

Chapter 14

Modbus Slave

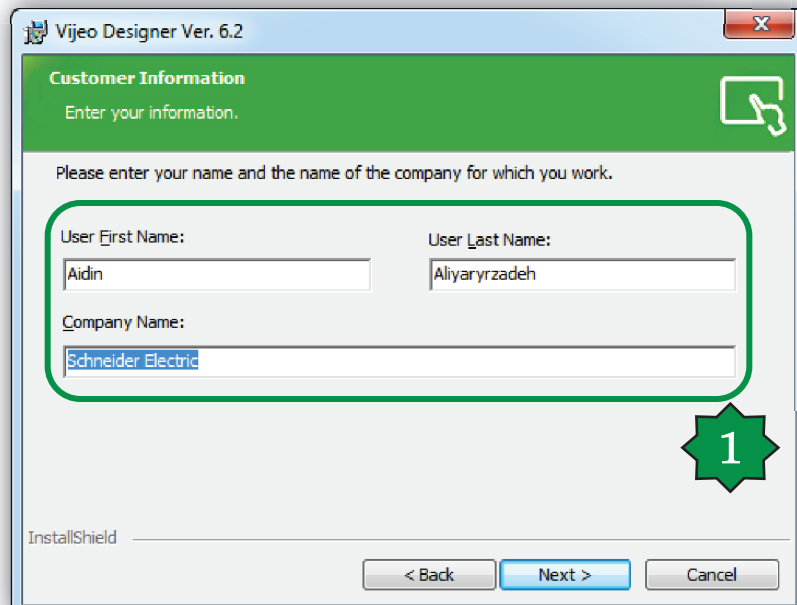
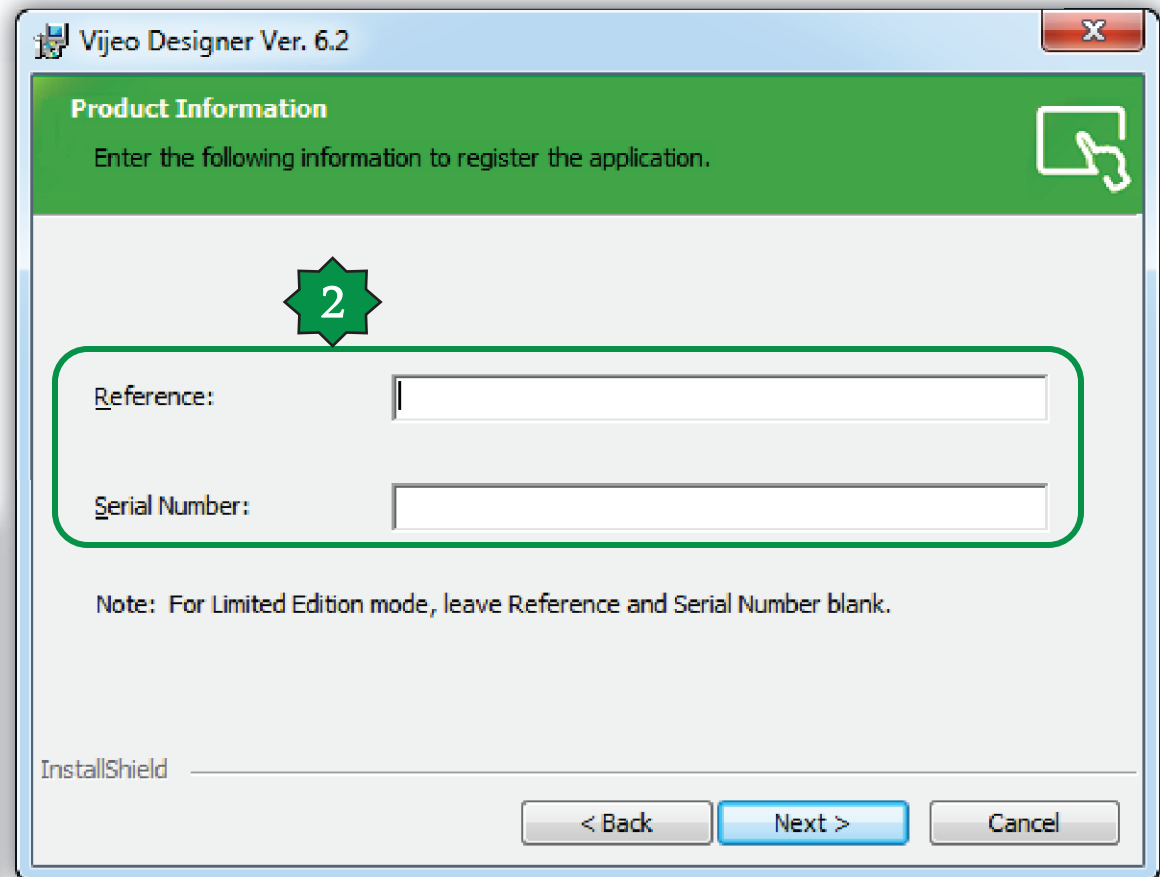
Goal:

Configuration of Free Studio to establish connection between Vijeodesigner & M171P via:

1. Modbus TCP/IP – Vijeodesigner off line simulation
2. Modbus RTU – Megalis target



Vijeo Designer Installation





New Project creation/Modbus TCP-IP

Create New Project

Project Name to Create

Project Name

Target : 1/1

Target Setup

☒ Assign the following IP Address

IP Address

Subnet Mask

Default Gateway

☐ Enable Audit Trails

Additional setup is required to use this feature. Please click on help and review configurations necessary.

Help

< Back Next > Finish Cancel

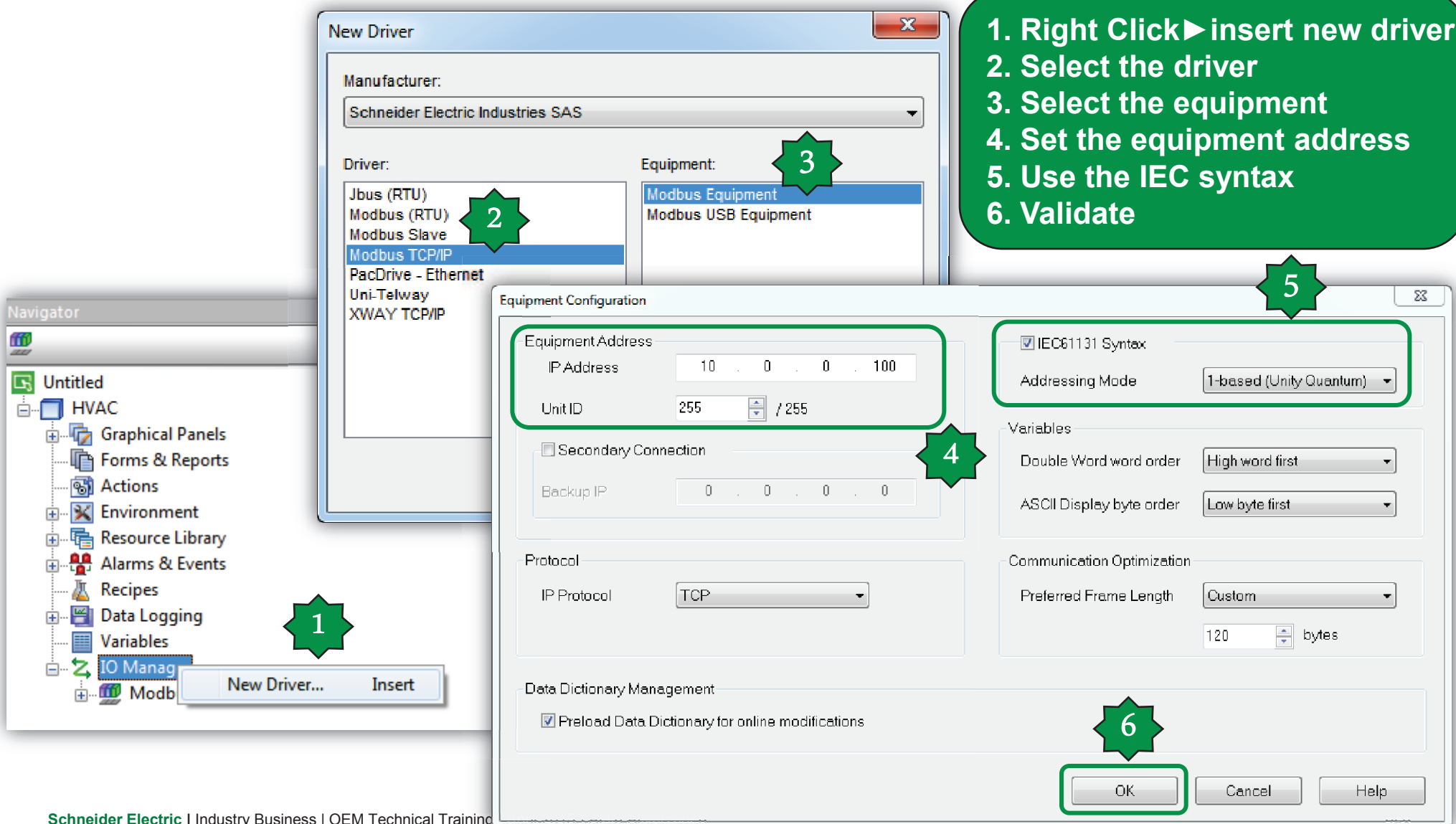
General Settings

1 The left sidebar shows the project structure under 'HVAC Simulation'. The 'Monitoring_HVAC' folder is selected, showing sub-items: Graphical Panels, Forms & Reports, Actions, Environment, Resource Library, Alarms & Events, Recipes, Data Logging, Variables, and IO Manager.

2 The middle settings pane shows the 'General' tab selected. Other tabs include Network, Hardware, Options, Remote Access, Multimedia, Keys, and Alarm.

3 The right configuration pane shows the 'General' settings for 'Monitoring_HVAC'. The 'Type' is set to 'HMISTU Series' and the 'Model' is set to 'HMISTU655 (320x240)'. Other settings include Target Color (64K Colors), Initial Panel ID (1: Panel 1), Download (USB), Target IP Address (10 . 0 . 0 . 120), Host Name, COM Port, Baud Rate, User Application (Main Drive), Include Editor Project, Preserve Run-Time Data (checked), and Use NAT.

I/O manager definition



1. Right Click► insert new driver

2. Select the driver

3. Select the equipment

4. Set the equipment address

5. Use the IEC syntax

6. Validate

Equipment Configuration

Equipment Address
IP Address: 10 . 0 . 0 . 100
Unit ID: 255 / 255

☐ Secondary Connection
Backup IP: 0 . 0 . 0 . 0

Protocol
IP Protocol: TCP

☒ IEC61131 Syntax
Addressing Mode: 1-based (Unity Quantum)

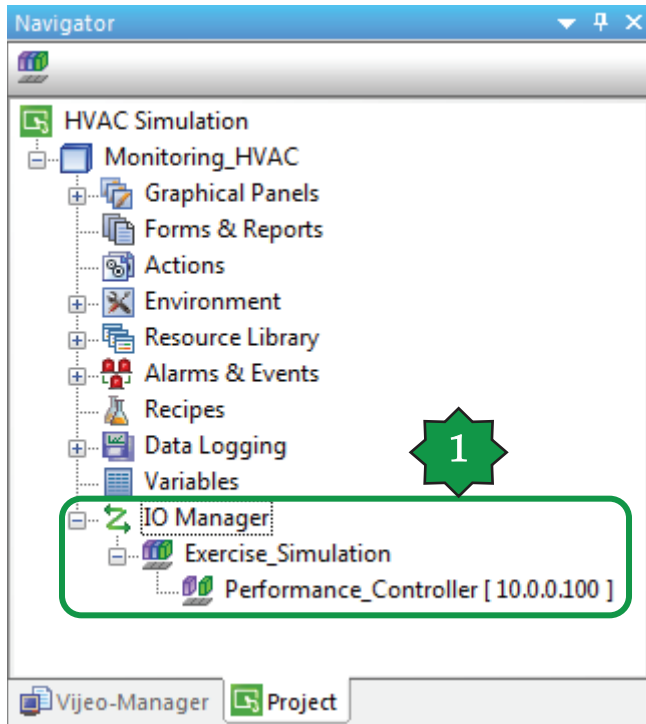
Variables
Double Word word order: High word first
ASCII Display byte order: Low byte first

Communication Optimization
Preferred Frame Length: Custom
120 bytes

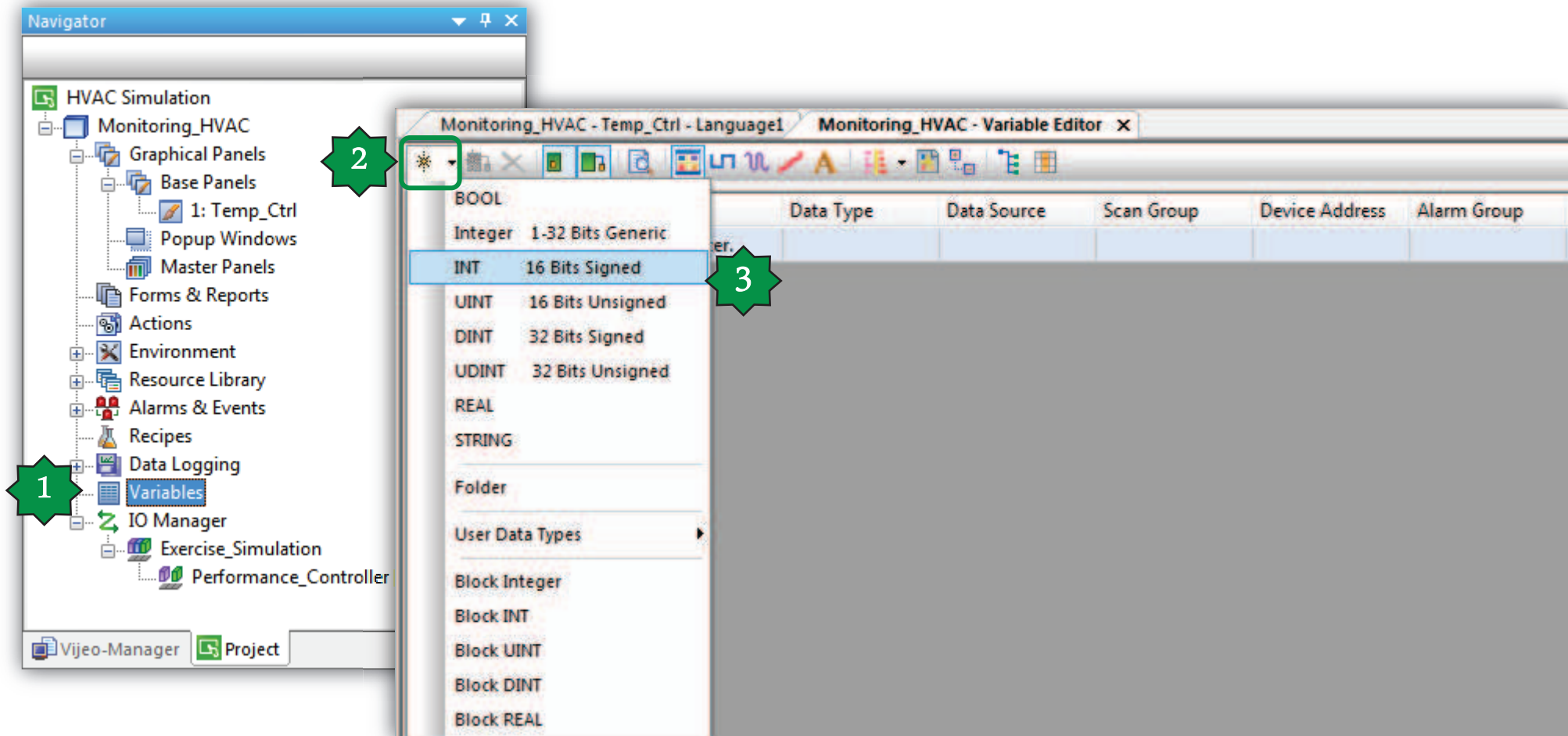
Data Dictionary Management
☒ Preload Data Dictionary for online modifications

OK Cancel Help

Renaming created driver & equipment



External Variable Definition



The screenshot illustrates the steps to define an external variable in the Vijeo-Manager software:

1. In the **Navigator** pane, expand the **Monitoring_HVAC** project and select **Variables**.
2. Click the **Add** button (represented by a star icon) in the toolbar of the **Monitoring_HVAC - Variable Editor** window.
3. In the dropdown menu, select **INT 16 Bits Signed** as the data type.

The **Monitoring_HVAC - Variable Editor** window displays a table with the following columns:

Data Type	Data Source	Scan Group	Device Address	Alarm Group



Variable Properties/Addressing

FreeEvolution Status Variables

Add
 Remove
 Recalc

1

#	Address	Name	Device type	Application type	Default value	Min	Max	Scale	Offset	Unit	Format	AccessLevel	Read only
1	8960	Ambient_Temperature	Signed 16-bit	INT				1	0	°C	XXX.Y	Always visible	True

Modbus TCP/IP

Address: %MWI

Offset (i): 8960

Bit (j):

Preview: %MW8960

OK Cancel Help

2

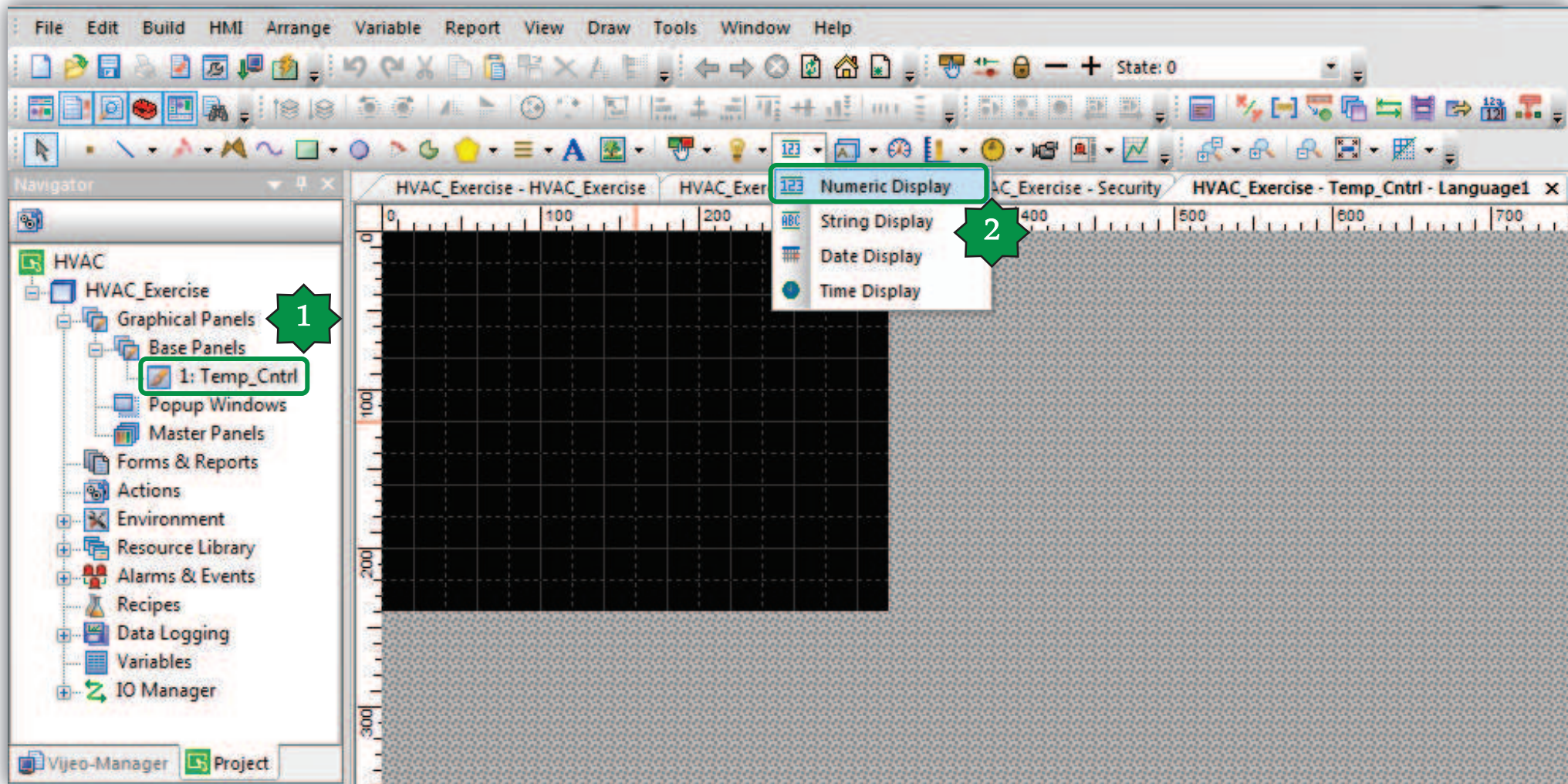
Note: No 1 bit shifting is needed

3

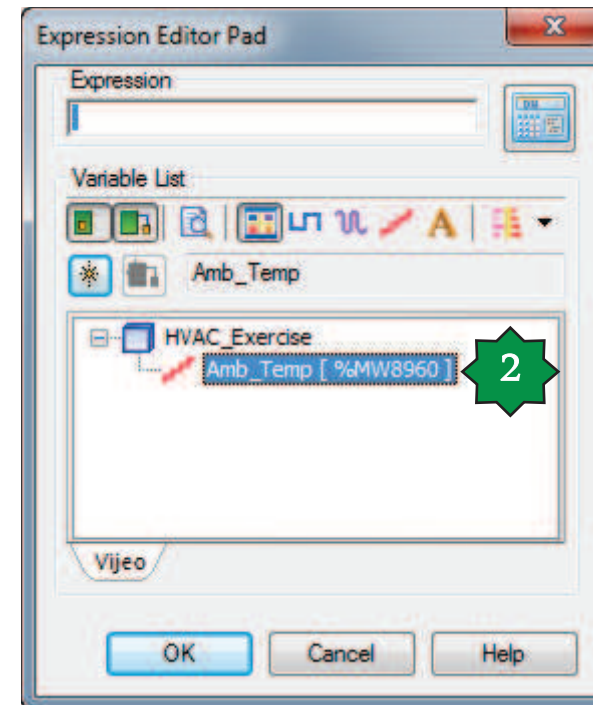
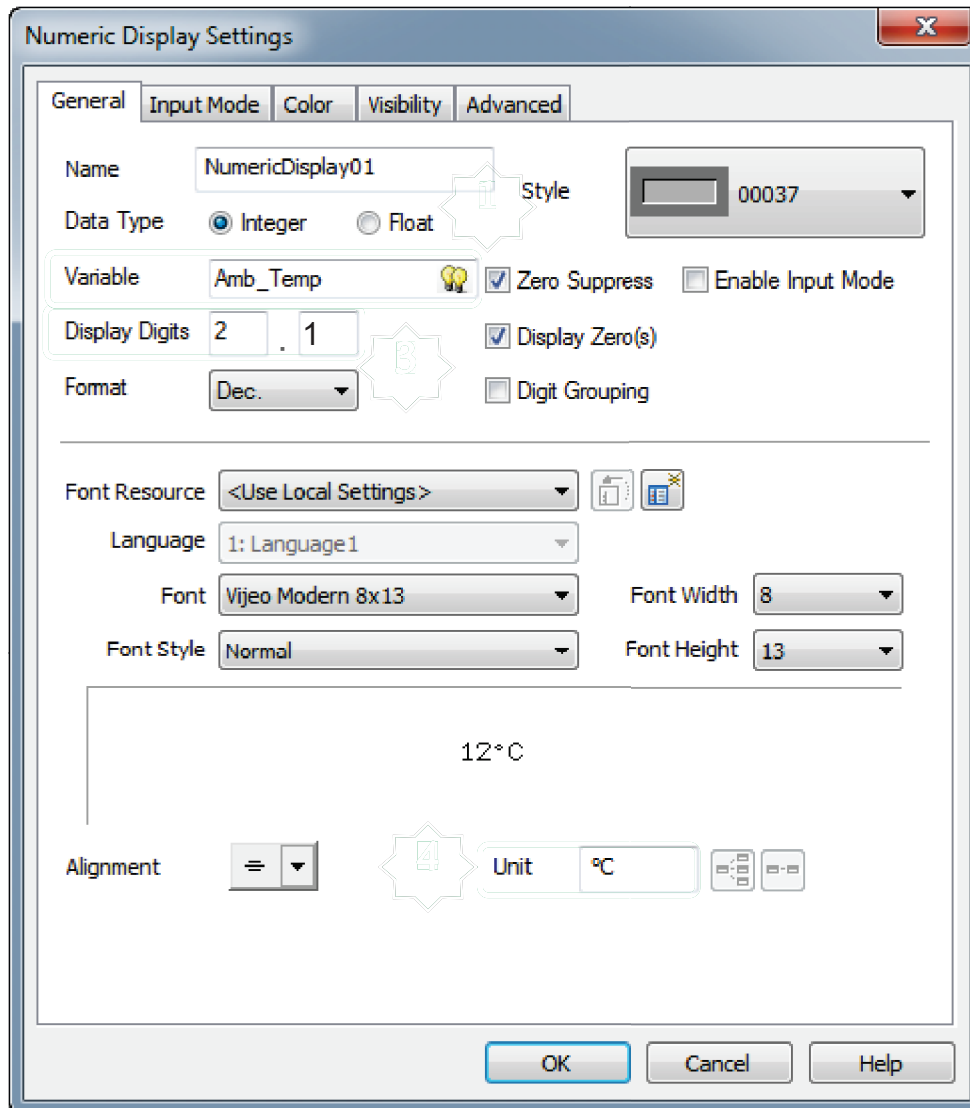
	Name	Data Type	Data Source	Scan Group	Device Address	Alarm Group	Logging Group
1	Amb_Temp	INT	External	Performance_Controller	%MW8960	Disabled	None

1. Check the status variable address defined in controller
2. Define an external variable in HMI side

Assigning the variable to the Numeric disp.

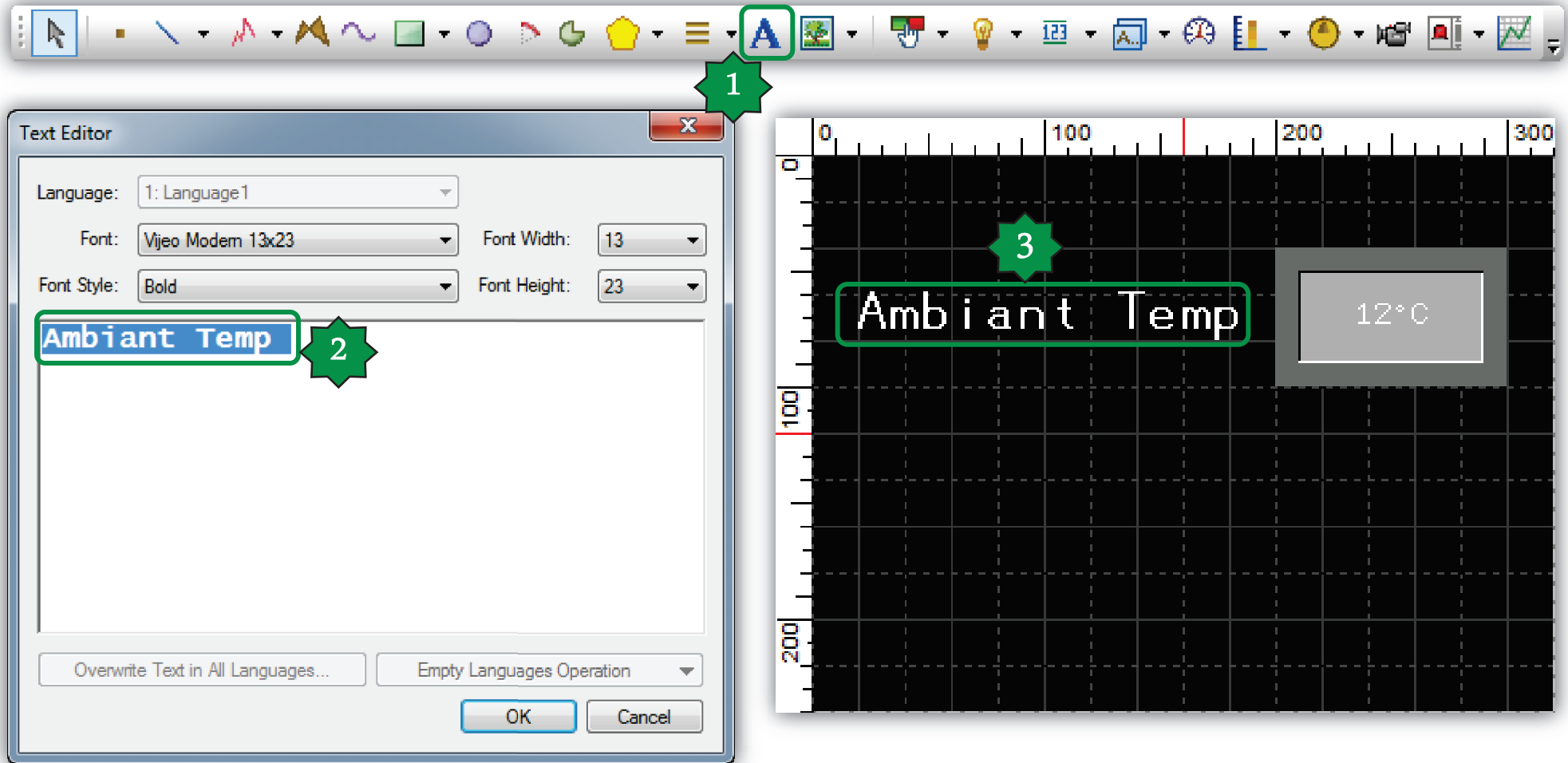


Numeric Display Properties



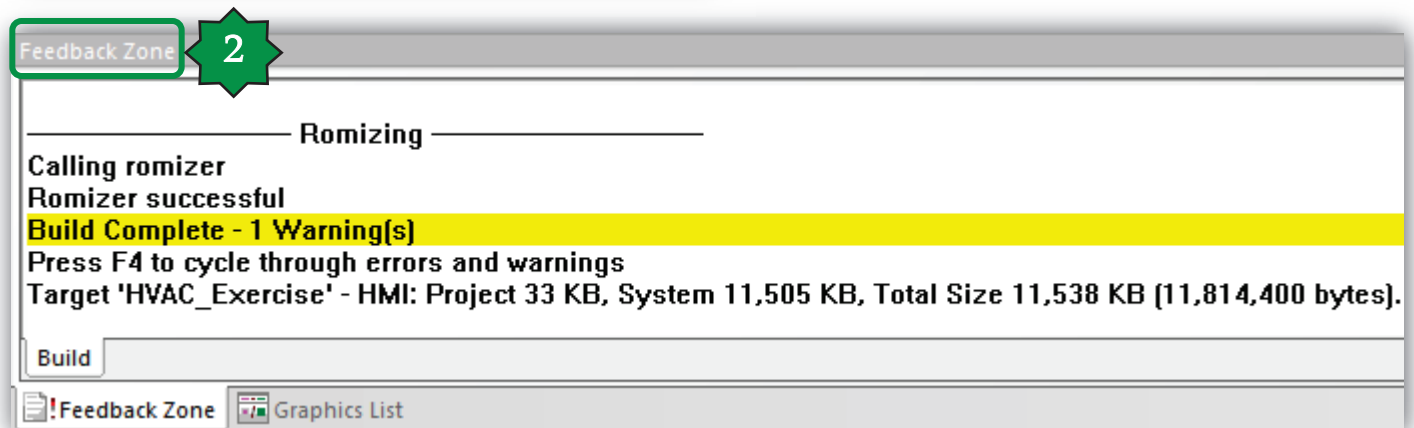
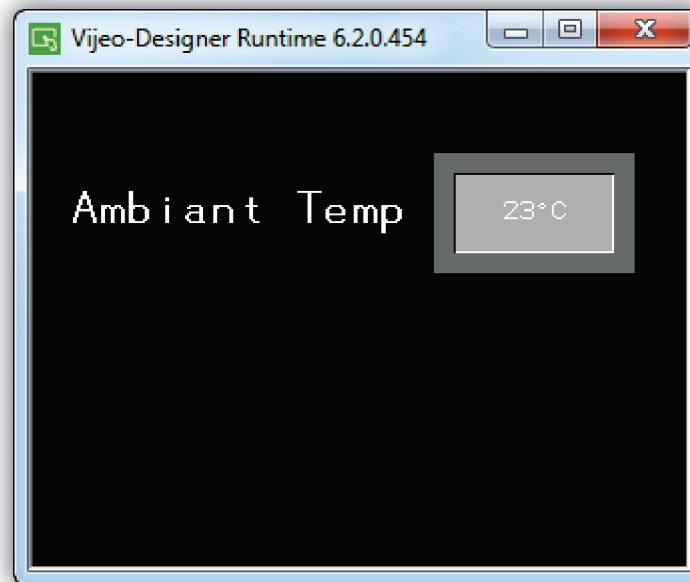
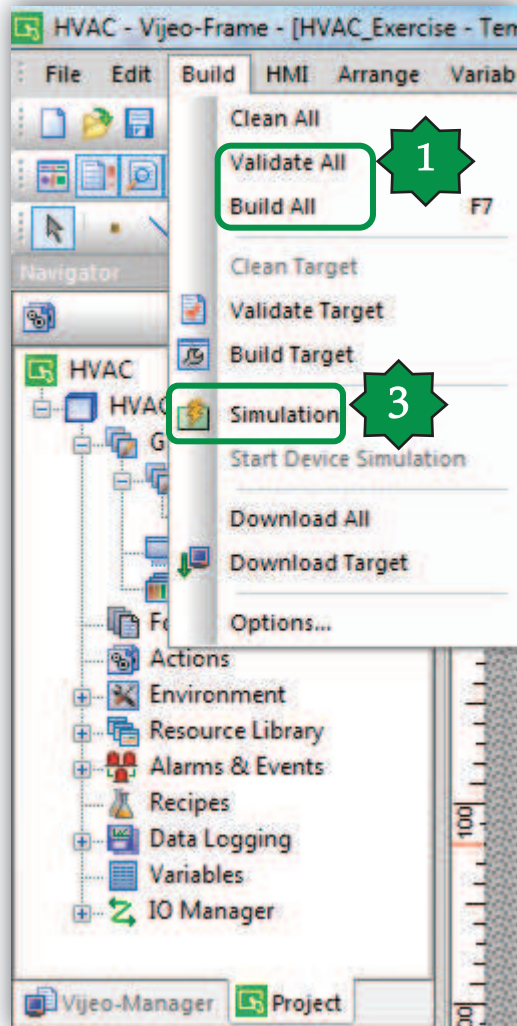


Forming the Panel





Running Simulation





EEPROM parameters assigning

FreeEvolution EEPROM Parameters

Add Remove Recalc

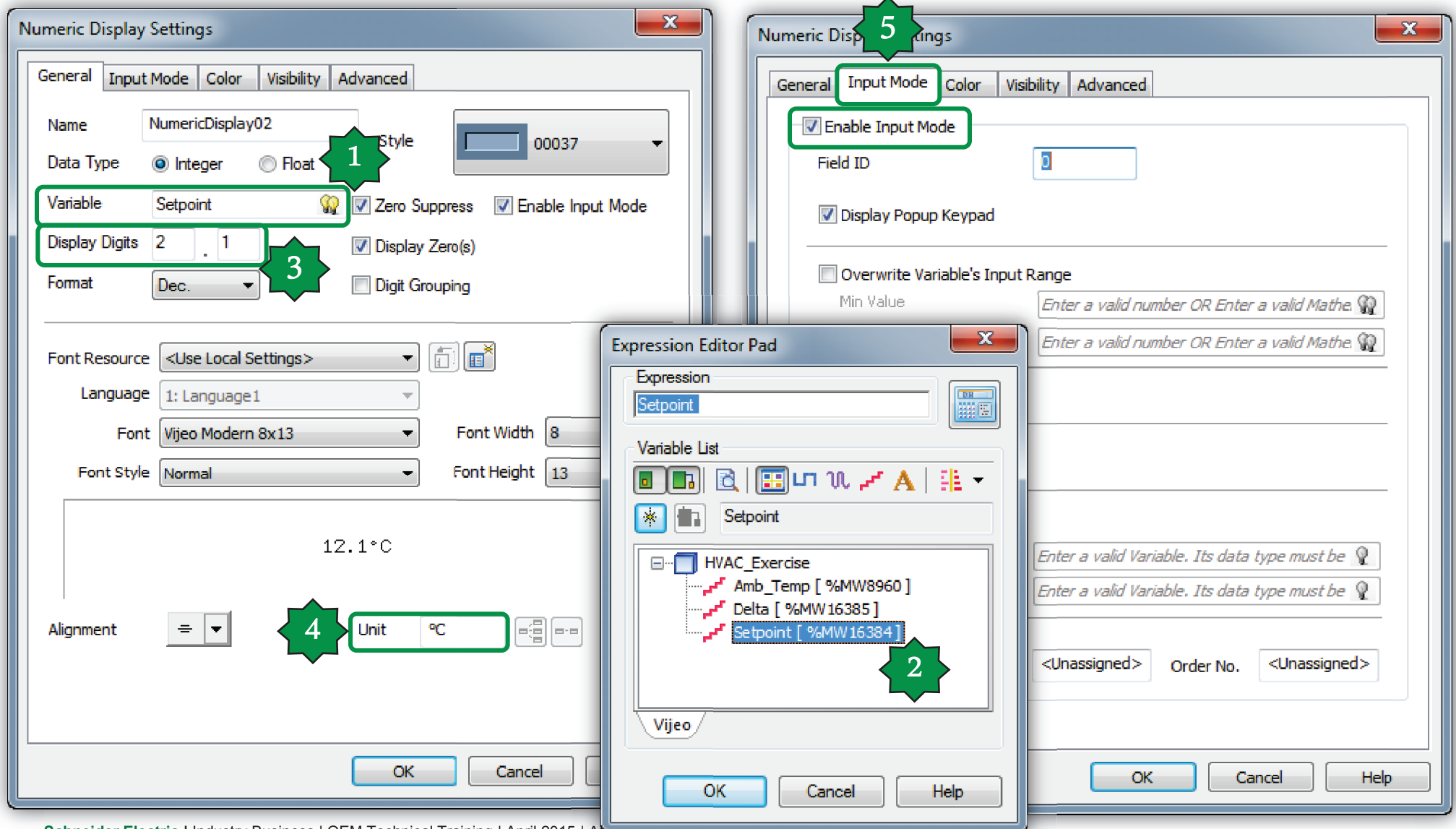
1

#	Address	Name	Device type	Application type	Size	Default value	Min	Max	Scale	Offset	Unit	Format	AccessLevel
1	16384	SetPoint	Signed 16-bit	INT		180	150	300	1	0	°C	XXX.Y	Always visible
2	16385	Differentiation	Signed 16-bit	INT		20	5	50	1	0	°C	XXX.Y	Always visible

	Name	Data Type	Data Source	Scan Group	Device Address	Alarm Group	Logging Group
1	Amb_Temp	INT	External	Performance_Controller	%MW8960	Disabled	None
2	Setpoint	INT	External	Performance_Controller	%MW16384	Disabled	None
3	Delta	INT	External	Performance_Controller	%MW16385	Disabled	None

2

Numeric Display settings/Enable Input



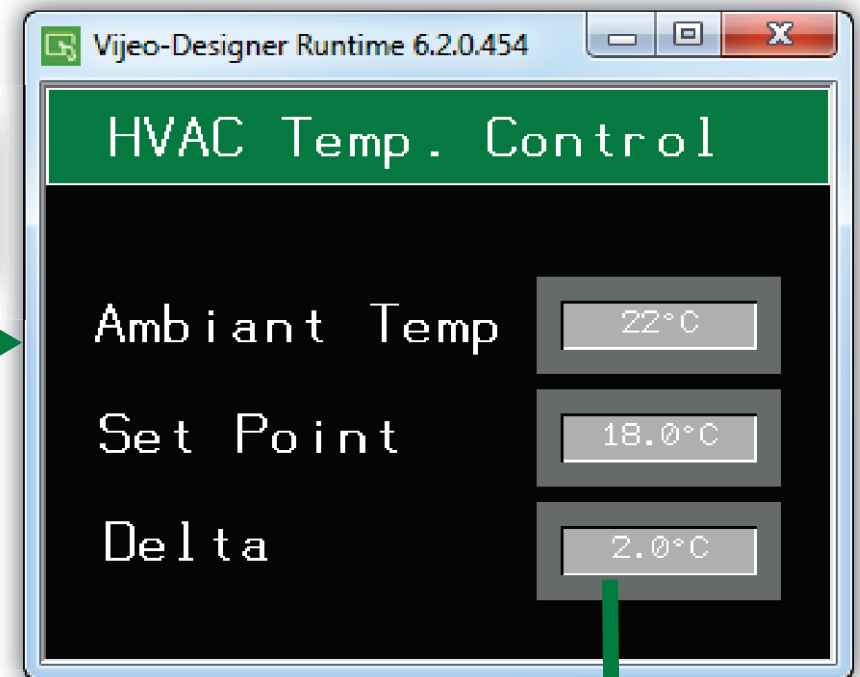
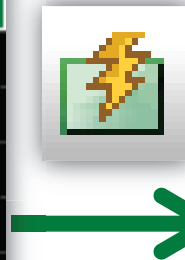
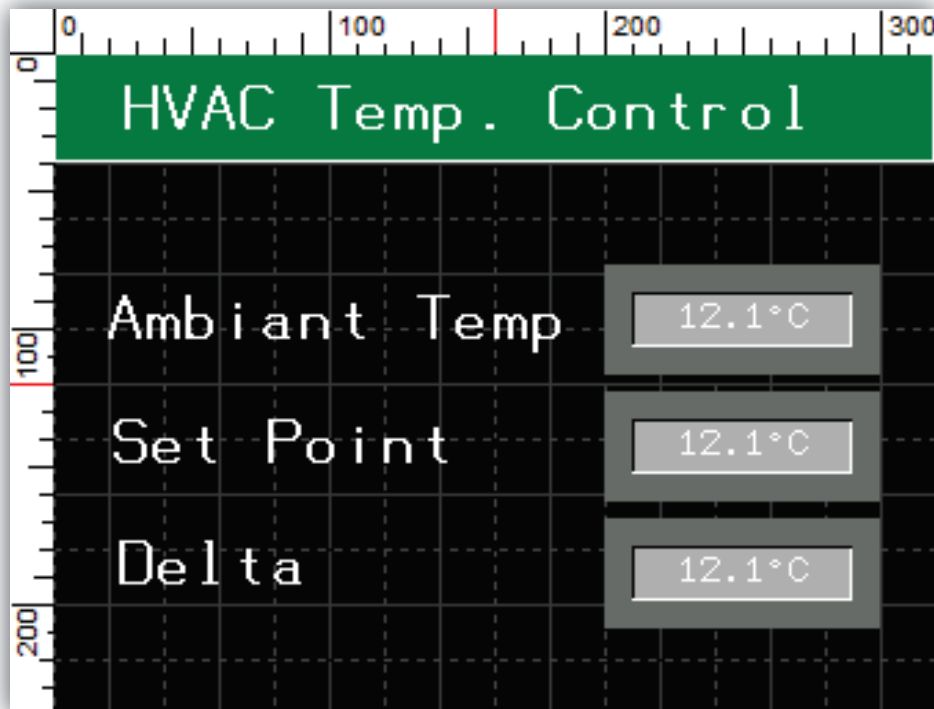
The image shows the 'Numeric Display Settings' dialog box with five numbered callouts indicating the steps to configure the numeric display and enable input:

- 1**: Select the **Variable** (Setpoint) and **Display Digits** (2 integer, 1 decimal).
- 2**: In the **Expression Editor Pad**, select the **Setpoint** variable from the **HVAC_Exercise** project.
- 3**: Select the **Format** (Dec.) and **Unit** (°C).
- 4**: Select the **Unit** (°C) and **Alignment** (center).
- 5**: In the **Input Mode** tab, select **Enable Input Mode**.

The dialog box also includes tabs for General, Input Mode, Color, Visibility, and Advanced. The General tab shows the Name (NumericDisplay02), Data Type (Integer), Style (00037), and Font settings. The Input Mode tab shows the Field ID (0), Display Popup Keypad, and Overwrite Variable's Input Range options. The Expression Editor Pad shows the selected variable (Setpoint) and the project structure (HVAC_Exercise).



Panel forming & Simulation



2*Click



ATV control/ final goal



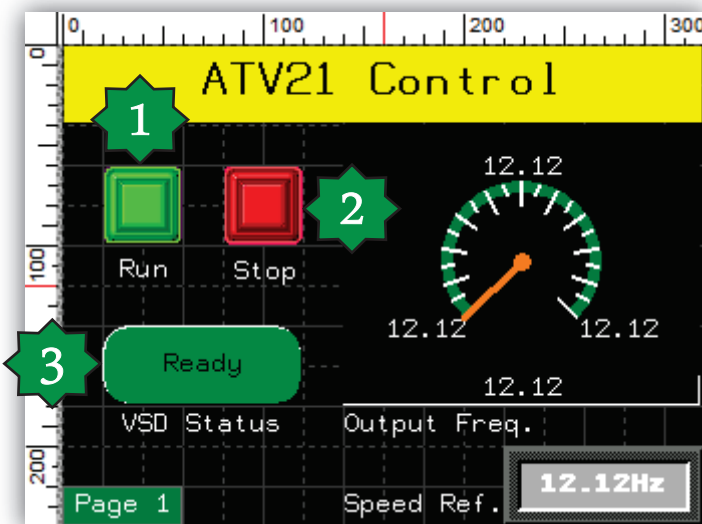


ATV Ctrl./Variable & Panel declaration

ID	Address	Name	Data Type	Unit	Scan Group	Device Address	Alarm Group	Logging Group
8	8967	ATV_Command	Unsigned 16-bit	UINT			Always visible	False
9	8968	ATV_Speed_Reference	Signed 16-bit	INT		Hz	Always visible	False
10	8969	ATV_Output_Frequency	Signed 16-bit	INT		Hz	Always visible	True
11	8970	Modbus_Comm_Error	Boolean	BOOL			Always visible	True
12	8971	Web_ATV_Comd	Boolean	BOOL			Always visible	False
13	8972	Web_ATV_Speed_Ref	Signed 16-bit	INT	0 0 5000	Hz	Always visible	False
14	8973	Web_ATV_Output_Frq	Signed 16-bit	INT		Hz	Always visible	False

	Name	Data Type	Data Source	Scan Group	Device Address	Alarm Group	Logging Group
1	Amb_Temp	INT	External	Performance_C...	%MW8960	Disabled	None
2	ATV_Command	BOOL	External	Performance_C...	%MW8971:X0	Disabled	None
3	ATV_Output_Freq	INT	External	Performance_C...	%MW8973	Disabled	None
4	ATV_Speed_Ref	INT	External	Performance_C...	%MW8972	Disabled	None
5	Delta	INT	External	Performance_C...	%MW16385	Disabled	None
6	Setpoint	INT	External	Performance_C...	%MW16384	Disabled	None

ATV Ctrl./Command & Status



1

Switch Settings

General Color Label Visibility Advanced

Mode ☒ Switch ☐ Switch with Lamp Category Bitmap

Name Switch03

State [Up]

Lamp Enter a valid Condition Expression. It

Style 00003 ☐ Reverse On Touch

When Touch While Touch When Release

Operation Bit

Operation

☐ Set

☒ Reset

☐ Toggle

☐ Momentary ON

☐ Momentary OFF

Destination

ATV_Command

Bit Reset [ATV_Command]

Apply Add >

OK Cancel Help

3

Lamp Settings

General Color Label Visibility

Name Lamp01

Category Primitive

Variable ATV_Command

State [Off]

Style 20052

ATV Ctrl./Output Freq.



1

Meter Settings

General Color Label Input Mode Numeric Display Visibility Advanced

☒ Enable Numeric Display

Display Digits 2 . 2 ☒ Zero Suppress Style 00026

Format Dec. ☒ Display Zero(s) ☐ Digit Grouping

Font Resource <Use Local Settings> Language 1: Language1

Font Vijeo Modern 8x13 Font Width 8

Font Style Normal Font Height 13

12.12

Alignment

OK Cancel Help



ATV Ctrl./Speed Reference



1

Numeric Display Settings

General Input Mode Color Visibility Advanced

Name NumericDisplay01 Style 00028

Data Type ☒ Integer ☐ Float

Variable ATV_Speed_Ref ☒ Zero Suppress ☒ Enable Input Mode

Display Digits 2 . 2 ☒ Display Zero(s)

Format Dec. ☐ Digit Grouping

Font Resource <Use Local Settings>

Language 1: Language1

Font Vjeco Modern 8x13 Bold Font Width 8

Font Style Bold Font Height 13

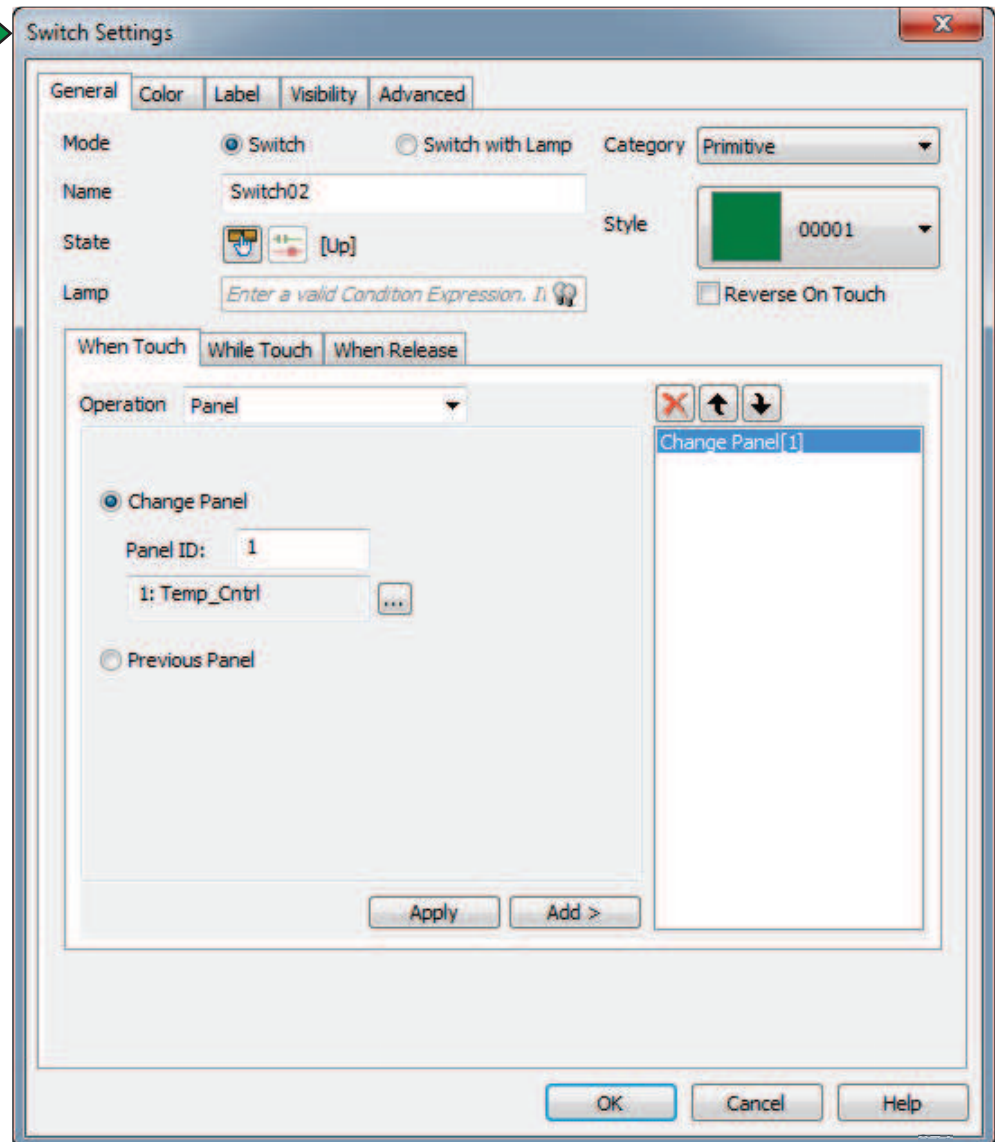
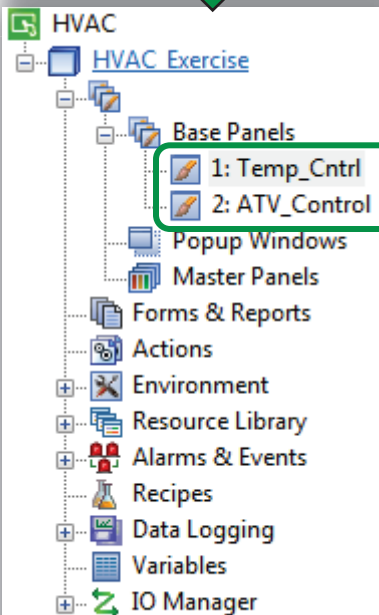
12.12Hz

Alignment Unit Hz

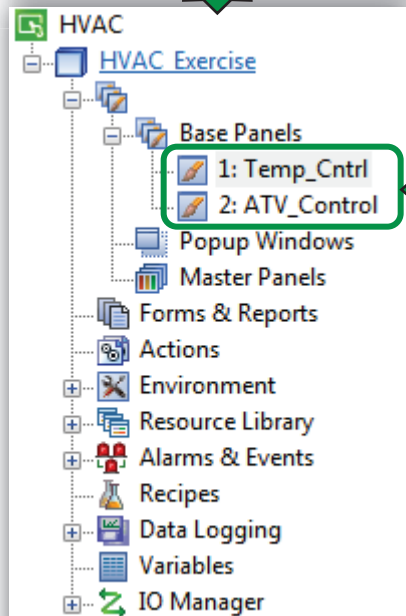
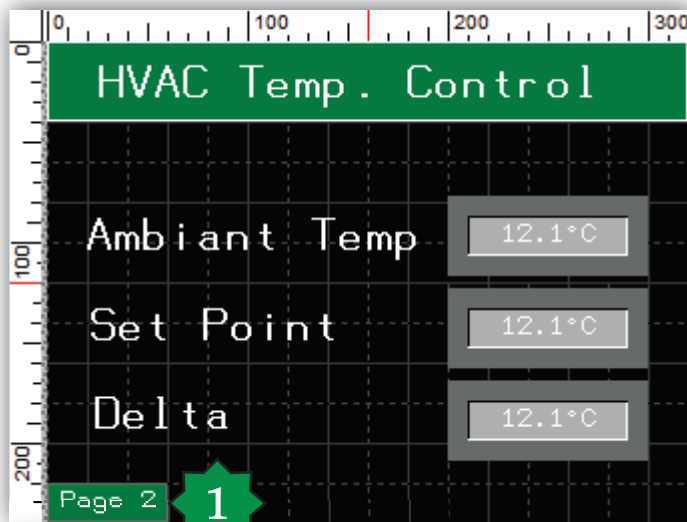
OK Cancel Help



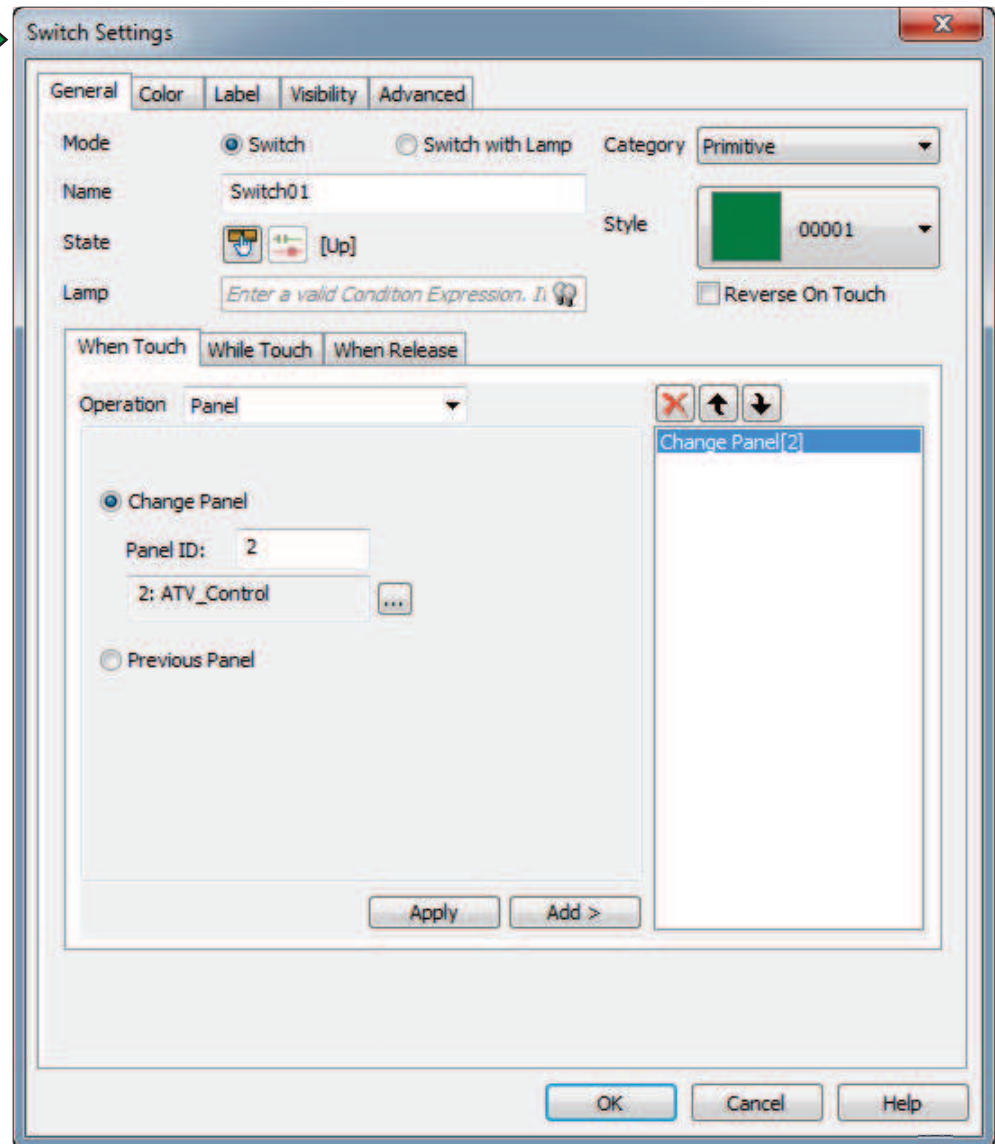
ATV Ctrl./Page switching



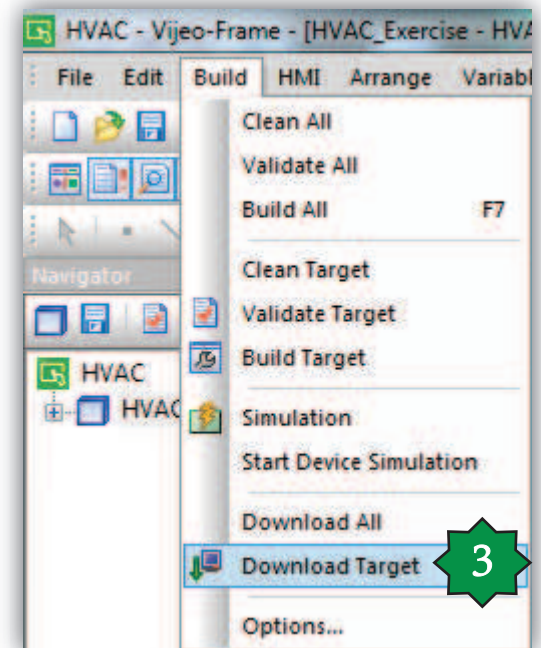
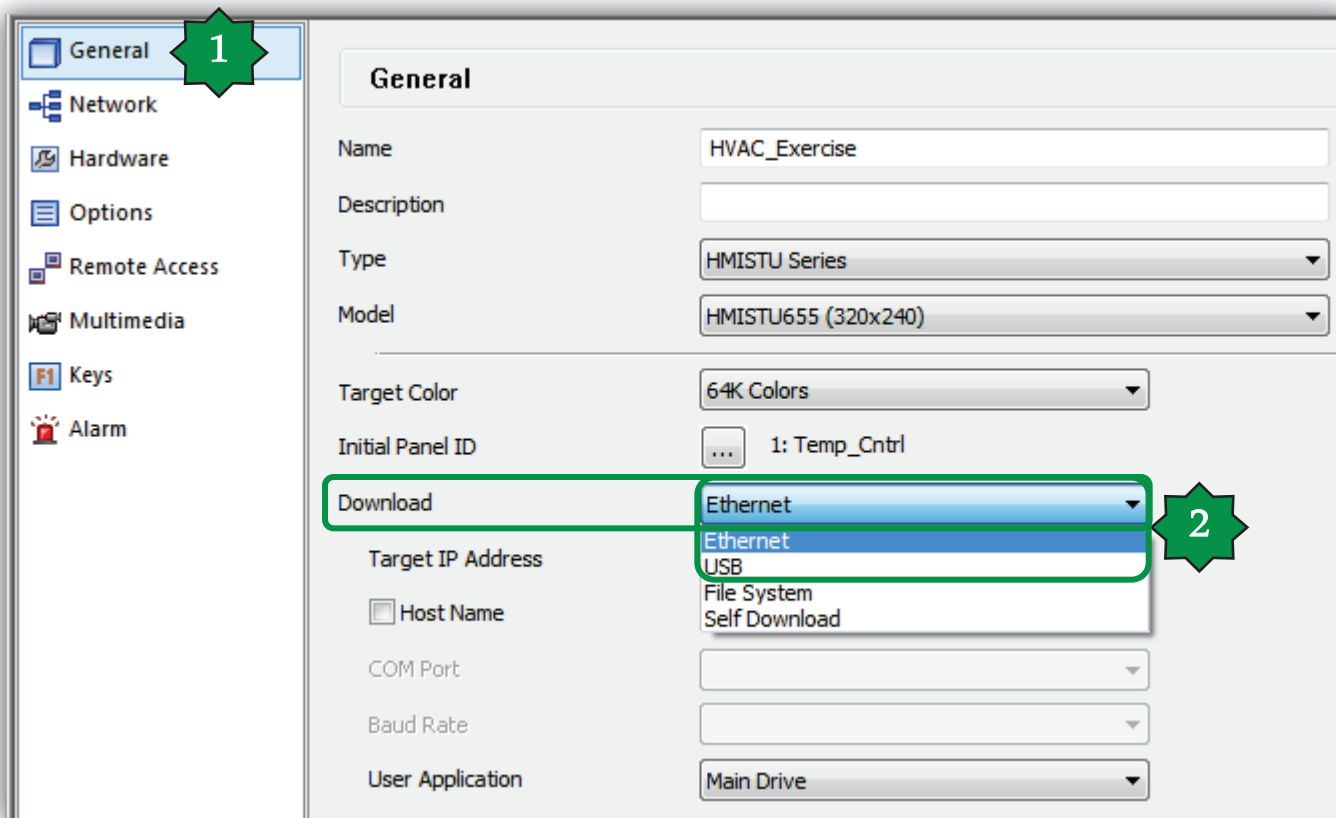
ATV Ctrl./Page Switching



1



Target Download via USB or Ethernet



Modbus Slave



- Status variables and EEPROM parameters have a modbus address and they are all Holding Registers, regardless the type of variable defined into Device Type

FreeEvolution Status Variables

Add Remove Recalc

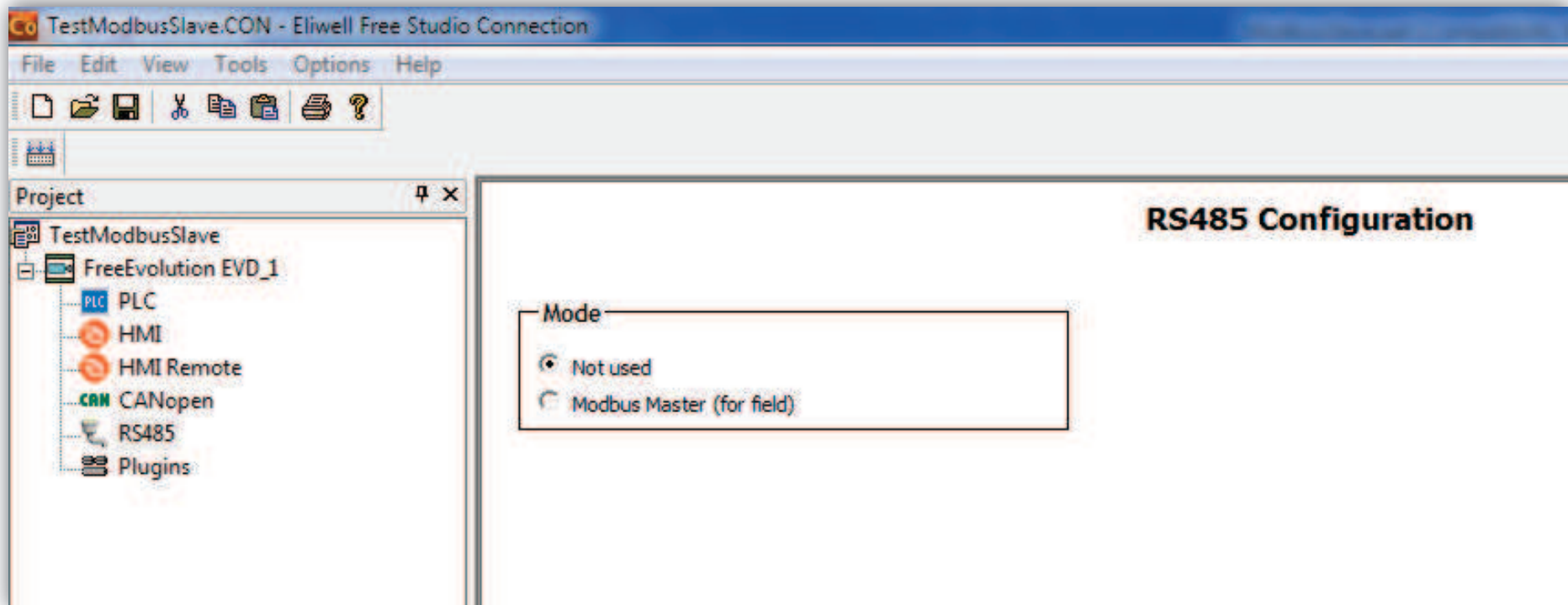
#	Address	Name	Device type	Application type	Size	Offset	Unit	AccessLevel	Read only
1	8960	TestWord	Unsigned 16-bit	UINT		0		Always visible	False
2	8961	TestBit	Boolean	BOOL		0		Always visible	False

- EEPROM parameters are always R/W
- Status Variables are RO by default
 - Set to False Read Only in case of R/W Status Variable

Modbus Slave



- In Free Studio Connection, set the Mode of RS485 of the controller to Not used
 - ➔ It means that the RS485 on board is configured as a slave port





Modbus Slave

- In Free Studio Device, in Bios parameters, click on RS485 On Board
- Configure the Modbus communication:
 - ➔ Address of the controller
 - ➔ Baudrate
 - ➔ Stop bits
 - ➔ Parity

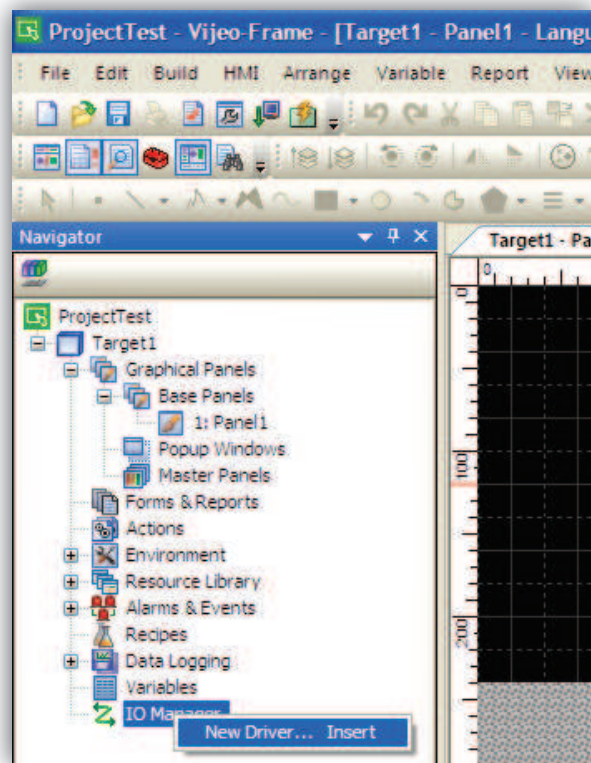
The screenshot shows the 'TestModbusSlave.CFN - Eliwell Free Studio Device' window. The left sidebar displays a tree view of parameters, with 'FreeEvolution EVD_1' expanded. The main window shows the 'RS485 On Board' configuration table. The 'Value' column for the first row, 'Addr_RS485_OB', is highlighted with a red box.

Address	Name	Value	Um	Default	Min	Max	Description
15774	Addr_RS485_OB	1	num	1	0	255	RS485 On Board address
15775	Proto_RS485_OB	3=Modbus/RT	num	3=Modbus/RT 2	3		Select RS485 On Board protocol
15776	DataBit_RS485_OB	8	num	8	8	8	RS485 On Board Data bit number
15777	StopBit_RS485_OB	1	num	1	1	2	RS485 On Board stop bit number
15778	Parity_RS485_OB	2=Even	num	2=Even	0	2	RS485 On Board parity protocol
15779	Baud_RS485_OB	1=19200	num	2=38400	0	5	RS485 On Board baud rate protocol

- Change to communication settings require a controller restart

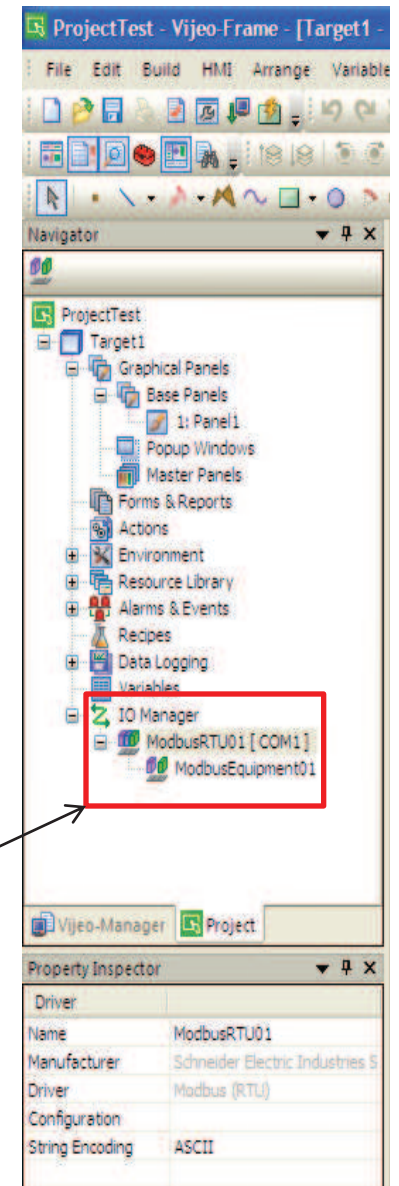
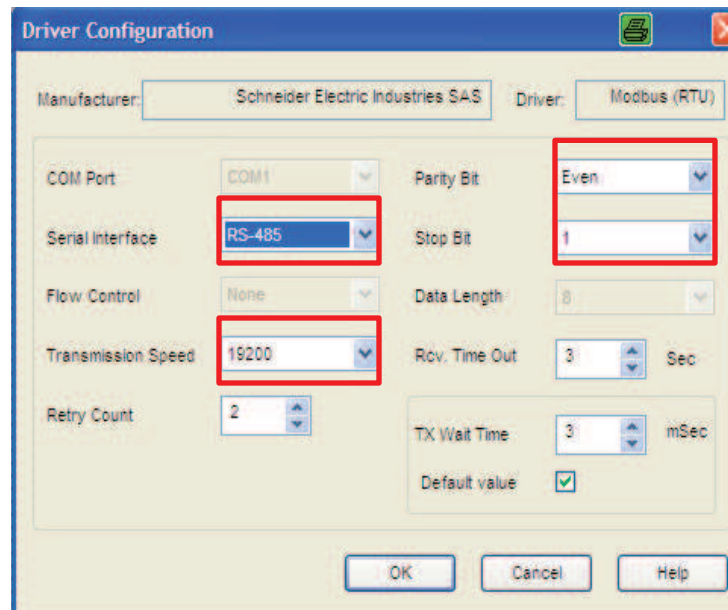
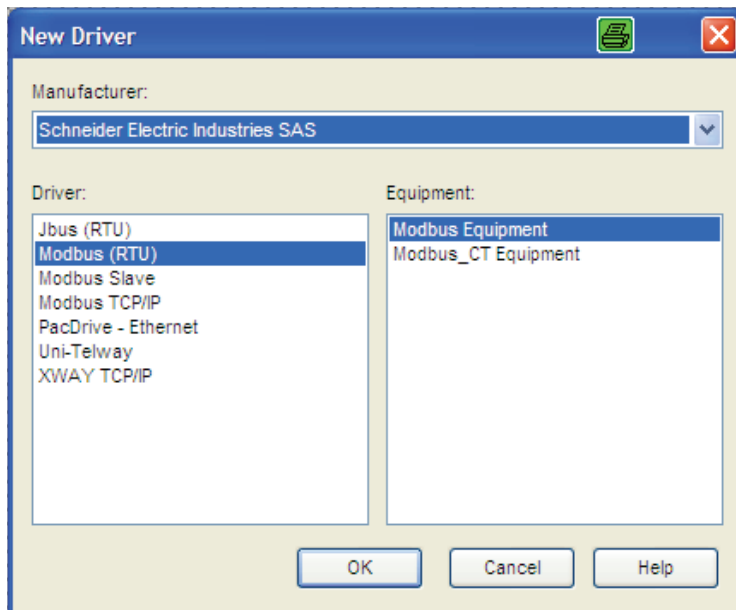
How to connect M171 to Megalis target via RS485

- Create a new driver



Vijeo Designer

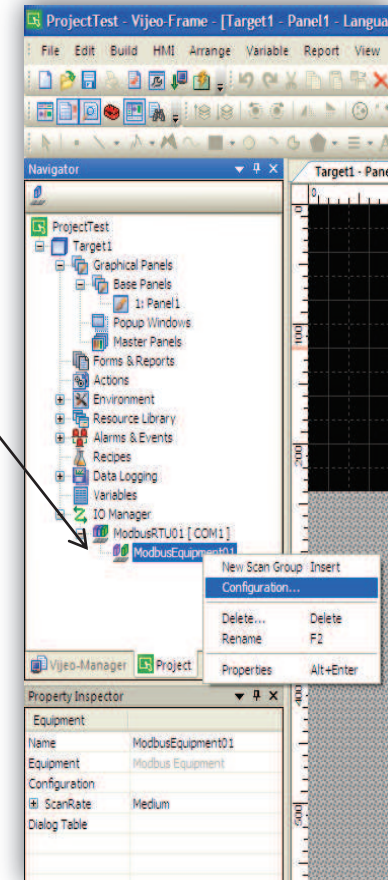
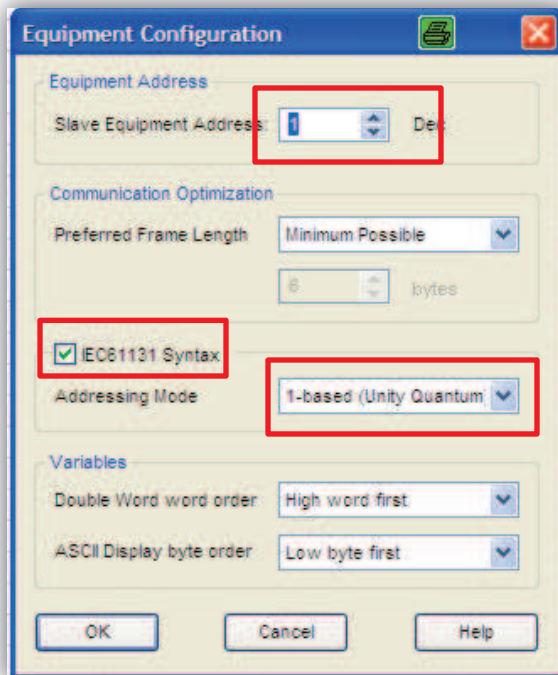
- Configure the driver as configured in Free Studio



- A new Modbus equipment has been created

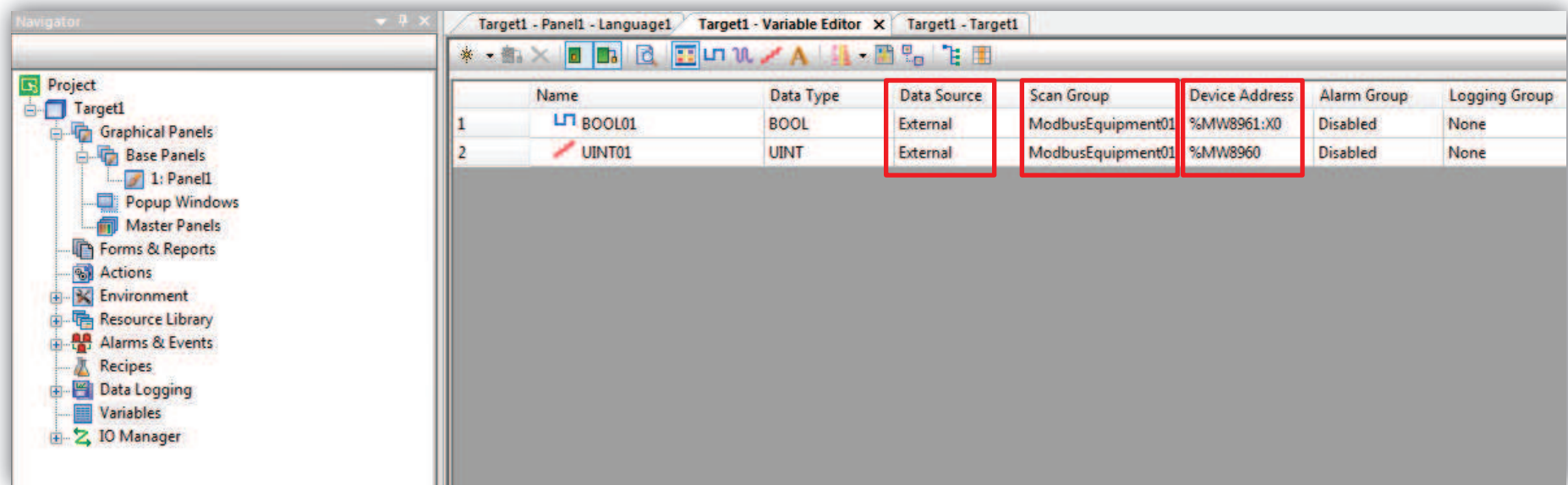
Vijeo Designer

- Configure the Modbus equipment (right click):
 - Enter the address as set in Free Studio
 - Select IEC61131 Syntax
 - Addressing mode: 1-based (Unity Quantum)



Vijeo Designer

- Create your variables:



- Define the Data Source: External
- Defin the Scan Group: name of your Modbus equipment you have created
- Specify the register address of the variable