

NT100-RE-DP 实现 PROFIBUS DP 主站转 Modbus 指南

一、网关介绍:

1)、NT100-RE-DP网关,可以支持PROFIBUS DP与PROFINET I0、EtherNet/IP、Open Modbus/TCP、Sercos之间的转换。支持多种转换方式:

- 1、 PROFIBUS DP与PROFINET IO之间: DP主站转PN从站、DP从站转PN主站、DP从站转PN从站
- 2、 PROFIBUS DP与EtherNet/IP之间: DP主站转EIP从站、DP从站转EIP主站、DP从站转EIP从站
- 3、 PROFIBUS DP与EtherCAT之间: DP主站转ECAT从站、DP从站转ECAT主站、DP从站转ECAT从站
- 4、 PROFIBUS DP与Sercos之间: DP主站转Sercos从站、DP从站转Sercos主站、DP从站转Sercos从站
- 5、 PROFIBUS DP与Open Modbus/TCP之间: DP主站转Open Modbus/TCP、DP从站转Open Modbus/TCP
- 2) 、NT100-RE-DP网关特点:
- I/0 数据转换时间最短, 不到 10 毫秒
- 通过基于内存卡的加载在数秒内完成设备更换
- •可加载固件,用于灵活使用其他转换
- •带 USB 诊断和配置端口
- 3)、NT 100网关的典型应用框图:





二、应用案例:

本文以NT100-RE-DP网关为例,实现Modbus/TCP Client与PROFIBUS DP设备间的通讯,从而将PROFIBUS DP从站 集成到Modbus/TCP网络中。下面将逐步介绍该网关的配置步骤,其他系列网关的配置步骤与此类似。



1 安装软件

(1) USB 串口驱动:当 NT 100 第一次通过 USB 电缆与计算机相连并且上电后,计算机会自动检测到该硬件。对应的驱动可在 DVD 文件夹以下目录中找到,安装驱动后可在电脑设备管理器中确认:

Gateway Solutions DVD 2019-08-1 V1 50	00 190606 28079 » Setu	ips & Drivers
名称	修改日期	类型
📕 Lua for Windows	2019/8/8 14:03	文件夹
netSCRIPT_Debugger	2019/8/8 14:03	文件夹
📕 Setup	2019/8/8 14:03	文件夹
📕 SYCON.net	2019/8/8 14:03	文件夹
📜 USB Driver	2019/8/8 14:03	文件夹

(2) SYCON 配置软件:在 DVD 文件夹以下目录找到 SYCON. net 配置软件,双击安装该软件:

	Gateway_Solution	ons_DVD_2019-08	-1_V1_500_190606_28079 > Setups & Drivers >
名称 ^	修改日期	类型	大小
Lua for Windows	2019/8/8 14:03	文件夹	
netSCRIPT_Debugger	2019/8/8 14:03	文件夹	
Setup	2019/8/8 14:03	文件夹	
SYCON.net	2019/8/8 14:03	文件夹	
USB Driver	2019/8/8 14:03	文件夹	

在软件安装完成后,如果首次打开 SYCON.net,要求设置密码,如果不需要,直接点击"0K"。在以后打开"SYCON.net"时,都会要求输入密码,如果没有密码,直接点击"0K"。

由此完成了配置 NT100 网关所需的软件安装:

• SYCON.net: 用于网关的参数配置与诊断。





2 网关参数设置

(1) 当网关 USB 设备驱动和配置工具 SYCON.net 都安装成功后,使用 USB 线缆连接 NT 100 与计算机,并打开 SYCON.net,选择 "File" "New"新建配置工程,出现如图所示界面:

netProject * * netDevice		
Project: Untitled		AS-Interface AS-Interface CANopen CC-Link E Field CC-Link IE Field Basic CompoNet DeviceNet EtherNet/IP Modbus RTU PROFIBUS DPV 0 PROFIBUS DPV 0 PROFIBUS DPV 1 PROFIBUS DPV 1 SERECS III VARAN N Fieldbus / Vendor / DTM Class / For S-Interface
s (()) SYCON.net / netDevice /	٢	5
	Administrate	or NUM

(2) 在软件界面右侧选择 "Fieldbus" 栏,将 PROFIBUS DPV 0, Gateway / Stand-Alone Slave 文件夹中的 NT 100-XX-XX 图标(代表网关)拖放至中间区域的灰线下方,如图所示:

etProject + ×	netDevice	
Project United	ne(TAP(HT 100-XXXX)(<>(#1)	A A

(3) 双击该图标,弹出配置对话框,选择"netX Driver"栏中"USB/RS232 Connection"页,确保"Enable USB/RS232 Conector"前已经打勾。在电脑设备管理器中确认 USB 所对应的 COM 端口,然后在此页面设置 COM 端口号,波特率等,完成后单击"Save" 保存。如图所示:



BD Device: NT 100-XX-XX Vendor: Hilscher GribH		Device ID: Vendor ID:	2			
Navigation area	netX Driver					
 Setting: Inver net/Driver net/Surver Configuration Stignal Mapping Memory Card Management Licensing 	UUB/R5222 Connector (TOP Connector Select Port Port Configuration Bauk Rais: 1522 BB/s Sind Bits: 1522 BB/s Sind B	Restore	5	ave.	Save	e All

(4)选择"Device Assignment"栏,单击 Scan 按钮,扫描到网关硬件,勾选该网关并单击 Apply 按钮,保存。只有这样 Apply 后,才能进行接下来对网关的进一步操作,否则可以报错显示无法找到设备。

(5)选择"Settings"栏, Port X2 选择 Open Modbus/TCP 协议, Port X3 选择 PROFIBUS DP Master 协议, 如图所示。选中对应的 Available Firmware, 单击右侧的 Download 按钮,下载对应的固件。固件下载完成后,单击 OK 按钮退出该对话框。

-	-					
Varigation area § Settings ∰ Driver NetX Driver Device Assignment © Configuration ⇒ Settings Signal Mapping Memory Card Management Licensing	Gasar al Description: Protect Coshinations Primary network (Port X2): Required gateway: Required gateway: Available Pirmare: Software dass: Software dass:	Settings	Secondary network (Port X3)	PROTEILS OF Mactor	Browse Download	
	Basic Settings Mapping Cycle Ime: Kateurk Address Svitch. Enable: Used by:	1	Mapping mode:	Default		1000

(6) 选择菜单栏 "Network"下 "Import Device Descriptions"选择第三方 PROFIBUS DP 设备的从站 eds 文件导入 SYCON 配置软件中,以便进行 PROFIBUS DP 网络组态与配置。如图:



File View Device	Network	Extras Help	
🗅 🧀 🔛 🖾 🗍 🖆	<mark>삼 Add</mark> 같 Delet	Busline te Last Busline	
e-⊡ Project: sycon3. ⊨- <mark>#</mark> netTAP[NT 1	Start Stop	Project Debug Mode Project Debug Mode	
EL6731-0	Devic	ce Catalog	
	Impo	ort Device Descriptions	
	Print	Project Data	

(7) 从右侧 Fieldbus 选项中"Vendor"对应厂商下找到导入的 eds 文件,拖到中间窗口与网关相连的紫色



(8)右击网关图标,选择"Configuration"可分别对网关、PROFIBUS DP 端与 Open Modbus/TCP 端进行

配置。



(9) 先设置 PROFIBUS DP 端,分为两步:

a.选择"Configuration""PROFIBUS DP Master", 弹出对话框, 设置 PROFIBUS DP Master 参数以及 www.hkaco.com 广州 深圳 武汉 成都 上海 西安 北京 台湾 香港 400-999-3848

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 传真:020-38743233



PROFIBUS DP 网络中对应的从站设备参数,如:波特率、站点号等参数,设置后注意保存,如图:

vigation 🗖			IO Device: NT 100-RE-DP
anfiguration Bus Parameters	Profile:	PROFILIUS DP v	Vendor: Hilscher GmbH
Process Data Address Table	Bud Rate:	1500 🗸 klit/s Station Address: 🛛 1 🛱	Navigation 🗖
Station Table	Slot Time:	300 tBit Target Rotation Time: 12854 tBit	Configuration
	Min. Station Delay Time:	11 15t = 8.5693 ms	Bus Parameters Activate Station Address
	Max. Station Delay Time:	150 stilt GAP Actualization Pactor: 10	Process Data P
	Quiet Time:	0 tSit Max. Retry Limit: 1	Address Table
	Setup Time:	1 15it Highest Station Address (HSA): 125	🖨 Station Table
	Bus Monitoring		
	Data Control Time:	120 ms Overwrite slave specific Watchdog Control Time	
	Min. Slave Interval:	2000 µs Watchdog Control Time: 20 ms	
	Calculated Timing	Auto Clear ON	
	Tid2: 150 tBit	Values marked with this symbol should be	
		adjusted to changes in the topology.	

b.双击紫色线下连接的 PROFIBUS DP 从站,在弹出的对话框中设置从站的输入输出数据量。从"Avalible Modbules"选择需要的数据模块,点击"Insert"后可在"Configured Modules"中看到配置参数,这里 以一个 17 WORD 个输入,7 WORD 个输出,如图:

Navigation Area			_		Modules						
Configuration General Modules Signal Configuration Parameters Groups Extensions DPV1 DPV2 Redundancy Device Description Device GSD	Image: state	Module - 16 - 15 - 15	24 26 28 30 30 32 35 36 40 42 44 44 44 44	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	i i In/Out 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0x05 0x00 0x00 0x16 0x10, 0x00 0x10, 0x00 0x10, 0x00 0x10, 0x00 0x10, 0x00 0x10, 0x00 0x10, 0x00	Identif	ier	31	ot Restrictio	05
	Configured Modules:	Kodule -Out Master-In 2009/000000		Inputs 34 17 Tord 0	Outputs 0 14 7 Vord	In/Out D	0x40, 0x00 0x40, 0x00 0x10, 0x00 0x50 0x50	Identifier.		Inset Slot Restri	Append
	¢ Length of input/output data: Length of input data: Length of output data:	40 bytes (max. 498 bytes) 34 bytes (max. 244 bytes) 14 bytes (max. 244 bytes)									Remov

可以在 "PROFIBUS DP Master" "Process Data" 下确认:



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10 Device: Vendor:	NT 100-RE-DP Hilscher GmbH			Device ID: Vendor ID:	0x004A 0x011E
rvigation Area 📮	-		Process Data		
Infiguration Box Parameters			-		
Process Data	image	lype	iag		
Address Table	- 00	H16731-0010 <add: 52=""></add:>	H16721-0010		
Station Table	4 8	17 WORD Slave-Out/Master-In <slot 1=""></slot>	17 WORD Slave-Out/Master-In		
		1 unsigned16 input	Input_1		
		1 unsigned16 input	Input_2		
		1 unsigned16 input	Input_3		
		1 unsigned16 input	Input_4		
		1 unsigned16 input	Input_5		
		1 unsigned16 input	Input_6		
		1 unsigned16 input	Input_7		
		1 unsigned16 input	Input_8		
		1 unsigned16 input	Input_9		
		1 unsigned16 input	Input_10		
		1 unsigned16 input	Input_11		
		1 unsigned16 input	Input_12		
		1 unsigned16 input	Input_13		
		1 unsigned16 input	Input_14		
		1 unsigned16 input	Input_15		
		1 unsigned16 input	Input_16		
		1 unsigned16 input	Input_17		
	· · ·	7 WORD Slave-In/Master-Out <slot 2=""></slot>	7 WORD Slave-In/Master-Out		
		1 unsigned16 output	Output_1		

另外由于网关功能不支持 DP V1 和 DP V2 服务,因此需要注意将两者的 Enable 前的勾去掉:

IO Device: EL62	731-0010	Parameter	Description		
Vendor: BEC	CHOFF	Maximum number of PROFIBUS DP slaves	125		
		Maximum number of total cyclic input data	5712 bytes		
		Maximum number of total cyclic output data	5760 bytes		
Navigation Area		Maximum number of cyclic input data	244 bytes/slave		
Configuration	Enable DPV1	Maximum number of cyclic output data	244 bytes/slave		
General		Configuration data	Max. 244 bytes per slave		
Modules	Max, channel data length: 0	Parameterization data per slave	7 bytes/slave standard parameters		
Signal Configuration			Max. 237 bytes/slave application specific parameters		
Parameters	Max. alarm PDU length:	Baud rate	9,6 kBits/s,		
Parameters	Alaras		19,2 kBits/s, 31,25 kBits/s,		
Groups	74.9.7		45,45 kBits/s		
Extensions	Alarm mode: 1 Alarm of each type		93,75 kBits/s, 187 5 kBits/s		
DPV1	Dull Dive Alarm Manufacturar-enactific Alarm		500 kBits/s,		
DPV2	Drocore Alarm		1, 5 MBits/s, 3 MBits/s		
Redundancy			6 MBits/s,		
Device Description	Update Alarm		12 MBit/s		
Device			Auto baud rate detection is not supported		
GED	Extra Alarm SAF	Data transport layer	PROFIBUS FDL		
650	Alarm Acknowledge via SAP 51	Limitations	DP V1 services class 1 and 2 are not supported		
	Alarm Advisowledge via SAP 50		DP V2 services are not supported		
		Reference to stack version	V2.5.x.x		

(10) 设置 PROFINET 端:

a.在 SYCON 软件中,选择 "Configuration" "Open Modbus/TCP", 弹出对话框,设置 Open Modbus/TCP 的 Protocol mode 及 IP 地址等参数,这里设置为 IO Server,如图:

Vendor: His	der Gribh			Vendor ID:	0x011e	
Navigation area			Configuration			
a Configuration — "Configuration Signal Configuration	Insertace - Bus startup: Walchdag time: Protocol mode. Data senp: Mag FG1 and FC3	Automodel - 0 IVO Server Yos	PIS ::			
	Den Phokided server connections: Olient connection watchtlog lime Response timeout: Send acknowledgement timeout. Connect adaptive/depresent timeout.	4 1993 2990 31000 310000	85 83 83 84			
	Close admontedgement teneout. IP address: Netmask: Gateway:	13000 172 101 1 33 255 255 255 0 0 0 0 0	ns V Finalda V Finalda Enalde			
	Extres	DectP DHCP				

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b.在 Modbus/TCP 的上位机软件或程序中使用对应的功能码读写数据,这里以功能码 FC 3 "Read Holding

Registers"为例,其读写起始地址为40001。

10.2.5 Open Modbus/TCP							
Parameter	Description	Configuration > Command Table > Command Table Open Woldow/TCP					
Maximum number of input data	2880 Registers	training of which the reading of which g command					
Maximum number of output data	2880 Registers	Benefities (Mathematica) Annual Annua					
Maximum number of connections	16	a to an					
Acyclic communication	Read/Write Register: - Max, 125 Registers per Aread Telegram (FC 3, 4, 23), - Max, 121 Registers per Write Telegram (FC 23), - Max, 123 Registers per Write Telegram (FC 16) Read/Write Colt: - Max, 1365 colts per Vrite Telegram (FC 1, 2), - Max, 1365 colts per Vrite Telegram (FC 15)	Extended: - Reacing Command with R.2. If writing Command with PLI6 Extended Academy Command with R.2. If writing Command with PLI6 registers are read by Canadia code, 3. The data are assigned to the memory addres (liternal) 0. Extended writing Command with PL R1: To the Code ComEREC/PLC Server with the SUGRE defees \$10 nd data address 40011 ownerds 12 registers are written by function code 16. The data are read from the process image of the Cleart from the memory address (bitmail) 0 osnards. The writing process is cally performed, if the data in the process image of the Cleart from the memory address (bitmail) 0 to 3 have charged, is the parameter trigger is set to charged.					
Motibus Function Codes	1. 2. 3. 4. 5. 6. 7. 15. 15. 15. 23 (Function code 23 in server mode only)						
Protocol Mode	Client or Server	Nadan 13 and 1 and					
Baud rates	10 and 100 MBit/s						
Data transport layer	Ethernet II, IEEE 802.3						
Reference to stack version	V2.5.x.x						
Table 81: Technical D	ata Open Modbus/TCP Protocol						

(11)再次双击网关(或右击网关,选择"Configuration""Gateway"),弹出对话框,选择"Signal Mapping"项,进行数据映射,点击下方"Map Signal",完成映射后点击 Apply 按钮,如图。

Navigation area	and the second second		Signal Mapping						
Settings Subriver netX Driver Device Assignment Su Configuration	Apartical Action (Copen Modbus/TCP) < 172.101.133> Import X2 (Open Modbus/TCP) < 172.101.133> Import X2 (State State Stat		• • •	EL6731-0010 <addr 52=""> EL6731-0010 <addr 52=""> TWORD Slave-Out/Master-In <slot 1=""> 7 WORD Slave-In/Master-Out <slot 2=""> Port X3 Signals +</slot></slot></addr></addr>			Data type		
Settings		2680 Registers In «Slot 0»			Receive	Input_0002		UNSIGNED 16	
- signal insepting Memory Card Management Litersing	Send .	2850 InWORDs	WORD ARRAY 2880		Receive	Input 0003		UNSIGNED 16	
	Send	~2880 InWORDs WORD_0002	WORD	13	Receive	Input_0004		UNSIGNED16	
	Send	~2880 InWORDs WORD_0003	WORD	-	Receive	Input_0005		UNSIGNED16	
	Send	~2880 InWORDs.WORD_0004	WORD		Receive	Input 0006			
	Send	~2880 InWORDs.WORD 0005	WORD	. *	Receive	Input 0007		UNSIGNED16	
				2	(C)				
	Port X2 (Open Modbus/ICP) <172.101.1.33> 2880 Registers in <slot 0=""> 2880 Registers Out <slot 0=""></slot></slot>			← ■ Port X3 (PROFIBUS-DP) <addr 1=""> ● ■ E16731_0010 <addr 52=""> ● ■ Status</addr></addr>					
	Port X2 (C	pen Modbus/TCP)		1	Port 3	X3 (PROFIBUS-DP)			
		ters în (Slot 07/ 3000 înRXBD, RXBD,0001 Manuel Mapping	e Map signals B	emove	- ELETA	-0010 (Addr 32)/37 KBB S1ave-	out/Master-)	n (Slot l)∕Input_000	1

数据映射的一般规则是总是把 Receive 的数据映射至 Send 的数据, Receive 的方向是网关上某一 个接口接收数据, Send 的方向是网关上另一个接口发送数据。

可以通过 Ctrl 键或 Shift 键选中多个 Receive 数据。还可以在 Auto Mapping 中,通过选择 "From Port3 to Port2",并单击 Apply 按钮,来进行数据自动映射。

(12)至此,完成了网关的所有配置。右击网关,选择 Download 将配置文件下载到网关中。根据所下载的固件和配置文件,网关就可以根据这些参数开始工作。





(13) 注意保存配置工程,以便在之后的应用中直接在此基础之上稍作改动,便可快速应用。

3 网关诊断

(1) 网关支持在线诊断,选择网关,保持 USB 线缆与计算机相连,右键先 "Connect",后选择 "Diagnosis" 可分别查看网关、PROFIBUS DP 端与 Open Modbus/TCP 端通讯状态。如图:



(2) 通过网关上的 Led 指示灯快速判断通讯状态,如图:



Figure 5: LEDs and Control Elements of the upper half of the Device

- () Connector X1 for power supply
- Slot for memory card (part number of SD card: 1719.003)
- Address switch, The address switches can be activated with SYCON.net version 1.351 (or higher) and can be used with firmware version 1.5 (or higher) for PROFIBUS DP Slave, DeviceNet Slave, CANopen Slave
 Address switch, Switch, Switch, State Control of the switch of the

Address sw factor 1

- tch, and CC-Link Slave. SYCON net configures, if the address switches are used for X2 or X3. Section Range of Values for the Address Switches on page 34 lists the range of values for each protocol.
- 5 SYS LED
- 6 APL LED
- LED, depends on protocol at X2
- 8 LED, depends on protocol at X2
- Mini-USB diagnostic interface below the cover
- 1 Cover for diagnostic interface
- (f) Position for protocol depending label for the protocol at X2 on the cover
- Position for protocol depending label for the protocol at X3
 - Continued on the next page

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- ▶ 通讯协议代码/网关/板卡(CO,ECAT,DP,PN,DN,EIP,Modbus,CC,IO-Link等)
- > TSN 时间敏感网络开发方案及应用方案
- ▶ INtime 实时操作系统(提升 windows 实时性)
- ➢ PLC/软 PLC 开发方案

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