EZMotion

INSTALLATION/**SOFTWARE**/USAGE

Q: Question

How to communicate with EZMotion over TCP?

A: Answer

CONNECTING AND LISTENING TO MOTION

IP Address should be the IP Address of the machine you want to receive Motion data on. If it is the same machine, leaving the IP address 127.0.0.1 is recommended.

Motion will communicate on three ports. The port entered by the user and the following two ports. EX:

- 13000 is used for sample data from Motion to app. (One Way)
- 13001 is used for error messages. from Motion to app. (One Way)
- 13002 is used for setup messages from Motion to app. (Two Way)

Motion is driven by the communication sent to it. Once connection is established you will need to send a Setup info message and wait for the reply which will contain all the information regarding active tracker groups. You can then send a start recording message to trigger motion to send data.

GENERAL MESSAGE STRUCTURE

- * Will be at the start of every message sent by Motion
- Two bytes which represents the command
- Signed 16-bit integer which represents the length of the message in bytes.
- Data bytes which should be decoded based on the command
- ~ as a mark for end of the message

Bytet	0	1	2	3	4	5	...	5 + Length
Content	*	Command		Data Byte Length		Data Bytes		~

Color Coding Legend

b. Red = placeholder for text in ASCII
c. Green = placeholder for 16 bit integer
d. Blue = double (8 byte)
e. Black = literal character

Initialization Process

Message from App to Motion

Send Init message over set up port 13002

*SI00~

Reply from Motion on port 13002

*SIXX|<TG Name> <channel name 1:data type:units> <channel name 2:data type:units> ...|<TG Name2> ...|<XYZ>~

- TGName : Name of the tracker group (user)
- Channel Name : 'X', 'Y', 'Z','I','J','K'
- Data type : 'double'
- Unit: 'mm', 'rad'
- <XYZ> : angle convention Roll Pitch Yaw

EXAMPLE:

Byte	0	1	2	3	4
Content	*	S	I	124	

Cont.

5 - 128	129
|<Engine Tracker Group 1> <X:double:mm> <Y:double:mm> <Z:double:mm> <I:double:rad> <J:double:rad> <K:double:rad>|<xyz>	~

START RECORDING MESSAGES - Command "SR"

App to Motion on port 13002

- *SRXX~ is sent to motion over the setup port to trigger motion into starting a recording
-

  Reply from Motion on port 13000

- Motion will then start sending values over the main port using the same command.
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- *SR(short representing message length)(double-precision floating points for each channel representing its data)(double-precision floating point representing a timestamp)~

  Example when there are 6 channels (XYZIJK) the message will look like

  Length of message = number of channels * 8byte + Timestamp

Byte	0	1	2	3	4
Content	*	S	R	6 x 8(double) +1	

Cont.

5 - 53	54 -	55
123.45683456.4685.41632.16851651689465	0.025	~

STOP RECORDING MESSAGES – Command "RS"

App to Motion on port 13002

- *RSXX~
- When triggering the recording to stop this command should be sent to motion over the setup port.

ERROR MESSAGES – Command "EW"

from Motion on port 13001

ERROR CODE	MEANING
401	Recording already started
402	Recording already stopped
403	Lost Tracking
404	Regained Tracking

- *EWXXAA~

- Sent over the error port

Offset	0	1	2	3	4	5	6	7
Content	*	EW		2		403		~

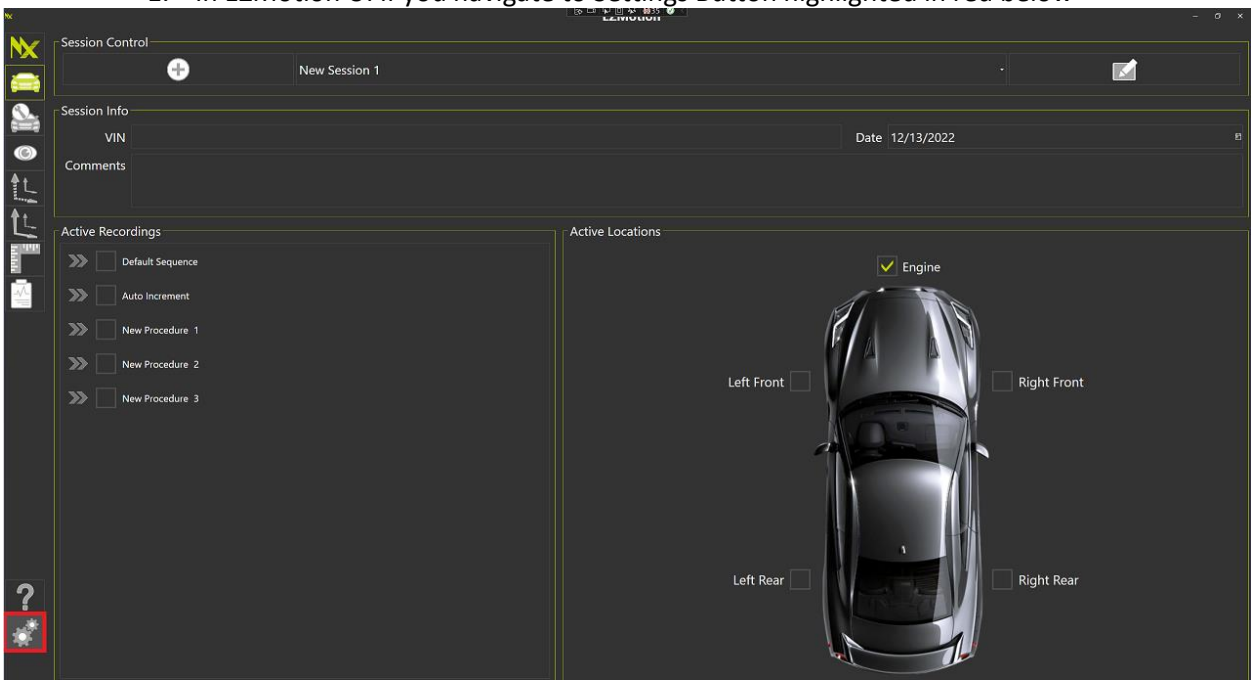
HEARTBEAT MESSAGE – Command “HB”

from Motion on port 13001

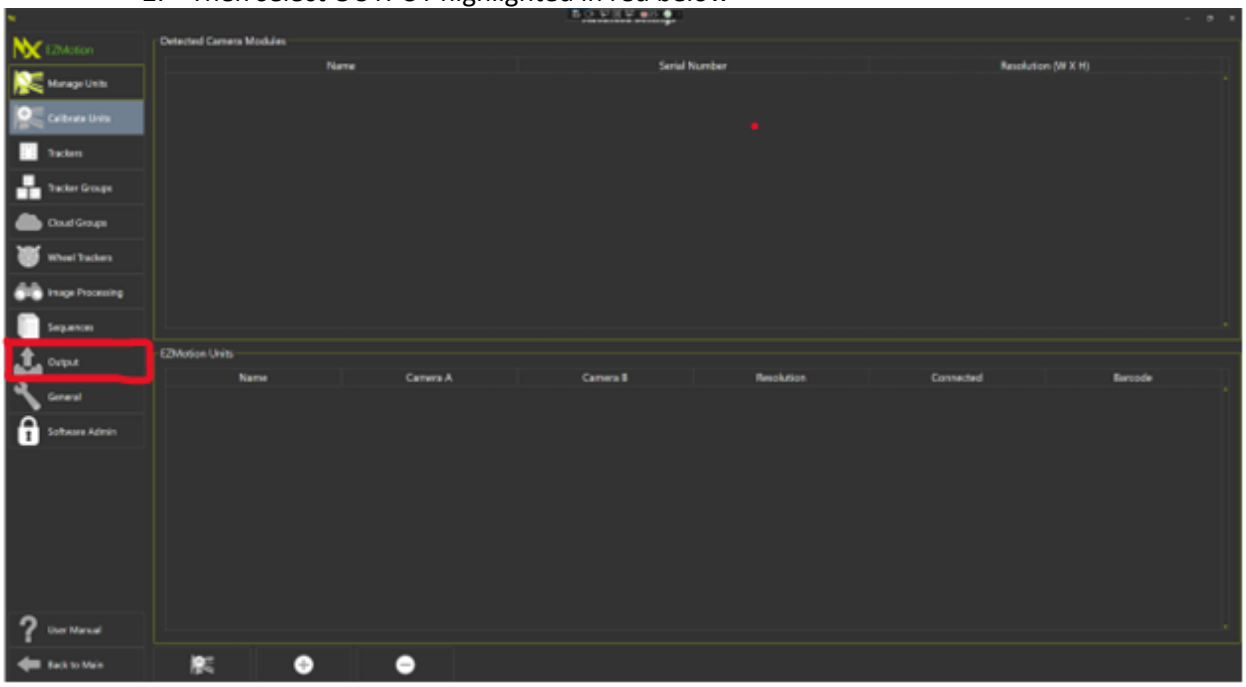
- *HBXX~
- Sent over error port
- This command is sent on a timer over the error port from motion every 5 seconds. Used by receiving software to make sure there is a connection still when expecting one.

Configuring EZMotion

1. In EZMotion UI if you navigate to Settings Button highlighted in red below



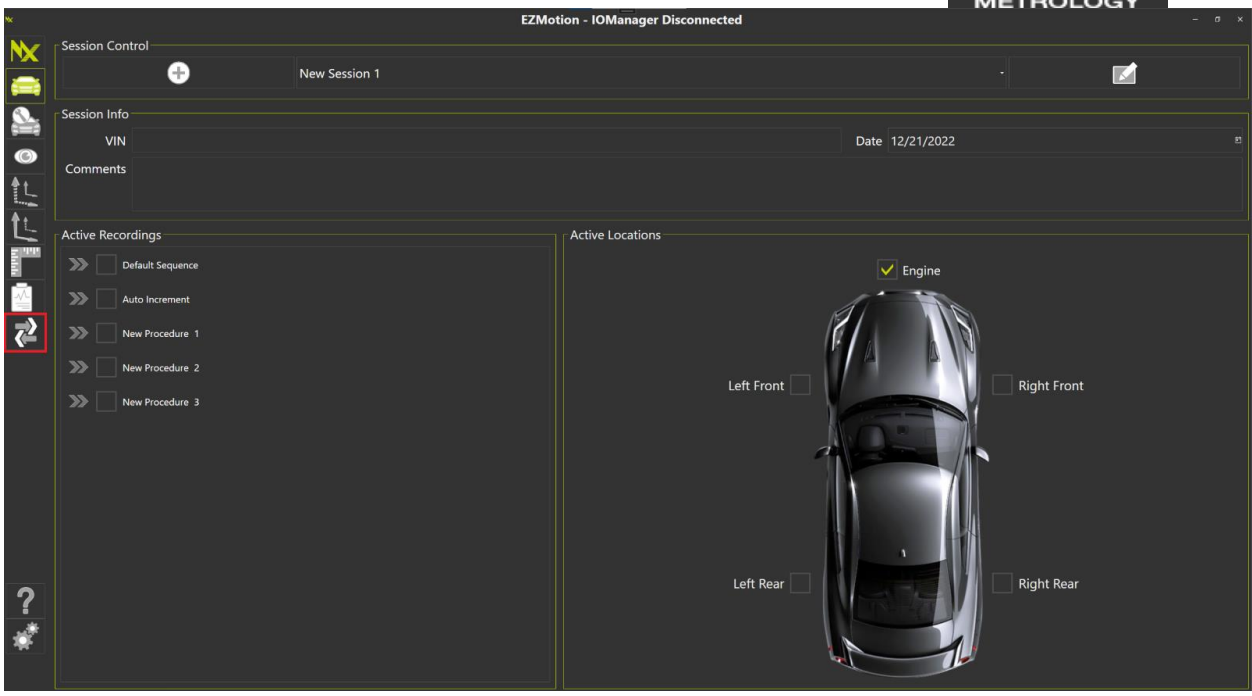
2. Then select OUTPUT highlighted in red below



3. You will then need to activate the IO Manager output checkbox as seen in the provided picture.

4. There are two fields, one for IP Address and one for port number.
    a. IP Address should be the IP Address of the machine you want to receive Motion data on. If it is the same machine, leaving the IP address 127.0.0.1 is recommended.
    b. Motion uses three ports to send different types of communication, one for value messages, one for setup messages and one for error messages. The user must define the value port. Error port will be value port +1 and setup port will be value port + 2.
    c. The port will vary depending on the security settings on your computer and network. Please contact IT Support if ports 13000, 13001, 13002 do not work as you may need to open ports.

Once Motion is set up and you are ready to initiate your connection. In Motion you must click the button on the main window that is highlighted in red in the following picture:

5. 

6. The symbol has three different states indicating its connection status.
   a. Not attempting connection

   b. Failed connection

   c. Connected

When it is showing connected symbol Motion is set up and ready for a connection to be established. Once established it will start sending data using TCP/IP Protocol to the connected client.