

KEPServerEx 和西门子 S7-300 系列 PLC 的连接步骤

(通过 Siemens TCP/IP Ethernet)

KEPServerEX 提供的西门子 Siemens TCP/IP 驱动能够为用户提供一个 OPC Server 接口, 将西门子 TCP/IP 以太网设备连接到 OPC Client 应用程序中,简单、可靠。

下面以西门子 S7-300 系列 PLC 为例,说明如何建立 KEPServerEX 和该系列 PLC 的连接。 S7-300 系列 PLC 可通过通讯模块 CP343 或者 NetLink 实现通信,以下以 CP343 为例说明。

◆ 设置 KEPServerEX

- ➤ 新建通道: New Channel
- 打开 "KEPServerEx V5.4" 软件,点击软件界面 "File" -> "New" 或者工具栏上的 "New Project",新建一个新工程:

🛍 KEPServerEX - Runtime	
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New Project (Ctrl+N)	Tag Name 🛆 Address 🛛 Data Type 🛛 Scan Rate 🚽 Scaling 👘 Description
5	
H + + H Devices Advanced Tags Data Lo	
Date 7 Time Source	Event
Devices Advanced Tags Data Lo Date 7 Time Source 1 2010-12-27 15:51:46 KEPServerEX\Runtime	Event Alarms & Events Plug-in V5.4.135.0

2. 单击软件界面 "Click to add a channel." 或者工具栏上的 "New Channel", 新建一个通道:



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9	Click to ac	d a channal	w Channel		Tag Name	Address	Data Type	Scan Rate	Scaling	Description

 修改通道名 "Channel name" 或不作修改, 单击 "下一步"。如下将通道名 "Channel name" 修改为西门子 S7-300:

New Channel - Identif	fication	X
	A channel name can be from 1 to 256 characters in length. Names can not contain periods, double quotations or start with an underscore. Channel name: 西门子S7-300	
	<上一步B) 下一步N)> 取消	帮助

4. 选择你想分配给本通道的设备驱动 "Device driver",在下图的下拉列表中选择 "Siemens TCP/IP Ethernet",单击 "下一步":



New Channel - Device	Driver	
	Select the device driver you want to assign to the channel. The drop-down list below contains the names of all the drivers that are installed on your system. Device driver: Siemens TCP/IP Ethernet	
	<上→步(B) 下一步(N)> 取消 看	習助 🛛

注意:1、在上图的下拉列表中选择您要连接设备的设备驱动;

2、如果用户在使用过程中没有找到所要连接设备的驱动,则可能是没有进行完全安装,用户应该对 KEPServerEX 进行修改(Modify)安装。用户在安装 KEPServerEX 时可根据需要安装所需要的设备驱动或者全部驱动。

5. 选择设备所用的网络适配器 "Network Adapter"。这里选择 "Default", 单击 "下一步"。

New Channel - Network	Interface	
	This channel is configured to communicate over a network. You can select the network adapter that the driver should use from the list below. Select 'Default' if you want the operating system to choose the network adapter for you. Network Adapter:	
	<上一步(B) 下一步(N)> 取消	帮助



6. 对通道进行优化设置"Write Optimizations",这里保持默认值,单击"下一步"。

New Channel - Write C)ptimizations	\mathbf{X}
	You can control how the server processes writes on this channel. Set the optimization method and write-to-read duty cycle below. Note: Writing only the latest value can affect batch processing or the equivalent. Optimization Method O Write all values for all tags Write only latest value for non-boolean tags Write only latest value for all tags Duty Cycle Perform 10 * writes for every 1 read	
	<上一步(B) 下一步(N)> 取消	帮助

7. 设置总结,单击"完成"。

New Channel - Summa	гу	
	If the following information is correct click 'Finish' to save the settings for the new channel. Name: 西门子S7-300 Device Driver: Siemens TCP/IP Ethernet Diagnostics: Disabled Network Adapter: Default Write Optimization: Write only latest value for all tags 10 writes per read	
	<上一步(B) 完成 取消 帮助	

至此,通道新建完成。

8. 用户可通过右键单击或者双击通道名修改通道参数: General、Network Interface、Write



Optimizations.

Channel Properties 🛛 🗙
General Network Interface Write Optimizations
Channel name:
西门子\$7-300
Device driver:
Siemens TCP/IP Ethernet
Enable diagnostics
确定 取消 应用 (A) 帮助

- ▶ 新建设备: New Device
- 1. 单击软件界面 "Click to add a device"或者工具栏上的 "New Device",进行设备设置。

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	8	F.C.M.	\$7-3	00	New Dev	vice			Tag Name 7	Address	Data Type	Scan Rate	Scaling	Description
		Em Cho	k to ac	id a dev	/ice.									



2. 修改设备名称"Device name",这里我们修改为"PLC",单击"下一步"。

New Device - Name		×
	A device name can be from 1 to 256 characters in length. Names can not contain periods, double quotations or start with an underscore. Device <u>n</u> ame:	
	一步B) 下一步(N)> 取消 帮助	

3. 选择设备模型"Device model",这里我们选择"S7-300",单击"下一步"。

New Device - Model	×
	The device you are defining uses a device driver that supports more than one model. The list below shows all supported models. Select a model that best describes the device you are defining.
	Device <u>m</u> odel:
 、上·	→步⑮) 下一步心)> 取消 帮助

4. 选择设备 ID"Device ID",这里指的是所要连接的 PLC 设备的 IP 地址。假如 IP 地址为: 192.168.0.155,则设置如下:



New Device - ID	×				
	The device you are defining may be multidropped as part of a network of devices. In order to communicate with the device, it must be assigned a unique ID. Your documentation for the device may refer to this as a "Network ID" or "Network Address." Device [D: 192.168.0.155				
<上一步(B) 下一步(N)> 取消 帮助					

5. 设置通信的时间参数"Timing",这里我们保持默认设置不变,单击"下一步"。

New Device - Timin	ng 🔀
	The device you are defining has communications timing parameters that you can configure.
	Connect timeout: 📴 📑 seconds
	Request timeout: 2000 📩 milliseconds
	Fail after 2 📩 successive timeouts
	Inter-request delay: 0 👘 milliseconds
<.	上一步(B) 下一步(N)> 取消 帮助

6. 自动降级 "Auto-Demotion" 设置,这里我们保持默认设置不变,单击"下一步"。

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New Device - Auto-	Demotion	×
	You can demote a device for a specific period upon communications failures. During this time no read request (writes if applicable) will be sent to the device. Demoting a failed device will prevent stalling communications with other devices on the channel.	
	Enable auto device demotion on communication failures Demote after 3 = successive failures Demote for 10000 = milliseconds	
	Discard write requests during the demotion period	_
<u> </u>	上一步(B) 下一步(N)> 取消 帮助 帮助	

7. 通信参数"Communication Parameters"设置,这里我们保持默认设置不变,单击"下一步"。

New Device - Comm	mications Parameters	×
	Set the TCP/IP port number the device is configured to use. The default for CP communications is 102 (TSAP). The default for NetLink communications is 1099. Enter the device's MPI ID (0 - 126) for NetLink models. Port Number: 102 MPI ID: 0	
 _ <.	上一步(B) 下一步(N)> 取消 帮助	

- 8. 设置 S7 通信参数 "S7 Comm. Parameters" 等,这里我们保持默认设置不变,单击"下一步"。
- 其中: Link Type: 连接类型, 一般选择默认值 "PC";

Rack (0~7): 实际机架的位置,应该与 STEP7 中的对应设置一致;

CPU Slot (1~31): 实际连接的 PLC 的 CPU 所在的槽位,应该与 STEP7 中的对应设置一致;

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New Device - S7 Co	nn. Parameters	×		
	S7-300/S7-400/S7-1200: Set the type of connection link to be used in communications. Also, enter the rack number and slot the CPU resides in. S7-200: Set the Local (PC) and Remote (Device) TSAP for this device connection. S7-200 Local TSAP (hex): 4D57 Remote TSAP (hex): 4D57 Local CPU Settings Back (0 - 7): CPU Settings CPU Settings Back (0 - 7): Q: CPU Settings Back (1 - 31): Q:			
<上一步(B) 下一步(N)> 取消 帮助				

注意: 这些设置需要和实际连接的 PLC 的相应设置一致!

9. 设置字节顺序"Byte Order",这里我们保持默认设置不变,单击"下一步"。 其中: Big Endian: 大端模式,

Little Endian: 小端模式,

New Device - Addre	ssing Options	×
	Select the byte order for 16 and 32 bit values. Big Endian (Motorola) is the default byte order for the Siemens S7 controllers. Little Endian (Intel) is available as an option. Byte Order	
<	上一步(B) 下一步(N)> 取消 帮助	

10. 设置总结,单击"完成"。

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11. 用户可通过右键单击->Properties 或者双击设备名称修改设备参数:

Device Prope	rties	×
S7 Comm. F General Timiny	Parameters Addressing Options g Auto-Demotion Communication Parameter	 21
Channel Assig	gnment	
Name:	西门子S7-300	
Driver:	Siemens TCP/IP Ethernet	
Device		
Name:	PLC.	
Model:	\$7-300 •	
ID:	192.168.0.155	
☑ <u>E</u> nable data	a collection	
确定	取消 应用(A) 帮助	

- ▶ 新建标签: New Tag
- 1. 单击软件界面 "Click to add a static tag",或者工具栏 "New Tag" 增加一个标签。



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回 🖣 西门子S7-300	New Tag		Tag Name 🛆 🛛 Address	Data Type	Scan Rate	Scaling	Description
			ど Click to add a static ta	g. Tags are not required	d, but are browsa	ble by OPC client	8.
1			1				

2. 设置 Tag 属性:

Tag Properties	
General Scaling	
Identification Name:	4
Address:	
Description:	
Data properties	
Data type: Default	
Client access: Read/Write	
Scan rate: 100 📑 milliseconds	
Note: The scan rate is only used for client applications that do not specify a rate when referencing this tag (e.g., non-OPC clients)	
	A) 帮助

这里我们做如下设置: Name=温度, Address= PIDI00, Description=温度变量, Data type=DWord, 其它各项保持默认值不变, 单击"确定"或"应用", 如下图:

Kepware 中国区代理	上海泗博自动化技术有限公司	SiboTech
Tag Propert:	ies	
General Scaling Identification Nam Addres Description Data propertie Cl Note: The sc specify a rate	e: 温度 s: PIDI00 w 温度变量 Data type: DWord マ eent access: Read/Write マ Scan rate: 100 美 milliseconds an rate is only used for client applications that do not e when referencing this tag (e.g., non-OPC clients)	
	确定 取消 应用	(A) 帮助

注意:设置 Address 时,必须确保填写的内容是硬件设备内部允许访问的地址,在你填 好之后,可以单击"对号"按钮进行测试或帮助。

3. 用户可通过右键单击->Properties 或者双击标签名称修改标签参数。至此,我们的 Kepware server 服务器端就设置完成了。本服务器只设置了一个标签。

Tag Properties	
General Scaling	
⊙ <u>None</u> C <u>L</u> inear C <u>S</u> qu	uare root
Raw Value Range	Scaled Value Range
Data type: DWord	Data type: Double 💌
High: 1000	High: 1000 🗖 Clamp
Low:	Low: 0 🗖 Clamp
	Units:

R



◆ 在 STEP7 中设置 S7-300

若要建立 S7-300 PLC 和西门子 TCP/IP 以太网驱动的连接,用户需要对 PLC 的 CPU 和 以太网模块做如下设置。

1. 打开 Simatic Manager, 在 "SIMATIC 300 Station" 下双击 "Hardware" 进入硬件组态界面:



- 2. 在打开的硬件组态界面中进行相应组态,在机架"Rack"中插入需要的模块,为确保 Siemens TCP/IP 以太网驱动和 PLC 的正常通信,至少需要插入一个以太网通信模块(CP343)。
- 3. 配置以太网通信模块: 右键点击通信模块 CP343-1, 选择 "Object Properties"

Image: Head Config - [SIMATIC 300 State Image: Head Confi	Add Master System Disconnect Master S Insert PROFINET IC Disconnect PROFIN PROFINET IO Mana PROFINET IO Topol Isochrone Mode	5ystem) System ET IO System ge Sync Domain løgy		- D × - B × - B ×
<u>X2</u> DP 3 -	Specify Module		1 0	
4 F CP 343- 5 6	Go To Filter Assigned Mod	ules	0	
	Monitor/Modify Edit Symbols		nterrace Istrial Ethernet CP 343-1 CP 66K7 343-15X00-0XE0	
Slot Module 0 1 PS 307 2A 6ES7 2 CPU 315-2 DP 6ES7 X2 DP -	Object Properties Product Support Inf FAQs Find Manual	ormation Ctrl+F2 Ctrl+F7 Ctrl+F6	GGK7 343-1E×00-0×E0 GGK7 343-1E×10-0×E0 GGK7 343-1E×11-0×E0 GGK7 343-1E×20-0×E0 GGK7 343-1E×20-0×E0 GGK7 343-1E×21-0×E0	
3 4 - [- CP 343-1 6GK7 V2 5 6 7 7 8 7 7 7	0 3 256 256 0 0	, ⊕-; CI ⊕-; CI ⊕-; PROF Prort-	▶ CP 343-1 ISO CP 343-1 PN P 343-1 Advanced-IT P 343-1 Lean IBUS to-Point	~
Displays properties of the selected object	for editing.	6GK7 343-1EX11-0XE0 S7 CP for Industrial Ethern SEND/RECEIVE and FE1 UDP. TCP. ISO. S7 comm replacement without PG. 1	et ISO and TCP/IP with CH/WRITE interface, long data, unication, routing, module 0/100 Mbos, fixed MAC	▲ ₹ <u><</u> ▼



4. 弹出的"Object Properties"窗口如下:

Properties - CP 343-1 - ((R0/54)		
General Addresses Op	otions Diagnostics		
Short Description:	CP 343-1 S7 CP for Industrial Ethernet ISO and TCP/IP with SEND/RECEIVE and FETCH/WRITE interface, long data, UDP, TCP, ISO, S7 communication, routing, module replacement without PG, 10/100 Mbps, fixed MAC address, initialization over LAN, IP multicast, firmware V2.0		
Order No./ firmware	6GK7 343-1EX11-0XE0 / V2.0		
Name:	CP 343-1		
_ Interface	Backplane Connection		
Type: Ethe	met MPI Address: 3		
Address: 10.1	0.110.70		
Networked: Yes	Properties		
Comment:			
	×		
OK	Cancel Help		

5. 在该标签页面 "General", 点击 "Interface" 部分的 "Properties..." 按钮:

Properties - Ethernet interface CP 343-1 (Ri	D/54) X
General Parameters	
Set MAC address / use ISO protocol	
MAC address:	If a subnet is selected, the next available addresses are suggested.
IP protocol is being used	
IP address: 192.168.0.155	Gateway Do not use router
Subnet mask. [200.200.200.0	O Use router
	Address: 192.168.0.1
Subnet:	
not networked Ethernet(1)	New
	Properties
	Delete
OK	Cancel Help



如上图所示,在"IP address"以及"Subnet mask"中分别设置通信模块的 IP 地址和子网 掩码。注意:这里设置的通信模块的 IP 地址等参数应该和 KEPServerEX 中新建设备的 ID 等 参数一致。

点击"Subnet"下的"New"按钮,新建一个网络,选中该网络,点击"OK"确认。 6. 返回硬件组态界面,配置参数。

7. 右键点击机架上的 CPU, 选择 "Object Properties":

HW Config - [SIMATIC 3] Station Edit Insert PL Config - Station PL (0) UR PS 307 -	Disconnect Master System Insert PROFINET IO System Disconnect PROFINET IO System PROFINET IO Manage Sync Domain PROFINET IO Topology Isochrone Mode		- [] × _ [] × _ [] × _] ×
2 CPU 31	Specify Module		Standard 🗸
	Delete	Del	
4 H CP 343- 5 6 7 ▼	Go To Filter Assigned Modules	•	ROFIBUS-PA ROFINET IO IMATIC 300
			IMATIC 400
	Edit Symbols Object Properties	Alt+Return	IMATIC PC Based Control 300/400
(0) UR	Product Support Information	Ctrl+F2	
1 PS 307 2A	FAQs Find Manual	Ctrl+F6	
2 CPU 315-2 DP	6E57V1.2.2		, j
<u>X2</u> DP	1023	_	
4 1 CP 343-1	6GK7 V2.0 3 256 256		
6 7		_	
8 9			
$10 \\ 11 \\ 11$		C7 (distri	US-DP slaves for SIMATIC S7, M7, and ts buted rack)
Displays properties of the selecte	d object for editing.		

8. 弹出的"Object Properties"窗口显示如下:



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Properties - CPU 315-2 DP - (R0/52)	×
General Startup Cycle/Clock Memory Retentive Memory	Interrupts
Time-of-Day Interrupts Cyclic Interrupts Diagnostics/Clock Protection	Communication
Connection Resources Reserved for	
PG Communication:	
OP Communication: 1	
S7 Standard Communication: 4	
S7 Communication: 0 (already configured))
Maximum Number of Connection Resources: 12	
OK Cancel	Help

9. 配置期望的 PG/OP 以及 PC (S7 Communication) 连接数:

类型	描述
PG 通信(PG Communication)	用于上下载程序、诊断
OP 通信(OP Communication)	用于操作控制和监控
S7 标准通信(S7 Standard Communication)	不需要配置的通信连接,用于 MPI 与 PUT/GET
	功能块的通信
S7 通信(PC) (S7 Communication)	可配置的连接,用于数据通信

注意: CPU PC 连接的最大数量等于"连接资源的最大数量"减去"S7 标准通信连接" 减去"OP 通信连接"减去"PG 通信连接"。"连接资源的最大数量"是由 CPU 的固件版本决定的。

在上图中,可用的 S7 通信连接数 (PC)为 6 (12-4-1-1=6)。同样地, PG 以及 PC 连接数也可以增大。

如果出现了"设备返回协议【类=0x83,代码=0x04】"错误,应该增加 S7 标准通信的连接数,从而 S7 通信连接数 (PC) 也会相应减少。

10. 配置好连接后,点击"OK"。重新进入硬件组态界面,点击"Station->Save and Compile",



进行保存和编译。

11. 点击"PLC->Download",将程序下载到 PLC。

◆ 对设置完成的 Kepware server 服务器进行测试

1. 首先打开西门子 S7-300 PLC,用 STEP7 对 PLC 进行编程,下载程序,必须确保程序中有 PID100,这个变量就是 PLC 的内部寄存器,它和上图中的 Address 所赋的值必须一样,否则 OPC client 访问不到。具体请参考 "在 STEP7 中设置 S7-300"。

2. 点击""设置完成的 Kepware OPC server 的工具栏的"Quick Client",或者点击软件界面 的 "Tools->Launch OPC Quick Client", 即可对 OPC server 进行测试。

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	🗈 🗙 🔤]					
□ 章 西门子S7-300	Tag Name 🗡	Address	Data Type	Scan Rate	Scaling	Description	
	2/温度	FIDIOU	DWord	100	None	温度变量	

🔞 KEPServerEX	- Runtime (Demo Expir	es O	1:59:44)					
<u>F</u> ile <u>E</u> dit <u>V</u> iew	<u>T</u> ools <u>R</u> untime <u>H</u> elp							
🗋 💕 🗟 🛃	Event Log							
□ ➡ 西门子S7-30	Launch OPC Quick Client		Tag Name 🛆	Address	Data Type	Scan Rate	Scaling	Description
PLC	<u>O</u> ptions		<u>《</u> 温度	PID100	DWord	100	None	温度变量

3. 点击"Quick Client"之后就会出现以下窗口:

🚾 OPC Quick Client -	无标题 *						
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>T</u> ools <u>H</u> e	lp						
D 📽 🔒 😹 📽 🗳 😭	👗 🖻 🖻 🗙						
🖃 📹 Kepware.KEPServerEX.V5	5 Item ID		🛆 🛛 Data Type	Value	Timestamp	Quality	Update Count
	●西门子S7-300.PL	CRack	Byte	0	09:51:12.703	Good	1
DataLogger	●西门子S7-300.PL	CSlot	Byte	2	09:51:12.703	Good	1
— Junio System	■西门子S7-300.PL	C.温度	DWord	Unknown	09:51:15.953	Bad	1
西门子\$7.300_3%6							
	· I						
西门子S7-300.PLC. 9	System						
💼 西门子S7-300.PLCS	System						
— 💼 西门子S7-300.PLCS	System						
— 💼 西门子 S7-300.PLCS	System						
└── 西门子S7-300.PLCS	System						
└─ ─ 西门子S7-300.PLCS	System						
└── 西门子S7-300.PLCS Date Time	System Event						
□	System Event Connected to server						
□ 面门子\$7-300.PLC_\$ □ Date Time ① 2010-12-29 9:51:13 ② 2010-12-29 9:51:13	System Event Connected to server Added group "_Alarm						
□ 西门子\$7-300.PLC_\$ □ Date Time ① 2010-12-29 9.51:13 ① 2010-12-29 9.51:13 ① 2010-12-29 9.51:13	Event Event Connected to server . Added group '_Alam Added i hems to gro.						
□ 西门子\$7-300.PLC_\$ □ 2010-12-29 9.51:13 ① 2010-12-29 9.51:13 ① 2010-12-29 9.51:13 ① 2010-12-29 9.51:13	Event Connected to server Added group "_Alarm. Added 1 items to gro Added 1 items to gro)					
□ ■ 西门子\$7-300.PLC_\$ □ 2010-12-29 9.51:13 ① 2010-12-29 9.51:13 ① 2010-12-29 9.51:13 ① 2010-12-29 9.51:13 ① 2010-12-29 9.51:13 ① 2010-12-29 9.51:13	Event Connected to server Added group '_Alarm Added 1 items to gro Added 1 items to gro Added 4 items to gro						

当上图中的"Quality"变为"Good"时,表明 OPC server 已经和西门子 S7-300PLC 正 确连接,且从上图中的"Value"中获取该温度值。 17 上海泗博自动化技术公司 www.sibotech.net