

Connecting two IOMod 16DI

Description

This article describes how to connect and configure two IOMods 16DI to the WCC Lite using IEC103, and Modbus RTU.



Typical connection schematic for two IOMod 16DI

i WCC Lite can be connected to two IOMod 16DI via PORT1 or PORT2.

Preparing the configuration

At first you need to make a configuration for the WCC Lite. This can be done using any spreadsheet editing program. Templates for configuration can be found on the WCC Lite web. Protocol Hub --> Configuration. On the bottom of the page there will be a *Download* button for template configurations.

PROTOCOL HUB	STATUS	SYSTEM	SERVICES	NETWORK	USERS	LOGOUT (ROOT)
CONFIGURATION	IMPORTED SIGNALS	EVENT LOG	PROTOCOL CONNECTIONS	PROTOCOL LOGGER	SCRIPT-RUNNER	

Protocol configuration

IMPORT PROTOCOL CONFIGURATION

Here you can import Excel configuration file. Up to 1000 signals are allowed. All previous signals will be replaced.

Configuration file:	<input type="button" value="Choose File"/> No file chosen	<input type="button" value="Import configuration"/>
PLC (IEC-61499) Boot file:	<input type="button" value="Choose File"/> No file chosen	<input type="button" value="Import FBOOT file"/>
IEC61850 Client model file:	<input type="button" value="Choose File"/> No file chosen	<input type="button" value="Import client model file"/>
IEC61850 Server model file:	<input type="button" value="Choose File"/> No file chosen	<input type="button" value="Import server model file"/>

DOWNLOAD CONFIGURATION

Template configurations:



You need to configure Devices and Signals sheets before continuing. These template configurations can also be used to configure protocols like Modbus-master and DNP3. Configuration can be modified according to functionality needed. In this case, *Device* sheet will only have three devices, WCC Lite and two IOMod 16DI. It is important to use only one protocol for each port, otherwise configuration will not work.

name	description	device_alias	enable	protocol	id	device	baudrate	databits	stopbits	parity	flowcontrol	scan_rate_ms	timeout_ms	link_address	serial_delay	bind_address	host	port	asdu_size	col_size	ioa_size	rwt	swt	t1	t2	t3	time_sync	message_size	cache_size	destination_address	source_address	unsol_classes	update
First IOMod16DI	IOMod 16DI via modbus	First_IOMod16	1	Modbus rtu	1	PORT1	9600	8	1	none	none	300	10000	50																		0	
Second IOMod16DI	IOMod 16DI via modbus	Second_IOMod16	1	Modbus rtu	2	PORT1	9600	8	1	none	none	300	10000	50																		0	
IEC104 SCADA system	IEC104 SCADA signals	IEC104_SCADA	1	IEC 60870-5-104 slave												0.0.0.0	192.168.1.2	2404	2	2	3	8	15	15	10	20	1	249	100				

You can download the example configuration for each firmware versions at the bottom of the article or create your own using these links:

- For IEC103
- For IEC101
- For Modbus

You need to configure Devices and Signals sheets before continuing. After downloading template configurations, open phub templates folder. You will see that there's different template folders for each IOMod:

4CS4VS	2025-03-13 11:06	File folder
4RTD	2025-03-14 10:14	File folder
8AI	2025-03-13 11:06	File folder
8DI4RO	2025-03-13 16:01	File folder
8DI8DO	2025-03-13 16:26	File folder
16DI	2025-03-13 16:27	File folder

To select correct configuration, check the sticker on the back of IOMod. There you will find which protocol to use according to Factory FW type. For example, if you have IOMod 16DI with IEC103 FW, select configuration iomod_16DI_IEC103_to_IEC104_DNP3_Modbus_SCADA.

Before connecting IOMods to WCC Lite you need to configure it via mini USB. This can be done following IOMod 16DI user manual.

You need to configure it, like it is done in the excel configuration. To do that, fist you need to open IOMod utility app and change these parameters: *baudrate*, *parity*, *link address*. It is important, that *link addresses* for both IOMods are different and *parity* and *baudrate* should be even. Other parameters such as *databits* and *stopbits* should be set to default. Signals sheet should be mapped according to functionality needed.

Uploading configuration

After configuration is ready, upload it to WCC Lite (Configuration --> Choose file --> Import configuration):

PROTOCOL HUB

CONFIGURATION

STATUS

IMPORTED SIGNALS

SYSTEM

EVENT LOG

SERVICES

PROTOCOL CONNECTIONS

NETWORK

SCRIPT-RUNNER

USERS

Protocol configuration

IMPORT PROTOCOL CONFIGURATION

Here you can import Excel configuration file. Up to 1000 signals are allowed. All previous signals will be replaced.

Configuration file:

1

Choose File

No file chosen

Import configuration

2

PLC (IEC-61499) Boot file:

Choose File

No file chosen

Import FBOOT file

IEC61850 Client model file:

Choose File

No file chosen

Import client model file

IEC61850 Server model file:

Choose File

No file chosen

Import server model file

After upload is done and no errors were detected, you should see all imported signals (Protocol Hub --> Imported signals):

PROTOCOL HUB

STATUS

SYSTEM

SERVICES

NETWORK

USERS

LOGOUT (ROOT)

WCC LITE

CONFIGURATION

IMPORTED SIGNALS

EVENT LOG

PROTOCOL CONNECTIONS

PROTOCOL LOGGER

SCRIPT-RUNNER

IMPORTED SIGNALS

☐ Column filter

Device name	Signal name	Device alias	Signal alias	Value	Units	State	Attributes	Time
First IOMod16DI	DI13	First_IOMod16	DI13	0				2025-03-17 15:48:44.75
First IOMod16DI	DI14	First_IOMod16	DI14	0				2025-03-17 15:48:44.75
First IOMod16DI	DI15	First_IOMod16	DI15	0				2025-03-17 15:48:44.75
First IOMod16DI	DI16	First_IOMod16	DI16	0				2025-03-17 15:48:44.75
First IOMod16DI	COMMUNICATION STATUS	First_IOMod16	comm_stat	1				2025-03-17 15:48:44.74
Second IOMod16DI	DI1	Second_IOMod16	DI1	0				2025-03-17 15:48:45.20
Second IOMod16DI	DI2	Second_IOMod16	DI2	0				2025-03-17 15:48:45.20
Second IOMod16DI	DI3	Second_IOMod16	DI3	0				2025-03-17 15:48:45.20
Second IOMod16DI	DI4	Second_IOMod16	DI4	0				2025-03-17 15:48:45.20
Second IOMod16DI	DI5	Second_IOMod16	DI5	0				2025-03-17 15:48:45.20

Before doing anything further you should also check for protocol connections if both IOMod 16DI are connected to WCC Lite via PORT1. Go to Protocol connections where you can see all the connected slave and master protocol devices:

PROTOCOL HUB

STATUS

SYSTEM

SERVICES

NETWORK

USERS

LOGOUT (ROOT)

WCC LITE

CONFIGURATION

IMPORTED SIGNALS

EVENT LOG

PROTOCOL CONNECTIONS

PROTOCOL LOGGER

SCRIPT-RUNNER

PROTOCOL CONNECTIONS

Device name	Device alias	Protocol	Host	Status	Timestamp
<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Second IOMod16DI	Second_IOMod16	Modbus Serial master	PORT1	Connected	2025-03-17 15:48:45
First IOMod16DI	First_IOMod16	Modbus Serial master	PORT1	Connected	2025-03-17 15:48:44
IEC104 SCADA system	IEC104_SCADA	IEC 60870-5-104 slave	192.168.1.2	Disconnected	2025-03-17 15:48:42

Connecting IEC104-slave via Vinci

After Excel and USB configurations, you can connect to device using Vinci software. In order to simulate IEC104 slave you need to choose IEC 60870-5-104 protocol and Master(Client) mode and press start. In *Settings* tab, check Structure, Timeouts and Windows values to match Excel configuration.

Settings

Console

Statistic

Structure

COT size in bytes: 2
ASDU size in bytes: 2
IOA size in bytes: 3

Parameters

☒ Send Start DT on start up
☒ Auto ack. Test Frame

Timeouts

t0 in seconds: 30
t1 in seconds: 15
t2 in seconds: 10
t3 in seconds: 20

Security

☐ Enable TLS

Windows

RWT (w) size: 8
SWT (k) size: 12

Then set correct IP address and Port at the top of the program page. **Port** for IEC104 should be 2404 and **IP address** should match your WCC Lite IP address.

THE VINCI PROTOCOL ANALYZER

File Tags Options Hardware Help

Protocol: IEC 60870-5-104
Mode: Master (Client)

START

IP: 127.0.0.1
Port: 2404

Extra

Interface info
Ping
Sockets

Settings

Console

Statistic

After clicking start, you should check protocol connections tab again to see if IEC104 slave is connected.

PROTOCOL HUB

STATUS

SYSTEM

SERVICES

NETWORK

USERS

LOGOUT (ROOT)

CONFIGURATION

IMPORTED SIGNALS

EVENT LOG

PROTOCOL CONNECTIONS

PROTOCOL LOGGER

SCRIPT-RUNNER

PROTOCOL CONNECTIONS

Device name	Device alias	Protocol	Host	Status	Timestamp
Second IOMod16DI	Second_IOMod16	Modbus Serial master	PORT1	Connected	2025-03-17 15:48:45
First IOMod16DI	First_IOMod16	Modbus Serial master	PORT1	Connected	2025-03-17 15:48:44
IEC104 SCADA system	IEC104_SCADA	IEC 60870-5-104 slave	192.168.1.2	Connected	2025-03-17 15:53:13

Once IEC104 slave is connected, console tab in Vinci software should look something like this:



Protocol: IEC 60870-5-104
 Mode: Master (Client)

STOP

IP: 192.168.1.1
 Port: 2404

Extra

Interface info

Ping

Sockets

Settings Console Statistic

Time	Source	Message	TI	Cause	ASDU	IOA	Value	Status	Time Tag	Name	RawData
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	8	Off[0]	Not Topical	2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	9	Off[0]	Not Topical	2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	10	Off[0]	Not Topical	2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	11	Off[0]	Not Topical	2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	12	Off[0]	Not Topical	2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	13	Off[0]	Not Topical	2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	14	Off[0]	Not Topical	2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	15	Off[0]	Not Topical	2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	16	Off[0]	Not Topical	2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	1	Off[0]		2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	2	Off[0]		2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	3	Off[0]		2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	4	Off[0]		2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:0	M_SP_TB_1 (30)	Spontan (3)	1	5	Off[0]		2025-3-17 13:48:...		68 F1 00 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	6	Off[0]		2025-3-17 13:48:...		68 83 02 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	7	Off[0]		2025-3-17 13:48:...		68 83 02 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	8	Off[0]		2025-3-17 13:48:...		68 83 02 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	9	Off[0]		2025-3-17 13:48:...		68 83 02 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	10	Off[0]		2025-3-17 13:48:...		68 83 02 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	11	Off[0]		2025-3-17 13:48:...		68 83 02 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	12	Off[0]		2025-3-17 13:48:...		68 83 02 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	13	Off[0]		2025-3-17 13:48:...		68 83 02 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	14	Off[0]		2025-3-17 13:48:...		68 83 02 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	15	Off[0]		2025-3-17 13:48:...		68 83 02 00 00
11:54:15.816	192.168.1.1:2404	RSN:0 SSN:1	M_SP_TB_1 (30)	Spontan (3)	1	16	Off[0]		2025-3-17 13:48:...		68 83 02 00 00

If you want to configure IOMod 16DI, you should refer to ->IOMod 16DI User Manual.

🔄Revision #3

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