

APLIKAČNÍ POSTUP

Komunikace PLC IDEC po síti Modbus RTU



Think Automation and beyond...

Použití FT1A pro komunikaci ModBUS RTU s FC6A

Abstrakt

Tento aplikační postup ukazuje jak nastavit síťovou komunikaci pomocí ModBUS RTU. Mezi FT1A (kterou budeme používat jako Master) a FC6A (kterou budeme používat jako Slave).

HW komponenty

- PLC FT1A-H48SA
- PLC FC6A-C40R1AE
- 1x FT1A-PC3
- USB kabel pro nahrání projektu
- 1x Ethernetový kabel

SW komponenty

• vývojové prostředí pro PLC IDEC Automation Organizer

Důležitá poznámka

Aplikační postupy demonstrují typické úkony na konkrétních případech. Nekladou si za cíl kompletnost a v žádném případě nenahrazují návod k obsluze! Změna aplikačních postupů je vyhrazena.

Úvod

V tomto aplikačním postupu bude popsáno nastavení FT1A a PLC FC6A v režimu, kdy bude FT1A vzdáleně vyčítat a zapisovat registry z FC6A. V PLC FC6A se nebude nacházet žádný program a bude se využívat pouze jako vzdálená periferie. Do FT1A vložíme komunikační kartu FT1A-PC3. Ethernet zapojíme do FCA6 do sériového portu. Druhou stranu odstřihneme a zapojíme podle tabulky níže. Použijeme piny 4,5,8 podle obrázku níže.



No.	Signal Wire (RS-232C)	(RS-485)		
1	RD	-		
2	SD	-		
3	ER	-		
4	-	A		
5	-	B		
6	DR	-		
7	-	-		
8	SG	SG		
Shell*1	Shield	Shield		

*1 Shell is connected to PE or FE on the power supply terminals.





FT1A-ModBUS RTU (Master)

FCA6-ModBUS RTU (Slave)

Pro komunikace mezi zařízeními budeme používat USB kabel, který budeme muset přenášet z FT1A do FC6A pro další nastavování programů a konfiguraci.

Postup nastavení FT1A jako ModBus RTU Master

- 1. Spustíme vývojové prostředí WindLDR a vytvoříme nový projekt.
- 2. V záložce *Configuration/PLC Type* vybereme PLC FT1A, kterým disponujeme. V našem případě FT1A-48 a potvrdíme tlačítkem OK.

PLC Type PLCs	/Stop Memory Input Introl Backup Configuration	Comm. Key Carta Ports Matrix & Mo Function Area Setting	ridges Device Program adules Settings Protection D
Project Window		7 × Main Progra	am
- - - - - - - - - - - - -	Settings dules Configuration rs	Rung 1	1
Tag Editor	PLC Selection OpenNet FC4A-C10R2X FC4A-C16R2X FC4A-C24R2X FC4A-D20X3 FC4A-D20X1 FC4A-D20RX1 FC4A-D40X3 FC5A-C10R2X FC5A-C16R2X FC5A-C16R2X FC5A-C16RX1 FC5A-D16X11 FC5A-D12X1E FC6A-C16X1XE FC6A-C40X1XE FC6A-C40X1XE FC6A-C40X1XE FC6A-C40X1XE FC6A-D16X1CEE F		? × ОК Сапсе!
Project Window	uolt Use as <u>D</u> efa	ult	

FC5A-C24R2X - USB Network: 1:1 | Mode: Edit | Rung: 1 Line: 1 Column: 1 |Program Size: Obytes

3. V záložce *Configuration/Communication Ports*. Záleží, jestli máme danou rozšiřující komunikační kartu danou na druhém nebo třetím portu. Jelikož jsme si ji dali na druhý tak rozklikneme druhý port. Zde vybereme ModBUS RTU Master.

)∓ line View				proje	ect01.pjw - WindLDR	
PLC Type PLC	L ut uration	Cartridges LCD Device Settings Settings	Program Protection	Self Calend Diagnostic & Clore	ar Network Connection k Settings Settings	Configure Slave	
Function Area Settings Run/Stop Control Memory Backup	Config	gure the communication ports.				?	×
Input Configuration	Communica	ition Ports					
Communication Ports	Port	Communication Mode		Comm. Param.	Mode Selection Input	Slave No.	
Cartridges	1	USB					
LCD Settings	2 1	Maintenance Protocol 🛛 🗸 🗸	Configure	115200-7-Even-1		0	
Device Settings	3	Maintenance Protocol	Configure	115200-7-Even-1		0	
Program Protection		Modbus RTU Master	- configure			(*)	- 25
Self Diagnostic		Nodbus RTU Slave]				
Calendar & Clock							
Network Settings							
Connection Settings							
connection settings							
Default						OK Cance	el
FT1A-48 - USB Network: 1:1 Mode	:Edit Rung: 1	Line: 1 Column: 1 Program	Size: 0	bytes			

4. Otevře se tabulka ModBUS RTU Master Request Table. Function code slouží k nastavení operace, jakou budeme provádět, viz tabulka níže. Master Device address ukazuje v jakým registru je daná funkce uložená. Slave number slouží k nastavení pro, který Slave se posílá tahle informace. Modbus Slave Address je adresa ve které daný Slave ukládá své informace. Jakmile nastavení hotové potvrdíme OK. 06 Preset Single Register – Slouží ke změně datových registrů.(word) V Master Device Address jsme nastavili hodnotu D0000.Tato hodnota ukazuje v jakém registru Master uchovává tenhle příkaz. Slave má tuhle hodnotu uloženou v D0000. Modbus Slave address isme si dali 400001. V této adrese se nachází naše funkce, kterou si Slave uchovává v tomhle registru. 16 Preset Multiple Registers-Slouží ke změně několika datových registrů v řadě.(word) V Master Device Address jsme nastavili hodnotu D0011 a D0012.Tato hodnota ukazuje v jakém registru Master uchovává tenhle příkaz. Slave má tuhle hodnotu uloženou v D0011 a D0012 Modbus Slave address jsme si dali 400012. V této adrese se nachází naše funkce, kterou si Slave uchovává v tomhle registru. 03 Read Holding Registers- Slouží k vyčítání vzdálených datových registrů.(word) V Master Device Address jsme nastavili hodnotu D0031 a D0032. Tato hodnota ukazuje v jakém registru Master uchovává tenhle příkaz. Slave má tuhle hodnotu uloženou v D0031 až D0042.

Modbus Slave address jsme si dali 400032. V této adrese se nachází naše funkce, kterou si Slave uchovává v tomhle registru.

dbus F	(TU Master Request Table (Port2))							?
equest	Execution Device	Error Status	-						
))Use	📃 💿 Unuse	s 💿 Use		9) Unuse	Use a singl	e DR for all communic or status only when co	ation requests ommunication fails	
Req. No.	Function Code	Master Device Address		Data Size	Word/Bit	Slave Number (0 to 247)	Modbus Slave Address	Req. Execution Device	Error Status
1	06 Preset Single Register	D0000		1	Word	1	400001		
2	16 Preset Multiple Registers	D0011		5	Word	1	400012		
3	03 Read Holding Registers	D0031	·	10	Word	1	400032		
4									
5									
6									
7									
8									
9									
10									

		-	· ·
Function Code	Data Size	Slave Address	SmartAXIS as Modbus Slave
01 Read Coil Status	1 to 128 bits	000001 - 065535	Reads bit device statuses of Q (output), R (shift register), or M (internal relay).
02 Read Input Status	1 to 128 bits	100001 - 165535	Reads bit device statuses of I (input), T (timer contact), or C (counter contact).
03 Read Holding Registers	1 to 64 words	400001 - 465535	Reads word device data of D (data register), T (timer preset value), or C (counter preset value).
04 Read Input Registers	1 to 64 words	300001 - 365535	Reads word device data of T (timer current value) or C (counter current value).
05 Force Single Coil	1 bit	000001 - 065535	Changes a bit device status of Q (output), R (shift register), or M (internal relay).
06 Preset Single Register	1 word	400001 - 465535	Changes word device data of D (data register).
15 Force Multiple Coils	1 to 128 bits	000001 - 065535	Changes multiple bit device statuses of Q (output), R (shift register), or M (internal relay).
16 Preset Multiple Registers	1 to 64 words	400001 - 465535	Changes multiple word device data of D (data register).

5. Tímto je konfigurace ModBUS RTU Master hotová. Jako další krok nahrajeme nastavení do FT1A. V záložce *Online/Download* nahrajeme nastavení do FT1A.

Home Configuration	n Online View		-	-
Download Upload Device Data List	Start Stop	nance 🔻	Monitor	Simulation
Transfer	PLC		Monitor	Simula
Project Window	д у		ain Program	
 master.pjw Function Area Settin Custom Monitors Device Data Programs Tag Editor Remote Host List Script Manager Text Manager 	195	Run 1	g 1	

Postup nastavení FC6A ModBUS RTU Slave

- 1. Spustíme vývojové prostředí WindLDR a vytvoříme nový projekt.
- 2. V záložce *Configuration/PLC Type* vybereme PLC, kterým disponujeme. V našem případě FC6A-C40R1AE a potvrdíme tlačítkem OK.

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Home Home	Configuration Online	e View					
PLC Type Modules	Run/Stop Control Backup	Input Configuration	Comm. Ex Ports M	ternal D emory Se	Device ettings	Program Protection	Di
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Property				ain Prog	ram (Module	Con
PLC Selecti	on			?	×		
OpenNet FC4A-C10 FC4A-C16 FC5A-C10 FC5A-C16 FC5A-C12 FC6A-C16 FC6A-C16 FC6A-C16 FC6A-C16 FC6A-C16 FC6A-C10 FC6A-C10 FC6A-C10 FC6A-C10 FC6A-D12 FT1A-12 FT1A-12 FT1A-48	R2X R2X R2X X3 RX1 X3 R2X R2X R2X R2X R2X RX1 X3 X1E X1XE X1XE X1XE X1XE X1XE X1XE			OK Cance			
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FC6A-C40X1XE - USB Network: 1:1 | Mode: Edit | Rung: 1 Line: 1 Column: 9 |Program Size:

3. V záložce *Configuration/Communication Ports* nastavíme Port 1 na ModBUS RTU Slave. Interface musíme nastavit na RS485.

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2	Home Configuration Online	View									
	PLC Expansion Modules PLCs	Input Configuration	Comm. Ports External Memory Settings Butternal	Program Protection Dia nction Area Setti	Self Calendar Net agnostic & Clock Set	twork Network C tings Management	Connection Access Settings Control	Config uration SD Card			
Pre	Function Area Settings							?	\times		
	Run/Stop Control Memory Backup Configure the communication ports.										
	Input Configuration	Communic	ation Ports								
	Communication Ports	Port	Communication Mode		Comm. Param.	Slave No.	Interface	Slot			
	External Memory Devices	1	Modbus RTU Slave	Configure	115200-8-Even-1	1	RS485				
	Device Settings	2	Maintenance Protocol User Protocol	Configure	9600-7-Even-1	0		Cartridge Slot 1			
	Program Protection	3	Data Link Master Data Link Slave	Configure	9600-7-Even-1	0		Cartridge Slot 2			
	Self Diagnostic	4	Modbus RTU Master Modbus RTU Slave					Unprotected			
	Calendar & Clock	5	-					Unprotected			
	Network Settings	6						Unprotected			
	Network Management	7						Upprotected			
	Connection Settings			_				Upprotected			
	Access Control	0		-				Unprotected			
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 Následně zvolíme *Configure*, kde se ukáže tabulka ModBUS RTU Slave. Nastavení musíme nechat všechna stejná, jako máme v Master FT1A, viz obrázek níže. Následně do jakého Slave number budeme informace posílat. Jakmile máme nastaveno, potvrdíme OK.

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Home Configuration C PLC Expansion Type Modules PLCs	nline View	Comm. External Device Ports Memory Setting	e Program gs Protection D	Self Calenda iagnostic & Clock	r Network Netw Settings Manag	ork Connection Acce ement Settings Cont	ss config uration SD Card	
unction Area Settings							?	×
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Memory Backup	13.0							
Input Configuration	Communica	tion Ports	-				et a	
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Device Settings	- 2	Maintenance Protocol	Configure	TIDEOU O ETCH	•	10.05	Hige Slot 1	
Program Protection	3	Maintenance Protocol	Configure	Modbus RTU Sla	ive (Port1)	?	X ine Slot 2	
Self Diagnostic	4		a a a a a a a a a a a a a a a a a a a	Baud Rate((bps):	115200	tected	
Calendar & Clock	- 5			Data Bits:		8	tected	
Network Settings	6			Parity:		Even	• tected	
Network Management	7		·	Stop Bits:		1	• tected	
Access Control	8					0.	tected	
	9						tected	
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6. Tímto je konfigurace ModBUS RTU Slave hotová. Jako další krok nahrajeme nastavení do FC6A. V záložce *Online/Download* nahrajeme nastavení do FC6A



7. Následně se zase připojíme do FT1A, kterou máme nastavenou jako Master. V záložce *Online/Monitor* zvolíme New Custom Monitor.



8. V *Device* nastavujeme stejnou adresu, jako jsme nastavovali v Master Device Address při nastavování naších funkcí.

V Current Value nastavíme, jakou hodnotu chceme vyčítat na FC6A.(Slave)

	0.0	12 📮 🗐	Ŧ					master.pjw - Wind	LDR
Home		nfiguration 0n	line View						
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9. Následně program uložíme a nahrajeme do FT1A

10. Na ověření funkčnosti v záložce *Online/Monitor* najedeme na *Batch*, kde se ukáže tabulka registrů.

Nome Configuration Prince Image: Configuration Image: Status Image: Configuration	🚛 🔄 🗠 🔝 📹 🥥 ד		master.pjw - WindLDR										
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Komunikace mezi FT1A(Master) a FC6A(Slave) proběhla úspěšně. Zařízení mezi sebou komunikují a posílají si informace vzájemně.