

AVIORACE IMU

Firmware Ver 2.09

1. Default Setting

CAN ID: 0x100, 0x101, 0x102

BAUD RATE: 1 Mbps

REFRESH-RATE: 100 Hz

DATA FORMAT: BIG ENDIAN

RE-PROGRAM ID: 0x0E5

ACCELEROMETER RANGE: ±12G

GYROSCOPE RANGE: ±250 °/s

ACCELEROMETER 3DB CUTOFF FREQUENCY (ALL AXES) : 19 Hz

GYROSCOPE 3DB CUTOFF FREQUENCY (ALL AXES) : 32 Hz

2. Transmitted Can Messages

CAN ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x100	Acceleration X		Acceleration Y		Acceleration Z		Serial Number	
0x101	Gyroscope X		Gyroscope Y		Gyroscope Z		Internal Temp	
0x102	Mag X		Mag Y		Mag Z		--	

The Accelerometer data is in [0.001 G] resolution

The Gyroscope data is in [0.1 °/s] resolution

The Serial Number data is in [1] resolution

The Magnetometer data is in [0.01 uT] resolution

The Internal Temp is in [0.1 °C] resolution

3. Software Operation

All can output data values are sent over can bus on different CAN IDs starting from a programmable CAN BASE ID.

It is possible to send a can configuration message in the correct format (see below the re-program Operation section) at **address 0x0E5** and change the IMU parameters or do the Zero Offset.

4. Re-program Operation

Sending a message on RE-PROGRAM ID is possible to change:

- Can ID
- Baud Rate
- Accelerometer Range
- Gyroscope Range
- IMU sensor installation position
- Accelerometer Cut-Off Frequency
- Gyroscope Cut-Off Frequency
- Get IMU information (fw version)
- Make Zero Offset

Please note If a not allow number/parameters option is sent, the default value is taken.

Can ID & Baud Rate:

CAN ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x0E5	0x01	0xA0	0xAA	Acc Range	Gyro Range	Baud Rate	Can Hi	Can Lo

Acc Range:

- 0x00 → ±3G
- 0x01 → ±6G
- **0x02 → ±12G**
- 0x03 → ±24G

Gyro Range:

- 0x00 → ±125 °/s
- **0x01 → ±250 °/s**
- 0x02 → ±500 °/s
- 0x03 → ±1000 °/s
- 0x04 → ±2000 °/s

Baud Rate:

- 0x00 → 250 Kbits
- 0x01 → 500 Kbits
- **0x02 → 1 Mbps**

To set a different CAN BASE-ID, it is necessary set the desired base-id using CAN HI and CAN LO bytes.

Example:

Desired Base-Id: 0x635; set the bytes as following:

CAN HI → 0x06

CAN LO → 0x35

After the configuration message is sent, the IMU perform an automatic reset to load the new configuration.

Positioning & Accelerometer & Gyroscope Cut-Off Frequency:

CAN ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x0E5	0x01	0xA3	0xAA	0xAA	0xAA	Positioning	Acc Freq	Gyr Freq

Accelerometer Frequency 3dB:

- 0x00 → 10 Hz
- **0x01 → 19 Hz**
- 0x02 → 40 Hz

Gyroscope Frequency 3dB:

- 0x00 → 12 Hz
- **0x01 → 32 Hz**

For Positioning value please see last page

After the configuration message is sent, the IMU perform an automatic reset to load the new configuration.

Make Zero Offset:

CAN ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x0E5	0x01	0xA1	0xAA	0xAA	0xAA	0xAA	0xAA	0xAA

After the configuration message is sent, the IMU perform an automatic reset to load the new configuration.

Get IMU information:

CAN ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x0E5	0x01	0xA2	0xAA	0xAA	0xAA	0xAA	0xAA	0xAA

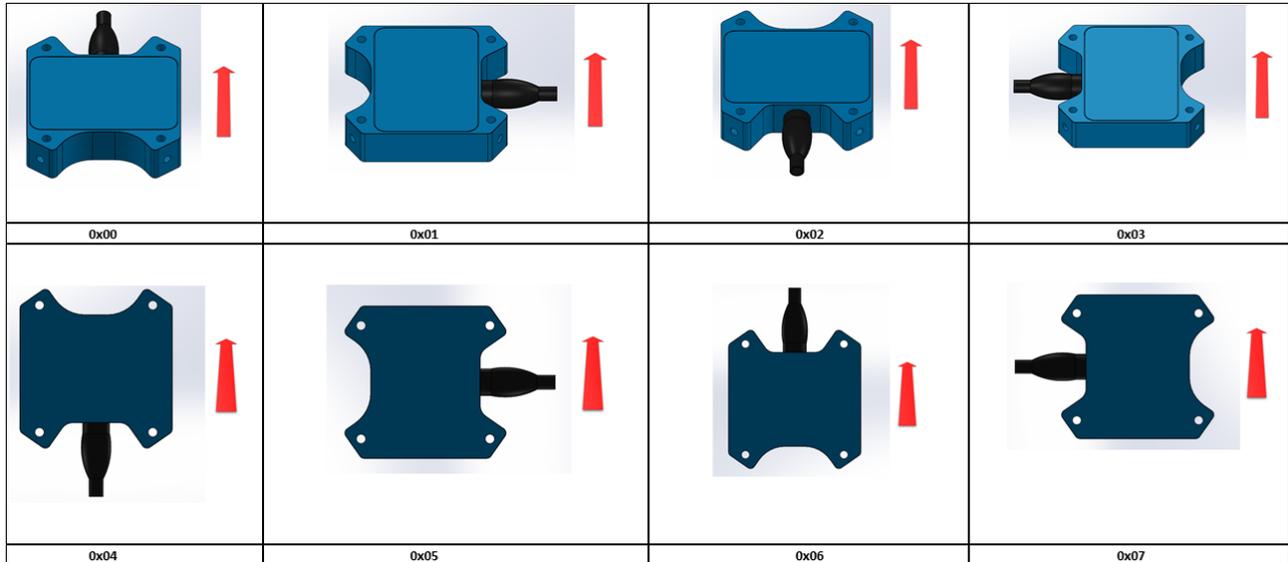
The IMU reply with a message on address 0x0E4:

CAN ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x0E4	Fw Version		Acc Range	Gyro Range	Acc Freq	Gyro Freq	Positioning	Bootloader version

Fw Version is in [0.01] resolution.

Bootloader version in in [0.1] resolution.

5. Positioning



The arrow represents the X Axis (running direction).

6. Sensing Axis Orientation

If IMU is accelerated and/or rotated in the indicated directions, the corresponding channels of the device will deliver a positive acceleration and/or yaw rate signal (dynamic acceleration).

If the IMU is at rest without any rotation and the force of gravity is acting contrary to the indicated directions, the output of the corresponding acceleration channel will be positive and the corresponding gyroscope channel will be 'zero' (static acceleration).

Example: if the IMU is at rest or at uniform motion in a gravity field according to the figure given below, the output channels are:

- ACC X = 0 g
- ACC Y = 0 g
- ACC Z = +1 g
- GYR X = 0 °/s
- GYR Y = 0 °/s
- GYR Z = 0 °/s

