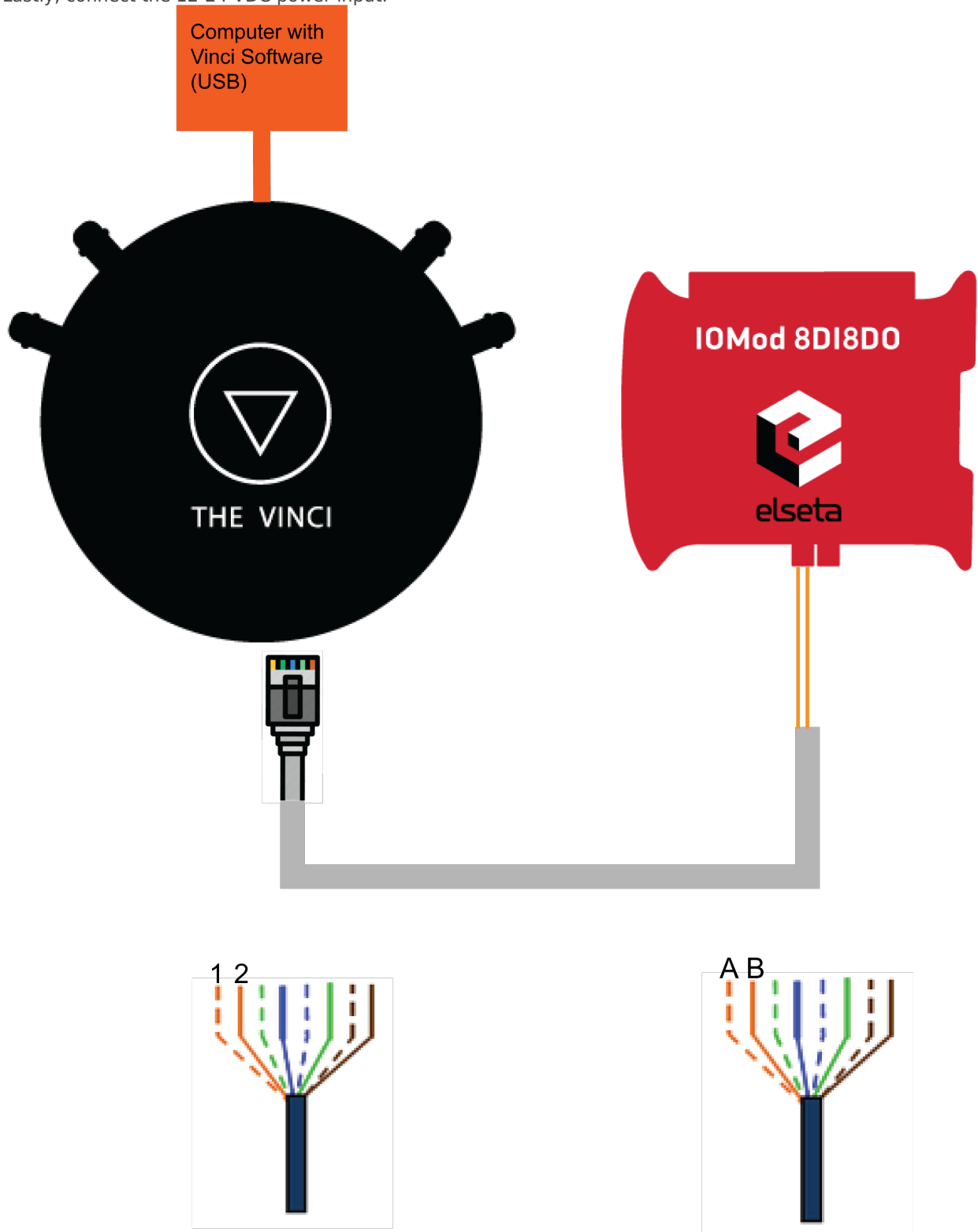


Initial Setup

- 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 displays the 'THE VINCI PROTOCOL ANALYZER' software interface. The top menu bar includes 'File', 'Tags', 'Options', 'Hardware', and 'Help'. Below the menu, there are settings for 'Protocol' (IEC 60870-5-103), 'Mode' (Master), 'Port' (COM11), 'Baudrate' (9600), 'Parity' (None), 'Data bits' (8), and 'Stop bits' (One). A red 'STOP' button is visible. To the right, there are buttons for 'Set Vinci ports', 'Swap ports', and 'Device Manager'. The main window is divided into three tabs: 'Settings', 'Console', and 'Statistic'. The 'Statistic' tab is active, showing a table of protocol events. The table has columns: TI, Cause, ASDU, FUN, INFO, INDEX, Value, Status, Time Tag, Name, and Count. The data shows various 'GeneralInterrogati...' and 'TimeTaggedMes...' events. On the right side, there is a 'System' tab with controls for 'APDU' (ASDU: 1), 'General interrogation' (Send, Scan: 1), 'Clock synchronization' (Send, PC time, 2021-12-31 12:37:48), and 'General Command' (FUN: 128, INF: 5, PR: 0, ON/OFF buttons). Below these controls is a small image of a physical device, likely the IOMOD device being tested.

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

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 interface. The 'Statistic' tab is active, and the table of protocol events is shown. The 6th row of the table, corresponding to the 'Command (20)' event, is highlighted in green. This row shows a function type of 128 and an info number of 6. The 'System' tab on the right is also visible, showing the same controls as in Figure 1.

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

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

🕒 Revision #12

★ Created 31 December 2021 10:51:33

✎ Updated 25 March 2022 14:40:50