



Zeno 42X User Manual

Document Type	User Manual
Document Classification	Public
Product	Zeno 42X
Department	R&D
Version	1.7

Table of Contents

1	Revision History	2
2	Abbreviations	2
3	Introduction	2
4	Hardware Specification	3
5	ViCANdo QML Application – Elmos ultrasonic	6
5.1	QML App	6
5.2	Source configuration	8
5.3	Internal protocol	10
5.3.1	Messages from QML application	10
5.3.1.1	Configure threshold message	10
5.3.1.2	Configure range message	10
5.3.1.3	Start sensor message	11
5.3.1.4	Stop all sensors message	11
5.3.1.5	Start simulation message	12
5.3.2	Messages from Zeno 42X board	12
5.3.2.1	Sensor data message	12
5.3.2.2	Error code message	12
6	Legal Information	14
6.1	About this document	14
6.2	Trademarks	14
7	References	14

1 Revision History

Date	Revision	Author	Description
24.10.2018	1.0	HL	Initial draft
06.11.2018	1.1	HL	Corrected the DB9 connector
04.12.2018	1.2	HL	Updated manual for hardware revision 2
29.01.2019	1.3	HL	Updated copy right year and minor fixes
21.03.2019	1.4	HL	Removed the object name "com" configuration since main_source is used in QML app v 1.1
25.03.2019	1.5	HL	Explains how to use start simulation in detail
27.03.2019	1.6	HL	Added Version Info
07.08.2019	1.7	HL	Added power supply, updated QML to v 1.2

2 Abbreviations

Below is a list of abbreviations used in this document.

us	Microseconds
ID	Identifier
len	Length
App	Application

3 Introduction

Zeno 42X is a hardware made by Zuragon to allow ViCANdo to interactive with sensors and to simulate the connected sensors when playing back the recorded sessions in ViCANdo.

Zeno 42X should be used together with the ViCANdo QML applications depends on which sensors/devices will be controlled by Zeno 42X. Below table lists the current supported QML applications and sensors.

ViCANdo QML application	Sensors/devices to be controlled	Description
Zeno42X.qml	Elmos ultrasonic sensors	

4 Hardware Specification

The Zeno 42X 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.

The firmware can be updated via the USB port.

The DB9 male connector can be connected to maximum six sensors.



Figure 1 Zeno 42X front view

Dimension: 108x40x61 mm

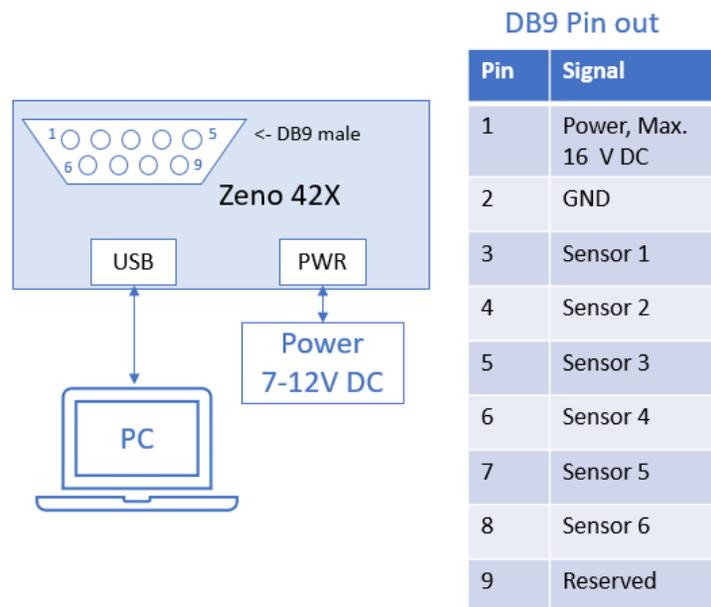


Figure 2 Zeno 42X connection and DB9 pin out

The IO pins of the Zeno 42X is a DB9 male connector.

DB9 pin 1: Connects to the power pins of the 6 sensors.

DB9 pin 2: Connects to the ground pins of the 6 sensors.

DB9 pin 3-8: Connects to the signal pin of each sensor.



Figure 3 Zeno 42X back view

There are six LEDs on the backside of the Zeno 42X.



Figure 4 LED description

If the sensor is not connected to Zeno 42X, the LED for that sensor will be OFF.

Below figure shows how to setup Zeno 42X, ViCANdo and sensors:

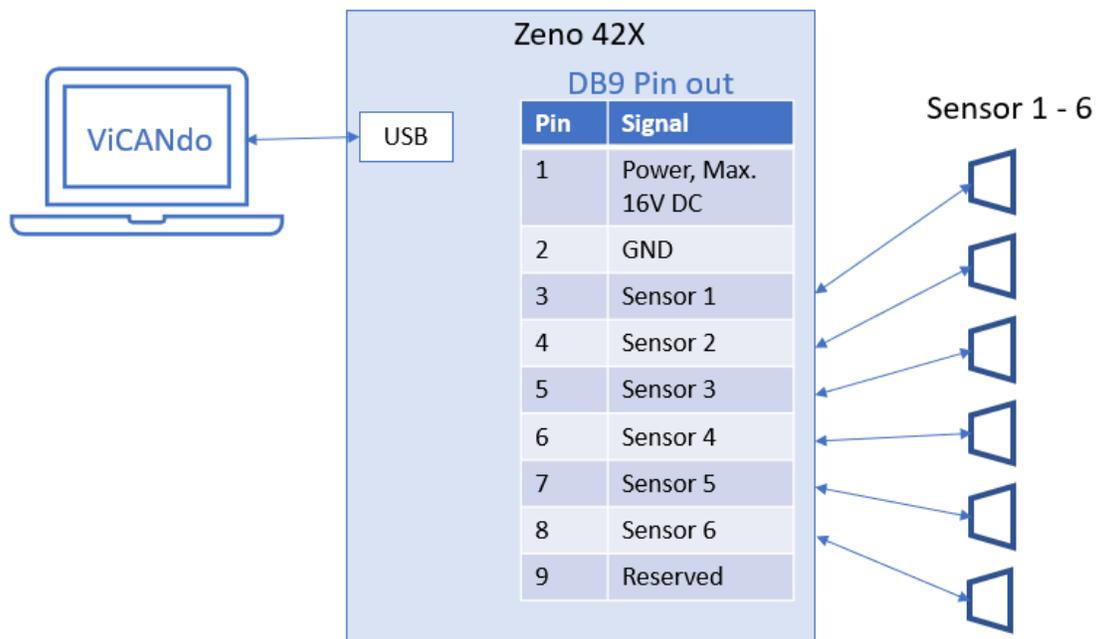


Figure 5 Zeno 42X Application hardware setup

5 ViCANdo QML Application – Elmos ultrasonic

5.1 QML App

	Zeno42X.qml	Zeno 42X
Version	Zeno 42X Presenter - Elmos ultrasonic (v 1.2)	HW rev 3

Zeno42X.qml is the ViCANdo QML application, which should be used together with the Zeno 42X (which is connected to elmos ultrasonic sensors). Below is a screenshot of the component and its explanation.



Figure 6 Zeno 42X.qml application

Area 1:

The left vertical bar and the chart are used for displaying the signals from the 6 sensors connected to the Zeno 42X. The unit of X axis can be switched from Time (us) or Distance (cm) from the bottom radio buttons.

Area 2:

The middle part is the control panel, which is used to start/stop/start simulation of the selected sensors. Each sensor supports short-range mode and long-range armed mode for distance measurement.

Zeno 42X supports two sampling modes, sync mode and round robin mode, for sampling its IO pins connected to the sensors:

- **Sync mode:**
 - The Zeno 42X will start sampling the selected sensors simultaneously.
- **Round robin mode:**
 - The Zeno 42X will start sampling the selected sensors one by one. For example, if all 6 sensors are selected, they will be sampled from sensor 1, sensor 2, until sensor 6.

When start simulation with selected sensors in ViCANdo, first you need to have a session to live playback. Then press start Simulation button. Zeno 42X will send the simulated sensor data in the session to its IO pins instead of taking the data from IO pins.

For more information regarding “Send RCV commands” checkbox, please refer to the Elmos digital ultrasonic transceiver driver and signal processor E524.02/03 datasheet, chapter 5.4 SEND and RECEIVE.

Logging sensor data with Zeno 42 X

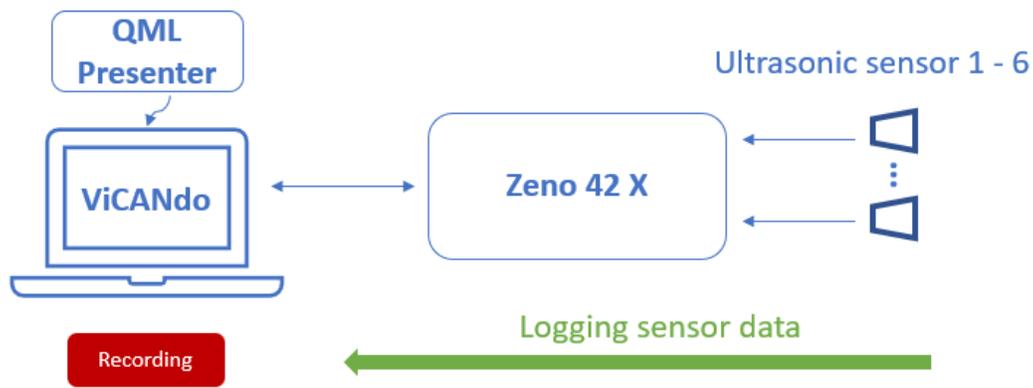


Figure 7 Logging sensor data with Zeno 42 X and ViCANdo

Simulating with Zeno 42 X

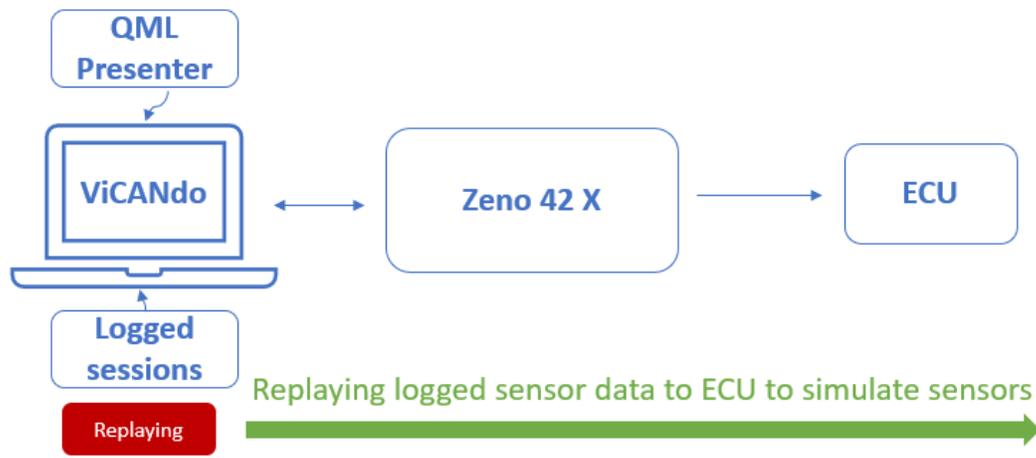


Figure 8 Simulation with Zeno 42 X

Area 3:

The bottom area is for displaying the driver frequency information and the 1st echo of each sensor in unit of Time (us) or Distance (cm) depends on the unit set in the radio buttons under chart.

5.2 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:

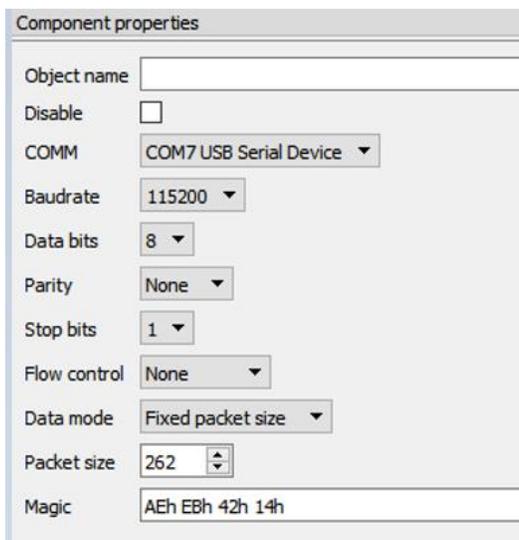


Figure 9 Source configuration in ViCANdo

Then add the Zeno42X.qml via Presentation menu from ViCANdo and assign it to the RS232 source you have added. Below is an example of the project:

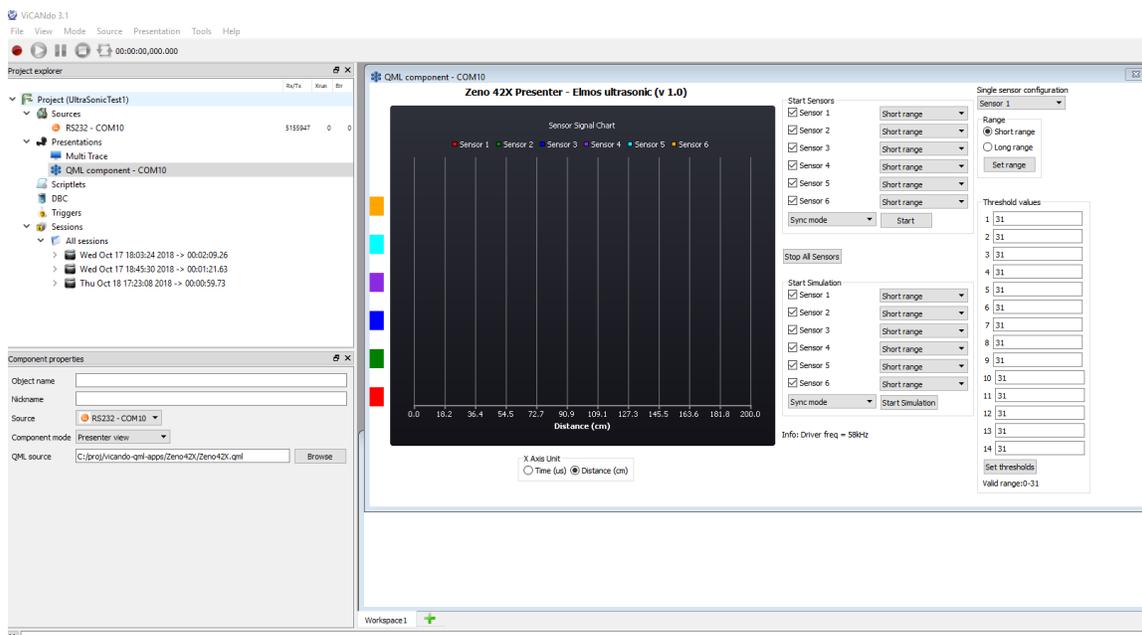


Figure 10 ViCANdo project with Zeno42X.qml loaded

5.3 Internal protocol

The internal protocol is the communication protocol between the Zeno 42X board (when connects to Elmos ultrasonic sensors) and ViCANdo QML application Zeno42X.qml.

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

5.3.1 Messages from QML application

The format of messages from QML application are:

Table 1 Message format

Meaning	Header				Control				Payload
Byte	0	1	2	3	4	5	6	7	8 - N
Value	0xAE	0xEB	0x42	0x14	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.

5.3.1.1 Configure threshold message

Meaning	Header	Control			Payload			
Byte	0-3	4	5	6-7	8	9	...	22
Value	See table1	Payload length	1	See table1	Sensor ID	Threshold 1	...	Threshold 14

Byte 5: The command filed value. 1 means to configure threshold values for the sensor.

Byte 8: The ID of the sensor to be configured. Value range from 1 to 6.

Byte 9 - 22: The 14 threshold values. Valid range from 1 to 31.

5.3.1.2 Configure range message

Meaning	Header	Control			Payload	
Byte	0-3	4	5	6-7	8	9
Value	See table1	Payload length	2	See table1	Sensor ID	Range 0: short range 1: long range

Byte 5: The command filed value. 2 means to configure range mode for the sensor.

Byte 8: The ID of the sensor to be configured. Value range from 1 to 6.

Byte 9: Range. 0 means short range mode. 1 means long range mode.

5.3.1.3 Start sensor message

Meaning	Header	Control			Payload		
Byte	0-3	4	5	6-7	8	9	10
Value	See table1	Payload length	3	See table1	Sensor ID mask	Range mask	Sample mode

Byte 5: The command filed value. 3 means to start the sensors connected to the Zeno 42X.

Byte 8: The ID mask of the sensors. Each sensor uses 1 bit:

Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor 5	Sensor 6		

For example, to send start command to sensor 4, the ID mask should have value of 0x10. To start sensor 6 and sensor 1 at the same time, the ID mask should have value of 0x21.

Byte 9: Range mask. Each sensor uses 1 bit, which is similar to the sensor ID mask field. 0 means short range mode. 1 means long range mode.

Byte 10: Sample mode. 0 means to use sync mode. 1 means to use round robin mode.

- **Sync mode:**
The Zeno 42X will start sampling the selected sensors simultaneously.
- **Round robin mode:**
The Zeno 42X will start sampling the selected sensors one by one. For example, if all 6 sensors are selected, they will be sampled from sensor 1, sensor 2, until sensor 6.

5.3.1.4 Stop all sensors message

This message will stop all the sensors connected the Zeno 42X.

Meaning	Header	Control		
Byte	0-3	4	5	6-7
Value	See table1	Payload length	4	See table1

Byte 4: No payload in this message. Therefore, here it should be always 0.

Byte 5: The command filed value. 4 means to stop all sensors.

5.3.1.5 Start simulation message

Meaning	Header	Control			Payload	
Byte	0-3	4	5	6-7	8	9
Value	See table1	Payload length	5	See table1	Sensor ID mask	Sample mode

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 start simulation on selected sensor.

Byte 8: The ID mask of the sensors. Each sensor uses 1 bit. For example, bit 0 = 1 means sensor 1 is selected. bit 0 = 0 means sensor 1 is not selected.

Byte 9: Sample mode. 0 means to use sync mode. 1 means to use round robin mode.

5.3.2 Messages from Zeno 42X board

5.3.2.1 Sensor data message

Meaning	Header	Control				Payload						
Byte	0-3	4	5	6	7	8	9	10	11	12	13	...
Value	See table1	Payload length	0	Sensor enabled mask	Sensor range mask	IO state	16 bits time	IO state	16 bits time			

Byte 4: The length of the payload field.

Byte 5: The command field. 0 means it is the sensor data from the Zeno 42X.

Byte 6: The sensor enabled mask. If one bit is 0, it means that sensor is not enabled. 1 means the sensor is enabled.

Byte 7: Sensor range mask. If one bit is 0, it means the sensor is in short range mode. 1 means the sensor is in long range mode.

Payload:

Payload contains number of packet data. Each packet data contains 3 bytes. 1 byte of IO state, 2 bytes of the timestamp in microseconds. For example, if the IO state in byte 8 is 0x04, it means the following timestamp (byte 9 and byte 10) is the time responded from sensor 3.

5.3.2.2 Error code message

Meaning	Header	Control			Payload
Byte	0-3	4	5	6-7	...

Value	See table1	Payload length	6	See table1	
-------	----------------------------	----------------	---	----------------------------	--

Byte 4: The length of the payload field.

Payload: Payload contains the error codes.

6 Legal Information

6.1 About this document

This document may not be reproduced without our prior written permission.

We believe that the information in this user guide was accurate at the time of printing. Zuragon cannot, however, assume responsibility for any errors or omissions in this document. The information in this document is subject to change without notice and should not be taken as a commitment by Zuragon.

6.2 Trademarks

All product names mentioned in this manual are registered or unregistered trademarks of their respective owners.

7 References

- 1) Elmos digital ultrasonic transceiver driver and signal processor E524.02/03 datasheet