

# How To

Explaining documents on how to set up.

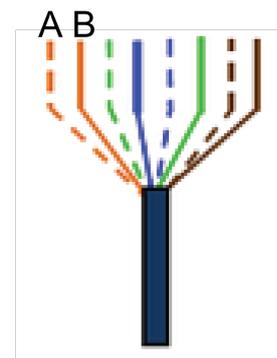
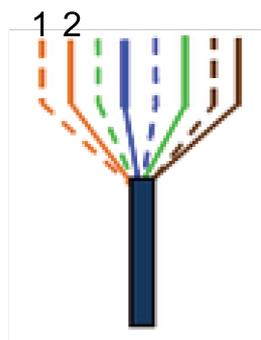
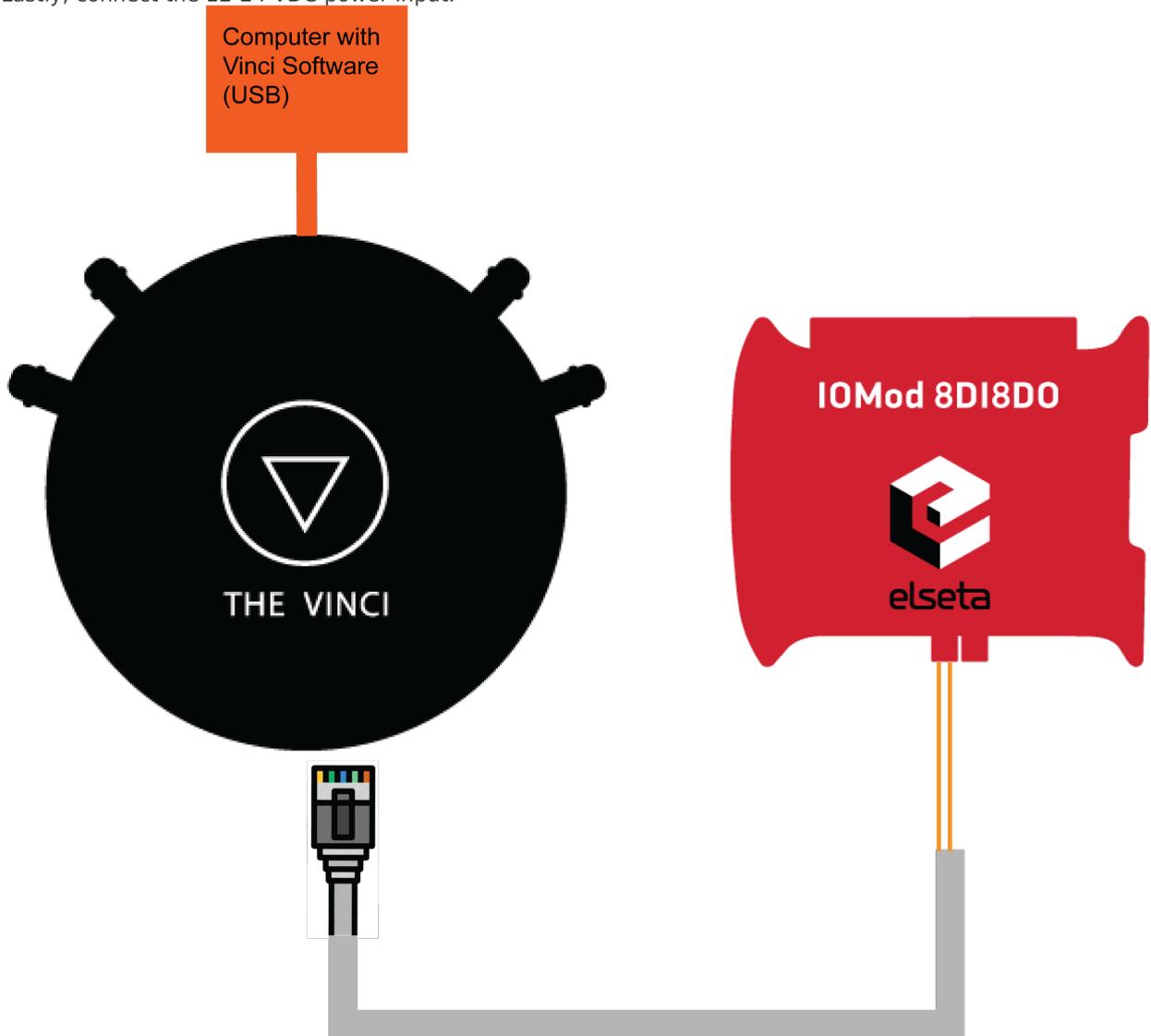
- [Testing IMod 8DI8DO IEC-103](#)
- [IEC 104 Slave Simulator for SCADA System](#)
- [IEC-104 Master SCADA Setup](#)
- [IEC 101 Master Simulator Tutorial](#)
- [IEC 101 Slave Simulator Tutorial](#)

# Testing IOMod 8DI8DO IEC-103

## Initial Setup

The first thing to do when setting up is to connect the IOMod to the computer using The Vinci Expert to convert from RS485 to USB. You need to connect it like in the diagram depicted below.

- Connect The Vinci Device to the computer using a micro USB cable.
- Using an ethernet cable connect one end to the Vinci, and the other two wires to IOMod A and B pins.
  - If the wire is connected using RJ-45 the A wire will be the orange striped wire and the B wire will be the single color orange wire.
- Lastly, connect the 12-24 VDC power input.



To test IOMod with default settings, the user connects the device through RS485 to IEC 60870-5-103 master. For example, using "The Vinci Expert" as a serial interface converter and adapter to PC with "The Vinci" software. When opening "The Vinci" software, choose IEC 60870-5-103 – Master mode. Initial settings – 9600 baud rate; 8 data, no parity, 1 stop bit. Press Start, send Time synchronization, General interrogation, and go to the "Statistic" tab:

The screenshot shows the 'THE VINCI PROTOCOL ANALYZER' software interface. At the top, there are menu options: File, Tags, Options, Hardware, Help. Below the menu is a settings bar with a protocol dropdown set to 'IEC 60870-5-103', a mode dropdown set to 'Master', a 'STOP' button, and fields for Port (COM11), Baudrate (9600), Parity (None), Data bits (8), and Stop bits (One). There are also 'Extra' buttons: Set Vinci ports, Swap ports, and Device Manager.

The main window is divided into 'Settings', 'Console', and 'Statistic' tabs. The 'Statistic' tab is active, displaying a table of protocol events:

Ti	Cause	ASDU	FUN	INFO	INDEX	Value	Status	Time Tag	Name	Count
StartOfGeneralInt...	GeneralInterogati...	1	0	0	0	1				2
Time TaggedMes...	GeneralInterogati...	1	128	1	0	0H(1)	SIN:1	17:14:20:248		2
Time TaggedMes...	GeneralInterogati...	1	128	2	0	0H(1)	SIN:1	17:14:22:319		2
Time TaggedMes...	GeneralInterogati...	1	128	3	0	0H(1)	SIN:1	17:14:24:392		2
Time TaggedMes...	GeneralInterogati...	1	128	4	0	0H(1)	SIN:1	17:14:26:472		2
Time TaggedMes...	GeneralInterogati...	1	128	5	0	0H(1)	SIN:1	17:14:28:568		2
Time TaggedMes...	Command (20)	1	128	6	0	0H(1)	SIN:16	17:29:45:98		6
Time TaggedMes...	GeneralInterogati...	1	128	7	0	0H(1)	SIN:1	17:14:32:734		2
Time TaggedMes...	GeneralInterogati...	1	128	8	0	0H(1)	SIN:1	17:14:34:811		2
Time TaggedMes...	GeneralInterogati...	1	160	1	0	0H(1)	SIN:1	17:14:36:906		4
Time TaggedMes...	GeneralInterogati...	1	160	2	0	0H(1)	SIN:1	17:14:38:982		2
Time TaggedMes...	GeneralInterogati...	1	160	3	0	0H(1)	SIN:1	17:14:41:55		2
Time TaggedMes...	GeneralInterogati...	1	160	4	0	0H(1)	SIN:1	17:14:43:125		2
Time TaggedMes...	GeneralInterogati...	1	160	5	0	0H(1)	SIN:1	17:14:45:205		2
Time TaggedMes...	GeneralInterogati...	1	160	6	0	0H(1)	SIN:1	17:14:47:277		2
Time TaggedMes...	GeneralInterogati...	1	160	7	0	0H(1)	SIN:1	17:14:49:363		2
Time TaggedMes...	GeneralInterogati...	1	160	8	0	0H(1)	SIN:1	17:14:51:441		2
GeneralInterogati...	EndOfGeneralInt...	1	255	0	0	15				2
Identification (5)	Start-Restart (5)	1	255	1	0	[2] [IOMOD-88] [1414745157]				1

On the right side, there are control panels for 'General Interrogation' (Send, Scan: 1), 'Clock synchronization' (Send, PC time, 2021-12-31 12:37:48), and 'General Command' (FUN: 128, INF: 6, FR: 0, ON, OFF buttons). Below these is a small image of the 'THE VINCI' hardware device.

Fig. 1. Testing IOMOD device with "THE VINCI" software

As seen in Figure 1, Outputs and inputs are shown with info numbers 1-8, and function types are 128 and 160 respectively.

General Interrogation, Time Synchronization, and General Command options can be found on the right side of the program, in the "System" tab.

Output commands are controlled by the "General command" window on the right side of the program, in the "System" tab, with Output address (Function type) 128, and output number (Info number).

Figure 2 shows the 6th output command sent and the "CMD ACK" response received.

This screenshot is similar to Figure 1, showing the 'THE VINCI PROTOCOL ANALYZER' software. The 'Statistic' tab is active, and the table shows the 6th output command highlighted in green:

Ti	Cause	ASDU	FUN	INFO	INDEX	Value	Status	Time Tag	Name	Count
StartOfGeneralInt...	GeneralInterogati...	1	0	0	0	1				2
Time TaggedMes...	GeneralInterogati...	1	128	1	0	0H(1)	SIN:1	17:14:20:248		2
Time TaggedMes...	GeneralInterogati...	1	128	2	0	0H(1)	SIN:1	17:14:22:319		2
Time TaggedMes...	GeneralInterogati...	1	128	3	0	0H(1)	SIN:1	17:14:24:392		2
Time TaggedMes...	GeneralInterogati...	1	128	4	0	0H(1)	SIN:1	17:14:26:472		2
Time TaggedMes...	GeneralInterogati...	1	128	5	0	0H(1)	SIN:1	17:14:28:568		2
Time TaggedMes...	Command (20)	1	128	6	0	0H(2)	SIN:16	17:23:32:800		4
Time TaggedMes...	GeneralInterogati...	1	128	7	0	0H(1)	SIN:1	17:14:32:734		2
Time TaggedMes...	GeneralInterogati...	1	128	8	0	0H(1)	SIN:1	17:14:34:811		2
Time TaggedMes...	GeneralInterogati...	1	160	1	0	0H(1)	SIN:1	17:14:36:906		4
Time TaggedMes...	GeneralInterogati...	1	160	2	0	0H(1)	SIN:1	17:14:38:982		2
Time TaggedMes...	GeneralInterogati...	1	160	3	0	0H(1)	SIN:1	17:14:41:55		2
Time TaggedMes...	GeneralInterogati...	1	160	4	0	0H(1)	SIN:1	17:14:43:125		2
Time TaggedMes...	GeneralInterogati...	1	160	5	0	0H(1)	SIN:1	17:14:45:205		2
Time TaggedMes...	GeneralInterogati...	1	160	6	0	0H(1)	SIN:1	17:14:47:277		2
Time TaggedMes...	GeneralInterogati...	1	160	7	0	0H(1)	SIN:1	17:14:49:363		2
Time TaggedMes...	GeneralInterogati...	1	160	8	0	0H(1)	SIN:1	17:14:51:441		2
GeneralInterogati...	EndOfGeneralInt...	1	255	0	0	15				2
Identification (5)	Start-Restart (5)	1	255	1	0	[2] [IOMOD-88] [1414745157]				1

The right side of the interface shows the same control panels as in Figure 1.

Fig. 2 Replies from IOmod device after a command has been sent through "THE VINCI" software

# IEC 104 Slave Simulator for SCADA System

## Initial Setup

All you need to do to set up is to be connected to a network from which the SCADA is reachable.

**i** Standard settings in the Vinci software are for an RJ-45 cable, but it is configurable using the [Hardware](#) tab.

When you're connected to the network it's time to open The Vinci Software and start configuring the simulated device parameters. Since The Vinci Expert will simulate the Slave (Server) when the software is started just select the IEC 60870-5-104 protocol and select Slave mode.

New

Protocol: IEC 60870-5-104

Mode: Slave (Server)

Start

**Fig. 1. Selecting Protocol and Mode.**

Go to the settings tab once the software opens. Now it's time to configure your device according to your SCADA settings. The defaults that are here are usually the defaults in most cases, but make sure to double-check. Also make sure to enter the IP and Port of the SCADA system they are located at the top of the window to the right of the green start button.

THE VINCI PROTOCOL ANALYZER

File Tags Options Hardware Help

Protocol: IEC 60870-5-104

Mode: Slave (Server)

START

IP: 127.0.0.1

Port: 2404

Extra

Interface info Ping Sockets

Settings Console Statistic

Structure

COT size in bytes: 2

ASDU size in bytes: 2

IOA size in bytes: 3

Parameters

Send End of ini. on start up

Auto ack. U-Frame

Auto ack. control commands

Auto ack. system commands

Timeouts

t0 in seconds: 30

t1 in seconds: 15

t2 in seconds: 10

t3 in seconds: 20

Windows

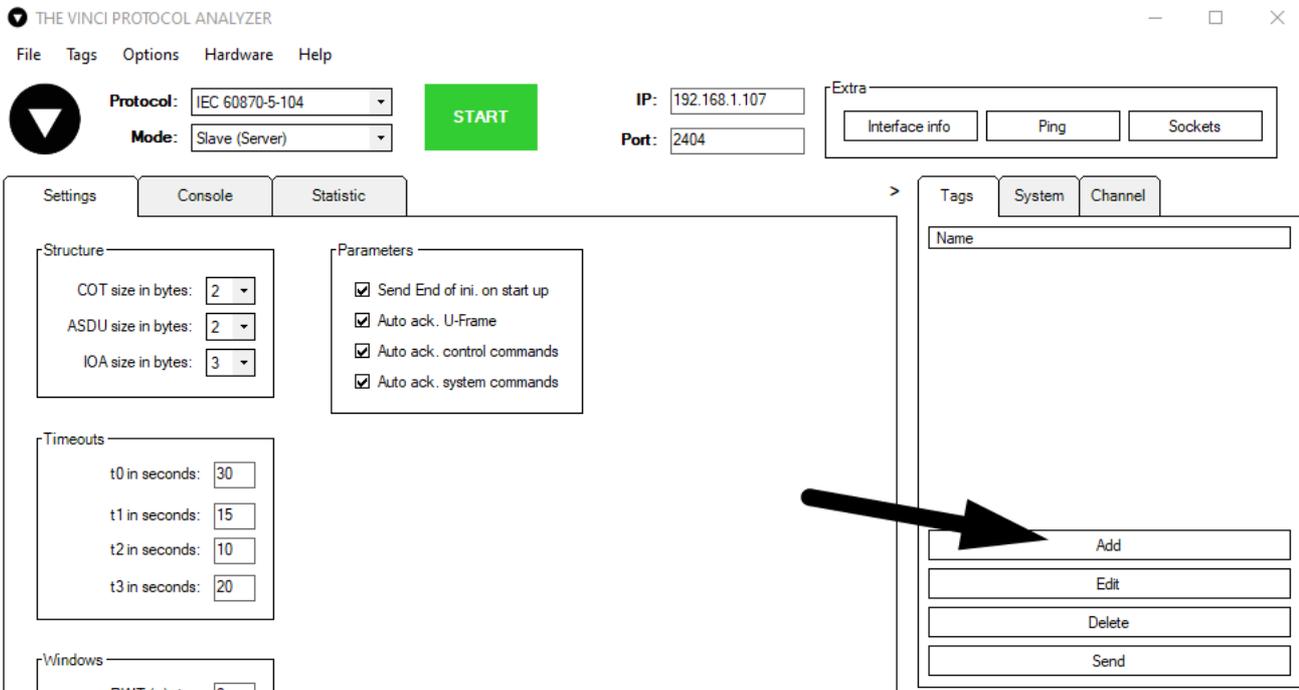
RWT (w) size: 8

SWT (k) size: 12

**Fig. 2. Configuring settings according to SCADA**

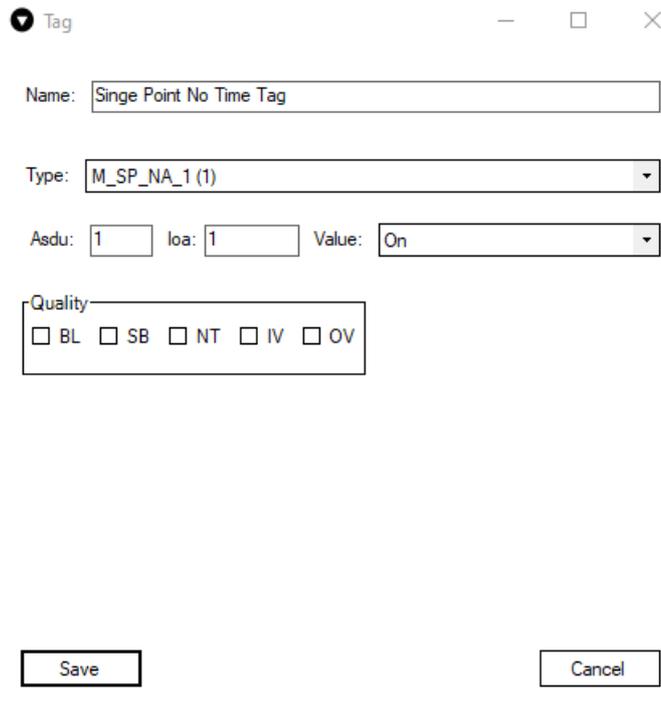
## Data Configuration

To begin adding data to send just go to the tags tab on the right side and press the "Add" button.



**Fig. 3. Add Tag**

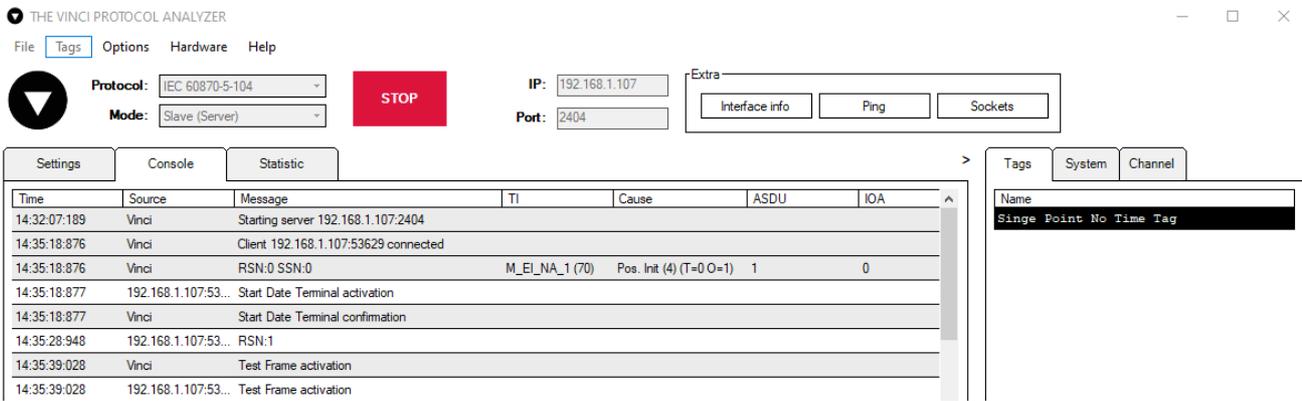
Now you can configure the data itself. Enter the tag name, select a desired type from the drop down list, type in the ASDU and IOA numbers and then select the value. The value field will change depending on the type selected.



**Fig. 4. Tag Menu**

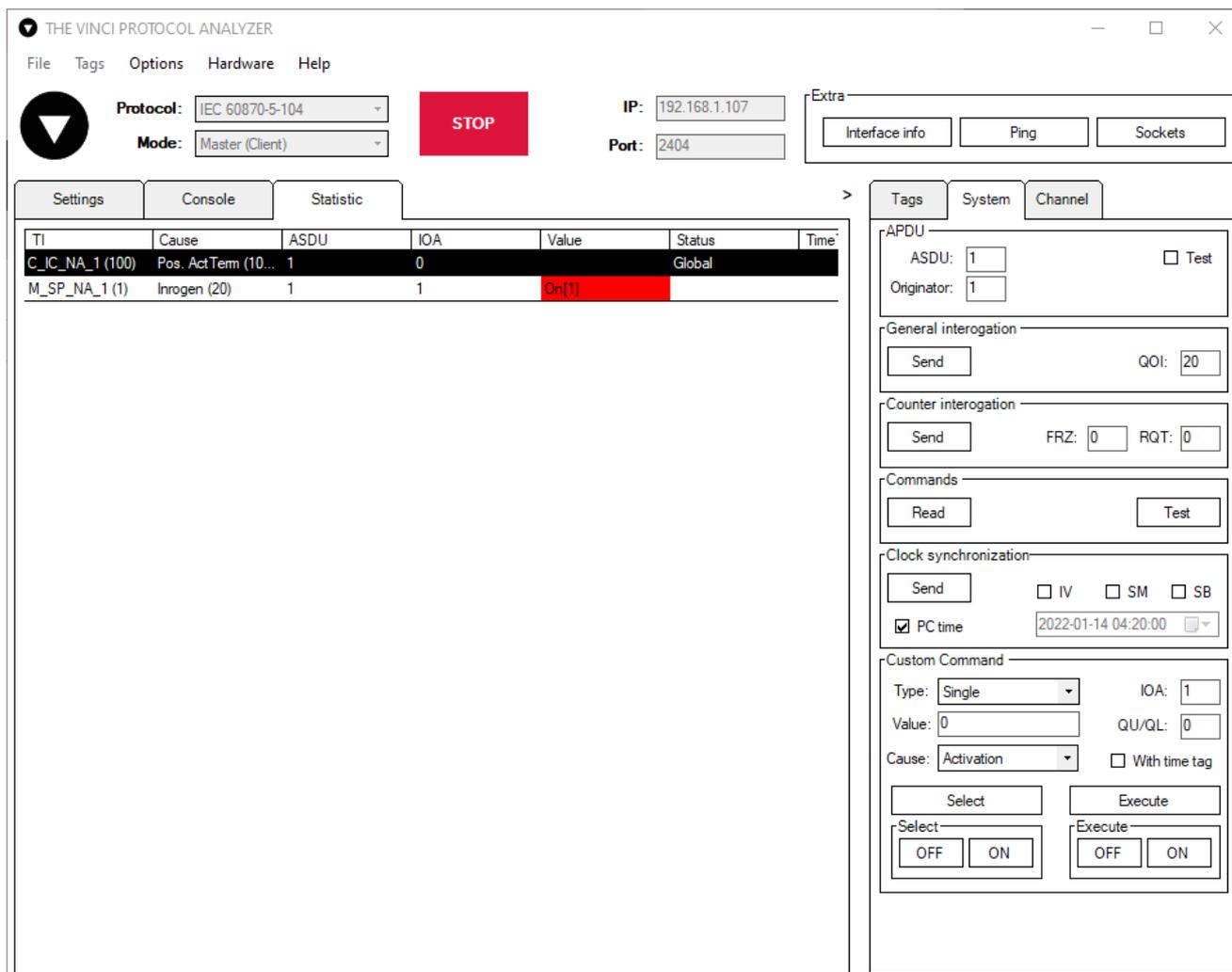
Now you can press the Start button, and The Vinci Software should start establishing communication with the SCADA system. Just like it's depicted in figure 5. You can check the commands that are being sent and recieved in the Console tab.

**i** If you want to add tags you can also do it even when the communication has been started.



**Fig. 5. Connection with SCADA**

For simplicity purposes the SCADA used in this example was another instance of The Vinci Software. As you can see after General Interrogation has been sent the slave sends back the value of the tag that was just added. We can see what the value is if we check the statistics window in The Vinci Software. If the value were to be changed the slave would send the updated value automatically to the SCADA system.



**Fig. 6. SCADA Values**

All that's left to do is to add the other values you desire in the Tags window and the SCADA should be receiving them after it's done

**i** If a new tag is added General Interrogation must be called for it to start sending data.

# IEC-104 Master SCADA Setup

## Initial Setup.

First connect to a network from which the IEC104 Slave device is reachable. When you're connected to the network it's time to open The Vinci Software and start configuring the SCADA parameters. The Vinci Expert will simulate the Master (Client) when the software is started select the IEC 60870-5-104 protocol and select Master mode, after making these selections press the start button.

New

Protocol: IEC 60870-5-104

Mode: Master (Client)

Start

Fig. 1. Selecting Protocol and Mode.

Once the software opens go to the settings tab as depicted in the figure below. Then configure settings in accordance with the Slave device. The defaults that are here are usually good in most cases, but make sure to double-check. After configuring the parameters enter the **IP** and **port** of the SCADA system they are located at the top of the window to the right of the green start button.

THE VINCI PROTOCOL ANALYZER

File Tags Options Hardware License Help

Protocol: IEC 60870-5-104

Mode: Master (Client)

START

IP: 127.0.0.1

Port: 2404

Settings Console Statistic

1

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

Windows

RWT (w) size: 8

SWT (k) size: 12

2

Fig. 2. Configuring settings according to SCADA

## Establishing a connection.

To begin communication with IEC 104 Slave once everything is configured press the green Start button and communication should begin. If it doesn't check if you have entered the correct IP and the Slave is reachable by pinging.



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



IP: 192.168.73.210  
 Port: 2404

Extra  
 Interface info Ping Sockets

Time	Source	Message	TI	Cause	ASDU	IOA	Value	Status
09:02:48:967	Vinci	Connecting to 192.168.73.2...						
09:02:48:974	Vinci	Connected to 192.168.73.21...						
09:02:48:974	Vinci	Start Date Terminal activation						
09:02:48:996	192.168.73.210:2...	Start Date Terminal confirmat...						
09:03:09:001	Vinci	Test Frame activation						
09:03:09:004	192.168.73.210:2...	Test Frame confirmation						

Fig. 3. Connection Established

## Command overview.

In the system tab, you can see all the IEC 104 commands that Vinci Software supports. A more detailed command description can be found [here](#). To begin to send commands, first you need to configure your ASDU (CASDU) and Originator at the top of the System tab. (ASDU referred to here is the Common Adress or better known as CASDU). After entering the correct ASDU (CASDU) commands can now be sent. To check if the device is responding with the correct data, a good command to test is General interrogation.

Tags

System

Channel

APDU

ASDU:   Test

Originator:

General interrogation

QOI:

Counter interrogation

FRZ:  RQT:

Commands

Clock synchronization

IV  SM  SB

PC time

Custom Command

Type:  IOA:

Value:  QU/QL:

Cause:

Select

Execute

SBO

Fig. 4. Sending Commands

# Slave response.

After sending the general interrogation command, the Slave device should respond with all the values that it is currently measuring. The **Statistic** tab will display all the gotten values in an orderly fashion, as depicted in the figure below. In this case, the data is gotten from a 16DI IOMod. As we can see, all the inputs are off.

THE VINCI PROTOCOL ANALYZER

File Tags Options Hardware License Help

Protocol: IEC 60870-5-104 Mode: Master (Client) IP: 192.168.73.210 Port: 2404

STOP

Extra: Interface info Ping Sockets

Settings Console **Statistic**

Tl	Cause	ASDU	IOA	Value	Status	TimeTag	Name	Count
C_IC_NA_1 (100)	Pos. ActTerm (10...	1	0		Global			6
M_SP_NA_1 (1)	Inrogen (20)	1	1	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	2	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	3	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	4	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	5	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	6	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	7	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	8	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	9	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	10	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	11	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	12	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	13	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	14	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	15	Off(0)				2
M_SP_NA_1 (1)	Inrogen (20)	1	16	Off(0)				2

Fig. 5. Statistics tab

# Sending custom commands.

At the bottom of the system tab, you can configure it to send custom commands. To configure a custom command, follow these steps

1. Select the type of the command.
2. Enter the IOA (Information Object Address).
3. Choose the command cause.
4. Choose what type of command you want to send.
  - If Select, Execute, or SBO (Select Before Operate) buttons are pressed, a command will be sent with the value entered in the **value** field.
  - If **ON** or **OFF** buttons are pressed, values will automatically be filled. 0 meaning **OFF** and 1 meaning **ON**

1 Custom Command

Type: C\_SC\_NA\_1(45)

IOA: 1

Value: 0

QU/QL: 0

3 Cause: Activation

4

Select	Execute
Select	Execute
OFF ON	OFF ON
SBO	
SBO	
OFF ON	

**Fig. 6. Custom Command Setup**

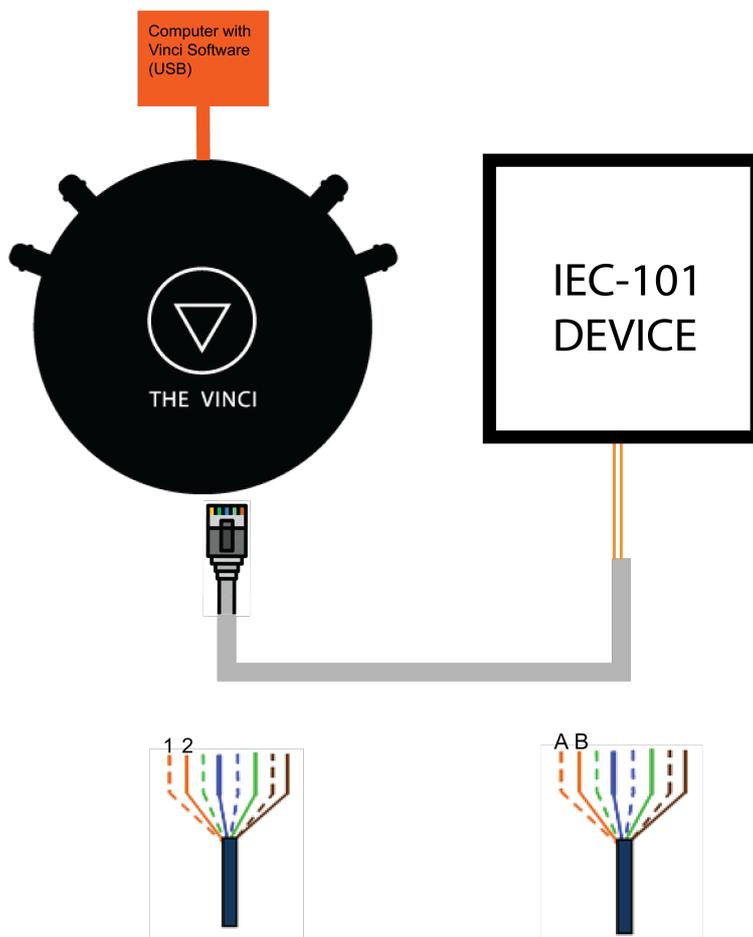
Considering often used functionalities for SCADA, that is about it. Of course, all values in the statistics window can be formatted using tags, although it doesn't make much sense since all data from IEC104 Slave has a type defined in the packet, so Vinci Software automatically formats it for that type. And the channel tab is mainly for testing, because the Vinci software also automatically sends S-Frames and Start DT, Stop DT, and Test frame commands.

# IEC 101 Master Simulator Tutorial

## Initial Setup

The first thing to do when setting up is to connect the IOMod to the computer using The Vinci Expert to convert from RS485 to USB. You need to connect it like in the diagram depicted below.

- Connect The Vinci Device to the computer using a micro USB cable.
- Using an ethernet cable connect one end to the Vinci, and the other two wires to IEC101 Device A and B pins.
  - If the wire is connected using RJ-45 the A wire will be the orange striped wire and the B wire will be the single color orange wire.



Standard settings in the Vinci software are for an RJ-45 cable, but it is configurable using the [Hardware](#) tab.

## Selecting protocol and mode

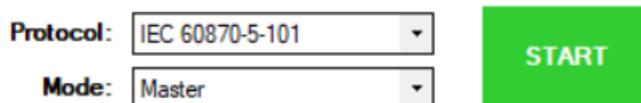


Fig. 1. Selecting protocol and mode

After the ethernet cable has been connected it's time to open The Vinci Software and start configuring the simulated device parameters. Since The Vinci Expert will simulate the Master (Client) when the software is started just select the IEC 60870-5-101 protocol and select Master mode.

## Selecting the Serial parameters

Protocol:  
 Port:  Baudrate:  Parity:  Data bits:  Stop bits:

Mode:

**Fig. 2. Selecting the Serial parameters**

The next step is to choose the correct serial port for your device and then set up serial communication parameters like baudrate, parity, databits, and stopbits in accordance with your device.

## Selecting the protocol parameters

Structure

Link size in bytes:   
 COT size in bytes:   
 ASDU size in bytes:   
 IOA size in bytes:

Timeouts

Reading data:   
 Pause before send:

Address

Link address:

**Fig. 3. Selecting the protocol parameters**

Go to the settings tab when you have serial communication parameters configured. Now it's time to configure your device according to your Device settings. The defaults that are here are usually the defaults in most cases, but make sure to double-check.

## Establishing a connection with the device

THE VINCI PROTOCOL ANALYZER  
 File Tags Options Hardware Help

Protocol:  Port:  Baudrate:

Mode:

Time	Source	Message	TI	Cause
15:20:56:128	Vinci[COM3]	RequestStatusOfLink(9)		

**Fig. 4. Establishing a connection with the device.**

Pressing the green "START" button should establish serial communication with the device. After the device responds with link status commands can be sent. Commands can be found on the right side of the Vinci software in the system tab.

## Calling General interrogation

**Fig. 5. Calling General interrogation**

A simple command to start and check if the device is responding and/or configured correctly is General interrogation just press the send button and the command will be sent to the device.

## Sending Clock synchronization

**Fig. 6. Sending Clock synchronization**

Another command that is usually sent whenever a connection is established is Clock synchronization. You can check the PC time checkbox so it sends the date of your computer and ignores whatever is selected in the date selection text box.

TI	Cause	ASDU	IOA	Value	Status	TimeTag	Name	Count
C_IC_NA_1 (100)	Pos. Act (6) (T=0 ...	1	0		Global			1
M_SP_TB_1 (30)	Inrogen (20)	1	1	Off[0]		2098-1-1 0:0:8.712Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	2	Off[0]		2098-1-1 0:0:9.768Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	3	Off[0]		2098-1-1 0:0:10.822Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	4	Off[0]		2098-1-1 0:0:11.881Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	5	Off[0]		2098-1-1 0:0:12.930Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	6	Off[0]		2098-1-1 0:0:13.990Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	7	Off[0]		2098-1-1 0:0:15.57Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	8	Off[0]		2098-1-1 0:0:16.120Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	9	Off[0]		2098-1-1 0:0:17.171Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	10	Off[0]		2098-1-1 0:0:18.232Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	11	Off[0]		2098-1-1 0:0:19.305Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	12	Off[0]		2098-1-1 0:0:20.364Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	13	Off[0]		2098-1-1 0:0:21.433Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	14	Off[0]		2098-1-1 0:0:22.503Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	15	Off[0]		2098-1-1 0:0:23.565Invalid		1
M_SP_TB_1 (30)	Inrogen (20)	1	16	Off[0]		2098-1-1 0:0:24.636Invalid		1

**Fig. 7. Statistics window.**

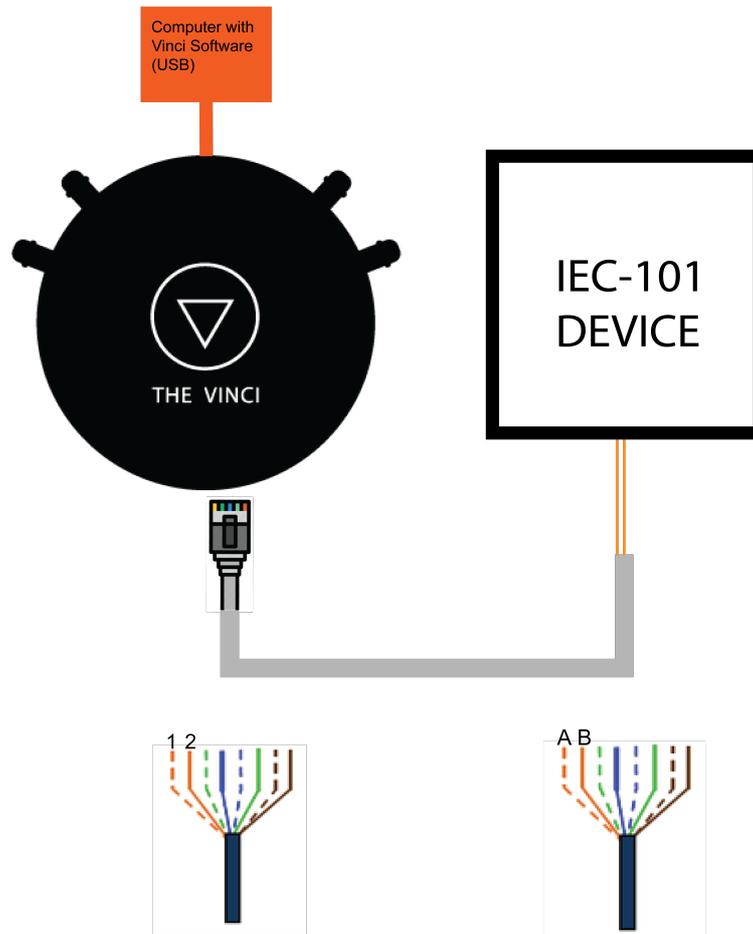
After sending the commands you desire all data that the slave responded with will be displayed in the statistics tab. In this case, the data is from a 16DI IOMod.

# IEC 101 Slave Simulator Tutorial

## Initial Setup

The first thing to do when setting up is to connect the IOMod to the computer using The Vinci Expert to convert from RS485 to USB. You need to connect it like in the diagram depicted below.

- Connect The Vinci Device to the computer using a micro USB cable.
- Using an ethernet cable or connect one end to the Vinci, and the other two wires to IEC101 Device A and B pins.
  - If the wire is connected using RJ-45 the A wire will be the orange striped wire and the B wire will be the single color orange wire.



**i** Standard settings in the Vinci software are for an RJ-45 cable, but it is configurable using the [Hardware](#) tab.

## Selecting protocol and mode

Protocol:	<input type="text" value="IEC 60870-5-101"/>	<input type="button" value="START"/>
Mode:	<input type="text" value="Slave"/>	

**Fig. 1. Selecting protocol and mode**

After the ethernet cable has been connected it's time to open The Vinci Software and start configuring the simulated device parameters. Since The Vinci Expert will simulate the Slave (Server) when the software is started just select the IEC 60870-5-101 protocol and select Slave mode.

# Selecting the Serial parameters

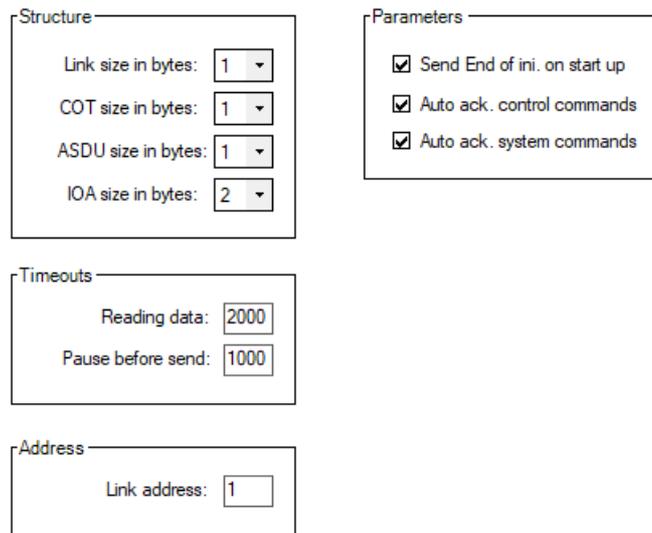


The screenshot shows a configuration interface for serial communication. It includes a 'Protocol' dropdown set to 'IEC 60870-5-101', a 'Mode' dropdown set to 'Slave', and a prominent green 'START' button. To the right, there are dropdowns for 'Port' (COM6), 'Baudrate' (9600), 'Parity' (None), 'Data bits' (8), and 'Stop bits' (One).

**Fig. 2. Selecting the Serial parameters**

The next step is to choose the correct serial port for your device and then set up serial communication parameters like baudrate, parity, databits, and stopbits in accordance with your device.

# Selecting the protocol parameters

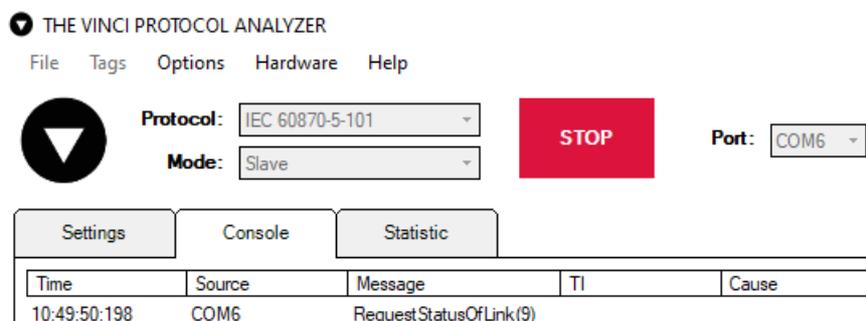


The screenshot displays protocol parameter settings. It is divided into three sections: 'Structure', 'Timeouts', and 'Address'. 'Structure' includes dropdowns for 'Link size in bytes' (1), 'COT size in bytes' (1), 'ASDU size in bytes' (1), and 'IOA size in bytes' (2). 'Timeouts' has input fields for 'Reading data' (2000) and 'Pause before send' (1000). 'Address' has an input field for 'Link address' (1). A 'Parameters' section on the right contains three checked checkboxes: 'Send End of ini. on start up', 'Auto ack. control commands', and 'Auto ack. system commands'.

**Fig. 3. Selecting the protocol parameters**

Go to the settings tab when you have serial communication parameters configured. Now it's time to configure your device according to your Device settings. The defaults that are here are usually the defaults in most cases, but make sure to double-check.

# Establishing a connection with the device



The screenshot shows the 'THE VINCI PROTOCOL ANALYZER' software interface. At the top, there are menu items: File, Tags, Options, Hardware, and Help. Below the menu is a navigation bar with 'Settings', 'Console', and 'Statistic' tabs. The 'Settings' tab is active, showing 'Protocol' (IEC 60870-5-101), 'Mode' (Slave), a red 'STOP' button, and 'Port' (COM6). Below the settings is a table with columns: Time, Source, Message, TI, and Cause. The table contains one entry: Time: 10:49:50:198, Source: COM6, Message: RequestStatusOfLink(9).

Time	Source	Message	TI	Cause
10:49:50:198	COM6	RequestStatusOfLink(9)		

**Fig. 4. Establishing a connection with the device.**

Pressing the green "START" button should establish serial communication with the device. After the device responds with link status tags can be sent. Tags can be found on the right side of the Vinci software in the system tab.

# Simulating an IOMod

This example will show how to simulate an IOMod using Vinci Protocol Analyzer. In the example below 4RTD IOMod is simulated.

Firstly, to simulate an IOMod tags should be created by clicking "Add" button. Tags are simulating signals that would be otherwise sent by a real IOMod (4RTD in this case).



**Fig. 5. Tags section.**

In order to create a tag some values from Excel configuration will be required.

signal_name	device_alias	signal_alias	source_device_alias	source_signal_alias	enable	units	add	multiply	math_expression	min_value	max_value	absolute_threshold	threshold_units	suppression_time_ms	suppression_values	log	gi	common_address	info_address	data_type
RTD1	IOMod4	RTD1			1						0	real			0	1	1	1	36	
RTD2	IOMod4	RTD2			1						0	real			0	1	1	2	36	
RTD3	IOMod4	RTD3			1						0	real			0	1	1	3	36	
RTD4	IOMod4	RTD4			1						0	real			0	1	1	4	36	

**Fig. 6. Signals sheet of 4RTD IOMod.**

In the picture below a tag creation window is shown. It opens after clicking "Add" button. To create a tag the Name has to be specified. After that the Type has to be specified. The type can be found in "data\_type" column of Excel configuration. After that "loa" has to be specified. Its value for each tag can be found in "info\_address" column. Lastly, a random value can be specified in "Value" box. Finally the tag can be saved by clicking "Save" button.

Tag

Name:

Type:

Asdu:  Ioa:  Value:

Quality:

BL  SB  NT  IV  OV

Time:

PC

Lookup values:

Use

**Fig. 7. Tag creation window.**

The created tags can be seen in WCC Lite Imported Signals section in browser.

Device	Signal	Value	Units	State	Attributes	Time
IOMod 4RTD	RTD1	10			asdu=1,cot=20,ioa=1,org=0,type=float	2023-05-02 16:59:58.20
IOMod 4RTD	RTD2	17			asdu=1,cot=20,ioa=2,org=0,type=float	2023-05-02 17:07:21.72
IOMod 4RTD	RTD3	15			asdu=1,cot=20,ioa=3,org=0,type=float	2023-05-02 17:16:26.86
IOMod 4RTD	RTD4	12			asdu=1,cot=20,ioa=4,org=0,type=float	2023-05-02 17:16:49.42

**Fig. 8. Imported Signals tab in browser.**

They can also be seen in Statistics section of Vinci application.

THE VINCI PROTOCOL ANALYZER

File Tags Options Hardware Help

Protocol:  Mode:   Port:  Baudrate:  Parity:  Data bits:  Stop bits:

TI	Cause	ASDU	IOA	Value	Status	TimeTag	Name	Count
C_IC_NA_1 (100)	Pos. ActTerm (10...	1	0		Global			150
M_ME_TF_1 (36)	Inrogen (20)	1	1	10		2023-5-2 13:59:5...	RTD1	48
M_ME_TF_1 (36)	Inrogen (20)	1	2	17		2023-5-2 14:7:21:...	RTD2	29
M_ME_TF_1 (36)	Inrogen (20)	1	3	15		2023-5-2 14:16:2...	RTD3	21
M_ME_TF_1 (36)	Inrogen (20)	1	4	12		2023-5-2 14:16:4...	RTD4	21

**Fig. 9. Previously created tags in Statistics section of Vinci.**

The state of the signals can be changed in System section of Vinci application by ticking Test or/and P/N options.

**Fig. 10. Selecting Test and P/N options.**

The change of signal states will be seen in WCC Lite Imported Signals section in browser.

Device	Signal	Value	Units	State	Attributes	Time
IOMod 4RTD	RTD1	10		cotn,test	asdu=1,cot=20,ioa=1,org=0,type=float	2023-05-02 16:59:58.20
IOMod 4RTD	RTD2	17		cotn,test	asdu=1,cot=20,ioa=2,org=0,type=float	2023-05-02 17:07:21.72
IOMod 4RTD	RTD3	15		cotn,test	asdu=1,cot=20,ioa=3,org=0,type=float	2023-05-02 17:16:26.86
IOMod 4RTD	RTD4	12		cotn,test	asdu=1,cot=20,ioa=4,org=0,type=float	2023-05-02 17:16:49.42

**Fig. 11. Changed State of signals after selecting Test and P/N options.**