The connection solution of iFIX with ET-7000 series

modules by using Modbus-TCP protocol

iFix is a kind of powerful SCADA software, and is generally implemented in the application of industrial control. In the following section, we will show you about how to use iFIX ver2.1 to connect ET-7000 series modules by using Modbus-TCP protocol, and guide you to finish a simple project step by step.(Attention: Before you use Modbus-TCp protocol, you must nstall the Modbus-TCP drivers-"MBE" first.)

Step 1: Startup the iFix SCADA software



Step2:Click **S**



Step3:Click button to set the communication parameters and I/O devices.



Step4: Click **?** button to select the communication method.

CADA Configuration			
SCADA Support	-Database Definitio	n	
⊙ Enable ○ Disable	Database Name:	мвтс	P ?
-I/O Driver Definition			
I/O Driver Name:			?
Configured I/O Drivers			
SIM - Simulation Driver	r		Add
			Configure
			Setup
1			Delete
- Backup SCADA SCADA Na	me:		
ОК	Cancel		НеІр

Step5:Select the item "MBE-Modbus Ethernet v7.16" in the list box, and click Ok the finish it.

Drivers available	
DDE - 32-bit DDE Driver Rev 6.0 MB1 - Modicon Modbus I/O Server v7.10b	•
MBE - Modbus Ethernet v7.16c OPC - OLE for Process Control Client 7.11 P31 - Paradym-31 Driver V6.00b	
OK Cancel	

Step6: Click "Add" button to add MBE - Modbus Ethernet v7.16 into configured I/O Drivers, and then click "Configure..." button to do the I/O drivers parameters setting.

SCADA Configuration
SCADA Support Database Definition
Enable O Disable Database Name: MBTCP ?
I/O Driver Definition
I/O Driver Name: MBE - Modbus Ethernet v7.16c ?
Configured I/O Drivers
SIM - Simulation Driver Add
MBE - Modbus Ethernet v7.16c Configure Setup Delete
Backup SCADA SCADA Name:
OK Cancel Help

Step7:Select "Use Local Server" and Click "Connect..." button to continue the other setting.

© Use Local Server	Remote machine name or TCP/IP address:
To run the User Interface, you must first connect to an 1/0 Driver OLE Automation Server. If you want to connect to the server on this machine, select "Use Local Server". If you want to connect to a server on another machine, select "Use Remote Server" and enter the machine name, or a TCP/IP address of the machine that has the server that you want to connect to. You can use the tree browser to help select a remote machine name.	
Show this dialog on startup	

IFix Linking to ICPDAS ET7000 Modbus/TCP

button to build a new connection channel.

	D:\DYNAMICS\Untitled.mbe - Intellution MBE Driver PowerTool	<u> </u>
	File Edit View Display Mode Options Help	
	MBE Name: MBE OLE Automation 1/0 Server, Version 7.16c Number of Channels: 0 Number of Devices: 0 Number of Data Blocks: 0 Advanced. Advanced.	
(
	For Help, press F1	

- 🕂 🔁

Step8: Click

Step9: Check the "Enable" check box to enable the Channel0, and then click **button** to add a new device.

Channel Name: Channel0		
Description: Network Interface Card Primary Card Number: Description: Descritin: Descriting: Descrip	MBE	Channel Name: Channel0 Description: Network Interface Card Primary Card Number: 0 Backup Card Number:

Step10:Fill the device name which you want in the field of Device Name, we use "MbDev" to be the name of this device here. Fill the IP address of ET-7000 in the field of "IP Address". If the ET-7000 has Modbus-TCP firmware inside. The IP address of ET-7000

will be showed on the LED in the left hand side of ET-7000. Fill the station number of ET-7000 in the filed of "Unit ID". The station number is the switch value in the right hand side of ET-7000.After finish the setting described above, click the "Enable" check box to enable this device. Then click the "Common" tag to modify the other parameters of MbDev.



Step11:Select "5-Digit" in the "Addressing Mode" combo box to rule the address length, then click button to build a new block.

		Primary Backur Comm	on		
		Channel Device	IP	Selected Communication Pat Channel Device IP	hs
		C Primary C Primary C Backup C Backup	 Primary Secondary 	Primary Primary Primary Backup Backup Primary Primary Backup Primary Backup Primary Primary	
			•	×	
		Addressing Mode:	5 - Digit 💌	Bit Base: 0 - 15 💌	
4	•		×		
For Help	p, press F1				

Step12: Fill the block name which you want in the field of "Block Name", we use "DO1" to be the name of first block here. Select "Boolean" for the data type. Fill the "Starting address", "Ending address", and address length in corresponding fields. Then click "Enable" check box, and click "Advanced... " button to make sure the correct setting of other parameters.(Attention: see the note of Step17)

⊡© MBE ⊡© Channel0 ⊡∭ MbDev	Block Name: D01 Description:	Enable 🔽
	I/O Address Setup	Polling Setup
	Starting Address: 00001	Primary Rate: U1
	Ending Address: 00001	Secondary Rate: 05:00
	Address Length.	
	Data Type: Boolean 💌	
	Deadband: 0	Access Time: 05:00
	Enables the driver to poll the datablock when	n you select this check Advanced

Step13:Because this block is used for output channels, you should make sure that the "Disable Output" check box to be blank. Then, click "ok" button to finish this dialog, and click to add second block.

Advanced Data Block Settings		
Data Format	Data Output	
Size of Registers: 2 Bytes 💌	Disable Outputs	
🗖 Swap Bytes 🔲 Swap Words	Enable Block Writes	
Unsolicited Messages	Latch Data	
Accept Unsolicited Messages	🔲 Enable Latch Data	
OK Cancel	Help	

Step14: Following the "Step 12" as a model to set the parameters of second block to be DI1 block. Then click "Enable" check box,

and click "Advanced..." button to make sure the correct setting of other parameters.(Attention: see the note of Step17)

Channel0 ⊡	Block Name: DI1 Description:	
	I/D Address Setup Starting Address: 10001	Polling Setup ✓ Primary Rate: 01
	Address Length	Phase: 00
	Deadband:	Access Time: 05:00
	Enables the driver to poll the datablock when box.	you select this check Advanced
• <u></u> •	 + 6 1 ×	Help
For Help, press F1		

Step15: This block is used for input channels, so you should make sure that the "Disable Output" check box to be checked. Then, click "ok" button to finish this dialog, and click dialog.

Advanced Data Block Settings	
Data Format	Data Output
Size of Registers: 2 Bytes 💌	Disable Outputs
🔲 Swap Bytes 🔲 Swap Words	Enable Block Writes
Unsolicited Messages	Latch Data
Accept Unsolicited Messages	🔲 Enable Latch Data
OK Cancel	Help

Step16: Following the "Step 12 and Step13" as a model to set the parameters of 3rd block to be AO1 block. After finish the

parameter setting of 3rd block, add the 4th block for AI channel.(Attention: see the note of Step17)

Channel0 → ∰ Channel0 → ∰ MbDev → ∰ DO1 D11 AO1	Block Name: A01 Description: 1/0 Address Setup	
	Starting Address: 40001 Image: Primary Rate Ending Address: 40001 Image: Secondary F Address Length: 1 Image: Philosophic Primary Rate Data Type: Unsigned Int Image: Philosophic Primary Rate	e: 01 Rate: 05:00
< F	Deadband: 0 Access Time Enables the driver to poll the datablock when you select this che box.	e: 05:00 ck Advanced Data Monitor Help
For Help, press F1		

Step17: Following the "Step 12 and Step13" as a model to set the parameters of 3rd block to be AI1 block.

D:\DYNAMICS\Untitled.mbe - Intellution MBE Driver PowerTool File Edit View Display Mode Options Help					
Channel0	Block Name: All Enable I				
601 A01 AI1	Starting Address: 30001				
	Ending Address: 30001 Secondary Rate: 05:00				
	Data Type: Unsigned Int				
	Enables the driver to poll the datablock when you select this check Advanced				
	Data Monitor Help				
• (11 + 11)	• fil X				
For Help, press F1					

- **Note:** In Modbus protocol, the type of digital output is set by "0", digital input is set by "1", analog output is set by "4" and analog input is set by "3". The data type of DI and DO use Boolean to present, and data type of AI and AO use unsigned integral to present. The "Starting address" begin at "0001". So if you want to use 5th channel of total digital input channels in ET-7000 series modules, you must give the "Starting address" to be "10005", and select Boolean to be the data type. The "Ending address" is the same with "Starting address". If you want to use the 15th channel of total analog input channels in ET-7000 series modules, you must set "30015" to be "Starting address", and Select "Unsigned Int" to be the data type. The "Ending address" is the same with "Starting address" is the same with "Starting address" is the same with "Starting address".
- **Step18:** After finishing all parameter setting, click "Save As" to save the result.

D:\DYNAMICS\Untitled.mbe - Intellution MBE Driver PowerTool					
File Edit View Display Mode Op	ions Help				
New Ctrl+N Open Ctrl+O					
Save As 1 Untitled 2 test1 3 TEST1.CSV 4 .csv Exit	Block Name: Al1 Description: Image: Constraint of the second sec	Polling Setup Primary Rate: Secondary Rate: Phase: Access Time:	Enable		
	Enables the driver to poll the datablock when y box.	ou select this check	Advanced		
Save the active document with a new r	iame				

Step18: The file name is called "MbConfig". Click "Save" to the file.

Save As			? ×
Save in: 🔂 Dynar	nics	▼ ← 6	È 💣 🎟 -
ALM APP HTR HTRDATA LOCAL NLS	PDB PIC RCC RCM		
File name: MbCo	onfig		Save
Save as type: Confi	ig Files (*.MBE)	•	Cancel

Step19: After finishing parameter setting, you can click _____ button to see the connection state. If the "Data Quality" shows "Good".

MBE Grannel0 Gran	Data Block Statistics for D01
DO1 DI1 AO1	Transmits: 300 Last Read Time: 11/28/2002 8:59:38 PM
	Receives: 300 Last Write Time:
	Timeouts: 0 Last Error Time:
	Retries: 0 Last Unsol Time:
	Errors: 0
	Overruns: 0
	Unsolicited: 0
	Data Quality. Good Data Monitor Troubleshooting

That means the connection state is good.

Step20: Click "OK" to finish the configuration of I/O driver.

DA Lonfiguration	
SCADA Support Database Definition	
Enable C Disable Database Name: MBT	CP ?
I/O Driver Definition	
I/O Driver Name: MBE - Modbus Ethernet v7.16c	?
Configured I/O Drivers	
SIM - Simulation Driver	Add
MBE - Modbus Ethernet V7.160	Configure
	Setup
	Delete
-Backup SCADA	
SCADA Name:	
OK Cancel	Help

Step21: Click "Save" to store the result of system configuration.



Step22: Click 🚠 button to build the database.

🚺 Intellution Dynamics WorkSpace	e (Configure)
File Edit WorkSpace Object View	Insert Format Window Help
	<u>251 (1818)</u>
FIX Alarm History Database Manager Documents Dynamo Sets FIX Recipes FIX Recip	■ untitled1.grf Toolbox
For Help, press F1	Configure

Step23: Select "Open Local Node" to continute.



Step24: Double click in the blank filed to build a new tag.

ai e e i i i	IX D	atabase Manager -	[FIX : 0	rows]				
8	Datal	base Edit View Blo	cks Dri	vers Tools Help				_ 8 ×
D	2		è 🛍			<u> </u>	N ?	
		Taq Name	Туре	Description	Scan Time	I/O Dev	I/O Addr	Curr Value 🔺
1								
2	2				Í			
3	}							
4	1							
5	5							
6	ò							
7	,							

Step25: Select "DO" to build a digital output tag.



Step26: Creat a tag name which you want and fill it in the "Tag Name"

field. Select Driver to be "MBE Modbus Ethernet v7.16c", and "I/O Address" to be "MbDev:00001". The first part of "I/O Address" is device name set in step10, and second part is block address set in step12. Select "UIni" to be "Hardware Options", and click "Invert Output" check box to inverse the output value. Then click "Save" button to save this tag.

Digital Output - [DO1]*	<u>?</u> ×
Basic Alarms Advanced	
Tag Name : DD1 Description : Previous :	Next :
Addressing Driver : I/O Address : Signal Conditioning :	Modbus Ethernet v7.16c I/O Configuration :00001 Hardware UInt I
Output Invert Output Initial Value :	Labels Open : OPEN Close : CLOSE
	Save Cancel Help

Step27:Following the "Step25" and "Step26" as a model, Select "DI" to build a new digital input tag, and set parameters as following.

Tag Name : 🌔	
Description :	
Previous :	Next :
- Addressing	
Driver :	MBE Modbus Ethernet v7.16c
I/O Address :	MbDev:10001
Signal Conditioning :	Hardware UInt Options :
- Scan Settings -	Labels
Process By	Exception Open: OPEN
Scan Time : 1	
Phase At :	Close : CLOSE

Step27: Follow "Step25" and "Step26" as a model, select "AO" to build a

new analog output tag, and set parameters as following. Be careful that the value of "High Limit" and "Low Limit" fields to be "32767" and "0".

Analog Output - [AO1]*		<u>? x</u>
Basic Alarms Advanced		
Tag Name : AD1 Description : Previous :	Next :	
Addressing Driver : MBE I/O Address : MbDev Signal Conditioning : None	Modbus Ethernet v7.16c :40001 Hardware UInt Options :	I/O Configuration ▼
Output Invert Output Initial Value :	Engineering Units Low Limit : 0 High Limit : 32,767 Units :	
	Save Cancel	Help

Step28: Set parameters as following by the same way for AI tag.

Analog Input - [AI1]*	? ×
Basic Alarms Advanced	
Tag Name : Al1 Description : Previous : Previous : Next : Addressing Next : Driver : MBE Modbus Ethernet v7.16c I/O Address : MbDev:30001	I/O Configuration
Conditioning : None I Hardware UInt Options :	•
Scan Settings Engineering Units Process by Exception Low Limit : Scan Time : 1 Phase At : Units :	
Save Cancel	Help

Step29: After finishing all tag setting, the database will show as bellow. Click 🔲 button to save this database.

iFIX	Database Manager -	[FIX : 4	rows]				
📕 Dat	abase Edit View Blo	cks Driv	ers Tools Help				_ 8 ×
	Taq Name	Type	Description	Scan Time	I/O Dev	I/O Addr	Curr Value 📥
1	Al1	AI		1	MBE	MbDev:30001	????
2	A01	AO		—	MBE	MbDev:40001	????
3	D01	DO			MBE	MbDev:00001	????
4	DI1	DI		1	MBE	MbDev:10001	OPEN
5							
6							
7							
8							
9							
10							▼ ▶
For Help,	, press F1			OFF EDIT d	efault	default	default //.

Step30: Build fore objects in a new picture. First, click button to build a "Push Button" object. When the "Push Button" object is put on the picture, double click on this object and input the words-"DO". Afterward, click button to set the action of this object.



pression Builder	×
Data Source Browser	1
FIX Database Pictures Historical Globals Data Servers Node Names Tag Names A.ADI A.11 A.01 A.ALMEXT1 A.2LMEXT1 A.ALMEXT2 A.2LMINTIME A.ALMINTIME A.2LMINTIME A.AREA10 A.AREA11 A.AREA12 A.AREA13 A.AREA14 A.AREA3 A.AREA4 A.AREA4 A.AREA4	
Fix32.FIX.D01 Tolerance: 0.000000 Deadband: 0.000000 Refresh Rate: 0.0	
OK Cancel Help Mathematical Functions >>	

Step32: Select "DO1" in the "Tag Name" list box. Then click "Ok".

Step33:Select "Pushbutton Entry" to be the output mode of "Push Button" object, and then click "OK" to store the result.

Choose Data Entry Method for Co	ommandButton1	×
Receive Fill Data From		
Data Source Fix32.FIX.D01.F_CV	✓ …	
Choose Data Entry Method		
C Numeric/Alphanumeric Entry	Pushbutton Titles	
C Slider Entry	Open Button Title[0]: Open	
Pushbutton Entry	Close Button Title[1]: Close	
C Ramp Entry		
	<u> </u>	

Step34: Click 1 to build a "Datalink" object to show the value of a digital input channel.



Step35: Clicl ____ button to select appropriate data source in the database.

Choose Data E	ntry Method for CommandButton1	×
)ata From	
Data Source		

Step36: Select "DI1" in the "Tag Name" list box. Then click "Ok".

Expression Builder Data Source Browser	Pictures Globals 😿 Data Servers	?×
Node Names	Al1	Field Names A_ADI A_ALMCK A_ALMCK A_ALMEXT1 A_ALMEXT2 A_ALMINTIME A_ALMINTIME A_ALMINASTTIME
Fix32.FIX.DI1		▲ Tolerance: 0.001000 Deadband: 0.000000 ▼ Refresh Rate: 0.0
·	OK Cancel H	Help Mathematical Functions >>

Step36: Click "Ok" to continue the other setting.

Datalink
Source
Fix32.FIX.DI1.F_CV
Data Entry Error Configuration
Type: None Output Error Mode:
Confirm
Formatting
🗖 Raw Format Type: Numeric 🔽
Justify: Left 💌 Whole Digits: 5 Decimal: 2
OK Cancel Help

Step37: Build a new "Datalink" object in the picture by the same way ,and put the "Datalink" below the "Push Button" object. Select "AO1" to be the data source.

Expression Builder	<u>? ×</u>
Data Source Browser	
🚜 FIX Database 🖳 Pictures 😵 Globals 7 Data Servers	
Node Names Tag Names	Field Names
FIX A01	A_ADI A ALMEXT1
DI1	A_ALMEXT2
NSD	
	A_ALMSN A_AREA1
	A_AREA10 A_AREA11
	A_AREA12 A_AREA13
	A_AREA14
	A_AREA2
	A_AREA4
	A_* F_*
× ▼ F	× F
Fix32.FIX.A01	Tolerance: 0.001000
	Deadband: 0.000000
	Refresh Rate: 0.0
OK Cancel Hel	p Mathematical Functions >>

Step38: Select "Datalink" object which is below "Push Button" object. Click **k** button to set the action of this "Datalink" object.



Step39: Select "Slider Entry" to set the output mode of AO object to be a slider. Check the "Fetch Limits from the Data Source" check box.

Choose Data Entry Method for Da	itaLink3
Receive Fill Data From	
Data Source Fix32.FIX.A01.F_CV	✓ …
Choose Data Entry Method	
C Numeric/Alphanumeric Entry	Slider Limits
Slider Entry	Low Limit: 0
C Pushbutton Entry	High Limit: 32767
C Ramp Entry	Fetch Limits from the Data Source
	<u>OK</u> <u>C</u> ancel <u>H</u> elp

Step40: Follow "Step37" as a model to build a new "Datalink" object in the picture ,and select "AI1" to be the data source.

Expression Builder	? ×
Data Source Browser	
🚜 FIX Database 🖳 Pictures 😵 Globals 7 Data Servers	
Node Names Field Names Field Names	
	-
DDI A_ALMEXT2 DDI A_ALMINTIME	
NSD A_ALMLASTTIME A_ALMSN	
A_AREA1 A_AREA10	
A_AREA11 A_AREA12	
A_AREA13 A_AREA14	
A_AREA15 A_AREA2	
A_AREA3 A_AREA4	-
	×
Fix32.FIX.Al1 Tolerance: 0.0010	00
Deadband: 0.0000	00
Refresh Rate: 0.0	•
OK Cancel Help Mathematical Fu	unctions >>

Step41: After finishing all parameter setting, click "Ok" to continue.

Datalink	×
Source	
Fix32.FIX.Al1	
Data Entry Error Configuration	
Type: None Uutput Error Mode:	
Confirm	
Formatting	
🗖 Raw Format Type: Numeric 💌	
Justify: Left 💌 Whole Digits: 5 Decimal: 2	
OK Cancel Help	

Step42: Click A button to create three "Text" object, and input the words "DI", "AO", and "AI" receptively in the appropriate place.



Step43:Click "Save as" to save this page as the name-"MbTest".

😈 Intellution Dynamics ¥	VorkSpace (Con	nfigure)	Ľ
File Edit WorkSpace Obj	ject View Inser	ert Format Window Help	
New Open	Ctrl+O	S <mark>▼ ≤# 8 2</mark> 2 2 4 5 2 3 7 7 1 4 2 3 3 3 4 5	
Close		untitled1.grf	
Save	Ctrl+S		
Save As		Testher	7
			1
Print	Ctrl+P		
1 D:\Dynamics\PIC\test1			
2 D:\DYNAMICS\PIC\untitle	ed1		
3 D:\DYNAMICS\PIC\test			
4 MBEdidw			5
	Save As	?	<u> </u>
Exit A Text2 A Text3 A Text4 Reports	Save in: Backup CocalAs	PIC 🔽 🗲 🖻 📸 🖬 🕶 sBackup sPrimary	-
	📃 回 Networl	rkStatusDisplay	8
	Networl	rkStatusRedundancyDisplay	
	File name:	MbTest Save	
	Save as typ	pe: Picture(*.grf) Cancel	

Step44: Run this project and click output object to set the digital and analog output value that you want as below.

