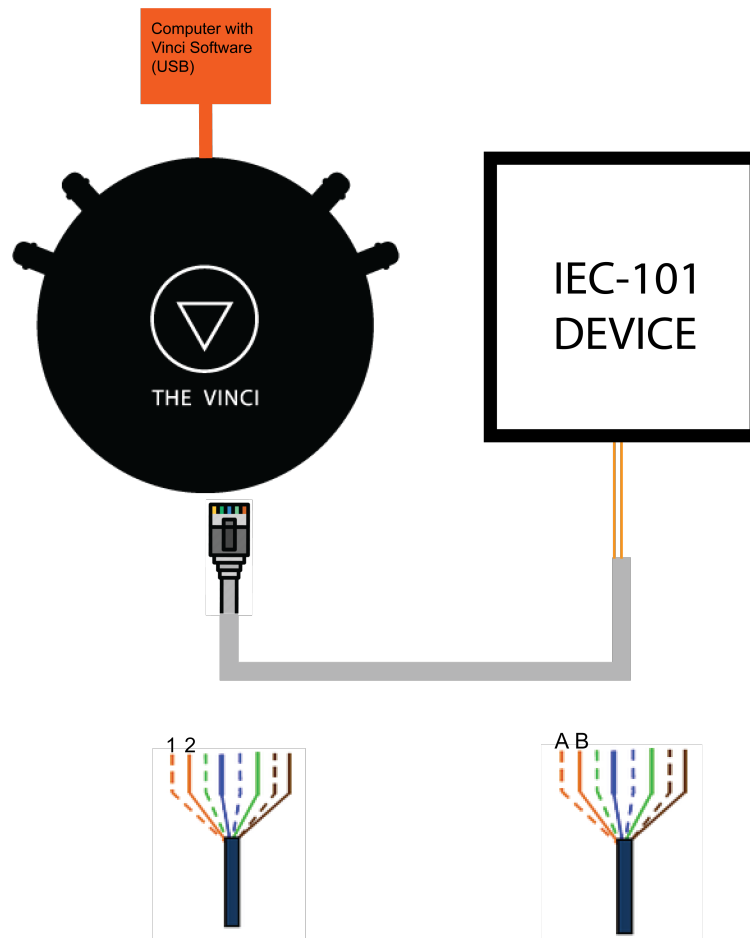


# IEC 101 Master Simulator Tutorial

## Initial Setup

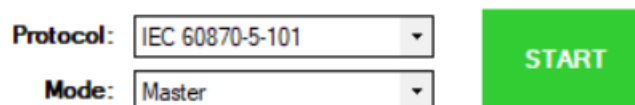
The first thing to do when setting up is to connect the IOMod to the computer using The Vinci Expert to convert from RS485 to USB. You need to connect it like in the diagram depicted below.

- 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: IEC 60870-5-101
Mode: Master

START

Port: COM8
Baudrate: 9600
Parity: None
Data bits: 8
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

Settings

Console

Statistic

Structure

Link size in bytes: 1

COT size in bytes: 1

ASDU size in bytes: 1

IOA size in bytes: 2

Timeouts

Reading data: 2000

Pause before send: 1000

Address

Link address: 1

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: IEC 60870-5-101
Mode: Master

STOP

Port: COM3
Baudrate: 9600

Settings

Console

Statistic

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

The screenshot shows a software interface with two tabs: 'Tags' and 'System'. The 'System' tab is active. It contains two main sections: 'APDU' and 'General interrogation'. In the 'APDU' section, there are input fields for 'ASDU' (value 1) and 'Originator' (value 1), and a 'Test' checkbox. In the 'General interrogation' section, there is a 'Send' button and a 'QOI' input field (value 20).

**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

The screenshot shows a 'Clock synchronization' dialog box. It contains a 'Send' button, three checkboxes labeled 'IV', 'SM', and 'SB', a checked checkbox labeled 'PC time', and a date/time field displaying '2022-01-26 10:49:57' with a dropdown arrow.

**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.

Settings		Console		Statistic					
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.

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