TRIGNO® Wireless System SDK

User's Guide

MAN-025-3-5

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1 Important Information

1.1 Intended Use

The Trigno SDK is a software development tool to be used in conjunction with the Trigno Wireless EMG biofeedback system. The SDK alone does not perform any therapeutic or diagnostic function. It is intended to be used as a software component of a parent software package. The function of the SDK is to manage the transfer of data from the Trigno System to the parent software and is designed to work exclusively with the Trigno System.

1.2 Technical Service and Support

For information and assistance visit our web site at:
www.delsys.com

Contact us at:
E-mail: support@delsys.com
Telephone: (508) 545 8200

1.3 Device Information

Please see the Trigno Wireless EMG System User Guide for information on the EMG Device.

1.4 System Requirements

Trigno Wireless EMG System
Windows 7 or newer, 64-bit or 32-bit operating systems supported
One USB 2.0 port
2.0 GHz processor clock speed (minimum)
2 GB system memory (minimum)
1 GB hard disk storage (minimum)

1.5 Trigno System Firmware Requirements

Version 3.5.X of the Trigno SDK requires the following firmware version:

Analog Base Station: MA2909-BE1503-DS0801-US2004-DA0900
Digital Base Station: MA2909-BE1503-DS0801-US2004-DA0000
Trigno Sensors: v30-18
Trigno IM Sensors: v25-66
Trigno Avanti Sensors: v40-34

1.6 Definitions

TCP: Transmission Control Protocol- a standardized protocol for transmitting information over a network

TCU: Trigno Control Utility- A windows system tray application for controlling and providing feedback on Trigno Biofeedback Systems.

SDK: Software Development Kit- a package of software tools for developing applications for specific devices and operating systems.

GUI: Graphical User Interface- user interface that includes graphical screen elements such as windows, icons and buttons.

EMG: Electromyographic- of or pertaining to electromyography.

IMU: Inertial Measurement Unit- a device used to report a body's acceleration, angular rotation and magnetic heading.

'g' Unit for measuring acceleration (1g ~ 9.8ms^2)

'dps' Degrees per second- unit for measuring angular rate.

2 Trigno Wireless System SDK Overview

The Trigno Wireless System SDK is a software package designed to allow programmers to interact with the Delsys Hardware. The SDK runs as a TCP/IP server with the Trigno Control Utility (TCU).

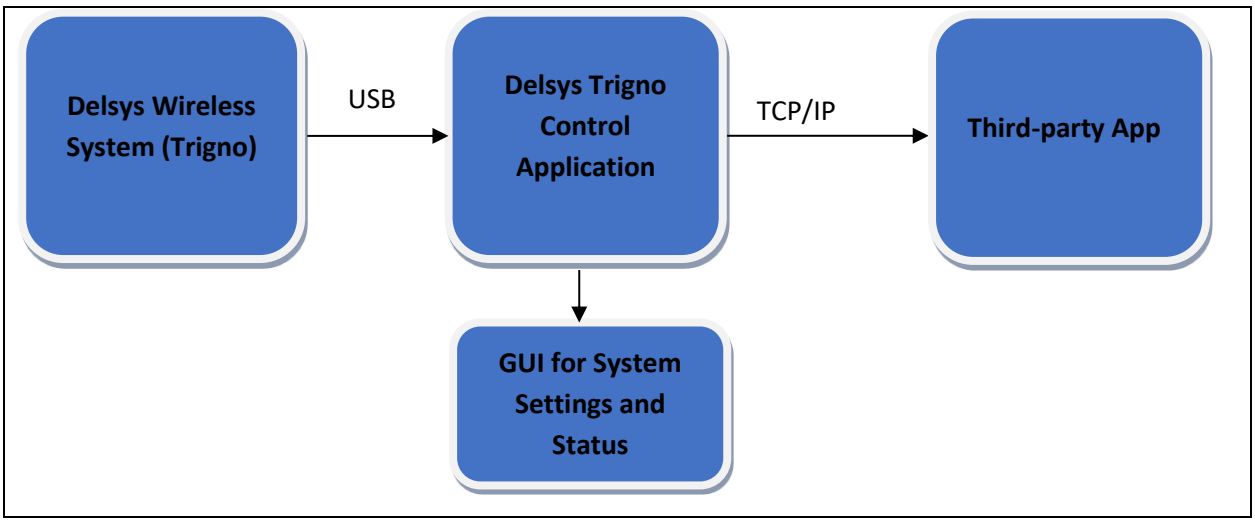


Figure 1: Data flow and SDK sub-system components.

3 Getting Started with the SDK

To use the SDK – install the software on a PC meeting the minimum requirements (listed above) and connect a Trigno Base Station (part of the Trigno Wireless EMG System) to the PC.

Use the Trigno Control Utility to pair sensors to desired slots (see the Trigno Wireless EMG System User Guide for help with pairing).

While the Trigno Control Utility is running, any other software can connect to the command port and instruct the base to begin streaming data. The command port is port 50040 on the host (running the Trigno Control Utility) computer.

To receive data, connect to the appropriate ports:

Port Name	Port Number	Port Function
Command Port	50040	*Receives*: Control commands *Sends:* Replies to control commands
EMG Data port	50043	*Receives:* N/A *Sends:* EMG and primary non-EMG data from all sensor types
AUX Data port	50044	*Receives:* N/A *Sends:* Auxiliary non-EMG data from all sensor types
Legacy EMG Data port	50041	*Receives:* N/A *Sends:* EMG and primary non-EMG data from select sensor types
Legacy AUX Data port	50042	*Receives:* N/A *Sends:* Auxiliary non-EMG data from select sensor types

All EMG or high-frequency data channels stream through the EMG Data port (50043), and all additional data channels stream through the AUX Data port (50044). Any sensors with 4 or fewer data channels will also have data duplicated on ports 50041 and 50042.

For technical specifications, including available control commands and details of how to read incoming data streams, please refer to Section 6.

4 Using the SDK

Please read the Trigno Wireless EMG System User Guide for information about using the Trigno hardware.

To use the SDK, a parent software application must perform the following tasks:

- Connect to the Trigno SDK Server via TCP/IP
- Configure the Trigno system hardware (see Section 5)
- Start data acquisition using one of two methods:
    - Send the command “START” over the Command port
    - Arm the system and send a start trigger to the Trigno Base Station (see the Trigno Wireless EMG System User Guide)
- Process the data streams that are being sent over the data ports (see Section 6)

5 Configuring the Trigno Hardware

The Trigno Base Station can have up to 16 sensors paired at once. To pair a sensor via the SDK, turn the sensor on, and use the command “SENSOR *n* PAIR”. This will initiate the pair process. Once the process is initiated, the user must press and hold the sensor button until the pair complete message is received.

Each Trigno Wireless sensor has a configurable digital setting which controls the sensor input range and the internal Inertial measurement unit ranges (accelerometer and/or gyroscope) dependent on sensor type. For more information about sensor settings, please see the Trigno Wireless EMG System User Guide.

To configure the sensor via the SDK, use the command "SENSOR *n* SETMODE *x*". This will set the sensor paired to slot *n* to mode *x*. For example, "SENSOR 1 SETMODE 3" will set Sensor 1 to Mode 3.

6 Technical Specifications

6.1 Data Ports

The Trigno SDK uses five TCP ports to communicate with client applications. The TCU application listens for incoming connections in the background on these ports and handles data routing to any applications that connect.

The command interface is implemented on the Command port (50040). This port both receives commands and sends replies.

All EMG or primary non-EMG data channels from connected sensors stream through the EMG Data port (50043), and all additional non-EMG data channels stream through the AUX Data port (50044).

Any connected sensors with 4 or fewer data channels will also stream data through the Legacy EMG Data and Legacy AUX Data ports (50041 and 50042), in addition to the EMG Data and AUX Data ports (50043 and 50044).

Port Name	**Port Number**	**Port Function**	**Data Channels**
Command port	50040	*Receives*: Control commands *Sends:* Replies to control commands	1
EMG Data port	50043	*Receives:* N/A *Sends:* EMG and primary non-EMG data from all connected sensors	16
AUX Data port	50044	*Receives:* N/A *Sends:* Auxiliary non-EMG data from all connected sensors	144
Legacy EMG Data port	50041	*Receives:* N/A *Sends:* EMG and primary non-EMG data from sensors with 4 or fewer channels	16
Legacy AUX Data port	50042	*Receives:* N/A *Sends:* Auxiliary non-EMG data from sensors with 4 or fewer channels	48

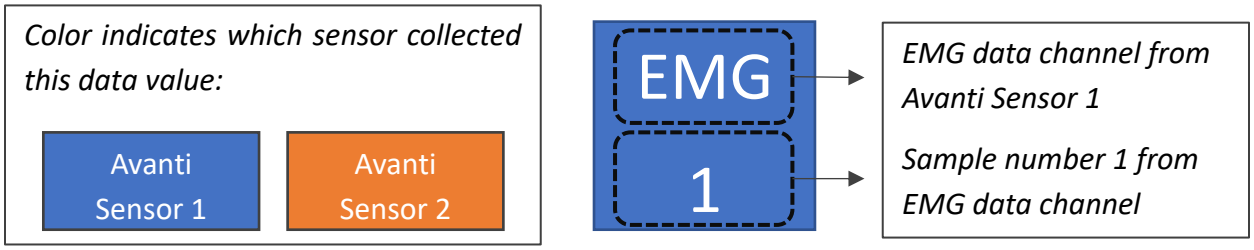
6.1.1 Reading & Parsing Data Streams

All data values are IEEE floats containing 4 bytes each. For synchronization purposes, always process bytes in segments determined by multiples of the following factor:

*(Number of data channels on port) * (4 bytes/sample)*

Data values streamed through any of the four Data ports (50041 through 50044) are multiplexed according to the number of data channels available on that port. Retrieve consecutive samples from the same data channel by reading every *M*th sample, where *M* = number of data channels available on that port.

For the example outlined below, use the following legend to read the accompanying diagrams:



Consider two Avanti EMG sensors, “Avanti Sensor 1” and “Avanti Sensor 2,” paired to slots 1 and 2 in the TCU, respectively. Each sensor is in EMG + IMU mode streaming 7 data channels:

- 1 x EMG data channel
- 3 x ACC data channels (X/Y/Z)
- 3 x GYR data channels (X/Y/Z)

Data from EMG data channels are streamed through the EMG Data port (50043) as follows:

Data value buffer from EMG Data port (50043)

EMG 1	EMG 1	No Data	…	No Data	EMG 2	EMG 2	No Data	…	No Data	EMG 3	EMG 3	No Data	…
0	1	2	3 - 14	15	16	17	18	19 - 30	31	32	33	34	35, etc.

Buffer index

Note that EMG data values are multiplexed so that consecutive samples from the same EMG channel appear every 16 data values. There are only two sensors streaming data, so the remaining data values read “0” to indicate no data.

Data from remaining non-EMG data channels are streamed through the AUX Data port (50044) as follows:

Data value buffer from AUX Data port (50044)

ACC X 1	ACC Y 1	ACC Z 1	GYR X 1	GYR X 1	GYR X 1	No Data	No Data	No Data	ACC X 1	ACC Y 1	ACC Z 1	GYR X 1	GYR Y 1	GYR Z 1	No Data	No Data	No Data	No Data	…
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19, etc.

Buffer index

Note that auxiliary data values are multiplexed so that consecutive samples from the same auxiliary channel appear every 144 data values. Note also that data from the same sensor are grouped together in blocks of nine data values; data values 0 through 8 are from Avanti Sensor 1, data values 9 through 17 are from Avanti Sensor 2, and so on.

6.1.2 Sampling Rates & Backwards Compatibility

The sampling rate of data passed through each port can be calculated as:

(Samples per frame)/(Frame interval)

The frame interval is fixed at 13.5ms (0.0135s). All data channels passing through the same port have the same sampling rates, and the sampling rate of each port will vary depending on the state of the SDK server:

With Backwards Compatibility ON: Data passed through each port is locked as follows:

Port Name	Port Number	UPSAMPLE ON		UPSAMPLE OFF	
		Sampling Rate	Sampling Period	Sampling Rate	Sampling Period
EMG Data port	50043	2000 Hz	0.0005 sec	$1111.\overline{111}$ Hz	$\frac{0.0135}{15}$ sec
AUX Data port	50044	$148.\overline{148}$ Hz	$\frac{0.0135}{2}$ sec	$148.\overline{148}$ Hz	$\frac{0.0135}{2}$ sec
Legacy EMG Data port	50041	2000 Hz	0.0005 sec	$1925.\overline{925}$ Hz	$\frac{0.0135}{26}$ sec
Legacy AUX Data port	50042	$148.\overline{148}$ Hz	$\frac{0.0135}{2}$ sec	$148.\overline{148}$ Hz	$\frac{0.0135}{2}$ sec

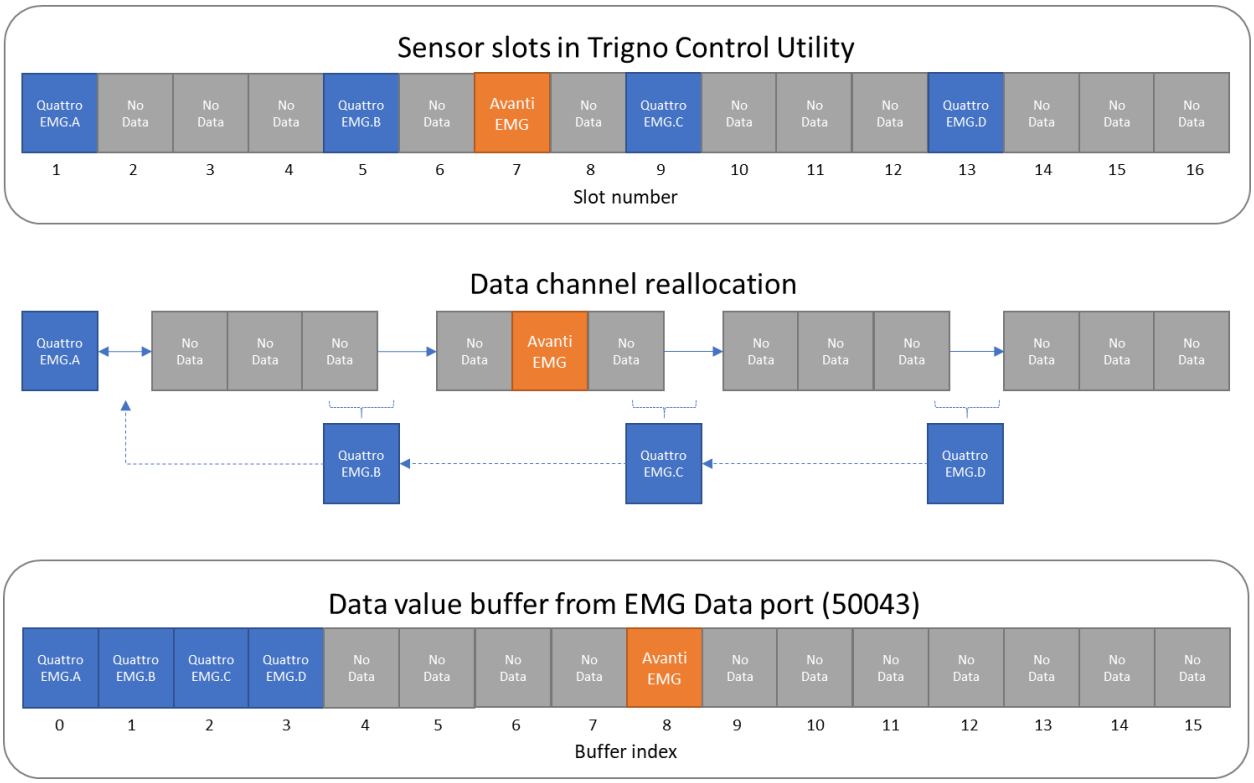
With Backwards Compatibility OFF: Data passed through each port is resampled to match the fastest sampling rate natively on that port. For instance, consider two Avanti EMG sensors, with one sensor sampling at 2222.22… Hz, and the other sampling at 2000 Hz; all data channels streamed through the EMG Data port will be resampled to the highest native sampling rate, which is 2222.22… Hz in this case.

For more information on sampling rates see the *Backwards Compatibility* and *Sensor Samples* commands.

6.1.3 Channel Allocation for Multibandwidth Sensors

Sensors with multiple EMG data channels, such as Trigno Quattro sensors, will have their EMG channels grouped together in the EMG Data port buffer. This channel reallocation can “push” data from other sensors to later positions in the SDK port buffers.

For instance, a Trigno Quattro sensor paired to slot 1 of the TCU will occupy slots 1, 5, 9, 13 (indexed from 1); after channel reallocation, the corresponding EMG data samples will appear on EMG Data port buffer channels 0, 1, 2, 3 (indexed from 0). An Avanti sensor paired in TCU slot 7 would then have its EMG data channel pushed to channel 8 in the EMG Data port buffer:



The query **"SENSOR n STARTINDEX?"** will return the index in the EMG Data port buffer of the first EMG/primary data channel for the queried sensor, where *n* is the sensor's TCU slot number. Use this query in combination with "**SENSOR n EMGCHANNELCOUNT?"** to map where EMG data channels appear in the EMG Data port buffer.

The position of auxiliary data in the AUX Data port buffer corresponds to the index of the first EMG/primary data channel as follows:

*(Index of first auxiliary data channel) = (Index of first EMG data channel) * 9*

Use this formula and the queries **"SENSOR n STARTINDEX?"** and "**SENSOR n AUXCHANNELCOUNT?"** to map where auxiliary data channels appear in the AUX Data port buffer.

Using the previous example, consider the following series of queries and replies:

Query	**Reply**	**Notes**
"SENSOR 1 STARTINDEX?"	"0"	Data from the first EMG channel of Quattro sensor 1 appears at index 0 of the EMG Data port buffer.
"SENSOR 1 EMGCHANNELCOUNT?"	"4"	Quattro sensor 1 has four EMG data channels. EMG channels from the same sensor are grouped together in the EMG Data port buffer, so EMG data from Quattro sensor 1 appears through index 0-3 of the EMG Data port buffer.

“SENSOR 7 STARTINDEX?”	“8”	Data from the first EMG channel of Avanti sensor 7 appears at index 8 of the EMG Data port buffer.
“SENSOR 7 EMGCHANNELCOUNT?”	“1”	Avanti sensor 7 has one EMG data channel; EMG data from Avanti sensor 7 appears only at index 8 of the EMG Data port buffer.
“SENSOR 7 AUXCHANNELCOUNT?”	“6”	Avanti sensor 7 has six auxiliary data channels. The first auxiliary data channel appears at index (8 * 9) = 72, and auxiliary channels from the same sensor are grouped together, so auxiliary data from Avanti sensor 7 appears through index 72-77 of the AUX Data port buffer.

6.1.4 Analog Outputs

Some Trigno base stations include two 68-pin ports, labeled “EMG 1-16” and “1-64,” which provide access to analog reconstructions of incoming Trigno sensor data. However, these analog reconstructions can only be accessed from Trigno sensors set to specific sampling rate modes:

Analog Port	**Required Sensor Sampling Rate(s)**
EMG 1-16	$1925.\overline{925}$ Hz (primary channel)
1-64	$1925.\overline{925}$ Hz (primary channel) $148.\overline{148}$ Hz (up to 3 additional channels)

Analog reconstructions of data from each Trigno sensor will be reflected on connector pins corresponding to the TCU slots occupied by each Trigno sensor. For more information, please refer to the “Using the Analog Outputs” section of the Trigno Wireless Biofeedback System User’s Guide.

6.2 Packet Structure

The TCP stream is broken into packets for commands and packetized data transfer. Each command is terminated with <CR><LF>. The end of a command packet is terminated by two consecutive <CR><LF> pairs, and the server will process all command received to this point when a two <CR><LF> pairs are received.

Control commands and replies are human-readable ASCII text, so telnet (or Hyperterminal) can be used to test communication with the server.

6.3 Control Commands

6.3.1 Protocol Version

Trigno SDK Server responds to an incoming connection by returning its version.

6.3.2 Triggers

Use query “TRIGGER?” return the state of the input and output triggers.

Use command “TRIGGER [START/STOP] [ON/OFF]” to arm or disarm start or stop input triggers.

6.3.3 Backwards Compatibility

Use query “BACKWARDS COMPATIBILITY?” to query the backwards compatibility flag. Indicates if backwards compatibility is on or off. When backwards compatibility is off , the sample rates for the EMG Data ports will scale up to the highest configured EMG sample rate, and the sample rates for the AUX Data ports will scale up to the highest configured auxiliary rate. With backwards compatibility on, the sample rates will be locked to either 2000 Hz or $1925.\overline{925}$ and $1111.\overline{111}$ Hz for EMG Data ports, and $148.\overline{148}$ Hz for auxiliary ports. See the UPSAMPLING command query for more information on sample rates in Backwards Compatibility mode.

Use command “BACKWARDS COMPATIBILITY [ON/OFF]” to set the backwards compatibility flag.

6.3.4 Upsampling

Use query “UPSAMPLING?” to query the upsampling flag. Indicates if upsampling is turned on or off. If backwards compatibility is on, when upsampling is turned on, all high frequency channels will be sampled at 2000Hz. If backwards compatibility is on and upsampling is off, EMG channels will be sampled at $1925.\overline{925}$ Hz (EMG Data) or $1111.\overline{111}$ Hz (IM EMG Data) and all AUX Data ports will be sampled at $148.\overline{148}$

If backwards compatibility is off, the upsampling flag has no effect on sample rates.

Use command “UPSAMPLE [ON/OFF]” to set the upsampling flag.

6.3.5 Max Samples EMG

Use the query “MAX SAMPLES EMG?” to query to the maximum number of samples per frame for the EMG channels.

6.3.6 Max Samples AUX

Use the query “MAX SAMPLES AUX?” to query the maximum number of samples per frame for the AUX channels.

6.3.7 Frame Interval

Use the query “FRAME INTERVAL?” to query the sampling frame interval.

6.3.8 Sensor Type

Use query “SENSOR *n* TYPE?” to query the type of a given sensor.

6.3.9 Sensor Serial

Use query “SENSOR *n* SERIAL?” to query the serial number of a given sensor.

6.3.10 Sensor Firmware

Use query “SENSOR *n* FIRMWARE?” to query the firmware version of a given sensor.

6.3.11 Sensor Pair Status

Use query “SENSOR *n* PAIRED?” to query the paired state of a given sensor. Will indicate “YES” for a paired sensor, and “NO” for an unpaired sensor.

Use command “SENSOR *n* PAIR” to pair a sensor.

6.3.12 Sensor Active Status

Use query “SENSOR n ACTIVE?” to query the active state of a given sensor. Will indicated “YES” for a currently active sensor, and “NO” for an inactive sensor.

6.3.13 Sensor EMG Channels

Use query “SENSOR n EMGCHANNELCOUNT?” to query the number of EMG channels in use on a given sensor.

6.3.14 Sensor AUX Channels

Use query “SENSOR n AUXCHANNELCOUNT?” to query the number of AUX channels in use on a given sensor

6.3.15 Sensor Start Index

Use query “SENSOR n STARTINDEX?” to query which position in the data buffer a given sensor’s first channel will appear.

6.3.16 Sensor Channels

Use query “SENSOR *n* CHANNELCOUNT?” to query the number of channels in use on a given sensor.

6.3.17 Sensor Gain

Use query “SENSOR *n* CHANNEL *m* GAIN?” to query the gain of a given channel on a given sensor.

6.3.18 Sensor Samples

Use query “SENSOR n CHANNEL m SAMPLES?” to query the native samples per frame of a given channel on a given sensor.

6.3.19 Sensor Rate

Use query “SENSOR n CHANNEL m RATES?” to query the native sample rate in Hz of a given channel on a given sensor.

6.3.20 Sensor Units

Use query “SENSOR *n* CHANNEL *m* UNITS?” to query the gain of a given channel on a given sensor.

6.3.21 Sensor Mode

Use query “SENSOR *n* MODE?” to query to current mode of a given sensor. This is the configurable mode of the sensor, most often the Accelerometer gain setting.

Use command “SENSOR *n* SETMODE *y*” to set the mode the given sensor. Mode can be set to modes 1-4.

6.3.22 Base Serial

Use query “BASE SERIAL?” to query the serial number of the connected base station.

6.3.23 Base Firmware

Use query “BASE FIRMWARE?” to query the firmware version of the connected base.

6.3.24 Data Format

Use query “ENDIANNESS?” to query the currently set endianness for the returned data.

Use command “ENDIAN BIG” to set the returned data format to big-endian.

Use command “ENDIAN LITTLE” to set the returned data format to little-endian (the default).

6.3.25 Data Collection

Use command “START” to start data collection.

Use command “STOP” to stop data collection.

6.3.26 Trigger Stop

When a stop trigger is received, the server will output the command “STOPPED”.

6.3.27 Disconnection

Use command “QUIT” to stop data collection and close the server session.

6.3.28 Version

Use query “VERSION?” to get the current version of the Trigno SDK

6.3.29 Master/Slave Connections

While the first connection to be created will default as the Master Connection, other connections can be made master instead.

Use query “MASTER” from a connection to make it master. Note that this command should only be sent when data collection is not running.

6.3.30 Set Range

Use command “SETRANGE” with arguments “LOW” or “HIGH” to configure a Trigno Avanti EMG sensor’s input range between +/-5.5mV (“LOW”) or +/-11mV (“HIGH”).

Use query “RANGE?” to query the current range setting for a Trigno Avanti sensor, where a returned value of “LOW” indicates +/-5.5mV and a returned value of “HIGH” indicates +/-11mV.

6.3.31 Set Bandwidth

Use command “SETBANDWIDTH” with arguments “NARROW” or “WIDE” to configure a Trigno Avanti sensor’s input bandwidth between 20-450HZ (“NARROW”) or 10-850Hz (“WIDE”).

Use query “BANDWIDTH?” to query the current bandwidth setting for a Trigno Avanti sensor, where a returned value of “NARROW” indicates 20-450Hz input bandwidth and a returned value of “WIDE” indicates 10-850Hz.

6.4 Control Command Replies

The server will respond “OK” to a command which is valid and has been processed.

The server will respond “INVALID COMMAND” to an unknown command or a known command with invalid data.

The server will respond “CANNOT COMPLETE” to a command which is valid, but cannot be completed due to the current state of the system (for example, a configuration command issued while data is streaming).

7 Sensor Information and Details

Several queries above refer to sensor properties such as type, mode, or channels. The full description of each sensor type with its available channels and modes are in the table below:

Description	# Type	α Type	Channels	Modes
Trigno Legacy EMG Sensor	0	A	EMG + 3 ACC	Dual Range Accelerometer (+/-1.5g, +/-6g)
Trigno Spring Contact Adapter	1	B	EMG + 3 ACC	Dual Range Accelerometer (+/-1.5g, +/-6g)
Trigno Snap Lead EMG Sensor	2	C	EMG + 3 ACC	Dual Range Accelerometer (+/-1.5g, +/-6g)
Trigno Standard EMG Sensor	3	D	EMG + 3 ACC	Quad Range Accelerometer (+/-1.5g, +/-4g, +/-6g, +/-9g)
Trigno FSR Adapter	4	E	4 Footswitch Channels	No variable mode control
Trigno EKG Biofeedback Sensor	5	F	EKG + 3 ACC	Dual Range Accelerometer (+/-1.5g, +/-6g)
Trigno Load Cell Adapter	6	G	1 Load Cell Channel	Three gain modes (506 V/V, 1015 V/V, 2025 V/V)
Trigno Goniometer Adapter	7	H	2 Goniometer Channels	Three gain modes (1813 V/V, 1413 V/V, 2221 V/V)
Trigno MiniHead Sensor	9	J	EMG + 3 ACC	Dual Range Accelerometer (+/-1.5g, +/-6g)
Trigno Analog Input Adapter	10	K	4 Analog Input Channels	No variable mode control
Trigno IM Sensor	11	L	EMG + 3 ACC + 3 GYRO + 3 MAG	Quad range IMU chip (± 2g, ±250 dps), (± 4g, ±500 dps), (± 8g, ±1000 dps), (± 2g, ±2000 dps) (dps = degrees/sec)
Trigno DR Sensor	12	M	EMG	Configurable bandwidth and gain for EMG channel: (150 V/V Gain, 20-450 Hz Bandwidth), (300 V/V, 20-450Hz), (150 V/V, 10-850HZ), (300 V/V, 10-850Hz)
Trigno Trigger Adapter	13	N	Trigger Chan	No variable mode control
Trigno Avanti Sensor	14	O	Variable, see Avanti section	Configurable bandwidth and gain for EMG channel. Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.
Trigno Quattro Sensor	16	Q	Variable, see Avanti section	Configurable bandwidth and gain for EMG channel. Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.
Trigno Galileo Sensor	17	R	Variable, see Avanti section	Configurable bandwidth and gain for EMG channel. Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.
Trigno Avanti Snap Sensor	18	--	Variable, see Avanti section	Configurable bandwidth and gain for EMG channel. Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.
Trigno Avanti Spring Contact Sensor	19	--	Variable, see Avanti section	Configurable bandwidth and gain for EMG channel. Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.
Trigno Avanti FSR Adapter	20	--	Variable, see Avanti section	Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.
Trigno Avanti EKG Sensor	21	--	Variable, see Avanti section	Configurable gain for EKG channel. Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.
Trigno Avanti Load Cell Adapter	22	--	Variable, see Avanti section	Configurable gain for load cell channel. Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.
Trigno Avanti Goniometer Adapter	23	--	Variable, see Avanti section	Configurable gain for goniometer channels. Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.
Trigno Avanti Mini Sensor	24	--	Variable, see Avanti section	Configurable bandwidth and gain for EMG channel. Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.
Trigno Avanti Analog Adapter	25	--	Variable, see Avanti section	Configurable bandwidth for Analog channel. Configurable Analog channel count (1x or 4x)
Trigno Duo Sensor	27	--	Variable, see Avanti section	Configurable bandwidth and gain for EMG channel. Configurable sensitivity for accelerometer. Configurable sensitivity for gyroscope.

7.1 Trigno Avanti/Avanti Snap/Avanti Spring/Avanti EKG/Avanti Mini Sensor Details

The Trigno Avanti sensor has a much more complex list of modes than the classic Trigno sensors. Refer to the chart below for possible "MODE" settings:

Avanti Modes Imitating Classic Modes:

Mode #	Mode Description	Data Output	Selectable Range	Selectable Bandwidth	Slot Occupancy
0	EMG plus Accelerometer (+/- 2g)	4 Channels, All Ports	☑	☑	1
1	EMG plus Accelerometer (+/- 4g)	4 Channels, All Ports	☑	☑	1
2	EMG plus Accelerometer (+/- 8g)	4 Channels, All Ports	☑	☑	1
3	EMG plus Accelerometer (+/- 16g)	4 Channels, All Ports	☑	☑	1
4	EMG plus Gyroscope (+/- 250dps)	4 Channels, All Ports	☑	☑	1
5	EMG plus Gyroscope (+/- 500dps)	4 Channels, All Ports	☑	☑	1
6	EMG plus Gyroscope (+/- 1000dps)	4 Channels, All Ports	☑	☑	1
7	EMG plus Gyroscope (+/- 2000dps)	4 Channels, All Ports	☑	☑	1
8	EMG plus IMU (+/- 2g, +/- 250dps)	10 channels	☑		1
9	EMG plus IMU (+/- 4g, +/- 250dps)	10 channels	☑		1
10	EMG plus IMU (+/- 8g, +/- 250dps)	10 channels	☑		1
11	EMG plus IMU (+/- 16g, +/- 250dps)	10 channels	☑		1
12	EMG plus IMU (+/- 2g, +/- 500dps)	10 channels	☑		1
13	EMG plus IMU (+/- 4g, +/- 500dps)	10 channels	☑		1
14	EMG plus IMU (+/- 8g, +/- 500dps)	10 channels	☑		1
15	EMG plus IMU (+/- 16g, +/- 500dps)	10 channels	☑		1
16	EMG plus IMU (+/- 2g, +/- 1000dps)	10 channels	☑		1
17	EMG plus IMU (+/- 4g, +/- 1000dps)	10 channels	☑		1
18	EMG plus IMU (+/- 8g, +/- 1000dps)	10 channels	☑		1
19	EMG plus IMU (+/- 16g, +/- 1000dps)	10 channels	☑		1
20	EMG plus IMU (+/- 2g, +/- 2000dps)	10 channels	☑		1
21	EMG plus IMU (+/- 4g, +/- 2000dps)	10 channels	☑		1
22	EMG plus IMU (+/- 8g, +/- 2000dps)	10 channels	☑		1
23	EMG plus IMU (+/- 16g, +/- 2000dps)	10 channels	☑		1
39	EMG plus Orientation	5 channels	☑		1

Avanti-Only Modes:

Mode #	Mode Description	Data Output	Selectable Range	Selectable Bandwidth	Slot Occupancy
40	EMG (2148Hz)	1 Channel, All Ports	☑	☑	1
42	EMG (1926Hz) plus ACC (74Hz, 2g)	4 Channels, All Ports	☑	☑	1

43	EMG (1926Hz) plus ACC (74Hz, 4g)	4 Channels, All Ports	☑	☑	1
44	EMG (1926Hz) plus ACC (74Hz, 8g)	4 Channels, All Ports	☑	☑	1
45	EMG (1926Hz) plus ACC (74Hz,16g)	4 Channels, All Ports	☑	☑	1
46	EMG (1926Hz) plus Gryo (74Hz, 250dps)	4 Channels, All Ports	☑	☑	1
47	EMG (1926Hz) plus Gryo (74Hz, 500dps)	4 Channels, All Ports	☑	☑	1
48	EMG (1926Hz) plus Gryo (74Hz, 1000dps)	4 Channels, All Ports	☑	☑	1
49	EMG (1926Hz) plus Gryo (74Hz, 2000dps)	4 Channels, All Ports	☑	☑	1
50	EMG (1259Hz) plus Acc (148Hz, 2g) and Gyro (148Hz, 250dps)	7 Channels	☑		1
51	EMG (1259Hz) plus Acc (148Hz, 4g) and Gyro (148Hz, 250dps)	7 Channels	☑		1
52	EMG (1259Hz) plus Acc (148Hz, 8g) and Gyro (148Hz, 250dps)	7 Channels	☑		1
53	EMG (1259Hz) plus Acc (148Hz, 16g) and Gyro (148Hz, 250dps)	7 Channels	☑		1
54	EMG (1259Hz) plus Acc (148Hz, 2g) and Gyro (148Hz, 250dps)	7 Channels	☑		1
55	EMG (1259Hz) plus Acc (148Hz, 4g) and Gyro (148Hz, 500dps)	7 Channels	☑		1
56	EMG (1259Hz) plus Acc (148Hz, 8g) and Gyro (148Hz, 500dps)	7 Channels	☑		1
57	EMG (1259Hz) plus Acc (148Hz, 16g) and Gyro (148Hz, 500dps)	7 Channels	☑		1
58	EMG (1259Hz) plus Acc (148Hz, 2g) and Gyro (148Hz, 1000dps)	7 Channels	☑		1
59	EMG (1259Hz) plus Acc (148Hz, 4g) and Gyro (148Hz, 1000dps)	7 Channels	☑		1
60	EMG (1259Hz) plus Acc (148Hz, 8g) and Gyro (148Hz, 1000dps)	7 Channels	☑		1
61	EMG (1259Hz) plus Acc (148Hz, 16g) and Gyro (148Hz, 1000dps)	7 Channels	☑		1
62	EMG (1259Hz) plus Acc (148Hz, 2g) and Gyro (148Hz, 2000dps)	7 Channels	☑		1
63	EMG (1259Hz) plus Acc (148Hz, 4g) and Gyro (148Hz, 2000dps)	7 Channels	☑		1
64	EMG (1259Hz) plus Acc (148Hz, 8g) and Gyro (148Hz, 2000dps)	7 Channels	☑		1
65	EMG (1259Hz) plus Acc (148Hz, 16g) and Gyro (148Hz, 2000dps)	7 Channels	☑		1
66	EMG (1778Hz) plus Orientation (74Hz, 16bits)	5 Channels	☑		1
67	EMG (1482Hz) plus Orientation (74Hz, 32bits)	5 Channels	☑		1
68	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 2g) and Gryo (296Hz, 250dps)	7 Channels	☑		1
69	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 4g) and Gryo (296Hz, 250dps)	7 Channels	☑		1
70	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 8g) and Gryo (296Hz, 250dps)	7 Channels	☑		1
71	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 16g) and Gryo (296Hz, 250dps)	7 Channels	☑		1
72	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 2g) and Gryo (296Hz, 500dps)	7 Channels	☑		1
73	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 4g) and Gryo (296Hz, 500dps)	7 Channels	☑		1
74	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 8g) and Gryo (296Hz, 500dps)	7 Channels	☑		1
75	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 16g) and Gryo (296Hz, 500dps)	7 Channels	☑		1
76	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 2g) and Gryo (296Hz, 1000dps)	7 Channels	☑		1
77	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 4g) and Gryo (296Hz, 1000dps)	7 Channels	☑		1
78	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 8g) and Gryo (296Hz, 1000dps)	7 Channels	☑		1
79	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 16g) and Gryo (296Hz, 1000dps)	7 Channels	☑		1
80	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 2g) and Gryo (296Hz, 2000dps)	7 Channels	☑		1
81	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 4g) and Gryo (296Hz, 2000dps)	7 Channels	☑		1
82	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 8g) and Gryo (296Hz, 2000dps)	7 Channels	☑		1
83	EMG (148Hz RMS, 100ms win) plus Acc (296Hz, 16g) and Gryo (296Hz, 2000dps)	7 Channels	☑		1
84	EMG (4370Hz)	1 Channel, All Ports	☑	☑	2
86	EMG (1259Hz) plus Acc (518Hz, 2g) and Gryo (519Hz, 250dps)	7 Channels	☑		2
87	EMG (1259Hz) plus Acc (518Hz, 4g) and Gryo (519Hz, 250dps)	7 Channels	☑		2
88	EMG (1259Hz) plus Acc (518Hz, 8g) and Gryo (519Hz, 250dps)	7 Channels	☑		2
89	EMG (1259Hz) plus Acc (518Hz, 16g) and Gryo (519Hz, 250dps)	7 Channels	☑		2
90	EMG (1259Hz) plus Acc (518Hz, 2g) and Gryo (519Hz, 500dps)	7 Channels	☑		2
91	EMG (1259Hz) plus Acc (518Hz, 4g) and Gryo (519Hz, 500dps)	7 Channels	☑		2
92	EMG (1259Hz) plus Acc (518Hz, 8g) and Gryo (519Hz, 500dps)	7 Channels	☑		2

93	EMG (1259Hz) plus Acc (518Hz, 16g) and Gryo (519Hz, 500dps)	7 Channels	☑		2
94	EMG (1259Hz) plus Acc (518Hz, 2g) and Gryo (519Hz, 1000dps)	7 Channels	☑		2
95	EMG (1259Hz) plus Acc (518Hz, 4g) and Gryo (519Hz, 1000dps)	7 Channels	☑		2
96	EMG (1259Hz) plus Acc (518Hz, 8g) and Gryo (519Hz, 1000dps)	7 Channels	☑		2
97	EMG (1259Hz) plus Acc (518Hz, 16g) and Gryo (519Hz, 1000dps)	7 Channels	☑		2
98	EMG (1259Hz) plus Acc (518Hz, 2g) and Gryo (519Hz, 2000dps)	7 Channels	☑		2
99	EMG (1259Hz) plus Acc (518Hz, 4g) and Gryo (519Hz, 2000dps)	7 Channels	☑		2
100	EMG (1259Hz) plus Acc (518Hz, 8g) and Gryo (519Hz, 2000dps)	7 Channels	☑		2
101	EMG (1259Hz) plus Acc (518Hz, 16g) and Gryo (519Hz, 2000dps)	7 Channels	☑		2
102	EMG (1259Hz) plus Acc (963Hz, 2g) and Gyro (74Hz, 250dps)	7 Channels	☑		2
103	EMG (1259Hz) plus Acc (963Hz, 4g) and Gyro (74Hz, 250dps)	7 Channels	☑		2
104	EMG (1259Hz) plus Acc (963Hz, 8g) and Gyro (74Hz, 250dps)	7 Channels	☑		2
105	EMG (1259Hz) plus Acc (963Hz, 16g) and Gyro (74Hz, 250dps)	7 Channels	☑		2
106	EMG (1259Hz) plus Acc (963Hz, 2g) and Gyro (74Hz, 500dps)	7 Channels	☑		2
107	EMG (1259Hz) plus Acc (963Hz, 4g) and Gyro (74Hz, 500dps)	7 Channels	☑		2
108	EMG (1259Hz) plus Acc (963Hz, 8g) and Gyro (74Hz, 500dps)	7 Channels	☑		2
109	EMG (1259Hz) plus Acc (963Hz, 16g) and Gyro (74Hz, 500dps)	7 Channels	☑		2
110	EMG (1259Hz) plus Acc (963Hz, 2g) and Gyro (74Hz, 1000dps)	7 Channels	☑		2
111	EMG (1259Hz) plus Acc (963Hz, 4g) and Gyro (74Hz, 1000dps)	7 Channels	☑		2
112	EMG (1259Hz) plus Acc (963Hz, 8g) and Gyro (74Hz, 1000dps)	7 Channels	☑		2
113	EMG (1259Hz) plus Acc (963Hz, 16g) and Gyro (74Hz, 1000dps)	7 Channels	☑		2
114	EMG (1259Hz) plus Acc (963Hz, 2g) and Gyro (74Hz, 2000dps)	7 Channels	☑		2
115	EMG (1259Hz) plus Acc (963Hz, 4g) and Gyro (74Hz, 2000dps)	7 Channels	☑		2
116	EMG (1259Hz) plus Acc (963Hz, 8g) and Gyro (74Hz, 2000dps)	7 Channels	☑		2
117	EMG (1259Hz) plus Acc (963Hz, 16g) and Gyro (74Hz, 2000dps)	7 Channels	☑		2
118	EMG (1259Hz) plus Acc (296Hz, 2g) and Gyro (741Hz, 250dps)	7 Channels	☑		2
119	EMG (1259Hz) plus Acc (296Hz, 4g) and Gyro (741Hz, 250dps)	7 Channels	☑		2
120	EMG (1259Hz) plus Acc (296Hz, 8g) and Gyro (741Hz, 250dps)	7 Channels	☑		2
121	EMG (1259Hz) plus Acc (296Hz, 16g) and Gyro (741Hz, 250dps)	7 Channels	☑		2
122	EMG (1259Hz) plus Acc (296Hz, 2g) and Gyro (741Hz, 500dps)	7 Channels	☑		2
123	EMG (1259Hz) plus Acc (296Hz, 4g) and Gyro (741Hz, 500dps)	7 Channels	☑		2
124	EMG (1259Hz) plus Acc (296Hz, 8g) and Gyro (741Hz, 500dps)	7 Channels	☑		2
125	EMG (1259Hz) plus Acc (296Hz, 16g) and Gyro (741Hz, 500dps)	7 Channels	☑		2
126	EMG (1259Hz) plus Acc (296Hz, 2g) and Gyro (741Hz, 1000dps)	7 Channels	☑		2
127	EMG (1259Hz) plus Acc (296Hz, 4g) and Gyro (741Hz, 1000dps)	7 Channels	☑		2
128	EMG (1259Hz) plus Acc (296Hz, 8g) and Gyro (741Hz, 1000dps)	7 Channels	☑		2
129	EMG (1259Hz) plus Acc (296Hz, 16g) and Gyro (741Hz, 1000dps)	7 Channels	☑		2
130	EMG (1259Hz) plus Acc (296Hz, 2g) and Gyro (741Hz, 2000dps)	7 Channels	☑		2
131	EMG (1259Hz) plus Acc (296Hz, 4g) and Gyro (741Hz, 2000dps)	7 Channels	☑		2
132	EMG (1259Hz) plus Acc (296Hz, 8g) and Gyro (741Hz, 2000dps)	7 Channels	☑		2
133	EMG (1259Hz) plus Acc (296Hz, 16g) and Gyro (741Hz, 2000dps)	7 Channels	☑		2
134	EMG (2370Hz) plus Orientation (222Hz, 32bits)	5 Channels	☑	☑	2
153	EMG (4000Hz) plus Acc (74Hz, 2g) and Gyro (74Hz, 250dps)	7 Channels	☑	☑	2
154	EMG (4000Hz) plus Acc (74Hz, 4g) and Gyro (74Hz, 250dps)	7 Channels	☑	☑	2
155	EMG (4000Hz) plus Acc (74Hz, 8g) and Gyro (74Hz, 250dps)	7 Channels	☑	☑	2
156	EMG (4000Hz) plus Acc (74Hz, 16g) and Gyro (74Hz, 250dps)	7 Channels	☑	☑	2
157	EMG (4000Hz) plus Acc (74Hz, 2g) and Gyro (74Hz, 500dps)	7 Channels	☑	☑	2
158	EMG (4000Hz) plus Acc (74Hz, 4g) and Gyro (74Hz, 500dps)	7 Channels	☑	☑	2
159	EMG (4000Hz) plus Acc (74Hz, 8g) and Gyro (74Hz, 500dps)	7 Channels	☑	☑	2

160	EMG (4000Hz) plus Acc (74Hz, 16g) and Gyro (74Hz, 500dps)	7 Channels	☑	☑	2
161	EMG (4000Hz) plus Acc (74Hz, 2g) and Gyro (74Hz, 1000dps)	7 Channels	☑	☑	2
162	EMG (4000Hz) plus Acc (74Hz, 4g) and Gyro (74Hz, 1000dps)	7 Channels	☑	☑	2
163	EMG (4000Hz) plus Acc (74Hz, 8g) and Gyro (74Hz, 1000dps)	7 Channels	☑	☑	2
164	EMG (4000Hz) plus Acc (74Hz, 16g) and Gyro (74Hz, 1000dps)	7 Channels	☑	☑	2
165	EMG (4000Hz) plus Acc (74Hz, 2g) and Gyro (74Hz, 2000dps)	7 Channels	☑	☑	2
166	EMG (4000Hz) plus Acc (74Hz, 4g) and Gyro (74Hz, 2000dps)	7 Channels	☑	☑	2
167	EMG (4000Hz) plus Acc (74Hz, 8g) and Gyro (74Hz, 2000dps)	7 Channels	☑	☑	2
168	EMG (4000Hz) plus Acc (74Hz, 16g) and Gyro (74Hz, 2000dps)	7 Channels	☑	☑	2
169	EMG (4000Hz) plus Orientation (74Hz, 16bits)	5 Channels	☑	☑	2
170	EMG (3740Hz) plus Orientation (74Hz, 32bits)	5 Channels	☑	☑	2

Additionally, use SETRANGE and SETBANDWIDTH to configure the sensor's flexible input range and input bandwidth (Note that not all modes support settable bandwidth)

When streaming from the Trigno Avanti sensor, all data parsing rules (sections 6.1.1, 6.1.2) apply.

7.2 Trigno Galileo and Quattro Sensor Details

The Trigno Galileo and Quattro sensors each contain 4 EMG sensing points, generating 4 channels of EMG data per sensor. All four channels will appear on the EMG ports. Please refer to section 6.1.3 regarding channel allocation. Refer to the chart below for possible "MODE" settings:

Mode #	Mode Description	Data Output	Selectable Range	Selectable Bandwidth	Slot Occupancy
245	EMG RMS x4 (222Hz) plus Acc (74Hz, 2g) and Gyro (74Hz, 250dps)	10 Channels	☑		1
246	EMG RMS x4 (222Hz) plus Acc (74Hz, 4g) and Gyro (74Hz, 250dps)	10 Channels	☑		1
247	EMG RMS x4 (222Hz) plus Acc (74Hz, 8g) and Gyro (74Hz, 250dps)	10 Channels	☑		1
248	EMG RMS x4 (222Hz) plus Acc (74Hz, 16g) and Gyro (74Hz, 250dps)	10 Channels	☑		1
249	EMG RMS x4 (222Hz) plus Acc (74Hz, 2g) and Gyro (74Hz, 500dps)	10 Channels	☑		1
250	EMG RMS x4 (222Hz) plus Acc (74Hz, 4g) and Gyro (74Hz, 500dps)	10 Channels	☑		1
251	EMG RMS x4 (222Hz) plus Acc (74Hz, 8g) and Gyro (74Hz, 500dps)	10 Channels	☑		1
252	EMG RMS x4 (222Hz) plus Acc (74Hz, 16g) and Gyro (74Hz, 500dps)	10 Channels	☑		1
253	EMG RMS x4 (222Hz) plus Acc (74Hz, 2g) and Gyro (74Hz, 1000dps)	10 Channels	☑		1
254	EMG RMS x4 (222Hz) plus Acc (74Hz, 4g) and Gyro (74Hz, 1000dps)	10 Channels	☑		1
255	EMG RMS x4 (222Hz) plus Acc (74Hz, 8g) and Gyro (74Hz, 1000dps)	10 Channels	☑		1
256	EMG RMS x4 (222Hz) plus Acc (74Hz, 16g) and Gyro (74Hz, 1000dps)	10 Channels	☑		1
257	EMG RMS x4 (222Hz) plus Acc (74Hz, 2g) and Gyro (74Hz, 2000dps)	10 Channels	☑		1
258	EMG RMS x4 (222Hz) plus Acc (74Hz, 4g) and Gyro (74Hz, 2000dps)	10 Channels	☑		1
259	EMG RMS x4 (222Hz) plus Acc (74Hz, 8g) and Gyro (74Hz, 2000dps)	10 Channels	☑		1
260	EMG RMS x4 (222Hz) plus Acc (74Hz, 16g) and Gyro (74Hz, 2000dps)	10 Channels	☑		1
261	EMG RMS x4 (222Hz) plus Orientation (74Hz, 20bits)	8 Channels	☑		1
262	EMG x4 (1111Hz)	4 Channels	☑		2
263	EMG x4 (963Hz) plus Acc (148Hz, 2g, 10bits) and Gyro (148Hz, 250dps, 10bits)	10 Channels	☑		2
264	EMG x4 (963Hz) plus Acc (148Hz, 4g, 10bits) and Gyro (148Hz, 250dps, 10bits)	10 Channels	☑		2
265	EMG x4 (963Hz) plus Acc (148Hz, 8g, 10bits) and Gyro (148Hz, 250dps, 10bits)	10 Channels	☑		2
266	EMG x4 (963Hz) plus Acc (148Hz, 16g, 10bits) and Gyro (148Hz, 250dps, 10bits)	10 Channels	☑		2

267	EMG x4 (963Hz) plus Acc (148Hz, 2g, 10bits) and Gyro (148Hz, 500dps, 10bits)	10 Channels	☑		2
268	EMG x4 (963Hz) plus Acc (148Hz, 4g, 10bits) and Gyro (148Hz, 500dps, 10bits)	10 Channels	☑		2
269	EMG x4 (963Hz) plus Acc (148Hz, 8g, 10bits) and Gyro (148Hz, 500dps, 10bits)	10 Channels	☑		2
270	EMG x4 (963Hz) plus Acc (148Hz, 16g, 10bits) and Gyro (148Hz, 500dps, 10bits)	10 Channels	☑		2
271	EMG x4 (963Hz) plus Acc (148Hz, 2g, 10bits) and Gyro (148Hz, 1000dps, 10bits)	10 Channels	☑		2
272	EMG x4 (963Hz) plus Acc (148Hz, 4g, 10bits) and Gyro (148Hz, 1000dps, 10bits)	10 Channels	☑		2
273	EMG x4 (963Hz) plus Acc (148Hz, 8g, 10bits) and Gyro (148Hz, 1000dps, 10bits)	10 Channels	☑		2
274	EMG x4 (963Hz) plus Acc (148Hz, 16g, 10bits) and Gyro (148Hz, 1000dps, 10bits)	10 Channels	☑		2
275	EMG x4 (963Hz) plus Acc (148Hz, 2g, 10bits) and Gyro (148Hz, 2000dps, 10bits)	10 Channels	☑		2
276	EMG x4 (963Hz) plus Acc (148Hz, 4g, 10bits) and Gyro (148Hz, 2000dps, 10bits)	10 Channels	☑		2
277	EMG x4 (963Hz) plus Acc (148Hz, 8g, 10bits) and Gyro (148Hz, 2000dps, 10bits)	10 Channels	☑		2
278	EMG x4 (963Hz) plus Acc (148Hz, 16g, 10bits) and Gyro (148Hz, 2000dps, 10bits)	10 Channels	☑		2
279	EMG x4 (963Hz) plus Acc (74Hz, 2g, 16bits) and Gyro (74Hz, 250dps, 16bits)	10 Channels	☑		2
280	EMG x4 (963Hz) plus Acc (74Hz, 4g, 16bits) and Gyro (74Hz, 250dps, 16bits)	10 Channels	☑		2
281	EMG x4 (963Hz) plus Acc (74Hz, 8g, 16bits) and Gyro (74Hz, 250dps, 16bits)	10 Channels	☑		2
282	EMG x4 (963Hz) plus Acc (74Hz, 16g, 16bits) and Gyro (74Hz, 250dps, 16bits)	10 Channels	☑		2
283	EMG x4 (963Hz) plus Acc (74Hz, 2g, 16bits) and Gyro (74Hz, 500dps, 16bits)	10 Channels	☑		2
284	EMG x4 (963Hz) plus Acc (74Hz, 4g, 16bits) and Gyro (74Hz, 500dps, 16bits)	10 Channels	☑		2
285	EMG x4 (963Hz) plus Acc (74Hz, 8g, 16bits) and Gyro (74Hz, 500dps, 16bits)	10 Channels	☑		2
286	EMG x4 (963Hz) plus Acc (74Hz, 16g, 16bits) and Gyro (74Hz, 500dps, 16bits)	10 Channels	☑		2
287	EMG x4 (963Hz) plus Acc (74Hz, 2g, 16bits) and Gyro (74Hz, 1000dps, 16bits)	10 Channels	☑		2
288	EMG x4 (963Hz) plus Acc (74Hz, 4g, 16bits) and Gyro (74Hz, 1000dps, 16bits)	10 Channels	☑		2
289	EMG x4 (963Hz) plus Acc (74Hz, 8g, 16bits) and Gyro (74Hz, 1000dps, 16bits)	10 Channels	☑		2
290	EMG x4 (963Hz) plus Acc (74Hz, 16g, 16bits) and Gyro (74Hz, 1000dps, 16bits)	10 Channels	☑		2
291	EMG x4 (963Hz) plus Acc (74Hz, 2g, 16bits) and Gyro (74Hz, 2000dps, 16bits)	10 Channels	☑		2
292	EMG x4 (963Hz) plus Acc (74Hz, 4g, 16bits) and Gyro (74Hz, 2000dps, 16bits)	10 Channels	☑		2
293	EMG x4 (963Hz) plus Acc (74Hz, 8g, 16bits) and Gyro (74Hz, 2000dps, 16bits)	10 Channels	☑		2
294	EMG x4 (963Hz) plus Acc (74Hz, 16g, 16bits) and Gyro (74Hz, 2000dps, 16bits)	10 Channels	☑		2
295	EMG x4 (963Hz) plus Orientation (74Hz, 28bits)	8 Channels	☑		2
296	EMG x4 (2222Hz)	4 Channels	☑	☑	4
297	EMG x4 (2000Hz) plus Acc (148Hz, 2g, 16bits) and Gyro (148Hz, 250dps, 16bits)	10 Channels	☑	☑	4
298	EMG x4 (2000Hz) plus Acc (148Hz, 4g, 16bits) and Gyro (148Hz, 250dps, 16bits)	10 Channels	☑	☑	4
299	EMG x4 (2000Hz) plus Acc (148Hz, 8g, 16bits) and Gyro (148Hz, 250dps, 16bits)	10 Channels	☑	☑	4
300	EMG x4 (2000Hz) plus Acc (148Hz, 16g, 16bits) and Gyro (148Hz, 250dps, 16bits)	10 Channels	☑	☑	4
301	EMG x4 (2000Hz) plus Acc (148Hz, 2g, 16bits) and Gyro (148Hz, 500dps, 16bits)	10 Channels	☑	☑	4
302	EMG x4 (2000Hz) plus Acc (148Hz, 4g, 16bits) and Gyro (148Hz, 500dps, 16bits)	10 Channels	☑	☑	4
303	EMG x4 (2000Hz) plus Acc (148Hz, 8g, 16bits) and Gyro (148Hz, 500dps, 16bits)	10 Channels	☑	☑	4
304	EMG x4 (2000Hz) plus Acc (148Hz, 16g, 16bits) and Gyro (148Hz, 500dps, 16bits)	10 Channels	☑	☑	4
305	EMG x4 (2000Hz) plus Acc (148Hz, 2g, 16bits) and Gyro (148Hz, 1000dps, 16bits)	10 Channels	☑	☑	4
306	EMG x4 (2000Hz) plus Acc (148Hz, 4g, 16bits) and Gyro (148Hz, 1000dps, 16bits)	10 Channels	☑	☑	4
307	EMG x4 (2000Hz) plus Acc (148Hz, 8g, 16bits) and Gyro (148Hz, 1000dps, 16bits)	10 Channels	☑	☑	4
308	EMG x4 (2000Hz) plus Acc (148Hz, 16g, 16bits) and Gyro (148Hz, 1000dps, 16bits)	10 Channels	☑	☑	4
309	EMG x4 (2000Hz) plus Acc (148Hz, 2g, 16bits) and Gyro (148Hz, 2000dps, 16bits)	10 Channels	☑	☑	4
310	EMG x4 (2000Hz) plus Acc (148Hz, 4g, 16bits) and Gyro (148Hz, 2000dps, 16bits)	10 Channels	☑	☑	4
311	EMG x4 (2000Hz) plus Acc (148Hz, 8g, 16bits) and Gyro (148Hz, 2000dps, 16bits)	10 Channels	☑	☑	4
312	EMG x4 (2000Hz) plus Acc (148Hz, 16g, 16bits) and Gyro (148Hz, 2000dps, 16bits)	10 Channels	☑	☑	4
313	EMG x4 (2000Hz) plus Orientation (74Hz, 32bits)	8 Channels	☑	☑	4
314	EMG x4 (1926Hz) plus Acc (222Hz, 2g, 16bits) and Gyro (148Hz, 250dps, 16bits)	10 Channels	☑	☑	4
315	EMG x4 (1926Hz) plus Acc (222Hz, 4g, 16bits) and Gyro (148Hz, 250dps, 16bits)	10 Channels	☑	☑	4
316	EMG x4 (1926Hz) plus Acc (222Hz, 8g, 16bits) and Gyro (148Hz, 250dps, 16bits)	10 Channels	☑	☑	4
317	EMG x4 (1926Hz) plus Acc (222Hz, 16g, 16bits) and Gyro (148Hz, 250dps, 16bits)	10 Channels	☑	☑	4
318	EMG x4 (1926Hz) plus Acc (222Hz, 2g, 16bits) and Gyro (148Hz, 500dps, 16bits)	10 Channels	☑	☑	4
319	EMG x4 (1926Hz) plus Acc (222Hz, 4g, 16bits) and Gyro (148Hz, 500dps, 16bits)	10 Channels	☑	☑	4
320	EMG x4 (1926Hz) plus Acc (222Hz, 8g, 16bits) and Gyro (148Hz, 500dps, 16bits)	10 Channels	☑	☑	4
321	EMG x4 (1926Hz) plus Acc (222Hz, 16g, 16bits) and Gyro (148Hz, 500dps, 16bits)	10 Channels	☑	☑	4
322	EMG x4 (1926Hz) plus Acc (222Hz, 2g, 16bits) and Gyro (148Hz, 1000dps, 16bits)	10 Channels	☑	☑	4

323	EMG x4 (1926Hz) plus Acc (222Hz, 4g, 16bits) and Gyro (148Hz, 1000dps, 16bits)	10 Channels	☑	☑	4
324	EMG x4 (1926Hz) plus Acc (222Hz, 8g, 16bits) and Gyro (148Hz, 1000dps, 16bits)	10 Channels	☑	☑	4
325	EMG x4 (1926Hz) plus Acc (222Hz, 16g, 16bits) and Gyro (148Hz, 1000dps, 16bits)	10 Channels	☑	☑	4
326	EMG x4 (1926Hz) plus Acc (222Hz, 2g, 16bits) and Gyro (148Hz, 2000dps, 16bits)	10 Channels	☑	☑	4
327	EMG x4 (1926Hz) plus Acc (222Hz, 4g, 16bits) and Gyro (148Hz, 2000dps, 16bits)	10 Channels	☑	☑	4
328	EMG x4 (1926Hz) plus Acc (222Hz, 8g, 16bits) and Gyro (148Hz, 2000dps, 16bits)	10 Channels	☑	☑	4
329	EMG x4 (1926Hz) plus Acc (222Hz, 16g, 16bits) and Gyro (148Hz, 2000dps, 16bits)	10 Channels	☑	☑	4
330	EMG x4 (1704Hz) plus Acc (296Hz, 2g, 16bits) and Gyro (370Hz, 250dps, 16bits)	10 Channels	☑		4
331	EMG x4 (1704Hz) plus Acc (296Hz, 4g, 16bits) and Gyro (370Hz, 250dps, 16bits)	10 Channels	☑		4
332	EMG x4 (1704Hz) plus Acc (296Hz, 8g, 16bits) and Gyro (370Hz, 250dps, 16bits)	10 Channels	☑		4
333	EMG x4 (1704Hz) plus Acc (296Hz, 16g, 16bits) and Gyro (370Hz, 250dps, 16bits)	10 Channels	☑		4
334	EMG x4 (1704Hz) plus Acc (296Hz, 2g, 16bits) and Gyro (370Hz, 500dps, 16bits)	10 Channels	☑		4
335	EMG x4 (1704Hz) plus Acc (296Hz, 4g, 16bits) and Gyro (370Hz, 500dps, 16bits)	10 Channels	☑		4
336	EMG x4 (1704Hz) plus Acc (296Hz, 8g, 16bits) and Gyro (370Hz, 500dps, 16bits)	10 Channels	☑		4
337	EMG x4 (1704Hz) plus Acc (296Hz, 16g, 16bits) and Gyro (370Hz, 500dps, 16bits)	10 Channels	☑		4
338	EMG x4 (1704Hz) plus Acc (296Hz, 2g, 16bits) and Gyro (370Hz, 1000dps, 16bits)	10 Channels	☑		4
339	EMG x4 (1704Hz) plus Acc (296Hz, 4g, 16bits) and Gyro (370Hz, 1000dps, 16bits)	10 Channels	☑		4
340	EMG x4 (1704Hz) plus Acc (296Hz, 8g, 16bits) and Gyro (370Hz, 1000dps, 16bits)	10 Channels	☑		4
341	EMG x4 (1704Hz) plus Acc (296Hz, 16g, 16bits) and Gyro (370Hz, 1000dps, 16bits)	10 Channels	☑		4
342	EMG x4 (1704Hz) plus Acc (296Hz, 2g, 16bits) and Gyro (370Hz, 2000dps, 16bits)	10 Channels	☑		4
343	EMG x4 (1704Hz) plus Acc (296Hz, 4g, 16bits) and Gyro (370Hz, 2000dps, 16bits)	10 Channels	☑		4
344	EMG x4 (1704Hz) plus Acc (296Hz, 8g, 16bits) and Gyro (370Hz, 2000dps, 16bits)	10 Channels	☑		4
345	EMG x4 (1704Hz) plus Acc (296Hz, 16g, 16bits) and Gyro (370Hz, 2000dps, 16bits)	10 Channels	☑		4
346	EMG x4 (1111Hz) plus Acc (741Hz, 2g, 16bits) and Gyro (741Hz, 250dps, 16bits)	10 Channels	☑		4
347	EMG x4 (1111Hz) plus Acc (741Hz, 4g, 16bits) and Gyro (741Hz, 250dps, 16bits)	10 Channels	☑		4
348	EMG x4 (1111Hz) plus Acc (741Hz, 8g, 16bits) and Gyro (741Hz, 250dps, 16bits)	10 Channels	☑		4
349	EMG x4 (1111Hz) plus Acc (741Hz, 16g, 16bits) and Gyro (741Hz, 250dps, 16bits)	10 Channels	☑		4
350	EMG x4 (1111Hz) plus Acc (741Hz, 2g, 16bits) and Gyro (741Hz, 500dps, 16bits)	10 Channels	☑		4
351	EMG x4 (1111Hz) plus Acc (741Hz, 4g, 16bits) and Gyro (741Hz, 500dps, 16bits)	10 Channels	☑		4
352	EMG x4 (1111Hz) plus Acc (741Hz, 8g, 16bits) and Gyro (741Hz, 500dps, 16bits)	10 Channels	☑		4
353	EMG x4 (1111Hz) plus Acc (741Hz, 16g, 16bits) and Gyro (741Hz, 500dps, 16bits)	10 Channels	☑		4
354	EMG x4 (1111Hz) plus Acc (741Hz, 2g, 16bits) and Gyro (741Hz, 1000dps, 16bits)	10 Channels	☑		4
355	EMG x4 (1111Hz) plus Acc (741Hz, 4g, 16bits) and Gyro (741Hz, 1000dps, 16bits)	10 Channels	☑		4
356	EMG x4 (1111Hz) plus Acc (741Hz, 8g, 16bits) and Gyro (741Hz, 1000dps, 16bits)	10 Channels	☑		4
357	EMG x4 (1111Hz) plus Acc (741Hz, 16g, 16bits) and Gyro (741Hz, 1000dps, 16bits)	10 Channels	☑		4
358	EMG x4 (1111Hz) plus Acc (741Hz, 2g, 16bits) and Gyro (741Hz, 2000dps, 16bits)	10 Channels	☑		4
359	EMG x4 (1111Hz) plus Acc (741Hz, 4g, 16bits) and Gyro (741Hz, 2000dps, 16bits)	10 Channels	☑		4
360	EMG x4 (1111Hz) plus Acc (741Hz, 8g, 16bits) and Gyro (741Hz, 2000dps, 16bits)	10 Channels	☑		4
361	EMG x4 (1111Hz) plus Acc (741Hz, 16g, 16bits) and Gyro (741Hz, 2000dps, 16bits)	10 Channels	☑		4

Additionally, use SETRANGE and SETBANDWIDTH to configure the sensor's flexible input range and input bandwidth (Note that not all modes support settable bandwidth)

When streaming from the Trigno Quattro and Galileo sensors, all data parsing rules (sections 6.1.1, 6.1.2) apply.

7.3 Trigno Duo Sensor Details

The Trigno Duo sensor contains 2 EMG sensing points, generating 2 channels of EMG data per sensor. Both channels will appear on the EMG ports. Please refer to section 6.1.3 regarding channel allocation. Refer to the chart below for possible "MODE" settings:

Mode #	Mode Description	Data Output	Selectable Range	Selectable Bandwidth	Slot Occupancy
172	EMG raw x2 (1111Hz)	2 Channels	☑		1
173	EMG RMS x2 (148Hz), ACC 2g (222Hz), GYRO 250dps (222Hz)	8 Channels	☑		1
174	EMG RMS x2 (148Hz), ACC 4g (222Hz), GYRO 250dps (222Hz)	8 Channels	☑		1
175	EMG RMS x2 (148Hz), ACC 8g (222Hz), GYRO 250dps (222Hz)	8 Channels	☑		1
176	EMG RMS x2 (148Hz), ACC 16g (222Hz), GYRO 250dps (222Hz)	8 Channels	☑		1
177	EMG RMS x2 (148Hz), ACC 2g (222Hz), GYRO 500dps (222Hz)	8 Channels	☑		1
178	EMG RMS x2 (148Hz), ACC 4g (222Hz), GYRO 500dps (222Hz)	8 Channels	☑		1
179	EMG RMS x2 (148Hz), ACC 8g (222Hz), GYRO 500dps (222Hz)	8 Channels	☑		1
180	EMG RMS x2 (148Hz), ACC 16g (222Hz), GYRO 500dps (222Hz)	8 Channels	☑		1
181	EMG RMS x2 (148Hz), ACC 2g (222Hz), GYRO 1000dps (222Hz)	8 Channels	☑		1
182	EMG RMS x2 (148Hz), ACC 4g (222Hz), GYRO 1000dps (222Hz)	8 Channels	☑		1
183	EMG RMS x2 (148Hz), ACC 8g (222Hz), GYRO 1000dps (222Hz)	8 Channels	☑		1
184	EMG RMS x2 (148Hz), ACC 16g (222Hz), GYRO 1000dps (222Hz)	8 Channels	☑		1
185	EMG RMS x2 (148Hz), ACC 2g (222Hz), GYRO 2000dps (222Hz)	8 Channels	☑		1
186	EMG RMS x2 (148Hz), ACC 4g (222Hz), GYRO 2000dps (222Hz)	8 Channels	☑		1
187	EMG RMS x2 (148Hz), ACC 8g (222Hz), GYRO 2000dps (222Hz)	8 Channels	☑		1
188	EMG RMS x2 (148Hz), ACC 16g (222Hz), GYRO 2000dps (222Hz)	8 Channels	☑		1
191	EMG raw x2 (2222Hz)	2 Channels	☑	☑	2
192	EMG raw x2 (1926Hz), ACC 2g (74Hz), GYRO 250dps (74Hz)	8 Channels	☑	☑	2
193	EMG raw x2 (1926Hz), ACC 4g (74Hz), GYRO 250dps (74Hz)	8 Channels	☑	☑	2
194	EMG raw x2 (1926Hz), ACC 8g (74Hz), GYRO 250dps (74Hz)	8 Channels	☑	☑	2
195	EMG raw x2 (1926Hz), ACC 16g (74Hz), GYRO 250dps (74Hz)	8 Channels	☑	☑	2
196	EMG raw x2 (1926Hz), ACC 2g (74Hz), GYRO 500dps (74Hz)	8 Channels	☑	☑	2
197	EMG raw x2 (1926Hz), ACC 4g (74Hz), GYRO 500dps (74Hz)	8 Channels	☑	☑	2
198	EMG raw x2 (1926Hz), ACC 8g (74Hz), GYRO 500dps (74Hz)	8 Channels	☑	☑	2
199	EMG raw x2 (1926Hz), ACC 16g (74Hz), GYRO 500dps (74Hz)	8 Channels	☑	☑	2

200	EMG raw x2 (1926Hz), ACC 2g (74Hz), GYRO 1000dps (74Hz)	8 Channels	☑	☑	2
201	EMG raw x2 (1926Hz), ACC 4g (74Hz), GYRO 1000dps (74Hz)	8 Channels	☑	☑	2
202	EMG raw x2 (1926Hz), ACC 8g (74Hz), GYRO 1000dps (74Hz)	8 Channels	☑	☑	2
203	EMG raw x2 (1926Hz), ACC 16g (74Hz), GYRO 1000dps (74Hz)	8 Channels	☑	☑	2
204	EMG raw x2 (1926Hz), ACC 2g (74Hz), GYRO 2000dps (74Hz)	8 Channels	☑	☑	2
205	EMG raw x2 (1926Hz), ACC 4g (74Hz), GYRO 2000dps (74Hz)	8 Channels	☑	☑	2
206	EMG raw x2 (1926Hz), ACC 8g (74Hz), GYRO 2000dps (74Hz)	8 Channels	☑	☑	2
207	EMG raw x2 (1926Hz), ACC 16g (74Hz), GYRO 2000dps (74Hz)	8 Channels	☑	☑	2
208	EMG raw x2 (1926Hz), OR 20bits (74Hz)	6 Channels	☑	☑	2
228	EMG raw x2 (1778Hz), ACC 2g (963Hz), GYRO 250dps (741Hz)	8 Channels	☑	☑	4
229	EMG raw x2 (1778Hz), ACC 4g (963Hz), GYRO 250dps (741Hz)	8 Channels	☑	☑	4
230	EMG raw x2 (1778Hz), ACC 8g (963Hz), GYRO 250dps (741Hz)	8 Channels	☑	☑	4
231	EMG raw x2 (1778Hz), ACC 16g (963Hz), GYRO 250dps (741Hz)	8 Channels	☑	☑	4
232	EMG raw x2 (1778Hz), ACC 2g (963Hz), GYRO 500dps (741Hz)	8 Channels	☑	☑	4
233	EMG raw x2 (1778Hz), ACC 4g (963Hz), GYRO 500dps (741Hz)	8 Channels	☑	☑	4
234	EMG raw x2 (1778Hz), ACC 8g (963Hz), GYRO 500dps (741Hz)	8 Channels	☑	☑	4
235	EMG raw x2 (1778Hz), ACC 16g (963Hz), GYRO 500dps (741Hz)	8 Channels	☑	☑	4
236	EMG raw x2 (1778Hz), ACC 2g (963Hz), GYRO 1000dps (741Hz)	8 Channels	☑	☑	4
237	EMG raw x2 (1778Hz), ACC 4g (963Hz), GYRO 1000dps (741Hz)	8 Channels	☑	☑	4
238	EMG raw x2 (1778Hz), ACC 8g (963Hz), GYRO 1000dps (741Hz)	8 Channels	☑	☑	4
239	EMG raw x2 (1778Hz), ACC 16g (963Hz), GYRO 1000dps (741Hz)	8 Channels	☑	☑	4
240	EMG raw x2 (1778Hz), ACC 2g (963Hz), GYRO 2000dps (741Hz)	8 Channels	☑	☑	4
241	EMG raw x2 (1778Hz), ACC 4g (963Hz), GYRO 2000dps (741Hz)	8 Channels	☑	☑	4
242	EMG raw x2 (1778Hz), ACC 8g (963Hz), GYRO 2000dps (741Hz)	8 Channels	☑	☑	4
243	EMG raw x2 (1778Hz), ACC 16g (963Hz), GYRO 2000dps (741Hz)	8 Channels	☑	☑	4

Additionally, use SETRANGE and SETBANDWIDTH to configure the sensor's flexible input range and input bandwidth (Note that not all modes support settable bandwidth)

When streaming from Trigno Duo sensors, all data parsing rules (sections 6.42, 6.4.3, 6.4.4) apply.

7.4 Trigno Avanti FSR Adapter

The Trigno Avanti FSR Adapter contains 4 FSR channels per sensor. Channel 1 will appear on EMG Data Port, while channels 2-4 will appear on the AUX port. Refer to the chart below for possible "MODE" settings:

Mode #	Mode Description	Data Output	Selectable Range	Selectable Bandwidth	Slot Occupancy
26	1 HF Chan (1926 Hz), 3 LF Chans (148 Hz)	4 Channels, All Ports			1
244	SIG raw x4 (519Hz)	4 Channels			1
362	SIG raw x4 (296Hz), ACC 2g (148Hz), GYRO 250dps (148Hz)	10 Channels			1
363	SIG raw x4 (296Hz), ACC 4g (148Hz), GYRO 250dps (148Hz)	10 Channels			1
364	SIG raw x4 (296Hz), ACC 8g (148Hz), GYRO 250dps (148Hz)	10 Channels			1
365	SIG raw x4 (296Hz), ACC 16g (148Hz), GYRO 250dps (148Hz)	10 Channels			1
366	SIG raw x4 (296Hz), ACC 2g (148Hz), GYRO 500dps (148Hz)	10 Channels			1
367	SIG raw x4 (296Hz), ACC 4g (148Hz), GYRO 500dps (148Hz)	10 Channels			1
368	SIG raw x4 (296Hz), ACC 8g (148Hz), GYRO 500dps (148Hz)	10 Channels			1
369	SIG raw x4 (296Hz), ACC 16g (148Hz), GYRO 500dps (148Hz)	10 Channels			1
370	SIG raw x4 (296Hz), ACC 2g (148Hz), GYRO 1000dps (148Hz)	10 Channels			1
371	SIG raw x4 (296Hz), ACC 4g (148Hz), GYRO 1000dps (148Hz)	10 Channels			1
372	SIG raw x4 (296Hz), ACC 8g (148Hz), GYRO 1000dps (148Hz)	10 Channels			1
373	SIG raw x4 (296Hz), ACC 16g (148Hz), GYRO 1000dps (148Hz)	10 Channels			1
374	SIG raw x4 (296Hz), ACC 2g (148Hz), GYRO 2000dps (148Hz)	10 Channels			1
375	SIG raw x4 (296Hz), ACC 4g (148Hz), GYRO 2000dps (148Hz)	10 Channels			1
376	SIG raw x4 (296Hz), ACC 8g (148Hz), GYRO 2000dps (148Hz)	10 Channels			1
377	SIG raw x4 (296Hz), ACC 16g (148Hz), GYRO 2000dps (148Hz)	10 Channels			1
378	SIG raw x4 (370Hz), OR 32 bits (74Hz)	8 Channels			1
346	SIG raw x4 (1111Hz), ACC 2g (741Hz), GYRO 250dps (741Hz)	10 Channels			4
347	SIG raw x4 (1111Hz), ACC 4g (741Hz), GYRO 250dps (741Hz)	10 Channels			4
348	SIG raw x4 (1111Hz), ACC 8g (741Hz), GYRO 250dps (741Hz)	10 Channels			4
349	SIG raw x4 (1111Hz), ACC 16g (741Hz), GYRO 250dps (741Hz)	10 Channels			4
350	SIG raw x4 (1111Hz), ACC 2g (741Hz), GYRO 500dps (741Hz)	10 Channels			4
351	SIG raw x4 (1111Hz), ACC 4g (741Hz), GYRO 500dps (741Hz)	10 Channels			4
352	SIG raw x4 (1111Hz), ACC 8g (741Hz), GYRO 500dps (741Hz)	10 Channels			4
353	SIG raw x4 (1111Hz), ACC 16g (741Hz), GYRO 500dps (741Hz)	10 Channels			4
354	SIG raw x4 (1111Hz), ACC 2g (741Hz), GYRO 1000dps (741Hz)	10 Channels			4
355	SIG raw x4 (1111Hz), ACC 4g (741Hz), GYRO 1000dps (741Hz)	10 Channels			4
356	SIG raw x4 (1111Hz), ACC 8g (741Hz), GYRO 1000dps (741Hz)	10 Channels			4
357	SIG raw x4 (1111Hz), ACC 16g (741Hz), GYRO 1000dps (741Hz)	10 Channels			4
358	SIG raw x4 (1111Hz), ACC 2g (741Hz), GYRO 2000dps (741Hz)	10 Channels			4
359	SIG raw x4 (1111Hz), ACC 4g (741Hz), GYRO 2000dps (741Hz)	10 Channels			4
360	SIG raw x4 (1111Hz), ACC 8g (741Hz), GYRO 2000dps (741Hz)	10 Channels			4
361	SIG raw x4 (1111Hz), ACC 16g (741Hz), GYRO 2000dps (741Hz)	10 Channels			4

7.5 Trigno Avanti Load Cell Adapter

The Trigno Avanti Load Cell Adapter contains 1 Load Cell channel per sensor. Refer to the chart below for possible “MODE” settings:

Mode #	Mode Description	Data Output	Selectable Range	Selectable Bandwidth	Slot Occupancy
50	SIG raw (1259 Hz), ACC 2g (148 Hz), GYRO 250 dps (148 Hz)	7 Channels	☑		1
51	SIG raw (1259 Hz), ACC 4g (148 Hz), GYRO 250 dps (148 Hz)	7 Channels	☑		1
52	SIG raw (1259 Hz), ACC 8g (148 Hz), GYRO 250 dps (148 Hz)	7 Channels	☑		1

53	SIG raw (1259 Hz), ACC 16g (148 Hz), GYRO 250 dps (148 Hz)	7 Channels	☑		1
54	SIG raw (1259 Hz), ACC 2g (148 Hz), GYRO 500 dps (148 Hz)	7 Channels	☑		1
55	SIG raw (1259 Hz), ACC 4g (148 Hz), GYRO 500 dps (148 Hz)	7 Channels	☑		1
56	SIG raw (1259 Hz), ACC 8g (148 Hz), GYRO 500 dps (148 Hz)	7 Channels	☑		1
57	SIG raw (1259 Hz), ACC 16g (148 Hz), GYRO 500 dps (148 Hz)	7 Channels	☑		1
58	SIG raw (1259 Hz), ACC 2g (148 Hz), GYRO 1000 dps (148 Hz)	7 Channels	☑		1
59	SIG raw (1259 Hz), ACC 4g (148 Hz), GYRO 1000 dps (148 Hz)	7 Channels	☑		1
60	SIG raw (1259 Hz), ACC 8g (148 Hz), GYRO 1000 dps (148 Hz)	7 Channels	☑		1
61	SIG raw (1259 Hz), ACC 16g (148 Hz), GYRO 1000 dps (148 Hz)	7 Channels	☑		1
62	SIG raw (1259 Hz), ACC 2g (148 Hz), GYRO 2000 dps (148 Hz)	7 Channels	☑		1
63	SIG raw (1259 Hz), ACC 4g (148 Hz), GYRO 2000 dps (148 Hz)	7 Channels	☑		1
64	SIG raw (1259 Hz), ACC 8g (148 Hz), GYRO 2000 dps (148 Hz)	7 Channels	☑		1
65	SIG raw (1259 Hz), ACC 16g (148 Hz), GYRO 2000 dps (148 Hz)	7 Channels	☑		1
67	SIG raw (1482 Hz), OR 32 bits (74 Hz)	5 Channels	☑		1
41	SIG raw (2222 Hz)	1 Channel	☑		1
0	SIG raw (1926 Hz), ACC 2g (148 Hz)	4 Channels, All Ports	☑		1
1	SIG raw (1926 Hz), ACC 4g (148 Hz)	4 Channels, All Ports	☑		1
2	SIG raw (1926 Hz), ACC 8g (148 Hz)	4 Channels, All Ports	☑		1
3	SIG raw (1926 Hz), ACC 8g (148 Hz)	4 Channels, All Ports	☑		1

7.6 Trigno Avanti Goniometer Adapter

The Trigno Avanti Goniometer Adapter contains 2 goniometer channels per sensor. Channel 1 will appear on the EMG port, while channel 2 will appear on the AUX port. Refer to the chart below for possible "MODE" settings:

Mode #	Mode Description	Data Output	Selectable Range	Selectable Bandwidth	Slot Occupancy
362	SIG raw x2 (296Hz), ACC 2g (148Hz), GYRO 250dps (148Hz)	8 Channels	☑		1
363	SIG raw x2 (296Hz), ACC 4g (148Hz), GYRO 250dps (148Hz)	8 Channels	☑		1
364	SIG raw x2 (296Hz), ACC 8g (148Hz), GYRO 250dps (148Hz)	8 Channels	☑		1
365	SIG raw x2 (296Hz), ACC 16g (148Hz), GYRO 250dps (148Hz)	8 Channels	☑		1
366	SIG raw x2 (296Hz), ACC 2g (148Hz), GYRO 500dps (148Hz)	8 Channels	☑		1
367	SIG raw x2 (296Hz), ACC 4g (148Hz), GYRO 500dps (148Hz)	8 Channels	☑		1
368	SIG raw x2 (296Hz), ACC 8g (148Hz), GYRO 500dps (148Hz)	8 Channels	☑		1
369	SIG raw x2 (296Hz), ACC 16g (148Hz), GYRO 500dps (148Hz)	8 Channels	☑		1
370	SIG raw x2 (296Hz), ACC 2g (148Hz), GYRO 1000dps (148Hz)	8 Channels	☑		1
371	SIG raw x2 (296Hz), ACC 4g (148Hz), GYRO 1000dps (148Hz)	8 Channels	☑		1
372	SIG raw x2 (296Hz), ACC 8g (148Hz), GYRO 1000dps (148Hz)	8 Channels	☑		1
373	SIG raw x2 (296Hz), ACC 16g (148Hz), GYRO 1000dps (148Hz)	8 Channels	☑		1
374	SIG raw x2 (296Hz), ACC 2g (148Hz), GYRO 2000dps (148Hz)	8 Channels	☑		1
375	SIG raw x2 (296Hz), ACC 4g (148Hz), GYRO 2000dps (148Hz)	8 Channels	☑		1
376	SIG raw x2 (296Hz), ACC 8g (148Hz), GYRO 2000dps (148Hz)	8 Channels	☑		1
377	SIG raw x2 (296Hz), ACC 16g (148Hz), GYRO 2000dps (148Hz)	8 Channels	☑		1
378	SIG raw x2 (370Hz), OR 32 bits (74Hz)	6 Channels	☑		1
26	1 HF Chan (1926 Hz), 1 LF Chans (148 Hz)	2 Channels, All Ports	☑		1
244	SIG raw x2 (519Hz)	2 Channels, All Ports	☑		1

7.7 Trigno Avanti Analog Adapter

The Trigno Avanti Analog Input Adapter contains up to 4 analog channels per sensor. Channel 1 will appear on the EMG port, while channels 2-4 will appear on the AUX port. Refer to the chart below for possible "MODE" settings:

Mode #	Mode Description	Data Output	Selectable Range	Selectable Bandwidth	Slot Occupancy
362	SIG raw x4 (296Hz), ACC 2g (148Hz), GYRO 250dps (148Hz), Low Bandwidth	10 Channels			1
363	SIG raw x4 (296Hz), ACC 4g (148Hz), GYRO 250dps (148Hz), Low Bandwidth	10 Channels			1
364	SIG raw x4 (296Hz), ACC 8g (148Hz), GYRO 250dps (148Hz), Low Bandwidth	10 Channels			1
365	SIG raw x4 (296Hz), ACC 16g (148Hz), GYRO 250dps (148Hz), Low Bandwidth	10 Channels			1
366	SIG raw x4 (296Hz), ACC 2g (148Hz), GYRO 500dps (148Hz), Low Bandwidth	10 Channels			1
367	SIG raw x4 (296Hz), ACC 4g (148Hz), GYRO 500dps (148Hz), Low Bandwidth	10 Channels			1
368	SIG raw x4 (296Hz), ACC 8g (148Hz), GYRO 500dps (148Hz), Low Bandwidth	10 Channels			1
369	SIG raw x4 (296Hz), ACC 16g (148Hz), GYRO 500dps (148Hz), Low Bandwidth	10 Channels			1
370	SIG raw x4 (296Hz), ACC 2g (148Hz), GYRO 1000dps (148Hz), Low Bandwidth	10 Channels			1
371	SIG raw x4 (296Hz), ACC 4g (148Hz), GYRO 1000dps (148Hz), Low Bandwidth	10 Channels			1
372	SIG raw x4 (296Hz), ACC 8g (148Hz), GYRO 1000dps (148Hz), Low Bandwidth	10 Channels			1
373	SIG raw x4 (296Hz), ACC 16g (148Hz), GYRO 1000dps (148Hz), Low Bandwidth	10 Channels			1
374	SIG raw x4 (296Hz), ACC 2g (148Hz), GYRO 2000dps (148Hz), Low Bandwidth	10 Channels			1
375	SIG raw x4 (296Hz), ACC 4g (148Hz), GYRO 2000dps (148Hz), Low Bandwidth	10 Channels			1
376	SIG raw x4 (296Hz), ACC 8g (148Hz), GYRO 2000dps (148Hz), Low Bandwidth	10 Channels			1
377	SIG raw x4 (296Hz), ACC 16g (148Hz), GYRO 2000dps (148Hz), Low Bandwidth	10 Channels			1
378	SIG raw x4 (370Hz), OR 32 bits (74Hz), Low Bandwidth	8 Channels			1
244	SIG raw x4 (519Hz), Low Bandwidth	4 Channels			1
262	SIG raw x4 (1111Hz), Low Bandwidth	4 Channels			2
296	SIG raw x4 (2222Hz)	4 Channels		☑	4
50	SIG raw (1259 Hz), ACC 2g (148 Hz), GYRO 250 dps (148 Hz), Low Bandwidth	7 Channels			1
51	SIG raw (1259 Hz), ACC 4g (148 Hz), GYRO 250 dps (148 Hz), Low Bandwidth	7 Channels			1
52	SIG raw (1259 Hz), ACC 8g (148 Hz), GYRO 250 dps (148 Hz), Low Bandwidth	7 Channels			1
53	SIG raw (1259 Hz), ACC 16g (148 Hz), GYRO 250 dps (148 Hz), Low Bandwidth	7 Channels			1
54	SIG raw (1259 Hz), ACC 2g (148 Hz), GYRO 500 dps (148 Hz), Low Bandwidth	7 Channels			1
55	SIG raw (1259 Hz), ACC 4g (148 Hz), GYRO 500 dps (148 Hz), Low Bandwidth	7 Channels			1
56	SIG raw (1259 Hz), ACC 8g (148 Hz), GYRO 500 dps (148 Hz), Low Bandwidth	7 Channels			1
57	SIG raw (1259 Hz), ACC 16g (148 Hz), GYRO 500 dps (148 Hz), Low Bandwidth	7 Channels			1
58	SIG raw (1259 Hz), ACC 2g (148 Hz), GYRO 1000 dps (148 Hz), Low Bandwidth	7 Channels			1
59	SIG raw (1259 Hz), ACC 4g (148 Hz), GYRO 1000 dps (148 Hz), Low Bandwidth	7 Channels			1
60	SIG raw (1259 Hz), ACC 8g (148 Hz), GYRO 1000 dps (148 Hz), Low Bandwidth	7 Channels			1
61	SIG raw (1259 Hz), ACC 16g (148 Hz), GYRO 1000 dps (148 Hz), Low Bandwidth	7 Channels			1
62	SIG raw (1259 Hz), ACC 2g (148 Hz), GYRO 2000 dps (148 Hz), Low Bandwidth	7 Channels			1
63	SIG raw (1259 Hz), ACC 4g (148 Hz), GYRO 2000 dps (148 Hz), Low Bandwidth	7 Channels			1
64	SIG raw (1259 Hz), ACC 8g (148 Hz), GYRO 2000 dps (148 Hz), Low Bandwidth	7 Channels			1
65	SIG raw (1259 Hz), ACC 16g (148 Hz), GYRO 2000 dps (148 Hz), Low Bandwidth	7 Channels			1
67	SIG raw (1482 Hz), OR 32 bits (74 Hz), Low Bandwidth	5 Channels			1
41	SIG raw (2222Hz)	1 Channel		☑	1
423	SIG raw (4444Hz)	1 Channel		☑	2
26	SIG raw x4 (1926 Hz-148Hz), Low Bandwidth	4 Channels			1

8 Appendix I: Command/Query Reference Table

QUERY	DESCRIPTION	EXAMPLE	EXAMPLE REPLY
"SENSOR *n* TYPE?"	Returns the type of the sensor *n* in letter form.	"SENSOR 1 TYPE?"	"A"
"SENSOR *n* CHANNELCOUNT?"	Returns the number of active channels on sensor *n*	"SENSOR 1 CHANNELCOUNT?"	"4"
"SENSOR n EMGCHANNELCOUNT?"	Returns the number of active EMG channels on sensor n	"SENSOR 1 EMGCHANNELCOUNT?"	"4"
"SENSOR n AUXCHANNELCOUNT?"	Returns the number of active auxiliary channels on sensor n	"SENSOR 1 AUXCHANNELCOUNT?	"6"
"SENSOR n STARTINDEX?"	Returns the position in the data the first channel will appear on sensor n	"SENSOR 1 STARTINDEX?"	"1"
"SENSOR *n* MODE?"	Returns the configurable mode state of sensor *n*	"SENSOR 1 MODE?"	"MODE 1 (1.5g)"
"SENSOR n CHANNEL m SAMPLES?"	Returns the native samples per frame on channel m of sensor n	"SENSOR 1 CHANNEL 1 SAMPLES?"	"26"
"SENSOR n CHANNEL m RATE?"	Returns the native sample rate in Hz of channel m of sensor n	"SENSOR 1 CHANNEL 1 RATE?"	"1777.77777778"
"SENSOR *n* CHANNEL *m* GAIN?"	Returns the gain on channel *m* of sensor *n*	"SENSOR 1 CHANNEL 1 GAIN?"	"300"
"SENSOR *n* CHANNEL *m* UNITS?"	Returns the units on channel *m* of sensor *n*	"SENSOR 1 CHANNEL 1 UNITS?"	"Volts"
"SENSOR *n* FIRMWARE?"	Returns the firmware version of sensor *n*	"SENSOR 1 FIRMWARE?	"30-06"
"SENSOR *n* SERIAL?"	Returns the serial number of sensor *n*	"SENSOR 1 SERIAL?"	"SID-1234"
"SENSOR *n* PAIRED?"	Returns yes or no, indicating sensor *n* is paired	"SENSOR 1 PAIRED?"	"YES"

“SENSOR n ACTIVE?”	Returns yes or no, indicated sensor n is active	“SENSOR 1 ACTIVE?”	“YES”
“TRIGGER?”	Returns status of both start and stop trigger	“TRIGGER?”	“START ON STOP OFF” “START OFF STOP OFF”
“BACKWARDS COMPATIBILITY?”	Returns whether backwards compatibility on is currently enabled. With backwards compatibility on, the EMG Data ports will be locked to 1926/1111 Hz or 2000 Hz (see Upsampling command).	“BACKWARDS COMPATIBILITY?”	“YES”
“UPSAMPLING?”	Returns upsampling setting. By default upsampling is turned on and the EMG channel will be upsampled to 2000Hz for all sensors if backwards compatibility is enabled.	“UPSAMPLING?”	“UPSAMPLING OFF”
“FRAME INTERVAL?”	Returns the Trigno System frame interval, which is the length in time between frames.	“FRAME INTERVAL?”	“0.0135”
“MAX SAMPLES EMG?”	Returns the expected maximum samples per frame for EMG channels. Divide by the frame interval to get expected EMG sample rate	“MAX SAMPLES EMG?”	“27”
“MAX SAMPLES AUX?”	Returns the expected maximum samples per frame for AUX channels. Divide by the frame interval to get the expected AUX samples rate.	“MAX SAMPLES AUX?”	“4”
“ENDIANNESS?”	Returns the currently set endianness for the streaming data. Reply	“ENDIANNESS?”	“LITTLE” “BIG”

	indicates big endianness (data streams in big-endian format), or little endianness (data streams in little-endian format).		
"BASE FIRMWARE?"	Returns the firmware version of the connected Trigno Base Station	"BASE FIRMWARE?"	"Firmware: MA2902-BE1500-DS0801-US2001-DA0900"
"BASE SERIAL?"	Returns the serial number of the connected Trigno Base Station"	"BASE SERIAL"	"BID: 0222"
"MASTER?"	Queries whether current connection is Master	"MASTER?"	"YES"
"SLAVE"	Queries whether current connection is Slave	"SLAVE?"	"NO"
COMMAND	DESCRIPTION	EXAMPLE	EXAMPLE REPLY
"SENSOR *n* PAIR"	Places the requested sensor number in pair mode, allowing user to complete the pairing process by turning on a sensor and holding down the button.	"SENSOR 1 PAIR"	"PAIR INITIATED, PRESS AND HOLD SENSOR BUTTON TO COMPLETE PAIR" After pair is complete: "SENSOR 1 PAIR COMPLETE"
"SENSOR *n* SETMODE"	Sets the configurable mode of the currently paired sensor	"SENSOR 1 SETMODE 2"	"Sensor 1 set to MODE 2"
"TRIGGER [START/STOP] [ON/OFF]"	Configures the triggers	"TRIGGER START ON" "TRIGGER STOP OFF"	"OK"
"BACKWARDS COMPATIBILITY [ON/OFF]"	Turns backwards compatibility mode on or off. When backwards compatibility mode is off, sample rates scale dynamically up to the highest rate. Otherwise, sample rates are locked by port (See UPSAMPLE command).	"BACKWARDS COMPATIBILITY ON"	"OK"

“UPSAMPLE [ON/OFF]”	Turns upsampling on or off for the EMG channel of all sensors. By default, upsampling is turned on, and the EMG channels will be upsampled to 2000Hz. Only applies when Backwards Compatibility mode is on.	“UPSAMPLE OFF”	“OK”
“ENDIAN [BIG/LITTLE]”	Sets the endianness of the streaming data.	“ENDIAN BIG” “ENDIAN LITTLE”	“OK”
“START”	Starts data collection. The SDK server will respond once communication with hardware is complete.	“START”	“OK”
“STOP”	Stops data collection. The SDK server will respond once communication with the hardware is complete.	“STOP”	“OK”
“MASTER”	Sets current connection as master, making all connections slave.	“MASTER”	“NEW MASTER”
“QUIT”	Stops data collection and closes the server session.	“QUIT”	“BYE”