

HMI to Controller

Sample application

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1. REQUIREMENTS

Hardware

1. HMI 750, Modbus master
2. Temperature controller, BTC 4100 or similar with RS485 interface, Modbus slave
3. HMI to PC, Ethernet cable (Cross over or straight cable)
4. Cable between HMI and BTC 4100

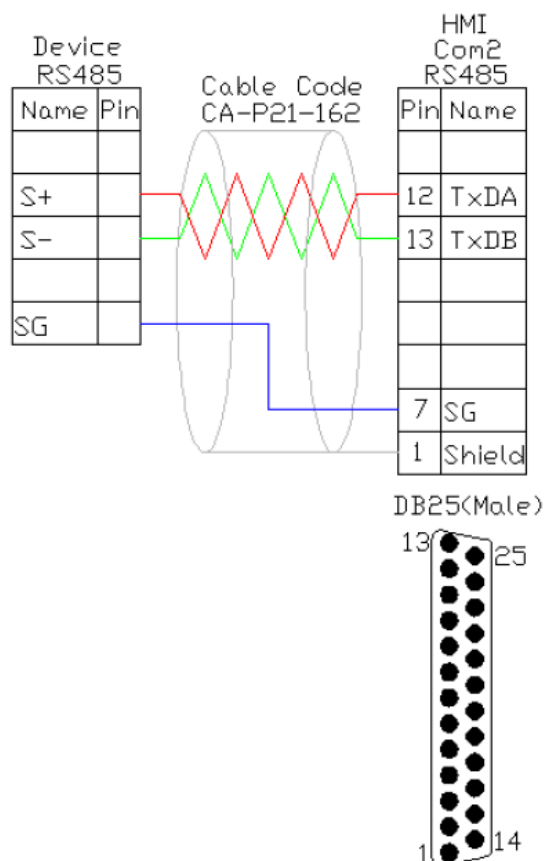
Software

Panel Studio software pack

Application program: HMI750_BTC4100

2. CABLE AND CONTROLLER SETTINGS

Cable between HMI 750, COM2 and BTC 4100 (RS485)



HMI side	Controller side
12 & 24 shot	+ (Tx1)
13 & 25 short	- (Tx2)

BTC 4100 communication settings

Connection: RS485, Protocol: RTU, Address: 1, baud rate: 9.6, Data 8 bit
Parity: None, Stop bit: 1, other settings: Decimal point DP = 1

7-3 Parameter Table

Register Address	Parameter Notation	Parameter	Scale Low	Scale High	Notes
0	SP1	Set point 1	*4	*4	R/W
1	SP2	Set point 2	*7	*7	R/W
2	SP3	Set point 3	*6	*6	R/W

Register Address	Parameter Notation	Parameter	Scale Low	Scale High	Notes
61	BPL1	Bumpless transfer of OP1	0.00	655.35	R
62	BPL2	Bumpless transfer of OP2	0.00	655.35	R
63	CJCL	Cold junction signal low	0.000	65.535	R
64, 128	PV	Process value	*4	*4	R
65, 129	SV	Current set point value	*4	*4	R

*4: The scale high/low values are defined in the following table for SP1, INLO, INHI, SP1L, SP1H, SHIF, PV, SV, RELO and REHI:

Conditions	Non-linear input	Linear input DP = 0	Linear input DP = 1	Linear input DP = 2	Linear input DP = 3
Scale low	-1999.9	-19999	-1999.9	-199.99	-19.999
Scale high	4553.6	45536	4553.6	455.36	45.536

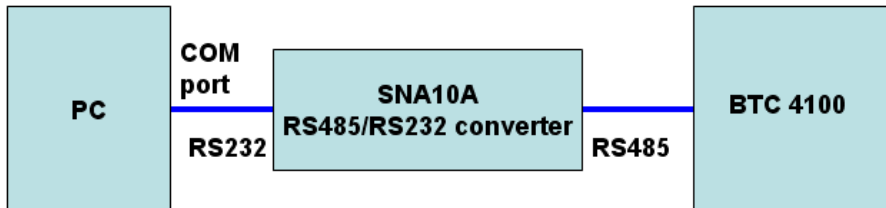
Use these settings in OPC server configuration for scaling purpose

Fig: The above information is available in 4100 user manual

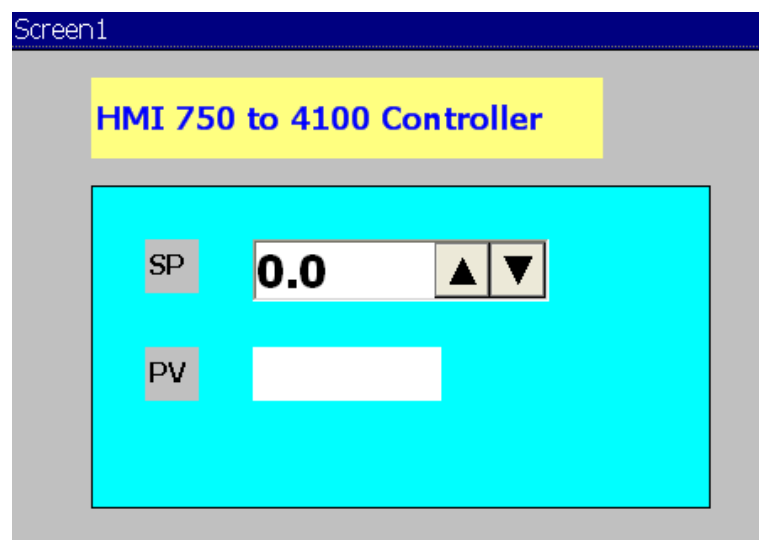
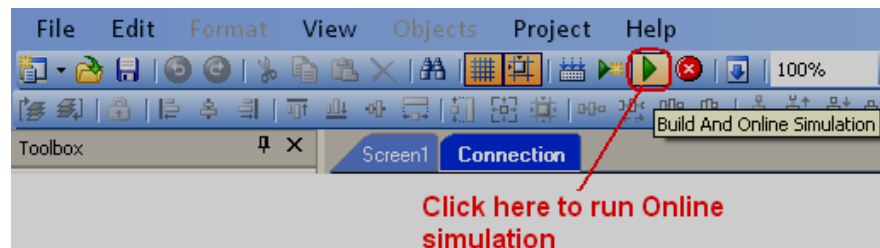
For Decimal point1 in Controller (DP=1),
SL = -1999.9
SH = 4553.6
SH-SL = 4553.6+19999=65535

3. ONLINE SIMULATION

This is to check application in PC itself by directly connecting controller to PC. Online simulation works in PC for maximum 2 hrs. only



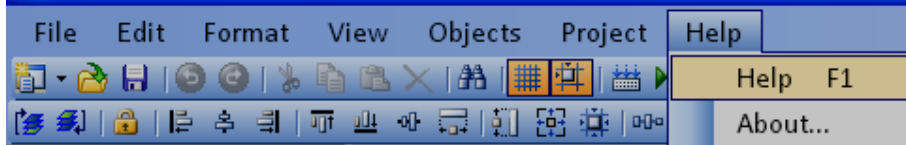
1. Connect proper cable between PC and Controller
2. If RS485/RS232 converter is used, make sure that all dip switches if any on converter are set to setting like Address:1, Baud rate=9.6 (It means 9600), data=8 bit, Parity=None, Stop=1 bit
3. Make sure controller address is set to 1 and all communication settings are set as above
4. Install Panel Studio pack in PC. Open HMI750_BTC4100.prj Panel Studio application in PC. Run Online simulation as shown below



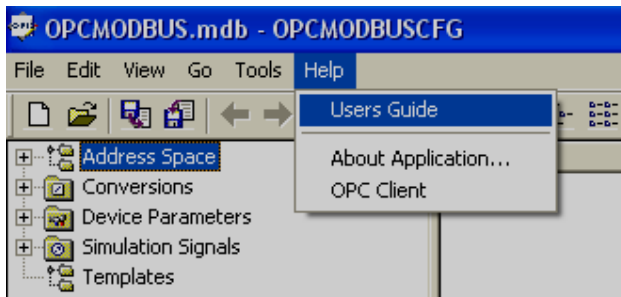
5. Use Up/Down arrows and change the value at SP. It should change set point in controller. Similarly, change value of temperature sensor connected to controller, it should show value in HMI at PV

4. REFERENCE MANUALS

HMI user manual



Modbus OPC server user manual (This can be accessed from Modbus OPC server configuration menu itself as shown below)



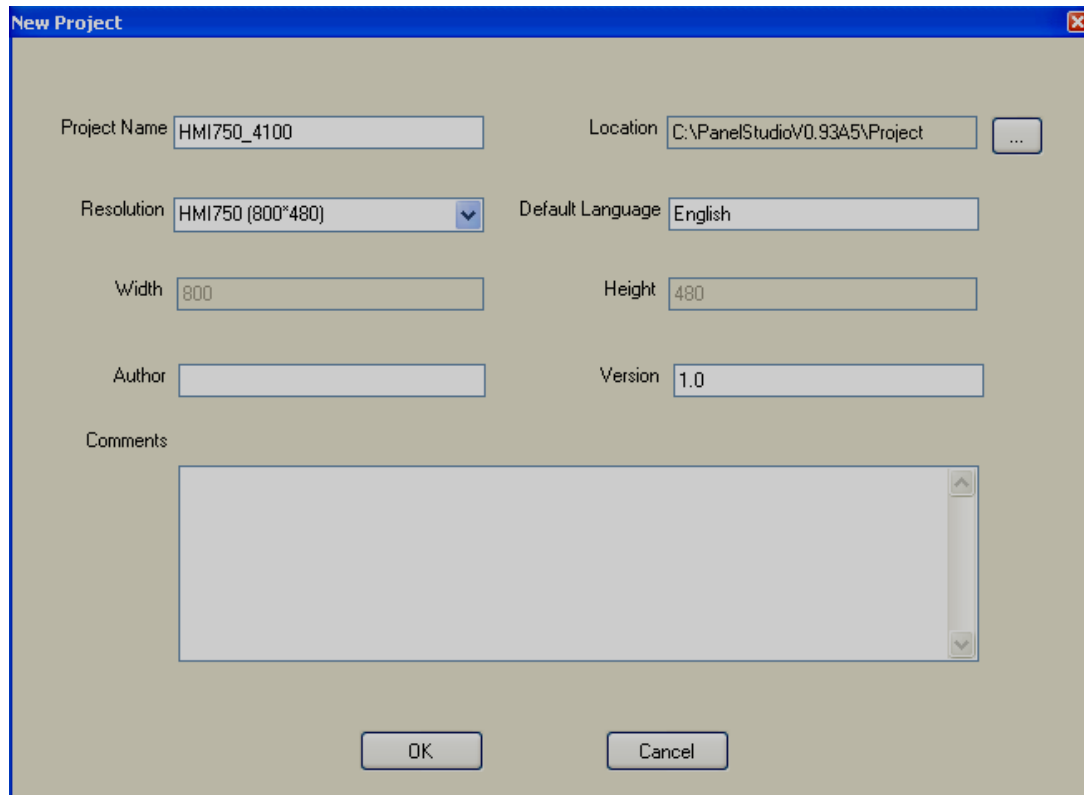
User manual for 4100 controller

5. OPC SERVER CONFIGURATION SCREENS

(This is already done in sample application program-all the following pages is for user information only when creating new project)

Software: Panel Studio

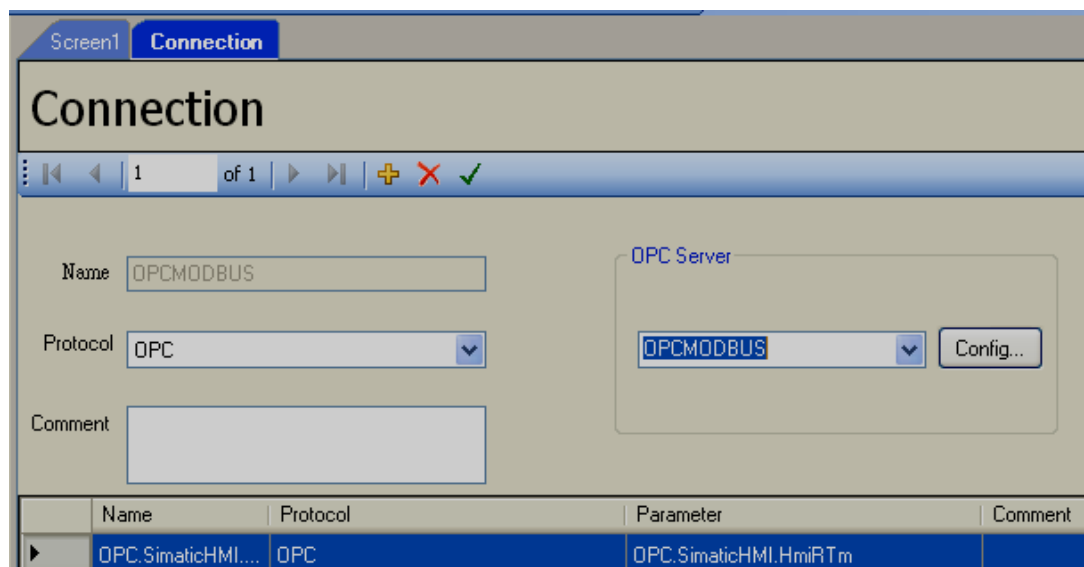
Open new project with HMI 750



The 'New Project' dialog box contains the following fields and controls:

- Project Name:** Text box with 'HMI750_4100'.
- Location:** Text box with 'C:\PanelStudioV0.93A5\Project' and a browse button (...).
- Resolution:** Dropdown menu showing 'HMI750 (800*480)'.
- Default Language:** Text box with 'English'.
- Width:** Text box with '800'.
- Height:** Text box with '480'.
- Author:** Empty text box.
- Version:** Text box with '1.0'.
- Comments:** Large empty text area.
- Buttons:** 'OK' and 'Cancel' at the bottom.

Configure Modbus driver as shown



The 'Connection' screen shows the configuration for an OPC server. It includes a toolbar with navigation and action icons, and a table listing the configured connections.

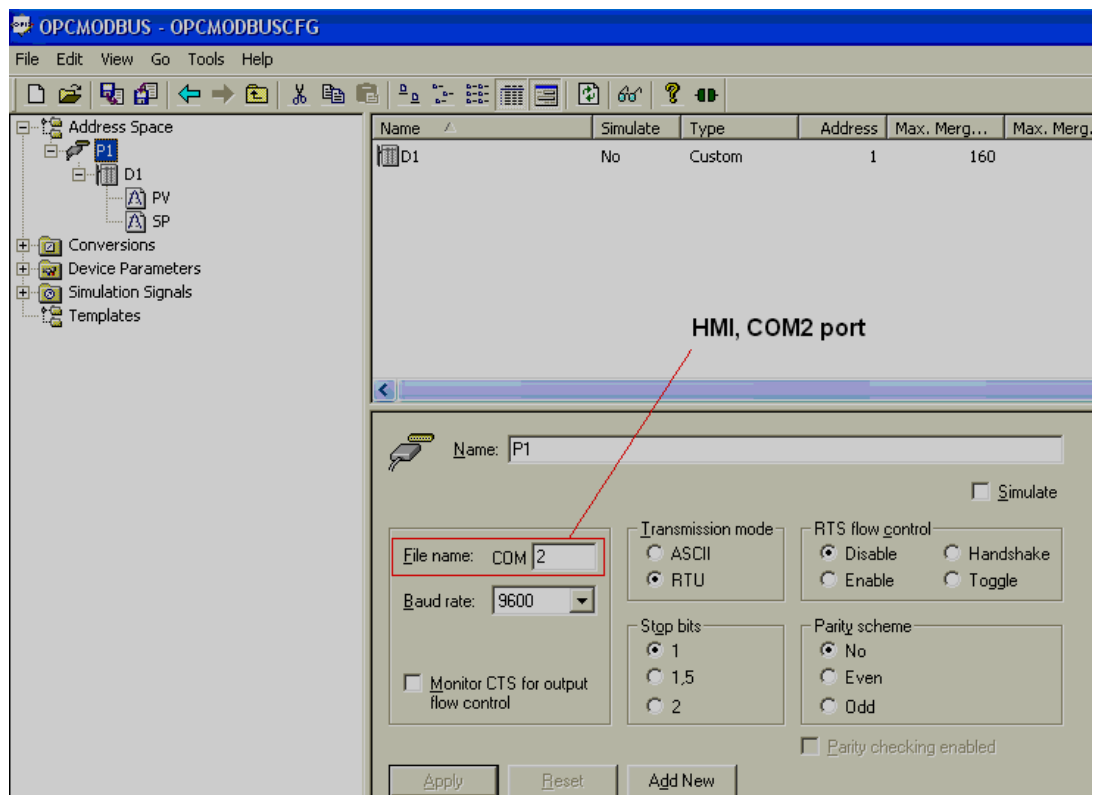
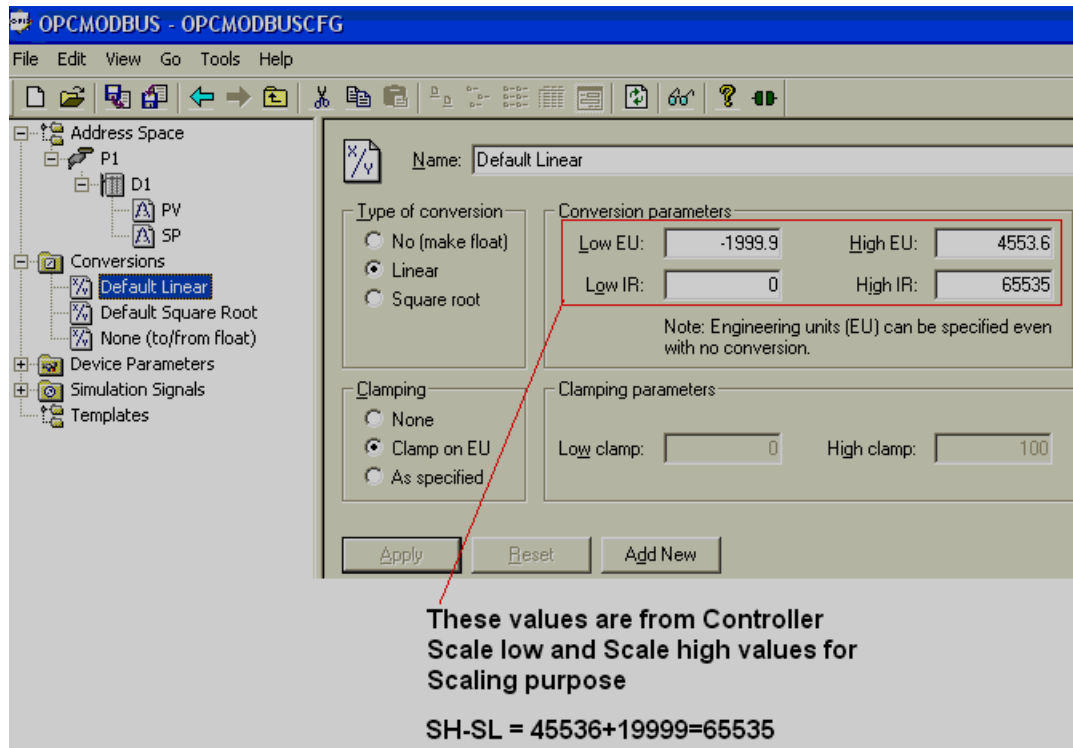
Connection Configuration Fields:

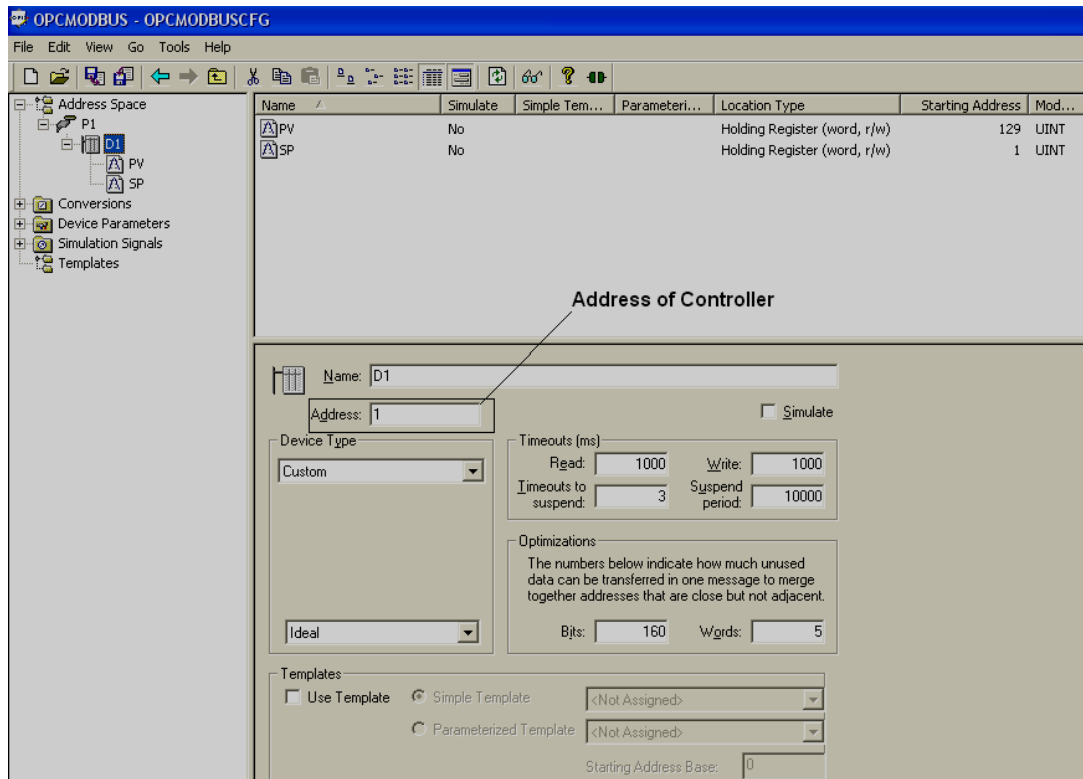
- Name:** Text box with 'OPCMODBUS'.
- Protocol:** Dropdown menu showing 'OPC'.
- Comment:** Empty text box.
- OPC Server:** A sub-panel containing a dropdown menu showing 'OPCMODBUS' and a 'Config...' button.

Table:

	Name	Protocol	Parameter	Comment
▶	OPC.SimaticHMI....	OPC	OPC.SimaticHMI.HmiRTm	

Select OPCMODBUS and click on Config





Task1: Write SP from HMI 750 to BTC 4100

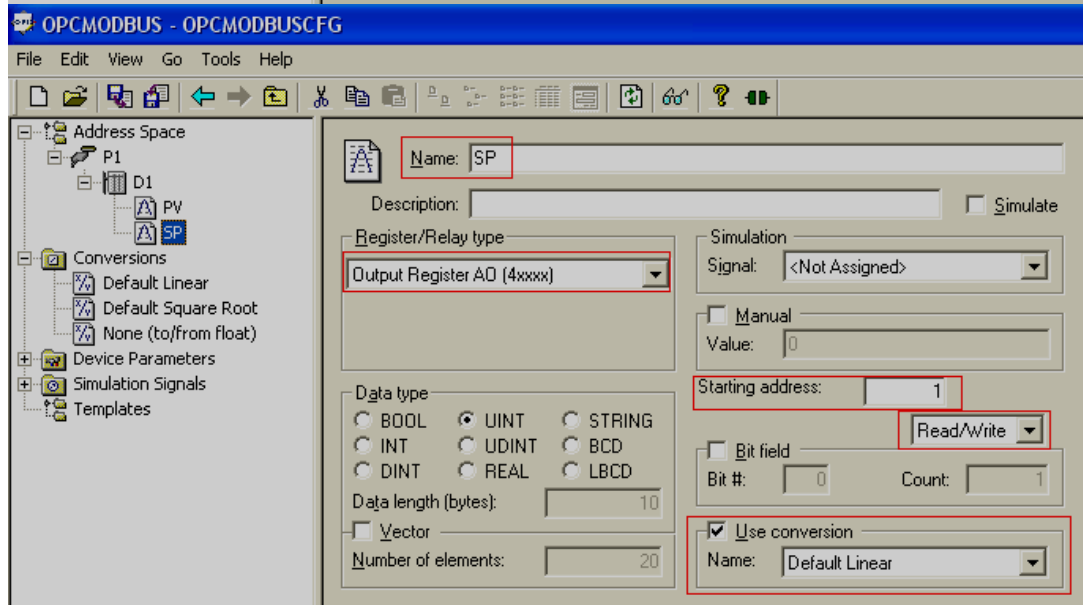
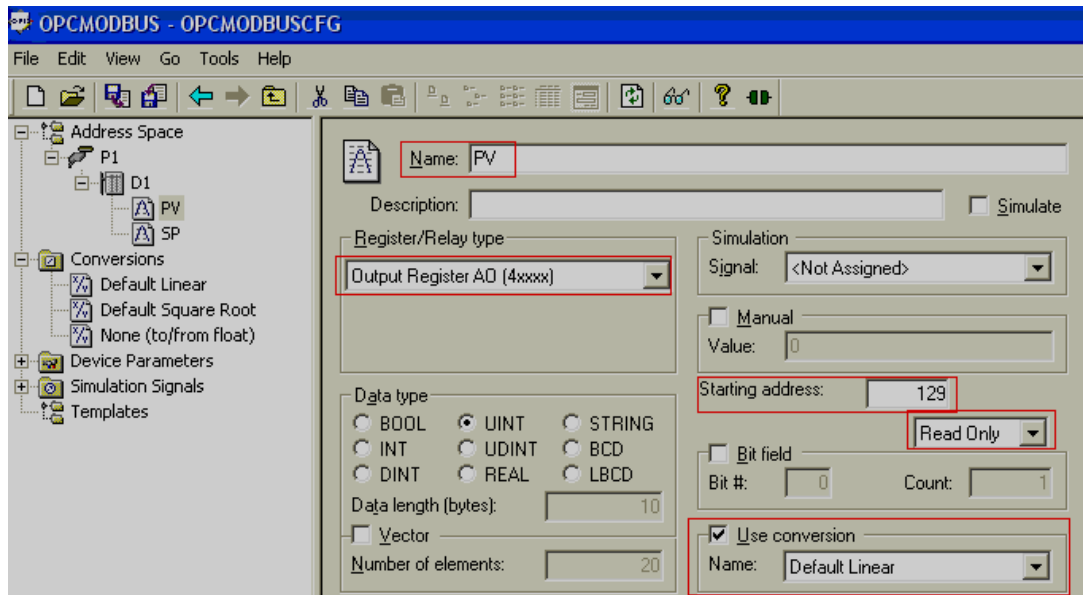
Task2: Read PV from BTC 4100 to HMI 750

BTC 4100 address table, please refer communication manual

SP1: 0, PV: 128

Note: Since register address starts from 0 in BTC 4100, +1 should be considered while matching Modbus holding registers with HMI.

Controller	HMI
0	400001
128	400129



Screen1 Connection **Tag**

Tag

User System

9 of 10

Connection: OPCMODBUS Register: P1.D1.PV

Name: P1_D1_PV Offset: 0

Data type: Int16

Scan mode: OnActivePage Scan rate (ms): 100

Comment:

	Connection	Name	Type	Scan	Scan rate	Register
	OPCMODBUS	P1_ParityScheme	Int16	OnActivePage	1000	P1.ParityScheme
	OPCMODBUS	P1_RtsControl	Int16	OnActivePage	1000	P1.RtsControl
	OPCMODBUS	P1_StopBits	Int16	OnActivePage	1000	P1.StopBits
▶	OPCMODBUS	P1_D1_PV	Int16	OnActivePage	100	P1.D1.PV
	OPCMODBUS	P1_D1_SP	Int16	OnActivePage	100	P1.D1.SP

6. HMI CONFIGURATION SCREENS

HMI 750 to 4100 Controller

SP 0.0 ▲ ▼

PV

NumericUpDown1's Properties

General Common Events

Appearance

☐ BackColor ☒ ForeColor

☐ WriteDesignTimeValue

Decimal

1

TextFont

Name

Tahoma

Size

20

Style

Bold

Values

Value

0

Minimum

0

Increment

1

Maximum

100

TagBinding

P1_D1_SP

Label4's Properties

General Common

Appearance

☐ BackColor ☒ ForeColor

Text

TextAlign

MiddleLeft

TextFont

Name

Tahoma

Size

14

Style

Bold

Decimal

1

TagBinding

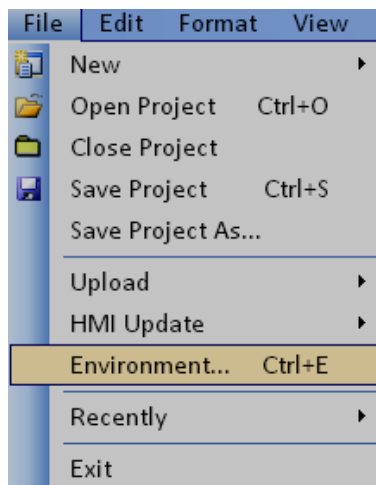
P1_D1_PV

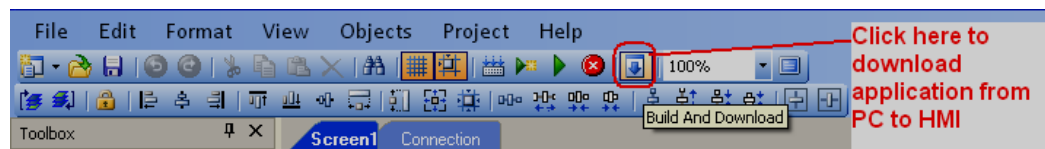
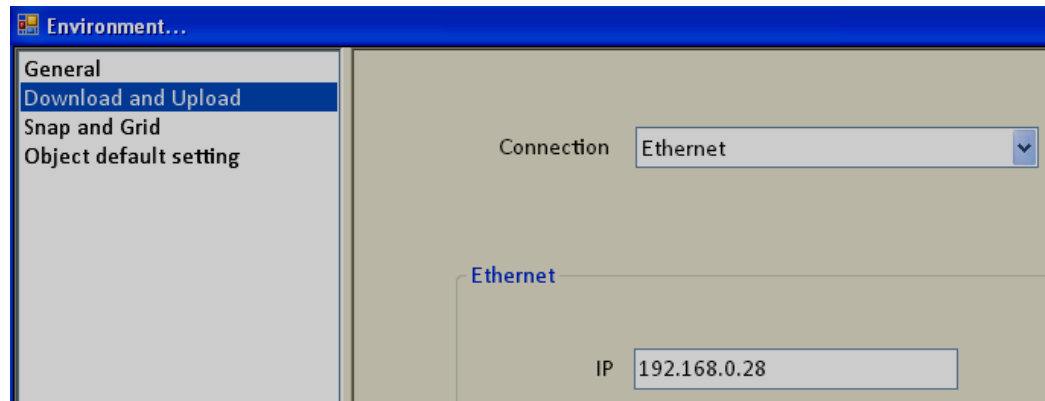
7. RUN APPLICATION IN HMI

1. Hold your finger at any touch area in HMI and Power on HMI. It should show control center screen



2. Connect HMI to PC directly via Ethernet or via Ethernet switch
3. In HMI, Press at “System information” and check IP address of HMI from Control Center. For ex: 192.168.0.28
4. From Panel Studio software, enter IP address of HMI as shown below and then download HMI750_BTC4100 application from PC to HMI via Ethernet





5. Set communication settings at BTC 4100 Ex: Protocol: RTU, Address:1, Baud rate=9.6 (It means 9600), data=8 bit, Parity=None, Stop=1 bit
6. Connect the cable between HMI 750, COM2 and BTC 4100
7. Restart HMI
8. From Control center at HMI, press “Run”
9. Enter set point SP1 in HMI and check that BTC 4100 SP is updated
10. Change PV at Controller and check if it is updating properly in HMI or not

8. OPC SERVER TESTING

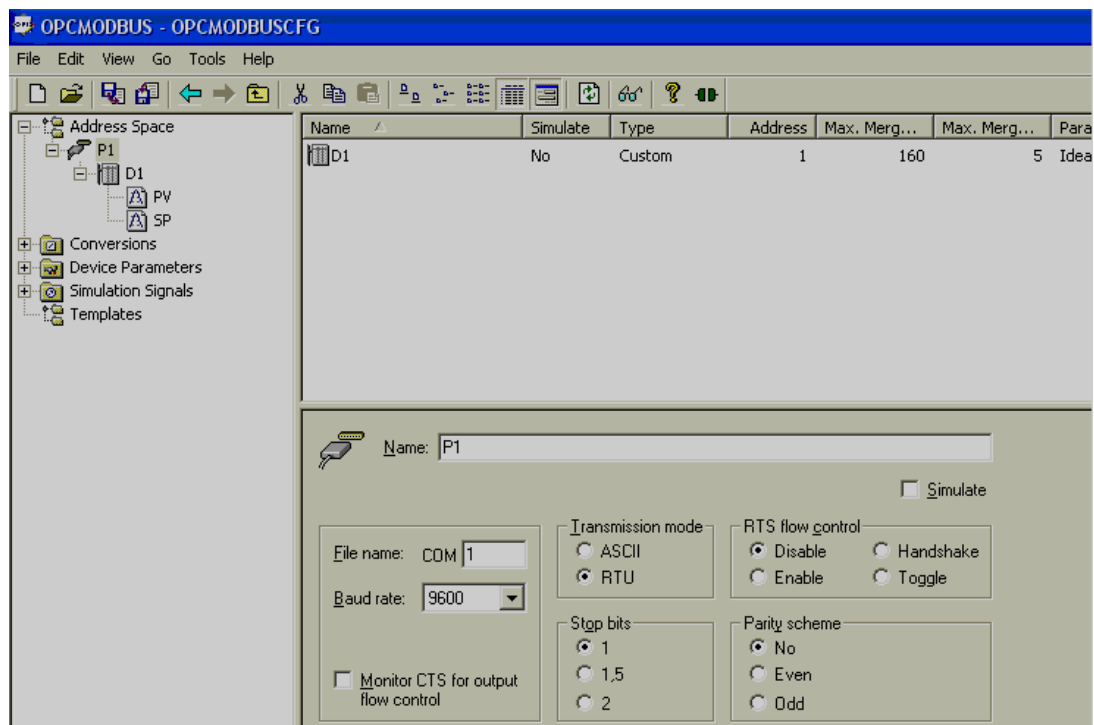
How to check communication between PC and Controller via OPC server?

(This is for advance users only)

Connect Controller to PC via RS485/RS232 converter like SNA10A

Earlier COM port number defined in OPC server is 2 because COM2 port of HMI is used to connect with Controller.

Now, assume COM1 is port number in PC, then, open OPC server and change COM port number from 2 to 1 as shown



OPCMODBUS - OPCMODBUSCFG

File Edit View Go Tools Help

Address Space

- P1
 - D1
 - PV
 - SP
- Conversions
- Device Parameters
- Simulation Signals
- Templates

Name	Simulate	Simple Tem...	Parameteri...	Location Type	Starting Address	Mod...
PV	No			Holding Register (word, r/w)	129	UINT
SP	No			Holding Register (word, r/w)	1	UINT

Select here

Click here

Name: D1

Address: 1

Device Type: Custom

Timeouts (ms)

Read:	1000	Write:	1000
Timeouts to suspend:	3	Suspend period:	10000

Optimizations

The numbers below indicate how much unused data can be transferred in one message to merge together addresses that are close but not adjacent.

Bits: 160 Wgrds: 5

Item ID

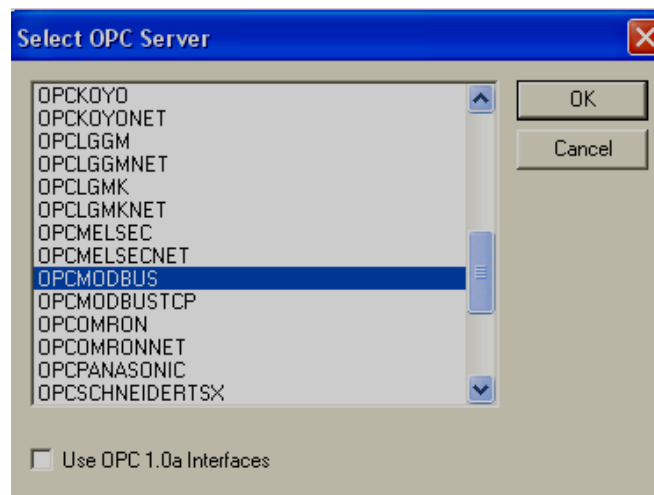
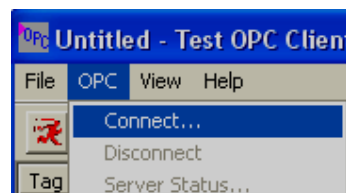
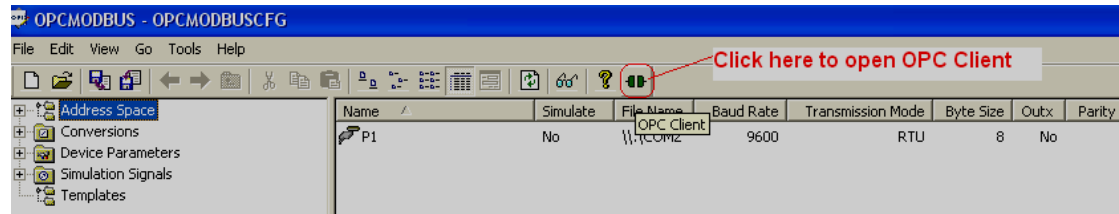
Item ID	Value	Timestamp	Quality	Subquality	Limit
✓ P1.D1.PV	23.7 (VT_R8)	02/08/10 12:02:35.468	Good	Non-specific	Not Limited
✓ P1.D1.SP	29.2 (VT_R8)	02/08/10 12:02:35.437	Good	Non-specific	Not Limited

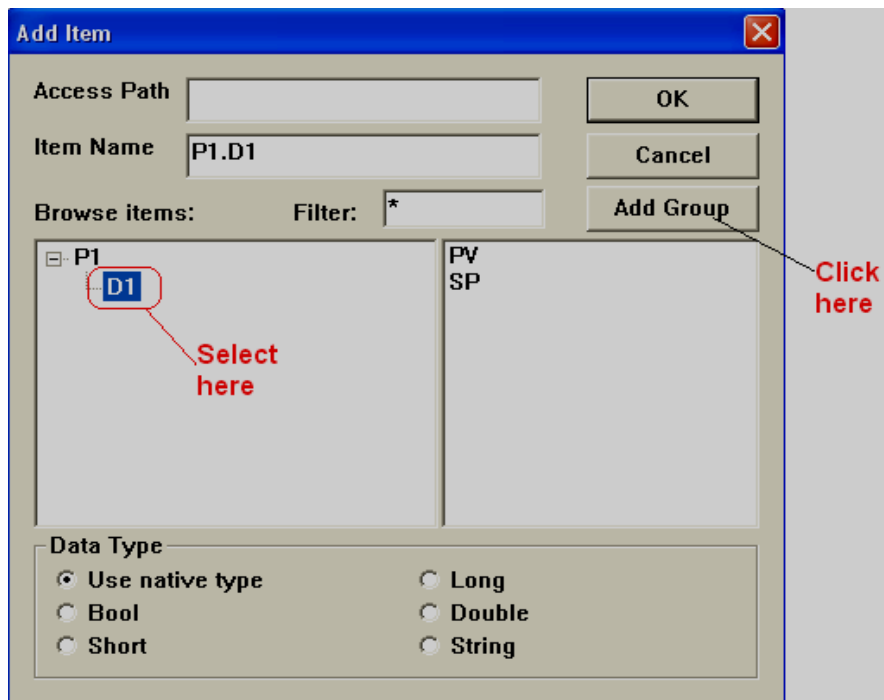
Select these two tags

9. OPC CLIENT TESTING

How to Read/Write data between PC & Controller using OPC client in PC

(This is for advance users only)





OPCMODBUS - Test OPC Client

File OPC View Help

Tag	Value
P1.D1.PV	23.2
P1.D1.SP	29.2

