M3X Project Interface Document

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# Document Release Notes

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| **Document Id** | **Changes** | **Date** |
| M3X-20221026-Rev003 | Added bluetooth commands and a continuous and event string. | 2022/Oct/26 |
| M3X-20220419-Rev002 | Corrected the order of the EMG RMS and Effort signals.  Added a “Sync State” field to the data stream. | 2022/Apr/19 |
| M3X-20220215-Rev001 | Initial Release | 2022/Feb/15 |

# Serial & Bluetooth Terminal Configuration

* Speed: 115200
* Data: 8 Bit
* Parity: None
* Stop Bits: 1 bit
* Flow Control: None

# Serial Reception String

* If a ‘!’ character arrives at the serial terminal, it will toggle the sync bit.

# Serial Transmission String

There are two types of strings that are transmitted via the serial terminal. A **continuous** string that is being constantly being broadcast, and an **event** string that only occurs when a mode (or configuration parameter) change has occurred. The 3rd column on the table below indicates in which string a given signal is transmitted.

|  |  |  |
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| **Signal Name** | **Signal Range** | **String Transmission** |
| Device type | H (hand) or E (elbow) | Both |
| Time since power up | (seconds).(nanoseconds) | Both |
| Tricep / Open EMG RMS | Integer | Both |
| Bicep / Close EMG RMS | Integer | Both |
| Current mode | Standby = 0,  Flex / Close = 1  Extend / Open = 2  Dual = 3 | Event string only |
| Configured dual mode | Classic = 0,  Classic with hold = 1  Constant velocity = 2  Proportional velocity = 3  Ramp velocity = 4 | Event string only |
| Tricep / Open Effort | Integer | Both |
| Bicep / Close Effort | Integer | Both |
| Tricep / Open Dual Mode Effort Threshold | Integer (10-100) | Event string only |
| Biceps / Close Dual Mode Effort Threshold | Integer (10-100) | Event string only |
| Bicep / Close Sensor Gain | Integer (0 – 2000) | Event string only |
| Tricep / Open Sensor Gain | Integer (0 – 2000) | Event string only |
| Bicep / Close Movement Threshold | Integer (0-20) | Event string only |
| Tricep / Open Movement Threshold | Integer (0-20) | Event string only |
| Joint Position | Integer(0-133 Degrees Elbow) Integer(~0-100 % ROM) | Both |
| Battery Current | Integer (mAmps) | Both |
| Hold Force Parameter | Dual Mode Hold Force slider value (1-20) | Event string only |
| Speed Parameter | Dual Mode Speed slider value (1-20) | Event string only |
| Sync Bit | 0 or 1  (A state change acknowledges the reception of the ‘!’ ASCII character via the serial channel, or whenever the $\e! 3 0 command arrives via bluetooth.) | Both |

# Serial Transmission Example

Note the “longer” string which contains the data that occurred when an event (mode change from standby to flex) occurred.

Text

Description automatically generated

# Bluetooth Reception String

The exact same string that is transmitted via the serial channel is also transmitted by the Bluetooth channel.

* To transmit the M3X string in the Bluetooth channel, type the command: **$\e! 2 1**
* To revert to the MyConfig string, type the command: **$\e! 2 0** or power-cycle the unit.
* To toggle the sync bit via, type the command **$\e! 3 0**