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Zeno 42X IO User Manual

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1 Revision History

Date	Revision	Author	Description
02.12.2018	1.0	HL	Initial draft
05.02.2019	1.1	HL	More information
21.03.2019	1.2	HL	Changed to use main_source in QML app version 1.2. Removed the requirement of setting the object name of the RS232 source to “com”
28.03.2019	1.3	HL	Formatted the document. Added Simulation section. Updated QML app to v1.4.
29.03.2019	1.4	HL	Added more information about how to use the simulation mode
07.08.2019	1.5	HL	Added warning

2 Abbreviations

Below is a list of abbreviations used in this document.

us	Microseconds
ID	Identifier
len	Length
App	Application
IO	Input/output
HW	Hardware
SW	Software

3 Introduction

Zeno 42X IO is a hardware with twelve digital IO channels which can be configured to either input or output, pull up to 12 V or open drain. It can be used together with a QML application in ViCANdo. You can make your own QML application to interface with Zeno 42 X IO.

4 Version Information

This manual applies to specific Zeno 42X IO HW and SW:

Item	Version
QML App – Zeno 42X IO Presenter Example	1.5
Zeno 42X IO hardware	1.0
Zeno 42X IO firmware	1.0

5 Hardware Specification

The Zeno 42X IO comes with a USB B port, a power port and a DB9 male connector. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V) or the DB9 connector (maximum 16V DC) if you are connecting the Zeno to the battery of the vehicle.

Note: DO NOT exceed the maximum voltage rate Zeno can handle. Any mis use of the hardware will result in void warranty. Each hardware has a one (1) year of limited warranty.

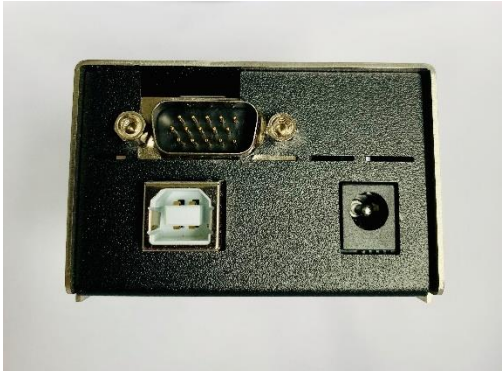


Figure 1 Zeno 42X IO front view

Dimension: 108x40x61 mm

Weight: 238 g

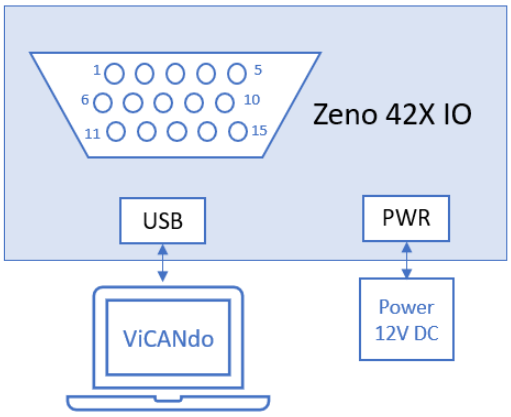


Figure 2 Zeno 42X IO front view

The pin out of the 15-pin male D-sub connector is as follows:

Table 1 15 Pin male connector pin out

Pin number	Description
1	POWER, Max. 16V DC
2	GND
3	IO 1
4	IO 2
5	IO 3
6	IO 4
7	IO 5
8	IO 6
9	IO 7
10	IO 8
11	IO 9
12	IO 10
13	IO 11
14	IO 12
15	Reserved

6 ViCANdo QML App Example – Zeno 42X IO Presenter

6.1 QML App Example

The example QML app contains two QML files:

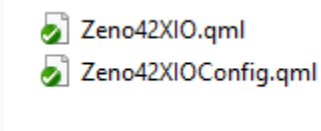


Figure 3 QML App

Zeno42XIOConfig.qml is the row component for the IO configuration group box in Zeno42XIO.qml. Zeno42XIO.qml is the main app.

It is recommended to keep the QML files under the same directory where you ViCANdo project file is saved.

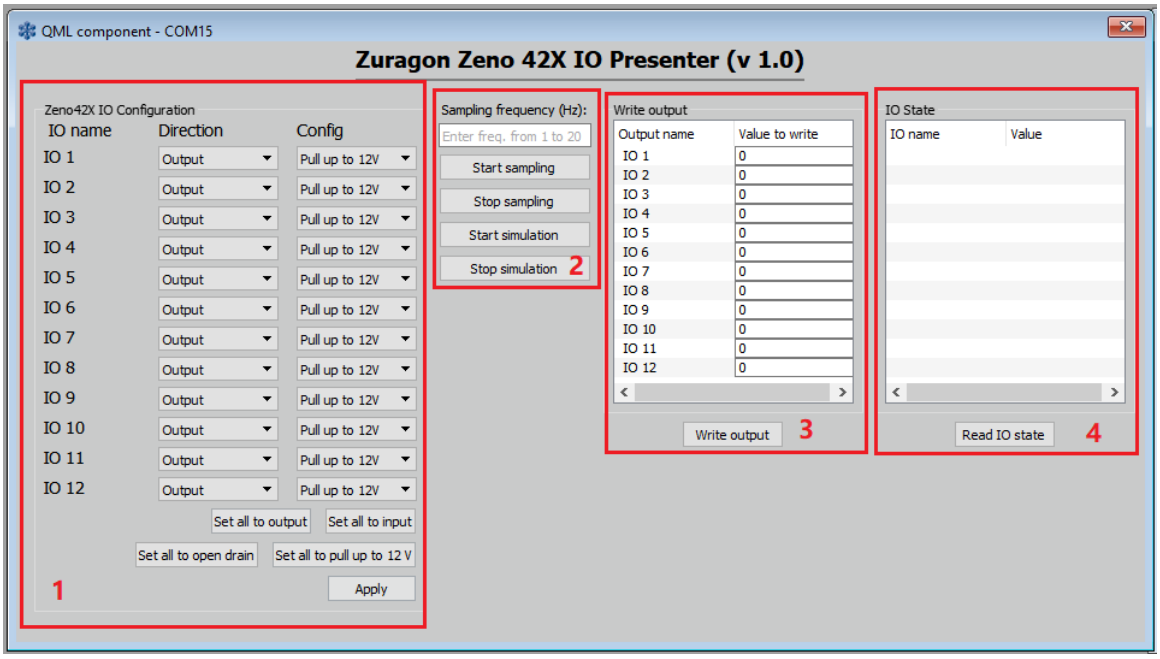


Figure 4 Zeno 42X IO QML App

Area 1:

Zeno42X IO Configuration group box. Here you can configure each IO or use the “set all…” buttons to configure all IOs at the same time. After you have configured the IO, click on Apply button to send the configuration messages to Zeno 42X IO.

Area 2:

Here you configure the IO sampling frequency and start/stop sampling/simulation.

Area 3:

Write output group box displays the outputs you have configured. The “Value to write” column can be used to write the value for the output. Type in the value 0 or 1 first then click “Enter” to confirm. Click on the “Write output” button to write the value to the output.

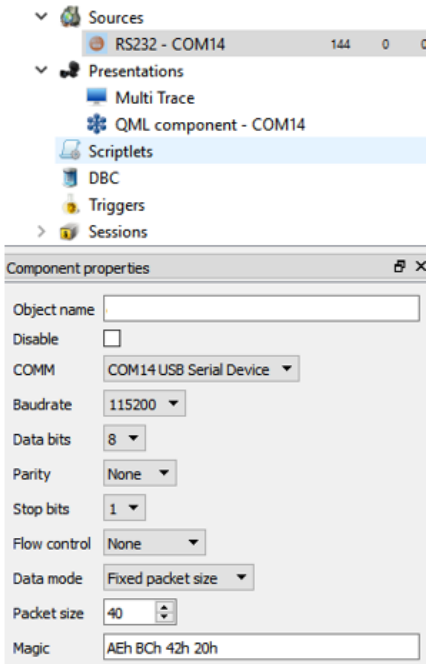
Area 4:

IO state group box displays the current status of the 12 IOs. Zeno 42X IO will send out the IO status message according to the configured sampling frequency. The “Read IO state” button is used for a single read.

6.2 Source configuration

Connect the Zeno 42X hardware to your PC with ViCANdo installed via USB port. Open ViCANdo and add a RS232 source.

The hardware will be recognized as a new COM source. It should be configured according to below figure:



Then add the Zeno42XIO.qml via Presentation menu from ViCANdo and assign it to the RS232 source you have added. Below is an example of the project:

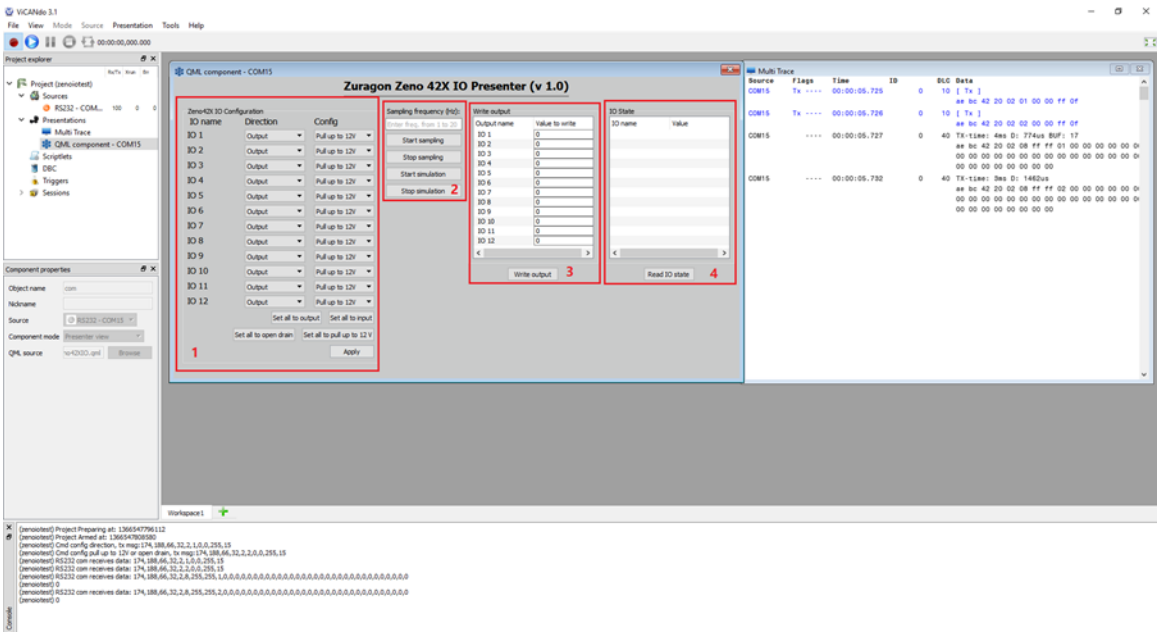


Figure 5 ViCANdo project with Zeno42XIO.qml loaded

6.3 Simulation

To use the simulation mode, you need to live playback a session in ViCANdo and in most cases the IOs of Zeno 42X IO needs to be configured in the opposite direction. For example, in normal mode/recording, Zeno 42X IO 0-6 are configured as input. While in the simulation mode, you may want to configure the 0-6 IOs as output.

Please refer to the internal protocol and QML example app to learn how to write your own QML app to interface with Zeno 42X IO for your application.

Note: Everything coming to RS232 source in ViCANdo is available in its SourceEventListener, no matter if it's normal mode or live playback mode.

6.4 Internal protocol

The internal protocol is the communication protocol between the Zeno 42X IO and ViCANdo QML application Zeno42XIO.qml.

The message formats are: Header fields + Control fields + Payload fields(optional)

6.4.1 Messages from QML application

The format of messages from QML application are:

Table 2 Message format

Meaning	Header				Control				Payload
Byte	0	1	2	3	4	5	6	7	8 - N
Value	0xAE	0xBC	0x42	0x20	Payload length	Command	Reserved	Reserved	Payload data

Byte 4: The length of the payload data in bytes.

Byte 5: Command field. The payload will have different types of data depends on the value in this field.

6.4.1.1 Configure IO direction message

Meaning	Header	Control			Payload	
Byte	0-3	4	5	6-7	8	9
Value	See table2	Payload length	1	See table2	2 bytes direction mask. 0 means input, 1means output	

Byte 4: The payload length. 2 for this message.

Byte 5: The command filed value. 1 means to configure the direction of the 12 IO channel.

Byte 8: The lower 8 bits of the 2 bytes direction mask. 0 is input, 1 is output. E.g. 0x3(binary 00000011) means IO 1 and IO 2 are outputs, the rest IOs are inputs.

Byte 9: The higher 8 bits of the 2 bytes direction mask.

6.4.1.2 Configure pull up to 12 V or open drain message

Meaning	Header	Control			Payload	
Byte	0-3	4	5	6-7	8	9
Value	See table2	Payload length	2	See table2	2 bytes mask. 0 means open drain. 1 means pull up to 12 V	

Byte 4: The payload length. 2 for this message.

Byte 5: The command filed value. 2 means to configure pull up to 12 V or open drain.

Byte 8: The lower 8 bits of the 2 bytes mask. E.g. 0x3(binary 00000011) means IO 1 and IO 2 are configured to pull up to 12 V, the rest IOs are configured to have open drain.

Byte 9: The higher 8 bits of the 2 bytes mask.

6.4.1.3 Write output message

Meaning	Header	Control			Payload	
Byte	0-3	4	5	6-7	8	9
Value	See table2	Payload length	3	See table2	2 bytes mask. 0 means low, 1 means high.	

Byte 5: The command filed value. 3 means to write the values to the outputs.

Byte 8: The lower 8 bits of 2 bytes mask. E.g. 0x4(binary 00000100) means only IO 3 is high.

Byte 9: The higher 8 bits of 2 bytes mask. E.g. 0x8(binary 00001000) means IO 12 is high, IO 9 – IO 11 are low.

6.4.1.4 Start sampling message

Meaning	Header	Control			Payload
Byte	0-3	4	5	6-7	8
Value	See table2	Payload length	4	See table2	1 byte frequency in Hz

Byte 4: Payload length. 1 for this message.

Byte 5: The command filed value. 4 means to start sampling all IOs.

Byte 8: The frequency in Hz. Valid values are from 1 to 20.

6.4.1.5 Stop sampling/simulation message

Meaning	Header	Control		
Byte	0-3	4	5	6-7
Value	See table2	Payload length	5	See table2

Byte 4: The length of the payload. This message has no payload. Therefore, here should be 0.

Byte 5: The command filed value. 5 means to stop sampling or simulation.

6.4.1.6 Read IO state message

Meaning	Header	Control		
Byte	0-3	4	5	6-7
Value	See table2	Payload length	6	See table2

Byte 4: The length of the payload. This message has no payload. Therefore, here should be 0.

Byte 5: The command filed value. 6 means to read IO state.

6.4.1.7 Start simulation message

Meaning	Header	Control		
Byte	0-3	4	5	6-7
Value	See table2	Payload length	9	See table2

Byte 4: The length of the payload. This message has no payload. Therefore, here should be 0.

Byte 5: The command filed value. 9 means to start simulation. When replaying a session in ViCANdo, Zeno 42X IO will send the IO status messages in the session.

6.4.2 Messages from Zeno 42X IO

6.4.2.1 IO state respond message

Meaning	Header	Control				Payload	
Byte	0-3	4	5	6	7	8	9
Value	See table2	Payload length	7	See table2		2 bytes IO state mask. 0 means low, 1 means high	

Byte 4: The length of the payload field. 2 for this message.

Byte 5: The command field. 7 means IO state respond message from the Zeno 42X IO.

Byte 8: The lower 8 bits of the 2 bytes IO state mask. E.g. 0x81 means IO 1 and IO 8 are high, IO 2 – IO 7 are low.

Byte 9: The higher 8 bits of the 2 bytes IO state mask. E.g. 0xF means IO 9 to IO 12 are high.

6.4.2.2 Command ack message

This command ack message is sent when Zeno 42X IO receives a command from ViCANdo + QML app.

Meaning	Header	Control			Payload		
Byte	0-3	4	5	6-7	8	9	10 - 39
Value	See table2	Payload length	8	See table2	Acknowledged command	Error code. 0 means ok. Other value means error	Filled with 0

Byte 4: The length of the valid payload field. 2 for this message.

Byte 5: The command field. 8 means send command acknowledged message.

Byte 8: The value of the command Zeno 42X IO is acknowledging.

Byte 9: Error code field. 0 means OK, other value means error.

Byte 10-39: These bytes are filled with zeros. The total length of the received message in RS232 source in ViCANdo in this project should be fixed 40 bytes (See COM port configuration chapter)

7 Legal Information

7.1 About this document

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8 References