## 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



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### **Vijeo Designer Installation**



Vijeo Designer Configuration Software Manual Guided Tour	Image: Wijeo Designer Ver. 6.2         Product Information         Enter the following information to register the application.
Select the installation language in the list below. English	2 Reference:
Vijeo Designer Ver. 6.2	Serial Number: Note: For Limited Edition mode, leave Reference and Serial Number blank.
Please enter your name and the name of the company for which you work.         User Eirst Name:         Aidin         Query Please Name:         Query Please Name:         Schneider Electric	InstallShield
InstallShield Cancel Cancel	Alivarzadeh



#### New Project creation/Modbus TCP-IP

Create New Project	
	Project Name to Create   Project Name   HVAC     Iarget : 1/1   Target Setup   Assign the following IP Address   IP Address   10 · 0 · 0 · 110   Subnet Mask   255 · 255 · 255 · 0   Default Gateway   0 · 0 · 0 · 0     Image: Comparison of the poly of the
	< Back Next > Finish Cancel



#### **General Settings**



General	
Name	Monitoring_HVAC
Description	
Туре	HMISTU Series
Model	HMISTU655 (320x240)
Target Color	64K Colors
Initial Panel ID	1: Panel1
Download	USB 🔻
Target IP Address	10 . 0 . 0 . 120
Host Name	
COM Port	<b></b>
Baud Rate	· · · · · · · · · · · · · · · · · · ·
User Application	Main Drive 🔻
Include Editor Project	
V Preserve Run-Time Data	
Use NAT	

# 

### I/O manager definition

	New Driver Manufacturer: Schneider Electric I	ndustries SAS	<ol> <li>Right Click ► insert new driver</li> <li>Select the driver</li> <li>Select the equipment</li> <li>Set the equipment address</li> </ol>
	Driver: Jbus (RTU) Modbus (RTU) Modbus Slave Modbus TCP/IP PacDrive - Ethernet Uni-Telway	2 Equipment: 3 Modbus Equipment Modbus USB Equipment	5. Use the IEC syntax 6. Validate
Avigator Untitled Untitled UNTITLE		Equipment Address         IP Address         Unit ID         255         Secondary Connection         Backup IP         0       0	IEC61131 Syntax         Addressing Mode         1-based (Unity Quantum)         Variables         Double Word word order         High word first         ASCII Display byte order
Resource Library  Alarms & Events  Recipes  Cata Logging  Variables  No Manage	1	Protocol IP Protocol TCP •	Communication Optimization Preferred Frame Length Custom  120  bytes
Sebasidas Electria Undustru Dunias	er Insert	Data Dictionary Management	OK Cancel Help



### Renaming created driver & equippment



#### **External Variable Definition**



Navigator  HVAC Simulation  Monitoring_HVAC  Graphical Panels	Monitoring_HVAC - Temp_Ctrl - Langu	agel / Monitoring	HVAC - Variable Ed	itor X		
1: Temp_Ctrl	BOOL	Data Type	Data Source	Scan Group	Device Address	Alarm Group
Popup Windows     Master Panels	INT 16 Bits Signed					
Forms & Reports     Actions     Actions     Environment     Environment     Actions     Compared Resource Library     Alarms & Events     Recipes     Data Logging	UINT 16 Bits Unsigned DINT 32 Bits Signed UDINT 32 Bits Unsigned REAL STRING					
Variables	Folder User Data Types					
Vijeo-Manager Project	Block Integer Block INT Block UINT Block DINT Block REAL					

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### Variable Properties/Addressing

	Add	📜 Remove 🛛 📓 Reca	lc	1	Free	Evolution	Statu	ıs Varia	ables				
#	Address	s 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 Ti Ad	CP/IP dress: %MWi set (i): 8960 Bit (j): eview: %MW8960 OK	Help	Note: N	o 1 bit sl	hifting is	s nee	ded					
*	· • ∰1 .	× 🗖 🖬 🗟 🖬		A   ∰ + 🖽 🗄				3					
		Name	Data Type	Data Source	e Scan (	Group		Device A	ddress	Alarr	m Group	Logging G	iroup
1		Amb_Temp	INT	External	Perfor	mance_Cont	troller	%MW89	60	Disat	oled	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**

Numeric Display Settings	Expression Editor Pad
General Input Mode Color Visibility Advanced	Expression
Name NumericDisplay01 Data Type Integer Float	Variable List
Variable Amb_Temp 🙀 🗹 Zero Suppress 🔲 Enable Input Mode	👔 Amb_Temp
Display Digits 2 . 1 📝 Display Zero(s)	HVAC_Exercise
Format Dec.   Digit Grouping	Amb_lemp[
Font Resource <use local="" settings="">   Language 1: Language1   Font Vijeo Modern 8x13   Font Width 8</use>	Vijeo
Font Style Normal - Font Height 13 -	OK Ca
Alignment - Vnit <sup>w</sup> C	
OK Cancel Help	

X Help

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#### Forming the Panel





#### **Running Simulation**





#### **EEPROM** parameters assigning

FreeEvolution EEPROM Parameters													
	Add	🛓 Remove	Recalc										
#	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

* • 🛍	× 🗖 🖪 🖻 🗉	յտ ա 🗾 🗛 🛛	🕂 - 🔡 🐂 🖓	: 🗉			
	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	محمر Delta	INT	External	Performance_Controller	%MW16385	Disabled	None

2



### Numeric Display settings/Enable Input

Numeric Display Settings	Numeric Disp 5 Angs	×
General Input Mode Color Visibility Advanced	General Input Mode Color Vis	ibility Advanced
Name NumericDisplay02 Data Type Integer Float Data Type	Enable Input Mode     Field ID	
Variable Setpoint 🙀 Zero Suppress 🗹 Enable Input	Mode 🛛 📝 Display Popup Keypad	
Display Digits     2     1       Format     Dec.     Image: Construction of the second s	Overwrite Variable's Input Min Value	Range Enter a valid number OR Enter a valid Mathe 🎡
Font Resource <use local="" settings="">   Language 1: Language1</use>	Expression Editor Pad	Enter a valid number OR Enter a valid Mathe 🙀
Font Vijeo Modern 8x13   Font Width 8	Variable List	
Font Style Normal   Font Height 13	■ 🖪 🖻 🖽 💷 🗤 🍀 🛩 🖌 🕌 🕶	
12.1°C Alignment = ▼ 4 Unit °C =	Setpoint       HVAC_Exercise       <	Enter a valid Variable. Its data type must be Enter a valid Variable. Its data type must be 🤉
	Vijeo	<unassigned> Order No. <unassigned></unassigned></unassigned>
OK Cancel	OK Cancel Help	OK Cancel Help
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#### **Panel forming & Simulation**



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#### ATV control/ final goal







#### ATV Ctrl./Variable & Panel declaration

	VAC HVAC_E Grap Form S Actic Actic C S Envir Reso Alarn Alarn C S Cata Alarn C S Cata Alarn Varia	xercise hical Panels ls & Reports ons onment urce Library ns & Events bes Loggin 1										HVAC HVAC HVA HVA	C_Exercise Graphical Panels Base Panels 1: Temp_Cntrl 2: ATV_Control Popup Windows Master Panels Forms & Reports Actions Invironment
8	8967	ATV_Command	Unsigned 16-bit	UINT		2				Always vis	sible	False	
9	8968	ATV_Speed_Reference	Signed 16-bit	INT				Hz		Always vis	sible	False	0-5000 (0.01 Hz)
10	8969	ATV_Output_Frequency	Signed 16-bit	INT				Hz		Always vis	sible	True	
11	8970	Modbus_Comm_Error	Boolean	BOOL						Always vis	sible	True	
12	8971	Web_ATV_Comd	Boolean	BOOL						Always vis	sible	False	
13	8972	Web_ATV_Speed_Ref	Signed 16-bit	INT	0	0	5000	Hz )	(X.YY	Always vis	sible	False	0-50 Hz
14	8973	Web_ATV_Output_Frq	Signed 16-bit	INT				Hz >	(X.YY	Always vis	sible	False	0-50 Hz
*	・m× N	ame	N 🛹 A 🔤	• 🖻 •	ata Sou	irce	Scan G	roup	Devic	e Address	Alarn	n Group	Logging Group
1		Amb_Temp	INT	E	xternal		Perform	nance_C	%MW	8960	Disab	led	None
2	1	ATV_Command	BOOL	E	xternal		Perform	nance_C	%MW	/8971:X0	Disab	led	None
3		ATV_Output_Freq	INT	E	xternal		Perform	nance_C	%MW	8973	Disab	led	None
4		ATV_Speed_Ref	INT	E	xternal		Perform	nance_C	%MW	8972	Disab	led	None
5		🥓 Delta	INT	E	xternal		Perform	nance_C	%MW	16385	Disab	led	None 2
6		🛹 Setpoint	INT	E	xternal		Perform	nance_C	%MW	16384	Disab	led	None



#### ATV Ctrl./Command & Status



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Switch Settings				×
General Color	Label Visibility A	dvanced		
Mode	Switch	🔘 Switch with Lamp	Category	Bitmap 👻
Name	Switch03			
State	🔁 💶 (Up)		Style	00003 -
Lamp	Enter a valid Condit	tion Expression. It 🎡		Reverse On Touch
When Touch	While Touch When F	Release		
Operation	Bit	-	×	<b>t</b>
Operation Set Rese Togg Mom Destination ATV_C	t le entary ON entary OFF n ommand	Apply Add :	₽	
			ОК	Cancel Help

#### ATV Ctrl./Output Freq.

<





Meter Settings		
General Color L	abel Input Mode Numeric Displa	V Visibility Advanced
📝 Enable Numer	ic Display	
Display Digits	2 · 2 Zero Suppre	ess Style
Format	Dec. 👻 Display Zero	o(s)
	🔲 Digit Groupi	ing
Font Resource	<use local="" settings=""></use>	
Language	1: Language 1	
Font	Vijeo Modern 8x13	▼ Font Width 8
Font Style	Normal	<ul> <li>Font Height</li> <li>13</li> </ul>
	12.12	2 Alignment 😑 🚍 🖃
		OK Cancel H

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#### ATV Ctrl./Speed Reference



eneral Input	Mode Color Visibility	Advanced			
Name 1	lumericDisplay01	Stule			53 <u>73</u>
Data Type	🖲 Integer 💿 Float	Style		10028	×.
Variable	ATV_Speed_Ref	Zero Sup	opress 🔽 Ena	able Input	t Mode
Display Digits	2 2	Display 2	Zero(s)		
Format	Dec. 👻	Digit Gro	uping		
Font Resource	<use local="" settings=""></use>	•			
Language	1: Language 1	*			
Font	Vijeo Modern 8x13 Bold	*	Font Width	8	
Font Style	Bold	*	Font Height	13	•
	12	.12Hz			
1					
Alignment	= •	Unit H	1z 🖃		
	2				



#### ATV Ctrl./Page switching



General Color	Label Visi	bility Advanced				
Mode	Switch	🔘 Switc	h with Lamp	Category	Primitive	
Name	Switch02			<b>Ch.</b>		12220
State	1	[Up]		Style		00001
Lamp	Enter a va	lid Condition Expri	ession. Ii 🚱		Revers	e On Touch
When Touch	While Touch	When Release				
Operation	Panel	*		X	++	
Orievio						
		Apply	Add	>		



### ATV Ctrl./Page Switching



General Color	Label Visib	pility Advanced		
Mode	Switch	Switch with Lamp	Category	Primitive
Name	Switch01			
State	<b>T</b> := (	[Up]	Style	00001
Lamp	Enter a vali	id Condition Expression. Ii 💡	2	Reverse On Tou
When Touch	While Touch	When Release		
Operation	Panel		×	
Panel II 2: ATV	): 2 _Control			
U Heviou	s Parlet	Apply	td >	



### Target Download via USB or Ethernet

General			HVAC - Vijeo-Frame - [HVAC_Exercise - HV/
- Network	General		File Edit Build HMI Arrange Variable
B Hardware	Name	HVAC_Exercise	Clean All Validate All
Remote Access	Type Model	HMISTU Series	Clean Target
FI Keys	Target Color	64K Colors	HVAC Build Target
	Download	Ethernet	Start Device Simulation Download All
	Target IP Address	USB File System Self Download	Download Target
	COM Port Baud Rate		
	User Application	Main Drive 💌	

#### **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

CON - Eliwell Free Studio C	CONTRACTOR OF TAXABLE	
File Edit View Tools Options Help		
028 * * * * * *		
Project 7 × TestModbusSlave FreeEvolution EVD_1 PLC HMI HMI Remote CANopen RS485 Plugins	Mode  Not used  Modbus Master (for field)	RS485 Configuration

#### Modbus Slave

#### • In Free Studio Device, in Bios parameters, click on RS485 On Board

#### • Configure the Modbus communication:

→ Address of the controller





# RTU

#### How to connect M171 to Megalis target via RS485

#### • Create a new driver



#### ProjectTest - Vijeo-Frame - [Target1] File Edit Build HMI Arrange Variable Configure the driver as configured in Free Studio 2 🕑 🖉 🖊 🚮 📑 HO (H 8 4 **Driver Configuration** New Driver - 4 x Navigator 80 Manufacturer: Schneider Electric Industries SAS Modbus (RTU) Manufacturer: Driver ProjectTest Schneider Electric Industries SAS ¥ 😑 🔲 Target1 COM Port Graphical Panels Parity Bit Even Driver: Equipment: 😑 👘 Base Panels Modbus Equipment Jbus (RTU) 📝 1: Panel1 Serial Interface RS-485 Stop Bit Modbus (RTU) Modbus\_CT Equipment Popup Windows Modbus Slave Master Panels Flow Control Data Length Modbus TCP/IP Forms & Reports PacDrive - Ethernet Actions Uni-Telway 19200 Transmission Speed Rov. Time Out 3 -Sec K Environment XWAY TCP/IP Resource Library + 2 \* **Retry Count** Alarms & Events mSec TX Wait Time Recipes 💾 Data Logging Default value Variables Z IO Manager ModbusRTU01 [ COM1 ] 0K Cancel Help OK Cancel Help ModbusEquipment01 Vijeo-Manager SProject **Property Inspector** - 4 × Driver • A new Modbus equipment has been created Vame ModbusRTU01 Manufacturer Schneider Electric Industries S Driver Modbus (RTU) Configuration String Encoding ASCII Schneider Electric | Industry Business | OEM Technical Training | April 2015 | Aidin Aliyarzadeh

#### Vijeo Designer

RTU

#### Vijeo Designer

#### • Configure the Modbus equipment (right click):

- Enter the address as set in Free Studio
- Select IEC61131 Syntax
- Adressing mode: 1-based (Unity Quantum)

Slave Equipment Address	De De
Communication Optimization	
Preferred Frame Length	Minimum Possible 💉
	6 🗢 bytes
LEC61131 Syntax	1-based (Unity Quantum 💌
Variables	
Double Word word order	High word first
ASCII Display byte order	Low byte first





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## Vijeo Designer

#### • Create your variables:

Project								A CONTRACTOR STOCK
Target1		Name	Data Type	Data Source	Scan Group	Device Address	Alarm Group	Logging Group
Graphical Panels	1	BOOL01	BOOL	External	ModbusEquipment01	%MW8961:X0	Disabled	None
Base Panels	2	VINT01	UINT	External	ModbusEquipment01	%MW8960	Disabled	None
Popup Windows Master Panels Forms & Reports S Actions								
Resource Library     Alarms & Events     Recipes								
🗈 📲 Data Logging								

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

