modbus TCP:prot1	Holding registers	400004	short
ACT1	Modbus TCP:prot1	Holding registers	400005	short
ACT2	Modbus TCP:prot1	Holding registers	400006	short

- 7.8. Switch tabs so the HMI page is displayed
- 7.9. Drag six labels and six numeric controls from the Widget gallery to the page as shown in figure 4.

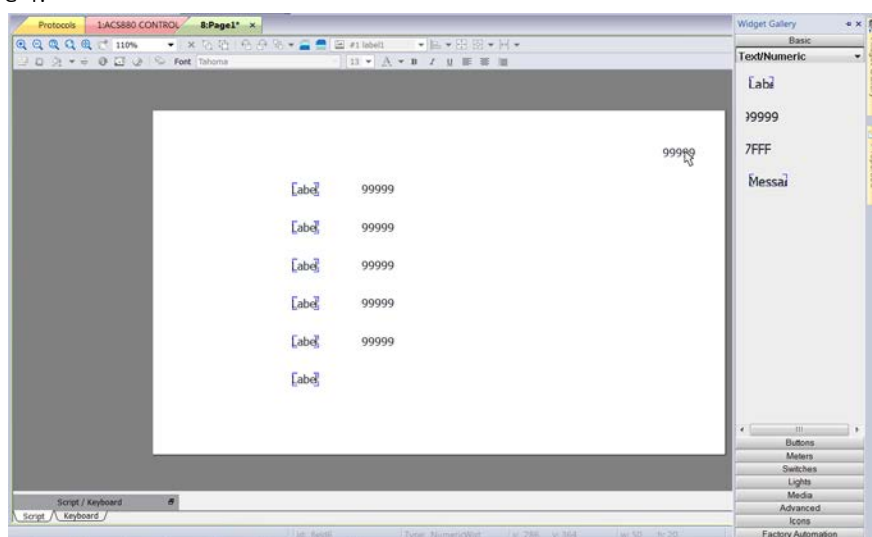


Figure 4- Adding controls to the HMI page

- 7.10. Double click each of the labels and rename them to match the tag names (e.g. CW, SW, Ref1 etc...)
- 7.11. Click to select the numeric value next to the 'CW' label and then click the [+] icon in the "Value" property to open the tag selection window. Select the tag labeled "CW". Be sure to select the "Read/write" radio button so the value can be edited at run-time. Click [OK].
- 7.12. Attach tags to the rest of the numeric values. Do not select the "Read/write" radio button for the feedback values – SW, Act1 or Act2.
- 7.13. Save the project. Then, download the project to the panel by selecting "Download to target" from the "Run" menu. You can manually enter the IP address of the panel or use the [V] button to select the IP address from a drop-down list. Click [Download] to load the project into the panel. The process should take 1-2 minutes then the panel should reboot to the screen created in the previous steps.

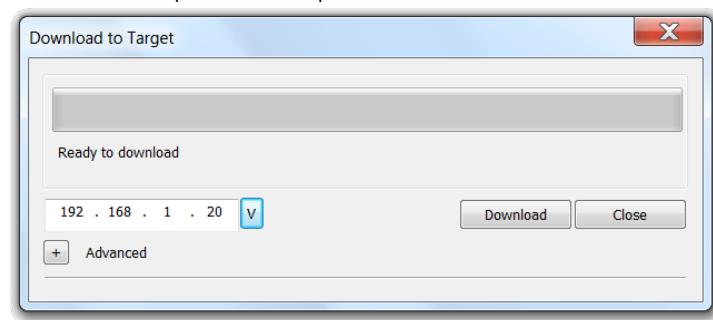


Figure 5-Download project to the target CP600

## 8. Testing the project

- 8.1. Power up the ACS880. The drive should power up without faults. At this point it is normal to have run enable and/or E-stop alarms as the control word is 0. On the FENA-x1 module the Host LED should be solid green, and the Module and Network LEDs should be blinking green.
- 8.2. At the HMI set CW to 1150.
- 8.3. Set CW to 1151. The drive should switch to run mode.
- 8.4. By default the reference is scaled so that a value of 20000 corresponds to rated motor speed. Change the REF1 value to 10000, the motor should accelerate to ½ rated speed.
- 8.5. Set CW to 1150. The drive should drop out of run mode and the motor should coast to stop.

Up to 32 recipes can be used in a single project and each recipe can contain as many

**Revision/Version history**

Rev/Ver	Date	Author	Comments
Draft	09/02/2016	JDK	First draft