Modbus/IEC61850 Gateway

iGate-850

User Manual

REV 1.0



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User Manual

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1 Product Overview

1.1 Product Function

The gateway's main function is to convert Modbus meter data to IEC61850 standard data.

1.2 Product Features

- One way 10/100 BASE-T self-adaptive Ethernet, RJ45 interface;
- Supports IEC61850-8-1 (MMS) and GOOSE (meeting the mechanism of fast message of substation automation system;
- Supports report service, control service, replace service, GOOSE service and time service;
- Maximum data points: 800; supports up to 2 IEC61850 master stations and up to 20 Modbus slave numbers;
- ▶ With 2 serial ports, Serial port can be RS-232, RS-485 or RS-422;
- > Transmission mode supports Modbus RTU and ASCII;
- ▶ The serial baud rate supports 200~38400bps;
- ▶ 8 data bits, 1 stop bits, parity : none, odd and even;
- Supports redundant channel transmission;
- Supports communication between two hosts.

1.3 Technical Specification

- [1] Each Modbus command can be set polling time, scaling, conversion between big and little Endian;
- [2]Two ends of the network support debugging functions;
- [3] Provides free configuration software and ICD modeling software;
- [4] Supports SNMP network management;
- [5] Through IEC61850-10 KEMA certification;
- [6] Low power consumption: 3W@24VDC, no fan;
- [7] Operation temp: -40°F~158°F (-40°C~70°C), Humidity: 5%~95% (non-condensing);
- [8] External dimensions (W*H*D): 1.57 in*4.92 in *4.33 in (40mm*125mm*110mm);
- [9] Protection level: IP20.



2 Hardware Descriptions

2.1 Product Appearance



Note: This picture is for reference only. Product appearance should refer to the real object.



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2.2 Indicators

Inc	licators	State	Description
		Red on	Module power supply is normal
Po	wer	Red off	Module is not powered or power supply is abnormal
	тх	Red blinking	Serial port data sending
Serial Port I		Red off	Serial connection not established or error
	RX	Green blinking	Serial port data receiving
		Green off	Serial connection not established or error
	тх	Red blinking	Serial port data sending
Serial Port II		Red off	Serial connection not established or error
	RX	Green blinking	Serial port data receiving
		Green off	Serial connection not established or error

2.3 Interface

2.3.1 Power Interface



Pin	Function
1	Power GND
2	NC, Not connected
3	24V+, DC Positive 24V, range 9~30V





2.3.2 Serial I

1) RS-232 interface:



Pin	Function
1	TX, connect RX of RS-232 of user device
2	RX, connect TX of RS-232 of user device
3	GND, connect GND of RS-232 of user device

2) RS-422/485 interface:



Pin	Function
1	R-,RS-422 Receive Negative
2	R+,RS-422 Receive Positive
3	GND
4	D-, RS-485 Data Negative/RS-422 Transmit Negative
5	D+, RS-485 Data Positive/RS-422 Transmit Positive



2.3.3 Serial II

1) RS-232 interface:



Pin	Function
1	TX, connect RX of RS-232 of user device
2	RX, connect TX of RS-232 of user device
3	GND, connect GND of RS-232 of user device

2) RS-422/485 interface:



Pin	Function
1	R-,RS-422 Receive Negative
2	R+,RS-422 Receive Positive
3	GND
4	D-, RS-485 Data Negative/RS-422 Transmit Negative
5	D+, RS-485 Data Positive/RS-422 Transmit Positive

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2.3.4 Ethernet Interface



Ethernet interface uses RJ-45 plug-in; its pin (standard Ethernet signal) is defined as below:

Pin	Signal Description
S1	TXD+, Tranceive Data+, Output
S2	TXD-, Tranceive Data-, Output
S3	RXD+, Receive Data+, Input
S4	Bi-directional Data+
S5	Bi-directional Data-
S6	RXD-, Receive Data-
S7	Bi-directional Data+
S8	Bi-directional Data-



3 Use Method

3.1 Quick Start Guide

Steps of Using iGate-850:

1.Use the network cable to connect the gateway to the network, noted the factory IP address of the gateway is 192.168.0.121. When there appears a problem during network connection, users need to modify the network segment of PC. That is :192.168.0.xx; the subnet mask is 255.255.255.0; the default gateway:192.168.0.1. (xx can be any value except 121).

2.Power on iGate-850, it will take about 1 minute to initialize.

3.Using ICD modeling software for modeling your Modbus devices, using the configuration software EasyConnect to configure the iGate-850. The main point is the Modbus command configuration and the objects mapped to IEC61850. When configuration is complete, download it into the gateway. Restart the iGate-850 or turn off the power then turn it on,makes the configuration take effect.

4. After the configuration has taken effected, the gateway enters the normal operation state.

3.2 System Requirements

The configuration module needs to use the EasyConnect software, users need to install EasyConnect.

This software requires the following hardware at a minimum:

- 3.1 GHz Processor
- 512MB installed RAM
- 100MB available disk space
- Operating system requirements: Windows 2000 and above Windows operating system
- Software environment requirements: .Net Framework 3.5 and above

After the installation is complete, the software is shown in the following figure.



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轮 EasyConnect			- @ X
File View Configuration Settings Diagnostics Tools	Help User Management		
🕒 😂 🚽 🗸 🕹 🧇 🔍 🗞 🗏 😔 🕨 🕘 🏈 🛹 🙀	= 2 # 2 3 0 4 3		
Configuration	EasyConnect		
	Recent Files	Resources C Lets	
			Malkitech
FasyConnect V485			

For the detailed use method, please refer to chapter 4.



4 Software Instructions

The interface of EasyConnect includes: title bar, menu bar, toolbar, device section and configuration section.

4.1 User Interface





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Image: Settings Row Number Point ID Basic Type Object Type Function Type Data Format Start Address Number Point ID Basic Type Object Type Function Type Data Format Start Address Number Point ID Basic Type Object Type Function Type Data Format Start Address Number Points Row1 1 Digital Input Single Indications Reed Coll Status 65535 1 Add Row Modify Row Delete Row Show Master Nodes
Channel-1 Modbus KTU Master_Node_1 Seneral Logic Settings Row Number Gateway Point ID Basic Type Object Type Function Type Data Format Start Address Number Row 1 1 Digital Input Single Indications Read Coll Status 65535 1 1 Add Row Modify Row Delete Row Show Master Nodes
Channel-1 Modbus KTU Master_Node_1 General Logic Settings Row Number Gateway Point ID Basic Type Object Type Function Type Data Format Start Address Numbe Points Row 1 1 Digital Input Single Indications Read Coll Status 65535 1 Add Row Modify Row Delete Row
General Logic Settings Common Section State Start Address Number Point ID Row Number Gateway Basic Type Object Type Function Type Data Format Start Address Number Points Row 1 1 Digital Input Single Indications Read Coll Status 65535 1 Add Row Modify Row Delete Row
Row Number Gateway Point ID Basic Type Object Type Function Type Data Format Start Address Numbe Points Row 1 1 Digital Input Single Indications Read Coll Status 65535 1 Add Row Modi fy Row Delete Row
Row1 1 Digital Input Single Indications Read Coil Status 65535 1 Image: Contrast of the state of
Add Row Modify Row Delete Row Show Master Nodes
Add Row Modify Row Delete Row Show Master Nodes
Add Row Modify Row Delete Row Show Master Nodes
Add Row Modify Row Delete Row Show Master Nodes
Add Row Modify Row Delete Row Show Master Nodes
Add Row Modify Row Delete Row Show Master Nodes
Add Row Modify Row Delete Row
Add Now Modify Now Jelete Kow
Show Master Nodes
Add Map Modify Map Delete Map



4.2 Toolbar

4.2.1 Restart 🧇

Device Name	SS1	*	SYNC221				
IP Address	Use LAN IP	~	192 .	168 .	0.	1	1

It's used to make configuration take effect after downloading the configuration.

When it appears the following hint, click OK button and the gateway starts to restart.





4.2.2 Device Scan

4.2.3 Version Information

After opening, make sure the device model and IP address is correct, click OK, as shown in the following figure, confirm and click "Close" to exit.



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Device Name Other Device Name IP Address Use LAN	SYNCS2R10EM Image: Syncs2R10EM IP 192.168.0.121	
	OK Close	
Device Model	SYNCS2R10EM	~
EasyConnect Version Name	4.6.0	
DCCP Version Name	2.14.0	
Secure DCCP	No	
GPC Version Name	2.20.0	
Number of Licensed Masters	2	-
Licensed Masters	MODBUS, SNTP Peer	
Number of Licensed Slaves	1	
Licensed Slaves	IEC61850	
Number of Licensed Modules	0	
Licensed Modules		
Build Date	23 Feb 2012 16:18:03	
Number of Licensed Com Ports	2	>



4.2.4 Update

SS1	~	SYNCS2R10EM	~
Use LAN IP	*	3.0.0	. 0
·			
	SS1 Use LAN IP	SS1	SS1 SYNCS2RIOEM Use LAN IP I I. O. O

Note: please do not update the program. If there is a problem with the product, be sure to carry out the function update process in the company's guidance.

4.2.5 Start 🖻

Device Name	SS1	* S	INC221				1
IP Address	Use LAN IP	~	192 .	168 .	0.	121	





4.2.6 Stop

Device Name	SS1	*	SYNC221	6
IP Address	Use LAN IP	*	192 . 168 . 0 . 121	



4.2.7 Time Settings

Device Name	SS1	¥	SYNC	221			Y
IP Address	Use LAN IP	~	192	. 168 . 0	. 121]	
Current Gatew	ay Settings						
Time (HH:MM	:SS : mmm)						
Date (dd / mm	n / уууу)						
Time Zone							
						Get	
Time Time 2	Zone						
💿 Use Sys	stem Settings						
🔘 Manual	Settings	08 /Sep	/ 2015	10:50:24			

It is used to set the system time and time zone.

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4.2.8 Traffic Monitor

Pa	cket Log
Channel1 Channel-1	Channel Channel-2
Channel-1 Node 1 < 01 01 00 00 00 05 FC 09 Channel-1 Node 1 Header Time Out * Channel-1 Node 1 Retransmitting the request 13:09:30.471 Channel-1 Node 1 < 01 01 00 00 00 05 FC 09 Channel-1 Node 1 Header Time Out * Channel-1 Node 1 Read Holding Registers 13:09:31.491 Channel-1 Node 1 < 01 03 00 00 00 0A C5 CD Channel-1 Node 1 Header Time Out * Channel-1 Node 1 Retransmitting the request 13:09:32.491 Channel-1 Node 1 < 01 03 00 00 0A C5 CD Channel-1 Node 1 Header Time Out * Channel-1 Node 1 < 01 03 00 00 0A C5 CD Channel-1 Node 1 Retransmitting the request 13:09:32.491 Channel-1 Node 1 Retransmitting the request 13:09:33.491 Channel-1 Node 1 Retransmitting the request 13:09:33.491 Channel-1 Node 1 < 01 03 00 00 00 0A C5 CD	Channel-2 Node 2 Header Time Out * Channel-2 Node 2 Retransmitting the request 13:09:29.830 Channel-2 Node 2 < 01 03 00 00 00 0A C5 CD Channel-2 Node 2 Header Time Out * Channel-2 Node 2 Retransmitting the request 13:09:30.830 Channel-2 Node 2 01 03 00 00 00 0A C5 CD Channel-2 Node 2 Reader Time Out * Channel-2 Node 2 Read Holding Registers 13:09:32.830 Channel-2 Node 2 < 01 03 00 00 00 0A C5 CD Channel-2 Node 2 Header Time Out * Channel-2 Node 2 < 01 03 00 00 00 0A C5 CD Channel-2 Node 2 Reatransmitting the request 13:09:33.830 Channel-2 Node 2 < 01 03 00 00 00 0A C5 CD
Pause Clear Log To File	Pause Clear Log To File

Used to monitor communication status of each channel.



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4.2.9 Diagnostics

Diagnostics				
IP Address 192 . 168	. 0 . 1	Retrieve	Output List PDC Output ID Code	
System Statistics	Values	1		
Database				

Note: This function is disabled.

4.2.10 Gateway Log 🖑

Device Name	SS1 💌	SYNC221	~
P Address	Use LAN IP 🛛 👻	192 . 168 . 0 . 121	
Start Date	Tuesday , March 10	, 2015 💌	
End Date	Sunday , April 12	, 2015 💌	
Save To			
		Get Log	ancel

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Note: This function is disabled.

4.2.11 Application Logs

Device Name	SS1	*	SYNC221				2
IP Address	Use LAN IP	*	192 .	168 .	0.	121	
. <u>.</u>							
Application	Dialup		*				
Save To							

4.3 EasyConnect Guide

Before using EasyConnect, you need to set up ICD model for your Modbus devices.

4.3.1 Device Selection

Open EasyConnect, click the Device option in the left column, as shown in figure 4.3.1.1, in the "SYNC"page, choose SYNC 200 IED Upgrade Card in SYNC SERIES; choose SYNC221 in MODEL option, click "OK" button, as shown in figure 4.3.1.2; The configuration file is mainly composed of three parts: "Channel", "Node" and "Profile" (as device path, node, and profile). First, you need to configure the channel (Channel), then is new node (Node), the last is configuring attributes (Profile). Currently iGate-850 supports 3 channels, one channel for the Ethernet interface (IEC61850), the remaining two channels for the serial port 1 and 2.



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😪 EasyConnect		- @ X
File View Configuration Settings Diagnostics Tool:	: Help User Management χ =	
Configuration	Device Configuration SYNC OTHERS SELECT MODEL SYNC SERIES SYNC2201/ED Upgrade card MODEL SYNC221 OK	

Figure 4.3.1.1





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Figure 4.3.1.2



Figure 4.3.1.3



Figure 4.3.1.4



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4.3.2 Configure Modbus Device channel

Click "Modbus RTU Master" of the "Master Protocols" in the area of "Protocol Configuration" in figure 4.3.2.1, and click once to add a Modbus RTU Master Channel. This device can add up to two channels, namely two Modbus RTU master, we can also directly right click "Add Channel" in the Protocol Configuration, then choose "Master"->"Serial"->"Modbus", click Channel in the left column, where the interface can display the serial property in the right column. As shown in figure 4.3.2.1, we can choose Modbus RTU or Modbus ASCII in the right column. You can choose COM port and select the transmission form of RS-232 or RS-485 or RS-422.

🛱 EasyConnect			- 8 %
Eile View Configuration Settings Diagnostics \bigcirc	Tools <u>H</u> elp User Management		
🖃 🏦 Configuration	Configuration Type	SERIAL	*
	Transmission Mode	RTU	~
 SIN 221 Protocol Configuration Channel-1 Modbus RTU Master Channel-2 Modbus RTU Master Settings NetworkDesign 	Port	Com1	~
	Channel Type	R\$232	~
	RS 422/ RS 485 mode	Half Duplex	×
	Baud Rate (in Bits per Second)	9600	~
	Data Bits	8	~
	Stop Bits	1	~
	Parity	Even	*
	Flow Control	None	~
	CTS Delay (0 - 65535 msec)	15000	
	Header Timeout (0 - 4294967295 msec)	1000	
	Retries	3	
	Channel Failure Condition	All nodes failure	*

Figure 4.3.2.1

Parameter name	Range / optional values	Default value	Description
Transmission Mode	RTU/ASCII	RTU	Specifies how information will be packed into the message fields and decoded. In ASCII mode, each 8-bit byte in a message is sent as two ASCII characters and in RTU mode, each 8-bit byte in a message contains two 4-bit hexadecimal characters.
Port	Com1 - Com2	Depends on serial	This product only supports Com1 and Com2





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		channels	
		configured	
			Type of serial communication for the
	DG 222/DG 422/		particular channel.
Channel Type	KS-232/KS-422/	RS-232	Note: RS 485/RS-422 configuration
	KS-485		depends on specific SYNC model. Refer
			SYNC User Manual.
			Type of serial communication for the
DG 422/DG 495			particular channel.
KS-422/KS-485	Hair Duplex, Full	Half Duplex	Note: RS 485/RS-422 configuration
mode	Duplex		depends on specific SYNC model. Refer
			SYNC User Manual.
	200 - 38400	0(001	Baud rate for serial communication in
Baud Rate (bits/sec)	bits/sec	9600 bps	Bits per second.
			Number of data bits for serial
	7,8		communication.
Data Bits		8	Data Bits 7 is for Transmission Mode
			ASCII.
			Number of stop bits for serial
	1,2	1	communication.
Stop Bits			Stop Bits 2 is for Transmission Mode
			ASCII.
Parity	None, Even, Odd	Even	Parity for serial communication.
	Hardware,Software,	N.	
Flow Control	None	None	Currently not supported
CTS Delay	0 - 65535	15000	
(0 - 65535 msec)	milliseconds	15000 msec	Currently not supported
			Indicates the maximum waiting time in
Llog don Time and (0	0 42040(7205		milliseconds within which the first byte of
$\frac{1}{10000} = \frac{1}{10000} = \frac{1}{10000} = \frac{1}{100000} = \frac{1}{10000000000000000000000000000000000$	0 - 429490/293	1000 msec	a response from the station should be
4294967295 msec)	mmseconds		received after the transmission of a
			request message.



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Retries	0 - 255	3		Indicates the maximum number of retries when there is no reply from the Slave device.
Channel failure condition	All node failure, Single node failure, Ignore the failure	All failure	node	This channel is considered as active or inactive depending on this configuration. If HSB is configured in the gateway, it will use this channel status for making the switch over decision All node failure: channel is made inactive if all the nodes in the channel fails. Single node failure:channel is made inactive if any of the the nodes in the channel fails. Ignore:channel is made inactive if all the nodes in the channel fails. But HSB will not use this channel status for making the switch over decision.

4.3.3 Configure Modbus Node

After adding nodes, we can configure the node's properties in the right column, such as node address, enable time synchronization and so on.

□ □ △ ◇ □ ○ ◇ □ ↑ Configuration ○ ◇ ○ ◇			
Channel: Modeus RTU Master Node_2 Network/Design	Node Address (1-254) Enable Time Synchronization Starting Offset Address (0 - 65525) Time Synchronization Interval (1 - 4294967 sec) Event on Quality Change RTU Offline Poll Period (0-4294967 sec)	1 False 0 60 External triggered only 0	×
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Parameter name	Range / optional values	Default value	Description
Node Address	1-254	NA	Indicates the Address of Remote slave Device
Enable Time Synchronization	True, False	False	Modbus master can send time synchronization messages if it is True
Starting Offset Address (0 - 65525)	0 - 65525	0	Indicates the starting address of continuous registers to which master has to write the date and time information.
Time Synchronization Interval (1-4294967 sec)	1 - 4294967 seconds	60 sec	This is the time interval between successive time synchronization command.
Event on Quality Change	External triggered only Generate Internal Event	External triggered only	Current not supported

Right click the node, users can add profile, shown as below:

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କୃତ୍ତି EasyConnect						
<u>File View Configuration Settings Diagnostics Tools H</u>	lelp User Managen	nent				
	₽ <u>₩₿₽₿</u>]					
Configuration Devices	Channel-1 Modbu	s RTV Master_No	le_1	*		
⇒ \$S1 : SYNC221	General Logic	Settings			1	
Protocol Configuration Channel-1 Modbus RTU Master Orbus RTU Master	Row Number	Gateway Point ID	Basic Type	Object Type	Function Type	Data Format
│	Row1	1	Digital Input	Single Indications	Read Coil Status	
⊕ ∯ Settings						
K PECKOLAUSA BI						
	<					>
	Add Row	Modify B	ow Delete	Row		
				× 1 3h	ow master Modes	
	Add Map	Modify M	lap Delete	e Map		Auto Map
EasyConnect V485						

Click the "Add Row" will pop up dialog box as follows:

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OL: T		
Ubject Type		×
Function Type		~
Data Format		*
Start Address		
Number of Points		
Number of Characters		
Polling Cycle (0 - 4294967295 msec)		
Start Bit		
Scale		
Enable Register in Combination		~
Deadband (0-2147483648)		
Enable Event		~
s Select Required		~
Command Type		~
Pulse Time (0 - 65535 msec)		
Description		
Use in Logic Engine	Disable	~

Modbus master profile parameter details:

Parameter name	Range / optional values	Default value	Description
	Single Indications		
Object Type	Double Indications		
	Analog Inputs	NA	Each profile entry is classified according to
	Pulse Counters		Each prome entry is classified according to
	Single Commands		ns type
	Double Commands		
	Analog Outputs String		



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Function Type	Read Coil Status Read Discrete Inputs Read Holding Register Read Input Register Force Single Coil Force Single Register Force Multiple Coils Force Multiple Register	NA	This indicates the possible function types for the points
Data Format	Double Float Float (lsw-msw) Signed 32 bit(msw-lsw) Signed 32 bit(lsw-msw) Signed Single Register Unsigned 32 bit(msw-lsw) Unsigned 32 bit(lsw-msw) Unsigned Single Register Single Register to be mapped to SI Register mapped to 16 Single Commands	NA	Indicates the supported Data types .
Start Address	0 - 65535	NA	It is the starting address of a sequence of points in the Modbus TCP/RTU Slave. And the number of contiguous points can be configure using <i>Number</i> <i>of Points</i> .
Number of Points	1-65535	NA	The number of contiguous points to be added from the <i>Start Address</i> point.
Number of	1-200	NA	The number of characters in the string. This field is applicable only for Object



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Characters			Type String.
Polling Cycle (0 – 4294967295 msec)	0 – 4294967295 milliseconds	1000 msec	The particular profile is polled at every configured polling cycle milliseconds.
Start Bit	1-16	1	User may select the particular <i>start bit</i> in entire 16 bit register and gateway must only consider bits from <i>Start bit</i>
Scale	100, 1, 0.1, 0.01, 0.001, 0.0001	1	This is the factor by which the Modbus data gets multiplied before sending to the external master.
Enable Register in Combination	True / False	False	Used to interpret data differently. If this parameter is <i>False</i> , the master will consider all the Master registers are with 16 bit register size. If <i>True</i> master will assume that the Master register has as much size as data type.
Deadband (0 - 2147483648)	0 - 2147483648	0	If the change in data value from the previous updated value is higher than ' <i>Deadband</i> ', the analog data points will get updated in the SYNC database. If event reporting is supported by the slave row mapped to this master row , data will be reported as event. <i>Deadband</i> , set to '0' will work as if the ' <i>Deadband</i> ' is disabled. Note: This parameter is valid / active only if <i>Object Type</i> is set as Analog Inputs, Binary Counter or Frozen Counter.



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Enable Event	True / False	True	Indicates whether the configured parameter should be reported when there is change in the value or on the request from the other master protocol. Note: Mapping protocol also must support this.
Is Select Required	True / False	False	If this parameter is 'True', it will cause a command to execute only if a valid select is obtained on the slave protocol point mapped to this Modbus point. Note: This parameter is valid/ active only if <i>Object Type</i> is set as <i>Single</i> <i>Commands</i> , <i>Double Commands</i> or <i>Analog Outputs</i>
Command Type	Latch Pulse Copy From Slave	Latch	Indicates the modes to configure 'Force single command' The options are described below. Latch: If configured in this option, the value of command from the slave side will be used in the force single coil command. Pulse:- If configured in this option, the value which is forced using Force Single Coil Command will be forced back to the previous value after <i>Pulse</i> <i>Time</i> Copy From Slave – This mode of configuration, executes a command operation on Modbus side, depending on the command got on the slave side protocol.



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			Note : Valid only when the object type is <i>Single Commands</i>
Pulse Time (0 – 65535 msec)	0 – 65535 milliseconds	1000 msec	Specifies the time interval after which the forced value will be back to its previous value for command on Modbus side, if ' <i>Command Type</i> ' is configured for the value of 'Pulse'.
Description			Description of the Row

In the software, users also can import profile besides adding profiles manually, as follows:

📔 🛃 🗸 🗸 🗞	> 🗏 😝 🕨 🔳 📀 🥪	🖌 🛥 📋 😐 🖻
👚 Configuration		GENE
🖻 🚹 Devices		No
E Chappel-1	nguration Modbus BTN Master	Ena
B P Node_1		Sta
	file	Tim
📄 🥖 Channel-2	Modbus RTV Master	Eve
- P Node_2	Add Profile	Territor
+ Fr Settings	Additionic	
Rotuerhleri m	Import Drofile	
🕞 NetworkDesign	Import Profile	
RetworkDesign	Import Profile Celete	
NetworkDesign	Import Profile Delete Copy	
RetworkDesign	Import Profile Delete Copy	
NetworkDesign	Import Profile Delete Copy	
NetworkDesign	Import Profile Delete Copy	
NetworkDesign	Import Profile Delete Copy	

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Right click Profile, users can add data attributes, export the data set (in XML format), automap, export data profile in Excel format, as shown in the following figure.

Configuration			Channel-1 Modbu General Logic	15 RTU Master_No	de_1	~		
- V Channel	Config 1-1 Mo e_1	guration odbus RTV Master	Row Number	Gateway Point ID	Basic Type	Object Type	Function Type	Data Format
	Profi L «	Add Points Export Profile AutoMap Excel Export Excel Import Delete	LL ^a pw1	1	Digital Input	Single Indications	Read Coil Status	

4.3.4 Configure IEC61850 Channel

Click "IEC61850 Peer Server" of "Peer Protocols" in the "Protocol Configuration" area, this device can add up to one IEC61850 Channel, namely one IEC61850 slave, we can also directly click "Add Channel" in the Protocol Configuration, then choose "Peer" -> "IEC61850 Server", click Channel in the left column, where it can display the IEC61850 channel property in the right column. As shown in figure 4.3.4.2.



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ବ୍ୟୁ EasyConnect					- C	D 23
<u>Eile</u> View <u>C</u> onfiguration Settings Diagnostics Tools <u>H</u> elp U	User M	lanagement				
🕒 🖾 🚽 🗸 🎸 🔍 🛎 🗏 😔 🕨 🖉 🖌 🙀 🖻	67 [
Configuration	P	Protocol Configurati	on			
SS1 : SYNC221		Master Protocols				
 ✓ Channel-1 Modbus KTU Master ✓ Channel-2 Modbus KTU Master ✓ Settings 		<u>C37118 Master</u> <u>Courier Master</u>	<u>IEC 103 Master</u> <u>IEC 104 Master</u>	<u>SPORT Master</u> <u>SPA Master</u>	<u>Event Logger Master</u>	
🕞 y Jettings		DLMS Master	<u>IOBoard Master</u>	SEPAM Modbus Master		
		DNP TCP Master	<u>Logic Interface Master</u> MAUELL Modbus Master	RTK Master		
		<u>File Transfer Master</u>	Modbus TCP Master	EXCOM Master		
		HSB Master	Modbus RTV Master	<u>IEC 1107 Master</u>		
		IEC 101 Master	<u>RP570 Master</u>	Zigbee SEP Master		
	-	Slave Protocols				
		<u>C37118Stream</u>	IEC 101 Slave	SMS Interface Slave		
		DLMS Slave	IEC 103 Slave	NMEA0183 Slave		
		DNP3.0 Serial Slave	IEC 104 Slave	RP570 Slave		
		DNP TCP Slave	Modbus RTU Slave	SNMP Slave		
		File Transfer Slave	Modbus TCP Slave			
		Peer Protocols				
		ICCP Peer	IEC61850 Peer Client	SNTP Peer		
		Transparent Peer	IEC61850 Peer Server	6		
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Figure 4.3.4.1

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<u>File</u> View <u>Configuration</u> Settings Diagnostics Tools <u>H</u> e	p User Management		
🕒 🖆 🚽 🔻 🛆 🤣 🔍 🖉 🖃 🖌 🕒 🕑 🧹 🎪 📮			
File View Configuration Settings Diagnostics Tools He Configuration Configuration Configuration Configuration Channel-1 Modbus RTU Master Channel-2 Modbus RTU Master Channel-3 TEC61850 Peer Server Channel-3 TEC61850 Peer Server RetworkDesign	P User Management Image: SCL File Name Image: SCL File Name IED Name Acess Point Name Report Scan Interval (1 - 65535 msec) Keep Alive Interval (0 - 60000 sec) Keep Alive Interval (0 - 60000 sec) Keep Alive Retries Buffer Size For Report (in KB) Scan File Name	2 0 3 3 100	

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Figure 4.3.4.2

IEC61850 Server Channel Parameter Details:

Parameter name	Range / optional values	Default value	Description
SCL Filename	Browse any files with extension .ICD	None	The selected/ browsed file will get copied to the IEC61850 folder available in the installed path of EasyConnect. If there is a file with similar name it will prompt user to over right the same. Note: The ICD file can be created using the software "SCL Manager".The procedures for creating ICD files are explained in its user manual .The ICD files used for SYNC should be saved

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			in UTF-8 format.
IED Name	List all the IED names inside the chosen SCL File.	First entry available in the SCL file.	The IED name will have specific significance if user map from IEC 61850 client to the server where user have multiple IEDs.
Access point name	List all the access point names inside the chosen SCL File.	First entry available in the file with the specified IED	It indicates a communication access point of the logical device(s) of an IED. Access point includes complete server address details for client-server connection and details of GSE address.
Report Scan interval (1 – 65535 msec)	1 – 65535 msec	2 milliseconds	It indicates the interval at which the server checks/ scans for the RCB data. After scanning at specified interval, reports will be generated immediately if available.
Keep Alive Interval (0 – 6000 sec)	0 – 6000 sec	0 second	It is the interval at which the server initiate the keep alive message. The message will be initiated if there is no messages from the client during this interval. If there is no reply from client even after the retries, the server will close its connection. '0' indicates the keep alive is not required.
Keep Alive Timeout (1 – 100 sec)	1 – 100 sec	3 seconds	It is the time for which the server will wait for reply from client (for keep alive message). The server will either retry for keep alive or close the connection as per the configuration of Keep alive





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			retries.
Keep Alive Retries	1 – 10 times	3	It indicates number of retries to be performed to keep alive messages.
Buffer Size For Report (in KB)	10 – 1000 KB	100	It indicates the Buffer Size for Buffered Reports.

File View Configuration Solitions Discovering Tools Hale User Management	
The view Conniguration settings Diagnosities roots Telp oser Management	
Configuration SCL File Name testicd	
IED Name ied1	*
Acess Point Name accessPoint1	~
B // Channel-1 Modbus KTU Master Report Scan Interval (1-65535 msec) 2	
E / Channel-2 Modbus RTU Master Keep Alive Interval (0 - 60000 sec) 0	
Channel-3 IB051850 Peer Server Keep Alive Time Out (1 - 100 sec) 3	
Reep Alive Retries 3	~
Buffer Size For Report (in KB) 100	
	10

4.3.5 Configure IEC61850 Node

Select IEC61850 Peer Server Channel, right click on "Add Station", as shown follows:

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4.3.6 Data Map

Select the Profile under the Modbus RTU Master channel, and select the Modbus command you want to map to the IEC61850 object, as shown follows:



User Manual

					-	• **
elp User Managemer	nt					
<u> </u>	0 🕖 🛃					
Channel-1 Modbu General Logic	s RTU Master_Node Settings	•_1	~			
Row Number	Gateway Point ID	Basic Type	Object Type	Function Type	Data Format	Start
Row1	1	Digital Input	Single Indications	Read Coil Status		6553
Row2	2	Digital Input	Single Indications	Read Coil Status		0
Row3	3	Analog Input	Analog Inputs	Read Holding Re	Signed Single Re	. 0
Add Row	Modify Ro	m Delete	Row Sh	ow Master Nodes	Auto M	ap
	Ip User Managemen	<pre>(p User Management</pre>	<pre>(p User Management</pre>	Ip User Management Image: Setting Settige Settige Setting Setting Setting Setting Setting Sett	Ip User Management Image: Setting sett	Image: Point Point Point ID Channel-1 Modbus RTU Master_Node_1 Channel-1 Modbus RTU Master_Node_1 General Logic Settings Row Number Gateway Point ID Basic Type Object Type Row1 1 Digital Input Row2 2 Digital Input Single Indications Row3 3 Analog Input Analog Inputs Row3 3 Analog Input Analog Inputs Add Row Modify Row Delete Row Modify Row Delete Row Show Master Nodes

Click "Add Map" for the selected the Modbus command, click the "Add Map" button and it will pop up the following figure:

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LDevice	~	
LNode	¥	
Profile Row Offs		Select <u>All None</u>
MMSTag	Description	

IEC61850 mapping details:

Parameter name	Range / optional values	Default value	Description
LDevice (Logical Deivce)	List out all the available logical devices under the selected SCL file (SCL file is selected as part of the channel configuration)	None	User need to select the desired logical device to get tags for mapping.
LNode (Logical	List out all the	None	User need to select the desired



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Node)	available logical		logical node to get tags for
	nodes under the		mapping.
	selected Ldevice		
	under the SCL.		
			Profile row offset allow the user to
			map selected points in a master
			row having more than 1 number of
			points. If 0 is configured and
		Least offset of	number point is N. N number of
Profile Row	0-(Number of Points	the master	points are mapped from the 1 st
Offset	in source row -1)	unmapped points	point of the master row in an order
			basis. If 1 is selected the 1 st point
			will be omitted and the N points
			from the 2nd point of Master row is
			mapped in order.
	All the tags under the		Depending upon the master row
MMS tags	chosen Ldevice and	None	selected to map, the possible MMS
C	Lnode		tags, under the chosen Ldevice and
			Lnode, will be listed
			It is an optional field where user can
Description	None	None	enter the description of each tag
			involved in the mapping

Select the mapping object, as shown in the following figure, click the "Save" button to save the mapping relationship;

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LDevice	ied11Device1 🛛 👻				
LNode	LPHD1 💌				
Profile Row Offs		Select <u>All None</u>			
MMS	Tag	Description			
🗹 ЦРНО1	\$ST\$Proxy\$stVal				

Click "Previous", then select the next Modbus command; click the "Next" button, then select the last Modbus command; click the "Cancel" button to exit the data map.

4.4 Change Gateway IP Address

As shown in the following figure, click "Edit Lan Settings" in the "Settings", set the IP address, subnet and gateway of the local area network.

🕷 Lan Sett	ings		
		eth0	
	IP Address	192 . 168 . 0 . 121	
	Subnet	255 . 255 . 255 . 0	
	Gateway	192 . 168 . 0 . 1	
	<u>}</u>		

4.5 Download

Users can download the file to the module when configuration is finished, as shown below:

User Manual

ପ୍ଲି EasyConnect			- 8 %
Eile View Configuration Settings Diagnostics Tools 	Help User Management		
🖃 🏦 Configura <mark>Download</mark>	Configuration Type	SERIAL	×
	Transmission Mode	RTU	*
- SI : SINC221	Port	Com1	*
- / Channel-1 Modbus RTU Master	Channel Type	RS232	*
E Vode_1	RS 422/ RS 485 mode	Half Duplex	*
Changele? Holling PTV Horizon	Baud Rate (in Bits per Second)	9600	¥
- / Channel-3 IEC61850 Peer Server	Data Bits	8	*
🚊 🖵 Node_3	Stop Bits	1	*
Profile	Parity	Even	~
Mapping	Flow Control	None	*
E I Network	CTS Delay (0 - 65535 msec)	15000	
L. Interfaces	Header Timeout (0 - 4294967295 msec)	1000	
Serial Ports	Retries	3	
Metworkhezi žu	Channel Failure Condition	All nodes failure	¥

After clicking the download button, it will pop up a dialog box, we need to set the device name, as well as the IP address as shown below.

User Manual

	SS1	¥ 8	YNC221		0
IP Address	Use LAN IP	~	192 . 16	8.0.121	
🗸 Configura	tion Fil From th	ne confi	guration	>	
License F	ile				
📕 Vpdate Pa	chaga				
1000 APR 20 Mar 100 20 Mar	crafe				
IED Name					
🗌 IED Name	ettings 🔄 VP)	N settin	gs	SMS sett:	ings
IED Name Dialup s SNMP set	ettings 🔄 VP1 tings 🛄 TL2	N settin S Creden	gs tials	SMS sett:	ings cies

Users need to select the "Configuration File ", click the "Download" button, after download is succeed, it will pop up a dialog box below:



We can upload the configuration file to see if the configuration file is downloaded successfully. Upload configuration file method see below. After downloading ,you need to restart the device, see the chapter 4.2.1.



4.6 Upload

Upload the configuration file:

9% EasyConnect		- • ×
<u>File View Configuration Settings Diagnostics Tools H</u> elp User Man	nagement	
🖻 🖆 🚽 🗸 🗞 🔍 🗏 😁 🖬 🕑 🖌 🙀 🗄 🗄	2 <u>0</u> 0 1	
Dev	vice Configuration SYNC OTHERS	
	SELECT MODEL SYNC SERIES MODEL SELECT MODEL OK	
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Upload Import to the Configuration (Add as a new device) 	
Import to the Configuration (Add as a new device)	
 ♥ Update the device 3S1 ♥ ♥ Save in 	
Configuration File	ings Fil
Model SYNC221	

As shown in the above dialog, click the Upload button, as shown in the figure below.

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유급 EasyConnect - test2015.ecc						-	• 83
<u>File</u> View <u>C</u> onfiguration Settings Diagnostics Tools <u>H</u> elp	User Manageme	nt					
📑 😂 🚽 🗸 🕹 🔍 🗞 🗏 😔 🕨 🔳 ⊘ 🎺 🙀 💷	2 🗗 🗋 🗐 🗌	0 0					
Devices	Channel-1 Modbu	s RTU Master_Nod	e_1	~			
- → SS1 : SYNC221	General Logic	Settings					
🚍 🥸 Protocol Configuration							
🖃 🧪 Channel-1 Modbus RTU Master	Row Number	Gateway Point ID	Basic Type	Object Type	Function Type	Data Format	Start
⊡-□ Node_1				6.5	4	1	
Channal=2 Madhus BTH Mastar	Row1	1	Digital Input	Single Indications	Read Coil Status	<u></u>	6553
Channel-3 IEC61850 Peer Server	Row2	2	Digital Input	Single Indications	Read Coil Status	-	0
B- Q Node_3	Row3	3	Analog Input	Analog Inputs	Read Holding Re	Signed Single Re	0
Mapping							
E Settings	<						>
Interfaces							
Serial Ports	Add Row	Modify Ro	ow Delete 1	Row			~
🖳 🙀 NetworkDesign	Chappel-3 IEC61	350 Peer Server 1	Node 3	V Sh	low Master Nodes		
	Citalater o 11001		Lessel Device		Dustia Davis		
	Master	Basic Type	Name	MMS Tag	Offset	Comments	
	Channel-1 Modbus	Digital Input	ied1IDevice1	LPHD1SSTSPro	xy 0		
							-
	<						>
	Add Map	Modify M	ap Delete	Map		Auto M	ap
						L	

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So far uploaded configuration file successfully.



5 Installation

5.1 Machine Dimension

Size: 1.57 in (width)*4.92 in (height)*4.33 in (depth)



5.2 Installation Method

Using 35mmDIN rail

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