KMS CAN Bus

Interface Manual

Firmware Version 1.3.0

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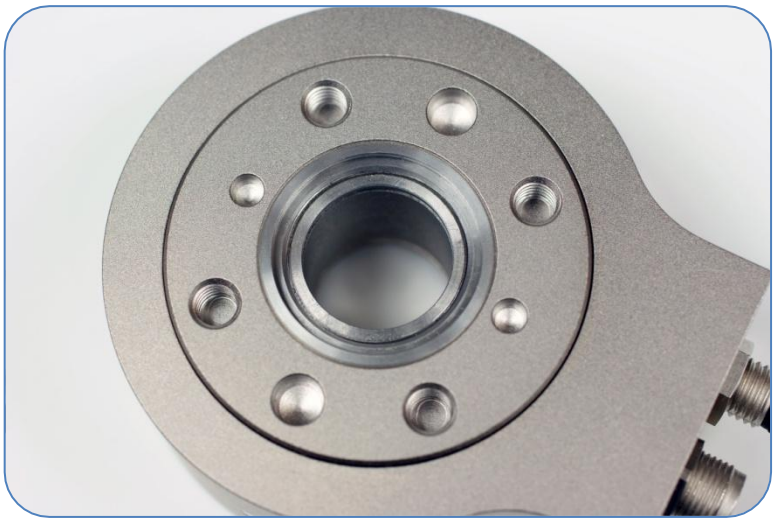

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1 Introduction

The KMS family of Force/Torque Sensors can be controlled by a number of interfaces using different command sets. While the Ethernet based interface and the RS-232 serial line interface provide a text-based command set, the optional CAN Bus interface uses a binary protocol adapted to the 8-byte payload of the CAN Bus message format. This manual gives a detailed explanation of the command set provided by the CAN Bus interface. For the other interfaces, please refer to the "KMS Command Set Reference Manual".

2 Using the CAN Bus Interface

To use the CAN Bus interface, the sensor must first be configured. Connect the KMS via Ethernet to the local network or directly to your computer's network interface and point your favorite web browser to the sensor's IP address, e.g. by typing the default **http://192.168.1.30** into the address bar and pressing "Enter". After the page has loaded, choose "*Settings -> Command Interface"* from the menu to configure the default interface.
To use the CAN Bus interface, select "CAN" from the list of available interfaces. Also select the bit rate to be used for the CAN Bus connection and the communication ID to be used to address the sensor. Press the "Apply" button to save all settings.
The sensor will now listen for incoming messages with the given communication ID.

The communication ID set here will be used as Base ID for the sensor's response messages.

3 Protocol Description

The sensor supports a basic CAN Bus protocol that can be used to read the measured force/torque values and to tare the sensor. To execute a command (e.g. read data or tare sensor), a request message must be sent to the sensor. This request message must have a payload of 1 byte which represents the so-called *request message identifier*. This identifier indicates the command that should be executed by the sensor. The sensor will submit response messages containing the requested data if applicable.
The following section describes the request and response messages in detail.

The Base ID referred to in the following command description corresponds to the CAN Bus communication ID set in the interface configuration in chapter 2.

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3.1 Acquire 32-bit Sensor Data

Request Message

To acquire 32-bit sensor data, the message identifier of the request message must be set to 0x01.

Message ID	Message Length	Byte No.	Value	Description
Base ID	1 byte	0	0x01	Request Message Identifier

Response Messages

The sensor returns four messages containing the currently measured force and torque data in N or Nm respectively and a sequence number that is incremented with each request. The message ID depends on the sensor's communication ID.

Message ID	Message Length	Byte No.	Value
Base ID + 1	8 bytes	0..3	F_x – Force in x direction, 32-bit signed integer format, in 1/1000 N
		4..7	M_x – Torque in x direction, 32-bit signed integer format, in 1/1000 Nm
Base ID + 2	8 bytes	0..3	F_y – Force in y direction, 32-bit signed integer format, in 1/1000 N
		4..7	M_y – Torque in y direction, 32-bit signed integer format, in 1/1000 Nm
Base ID + 3	8 bytes	0..3	F_z – Force in z direction, 32-bit signed integer format, in 1/1000 N
		4..7	M_z – Torque in z direction, 32-bit signed integer format, in 1/1000 Nm
Base ID + 4	8 bytes	0..3	reserved
		4..7	Sequence number, 32-bit unsigned integer format

3.2 Acquire 16-bit Sensor Data

Request Message

To acquire 16-bit sensor data, the message identifier of the request message must be set to 0x02.

Message ID	Message Length	Byte No.	Value	Description
Base ID	1 byte	0	0x02	Request Message Identifier

Response Messages

The sensor returns two messages containing the currently measured force and torque data in N or Nm respectively and a sequence number that is incremented with each request.

Message ID	Message Length	Byte No.	Value
Base ID + 5	8 bytes	0..1	F_x – Force in x direction, 16-bit signed integer format, in 1/100 N
		2..3	M_x – Torque in x direction, 16-bit signed integer format, in 1/100 Nm
		4..5	F_y – Force in y direction, 16-bit signed integer format, in 1/100 N
		6..7	M_y – Torque in y direction, 16-bit signed integer format, in 1/100 Nm
Base ID + 6	8 bytes	0..1	F_z – Force in z direction, 16-bit signed integer format, in 1/100 N
		2..3	M_z – Torque in z direction, 16-bit signed integer format, in 1/100 Nm
		4..5	reserved
		6..7	Sequence number, 16-bit unsigned integer format

3.3 Tare the Sensor

Request Message Identifier

To tare the sensor, the message identifier of the request message must be set to 0x04.

Message ID	Message Length	Byte No.	Value	Description
Base ID	1 byte	0	0x04	Request Message Identifier

Response Message

No response data submitted.

4 Demo Program “KMS CAN Sample”

Weiss Robotics provides a simple demo program for MS Windows that can be used to evaluate the CAN Bus interface. To connect the sensor’s CAN Bus interface to a computer, a USB to CAN Bus dongle must be used. The program only supports dongles provided by ESD[1].

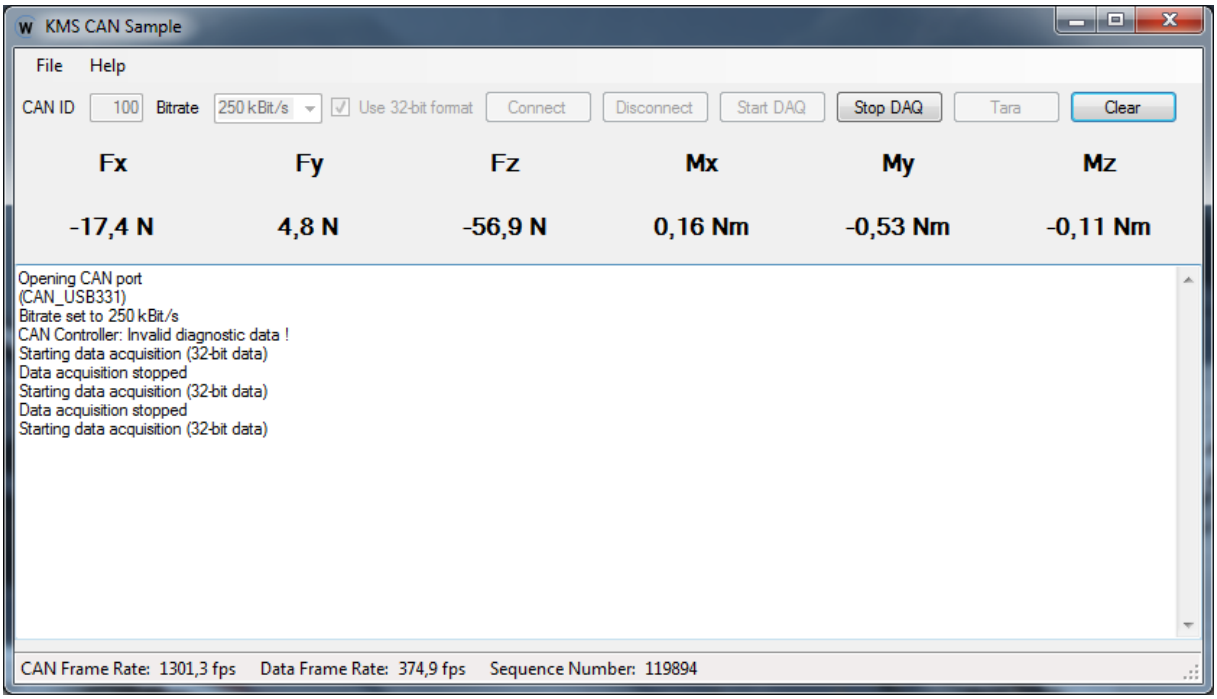
The demo program can be found on the Product CD or downloaded from the sensor’s web interface by choosing “Help”-> “Documentation” from the menu.

Before installing the software, please make sure your ESD CAN Bus driver is properly installed and working. Unzip the archive to a folder of your choice and run “setup.exe”. The installer will then check your system for an installed version of the Microsoft .NET Runtime Environment 4.0 or higher. If this runtime environment is not found on your system, the installer will attempt to download it from the Internet.

After the installation, the software will start immediately. Now connect the sensor to the ESD CAN Bus dongle. Adjust CAN ID and bitrate to your sensor’s settings and click “Connect”. The program will now try to initialize the CAN driver. If the driver could be initialized, click “Start DAQ” to acquire data from the sensor.

To tare the sensor, the data acquisition must be stopped by clicking “Stop DAQ”. Then click “Tara” to tare the sensor. Afterwards, the data acquisition can be restarted again.

[1] https://esd.eu



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