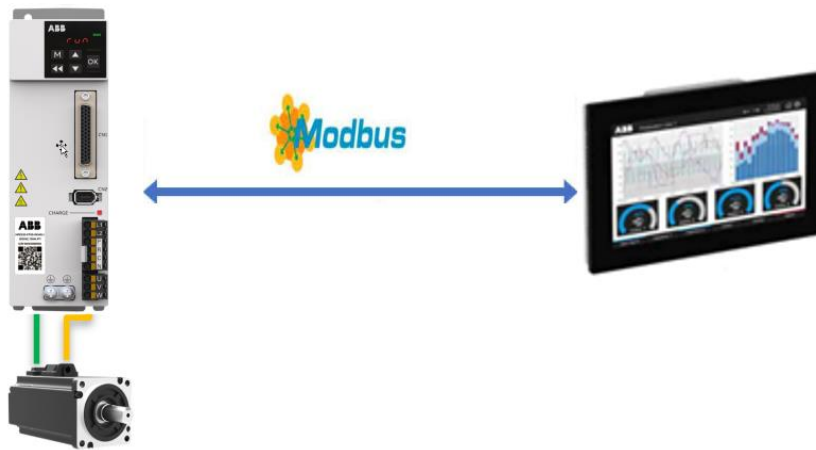


Servo Motion

ABB E530 伺服驱动器与 CP600 HMI 基于 Modbus TCP 通讯的说明

Application Note 00302

Rev A (Chinese)



Introduction to documentation

The ABB E530 servo drive supports Modbus TCP communication function, and the communication connection between the driver and the HMI can be realized through the CN4 RJ45 terminal at the upper end of the driver and the standard network cable connection. Through the HMI reading and writing the internal registers of the E530 servo drive, the HMI can directly control the servo drive for servo motor control in fixed position control mode (FP), speed control mode (S), torque control mode (T) and other modes, without any PLC or upper controller, to achieve the most economical and intelligent servo motion control. This document takes the ABB E530PT servo drive and CP610 HMI as examples, introduces the method of HMI direct control of the drive via ModbusTCP, and provides a simple HMI program.

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1. Introduction

ABB E530 servo drive supports a total of 11 control modes, among which fixed position control mode (FP), speed control mode (S), torque control mode (T) and other modes can interact with the upper HMI through Modbus TCP Ethernet protocol to realize the direct control of the E530 drive by HMI. The system connection and control schematic diagram is as follows:



2. Software and hardware versions

The test and accompanying routines in this application note are based on the following hardware and software versions:

Servo drive debugging software	ABB Servo Composer	V1.03
Servo drives	ABB E530PT	Firmware: 1.1.0.4
Servo control mode	Fixed Position Control Mode (FP)	
HMI touch screen	ABB CP635	
HMI programming software	Panel Builder 600	4.5

3. Basic configuration of servo drives

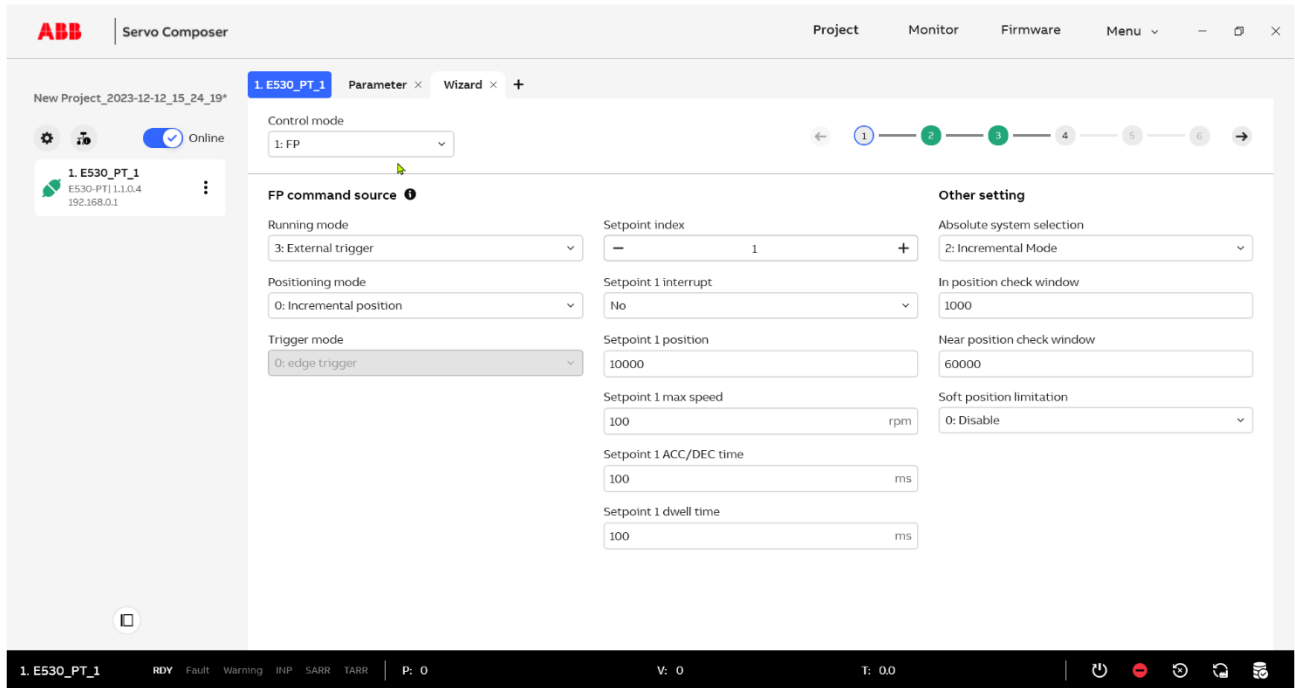
In this demonstration, the E530 driver is set to FP mode, and the 4-segment FP position is set, and VDI1 is configured as SON (Servo Enabled), VDI2 is configured as FRST (Fault Reset), and VDI3 is configured as EMGS (Emergency Stop)., configure VDI4 as POS1, VDI5 as POS2, and VDI6 as CTRG (motion trigger).

To connect the drive using the Servo Composer software, follow these steps:

- ➔ Connect the E 530 drive using the Servo Composer software and open the Wizard

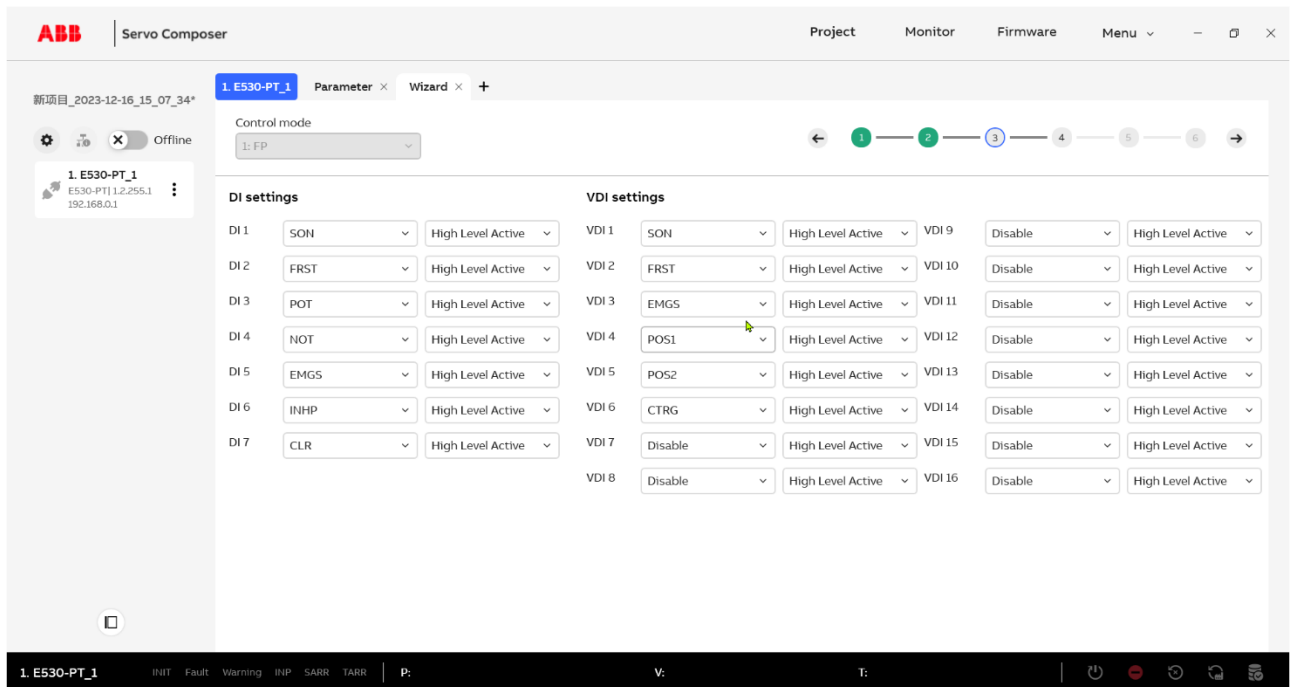


→ set Control Mode= 1: FP, Running Mode= 3 External trigger;

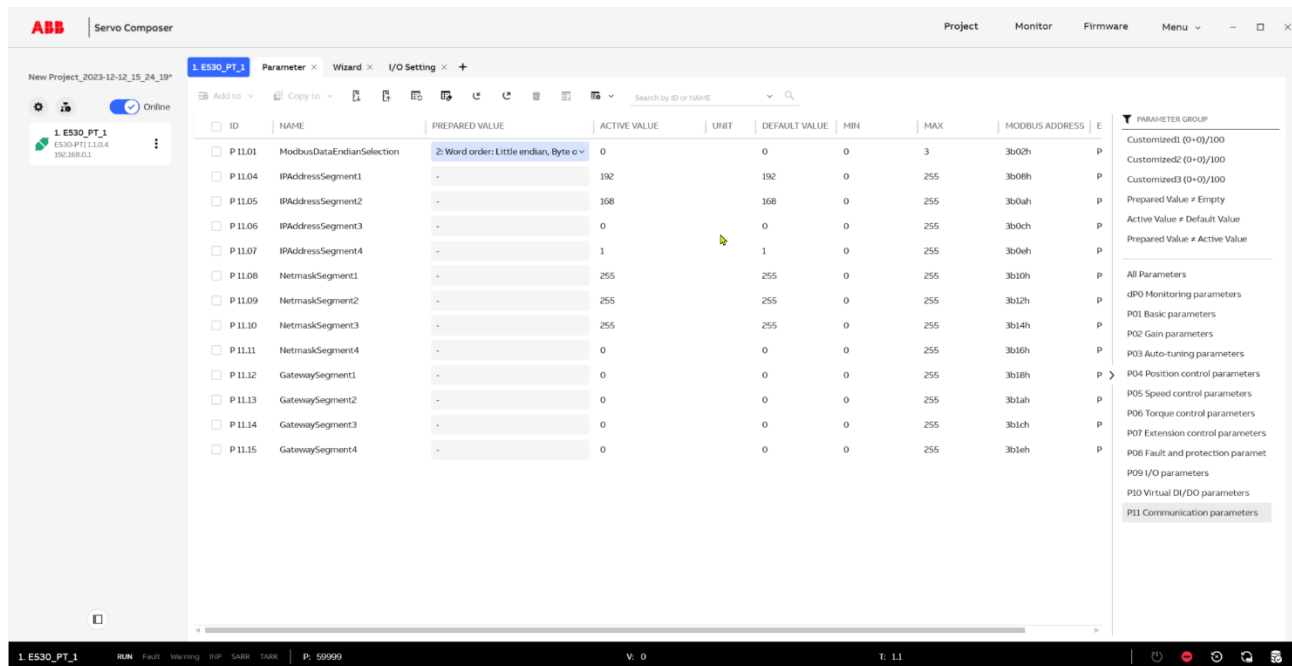


→ set Electronic gear ratio: Pulse number per revolution of motor=2000;

→ set VDI Setting, VDI1=SON, VDI1=FRST, VDI3=EMGS, VDI4=POS1, VDI5=POS2, VDI6=CTRG;



➔ Set P11.01 ModbusDataEndianSelecton=2 (word order small end, byte order big end) and set the IP address of the drive



-> Download the parameters, save the parameters, restart the drive, and complete the configuration.

4. Determine the Modbus communication address for the read/write parameters

We will set the relevant parameters of the FP mode of the E 530 driver through the CP635 HMI and Modbus TCP communication, and the Modbus addresses of these parameters can be viewed through the servo Composer software (as shown in the figure below, the Modbus address of the corresponding parameters is in the column on the right):

ID	NAME	PREPARED VALUE	ACTIVE VALUE	UNIT	MODBUS ADDRESS
P 07.00	FPRunningModeSelection	-	-		3700h
P 07.01	FPPositioningModeSelection	-	-		3702h
P 07.02	FPTriggerModeSelection	-	-		3704h
P 07.03	FPStartPointIndex	-	-		3706h
P 07.04	FPEndPointIndex	-	-		3708h
P 07.05	FPRestartPointSelection	-	-		370ah
P 07.06	FPPointInsProperty	-	-		370ch
P 07.07	FPSetpoint1Position	-	-	user unit	370eh
P 07.08	FPSetpoint1Speed	-	-	rpm	3710h
P 07.09	FPSetpoint1AccOrDecTime	-	-	ms	3712h
P 07.10	FPSetpoint1DelayTime	-	-	ms	3714h
P 07.11	FPSetpoint2Position	-	-	user unit	3716h
P 07.12	FPSetpoint2Speed	-	-	rpm	3718h

In this demonstration, you will set the 4-segment FP position, and the following table shows the parameters that need to be set:

The name of the parameter	Modbus 地址 16#	Modbus 地址 10#	CP635 HMI mailing address	How it works
P07.01, FP Position Command Type	3702h	14082	414083	Power back on
P07.02, FP Trigger Mode Type	3704h	14084	414085	Re-enabled
P07.03, FP start segment number	3706h	14086	414087	Re-enabled
P07.04, FP Terminate segment number	3708h	14088	414089	Re-enabled
P07.05, FP Restart Window Number Selection	370Ah	14090	414091	Re-enabled
P07.07 FP Position Segment 1 - Position	370Eh	14094	414095	Effective immediately
P07.08 FP position segment 1 - speed	3710h	14096	414097	Effective immediately
P07.09 FP position segment 1 - acceleration and deceleration time	3712h	14098	414099	Effective immediately
P07.10 FP Position Segment 1 - Delay Time After Completion	3714h	14100	414101	Effective immediately
P07.11—P07.22 FP position 2-4 segment setting	3716h – 372Ch	14102 - 14124	414103--414125	Effective immediately
P10.32 VDI status bits	3A40h	14912	414913	Effective immediately

As can be seen from the above table, each parameter of the E530 has a corresponding Modbus communication address, and each parameter has a corresponding effective mode, and the corresponding operation parameters need to be performed to take effect.

When programming the Modbus TCP address must be worked out via the below offset value calculation of the Modbus address. This calculation of this offset and of the corresponding E530 holding register address is calculated as:

$$400000 + 10\# \text{ address} + 1$$

So, for example: P07.07: 'FP position segment 1-position'. Firstly look into the parameter list to go 07.07:

<input type="checkbox"/> ID	NAME	PREPARED VALUE	ACTIVE VALUE	UNIT	MODBUS ADDRESS
<input type="checkbox"/> P 07.07	FPSetpoint1Position	-	-	user unit	370Eh

We can see #16 address is 370E so convert that to #10 = 14094

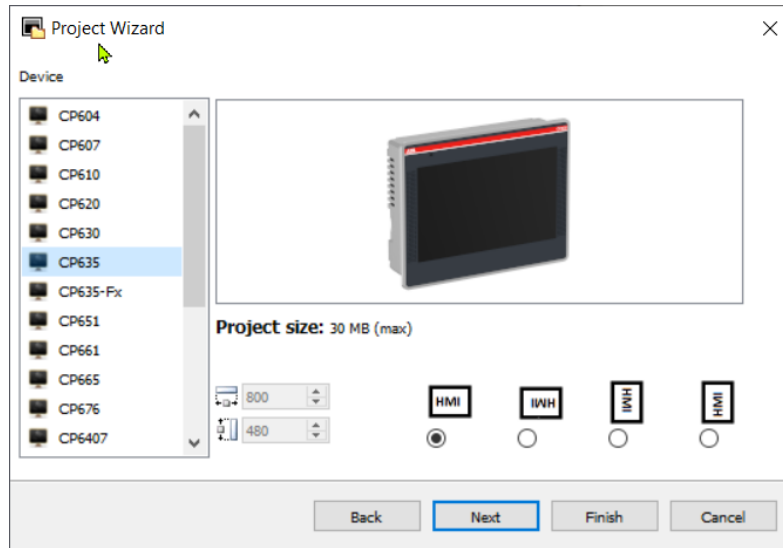
So the offset=40000+ 14094 +1 = 414095

So when the CP600 is programmed we must use the holding register '414095' to interact with this parameter.



5. CP600 HMI configuration and editing

1. Start the Panel Builder 600 HMI programming software, create a new project, and select the appropriate HMI model

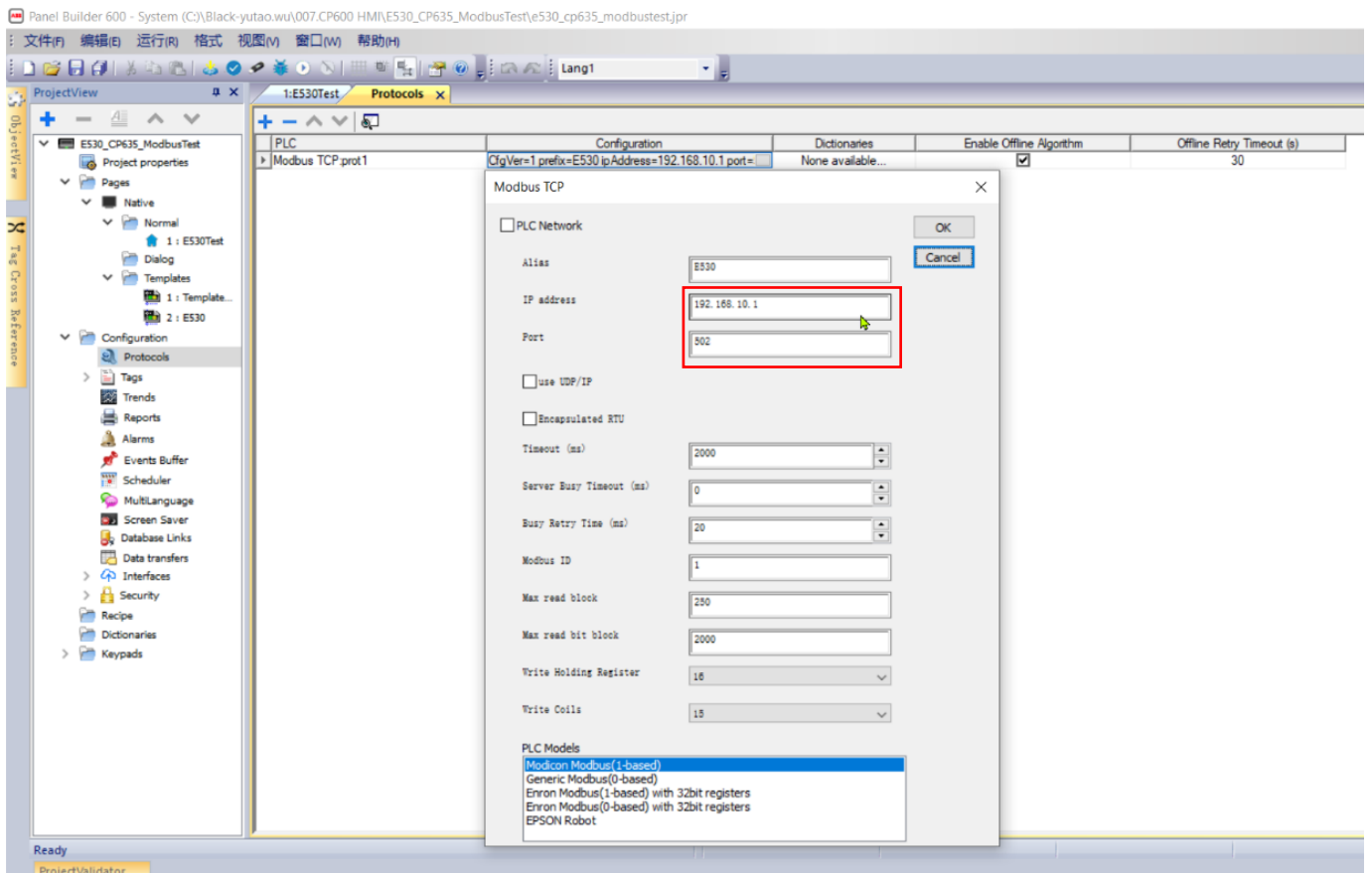


2. Modbus TCP communication configuration

On the Configuration Protocols page, configure the Modbus TCP protocol. Press the + sign to add configuration, select Modbus TCP protocol, HMI as

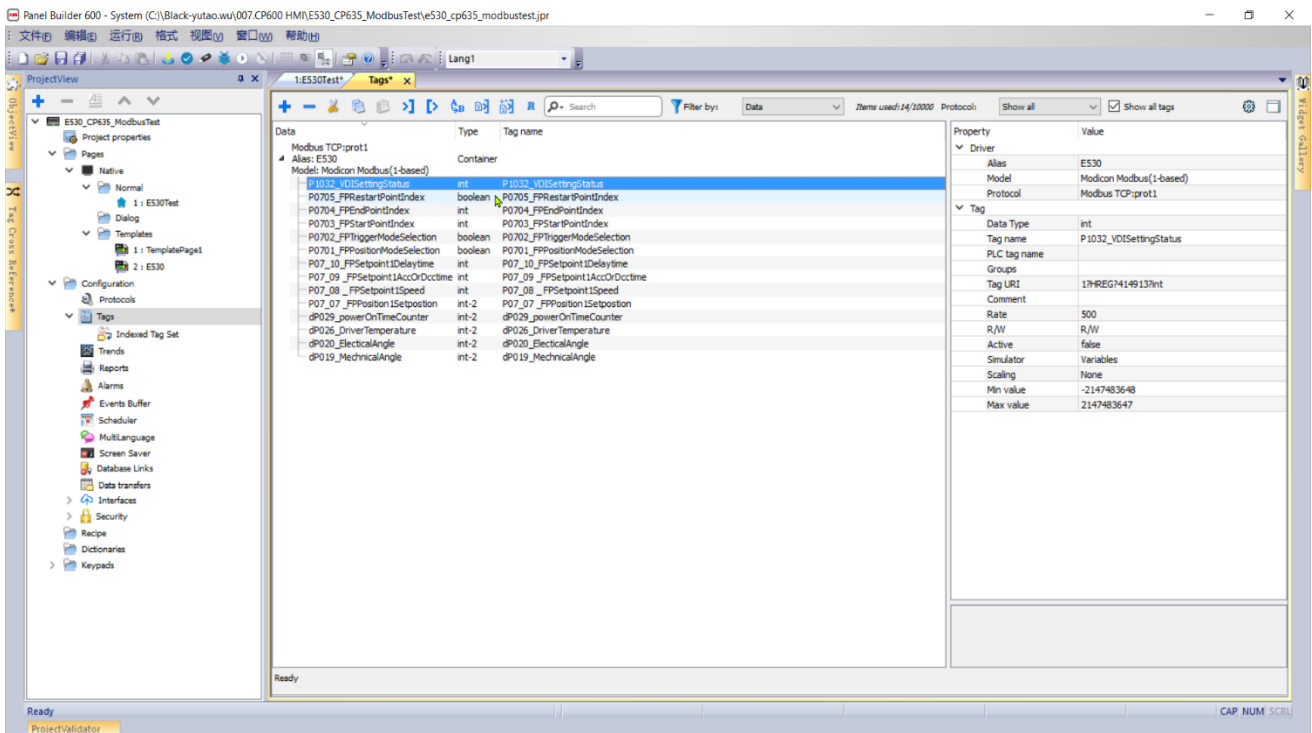
The parameters of Client, Sever should be the same as those in Servo Composer. Multiple servers can be added to realize one HMI for multiple servos

Control of the service shaft.

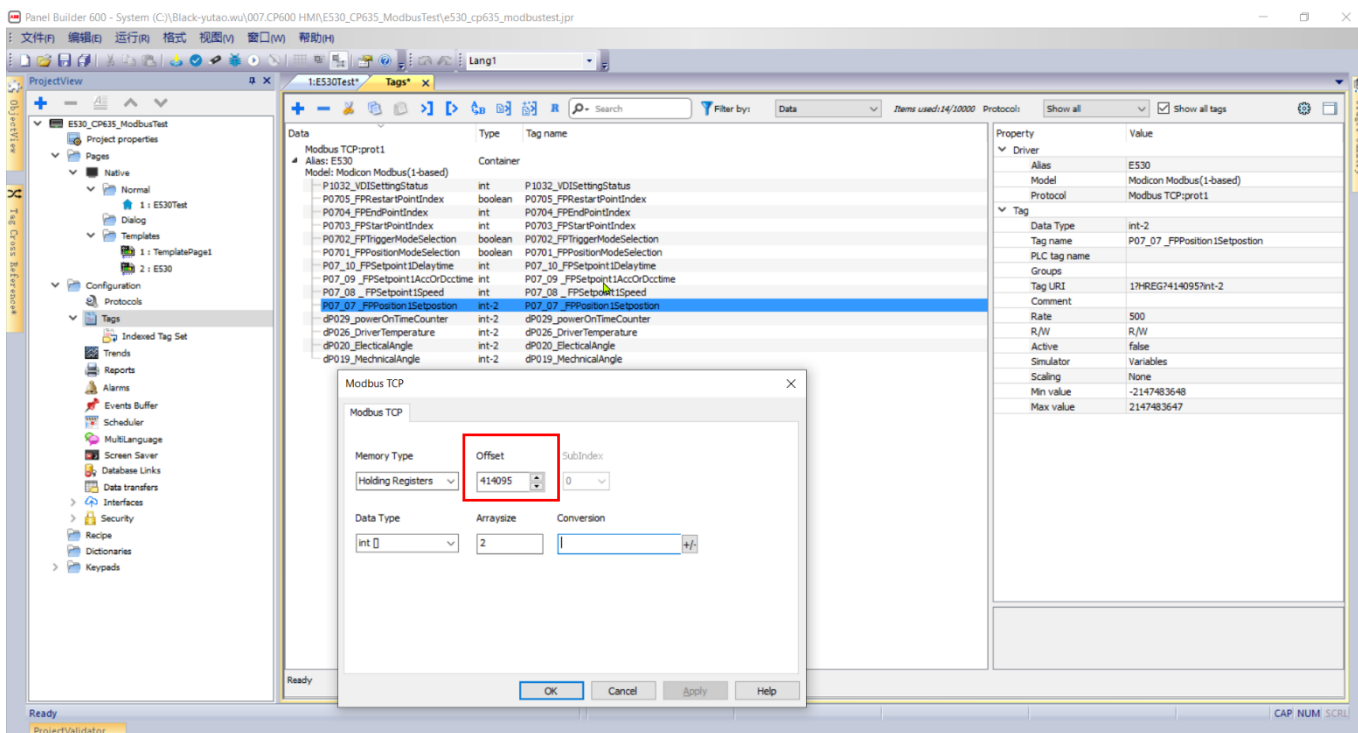


3. New variable Tags

The name of the parameter	Tag name	data type	CP635 HMI mailing address
P07.01, FP Position Command Type	P0701_FPPositionModeSelection	Int	414083
P07.02, FP Trigger Mode Type	P0702_FPTriggerModeSelection	Bool	414085
P07.03, FP start segment number	P0703_FPStartPointIndex	Int	414087
P07.04, FP Terminate segment number	P0704_FPEndPointIndex	Int	414089
P07.05, FP Restart Window Number Selection	P0705_FPRestartPointIndex	Int	414091
P07.07 FP Position Segment 1 - Position	P0707_FPSetpoint1position	Dint	414095
P07.08 FP position segment 1 - speed	P0708_FPSetpoint1Speed	Int	414097
P07.09 FP position segment 1 - acceleration and deceleration time	P0709_FPSetpoint1AccOrDecTime	Int	414099
P07.10 FP Position Segment 1 - Delay Time After Completion	P0710_FPSetpoint1DelayTime	Int	414101
P07.11—P07.22 FP position 2-4 segment setting	P0711—P0722	DInt/Int	414103--414125
P10.32 VDISettingStatus	P1032_VDISettingStatus	Int	414913

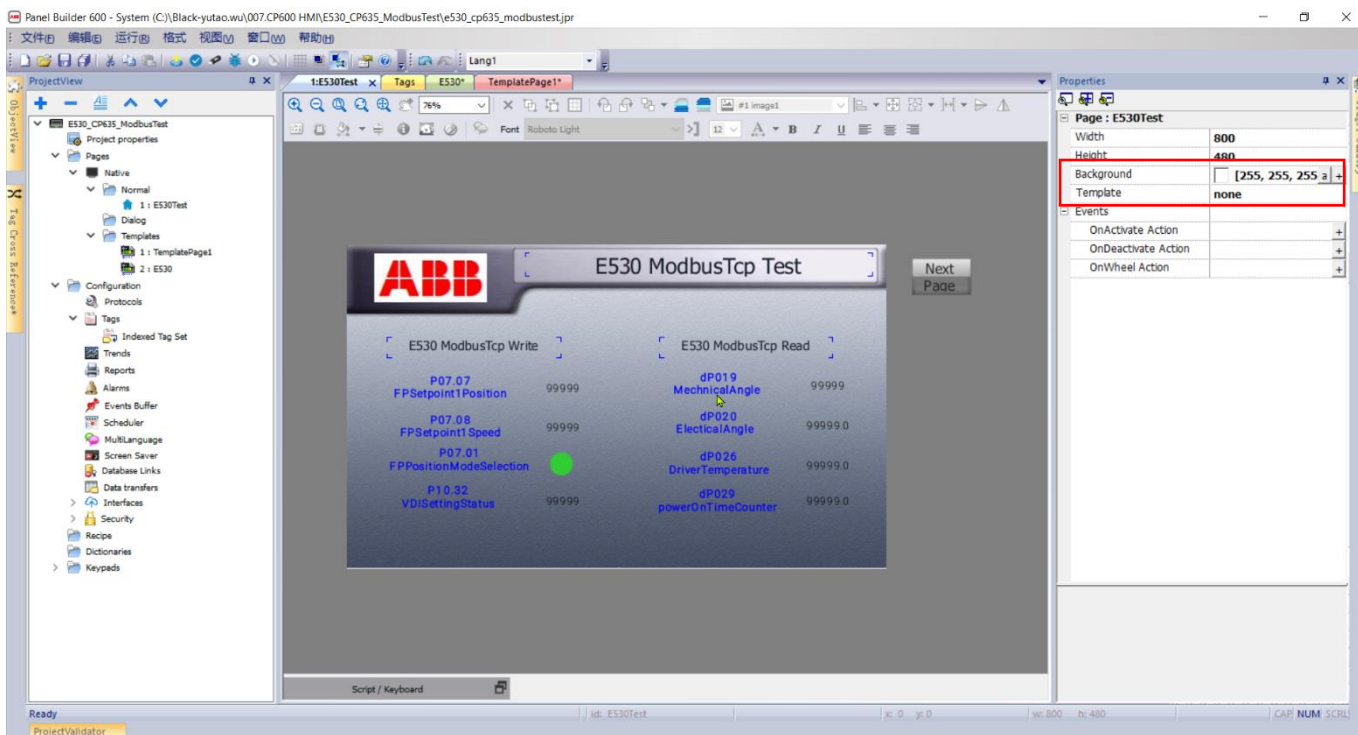


Set the value of the Modbus TCP Offset variable, for example, the P0707_FPSetpoint1position parameter, offset=414095 (see the communication address in the preceding table).



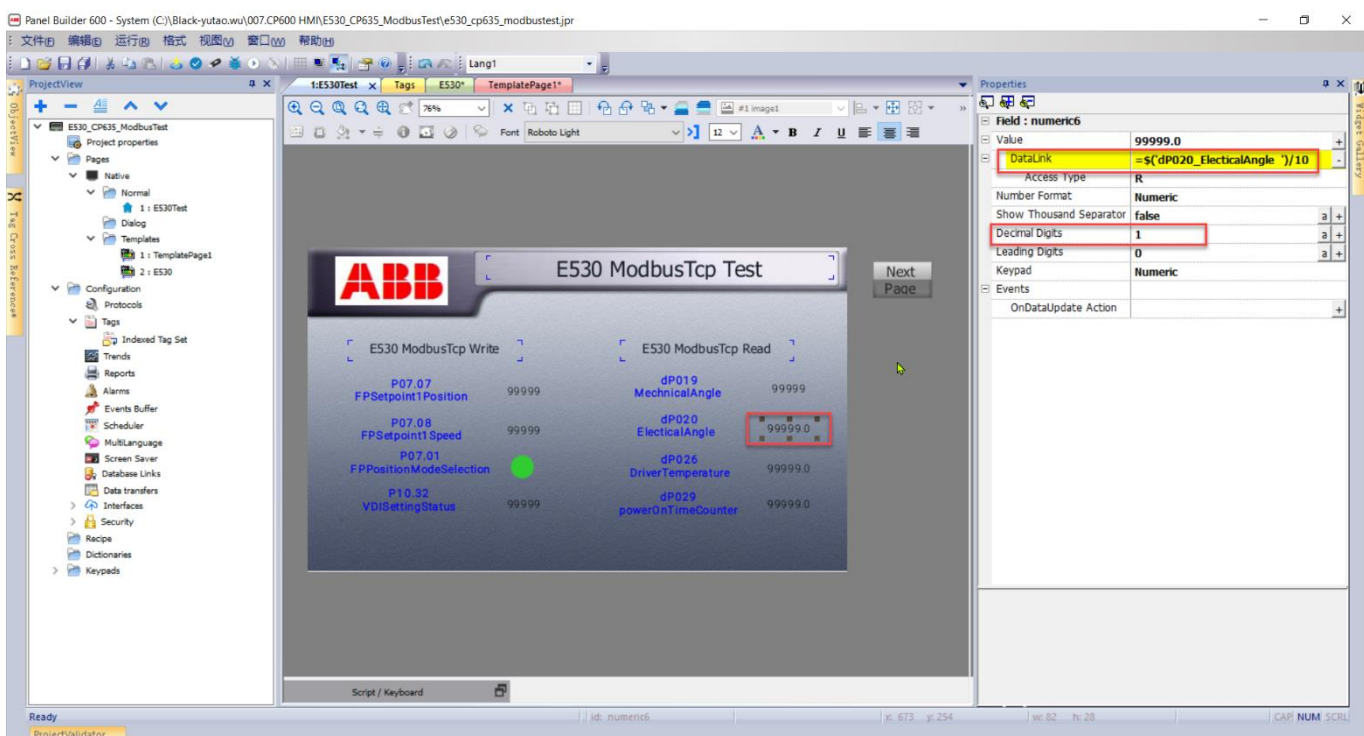
4. Edit the HMI screen

First, design the required HMI screen layout, and add the corresponding parameter data input box controls, as follows:



5. Correlating the variables with Widgets

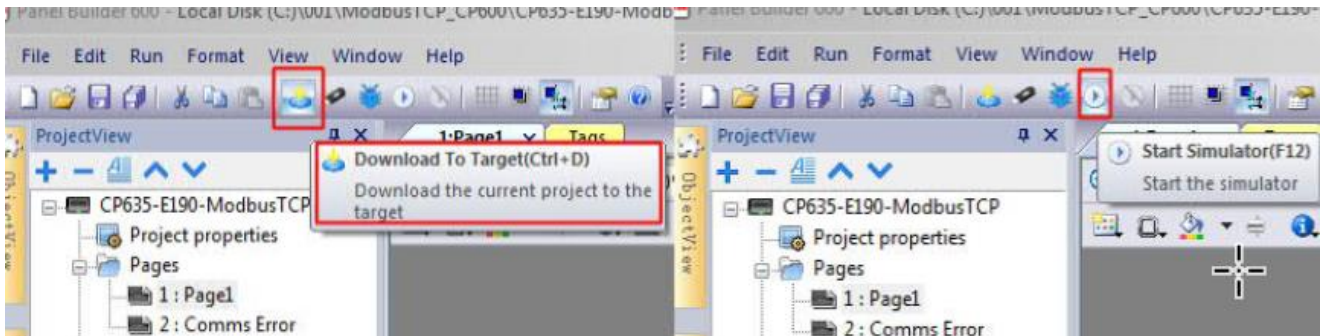
Associate the variables in the created Tags for each read and write data. Note that since the data on the E530 is an INT data type, if you want to read and write the parameter as floating-point number, you need to add a calculation formula to DataLink, for example, if the decimal point is 1, you need the data /10 and fill in 1 in the Decimal Digits, as shown in the following figure.



6. HMI screen display and operation

Download the HMI configuration and screen to the CP635 for direct motion control of the servo drive via the touch screen.

At the same time, you can use the Simulator function in the software to synchronize the HMI screen online, that is, to operate the HMI in the PC section.



Set P0707_FPSetpoint1position=10000, P0707_FPSetpoint2position=20000, P0707_FPSetpoint3position=30000, P0707_FPSetpoint4position=40000;

Set P1032_VDISettingStatus=1 and enable the servo

Set P1032_VDISettingStatus=2 and reset the servo fault;

Set P1032_VDISettingStatus=4 and the servo will stop urgently;

Set P1032_VDISettingStatus=4 and the servo will stop urgently;

Set P1032_VDISettingStatus=21, the servo is enabled, and the servo will perform the displacement set by P0707_FPSetpoint1position=10000;

Set P1032_VDISettingStatus=29, the servo is enabled, and the servo will perform the displacement set by P0707_FPSetpoint2position=10000;

Set P1032_VDISettingStatus=31, the servo is enabled, and the servo will perform the displacement set by P0707_FPSetpoint3position=10000;

Set P1032_VDISettingStatus=39, the servo is enabled, and the servo will perform the displacement set by P0707_FPSetpoint4position=10000;

Press the P0702_FPTriggerModeSelection button to select the absolute position mode, and the servo will perform the absolute position displacement after re-enablement;

Version information			
version	date	author	substance
A	2023-12-16	Black-Yutao Wu	First draft
B			Content..
C			Content..

Contact us

For more information, please contact your local ABB representative or one of the following:

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