

HMI to IO Module

Sample application

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1. REQUIREMENTS

Hardware

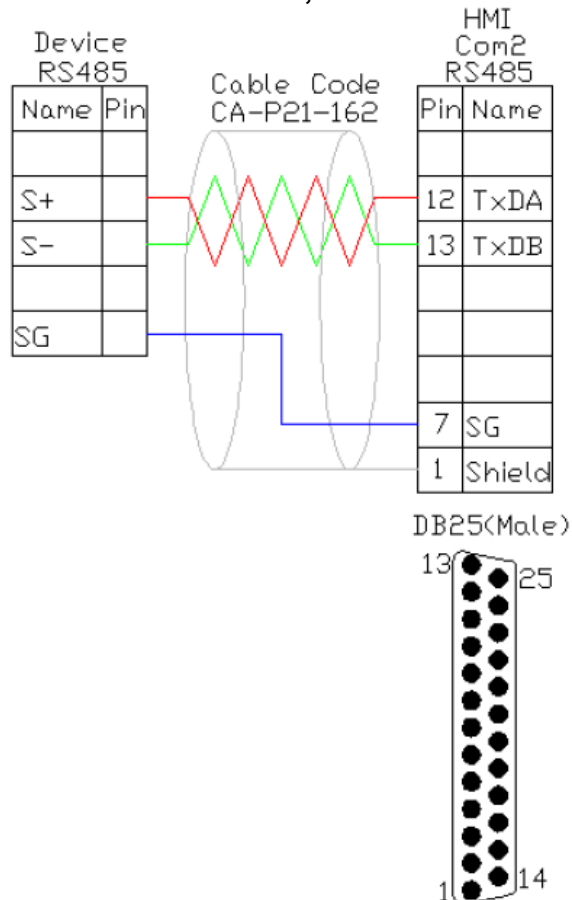
1. HMI 750, Modbus master
2. Any IO module with RS485 interface, Modbus slave
3. HMI to PC, Ethernet cable (Cross over or straight cable)
4. Cable between HMI and IO module
5. RS485/RS232 converter

Software

Panel Studio software pack
Application program: HMI750_IOModule1

2. CABLE AND IO MODULE SETTINGS

Cable between HMI 750, COM2 and IO Module (RS485)



HMI side
12
13

IO Module side
+ (3)
- (4)

IO module settings

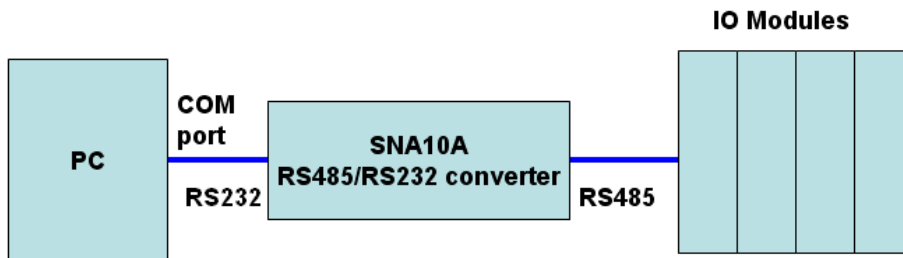
1. Set Dip switch 10 = OFF in IO module to allow IO module communicate on default communication settings. Baud rate=9.6 (It means 9600), data=8 bit, Parity=None, Stop=1 bit
2. Set address of IO module properly using dip switches.

IO – 16DI, Address: 1, Switch 1 ON
IO- 16 DO, Address:2, Switch 2 ON
IO– 4RO, Address:3, Switch 1 & 2 ON
IO-8DIO, Address:4, Switch 3 ON
IO-8AI, Address: 5, Switch 3 and 1 ON (Either IO 8 AI/8AIV/8AIIS/8AIVS)
IO-8TC, Address:6, Switch 3 & 2 ON
IO-6RTD, Address:7, Switch 1, 2 & 3 ON
IO-DAIO, Address:8, Switch 4 ON
IO-AO, Address:9, Switch 4 & 1 ON

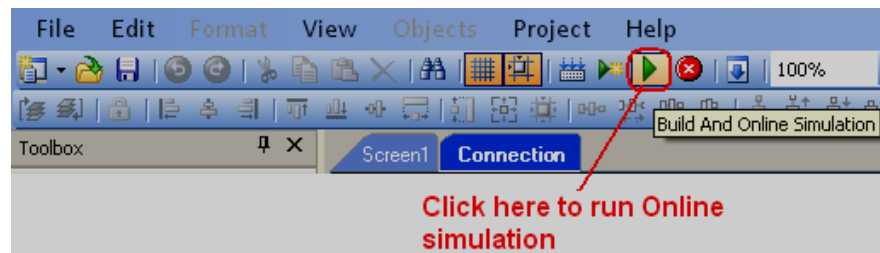
Note: The above address setting configured in project for test purpose. If you wish to use any other address, then, it is required to change address at OPC server configuration properly

3. ONLINE SIMULATION

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

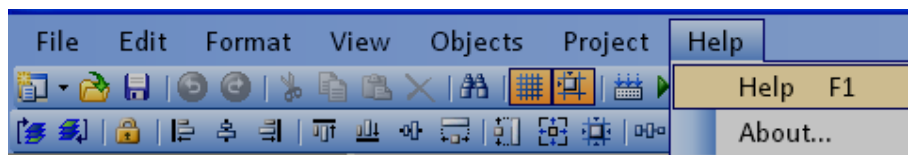


1. Connect proper cable between PC and IO modules
2. If RS485/RS232 converter is used, make sure that all dip switches if any on converter are set to setting like Address:1, Baud rate=9.6 (It means 9600), data=8 bit, Parity=None, Stop=1 bit
3. Make sure unique address is set properly on all IO modules as described earlier
4. Install Panel Studio pack in PC. Open HMI750_IOModule1.prj Panel Studio application in PC. Run Online simulation as shown below

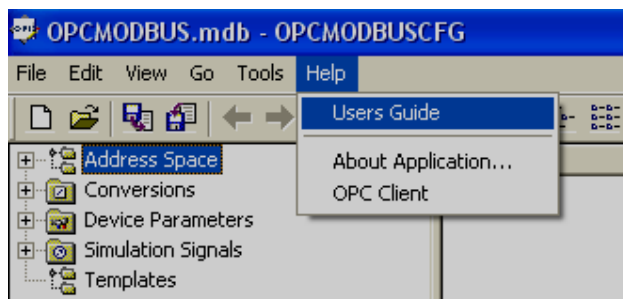


4. REFERENCE MANUALS

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 IO modules

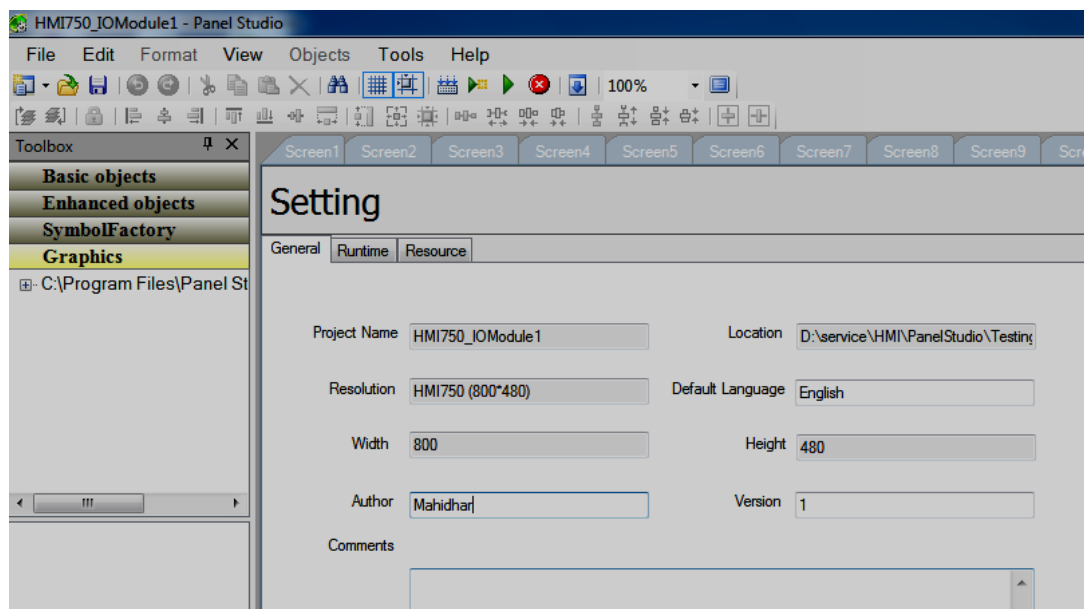
5. OPC SERVER CONFIGURATION SCREENS

HMI 750 Modbus driver configuration

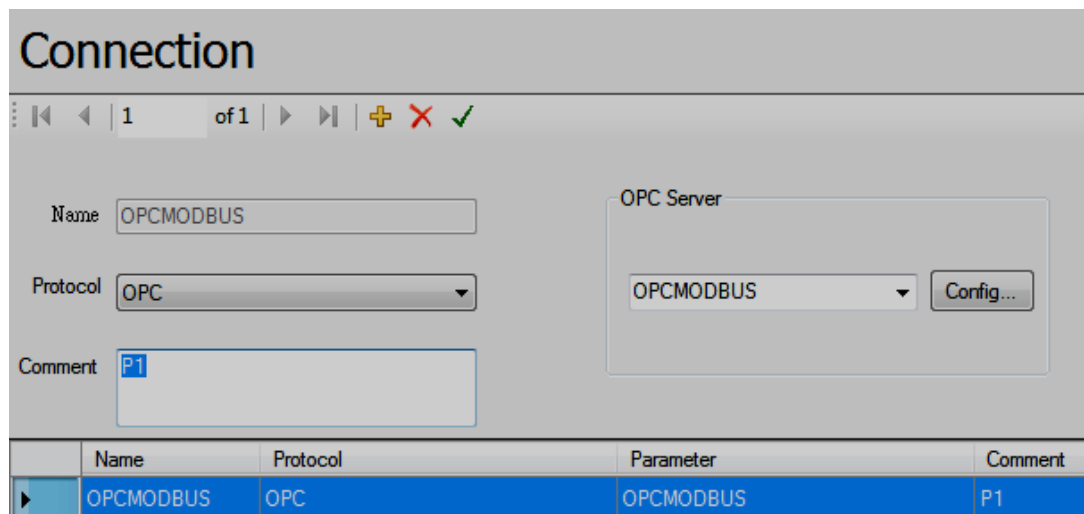
(This is already done in sample application program-all the following pages is for user information only when creating new project)

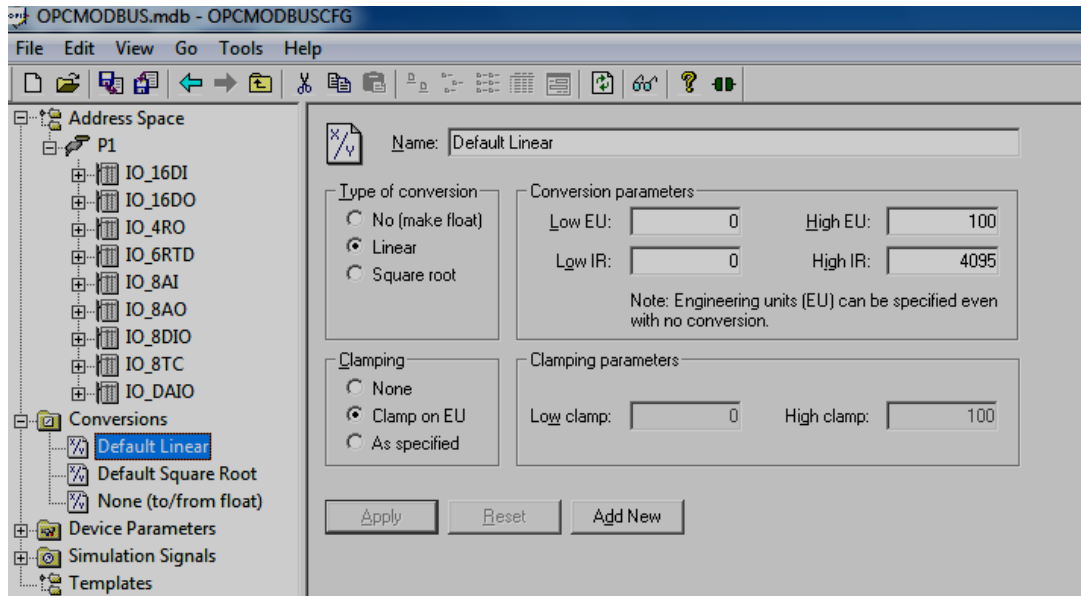
Software: Panel Studio

Open new project with HMI 750



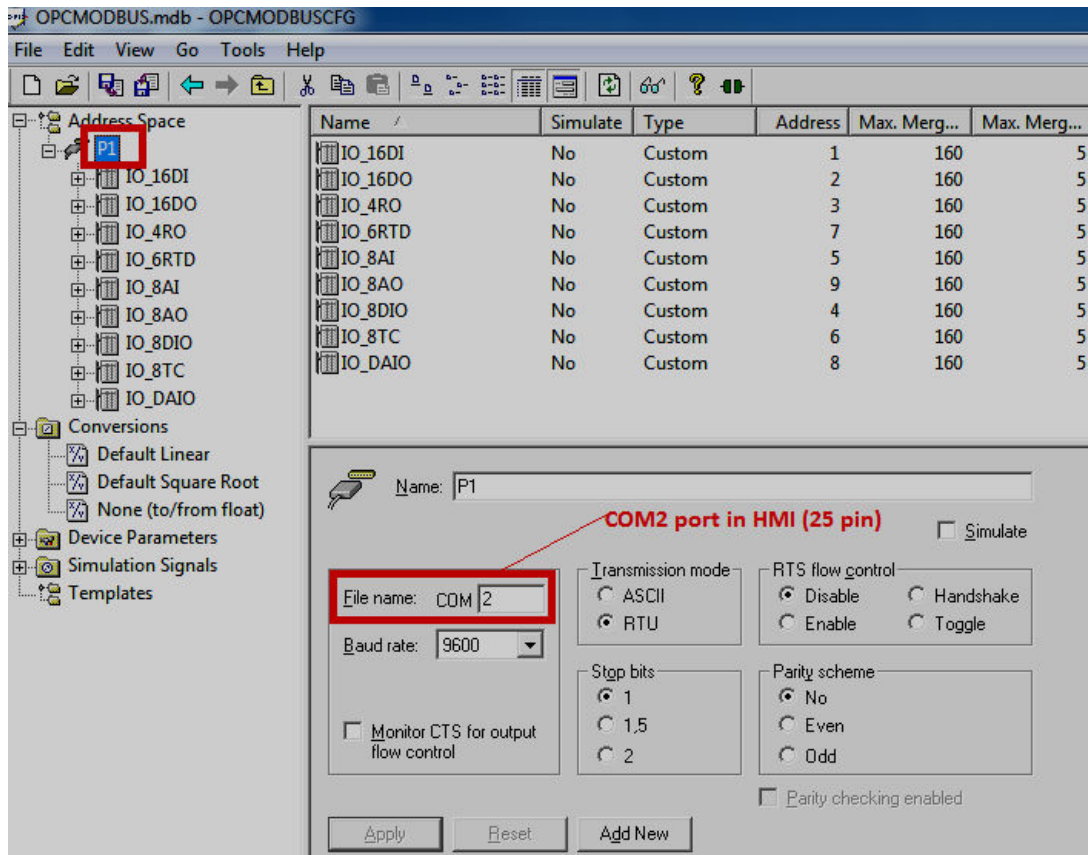
Configure Modbus driver as shown

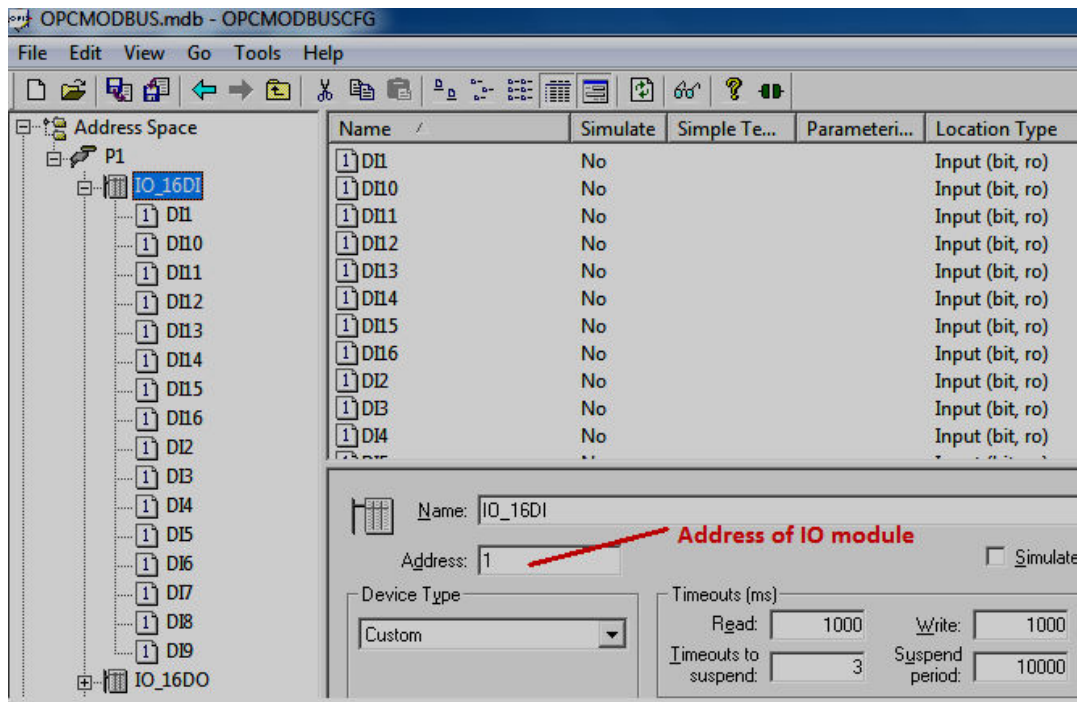




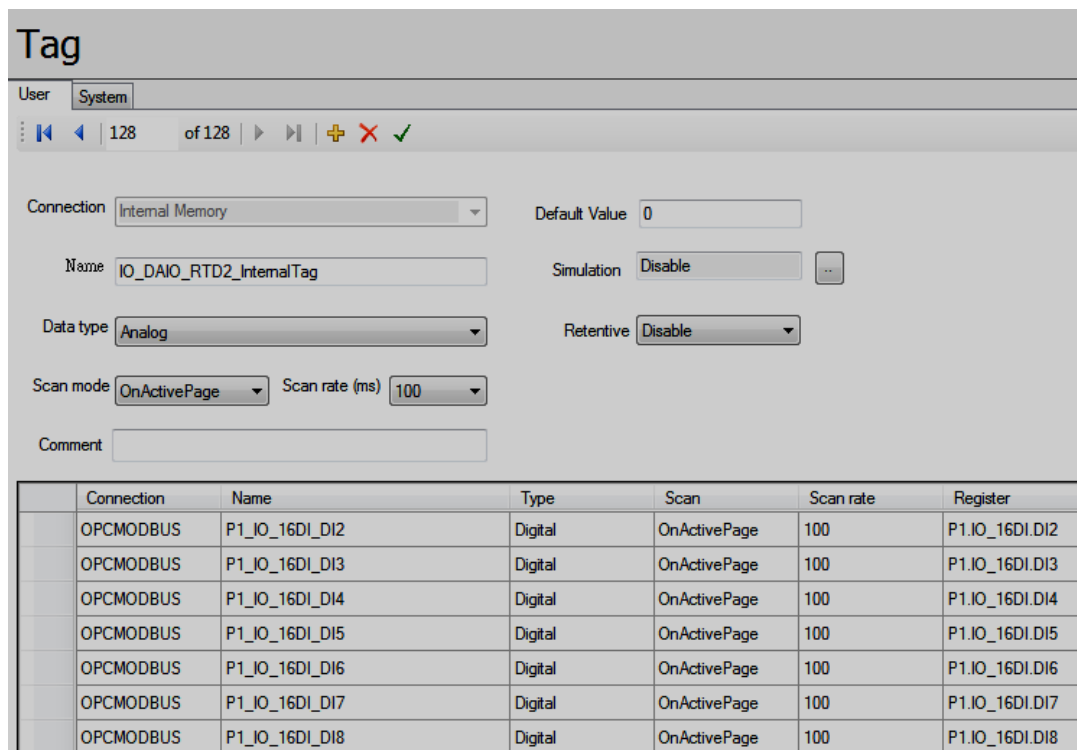
This is scaling conversion. Useful to convert register counts to process values understood by operators.

Ex: Analog input, 12 bit resolution, 0 to 4095.
Show this as 0 to 100 to operator in HMI





If you close OPC server and open tags, it will show IO module tags defined at OPC server



6. HMI CONFIGURATION SCREENS

Screen2

Digital Inputs (IO-16 DI) Address=1

DI1	0	DI5	0	DI9	0	DI13	0
DI2	0	DI6	0	DI10	0	DI14	0
DI3	0	DI7	0	DI11	0	DI15	0
DI4	0	DI8	0	DI12	0	DI16	0

16DI 16DO 4RO 8DIO 8AI 8TC 8RTD DAIO 8AO First

Screen3

Digital Outputs (IO-16 DO) Address=2

DO1	ON	OFF	DO5	ON	OFF	DO9	ON	OFF	DO13	ON	OFF
DO2	ON	OFF	DO6	ON	OFF	DO10	ON	OFF	DO14	ON	OFF
DO3	ON	OFF	DO7	ON	OFF	DO11	ON	OFF	DO15	ON	OFF
DO4	ON	OFF	DO8	ON	OFF	DO12	ON	OFF	DO16	ON	OFF

16DI 16DO 4RO 8DIO 8AI 8TC 8RTD DAIO 8AO First

Screen4

Digital Outputs (4 RO) Address=3

D01	ON	OFF
D02	ON	OFF
D03	ON	OFF
D04	ON	OFF

16DI 16DO 4RO 8DIO 8AI 8TC 8RTD DAIO 8AO First

Screen5

Digital Inputs & Digital Outputs (IO-8 DIO) Address=4

DI1	0	DI5	0	D01	ON	OFF	D05	ON	OFF
DI2	0	DI6	0	D02	ON	OFF	D06	ON	OFF
DI3	0	DI7	0	D03	ON	OFF	D07	ON	OFF
DI4	0	DI8	0	D04	ON	OFF	D08	ON	OFF

16DI 16DO 4RO 8DIO 8AI 8TC 8RTD DAIO 8AO First

Analog inputs (IO-8AII/IO-8AIIS)

Address=5

AI1	
AI2	
AI3	
AI4	

AI5	
AI6	
AI7	
AI8	

Conversion at OPC server

0 to 4095 = 0 to 100

16DI	16DO	4RO	8DIO	8AI	8TC	8RTD	DAIO	8AO	First
------	------	-----	------	-----	-----	------	------	-----	-------

Thermocouple inputs (IO-8TC)

Address=6

AI1	
AI2	
AI3	
AI4	

AI5	
AI6	
AI7	
AI8	

TC Type	J Type
CJC Temp	
Units Type	Deg.C
Dip switch	

16DI	16DO	4RO	8DIO	8AI	8TC	8RTD	DAIO	8AO	First
------	------	-----	------	-----	-----	------	------	-----	-------

Screen8

RTD inputs (IO-6RTD) Address=7

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>AI1</td><td></td></tr> <tr><td>AI2</td><td></td></tr> <tr><td>AI3</td><td></td></tr> <tr><td>AI4</td><td></td></tr> </table>	AI1		AI2		AI3		AI4		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>AI5</td><td></td></tr> <tr><td>AI6</td><td></td></tr> </table>	AI5		AI6		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>RTD Type</td> <td>PT100</td> </tr> <tr> <td>Units Type</td> <td>Deg.C</td> </tr> </table>	RTD Type	PT100	Units Type	Deg.C
AI1																		
AI2																		
AI3																		
AI4																		
AI5																		
AI6																		
RTD Type	PT100																	
Units Type	Deg.C																	

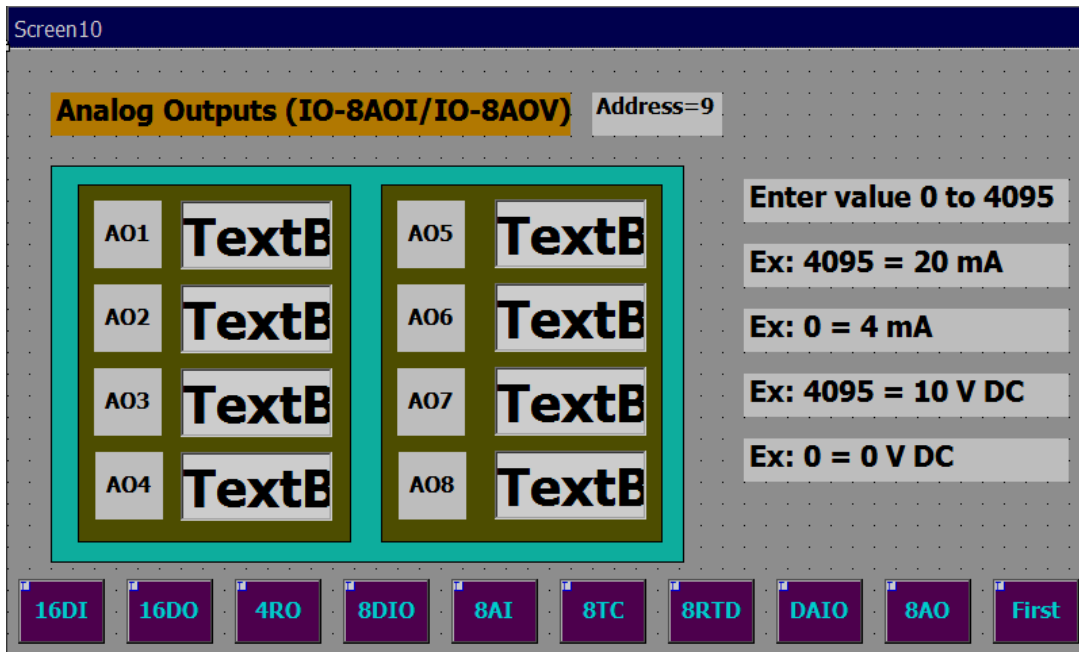
16DI 16DO 4RO 8DIO 8AI 8TC 8RTD DAIO 8AO First

Screen9

Combination module (IO-DAIO) Address=8

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>DI1</td><td>0</td></tr> <tr><td>DI2</td><td>0</td></tr> <tr><td>DI3</td><td>0</td></tr> <tr><td>DI4</td><td>0</td></tr> </table>	DI1	0	DI2	0	DI3	0	DI4	0	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>DO1</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>DO2</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>A01</td> <td>0</td> <td>▲ ▼</td> </tr> <tr> <td colspan="3">Enter 0 to 4095</td> </tr> <tr> <td>A01 Type</td> <td colspan="2"></td> </tr> </table>	DO1	ON	OFF	DO2	ON	OFF	A01	0	▲ ▼	Enter 0 to 4095			A01 Type			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>AI1</td> <td></td> <td>Type</td> <td></td> </tr> <tr> <td>AI2</td> <td></td> <td>Type</td> <td></td> </tr> <tr> <td>RTD1</td> <td></td> <td>Type</td> <td></td> </tr> <tr> <td>RTD2</td> <td></td> <td>Type</td> <td></td> </tr> </table>	AI1		Type		AI2		Type		RTD1		Type		RTD2		Type	
DI1	0																																								
DI2	0																																								
DI3	0																																								
DI4	0																																								
DO1	ON	OFF																																							
DO2	ON	OFF																																							
A01	0	▲ ▼																																							
Enter 0 to 4095																																									
A01 Type																																									
AI1		Type																																							
AI2		Type																																							
RTD1		Type																																							
RTD2		Type																																							

16DI 16DO 4RO 8DIO 8AI 8TC 8RTD DAIO 8AO First



IO_8TC_Conversion()

//From Thermocouple module, temp. values comes as 264 for a temperature of 26.4
 // Modbus do not know decimal point. So, it need to divide the value by 10 to show temp.values properly

```
IO8TC_CJC_InternalTag=(P1_IO_8TC_CJCTemp/10);
IO_8TC_AI1_InternalTag=(P1_IO_8TC_AI1/10);
IO_8TC_AI2_InternalTag=(P1_IO_8TC_AI2/10);
IO_8TC_AI3_InternalTag=(P1_IO_8TC_AI3/10);
IO_8TC_AI4_InternalTag=(P1_IO_8TC_AI4/10);
IO_8TC_AI5_InternalTag=(P1_IO_8TC_AI5/10);
IO_8TC_AI6_InternalTag=(P1_IO_8TC_AI6/10);
IO_8TC_AI7_InternalTag=(P1_IO_8TC_AI7/10);
IO_8TC_AI8_InternalTag=(P1_IO_8TC_AI8/10);
```

IO_6RTD_Conversion()

//From Thermocouple module, temp. values comes as 264 for a temperature of 26.4
 // Modbus do not know decimal point. So, it need to divide the value by 10 to show temp.values properly

```
IO_6RTD_AI1_InternalTag=(P1_IO_6RTD_AI1/10);
IO_6RTD_AI2_InternalTag=(P1_IO_6RTD_AI2/10);
IO_6RTD_AI3_InternalTag=(P1_IO_6RTD_AI3/10);
IO_6RTD_AI4_InternalTag=(P1_IO_6RTD_AI4/10);
IO_6RTD_AI5_InternalTag=(P1_IO_6RTD_AI5/10);
IO_6RTD_AI6_InternalTag=(P1_IO_6RTD_AI6/10);
```

IO_DAIO_RTD_Conversion()

//From Thermocouple module, temp. values comes as 264 for a temperature of 26.4
// Modbus do not know decimal point. So, it need to divide the value by 10 to show
temp.values properly

```
IO_DAIO_RTD1_InternalTag=(P1_IO_DAIO_RTD1/10);  
IO_DAIO_RTD2_InternalTag=(P1_IO_DAIO_RTD2/10);
```

Call all the above scripts from scheduler as shown below

Scheduler

1 of 1

Type: Repeat Countdown

Action: Enable

Event:
IO_8TC_Conversion();
IO_6RTD_Conversion();
IO_DAIO_RTD_Conversion();

Day: 0

Hour: 0

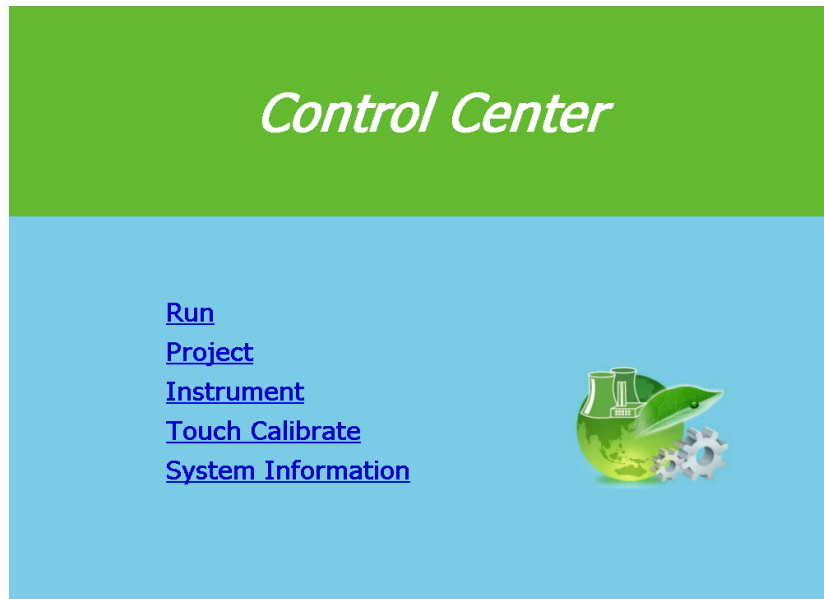
Minute: 0

Second: 1

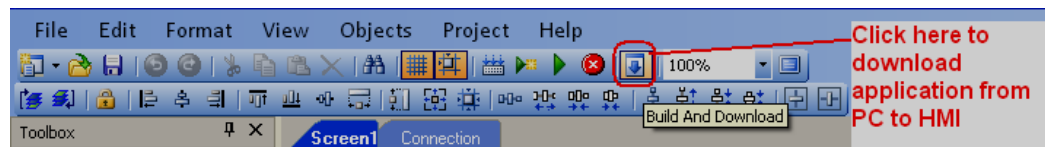
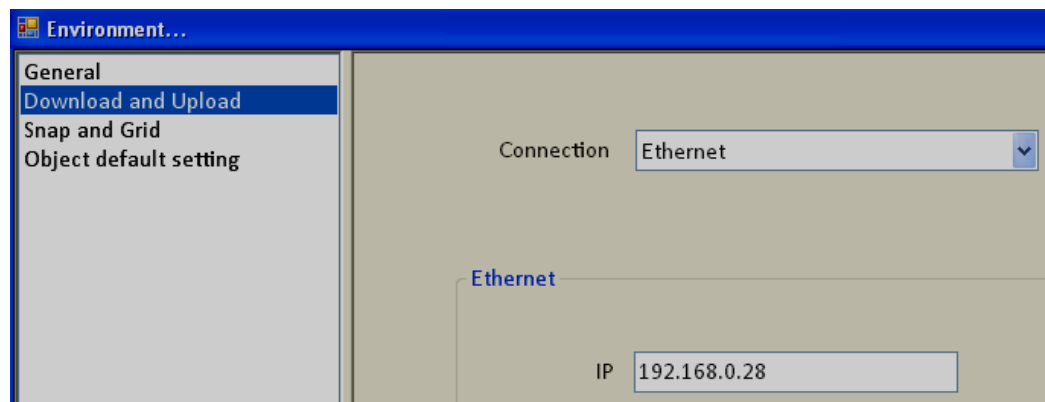
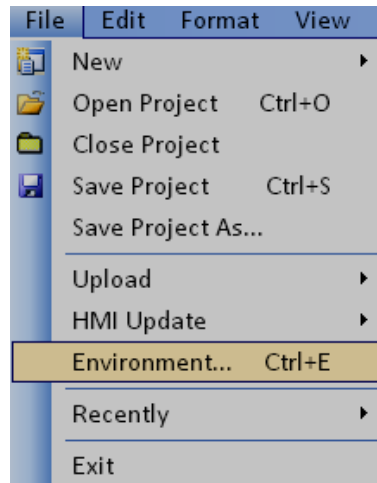
No	Type	Action	Event	Day	Hour	Minute	Second
1	Repeat Countdown	Enable	IO_8TC_Conversion();IO_6RTD_Conv...	0	0	0	1

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_IOModule1 application from PC to HMI via Ethernet



5. Set dip switch at IO module as explained earlier for default communication settings. Ex: Baud rate=9600, data=8 bit, Parity=None, Stop=1 bit.
6. Connect the cable between HMI 750, COM2 and IO module
7. Restart HMI
8. From Control center at HMI, press "Run"

8. OPC SERVER TESTING

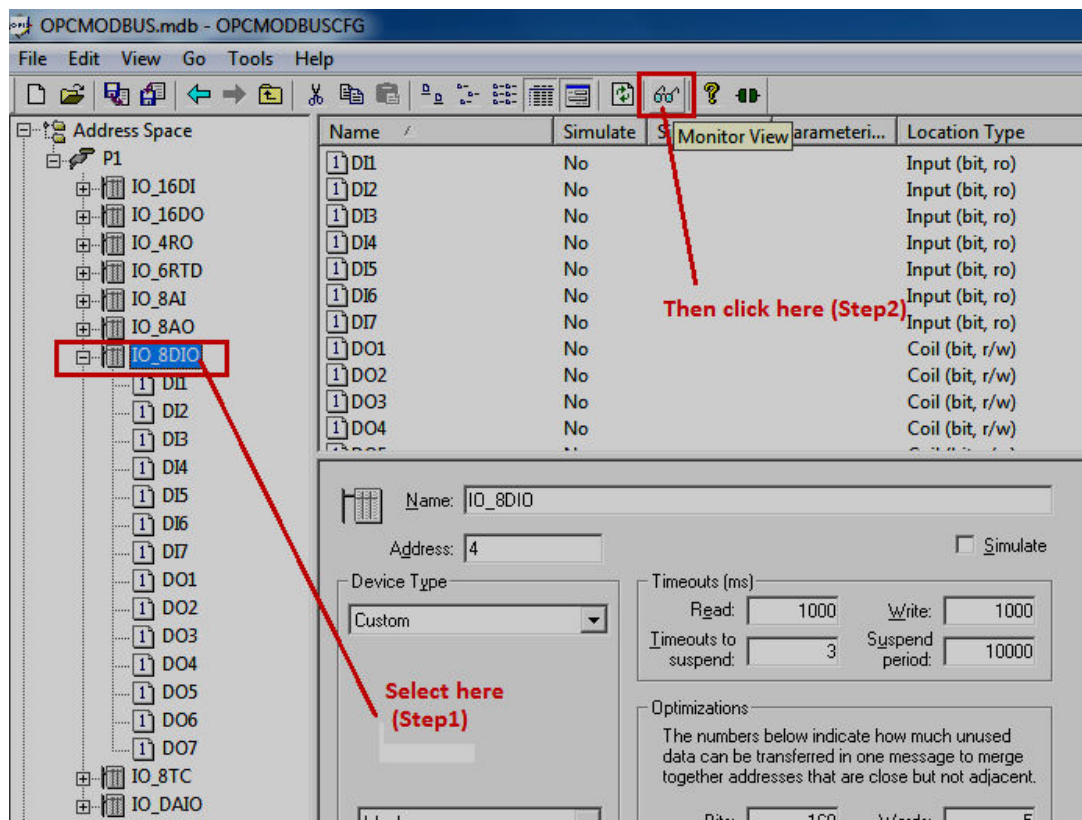
How to check communication between PC and IO module via OPC server?

(For advanced users only)

Connect IO module 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 IO Module

Now, please make sure that COM2 is available in PC



Item ID	Value	Timestamp	Quality	Subquality	Limit
<input checked="" type="checkbox"/> P1.IO_8DIO.DI1	0 (VT_BOOL)	06/22/10 16:58:29.843	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DI2	0 (VT_BOOL)	06/22/10 16:58:29.843	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DI3	0 (VT_BOOL)	06/22/10 16:58:29.843	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DI4	0 (VT_BOOL)	06/22/10 16:58:29.843	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DI5	0 (VT_BOOL)	06/22/10 16:58:29.843	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DI6	0 (VT_BOOL)	06/22/10 16:58:29.843	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DI7	0 (VT_BOOL)	06/22/10 16:58:29.843	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DO1	0 (VT_BOOL)	06/22/10 16:58:29.890	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DO2	0 (VT_BOOL)	06/22/10 16:58:29.890	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DO3	0 (VT_BOOL)	06/22/10 16:58:29.890	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DO4	0 (VT_BOOL)	06/22/10 16:58:29.890	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DO5	0 (VT_BOOL)	06/22/10 16:58:29.890	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DO6	0 (VT_BOOL)	06/22/10 16:58:29.890	Good	Non-specific	Not Limited
<input checked="" type="checkbox"/> P1.IO_8DIO.DO7	0 (VT_BOOL)	06/22/10 16:58:29.890	Good	Non-specific	Not Limited

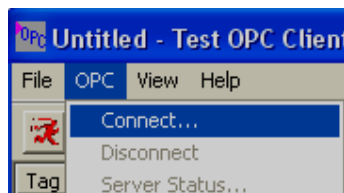
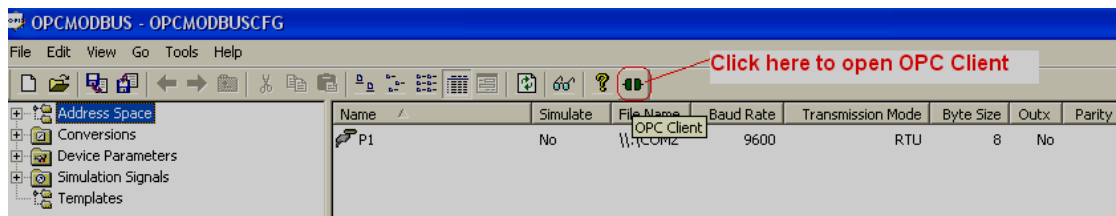
Select the check box if it is not selected, then, it should show status of tag in Real time. If quality is good, then, communication is OK. If it is showing “Bad”, then, you need to check cable, communication settings in IO module, COM port number in OPC server configuration at PC etc..

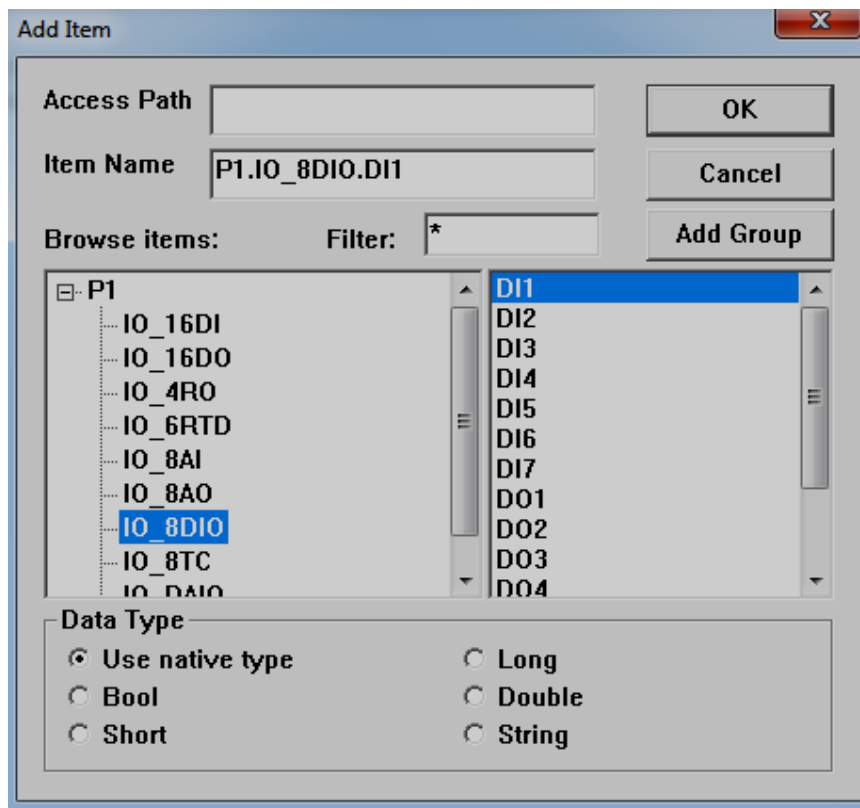
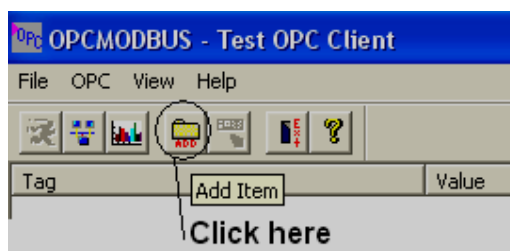
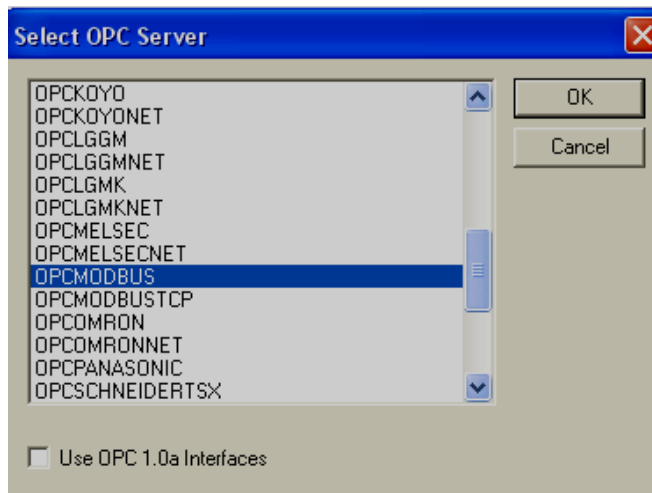
9. OPC CLIENT TESTING

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

(For advanced users only)

Ex: IO-8DIO module






Select the IO module, focus on any tag like DI1 and then click at "Add group", it will add all the tags of this IO module in OPC client for testing purpose

OPCMODBUS - Test OPC Client


File OPC View Help



Tag	Value
P1.IO_8DIO.DI1	Off
P1.IO_8DIO.DI2	Off
P1.IO_8DIO.DI3	Off
P1.IO_8DIO.DI4	Off
P1.IO_8DIO.DI5	Off
P1.IO_8DIO.DI6	Off
P1.IO_8DIO.DI7	Off
P1.IO_8DIO.DO1	Off
P1.IO_8DIO.DO2	Off
P1.IO_8DIO.DO3	Off
P1.IO_8DIO.DO4	Off
P1.IO_8DIO.DO5	Off
P1.IO_8DIO.DO6	Off
P1.IO_8DIO.DO7	Off
P1.IO_8DIO.DI1	Off

OPCMODBUS - Test OPC Client

File OPC View Help



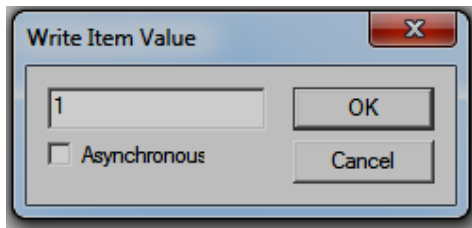
Tag	Value
P1.IO_8DIO.DI1	Off
P1.IO_8DIO.DI2	Off
P1.IO_8DIO.DI3	Off
P1.IO_8DIO.DI4	Off
P1.IO_8DIO.DI5	Off
P1.IO_8DIO.DI6	Off
P1.IO_8DIO.DI7	Off
P1.IO_8DIO.DO1	Off
P1.IO_8DIO.DO2	Off
P1.IO_8DIO.DO3	Off
P1.IO_8DIO.DO4	Off
P1.IO_8DIO.DO5	Off
P1.IO_8DIO.DO6	Off
P1.IO_8DIO.DO7	Off
P1.IO_8DIO.DI1	Off

Write Item

These are digital inputs, so, you can only read status

Step-2, Click at "Write item" icon

Step-1, select this Digital Output tag



Write value 1 and click at “OK”. This will switch ON digital output1 in IO-8DIO module.

Write value 0 and click at “OK”. This will switch OFF digital output1 in IO-8DIO module.